

# Cage type Double Seated Control Valves (Rating : ANSI 600 or Less)

Model VDC\_ \_ \_

## OVERVIEW

Model VDC control valve has a smaller actuator available for higher differential pressure as well as faster response in throttling action because of excellence in pressure balancing effect.

The plug has less vibration-generating shape and all parts are housed in the cage, thus realizing anti-vibration and wearing-out resistant features.

Valve body can be disassembled with ease. Inspection of trim and replacement of parts can be carried out rapidly. Capacity change by reducing port is performed by only replacing the cage with the plug unchanged.

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

## SPECIFICATIONS

### Body

#### Type

Straight-through, cast globe valve

#### Nominal Size

5, 10, 12 inches

#### Pressure rating and End connection

- Flanged end :

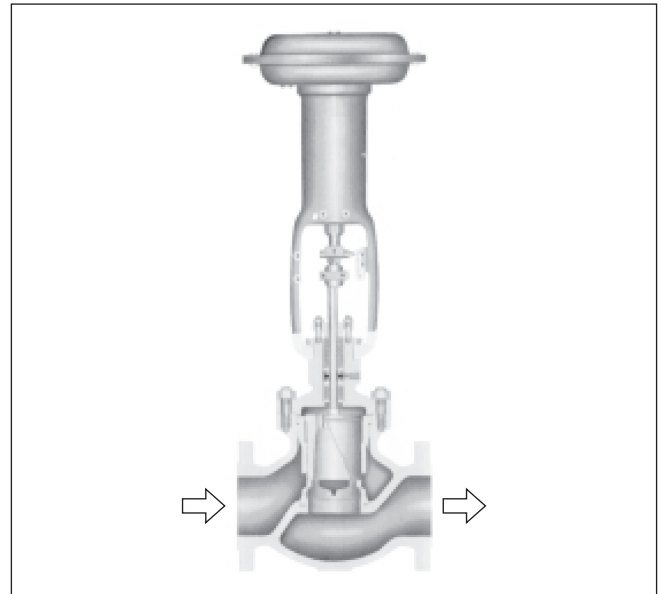
Connection type	Pressure rating	Applicable standard
FF	JIS10K	JIS B2212-1972
	ANSI Class 125	ANSI B16.5-1968
	JPI Class 125	JPI-7S-15-1993
RF	JIS10K	JIS B2212-1972
	JIS16K	JIS B2213-1967
	JIS20K	JIS B2214-1967
	JIS30K	JIS B2215-1967
	JIS40K	JIS B2216-1967
	ANSI Class 150, 300, 600	ANSI B16.5-1968
	JPI Class 150, 300, 600	JPI-7S-15-1993
RJ	ANSI Class 150, 300, 600	ANSI B16.5-1968
	JPI Class 150, 300, 600	JPI-7S-15-1993

### Material

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

### Bonnet

Bonnet type	Temperature range
Plain bonnet	0 to 200 °C
High temp. bonnet	200 to 520 °C
Extension bonnet	-196 to 0 °C
Bellows bonnet	-30 to + 300 °C (981 kPa {10 kgf/cm <sup>2</sup> } max.)



### Gland type

Bolted gland

### Grease

- Grease not provided  
When PTFE packing is used.
- Grease provided  
When graphite packing is used.

*Note) PTFE: Polytetrafluoroethylene*

### Drain plug

No (optionally available)

### Trim

#### Valve plug

Pressure balanced type

### Cage

- Metal seat  
Equal percentage (%V)  
Linear (LV)
- Soft seat  
Equal percentage (%T)  
Linear (LT)

*Note)1) For cage design (integral cage or split cage), refer to Table 1.*

*2) For operating temperature and maximum differential pressure ranges of soft seat type, refer to Figure 1.*

**Material**

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

**Actuator**

**Type**

Actuator type	Actuator model
Single acting diaphragm actuator	VA5_
Spring type piston actuator	PSA6R

**Action**

Actuator model	Actuator action
VA5_	Direct or reverse action
PSA6R	Reverse action

**Diaphragm**

Actuator model	Diaphragm material
VA5_	Cloth-embedded chloroprene rubber

**Spring range**

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

**Air connection**

Actuator model	Connection
VA5_	<ul style="list-style-type: none"> <li>Rc1/4 or 1/4NPT internal thread</li> <li>Rc3/8 or 3/8NPT internal thread</li> <li>Rc1/2 internal thread</li> </ul>
PSA6R	<ul style="list-style-type: none"> <li>Rc1/4 or 1/4NPT internal thread</li> <li>Rc3/8 or 3/8NPT internal thread</li> <li>Rc1/2 or 1/2NPT internal thread</li> </ul>

**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.

Actuator model	Positioner		Hand wheel	
	P/P	I/P	Top	Side
VA5_	HTP-__	AVP2__ AVP3__	Mounted	Mounted
PSA6R	HTP-__ VPP-__-__	AVP7__ HEP__	—	

**Additional specification**

Steam jacket

(Operating pressure 981 kPa {10.0 kgf/cm<sup>2</sup>} or less)

**Functional Safety Standard (IEC61508) conformity:**

SIL3 capable - certified by exida Consulting LLC

**Performance**

**Rated Cv value**

Refer to Table 2.

**Inherent rangeability**

- 30:1
- Optional 75:1 for full port size

**Allowable differential pressure**

Refer to Table 3 to Table 6.

**Leakage specification**

IEC 60534-4:2006 or JIS B2005-4:2008

**Metal seat**

Standard.....ClassII: Leakage less than 0.5% of maximum valve capacity.

Optional.....ClassIII: Leakage less than 0.1% of maximum valve capacity.

**Soft seat**

Class VI: Leakage less than 0.00001% of maximum valve capacity.

**Hysteresis error**

Actuator model	VA5_	PSA6R
Without positioner	±3% F.S	±9% F.S
With positioner	±1% F.S	±2% F.S

**Linearity**

Actuator model	VA5_	PSA6R
Without positioner	±5% F.S	±9% F.S
With positioner	±1% F.S..	±2% F.S

**Dimensions**

Refer to Table 7 and Table 8.

**Weight**

Refer to Table 9.

**Finish**

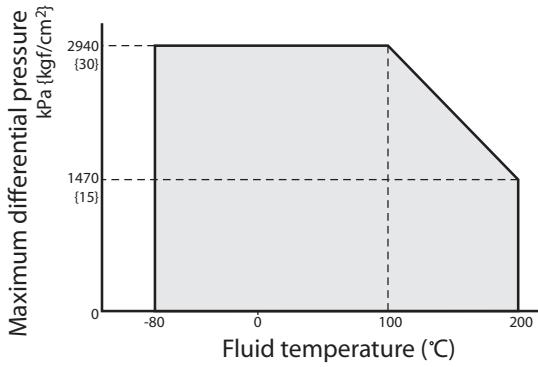
Blue ( Munsell 10B5/10) or silver, or other specified colors.

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

Body material	Plug material Cage material	Plug type Cage type	Operating temperature range (°C)
SCPH2	SCS24	Cage	-5 to +425
SCPH21	SCS24		
SCPH21	SCS14 atomlloy furnished	Split cage	+426 to +500
	SCS14 CoCr-A		+426 to +550
SCPH61	SCS24	Cage	-5 to +425
	SCS14 atomlloy furnished	Split cage	+426 to +500
	SCS14 CoCr-A		+426 to +600
SCS13	SCS14*1	Cage	-195 to +200
		Split cage	+201 to +300
	SCS14 atomlloy furnished	Cage	-195 to +200
		Split cage	+201 to +500
	SCS14 CoCr-A	Cage	-195 to +200
		Split cage	+201 to +600
SCS14	SCS14*1	Cage	-195 to +200
		Split cage	+201 to +300
	SCS14 CoCr-A	Cage	-195 to +200
		Split cage	+201 to +600

Note) \*1 Requires hardening treatment according to operating differential pressures. Refer to Document No. IB2-8000-0100.

\*2 10B and 12B are split cage.



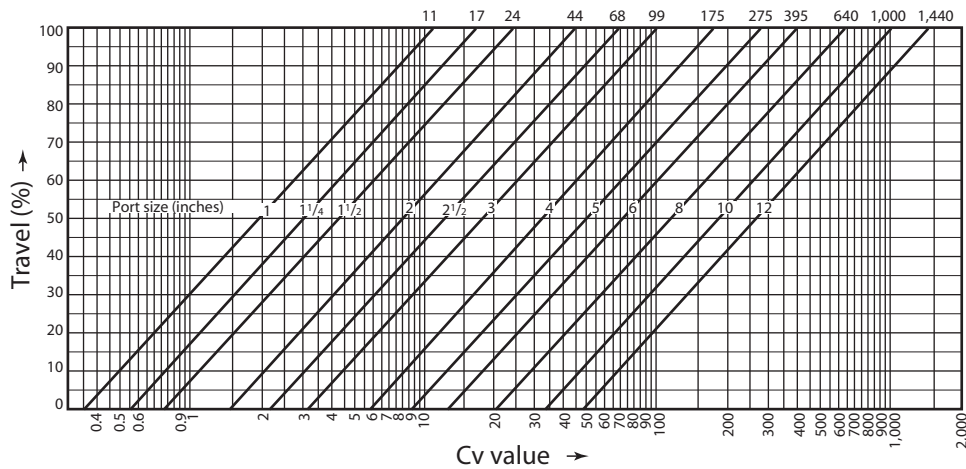
**Figure 1. Temperature and maximum differential pressure range of soft-seat type**

**Table 2. Cv value and travel**

Valve size (inches)		5			10			12		
Port size (inches)		3	4	5	6	8	10	8	10	12
Rated Cv value		99	175	275	395	640	1000	640	1000	1440
Plug type & Characteristic	Equal percentage cage,	✓	✓	✓	△	△	△	△	△	△
	Linear cage & Soft seat									
	Equal percentage split	✓	✓	✓	✓	✓	✓	✓	✓	✓
	cage & Linear split cage									

Note) △...Available for only soft seat valve.

**Equal percentage**



**Figure 2. Flow characteristics**

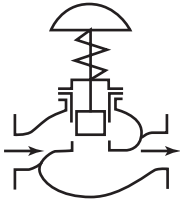
(Idealistic flow characteristics is indicated in this graph.)

## Allowable differential pressure

### Metal seat (%V, LV) : PTFE packing

Valves with type VA actuator

Table 3. Air-to-close

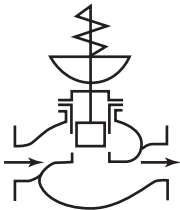


Actuator model	Supply pressure kPa {kgf/cm <sup>2</sup> }	Spring range kPa {kgf/cm <sup>2</sup> }	Positioner	Differential pressure kPa {kgf/cm <sup>2</sup> }		
				Valve size (inches)		
				5	10	12
VA5D	120 {1.2}	20 to 98 {0.2 to 1.0}	×	1180 {12.0}	600 {6.1}	500 {5.1}
	140 {1.4}	20 to 98 {0.2 to 1.0}	✓	3040 {31.0}	1470 {15.0}	1270 {13.0}
	250 {2.6}	20 to 98 {0.2 to 1.0}	✓	3920 {40.0}	3920 {40.0}	3920 {40.0}

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

2) ✓: Positioner is necessary. ×: Positioner is not necessary.

Table 4. Air-to-open



Actuator model	Supply pressure kPa {kgf/cm <sup>2</sup> }	Spring range kPa {kgf/cm <sup>2</sup> }	Positioner	Differential pressure kPa {kgf/cm <sup>2</sup> }		
				Valve size (inches)		
				5	10	12
VA5R	140 {1.4}	20 to 98 {0.2 to 1.0}	× or ✓	1180 {12.0}	600 {6.1}	500 {5.1}
		40 to 120 {0.4 to 1.2} *	△	3530 {36.0}	1760 {18.0}	1470 {15.0}
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	3920 {40.0}	3920 {40.0}	3530 {36.0}
PSA6R	400 {4.0}	200 to 340 {2.0 to 3.4}	✓	3920 {40.0}	—	—
	500 {5.0}	200 to 390 {2.0 to 4.0}	✓	—	3920 {40.0}	3920 {40.0}

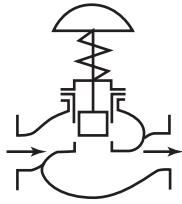
Note) 1) \* The limit of differential pressure for 40 to 200 kPa {0.4 to 2.0 kgf/cm<sup>2</sup>} spring range are the same as for 40 to 120 kPa {0.4 to 1.2 kgf/cm<sup>2</sup>} spring.

2) “” shows a model with standard actuator.

3) ✓: Positioner is necessary. ×: Positioner is not necessary. △: Positioner is preferable.

**Soft seat (%T, LT)**

Valves with VA actuator

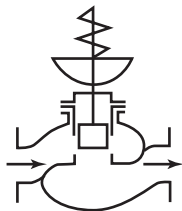
**Table 5. Air-to-close**

Actuator model	Supply pressure kPa {kgf/cm <sup>2</sup> }	Spring range kPa {kgf/cm <sup>2</sup> }	Positioner	Differential pressure kPa {kgf/cm <sup>2</sup> }	
				Valve size (inches)	
				5	
VA5D	120 {1.2}	20 to 98 {0.2 to 1.0}	✕	830* {8.5}	
	140 {1.4}	20 to 98 {0.2 to 1.0}	✓	2060* {21.0}	
	250 {2.6}	20 to 98 {0.2 to 1.0}	✓	2940 {30.0}	

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

2) ✓: Positioner is necessary. ✕: Positioner is not necessary.

3) Valve seat leakage at full closure marked with "\*" is 0.01% or less (Class IV), and that without mark is 0.00001% or less (Class VI).

**Table 6. Air-to-open**

Actuator model	Supply pressure kPa {kgf/cm <sup>2</sup> }	Spring range kPa {kgf/cm <sup>2</sup> }	positioner	Differential pressure kPa {kgf/cm <sup>2</sup> }	
				Valve size (inches)	
				5	
VA5R	140 {1.4}	20 to 98 {0.2 to 1.0}	✕ or ✓	1180* {12.0}	
		40 to 120 {0.4 to 1.2}	△	2450* {25.0}	
	270 {2.8}	80 to 240 {0.8 to 2.4}	✓	2940 {30.0}	

Note) 1) \* The limit of differential pressure for 40 to 200 kPa {0.4 to 2.0 kgf/cm<sup>2</sup>} spring range are the same as for 40 to 120 kPa {0.4 to 1.2 kgf/cm<sup>2</sup>} spring.

2) "■" shows a model with standard actuator.

3) ✓: Positioner is necessary. ✕: Positioner is not necessary. △: Positioner is preferable.

4) Valve seat leakage at full closure marked with "\*" is 0.01% or less (Class IV), and that without mark is 0.00001% or less (Class VI).

## DIMENSIONS

Table 7. Face to face dimensions

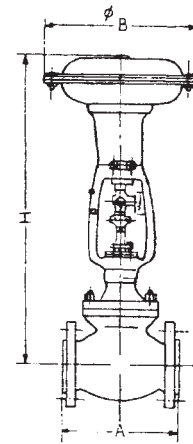
[Unit: mm]

Valve size (inches)	A						
	JIS 10K FF, RF ANSI 150 RF	JIS 16K, 20K RF ANSI 300 RF	JIS 30K RF	JIS 40K RF ANSI 600 RF	ANSI 150 RJ	ANSI 300 RJ	ANSI 600RJ
5	403	425	425	457	416	441	460
10	673	708	708	752	686	724	756
12	737	775	775	819	749	791	822

Table 8. External dimensions

[Unit: mm]

Valve size (inches)	Actuator model	H (mm)						φB (mm)
		Direct action (air-to-close)			Reverse action (air-to-open)			
		Plain	High temp. Extention	Bellows type	Plain	High temp. Extention	Bellows type	
5	VA5D, R	1330	1480	—	1440	1590	—	620
10	VA5D, R	1760	2015	—	1890	2145	—	620
	PSA6R	1685	1940	—	1815	2070	—	476
12	VA5D, R	1810	2020	—	1940	2150	—	620
	PSA6R	1735	1945	—	1865	2075	—	476



Note) P: Plain bonnet, RF: Radiator finned bonnet, BS: Bellows seal bonnet

## Weight

Table 9. Weight

[Unit: kg]

Valve size (inches)	Actuator model	Weight								
		JIS 10K, ANSI 150			JIS 16K, 20K, 30K, ANSI 300			JIS 40K, ANSI 600		
		Plain	High temp. Extention	Bellows type	Plain	High temp. Extention	Bellows type	Plain	High temp. Extention	Bellows type
5	VA5D	260	268	—	270	278	—	315	323	—
	VA5R	285	293	—	295	303	—	340	348	—
10	VA5D	560	600	—	690	710	—	750	780	—
	VA5R	585	625	—	715	735	—	775	805	—
	PSA6R	540	580	—	670	690	—	730	760	—
12	VA5D	750	780	—	900	920	—	1000	1100	—
	VA5R	775	805	—	925	945	—	1025	1125	—
	PSA6R	730	760	—	880	900	—	980	1080	—

Note) P: Plain bonnet, RF: Radiator finned bonnet, BS: Bellows seal bonnet



## Ordering Information

When ordering, please specify ;

- 1) Model Number: VDC
- 2) Valve size × Port size of Cv required
- 3) Type and rating of end connections
- 4) Body and trim material, necessity of hardening
- 5) Plug characteristics (on-off, equal percentage, linear)
- 6) Type of bonnet
- 7) Type of actuator, air to diaphragm
- 8) Valve action (direct or reverse)
- 9) Accessories (positioner, hand wheel, pressure regulator etc.)
- 10) Special requirement of 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

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*Specifications are subject to change without notice.*



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