

# Acorn Type, Angle Control Valve Model VAA

## Introduction

The Acorn Type Angle Control Valve (VAA) is used for application where an angle valve is required because of process piping. The VAA valve provides rugged-guide and sliding area with sufficient resistance to abrasion.

Standard process fluid flow direction is from the bottom side of the body to the horizontal.

The VAA valve is designed for easy disassembling the valve body, resulting in faster in checking of trim and parts replacement, and valve plug and seat ring can be fitted without mounting the bonnet.

## Specifications

### Body

**Type** : Single seated, Cast angle valve

**Material** : Carbon steel (SCPH 2), Stainless steel (SCS 13 14),  
Low alloy steel (SCPH 21, 61) and other alloy steel

**Size** : 1, 1½, 2, 2½, 3, 4, 5, 6, 8, 10, 12 inches

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

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

**Gland type** : Bolted gland

**Bonnet** : Plain bonnet (0~200°C)

Radiator finned bonnet (200°C or over)

Extended bonnet (0°C or less)

Bellows seal bonnet (-30~+300°C, 10kgf/cm<sup>2</sup> or less)

**Packing** : V-Teflon, Asbestos yarn and Others

### Trim

**Valve plug** : Single seated,

Equal percentage contoured and Teflon seat

Linear contoured and Teflon seat

On-off plug with stellite seat

(For the Teflon seat plug for on-off service,  
Linear contoured Teflon seat plug is used.)

[Note] For the operating temperature and pressure differential range of the Teflon seat plug, refer to the Figure in the following page.

**Material** : Stainless steel (SUS316, SUS316 with stellite coating furnished to the seat or entire surface and SUS 440C) and other alloy steel.

### Actuator

**Type** : Spring type pneumatic diaphragm actuator (direct or reverse action) or

Spring type pneumatic piston cylinder (reverse action)

**Diaphragm material** : Chloroprene rubber reinforced with fabric

### Spring range :

Diaphragm actuator.....0.2~1.0, (0.4~1.2) kgf/cm<sup>2</sup>,  
0.4~2.0, (0.8~2.4) kgf/cm<sup>2</sup>

Piston cylinder.....1.9~4.0kgf/cm<sup>2</sup>

### Air to diaphragm :

Diaphragm actuator.....1.2, 1.4, 2.6 and 2.8kgf/cm<sup>2</sup>

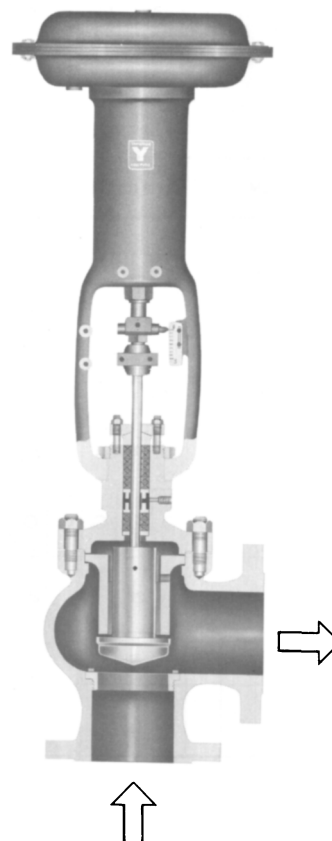
Piston cylinder.....5kgf/cm<sup>2</sup>

### Air connection :

Diaphragm actuator.....Rc¼ internal thread

(VA4, VA5 type.....Rc½ with Rc¼ adapter, also  
(available Rc¾ adapter.

Piston cylinder.....Rc½ with Rc¼ internal thread  
(with Rc¼ adapter, also available Rc¾ adapter)



**Ambient temperature** : -30 to +70°C

**Valve action** : Air-to-close or air-to-open available by using direct or reverse actuator.

**Optional accessories** : Handwheel (side or top mounted), Positioner, Limit switch, Motion transmitter, Volume booster, Air lock relay and others.

**Additional specification** : Steam jacket (operating pressure 10kgf/cm<sup>2</sup> or less) may be provided as required.

### Performance

#### Seat leakage (percentage to rated Cv value) :

Metallic seat

Contoured : 0.01% or less

On-off plug with stellite seat : Bubble-tight shut-off or  
0.00001% or less

Soft seat

Teflon seat : Bubble-tight shut-off or 0.00001% or less

**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

**Inherent rangeability** : 30 : 1

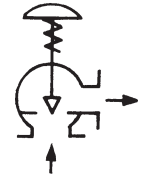


## Maximum Pressure Differential

### A) General use valve

#### I) Direct action (air-to-close)

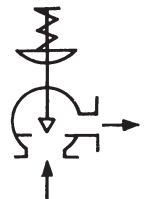
Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Spring range (kgf/cm <sup>2</sup> )	w or w/o positioner	Pressure differential (kgf/cm <sup>2</sup> )													
				At corresponding port size (inch)													
				3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	
VA1D	1.2	0.2~1.0	×	10	7.5	4.7	<b>3.1</b>	<b>1.8</b>									
	1.4	0.2~1.0	○	25	19	12	<b>7.9</b>	<b>4.7</b>									
	2.6	0.2~1.0	○	40	40	40	<b>39</b>	<b>23</b>									
VA2D	1.2	0.2~1.0	×	14	10	6.8	4.5	2.6	<b>1.6</b>	<b>1.1</b>	<b>0.6</b>						
	1.4	0.2~1.0	○	36	27	17	11	6.8	4.2	3.0	1.7						
	2.6	0.2~1.0	○	40	40	40	40	34	21	15	8.5						
VA3D	1.2	0.2~1.0	×		17	11	7.4	4.4	2.7	1.9	1.1	<b>0.7</b>	<b>0.4</b>				
	1.4	0.2~1.0	○		40	28	19	11	7.0	5.0	2.8	1.8	1.2				
	2.6	0.2~1.0	○		40	40	40	40	35	25	14	9.1	6.3				
VA4D	1.2	0.2~1.0	×						3.8	2.7	1.5	1.0	0.6	<b>0.3</b>			
	1.4	0.2~1.0	○						9.8	7.0	3.9	2.5	1.7	0.9			
	2.6	0.2~1.0	○						40	35	19	12	8.8	4.9			
VA5D	1.2	0.2~1.0	×									1.3	0.9	0.5	0.3	0.2	
	1.4	0.2~1.0	○									3.4	2.4	1.3	0.8	0.6	
	2.6	0.2~1.0	○									17	12	6.8	4.3	3.0	



Notes: 1. The figures inside bold line are for standard actuator.  
2. Positioner ; X . . . Without, O . . . With

#### II) Reverse action (air-to-open)

Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Spring range (kgf/cm <sup>2</sup> )	w or w/o positioner	Pressure differential (kgf/cm <sup>2</sup> )													
				At corresponding port size (inch)													
				3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	
VA1R	1.4	0.2~1.0	X or ○	10	7.5	4.7	<b>3.1</b>	<b>1.8</b>									
		*0.4~1.2	△	30	22	14	<b>9.3</b>	<b>5.6</b>									
	2.8	0.8~2.4	○	40	40	33	21	13									
VA2R	1.4	0.2~1.0	X or ○	14	10	6.8	4.5	2.6	<b>1.6</b>	<b>1.1</b>	<b>0.6</b>						
		*0.4~1.2	△	40	32	20	13	8.0	5.0	3.5	2.0						
	2.8	0.8~2.4	○		40	40	31	18	11	8.3	4.7						
VA3R	1.4	0.2~1.0	X or ○		17	11	7.4	4.4	2.7	1.9	1.1	<b>0.7</b>	<b>0.4</b>				
		*0.4~1.2	△		40	34	22	13	8.2	5.9	3.3	2.1	1.4				
	2.8	0.8~2.4	○		40	40	40	31	19	13	7.8	5.0	3.4				
VA4R	1.4	0.2~1.0	X or ○						3.8	2.7	1.5	1.0	0.6	<b>0.3</b>			
		*0.4~1.2	△						11	8.3	4.6	3.0	2.0	1.1			
	2.8	0.8~2.4	○						27	19	10	7.0	4.8	2.7			
VA5R	1.4	0.2~1.0	X or ○									1.3	0.9	0.5	0.3	0.2	
		*0.4~1.2	△									4.1	2.8	1.6	1.0	0.7	
	2.8	0.8~2.4	○									9.5	6.6	3.7	2.3	1.6	
VA6R	5	1.9~(3.5)	○						40	40	30	—	—				
		1.9~4.0	○						—	—	—	19	10				



Notes: 1. \*The pressure differential limits for 0.4~2.0kgf/cm<sup>2</sup> spring range are the same as for 0.4~1.2kgf/cm<sup>2</sup> spring.  
2. The figures inside bold line are for standard actuator.  
3. Positioner : X . . . Without, △ . . . Preferably with, O . . . With.

**B) Teflon seat valve**

**I) Direct action (air-to-close)**

Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Spring range (kgf/cm <sup>2</sup> )	w or w/o positioner	Pressure differential (kgf/cm <sup>2</sup> )														
				At corresponding port size (inch)														
				3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12		
VA1D	1.2	0.2~1.0	×	7.0	5.5	2.6	<b>1.2</b>	<b>0.1</b>										
	1.4	0.2~1.0	○	17	15.9	9.7	6.3	3.3										
	2.6	0.2~1.0	○	30	30	30	30	19.4										
VA2D	1.2	0.2~1.0	×		9.9	5.7	3.4	1.5	0.5									
	1.4	0.2~1.0	○		19.9	15.9	10.7	6.1	3.4	2.2	0.9							
	2.6	0.2~1.0	○		30	30	30	27.9	18.7	15	8.3							
VA3D	1.2	0.2~1.0	×				8.2	4.6	2.4	1.5	0.5							
	1.4	0.2~1.0	○				20	12	7.2	5	2.5	1.4	0.8					
	2.6	0.2~1.0	○				30	30	30	23.4	14.8	9.4	6.4					
VA4D	1.2	0.2~1.0	×						4.3	2.8	1.2	0.6	0.3					
	1.4	0.2~1.0	○						11	7.8	4.1	2.5	1.6	0.6				
	2.6	0.2~1.0	○						30	30	21	13.6	9.4	5.1				
VA5D	1.2	0.2~1.0	×								2.6	1.2	0.7					
	1.4	0.2~1.0	○								6.2	3.8	2.5	1.2	0.6	0.3		
	2.6	0.2~1.0	○								27	19	14	7.3	4.6	3.1		

- Notes: 1. The figures inside bold line are for standard actuator.  
 2. Positioner : X . . . Without, O . . . With

**II) Reverse action (air-to-open)**

Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Spring range (kgf/cm <sup>2</sup> )	w or w/o positioner	Pressure differential (kgf/cm <sup>2</sup> )														
				At corresponding port size (inch)														
				3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12		
VA1R	1.4	0.2~1.0	X or O	7.0	3.8	1.7	<b>0.6</b>											
		※0.4~1.2	△	21	14.6	8.8	5.6	2.9										
	2.8	0.8~2.4	○	30	26.7	18.9	15.7	9.2										
VA2R	1.4	0.2~1.0	X or O		8	4.4	2.5	1	0.1									
		※0.4~1.2	△		18.6	14.6	9.8	5.5	3	1.9	0.7							
	2.8	0.8~2.4	○		30	27.3	20.3	14.6	8.8	6.2	3.2							
VA3R	1.4	0.2~1.0	X or O				6.7	3.6	1.8	1	0.2							
		※0.4~1.2	△				18	10	6.6	4.6	2.3	1.2	0.7					
	2.8	0.8~2.4	○				30	22	16.2	11.6	6.4	3.9	2.6					
VA4R	1.4	0.2~1.0	X or O						3.4	2.2	0.9	0.4						
		※0.4~1.2	△						10	7.2	3.7	2.2	1.4	0.6				
	2.8	0.8~2.4	○						23	17	9.5	5.9	4	2				
VA5R	1.4	0.2~1.0	X or O									0.9	0.5					
		※0.4~1.2	△									3.5	2.2	1.1	0.5	0.3		
	2.8	0.8~2.4	○									8.6	5.8	3.1	1.9	1.2		
VA6R	5	1.9~4.0	○									25.8	18.2	12.6				

- Notes: 1. \*The pressure differential limits for 0.4~2.0kgf/cm<sup>2</sup> spring range are the same as for 0.4~1.2kgf/cm<sup>2</sup> spring.  
 2. The figures inside bold line are for standard actuator.  
 3. Positioner : X . . . Without, △ . . . Preferably with, O . . . With.

**C) On-off plug with stellite seat valve**

**I) Direct action (air-to-close)**

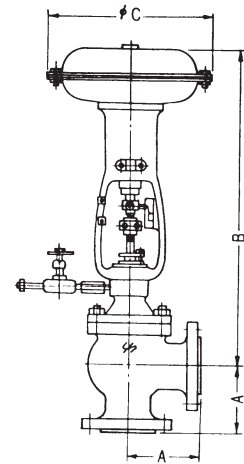
Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Operating spring range (kgf/cm <sup>2</sup> )	Initial spring compression (kgf/cm <sup>2</sup> )	Pressure differential (kgf/cm <sup>2</sup> )													
				At corresponding port size (inch)													
				1	1½	2	2½	3	4	5	6	8	10	12			
VA1D	1.4	0.2~1.0	0.2	13.4	8.8	6.2											
	2.6	0.2~1.0	0.2	32	23	16											
VA2D	1.4	0.2~1.0	0.2		12	8.9	5.2	3.8	2.2								
	2.6	0.2~1.0	0.2		33	23	14	10	6.2								
VA3D	1.4	0.2~1.0	0.2		21	14	8.7	6.4	3.7	2.4	1.7						
	2.6	0.2~1.0	0.2		55	39	24	17	10	7.2	5.2						
VA4D	1.4	0.2~1.0	0.2				12	8.9	5.2	4.4	3.2	1.5					
	2.6	0.2~1.0	0.2				34	25	14	11	8.0	4.3					
VA5D	1.4	0.2~1.0	0.2							6.9	4.9	2.1	1.7	1.2			
	2.6	0.2~1.0	0.2							16	11	5.9	3.9	2.8			

**II) Reverse action (air-to-open)**

Actuator model no.	Air to diaphragm (kgf/cm <sup>2</sup> )	Operating spring range (kgf/cm <sup>2</sup> )	Initial spring compression (kgf/cm <sup>2</sup> )	Pressure differential (kgf/cm <sup>2</sup> )														
				At corresponding port size (inch)														
				1	1½	2	2½	3	4	5	6	8	10	12				
VA1R	1.4	0.2~1.0	0.4	6.2	4.8	3.3												
	2.6	0.4~2.0	0.8	12.4	9.5	6.7												
VA2R	1.4	0.2~1.0	0.4		6.8	4.8	3.1	2.3	1.3									
	2.6	0.4~2.0	0.8		13	9.7	6.3	4.6	2.7									
VA3R	1.4	0.2~1.0	0.4		11	8.0	5.2	3.8	2.2	1.6	1.1							
	2.6	0.4~2.0	0.8		22	16	10	7.6	4.4	3.2	2.3							
VA4R	1.4	0.2~1.0	0.4				7.3	5.3	3.1	2.2	1.6	0.9						
	2.6	0.4~2.0	0.8				14	10	6.2	4.4	3.2	1.8						
VA5R	1.4	0.2~1.0	0.4							3.0	2.2	1.2	0.8	0.6				
	2.6	0.4~2.0	0.8							6.1	4.4	2.5	1.7	1.2				
VA6R	5	1.9~(3.0)	-				53	39	22									
		1.9~(3.5)	-							14	10							

### Face to Face Dimensions

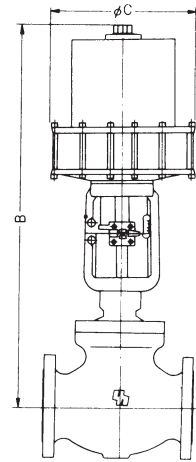
Valve size (inch)	A (mm)					
	JIS 10K FF, RF ANSI 150 RF	JIS 16K, 20K, 30K RF ANSI 300 RF	JIS 40K RF ANSI 600 RF	ANSI 150 RJ	ANSI 300 RJ	ANSI 600 RJ
1	92	98	105	98	105	105
1½	111	117	125	117	124	125
2	127	133	143	133	141	144
2½	138	146	156	144	154	157
3	149	159	168	156	167	170
4	176	184	197	183	192	198
5	202	213	229	208	221	230
6	225	237	254	232	244	256
8	271	284	330	278	292	332
10	337	354	394	343	362	396
12	364	388	419	375	396	421



(Model VA1~5 actuator)

### External Dimensions

Valve size (inch)	Actuator model no.	B (mm)						C (φ mm)
		Direct action (Air-to-Close)			Reverse action (Air-to-Open)			
		P	RF	BS	P	RF	BS	
1	VA1D, R	645	795	795	645	795	795	300
1½	VA1D, R	670	820	830	670	820	830	300
	VA2D, R	810	960		810	960		350
	VA3D, R	975	1125		975	1125		450
2	VA1D, R	670	820	830	670	820	830	300
	VA2D, R	810	960		810	960		350
	VA3D, R	975	1125		975	1125		450
2½	VA2D, R	845	995	1065	845	995	1065	350
	VA3D, R	1015	1165		1015	1165		450
	VA4D, R	1180	1330		1295	1445		520
	VA6R W/HM				1090	1240		445
3	VA2D, R	855	1005	1075	855	1005	1075	350
	VA3D, R	915	1165		915	1165		450
	VA4D, R	1180	1330		1295	1445		520
	VA6R W/HM				1095	1245		445
4	VA2D, R	855	1010	1075	855	1010	1075	350
	VA3D, R	1020	1170		1020	1170		450
	VA4D, R	1185	1335		1300	1450		520
	VA6R W/HM				1095	1245		445
5	VA3D, R	1040	1190	1330	1040	1190	1330	450
	VA4D, R	1205	1355		1320	1470		520
	VA5D, R	1255	1405		1365	1515		620
	VA6R W/HM				1110	1260		445
6	VA3D, R	1060	1210	1345	1060	1210	1345	450
	VA4D, R	1225	1375		1340	1490		520
	VA5D, R	1275	1425		1385	1535		620
	VA6R W/HM				1130	1280		445
8	VA4D, R	1315	1460		1425	1575		520
	VA5D, R	1410	1555		1515	1665		620
10	VA5D, R	1620	1875		1750	2010		620
12	VA5D, R	1670	1880		1800	2010		620



(Model VA6R actuator)

Note. 1) P: Plain bonnet, RF: Radiator finned bonnet, BS: Bellows seal bonnet

2) W/HM: With hand manual

**Approximate Weights**

Valve size (inch)	Actuator model no.	Approximate weights (kg)								
		JIS 10K, ANSI 150			JIS 16K, 20K, 30K, ANSI 300			JIS 40K, ANSI 600		
		P	RF	BS	P	RF	BS	P	RF	BS
1	VA1D, R	30	32	33	30	32	33	30	32	33
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	163	166		168	171		213	216	
	VA4R	188	191		193	196		238	241	
	VA6R	235	238		240	243		285	288	
3	VA2D, R	80	85	87	83	88	90	120	125	127
	VA3D, R	108	113		111	116		148	153	
	VA4D	183	188		186	191		223	228	
	VA4R	208	213		211	216		248	253	
	VA6R	255	260		258	263		295	300	
4	VA2D, R	95	100	105	110	115	120	150	155	160
	VA3D, R	123	128		138	143		178	183	
	VA4D	198	203		213	218		253	258	
	VA4R	223	228		238	243		278	283	
	VA6R	270	275		285	290		325	330	
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	
	VA6R	300	308		310	318		355	363	
6	VA3D, R	230	240	245	240	250	265	300	310	315
	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		515	525	
	VA6R	370	380		380	390		530	540	
8	VA4D	340	360		390	400		510	530	
	VA4R	365	385		415	425		535	555	
	VA5D	370	390		420	430		540	560	
	VA5R	395	415		445	455		565	585	
10	VA5D	520	560		650	670		710	740	
	VA5R	545	585		675	695		735	765	
12	VA5D	710	740		860	880		960	1060	
	VA5R	735	765		885	905		985	1085	

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

## Ordering Information

### When ordering, please specify :

- |  |   |
|--|---|
| 1) Model No.:VAA   | 9 ) Accessories (positioner, handwheel, pressure regulator, etc.)                                   |
| 2) Valve size×Port size or Cv required                     | 10) Special requirement of degreasing, free from copper and etc.                                    |
| 3) Type and rating of end connections                      | 11) Name of flow medium   |
| 4) Body and trim material, necessity of hardening          | 12) Normal flow and maximum required flow   |
| 5) Plug characteristics (on-off, equal percentage, linear) | 13) Pressure of flow medium, upstream and downstream pressure at maximum and minimum required flow. |
| 6) Type of bonnet  | 14) Temperature and specific gravity of flow medium   |
| 7) Type of actuator, air to diaphragm                      | 15) Viscosity of flow medium, inclusive or exclusive of slurry                                      |
| 8) Valve action (direct or reverse)                        |   |

*Specifications are subject to change without notice.*

**azbil**

## Yamatake Corporation Advanced Automation Company

1-12-2 Kawana, Fujisawa  
Kanagawa 251-8522 Japan

URL:<http://www.azbil.com>