

Three Way Control Valves

Model AMT

OVERVIEW

The valve model AMT is a three-way control valve for diverting and mixing service.

The actuator employed is of a multispring type and has a small-sized, high-output diaphragm motor with an extremely simplified operating mechanism.

It is used for the heat control of heat converters, etc.

SPECIFICATIONS

Model: AMT (Mixing service three-way valve)

Body

Type

Three-way cast globe valve

Nominal size

1, 1½, 2, 2½, 3, 4, 5, 6 inches

Pressure rating

- JIS 10K, 20K, 30K
- ANSI Class 150, 300
- JPI Class 150, 300

End connection: Flanged end

Connection type	Pressure rating	Applicable standard
FF	JIS10K	JIS B2210-1984
	ANSI Class 150	ANSI B16.5-1981
	JPI Class 150	JPI-7S-15-1993
RF	JIS10K, 20K, 30K	JIS B2210-1984
	ANSI Class 150, 300	ANSI B16.5-1981
	JPI Class 150, 300	JPI-7S-15-1993

Material

SCPH2, SCS13A, SCS14A

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

Bonnet

- Plain bonnet (-17 to +230°C)
- Extension bonnet (+230 to +350°C)

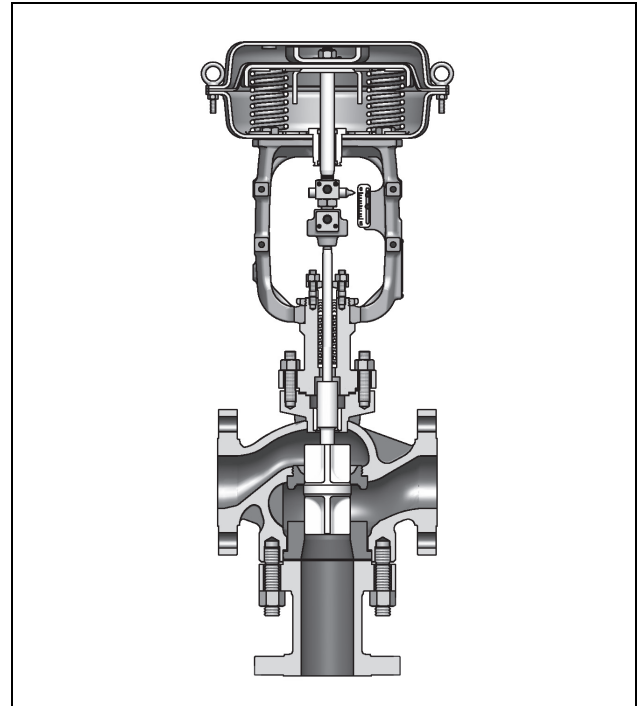
Note) Take care not to exceed the operating temperature ranges specified for respective materials.

Gland type

Bolted gland

Packing / grease

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



- Grease provided; When graphite, or graphite packing is used.

Note) PTFE: Polytetrafluoroethylene.

Gasket

Type; serrated type

Material; SUS316, SUS316 (PTFE)

Trim

Valve plug

Three-way, V-port with linear characteristics (LV)

Material: SUS316 (SCS14), SUS316L (SCS16)

SUS316 (SCS14) stellite,
SUS316L (SCS16) stellite

Note) 1) Parenthesized codes denote symbol displays of valve plug.

2) For fluid conditions requiring stellite, refer to Figure 1.

Actuator

Type: Single acting diaphragm actuator (Type PSA1, HA)

Action: Direct or reverse action

Diaphragm: Cloth embedded ethylene propylene rubber

Spring range: 20 to 98 kPa {0.2 to 1.0 kgf/cm²}
80 to 240 kPa {0.8 to 2.4 kgf/cm²}

Supply pressure:

120 to 340 kPa {1.2 to 3.5 kgf/cm²}

Note) Spring range varies depending on allowable differential pressure and air supply pressure.

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

Ambient temperature: -30 to +70°C

Valve action

Air fail bottom open (Direct action actuator is combined.)

Air fail bottom close (Reverse action actuator is combined.)

For relations between the valve action and the flow direction, refer to Table 3.

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 drawings of respective accessories.

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

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

Additional specification (by special order)

- Special inspection
Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection.
- Double gland
- Oil/water free treatment
- Copper free treatment
- Stainless steel (SUS304) atmosphere-exposed nuts and bolts.
- Special air piping and joints
- Sand-/dust preventive measure
- Saline damage countermeasures
- Cold-proof specifications
- Tropical proof specifications
- Vacuum service

Performance

Rated Cv value: Refer to Table 2.

Inherent rangeability: 30 : 1

Allowable differential pressure

Refer to Table 4 and Table 5.

Leakage specification

IEC 60534-4:2006 or JIS B 2005-4:2008

- Metal seat

Standard

Class IV: Leakage less than 0.01% of maximum valve capacity.

Hysteresis error

Without positioner: Within 3% F.S. (Within 5% F.S.)

With positioner: Within 1% F.S.

Linearity

Without positioner: Within ± 5% F.S.

With positioner: Within ± 1% F.S.

(model VPE: ± 3% F.S., model HEP: ± 2% F.S.)

Note) 1) When positioner is not provided, operating performance may vary depending on type of packings used.

2) Parenthesized figures are applicable to type PSA1.

Dimensions

Refer to Figure 4 and Table 8.

Weight

Refer to Table 9.

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	SCS 13A	SCS 14A
		ASTM	A216WCB	A351 CF8	A351 CF8M
JIS	SCS316 (SUS14)		-5 to 300	-17 to 300	-17 to 300
JIS	SUS316L (SCS16A)		-	-17 to 300	-17 to 300
JIS	SUS316 Stellite (SCS14 Stellite)		-5 to 350	-17 to 350	-17 to 350
JIS	SUS316L Stellite (SCS16A Stellite)		-	-17 to 350	-17 to 350

Note) 1) “

2) Parenthesized codes denote symbol displays of valve plug.

Table 2 Cv value and travel

Nominal size (inches)	1		1½	2	2½	3	4	5	6
Port size (inches)	¾	1	1½	2	2½	3	4	5	6
Rated Cv value	6.3	10	23	40	63	90	160	250	360
Rated travel (mm)	14.3		25		38			50	

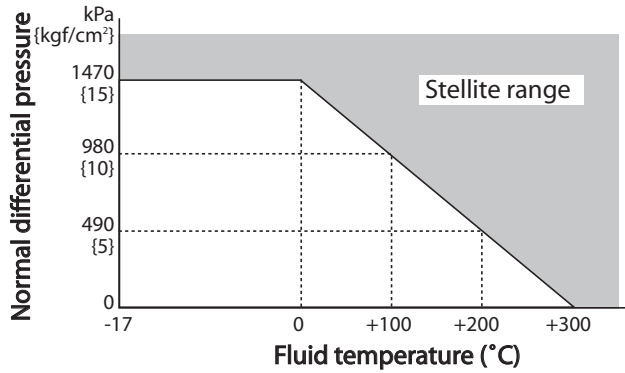


Figure 1 Temperature / normal differential pressure ranges requiring stellite

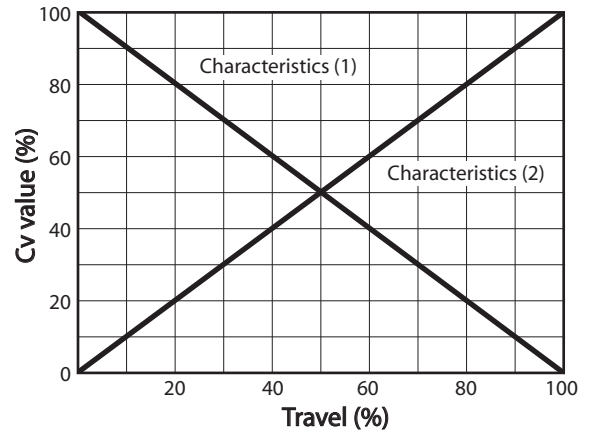


Figure 2 Flow characteristics

Note) When cavitation, flushing service, oil free treatment service, or retention of valve closing performance is required, stellite is recommended regardless of temperature and differential pressure.

Note) This graph indicates ideal flow rate characteristics.

Table 3 Flow rate characteristics and flow direction

Body structure	service	Flow rate characteristics	Actuator	Valve action	Flow direction
AMT	Mixing	Characteristics (1): A→AB Characteristics (2): B→AB	Direct action	Figure 3. a	B→AB
			Reverse action	Figure 3. b	A→AB
	Diverting	Characteristics (1): AB→A Characteristics (2): AB→B	Direct action	Figure 3. c	AB→B
			Reverse action	Figure 3. d	AB→A

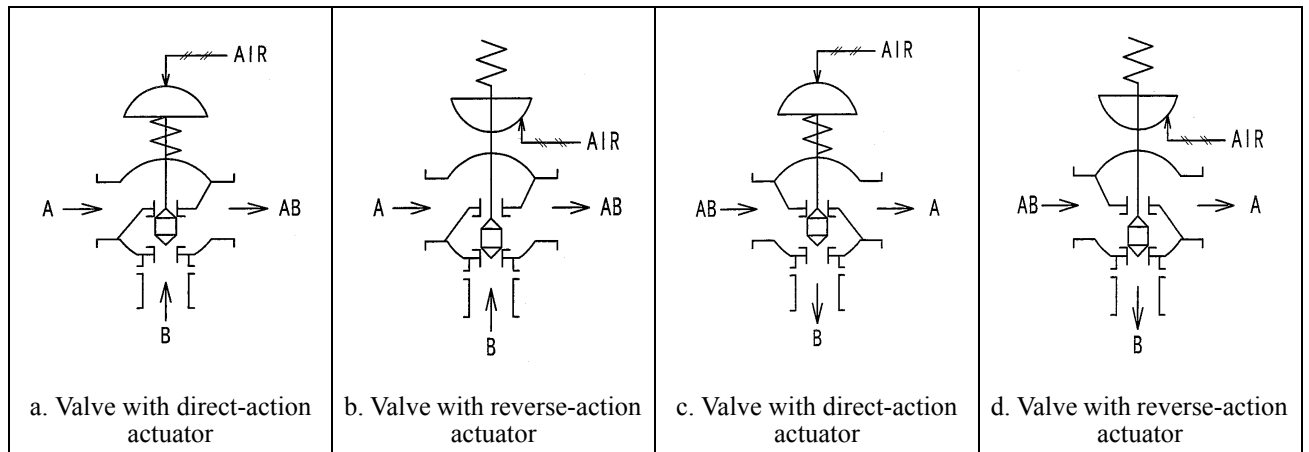
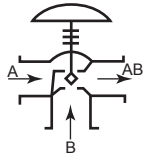


Figure 3 Valve action

Allowable differential pressure

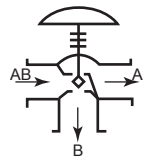
PTFE packing

Table 4 Mixing service by AMT



Actuator model no.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure [by port size (inches)] kPa {kgf/cm ² }									
				3/4	1	1½	2	2½	3	4	5	6	
PSA1D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	410 {4.2}	250 {2.6}	170 {1.7}	98 {1.0}	—	—	—	—	—	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	2880 {29.4}	1780 {18.1}	1210 {12.3}	720 {7.3}	—	—	—	—	—	
HA2D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	790 {8.1}	490 {5.0}	330 {3.4}	200 {2.0}	120 {1.2}	90 {0.9}	50 {0.5}	—	—	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3480 {35.5}	2300 {23.5}	1390 {14.2}	860 {8.8}	620 {6.3}	340 {3.5}	—	—	
HA3D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	—	—	590 {6.0}	350 {3.6}	220 {2.2}	160 {1.6}	90 {0.9}	50 {0.5}	40 {0.4}	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	—	—	3920 {40.0}	2480 {25.3}	1530 {15.3}	1100 {11.2}	620 {6.3}	390 {4.0}	270 {2.8}	
HA4D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	—	—	—	—	370 {3.8}	260 {2.7}	150 {1.5}	98 {1.0}	60 {0.6}	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	2650 {27.0}	1900 {19.4}	1070 {10.9}	690 {7.0}	470 {4.8}	

Table 5 Diverting service by AMT

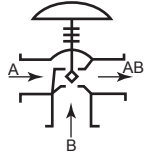


Actuator model no.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure [by port size (inches)] kPa {kgf/cm ² }									
				3/4	1	1½	2	2½	3	4	5	6	
PSA1D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	410 {4.2}	250 {2.6}	170 {1.7}	98 {1.0}	—	—	—	—	—	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	820 {8.4}	510 {5.2}	340 {3.5}	200 {2.1}	—	—	—	—	—	
HA2D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	790 {8.1}	490 {5.0}	330 {3.4}	200 {2.0}	120 {1.2}	90 {0.9}	50 {0.5}	—	—	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	1600 {16.3}	990 {10.1}	670 {6.8}	390 {4.0}	240 {2.5}	180 {1.8}	98 {1.0}	—	—	
HA3D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	—	—	590 {6.0}	350 {3.6}	220 {2.2}	160 {1.6}	90 {0.9}	50 {0.5}	40 {0.4}	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	—	—	1180 {12.0}	710 {7.2}	430 {4.4}	310 {3.2}	180 {1.8}	110 {1.1}	80 {0.8}	
HA4D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	Δ	—	—	—	—	370 {3.8}	260 {2.7}	150 {1.5}	98 {1.0}	60 {0.6}	
	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	760 {7.7}	540 {5.5}	300 {33.1}	200 {2.0}	130 {1.3}	

- Note) 1) ✓ Positioner is necessary
 Δ: Can be operated either with or without positioner.
 2) Table 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.

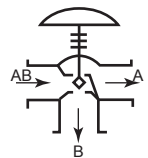
Graphite packing "P6610CH+P6528" (+230 to 350°C)

Table 6 Mixing service by AMT



Actuator model no.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure [by port size (inches)] kPa {kgf/cm ² }								
				3/4	1	1½	2	2½	3	4	5	6
HA2D, R	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	3920	2660	1800	1070	660	470	260	—	—
{39.9}				{27.1}	{18.3}	{10.9}	{6.7}	{4.7}	{2.6}	—	—	
HA3D, R				—	—	3200	1910	1180	850	470	300	210
				{32.6}	{19.4}	{12.0}	{8.6}	{4.7}	{3.0}	{2.1}		
HA4D, R				—	—	—	—	2150	1550	870	540	380
								{21.9}	{15.8}	{8.8}	{5.5}	{3.8}

Table 7 Diverting service by AMT



Actuator model no.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure [by port size (inches)] kPa {kgf/cm ² }								
				3/4	1	1½	2	2½	3	4	5	6
HA2D, R	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	1430	880	600	350	220	150	80	—	—
{14.5}				{8.9}	{6.1}	{3.5}	{2.2}	{1.5}	{0.8}	—	—	
HA3D, R				—	—	1060	630	390	280	150	100	70
				{10.8}	{6.4}	{3.9}	{2.8}	{1.5}	{1.0}	{0.7}		
HA4D, R				—	—	—	—	690	500	280	170	120
								{7.0}	{5.0}	{2.8}	{1.7}	{1.2}

Note) 1) ✓ Positioner is necessary

2) Table 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.

DIMENSIONS

Table 8 Face-to-face and external dimensions

[Unit: mm]

Nominal size (inches)	Actuator model no.	A		E	H				φ B	B
		JIS 10K FF, RF ANSI 150RF	JIS 20K RF JIS 30K RF ANSI 300RF	JIS 10K FF, RF JIS 20K RF JIS 30K RF ANSI 150 RF ANSI 300 RF	Plain bonnet		Extension bonnet			
					Welded type body	Integral type body	Welded type body	Integral type body		
1	PSA1D, R	184	197	145	445	445	595	595	218	230
	HA2D, R				475	475	630	630	167	281
1½	PSA1D, R	370	235	205	480	465	630	615	218	230
	HA2D, R				510	495	665	650	267	281
	HA3D, R				605	595	760	745	350	363
2	PSA1D, R	410	267	230	495	480	645	630	218	230
	HA2R, R				525	510	680	660	267	281
	HA3D, R				620	580	775	760	350	363
2½	HA2D, R	276	292	260	575	565	745	715	267	281
	HA3D, R				630	620	795	770	350	363
	HA4D, R				900	865	1035	1015	470	520
3	HA2D, R	298	317	280	590	580	760	730	267	281
	HA3D, R				640	635	810	785	350	363
	HA4D, R				915	880	1045	1030	470	520
4	HA2D, R	352	368	330	—	605	—	755	267	281
	HA3D, R				—	660	—	810	350	363
	HA4D, R				—	900	—	1050	470	520
5	HA3D, R	403	425	370	—	765	—	915	350	363
	HA4D, R				—	935	—	1085	470	520
6	HA3D, R	451	473	410	—	795	—	945	350	363
	HA4D, R				—	965	—	1115	470	520

Table 9 Weight

[Unit: kg]

Nominal size (inches)	Actuator model No.	FF, RF			
		JIS 10K ANSI 125, 150 JPI 125, 150		JIS 16, 20, 30 ANSI 300 JPI 300	
		Plain bonnet	Extension bonnet	Plain bonnet	Extension bonnet
1	PSA1D, R	26	31	29	32
	HA2D, R	33	38	36	39
1½	PSA1D, R	30	33	39	42
	HA2D, R	37	40	46	49
	HA3D, R	53	56	62	65
2	PSA1D, R	37	40	40	43
	HA2D, R	44	47	47	50
	HA3D, R	60	64	63	66
2½	HA2D, R	54	58	65	69
	HA3D, R	69	73	81	85
	HA4D, R	106	110	118	122
3	HA2D, R	75	81	87	93
	HA3D, R	90	96	103	109
	HA4D, R	127	133	140	146
4	HA2D, R	93	103	125	135
	HA3D, R	108	118	140	150
	HA4D, R	145	155	177	187
5	HA3D, R	162	175	188	202
	HA4D, R	198	211	225	238
6	HA3D, R	237	252	280	295
	HA4D, R	273	288	306	331

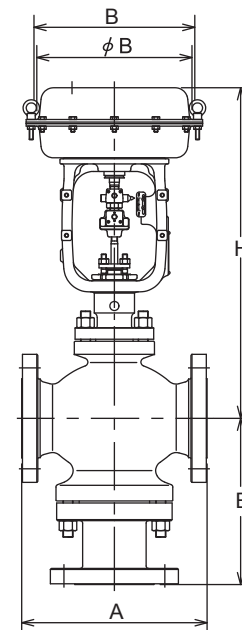
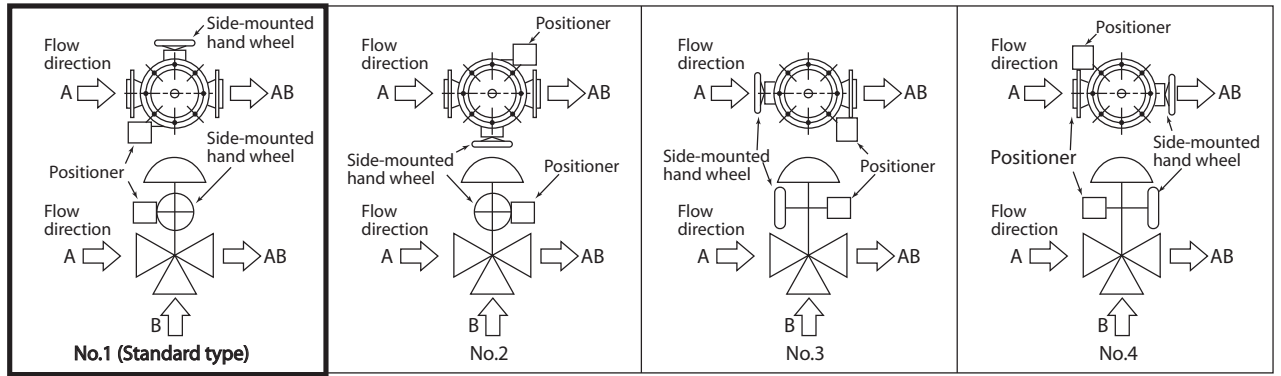


Figure 4 Face-to-face and external dimensions

a. Mixing service by AMT



b. Diverting service by AMT

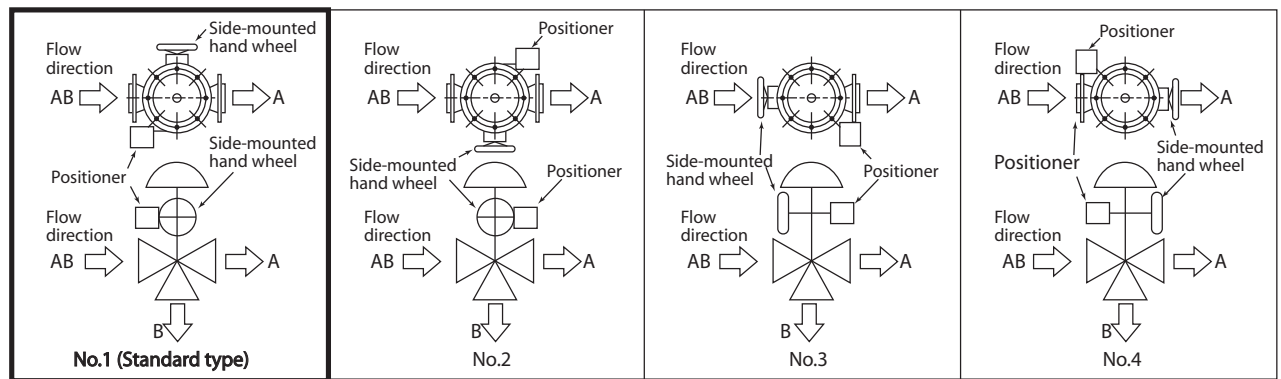


Figure 5 Actuator orientation

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

Ordering Information

When ordering, please specify;

- | | |
|--|--|
| 1) Model Number: AMT | 9) Special requirement of oil/water or copper free treatment, etc. |
| 2) Nominal size X | 10) Name of flow medium |
| 3) Port size or Cv required | 11) Normal flow and maximum required flow |
| 4) Type and rating of end connections | 12) Pressure of flow medium, upstream and downstream pressure at maximum required flow |
| 5) Body and trim material, necessity of hardening | 13) Temperature and specific gravity of flow medium |
| 6) Type of bonnet | 14) Viscosity of flow medium, inclusive or exclusive of slurry |
| 7) Type of actuator, air to diaphragm | |
| 8) Valve action (direct or reverse)
Accessories (positioner, hand wheel, pressure regulator etc.) | |

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