

CV3000 Series

Smart-Port Single Seated Control Valves with Steam Jacket

Model HLS

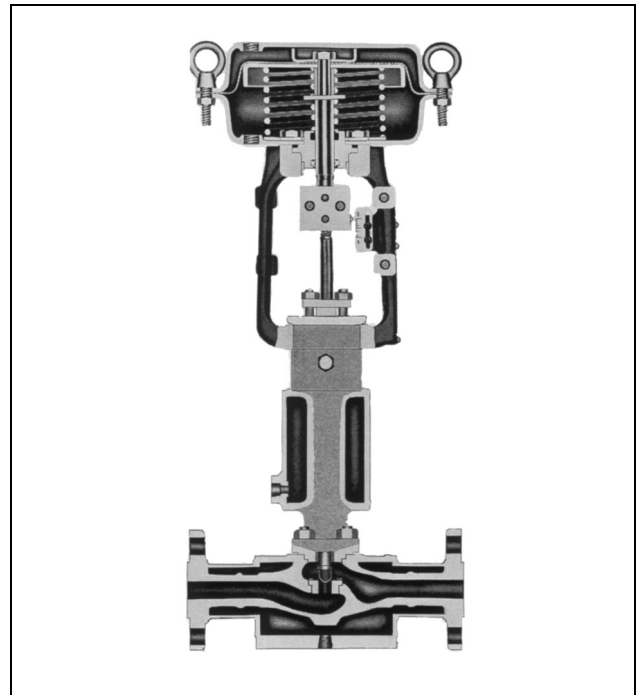
OVERVIEW

Model HLS Small-Port Single Seated Control Valves with Steam Jacket are designed for heavy duty service requiring high adiathermic capability.

The compact valve body, having an S-shape flow passage that features low pressure loss, allows a large flow capacity, rangeability, and high accuracy flow characteristics.

The valve plugs are available in a wide range of Cv values. The flow shutoff performance complies with the ANSI Standards. The actuator integrated with simplest mechanisms utilizes a compact yet powerful diaphragm actuator leaded with multiple springs.

The model HLS control valves are widely applicable for reliable control of small flows in high or low temperature, high pressure process lines.



SPECIFICATIONS

Body

Type

Straight-through, cast globe valve

Nominal size

1/2, 3/4, 1 inch

(Flange connection size for full-jacket type: 2 inches)

Pressure rating

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

End connection

Flanged end; RF

Material

For combining the valve body, trim materials and the operating temperature ranges, refer to Table 1.

Bonnet type

Plain bonnet (0 to 230°C)

Extended bonnet (230 to 566°C)

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

Jacket type

Body, Full-jacket, semi-jacket*

Bonnet; Without jacket, with jacket*

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

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

Jacket size

1/2 inch

Pressure rating

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

Jacket connection

Flanged end; RF

Threaded end; Rc, NPT

Operating pressure

981 kPa {10 kgf/cm²} or less

Operating temperature

350°C or less

Material

SS400, SUS304

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

Gland Type

Bolted gland

Packing / Grease

Grease not provided; When V shaped PTFE packing or PTFE yarn packing is used.

Grease provided; When asbestos yarn, PTFE-lined asbestos yarn, asbestos yarn with graphite, or graphite packing is used.

Gasket

Type; Flat type, saw-tooth type

Material; SUS316, SUS316L, SUS329J1, copper, aluminum

Note) PTFE: Polytetrafluoroethylene

Note: Sizing

When the flow rates are small, a laminar flow is formed at the vena contracta of the valve if the fluid viscosity is relatively small or the differential pressure is high. Valve capacity is defined on the assumption that the flow at the vena contracta is turbulent. For this reason, valve capacity at the vena contracta is calculated large unless the Cv value calculation formula is corrected to the logical dimensions, which may produce a valve capacity insufficient for the application. Refer to the Instrumentation Bulletin No.ID2-8000-3800 correcting Cv calculations based on fluid viscosity, and refer to No. PD2-8110-0500 for valves with such micro Cv values as 0.01, 0.04 or 0.1.

Trim

Valve plug

Single seated, Contoured type plug

- Metal seat
(For flow characteristics, refer to Figure 1 and 2.)
 - Equal percentage (%CF)
 - Linear (LCF)

Single seated, Quick opening type plug

- Metal (Stellite) seat (QS)

Note) For rated Cv 0.01 to 0.1, cage guided plug design.

Material

For combining the body, trim materials and the operating temperature range, refer to Table 1.

Note) For fluid conditions requiring Stellite, refer to Figure 3.

Actuator

Type

Single acting diaphragm actuator (Type HA)

Action

Direct or reverse action

Diaphragm

Cloth embedded ethylene propylene rubber

Spring range

20 to 98 kPa {0.2 to 1.0 kgf/cm²} or
80 to 240 kPa {0.8 to 2.4 kgf/cm²}

Supply pressure

120 to 390 kPa {1.2 to 4.0 kgf/cm²}

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

Air connection

Rc1/4 or 1/4NPT internal thread

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 (provided upon request)

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 drawing of respective accessories.

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

Actuator	Positioner		Manual handwheel	
	P/P	I/P	Top	Side
HA1	VPE	HEP/AVP	THM	
HA2	HTP	HEP/AVP	THM	SHM

Additional specifications (by special order)

- Special inspection
Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection, steam inspection
- Double gland
- Oil/water free treatment
- Copper free treatment
- York material (SCPH2)
- Stainless steel (SUS304) atmosphere-exposed nuts and bolts
- 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 on page 4.

Flow characteristics

Refer to Figure 1 and 2 on page 4.

Inherent rangeability

Refer to Table 2.

(Rangeability 75 : 1 is available as option for rated Cv larger than 1.0)

Allowable differential pressure

Refer to Table 3, 4, 5 and 6.

Leakage specification (percentage to rated Cv value)

- Contoured type plug
IEC534-4-1982 or JISB2007-1993
<Metal seat>
Standard..... Class IV: Leakage less than 0.01%
Option..... Leakage less than 0.001% of maximum valve capacity.
- Quick opening plug
<Metal stellite seat>
Leakage less than 0.00001% of maximum value

Hysteresis error

Without positioner: Within 3% F.S. (within 5% F.S.)

With positioner: Within 1% F.S.

Linearity

Without positioner: Within $\pm 5\%$ F.S.

With positioner: Within $\pm 1\%$ F.S.

(model VPE: $\pm 3\%$ FS, model AVP&HEP: $\pm 2\%$ F.S.)

Note) 1) When positioner is not provided, operating performance may vary depending on types of packings used.

2) Parenthesized figures are applicable to Type HAI

Dimensions

Refer to Figure 4, Table 7 and Table 8.

Weight

Refer to Table 9 and 10.

Actuator orientation

Refer to Figure 5.

Finish

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

Table 1 Material combination / Temperature ranges (°C)

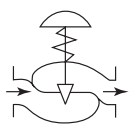
Body material		JIS	SCPH2	SCS13A	SCS14A
Trim material		ASTM	A216WCB	A351CF8	A351CF8M
JIS	SUS304		0 to 300	0 to 300	—
AISI	304				
JIS	SUS316		0 to 300	0 to 300	0 to 300
AISI	316				
JIS	SUS304L		—	0 to 300	—
AISI	304L				
JIS	SUS316L		—	0 to 300	0 to 300
AISI	316L				
JIS	SUS329J1		—	—	0 to 300
JIS	SUS304 Stellite				
AISI	304 Stellite		0 to 425	0 to 550	—
JIS	SUS304 Stellite face				
AISI	304 Stellite face		0 to 425	0 to 550	—
JIS	SUS 316 Stellite face				
AISI	316 Stellite		0 to 425	0 to 550	0 to 550
JIS	SUS316 Stellite				
AISI	316 Stellite face		0 to 425	0 to 550	0 to 550
JIS	SUS304L Stellite				
AISI	304L Stellite		—	0 to 550	—
JIS	SUS316 Stellite				
AISI	316L Stellite		—	0 to 450	0 to 450
JIS	SUS329J1 Stellite				
AISI	316L Stellite		—	—	0 to 550
JIS	SUS329J1 Stellite				

Note) 1) “□” shows standard combination of valve body and trim materials.

2) Those complying ASTM Regulation show JIS equivalents.

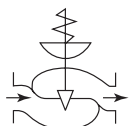
Allowable differential pressure**Contoured-type metal seat (%CF, LCF)**

Table 3 Air-to-close



Actuator Model No.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure {by Cv value} kPa {kgf/cm ² }											
				Below 0.25	0.4	063	1.0	1.6	2.5	4.0	6.3	10	14		
HA1D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920* {40.0}	3040 {31.0}	3040 {31.0}	1570 {16.0}	1570 {16.0}	981 {10.0}	981 {10.0}	550 {5.6}	410 {4.2}	250 {2.6}		
				5100 {52.0}											
	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}	3920* {40.0}	3920* {40.0}	2740 {28.0}	2060 {21.0}	1270 {13.0}		
				5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}		
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	3920* {40.0}	3920* {40.0}	3920* {40.0}	3920* {40.0}	3820 {39.0}		
				—	—	—	—	—	—	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	
HA2D	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920* {40.0}	3920* {40.0}	3920* {40.0}	3200 {32.6}	3200 {32.6}	1960 {20.0}	1960 {20.0}	1070 {10.9}	800 {8.2}	490 {5.0}		
				5100 {52.0}	5100 {52.0}	5100 {52.0}									
	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}	3920* {40.0}	3920* {40.0}	3920* {40.0}	3920 {40.0}	2470 {25.2}	
				—	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}		
	390 {4.0}	80 to 240 {0.8 to 2.4}	✓	—	—	—	—	—	—	—	—	—	3920* {40.0}	3920* {40.0}	3920* {40.0}
				—	—	—	—	—	—	—	—	—	—	5100 {52.0}	5100 {52.0}

Table 4 Air-to-open



Actuator Model No.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Positioner	Differential pressure {by Cv value} kPa {kgf/cm ² }										
				Below 0.25	0.4	063	1.0	1.6	2.5	4.0	6.3	10	14	
HA1R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920* {40.0}	3040 {31.0}	3040 {31.0}	1570 {16.0}	1570 {16.0}	981 {10.0}	981 {10.0}	550 {5.6}	410 {4.2}	250 {2.6}	
				5100 {52.0}										
	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}	3920* {40.0}	3920* {40.0}	3920* {40.0}	3820 {39.0}	2840 {29.0}	1760 {18.0}
				5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}		
HA2R	140 {1.4}	20 to 98 {0.2 to 1.0}	△	3920* {40.0}	3920* {40.0}	3920* {40.0}	3200 {32.6}	3200 {32.6}	1960 {20.0}	1960 {20.0}	1070 {10.9}	800 {8.2}	490 {5.0}	
				5100 {52.0}	5100 {52.0}	5100 {52.0}								
	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}	3920* {40.0}	3920* {40.0}	3920* {40.0}	3920 {40.0}	3430 {35.0}
				—	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	5100 {52.0}	

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

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

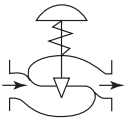
3) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B 16. 34-1981 or JIS B2201-1984.

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

5) The operating allowable differential pressure with an asterisk(*) should be read as 2940 kPa {30 kgf/cm²}, for liquid application. For the liquid application involving differential pressure of more than 2940kPa {30kgf/cm²}, use the HLC-type cage trim (%CC, LCC). (Refer to the Specification sheet No.SS2-HLC110-0100)

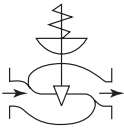
Quick-opening type metal (Stellite) seat (QS)

Table 5 Air-to-close



Action Model No.	Supply pressure kPa {kgf/cm ² }	Spring range kPa {kgf/cm ² }	Differential pressure kPa {kgf/cm ² }	
			Cv=10	Cv=14
HA1D	140 {1.4}	20 to {0.2 to }	720 {7.3}	490 {5.0}
	290 {3.0}	20 to 52 {0.2 to 0.53}	2000 {20.0}	1800 {18.0}
HA2D	140 {1.4}	20 to 52 {0.2 to 0.53}	1430 {14.6}	1300 {13.0}
	290 {3.0}	20 to 52 {0.2 to 0.53}	3900 {40.0}	3600 {37.0}

Table 6 Air-to-open



Action Model No.	Supply pressure kPa {kgf/cm ² }	Initial spring compression kPa {kgf/cm ² }	Differential pressure kPa {kgf/cm ² }	
			Cv=10	Cv=14
HA1R	140 {1.4}	40 {0.4}	330 {3.4}	290 {3.0}
	270 {2.8}	80 {0.8}	670 {6.8}	590 {6.0}
HA2R	140 {1.4}	40 {0.4}	660 {6.7}	590 {6.0}
	270 {2.8}	80 {0.8}	1320 {13.5}	1190 {12.1}

- Note) 1) "□" shows a model with a standard actuator.
 2) Take care not to cause the maximum allowable differential pressure to exceed the maximum operating pressure designated by ANSI B16. 34-1981, or JIS B2201-1984.

DIMENSIONS

Table 7 Face-to-face dimensions

[Unit: mm]

Nominal size (inch)	A			
	Semi-jacket type		Full-jacket type	
	JIS 10K RF ANSI 150RF JPI 150RF	JIS 16K RF JIS 20K RF ANSI 300RF JPI 300RF	JIS 10K RF ANSI 150RF JPI 150RF	JIS 16K RF JIS 20K RF ANSI 300RF JPI 300RF
1/2, 3/4, 1	184	197	320*	330*

Note) *: Flange size of full-jacket type is 2 inches regardless of its nominal size. Those dimensions suit to that of 2 inches sized valve.

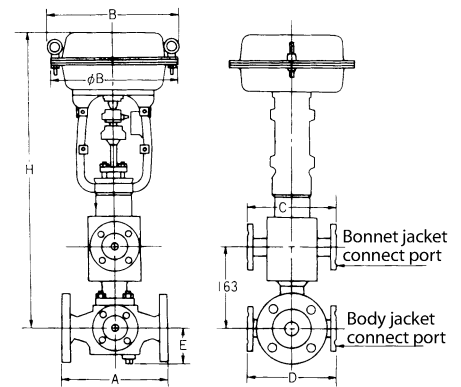


Figure 4 Face-to-face and other dimensions

Table 8 Other dimensions

[Unit: mm]

Actuator model no.	H		phi B	B	C		D		E
	Plain bonnet	Extension bonnet Type 1			Threaded type	Flanged type	Threaded type	Flanged type	
HA1D,R	415	565	218	230	143	180	180	246	65
HA2D,R	490	640	267	281					

Note) "H" dimensions are applicable when a handwheel is not provided. When a top-mounted handwheel actuator is used, add the dimensions of handwheel specified on Specification Sheets (No.SS2-8213-0500).

Weight

Table 9 Semi-jacket type

[Unit: kg]

End connection (inch)	Actuator Model No.	Jacket connection	JIS 10KANSI 150, JPI 150		JIS 16K, JIS 20K, ANSI 300, JPI 300	
			Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet
1/2, 3/4, 1	HA1D,R	Screw-on type	17	20	18	21
		Flanged type	19	23	20	24
	HA2D,R	Screw-on type	24	27	25	28
		Flanged type	26	30	27	31

Table 10 Full-jacket type

[Unit: kg]

End connection (inch)	Actuator Model No.	Jacket connection	JIS 10KANSI 150, JPI 150		JIS 16K, JIS 20K, ANSI 300, JPI 300	
			Plain bonnet	Extension type bonnet	Plain bonnet	Extension type bonnet
1/2, 3/4, 1	HA1D,R	Screw-on type	27	30	29	32
		Flanged type	29	33	31	35
	HA2D,R	Screw-on type	34	37	36	39
		Flanged type	36	40	38	42

Note) Flange size of full-jacket type is 2 inches regardless of its nominal size.

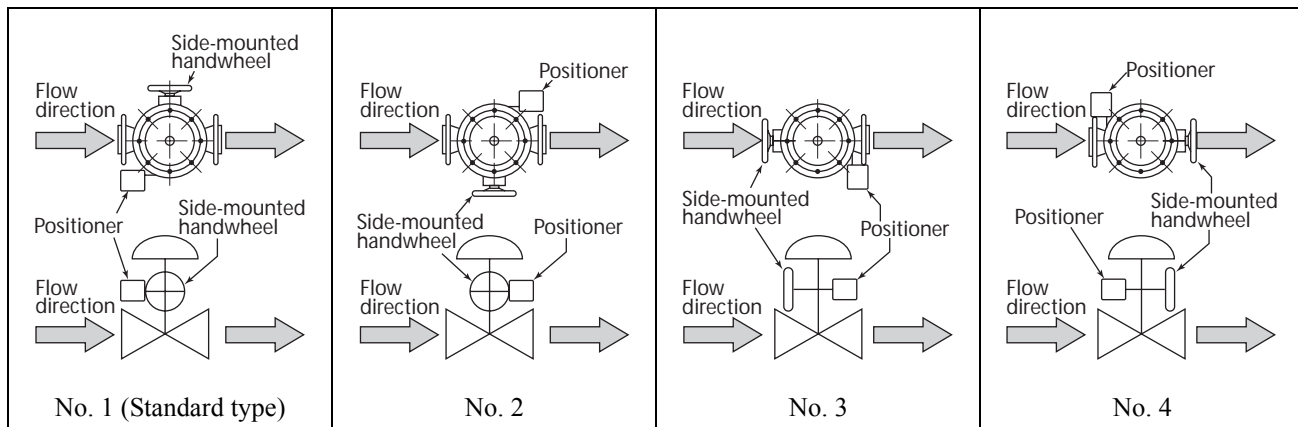


Figure 5 Actuator orientation

Note) 1) Indicated by position number when installation other than by the standard type is required.
 2) HA1 actuator is provided with the top-mounted handwheel only.

Ordering information

When ordering, please specify;

- | | |
|---|---|
| 1) Model number: HLS | 10) Accessories (positioner, handwheel, pressure regulator etc.) |
| 2) Nominal size × Cv required | 11) Special requirement of degreasing, free from copper and etc. |
| 3) Type and rating of end connections | 12) Name of flow medium |
| 4) Body and trim material, necessity of hardening | 13) Normal flow and maximum required flow |
| 5) Type of bonnet | 14) Pressure of flow medium, upstream and downstream pressure at maximum and minimum, required flow |
| 6) Jacket type, rating, connection, material | 15) Temperature and specific gravity of flow medium |
| 7) Valve and plug characteristics | 16) Viscosity of flow medium, inclusive or exclusive of slurry |
| 8) Type of actuator, air to diaphragm | |
| 9) Valve action (direct or reverse) | |

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