



HLSW 波纹管密封小口径单座调节阀

HLSW 波纹管密封小口径单座调节阀阀体结构紧凑，流体通道呈 S 型，具有压降损失小，流量大，可调范围广，流量特性精度高，符合 IEC60534-2-1-2011 标准。其上阀盖采用波纹管密封结构，适用于极毒、易燃易爆易挥发和稀有贵重金属介质的。另外该阀也可用在真空的场合。

调节阀泄漏量符合 ANSI FCI 70-2-2006 标准。调节阀配用多弹簧薄膜执行机构，其结构紧凑，输出力大。

产品符合 GB/T4213-2008 标准

Bellows Seal Small-port Single Seated Control Valve

HLSW Bellows Seal Small-port Single seated Control Valve with a compact valve body and an S-shape flow way features with low pressure loss, large flow capacity, wide rangeability and high-precision flow characteristics. The design of valve complies with IEC60534-2-1-2011 standard. The bonnet with bellows seal is suitable for highly toxic, flammable, explosive, volatile process fluid and rare metal. Moreover, this valve is also available in vacuum situation.

The leakage rate accords with ANSI FCI 70-2-2006 standard. The compact size and large output force can be available when the control valve is combined with multi-spring diaphragm actuator or cylinder actuator.

This product complies with the GB/T4213-2008 standards.

标准规格 STANDARD SPECIFICATION

阀体 BODY

形式 Type	直通单座铸造球型阀 Straight-through, single seated, cast globe valve
公称通径 Normal size	15, 20, 25mm
公称压力 Pressure rating	ANSI Class 125, 150, 300, 600; JIS 10K, 20K, 30K, 40K; PN 1.6, 4.0, 6.4 MPa *
连接型式 End connections	法兰型 Flanged: FF、RF、RJ、TG、MFM 焊接型 Welded end: SW
尺寸 Dimensions	请参见表 9 See Table 9
阀体及上阀盖材质 Body & Bonnet Material	SCPH2/WCB, SCPH21/WC6, SCS13A/CF8, SCS14A/CF8M, SCS16A/CF3M and other alloy steels. 各种材质的使用温度·压力范围，请参见表 1 和表 2 As to the operating pressure-temperature limitation for each material, see Table 1& 2
上阀盖型式 Bonnet type	波纹管密封型 Bellows seal : -196~+350℃
压盖型式 Gland type	螺栓压紧式 Bolted gland
填料 Packing	V 型聚四氟乙烯填料、石墨填料请参见图 2 Teflon V-ring, Grafoil, etc. See Fig.2.
垫片 Gasket	平型、锯齿型（碳钢、不锈钢（SUS304、SUS316、SUS316L）、其它合金） Flat type, Saw-tooth type (Carbon steel, Stainless steel or other alloy steels)
表面涂层 Surface coating	银灰色（环氧树脂）。但是阀体材质为不锈钢时，本体部不加涂层。 SLV (Epoxy resin group) is standard. In the case of stainless steel body, no painting is standard.

* 法兰标准 Standard: JIS B2201-1984、JB/T79.1-94(PN1.6MPa);JB/T79.2-94(PN4.0、6.4MPa);

ANSI B16.5-2009;HG20592-2009、HG20615-2009

阀内组件 TRIM

阀芯型式 Valve plug type	单座柱塞型 Single seated, Contoured type
阀内件材质 Trim materials	标准材质组合及使用温度· 压力范围, 请参见表 1 及图 1
阀内件处理 Trim materials	See Table 1&Fig.1 for hardening treatment and operating pressure-temperature
流量特性 Flow characteristics	<p>参见图 4</p> <p>金属阀座 等百分比特性 (%CF) 和线性特性 (LCF) CV 值从 0.04~14 的高精度流量特性符合 IEC60534-2-1-2011 标准</p> <p>软阀座 等百分比特性 (%TF) 和线性特性 (LTF) See Fig.4</p> <p>Metal seat: Equal percentage (%CF) and Linear (LCF) High-precision flow characteristics of CV 0.04~14 conform to IEC60534-2-1-2011 standards</p> <p>Soft seat: Equal percentage (%TF) and Linear (LTF)</p>

执行机构 ACTUATOR

型号 Type	气动薄膜式 Pneumatic Diaphragm type	电子式 Electronic type	电动式 Electric Motor type
	规格 Specification	HA 多弹簧型 Multi-Spring type	EIL04
用途 Purpose	调节 Modulation	调节 Modulation	调节 Modulation
供气压力或 供给电压 Air supply or Power supply	供气压力 (弹簧范围) Air supply (Spring range) 280 (80~240) kPa 400 (80~240) kPa	电压: 220 /380V 50HZ Power supply:220 /380V 50Hz 输入信号 Input signal : 4~20mA DC	电压: 220 /380V 50HZ Power supply:220 /380V 50Hz 输入信号 Input signal : 4~20mA DC
接口 Connection	空气配管: Rc1/4 Air piping: Rc1/4	配线:2-PF3/4 Wiring: 2-PF3/4	配线:2-G1/2 Wiring:2-G1/2
正作用 Direct action	气压增加阀闭 Air to valve close	输入信号阀闭 Signal increase to valve close	输入信号阀闭 Signal increase to valve close
反作用 Reverse action	气压增加阀开 Air to valve open	输入信号阀开 Signal increase to valve open	输入信号阀开 Signal increase to valve open
回差	≤3%FS (带定位器)	≤1%FS	≤1%FS

Hysteresis error	$\leq 5\%FS$ (不带定位器) $\leq 3\%FS$ (With positioner) $\leq 5\%FS$ (Without positioner)		
基本误差 Limit of intrinsic error	$\leq \pm 3\%FS$ (带定位器) $\leq \pm 11\%FS$ (不带定位器) $\leq \pm 3\%FS$ (With positioner) $\leq \pm 11\%FS$ (Without positioner)	$\leq \pm 1\%FS$	$\leq \pm 1\%FS$
环境温度 Ambient temperature	标准型 Standard type-30~+70℃ 高温型 High Temp.service 0~+100℃ 低温型 Low Temp.service -40~+40℃	-20~+70℃	-25~+70℃
油漆颜色 Painting	蓝色 Munsell 色标 10B5/10 Blue (Munsell color 10B5/10)		
附件 Accessories	定位器、空气过滤减压阀、保位阀、阀传送器、手轮机构等 Positioner, Air-set, Lock valve, Position transmitter, Manual handle and others	EIL 执行机构手轮 Handwheel	RS 执行机构手轮 Handwheel

性能 PERFORMANCE

CV 值及行程 Rated CV value and Travel	请参见表 3 See Table 3
阀座泄漏量 Seat Leakage	请参见表 1 See Table 1
可调范围 Rangeability	50 ($0.25 \leq Cv \leq 14$) or 30 ($Cv \leq 0.16$)
允许压差 Allowable pressure drops	请参见表 4 See Table 4
产品重量 Weight	请参见表 4 See Table 4
配管安装示意图 Actuator orientation	请参见图 3 See Fig.3

表 1 阀体、阀内件材质组合及使用温度范围• 阀座允许泄漏量

Table 1 BODY/TRIM STANDARD MATERIAL COMBINATION, OPERATING TEMPERATURE AND SEAT LEAKAGE

- R.TFE: 强化聚四氟乙烯 Reinforced Teflon
- HT : 热处理 Heat treatment
- ST : 堆焊司太莱合金 Partial stellite
- SS : 部分堆焊司太莱合金 Stellite seat surface
- SF : 全部堆焊司太莱合金 Stellite full surface

表 1-1 阀体材质: 碳钢

Table 1-1 BODY MATERIAL: CARBON STEEL

阀体材质 Body material		SCPH2/A216-WCB,SCPH21/A217-WC6,SCPL1/A352-LCB		
阀芯 Plug	材质 material	SUS304/316	SUS304/316	SUS304/316
	处理 treatment	——	R.TFE	SS/SF
阀座 Seat ring	材质 material	SUS304/316	SUS304/316	SUS304/316
	处理 treatment	——	——	SS/SF
导向套 Guide	材质 material	SUS420	SUS420	SUS420
	处理 treatment	HT	HT	HT
垫圈 Gasket	材质 material	SUS316L	SUS316L	SUS316L
阀座允许泄漏量 Seat Leakage	ANSI	Class IV	Class VI	Class IV
	Rated Cv×	0.01%	Bubble-tight	0.01%
使用温度 Operating Tep. °C	SCPH2/WCB Body	-17~+350	-17~+230	-17~+350
	SCPH21/WC6 Body	-17~+350	-17~+230	-17~+350
	SCPL1/LCB Body	-45~+350	-45~+230	-45~+350

表 1-2 阀体材质: 不锈钢

Table 1-2 BODY MATERIAL: STAINLESS STEEL

阀体材质 Body material		SCS13A/CF8,SCS14A/CF8M,SCS16A/CF3M		
阀芯 Plug	材质 material	SUS304/316/316L	SUS304/316	SUS304/316/316L
	处理 treatment	——	R.TFE	SS/SF
阀座 Seat ring	材质 material	SUS304/316/316L	SUS304/316/316L	SUS304/316/316L
	处理 treatment	——	——	SS/SF
导向套 Guide	材质 material	SUS304/316/316L	SUS304/316/316L	SUS304/316/316L
	处理 treatment	—	R.TFE	ST
垫圈 Gasket	材质 material	SUS316L	SUS316L	SUS316L
阀座允许泄漏量 Seat Leakage	ANSI	Class IV	Class VI	Class IV
	Rated Cv×	0.01%	Bubble-tight	0.01%
使用温度 Operating Temp. °C		-196~+350	-45~+230	-196~+350

表 2 阀体材质使用温度· 压力范围

Table 2 BODY MATERIAL/OPERATING PRESSURE-TEMPERATURE RATIO

表 2-1 Table 2-1 ANSI

UNIT:MPa

温度 Temp. °C	ANSI150					ANSI300					ANSI600				
	LCB	WCB	WC6	SCS13A	SCS14A	LCB	WCB	WC6	SCS13A	SCS14A	LCB	WCB	WC6	SCS13A	SCS14A
				CF8	CF8M				CF8	CF8M				CF8	CF8M
-196~38	—	—	—	1.90	1.90	—	—	—	4.95	4.95	—	—	—	9.91	9.92
-45~38	1.84	—	—	1.90	1.90	4.78	—	—	4.95	4.95	9.57	—	—	9.91	9.92
-5~38	1.84	1.96	1.99	1.90	1.90	4.78	5.10	5.16	4.95	4.95	9.57	10.2	10.32	9.91	9.92
50	1.81	1.92	1.92	1.84	1.84	4.72	5.00	5.16	4.77	4.80	9.46	10.1	10.32	9.56	9.62
100	1.72	1.76	1.76	1.56	1.61	4.51	4.63	5.14	4.08	4.21	9.02	9.27	10.29	8.17	8.43
150	1.57	1.57	1.57	1.39	1.47	4.40	4.51	5.01	3.62	3.85	8.78	9.04	10.03	7.26	7.69
200	1.40	1.40	1.40	1.25	1.37	4.26	4.38	4.88	3.27	3.56	8.54	8.75	9.75	6.54	7.12
250	1.20	1.20	1.20	1.16	1.20	4.05	4.16	4.62	3.04	3.34	8.11	8.33	9.26	6.10	6.67
300	1.01	1.01	1.01	1.01	1.01	3.76	3.87	4.23	2.91	3.15	7.54	7.74	8.48	5.80	6.32
350	0.84	0.84	0.84	0.84	0.84	3.59	3.69	4.01	2.81	3.03	7.18	7.38	8.04	5.60	6.07
375		0.73	0.73	0.73	0.73		3.64	3.88	2.77	2.96		7.28	7.75	5.54	5.93
400		0.64	0.64	0.64	0.64		3.44	3.65	2.74	2.91		6.89	7.31	5.48	5.81
425		0.55	0.55	0.55	0.55		2.88	3.44	2.71	2.87		5.74	6.91	5.42	5.72
450		0.47	0.47	0.47	0.47		1.99	3.08	2.68	2.81		4.00	6.17	5.37	5.61
475		0.37	0.37	0.37	0.37		1.35	2.58	2.65	2.73		2.70	5.17	5.30	5.46
500		0.28	0.28	0.28	0.28		0.88	2.02	2.60	2.67		1.75	4.04	5.20	5.37
525		0.18	0.18	0.18	0.18		0.51	1.53	2.19	2.57		1.03	3.07	4.77	5.15
550		—						1.20	2.00	2.40			2.40	4.00	4.60
566								1.00	1.90	2.20			2.00	3.80	4.50

表 2-2 Table 2-2 JB/T79-94 或 HG20592-2009

UNIT:MPa

温度 Temp. °C	PN16	PN40	PN63	PN100	温度 Temp. °C	PN16	PN40	PN63	PN100
	ZG230-450					ZG0Cr18Ni9			
-5~200	1.60	4.00	6.30	10.0	-45~200	1.60	4.00	6.30	10.0
~250	1.40	3.50	5.40	9.00	~300	1.40	3.50	5.40	9.00
~300	1.20	3.00	4.80	7.50	~400	1.20	3.00	4.80	7.50
~350	1.10	2.60	4.00	6.60	~480	1.10	2.60	4.00	6.60
~400	0.90	2.30	3.70	5.80	~520	0.90	2.30	3.70	5.80
~425	0.80	2.00	3.20	5.00	~560	0.80	2.00	3.20	5.00
~435	0.70	1.80	2.80	4.50					
~445	0.62	1.60	2.50	4.20					
~455	0.57	1.40	2.30	3.60					

图 1 阀内件材质·处理

Fig.1 TRIM MATERIAL/TREATMENT

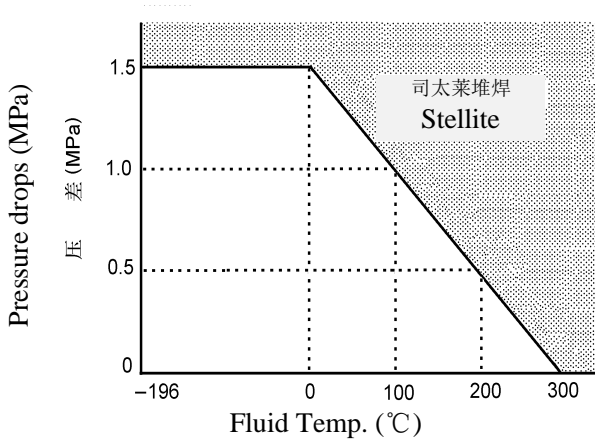


图 1-1 司太莱的工作范围
Fig.1-1 Temperature/normal pressure drops ranges requiring Stellite

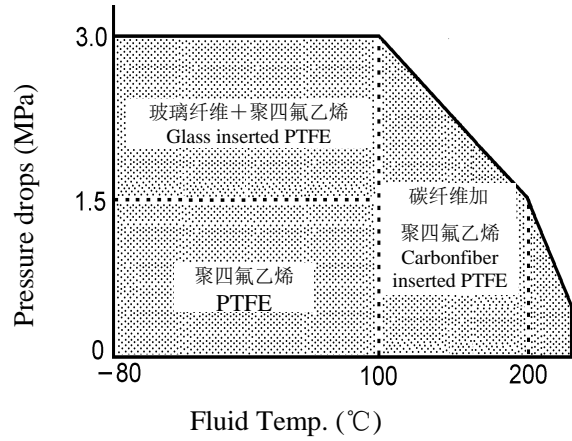


图 1-2 软阀座的工作温度和压差的范围
Fig.1-2 Temperature and maximum pressure drops range for soft seat

- 注:
1. 空化和闪蒸或者水的温度超过 100 °C 热场合, 建议用 9Cr18 硬化不锈钢。
 2. 空化、闪蒸、禁油及常处于关闭状态
 3. 如 $C_v \leq 0.16$, 阀芯全部堆焊司太莱合金或用 9Cr18 硬化不锈钢。

Note: 1. 9Cr18 hardened stainless steel is recommended for valves for cavitation/flashing service or for superheated service of water higher than 100 °C.

2. When cavitation/flashing service, oil prohibitive service, or retention of valve-close performance is required, use of stellite is recommended regardless of temperature or pressure drops.
3. When C_v is 0.16 or lower, Stellite faced valve plugs or 9Cr18 hardened stainless steel valve plugs is standard.

图 2 软阀座材质及填料使用温度·压力范围

Fig.2 SOFT SEAT MATERIAL & PACKING PRESSURE · TEMPERATURE RATINGS

图 2-1 软密封(增强聚四氟乙烯)
Fig. 2-1 Soft seal (R. TFE V-RING)

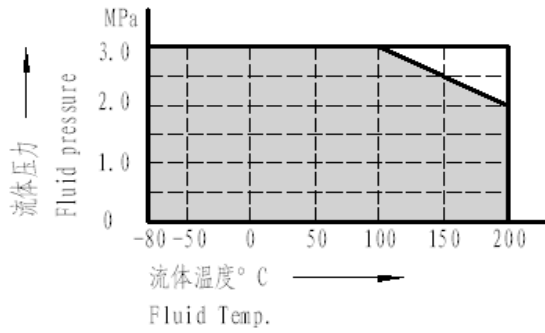


图 2-2 聚四氟乙烯碳纤维/聚四氟乙烯石棉
Fig. 2-1 TFE FIBER/TFE-ASBESTOS

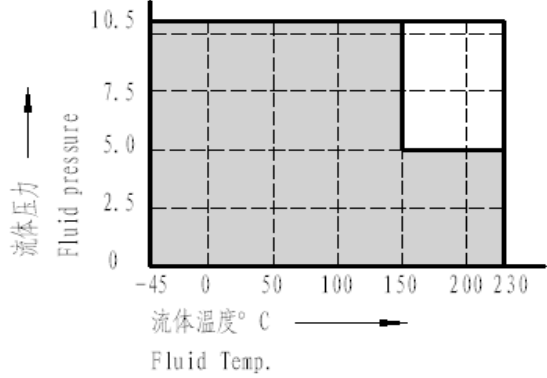


图 2-3 柔性石墨
Fig. 2-3 GRAFOIL

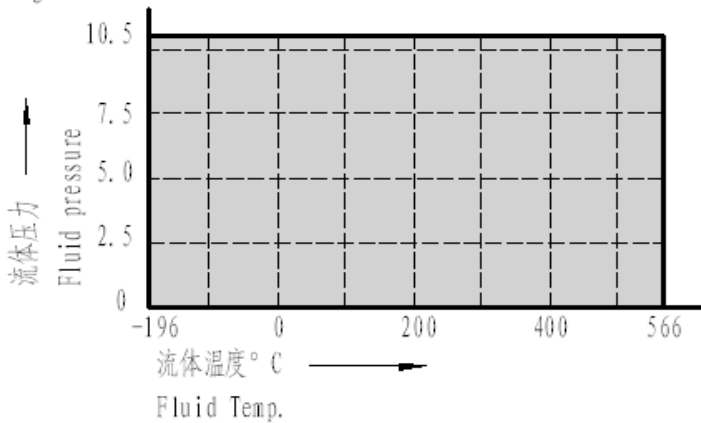


图 2-4 V型聚四氟乙烯填料
Fig. 2-4 PTFE V-RING

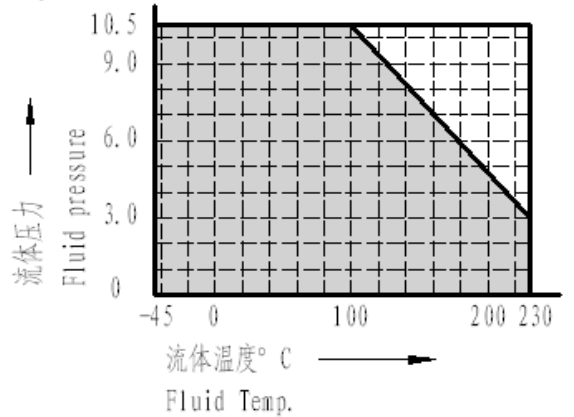


图 3 阀体部件结构 Fig.3 BODY SECTION

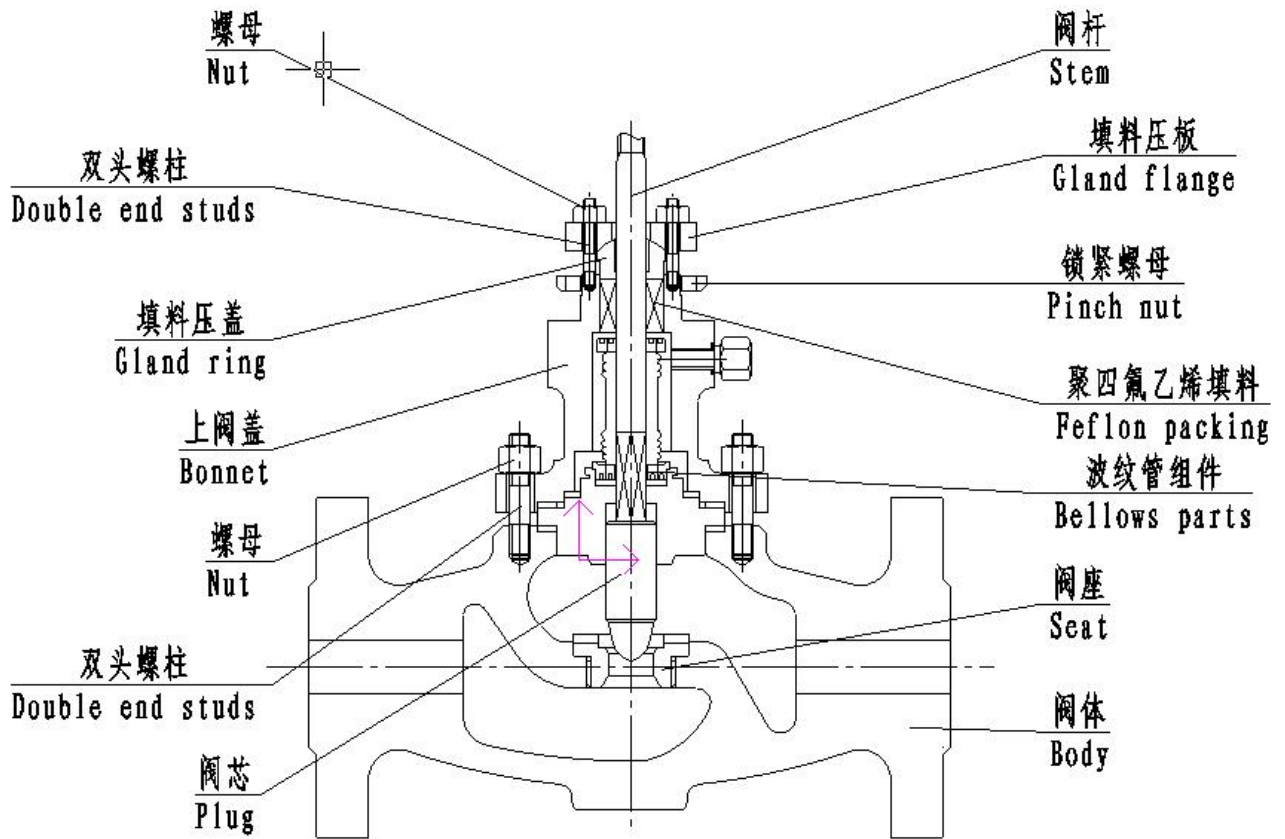


表 3 CV 值和行程

Table 3 Rated CV value and travel

阀芯型式 Plug type	阀座和流量特性 Seat and Flow characteristics		额定行程 Rated Stroke	额定 CV 值 Rated CV value													
				0.01	0.04	0.1	0.16	0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14
柱塞 阀芯 Contoured type	金属 阀座 Metal seat	等百分比(%CF) Equal percentage	14.3					○	△	△	△	△	△	△	△	△	
		线性(LCF) Linear		○	○	○	○	○	△	△	△	△	△	△	△	△	
	软阀 座 Soft seat	等百分比(%TF) Equal percentage		○	○	○	○	○	○	○	○	○	○	○	○	○	○
		线性(LTF) Linear				○	○	○	○	○	○	○	○	○	○	○	○
公称通径 x 阀座直径 Normal size x Seat size			20	6	6	6	6	6	8	8	11	11	14	14	19	22	
			25	6	6	6	6	6	8	8	11	11	14	14	19	22	28

注: 1.符号○和△表示阀的规格范围。

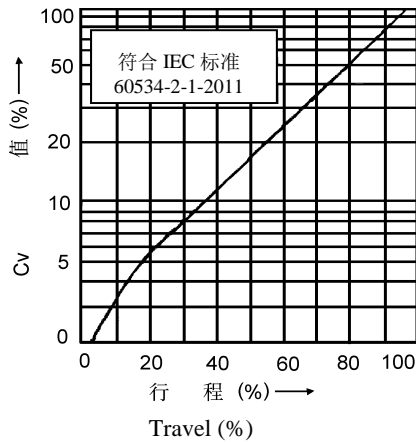
2.符号△表示阀的流量特性符合 IEC534-2-1976 标准。

Note: 1.○ and △ denotes production ranges.

2. △ denotes the flow characteristics complying with the IEC60534-2-1-2011 standards.

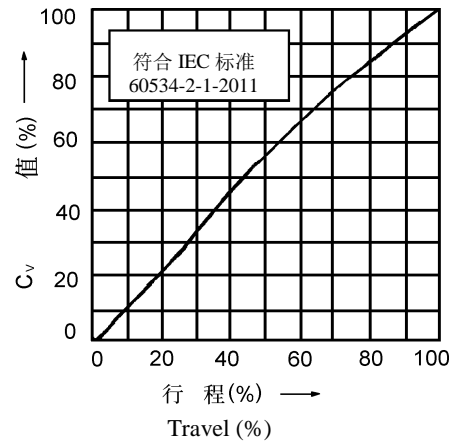
图 4 典型流量特性曲线

Fig.4 TYPICAL FLOW CHARACTERISTICS



等百分比特性 (%CF 金属阀座)

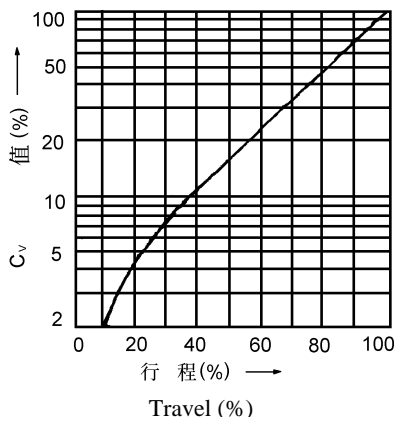
Equal percentage characteristics (%CF metal seat)



线性特性 (LCF 金属阀座)

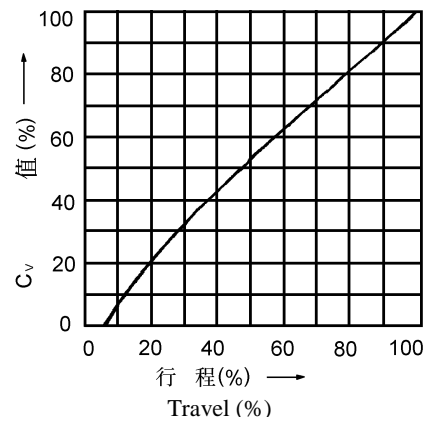
Linear characteristics (LCF metal seat)

图 4-1 高精度的流量特性曲线 (Cv=0.4~14)
Fig.4-1 High-precision flow characteristics (CV=0.4~14)



等百分比特性 (%TF 软阀座)

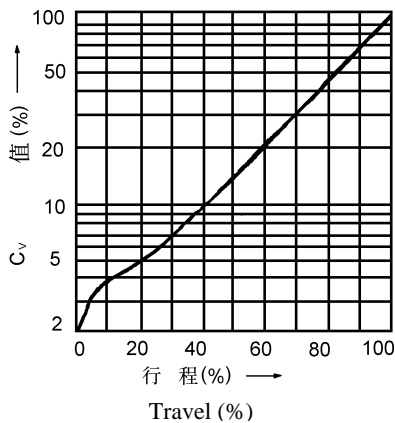
Equal percentage characteristics (%TF soft seat)



线性特性 (LTF 金属阀座)

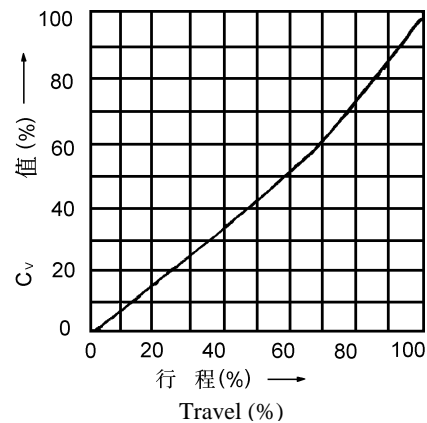
Linear characteristics (LTF soft seat)

图 4-2 柱塞型阀芯的流量特性曲线 (Cv=0.4~14)
Fig.4-2 Flow characteristics: Contoured type (Cv=0.4~14)



等百分比特性 (%CF 金属阀座、%TF 软阀座)

Equal characteristics (%CF metal seat, %TF soft seat)



线性特性 (LCF 金属阀座、LTF 软阀座)

Linear characteristics (LCF metal seat, LTF soft seat)

图 4-3 柱塞型阀芯的流量特性曲线 (Cv=0.01~0.25)
Fig.4-3 Flow characteristics: Contoured type (Cv=0.01~0.25)

表 4 允许压差

Table 4 ALLOWABLE PRESSURE DROPS

表 4-1 薄膜式执行机构 (HA)

Table 4-1 DIAPHRAGM ACTUATOR (HA)

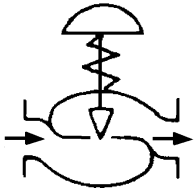
I. 柱塞阀芯、金属阀座 (%CF, LCF)

I. Contoured-type plug and metal seat

表 4-1-1 气—关式阀

Table 4-1-1 Air-to-close

100kPa

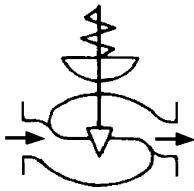


执行机构 Actuator	供气压力 Air supply	弹簧范围 Spring range	定位器 Positioner	允许压差 Allowable pressure drops										
				额定 Cv 值 Rated Cv										
				≤0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14	
HA2D	4.0	0.8~2.4	有 With	20	20	20	20	20	20	20	20	20	20	20
				51	50	50	50	50	50	50	50	50	50	37.5

表 4-1-2 气—开式阀

Table 4-1-2 Air-to-open

100kPa



执行机构 Actuator	供气压力 Air supply	弹簧范围 Spring range	定位器 Positioner	允许压差 Allowable pressure drops										
				额定 Cv 值 Rated Cv										
				≤0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14	
HA2R	2.8	0.8~2.4	有 With	20	20	20	20	20	20	20	20	20	20	17.5
				51	50	50	50	50	50	50	38	38		

注： 1. 最大允许压差不准超过 ANSI B16.34—1981 或 JIS B2201—1984 标准规定的最大工作压力。
2. 同一格内的上方数字表示阀常开允许压差，下方数字表示阀全关时的允许压差。

Note: 1. Take care not to cause the allowable maximum pressure drops to exceed the maximum operating pressure designated by ANSI B16.34—1981 或 JIS B2201—1984.

2. The upper figures denote the operating allowable pressure drops; the lower denote the allowable pressure drops at full closure.

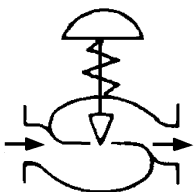
II. 柱塞阀芯、软阀座 (%TF、LTF)

II. Contoured-type plug and metal seat (%TF、LTF)

表 4-1-3 气—关式阀

Table 4-1-3 Air-to-close

100kPa

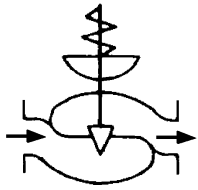


执行机构 Actuator	供气压力 Air supply	弹簧范围 Spring range	定位器 Positioner	允许压差 Allowable pressure drops									
				额定 Cv 值 Rated Cv									
				≤0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14
HA2D	4.0	0.8~2.4	有 With	20	20	20	20	20	20	20	20	20	20
				30	30	30	30	30	30	30	30	30	30

表 4-1-4 气—开式阀

Table 4-1-4 Air-to-open

100kPa



执行机构 Actuator	供气压力 Air supply	弹簧范围 Spring range	定位器 Positioner	允许压差 Allowable pressure drops										
				额定 Cv 值 Rated Cv										
				≤0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14	
HA2R	2.8	0.8~2.4	有 With	20	20	20	20	20	20	20	20	20	20	17.5
				30	30	30	30	30	30	30	30	30	30	

注： 1. 最大允许压差不准超过 ANSI B16.34—1981 或 JIS B2201—1984 标准规定的最大工作压力。
2. 同一格内的上方数字表示阀常开允许压差，下方数字表示阀全关时的允许压差。

Note: 1. Take care not to cause the allowable maximum pressure drops to exceed the maximum operating pressure designated by ANSI B16.34—1981 或 JIS B2201—1984.

2. The upper figures denote the operating allowable pressure drops; the lower denote the allowable pressure drops at full closure.

表 4-2 电子式执行机构 (EIL04)

Table 4-2 ELECTRONIC ACTUATOR (EIL04)

100kPa

型号 Model	阀座型式 Seat type	允许压差 Allowable pressure drops										
		额定 Cv 值 Rated Cv										
		≤0.25	0.4	0.63	1.0	1.6	2.5	4.0	6.3	10	14	
EIL04	金属密封 Metal seal	20	20	20	20	20	20	20	20	20	20	20
		100	100	100	100	100	100	100	100	100	100	100
	软密封 Soft seal	20	20	20	20	20	20	20	20	20	20	20
		30	30	30	30	30	30	30	30	30	30	30

注： 1. 最大允许压差不准超过 ANSI B16.34—1981 或 JIS B2201—1984 标准规定的最大工作压力。
2. 同一格内的上方数字表示阀常开允许压差，下方数字表示阀全关时的允许压差。

Note: 1. Take care not to cause the allowable maximum pressure drops to exceed the maximum operating pressure designated by ANSI B16.34—1981 或 JIS B2201—1984.

2. The upper figures denote the operating allowable pressure drops; the lower denote the allowable pressure drops at full closure.

表 5 尺寸

Table 5 DIMENSIONS

表 5-1 法兰距尺寸

Table 5-1 Fact-to-Face dimensions

mm

公称 口径 Normal size	A					
	ANSI 125 FF ANSI 150 RF JIS 10K FF RF PN1.6 RF	JIS 16K RF	ANSI 300 RF JIS 20K RF JIS 30K RF PN4.0 MFM	ANSI600 RF JIS 40K RF PN6.4 MFM	ANSI 150 RJ	ANSI 300 RJ
20	184	190	194	206	—	206
25	184	193	197	210	197	210

注：法兰距符合 IEC 534—3—1976 标准。

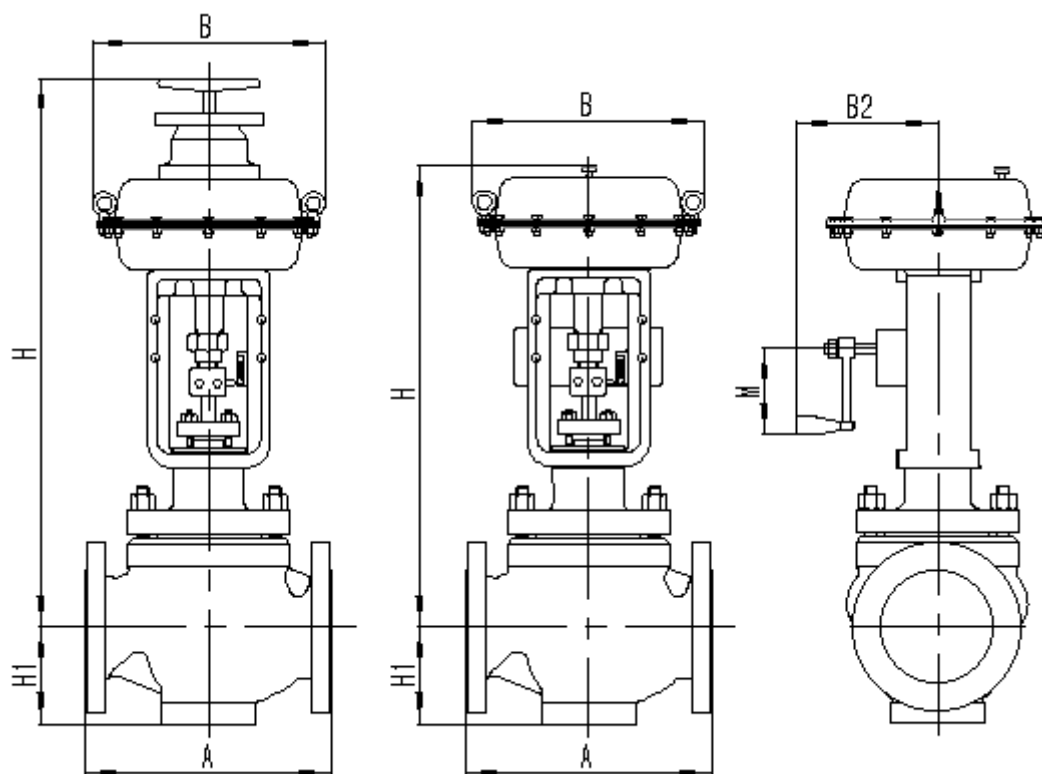
Note: Face-to-face dimensions comform to IEC 534-3-1976 Standard.

表 5-2 外形尺寸

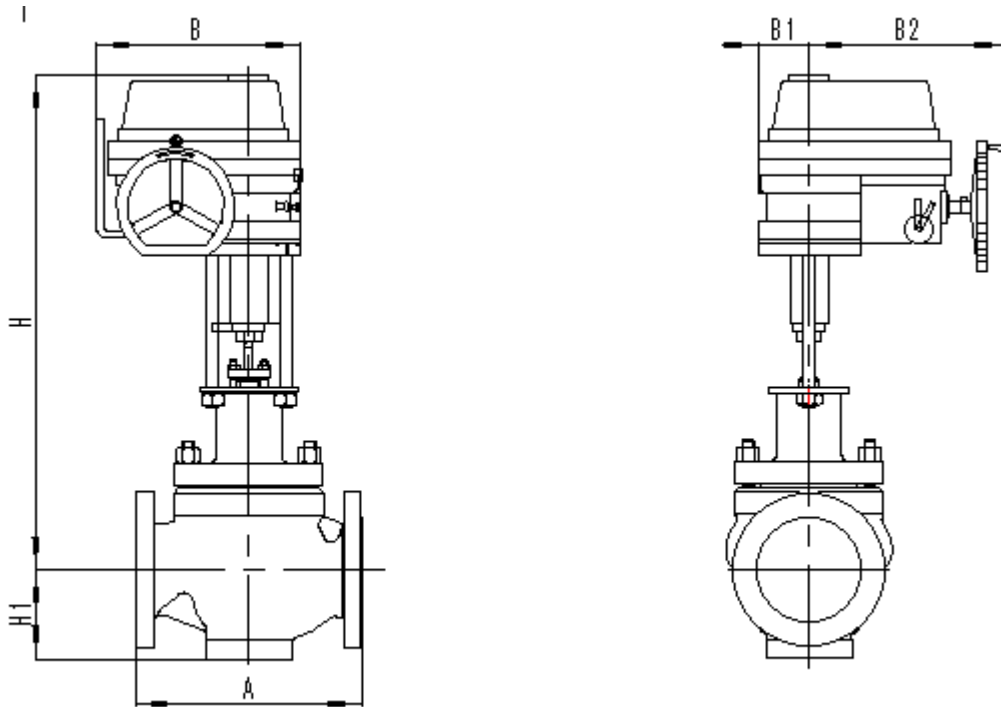
Table 5-2 Other dimensions

mm

执行机构 Actuator	H			B	B1	B2	M	H1
	不带手轮 Without handwheel	侧装手轮 Side-mounted handwheel	顶装手轮 Top-mounted handwheel					
HA2D、R	640	640	910	281	—	273.5	175	70
EIL04	870	—	—	172	—	258	—	



配 HA 执行机构
With type HA



配 EIL 执行机构
With type EIL

图 5 法兰距及外形尺寸
Fig.5 Face-to-Face dimension and Other dimensions

表 4 重量

Table 4 WEIGHT

表 4-1 法兰连接

Table 4-1 Flanged end connection type

Kg

公称通径 Nominal size	执行机构 Actuator	ANSI 125、150 JIS 10K	ANSI 300、600 JIS 16、20、30、40K
20、25	HA1D、R	26	27
	HA2D、R	33	34
	EIL04	26	27

表 4-2 焊接连接

Table 4-2 Welded type

Kg

公称通径 Nominal size	执行机构 Actuator	—
20、25 (SW)	HA1D、R	24
	HA2D、R	31
	EIL04	24