YAMATAKE Specification

Cage Type Double Seated Control Valve (Rating : ANSI 600 or Less)

Model VDC

Introduction

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.

Specifications

Body

Type : Straight-through type, Cast glove valve

Size : 1½, 2, 2½, 3, 4, 5, 6, 8, 10, 12 inches

Rating : JIS 10K, 16K, 20K, 30K, and 40K
ANSI Class 150, 300 and 600

End connection : Flanged end (FF, RF and RJ)

Material : Carbon steel (SCPH2), Stainless steel (SCS13, 14), Low alloy steel (SCPH21, 61), Cast iron (FC200) and Other alloy steel

Bonnet : Plain bonnet (0~+200℃)
Radiator finned bonnet (Over 200℃)
Extended bonnet (0℃ or less)
Bellows bonnet [−30 to +300℃, 10kgf/㎠ (981kPa) or less]

Gland type : Bolted gland

Packing : PTFE Shevron, Asbestos yarn and Others
Note) PTFE: Polytetrafluoroethylene

Drain plug : No (optionally available)

Trim

Valve plug : Double seated,
Equal percentage cage and Soft seat
Equal percentage split cage
Linear cage and Soft seat
Linear split cage
(For the operating temperature and pressure differential range of the Soft seat plug, refer to the figure in the following page.)

Material : Valve plug and cage;
Stainless steel (SCS24, SCS14, SCS14 stellite coating, SCS14 atomloy) and Other alloy steel
Other trim;
Stainless steel (SUS316) and Other alloy steel
(For combination of materials for valve body, plug, and cage, refer to the Table in the following page.)

Actuator

Type : Spring type pneumatic diaphragm actuator, direct or reverse action

Diaphragm material : Neoprene with fabric reinforced.

Spring range : 0.2~1.0kgf/㎠ (20~98kPa)
0.4~1.2kgf/㎠ (40~120kPa)
0.4~2.0kgf/㎠ (40~200kPa)
0.8~2.4kgf/㎠ (80~240kPa)

Air to diaphragm : 1.2~2.8kgf/㎠(120~270kPa)

Pneumatic tubing connection : Rc¼ internal thread
(VA4, VA5 type···Rc½ with Rc¼ adapter, also available Rc⅜ adapter.)

Ambient temperature : −30 to +70℃

Valve action Air-to-close or air -to-open available by using direct or reverse actuator. Non-reversible body.

Accessories Handwheel (side or top mounted), Positioner, Limit switch, Motion transmitter, Volume booster, Air lock relay and Other available.

Additional specification Steam jacket [operating pressure 10kgf/㎠ (981kPa) or less] may be provided as required.

Performance

Seat leakage rate

- Metal seat
  Standard
  Class II (IEC534-4-1982 or JISB2007-1993)-Leakage less than 0.5% of maximum valve capacity.
  Optional
  Class III -Leakage less than 0.1% of maximum valve capacity.
- Soft seat
  Class VI (IEC534-4-1982 or JISB2007-1993)-Leakage less than 0.00001% of maximum valve capacity.

Action : For standard type gland

Hysteresis error

Without positioner; 3% FS or less

With positioner; 1% FS or less

Linearity

Without positioner; ±5% FS or less

With positioner; ±1% FS or less

Rangeability : 30 : 1 (optional 50 : 1)

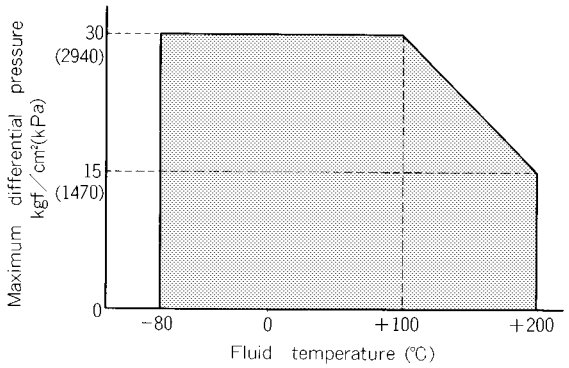


Figure 1. Operating temp. & press. diff. limit. of PTFE seat valve

Table 1. Combination of materials for valve body, plug, and cage, and operating temperature limit

Body material	Plug Cage material	Plug Cage type	Operating temperature limit (℃)
Cast iron (FC200)	Stainless steel (SCS24)	Cage	0 ~200
Carbon steel (SCPH2)	Stainless steel (SCS24)		− 5 ~+425
Low alloy steel (SCPH21)	Stainless steel (SCS24)		
	SCS14 atomloy furnished	Split cage	426~500
	SCS14 stellite coating		426~550
Low alloy steel (SCPH61)	Stainless steel (SCS24)	Cage	− 5 ~+425
	SCS14 atomloy furnished	Split cage	426~500
	SCS14 stellite coating		426~600
Stainless steel (SCS13)	Stainless steel (SCS14)*	Cage	−195~+200
		Split cage	201~300
	SCS14 atomloy furnished	Cage	−195~+200
		Split cage	201~500
	SCS14 stellite coating	Cage	−195~+200
		Split cage	201~600
Stainless steel (SCS14)	Stainless steel (SCS14)*	Cage	−195~+200
		Split cage	201~300
	SCS14 stellite coating	Cage	−195~+200
		Split cage	201~600

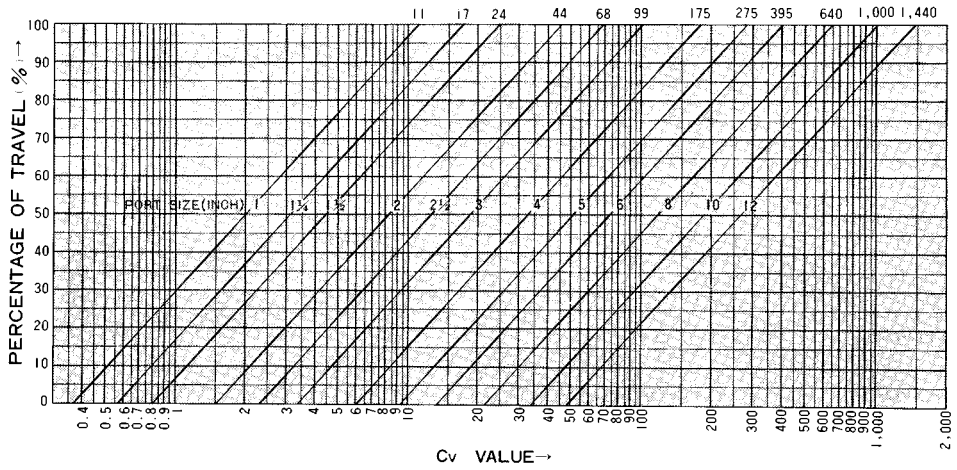
*Requires hardening treatment according to operating differential pressures. Refer to Document No. IB2-8000-0100.

Table 2. Flow coefficient Cv and stem travel

Valve size (inch)		1½			2			2½			3			4			5			6			8			10			12		
Port size (inch)		1	1¼	1½	1¼	1½	2	1½	2	2½	2	2½	3	2½	3	4	3	4	5	4	5	6	5	6	8	6	8	10	8	10	12
Rated Cv value		11	17	24	17	24	44	24	44	68	44	68	99	68	99	175	99	175	275	175	275	395	275	395	640	395	640	1000	640	1000	1440
Plug type & characteristics	Equal percentage cage, Linear cage & Teflon seat	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	△	△	△	△	△	△	△	△	△
	Travel (mm)	25			25			37.5			37.5			37.5			50			50			75			100			100		
	Equal percentage split cage & Linear split cage	—	—	—	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Travel (mm)	25			25			37.5			37.5			37.5			50			50			75			100			100		

Note : △···Available for only soft seat valve.

Equal percentage



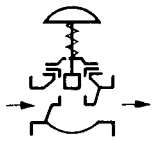
(Idealistic flow characteristics is indicated in this graph.)

Figure 2. Flow characteristics

Table 3. Maximum pressure differential

Table 3-1. General use valve

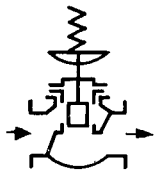
Table 3-1-1. Direct action (air-to-close)

Actuator model No.	Air to diaphragm kgf/㎠ (kPa)	Spring range kgf/㎠ (kPa)	w or w/o positioner	Pressure differential kgf/㎠ (kPa)									
				Valve size (inch)									
				1½	2	2½	3	4	5	6	8	10	12
VA1D	1.2 (120)	0.2~1.0 (20~98)	×	8.1 (790)	6.4 (630)								
	1.4 (140)	0.2~1.0 (20~98)	○	20.0 (1960)	16.0 (1570)								
	2.6 (250)	0.2~1.0 (20~98)	○	40.0 (3920)	40.0 (3920)								
VA2D	1.2 (120)	0.2~1.0 (20~98)	×	11.0 (1080)	9.2 (900)	7.3 (720)	6.3 (620)	4.7 (460)					
	1.4 (140)	0.2~1.0 (20~98)	○	29.0 (2840)	23.0 (2260)	18.0 (1750)	16.0 (1570)	12.0 (1180)					
	2.6 (250)	0.2~1.0 (20~98)	○	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)					
VA3D	1.2 (120)	0.2~1.0 (20~98)	×	19.0 (1860)	15.0 (1470)	12.0 (1180)	10.0 (981)	7.9 (770)	6.4 (630)	5.3 (520)			
	1.4 (140)	0.2~1.0 (20~98)	○	40.0 (3920)	39.0 (3820)	31.0 (3040)	26.0 (2650)	20.0 (1960)	16.0 (1570)	13.0 (1270)			
	2.6 (250)	0.2~1.0 (20~98)	○	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)			
VA4D	1.2 (120)	0.2~1.0 (20~98)	×			17.0 (1670)	14.0 (1370)	11.0 (1080)	8.9 (870)	7.4 (720)	5.6 (550)		
	1.4 (140)	0.2~1.0 (20~98)	○			40.0 (3920)	37.0 (3630)	28.0 (2740)	22.0 (2160)	19.0 (1860)	14.0 (1370)		
	2.6 (250)	0.2~1.0 (20~98)	○			40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)		
VA5D	1.2 (120)	0.2~1.0 (20~98)	×						12.0 (1180)	10.0 (981)	7.6 (740)	6.1 (600)	5.1 (500)
	1.4 (140)	0.2~1.0 (20~98)	○						31.0 (3040)	26.0 (2550)	19.0 (1860)	15.0 (1470)	13.0 (1270)
	2.6 (250)	0.2~1.0 (20~98)	○						40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)

Notes : 1) The figures inside bold line are for standard actuator.
2) Positioner : ×···Without, ○···With

Table 3-1-2. Reverse action (air-to-open)

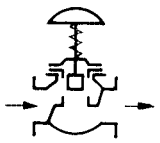
Actuator model No.	Air to diaphragm kgf/cm² (kPa)	Spring range kgf/cm² (kPa)	w or w/o positioner	Pressure differential kgf/cm² (kPa)									
				Valve size (inch)									
				1½	2	2½	3	4	5	6	8	10	12
VA1R	1.4 (140)	0.2～1.0 (20～98)	× or ○	8.1 (790)	6.4 (630)								
		※0.4～1.2 (40～120)	△	24.0 (2350)	19.0 (1860)								
	2.8 (270)	0.8～2.4 (80～240)	○	40.0 (3920)	40.0 (3920)								
VA2R	1.4 (140)	0.2～1.0 (20～98)	× or ○	11.0 (1080)	9.2 (900)	7.3 (720)	6.3 (620)	4.7 (460)					
		※0.4～1.2 (40～120)	△	35.0 (3430)	27.0 (2650)	22.0 (2160)	18.0 (1760)	14.0 (1370)					
	2.8 (270)	0.8～2.4 (80～240)	○	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	33.0 (3240)					
VA3R	1.4 (140)	0.2～1.0 (20～98)	× or ○	19.0 (1860)	15.0 (1470)	12.0 (1180)	10.0 (981)	7.9 (770)	6.4 (630)	5.3 (520)			
		※0.4～1.2 (40～120)	△	40.0 (3920)	40.0 (3920)	36.0 (3530)	31.0 (3040)	23.0 (2260)	19.0 (1860)	16.0 (1570)			
	2.8 (270)	0.8～2.4 (80～240)	○	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	37.0 (3920)			
VA4R	1.4 (140)	0.2～1.0 (20～98)	× or ○			17.0 (1670)	14.0 (1370)	11.0 (1080)	8.9 (870)	7.4 (720)	5.6 (550)		
		※0.4～1.2 (40～120)	△			40.0 (3920)	40.0 (3920)	33.0 (3240)	26.0 (2550)	22.0 (2160)	16.0 (1570)		
	2.8 (270)	0.8～2.4 (80～240)	○			40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	39.0 (3820)		
VA5R	1.4 (140)	0.2～1.0 (20～98)	× or ○						12.0 (1180)	10.0 (981)	7.6 (740)	6.1 (600)	5.1 (500)
		※0.4～1.2 (40～120)	△						36.0 (3530)	30.0 (2940)	23.0 (2260)	18.0 (1760)	15.0 (1470)
	2.8 (270)	0.8～2.4 (80～240)	○						40.0 (3920)	40.0 (3920)	40.0 (3920)	40.0 (3920)	36.0 (3530)



Notes : 1) ※The pressure differential limits for 0.4～2.0kgf/cm² (40～200kPa) spring range are the same as for 0.4～1.2kgf/cm² (40～120kPa) spring.
2) The figures inside bold line are for standard actuator.
3) Positioner : ×…Without, △…Preferably with, ○…With.

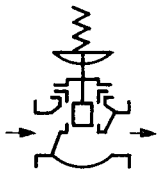
Table 3-2. Soft seat valve

Table 3-2-1. Direct action (air-to-close)

Actuator model No.	Air to diaphragm kgf/cm² (kPa)	Spring range kgf/cm² (kPa)	w or w/o positioner	Pressure differential kgf/cm² (kPa)						
				Valve size (inch)						
				1½	2	2½	3	4	5	6
VA1D	1.2 (120)	0.2~1.0 (20~98)	×	5.7* (560)	4.5* (440)					
	1.4 (140)	0.2~1.0 (20~98)	○	14.0* (1370)	11.0* (1080)					
	2.6 (250)	0.2~1.0 (20~98)	○	30.0 (2940)	30.0 (2940)					
VA2D	1.2 (120)	0.2~1.0 (20~98)	×	8.2* (800)	6.4* (630)	5.1* (500)	4.4* (470)	3.3* (320)		
	1.4 (140)	0.2~1.0 (20~98)	○	20.0* (1960)	16.0* (1570)	13.0* (1270)	11.0* (1080)	8.5* (830)		
	2.6 (250)	0.2~1.0 (20~98)	○	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)		
VA3D	1.2 (120)	0.2~1.0 (20~98)	×	13.0* (1270)	10.0* (981)	8.5* (830)	7.3* (720)	5.5* (540)	4.4* (430)	3.7* (360)
	1.4 (140)	0.2~1.0 (20~98)	○	30.0 (2940)	27.0 (2650)	21.0 (2060)	18.0 (1760)	14.0 (1370)	11.0 (1080)	9.5 (930)
	2.6 (250)	0.2~1.0 (20~98)	○	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)
VA4D	1.2 (120)	0.2~1.0 (20~98)	×			11.0* (1080)	10.0* (981)	7.7* (760)	6.2* (610)	5.2* (510)
	1.4 (140)	0.2~1.0 (20~98)	○			30.0* (2940)	26.0* (2550)	19.0* (1860)	15.0* (1470)	13.0* (1270)
	2.6 (250)	0.2~1.0 (20~98)	○			30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)
VA5D	1.2 (120)	0.2~1.0 (20~98)	×						8.5* (830)	7.1* (700)
	1.4 (140)	0.2~1.0 (20~98)	○						21.0* (2060)	18.0* (1760)
	2.6 (250)	0.2~1.0 (20~98)	○						30.0 (2940)	30.0 (2940)

Notes : 1) The figures inside bold line are for standard actuator.
2) Positioner : ×···Without, ○···With
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 3-2-2. Reverse action (air-to-open)

Actuator model No.	Air to diaphragm kgf/㎠ (kPa)	Spring range kgf/㎠ (kPa)	w or w/o positioner	Pressure differential kgf/㎠ (kPa)						
				Valve size (inch)						
				1½	2	2½	3	4	5	6
VA1R	1.4 (140)	0.2~1.0 (20~98)	× or ○	5.7* (560)	4.5* (440)					
		0.4~1.2 (40~120)	△	17.0* (1670)	13.0* (1270)					
	2.8 (270)	0.8~2.4 (80~240)	○	30.0 (2940)	30.0 (2940)					
VA2R	1.4 (140)	0.2~1.0 (20~98)	× or ○	8.2* (800)	6.4* (630)	5.1* (500)	4.4* (430)	3.3* (320)		
		0.4~1.2 (20~120)	△	24.0* (2350)	19.0* (1860)	15.0* (1470)	13.0* (1270)	10.0* (981)		
	2.8 (270)	0.8~2.4 (80~240)	○	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	23.0 (2260)		
VA3R	1.4 (140)	0.2~1.0 (20~98)	× or ○	13.0* (1270)	10.0* (981)	8.5* (830)	7.3* (720)	5.5* (540)	4.4* (430)	3.7* (360)
		0.4~1.2 (40~120)	△	30.0* (2940)	30.0* (2940)	25.0* (2450)	21.0* (2060)	16.0* (1570)	13.0* (1270)	11.0* (1080)
	2.8 (270)	0.8~2.4 (80~240)	○	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	26.0 (2550)
VA4R	1.4 (140)	0.2~1.0 (20~98)	× or ○			11.0* (1080)	10.0* (981)	7.7* (760)	6.2* (610)	5.2* (510)
		0.4~1.2 (40~120)	△			30.0* (2940)	30.0* (2940)	23.0* (2260)	18.0* (1760)	15.0* (1470)
	2.8 (270)	0.8~0.4 (80~240)	○			30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)	30.0 (2940)
VA5R	1.4 (140)	0.2~1.0 (20~98)	× or ○						12.0* (1180)	10.0* (981)
		0.4~1.2 (40~120)	△						25.0* (2450)	21.0* (2060)
	2.8 (270)	0.8~2.4 (80~240)	○						30.0 (2940)	30.0 (2940)

Notes : 1) The pressure differential limits for 0.4~2.0kgf/㎠ (40~200kPa) spring range are the same as for 0.4~1.2kgf/㎠ (40~120kPa) spring.
2) The figures inside bold line are for standard actuator.
3) Positioner : ×···Without, △···Preferably with, ○···With
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).

Table 4. Face to face dimensions

(Unit : mm)

Valve size (inch)	A						
	JIS 10K, FF, RF ANSI 150 RF	JIS 16K, 20KRF ANSI 300 RF	JIS 30K RF	JIS 40K RF ANSI 600 RF	ANSI 150 RJ	ANSI 300 RJ	ANSI 600 RJ
1½	222	235	235	251	235	248	251
2	254	267	267	286	267	283	289
2½	276	292	292	311	289	308	314
3	298	318	318	337	311	333	340
4	352	368	368	394	365	384	397
5	403	425	425	457	416	441	460
6	451	473	473	508	464	489	511
8	543	568	568	610	556	584	613
10	673	708	708	752	686	724	756
12	737	775	775	819	749	791	822

Table 5. External dimensions

(Unit : mm)

Valve size (inch)	Actuator model No.	H						B
		Direct action (air-to-close)			Reverse action (air-to-open)			
		P	RF	BS	P	RF	BS	
1½	VA1D, R	695	845	855	695	845	855	300
	VA2D, R	835	985		835	985		350
	VA3D, R	1000	1150		1000	1150		450
2	VA1D, R	705	855	865	705	855	865	300
	VA2D, R	845	995		845	995		350
	VA3D, R	1010	1160		1010	1160		450
2½	VA2D, R	885	1035	1105	885	1035	1105	350
	VA3D, R	1055	1205		1055	1205		450
	VA4D, R	1220	1370		1335	1485		520
3	VA2D, R	900	1050	1120	900	1050	1120	350
	VA3D, R	1060	1210		1060	1210		450
	VA4D, R	1225	1375		1340	1490		520
4	VA2D, R	915	1070	1135	915	1070	1135	350
	VA3D, R	1080	1230		1080	1230		450
	VA4D, R	1245	1395		1360	1510		520
5	VA3D, R	1115	1265	1405	1115	1265	1405	450
	VA4D, R	1280	1430		1395	1545		520
	VA5D, R	1330	1480		1440	1590		620
6	VA3D, R	1145	1295	1430	1145	1295	1430	450
	VA4D, R	1310	1460		1425	1575		520
	VA5D, R	1360	1510		1470	1620		620
8	VA4D, R	1430	1575		1540	1690		520
	VA5D, R	1525	1670		1630	1780		620
10	VA5D, R	1760	2015		1890	2145		620
12	VA5D, R	1810	2020		1940	2150		620

Note, P; Plain bonnet RF; Radiator finned bonnet BS; Bellows seal bonnet.

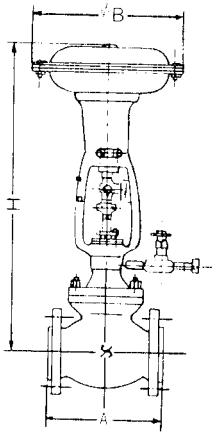


Table 6. Approximate weights

(Unit : kg)

Valve size (inch)	Actuator model No.	Approximate weights								
		JIS 10K, ANSI 150			JIS 16K, 20K, 30K, ANSI 300			JIS 40K, ANSI 600		
		P	RF	BS	P	RF	BS	P	RF	BS
1½	VA1D, R	37	39	40	42	44	45	50	52	53
	VA2D, R	48	50		53	55		61	63	
	VA3D, R	76	78		81	83		89	91	
2	VA1D, R	43	45	46	43	46	47	60	63	64
	VA2D, R	54	56		54	57		71	74	
	VA3D, R	82	84		82	85		91	102	
2½	VA2D, R	60	63	65	65	68	70	110	113	115
	VA3D, R	88	91		93	96		138	141	
	VA4D, R	163	166		168	171		213	216	
	VA4R	188	191		193	196		238	241	
3	VA2D, R	80	85	87	83	88	90	120	125	127
	VA3D, R	108	113		111	116		148	153	
	VA4D, R	183	188		186	191		223	228	
	VA4R	208	213		211	216		248	253	
4	VA2D, R	95	100	105	110	115	120	150	155	160
	VA3D, R	123	128		138	143		178	183	
	VA4D, R	198	203		213	218		253	258	
	VA4R	223	228		238	243		278	283	
5	VA3D, R	160	168	173	170	178	183	215	223	228
	VA4D	235	243		245	253		290	298	
	VA4R	260	268		270	278		315	323	
	VA5D	260	268		270	278		315	323	
	VA5R	285	293		295	303		340	348	
6	VA3D, R	230	240	245	240	250	265	300	310	325
	VA4D	305	315		315	325		375	385	
	VA4R	330	340		340	350		400	410	
	VA5D	330	340		340	350		400	410	
	VA5R	355	365		365	375		425	435	
8	VA4D	380	400		430	440		550	570	
	VA4R	405	425		455	465		575	595	
	VA5D	410	430		460	470		580	600	
	VA5R	435	455		485	495		605	625	
10	VA5D	560	600		690	710		750	780	
	VA5R	585	625		715	735		775	805	
12	VA5D	750	780		900	920		1000	1100	
	VA5R	775	805		925	945		1025	1125	

Note, P ; Plain bonnet RF ; Radiator finned bonnet BS ; Bellows seal bonnet.

Ordering Information

When ordering, please specify :

1) Key No. : 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, handwheel, 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

Specifications are subject to change without notice.

YAMATAKE

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Yamatake (Thailand) Co., Ltd.	: Thailand	66-2-210-0900~7
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PT. Yamatake Berca Indonesia	: Indonesia	62-21-230-5537/5539
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