Three Way Control Valves

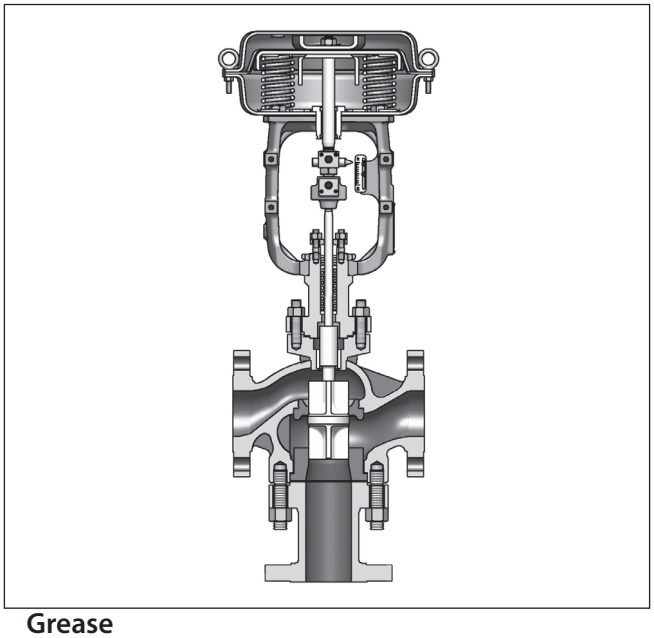
Model AMT_ _ _

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, 1-1/2, 2, 2-1/2, 3, 4, 5, 6 inches

Pressure rating and End connection:

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 Type 1	+230 to +350 °C

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

Gland type

Bolted gland

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: Polytetrafuloroethylene.

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) CoCr-A,
SUS316L (SCS16) CoCr-A

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

2. For fluid conditions requiring CoCr-A, refer to Figure 1.

Actuator

Actuator type	Actuator model
Single acting diaphragm actuator	PSA1 HA_ _

Action: Direct or reverse action

Actuator model	Diaphragm material
PSA1_ HA_ _	Cloth embedded ethylene propylene rubber

Spring range:

Actuator model	Spring range
PSA1_ HA_ _	20 to 98 kPa {0.2 to 1.0 kgf/cm²} 80 to 240 kPa {0.8 to 2.4 kgf/cm²}

Supply pressure:

Actuator model	Supply pressure
PSA1_ HA_ _	120 to 390 kPa {1.2 to 4.0 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) * For the optional items, refer to the specification sheets and installation drawings of respective accessories.*

Actuator model	Positioner		Hand wheel	
	P/P	I/P	Top	Side
PSA1	VPE_ _ - _	AVP2_ _ AVP3_ _ AVP7_ _	Mounted	Mounted
HA2 - 4	HTP-_ _			

Additional specification

- 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

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

Hysteresis error

Actuator Model	PSA1_	HA_ _
Without positioner	Within 5% F.S.	Within 3% F.S.
With positioner	Within 1% F.S.	Within 1% F.S.

Linearity

Actuator Model	PSA1_	HA_ _
Without positioner	Within ± 5% F.S.	Within ± 5% F.S.
With positioner	VPE_ _-_: Within ± 3% F.S. AVP_ _ _: Within ± 2% F.S.	Within ±1% F.S.

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

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)

Trim material \ Body 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 CoCr-A (SCS14 CoCr-A)		-5 to 350	-17 to 350	-17 to 350
JIS	SUS316L CoCr-A (SCS16A CoCr-A)		-	-17 to 350	-17 to 350

Note) 1. " ▭ " shows standard combination of valve body and trim materials.

2. Parenthesized codes denote symbol displays of valve plug.

Table 2. Cv value and travel

Nominal size (inch)	1		1-1/2	2	2-1/2	3	4	5	6
Port size (inch)	3/4	1	1-1/2	2	2-1/2	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	

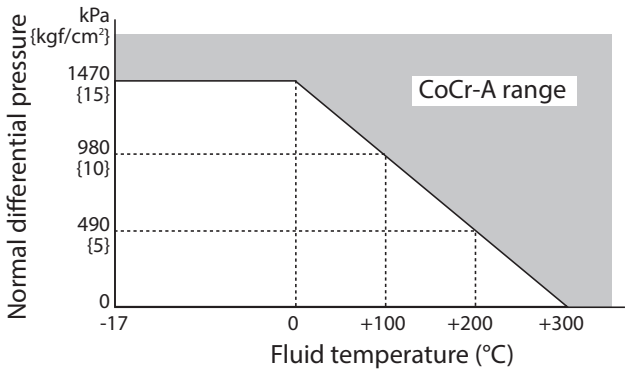


Figure 1. Temperature / normal differential pressure ranges requiring CoCr-A

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

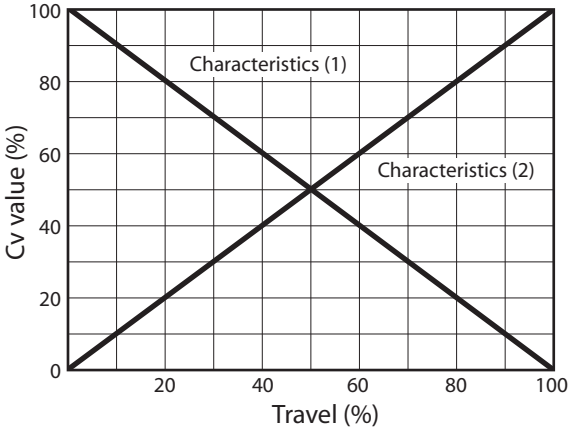
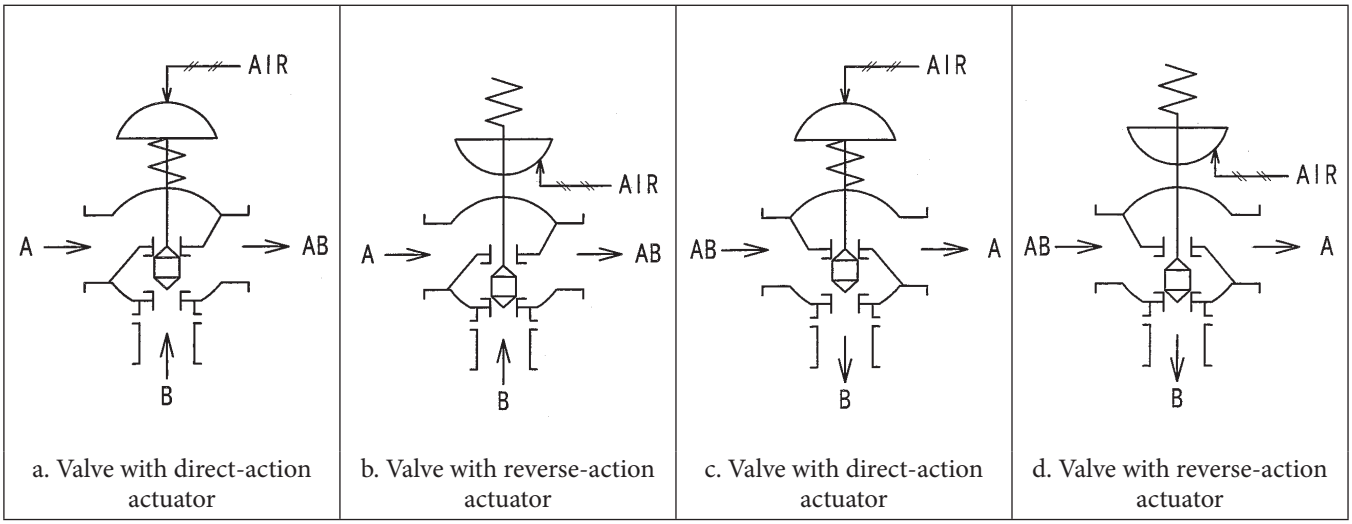


Figure 2. Flow characteristics

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



a. Valve with direct-action actuator

b. Valve with reverse-action actuator

c. Valve with direct-action actuator

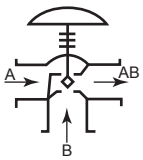
d. Valve with reverse-action actuator

Figure 3. Valve action

Allowable differential pressure

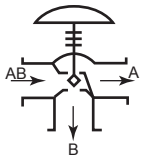
PTFE packing

Table 4. Mixing service by AMT



Actuator model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure [by port size (inch)] kPa {kgf/cm²}								
				3/4	1	1-1/2	2	2-1/2	3	4	5	6
PSA1D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	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}	△	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}	△	——	——	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}	△	——	——	——	——	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	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure [by port size (inch)] kPa {kgf/cm²}								
				3/4	1	1-1/2	2	2-1/2	3	4	5	6
PSA1D, R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	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}	△	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}	△	——	——	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}	△	——	——	——	——	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}

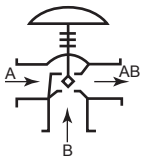
Note) 1. ✓ *Positioner is necessary*

△: *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 disignated by ANSI B16.34-1981 or JIS B2201-1984.

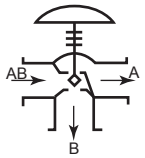
Graphite packing "P6610CH+P6528" (+230 to 350 °C)

Table 6. Mixing service by AMT



Actuator model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure [by port size (inch)] kPa {kgf/cm²}								
				3/4	1	1-1/2	2	2-1/2	3	4	5	6
HA2D, R	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	3920 {39.9}	2660 {27.1}	1800 {18.3}	1070 {10.9}	660 {6.7}	470 {4.7}	260 {2.6}	——	——
HA3D, R				——	——	3200 {32.6}	1910 {19.4}	1180 {12.0}	850 {8.6}	470 {4.7}	300 {3.0}	210 {2.1}
HA4D, R				——	——	——	——	2150 {21.9}	1550 {15.8}	870 {8.8}	540 {5.5}	380 {3.8}

Table 7. Diverting service by AMT



Actuator model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure [by port size (inch)] kPa {kgf/cm²}								
				3/4	1	1-1/2	2	2-1/2	3	4	5	6
HA2D, R	340 {3.5}	80 to 240 {0.8 to 2.4}	✓	1430 {14.5}	880 {8.9}	600 {6.1}	350 {3.5}	220 {2.2}	150 {1.5}	80 {0.8}	——	——
HA3D, R				——	——	1060 {10.8}	630 {6.4}	390 {3.9}	280 {2.8}	150 {1.5}	100 {1.0}	70 {0.7}
HA4D, R				——	——	——	——	690 {7.0}	500 {5.0}	280 {2.8}	170 {1.7}	120 {1.2}

Note) 1. ✓ *Positioner is necessary*

2. Table care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure disignated by ANSI B16.34-1981 or JIS B2201-1984.

DIMENSIONS

Table 8. Face-to-face and external dimensions [Unit: mm]

Nominal size (inch)	Actuator model	A		E	H				ϕB	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
1-1/2	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
2-1/2	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 (inch)	Actuator model	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
1-1/2	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
2-1/2	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

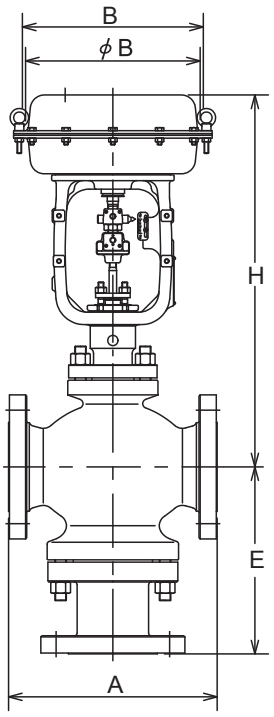
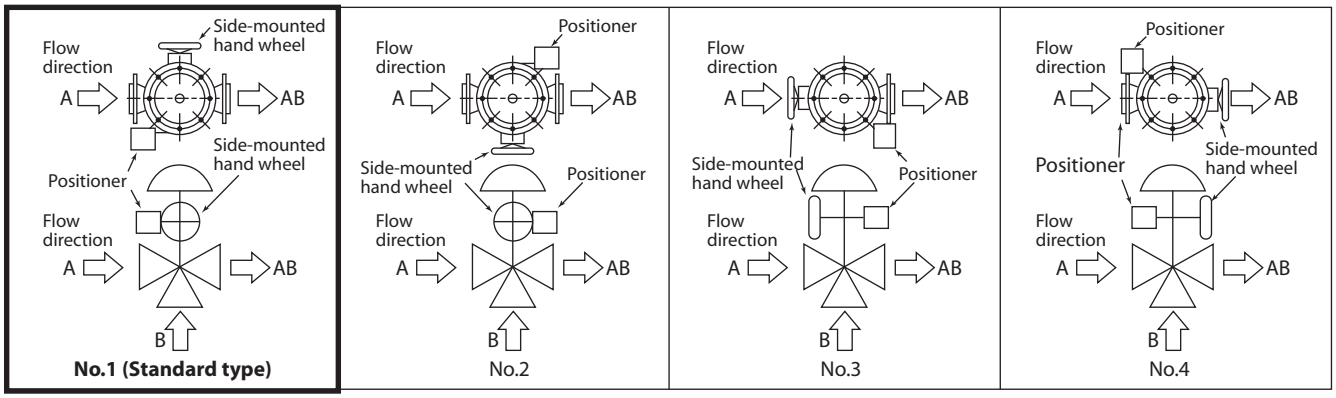


Figure 4. Face-to-face and external dimensions

a. Mixing service by AMT



b. Diverting service by AMT

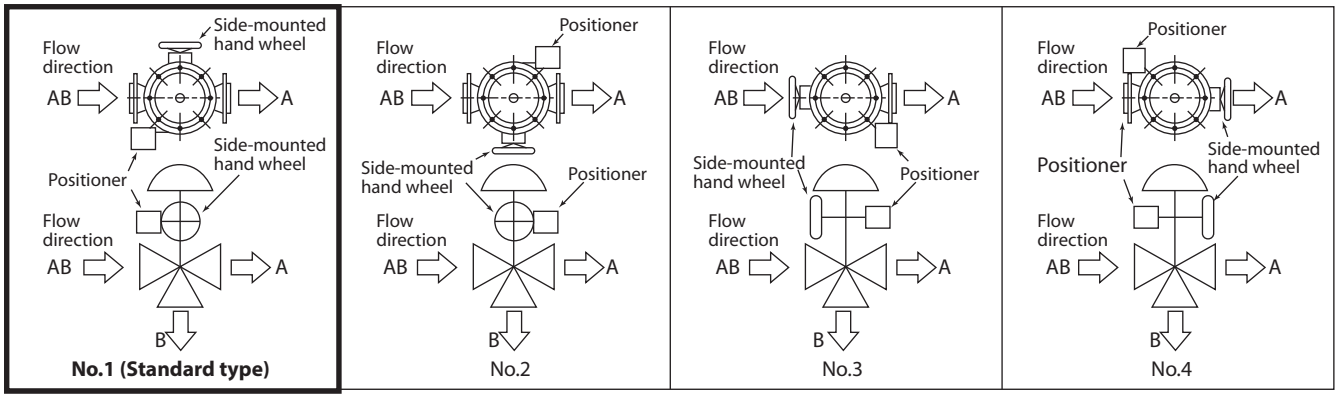


Figure 5. Actuator orientation

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

Ordering Information

When ordering, please specify;

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

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