

Mark 96AA Series

Sanitary Air Augmented Pressure Regulators

*"Send a signal
not a
technician"*

The Mark 96 with air augmentation (AA) option offers the same line sizes, Cv choices, seats, great low droop characteristics, and stability of the standard bolted bonnet Mark 96, but with an advantage. By connecting an air pressure signal to the 1/4" FNPT dome fitting via an air regulator or I/P, the set point can be changed remotely by "sending an air signal instead of a technician".

The Mark 96AA gives users the ability to change pressure set points to any point in excess of the springs minimum set point (3 psi on a 3/4" – 1" (DN15, DN20 & DN25) Mark 96, 10 psi on a 1-1/2" – 2" (DN40 & DN50), and 15 psi on a 3"(DN80)). Users adjust the regulator's spring to the lowest set point, or to the lowest set pressure that the regulator will operate at (sterilization steam pressure for example). To achieve a higher pressure set point (CIP or WFI flush), air pressure is added to the regulator dome. To lower the set point to its previous value, or to the springs manual set point, the pressure is reduced in the same manner.

Air Loading a MK96AA:

The Mark 96AA is used in conjunction with either a Steriflow I/P for remote control via PLC or DCS; or with a small air regulator. Note: If using a regulator we recommend the JSRLF-025 with Teflon Seat, or JSRLFE-025 (EPDM seat), specified with .2 Cv and self relieving option.

The I/P or gas regulator can be direct mounted on the MK96AA, or mounted remote from the valve. For example, you may want to wall or panel mount a JSRLF outside of a clean room, and run pneumatic tubing from its outlet into the Clean room to the MK96AA. See order code space 15 for options.

FEATURES

- DIN & ISO Tri-Clamp and tube weld ends - standard
- Optional Gauge Port (for gauges requiring EN 10204 2.2 or 3.1 certification, please consult factory)
- Reduce project CapEx. Remote regulator operation reduces the time required for steam pressure balancing, commissioning and validation of SIP and CIP routines.
- Complete range of products for any size or Cv requirement. The available sizes and Cv's are the same as the current MK96 product line.
- **Mark 96AA upgrade kits available for MK96 regulators.**
- With preset spring, users maintain control in the event of power (air failure). Valve will return to manual preset.



- Minimal droop when compared with all other spring loaded and air operated products, especially at higher set points.
- Extended permissible operating range when compared with all spring loaded and air load regulators.
 - The minimum set point is equivalent to the minimum spring rate set point (3 psi on a 3/4" – 1" (DN15, DN20 & DN25), 10 psi on a 1-1/2" – 2" (DN40 & DN50) and 15 psi on a 3" (DN80) model).
 - No differential pressure requirements. Users can adjust the set point to any point between the minimum and maximum set point, without restriction.

DOCUMENTATION

The following documentation is shipped with each order:

- Steriflow Unicert
 - Certificate of Material Compliance with Traceable Material Heat Number for body and ferrules and MTRs
 - Certificate of Compliance to FDA and USP Class VI
 - Certificate of Surface Finish
- Final Test Reports and Certificate of Origin available upon request at time of order

AVAILABLE FINISHES

Body:

- Standard: 20 Ra μin (0,5 Ra μm) (ASME BPE SF5) mechanical finish and electropolish on inside wetted surfaces; 40 Ra μin (1 Ra μm) and electropolish on exterior.
- Optional: 20 Ra μin (0,5 Ra μm) SF5 mechanical finish and electropolish on external surfaces; 8 Ra μin (0,2 Ra μm) finish on internal or external finishes and electropolish (Better than SF4)

Spring Housing:

- Standard: machined or investment cast finished 316SST, electropolished
- Optional: 20 Ra μin (0,5 Ra μm) mechanical finish and electropolish on external surfaces (SF5). 8 Ra μin (0,2 Ra μm) finish on external surfaces on all sizes and electropolish. (Better than SF4)

Adjusting Screw and Handle:

- Standard: 32Ra μin electropolished (Note: adjusting screw is a threaded part)
- Optional: 20 Ra μin (0,5 Ra μm) mechanical finish and electropolish finish (SF5)

SPECIFICATIONS

Sizes: 3/4", 1", 1-1/2" 2", 3"; DIN DN15, DN20, DN25, DN40, DN50, DN80; ISO DN15, DN20, DN25, DN40, DN50, DN80

End Connections:

- ASME Tri-Clamp
- ASME Tube Weld Ends
- DIN/ISO Tri-Clamp Conn's to DIN 32676 Row A, B
- DIN/ISO Tube Weld Ends to DIN 11866 Row A, B

Gauge Port: 3/4" ASME Hygienic Clamp

Body Connections: Mark 96 – Bolted – Standard for all sizes

Body & Trim Materials:

ASME SA479 316L (UNS 31603) is standard. EN 10272:2000 GR 1.4435, AL-6XN®, Hastelloy®C-22 and others are optional.

Seat Materials:

- Standard hard seat – integral 316L SST seat
- Optional soft seat
 - Jorlon (for Cv 1.5, 3/4" (DN20) size and above) (FDA & USP Class VI) for steam and hot fluid service to 338°F (170°C)
 - Teflon (for Cv 1.5, 3/4" (DN20) size and above) to 252°F (122°C) continuous or 275°F (135°C) intermittent [not to exceed 15 min. in a one hour period] FDA, USP Class VI
 - PEEK (3/4" and above) (FDA & USP Class VI) for steam and hot fluid service to 350° (177°C)

Note: For a complete ancillary list of all wetted and non-wetted -2- material specifications, please contact Steriflow Valve.

Spring Housing Materials:

- 3/4" - 1" (DN15-DN25):
 - Material: A351 CF8M 316SS Investment casting, if SF5 or better finish required, fabricated 316L
- 1 1/2" - 3" (DN 40 - DN80):
 - Material: Fabricated 316L

Diaphragm Materials:

- Jorlon (to 400°F, 204°C) – FDA, USP Class VI
- 316L SST
- EPDM/Nylon (to 275°F, 135°C), FDA only
- Ultra-thin Jorlon (to 400°F, 204°C), FDA, USP Class VI (for use with 3-8 range spring only)

O-Ring Materials:

- EPDM (to 275°F, 135°C) – FDA, USP Class VI
- Buna-N (to 225°F, 107°C) – FDA
- Viton (to 400°F, 204°C) – FDA, USP Class VI*
- Silicone (to 400°F, 204°C) – FDA, USP Class VI*
- Teflon-Encapsulated Viton (to 400°F, 204°C) – FDA, USP Class VI
- Teflon-Encapsulated Silicone (to 400°F, 204°C) – FDA, USP Class VI (1" - 3" only)

*While rated to exceed normal Clean Steam operating temperatures, Steriflow does not recommend the use of non-encapsulated Viton, or Silicon for continuous clean steam service. Contact the factory if questions.

Shutoff: ANSI Class III hard seat or Class VI soft seat

Body Pressure Temperature Rating: (dependent upon construction)

Valve Size	PSIG @ 100°F	PSIG @ 450°F
3/4", 1", DN15, DN20, DN25	350 (24,1 bar)	250 (17,2 bar)
1-1/2", 2", 3", DN40, 50, 80	200 (13,8 bar)	200 (13,8 bar)

Pressure on 1/2", 3/4" & 1" size limited to 225 psig (15,5 bar) @ 100°F and 200 psig (13,8 bar) @ 400°F if using Ultra-thin Jorlon diaphragm.

Set Point Spring Ranges:

Valve Size	Set Point Ranges, PSI (bar)
3/4" & 1" DN15, DN20 & DN25	3-8* (0,2-0,5), 5-25 (0,37-1,7), 15-50 (1,0-3,4), or 40-90 (2,7-6,2)
1-1/2", DN40	10-25 (0,7-1,7), 15-50 (1,0-3,4) or 35-80 (2,4-5,5)
2", DN50	10-25 (0,7-1,7) or 15-60 (1,0-4,1)
3", DN80	15-25 (1,0-1,7) or 15-60 (1,0-4,1)

* Range available with elastomer or Ultra-thin Jorlon diaphragm only. Maximum pressure drop 40 psi.

SPECIFICATIONS (CON'T)

Cv (Kv) Ratings:

Valve Size	Available Cv (Kv)	Cv for Relief Valve Sizing
3/4"*** DN15, DN20	1.5 (1,3)	1.8 (1,56)
1"*** DN25	1.5, 2.5, 4.5, 5.5**, 6.1** (1,3; 2,2; 3,9; 4,7; 5,3)	1.8, 3, 5.4, 6.6, 7.3 (1,6;2,7; 4,7; 5,7; 6,4)
1-1/2" DN40	4.5 or 10.0 (3,9 or 8,6)	5.4 or 12 (4,68 or 10,32)
2" DN50	10.0 or 19.0 (8,6 or 16,3)	12 or 22.8 (10,32 or 19,56)
3" DN80	10.0 or 23.0 (8,6 or 19,8)	12 or 27.6 (10,32 or 23,76)

** Not available with metal diaphragms, Jorlon and other elastomers acceptable

*** When using the 3-8 range spring the following sizing limits apply:

Set Point	Sizing Limit (of rated capacity)
8	50%
5	33%
3	25%

For example, a 1" (DN25) Cv5.5 valve with a 3-8 range spring, if the customer's set point is P2 = 8 psi, then the actual Cv sizing should not exceed 2.75Cv. If the customer's intended set point is P2 = 5 psi, then the actual Cv sizing should not exceed 1.8Cv and if their set point is P2 = 3 psi, then the actual Cv sizing should not exceed 1.38 Cv.

Note: For a complete ancillary list of all wetted and non-wetted material specifications please contact Steriflow Valve.

Maximum Allowable Pressure Differential: 200 psi (3-8 spring range has a max of 40 psi)

Note: Steriflow does not recommend using metal seated trim on any service where the flow will be deadheaded downstream of the pressure reducing regulator. Use an appropriate Teflon, Jorlon or Peek soft seat for the trim instead.

Maximum Allowable Pressure Setpoint: The total of the spring setpoint and additional air pressure cannot exceed:

- 3/4" – 1" (DN15 – DN25): 135 psi (9,3 bar)
- 1-1/2" (DN40): 100 psi (6,9 bar)
- 2" – 3" (DN50 – DN80): 80 psi (5,5 bar)

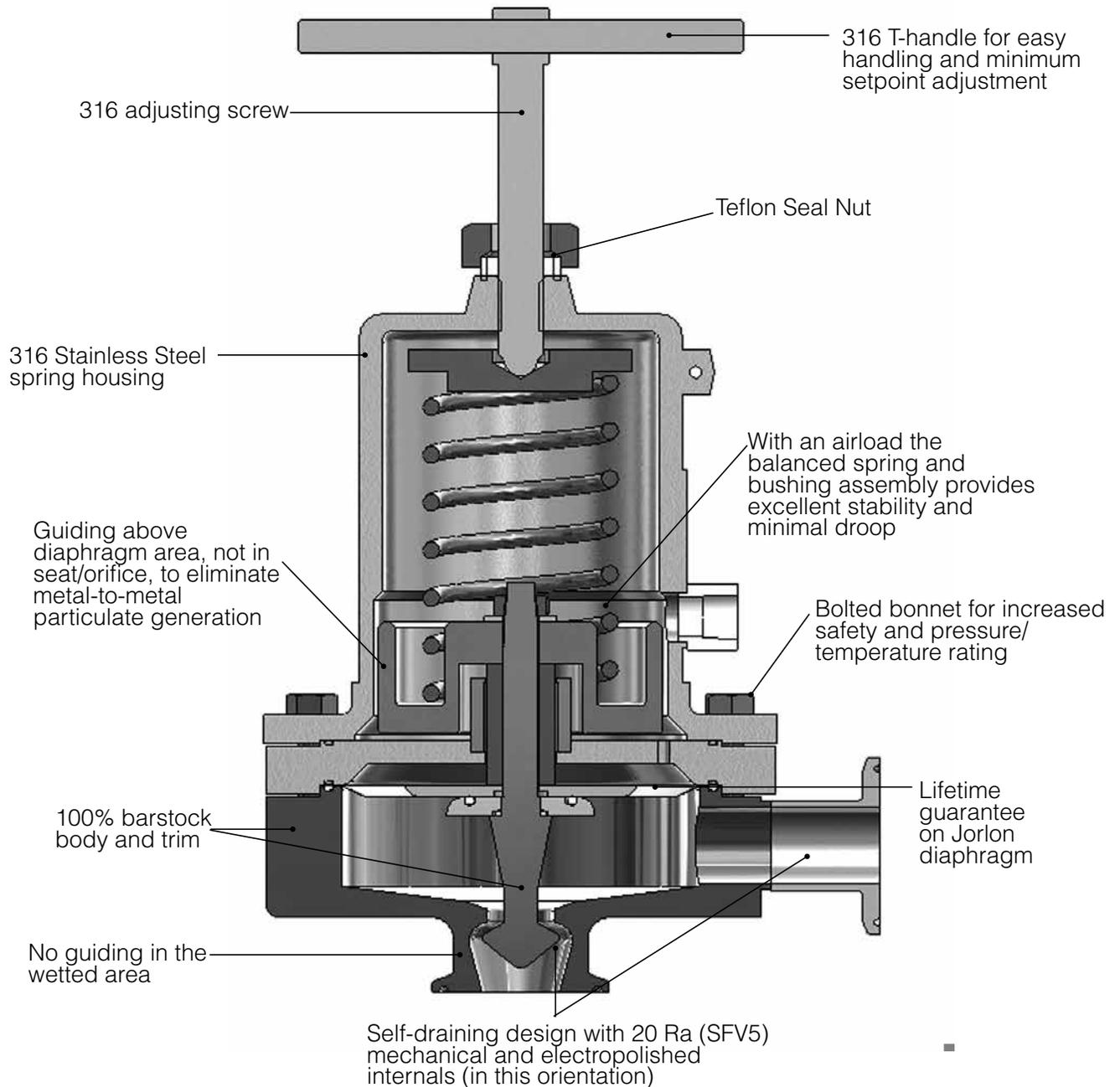
Minimum Allowable Differential Pressure: No restrictions

Minimum Allowable Setpoint: Equivalent to the minimum spring rate set point:

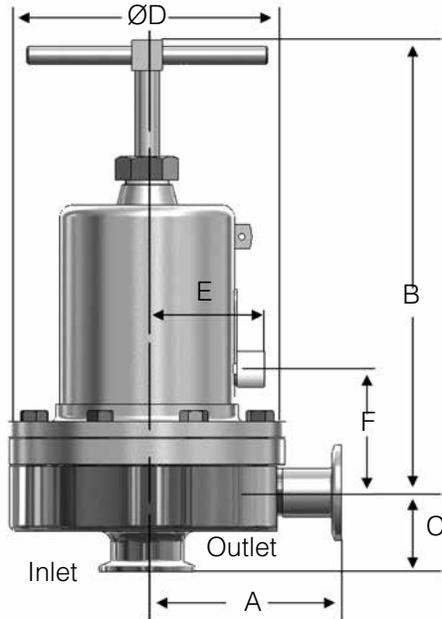
- 3/4" – 1" (DN15 – DN25) : 3 psi (0,2 bar)
- 1-1/2" – 2" (DN40 – DN50): 10 psi (0,69 bar)
- 3" (DN80): 15 psi (1,03 bar)

Note: Steriflow does not recommend using metal seated trim on any service where the flow will be deadheaded downstream of the pressure reducing regulator. Use an appropriate Teflon, Jorlon, or Peek soft seat for the trim instead.

FEATURES & BENEFITS



DIMENSIONS



• ASME Tri-Clamp Ends

Valve Size	Dimensions (inches)						Weight Lbs
	A	B	C	D	E	F	
3/4"	3.29	8.00	1.50	5.70	2.44	2.44	18
1"	4.00	8.00	1.64	5.70	2.44	2.57	20
1-1/2"	4.21	10.50	2.53	7.25	2.82	3.49	40/28.7*
2"	5.34	17.50	2.96	9.50	3.83	4.89	90/66**
3"	5.34	18.00	3.46	9.50	3.83	5.39	98

• ASME Tri-Clamp Ends, mm

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
3/4"	83,6	203	38,1	144,8	2,44	2,44	8
1"	101,6	203	41,7	144,8	2,44	2,57	9
1-1/2"	106,9	267	64,3	184,2	2,82	3,49	18/13*
2"	135,6	445	75,2	241	3,83	4,89	41/30**
3"	135,6	457	87,9	241	3,83	5,39	44

• ASME Tube Weld Ends, inches

Valve Size	Dimensions (inches)						Weight Lbs
	A	B	C	D	E	F	
3/4"	3.32	8.00	1.88	5.70	2.44	2.44	18
1"	3.34	8.00	2.18	5.70	2.44	2.57	20
1-1/2"	4.68	10.50	3.67	7.25	2.82	3.49	40/28.7*
2"	5.34	17.50	2.96	9.50	3.83	4.89	90/66**
3"	5.34	18.00	3.46	9.50	3.83	5.39	98

• ASME Tube Weld Ends, mm

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
3/4"	84,3	203	47,8	144,8	2,44	2,44	8,2
1"	84,8	203	55,4	144,8	2,44	2,57	9,1
1-1/2"	118,9	267	93,2	184,2	2,82	3,49	18/13*
2"	135,6	444	75,2	241	3,83	4,89	41/30**
3"	135,6	457	87,9	241	3,83	5,39	44

• DIN Tri-Clamp Connections to DIN 32676 Row A

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
15	100,3	203,2	63,6	146,1	62	62	8,1
20	99,7	203,2	70,2	146,1	62	62	8,1
25	99,7	203,2	72,8	146,1	62	65	9,1
40	118,3	266,7	83,6	183,4	72	89	18/13*
50	145,8	444,5	93,9	240,5	97	124	41/30**
80	146,6	457,2	105	240,5	97	137	44,4

• DIN Tube Weld Ends to DIN 11866 Row A

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
15	93,4	203,2	56,7	146,1	62	62	8,1
20	92,8	203,2	63,3	146,1	62	62	8,1
25	92,8	203,2	65,9	146,1	62	65	9,1
40	111,4	266,7	76,7	183,4	72	89	18/13*
50	138,9	444,5	87	240,5	97	124	41/30**
80	139,7	457,2	98,1	240,5	97	137	44,4

• ISO Tri-Clamp Connections to DIN 32676 Row B

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
15	92,1	203,2	62,5	146,1	62	62	8,1
20	92,1	203,2	62,5	146,1	62	62	8,1
25	92,1	203,2	65,3	146,1	62	65	9,1
40	110,6	266,7	76,8	183,4	72	89	18/13*
50	138,2	444,5	93,9	240,5	97	124	41/30**
80	138,9	457,2	96,8	240,5	97	137	44,4

• ISO Tube Weld Ends to DIN 11866 Row B

Valve Size	Dimensions (mm)						Weight Kgs
	A	B	C	D	E	F	
15	92,1	203,2	62,5	146,1	62	62	8,1
20	92,1	203,2	62,5	146,1	62	62	8,1
25	92,2	203,2	65,3	146,1	62	65	9,1
40	110,6	266,7	76,8	183,4	72	89	18/13*
50	138,2	444,5	93,9	240,5	97	124	41/30**
80	138,9	457,2	96,8	240,5	97	137	44,4

* 40 lbs (18,1 kgs) std; 28.7 lbs (13 kgs) with aluminum spring housing

** 90 lbs (40,7 kgs) std; 66 lbs (33 kgs) with aluminum spring housing

SAMPLE SPECIFICATION

Stainless steel sanitary pressure regulator shall be made from ASME-SA479 barstock material, which includes body and all wetted metal parts. Regulator shall utilize FDA approved, USP Class VI certified Jorlon diaphragm. Regulator shall be fully and remotely adjustable with the addition of a pneumatic air signal, to any set point above the minimum spring set point up to a maximum of 135 psi for sizes 1" and below; 80 psi for 1-1/2" and above. In the event of air system failure, valve shall be manually adjustable. Guiding of valve stem/plug shall be outside of the wetted process areas of valve internals, above diaphragm. Regulator shall be free of threads within wetted, process areas and shall be self draining when installed with inlet vertical and below valve assembly.

SIZING AND SELECTION

In order to find out the actual Cv and/or flow rates for your application, complete the following:

1. Select the appropriate line size, required nominal Cv, and set point spring for your application from the charts on page 2, or from the ordering grid below.
2. Input that data, along with the installation inlet pressure, desired outlet pressure set point, and other required data into the Steriflow SFCV sizing program. If you do not have a copy of the sizing program, call your local Steriflow representative or request a copy by email to steriflow@richardsind.com.
3. If the actual Cv, or flow rate (if solving for flow rate), are not sufficient for your application, then select and input a more appropriate valve Cv for that line size until you get an actual Cv that will work in your application. Note: If the actual Cv generated by the program is still not appropriate, you may be required to input a different valve line size, in order to obtain the correct Cv. Note, never select an automated valve by line size only.

Note: if ordering a Retrofit Kit for an existing Mark 96, you must provide the serial number of the Mark 96 with your RFQ or order.

ORDERING SCHEMATIC FOR MARK 96AA

					/	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10	11 & 12	13 & 14	15
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Model	
96AA	ASME BPE Tri-Clamp Connections
96TAA	ASME BPE Tube Weld Ends
96DAA	DIN Tri-Clamp Conn's to DIN 32676 Row A
96DTAA	DIN Tube Weld Ends to DIN 11866 Row A
96SAA	ISO Tri-clamp Conn's to DIN 32676 Row B
96STAA	ISO Tube Weld Ends to DIN 11866 Row B

Size	
075	3/4"
100	1"
150	1-1/2"
200	2"
300	3"
15	DN15
15N*	DN15 Non-standard Clamp Face (MK96DAA or MK96SAA)
20	DN20
20N*	DN20 Non-standard Clamp Face (MK96DAA only)
25	DN25
40	DN40
50	DN50
80	DN80

Body Material	
6L	ASME SA479 316L (UNS 31603)
6E	EN 10272:2000 GR 1.4435

Body Configuration - Standard or Gauge Port*	
	Standard - no gauge port. Leave Blank
90	3/4" ASME BPE Tri-Clamp gauge fitting @ 90°
180	3/4" ASME BPE Tri-Clamp gauge fitting @ 180°
270	3/4" ASME BPE Tri-Clamp gauge fitting @ 270°

* DIN or ISO tri-clamp face not conforming to DIN standard 32676. State face size as noted on P.O.

Body Finish	
A	20Ra (SFV5) Interior/40Ra Exterior (Std)
B	20Ra (SFV5) Interior/20Ra Exterior
C	8Ra Interior/40Ra Exterior
D	20Ra (SFV5) Interior/8Ra Exterior
E	8Ra Interior/8Ra Exterior
F	8Ra Interior/20Ra Exterior

2 Body Cv (Kv) See chart on page 2		
	Cv	Kv
A	1.5 (3/4" & 1")	1,3
D	2.5 (1" only)	2,2
H	4.5 (1" & 1-1/2")	3,9
K	5.5 & 6.1 (1" only)	4,7 & 5,3
M	10.0 (1-1/2" - 3")	8,6
N	19.0 (2" only)	16,3
P	23.0 (3" only)	19,8

3 Trim Finish	
A	20Ra (Standard)
B	8Ra

4 Trim				
Finish		Cv & Seat		Available in Valve Size
A	20Ra (Standard)	A	Cv 1.5 Hard Seat	075 - 100
B	8Ra	1	Cv 1.5 Teflon Seat	075 - 100
		2	Cv 1.5 Jorlon Seat	075 - 100
		9	Cv 1.5 Peek Seat	075 - 100
		B	Cv 2.5 Hard Seat	100
		C	Cv 2.5 Teflon Seat	100
		D	Cv 2.5 Jorlon Seat	100
		5	Cv 2.5 Peek Seat	100
		H	Cv 4.5 Hard Seat	100 - 150
		J	Cv 4.5 Teflon Seat	100 - 150
		K	Cv 4.5 Jorlon Seat	100 - 150
		6	Cv 4.5 Peek Seat	100 - 150
		L	Cv 5.5 Hard Seat	100
		M	Cv 5.5 Teflon Seat	100
		N	Cv 5.5 Jorlon Seat	100
		8	Cv 5.5 Peek Seat	100
		7	Cv 6.1 Hard Seat	100
		E	Cv 6.1 Teflon Seat	100
		G	Cv 6.1 Jorlon Seat	100
		F	Cv 6.1 Peek Seat	100
		P	Cv 10 Hard Seat	150-300
		Q	Cv 10 Teflon Seat	150-300
		R	Cv 10 Jorlon Seat	150-300
		3	Cv 10 Peek Seat	150-300
		S	Cv 19 Hard Seat	200
		T	Cv 19 Teflon Seat	200
		U	Cv 19 Jorlon Seat	200
		4	Cv 19 Peek Seat	200
		V	Cv 23 Hard Seat	300
		W	Cv 23 Teflon Seat	300
		X	Cv 23 Jorlon Seat	300
		Y	Cv 23 Peek Seat	300
		ZZ	Non-Standard	

Consult factory for parts to retrofit a MK96 into a MK96AA. Retrofit kits may not be available with some MK96 project valves and valve models older than 2002. The valve serial number will identify your MK96's bill of material and is required for proper retrofit selection.

ORDERING SCHEMATIC FOR MARK 96AA

	—		—		—		/	1 & 2	3 & 4	5 & 6	7 & 8	9 & 10	11 & 12	13 & 14	15

5 & 6	O-Ring/Diaphragm
TY	Teflon Encaps. Viton/Jorlon Diaphragm
JE	EPDM/Jorlon
JS	Silicone/Jorlon
JV	Viton/Jorlon
JY	TFE/Silicone/Jorlon (1-1/2" - 3")
JK	Kalrez/Jorlon
EE	EPDM/EPDM Diaphragm
ZZ	Non-Standard

9 & 10	Diaphragm
EP	EPDM (all exterior)
JL	Jorlon (all exterior)
UJ	Ultra-thin Jorlon (all exterior)
ZZ	Non-Standard

7	Adjusting Screw Finish (Except Threads)
A	Electro-polished (Standard)
B	20Ra (SFV5)
C	8Ra

11 & 12	Actuator Finish/Type
AA	Standard
BA	20Ra (SFV5) exterior

* Excluding welds

13 & 14	PED Compliance
00	Not required
0G	SEP (3/4" - 1")
0F	CE Category 1 (1-1/2", 2", 3")

8	Range PSI (Bar) see chart on page 2
A	3 - 8 (0,1 - 0,6)* 3/4" - 1"
C	5 - 25 (0,3 - 1,7) 3/4" - 1"
E	10 - 25 (0,7 - 1,7) 1-1/2" - 2"
P	15 - 25 (1,0 - 1,7) 3" only
H	15 - 50 (1,0 - 3,4) 3/4" - 1-1/2"
J	15 - 60 (1,0 - 4,1) 2" & 3"
M	35 - 80 (2,4 - 5,5) 1-1/2" only
R	40 - 90 (2,8 - 6,2) 3/4" & 1"

15	Air Loading (I/P) Option
0	None
1	I/P Transducer, 4/20 MA / 1-17 PSI
2	I/P Transducer, 4/20 MA / 3-27 PSI
3	I/P Transducer, 4/20 MA / 6-30 PSI
4	I/P Transducer, 4/20 MA / 3-120 PSI

* Must use EPDM or Ultra-thin Jorlon diaphragm

NOTE: If you want to use a small, manual inst. air regulator to air load the MK96AA (instead of an I/P), separately order a JSRLF-025, (with TFE seat), or a JSRLF-025 (EPDM seat), .2 Cv, and the self-relieving feature.



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