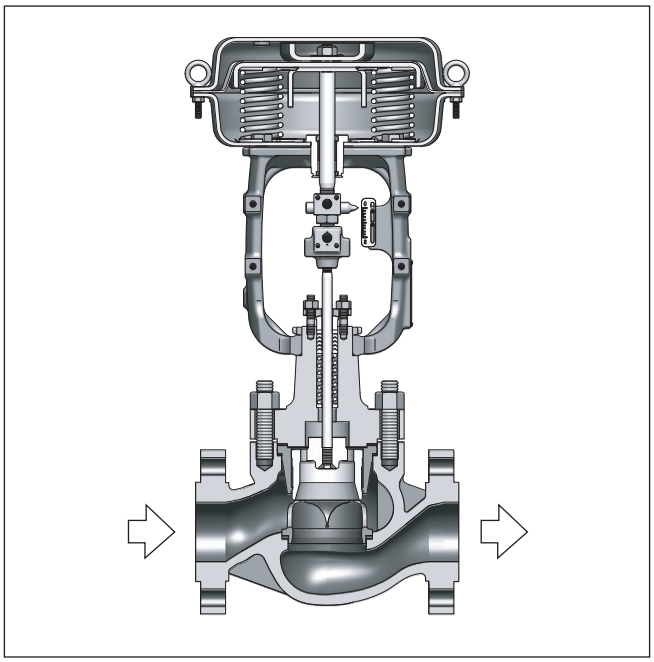
Pressure Balanced Cage type Control Valve

Model HCB_ _ _

OVERVIEW

Model HCB Pressure Balanced Cage Type Control Valves are designed for heavy duty services. The compact valve body, having a S-shape flow passage that features low pressure loss and a stabilizer that regulates turbulent flow around the cage, allows a large flow capacity, rangeability, and high accuracy flow characteristics.
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 model HCB valves are widely applicable for reliable control of high or low temperature, high pressure or high differential pressure process lines where dynamic stability, low noise, and cavitation/ flashing resistance are required.
Model HCB 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, 6, 8 inches

Pressure rating and End connection

Connection type	Pressure rating	Applicable standard
FF	JIS10K	JIS B2210-1984
	ANSI Class 125	ANSI B16.5-1981
	JPI Class 125	JPI-7S-15-1993
RF	JIS10K, 16K, 20K, 30K, 40K	JIS B2210-1984
	ANSI Class 150, 300, 600	ANSI B16.5-1981
	JPI Class150, 300, 600	JPI-7S-15-1993
RJ, LG	ANSI Class 150, 300, 600	ANSI B16.5-1981
	JPI Class 150, 300, 600	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 .

Bonnet

Plain bonnet	-17 to 230 °C	
Extension bonnet type 1	-45 to -17 °C and 230 to 566 °C	
Extension bonnet type 2	-100 to -45 °C	Integral cast type
	-196 to -100 °C	Welded type
Bellows type	For operating temperature and pressure range, refer to Fig.3	

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 spiral wound type (integral cage),
Serrated type (split cage)
Material
Stainless steel (SUS316, SUS316L, SUS329J1), copper, aluminum

Trim

Valve plug

Pressure balanced type

Cage

- High-capacity characteristics type
  (For flow characteristics, refer to Figure 1.)
  -Metal seat: Equal percentage (%V)
  Linear (LV)
  -Soft seat: Equal percentage (%T)
  Linear (LT)
- High-flow characteristics type
  (For flow characteristics, refer to Figure 2.)
  -Metal seat: Equal percentage (%VF)
  Linear (LVF)
  -Soft seat: Equal percentage (%TF)
  Linear (LTF)

Note) 1.For cage design (integral cage or splie cage) refer to Table 1.

2.For operating temperature and maximum differential pressure range of soft-seat type, refer to Figure 4.

Material

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

Note) For fluid conditions that require CoCr-A, refer to Figure 5.

Actuator

Actuator type	Actuator model
Single acting diaphragm actuator	PSA1_ HA_ _ VA5_
Spring Type piston actuator	PSA6R

Action

Direct or reverse action

Diaphragm

Actuator model	Diaphragm material
PSA1_ HA_ _	Cloth embedded ethylene propylene rubber
VA5_	Cloth-embedded chloroprene rubber

Spring range

Actuator model	Spring range
PSA1_ HA_ _ VA5_	20 to 98 kPa {0.2 to 1.0 kgf/cm^2}, 40 to 120 kPa {0.4 to 1.2 kgf/cm^2} 80 to 240 kPa {0.8 to 2.4 kgf/cm^2}
PSA6R	200 to 340kPa {2.0 to 3.5 kgf/cm^2} 200 to 390kPa {2.0 to 4.0 kgf/cm^2}

Supply pressure

Actuator model	Supply pressure
PSA1_ HA_ _	140 to 390 kPa {1.4 to 4.0 kgf/cm^2}
VA5_	140 to 270 kPa {1.4 to 2.8 kgf/cm^2}
PSA6R	400 or 500 kPa {4 to 5kgf/cm^2}

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

Air connection

Actuator model	Connection
PSA1_ HA_ _	Rc1/4 or 1/4NPT
VA5_ PSA6R	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.)

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 Model	Positioner		Hand wheel	
	P/P	I/P	Top	Side
PSA1	VPE_ _-_	AVP20_ AVP30_ AVP70_	Mounted	Mounted
HA2_ HA3_ HA4_ VA5_	HTP_ _			
PSA6R	HTP_ _ VPP_ _-_		—	

Additional specification (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
- York material SCPH2 (York material of PSA1 is SCPH2 as standard.)
- Stainless steel (SUS304) atmosphere-exposed nuts and bolts
- Special air piping and joint
- Sand-/dust-preventive measure
- Saline damage countermeasure
- Cold-area use specifications
- Tropical-area use specifications
- Vacuum service

Functional Safety Standard (IEC61508) conformity:

SIL3 capable - certified by exida Consulting LLC

Performance

Rated Cv value

Refer to Table 2.

Flow characteristics

Refer to Figure 1 and Figure 2.

Inherent rangeability

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

Allowable differential pressure

Refer to Table 8 to Table 15.

Leakage specification

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

- Metal seat
  Standard...Class II: Leakage less than 0.5% of maximum valve capacity.
  Option.....Class III: Leakage less than 0.1% of maximum valve capacity.

Note) If you require leakage Class IV, please refer to model ACP (No.SS2-ACP110-0100).

- Soft seat
  Class VI: Leakage 0.00001% of maximum valve capacity.

Hysteresis error

Actuator model	PSA1_	HA2_ to HA4_	PSA6R
Without positioner	± 5% F.S.	± 3% F.S.	± 9% F.S.
With positioner	± 1% F.S.	± 1% F.S.	± 2% F.S.

Linearity

Actuator model	PSA1_	HA2_ to HA4_	PSA6R
Without positioner	± 5% F.S.	± 5% F.S.	±9% F.S.
With positioner	VPE_ _-_ : ±3% F.S. AVP_ _ _ : ±2% F.S.	± 1% F.S.	±2% F.S.

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

Dimensions

Refer to Table 17 and Table 18

Weight

Refer to Table 19.

Actuator orientation

Refer to Figure 9.

Finish

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

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

Body material / Trim material		JIS	SCPH2	SCPH21	SCPH61	SCPL1	SCS11	SCS13A	SCS14A	SCS16A	SCS19A
		ASTM	A216WCB	A217WC6	A217C5	A352LCB	------	A351CF8	A351CF8M	A351CF3M	A351CF3
JIS	SCS24		-5 to 425	-5 to 425	-5 to 425	-40 to 350	---	---	---	---	---
JIS	SCS11		---	---	---	---	-50 to 300	---	-50 to 300	---	---
JIS	SCS14A		-5 to 300*	-5 to 300*	-5 to 300*	-45 to 300	---	-196 to 300	-196 to 300	---	---
JIS	SCS16A		---	---	---	-45 to 300	---	-196 to 300	-196 to 300	-196 to 300	-
JIS	SCS19A		---	---	---	-45 to 300	---	-196 to 300	-196 to 300	---	-196 to 300
JIS	SCS11 CoCr-A		---	---	---	---	-50 to 550	---	-50 to 550	---	---
JIS	SCS14A CoCr-A		-5 to 425*	-5 to 550*	-5 to 556*	-45 to 350	---	-196 to 550	-196 to 550	---	---
JIS	SCS16A CoCr-A		---	---	---	-45 to 350	---	-196 to 450	-196 to 450	-196 to 450	---
JIS	SCS19A CoCr-A		-	-	-	-45 to 350	-	-196 to 450	-196 to 450	-	-196 to 450
JIS	SCS14A Atomlloy		-5 to 425*	-5 to 500*	-5 to 500*	---	---	---	---	---	---
JIS	SCS14A Soft seat		-5 to 200	---	---	-45 to 200	---	-80 to 200	-80 to 200	---	---
JIS	SCS16A Soft seat		---	---	---	-45 to 200	---	-80 to 200	-80 to 200	-80 to 200	-80 to 200

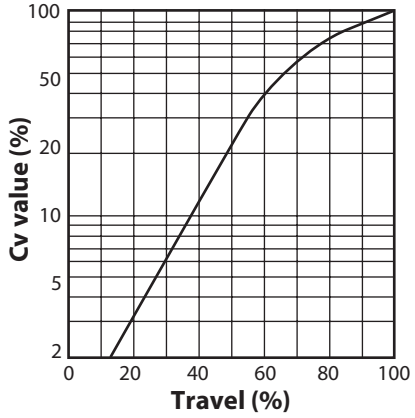
Note) 1. Asterisk marked (*) combinations, split cages are used when fluid temperature exceeds 230 °C and valve size is greater than 3 inches.

2. " ▭ " shows standard combination of valve body and trim materials.

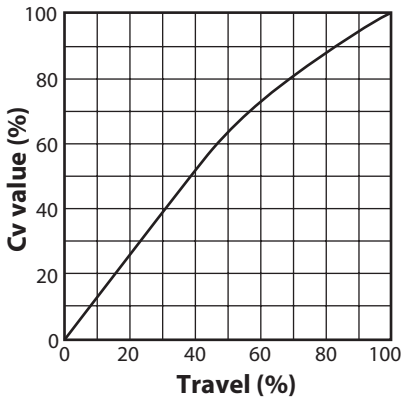
Cv value and travel

Table 2. High-capacity type cage (%V, LV, %T, LT)

Nominal size (inch)		1-1/2	2	2-1/2	3	4	6	8
Port size (inch)		1-1/2	2	2-1/2	3	4	6	8
Rated Cv value	Metal or soft seat type Equal percentage characteristics (%V,%T)	36	60	100	140	220	420	820
	Metal or soft seat type Linear characteristics (LV, LT)	40	75	110	150	240	435	850
Rated travel (mm)		25		38			50	75



a. Equal percentage characteristics
(%V: metal seat, %T: soft seat)

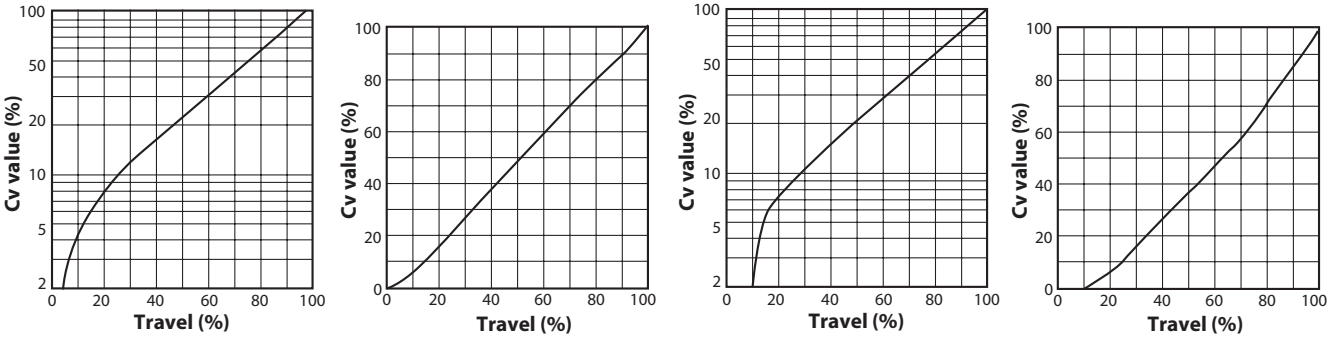


b. Linear characteristics
(%LV: metal seat, LT: soft seat)

Figure 1. Flow characteristics: High-capacity type

Table 3. High-flow characteristic type cage (%VF, LVF, %TF, LTF)

Nominal size (inch)	1-1/2			2			2-1/2			3			4			6			8		
Port size (inch)	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	4	5	6	5	6	8
Rated Cv value (%VF, LVF, %TF, LTF)	11	17	24	17	24	44	24	44	68	44	68	99	68	99	175	175	275	360	275	360	650
Rated travel (mm)	25						38									50			75		



a. Equal percentage characteristics (%VF: metal seat)

b. Linear characteristics (LVF: metal seat)

c. Equal percentage characteristics (%TF: Soft seat)

d. Linear characteristics (LTF: Soft seat)

Figure 2. Flow characteristics: High-flow characteristic type cage

Note) The above graphs indicate typical flow characteristics.

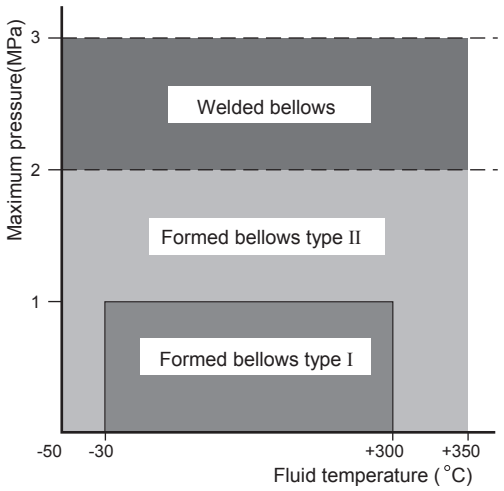


Figure 3. Bellows Type by Temperature and Pressure Ranges

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.

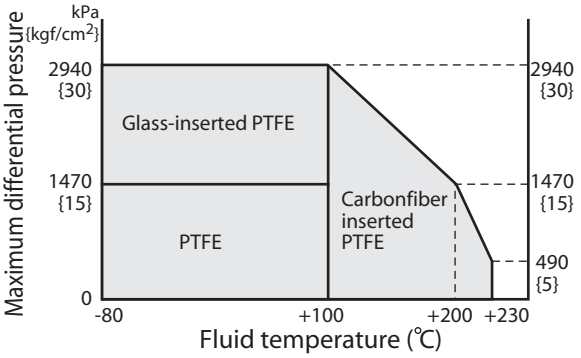


Figure 4. Temperature and maximum differential pressure range of soft-seat type

Note) If there is any possibility to cause erosion due to saturated steam or superheated-water, use the metal seat.

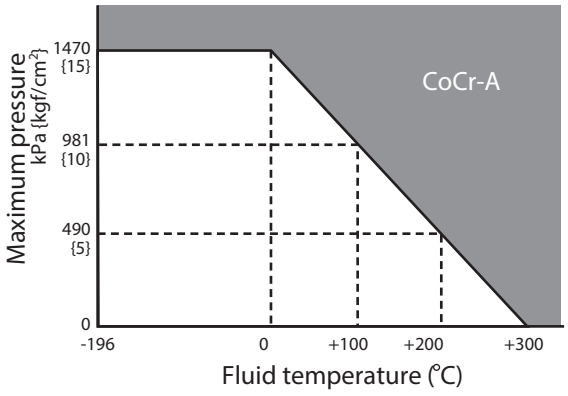


Figure 5. Temperature / normal differential pressure ranges requiring CoCr-A

Note) 1. SCS24 (Precipitation-hardened stainless steel) requires no CoCr-A.

2. For cavitation / flashing service or oil free service, SCS24 or CoCr-A is recommended regardless of temperature and differential pressure.

Table 4. Gland packing

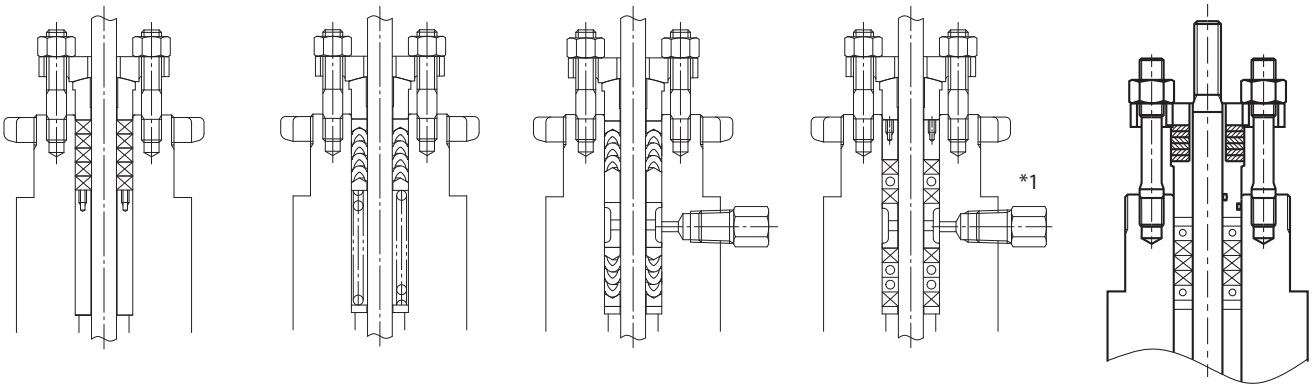
According to your application, select appropriate type of gland packing from the following:

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.)]

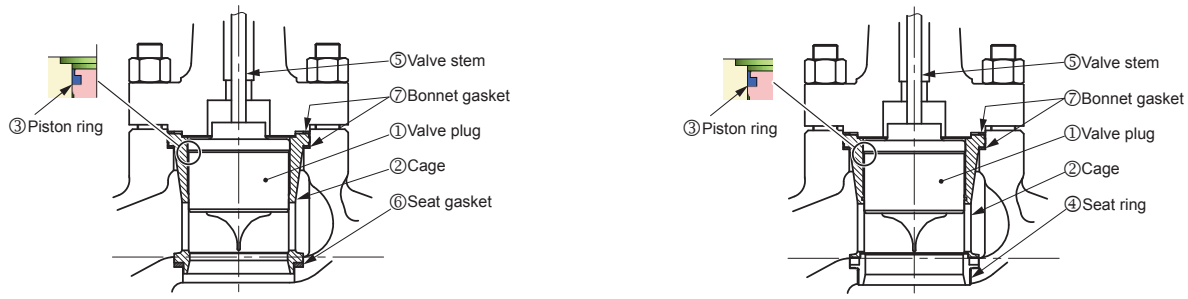
For high temperature [P6610CH+P6528]
*1 Grease provided by lubricator

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

Figure 6. 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 that are not listed in this table.



a. Integral cage type (Plain bonnet)

b. Split cage type (Extension bonnet type1)

Figure 7. Structual drawing of trim

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

	Figure 7-a			
①Valve plug ②Cage	SCS24	SCS14A	SCS14A CoCr-A	SCS14A Soft seat
③Piston ring*1	General		Oil free	General
	Ni-resist		CoCr-E	---
④Valve stem	SUS316			
⑤Seat gasket	Spiral wound(hoop: SUS316, filler: Inorganic paper)		Spiral wound(hoop: SUS316, filler: PTFE)	Spiral wound(hoop: SUS316, filler: Inorganic paper)
⑥Bonnet gasket	SUS316		SUS316(PTFE coating)	SUS316

*Note) *1. For gas or steam only.*

Table 6. The valve body material is carbon steel (SCPH2/A216WCB) and Extension bonnet type1.

	Figure 7-a			Figure 7-b	
①Valve plug ②Cage	SCS24	SCS14A	SCS14A CoCr-A	SCS14A	SCS14A CoCr-A
③Piston ring*1	Austenitic cast iron				
④Seat ring *2	---			SCS14A	SCS14A CoCr-A
⑤Valve stem	SUS316				
⑥Seat gasket	Spiral wound(hoop: SUS316, filler: Inorganic paper)			---	
⑦Bonnet gasket	SUS316				

*Note) *1. For gas or steam only.*
**2. For split cage only.*

Table 7. The valve body material is stainless steel (SCS13A/A351CF8 or SCS14A/A351CF8M) and plain bonnet

	Figure 7-a		
①Valve plug ②Cage	SCS14	SCS14A CoCr-A	SCS14A Soft seat
③Piston ring*1	General	Oil free	General
	Ni-resist	CoCr-E	---
④Valve stem	SUS316		
⑤Seat gasket	Spiral wound(Hoop: SUS316, Filler: Inorganic paper)	Spiral wound(Hoop: SUS316, Filler: PTFE)	Spiral wound(Hoop: SUS316, Filler: Inorganic paper)
⑥Bonnet gasket	SUS316	SUS316(PTFE coating)	SUS316

*Note) *1. For gas or steam only.*

Table 8. The valve body material is stainless steel (SCS13A/A351CF8 or SCS14A/A351CF8M) and extension bonnet type1

	Figure 7-a			Figure 7-b	
①Valve plug ②Cage	SCS24	SCS14A	SCS14A CoCr-A	SCS14A	SCS14A CoCr-A
③Piston ring*1	Austenitic cast iron				
④Seat ring *2	---			SCS14A	SCS14A CoCr-A
⑤Valve stem	SUS316				
⑥Seat gasket	Spiral wound(Hoop: SUS316, Filler: Inorganic paper)			---	
⑦Bonnet gasket	SUS316				

*Note) *1. For gas or steam only.*
**2. For split cage only.*

Allowable differential pressure

Metal seat (%VF, LVF, %V, LV) : PTFE packing
Valves with type PSA, HA actuator

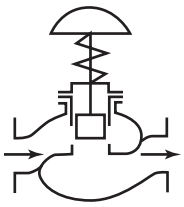


Table 9. Air-to-close

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	6	8
PSA1D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	500 {5.1}	390 {4.0}	---	---	---	---	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	2450 {25.0}	1860 {19.0}	---	---	---	---	---
	390 {4.0}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3920 {40.0}	---	---	---	---	---
				7450 {76.0}	5780 {59.0}					
HA2D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	970 {9.9}	760 {7.7}	650 {6.6}	530 {5.4}	410 {4.2]	---	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3730 {38.0}	3230 {32.9}	2690 {27.4}	2040 {20.8}	---	---
				4820 {49.2}						
	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}	9810 {100}	9680 {98.7}	8070 {82.3}	6160 {62.8}		
HA3D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	1720 {17.5}	1340 {13.7}	1150 {11.7}	950 {9.7}	720 {7.4}	510 {5.2}	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3630 {37.0}	2560 {26.1}	---
				8530 {87.0}	6570 {67.0}	5690 {58.0]	3630 {48.7}			
	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}	---
				9810 {100}	9810 {100}	9810 {100}	9810 {100}	9810 {100}	7710 {78.6}	
HA4D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	---	---	1980 {20.2]	1640 {16.7]	1260 {12.8}	880 {9.0}	720 {7.4}
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	---	---	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3630 {37.0}
						9810 {100}	8230 {83.9}	6240 {63.6}	4410 {45.0}	
	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}	9810 {100}	9810 {100]	9810 {100]	9810 {100}

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 B 16. 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.

Metal seat (%VF, LVF, %V, LV) : PTFE packing
Valves with type PSA, HA actuator

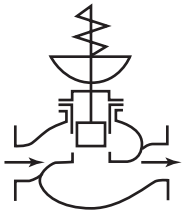


Table 10. Air-to-open

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	6	8
PSA1R	140{1.4}	20 to 98 {0.2 to 1.0}	△	500 {5.1}	390 {4.0}	---	---	---	---	---
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	3430 {35.0}	2650 {27.0}	---	---	---	---	---
HA2R	140{1.4}	20 to 98 {0.2 to 1.0}	△	970 {9.9}	760 {7.7}	650 {6.6}	530 {5.4}	410 {4.2}	---	---
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3760 {38.4}	2870 {29.3}	---	---
				6680 {68.1}	5280 {53.9}	4510 {46.0}				
HA3R	140{1.4}	20 to 98 {0.2 to 1.0}	△	1720 {17.5}	1340 {13.7}	1150 {11.7}	950 {9.7}	720 {7.4}	510 {5.2}	---
	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}	3600 {36.7}	---
				9810 {100}	9380 {95.7}	8010 {81.7}	6670 {68.0}	5080 {51.8}		
HA4R	140{1.4}	20 to 98 {0.2 to 1.0}	△	---	---	1980 {20.2}	1640 {16.7}	1260 {12.8}	880 {9.0}	720 {7.4}
	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}
						9810 {100}	9810 {100}	8800 {89.7}	6180 {63.0}	5000 {51.0}
HR5R	140{1.4}	20 to 98 {0.2 to 1.0}	△	---	---	---	---	1720 {17.5}	1210 {12.3}	1000 {10.2}
	140{1.4}	40 to 120 {0.4 to 1.2}	△	---	---	---	---	3920 {40.0}	3630 {37.0}	3010 {30.7}
								5100 {52.0}		
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	---	---	---	---	3920 {40.0}	3920 {40.0}	3920 {40.0}
								9810 {100}	7840 {80.0}	6860 {70.0}
PSA6R	400{4.0}	200 to 340 {2.0 to 3.5}	✓	---	---	---	---	3920 {40.0}	---	---
								9810 {100}		
	500{5.0}	200 to 390 {2.0 to 4.0}	✓	---	---	---	---	---	3920 {40.0}	---
									9810 {100}	

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 B 16. 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.

Soft seat (%TF, LTF, %T, LT)

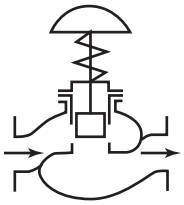


Table 11. Air-to-close

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	6	8
PSA1D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	350* {3.6}	270* {2.8}	---	---	---	---	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	1670 {17.0}	1270 {13.0}	---	---	---	---	---
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	2940 {30.0}	---	---	---	---	---
HA2D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	680* {6.9}	530* {5.4}	450* {4.6}	370* {3.8}	280* {2.9}	---	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	2940 {30.0}	2610 {26.6}	2260 {23.0}	1880 {19.2}	1430 {14.6}	---	---
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	---	---
HA3D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	1210* {12.3}	940* {9.6}	800* {8.2}	670* {6.8}	510 {5.2}	350* {3.6}	---
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2540 {25.9}	1790 {18.3}	---
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	---
HA4D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	---	---	1380* {14.1}	1150* {11.7}	880* {9.0}	620* {6.3}	510 {5.2}
	160 {1.6}	20 to 98 {0.2 to 1.0}	✓	---	---	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2540 {25.9}
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	---	---	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}

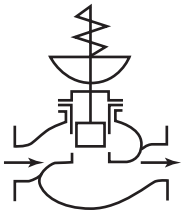


Table 12. Air-to-open

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	6	8
PSA1R	140{1.4}	20 to 98 {0.2 to 1.0}	△	350* {3.6}	270* {2.8}	---	---	---	---	---
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	2450 {25.0}	1860 {19.0}	---	---	---	---	---
HA2R	140{1.4}	20 to 98 {0.2 to 1.0}	△	680* {6.9}	530* {5.4}	450* {4.6}	370* {3.8}	280* {2.9}	---	---
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	2940 {30.0}	2940 {30.0}	2640 {26.9}	2010 {20.5}	---	---
HA3R	140{1.4}	20 to 98 {0.2 to 1.0}	△	1210* {12.3}	940* {9.6}	800* {8.2}	670* {6.8}	510* {5.2}	350* {3.6}	---
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2520 {25.7}	---
HA4R	140{1.4}	20 to 98 {0.2 to 1.0}	△	---	---	1380* {14.1}	1150* {11.7}	880* {9.0}	620* {6.3}	510* {5.2}
	270{2.8}	80 to 240 {0.8 to 2.4}	✓	---	---	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}	2940 {30.0}

Note) 1. " ▭ " shows a model with standard actuator.

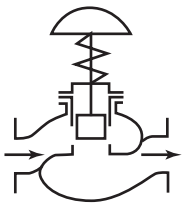
2. ✓: Positioner is necessary, △: Can be operated either with or without positioner.

3. Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 34-1981 or JIS B2201-1984.

4. Seat leakages of items marked with asterisk(*) are less than 0.01% (Class IV).
Those for items without asterisk marks(*) are less than 0.00001% (Class VI).

Metal seat (%VF, LVF, %V, LV): Graphite packing "P6610CH+P6528" (+230 to +500 °C) Valves with type PSA, HA or VA actuator

Table 13. 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	6	8
HA2D	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}	9550 {97.3}	8150 {83.1}	6790 {69.2}	5180 {52.8}		
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}	——
				9810 {100}	9810 {100}	9810 {100}	9810 {100}	9190 {93.7}	6490 {66.1}	
HA4D	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}	9810 {100}	9810 {100]	9810 {100]	9360 {95.4}

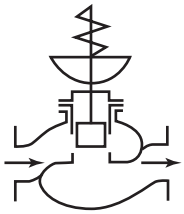
Note) 1) "▭" shows a model with standard actuator.

2)✓: Positioner is necessary.

3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 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.

Table 14. 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	6	8
HA2R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3550 {36.1}	2960 {30.1}	2250 {22.9}	——	——
				5320 {54.2}	4160 {42.4}					
HA3R	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}	2830 {28.8}	——
				9450 {96.3}	7380 {75.2}	6300 {64.2}	5250 {53.5}	4000 {40.7}		
HA4R	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}
						9810 {100}	9810 {100}	7290 {74.3}	5150 {52.5}	4200 {42.8}
HR5R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	——	——	——	——	3920 {40.0}	3920 {40.0}	3920 {40.0}
								9460 {96.4}	6690 {68.2}	5450 {55.5}
PSA6R	400{4.0} *1	200 to 340 {2.0 to 3.5}	✓	——	——	——	——	3920 {40.0}	——	——
								9810 {100}		
	500{5.0} *2	200 to 390 {2.0 to 4.0}		——	——	——	——	——	3920 {40.0}	-
									9810 {100}	——
	400{4.0} *3	200 to 340 {2.0 to 3.5}		——	——	——	——	——	——	3920 {40.0}
										9810 {100}

Note) 1) "▭" shows a model with standard actuator.

2)✓: Positioner is necessary.

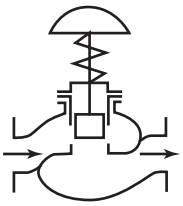
3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 34-1981 or JIS B2201-1984.

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 21/2 to 4 inches, *2 .. Applicable to valve size of 6 inches, *3 .. Applicable to valve size of 8 inches*

Metal seat (%VF, LVF, %V, LV): Graphite packing "P6610CH+M8590" (+500 to +566 °C) Valves with type PSA, HA or VA actuator

Table 15. 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	6	8
HA2D	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}	8940 {91.1}	7630 {77.8}	6350 {64.7}	4850 {49.4}		
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}	——
				9810 {100}	9810 {100}	9810 {100}	9810 {100}	8600 {87.6}	6080 {61.9}	
HA4D	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}	9810 {100}	9810 {100}	9810 {100}	8880 {90.5}

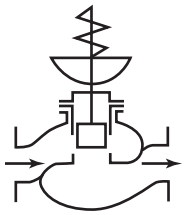
Note) 1) " ▭ " shows a model with standard actuator.

2)✓: Positioner is necessary.

3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 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.

Table 16. 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	6	8
HA2R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3540 {36.0}	3020 {30.7}	2520 {25.6}	1920 {19.5}	——	——
				4530 {46.1}						
HA3R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3410 {34.7}	2410 {24.5}	——
				8050 {82.0}	6290 {64.1}	5360 {54.6}	4470 {45.5}			
HA4R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	——	——	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3710 {37.8}
						9810 {100}	8470 {86.3}	6460 {65.8}	4560 {46.4}	
VA5R	270{2.8}	80 to 240 {0.8 to 2.4}	✓	——	——	——	——	3920 {40.0}	3920 {40.0}	3920 {40.0}
								8060 {82.1}	5690 {58.0}	4640 {47.3}
PSA6R	400{4.0} *1	200 to 340 {2.0 to 3.5}	✓	——	——	——	——	3920 {40.0}	——	——
								9810 {100}		
	500{5.0} *2	200 to 390 {2.0 to 4.0}		——	——	——	——	——	3920 {40.0}	——
									9810 {100}	——
	400{4.0} *3	200 to 340 {2.0 to 3.5}		——	——	——	——	——	——	3920 {40.0}
										9810 {100}

Note) 1) " ▭ " shows a model with standard actuator.

2)✓: Positioner is necessary.

3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 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 21/2 to 4 inches, *2 .. Applicable to valve size of 6 inches, *3 .. Applicable to valve size of 8 inches*

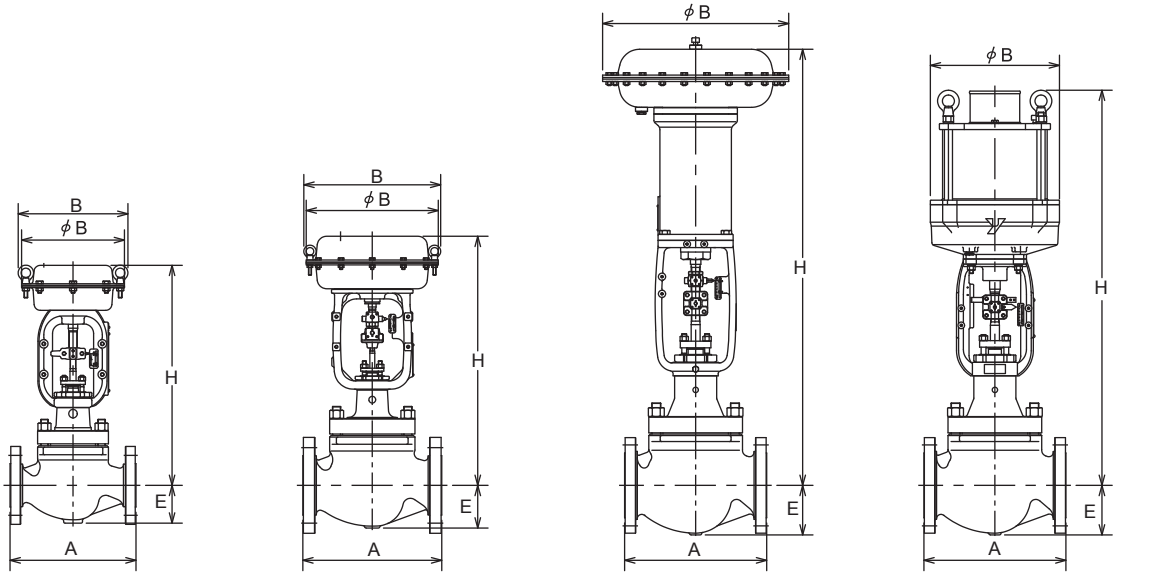
DIMENSIONS

Table 17. 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 Tongue and groove Male and female	JIS 20K Tongue and groove Male and female	JIS 30K Tongue and groove Male and female	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
6	451	465	473	508	475	473	486	508
8	543	560	568	610	570	568	580	610

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 150SW, BW *	ANSI 300, 600 JPI 300, 600SW, BW *
1-1/2	235	248	251	244	248	251	251
2	267	283	289	276	283	286	286
2-1/2	289	308	314	302	308	311	311
3	311	333	340	327	333	337	337
4	365	384	397	378	391	394	394
6	464	489	511	483	505	473	508
8	556	584	613	578	606	568	610

*Note) * : Face-to-face dimensions conform to following standards.*
- IEC 60534-3-1 : 2001 - IEC 60534-3-3 : 1998 (2-1/2 inches or over)
- JIS B 2005-3-1 : 2005 - JIS B 2005-3-3 : 2005 (2-1/2 inches or over)



a. For PSA1 actuator b. For HA actuator c. For VA5 actuator d. For PSA6 actuator

Figure 8. Face-to-face and external dimensions

Table 18. External dimensions [Unit: mm]

Nominal size (inch)	Actuator Model	H					B	ϕ B	E
		Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2		Bellows type bonnet			
				Integral cast type	Welded type				
1-1/2	PSA1D, R	466	631	746	986	626	230	218	70
	HA2D, R	500	665	780	1020	660	281	267	
	HA3D, R	590	760	875	1140	750	363	350	
2	PSA1D, R	466	636	751	991	626	230	218	80
	HA2D, R	500	670	785	1025	660	281	267	
	HA3D, R	595	765	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	
	HA4D, R	865	1035/1045	1165	1495	-	520	470	
3	HA2D, R	580	755/765	900	1135	800	281	267	100
	HA3D, R	635	810/820	955	1190	855	363	350	
	HA4D, R	870	1045/1055	1190	1505	-	520	470	
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	
	VA5R	1420	1635	1820	2050	-	-	620	
	PSA6R	1255	1470	1655	1855	-	-	476	
6	HA3D, R	785	1020/1045	1250	1385	1075	363	350	170
	HA4D, R	955	1190/1215	1425	1570	1245	520	470	
	VA5R	1480	1740	1980	2110	-	-	620	
	PSA6R	1315	1575	1815	1945	-	-	476	
8	HA4D, R	1090	1350	1580	1710	1340	-	470	220
	VA5R	1585	1850	2145	2275	-	-	620	
	PSA6R	1735	2000	2295	2425	-	-	476	

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 actuators are used, add the hand wheel dimentsions designated in respective specification sheets (No. SS2-8213-0500 for Type HA actuators, No.SS2-8210-0100 for Type VA actuators and SS2-PSA100-0100 for Type PSA actuators).

2. "H" dimensions of Extension bonnet Type 1 are as follows: The left side JIS 10K and ANSI 150, and the right side for JIS 16K and ANSI 300 or over.

Table 19. Weight

[Unit: kg]

Nominal size (inch)	Actuator Model	Weight															
		Flanged type JIS 10K, ANSI/JPI 150				Flanged type JIS 16K, 20K, 30K ANSI/JPI 300				Flanged type JIS 40K ANSI/JPI 600				Welded type JIS10K,16K,20K, 30K ANSI/JPI150,300,600			
		Plain bonnet	Extension Type 1, Bellows type	Extension Type 2		Plain bonnet	Extension Type 1, Bellows type	Extension Type 2		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			Integral cast type	Welded type			Integral cast type	Welded type
1-1/2	PSA1D, R	24	27	30	32	29	32	35	37	37	40	43	45	29	32	35	37
	HA2D, R	31	34	37	39	36	39	42	44	44	47	50	52	36	39	42	44
	HA3D, R	43	46	49	51	48	51	54	56	56	59	62	64	48	51	54	56
2	PSA1D, R	30	33	36	38	35	38	41	43	40	43	46	48	35	38	41	43
	HA2D, R	37	40	43	45	42	45	48	50	47	50	53	55	42	45	48	50
	HA3D, R	49	52	55	57	54	57	60	62	59	62	65	67	54	57	60	62
2-1/2	HA2D, R	43	47	51	53	48	52	56	58	65	69	73	75	48	52	56	58
	HA3D, R	55	59	63	65	60	64	68	70	77	81	85	87	60	64	68	70
	HA4D, R	86	90	94	96	91	95	99	101	108	112	116	118	91	95	99	101
3	HA2D, R	53	59	65	68	63	69	75	78	85	91	97	100	63	69	75	78
	HA3D, R	65	71	77	80	75	81	87	90	97	103	109	112	75	81	87	90
	HA4D, R	96	102	108	111	106	112	118	121	128	134	140	143	106	112	118	121
4	HA2D, R	63	73	78	81	78	88	93	96	113	123	128	131	75	85	90	93
	HA3D, R	75	85	90	93	90	100	105	108	125	135	140	143	87	97	102	105
	HA4D, R	106	116	121	124	121	131	136	139	156	166	171	174	118	128	133	136
	VA5R	233	243	248	251	248	258	263	266	283	293	298	301	245	255	260	263
	PSA6R	213	223	228	231	228	238	243	246	258	273	278	281	225	235	240	243
6	HA3D, R	157	172	179	182	187	202	209	212	237	252	259	262	117	192	199	202
	HA4D, R	188	203	210	213	218	233	240	243	268	283	290	293	208	223	230	233
	VA5R	315	330	337	340	345	360	367	370	395	410	417	420	335	350	357	360
	PSA6R	295	310	317	320	325	340	347	350	375	390	397	400	315	330	337	340
8	HA4D, R	268	288	298	303	318	338	348	353	438	458	468	473	308	328	338	343
	VA5R	395	415	425	430	445	465	475	480	565	585	595	600	435	455	465	470
	PSA6R	420	440	450	455	470	490	500	505	590	610	620	625	460	480	490	495

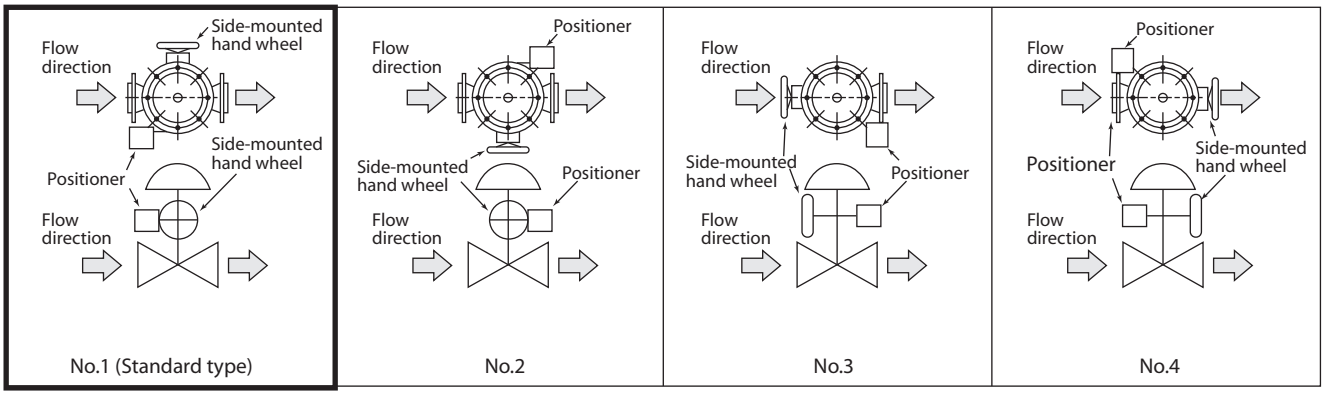


Figure 9. Actuator orientation

Note) 1. Indicate by position number when installation other than the standard type is required.
2. With Type PSA6R actuator, the side-mounted hand wheel is mounted on the same side as the positioner.

Ordering Information

When ordering, please specify ;

1) Model number: HCB
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) Valve and plug characteristics
7) Type of actuator, air pressure to diaphragm
8) Valve action (direct or reverse)
9) Accessories (positioner, hand wheel, pressure regulator with filter and etc.)
10) Special requirement of degreasing, 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 the following URL before ordering and use.

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

Specifications are subject to change without notice.

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