Pressure-Balanced Cage type Control Valve

Model ACP_ _ _

OVERVIEW

The model ACP pressure-balanced cage type control valves are designed for heavy duty service.

The valve plug employs a pressure balance function to control high differential pressure fluid with small actuator force.

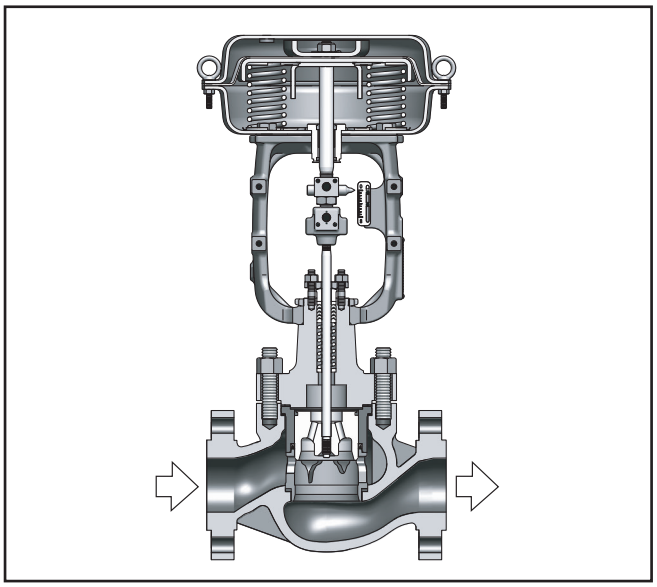
The ACP_ _ _ realizes seat leakage performance as single seat valve by seal-ring structure.

In addition, the ACP_ _ _ is equipped the cage plug with a scraper ring to prevent a malfunction caused by foreign object enter between the cage plug and the cage.

The actuator is adopted a compact and powerful diaphragm motor.

The ACP_ _ _ is widely applicable for reliable control of high or low temperature, high differential pressure process lines where dynamic stability, dynamic stability, low noise, anti-cavitation/flashing are required.

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



SPECIFICATIONS

Body

Type

Straight-through, cast globe valve

Nominal size

1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12 inches

Pressure rating and End connection

Connection type	Pressure rating	Applicable standard	
		8 inches or less	10, 12 inches
FF	JIS10K	JIS B2210-1984	JIS B2212-1972
	ANSI Class 125	ANSI B16.5-1981	ANSI B16.5-1968
	JPI Class125	JPI-7S-15-1993	—
RF	JIS10K	JIS B2210-1984	JIS B2212-1972
	JIS20K		JIS B2214-1967
	JIS30K		JIS B2215-1967
	ANSI Class 150, 300, 600	ANSI B16.5-1981	ANSI B16.5-1968
	JPI Class 150, 300, 600	JPI-7S-15-1993	JPI-7S-15-1993
RJ, LG	ANSI Class 150, 300, 600	ANSI B16.5-1981	ANSI B16.5-1968
	JPI Class 150, 300, 600	JPI-7S-15-1993	JPI-7S-15-1993
Tongue and groove (groove) Male and female (female)	JIS16K, 20K, 30K, 40K	JIS B2202-1984	—

- Welded end; SW (1-1/2, 2 inches), BW (2-1/2 to 8 inches)

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1, Table 5, Table 6, Table 7 and Table 8.

Bonnet

Plain bonnet	−17 to +230 °C	—
Extension bonnet Type 1	−45 to −17 °C +230 to +400 °C	—
Extension bonnet Type 2*	−100 to −45 °C	Integral cast type
	−196 to −100 °C	Welded type
Bellows type	−50 to +350 °C	Formed or welded bellows Detail is showing in Fig. 3

Note: 1. Take care not to exceed the operating temperature ranges specified for respective materials.

*2. * Nominal size 10 and 12 inches are optional specification.*

Gland type

Bolted gland

Grease

- Grease not provided
  V shaped PTFE* packing or PTFE* yarn packing
- Grease provided
  Graphite packing

** PTFE: Polytetrafluoroethylene*

Gasket

	General/Low temp.	High temperature	Oil free treatment
Between body and bonnet	Serrated gasket V543	Serrated gasket V543	Serrated gasket (PTFE coating) V543 (PTFE)
For upper cage	Serrated gasket V543	Serrated gasket V543	Serrated gasket (PTFE coating) V543 (PTFE)
For bottom cage	Spiral wound gasket V8590F	Not necessary	Spiral wound gasket V7590

Trim

Valve plug

Single seated pressure balanced type

Cage

- High-flow characteristics
  - Metal seat (For flow characteristics, refer to Figure 1.)
  - Equal percentage (%V)
  - Linear (LV)

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1, Table 5, Table 6, Table 7 and Table 8.

Note: For fluid conditions that require CoCr-A, refer to Figure 2.

Actuator

Model

Single acting diaphragm actuator	HA_ _, VA5_
Spring type piston actuator	PSA6R / PSA7R
Double acting piston actuator	DAP560

Action

Direct or reverse action

Diaphragm

Actuator Model	Material
HA_ _	Cloth embedded ethylene propylene rubber
VA5_	Cloth embedded chloroprene rubber

Spring range

Actuator Model	Spring range
HA_ _	20 to 98 kPa {0.2 to 1.0 kgf/cm^2} 80 to 240 kPa {0.8to 2.4 kgf/cm^2}
VA5_	40 to 200 kPa {0.4 to 2.0 kgf/cm^2} 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 3.9 kgf/cm^2}
PSA7R	200 to 340 kPa {2.0 to 3.5 kgf/cm^2}

Supply pressure

Actuator Model	Supply pressure
HA_ _	140 to 390 kPa {1.4 to 4.0 kgf/cm^2}
VA5_	270 kPa {2.8 kgf/cm^2}
PSA6R	400, 500 kPa {4, 5 kgf/cm^2}
PSA7R	400, 500 kPa {4, 5 kgf/cm^2}
DAP560	500 kPa {5 kgf/cm^2}

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

Air connection

Actuator Model	Connection
HA_ _	Rc1/4 or 1/4NPT internal thread
PSA6R PSA7R VA5_ DAP560	Standard : Rc1/4 or 1/4NPT internal thread Rc1/4 or 1/4NPT is adapter use on Rc1/2 in 1/2NPT internal thread. Option : Rc3/8 or 3/8NPT adapter is possible R1/2 or 1/2NPT is possible without adapter.

Ambient temperature

−30 to +70 °C

Valve action

Air-to-close (Direct action actuator is combined.)
Air-to-open (Reverse action actuator is combined.)

Functional Safety Standard (IEC61508) conformity:

SIL3 capable - certified by exida Consulting LLC

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

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

<table>
<tr><th rowspan="2">Actuator Model</th><th colspan="2">Positioner</th><th colspan="2">Hand wheel</th></tr>
<tr><th>P/P</th><th>I/P</th><th>Top</th><th>Side</th></tr>
<tr><td>HA2 to 4</td><td rowspan="2">HTP-_ _</td><td rowspan="4">AVP7_ _
AVP3_ _
AVP2_ _</td><td rowspan="2">Mounted</td><td rowspan="3">Mounted</td></tr>
<tr><td>VA5</td></tr>
<tr><td>PSA6R</td><td>HTP-_ _
VPP0_ - _</td><td rowspan="3">—</td></tr>
<tr><td>PSA7R</td><td rowspan="2">VPP0_ - _</td><td rowspan="2">Mounted (Hydraulic)</td></tr>
<tr><td>DAP560</td></tr>
</table>

Additional specifications (by special order)

- Special inspection
  Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection, steam inspection, low-temperature inspection
- With drain plug
- Double gland
- Oil/water free treatment
- Copper free treatment
- Stainless steel (SUS304) atmospheric-exposed nuts and bolts
- Yoke material SCPH2
- Special air piping and joint
- Sand-/dust preventive measure
- Saline damage countermeasure
- Cold-area use specification
- Tropical-area use specification
- Vacuum service

Performance

Rated Cv value

Refer to Table 2 and Table 3.

Flow characteristics

Refer to Figure 1.

Inherent range ability

- 50 : 1
- Optional 75 : 1 for full port size

Allowable differential pressure

Temperature range	Refer to Table
−196 to +230 °C	Table 9 and Table 10
+230 to +400 °C	Table 11 and Table 12

Leakage specification

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

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

0.05 % of maximum valve capacity.

Refer to following table about combination of port size and seat leakage specification.

Operating temperature	Nominal size (inch)	Port size	Seat leakage
−196 to +230 °C	1-1/2 to 12	Full	Class IV: 0.01 % of Cv value
		Reduced	
+230 to +400 °C	1-1/2 , 2	Full	0.05 % of Cv value
		Reduced	—
	2-1/2, 3	Full	Class IV: 0.01 % of Cv value
		Reduced	—
	4 to 12	Full	Class IV: 0.01 % of Cv value
		Reduced	

Hysteresis error

Actuator Model	HA_ _, VA5_, DAP560	PSA6R/7R
Without positioner	± 3 %F.S.	± 9 %F.S.
With positioner	± 1 %F.S.	± 2 %F.S.

Linearity

Actuator Model	HA_ _, VA5_, DAP560	PSA6R/7R
Without positioner	± 5 %F.S.	± 9 %F.S.
With positioner	± 1 %F.S.	± 2 %F.S.

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

Dimensions

Refer to Figure 6, Table 13 and Table 14.

Weight

Refer to Table 15.

Actuator orientation

Refer to Figure 7.

Finish

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

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

Trim material \ Body material		JIS	SCPH2	SCPH21	SCS61	SCPL1	SCS13A	SCS14A
		ASTM	A216WCB	A217WC6	A217C5	A352LCB	A351CF8	A351CF8M
ASTM	A351CF8M*		−5 to +230	−5 to +230	−5 to +230	−45 to +230	−196 to +230	−196 to +230
ASTM	A351CF8M* CoCr-A		−5 to +400	−5 to +400	−5 to +400	−45 to +350	−196 to +400	−196 to +400
JIS	SCS24		−5 to +400	−5 to +400	−5 to +400	−5 to +350	—	—

** Equivalent to SCS14A.*

Cv value and travel

Table 2. CV value and travel (temperature range: −45 to +230 °C)

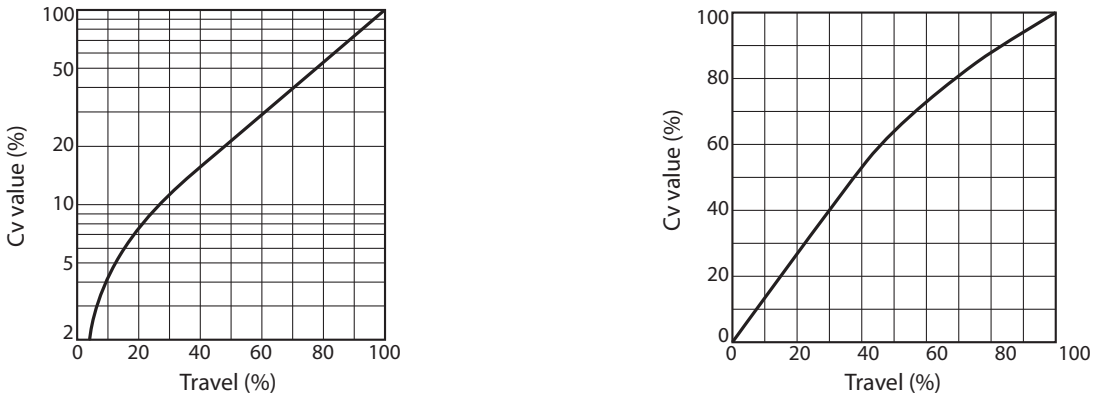
Nominal size (inch)		1-1/2			2			2-1/2			3			4		
Port size (inches)		1	1-1/4	1-1/2	1-1/4	1-1/2	2	1-1/2	2	2-1/2	2	2-1/2	3	2-1/2	3	4
Rated Cv value	%V	10	26	29	18	31	56	23	40	78	59	78	110	63	103	158
	LV	—	—	34	—	—	60	—	—	81	—	—	115	—	—	203
Rated travel (mm)		25			25			38			38			38		

Nominal size (inch)		5			6			8			10			12		
Port size (inches)		3	4	5	4	5	6	5	6	8	6	8	10	8	10	12
Rated Cv value	%V	88	175	250	179	261	322	275	360	610	395	750	1000	800	1000	1440
	LV	—	—	250	—	—	371	—	—	795	—	—	1000	—	—	1440
Rated travel (mm)		50			50			75			100			100		

Table 3. CV value and travel (temperature range: +230 to +400 °C)

Nominal size (inch)		1-1/2			2			2-1/2			3			4		
Port size (inches)		1	1-1/4	1-1/2	1-1/4	1-1/2	2	1-1/2	2	2-1/2	2	2-1/2	3	2-1/2	3	4
Rated Cv value	%V	—	—	29	—	—	56	—	—	78	—	—	110	63	103	158
	LV	—	—	24	—	—	52	—	—	78	—	—	110	63	103	150
Rated travel (mm)		25			25			38			38			38		

Nominal size (inch)		5			6			8			10			12		
Port size (inches)		3	4	5	4	5	6	5	6	8	6	8	10	8	10	12
Rated Cv value	%V	99	175	250	179	261	322	275	360	610	395	750	1000	800	1200	1440
	LV	99	175	250	179	261	350	275	360	600	—	—	1000	—	—	1440
Rated travel (mm)		50			50			75			100			100		



a. Equal percentage characteristics (%V) b. Linear characteristics (LV)

Figure 1. Flow characteristics

Note: The above graphs indicate typical flow characteristics.

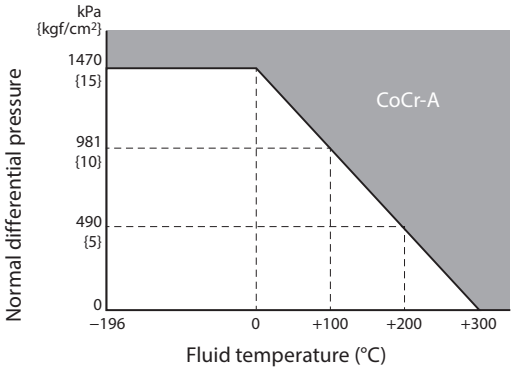


Figure 2. Temperature/normal differential pressure ranges requiring CoCr-A

Note: For cavitation/flashing service or oil free service, CoCr-A is recommended regardless of temperature and differential pressure.

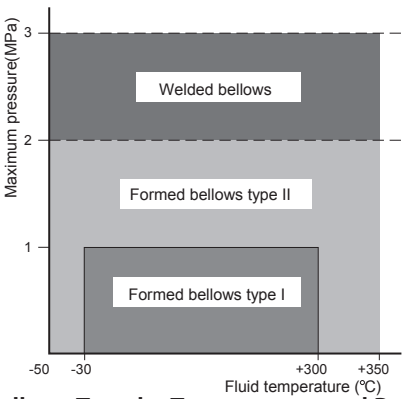


Figure 3. Bellows Type by Temperature and Pressure Ranges

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.

Table 4. Gland packing

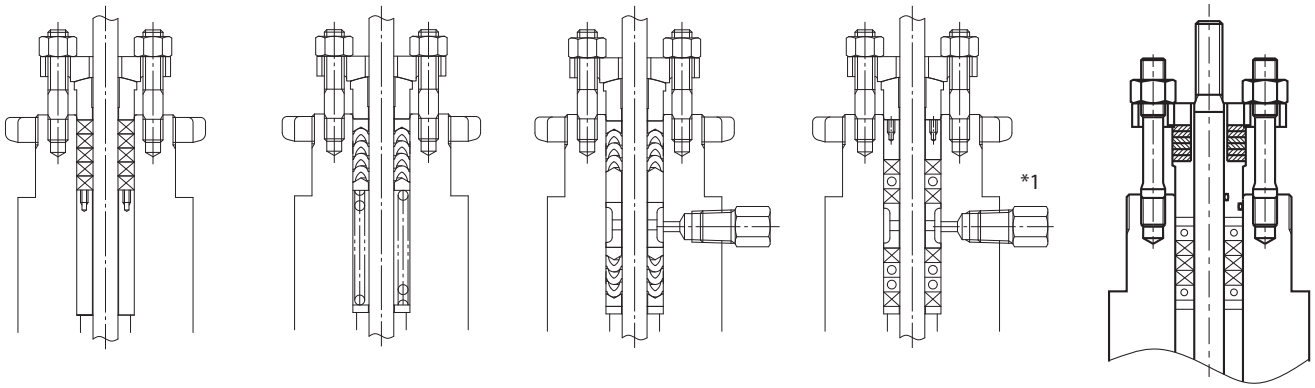
According to your application, select appropriate type of gland packing from the following:

Application	Packing Type	Fluid temperature range Maximum working pressure
General use (Various chemical, acid and alkali)	PTFE fiber yarn packing with carbon fiber core packing [P4519]	-17 to +230 °C 10MPa Max.
General use or oil free (Various chemical, acid and alkali)	V shaped pure PTFE packing [Pure PTFE]	-196 to + 230 °C 10MPa Max.
Vacuum and General use or oil free (Various chemical, acid and alkali)	V shaped pure PTFE packing (Dir. + Rev.) [Pure PTFE (Dir. + Rev.)]	-196 to +230 °C 10MPa Max.
Low or standard temperature (Various chemical, acid and alkali, LNG, etc.)	V shaped pure PTFE packing + PTFE fiber yarn packing or PTFE braided packing [Pure PTFE +PTFE fiber]	-196 to +230 °C 10MPa Max.
High temperature	Expanded graphite packing + Expanded graphite yarn packing *1 [P6610CH+P6528]	+230 to +500 °C 43MPa Max.
	Expanded graphite packing + Carbon fiber reinforced expanded graphite packing *1 [P6610CH+M8590]	+500 to +566 °C 43MPa MAX.
Measures against VOC *2 exhaust regulation [ISO15848-1 compliant low emission packing system]	Packing with Live Load structure *3	-17 to +350 °C 15.5 MPa Max.

*1. *Grease provided*
It cannot be applied to PSA1 actuator (spring range 20 to 98 kPa).

*2. *Volatile Organic Compound*

*3. *Refer to special spec sheet No.SS2-SSL100-0100 about detail of Low emission gland packing.*



For general use [P4519]

For general use or oil free [V shaped pure PTFE]

For vacuum and general use or oil free [V shaped pure PTFE (Dir.+Rev.)]

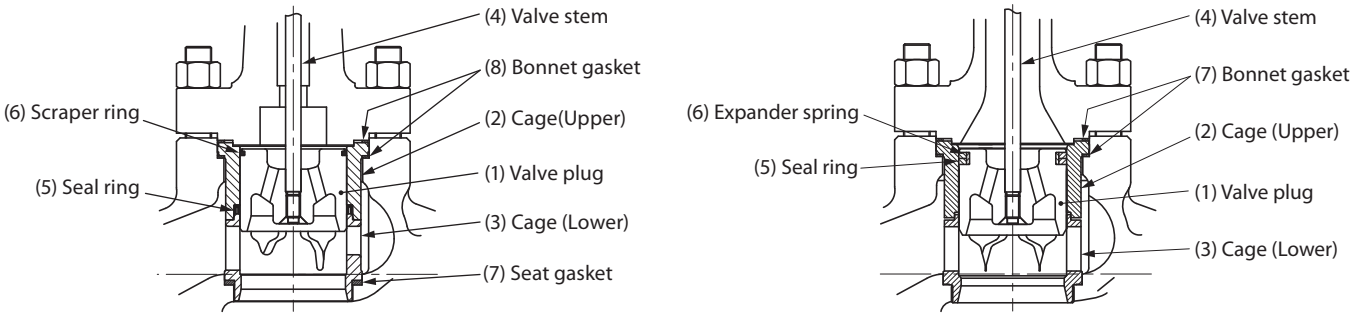
For high temperature [P6610CH+P6528]
*1 Grease provided by lubricator

Measures against VOC exhaust regulation [Packing with Live Load structure]

Figure 4. Gland Packing structure

Structural drawing of trim and body/trim material combinations

Following table shows typical body/trim material combinations. Please contact us about materials not listed in this table.



a. Plain bonnet b. Extension bonnet type 1

Figure 5. Structural drawing of trim

Table 5. The valve body material is carbon steel (SCPH2/A216WCB), and bonnet type is plain.

(1) Valve plug	A351CF8M	SCS24	A351CF8M CoCr-A
(2) Cage (Upper)	A351CF8M	SCS24	A351CF8M
(3) Cage (Lower)	A351CF8M/SUS316	SCS24	A351CF8M/SUS316 CoCr-A
(4) Valve stem	SUS316		
(5) Seal ring	MoS2-inserted PTFE, ASTM B574 (Hastelloy C-276 equivalent) with spring		
(6) Scraper ring	Carbon-inserted PTFE		
(7) Seat gasket	General		Oil free
	Spiral gasket (hoop: SUS316, filler: inorganic paper)		Spiral gasket (hoop: SUS316, filler: PTFE)
(8) Bonnet gasket	SUS316		SUS316 (PTFE coating)

Table 6. The valve body material is carbon steel (SCPH2/A216WCB), and bonnet type is extension type 1 for high temperature.

(1) Valve plug	A351CF8M CoCr-A
(2) Cage(Upper)	A351CF8M
(3) Cage(Lower)	SUS316 CoCr-A
(4) Valve stem	SUS316
(5) Seal ring	Carbon impregnated with antimony
(6) Expander spring	Nickel based super alloy
(7) Bonnet gasket	SUS316

Table 7. valve body material is stainless steel (SCS13A/A351CF8 of SCS14A/A351CF8M), and bonnet type is plain.

(1) Valve plug	A351CF8M	A351CF8M CoCr-A
(2) Cage (Upper)	A351CF8M	A351CF8M
(3) Cage (Lower)	A351CF8M/SUS316	A351CF8M/SUS316 CoCr-A
(4) Valve stem	SUS316	
(5) Seal ring	MoS2-inserted PTFE, ASTM B574 (Hastelloy C-276 equivalent) with spring	
(6) Scraper ring	Carbon-inserted PTFE	
(7) Seat gasket	General	Oil free
	Spiral gasket (hoop: SUS316, filler: inorganic paper)	Spiral gasket (hoop: SUS316, filler: PTFE)
(8) Bonnet gasket	SUS316	SUS316 (PTFE coating)

Table 8. The valve body material is carbon steel (SCS13A/A351CF8 of SCS14A/A351CF8M), and bonnet type is extension type 1 for high temperature.

(1) Valve plug	A351CF8M CoCr-A
(2) Cage(Upper)	A351CF8M
(3) Cage(Lower)	SUS316 CoCr-A
(4) Valve stem	SUS316
(5) Seal ring	Carbon impregnated with antimony
(6) Expander spring	Nickel based super alloy
(7) Bonnet gasket	SUS316

Allowable differential pressure (Temperature range: –45 to +230°C)

Metal seat (%V, LV): PTFE packing

Table 9. Air-to-close

Actuator Model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure (by Nominal size (inch)) kPa {kgf/cm²}									
				1-1/2	2	2-1/2	3	4	5	6	8	10	12
HA2D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920 {40.0}	2300 {23.5}	1310 {13.4}	540 {5.5}	—	—	—	—	—	—
				3950 {40.3}	2300 {23.5}	1310 {13.4}	540 {5.5}	—	—	—	—	—	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3920 {40.0}	3760 {38.3}	2720 {27.8}	1240 {12.6}	—	—	—	—	—
				7900 {80.6}	5380 {54.9}	3920 {40.0}	2720 {27.8}	1240 {12.6}	—	—	—	—	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	—	—	—	—	—
				9810 {100.0}	9810 {100.0}	9810 {100.0}	9810 {100.0}	9810 {100.0}	—	—	—	—	—
HA3D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920 {40.0}	3920 {40.0}	3920 {40.0}	2890 {29.5}	1470 {15.0}	—	—	—	—	—
				8760 {89.3}	6810 {69.4}	4640 {47.3}	2890 {29.5}	1470 {15.0}	—	—	—	—	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2050 {20.9}	1560 {15.9}	—	—	—
				9810 {100.0}	9810 {100.0}	9280 {94.6}	6750 {68.8}	4400 {44.9}	2050 {20.9}	2070 {21.1}	—	—	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	—	—	—
				—	—	9810 {100.0}	9810 {100.0}	9810 {100.0}	9810 {100.0}	9810 {100.0}	—	—	—
HA4D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	—	—	—	—	3920 {40.0}	2660 {27.1}	1900 {19.4}	1020 {10.4}	—	—
				—	—	—	—	5070 {51.7}	2660 {27.1}	2680 {27.3}	1450 {14.8}	—	—
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	3450 {35.2}	2280 {23.2}	—	—
				—	—	—	—	9810 {100.0}	6210 {63.3}	6250 {63.7}	4360 {44.5}	—	—
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	—	—
				—	—	—	—	9810 {100.0}	9810 {100.0}	9810 {100.0}	9810 {100.0}	—	—
VA5D	270 {2.8}	40 to 200 {0.4 to 2.0}	✓	—	—	—	—	—	—	—	—	2000 {20.4}	1.09 {11.1}
				—	—	—	—	—	—	—	—	4.62 {47.1}	3.64 {37.1}
DAP 560	500 {5.0}	–	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9810 {100.0}

Table 10. Air-to-open

Actuator Model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure (by Nominal size (inch)) kPa {kgf/cm²}									
				1-1/2	2	2-1/2	3	4	5	6	8	10	12
HA2R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2840 {29.0}	—	—	—	—	—
				9810 {100.0}	8450 {86.2}	6540 {66.7}	4890 {49.9}	2890 {29.5}	—	—	—	—	—
HA3R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	1750 {17.8}	1360 {13.9}	—	—	—	—	—	—	—	—
				1750 {17.8}	1360 {13.9}	—	—	—	—	—	—	—	—
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	2460 {25.1}	—	—	—
				—	9810 {100.0}	9810 {100.0}	9810 {100.0}	7340 {74.8}	4110 {41.9}	4140 {42.2}	—	—	—
HA4R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3540 {36.1}	—	—
				—	—	—	—	9810 {100.0}	9750 {99.4}	9810 {100.0}	7270 {74.1}	—	—
VA5R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	—	—	—	2450 {25.0}	1470 {15.0}
				—	—	—	—	—	—	—	—	5840 {59.6}	4220 {43.0}
PSA6R	500 {5.0}	200 to 390 {0.2 to 4.0}	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9810 {100.0}
PSA7R	400 {4.0}	200 to 340 {0.2 to 3.5}	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9810 {100.0}

Note: 1. "▭" shows 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. Combination of supply pressure 140 kPa and without positioner is able to be selected only for ON-OFF application.

Allowable differential pressure (Temperature range: +230 to +400°C)

Metal seat (%V, LV): Graphite packing "P6610CH+P6528"

Table 11. Air-to-close

Actuator Model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure (by Nominal size (inch)) kPa {kgf/cm²}									
				1-1/2	2	2-1/2	3	4	5	6	8	10	12
HA3D	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	—	—	—
				9810 {100.0}	9810 {100.0}	9630 {98.2}	9240 {94.2}	7600 {77.4}	7600 {77.4}	4290 {43.7}	—	—	—
HA4D	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	—	—
				—	—	—	—	9810 {100.0}	9810 {100.0}	9050 {92.2}	7040 {71.7}	—	—
VA5D	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	—	—	—	3060 {31.2}	1280 {13.1}
				—	—	—	—	—	—	—	—	4360 {44.5}	3630 {37.0}
DAP 560	500 {5.0}	—	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9810 {100.0}

Table 12. Air-to-open

Actuator Model	Supply pressure kPa {kgf/cm²}	Spring range kPa {kgf/cm²}	Positioner	Differential pressure (by Nominal size (inch)) kPa {kgf/cm²}									
				1-1/2	2	2-1/2	3	4	5	6	8	10	12
HA3R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3420 {34.8}	3030 {30.8}	3030 {30.8}	3030 {30.8}	1730 {17.6}	—	—	—
				5760 {58.7}	4470 {45.5}						—	—	—
HA4R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	3920 {40.0}	3920 {40.0}	3760 {38.3}	2930 {29.8}	—	—
				—	—	—	—	6670 {68.0}	6670 {68.0}			—	—
VA5R	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	—	—	—	3920 {40.0}	2110 {21.5}
				—	—	—	—	—	—	—	—	4060 {41.4}	2110 {21.5}
PSA6R	400 {4.0}	200 to 340 {2.0 to 3.5}	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9700 {98.9}
PSA7R	400 {4.0}	200 to 340 {2.0 to 3.5}	✓	—	—	—	—	—	—	—	—	3920 {40.0}	3920 {40.0}
				—	—	—	—	—	—	—	—	9810 {100.0}	9810 {100.0}

Note: 1. "▭" shows 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.

DIMENSIONS

Table 13. Face-to-face dimensions

Unit: mm

Nominal size (inch)	A							
	JIS 10KFF, RF ANSI 125FF ANSI 150RF JPI 150RF	JIS 16KRF	JIS 20KRF JIS 30KRF ANSI 300RF JPI 300RF	JIS 40KRF ANSI 600RF JPI 600RF	JIS 16K	JIS 20K	JIS 30K	JIS 40K
					Tongue and groove, male and female			
1-1/2	222	231	235	251	235	236	248	251
2	254	263	267	286	265	267	276	286
2-1/2	276	288	292	311	290	292	303	311
3	298	313	317	337	310	317	326	337
4	352	364	368	394	360	368	379	394
5	403	425	425	457	—	—	—	—
6	451	465	473	508	475	473	486	508
8	543	560	568	610	570	568	580	610
10	673	708	708	752	—	—	—	—
12	737	775	775	819	—	—	—	—

Nominal size (inch)	A							
	ANSI 150RJ JPI 150RJ	ANSI 300RJ JPI 300RJ	ANSI 600RJ JPI 600RJ	ANSI 300LG JPI 300LG	ANSI 600LG JPI 600LG	ANSI 150 JPI 150 SW, BW	ANSI 300 JPI 300 SW, BW	ANSI 600 JPI 600 SW, BW
1-1/2	235	248	251	244	248	251	251	251
2	267	283	289	276	283	286	286	286
2-1/2	289	308	314	302	308	311	311	311
3	311	333	340	327	333	337	337	337
4	365	384	397	378	391	394	394	394
5	416	441	460	441	460	425	425	457
6	464	489	511	483	505	473	508	508
8	556	584	613	578	606	568	610	610
10	686	724	756	—	—	—	—	—
12	749	791	822	—	—	—	—	—

Table 14. External dimensions

Unit: mm

Nominal size (inch)	Actuator Model	H					B	ϕB	E
		Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2		Bellows bonnet			
				Integral cast type	Welded type				
1 -1/2	HA2D, R	500	665	780	1020	660	281	267	70
	HA3D, R	590	760	875	1140	750	363	350	
2	HA2D, R	500	670	785	1025	660	281	267	80
	HA3D, R	595	760	875	1140	750	363	350	
2 -1/2	HA2D, R	575	745/755	880	1130	795	281	267	90
	HA3D, R	630	800/810	930	1180	850	363	350	
3	HA2D, R	580	755/765	900	1135	800	281	267	100
	HA3D, R	635	810/820	955	1190	855	363	350	
4	HA2D, R	610	810/820	915	1150	830	281	267	115
	HA3D, R	660	860/870	1020	1205	880	363	350	
	HA4D, R	890	1100/1110	1255	1520	—	520	470	
5	HA3D, R	775	925	1265	1365	855	363	350	141
	HA4D, R	945	1095	1435	1535	1005	520	470	
6	HA3D, R	785	1020/1045	1250	1385	1075	363	350	170
	HA4D, R	955	1190/1215	1425	1570	1245	520	470	
8	HA4D, R	1090	1350	1580	1710	1340	520	470	220
	VA5D	1475	1740	2025	2155	—	—	620	
	VA5R	1585	1850	2145	2275	—	—	620	
10	VA5D	1760	2015	*	—	—	—	620	300
	VA5R	1890	2145	*	—	—	—	620	
	PSA6R	1815	2070	*	—	—	—	476	
	PSA7R	*	*	*	—	—	—	580	
	DAP560	1545	1800	*	—	—	—	380	
12	VA5D	1810	1960	*	—	—	—	620	325
	VA5R	1940	2090	*	—	—	—	620	
	PSA6R	1865	2015	*	—	—	—	476	
	PSA7R	*	*	*	—	—	—	580	
	DAP560	1595	1745	*	—	—	—	380	

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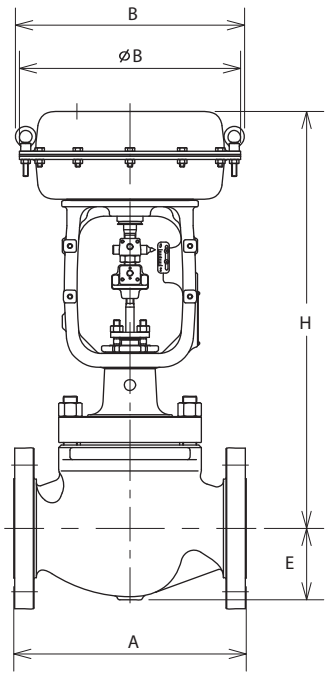

Figure 6. Face-to-face and other dimensions

Table 15. Weight

Unit: kg

Nominal size (inch)	Actuator Model	Weight							
		Flange type: JIS 10K, ANSI/JPI 150				Flange type: JIS 16K, 20K, 30K, ANSI/JPI 300			
		Plain bonnet	Extension Type 1 Bellows type	Extension Type 2		Plain bonnet	Extension Type 1 Bellows type	Extension Type 2	
				Integral cast type	Welded type			Integral cast type	Welded type
1-1/2	HA2D, R	31	34	37	39	36	39	42	44
	HA3D, R	43	46	49	51	48	51	54	56
2	HA2D, R	37	40	43	45	42	45	48	50
	HA3D, R	49	52	55	57	54	57	60	62
2-1/2	HA2D, R	43	47	51	53	48	52	56	58
	HA3D, R	55	59	63	65	60	64	68	70
3	HA2D, R	53	59	65	68	63	69	75	78
	HA3D, R	65	71	77	80	75	81	87	90
4	HA2D, R	63	73	78	81	78	88	93	96
	HA3D, R	75	85	90	93	90	100	105	108
	HA4D, R	106	116	121	124	121	131	136	139
5	HA3D, R	132	140	154	157	142	150	164	167
	HA4D, R	168	176	190	193	178	186	200	203
6	HA3D, R	157	172	179	182	187	201	209	212
	HA4D, R	188	203	210	213	218	233	240	243
8	HA4D, R	268	288	298	303	318	338	348	353
	VA5D	370	390	400	405	420	440	450	455
	VA5R	395	415	425	430	445	465	475	480
10	VA5D	560	600	*	*	690	710	*	*
	VA5R	585	625	*	*	715	735	*	*
	PSA6R	*	*	*	*	*	*	*	*
	PSA7R	*	*	*	*	*	*	*	*
	DAP560	*	*	*	*	*	*	*	*
12	VA5D	750	780	*	*	900	920	*	*
	VA5R	775	805	*	*	925	945	*	*
	PSA6R	*	*	*	*	*	*	*	*
	PSA7R	*	*	*	*	*	*	*	*
	DAP560	*	*	*	*	*	*	*	*

Nominal size (inch)	Actuator Model	Weight							
		Flange type: JIS 40K, ANSI/JPI 600				Welded type: JIS 10K, 16K, 20K, 30K, ANSI/JPI 150, 300, 600			
		Plain bonnet	Extension Type 1 Bellows type	Extension Type 2		Plain bonnet	Extension Type 1 Bellows type	Extension Type 2	
				Integral cast type	Welded type			Integral cast type	Welded type
1-1/2	HA2D, R	44	47	50	52	36	39	42	44
	HA3D, R	56	59	62	64	64	51	54	56
2	HA2D, R	47	50	53	55	42	45	48	50
	HA3D, R	59	62	65	67	54	57	60	62
2-1/2	HA2D, R	65	69	73	75	48	52	56	58
	HA3D, R	77	81	85	87	60	64	68	70
3	HA2D, R	85	91	97	100	63	69	75	78
	HA3D, R	97	103	109	112	75	81	87	90
4	HA2D, R	113	123	128	131	75	85	90	93
	HA3D, R	125	135	140	143	87	97	102	105
	HA4D, R	156	166	171	174	118	128	133	136
5	HA3D, R	187	195	209	212	135	143	157	160
	HA4D, R	223	231	245	258	168	179	190	193
6	HA3D, R	237	252	259	262	177	192	199	202
	HA4D, R	268	283	290	293	208	223	230	233
8	HA4D, R	438	458	468	473	308	328	338	343
	VA5D	540	560	570	575	410	430	440	445
	VA5R	565	585	595	600	435	455	465	470
10	VA5D	750	780	*	*	*	*	*	*
	VA5R	775	805	*	*	*	*	*	*
	PSA6R	*	*	*	*	*	*	*	*
	PSA7R	*	*	*	*	*	*	*	*
	DAP560	*	*	*	*	*	*	*	*
12	VA5D	1000	1100	*	*	*	*	*	*
	VA5R	1025	1125	*	*	*	*	*	*
	PSA6R	*	*	*	*	*	*	*	*
	PSA7R	*	*	*	*	*	*	*	*
	DAP560	*	*	*	*	*	*	*	*

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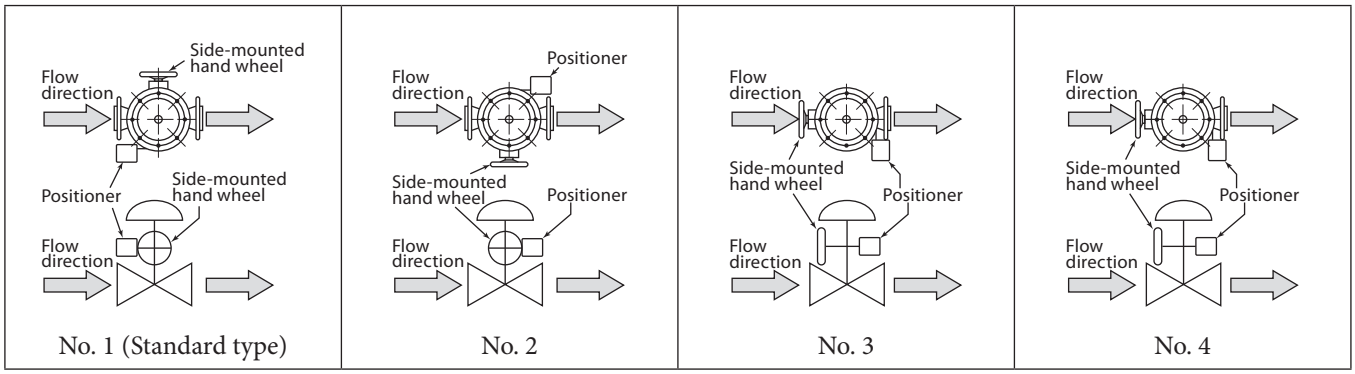
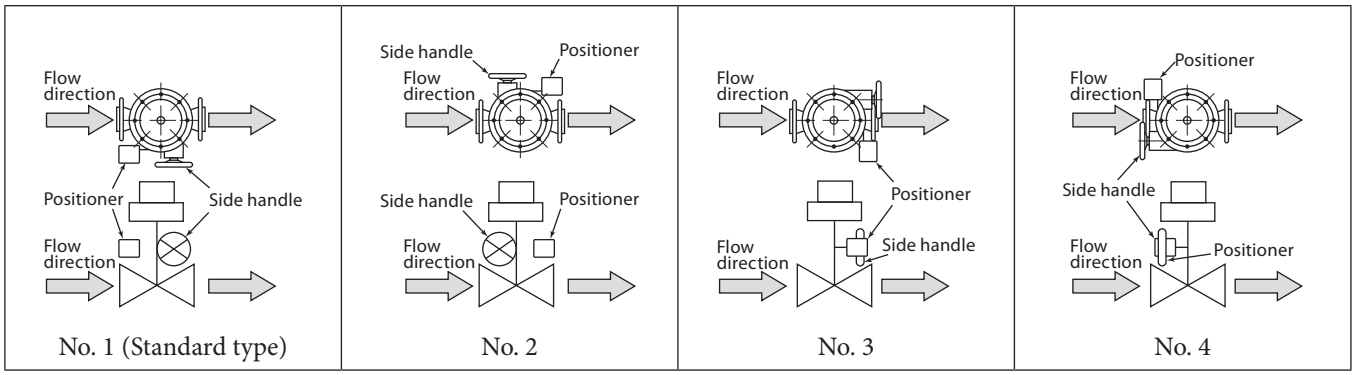
(HA and VA5 Actuator)



(PSA6R Actuator)



(PSA7R and DAP560 Actuator)

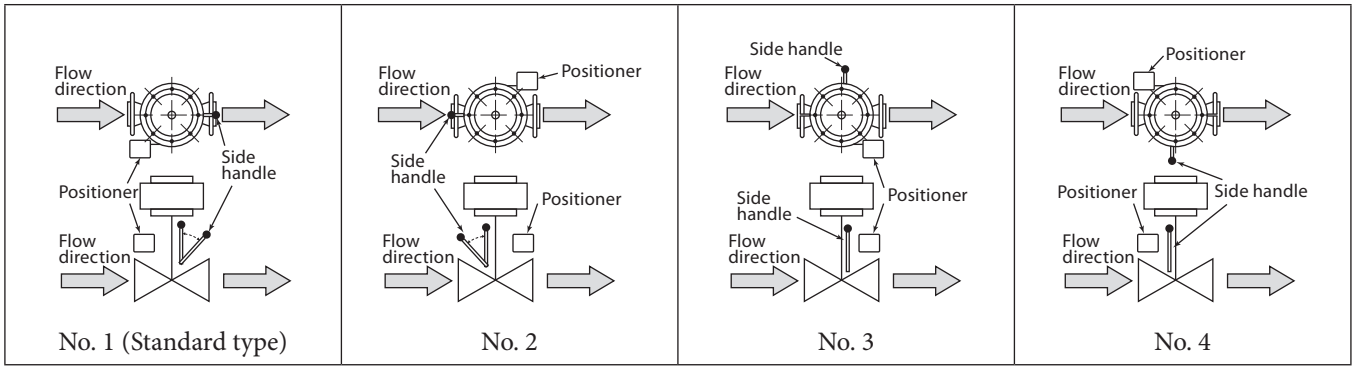


Figure 7. Actuator orientation

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

Ordering Information

When ordering, please specify;

1) Model Number: ACP
2) Nominal size X Port size
3) Type and rating of end connections
4) Body and trim material, necessity of hardening
5) Type of bonnet
6) Valve and plug characteristics
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 degreasing, free from copper 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

Please read “Terms and Conditions” from the following URL before ordering and use.

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

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