

Venturi Throat Type Angle Control Valves

Model HAV

Introduction

Model HAV venturi throat type angle control valves are compact, high-performance control valves designed for heavy-duty 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 ANSI Standards. The actuator, integrated with simplest mechanisms, utilizes a compact yet powerful diaphragm actuator loaded with multiple springs.

Standard specifications

Body

Type : Single-seat, cast angle valve

Nominal size : 1", 1½", 2", 2½", 3", 4", 5", 6"

Pressure rating :

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

End connection : Flanged end; FF, RF, RJ

Material : For body/trim material combinations and operating temperature ranges, refer to Table 1, page 2.

Bonnet :

- Plain bonnet (0°C to +200°C)
- Extension bonnet (-50°C to 0°C and 200°C to 425°C)
- Bellows type (For operating temperature and pressure range, refer to Fig. 2, page 3.)

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 Teflon or Teflon yarn packing is used.
- Grease provided; When asbestos yarn, Teflon impregnated asbestos yarn, asbestos yarn with graphite, or graphite packing is used.

Gasket : Type; Flat type, saw-tooth type
Material; Carbon steel (S15C), stainless steel (SUS316, SUS316L, SUS329J1), copper, aluminum

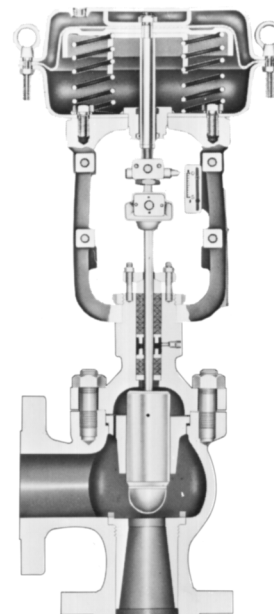
Trim

Valve plug :

- Single-seated, contoured-type plug (For flow characteristics, refer to Fig. 1, page 3.)
- Metal seat; Equal percentage (%C), Linear (LC)

Material : For body/trim material combinations and operating temperature ranges, refer to Table 1, page 2.

Note) For fluid conditions that require Stellite armoring, refer to Fig. 3, page 3.



Actuator

Type :

- Single-acting diaphragm actuator (Type HA or Type VA5)
- Single-acting piston actuator (Type VA6)

Action : Direct or reverse action

Diaphragm :

- Type HA; Cloth-embedded ethylene propylene rubber
- Type VA; Cloth-embedded chloroprene rubber

Spring range :

- 0.2~1.0kgf/cm² {20~98kPa}, 0.8~2.4kgf/cm² {80~240kPa} (Type HA)
- 0.2~1.0kgf/cm² {20~98kPa}, 0.4~2.0kgf/cm² {40~200kPa} (VA5 Type)
- 1.9~4.0kgf/cm² {190~390kPa} (Type VA6)

Air supply pressure :

- Diaphragm actuator; 1.4~3.0kgf/cm² {140~290kPa} (Type HA), 1.4~2.8kgf/cm² {140~270kPa} (Type VA5)
- Piston actuator; 5.0kgf/cm² {490kPa} (Type VA6)

Air connection : Rc¼ or ¼NPT internal thread

Note) With Type VA, Rc¼ adapter or ¼NPT adapter is provided on Rc½ internal thread Rc¾ adapter is also available).

Ambient temperature : -30°C to +70°C

Valve action

Direct action (Direct-action actuator is combined.)

Reverse action (Reverse-action actuator is combined.)

Optional accessories

Positioner*, pressure regulator with filter, manual operating device*, limit switch, solenoid valve, motion transmitter, volume booster, air lock relay, and others

Notes 1) For the optional items, refer to the specification sheets and installation drawings of respective valves.

2) Accessories with an asterisk mark (*) are selected from among the following types, depending on the actuators to be combined.

Actuator	Positioner		Manual handwheel	
	P/P	I/P	Top	Side
HA1	VPE	HEP	THM	—
HA2~4	HTP	HEP	THM	SHM
VA5	HTP	HEP	THM	SHM
VA6	VPP	HEP	—	SHM

Additional specifications (by special order)

- Special inspection
Flow characteristics inspection, material inspection (MILL sheet), nondestructive inspection, steam inspection, low-temperature inspection.
- Double gland
- Steam jacket
- Oil/water prohibitive treatment
- Copper prohibitive treatment
- Approval by high-pressure gas control law
- SUS304 atmosphere-exposed nuts and bolts
- Special air piping and joint
- Sand-/dust-preventive measures
- Saline damage countermeasures
- Cold-area use specifications
- Tropical-area use specifications
- Vacuum service

Performance

Rated Cv value : Refer to Table 2, page 3.

Flow characteristics : Refer to Fig. 1, page 3.

Inherent rangeability : 30 : 1

Permissible differential pressure : Refer to Table 3, page 4.

Seat leakage rate (percent to rated Cv value) :

- Metal seat;

Standard

ANSI Class IV (B16.104-1976) - Leakage less than 0.01% or less

Optional

Leakage less than 0.001% or less

Hysteresis error :

Without positioner : Within 3% FS (Within 5% FS)

With positioner; Within 1% FS

Linearity :

Without positioner; Within $\pm 5\%$ FS

With positioner; Within $\pm 1\%$ FS

(VPE : Within $\pm 3\%$ FS

HEP : Within $\pm 2\%$ FS)

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

2) Parenthesized figures are applicable to Type HA1.

Face-to-face dimensions : Refer to Table 4, page 4, and

Fig. 4, page 5.

External dimensions : Refer to Fig. 4 and Table 5, page 5.

Weight : Refer to Table 6, page 6.

Finish : Grayish green (Munsell 5B4/1) or silver, or other specified colors.

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

Body material / Trim material		JIS	FC 200	SCPH2	SCPH21	SCS13	SCS14
		ASTM	A126Gr.A	A216WCB	A217WC6	A351CF8	A351CF8M
JIS	SUS316		0~+200	-5~+300	—	-50~+300	-50~+300
AISI	316						
JIS	SUS316L		—	—	—	-50~+300	-50~+300
AISI	316L						
JIS	SUS440C		—	-5~+425	-5~+425	—	—
AISI	440C						
JIS	SUS316 Stellite armoring		—	-5~+425	-5~+425	-50~+425※	-50~+425※
AISI	316 Stellite armoring						
JIS	SUS316 Full-surface Stellite armoring		—	-5~+425	-5~+425	-50~+425※	-50~+425※
AISI	SUS316 Full-surface Stellite armoring						
JIS	SUS316L Stellite armoring		—	—	—	-50~+425※	-50~+425※
AISI	316L Stellite armoring						

Notes 1) Columns bordered with solid line" " denote values applicable to standard body/trim combination.

2) ASTM Specifications indicate materials equivalent to those designated by JIS.

3) When high-pressure gas control law is applied, maximum operating temperatures for temperature ranges marked with asterisks (*) are +350°C.

Table 2. Cv value and travel

Nominal size (inch)	1						1½		2		2½		3		4		5		6								
Port size (inch)	—	—	—	—	—	—	¾	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								

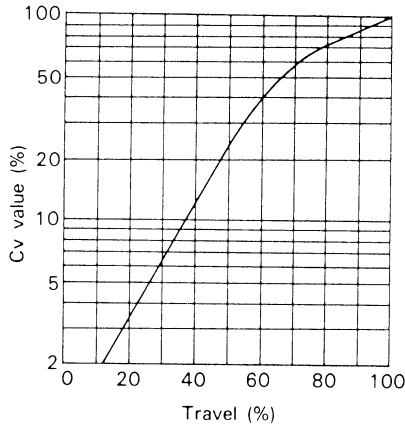


Figure 1-1 Equal percentage characteristics (%C : Metal seat)

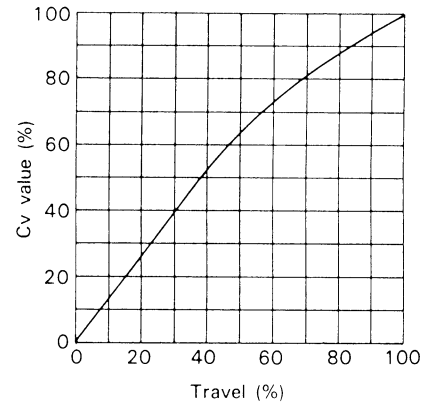


Figure 1-2 Linear characteristics (LC : Metal seat)

Figure 1. Flow characteristics

Note) The above graphs indicate typical flow characteristics.

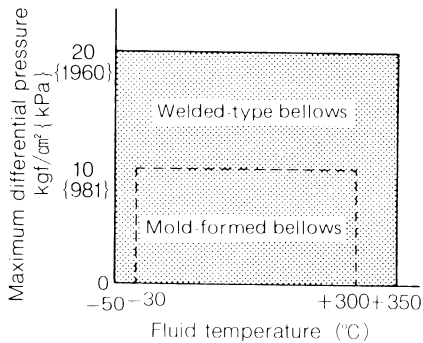


Figure 2. Operating temperature and pressure range of bellows-type bonnet

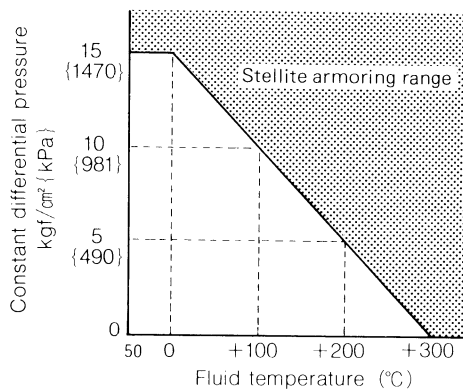
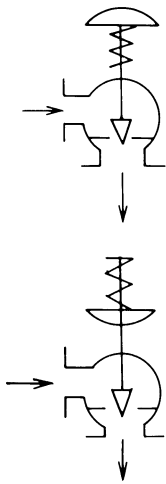


Figure 3. Temperature/constant differential pressure ranges requiring Stellite armoring

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

Table 3. Permissible differential pressure

**With Type HA or Type VA actuator
Direct action (Air-to-close) and Reverse action (Air-to-open)**



Actuator model No.	Supply air pressure (kgf/cm ²) {kPa}	Spring range (kgf/cm ²) {kPa}	Positioner	Differential pressure (by port size (inch))											kgf/cm ² {kPa}		
				Cv1.6 Cv1.0	Cv2.5	Cv.6.3 Cv.4.0	¾ Cv11	1	1¼	1½	2	2½	3	4	5		
HA1D,R	1.4 {140}	0.2~1.0 {20~98}	△	40.0 {3920}	33.7 {3300}	20.8 {2040}	20.8 {2040}	11.3 {1110}	5.2 {510}	3.5 {340}	—	—	—	—	—	—	—
	3.0 {290}	0.8~2.4 {80~240}	○	40.0 {3920}	40.0 {3920}	40.0 {3920}	40.0 {3920}	22.6 {2220}	10.4 {1020}	7.0 {690}	—	—	—	—	—	—	—
HA2D,R	1.4 {140}	0.2~1.0 {20~98}	△	40.0 {3920}	40.0 {3920}	40.0 {3920}	40.0 {3920}	21.9 {2150}	10.1 {990}	6.8 {670}	4.1 {400}	2.5 {240}	1.8 {180}	—	—	—	—
	2.8 {270}	0.8~2.4 {80~240}	○	40.0 {3920}	40.0 {3920}	40.0 {3920}	40.0 {3920}	20.1 {1970}	13.7 {1340}	8.2 {800}	5.0 {490}	3.6 {350}	—	—	—	—	—
HA3D,R	1.4 {140}	0.2~1.0 {20~98}	△	—	—	—	—	—	17.9 {1760}	12.1 {1190}	7.2 {710}	4.5 {440}	3.2 {310}	1.8 {180}	1.2 {120}	—	—
	2.8 {270}	0.8~2.4 {80~240}	○	—	—	—	—	—	35.7 {3500}	24.2 {2370}	14.5 {1420}	8.9 {870}	6.4 {630}	3.6 {350}	2.3 {220}	—	—
HA4D,R	1.4 {140}	0.2~1.0 {20~98}	△	—	—	—	—	—	30.9 {3030}	20.9 {2050}	12.5 {1220}	7.7 {760}	5.6 {550}	3.1 {300}	2.0 {200}	—	—
	2.8 {270}	0.8~2.4 {80~240}	○	—	—	—	—	—	40.0 {3920}	40.0 {3920}	25.0 {2450}	15.4 {1420}	11.1 {1090}	6.2 {660}	4.0 {390}	—	—
HA5D,R	1.4 {140}	0.2~1.0 {20~98}	△	—	—	—	—	—	—	—	16.0 {1570}	10.0 {981}	7.5 {740}	4.2 {410}	2.7 {260}	—	—
	2.8 {270}	0.4~2.0 {40~200}	○	—	—	—	—	—	—	—	32.0 {3140}	21.0 {2060}	15.0 {1470}	8.5 {830}	5.4 {530}	—	—
VA6R※	5.0 {490}	1.9~4.0 {190~390}	○	—	—	—	—	—	—	—	—	—	—	—	—	9.1 {890}	5.8 {570}

- Notes 1) Columns bordered with solid lines ("□") denote types provided with standard-type actuators.
 2) ○ : Positioner is necessary. △ : Can be operated either with or without positioner.
 3) Exercise care not to cause the maximum permissible differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981 or JIS B2201-1984.
 4) * : Only reverse action for VA6R.

Table 4. Face-to-face dimensions

(Unit:mm)

Nominal size (inch)	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
1	92	98	98	105
1½	111	117	117	125
2	127	133	133	143
2½	138	146	146	156
3	149	159	159	168
4	176	184	184	197
5	202	213	213	229
6	225	237	237	254

Nominal size (inch)	A (mm)				
	ANSI 150RJ JPI 150RJ	ANSI 300RJ JPI 300RJ	ANSI 600RJ JPI 600RJ	ANSI 300LG JPI 300LG	ANSI 600LG JPI 600LG
1	98	105	105	105	105
1½	117	124	125	124	125
2	133	141	144	141	144
2½	144	154	157	154	157
3	156	167	170	167	170
4	183	192	198	192	198
5	208	221	230	221	230
6	232	244	256	244	256

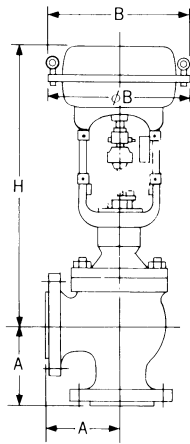


Figure 4-1. When Type HA actuator is provided

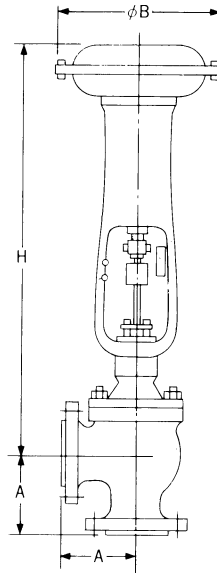


Figure 4-2. When Type VA5 actuator is provided

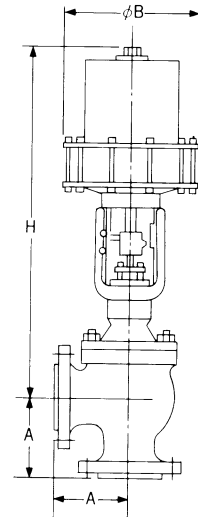


Figure 4-3. When Type VA6 actuator is provided

Figure 4. Face-to-face and external dimensions

Table 5. External dimensions

(Unit:mm)

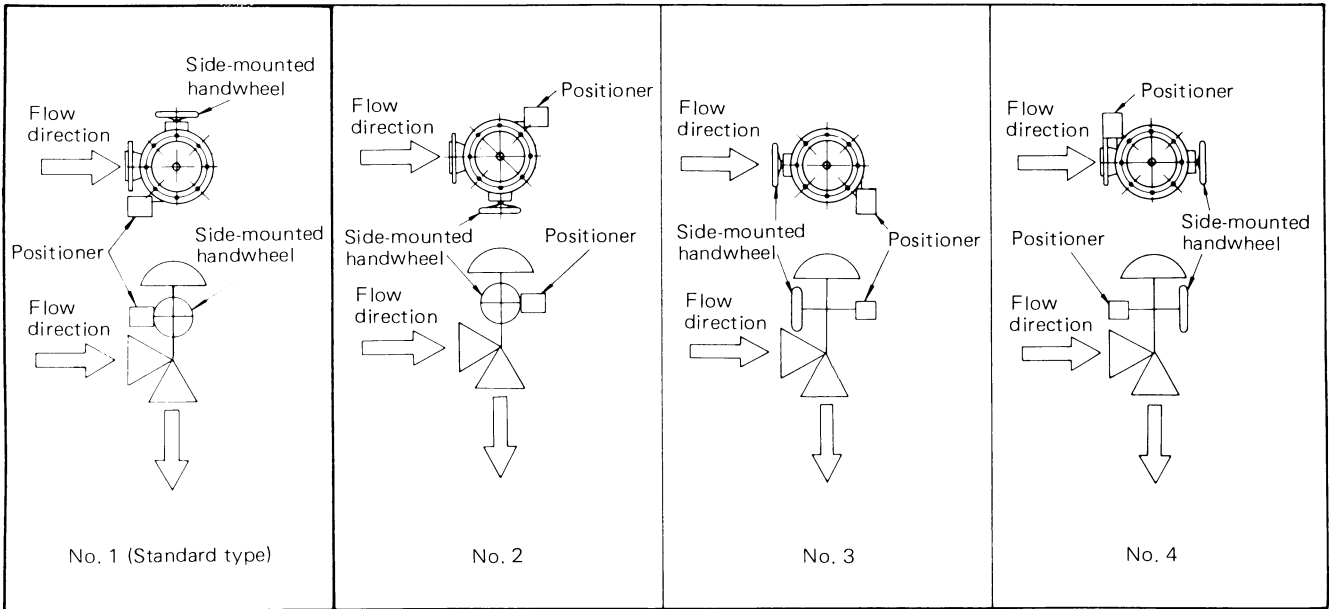
Nominal size (inch)	Actuator model No.	H			B	φ B
		Plain bonnet	Extension bonnet	Bellows type bonnet		
1	HA 1D, R	390	545	545	230	218
	HA 2D, R	465	620	—	281	267
1½	HA 1D, R	400	550	560	230	218
	HA 2D, R	475	625	—	281	267
	HA 3D, R	580	730	—	363	350
	HA 4D, R	830	975	—	520	470
2	HA 1D, R	400	550	560	230	218
	HA 2D, R	475	625	—	281	267
	HA 3D, R	580	730	—	363	350
	HA 4D, R	835	980	—	520	470
2½	HA 2D, R	545	695	765	281	267
	HA 3D, R	600	750	—	363	350
	HA 4D, R	840	990	—	520	470
	VA 5D	1225	1375	—	—	620
	VA 5R	1335	1485	—	—	620
3	HA 2D, R	555	705	775	281	267
	HA 3D, R	610	760	—	363	350
	HA 4D, R	840	990	—	520	470
	VA 5D	1225	1375	—	—	620
	VA 5R	1335	1485	—	—	620
4	HA 2D, R	555	710	775	281	267
	HA 3D, R	610	765	—	363	350
	HA 4D, R	845	995	—	520	470
	VA 5D	1230	1380	—	—	620
	VA 5R	1340	1490	—	—	620
5	HA 3D, R	700	850	990	363	350
	HA 4D, R	865	1015	—	520	470
	VA 5D	1255	1405	—	—	620
	VA 5R	1365	1515	—	—	620
	VA 6R	1110	1260	—	—	445
6	HA 3D, R	720	870	1005	363	350
	HA 4D, R	885	1035	—	520	470
	VA 5D	1275	1425	—	—	620
	VA 5R	1385	1535	—	—	620
	VA 6R	1130	1280	—	—	445

Note) H " dimensions are applicable when a handwheel is not provided. When top-mounted handwheel HA or VA actuators or side-mounted handwheel VA6R or VP actuators are used, add the handwheel dimensions designated in respective specification sheets.
(No. SS2-8213-0500 for Type HA ; No. SS2-8210-0100 and No. SS2-8210-0400 for Type VA ; No. SS2-8210-0300 for Type VP).

Table 6. Weight

(Unit : kg)

Nominal size (inch)	Actuator Model No.	FF, RF, RTJ, LG						SW, BW	
		JIS10K, ANSI125, 150 JPI125, 150		JIS16, 20, 30K ANSI300 JPI300		JIS40K ANSI600 JPI600		JIS10~40K JPI150~600 ANSI150~600	
		Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet
1	HA1D, R	22	27	23	26	24	27	22	25
	HA2D, R	29	34	30	33	31	34	29	32
1½	HA1D, 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	HA1D, 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
	VA6R	300	313	325	338	405	418	355	368
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
	VA6R	370	385	400	415	520	535	460	475



Notes: 1) Indicate by position No. when installation other than by the standard type is required.

2) With Type VA 6R and Type VP actuators, the side mounted handwheels are mounted on the same side as the positioners.

Figure 5 . Pipe installation positions

Ordering Information

When ordering, please specify;

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

Specifications are subject to change without notice.

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