

CV3000 Series

Top-Guided Single Seated Control Valves with Steam Jacket

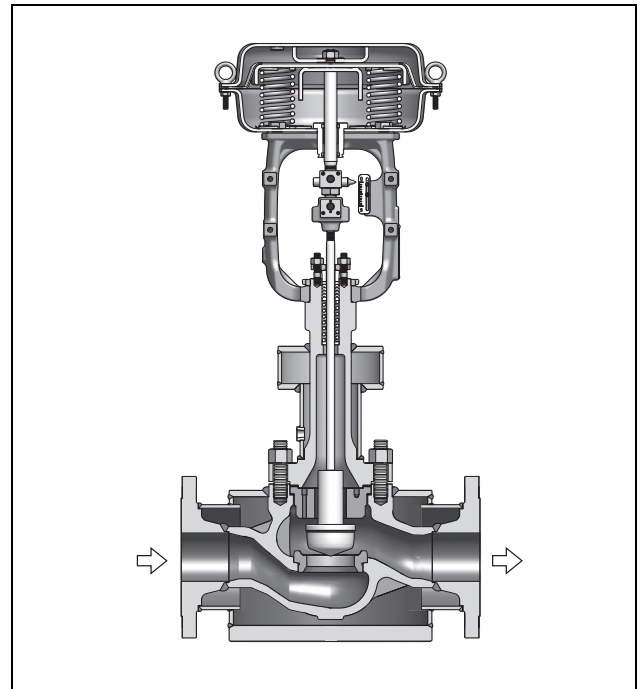
Model HTS

OVERVIEW

Model HTS Top-Guided Single Seated Control Valves with Steam Jacket are designed for heavy duty service requiring high adiabatic capability. The compact valve body, having an S-Shape flow passage that features low pressure loss, allows a large flow capacity, rangeability, and high accuracy flow characteristics.

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.

The model HTS Valves are widely applicable for reliable control, with high shut-off performance, in high or low temperature, high pressure process lines.



SPECIFICATIONS

Body

Type: Straight-through, cast globe valve

Nominal size: 1½, 2, 2½, 3, 4, 6 inches

For combining the nominal size and flange size, refer to Table 1.

Pressure rating

- JIS 10K, 16K, 20K
- ANSI Class 150, 300
- JPI Class 150, 300

End connection: Flanged end;

Connection type	Pressure rating	Applicable standard
RF	JIS10K, 16K, 20K	JIS B2210-1984
	ANSI Class 150, 300	ANSI B16.5-1981
	JPI Class 150, 300	JPI-7S-15-1993

Material

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

Bonnet:

- Plain bonnet (0 to 230°C)
- Extension type bonnet (230 to 566°C)

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

Jacket

Type: Body; Full-jacket, semi-jacket*
Bonnet; Without jacket, with jacket*

Note) The following structural combinations () are used for the jacket*

Jacket	Location	Type
Semi-jacket	Body	1
	Body, bonnet	2
Full-jacket	Body	3
	Body, bonnet	4

Jacket size: 1/2, 3/4, 1 inch

For combining the nominal size, flange size and jacket connection size, refer to Table 1.

Pressure rating:

- JIS 10K, 16K, 20K
- ANSI Class 150, 300
- JPI Class 150, 300

Jacket connection: Flanged end;

Connection type	Pressure rating	Applicable standard
RF	JIS10K, 16K, 20K	JIS B2210-1984
	ANSI Class 150, 300	ANSI B16.5-1981
	JPI Class 150, 300	JPI-7S-15-1993

Threaded end; Rc, NPT

Operating pressure: 981 kPa {10.0kgf/cm²} or less

Operating temperature: 350°C or less

Material: SS400, SUS304

Note) Drain plug is provided as a standard at the jacket.

Gland type: Bolted gland

Packing / Grease

- Grease not provided; When V shaped PTFE packing or PTFE yarn packing is used.
- Grease provided; When asbestos yarn, PTFE-impregnated asbestos yarn, asbestos yarn with graphite, or graphite, or graphite packing is used.

Note) PTFE: Polytetrafluoroethylene

Gasket

Type: Flat type, serrated type
 Materials: SUS316, SUS316L, SUS329J1, copper, aluminum

Trim

Valve plug

- Single seated, Contoured type plug
- High-capacity type (For flow characteristics, refer to Figure 1.)
 <Metal seat> Equal percentage (%C), Linear (LC)
 - High-flow characteristics type
 <Metal seat> (For flow characteristics, refer to Figure 2.)
 Equal percentage (%CF), Linear (LCF)
- Single seated, Quick-opening type plug
 <Metal (Stellite) seat> (QS)

Material

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

Note) For fluid conditions that require Stellite, refer to Figure 4.

Actuator

Type

Single acting diaphragm actuator (Type PSA1, HA or VA5)
 Spring Type piston actuator (Type PSA6)
 Double acting piston actuator (Type DAP)

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 or VA5)
 20 to 98 kPa {0.2 to 1.0 kgf/cm²} or
 80 to 240 kPa {0.8 to 2.4 kgf/cm²}
 (Type PSA6)
 200 to 340 kPa {2.0 to 3.5 kgf/cm²} or
 200 to 390 kPa {2.0 to 4.0 kgf/cm²}

Supply pressure

Diaphragm actuator
 Type HA, PSA1 : 120 to 390 kPa {1.2 to 4.0 kgf/cm²}
 Type VA5 : 120 to 270 kPa {1.2 to 2.8 kgf/cm²}
 Spring type piston actuator
 Type PSA6 : 400 to 500 kPa {4.0 to 5.0 kgf/cm²}
 Piston actuator
 Type DAP : 290 to 490 kPa {3.0 to 5.0 kgf/cm²}

Note) Allowable differential pressure varies depending on spring range and air supply pressure.

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

Note) With Type VA or DAP, Rc1/4 adapter or 1/4NPT adapter is provided on Rc1/2 internal thread (also providing Rc3/8 adapter is possible).

Ambient temperature: -30 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, 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	Manual	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
DAP560	VPP	AVP/HEP	-	SHM
DAP1000				
DAP1500				

Additional specification (by special order)

- Special inspection
 Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection, steam inspection
- Seat chamfered flange
- Double gland
- Oil/water free treatment
- Copper free treatment
- York material SCPH2 (York material of PSA1 is SCPH2 as standard)
- Special air piping and joint
- Stainless steel (SUS304) atmosphere-exposed nuts and bolts
- Saline damage countermeasures
- Sand-/dust-preventive measures
- Tropical-area use specifications
- Cold-area use specifications
- Vacuum service

Performance

Rated Cv value: Refer to Table 3, Table 4 and Table 5.

DAP characteristics: Refer to Figure 1 and 2.

Inherent rangeability: 50 : 1 (Optional 75 : 1)

Allowable differential pressure

Refer to Table 6, 7, 8, 9 and 10.

Leakage specification

Contoured type plug

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

<Metal seat>

Standard.... Class IV: Leakage less than 0.01%

Option..... Leakage less than 0.001% of maximum valve capacity.

Quick opening plug

Leakage less than 0.00001% of maximum valve capacity.

Hysteresis errorWithout positioner : Within 3% F.S. (Within 5% F.S.)
((Within 9% F.S.))

With positioner : Within 1% F.S. ((Within 2% F.S.))

LinearityWithout positioner : Within ±5% F.S.
((Within 9% F.S.))With positioner : Within ±1% F.S. (VPE : Within ±3%
F.S., HEP : Within ±2% F.S.)
((Within 2% F.S.))*Note) 1) When positioner is not provided, operating performance may vary depending on type of packing used.**2) Parenthesized figures are applicable to Type PSA1.**3) Double parenthesized figures are applicable to type PSA6R.***Dimensions**

Refer to Figure 5, Table 17, and Table 18.

Weight: Refer to Table 19 and Table 20.**Actuator orientation:** Refer to Figure 6.**Finish**

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

Table 1 Combination of the nominal size, flange size and jacket connection size

Nominal size (inches)		1½	2	2½	3	4	6
Flange size (inches)	Semi-jacket	1½	2	2½	3	4	6
	Full-jacket	2½	3	4	5	6	8
Jacket connection size (inches)	Flange type	1/2, 3/4				1/2, 3/4, 1	
	Screwed type	1/2, 3/4					

Table 2 Body/trim material combinations and operating temperature ranges range (°C)

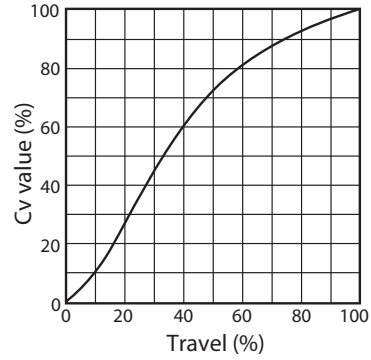
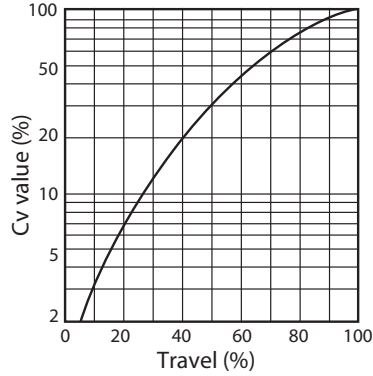
Trim material	Body material	JIS	SCPH2	SCS13A	SCS14A
		ASTM	A216WCB	A351CF8	A351CF8M
JIS	SUS304		0 to +300	0 to +300	—
JIS	SUS316		0 to +300	0 to +300	0 to +300
JIS	SUS304L		—	0 to +300	—
JIS	SUS316L		—	0 to +300	0 to +300
JIS	SUS329J1		—	—	0 to +300
JIS	SUS304 Stellite		0 to +425	0 to +550	—
JIS	SUS304 Stellite face		0 to +425	0 to +550	—
JIS	SUS316 Stellite		0 to +425	0 to +550	0 to +550
JIS	SUS316 Stellite face		0 to +425	0 to +550	0 to +550
JIS	SUS304L Stellite		—	0 to +550	—
JIS	SUS316L Stellite		—	0 to +450	0 to +450
JIS	SUS329J1 Stellite		—	—	0 to +550

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

Cv value and travel

Table 3 Contoured type plug (High-capacity type) (%C, LC)

Nominal size (inches)	1½	2	2½	3	4	6
Port size (inches)	1½	2	2½	3	4	6
Rated Cv value (%C, LC)	30	50	85	125	200	420
Rated travel (mm)	25		38			50



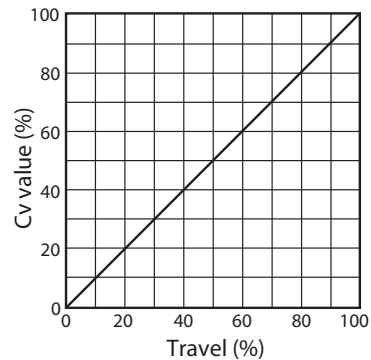
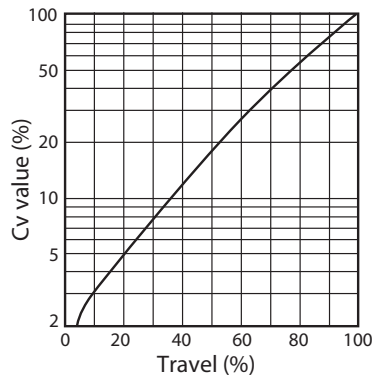
a. Equal percentage characteristics (%C : Metal seat)

b. Linear characteristics (LC : Metal seat)

Figure 1 Flow characteristics: High-capacity type

Table 4 High-flow characteristics type contoured plug (%CF, LCF)

Nominal size (inches)	1½			2			2½			3			4			6		
Port size (inches)	1	1¼	1½	1¼	1½	2	1½	2	2½	2	2½	3	2½	3	4	4	5	6
Rated Cv value (%CF, LCF)	10	17	24	17	24	44	24	44	68	44	68	99	68	99	175	175	275	360
Rated travel (mm)	25						38						50					



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

b. Linear characteristics (LCF: Metal seat)

Figure 2 Flow characteristics: High-flow characteristics type

Note) The above graphs indicate typical flow characteristics.

Table 5 Quick-opening type plug

Nominal size (inches)	1½	2	2½	3	4	6
Port size (inches)	1½	2	2½	3	4	6
Rated Cv value (QS)	35	55	95	135	220	460
Rated travel (mm)	10	13	19	19	25	30

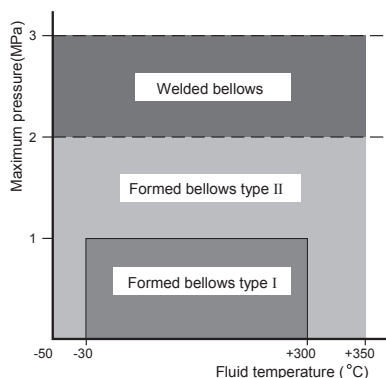


Figure 3 Bellows Type by Temperature and Pressure Ranges

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.

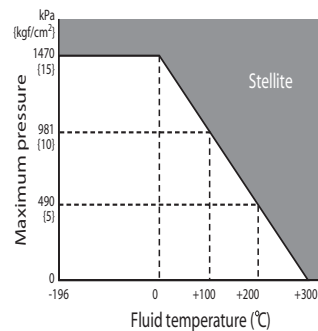


Figure 4 Temperature / normal differential pressure ranges requiring Stellite

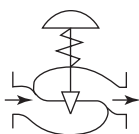
Note) When cavitation / flushing service, oil prohibitive service, or retention of valve-close performance is required, use of Stellite is recommended regardless of temperature or differential pressure.

Allowable differential pressure

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

Valves with type PSA1, HA or VA actuator

Table 6 Air-to-close

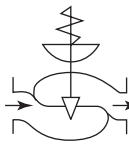


Actuator Model No.	Supply pressure kPa{kgf/cm ² }	Spring range kPa{kgf/cm ² }	Positioner	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }									
				1	1¼	1½	2	2½	3	4	5	6	
PSA1D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	320 {3.3}	200 {2.0}	140 {1.4}	80 {0.8}	—	—	—	—	—	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	1570 {16.0}	970 {9.9}	700 {7.1}	400 {4.1}	—	—	—	—	—	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0} 4710 {48.0}	2840 {29.0}	2060 {21.0}	1180 {12.0}	—	—	—	—	—	—
HA2D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	620 {6.3}	370 {3.8}	260 {2.7}	160 {1.6}	98 {1.0}	70 {0.7}	50 {0.5}	—	—	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3100 {31.6}	1890 {19.3}	1340 {13.7}	760 {7.8}	500 {5.1}	340 {3.5}	200 {2.0}	—	—	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0} 5100 {52.0}	3920 {40.0}	3920 {40.0}	2130 {21.7}	1460 {14.9}	1030 {10.5}	580 {5.9}	—	—	—
HA3D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	1100 {11.2}	670 {6.8}	470 {4.8}	270 {2.8}	170 {1.7}	120 {1.2}	70 {0.7}	40 {0.4}	30 {0.3}	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0} 5100 {52.0}	3350 {34.2}	2370 {24.2}	1370 {14.0}	860 {8.8}	610 {6.2}	340 {3.5}	220 {2.2}	140 {1.4}	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0} 5100 {52.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2600 {26.5}	1830 {18.7}	1030 {10.5}	660 {6.7}	400 {4.1}	—
HA4D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	810 {8.3}	470 {4.8}	290 {3.0}	220 {2.2}	120 {1.2}	70 {0.7}	50 {0.5}	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	—	—	3920 {40.0}	2370 {24.2}	1490 {15.2}	1050 {10.7}	600 {6.1}	380 {3.9}	240 {2.4}	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3160 {32.2}	1780 {18.2}	1140 {11.6}	700 {7.1}	—
VA5D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	410 {4.2}	280 {2.9}	160 {1.6}	110 {1.1}	60 {0.6}	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	—	—	—	—	2040 {20.8}	1440 {14.7}	810 {8.3}	520 {5.3}	310 {3.2}	—

- Note) 1) "□" show a model with standard actuator.
 2) ✓ : Positioner is necessary, △: Can be operated either with or without positioner.
 3) 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.
 4) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

Allowable differential pressure**Contoured-type metal seat (%CF, LCF, %C, LC) : PTFE packing**

Valves with type PSA1, HA or VA actuator

Table 7 Air-to-open


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 }									
				1	1¼	1½	2	2½	3	4	5	6	
PSA1R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	320 {3.3}	200 {2.0}	140 {1.4}	80 {0.8}	—	—	—	—	—	—
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	2160 {22.0}	1270 {13.0}	970 {9.9}	560 {5.7}	—	—	—	—	—	—
HA2R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	620 {6.3}	370 {3.8}	260 {2.7}	160 {1.6}	98 {1.0}	70 {0.7}	50 {0.5}	—	—	—
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	2650 {27.0}	1870 {19.1}	1090 {11.1}	680 {6.9}	480 {4.9}	270 {2.8}	—	—	—
				4310 {44.0}							—	—	—
HA3R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	1100 {11.2}	670 {6.8}	470 {4.8}	270 {2.8}	170 {1.7}	120 {1.2}	70 {0.7}	40 {0.4}	30 {0.3}	
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3330 {34.0}	1920 {19.6}	1210 {12.3}	850 {8.7}	480 {4.9}	300 {3.1}	190 {1.9}	
				5100 {52.0}	4610 {47.0}								—
HA4R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	820 {8.4}	470 {4.8}	290 {3.0}	220 {2.2}	120 {1.2}	70 {0.7}	50 {0.5}	
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	3920 {40.0}	3090 {31.5}	2090 {21.3}	1470 {15.0}	830 {8.5}	530 {5.4}	320 {3.3}	
				—	—	5100 {52.0}							—
VA5R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	410 {4.2}	280 {2.9}	170 {1.7}	110 {1.1}	60 {0.6}	
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	2860 {29.2}	2020 {20.6}	1140 {11.6}	720 {7.4}	440 {4.5}	
PSA6R	400 {4.0} *1	200 to 340 {2.0 to 3.5}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	2370 {24.2}	—	—	
				—	—	—	—	5100 {52.0}	4220 {43.0}		—	—	
	500 {5.0} *2	200 to 390 {2.0 to 4.0}	✓	—	—	—	—	—	—	2370 {24.2}	1520 {15.5}	930 {9.5}	

Note) 1) " □ " show a model with standard actuator.

2) ✓ : Positioner is necessary, △: Can be operated either with or without positioner.

3) 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.

4) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

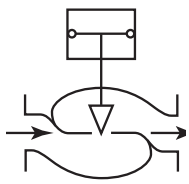
5) *1...Applicable to valve sizes of 2½ to 4 inches, *2 ...Applicable to valve size of 6 inches.

Allowable differential pressure

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

Valves with type DAP actuator

Table 8 Air-to-open and Air-to-close



Actuator Model No.	Supply Pressure kPa {kgf/cm ² }	Positioner	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }				
			2½	3	4	5	6
DAP560	290 {3.0}		3920 {40.0}	3610 {36.8}	2030 {20.7}	1290 {13.2}	780 {8.0}
			5100 {52.0}				
	390 {4.0}		3920 {40.0}	3920 {40.0}	2730 {27.8}	1740 {17.8}	1060 {10.8}
			5100 {52.0}	4800 {49.0}			
	490 {5.0}		3920 {40.0}	3920 {40.0}	3420 {34.9}	2200 {22.4}	1330 {13.6}
			5100 {52.0}	5100 {52.0}			
DAP1000	290 {3.0}	✓	3920 {40.0}	3920 {40.0}	3620 {36.9}	2310 {23.6}	1410 {14.4}
			5100 {52.0}	5100 {52.0}			
	390 {4.0}		3920 {40.0}	3920 {40.0}	3920 {40.0}	3120 {31.8}	1890 {19.3}
			5100 {52.0}	5100 {52.0}	4800 {49.0}		
	490 {5.0}		3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2380 {24.3}
			5100 {52.0}	5100 {52.0}	5100 {52.0}		
DAP1500	290 {3.0}		—	—	—	3480 {35.5}	2120 {21.6}
			—	—	—		
	390 {4.0}		—	—	—	3920 {40.0}	2840 {29.0}
			—	—	—		
	490 {5.0}		—	—	—	3920 {40.0}	3570 {36.4}
			—	—	—		

Note) 1) When a backup system for pressure drop at the air source is used, select the allowable differential pressure from whichever is lower-constant supplied air pressure or backup system set pressure (trip pressure).

2) ✓ : Positioner is necessary.

3) 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.

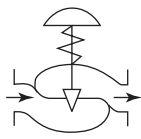
4) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

Allowable differential pressure

Quick-opening type metal (Stellite) seat (QS) : PTFE packing

Valves with a type PSA1, HA or VA actuator

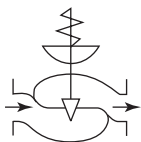
Table 9 Air-to-close



Actuator model No.	Supply pressure kPa {kgf/cm ² }	Differential pressure by port size(inches) kPa {kgf/cm ² }					
		1½	2	2½	3	4	6
PSA1D	140 {1.4}	320 {3.3}	200 {2.0}	—	—	—	—
	290 {3.0}	1470 {15.0}	960 {9.8}	—	—	—	—
HA2D	140 {1.4}	1090 {11.1}	600 {6.1}	400 {4.1}	300 {3.1}	150 {1.5}	—
	290 {3.0}	3060 {31.2}	1920 {19.6}	1220 {12.5}	910 {9.3}	490 {5.0}	—
HA3D	140 {1.4}	1920 {19.6}	1060 {10.8}	720 {7.4}	540 {5.5}	250 {2.6}	120 {1.2}
	290 {3.0}	3920 {40.0}	3400 {34.7}	2170 {22.1}	1620 {16.5}	870 {8.9}	390 {4.0}
		5100 {52.0}					
HA4D	140 {1.4}	—	—	1240 {12.7}	930 {9.5}	450 {4.6}	200 {2.1}
	290 {3.0}	—	—	3750 {38.2}	2790 {28.5}	1520 {15.5}	680 {6.9}
VA5D	140 {1.4}	—	—	—	—	—	280 {2.9}
	290 {3.0}	—	—	—	—	—	850 {8.7}
Spring range kPa {kgf/cm ² }		20 to 51 {0.2 to 0.52}	20 to 61 {0.2 to 0.62}	20 to 59 {0.2 to 0.6}	20 to 59 {0.2 to 0.6}	20 to 72 {0.2 to 0.73}	20 to 67 {0.2 to 0.68}

Note) 1) " □ " show a model with standard actuator.

Table 10 Air-to-close



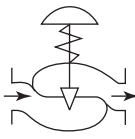
Actuator Model No.	Supply pressure kPa {kgf/cm ² }	Initial spring compression kPa {kgf/cm ² }	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }					
			1½	2	2½	3	4	6
PSA1R	140 {1.4}	22 {0.22}	110 {1.1}	70 {0.7}	—	—	—	—
	270 {2.8}	80 {0.8}	490 {5.0}	310 {3.2}	—	—	—	—
HA2R	140 {1.4}	20 {0.2}	240 {2.5}	170 {1.7}	98 {1.0}	80 {0.8}	40 {0.4}	—
	270 {2.8}	80 {0.8}	981 {10.0}	640 {6.5}	400 {4.1}	300 {3.1}	180 {1.8}	—
HA3R	140 {1.4}	20 {0.2}	440 {4.5}	290 {3.0}	180 {1.8}	140 {1.4}	80 {0.8}	30 {0.3}
	270 {2.8}	80 {0.8}	1740 {17.8}	1170 {11.9}	720 {7.4}	540 {5.5}	300 {3.1}	140 {1.4}
HA4R	140 {1.4}	20 {0.2}	—	—	310 {3.2}	240 {2.4}	140 {1.4}	60 {0.6}
	270 {2.8}	80 {0.8}	—	—	1240 {12.7}	930 {9.5}	530 {5.4}	240 {2.4}
VA5R	140 {1.4}	20 {0.2}	—	—	—	—	190 {1.9}	80 {0.8}
	270 {2.8}	80 {0.8}	—	—	—	—	720 {7.4}	320 {3.3}
PSA6R	500 {5.0}	200 {2.0}	—	—	—	—	1410 {14.4}	620 {6.3}

Note) 1) " □ " show a model with standard actuator.

Contoured-type metal seat (%CF, LCF, %C, LC) : Graphite packing (+230 to +500 °C)

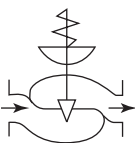
Valves with type PSA1, HA or VA actuator

Table 11 Air-to-close



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 }								
				1	1¼	1½	2	2½	3	4	5	6
HA2D				3920 {40.0}	3920 {40.0}	3380 {34.4}	1950 {19.8}	1230 {12.5}	870 {8.8}	480 {4.8}	—	—
				5100 {52.0}	4770 {48.6}							
HA3D	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3470 {35.3}	2180 {22.2}	1540 {15.7}	860 {8.7}	550 {5.6}	330 {3.3}
				5100 {52.0}	5100 {52.0}	5100 {52.0}						
HA4D				—	—	3920 {40.0}	3920 {40.0}	3860 {39.3}	2720 {27.7}	1530 {15.6}	980 {9.9}	590 {6.0}
				—	—	5100 {52.0}	5100 {52.0}					
VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}		—	—	3920 {40.0}	2910 {29.6}	1830 {18.6}	1290 {13.1}	720 {7.3}	460 {4.6}	280 {2.8}
				—	—	5040 {51.3}						

Table 12 Air-to-open



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 }								
				1	1¼	1½	2	2½	3	4	5	6
HA2R				3410 {34.7}	2080 {21.2}	1470 {14.9}	850 {8.6}	530 {5.4}	370 {3.7}	210 {2.1}	—	—
HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3690 {37.6}	2610 {26.6}	1510 {15.3}	950 {9.6}	670 {6.8}	370 {3.7}	240 {2.4}	140 {1.4}
				5100 {52.0}								
HA4R				—	—	3920 {40.0}	2750 {28.0}	1730 {17.6}	1220 {12.4}	680 {6.9}	440 {4.4}	260 {2.6}
				—	—	4770 {48.6}						
VA5R				—	—	—	—	2250 {22.9}	1580 {16.1}	890 {9.0}	570 {5.8}	340 {3.4}
PSA6R	400 {4.0} *1	200 to 340 {2.0 to 3.5}		—	—	—	—	3920 {40.0}	3920 {40.0}	2370 {24.1}	—	—
	500 {5.0} *2	200 to 390 {2.0 to 4.0}	—	—	—	—	5100 {52.0}	4220 {43.0}				
	400 {4.0} *3	200 to 340 {2.0 to 3.5}	—	—	—	—	—	—	—	2370 {24.2}	1520 {15.5}	930 {9.4}
				—	—	—	—	—	—	—	1520 {15.5}	930 {9.4}

Note) 1) ✓ : Positioner is necessary.

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.

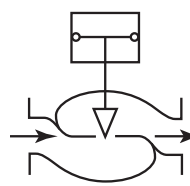
3) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

4) *1...Applicable to valve sizes of 2½ to 4 inches, *2 ...Applicable to valve size of 6 inches.

Contoured-type metal seat (%CF, LCF, %C, LC)

Valves with type DAP actuator

Table 13 Air-to-open and Air-to-close



Actuator Model No.	Supply Pressure kPa {kgf/cm ² }	Positioner	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }				
			2½	3	4	5	6
DAP560	290 {3.0}	✓	3920 {40.0}	3430 {34.9}	1490 {15.1}	950 {9.6}	580 {5.9}
			4770 {48.6}				
	390 {4.0}		3920 {40.0}	3920 {40.0}	2210 {22.5}	1410 {14.3}	860 {8.7}
			5100 {52.0}	4800 {49.0}			
	490 {5.0}		3920 {40.0}	3920 {40.0}	2920 {29.7}	1870 {19.0}	1140 {11.6}
			5100 {52.0}	5100 {52.0}			
DAP1000	290 {3.0}	3920 {40.0}	3920 {40.0}	2540 {25.9}	1620 {16.5}	990 {10.0}	
		5100 {52.0}	5100 {52.0}				
	390 {4.0}	3920 {40.0}	3920 {40.0}	3740 {38.1}	2390 {24.3}	1460 {14.8}	
		5100 {52.0}	5100 {52.0}				
	490 {5.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3170 {32.3}	1930 {19.6}	
		5100 {52.0}	5100 {52.0}	4950 {50.4}			
DAP1500	290 {3.0}	—	—	—	2490 {25.3}	1520 {15.5}	
	390 {4.0}	—	—	—	3680 {37.5}	2250 {22.9}	
	490 {5.0}	—	—	—	3920 {40.0}	2970 {30.2}	
				4870 {49.6}			

Note) 1) When a backup system for pressure drop at the air source is used, select the allowable differential pressure from whichever is lower-constant supplied air pressure or backup system set pressure (trip pressure).

2) ✓ : Positioner is necessary.

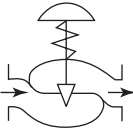
3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981 or JIS B2201-1984.

4) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

Contoured-type metal seat (%CF, LCF, %C, LC): Graphite packing “P6610CH+M8590” (+500 to +566 °C)

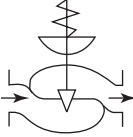
Valves with type PSA1, HA or VA actuator

Table 14 Air-to-close



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 }								
				1	1¼	1½	2	2½	3	4	5	6
HA2D				3920 {40.0}	3920 {40.0}	3170 {32.3}	1830 {18.6}	1150 {11.7}	810 {8.2}	450 {4.5}	—	—
				5100 {52.0}	4470 {45.5}							
HA3D	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3240 {33.0}	2040 {20.8}	1440 {14.6}	810 {8.2}	510 {5.2}	310 {3.1}
				5100 {52.0}	5100 {52.0}	5100 {52.0}						
HA4D				3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3660 {37.3}	2580 {26.3}	1450 {14.7}	930 {9.4}	560 {5.7}
				5100 {52.0}	5100 {52.0}	5100 {52.0}						
VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}		5100 {52.0}	5100 {52.0}	3920 {40.0}	2380 {24.2}	1500 {15.2}	1050 {10.7}	590 {6.0}	380 {3.8}	230 {2.3}
						4120 {42.0}						

Table 15 Air-to-open



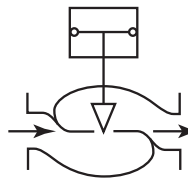
Actuator Model No.	Supply pressure kPa{kgf/cm ² }	Spring range kPa{kgf/cm ² }	Positioner	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }									
				1	1¼	1½	2	2½	3	4	5	6	
HA2R				2900 {29.5}	1770 {18.0}	1250 {12.7}	720 {7.3}	450 {4.5}	320 {3.2}	180 {1.8}	—	—	
HA3R				3920 {40.0}	3140 {32.0}	2230 {22.7}	1280 {13.0}	810 {8.2}	570 {5.8}	320 {3.2}	200 {2.0}	120 {1.2}	
				5100 {52.0}									
HA4R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	2430 {24.7}	1530 {15.6}	1080 {11.0}	600 {6.1}	390 {3.9}	230 {2.3}	
				5100 {52.0}	5100 {52.0}	4220 {43.0}							
VA5R				3920 {40.0}	3920 {40.0}	3920 {40.0}	3040 {30.9}	1910 {19.4}	1350 {13.7}	760 {7.7}	480 {4.8}	290 {2.9}	
				5100 {52.0}	5100 {52.0}	5100 {52.0}							
PSA6R	400 {4.0} *1	200 to 340 {2.0 to 3.5}		3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2320 {23.6}	—	—	
	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	4130 {42.1}							
	500 {5.0} *2	200 to 390 {2.0 to 4.0}		—	—	—	—	—	—	—	2320 {23.6}	1480 {15.0}	900 {9.1}
	400 {4.0} *3	200 to 340 {2.0 to 3.5}		—	—	—	—	—	—	—	—	1480 {15.0}	900 {9.1}

- Note) 1) ✓ : Positioner is necessary.
 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) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.
 4) *1 ...Applicable to valve sizes of 2½ to 4 inches, *2 ...Applicable to valve size of 6 inches, *3 ...Applicable to valve size of 8 inches.

Contoured-type metal seat (%CF, LCF, %C, LC): Graphite packing “P6610CH+M8590” (+500 to +566 °C)

Valves with type DAP actuator

Table 16 Air-to-open and Air-to-close



Actuator Model No.	Supply Pressure kPa {kgf/cm ² }	Positioner	Differential Pressure (by port size(inches)) kPa {kgf/cm ² }				
			2½	3	4	5	6
DAP560	290 {3.0}	✓	3590 {36.6}	2530 {25.7}	1420 {14.4}	910 {9.2}	580 {5.6}
			3920 {40.0}	3800 {38.7}	2130 {21.7}	1360 {13.8}	830 {8.4}
	5100 {52.0}						
	490 {5.0}		3920 {40.0}	3920 {40.0}	2850 {29.0}	1820 {18.5}	1110 {11.3}
			5100 {52.0}	5070 {51.6}			
	DAP1000		290 {3.0}	3920 {40.0}	3920 {40.0}	2410 {24.5}	1540 {15.7}
5100 {52.0}		4300 {43.8}					
390 {4.0}		3920 {40.0}	3920 {40.0}	3620 {36.9}	2320 {23.6}	1410 {14.3}	
		5100 {52.0}	5100 {52.0}				
490 {5.0}		3920 {40.0}	3920 {40.0}	3920 {40.0}	3090 {31.5}	1880 {19.1}	
		5100 {52.0}	5100 {52.0}				4830 {49.2}
DAP1500	290 {3.0}	—	—	3710 {37.8}	2370 {24.1}	1450 {14.7}	
		390 {4.0}	—	—	3920 {40.0}	3560 {36.3}	2170 {22.1}
	5570 {56.7}						
	490 {5.0}	—	—	3920 {40.0}	3920 {40.0}	2900 {29.5}	
		7430 {75.7}	4750 {48.4}				

Note) 1) When a backup system for pressure drop at the air source is used, select the allowable differential pressure from whichever is lower-constant supplied air pressure or backup system set pressure (trip pressure).

2) ✓ : Positioner is necessary.

3) 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.

4) The upper figures denote the operating allowable differential pressure. The lower denote allowable differential pressure at full closure.

Dimensions

Table 17 Face-to-face dimensions

[Unit : mm]

Nominal size (inches)	A				
	Semi-jacket type		Connection port size	Full-jacket type	
	JIS 10K RF ANSI 150 RF JPI 150 RF	JIS 16K RF JIS 20K RF ANSI 300 RF JPI 300 RF		JIS 10K RF ANSI 150 RF JPI 150 RF	JIS 16K RF JIS 20K RF ANSI 300 RF JPI 300 RF
1½	370	380	2½	370	380
2	400	400	3	410	420
2½	430	440	4	430	460
3	460	470	5	470	470
4	510	540	6	530	550
6	600	660	8	620	660

Table 18 Other dimensions

[Unit : mm]

Nominal size (inches)	Actuator Model No.	H		B	F	C		D		E
		Plain bonnet	Extension type bonnet			Screw-on type	Flange type	Screw-on type	Flange type	
1½	PSA1D,R	446	636	230	218	130	190	230	300	95
	HA2D,R	500	665	281	267					
	HA3D,R	590	760	363	350					
2	PSA1D,R	446	636	230	218	130	190	285	350	110
	HA2D,R	500	670	281	267					
	HA3D,R	595	765	363	350					
2½	HA2D,R	575	755	281	267	155	215	285	350	120
	HA3D,R	630	810	363	350					
	HA4D,R	865	1045	520	470					
	DAP560	1175	1325	—	380					
3	HA2D,R	580	765	281	267	180	240	335	400	135
	HA3D,R	635	820	363	350					
	HA4D,R	870	1055	520	470					
	DAP560	1190	1375	—	380					
4	HA2D,R	610	820	281	267	180	230(260)	370	435(455)	165
	HA3D,R	660	870	363	350					
	HA4D,R	890	1110	520	470					
	VA5D	1300	—	—	620					
	VA5R	1420	—	—	620					
	PSA6R	1255	—	—	476					
	DAP560	1185	1395	—	380					
	DAP1000	1215	1455	—	470					
6	HA3D,R	785	1045	363	350	180	240(260)	475	540(560)	220
	HA4D,R	955	1215	520	470					
	VA5D	1360	—	—	620					
	VA5R	1480	—	—	620					
	PSA6R	1315	—	—	476					
	DAP560	1465	1730	—	380					
	DAP1000	1440	1790	—	470					
	DAP1500	1485	1755	—	470					

Note) 1) "H" dimensions are applicable when a hand wheel is not provided. When top-mounted hand wheel HA or VA actuators or side-mounted hand wheel PSA6R or DAP actuators are used, add the hand wheel dimensions designated in respective specification sheets (No.SS2-8213-0500 for Type HA actuators; No.SS2-8210-0100 and SS2-PSA100-0100 for Type VA, PSA actuators; No. SS2-8210-0300 for Type VP actuators).
 2) Dimensions in () are for jacket size 1 inch.

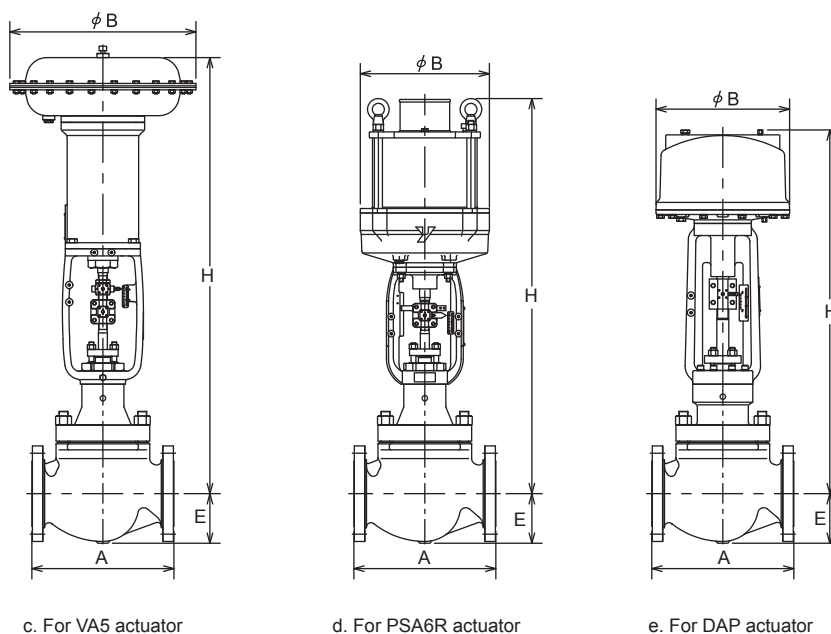
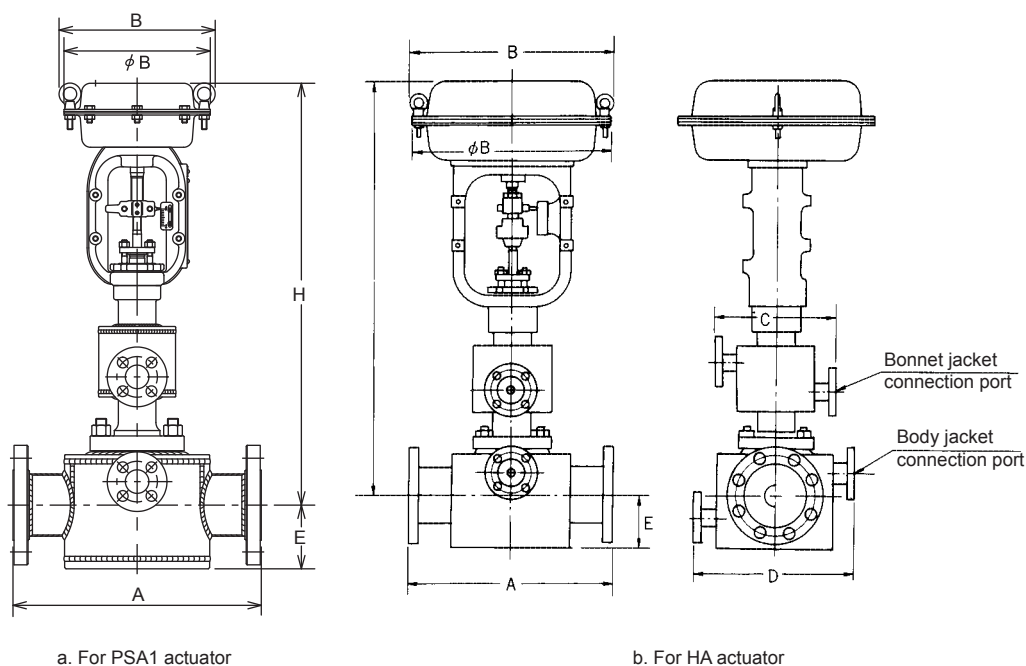


Figure 5 Face-to-face and external dimensions

Weight

Table 19 Semi-jacket type

[Unit : kg]

Connection port size (inches)	Actuator Model No.	JIS 10KANSI 150, JPI150		JIS 16K, JIS 20KANSI 300, JPI 300	
		Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet
1½	PSA1D, R	47 (44)	55 (49)	49 (46)	57 (51)
	HA2D, R	54 (51)	62 (56)	56 (53)	64 (58)
	HA3D, R	66 (63)	74 (68)	68 (65)	76 (70)
2	PSA1D, R	65 (63)	73 (68)	67 (64)	75 (70)
	HA2D, R	72 (70)	80 (75)	74 (71)	82 (77)
	HA3D, R	84 (82)	92 (87)	86 (83)	94 (89)
2½	HA2D, R	79 (76)	89 (84)	81 (78)	91 (85)
	HA3D, R	91 (88)	101 (96)	93 (90)	103 (97)
	HA4D, R	122 (119)	132 (127)	124 (121)	134 (128)
	DAP560	229(226)	239(234)	231(228)	241(235)
3	HA2D, R	107 (104)	121 (115)	110 (107)	124 (118)
	HA3D, R	119 (116)	133 (127)	122 (119)	136 (130)
	HA4D, R	150 (147)	164 (158)	153 (150)	167 (161)
	DAP560	257(254)	271(265)	260(257)	274(268)
4	HA2D, R	146 (143)	166 (158)	154 (150)	173 (166)
	HA3D, R	158 (155)	178 (170)	166 (162)	185 (178)
	HA4D, R	189 (186)	209 (201)	197 (193)	216 (209)
	VA5D	291 (288)	311 (303)	299 (295)	318 (311)
	VA5R	316 (313)	336 (328)	324 (320)	343 (336)
	PSA6R	296 (293)	316 (308)	304 (300)	323 (316)
	DAP560	291(288)	311(303)	299(295)	318(311)
	DAP1000	336(333)	356(348)	344(340)	363(356)
6	HA3D,R	307 (304)	332 (325)	324 (320)	349 (342)
	HA4D,R	338 (335)	363 (356)	355 (351)	380 (373)
	VA5D	440 (437)	465 (458)	457 (453)	482 (475)
	VA5R	465 (462)	490 (483)	482 (478)	507 (500)
	PSA6R	445 (442)	470 (463)	462 (458)	487 (480)
	DAP560	440(437)	465(458)	457(453)	482(475)
	DAP1000	480(477)	505(498)	497(493)	522(515)
	DAP1500	610(607)	635(628)	627(623)	652(645)

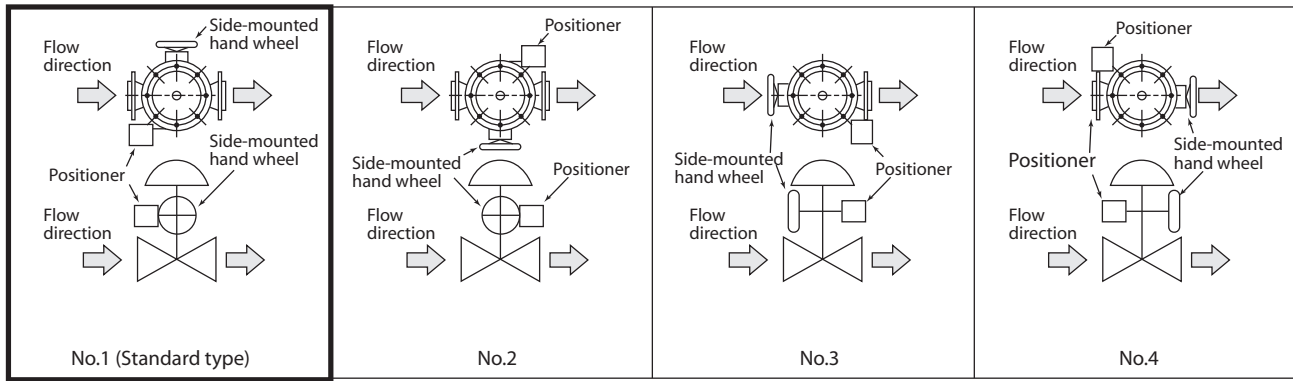
Note) Figures in () are weight for screw-on type jacket connection.

Table 20 Full-jacket type

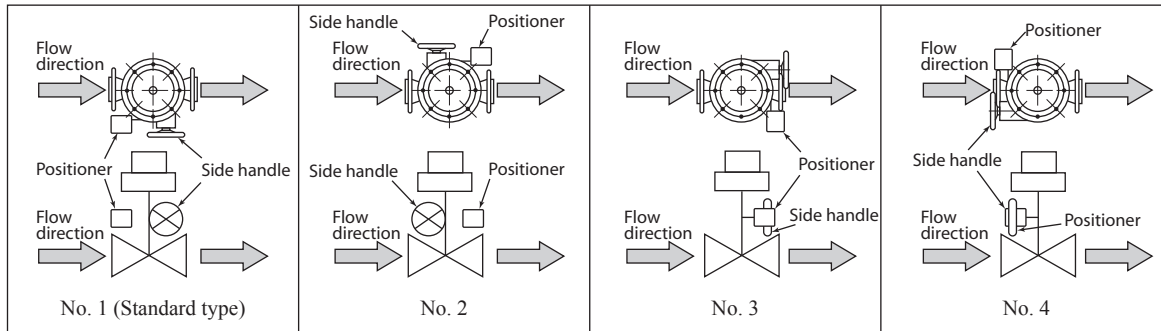
[Unit : kg]

Connection port size (inches)	Actuator Model No.	JIS 10KANSI 150, JPI 150		JIS 16K, JIS 20KANSI 300, JPI 300	
		Plainbonnet	Extension type bonnet	Plainbonnet	Extension type bonnet
2½	PSA1D, R	53 (51)	61 (56)	55 (52)	63 (58)
	HA2D, R	60 (58)	68 (63)	62 (59)	70 (65)
	HA3D, R	72(70)	80 (75)	74 (71)	82 (77)
	DAP560	240(237)	250(244)	249(246)	259(253)
3	PSA1D, R	70 (67)	78 (73)	74 (71)	82 (76)
	HA2D, R	77 (74)	85 (80)	81 (78)	89 (83)
	HA3D, R	89 (86)	97 (92)	93 (90)	101 (95)
	DAP560	269(267)	283(277)	283(281)	297(291)
4	HA2D, R	90 (87)	100 (94)	99 (96)	109 (103)
	HA3D, R	102 (99)	112 (106)	111 (108)	121 (115)
	HA4D, R	133 (130)	143 (137)	142 (139)	152 (146)
6	HA2D, R	164 (161)	184 (176)	183 (179)	202 (195)
	HA3D, R	176 (173)	196 (188)	195 (191)	214 (207)
	HA4D, R	207 (204)	227 (219)	226 (222)	245 (238)
	VA5D	309 (306)	329 (321)	328 (324)	347 (340)
	VA5R	334 (331)	354 (346)	353 (349)	372 (365)
	PSA6R	314 (311)	334 (326)	333 (329)	352 (345)
	DAP560	309(306)	329(321)	328(281)	347(340)
	DAP1000	354(351)	374(366)	373(369)	392(385)
8	HA3D, R	335 (331)	360 (353)	360 (356)	385 (378)
	HA4D, R	366 (362)	391 (384)	391 (387)	416 (409)
	VA5D	468 (464)	493 (486)	493 (489)	518 (511)
	VA5R	493 (489)	518 (514)	518 (514)	543 (536)
	PSA6R	473 (469)	498 (491)	498 (494)	523 (516)
	DAP560	468(464)	493(486)	493(489)	518(511)
	DAP1000	508(504)	533(526)	533(529)	558(551)
	DAP1500	638(634)	663(656)	663(659)	688(681)

Note) Figures in () are weight for screw-on type jacket connection.



(PSA6 Actuator)



(PSA7 and DAP Actuator)

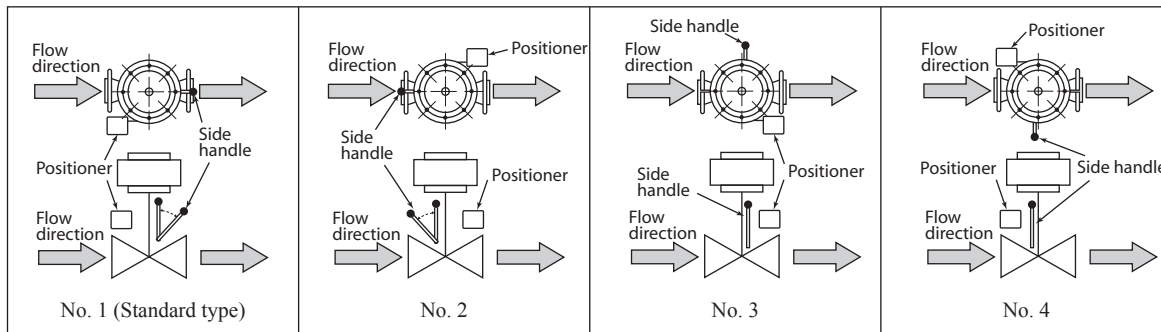


Figure 6 Actuator orientation

Note) 1. Indicate by position number when installation other than the standard type is required.

Ordering information

When ordering, please specify;

- 1) Model number: HTS
- 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) Jacket type, rating, connection, material
- 7) Valve and plug characteristics
- 8) Type of actuator, air pressure to diaphragm
- 9) Valve action (direct or reverse)
- 10) Accessories (positioner, hand wheel, pressure regulator with filter and etc.)
- 10) Special requirement of degreasing, oil/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

Note

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.

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