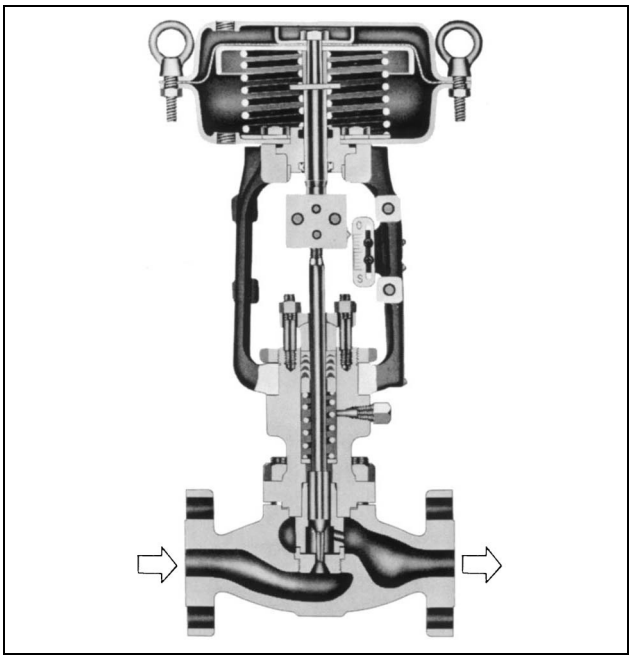
CV3000 Series
Model HLC
Small-Port Single Seated Control Valves

OVERVIEW

Model HLC Small-Port Cage Guide Type Single Seated Control Valves are designed for high differential pressure Service where fluid normal differential pressure exceeds 30kgf/cm² or for heavy-duty service where flashing/cavitation may occur. Further, they are ideal for preventing erosion from the valve body, because their guides are sturdy and the valve body is protected by a cage. The compact valve body, having an S-shaped flow passage that features low pressure loss, allows a large flow capacity and rangeability.

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

The HLC Control Valves are widely applicable for reliable control of small flows in high- or low-temperature, high differential pressure process lines.



SPECIFICATIONS

Body

Type

Straight-through, cast globe valve

Nominal size

3/4, 1 in.

Pressure rating

- JIS 10K, 16K, 20K, 30K, 40K
- ANSI Class 125, 150, 300, 600
- JPI Class 125, 150, 300, 600

End connections

• Flange end : FF, RF, RJ, LG
Tongue and groove type (Groove)
Male and female type (Female)
• Welded end : SW (1/2in. ~ 2in.)
BW (2½in.,3in.)
• Threaded end : Rc (1/2 to 1in.)

Materials

For combining the valve body, trim materials and the operating temperatures 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
  Integral-cast type (-100 to -45°C)
  Welded type (-196 to -100 °C)
  Note) Take care not to exceed the operating temperature ranges specified for respective materials.

Gland type

Bolted gland

Packing/Grease

- Grease not provided; When V shaped PTFE packing or PTFE yarn packing is used.
- Grease provided; When asbestos yarn, PTFE lined asbestos yarn, asbestos yarn with graphite, or graphite packing is used.

Note) PTFE:Polytetrafluoroethylene.

Gasket

Type; Flat type, saw-tooth type
Material; Stainless steel (SUS316, SUS316L, SUS329J1), copper, aluminum

Trim

Valve plug

•Single-seated, contoured type
Metal seat
Equal percentage (%CC)
Linear (LCC)

Cage

Separated type

Materials

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

Actuator

Type

Single-acting diaphragm actuator (Type HA)

Action

Direct or reverse action

Diaphragm

Cloth embedded ethylene propylene rubber

Spring range

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

Air supply pressure

120 to 390kPa {1.2 to 4.0kgf/cm²}
Note) Spring range and air supply pressure vary depending on permissible differential pressure.

Air connection

Rc¼ or ¼NPT internal thread

Ambient temperature

-30 to 70°C

Valve action

Direct action (Direct action actuator is combined.)
Reverse action (Reverse action actuator is combined.)

Optional accessories (provided upon request)

Positioner*, pressure regulator with filter, manual operating device*, limit switch, solenoid valve, motion transmitter, volume booster, air lock relay, and others

Notes 1) For the optional items, refer to specification sheets and installation drawings of respective accessories.
2) Accessories with an 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
PSA1	VPE/HTP	HEP/AVP	THM	SHM
HA2	HTP	HEP/AVP	THM	SHM

Additional specifications (by special order)

- Special inspection
  Flow characteristics inspection, material inspection (Material certificate), nondestructive inspection, steam inspection, low-temperature inspection
- Seat-chamfered flange
- With drain plug
- Double gland
- Steam jacket
- Oil/water free treatment
- Copper free treatment
- Stainless steel (SUS304) atmosphere-exposed nuts and bolts
- Special air piping and joint
- Sand-/ dust-preventive measures
- Saline damage countermeasures
- Cold-area use specifications
- Tropical-area use specifications
- Vacuum service

Performance

Rated Cv value

Refer to Table 2.

Flow characteristics

Refer to Figure 1 and 2.

Inherent rangeability

50 : 1 (30 : 1 for values of rated Cv 0.16 or less)

(Optional : 75 : 1)

Permissible differential pressure

Refer to Table 3 and 4.

Seat leakage rate

IEC 534-4-1982 or JIS B 2007-1993

- Standard

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

- Optional

  Leakage less than 0.001% of maximum valve capacity.

Hysteresis error

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

With positioner : Within 1% F.S.

Linearity

Without positioner : Within ±5% F.S. (Within ±10% F.S.)

With positioner : Within ±1% F.S.

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

2) Parenthesized figures are applicable to Type PSA1.

Face-to-face dimensions

Refer to Table 5.

External dimensions

Refer to Table 6.

Weight

Refer to Table 7, 8 and 9.

Pipe installation position

Refer to Figure 4.

Finish

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

Table 1. Combining the valve body, trim material and operating temperature ranges (°C)

Trim material \ Body material		JIS	SCPH2	SCPH21	SCPH61	SCS11	SCS13A	SCS14A	SCS16A	SCS19A
		ASTM	A216WCB	A217WC6	A217C5	—	A351CF8	A351CF8M	A351CF3M	A351CF3
JIS	SUS440C		-5~ +425	-5~ +425	-5~ +425	—	—	—	—	—
AISI	440C									
JIS	SUS304 Stellite		-5~ +425	-5~ +550	-5~ +566	—	-196~ +550	—	—	—
AISI	304 Stellite									
JIS	SUS304 Stellite face		-5~ +425	-5~ +550	-5~ +566	—	-196~ +550	—	—	—
AISI	304 Stellite face									
JIS	SUS316 Stellite		-5~ +425	-5~ +550	-5~ +566	—	-196~ +550	-196~ +550	—	—
AISI	316 Stellite									
JIS	SUS316 Stellite face		-5~ +425	-5~ +550	-5~ +566	—	-196~ +550	-196~ +550	—	—
AISI	316 Stellite face									
JIS	SUS304L Stellite		—	—	—	—	-196~ +550	—	—	-196~ +450
AISI	304L Stellite									
JIS	SUS316L Stellite		—	—	—	—	-196~ +450	-196~ +450	-196~ +450	-196~ +450
AISI	316L Stellite									
JIS	SUS329J1 Stellite		—	—	—	-50~ +550	—	-196~ +550	—	—

Notes 1) " ▭ " shows standard combination of value body and trim materials.

2) Those complying ASTM Regulation show JIS equivalents.

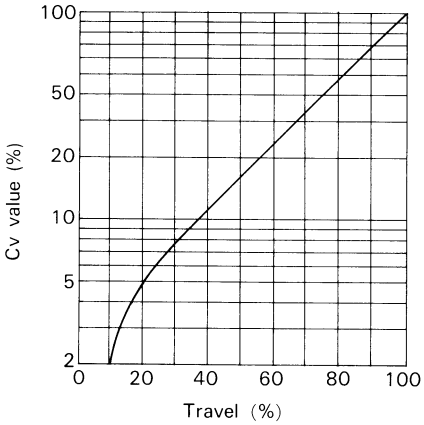
3) SUS440C is recommended for values for cavitation/flashing service of water or for superheated service of water higher than 100°C.

4) When rated Cv value is 0.16 or lower Stellite faced valve plugs or SUS440C valve plugs are standard.

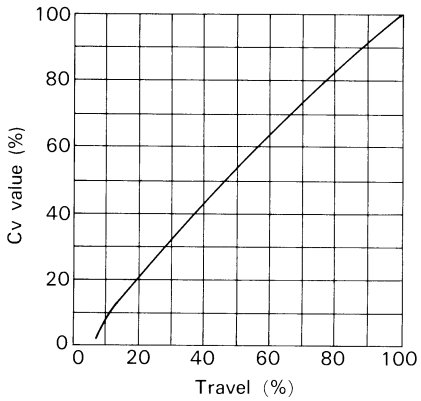
Table 2. Cv value or travel

Plug type/ characteristics \ Rated travel (mm) \ Rated Cv				0.01	0.04	0.1	0.16	0.25	0.4	0.63	1.0	1.6	2.5	4.0
Contoured type	Metal seat	Equal percentage (% C C)	14.3					✔	✔	✔	✔	✔	✔	✔
		Linear (LCC)		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Connection size (inch)		½		◀									▶	
		¾, 1, 1½, 2, 2½, 3		◀										▶

Note) " ✔ " denotes production ranges.

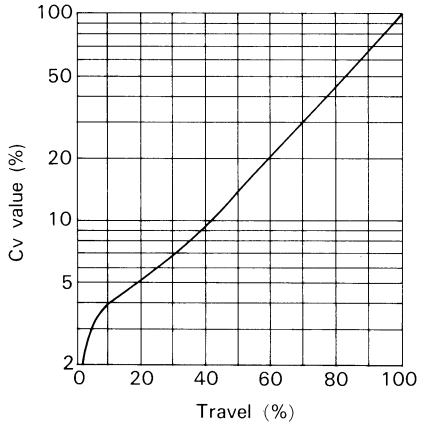


a. Equal percentage characteristics (%CC)

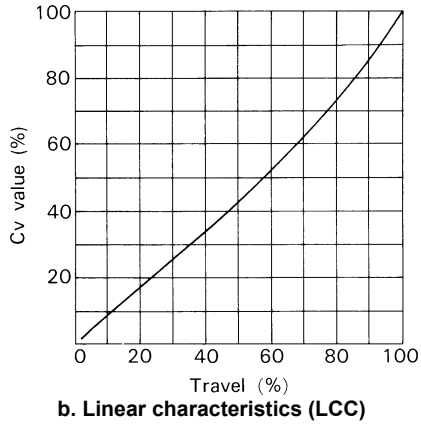


b. Linear characteristics (LCC)

Figure 1. Flow characteristics: Contoured type (Cv valve : 0.4 ~ 4.0)



a. Equal percentage characteristics (%CC/Cv valve : 0.25)



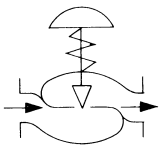
b. Linear characteristics (LCC)

Figure 2. Flow characteristics: Contoured type (Cv valve : 0.01~0.25)

Note) The above graphs indicate typical flow characteristics.

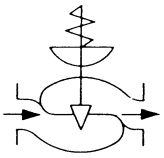
Permissible differential pressure

Table 3. Direct action (Air-to-close)



Actuator Model No.	Supply Pressure KPa {Kgf/cm²}	Spring Range KPa {Kgf/cm²}	Positioner	Differential pressure {by Cv value} kPa {kgf/cm²}						
				Below 0.25	0.4	063	1.0	1.6	2.5	4.0
HA1D	140 {1.4}	20~98 {0.2~1.0}	Δ	3920 {40.0}	3040 {31.0}	3040 {31.0}	1570 {16.0}	1570 {16.0}	981 {10.0}	981 {10.0}
				5490 {56.0}						
	160 {1.6}	20~98 {0.2~1.0}	✔	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}
				9810 {100}	9810 {100}	9810 {100}	8240 {84.0}	8240 {84.0}	5100 {52.0}	5100 {52.0}
	390 {4.0}	80~240 {0.8~2.4}	✔	—	—	—	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}
							9810 {100}	9810 {100}	9810 {100}	9810 {100}
HA2D	140 {1.4}	20~98 {0.2~1.0}	Δ	3920 {40.0}	3920 {40.0}	3920 {40.0}	3200 {32.6}	3200 {32.6}	1960 {20.0}	1960 {20.0}
				9810 {100}	62.0 {6080}	62.0 {6080}				
	160 {1.6}	20~98 {0.2~1.0}	✔	—	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}	9810 {100}

Table 4. Reverse action (Air-to-open)



Actuator Model No.	Supply Pressure Kgf/cm² {kPa}	Spring Range Kgf/cm² {kPa}	Positioner	Differential pressure {by Cv value} kPa {kgf/cm²}						
				Below 0.25	0.4	063	1.0	1.6	2.5	4.0
HA1R	140 {1.4}	20~98 {0.2~1.0}	Δ	3920 {40.0}	3040 {31.0}	3040 {31.0}	1570 {16.0}	1570 {16.0}	981 {10.0}	981 {10.0}
				56.0 {5490}						
	160 {1.6}	80~240 {0.8~2.4}	✔	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}	3920 {40.0}
				9810 {100}	9810 {100}	9810 {100}	9810 {100}	9810 {100}	72.0 {7060}	72.0 {7060}
HA2R	140 {1.4}	20~98 {0.2~1.0}	Δ	3920 {40.0}	3920 {40.0}	3920 {40.0}	3200 {32.6}	3200 {32.6}	1960 {20.0}	1960 {20.0}
				9810 {100}	6080 {62.0}	6080 {62.0}				
	160 {1.6}	80~240 {0.8~2.4}	✔	—	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}	9810 {100}

Note : 1) ✔ : Positioner is necessary, Δ : Can be operated either with or without positioner.

2) Take care not to cause the maximum permissible 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 permissible differential pressure; the lower denote permissible differential pressure at full closure.

DIMENSIONS

Table 5. Face-to-face dimensions (Unit : mm)

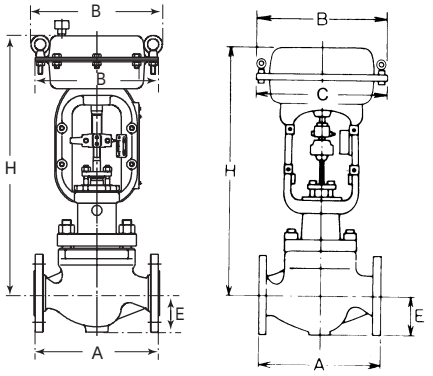
Nominal size (in.)	JIS 10K FF,RF ANSI 125FF JPI 125FF ANSI 150RF JPI 150RF	JIS16KRF	JIS20KRF JIS30KRF ANSI300RF JPI300RF	JIS40KRF ANSI600RF JPI600RF SW,BW	ANSI150RJ JPI150RJ	ANSI300RJ JPI300RJ	ANSI 600RJ JPI600RJ	JIS20K Tongue and groove Male and female	JIS30K Tongue and groove Male and female	ANSI1300LG JP1300LG	Screw-on Type
½	184	190	194	206	—	206	206	198	208	203	125
¾	184	190	194	206	—	206	206	198	208	203	125
1	184	193	197	210	197	210	210	198	212	206	125
1½	222	231	235	251	235	248	251	236	248	244	—
2	254	263	267	286	267	283	289	267	276	276	—
2½	276	288	292	311	289	308	314	292	303	302	—
3	298	313	317	337	311	333	340	317	326	327	—

Note: Face-to-face dimensions conform to IEC 534-3-1976 Standard.

Table 6. External dimensions (Unit: mm)

Actuator model No.	H				C	B	E
	Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2				
			Integral cast type	Welded type			
PSA1D,R	416	566	726	941	218	230	40
HA2D,R	450	600	760	975	267	281	40

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



a. For PSA actuator
b. For HA actuator

Figure 3. Face-to-face and External dimensions

Weight

Table 7. Screw-on type (Unit: kg)

Nominal size (in.)	Actuator model	Weight			
		Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2	
				Integral cast type	Welded type
½ ¾ 1	HA1D,R	13	15	18	23
	HA2D,R	20	22	25	30

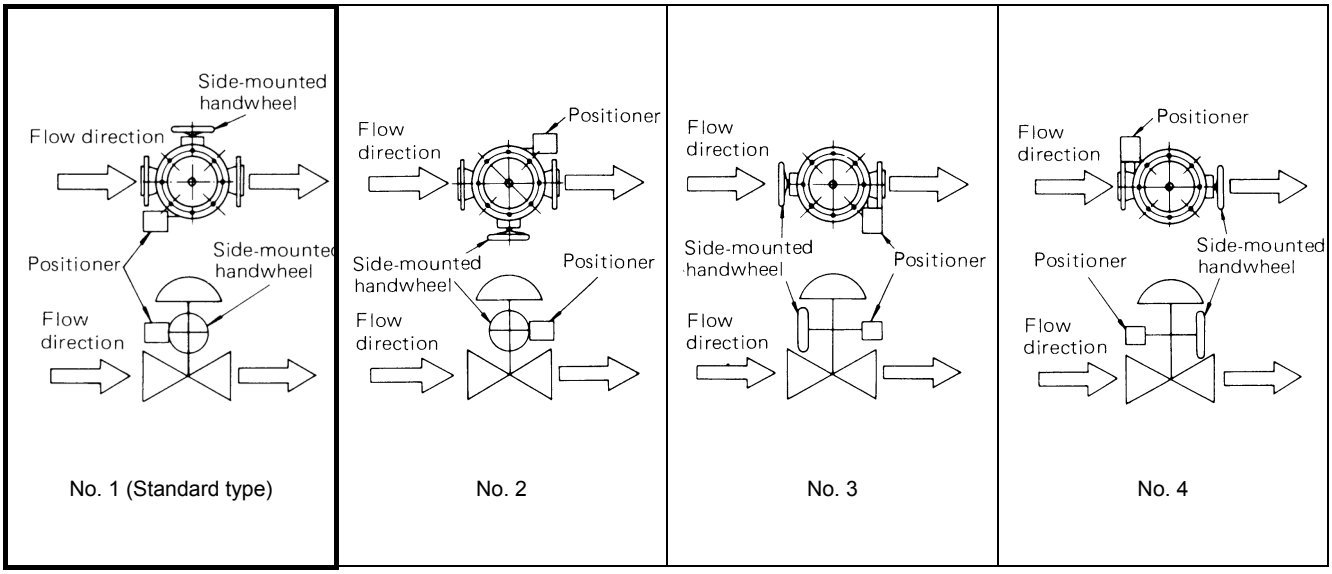
Table 8. Flanged type (Unit: kg)

Nominal size (in.)	Actuator model No.	Weight							
		JIS 10K, ANSI 125, 150, JPI 125, 150				JIS 16K, 20K, 30K, 40K, ANSI 300, 600, JPI 300, 600			
		Plain bonnet	Extension bonnet type	Extension bonnet Type 2		Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2	
				Integral-cast type	Welded type			Integral-cast type	Welded type
½	HA1D,R	15	17	20	25	16	18	21	26
	HA2D,R	22	24	27	32	23	25	28	33
¾	HA1D,R	16	18	21	26	17	19	22	27
	HA2D,R	23	25	28	33	24	26	29	34
1	HA1D,R	16	18	21	26	17	19	22	27
	HA2D,R	23	25	28	33	24	26	29	34
1½	HA1D,R	17	19	22	27	18	20	23	28
	HA2D,R	24	26	29	34	25	27	30	35
2	HA1D,R	19	21	24	29	20	22	25	30
	HA2D,R	26	28	31	36	27	29	32	37
2½	HA1D,R	22	24	27	32	23	25	28	33
	HA2D,R	29	31	34	39	30	32	35	40
3	HA1D,R	27	29	32	37	28	30	33	38
	HA2D,R	34	36	39	44	35	37	40	45

Table 9. Welded type

(Unit: mm)

Nominal size (in.)		Actuator model No.	Weight			
			Plain bonnet	Extension bonnet Type 1	Extension bonnet Type 2	
					Integral cast type	Welded type
½, ¾, 1	(SW)	HA1D,R	14	16	19	24
		HA2D,R	21	23	26	31
1½, 2	(SW)	HA1D,R	15	17	20	25
		HA2D,R	22	24	27	32
2½	(BW)	HA1D,R	16	18	21	26
		HA2D,R	23	25	28	33
3	(BW)	HA1D,R	19	21	24	29
		HA2D,R	26	28	31	36



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.

Figure 7. Pipe installation positions

Ordering Information

When ordering, please specify;

1) Model Number: HLC
2) Nominal size X Cv required
3) Type and rating of end connections
4) Body and trim material.
5) Type of bonnet
6) Valve and plug characteristics
7) Type of actuator, necessity of manual handwheel, air pressure to diaphragm
8) Valve action (direct or reverse)
9) Accessories (pressure regulator with filter etc.)
10) Special requirement of oil/water free treatment, copper free treatment, 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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