

Pressure Balanced High-Pressure Cage type Control Valves

Model HPC_ _ _

OVERVIEW

Model HPC Pressure balanced high-pressure cage type Control Valves are design for high temperature, high pressure services. The compact valve body, having a S-shade flow passage that features low pressure loss and a stabilizer that regulates turbulent flow around the cage, allows a large flow capacity and rangeability.

The valve plug is structured in a pressure balanced type that permits flow control of a high differential pressure with a small actuating force. The actuator integrated with simplest mechanisms utilizes a compact yet powerful diaphragm actuator loaded with multiple springs.

The HPC Valves are widely applicable for reliable control of high temperature, high pressure or high differential pressure process lines where dynamic stability, low noise, and cavitation resistance are required.

Model HPC is compliant to Functional Safety Standard (IEC61508).

SPECIFICATIONS

Body

Type

Straight through, cast globe valve

Nominal size

1-1/2, 2, 3, 4, 6, 8 inches

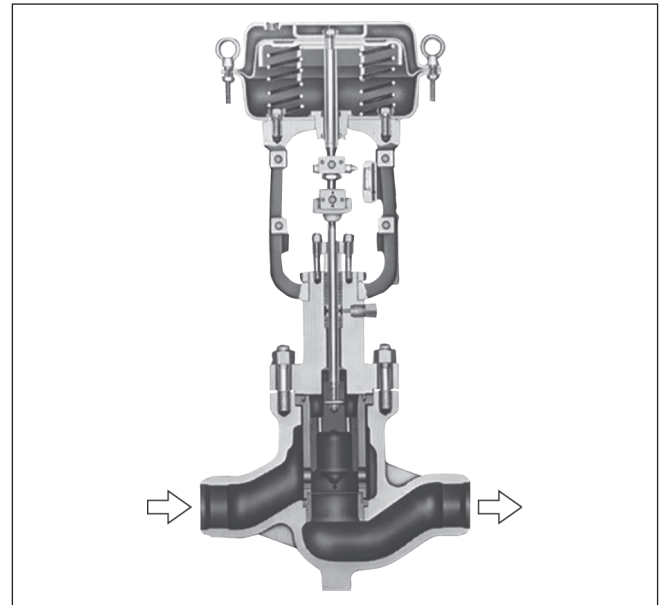
Pressure rating and End connection

Connection type	Pressure rating	Applicable standard
RF	JIS63K	JIS B2210-1984
	ANSI Class 900, 1500, 2500	ANSI B16.5-1981
	JPI Class 900, 1500, 2500	JPI-7S-15-1993
RJ	ANSI Class 900, 1500, 2500	ANSI B16.5-1981
	JPI Class 900, 1500, 2500	JPI-7S-15-1993

Welded end;

SW (1-1/2, 2, 3 inches)

BW (3 to 8 inches)



Material

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

Bonnet

- Plain bonnet (-5 to +230 °C)
- Extension bonnet type 1 (230 to 566 °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 packing is used.

Gasket

Type

Combination of serrated type and flat type

Material

Stainless steel (SUS316) or others

Trim

Valve plug

Pressure balanced type

Cage (split cage)

Equal percentage(%V)

Linear cage (LV)

Material

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

Actuator

Model

Motor type	Actuator Model
Single acting diaphragm actuator	HA__ or VA5_
Spring type piston actuator	PSA6R
Double acting piston actuator	DAP__

Action

Direct or reverse action

Diaphragm

Actuator Model	Diaphragm rubber material
HA__	Cloth embedded ethylene propylene rubber
VA5_	Cloth embedded chloroprene rubber

Spring range

Actuator Model	Spring range
HA__	40 to 200 kPa {0.4 to 2.0 kgf/cm ² }
VA5_	80 to 240 kPa {0.8 to 2.4 kgf/cm ² }
PSA6R	200 to 340 kPa {2.0 to 3.5 kgf/cm ² } 200 to 390 kPa {2.0 to 4.0 kgf/cm ² }

Supply pressure

Actuator Model	Supply pressure
HA__	270 to 390 kPa {2.8 to 4.0 kgf/cm ² }
VA5_	270 kPa {2.8 kgf/cm ² }
PSA6R	400 to 490 kPa {4.0 to 5.0 kgf/cm ² }
DAP	290 to 490 kPa {3.0 to 5.0 kgf/cm ² }

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

Air connection

Model	Spring range
HA__ PSA6R	Rc1/4 or 1/4NPT internal thread
VA5_ DAP__	Rc1/4 or 1/4NPT internal thread (Rc1/2,1/2NPT or Rc3/8,3/8NPT adapter is provided on Rc½ internal thread)

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

Actuator	Positioner		Hand wheel	
	P/P	I/P	Top	Side
HA3_ HA4_ VA5_	HTP	AVP7__ AVP3__ AVP2__	Mounted	Mounted
PSA6R				
DAP__	VPP		-	Mounted (hydraulic)

Additional specification (by special order)

- Special inspection
- Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection, steam inspection.
- With drain plug
- Double gland
- Oil/Water free treatment
- Copper free treatment
- Yoke material SCPH2
- Stainless steel (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 specification

Functional Safety Standard (IEC61508) conformity:

SIL3 capable - certified by exida Consulting LLC

The SIL Certificate is valid with the combination of Model PSA__,HA__, or VA5_ Spring return Actuators.

Performance**Rated Cv value**

Refer to Table 2.

Flow characteristics

Refer to Figure 1.

Inherent rangeability

50 : 1

Optional; 75:1(full port only)

Allowable differential pressure

Refer to Table 5 to Table 13

Leakage specification

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

Metal seat

Standard.....Class III: Leakage less than 0.1% of maximum valve capacity.

Hysteresis and Linearity

Actuator Model	Hysteresis error	Linearity
HA_ _ VA5_ _ DAP_ _ _	±1% F.S. With positioner	±1% F.S. With positioner
PSA6R	±2% F.S. With positioner	±2% F.S. With positioner

Dimensions

Refer to Figure 3, Table 14 and Table 15.

Weight

Refer to Table 16.

Actuator orientation

Refer to Figure 4.

Finish

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

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

Body material		JIS	body	SCPH 2	SCPH 21	SCPH 32	SCPH 61	SCS 13A	SCS 14A
			bonnet	SFVC2A	SFVCF11A	SFVAF22B	SFVAF5B	SUSF304	SUSF316
Trim material		ASTM	body	A216 WCB	A217 WC6	A217 WC9	A217 C5	A351 CF8	A351CF8M*1
			bonnet	A105	A182F11	A182F22	A182F5	A182F304	A182F316
Valve plug	Cage	Seat ring							
SUS 630	SUS 630 (SCS24)*2	SUS 630 (SCS24)*3	-5 to +425	-5 to +425	-5 to +425	-5 to +425	-	-	-
SUS 304 Atomlloy treatment	SUS 304 Atomlloy treatment (SCS 13A Atomlloy treatment)*2	SUS 316 CoCr-A (SCS 14A CoCr-A)*3	-5 to +425	-5 to +500	-5 to +500	-5 to +500	-5 to +500	-5 to +500	-5 to +500*1
SUS 316 CoCr-A	SUS 304 Atomlloy treatment (SCS 13A Atomlloy treatment)*2	SUS 316 CoCr-A (SCS 14A CoCr-A)*3	-5 to +425	-5 to +500	-5 to +500	-5 to +500	-5 to +500	-5 to +500	-5 to +500*1
SUS 316 CoCr-A face	SUS 316 CoCr-A face+Atomlloy treatment (SCS 14A CoCr-A face+ Atomlloy treatment)*2	SUS 316 CoCr-A face (SCS14A CoCr-A face)*3	-5 to +425	-5 to +550	-5 to +556	-5 to +556	-5 to +550	-5 to +550	-5 to +550*1

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

2. *1: For ASTM A351CF8M, the maximum temperature can be +566°C.

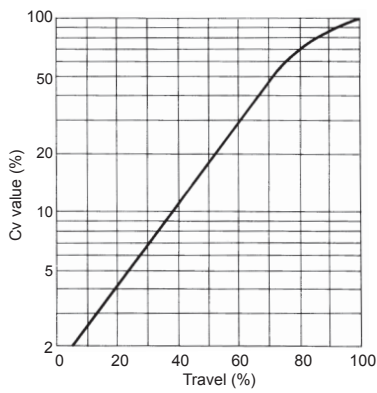
3. *2: When the nominal size is 3 inches or over, the equivalent cast material shown in parenthesis is applied.

4. *3: When the nominal size is 4 inches or over, the equivalent cast material shown in parenthesis is applied.

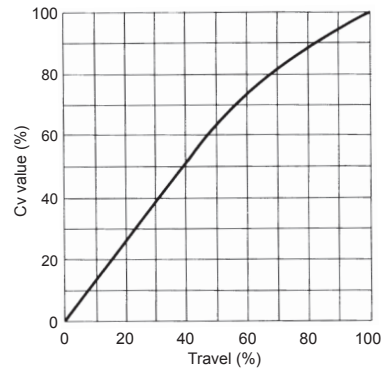
5. The standard material for piston ring is Ni-resist. When a valve needs oil-free treatment or is used for high temperature fluid more than 230°C, the piston ring material is changed to CoCr-E.

Table 2. Cv value and travel

Nominal size (inch)			1-1/2			2			3			4			6			8		
Port size (inch)			1	1-1/4	1-1/2	1-1/4	1-1/2	2	2	2-1/2	3	2-1/2	3	4	4	5	6	5	6	8
Rated Cv value	Equal percentage (%V)	JIS 63K																		
		ANSI 900, 1500 JPI 900, 1500	12	17	25	17	25	52	52	78	110	78	110	180	180	270	375	270	375	650
	Equal percentage (%V)	ANSI 2500 JPI 2500	-	12	17	12	17	31	31	52	78	52	78	125	125	180	270	180	270	470
		JIS63K																		
Equal percentage (%V)	ANSI 900, 1500 JPI 900, 1500	12	20	30	20	30	62	62	90	135	90	135	210	210	330	485	330	485	700	
	ANSI 2500 JPI 2500	-	12	20	12	20	43	43	62	90	62	90	150	150	210	330	210	330	520	
Rated travel (mm)			25						38						50			75		



a. Equal percentage characteristics (%C)



b. Linear characteristics (LC)

Figure 1. Flow characteristics

Note) The above graphs indicate typical flow characteristics.

Structural drawing of trim and body/trim material combinations

Following table shows typical body/trim material combinations.

Please contact us about materials that are not listed in this table.

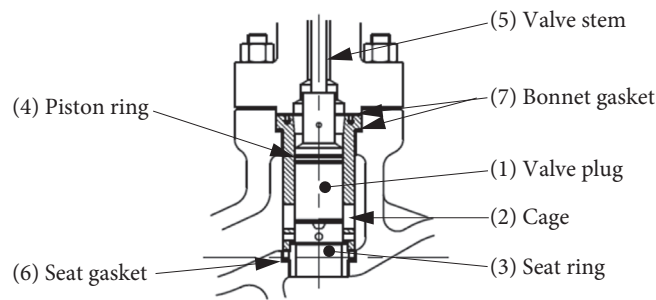


Figure 2. Structural drawing of trim

Table 3. Body material carbon steel (SCPH2/A216WCB or SCPH21/A217WC6)

(1) Plug	SUS630	SUS304 Atomlloy	SUS316 CoCr-A	SUS316 CoCr-A face
(2) Cage *1	SUS630(SCS24)	SUS304(SCS13A) Atomlloy	SUS304(SCS13A) Atomlloy	SUS316(SCS14A) CoCr-A+Atomlloy
(3) Seat ring *2	SUS630(SCS24)	SUS316(SCS14A) CoCr-A	SUS316(SCS14A) CoCr-A	SUS316(SCS14A) CoCr-A face
(4) Piston ring	Ni-resist	Ni-resist	CoCr-E	CoCr-E
(5) Stem	SUS316			
(6) Seat gasket	Nickel-Copper Alloy			
(7) Bonnet gasket	SUS316			

Note) *1 In case of nominal size 3 inches or over, material in parenthesis is used.

*2 In case of nominal size 4 inches or over, material in parenthesis is used.

Table 4. Body material stainless steel(SCS13A/A351CF8 or SCS14A/A351CF8M)

(1) Plug	SUS630	SUS304 Atomlloy	SUS316 CoCr-A	SUS316 CoCr-A face
(2) Cage *1	SUS630(SCS24)	SUS304(SCS13A) Atomlloy	SUS304(SCS13A) Atomlloy	SUS316(SCS14A) CoCr-A+Atomlloy
(3) Seat ring *2	SUS630(SCS24)	SUS316(SCS14A) CoCr-A	SUS316(SCS14A) CoCr-A	SUS316(SCS14A) CoCr-A face
(4) Piston ring	Ni-resist	Ni-resist	CoCr-E	CoCr-E
(5) Stem	SUS316			
(6) Seat gasket	Nickel-Copper Alloy			
(7) Bonnet gasket	SUS316			

Note) *1 In case of nominal size 3 inches or over, material in parenthesis is used.

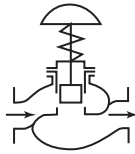
*2 In case of nominal size 4 inches or over, material in parenthesis is used.

Allowable differential pressure

Metal seat (%L, LV) : Graphite packing "P6610CH+P6528" (+230 to +500 °C)

Valves with Model HA, VA or PSA actuator

Table 5. Air-to-close



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }							
				1-1/2	2	3	4	6	8		
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3D	340 {3.5}	80 to 240 {0.8 to 2.4}	25600 {261}	20900 {213}	14000 {142}	10500 {107}	6280 {64.0}	—		
				25900 {264}				6280 {64.0}			
		390 {4.0}		25900 {264}	22800 {232}	15300 {156}	11500 {117}	6280 {64.0}		—	
				25900 {264}	25900 {264}	25500 {260}	18700 {190}	11500 {117}			
	HA4D	340 {3.5}		80 to 240 {0.8 to 2.4}	—	25900 {264}	25900 {264}	19800 {202}	13200 {135}	9320 {95.0}	
					—				20300 {207}		13500 {137}
		390 {4.0}			—	—	—	19800 {202}	13200 {135}	9900 {100}	
					—	—	—	25900 {264}	22200 {226}	15500 {158}	
	VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}		—	—	—	12700 {129}	8490 {86.5}	6380 {65.0}	
	ANSI 2500 JPI 2500	HA3D	340 {3.5}		80 to 240 {0.8 to 2.4}	25600 {261}	20900 {213}	19000 {193}	12800 {130}	7650 {78.0}	—
						27300 {278}				8600 {87.6}	
			390 {4.0}			30000 {305}	22800 {232}	20800 {212}	13900 {141}	8600 {87.6}	
43100 {440}				38100 {388}		34700 {353}	23400 {238}	13100 {133}			
HA4D		340 {3.5}	80 to 240 {0.8 to 2.4}	28300 {288}		28300 {288}	28300 {288}	24100 {245}	14500 {147}	12200 {124}	
				43100 {440}					40200 {409}		36600 {373}
		390 {4.0}		41200 {420}		39500 {402}	36000 {367}	24100 {245}	15000 {152}	13200 {134}	
				43100 {440}		43100 {440}	43100 {440}	42900 {437}	25800 {263}	22200 {226}	
VA5D		270 {2.8}		40 to 200 {0.4 to 2.0}	—	—	—	15400 {157}	9790 {99.8}	8490 {86.5}	

Note) 1. Positioner is employed in general.

2. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).

Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).

Detailed information is available on request.

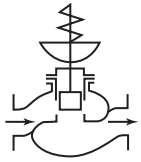
3. Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16.34-1981 or JIS B2201-1984.

4. Take care not to cause the inlet pressure ($P1$) to exceed the allowable differential pressure at full closure.

5. The upper figures denote the operating allowable differential pressure.

The lower denote the allowable differential pressure at full closure.

Table 6. Air-to-open



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }							
				1-1/2	2	3	4	6	8		
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	18400 {187}	14000 {142}	9440 {96.2}	7100 {72.3}	—	—		
	HA4R	270 {2.8}		20700 {211}	20600 {210}	19000 {193}	14300 {145}	8920 {90.9}	5590 {57.0}		
				25900 {264}	25900 {264}						
	VA5R	270 {2.8}		—	—	—	—	—	13500 {137}	9020 {91.9}	6770 {69.0}
									19500 {198}	13100 {133}	9320 {95.0}
	PSA6R	400 {4.0}		200 to 340 {2.0 to 3.5}	—	—	—	25900 {264}	—	—	
500 {5.0}		200 to 390 {2.0 to 4.0}	—	—	—	—	18700 {190}	—			
ANSI 2500 JPI 2500	HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	18400 {187}	14000 {142}	12800 {130}	8640 {88.1}	4300 {43.8}	—		
	HA4R	270 {2.8}		20700 {211}	20600 {210}	20600 {210}	15600 {159}	10800 {110}	8920 {90.9}		
				37000 {377}	28300 {288}	25800 {263}	17400 {177}				
	VA5R	270 {2.8}		—	—	—	—	—	16500 {168}	10200 {104}	9020 {91.9}
									20400 {208}	12900 {131}	11200 {114}
	PSA6R	400 {4.0}		200 to 340 {2.0 to 3.5}	—	—	—	30400 {310}	—	—	
500 {5.0}		200 to 390 {2.0 to 4.0}	—	—	—	43100 {439}	21200 {216}	—			
							36100 {368}	—			

Note) 1. Positioner is employed in general.

2. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
 Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
 Detailed information is available on request.

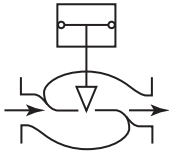
3. Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981 or JIS B2201-1984.

4. Take care not to cause the inlet pressure ($P1$) to exceed the allowable differential pressure at full closure.

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

Valves with Model DAP actuator

Table 7. Air-to-close and Air-to-open



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Differential pressure kPa {kgf/cm ² }	
			6	8
JIS63K ANSI 900, 1500 JPI 900, 1500	DAP560	490 {5.0}	25900 {264}	—
	DAP1000		—	25900 {264}
ANSI 2500 JPI 2500	DAP560		29300 {298}	—
			36700 {374}	
	DAP1000		—	27900 {284}
			—	43100 {439}

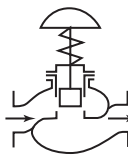
Note) 1. Positioner is employed in general.

2. When a back-up system for pressure drop of supply air source is used, select the allowable differential pressure whichever is lower-constant supplied air pressure or back-up system set pressure (trip pressure).
3. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
Detailed information is available on request.
4. 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.
5. The upper figures denote the operating allowable differential pressure.
The lower denote the allowable differential pressure at full closure.

Metal seat (%L, LV) : Graphite packing "P6610CH+M8590" (+500 to +566 °C)

Valves with Model HA, VA or PSA actuator

Table 8. Air-to-close



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }					
				1-1/2	2	3	4	6	8
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3D	340 {3.5}	80 to 240 {0.8 to 2.4}	21900 {223}	16800 {171}	11200 {114}	8490 {86.5}	5680 {57.9}	—
		390 {4.0}		25900 {264}	22800 {232}	15300 {156}	11500 {117}	6280 {64.0}	—
	HA4D	340 {3.5}	80 to 240 {0.8 to 2.4}	—	25900 {264}	23500 {239}	17700 {180}	11800 {120}	8910 {90.8}
		390 {4.0}		—	—	—	19800 {201}	13200 {134}	9900 {100}
	VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}	—	—	—	7780 {79.3}	5200 {53.0}	3910 {39.8}
		390 {4.0}	—	—	—	—	25900 {264}	21800 {222}	15500 {158}
ANSI 2500 JPI 2500	HA3D	340 {3.5}	80 to 240 {0.8 to 2.4}	21900 {223}	16800 {171}	15300 {156}	10300 {105}	6540 {66.6}	—
		390 {4.0}		30000 {305}	22800 {232}	20800 {212}	13900 {141}	8600 {87.6}	—
				43100 {439}	33900 {345}	30900 {315}	20800 {212}	13100 {133}	—
	HA4D	340 {3.5}	80 to 240 {0.8 to 2.4}	28300 {288}	28300 {288}	28300 {288}	21500 {219}	13600 {138}	11800 {120}
		390 {4.0}		43100 {439}	35100 {357}	31900 {325}			
				41200 {420}	39500 {402}	36000 {367}	24100 {245}	15000 {152}	13200 {134}
	VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}	—	—	—	9470 {96.5}	6000 {61.1}	5200 {53.0}
		390 {4.0}	—	—	—	—	43100 {439}	39800 {405}	25200 {256}

Note) 1. Positioner is employed in general.

2. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).

Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).

Detailed information is available on request.

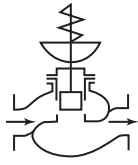
3. Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981 or JIS B2201-1984.

4. Take care not to cause the inlet pressure ($P1$) to exceed the allowable differential pressure at full closure.

5. The upper figures denote the operating allowable differential pressure.

The lower denote the allowable differential pressure at full closure.

Table 9. Air-to-open



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }					
				1-1/2	2	3	4	6	8
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3R	390 {4.0}	80 to 240 {0.8 to 2.4}	13000 {132}	9950 {101}	6680 {68.1}	5020 {51.1}	—	—
	HA4R	390 {4.0}		20700 {211}	20600 {210}	15600 {159}	11700 {119}	7850 {80.0}	5590 {57.0}
			25900 {264}	23200 {236}					
	VA5R	270 {2.8}	70 to 230 {0.7 to 2.3}	—	—	—	7700 {78.5}	5200 {53.0}	3910 {39.8}
	PSA6R	400 {4.0}	200 to 340 {2.0 to 3.5}	—	—	—	25900 {264}	—	—
		500 {5.0}	200 to 390 {2.0 to 4.0}	—	—	—	—	18700 {190}	25900 {264}
ANSI 2500 JPI 2500	HA3R	390 {4.0}	80 to 240 {0.8 to 2.4}	13000 {132}	9950 {101}	9060 {92.3}	6110 {62.3}	3870 {39.4}	—
	HA4R	390 {4.0}		20700 {211}	20600 {210}	20600 {210}	14200 {144}	9050 {92.2}	7850 {80.0}
			30400 {309}	23200 {236}	21100 {215}				
	VA5R	270 {2.8}	70 to 230 {0.7 to 2.3}	—	—	—	9400 {95.8}	6000 {61.1}	5200 {53.0}
	PSA6R	400 {4.0}	200 to 340 {2.0 to 3.5}	—	—	—	27700 {282}	—	—
		500 {5.0}	200 to 390 {2.0 to 4.0}	—	—	—	43100 {439}	21200 {216}	36100 {368}

Note) 1. Positioner is employed in general.

2. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
 Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
 Detailed information is available on request.

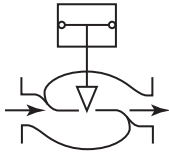
3. Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981 or JIS B2201-1984.

4. Take care not to cause the inlet pressure ($P1$) to exceed the allowable differential pressure at full closure.

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

Valves with Model DAP actuator

Table 10. Air-to-close and Air-to-open



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Differential pressure kPa {kgf/cm ² }	
			6	8
JIS63K ANSI 900, 1500 JPI 900, 1500	DAP560	490 {5.0}	25900 {264.0}	—
	DAP1000		—	25900 {264.0}
ANSI 2500 JPI 2500	DAP560		27700 {282}	—
			43100 {439.0}	
	DAP1000		—	31900 {319.0}
			—	43100 {439.0}

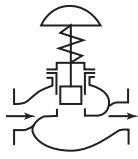
Note) 1. Positioner is employed in general.

2. When a back-up system for pressure drop of supply air source is used, select the allowable differential pressure whichever is lower-constant supplied air pressure or back-up system set pressure (trip pressure).
3. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
Detailed information is available on request.
4. 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.
5. The upper figures denote the operating allowable differential pressure.
The lower denote the allowable differential pressure at full closure.

Metal seat (%L, LV) : PTFE packing

Valves with Model HA, VA or PSA actuator

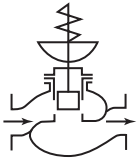
Table 11. Air-to-close



Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }						
				1-1/2	2	3	4	6	8	
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3D	270 {2.8}	40 to 200 {0.4 to 2.0}	15000 {153}	11400 {116}	7650 {78.0}	5690 {58.0}	—	—	
				25900 {264}	18600 {190}	11100 {113}	7260 {74.0}	—	—	
		290 {3.0}		80 to 240 {0.8 to 2.4}	15000 {153}	11400 {116}	7650 {78.0}	5690 {58.0}	—	—
					25900 {264}	24300 {248}	14900 {152}	10100 {103}	—	—
		340 {3.5}	80 to 240 {0.8 to 2.4}	25600 {261}	22800 {233}	15300 {156}	11500 {117}	6280 {64.0}	—	
				25900 {264}	25900 {264}	16900 {172}	11600 {118}	6280 {64.0}	—	
		390 {4.0}	80 to 240 {0.8 to 2.4}	25900 {264}	22800 {233}	15300 {156}	11500 {117}	7650 {78.0}	—	
				25900 {264}	25900 {25.9}	25900 {264}	18700 {191}	11500 {117}	—	
	HA4D	270 {2.8}	40 to 200 {0.4 to 2.0}	20700 {211}	19700 {201}	13200 {135}	9900 {100}	6570 {67.0}	4900 {50.0}	
				25900 {264}	25900 {264}	22300 {227}	15600 {159}	8920 {91.0}	5590 {57.0}	
		290 {3.0}		80 to 240 {0.8 to 2.4}	25800 {263}	19700 {201}	13200 {135}	9900 {100}	6570 {67.0}	4900 {50.0}
					25900 {264}	25900 {264}	25900 {264}	20600 {210}	12200 {125}	8140 {83.0}
		340 {3.5}	80 to 240 {0.8 to 2.4}	—	25900 {264}	25900 {264}	19800 {202}	13200 {135}	9320 {95.0}	
				—	25900 {264}	25900 {264}	23000 {235}	13900 {142}	9320 {95.0}	
		390 {4.0}	80 to 240 {0.8 to 2.4}	—	—	—	19800 {202}	13200 {135}	9900 {101}	
				—	—	—	25900 {264}	22200 {226}	15500 {158}	
	VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}	—	—	—	13500 {138}	9020 {92.0}	6770 {69.0}	
				—	—	—	22900 {234}	13800 {141}	9320 {950}	
	ANSI 2500 JPI 2500	HA3D	270 {2.8}	40 to 200 {0.4 to 2.0}	15000 {153}	11400 {116}	10400 {106}	6960 {71.0}	4310 {44.0}	—
					25900 {264}	18600 {190}	16600 {169}	9710 {99.0}	4410 {45.0}	—
290 {3.0}			80 to 240 {0.8 to 2.4}		15000 {153}	11400 {116}	10400 {106}	6960 {71.0}	4310 {44.0}	—
					33200 {339}	24300 {248}	21800 {222}	13200 {135}	6570 {67.0}	—
340 {3.5}			80 to 240 {0.8 to 2.4}	25600 {261}	22800 {233}	20800 {212}	13900 {142}	7650 {78.0}	—	
				37000 {377}	27200 {277}	24400 {249}	15000 {153}	7650 {78.0}	—	
390 {4.0}			80 to 240 {0.8 to 2.4}	30000 {30}	22800 {233}	20800 {212}	13900 {142}	8630 {88.0}	—	
				43100 {440}	41500 {423}	37400 {381}	23700 {242}	13100 {134}	—	
HA4D		270 {2.8}	40 to 200 {0.4 to 2.0}	20700 {211}	19700 {201}	17900 {183}	12100 {123}	7450 {76.0}	6570 {67.0}	
				43100 {440}	35200 {359}	31800 {324}	19900 {203}	10800 {110}	8920 {91.0}	
		290 {3.0}		80 to 240 {0.8 to 2.4}	25800 {263}	19700 {201}	17900 {183}	12100 {123}	7450 {76.0}	6570 {67.0}
					43100 {440}	35200 {359}	40700 {415}	26000 {265}	14500 {148}	12200 {125}
		340 {3.5}	80 to 240 {0.8 to 2.4}	28300 {289}	19700 {201}	28300 {289}	24100 {246}	15000 {153}	13200 {135}	
				43100 {440}	43100 {440}	43100 {440}	28900 {295}	16400 {167}	13900 {142}	
		390 {4.0}	80 to 240 {0.8 to 2.4}	41200 {420}	39500 {403}	36000 {367}	24100 {246}	15000 {153}	13200 {135}	
				43100 {440}	43100 {440}	43100 {440}	43100 {440}	25800 {263}	22200 {226}	
VA5D		270 {2.8}	40 to 200 {0.4 to 2.0}	—	—	—	16500 {168}	10200 {104}	9020 {92.0}	
				—	—	—	28800 {294}	16300 {166}	13800 {141}	

- Note) 1. " — " shows a model with standard actuator.
2. Positioner is employed in general.
3. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$). Detailed information is available on request.
4. 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.
5. Take care not to cause the inlet pressure ($P1$) to exceed allowable differential pressure at full closure.
6. The upper figures denote the operating allowable differential pressure. The lower denote the allowable differential pressure at full closure.

Table 12. Air-to-open



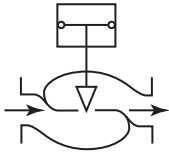
Rating	Actuator model	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure (by nominal size(inches)) kPa {kgf/cm ² }					
				1-1/2	2	3	4	6	8
JIS63K ANSI 900, 1500 JPI 900, 1500	HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	15000 {153}	11400 {116}	7650 {78.0}	5690 {58.0}	—	—
				25900 {264}	18600 {190}	11100 {113}	7260 {74.0}		
		290 {3.0}		18600 {190}	17200 {175}	11100 {113}	7260 {74.0}	—	—
				25900 {264}	18600 {190}				
		340 {3.5}		—	22800 {233}	—	—	—	—
				—	25900 {264}	—	—	—	—
	HA4R	270 {2.8}	80 to 240 {0.8 to 2.4}	20700 {211}	19700 {201}	13200 {135}	9900 {110}	6570 {67.0}	4900 {50.0}
				25900 {264}	25900 {264}	22300 {227}	15600 {159}	8920 {91.0}	5590 {57.0}
		290 {3.0}		—	20600 {210}	19900 {203}	14900 {152}	8920 {91.0}	5590 {57.0}
				25900 {264}	22300 {227}	15600 {159}	8920 {91.0}	5590 {57.0}	
		340 {3.5}		—	—	20600 {210}	15600 {159}	—	—
				—	22300 {227}	15600 {159}	—	—	
VA5R	270 {2.8}	40 to 200 {0.4 to 2.0}	—	—	—	13500 {138}	9020 {92.0}	6770 {69.0}	
PSA6R	400 {4.0}	200 to 340 {2.0 to 3.5}	—	—	—	22900 {234}	13800 {141}	9320 {95.0}	
	500 {5.1}	200 to 390 {2.0 to 4.0}	—	—	—	25900 {264}	—	—	
ANSI 2500 JPI 2500	HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	15000 {153}	11400 {116}	10400 {106}	6960 {71.0}	4310 {44.0}	—
				25900 {264}	18600 {190}	16600 {169}	9710 {99.0}	4410 {45.0}	—
		290 {3.0}		18600 {190}	17200 {175}	15600 {159}	9710 {99.0}	4310 {44.0}	—
				25900 {264}	18600 {190}	16600 {169}		4410 {45.0}	—
		340 {3.5}		—	18500 {189}	16600 {169}	—	—	—
				—	18600 {190}	—	—	—	
	HA4R	270 {2.8}	80 to 240 {0.8 to 2.4}	20700 {211}	19700 {201}	18500 {189}	12100 {123}	7450 {76.0}	6570 {67.0}
				43100 {440}	35200 {359}	31800 {324}	19900 {203}	10800 {110}	8920 {91.0}
		290 {3.0}		—	20600 {210}	20600 {210}	1800 {184}	10800 {110}	8920 {91.0}
				35200 {359}	31800 {324}	19900 {203}			
		340 {3.5}		—	—	—	19900 {203}	—	—
				—	—	—	—	—	
	VA5R	270 {2.8}	80 to 240 {0.4 to 2.0}	—	—	—	24.1 {246}	—	—
	PSA6R	390 {4.0}	200 to 340 {2.0 to 3.5}	—	—	—	35500 {362}	—	—
		490 {5.0}	200 to 390 {2.0 to 4.0}	—	—	—	43100 {440}	—	—
	—	—	—	—	—	—	21200 {216}	—	—
	—	—	—	—	—	—	36100 {368}	—	—

Note) 1. “” shows a model with standard actuator.

2. Positioner is employed in general.
3. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
Detailed information is available on request.
4. 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.
5. Take care not to cause the inlet pressure ($P1$) to exceed allowable differential pressure at full closure.
6. The upper figures denote the operating allowable differential pressure. The lower denote the allowable differential pressure at full closure.

Valves with Model DAP actuator

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



Rating	Actuator model	Supply pressure Nominal size(inch)	290 kPa {kgf/cm ² }	390 kPa {kgf/cm ² }	490 kPa {kgf/cm ² }
			Differential pressure kPa {kgf/cm ² }		
JIS63K ANSI 900, 1500 JPI 900, 1500	DAP 560	6	19400 {198}	25900 {264}	25900 {264}
			23700 {242}	25900 {264}	25900 {264}
19400 {198}			25900 {264}	32400 {330}	
27600 {281}			38100 {389}	43100 {440}	
ANSI 2500 JPI 2500	DAP 1000	8	18700 {191}	2500 {255}	25900 {264}
			25900 {264}	25900 {264}	25900 {264}
18800 {192}			25000 {255}	31300 {319}	
43100 {440}			43100 {440}	43100 {440}	

Note) 1. Positioner is employed in general.

2. In case a back-up system is used for pressure drop of supply air, select the allowable differential pressure whichever is lower-the operating supply air pressure or the back-up system set pressure (trip pressure).

3. Allowable differential pressure at valve-close in the above table is under the condition of $\Delta P \approx P1$ ($P2 \approx 0$).
Allowable differential pressure at full closure varies depending on the outlet pressure ($P2$).
Detailed information is available on request.

4. 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.

5. Take care not to cause the inlet pressure ($P1$) to exceed the allowable differential pressure at full closure.

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

Dimensions

Table 14. Face-to-face dimensions

[Unit:mm]

Nominal size (inch)	A						
	JIS 63K	ANSI 900, JPI 900		ANSI 1500, JPI 1500		ANSI 2500, JPI 2500	
	RF	RF(SW,BW)	RJ	RF(SW,BW)	RJ	RF(SW,BW)	RJ
1-1/2	323	333	333	333	333	358	361
2	354	375	378	375	378	400	403
3	431	440	443	460	463	498	504
4	496	510	513	530	533	575	585
6	699	715	718	770	776	820	833
8	895	915	918	972	982	1020	1036

Table 15. External dimensions

[Unit:mm]

Nominal size (inch)	Actuator model	H						B	C	E		
		JIS 63K ANSI 900 JPI 900		ANSI 1500 JPI 1500		ANSI 2500 JPI 2500				JIS 63K ANSI 900 JPI 900	ANSI 1500 JPI 1500	ANSI 2500 JPI 2500
		Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet					
1-1/2	HA 3D, R	735	875	735	875	780	725	363	350	100	105	115
	HA 4D, R	890	1030	890	1030	935	1080	520	470			
2	HA 3D, R	765	925	765	925	300	960	353	350	110	120	130
	HA 4D, R	925	1085	925	1085	960	1120	520	470			
3	HA 3D, R	800	980	800	980	835	1005	363	350	140	150	165
	HA 4D, R	960	1140	960	1140	995	1165	520	470			
4	HA 3D, R	835	1015	835	1015	880	1050	363	350	160	170	195
	HA 4D, R	995	1175	995	1175	1040	1210	520	470			
	VA 5D	1380	1560	1380	1560	1425	1595	—	620			
	VA 5R	1490	1670	1490	1670	1535	1705	—	620			
	PSA 6R	1324	1504	1324	1504	1369	1539	—	475			
6	HA 3D, R	895	1075	895	1075	935	1110	363	350	210	225	260
	HA 4D, R	1055	1235	1055	1235	1095	1270	520	470			
	VA 5D	1440	1620	1440	1620	1480	1655	—	620			
	VA 5R	1550	1730	1550	1730	1590	1765	—	620			
	PSA 6R	1395	1575	1395	1575	1435	1610	—	476			
	DAP560	—	—	—	—	—	—	—	—			
8	HA 4D, R	1155	1395	1155	1395	1185	1370	520	470	280	290	330
	VA 5D	1545	1785	1545	1785	1575	1760	—	620			
	VA 5R	1655	1895	1655	1895	1685	1870	—	620			
	DAP1000	—	—	—	—	—	—	—	—			

“H” dimensions are applicable when hand wheel is not provided. When top-mounted hand wheel HA or VA actuators or side-mounted hand wheel PSA6R is used, add the hand wheel dimensions designated in respective specification sheets (No. SS2-8213-0500 for model HA actuators, No. SS2-8210-0100 for model VA, SS2-PSA100-0100 for model PSA).

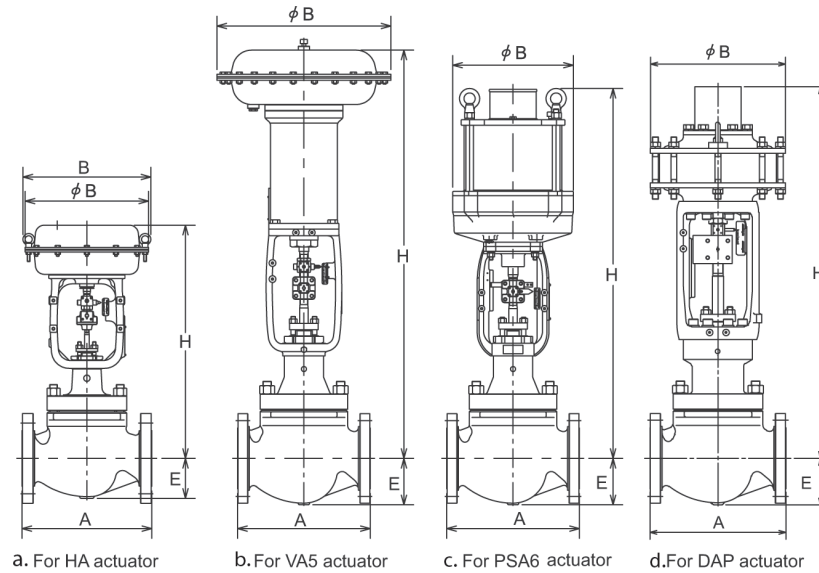


Figure 3. Face-to-face and other dimensions

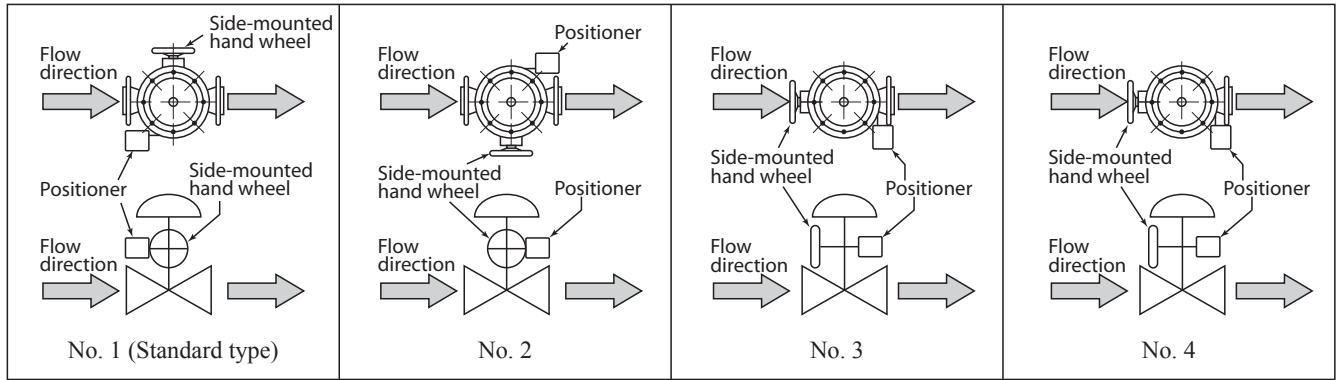
Table 16. Weight

[Unit:kg]

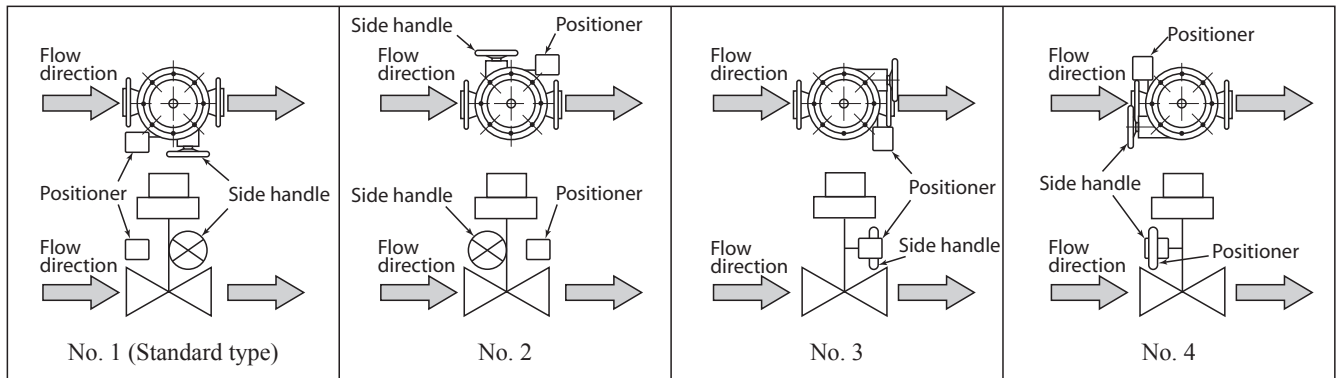
Nominal size (inch)	Actuator model	Weight (Flanged connection)						Weight (Welded connection)					
		JIS63K, ANSI 900 JPI 900		ANSI 1500 JPI 1500		ANSI 2500 JPI 2500		JIS63K, ANSI 900 JPI 900		ANSI 1500 JPI 1500		ANSI 2500 JPI 2500	
		Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet	Plain bonnet	Extention bonnet
1-1/2	HA 3D, R	60 (55)	65 (60)	65	70	90	95	50	55	55	60	75	80
	HA 4D, R	90 (85)	95 (90)	95	100	125	130	80	85	85	90	405	110
2	HA 3D, R	70 (65)	80 (75)	75	85	110	120	55	65	60	70	85	95
	HA 4D, R	100 (95)	110 (105)	105	115	140	150	85	95	90	100	115	125
3	HA 3D, R	105 (100)	115 (110)	140	160	225	245	85	95	110	30	170	190
	HA 4D, R	135 (130)	145 (140)	170	190	255	275	115	125	140	160	200	220
4	HA 3D, R	135 (125)	160 (150)	195	225	315	345	105	130	155	185	230	260
	HA 4D, R	165 (155)	190 (180)	225	255	345	375	135	160	185	215	260	290
	VA 5D	265 (255)	290 (280)	325	355	445	475	235	260	285	315	360	390
	VA 5R	290 (280)	315 (305)	350	380	470	500	260	285	310	340	385	415
	PSA 6R	270 (260)	275 (285)	330	360	450	480	240	265	290	320	365	395
6	HA 3D, R	345 (330)	380 (365)	525	570	85	915	285	320	435	480	660	700
	HA 4D, R	395 (360)	410 (395)	555	600	905	945	315	350	465	510	690	730
	VA 5D	475 (460)	510 (495)	655	700	1005	1045	415	450	565	610	790	830
	VA 5R	500 (485)	535 (520)	680	725	1030	1070	440	475	590	635	815	855
	PSA 6R	480 (465)	515 (500)	660	705	1010	1050	420	455	470	615	795	835
	DAP560	—	—	—	—	—	—	—	—	—	—	—	—
8	HA 4D, R	633 (598)	678 (643)	65	1115	1500	1545	535	580	580	958	1193	1240
	VA 5D	735 (700)	780 (745)	1165	1215	1600	1645	635	680	680	1060	1295	1340
	VA 5R	760 (725)	805 (770)	1190	1240	1625	1670	660	705	705	1085	1320	1365
	DAP1000	—	—	—	—	—	—	—	—	—	—	—	—

Note) Parenthesized figures denote the weight under JIS 63K.

(HA and VA5 Actuator)



(PSA6 Actuator)



(DAP Actuator)

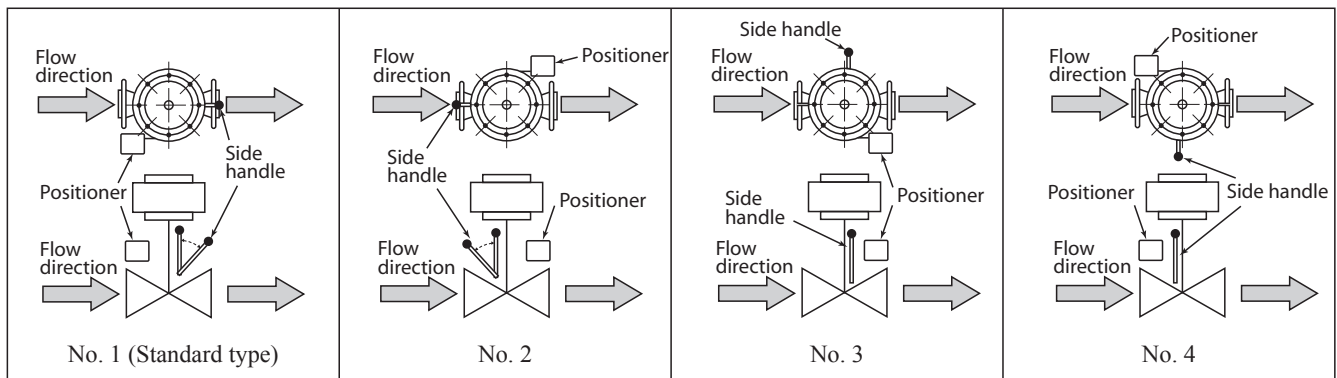


Figure 4. Actuator orientation

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

2. With Type PSA6R and DAP actuators, the side mounted hand wheel is mounted on the same side as the positioner.

Note

Note

Ordering Information

When ordering, please specify;

- 1) Model Number: HPC_ _ _
- 2) Nominal size × Cv value
- 3) Type and rating of end connections
- 4) Body and trim material, necessity of hardening
- 5) Valve and plug characteristics
- 6) Type of bonnet
- 7) Type of actuator and air to diaphragm
- 8) Valve action (direct or reverse)
- 9) Accessories (positioner, hand wheel, pressure regulator and etc.)
- 10) Special requirement of degreasing, copper free 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

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<https://www.azbil.com/products/factory/order.html>

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