Process Gas Equipment

New

Regulators
Diaphragm Valves
Check Valves
Vacuum Generators
Flow Switches

APTech SMC

CAT.ES100-88C

Regulators

For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries.

AP9000

AP1600/AP1900

AP1700

AP1400T

AP1200

AP2700

AP1000/AP1100/AP1500

AP500

Series AP

P.29 to 50

SL5500

SL5400/SL5800

SL5200

Series SL

P.51 to 58

AZ1200/AZ1300/AZ1400T

AZ1000/AZ1100/AZ1500

AZ9200

Series AZ

P.59 to 72

BP1000 Welded

Back Pressure Regulator

Series BP

P.89, 90

Regulators

For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries.

<Air operated type>

AP10PA/AP15PA

AP12PA/AP14PAT

Series **AP□PA**

P.91 to 98

AZ10PA/AZ15PA

AZ12PA/AZ14PAT

Series **AZ□PA**

P.99 to 106

For general applications

For wide variety of applications from semiconductor to general.

AK1700

AK1000/AK1500

AK1200/
AK1300/
AK1400T

AK9200

Series **AK**

P.73 to 86

BP1000

Back Pressure Regulator

Series **BP**

P.87, 88

<Air operated type>

AK10PA/AK15PA

AK12PA/AK14PAT

Series **AK□PA**

P.107 to 114

Diaphragm Valves

For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries.

Air operated type

Series AP

P.121 to 134

Manually operated type

Series AP

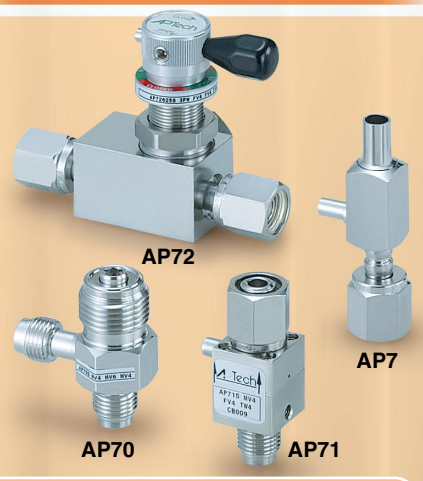
P.135 to 144

Check Valve

Series AP64

P.149, 150

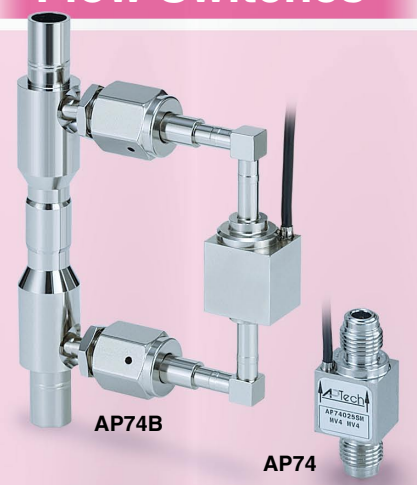
Vacuum Generators



Series AP7,70/71/72

P.151 to 156

Flow Switches



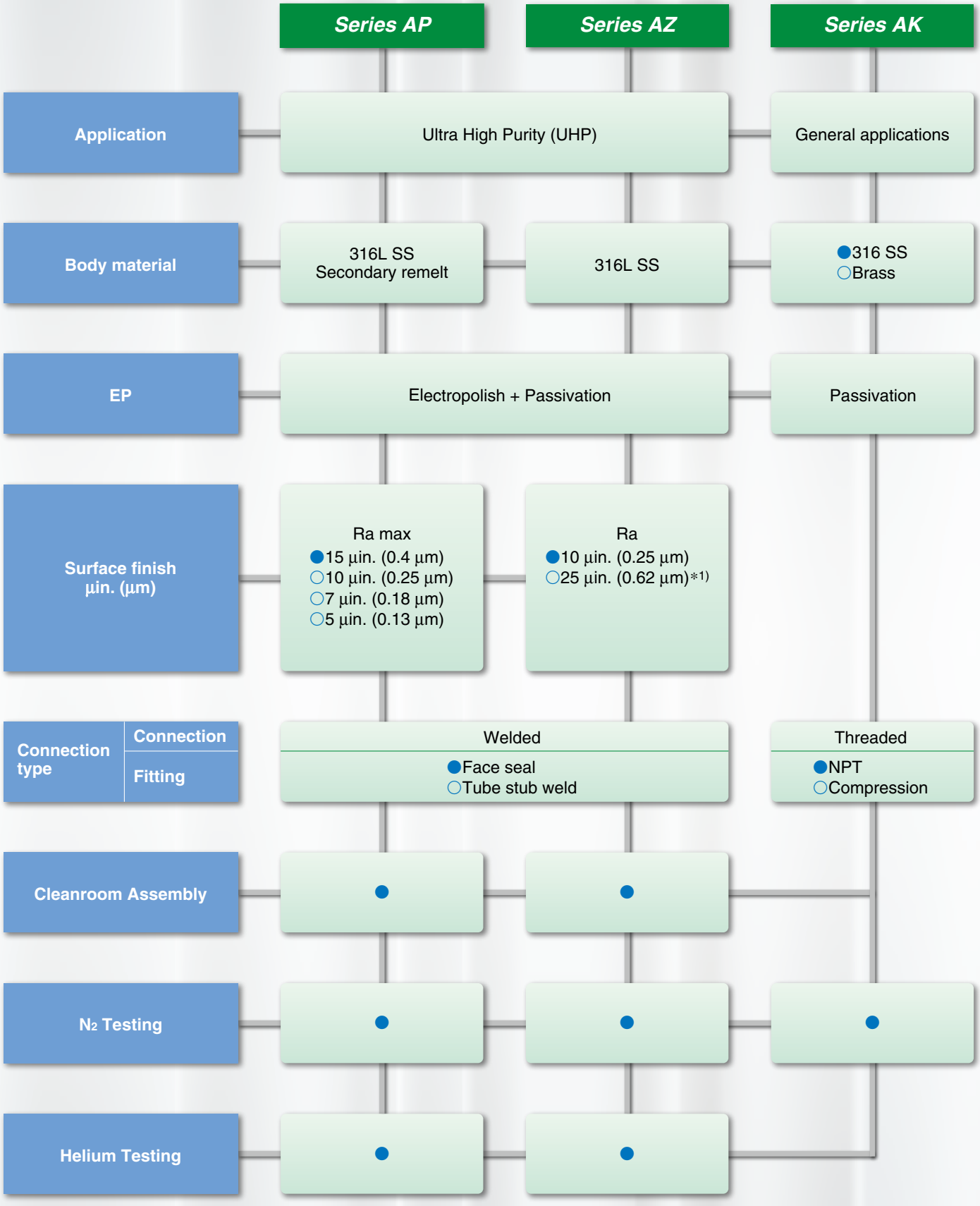
Series AP74/74B

P.157 to 160

●Technical Data/Glossary of Terms P.164,165

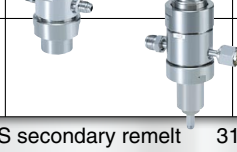
Series Features

●Standard ○Selectable by model or option



*1) Optional finish not available on all AZ series.

Regulator *Series AP/SL*

Series			Application		Construction		Material		Max. inlet pressure	
			Distribution (Point of use)	Source (Cylinder)	Tied diaphragm	Springless	Body *1)	Ni-Cr-Mo alloy Internal	psig	(MPa)
Single stage	AP1000		●	△			316L VAR	○	300 3500	2.1 24.1
	AP1100		●	●*4)			316L VAR	○	300	2.1
	AP1500			●	●		316L VAR	○	3500	24.1
	SL5500		●	●	●	●	316L VAR	○	3500	24.1
	AP1600		●				316L VAR	○	100 3500	0.7 24.1
	AP1900			●	●		316L VAR	○	3500	24.1
	SL5400		●	●	●	●	316L VAR	○	1000	6.9
	SL5800		●		●	●	316L VAR		300	2.1
	AP1400T		●	●	●		316L VAR	●	300 2300 ●2300 ○3000	2.1 15.9 ●15.9 ○20.7
	AP1200		●	●	●		316L VAR	○	1700 ●1700 ○3000	11.7 ●11.7 ○20.7
	AP9000		●	●	●		316L	●	1700	11.7
	AP9100		●	●	●		316L	●	800	5.5
	AP9115								250	1.7
Single stage (compact)	AP500		●				316L VAR	○	150	1.0
	SL5200		●		●	●	316L VAR	○	150	1.0
Two stage	AP1700			●	●		316L VAR	○	3500	24.1
	AP2700			●	●		316L VAR	○	3500	24.1

*1) 316L VAR : 316L SS secondary remelt 316L : 316L SS
*2) In accordance with SEMI F32.
*3) At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.
*4) For low vapor pressure gases.

●Standard ○Selectable by model or option
△May be selected for source applications of inert gases, though tied diaphragm is recommended.

Outlet pressure			Cv *2)	Flow, N_2 *3) slpm	Connection size inch	Connection type		Page
psig	(MPa)	Sub-atmospheric (Absolute)				Connection	Fittings	
1 to 10	0.007 to 0.07		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Welded	●Face seal ○Tube stub	P.31
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0							
100 mmHg absolute to 10 psig	-88 kPa to 0.07 MPa	●	0.05	0.5	1/4 3/8			P.43
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		0.09	30	1/4 3/8			P.33
100 mmHg abs. to 30 psig	-88 kPa to 0.2 MPa	○	0.09	30	1/4 3/8			P.53
1 to 30 1 to 60 2 to 100	0.007 to 0.2 0.007 to 0.4 0.014 to 0.7							
1 to 10	0.007 to 0.07		0.13	100	1/4 3/8			P.35
1 to 30 2 to 60 2 to 100	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7							
1 to 10 1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.07 0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		●0.13 ○0.16	●100 ○150 (HF opt.)	1/4 3/8 1/2			P.37
1 to 30 1 to 60 2 to 100	0.007 to 0.2 0.007 to 0.4 0.014 to 0.7		0.23	120	1/4 3/8 1/2			P.55
1 to 30 1 to 60 2 to 100	0.007 to 0.2 0.007 to 0.4 0.014 to 0.7		0.4	200	1/4 3/8 1/2			P.57
100 mmHg abs. to 30 psig	-88 kPa to 0.2 MPa	○	0.45	400	1/4 3/8 1/2			P.39
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0							
1 to 30 2 to 60	0.007 to 0.2 0.014 to 0.4		●0.65 ○1.1	●800 ○1000 (HF opt.) ○1500 (FC opt.)	1/4 3/8 1/2 3/4			P.41
2 to 100 5 to 150	0.014 to 0.7 0.034 to 1.0							
5 to 100 Preset to 300	0.034 to 0.7 Preset to 2.1		3.0	2000	1/2 3/4 1			P.49
5 to 100	0.034 to 0.7		4.0	5000	1/2 3/4 1			
5 to 150	0.034 to 1.0							
100 mmHg abs. to 10 psig	-88 kPa to 0.07 MPa	○	●0.06 ○0.1	●15 ○30 (HF opt.)	1/4	Welded	●Face seal ○Tube stub	P.29
0.5 to 10 0.5 to 30 1 to 60 1 to 100	0.0034 to 0.07 0.0034 to 0.2 0.007 to 0.4 0.007 to 0.7							
100 mmHg abs. to 10 psig	-88 kPa to 0.07 MPa	○	●0.07 ○0.15	●30 ○130 (HF opt.)	1/4 3/8			P.51
0.5 to 10 0.5 to 30 1 to 60 1 to 100	0.0034 to 0.07 0.0034 to 0.2 0.007 to 0.4 0.007 to 0.7							
1 to 30 2 to 60 2 to 100	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7		0.05	30	1/4 3/8	Welded	●Face seal ○Tube stub	P.45
1 to 30 2 to 60 2 to 100 3 to 120	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.021 to 0.8		0.105	150	1/4 3/8			P.47

Regulator *Series AZ*

Series			Application		Construction		Material		Max. inlet pressure	
			Distribution (Point of use)	Source (Cylinder)	Tied diaphragm	Springless	Body *1)	Ni-Cr-Mo alloy Internal	psig	(MPa)
Single stage	AZ1000		●	△			316L	○	300 3500	2.1 24.1
	AZ1100		●	●*4)				○	300	2.1
	AZ1500			●	●			○	3500	24.1
	AZ1400T		●	●	●			●	300 2300 ●2300 ○3000	2.1 15.9 ●15.9 ○20.7
	AZ1300		●						300	2.1
	AZ1200		●	●	●			○	1700 ●1700 ○3000	11.7 ●11.7 ○20.7
	AZ9200		●		●				300	2.1

Regulator *Series AK*

Series			Application		Construction		Material		Max. inlet pressure	
			Distribution (Point of use)	Source (Cylinder)	Tied diaphragm	Springless	Body *1)	Ni-Cr-Mo alloy Internal	psig	(MPa)
Single stage	AK1000		●	△			●316 ○B	○	300 3500	2.1 24.1
	AK1500			●	●			○	3500	24.1
	AK1400T		●	●	●			●	300 2300 ●2300 ○3000	2.1 15.9 ●15.9 ○20.7
	AK1300		●						300	2.1
	AK1200		●	●	●			○	1700 ●1700 ○3000	11.7 ●11.7 ○20.7
	AK9200		●		●				300	2.1
Two stage	AK1700			●	●		●316 ○B	○	3500	24.1

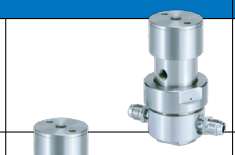
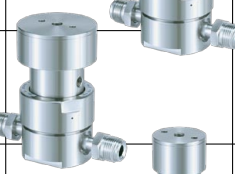
*1) 316L : 316L SS 316 : 316 SS B : Brass
*2) In accordance with SEMI F32.
*3) At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.
*4) For low vapor pressure gases.

●Standard ○Selectable by model or option
△May be selected for source applications of inert gases, though tied diaphragm is recommended.

Outlet pressure			Cv *2)	Flow, N_2 *3) slpm	Connection size inch	Connection type		Page
psig	(MPa)	Sub-atmospheric (Absolute)				Connection	Fittings	
1 to 10	0.007 to 0.07		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Welded	●Face seal ○Tube stub	P.59
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0							
100 mmHg absolute to 10 psig	-88 kPa to 0.07 MPa	●	0.05	0.5	1/4 3/8			P.71
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		0.09	30	1/4 3/8			P.61
100 mmHg abs. to 30 psig	-88 kPa to 0.2 MPa	○	0.45	400	1/4 3/8 1/2			P.63
1 to 30 2 to 60	0.007 to 0.2 0.014 to 0.4							
2 to 100 5 to 150	0.014 to 0.7 0.034 to 1.0							
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		1.1	1000	1/4 3/8 1/2			P.65
1 to 30 2 to 60	0.007 to 0.2 0.014 to 0.4		●0.65 ○1.1	●800 ○1000 (HF opt.) ○1500 (FC opt.)	1/4 3/8 1/2			P.67
2 to 100 5 to 150	0.014 to 0.7 0.034 to 1.0							
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		1.6	2000	3/4 1			P.69

Outlet pressure			Cv *2)	Flow, N_2 *3) slpm	Connection size inch	Connection type		Page
psig	(MPa)	Sub-atmospheric (Absolute)				Connection	Fittings	
0.5 to 10	0.007 to 0.07		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Threaded	●NPT ○Compression	P.73
1 to 30 2 to 60 2 to 100 5 to 150 5 to 200 5 to 300 10 to 500	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0 0.034 to 1.4 0.034 to 2.1 0.07 to 3.4							
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		0.09	30	1/4 3/8			P.75
100 mmHg abs. to 30 psig	-88 kPa to 0.2 MPa	○	0.45	400	1/4 3/8 1/2			P.77
1 to 30 2 to 60	0.007 to 0.2 0.014 to 0.4							
2 to 100 5 to 150	0.014 to 0.7 0.034 to 1.0							
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		1.1	1000	1/4 3/8 1/2			P.79
1 to 30 2 to 60	0.007 to 0.2 0.014 to 0.4		●0.65 ○1.1	●800 ○1000 (HF opt.) ○1500 (FC opt.)	1/4 3/8 1/2			P.81
2 to 100 5 to 150	0.014 to 0.7 0.034 to 1.0							
1 to 30 2 to 60 2 to 100 5 to 150	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.0		1.6	2000	3/4			P.83
1 to 30 2 to 60 2 to 100 5 to 200	0.007 to 0.2 0.014 to 0.4 0.014 to 0.7 0.034 to 1.4		0.05	30	1/4 3/8	Threaded	●NPT ○Compression	P.85

Air Operated Regulator *Series AP/AZ/AK*

Series			Application		Construction		Material		Max. inlet pressure	
			Distribution (Point of use)	Source (Cylinder)	Tied diaphragm	Springless	Body *1)	Ni-Cr-Mo alloy Internal	psig	(MPa)
Single stage	AP10PA		●	△			316L VAR	○	3500	24.1
	AP15PA			●	●			○	3500	24.1
	AP14PAT		●	●	●			●	●2300 ○3000	●15.9 ○20.7
	AP12PA		●	●	●			○	●1700 ○3000	●11.7 ○20.7
	AZ10PA		●	△			316L	○	3500	24.1
	AZ15PA			●	●			○	3500	24.1
	AZ14PAT		●	●	●			●	●2300 ○3000	●15.9 ○20.7
	AZ12PA		●	●	●			○	●1700 ○3000	●11.7 ○20.7
	AK10PA		●	△			●316 ○B	○	3500	24.1
	AK15PA			●	●			○	3500	24.1
	AK14PAT		●	●	●			●	●2300 ○3000	●15.9 ○20.7
	AK12PA		●	●	●			○	●1700 ○3000	●11.7 ○20.7

*1) 316L VAR : 316L SS secondary remelt 316L : 316L SS
*2) In accordance with SEMI F32.
*3) At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

●Standard ○Selectable by model or option
△May be selected for source applications of inert gases, though tied diaphragm is recommended.

Outlet pressure			Cv *2)	Flow, N_2 *3) slpm	Connection size inch	Connection type		Page
psig	(MPa)	Sub-atmospheric (Absolute)				Connection	Fittings	
7 to 150	0.05 to 1.0		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Welded	●Face seal ○Tube stub	**P.91**
7 to 150	0.05 to 1.0		0.09	30	1/4 3/8			**P.93**
7 to 150	0.05 to 1.0		0.45	400	1/4 3/8 1/2			**P.95**
7 to 150	0.05 to 1.0		●0.65 ○1.1	●800 ○1000 (HF opt.)	1/4 3/8 1/2 3/4			**P.97**
7 to 150	0.05 to 1.0		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Welded	●Face seal ○Tube stub	**P.99**
7 to 150	0.05 to 1.0		0.09	30	1/4 3/8			**P.101**
7 to 150	0.05 to 1.0		0.45	400	1/4 3/8 1/2			**P.103**
7 to 150	0.05 to 1.0		●0.65 ○1.1	●800 ○1000 (HF opt.)	1/4 3/8 1/2			**P.105**
7 to 150	0.05 to 1.0		●0.09 ○0.15	●30 ○120 (HF opt.)	1/4 3/8	Threaded	●NPT ○Compression	**P.107**
7 to 150	0.05 to 1.0		0.09	30	1/4 3/8			**P.109**
7 to 150	0.05 to 1.0		0.45	400	1/4 3/8 1/2			**P.111**
7 to 150	0.05 to 1.0		●0.65 ○1.1	●800 ○1000 (HF opt.)	1/4 3/8 1/2			**P.113**

Back Pressure Regulator *Series BP*

●Standard ○Selectable by model or option

Series		Body material *1)	Operating pressure		Cv *2)	Connection size inch	Connection type		Page
			psig	(MPa)			Connection	Fittings	
BP1000		316L VAR	0.5 to 10 1 to 30 2 to 60 5 to 100 15 to 200 15 to 300	0.0034 to 0.07 0.007 to 0.2 0.014 to 0.4 0.034 to 0.7 0.1 to 1.4 0.1 to 2.1	0.3	1/4 3/8	Welded	●Face seal ○Tube stub	**P.89**
		●316 ○B				1/4	Threaded	●NPT ○Compression	**P.87**

∗1) 316L VAR : 316L SS secondary remelt 316L : 316L SS 316 : 316 SS S : 300 SS series B : Brass
∗2) In accordance with SEMI F32.

Pressure Gauges (For UHP and general applications) ▶▶▶ **P.115**

Diaphragm Valves (Air operated)

Series			Application		Status		Body material *1)	
			Distribution (Point of use)	Source (Cylinder)	N.C.	N.O.		
Air operated	AP3540		●		●		316L VAR	
	AP3550		●	△	●			
	AP3580		●			●		
	AP3000			●	●			
	AP4540		●		●			
	AP4550		●	△	●			
	AP4580		●			●		
	AP3113		●	●	●			
	AP3130		●	●	●			
	AP3700		●	△	●			
	AP3708		●			●		

Diaphragm Valves (Two step mode)

Series			Application		Status		Body material *1)	
			Distribution (Point of use)	Source (Cylinder)	N.C.	N.O.		
Air operated Two step mode	AP3571		●		●		316L VAR	
	AP4571		●		●			

*1) 316L VAR : 316L SS secondary remelt
*2) In accordance with SEMI F32.

●Standard ○Selectable by model or option
△Source applications for maximum source pressure of 250 psig (1.7 MPa) or less.

Max. operating pressure		Cv *2)	LOTO	Connection size inch	Connection type		Page
psig	(MPa)				Connection	Fitting	
125	1.0	0.29	○	1/4 3/8	Welded	●Face seal ○Tube stub	P.121
250	2.1	0.29					
250	1.7	0.29	○				
3000	20.7	●0.23 ○0.28	○	1/4 3/8			P.125
125	0.9	0.5	○	1/4 3/8			P.123
250	2.1	0.5					
250	1.7	0.5	○				
1300	9.0	1.0	○	1/4 3/8 1/2 3/4			P.127
3000	20.7	0.7	○				
250	1.7	2.8		3/8 1/2 3/4			P.129
250	1.7	2.8					

Max. operating pressure		Cv *2)	LOTO	Connection size inch	Connection type		Page
psig	(MPa)				Connection	Fitting	
125	0.9	0.29		1/4 3/8	Welded	●Face seal ○Tube weld	P.131
125	0.9	0.5					

Diaphragm Valves (Manual)

Series			Application		Knob	Body material *1)	
			Distribution (Point of use)	Source (Cylinder)			
Manual	AP3600		●	●	Multi turn round knob	316L VAR	
	AP3625		●	●	1/4 turn lever knob		
	AP3650		●	●	1/4 turn indicating round knob		
	AP3657		●	●	Pull twist round knob		
	AP4600		●	△	Multi turn round knob		
	AP4625		●	△	1/4 turn lever knob		
	AP4650		●	△	1/4 turn indicating round knob		
	AP4657		●	△	Pull twist round knob		
	AP3100		●	●	Multi turn round knob		
	AP3125		●	●	1/4 turn lever knob		
	AP3150		●	●	1/4 turn indicating round knob		
	AP3157		●	●	Pull twist round knob		
	AP3800		●	△	Round knob		
	AP3900		●	△	Pull twist round knob		

Diaphragm Valves (Metal seated)

Series			Application		Status or Knob	Body material *1)	
			Distribution (Point of use)	Source (Cylinder)			
Air operated	AP3200		●		N.C.	316L VAR	
Manual	AP3260		●		Multi turn round knob		

*1) 316L VAR : 316L SS secondary remelt *2) In accordance with SEMI F32.

Option (LOTO, Operational Safety Device) ▸▸▸ P.145 Porting Guide ▸▸▸ P.146

●Standard ○Selectable by model or option
△Source applications for maximum source pressure of 250 psig (1.7 MPa) or less.

Max. operating pressure		Cv *2)	LOTO	Connection size inch	Connection type		Page
psig	(MPa)				Connection	Fitting	
3000	20.7	0.29		1/4 3/8	Welded	●Face seal ○Tube stub	P.135
			○				
			●				
250	2.1	0.5		1/4 3/8			P.137
			○				
			●				
3000	20.7	●0.7 ○1.3		1/4 3/8 1/2 3/4			P.139
3000	20.7	1.0	○				
1300	9.0	1.0					
1300	9.0	1.0	●				
250	1.7	2.8		3/8 1/2 3/4			P.141
			●				

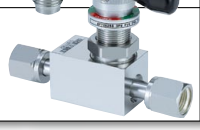
Maximum inlet pressure		Cv *2)	LOTO	Connection size inch	Connections		Page
psig	MPa				Connection	Fitting	
125	0.9	0.27		1/4 3/8	Welded	●Face seal ○Tube weld	P.133
125	0.9	0.27					P.143

Check Valve

●Standard ○Selectable by model or option

Series		Body material *1)	Max. operating pressure		Cracking pressure		Cv *2)	Connection size inch	Connection type		Page
			psig	(MPa)	psid	(MPa)			Connection	Fitting	
AP64		316L VAR	3500	24.1	3	0.023	0.4 max	1/4	Welded	●Face seal ○Tube stub	P.149

Vacuum Generator

Series		Body material *1)	Max. vacuum pressure		Modules *3)	Check valve cracking pressure		Constant bleed	Connection size inch	Connection type		Page
			in.Hg (Torr)	(kPa)		psid	(MPa)			Connection	Fitting	
AP7		316L	-26 (100)	-88		—	—		1/4 3/8	Welded	●Face seal ○Tube stub	P.151
AP70		316L	-26 (100)	-88		—	—		1/4 3/8			
AP71		316L	-26 (100)	-88	●	3	0.023	○	1/4 3/8			P.153
AP72		316L VAR	-26 (100)	-88	●	3	0.023	○	1/4 3/8			P.155

Flow Switch

Series		Body material *1)	Max. operating pressure		Flow, at 100 psig (0.69 MPa) N_2 slpm	Connection size inch	Connections		Page
			psig	MPa			Connection	Fitting	
AP74		316L VAR	3500	24.1	2 5 10 25 50 100	1/4	Welded	●Face seal ○Tube stub	P.157
AP74B		316L	3500	24.1	225 350 500 950	1/2			P.159
			2400	16.3	1100 1650 2600	3/4			

*1) 316L VAR : 316L SS secondary remelt 316L : 316L SS
*2) In accordance with SEMI F32.
*3) Monoblock vacuum generator, N_2 supply valve and check valve

Regulator and Valve Selection Guide ··· **P.19 to 26**
Technical Data/Glossary of Terms ····· **P.164, 165**

Process Gas Equipment Variations

For details, refer to the **WEB catalog**.

Regulator
for General Applications *Series AK1000T*

Series	Type	Body material	Connection	Connection size
AK1000T	Manually operated type	SUS316	Rc, NPT Compression	1/4", 3/8"

Diaphragm Valve
for General Applications *Series AK*

Series	Type	Body material	Connection	Connection size
AK3542, 4542	Air operated type	SUS316	Compression Rc, R, NPT	1/4", 3/8"
AK3652, 4652	Manually operated type	SUS316	Compression Rc, R, NPT	1/4", 3/8"

Diaphragm Valve
for Ultra High Purity *Series AZ*

Series	Type	Body material	Connection	Connection size
AZ3542, 4542	Air operated type	SUS316L	Face seal fitting Tube weld	1/4", 3/8", 1/2
AZ3652, 4652	Manually operated type	SUS316L	Face seal fitting Tube weld	1/4", 3/8", 1/2

Regulator and Valve Selection Guide
Valve and Regulator Recommendations
for source and distribution application

This guide is a reference guide to help customers determine an appropriate AP Tech valve and regulator to be used in process gas systems. Before selecting a product, please make sure to read through this guide. For information and specifications related to the specific model, please refer to the catalog data sheet.

Precautions for selection

The guide's general recommendations are based upon typical applications from material point of view.
Some series are not available depending on the regulations in different countries so the selection should be made complying with the regulations in the countries where the product will be used.
In Japan since using compression fittings for toxic gas is prohibited, AP/AZ series should be used for toxic gas.
The proper regulator and valve selection can be significantly affected by parameters such as system design, flow duration, frequency of use, ambient conditions and outlet pressure. Please consult SMC for a specific recommendation beyond the scope of this document or if any doubt exists. It is important to understand that one may follow this guide's recommendation, yet have a failure due to a parameter specific to the given application, as noted. Restated, one may achieve higher or lower flow capacities than stipulated in this guide due to the parameters and conditions of a specific application and system design.

- **Source valves** are those on the upstream side of the pressure regulator in the source gas cabinet or bulk delivery system.
- **Distribution valves** are those on the downstream side of the pressure regulator in the source gas cabinet or bulk delivery system and used anywhere downstream of the regulator (s) for cylinder applications at point of use (POU) in valve manifold boxes (VMBs) and process tools.
- **Source regulators** are those used in the source gas cabinet or bulk delivery system.
- **Distribution regulators** are those used at point of use (POU) in valve manifold boxes (VMBs) and process tools. Recommendations are based on typical usage. Operating practices at a specific facility may require a different component selection.
- It is assumed that non-liquefied gas cylinders are switched over to a new cylinder when the pressure drops to 150 to 250 psig (1.0 to 1.7 MPa). Therefore, maximum recommended flow rates for source regulators and source valves assume 150 to 250 psig (1.0 to 1.7 MPa) inlet pressure for this gas.
- It is assumed that the cylinder pressure for liquefied gas systems is maintained at or above the vapor pressure at 16 °C. It is assumed that cylinders are switched over before the liquid is all vaporized into gas. Therefore, maximum recommended flow rates for **source regulators** are based on 16 °C vapor pressure at the regulator inlet for these gases.
- Absolute or very low positive pressure delivery bear close scrutiny. The AP1402TA delivers both sub-atmospheric and positive pressure (30 psig) equally well, whereas the AP1101 is strictly intended for sub-atmospheric pressure delivery (10 psig or less). If low flow and very low positive pressure delivery is desired, the AP1001 should be selected instead of the AP1101. The alternative is to select the AP1402TA which provides more flow capacity and the ability to delivery sub-atmospheric and positive pressure.
- The SHP option is for certain point of use applications in lieu of the SH option. The SHP designation provides Ni-Cr-Mo alloy internals comprised of the poppet and diaphragm, whereas the SH option includes the nozzle.
- If a source regulator is listed as ① and ②, it means two stage regulation is required. The two regulators are in series with ① listed as the first stage and ② listed as the second stage.
- Valve recommendations are based on typical cylinder pressures and delivery line pressures. Pressure drop across valves at low pressures may be excessive and required a different valve selection.
- Valve recommendations are for the process line isolation. Purge and vent valves are not addressed in this document but generally an AP3000, AP3650, or AP3540 valve will provide sufficient flow capability. The valve series recommended were purposely limited for the sake of brevity. The model number indicates the basic size and rating. For example, manually operated valves are noted as AP3650 but an AP3600 or AP3625 would also be appropriate and equivalent selections.
- Polyimide seats are recommended for nitrous oxide (N_2O) and for source applications for carbon dioxide (CO_2) with either continuous flow demand or flow rates in excess of 100 slpm.
- Heating may be required in the source manifold for some gases even when not stated due to duration of flow, ambient conditions, etc. When heating is recommended, appropriate heating method shall be selected depending on gas type. In general, the gas should be heated upstream of the pressure regulator.
- Distribution line pressure is assumed to be 60 psig (0.4 MPa) minimum or typical source pressure whichever is less. If the actual line pressure is higher, then higher flow rates than listed in this guideline can be obtained.

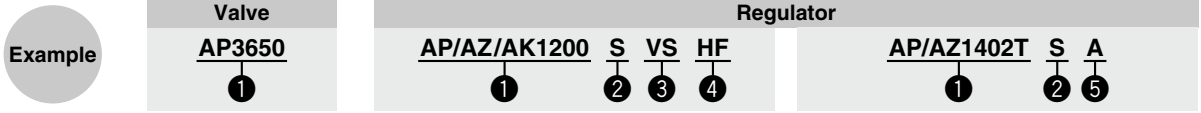
⚠ Caution

Since the product specified here is used under various operating conditions, its compatibility with fluid and specific equipment must be decided by the person who designs the equipment or decided its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product regardless of any recommendation.
Proper installation, operation and maintenance are also required to assure safe, trouble free performance.

Recommended Model Selection Table

Please read page 19 before selecting a product.

How to read model number listed as recommendation.



❶ **Series**
AP/AZ/AK1200: 3 series are recommended (AP1200, AZ1200, AK1200).
Valve: Only typical series is shown as recommendation and other models with same specifications (operating pressure, Cv) are also recommended.
For example, other than AP3650, AP3600/3625/3657 are also recommended.

❷ **Material**
S: Stainless steel body as standard design.
SH: Stainless steel body with Ni-Cr-Mo alloy internals as it further improves corrosion resistance than S (standard design). Either SH or SHP can be used with AP series regulators and SHP is used with AZ series regulators. (SHP provides Ni-Cr-Mo alloy internals comprised of the poppet and diaphragm, whereas SH includes the nozzle.)
Material of stainless steel body varies depending on series.
- **AP series (except AP9000&9100) … 316L SS secondary remelt**
- **AZ series and AP9000&9100 … 316L SS**
- **AK series … 316 SS**

❸ **VS: Seat material is made of Polyimide.** (Only for specific series)
No code: PCTFE as standard design.

❹ **Option** (Only for specific series)
- **HF: High flow**
- **FC: Force compensation**
- **HR: High inlet pressure**

❺ **A: Delivery of sub-atmospheric pressure.** (Only for specific series)

For more details, please refer to catalog.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Acetylene ∗ (C_2H_2)	230	**AP3000**	25	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	6	**AP/AZ/AK1000S HF**
	280	**AP3002**	45	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**			75	**AP/AZ/AK1200S**
			400	**AP3700**			95	**AP/AZ/AK1200S HF**
				AP3800				**AZ/AK1300S**
Air	185	**AP3000**	90	**AP3540**	30	**AP/AZ/AK1500S**	30	**AP/AZ/AK1000S**
		AP3650		**AP3650**	100	**AP1900S**	50	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**	200	**AP/AZ/AK1400TS**	150	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	800	**AP/AZ/AK1200S HR**	400	**AP/AZ/AK1200S**
		AP3100		**AP3800**			600	**AP/AZ/AK1200S HF**
	550	**AP3130**	890	**AP3700**				**AZ/AK1300S**
	475	**AP3125**		**AP3800**				
Ammonia (NH_3)	250	**AP3540**	100	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	30	**AP/AZ/AK1000S HF**
	450	**AP4540**	225	**AP4540**	75	**AP/AZ/AK1200S**	60	**AP/AZ/AK1400TS**
		AP4650		**AP4650**	400	**AP/AZ/AK1200S**	125	**AP/AZ/AK1200S**
	1000	**AP3113**	1000	**AP3700**	600	**AP/AZ/AK1200S HF**	250	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**	1100	**AP9100S**		**AZ/AK1300S**
							500	**AP/AZ/AK1200S FC**
							1000	**AP9100S**
Argon (Ar)	200	**AP3000**	80	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	100	**AP1900S**	25	**AP/AZ/AK1000S HF**
	350	**AP3002**	150	**AP4540**	300	**AP1900S HF**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	1500	**AP/AZ/AK1200S HR**	100	**AP/AZ/AK1200S**
	1000	**AP3130**	800	**AP3700**			200	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300S**
							400	**AP/AZ/AK1200S FC**
							1000	**AP9100S**

∗ 15 psig (0.1 MPa) maximum source regulator outlet pressure.
■ denotes heating required to achieve stated flow.

Recommended Model Selection Table

Please read page 19 before selecting a product.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Arsine (AsH_3)	140	**AP3540**	55	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP/AZ/AK1400TS**	20	**AP/AZ/AK1000S HF**
	240	**AP4540**	95	**AP4540**				
		AP4650		**AP4650**				
Arsine Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	15	**AP/AZ/AK1500S**	15	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP1900S**	50	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**	150	**AP/AZ/AK1400TS**	150	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Boron Trichloride (BCl_3)	20	**AP4540**	15	**AP4540**	6	**AP/AZ/AK1402TSA**	0.4	**AP/AZ/AK1101SH**
		AP4650		**AP4650**			6	**AP/AZ/AK1402TSA**
Boron Trichloride Mix (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	15	**AP/AZ/AK1500S**	15	**AP/AZ/AK1000S**
		AP3650		**AP3650**	60	**AP/AZ/AK1400TS**	30	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**			60	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Boron Trifluoride (BF_3)	115	**AP3000**	60	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	25	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	145	**AP3002**	100	**AP4540**			25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Boron 11 Trifluoride ($11BF_3$)	115	**AP3000**	60	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	25	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	145	**AP3002**	100	**AP4540**			25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Butadiene (C_4H_6)	60	**AP4540**	60	**AP4540**	3	**AP/AZ1500S**	3	**AP/AZ1000S**
		AP4625		**AP4625**	40	**AP/AZ1400T**	5	**AP/AZ1000S HF**
n-butane (C_4H_{10})	60	**AP4540**	60	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4625		**AP4625**	40	**AP/AZ/AK1400T**	5	**AP/AZ/AK1000S HF**
Butene-1 (C_4H_8)	35	**AP3540**	30	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	65	**AP4540**	60	**AP4540**				
		AP4650		**AP4650**				
Carbon Dioxide (CO_2)	500	**AP3000**	75	**AP3540**	3	**AP/AZ/AK1500S**	8	**AP/AZ/AK1000S**
		AP3650		**AP3650**	75	**AP/AZ/AK1400TS**	20	**AP/AZ/AK1000S HF**
	700	**AP3002**	140	**AP4540**	150	**AP/AZ/AK1200S VS**	40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	500	**①AP/AZ/AK1225S VS**	100	**AP/AZ/AK1200S**
	2500	**AP3113**	750	**AP3700**		**②AP/AZ/AK1200S VS HF**	160	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**	1000	**①AP9030S VS**		**AZ/AK1300S**
						②AP9100S VS	325	**AP/AZ/AK1200S FC**
							800	**AP9100S**
Carbon Monoxide (CO)	185	**AP3000**	90	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	15	**AP1900S**	15	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**	50	**AP/AZ/AK1400TS**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Carbonyl fluoride (COF_2)	115	**AP3000**	60	**AP3540**	5	**AP/AZ1500S**	3	**AP/AZ1000S**
		AP3625		**AP3625**	25	**AP/AZ1400TS**	10	**AP/AZ1000S HF**
	200	**AP3625**	100	**AP4540**				
				AP4625				
Chlorine (Cl_2)	75	**AP3540**	50	**AP3540**	3	**AP/AZ/AK1500SH**	5	**AP/AZ/AK1000SH**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	15	**AP/AZ/AK1000SH HF**
	150	**AP4540**	100	**AP4540**	75	**AP/AZ/AK1200SH**	30	**AP/AZ/AK1400TS**
		AP4650		**AP4650**	200	**AP/AZ/AK1200SH HF**	75	**AP/AZ/AK1200SH**
	300	**AP3113**	400	**AP3700**			125	**AP/AZ/AK1200SH HF**
		AP3125		**AP3800**				**AZ/AK1300S**
							250	**AP/AZ/AK1200SH FC**
Chlorine Trifluoride (ClF_3)	20	**AP4540**	15	**AP4540**	6	**AP/AZ/AK1402TSA**	0.5	**AP/AZ/AK1101S**
		AP4650		**AP4650**			6	**AP/AZ/AK1402TSA**
Diborane Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	5	**AP1700S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	225	**AP2700S**	20	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**				
		AP3650		**AP4650**				
Dichlorosilane (SiH_2Cl_2)	20	**AP4540**	20	**AP4540**	7	**AP/AZ1402TSA**	1	**AP1001S**
		AP4650		**AP4650**			7	**AP/AZ/AK1402TSA**

■ denotes heating required to achieve stated flow.
Please read page 20 regarding how to read model number listed as recommendation.

If ① and ② are indicated in front of a model number, it means two stage regulation is required. The two regulators are in series with ① listed as the first stage and ② listed as the second stage.

Recommended Model Selection Table

Please read page 19 before selecting a product.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Diethyltelluride ($Te(C_2H_5)_2$)	70	**AP3000**	35	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	5	**AP1900S**	5	**AP/AZ/AK1000S HF**
	85	**AP3002**	60	**AP4540**	25	**AP/AZ/AK1400TS**	25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Vinylidene fluoride ($C_2H_2F_2$)	140	**AP3000**	55	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3625		**AP3625**	50	**AP/AZ/AK1400TS**	6	**AP/AZ/AK1000S HF**
	200	**AP3625**	100	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
				AP4625			75	**AP/AZ/AK1200S**
Dimethylsilane (C_2SiH_8)	14	**AP4540**	7	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	50	**AP/AZ/AK1400TS**	50	**AP/AZ/AK1400TS**
	150	**AP3700**	75	**AP3700**	75	**AP/AZ/AK1200S**	75	**AP/AZ/AK1200S**
		AP3800		**AP3800**				
Disilane (Si_2H_6)	14	**AP4540**	7	**AP4540**	1	**AP/AZ/AK1000S**	1	**AP/AZ/AK1000S**
		AP4650		**AP4650**	7	**AP/AZ/AK1402TSA**	7	**AP/AZ/AK1402TSA**
Ethylene (C_2H_4)	380	**AP3000**	90	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	485	**AP3002**	160	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**			75	**AP/AZ/AK1200S**
Fluorine(F_2)	10	**AP3200**	10	**AP3200**	Consult Factory		Consult Factory	
Fluorine Mixtures (10 %, 3.4 MPa) (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	5	**AP/AZ/AK1500SH**	5	**AP/AZ/AK1000SH**
		AP3650		**AP3650**	25	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000SH HF**
	225	**AP3002**	160	**AP4540**			25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Germane (GeH_4)	10	**AP3540**	4	**AP3540**	1	**AP/AZ/AK1000S**	1	**AP/AZ/AK1000S**
		AP3650		**AP3650**	7	**AP/AZ/AK1402TSA**	7	**AP/AZ/AK1402TSA**
	18	**AP4540**	7	**AP4540**				
		AP4650		**AP4650**				
Germane Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**	50	**AP/AZ/AK1400TS**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Halocarbon 12 (CCl_2F_2)	55	**AP4540**	40	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
							50	**AP/AZ/AK1400TS**
Halocarbon 12B2 (CBr_2F_2)	15	**AP4540**	15	**AP4540**	5	**AP/AZ1400TSA**	0.5	**AP/AZ1101S**
		AP4650		**AP4650**			5	**AP/AZ1402TSA**
Halocarbon 13 ($CClF_3$)	140	**AP3000**	40	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	170	**AP3002**	70	**AP4540**			50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Halocarbon 13B1 ($CBrF_3$)	110	**AP3540**	35	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	190	**AP4540**	65	**AP4540**			50	**AP/AZ/AK1400TS**
		AP4650		**AP4650**				
Halocarbon 14 (CF_4)	10	**AP3000**	50	**AP3540**	10	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP1900S**	15	**AP/AZ/AK1000S HF**
	200	**AP3002**	100	**AP4540**	80	**AP1900S HF**	30	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	500	**AP/AZ/AK1200S HR**	60	**AP/AZ/AK1200S**
	600	**AP3130**	500	**AP3700**			100	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300**
							250	**AP/AZ/AK1200S FC**
							500	**AP9100S**
Halocarbon 21 ($CHCl_2F$)	25	**AP4540**	15	**AP4540**	5	**AP/AZ/AK1402TSA**	0.5	**AP/AZ1101S**
		AP4650		**AP4650**				**AP1001S**
							5	**AP/AZ/AK1402TSA**
Halocarbon 23 (CHF_3)	115	**AP3000**	145	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	20	**AP/AZ/AK1000S HF**
	140	**AP3002**	250	**AP4540**			50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Halocarbon 32 (CH_2F_2)	140	**AP3000**	55	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	6	**AP/AZ/AK1000S HF**
	175	**AP3002**	100	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**			75	**AP/AZ/AK1200S**

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Recommended Model Selection Table

Please read page 19 before selecting a product.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Halocarbon 114 ($C_2Cl_2F_4$)	30	**AP4540**	25	**AP4540**	7	**AP/AZ/AK1402TSA**	0.5	**AP/AZ/AK1101S**
		AP4650		**AP4650**			1	**AP/AZ/AK1000S**
							7	**AP/AZ/AK1402TSA**
Halocarbon 115 (C_2ClF_5)	60	**AP4540**	40	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
					75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
							75	**AP/AZ/AK1200S**
Halocarbon 116 (C_2F_6)	60	**AP3000**	40	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	100	**AP3002**	80	**AP4540**	75	**AP/AZ/AK1200S**	25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	125	**AP/AZ/AK1200S HF**	50	**AP/AZ/AK1200S**
	275	**AP3113**	400	**AP3700**			90	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300**
							175	**AP/AZ/AK1200S FC**
							450	**AP9100S**
Halocarbon 125 (C_2HF_5)	180	**AP4540**	70	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	25	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
					75	**AP/AZ/AK1200S**	25	**AP/AZ/AK1400TS**
							75	**AP/AZ/AK1200S**
Halocarbon 134A ($C_2H_2F_4$)	55	**AP4540**	40	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
		AP3100		**AP3800**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
	350	**AP3700**	230	**AP3700**			75	**AP/AZ/AK1200S**
		AP3800		**AP3800**				
Halocarbon R218 (C_3F_8)	35	**AP3540**	20	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	60	**AP4540**	40	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP4650		**AP4650**			75	**AP/AZ/AK1200S**
Halocarbon C318 (C_4F_8)	25	**AP4540**	20	**AP4540**	6	**AP/AZ/AK1402TSA**	1	**AP/AZ/AK1101S**
		AP4650		**AP4650**			6	**AP/AZ/AK1402TSA**
Helium (He)	750	**AP3000**	250	**AP3540**	125	**AP/AZ/AK1500S**	65	**AP/AZ/AK1000S**
		AP3650		**AP3650**	500	**AP1900S**	125	**AP/AZ/AK1000S HF**
	1000	**AP3002**	450	**AP4540**	625	**AP1900S HF**	275	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	2000	**AP/AZ/AK1200S HR**	625	**AP/AZ/AK1200S**
	2500	**AP3130**	2500	**AP3700**			900	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300**
							1200	**AP/AZ/AK1200S FC**
							2500	**AP9100S**
Hexafluoropropane ($C_3H_2F_6$)	20	**AP4540**	15	**AP4540**	6	**AP/AZ/AK1402TSA**	6	**AP/AZ/AK1402TSA**
		AP4625		**AP4625**				
Hexafluoropropylene (C_3F_6)	60	**AP4540**	40	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4625		**AP4625**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
					75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
							75	**AP/AZ/AK1200S**
Hydrogen (H_2)	800	**AP3000**	300	**AP3540**	125	**AP/AZ/AK1500S**	65	**AP/AZ/AK1000S**
		AP3650		**AP3650**	500	**AP1900S**	125	**AP/AZ/AK1000S HF**
	1600	**AP3002**	600	**AP4540**	625	**AP1900S HF**	275	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	900	**AP2700S**	625	**AP/AZ/AK1200S**
	3000	**AP3130**	3000	**AP3700**	1200	**AP/AZ/AK1200S HR**	900	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300S**
							1200	**AP/AZ/AK1200S FC**
							3000	**AP9100S**
Hydrogen Bromide (HBr)	155	**AP3000**	55	**AP3540**	1	**AP/AZ/AK1500SH**	1	**AP/AZ/AK1000SH**
		AP3650		**AP3650**	30	**AP/AZ/AK1400TS**	2	**AP/AZ/AK1000SH HF**
	190	**AP3002**	95	**AP4540**	50	**AP/AZ/AK1200SH**	30	**AP/AZ/AK1400TS**
		AP3650		**AP4650**			50	**AP/AZ/AK1200SH**
Hydrogen Chloride (HCl)	350	**AP3000**	75	**AP3540**	2	**AP/AZ/AK1500SH**	8	**AP/AZ/AK1000SH**
		AP3650		**AP3650**	90	**AP/AZ/AK1400TS**	20	**AP/AZ/AK1000SH HF**
	500	**AP3002**	150	**AP4540**	150	**AP/AZ/AK1200SH**	40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	600	**①AP1225SH**	85	**AP/AZ/AK1200SH**
	2000	**AP3113**	850	**AP3700**		**②AP1210SH HF**	160	**AP/AZ/AK1200SH HF**
		AP3125		**AP3800**	2000	**①AP9030S**		**AZ/AK1300S**
						②AP9110S	300	**AP/AZ/AK1200SH FC**
							800	**AP9100S**

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Recommended Model Selection Table

Please read page 19 before selecting a product.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Hydrogen Chloride Mixtures (Nitrogen Balance)	210	**AP3000**	105	**AP3540**	10	**AP/AZ/AK1500SH**	10	**AP/AZ/AK1000SH**
		AP3650		**AP3650**	20	**AP1900SH**	20	**AP/AZ/AK1000SH HF**
	265	**AP3002**	190	**AP4540**	40	**AP/AZ/AK1400TS**	40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Hydrogen Fluoride (HF)	20	**AP4540**	20	**AP4540**	5	**AP/AZ/AK1402TSA**	5	**AP/AZ/AK1402TSA**
		AP4650		**AP4650**				
Hydrogen Selenide (H_2Se)	125	**AP3540**	55	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP/AZ/AK1400TS**	20	**AAP/AZ/AK1000S HF**
	215	**AP4540**	95	**AP4540**			40	**AP/AZ/AK1400TS**
		AP4650		**AP4650**				
Hydrogen Selenide Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ/AK1000S HF**
	225	**AP3002**	160	**AP4540**	50	**AP/AZ/AK1400TS**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Hydrogen Sulfide (H_2S)	210	**AP3000**	80	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	260	**AP3002**	140	**AP4540**			40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Krypton (Kr)	105	**AP3000**	50	**AP3540**	20	**AP/AZ/AK1500S**	20	**AP/AZ/AK1000S**
		AP3650		**AP3650**	60	**AP/AZ/AK1400TS**	30	**AP/AZ/AK1000S HF**
	130	**AP3002**	90	**AP4540**			60	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Methane (CH_4)	245	**AP3000**	120	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ/AK1000S HF**
	295	**AP3002**	210	**AP4540**	40	**AP/AZ/AK1400TS**	40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Methanol (CH_3OH)	40	**AP3540**	25	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	70	**AP4540**	40	**AP4540**				
		AP4650		**AP4650**				
Methyl bromide (CH_3Br)	25	**AP4540**	15	**AP4540**	5	**AP/AZ1402TSA**	5	**AP/AZ1402TSA**
		AP4625		**AP4625**				
Methyl Chloride (CH_3Cl)	60	**AP4540**	45	**AP4540**	1	**AP/AZ/AK1000S**	10	**AP/AZ/AK1402TSA**
		AP4650		**AP4650**	10	**AP/AZ/AK1402TSA**		
Methylsilane (CH_3SiH_3)	200	**AP3540**	70	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	350	**AP4540**	120	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP4650		**AP4650**			75	**AP/AZ/AK1200S**
Methyl Fluoride (CH_3F)	400	**AP3000**	120	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	490	**AP3002**	200	**AP4540**			50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Neon (Ne)	215	**AP3000**	110	**AP3540**	20	**AP/AZ/AK1500S**	20	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP1900S**	40	**AP/AZ/AK1000S HF**
	260	**AP3002**	190	**AP4540**	300	**AP/AZ/AK1200S HF**	100	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Nitrogen (N_2)	250	**AP3000**	100	**AP3540**	50	**AP/AZ/AK1500S**	25	**AP/AZ/AK1000S**
		AP3650		**AP3650**	200	**AP1900S**	50	**AP/AZ/AK1000S HF**
	400	**AP3002**	200	**AP4540**	250	**AP1900S HF**	150	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	350	**AP2700**	250	**AP/AZ/AK1200S**
	1000	**AP3130**	1000	**AP3700**	1000	**AP/AZ/AK1200S HR**	300	**AP/AZ/AK1200S HF**
		AP3125		**AP3800**				**AZ/AK1300S**
							400	**AP/AZ/AK1200S FC**
							1000	**AP9100S**
Nitrogen Trifluoride (NF_3)	75	**AP3000**	60	**AP3540**	5	**AP/AZ1500S**	6	**AP/AZ1000S**
		AP3650		**AP3650**	60	**AP/AZ1400TS**	15	**AP/AZ1000S HF**
	100	**AP3002**	110	**AP4540**	150	**AP/AZ1400TS**	30	**AP/AZ1400TS**
		AP3650		**AP4650**		**AP2700S**	75	**AP/AZ1200S**
	350	**AP3130**	500	**AP3700**	400	**AP/AZ1200S HR**	125	**AP/AZ1200S HF**
		AP3125		**AP3800**	1000	**①AP9030**		**AZ1300S**
						②AP9110	250	**AP/AZ1200S FC**
							600	**AP9100S**

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Recommended Model Selection Table

Please read page 19 before selecting a product.

Application / Process Gas	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Nitric Oxide (NO)	310	**AP3000**	75	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	6	**AP/AZ/AK1000S HF**
	380	**AP3002**	125	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**			75	**AP/AZ/AK1200S**
Nitrous Oxide (N_2O)	300	**AP3000**	70	**AP3540**	3	**AP/AZ/AK1500S VS**	8	**AP/AZ/AK1000S VS**
		AP3650		**AP3650**	60	**AP/AZ/AK1400TS VS**	20	**AP/AZ/AK1000S VS HF**
	500	**AP3002**	140	**AP4540**	100	**AP/AZ/AK1200S VS**	35	**AP/AZ/AK1400TS VS**
		AP3650		**AP4650**	150	**AP/AZ1200S VS HF**	85	**AP/AZ/AK1200S VS**
	1500	**AP3113**	750	**AP3700**	500	**①AP/AZ1225S VS**	160	**AP/AZ/AK1200S VS HF**
		AP3125		**AP3800**		**②AP/AZ1200S VS HF**		**AZ/AK1300S**
					1000	**①AP9030S VS**	320	**AP/AZ/AK1200S VS FC**
						②AP9100S VS	800	**AP9100S VS**
Octafluorocyclopentene (C_5F_8)	15	**AP4540**	15	**AP4540**	5	**AP/AZ/AK1402TSA**	0.3	**AP/AZ1101S**
		AP4650		**AP4650**			5	**AP/AZ/AK1402TSA**
Oxygen (O_2)	250	**AP3000**	75	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	80	**AP1900S**	25	**AP/AZ/AK1000S HF**
	400	**AP3002**	150	**AP4540**	150	**AP1900S HF**	50	**AP/AZ/AK1400TS**
		AP3650		**AP4650**	1000	**AP/AZ/AK1200S HR**	120	**AP/AZ/AK1200S**
			1000	**AP3700**			200	**AP/AZ/AK1200S HF**
				AP3800				**AZ/AK1300S**
							400	**AP/AZ/AK1200S FC**
							1000	**AP9100S**
Perfluorobutadiene (C_4F_6)	25	**AP4540**	25	**AP4540**	5	**AP/AZ1402TSA**	0.5	**AP/AZ1101S**
		AP4650		**AP4650**			5	**AP/AZ1402TSA**
Phosphine (PH_3)	320	**AP3000**	80	**AP3540**	5	**AP/AZ1500S**	5	**AP/AZ1000S**
		AP3650		**AP3650**	40	**AP/AZ1400TS**	10	**AP/AZ1000S HF**
	390	**AP3002**	145	**AP4540**				
		AP3650		**AP4650**				
Phosphine Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	10	**AP/AZ1500S**	10	**AP/AZ1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ1000S HF**
	225	**AP3002**	160	**AP4540**				
		AP3650		**AP4650**				
Phosphorous Pentafluoride (PF_5)	15	**AP3000**	5	**AP3540**	10	**AP/AZ1500S**	10	**AP/AZ1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ1000S HF**
	19	**AP3002**	9	**AP4540**				
		AP3650		**AP4650**				
	41	**AP3130**	52	**AP3700**				
		AP3125		**AP3800**				
Propane (C_3H_8)	65	**AP3540**	42	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	115	**AP4450**	75	**AP4540**	75	**AP/AZ/AK1200S**	50	**AP/AZ/AK1400TS**
		AP4650		**AP4650**				
Propene (C_3H_6)	185	**AP3540**	75	**AP3540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP3650		**AP3650**	50	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
	320	**AP4540**	125	**AP4540**			50	**AP/AZ/AK1400TS**
		AP4650		**AP4650**				
Silane (SiH_4)	150	**AP3000**	75	**AP3540**	5	**AP/AZ1500S**	10	**AP/AZ1000S**
		AP3650		**AP3650**	40	**AP/AZ1400TS**	25	**AP/AZ1000S HF**
	250	**AP3002**	150	**AP4540**	50	**AP2700S**	50	**AP/AZ1400TS**
		AP3650		**AP4650**	60	**AP/AZ1200S**	120	**AP/AZ1200S**
	600	**AP3130**	750	**AP3700**	100	**AP/AZ1200S HF**	200	**AP/AZ1200S HF**
		AP3125		**AP3800**	500	**①AP/AZ1225S**		**AZ1300S**
						②AP/AZ1200S HF	400	**AP/AZ1200S FC**
							1000	**AP9100S**
Silane Mixtures (Nitrogen Balance)	185	**AP3000**	90	**AP3540**	10	**AP/AZ1500S**	10	**AP/AZ1000S**
		AP3650		**AP3650**	20	**AP1900S**	20	**AP/AZ1000S HF**
	225	**AP3002**	160	**AP4540**	40	**AP/AZ1400TS**	40	**AP/AZ1400TS**
		AP3650		**AP4650**				
Silicon Tetrachloride ($SiCl_4$)	10	**AP4540**	10	**AP4540**	5	**AP/AZ1402TSA**	0.5	**AP/AZ1101S**
		AP4650		**AP4650**			5	**AP/AZ1402TSA**

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Recommended Model Selection Table

Please read page 19 before selecting a product.

Process Gas \ Application	Valve				Regulator			
	Source applications		Distribution applications		Source applications		Distribution applications	
	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation	Maximum flow (slpm)	Recommendation
Silicon Tetrafluoride (SiF_4)	95	**AP3000**	45	**AP3540**	10	**AP/AZ/AK1500S**	10	**AP/AZ/AK1000S**
		AP3650		**AP3650**	40	**AP/AZ/AK1400TS**	20	**AP/AZ/AK1000S HF**
	115	**AP3002**	80	**AP4540**			40	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				
Sulfur Dioxide (SO_2)	80	**AP4540**	30	**AP4540**	1	**AP/AZ/AK1000S**	6	**AP/AZ/AK1402TSA**
		AP4650		**AP4650**	6	**AP/AZ/AK1402TSA**		
Sulfur Hexafluoride (SF_6)							5	**AP/AZ/AK1000S**
	125	**AP3000**	35	**AP3540**	3	**AP/AZ/AK1500S**	12	**AP/AZ/AK1000S HF**
		AP3650		**AP3650**	40	**AP/AZ/AK1400TS**	25	**AP/AZ/AK1400TS**
	200	**AP3000**	75	**AP4540**	60	**AP/AZ/AK1200S**	60	**AP/AZ/AK1200S**
		AP3650		**AP4650**	150	**AP/AZ/AK1200S HF**	90	**AP/AZ/AK1200S HF**
	500	**AP3113**	400	**AP3700**	500	**AP9100S**		**AZ/AK1300S**
		AP3125		**AP3800**			180	**AP/AZ/AK1200S FC**
							400	**AP9100S**
Sulfur Tetrafluoride (SF_4)	200	**AP4540**	80	**AP4540**	3	**AP/AZ/AK1500S**	3	**AP/AZ/AK1000S**
		AP4650		**AP4650**	15	**AP/AZ/AK1400TS**	5	**AP/AZ/AK1000S HF**
							15	**AP/AZ/AK1400TS**
Trichlorosilane ($SiHCl_3$)	35	**AP4540**	30	**AP4540**	10	**AP/AZ/AK1402TSA**	0.5	**AP/AZ/AK1101S**
		AP4650		**AP4650**			10	**AP/AZ/AK1402TSA**
Trimethylsilane ($(CH_3)_3SiH$)	30	**AP4540**	25	**AP4540**	7	**AP/AZ/AK1402TSA**	0.5	**AP/AZ1101S**
		AP4650		**AP4650**			7	**AP/AZ/AK1402TSA**
Tungsten Hexafluoride (WF_6)	10	**AP4540**	10	**AP4540**	5	**AP/AZ/AK1402TSA**	0.3	**AP/AZ/AK1101SH**
		AP4650		**AP4650**			5	**AP/AZ/AK1402TSA**
Xenon (Xe)	85	**AP3000**	40	**AP3540**	5	**AP/AZ/AK1500S**	5	**AP/AZ/AK1000S**
		AP3650		**AP3650**	25	**AP/AZ/AK1400TS**	10	**AP/AZ/AK1000S HF**
	100	**AP3002**	70	**AP4540**			25	**AP/AZ/AK1400TS**
		AP3650		**AP4650**				

■ denotes heating required to achieve stated flow.
Please read page 20 regarding how to read model number listed as recommendation.

If ① and ② are indicated in front of a model number, it means two stage regulation is required. The two regulators are in series with ① listed as the first stage and ② listed as the second stage.

Regulators

	Series	Page
For ultra high purity (UHP)		
Single Stage Compact Regulator	**AP500**	P.29
Single Stage Regulator: Low to intermediate flow	**AP1000**	P.31
Single Stage Regulator: Low flow (Tied-diaphragm)	**AP1500**	P.33
Single Stage Regulator: Low to intermediate flow	**AP1600**	P.35
Single Stage Regulator: Low to intermediate flow (Tied-diaphragm)	**AP1900**	P.37
Single Stage Regulator: Intermediate flow (Tied-diaphragm)	**AP1400T**	P.39
Single Stage Regulator: High flow (Tied-diaphragm)	**AP1200**	P.41
Single Stage Regulator: Delivery of sub-atmospheric pressure	**AP1100**	P.43
Two Stage Regulator: Low flow (Tied-diaphragm)	**AP1700**	P.45
Two Stage Regulator: Intermediate flow (Tied-diaphragm)	**AP2700**	P.47
Single Stage Regulator: Bulk gas delivery	**AP9000 & 9100**	P.49
Single Stage Compact Regulator	**SL5200**	P.51
Single Stage Regulator: Low flow	**SL5500**	P.53
Single Stage Regulator: Intermediate flow	**SL5400**	P.55
Single Stage Regulator: Intermediate flow	**SL5800**	P.57
Single Stage Regulator: Low to intermediate flow	**AZ1000**	P.59
Single Stage Regulator: Low flow (Tied-diaphragm)	**AZ1500**	P.61
Single Stage Regulator: Intermediate flow (Tied-diaphragm)	**AZ1400T**	P.63
Single Stage Regulator: High flow	**AZ1300**	P.65
Single Stage Regulator: High flow (Tied-diaphragm)	**AZ1200**	P.67
Single Stage Regulator: High flow (Tied-diaphragm)	**AZ9200**	P.69
Single Stage Regulator: Delivery of sub-atmospheric pressure	**AZ1100**	P.71
For general applications		
Single Stage Regulator: Low to intermediate flow	**AK1000**	P.73
Single Stage Regulator: Low flow (Tied-diaphragm)	**AK1500**	P.75
Single Stage Regulator: Intermediate flow (Tied-diaphragm)	**AK1400T**	P.77
Single Stage Regulator: High flow	**AK1300**	P.79
Single Stage Regulator: High flow (Tied-diaphragm)	**AK1200**	P.81
Single Stage Regulator: High flow (Tied-diaphragm)	**AK9200**	P.83
Two Stage Regulator: Low flow (Tied-diaphragm)	**AK1700**	P.85
Back Pressure Regulator	**BP1000**	P.87
For ultra high purity (UHP)		
Back Pressure Regulator	**BP1000**	P.89
For air operated applications		
Pneumatic Actuation Pressure Regulator: Low flow	**AP10PA**	P.91
Pneumatic Actuation Pressure Regulator: Low flow (Tied-diaphragm)	**AP15PA**	P.93
Pneumatic Actuation Pressure Regulator: Intermediate flow (Tied-diaphragm)	**AP14PAT**	P.95
Pneumatic Actuation Pressure Regulator: High flow (Tied-diaphragm)	**AP12PA**	P.97
Pneumatic Actuation Pressure Regulator: Low flow	**AZ10PA**	P.99
Pneumatic Actuation Pressure Regulator: Low flow (Tied-diaphragm)	**AZ15PA**	P.101
Pneumatic Actuation Pressure Regulator: Intermediate flow (Tied-diaphragm)	**AZ14PAT**	P.103
Pneumatic Actuation Pressure Regulator: High flow (Tied-diaphragm)	**AZ12PA**	P.105
Pneumatic Actuation Pressure Regulator: Low flow	**AK10PA**	P.107
Pneumatic Actuation Pressure Regulator: Low flow (Tied-diaphragm)	**AK15PA**	P.109
Pneumatic Actuation Pressure Regulator: Intermediate flow (Tied-diaphragm)	**AK14PAT**	P.111
Pneumatic Actuation Pressure Regulator: High flow (Tied-diaphragm)	**AK12PA**	P.113
Pressure Gauges		P.115
Regulators and Back Pressure Regulator/Specific Product Precautions		P.117

Single Stage Compact Regulator for Ultra High Purity

Series AP500

- **For UHP gas delivery**
- **Flow capacity Standard: to 15 slpm**
  HF (option): to 30 slpm
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Sub-atmospheric pressure delivery option**

RoHS

How to Order

AP5 02 S □ □ 2PW FV4 FV4 □ □ □ □

Port Number: ① ② ③

Delivery pressure

Code	Delivery pressure
01	0.5 to 10 psig (0.0034 to 0.07 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)
02	0.5 to 30 psig (0.0034 to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	1 to 100 psig (0.007 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	Ni-Co alloy	316L SS
SH		Ni-Cr-Mo alloy		

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PWG	3 ports

Range options ∗1)

Code	Specification
No code	Standard
A	Sub-atmospheric

∗1) Only available with AP501.

Pressure gauge unit ∗3)

Code	Unit
No code	psig/bar
MPA	MPa

∗3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Option

Code	Specification	Cv
No code	Standard	0.06
FI	Friction dampener ∗6)	
HF	High flow ∗7)	0.1

∗6) FI is friction dampener to slow response and reduce interaction with MFC.

∗7) VS material not available with HF option.

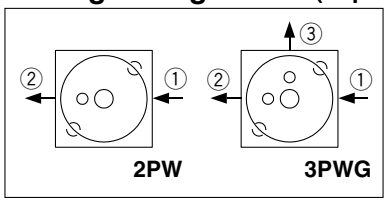
Seat material

Code	Material
No code	PCTFE (Standard)
TF	PTFE ∗4)
VS	Polyimide ∗5)

∗4) PTFE recommended for applications such as within a process tool.

∗5) Not available with SH material.

Porting Configuration (Top view)



①IN ②OUT ③Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld

Gauge port (Outlet③)

Code	Connections or Pressure gauge ∗2)		
		psig/bar unit	MPa unit
No code	No gauge port		
MV4	No pressure gauge	1/4 inch face seal (Male)	
FV4		1/4 inch face seal (Female)	
TW4		1/4 inch tube weld	
V3	With pressure gauge	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L		-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1		-30 in.Hg to 100 psig	-0.1 to 0.7 MPa

∗2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Specifications

Operating Parameters		AP501□□A	AP501	AP502	AP506	AP510
Delivery pressure		100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)	0.5 to 10 psig (0.0034 to 0.07 MPa)	0.5 to 30 psig (0.0034 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	1 to 100 psig (0.007 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 150 psig (1.0 MPa)				
Proof pressure (Inlet)		500 psig (3.4 MPa)				
Burst pressure		1000 psig (6.9 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)				
Cv		0.06				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)				
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)			
Connections		Face seal, Tube weld				
Supply pressure effect		0.2 psig (0.0014 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop				
Installation		Bottom mount				
Internal volume		0.15 in³ (2.4 cm³)				
Weight		0.45 kg ∗3)				

∗1) Max. 90°C for Polyimide seat.

∗2) Tested with Helium gas inlet pressure 100 psig (0.7 MPa).

∗3) Weight, including individual boxed weight, may vary depending on connections or options.

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP501□□A	AP501	AP502	AP506	AP510
HF	**Cv**	0.1				
	Supply pressure effect	0.4 psig (0.0028 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop				

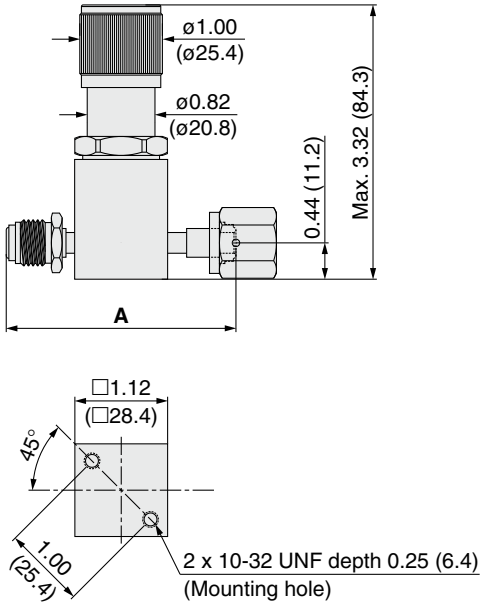
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	Ni-Co alloy	
Nozzle	316L SS	
Seat	PTFE (Option: PCTFE, Polyimide)	PTFE (Option: PCTFE)

Dimensions

inch (mm)

AP500

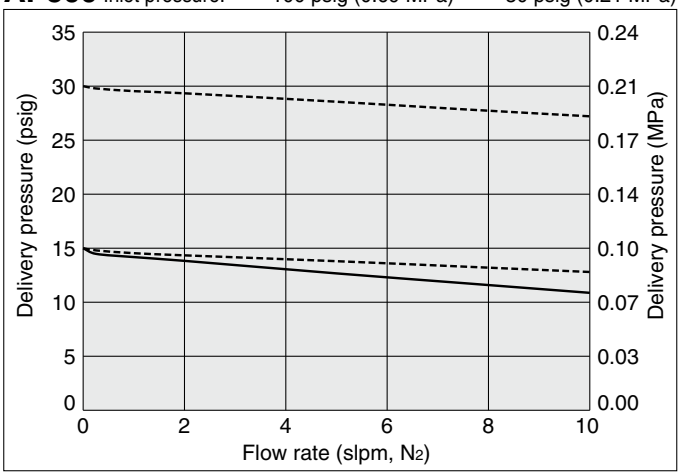


Connections	A	
	inch	(mm)
FV4	2.78	(70.6)
MV4		
TW4	2.12	(53.8)

Flow Characteristics

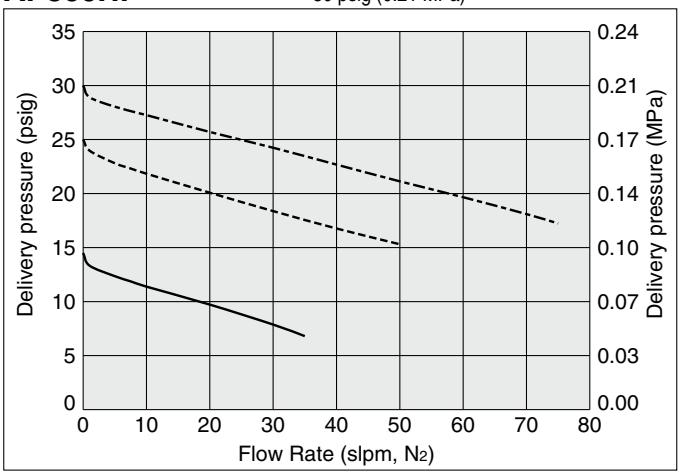
AP500

Inlet pressure: ---- 100 psig (0.69 MPa) —— 30 psig (0.21 MPa)



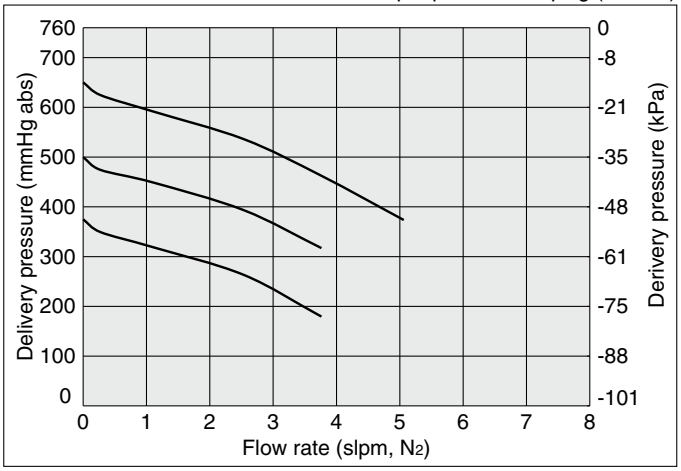
AP500HF

Inlet pressure: ---- 75 psig (0.52 MPa) ---- 45 psig (0.31 MPa) —— 30 psig (0.21 MPa)



AP501A

Input pressure : 2 psig (14 kPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Low to intermediate flow

Series AP1000

- **For UHP gas delivery**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

Port Number ① ② ③ ④

AP10 [01] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
01	1 to 10 psig (0.007 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP	secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy
SH				
H	Ni-Cr-Mo alloy			

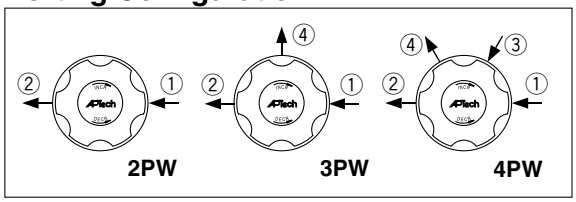
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④		
AP1001S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	1	V3	MPA

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗6)

∗6) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15)

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
TF	PTFE ∗4) ∗5)

∗3) Not available with SHP, SH, H materials.

∗4) PTFE recommended for applications such as within a process tool.

∗5) Source pressure rating is limited to 300 psig (2.1 MPa) or less.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP1001	AP1002	AP1006	AP1010	AP1015
Delivery pressure		1 to 10 psig (0.007 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 300 psig (2.1MPa)	Vacuum to 3500 psig (24.1 MPa) ∗1)			
Proof pressure (Inlet)		5000 psig (34.5 MPa)				
Burst pressure		10000 psig (69 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗2)				
Cv		0.09				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗4)				
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)				
Connections		Face seal, Tube weld				
Bonnet port		NPT 1/8 inch ∗5)				
Supply pressure effect		0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		0.49 in³ (8 cm³)				
Weight		1.25 kg ∗6)				

∗1) Max. 300 psig (2.1 MPa) for PTFE seat.

∗2) Max. 90°C for Polyimide seat.

∗3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

∗4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

∗5) On panel mount option, bonnet port is not threaded.

∗6) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP1001	AP1002	AP1006	AP1010	AP1015
HF	**Cv**	0.15				
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

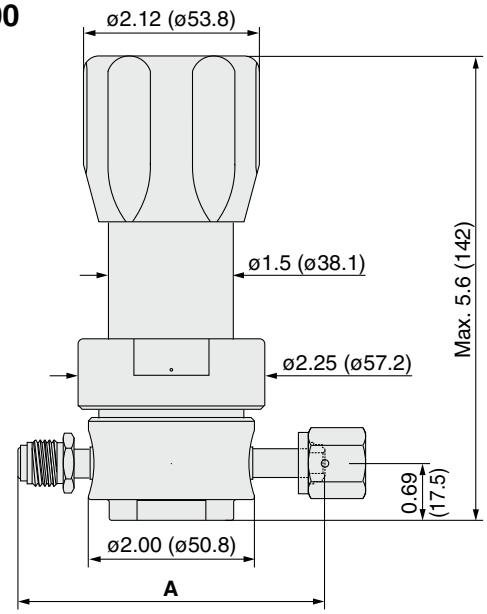
Wetted Parts Material

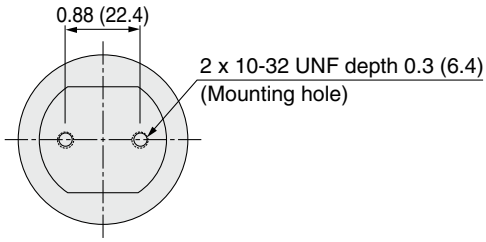
Wetted Parts	S	SHP	SH	H
Body	316L SS secondary remelt			Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation			Electropolish
Poppet	316L SS	Ni-Cr-Mo alloy		
Diaphragm	316L SS	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy	
Seat	PCTFE (Option: Polyimide, PTFE)	PCTFE (Option: PTFE)		

Dimensions

inch (mm)

AP1000

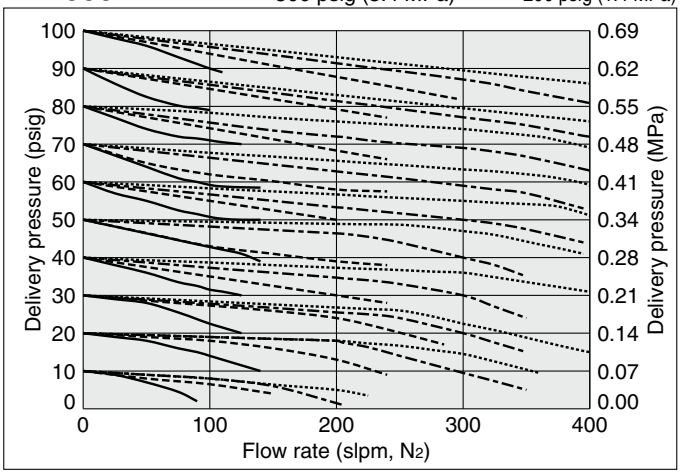




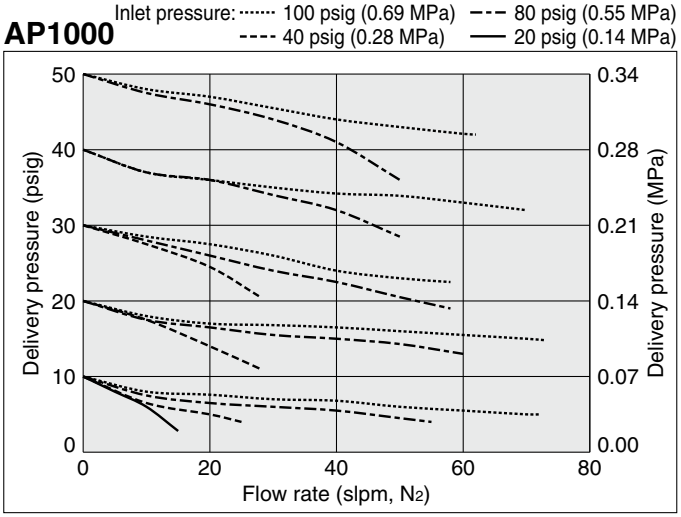
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

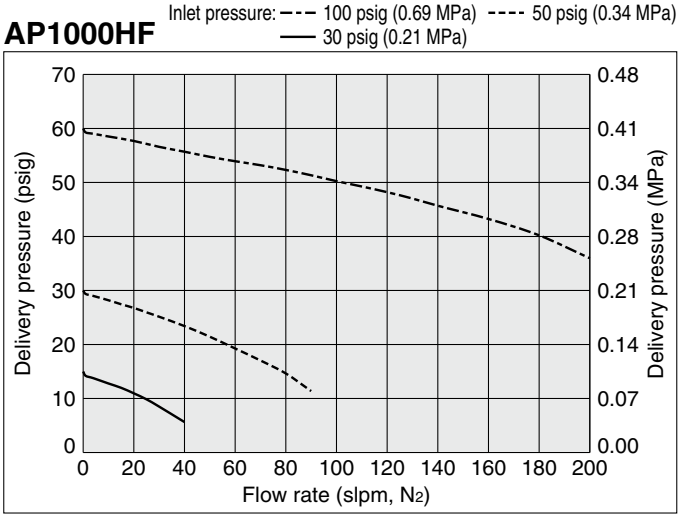
AP1000



AP1000



AP1000HF



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Low flow (Tied-diaphragm)

Series AP1500

- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity: to 30 slpm
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④

AP15 [02] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	
SH				Ni-Cr-Mo alloy
H	Ni-Cr-Mo alloy			

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 port
3PW	3 port
4PW	4 port

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

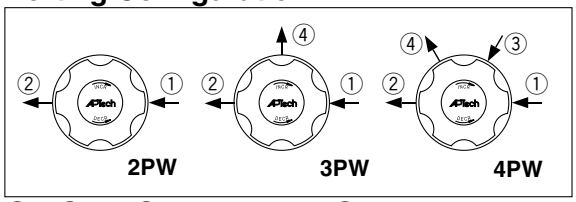
∗3) Not available with SHP, SH, H materials.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Sample Order Number

	Port	①	②	③	④	
AP1510S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		1	MPA
	4PW	FV4	FV4	40	1	MPA

Specifications

Operating Parameters		AP1502	AP1506	AP1510	AP1515
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 3500 psig (24.1 MPa)			
Proof pressure (Inlet)		5000 psig (34.5 MPa)			
Burst pressure		10000 psig (69MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.09			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)			
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)		
Connections		Face seal, Tube weld			
Bonnet port		NPT 1/8 inch ∗4)			
Supply pressure effect		0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.51 in³ (8.4 cm³)			
Weight		1.27 kg ∗5)			

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

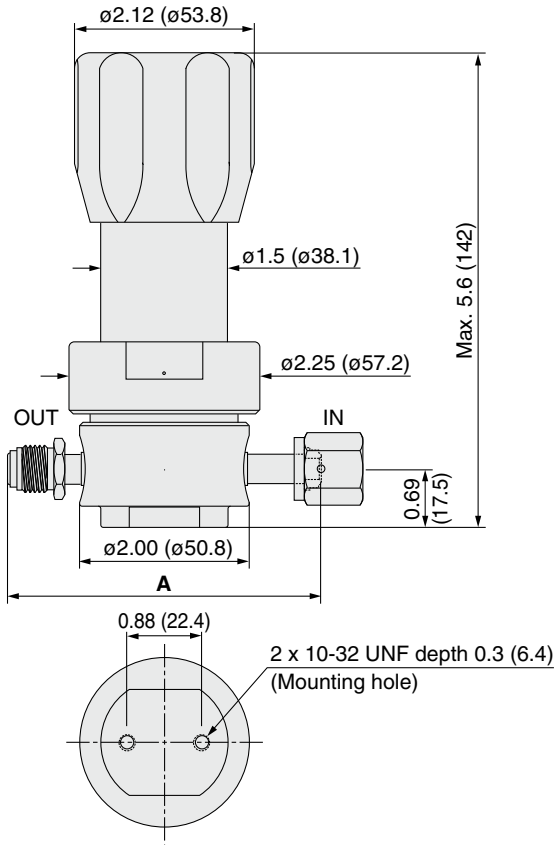
Wetted Parts Material

Wetted Parts	S	SHP	SH	H
Body	316L SS secondary remelt			Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation			Electropolish
Poppet	316L SS	Ni-Cr-Mo alloy		
Diaphragm	316L SS	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE		

Dimensions

inch (mm)

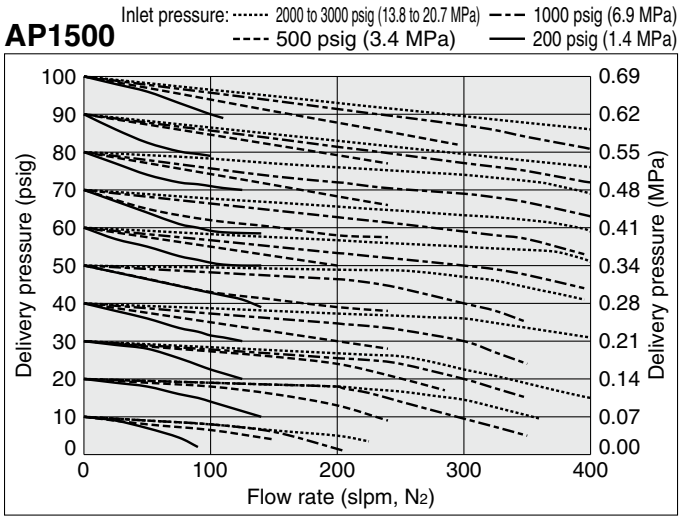
AP1500



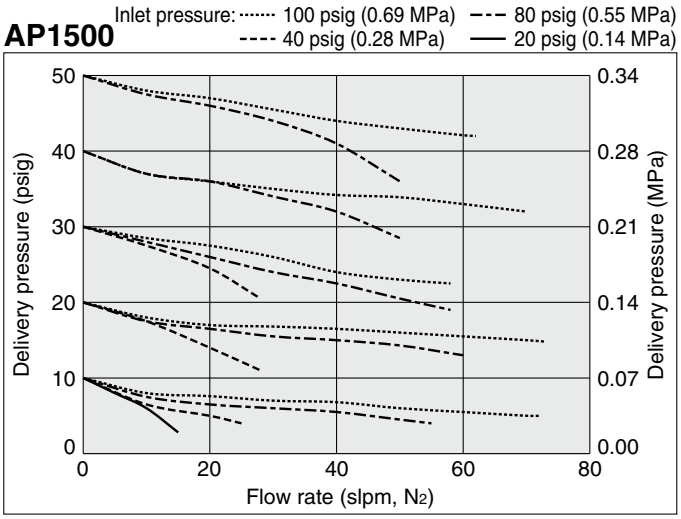
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

AP1500



AP1500

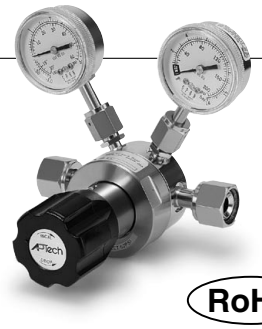


Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Low to intermediate flow

Series AP1600



- **For UHP gas delivery**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity: to 100 slpm**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

Port Number ① ② ③ ④

AP16 [01] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
01	1 to 10 psig (0.007 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SH	secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

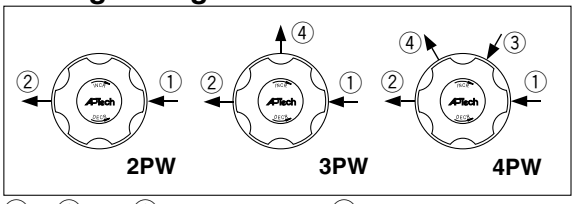
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port	①	②	③	④	
AP1601S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	1	V3	MPA
	4PW	FV4	FV4	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.43 inch (36.3 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP1601	AP1602	AP1606	AP1610
Delivery pressure		1 to 10 psig (0.007 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 100 psig (0.7 MPa)	Vacuum to 3500 psig (24.1 MPa)		
Proof pressure (Inlet)		4000 psig (27.6 MPa)			
Burst pressure		8000 psig (55.2 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.13			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)			
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)		
Connections		Face seal, Tube weld			
Bonnet port		NPT 1/8 inch ∗4)			
Supply pressure effect		0.25 psig (0.0017 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.82 in³ (13.5 cm³)			
Weight		1.54 kg ∗5)			

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

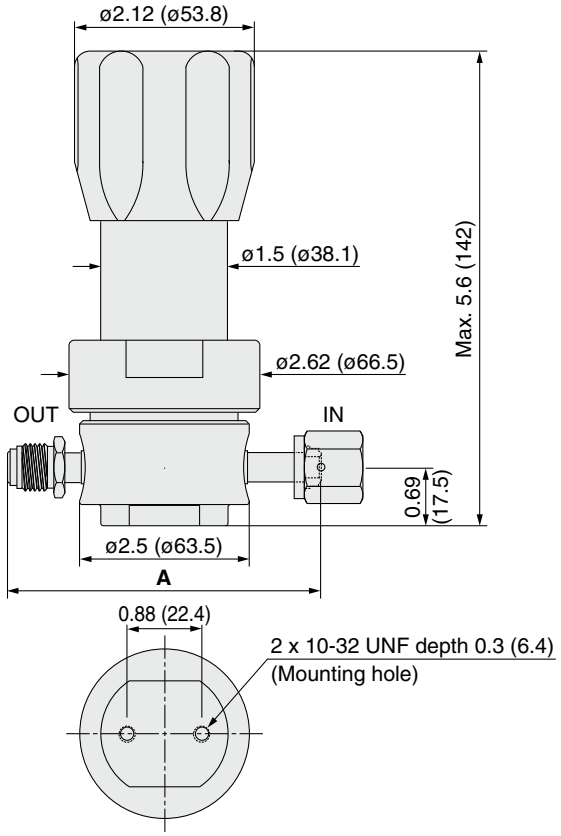
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

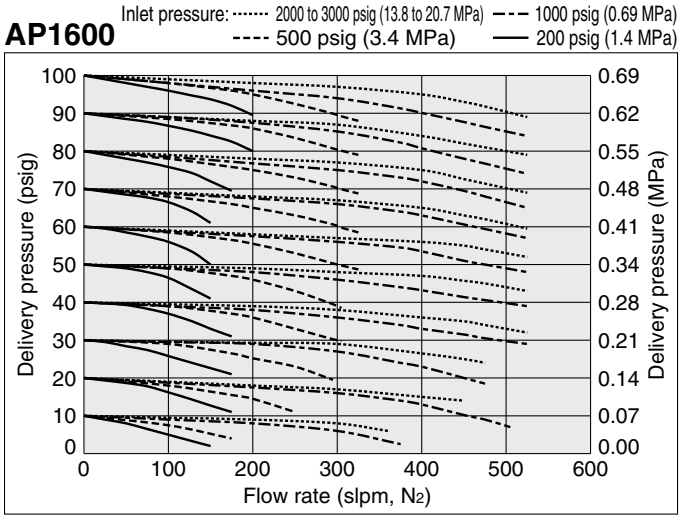
AP1600



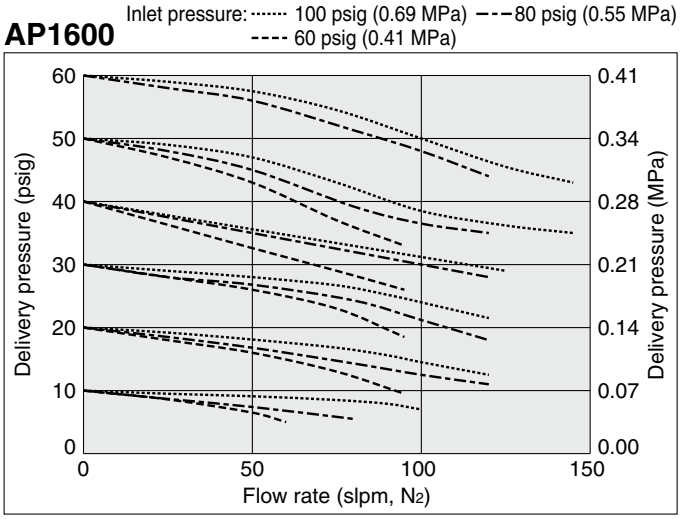
Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
TW4	3.46	(87.9)
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)

Flow Characteristics

AP1600



AP1600

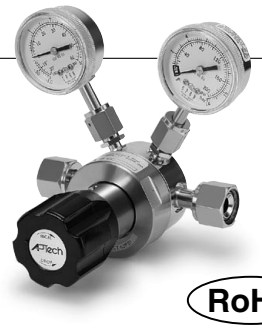


Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Low to intermediate flow (Tied-diaphragm)

Series AP1900



- **For UHP gas delivery**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Tied-diaphragm design**

RoHS

How to Order

Port Number ① ② ③ ④

AP19 [01] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
01	1 to 10 psig (0.007 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	316L SS	316L SS
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

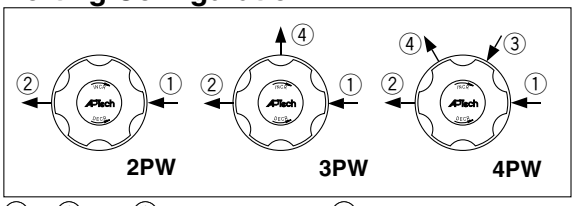
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port	①	②	③	④	
AP1901S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	40	V3	MPA
	4PW	FV4	FV4	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia.1.43 inch (36.3 mm).

Option

Code	Specification
No code	Standard (Cv: 0.13)
HF	High flow (Cv: 0.16)

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP1901	AP1902	AP1906	AP1910	AP1915
Delivery pressure		1 to 10 psig (0.007 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 3500 psig (24.1 MPa)				
Proof pressure (Inlet)		4000 psig (27.6 MPa)				
Burst pressure		8000 psig (55.2 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)				
Cv		0.13				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)				
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)			
Connections		Face seal, Tube weld				
Bonnet port		NPT 1/8 inch ∗4)				
Supply pressure effect		0.25 psig (0.0017 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		0.82 in³ (13.5 cm³)				
Weight		1.54 kg ∗5)				

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP1901	AP1902	AP1906	AP1910	AP1915
HF	**Cv**	0.16				
	Supply pressure effect	0.6 psig (0.0042 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

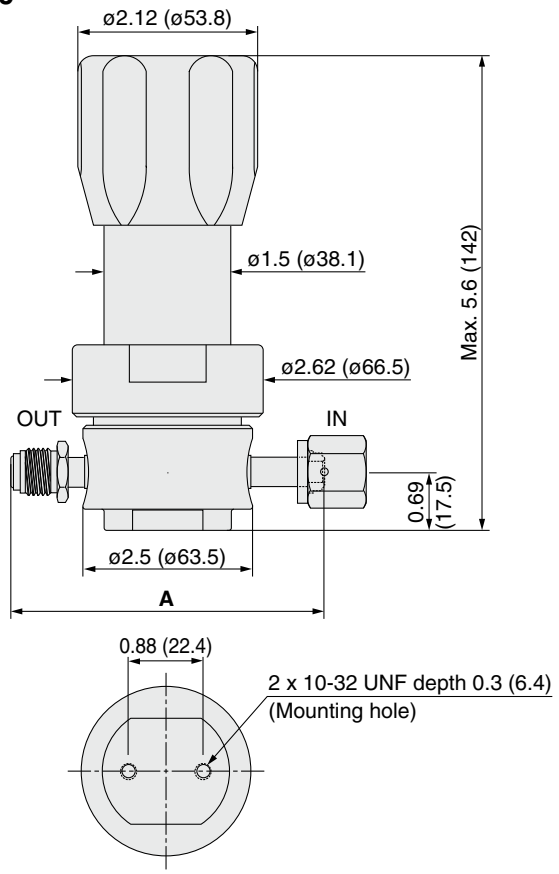
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

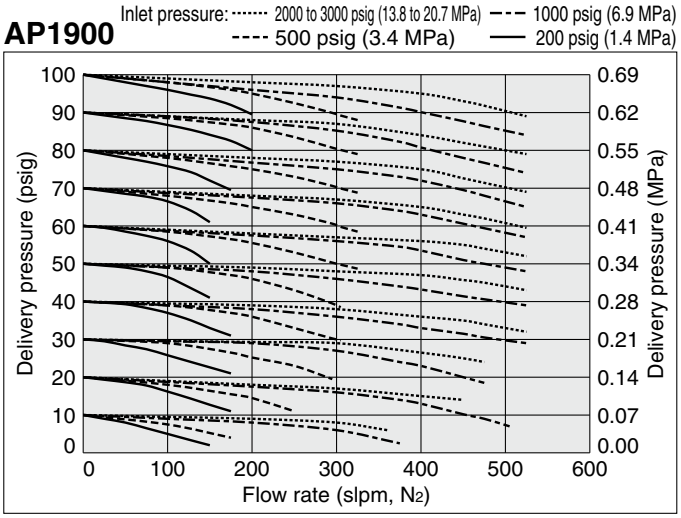
AP1900



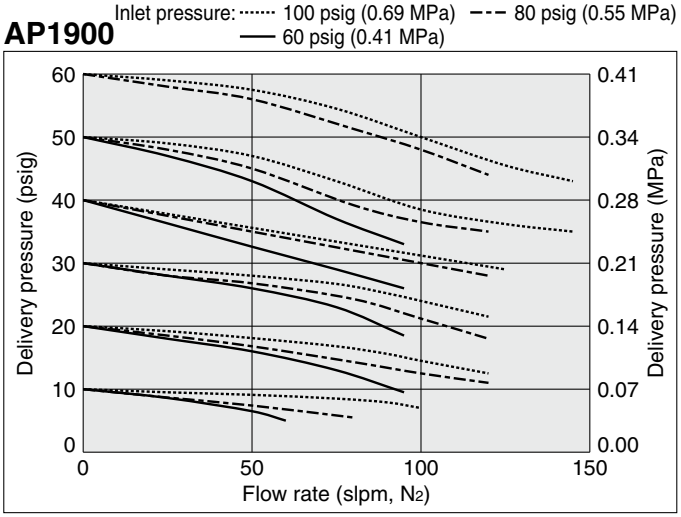
Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
TW4	3.46	(87.9)
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

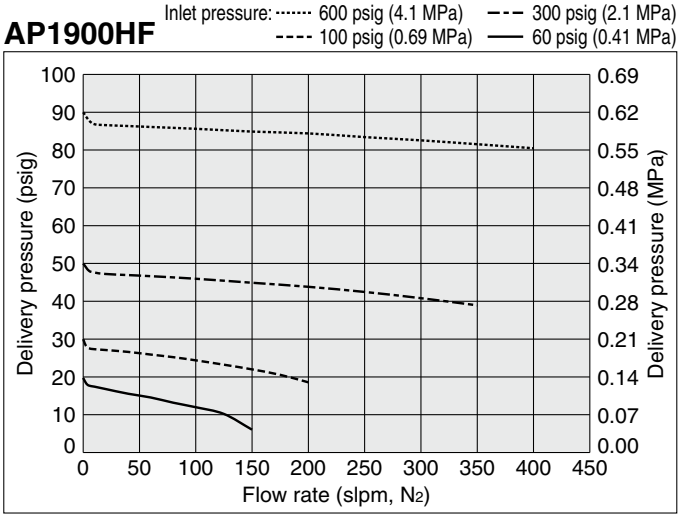
AP1900



AP1900



AP1900HF



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Intermediate flow (Tied-diaphragm)

Series AP1400T

- **For UHP gas delivery**
- **High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity: to 400 slpm**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals standard**
- **Sub-atmospheric pressure delivery option**
- **Tied-diaphragm design**

RoHS

How to Order

Port Number ① ② ③ ④

AP14 [02] T [S] [ ] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
	Sub-atmospheric(A):100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	316L SS
SH				Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Range options *1)

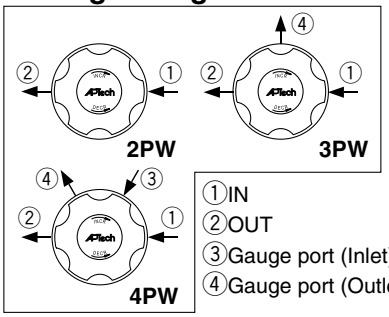
Code	Range
No code	Standard
A	Sub-atmospheric

*1) Only available with AP1402T.

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge *2)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa
40	0 to 4000 psig	0 to 28 MPa

*2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④	
AP1410T	2PW FV4	FV4			
	3PW FV4	FV4		0	
	3PW FV4	FV4		1	MPA
	4PW FV4	FV4	40	1	MPA
	4PW FV4	FV4	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation *6)
SC	Short type *7)

*6) Panel mounting hole: 1.56 inch (39.6 mm).
*7) Bonnet port is not threaded. SC option not available with 1402TA option.

Option

Code	Specification
No code	Standard
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *5)

*5) Not available with AP1402T and AP1406T.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *4)

*4) Not available with SH material.

Pressure gauge unit *3)

Code	Unit
No code	psig/bar
MPA	MPa

*3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP1402T□□A	AP1402T	AP1406T	AP1410T	AP1415T
Delivery pressure		100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) *1)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 300 psig (2.1 MPa)	Vacuum to 2300 psig(15.9 MPa)			
Proof pressure (Inlet)		4000 psig (27.6 MPa)				
Burst pressure		8000 psig (55.2 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) *2)				
Cv		0.45				
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s *3)				
Across the seat leak		4×10^{-9} Pa·m³/s *4)				
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)			
Connections		Face seal, Tube weld				
Bonnet port		NPT 1/8 inch *5)				
Supply pressure effect		1.6 psig(0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		1.06 in³ (17.4 cm³)				
Weight		2.04 kg *6)				

*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 2300 psig (15.9 MPa), achievable delivery pressure is around 129 psig (0.89 MPa).
*2) Max. 90°C for Polyimide seat.
*3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
*4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
*5) On panel mount option, bonnet port is not threaded.
*6) Weight, including individual boxed weight, may vary depending on connections or options.

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AP1410T	AP1415T
HR	**Source pressure**	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

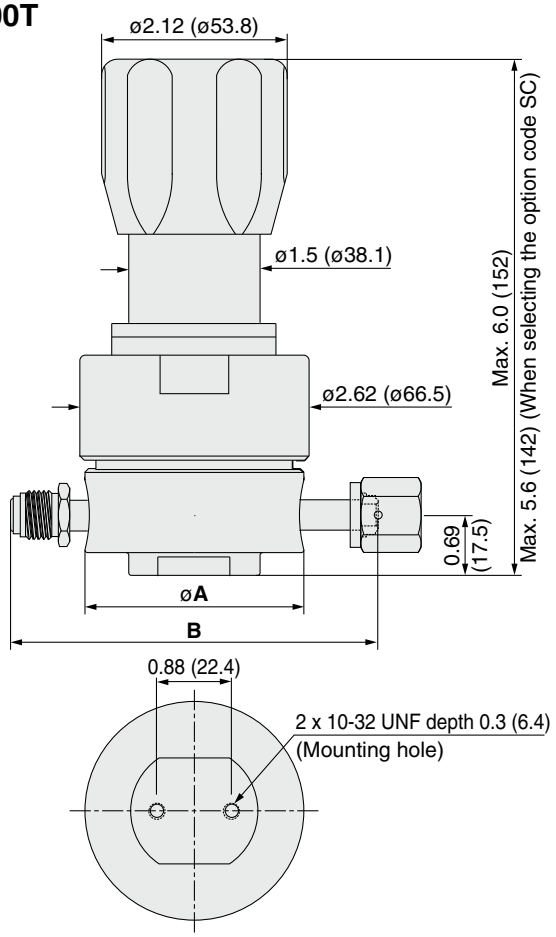
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	Ni-Cr-Mo alloy	
Diaphragm	Ni-Cr-Mo alloy	
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

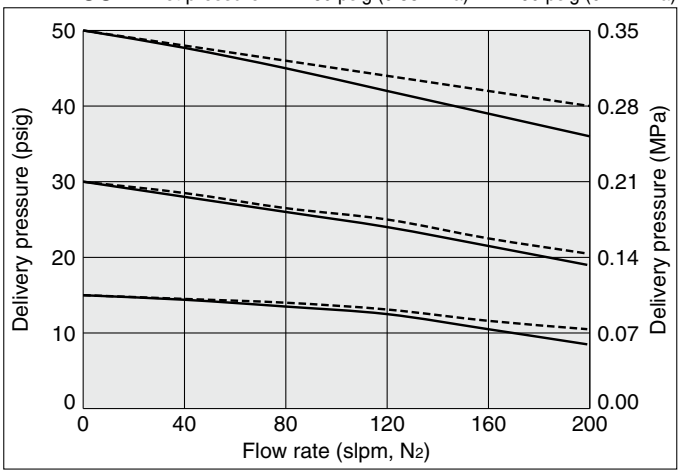
AP1400T



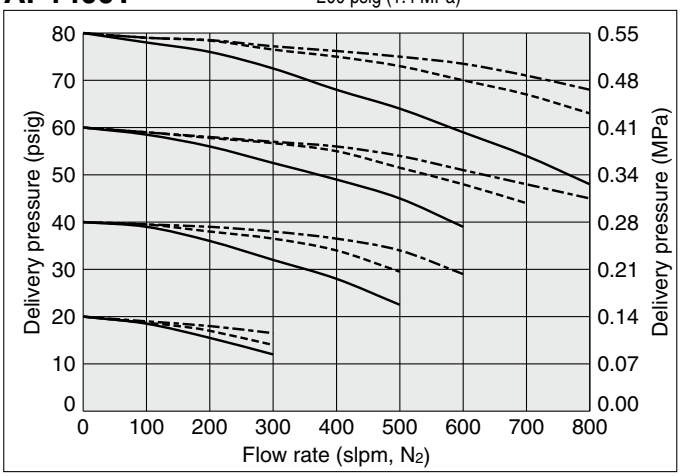
Connections	A		B	
	inch	(mm)	inch	(mm)
FV4	2.00	(50.8)	3.70	(94.0)
MV4			4.00	(101.6)
TW4			3.46	(87.9)
FV6	2.50	(63.5)	5.22	(132.6)
MV6				
TW6			4.00	(101.6)
FV8			5.22	(132.6)
MV8				
TW8			4.34	(110.2)

Flow Characteristics

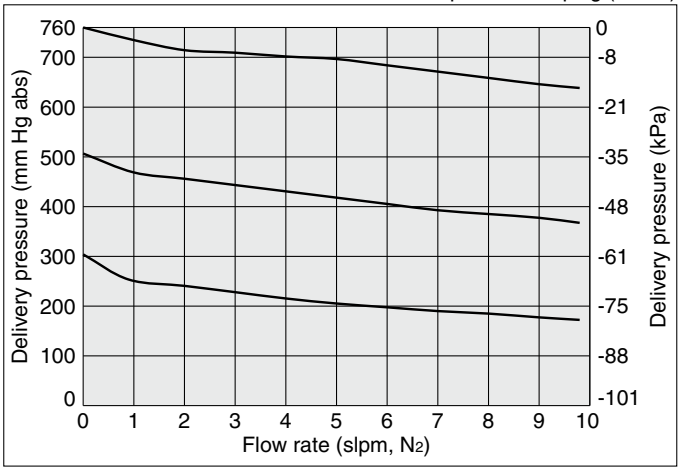
AP1400T Inlet pressure: ---- 80 psig (0.55 MPa) —— 60 psig (0.41 MPa)



AP1400T Inlet pressure: ---- 2000 psig (13.8 MPa) ---- 600 psig (4.1 MPa) —— 200 psig (1.4 MPa)



AP1402TA Inlet pressure: 0 psig (0 kPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

High flow (Tied-diaphragm)

Series AP1200

- For UHP gas delivery
- High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)
  HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity Standard: to 800 slpm
  HF (option): to 1000 slpm
  FC (option): to 1500 slpm
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④

AP12 [02] [S] [ ] [2PW] [FV8] [FV8] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)
25	Preset to 250 psig (1.7 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	Ni-Cr-Mo alloy	316L SS
SHP		Ni-Cr-Mo alloy		Ni-Cr-Mo alloy
SH				

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female) ∗1)
MV12	3/4 inch face seal (Male) ∗1)
TW12	3/4 inch tube weld

∗1) Prepare a suitable mating fitting with a rated pressure.

Pressure gauge unit ∗3)

Code	Unit
No code	psig/bar
MPA	MPa

∗3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗7)
SC	Short type ∗8)

∗7) Panel mounting hole: dia. 1.56 inch (39.6 mm).

∗8) Bonnet port is not threaded. SC option not available with FC or HR option.

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1)
FC	Force compensation (Cv: 0.65) ∗5)∗6)
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) ∗5)

∗5) FC and HR options are not available with AP1202, AP1206 and AP1225.

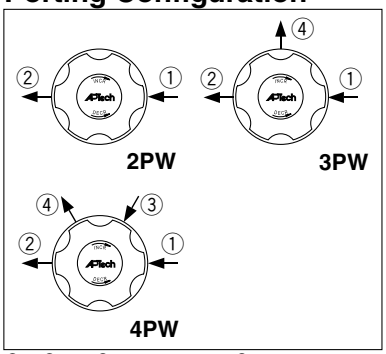
∗6) FC option is available with connection size 1/2 or 3/4 inch.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗4)

∗4) Not available with SHP and SH materials.

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗2)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④	
AP1210S	2PW	FV8	FV8		
	3PW	FV8	FV8		0
	3PW	FV8	FV8		1 MPA
	4PW	FV8	FV8	40	1 MPA
	4PW	FV8	FV8	0	0

Specifications

Operating Parameters		AP1202	AP1206	AP1210	AP1215	AP1225
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) ∗1)	Preset to 250 psig (1.7 MPa) ∗2)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 1700 psig (11.7 MPa)				
Proof pressure (Inlet)		2550 psig (17.6 MPa)				
Burst pressure		8000 psig (55.2 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗3)				
Cv		0.65				
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗4)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗5)				
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)				
Connections		Face seal, Tube weld				
Bonnet port		NPT 1/8 inch ∗6)				
Supply pressure effect		3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		1.07 in³ (17.6 cm³)				
Weight		2.0 kg ∗7)				

∗1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 1700 psig (11.7 MPa), achievable delivery pressure is around 125 psig (0.86 MPa) (HF and FC option 120 psig (0.83 MPa)).

∗2) 250 psig outlet pressure preset at 800 psig (5.5MPa) inlet pressure. Custom inlet/outlet pressure settings available. Please contact SMC.

∗3) Max. 90°C for Polyimide seat.

∗4) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

∗5) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

∗6) On panel mount option, bonnet port is not threaded.

∗7) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Options

1. High flow
Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP1202	AP1206	AP1210	AP1215	AP1225
HF	Cv	1.1				
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

2. Force compensation
Force compensation feature added to HF option and has wider flow capacity than HF option. Changes from the standard type are:

Option	Other Parameters	AP1210	AP1215
FC	Source pressure	Vacuum to 300 psig (2.1 MPa)	
	Cv	0.65	
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop	
	Connections	1/2, 3/4 inch face seal, 1/2, 3/4 inch tube weld	

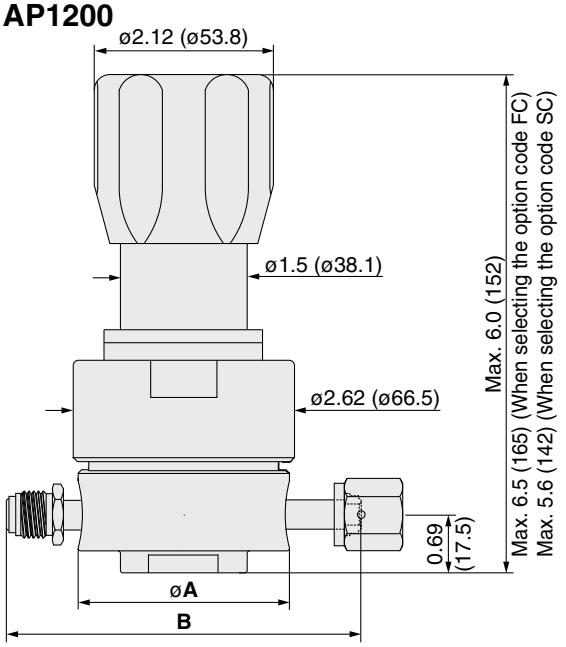
3. High inlet pressure
Changes from the standard type are:

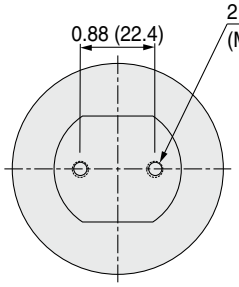
Option	Other Parameters	AP1210	AP1215
HR	Source pressure	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

Dimensions

inch (mm)

AP1200





Connections	A inch	A (mm)	B inch	B (mm)
FV4	2.00	(50.8)	3.70	(94.0)
MV4			4.00	(101.6)
TW4			3.46	(87.9)
FV6	2.50	(63.5)	5.22	(132.6)
MV6				
TW6			4.00	(101.6)
FV8			5.22	(132.6)
MV8				
TW8			4.34	(110.2)
FV12			6.26	(159.0)
MV12				
TW12			5.00	(127.0)

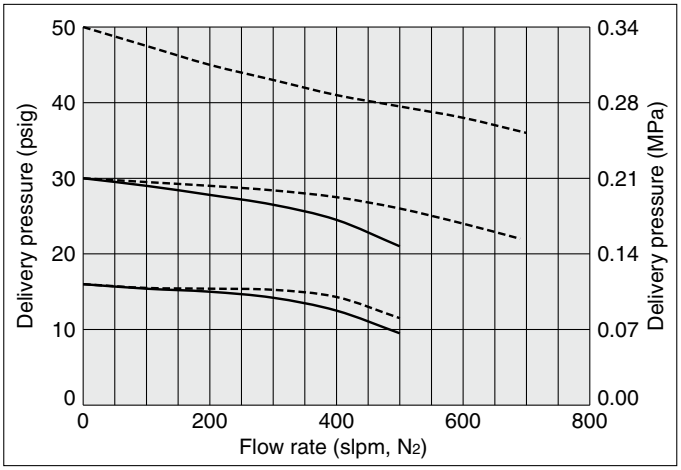
Wetted Parts Material

Wetted Parts	S	SHP	SH
Body	316L SS secondary remelt		
Surface finish	Electropolish + Passivation		
Poppet	316L SS	Ni-Cr-Mo alloy	
Diaphragm	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE	

Flow Characteristics

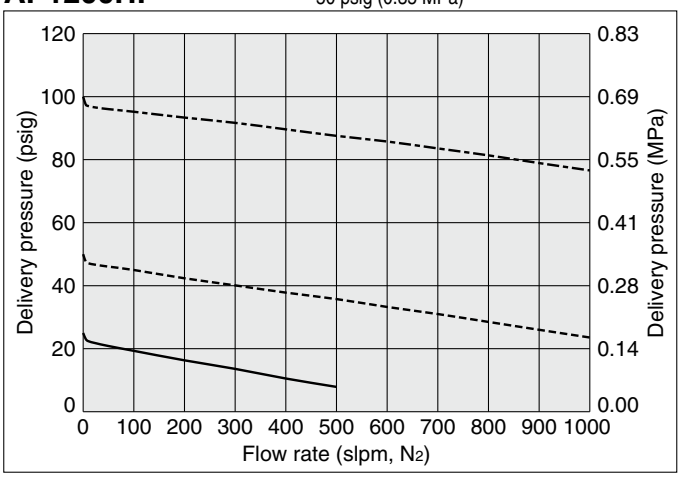
AP1200

Inlet pressure: ---- 80 psig (0.55 MPa) —— 60 psig (0.41 MPa)
1/2 inch connections *)



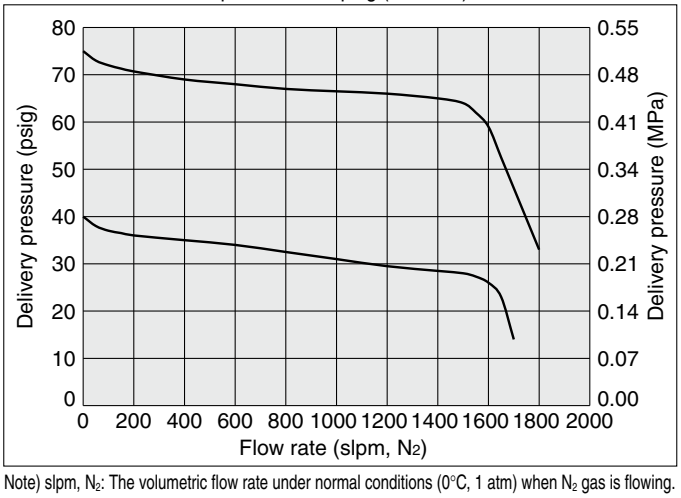
AP1200HF

Inlet pressure: ---- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)
—— 50 psig (0.35 MPa)



AP1200FC

Inlet pressure:150 psig (1.0 MPa) 3/4 inch connections *)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Delivery of sub-atmospheric pressure

Series AP1100

- **For UHP gas delivery**
- **Sub-atmospheric to low positive pressure delivery**
- **Flow capacity: to 0.5 slpm**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

AP11 01 S □ 2PW FV4 FV4 □ □ □ □ □

Port Number: ① ② ③ ④

Delivery pressure

Code	Delivery pressure
01	100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	
SH				Ni-Cr-Mo alloy
H	Ni-Cr-Mo alloy			

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Seat material

Code	Material
No code	PCTFE (Standard)
TF	PTFE ∗3)

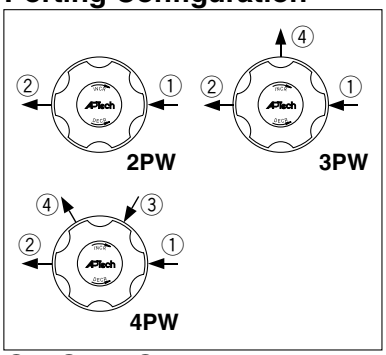
∗3) PTFE recommended for applications such as within a process tool.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Sample Order Number

	Port ①	②	③	④		
AP1101S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	V3	V3	MPA
	4PW	FV4	FV4	0	0	

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa

∗1) Other range available. Refer to gauge guide (P.115). Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Specifications

Operating Parameters		AP1101
Delivery pressure		100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 300 psig (2.1 MPa)
Proof pressure (Inlet)		500 psig (3.4 MPa)
Burst pressure		8000 psig (55.2 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing)
Cv		0.05
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)
Across the seat leak		4×10^{-9} Pa·m³/s ∗1)
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)
Connections		Face seal, Tube weld
Bonnet port		NPT 1/8 inch ∗2)
Installation		Bottom mount (Option: panel mount)
Internal volume		0.49 in³ (8 cm³)
Weight		1.25 kg ∗3)

∗1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).
∗2) On panel mount option, bonnet port is not threaded.
∗3) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

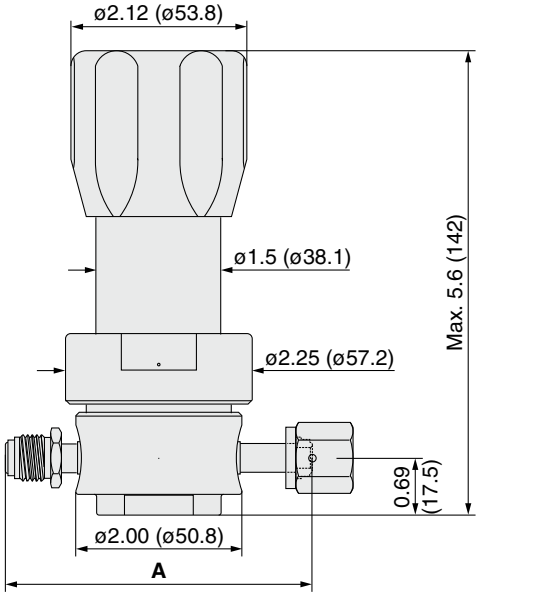
Wetted Parts Material

Wetted Parts	S	SHP	SH	H
Body	316L SS secondary remelt			Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation			Electropolish
Poppet	316L SS	Ni-Cr-Mo alloy		
Diaphragm	316L SS	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy	
Seat	PCTFE (Option: PTFE)			

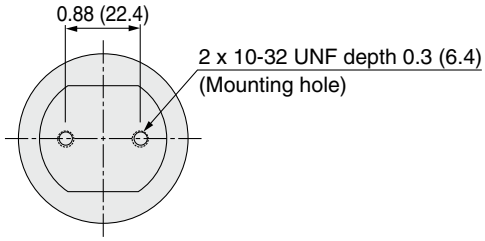
Dimensions

inch (mm)

AP1100



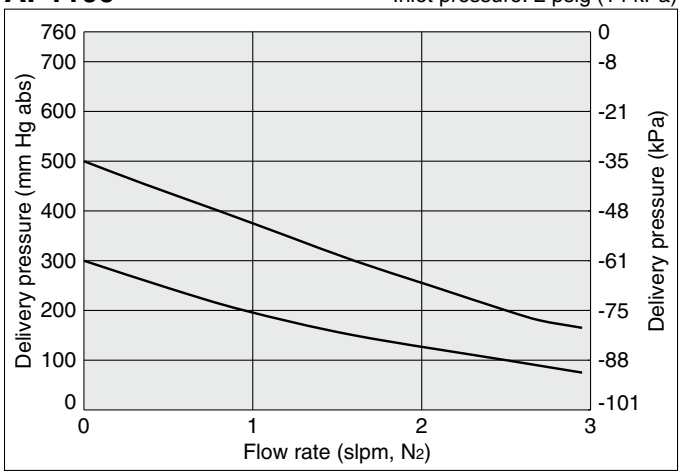
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)



Flow Characteristics

AP1100

Inlet pressure: 2 psig (14 kPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Two Stage Regulator for Ultra High Purity

Low flow (Tied-diaphragm)

Series AP1700

- **For UHP gas delivery**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Minimizes supply pressure effect by two stage regulation**
- **Tied-diaphragm design**

RoHS

How to Order

Port Number ① ② ③ ④

AP17 [02] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SH	secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

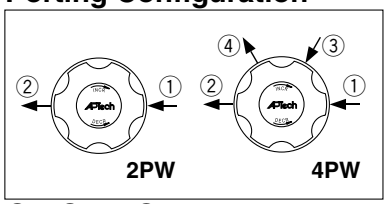
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port	①	②	③	④	
AP1702S	2PW	FV4	FV4			
	4PW	FV4	FV4	0	0	
	4PW	FV4	FV4	40	V3	MPA

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia.1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP1702	AP1706	AP1710
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas		
Source pressure		Vacuum to 3500 psig (24.1 MPa)		
First stage pressure		175 psig (1.2 MPa)		
Proof pressure (Inlet)		4000 psig (27.6 MPa)		
Burst pressure		8000 psig (55.2 MPa)		
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)		
Cv		0.05		
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s		
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)		
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)		
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)	
Connections		Face seal, Tube weld		
Bonnet port		NPT 1/8 inch ∗4)		
Supply pressure effect		0.05 psig (0.00035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop		
Installation		Option: panel mount		
Internal volume		0.92 in³ (15.1 cm³)		
Weight		2.04 kg ∗5)		

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

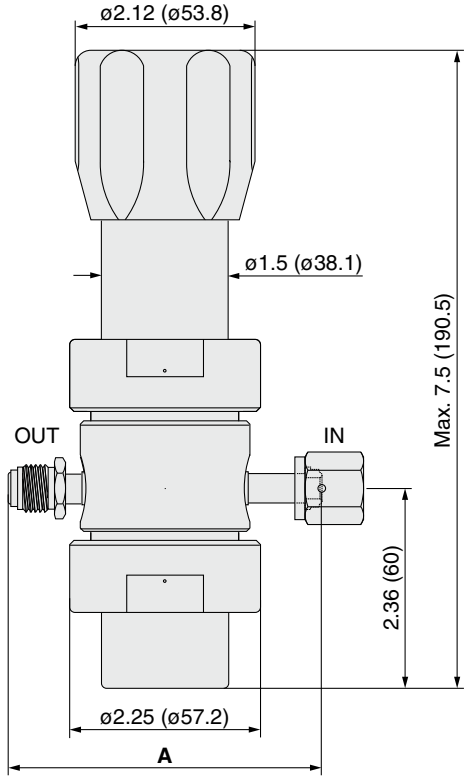
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

AP1700

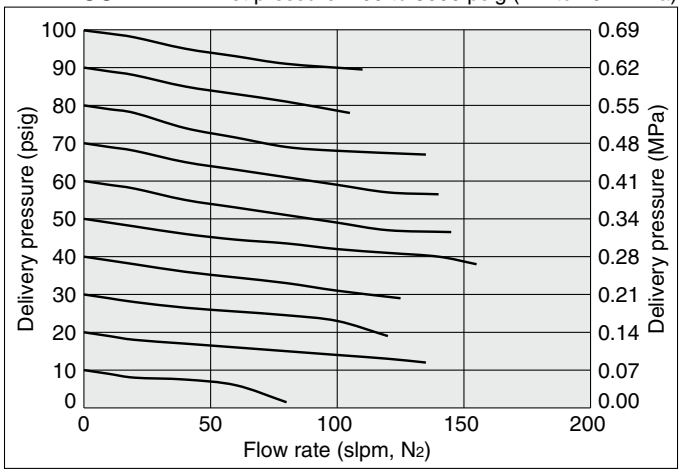


Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

AP1700

Inlet pressure: 200 to 3000 psig (1.4 to 20.7 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Two Stage Regulator for Ultra High Purity

Intermediate flow (Tied-diaphragm)

Series AP2700

- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity to 150 slpm (NF_3) to 900 slpm (H_2)
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Minimizes supply pressure effect by two stage regulation
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④

AP27 [02] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
12	3 to 120 psig (0.021 to 0.8 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	316L SS/ Ni-Cr-Mo alloy	316L SS
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Ports

Code	Ports
2PW	2 ports
3PWQ	3 ports (1 pressure monitor port (MP))
4PW	4 ports
5PWQ	5 ports (1 pressure monitor port (MP))

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

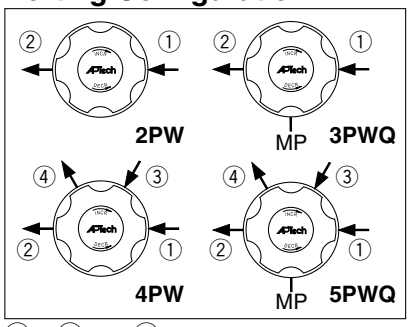
∗3) Not available with SH material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet) MP=Monitoring gauge port

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port			③	④	
AP2702S	2PW	FV4	FV4			
	3PWQ	FV4	FV4			
	4PW	FV4	FV4	40	V3	MPA
	5PWQ	FV4	FV4	40	V3	MPA

Specifications

Operating Parameters		AP2702	AP2706	AP2710	AP2712
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	3 to 120 psig (0.021 to 0.8 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 3500 psig (24.1 MPa)			
First stage pressure		200 psig (1.4 MPa)			
Proof pressure (Inlet)		4000 psig (27.6 MPa)			
Burst pressure		8000 psig (55.2 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.105			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)			
Surface finish		Ra max 15 μin. (0.4 μm)	Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)		
Connections		Face seal, Tube weld			
Bonnet port		NPT 1/8 inch ∗4)			
Supply pressure effect		0.01 psig (0.00007 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Option: panel mount			
Internal volume		1.87 in³ (30.6 cm³)			
Weight		2.27 kg ∗5)			

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

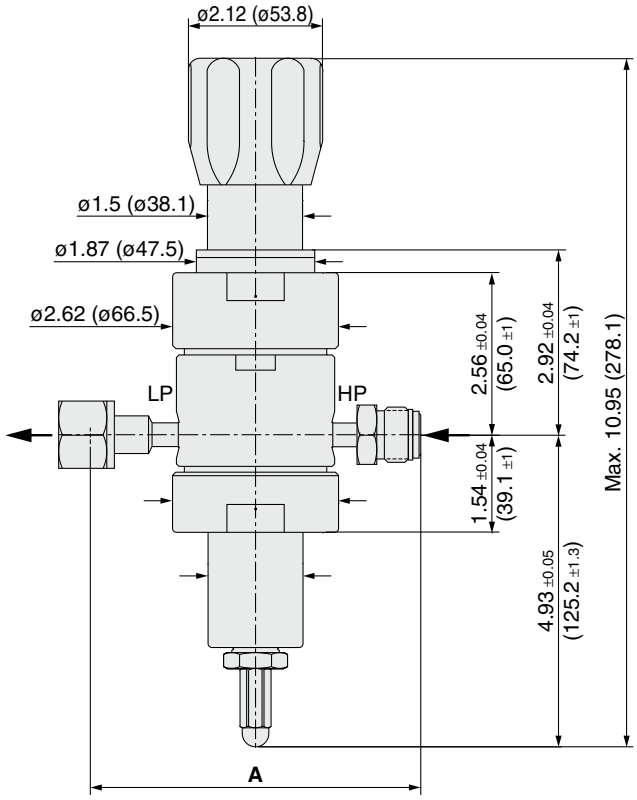
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS/Ni-Cr-Mo alloy	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

AP2700

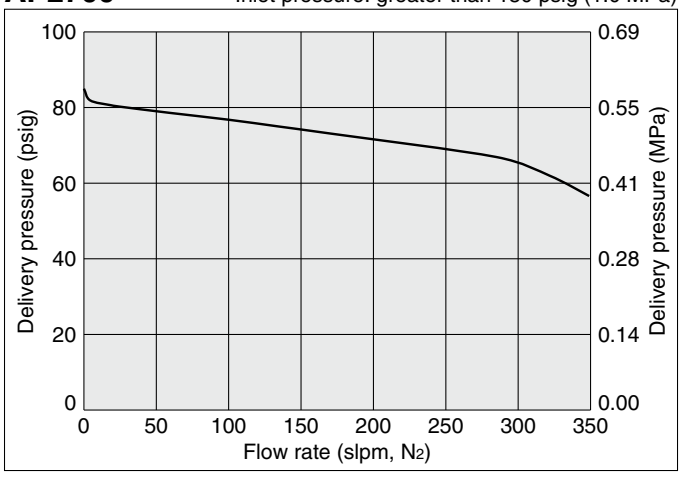


Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
TW4	3.46	(87.9)
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)

Flow Characteristics

AP2700

Inlet pressure: greater than 150 psig (1.0 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Series AP9000 & 9100

- For UHP gas delivery
- Inlet pressure AP9000: Max. 1700 psig (11.7 MPa)
  AP9100: Max. 800 psig (5.5 MPa)
- Flow capacity AP9000: to 2000 slpm
  AP9100: to 5000 slpm
- Body material: 316L SS
- Tied-diaphragm design

RoHS

How to Order

AP9 [0] [10] [S] [ ] [2PW] [FV16] [FV16] [ ] [ ] [ ]

Port Number: ① ② ③

Size

Code	Cv
0	3
1	4

Delivery pressure

Code	Delivery pressure	Size 0	Size 1
10	5 to 100 psig (0.034 to 0.7 MPa)	●	●
15	5 to 150 psig (0.034 to 1.0 MPa)		●
30	Preset to 300 psig (2.1 MPa)	●	

Material

Code	Material
S	316L SS

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm)
M	10 μin. (0.25 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female)
MV12	3/4 inch face seal (Male)
TW12	3/4 inch tube weld
FV16	1 inch face seal (Female)
MV16	1 inch face seal (Male)
TW16	1 inch tube weld

Sample Order Number

	Port ①	②	③		
AP9010S	2PW	FV16	FV16		
	3PW	FV16	FV16	H	MPA

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Pressure gauge unit *2)

Code	Unit
No code	psig/bar
MPA	MPa

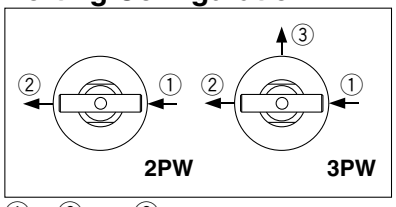
*2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Gauge ports (Outlet③)

Code	Pressure gauge*1) psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
4	0 to 400 psig	0 to 3 MPa

*1) Refer to gauge guide (P.115) for gauge specifications.
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Porting Configuration



①IN ②OUT ③Gauge port (Outlet)

Specifications

Operating Parameters		AP9010	AP9030	AP9110	AP9115
Delivery pressure		5 to 100 psig (0.034 to 0.7 MPa)	Preset to 300 psig (2.1 MPa) *1)	5 to 100 psig (0.034 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 250 psig or less)*5)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 1700 psig (11.7 MPa)		Vacuum to 800 psig (5.5 MPa)	
Proof pressure (Inlet)		2550 psig (17.6 MPa)			
Burst pressure		6800 psig (46.9 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) *2)			
Cv		3.0		4.0	
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s *3)			
Across the seat leak		4×10^{-9} Pa·m³/s *3)			
Surface finish		Ra max 15 μin (0.4 μm) or 10 μin (0.25 μm)			
Connections		Face seal, Tube weld			
Bonnet port		NPT 1/8 inch			
Supply pressure effect		3.7 psig (0.026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop		5.4 psig (0.038 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop	
Internal volume		12 in³ (197 cm³)			
Weight		5.9 kg *4)			

*1) At 800 psig (5.5 MPa) inlet pressure. Optional preset pressure available. Please contact SMC.
*2) Max. 90°C for Polyimide seat.
*3) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).
*4) Weight, including individual boxed weight, may vary depending on connections or options.
*5) Source pressure above 250 psig (1.7 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 800 psig (5.5 MPa), achievable delivery pressure is around 119 psig (0.82 MPa).

Wetted Parts Material

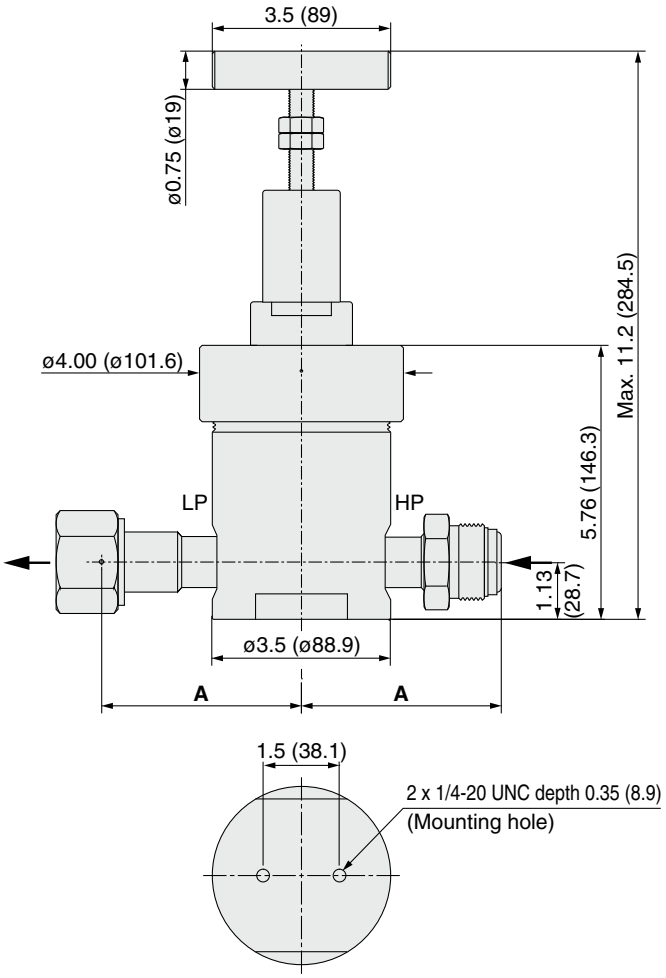
Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Poppet	Ni-Cr-Mo alloy
Bellows	Ni-Cr-Mo alloy
Nozzle	316L SS
Seat	PCTFE (Option: Polyimide)
Poppet spring	Ni-Co alloy
Bonnet seal	Nickel 200 *) (Silver plated)

*) 316 SS silver plated for AP9030

Dimensions

inch (mm)

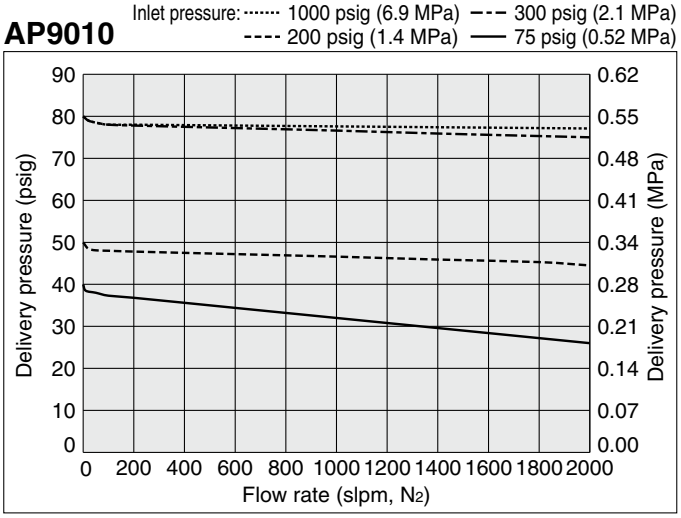
AP9000 & 9100



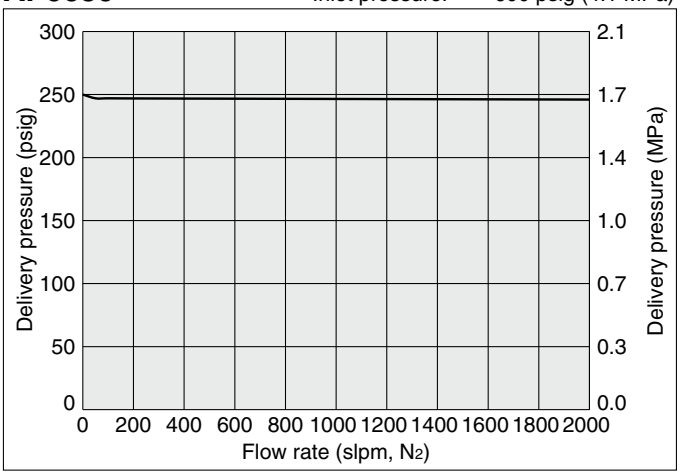
Connections	A	
	inch	(mm)
FV8	3.11	(79.0)
MV8		
TW8	4.75	(120.7)
FV12	3.64	(92.5)
MV12		
TW12	4.75	(120.7)
FV16	3.92	(99.6)
MV16		
TW16	4.75	(120.7)

Flow Characteristics

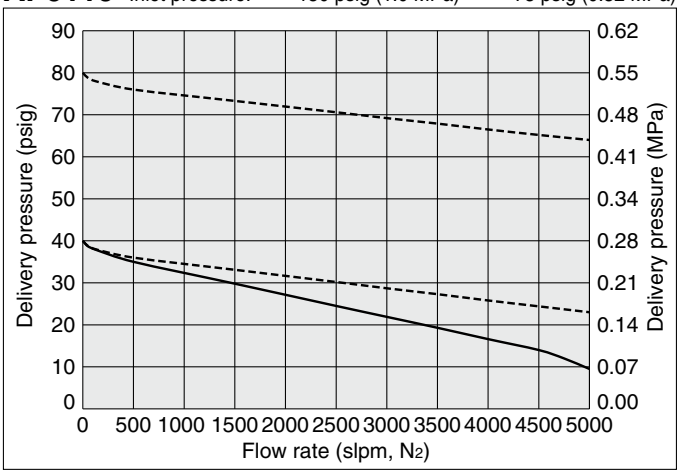
AP9010



AP9030



AP9110



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Compact Regulator for Ultra High Purity

Series SL5200

- **For UHP gas delivery**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 130 slpm
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Sub-atmospheric pressure delivery option**
- **Springless design (No poppet spring in the wetted area)**

RoHS

How to Order

Port Number ① ② ③

SL52 [02] [S] [M] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
01	0.5 to 10 psig (0.0034 to 0.07 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)
02	0.5 to 30 psig (0.0034 to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	1 to 100 psig (0.007 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS secondary remelt	316L SS	316L SS
SH		Ni-Cr-Mo alloy	

Surface finish

Code	Surface finish Ra max
M	10 µin. (0.25 µm) Standard
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Range options ∗1)

Code	Specification
No code	Standard
A	Sub-atmospheric

∗1) Only available with SL5201.

Ports

Code	Ports
2PW	2 ports
3PW	3 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Outlet③)

Code	Connections or Pressure gauge ∗2)		
		psig/bar unit	MPa unit
No code	No gauge port		
0	No pressure gauge	1/4 inch face seal (Male)	
FV4		1/4 inch face seal (Female)	
V3	With pressure gauge	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L		-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1		-30 in.Hg to 100 psig	-0.1 to 0.7 MPa

∗2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗4)

∗4) Not available with SH material.

Pressure gauge unit ∗3)

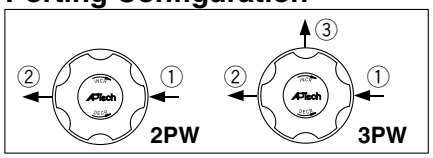
Code	Unit
No code	psig/bar
MPA	MPa

∗3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Option

Code	Specification
No code	Standard
HF	High flow

Porting Configuration



①IN ②OUT ③Gauge port(Outlet)

Specifications

Operating Parameters		SL5201□□A	SL5201	SL5202	SL5206	SL5210
Delivery pressure		100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)	0.5 to 10 psig (0.0034 to 0.07 MPa)	0.5 to 30 psig (0.0034 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	1 to 100 psig (0.007 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 150 psig (1.0 MPa)				
Proof pressure (Inlet)		500 psig (3.4 MPa)				
Burst pressure		1000 psig (6.9 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)				
Cv		0.07				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)				
Surface finish		Ra max 10 µin. (0.25 µm) Option: 7 µin. (0.18 µm), 5 µin. (0.13 µm)				
Connections		Face seal, Tube weld				
Supply pressure effect		0.20 psig (0.0014 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop				
Installation		Bottom mount				
Internal volume		0.19 in³ (3.1 cm³)				
Weight		0.45 kg ∗3)				

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 100 psig (0.7 MPa).
∗3) Weight, including individual boxed weight, may vary depending on connections or options.

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	SL5201□□A	SL5201	SL5202	SL5206	SL5210
HF	**Supply pressure effect**	0.50 psig (0.0035 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop				

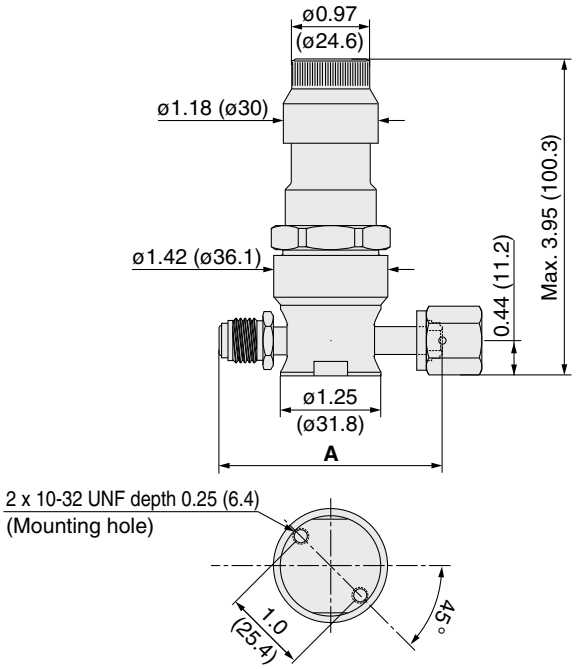
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

SL5200

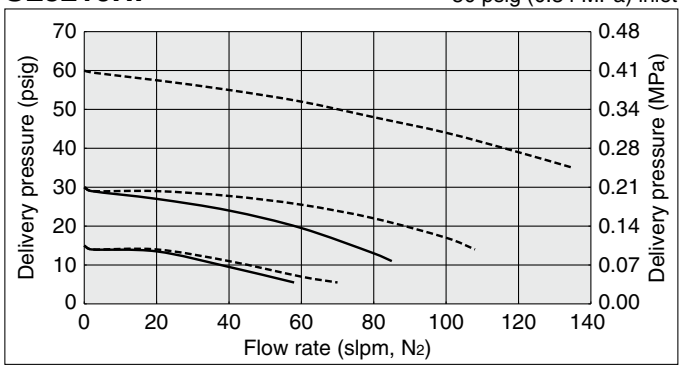


Connections	A	
	inch	(mm)
FV4	2.78	(70.6)
MV4		
TW4	2.12	(53.8)
FV6	3.86	(98.0)
MV6		
TW6	2.65	(67.3)

Flow Characteristics

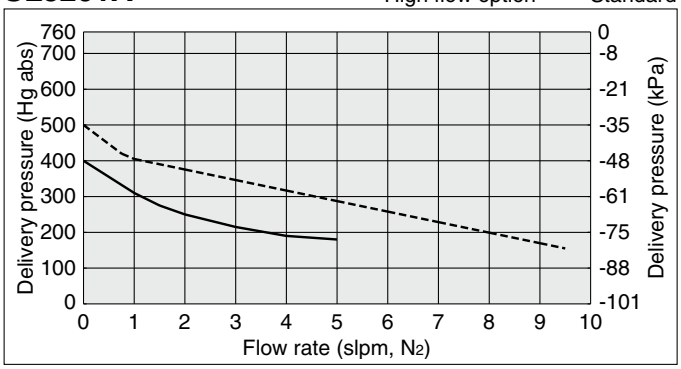
SL5210HF

Inlet pressure: ---- 100 psig (0.69 MPa) inlet
—— 50 psig (0.34 MPa) inlet



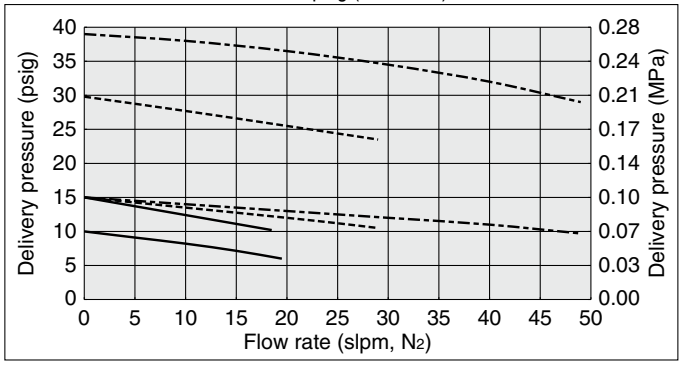
SL5201A

Inlet pressure: 2 psig (14 kPa)
---- High flow option —— Standard



SL5210

Inlet pressure: - - - 100 psig (0.69 MPa) ---- 60 psig (0.41 MPa)
—— 30 psig (0.21 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Low flow

Series SL5500

- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity to 30 slpm
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Sub-atmospheric pressure delivery option
- Springless design (No poppet spring in the wetted area)

RoHS

How to Order

Port Number ① ② ③ ④

SL55 | 02 | S | M | | 2PW | FV4 | FV4 | | | | | | |

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS secondary remelt	316L SS	316L SS
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Surface finish

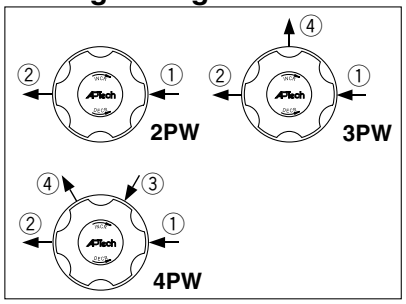
Code	Surface finish Ra max
M	10 µin. (0.25 µm) Standard
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Range options ∗1)

Code	Specification
No code	Standard
A	Sub-atmospheric

∗1) Only available with SL5502.

Porting Configuration



Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

①IN ②OUT
③Gauge port (Inlet)
④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗2)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port	③	④	
SL55 ∗∗∗∗	2PW ∗∗			
	3PW ∗∗		0	
	3PW ∗∗		1	MPA
	4PW ∗∗	0	0	
	4PW ∗∗	40	1	MPA

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗5)

∗5) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗4)

∗4) Not available with SH material.

Pressure gauge unit ∗3)

Code	Unit
No code	psig/bar
MPA	MPa

∗3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		SL5502□□A	SL5502	SL5506	SL5510
Delivery pressure		100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 3500 psig (24.1 MPa)			
Proof pressure (Inlet)		5000 psig (34.5 MPa)			
Burst pressure		10000 psig (69 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.09			
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)			
Surface finish		Ra max 10 µin. (0.25 µm) Option: 7 µin. (0.18 µm), 5 µin. (0.13 µm)			
Bonnet port		NPT 1/8 inch ∗4)			
Supply pressure effect		0.25 psig (0.0017 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.55 in³ (9 cm³)			
Weight		1.63 kg ∗5)			

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

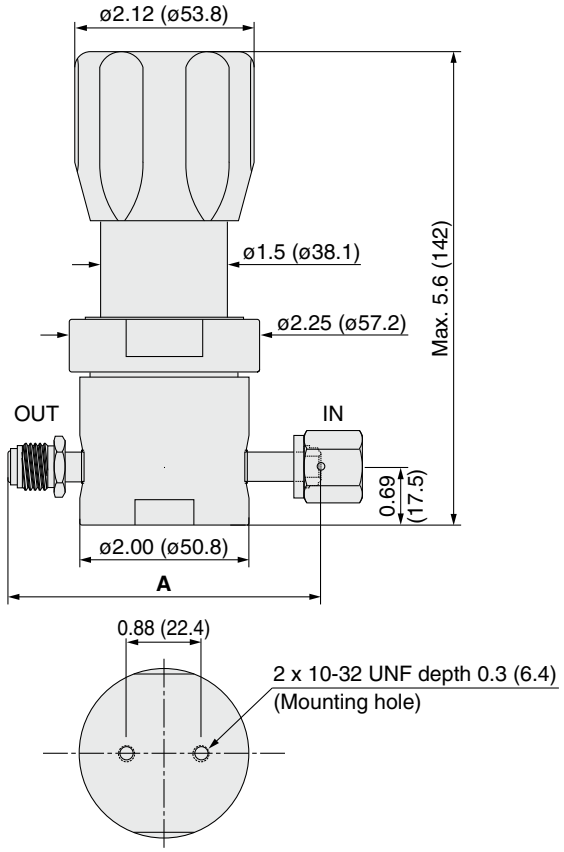
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

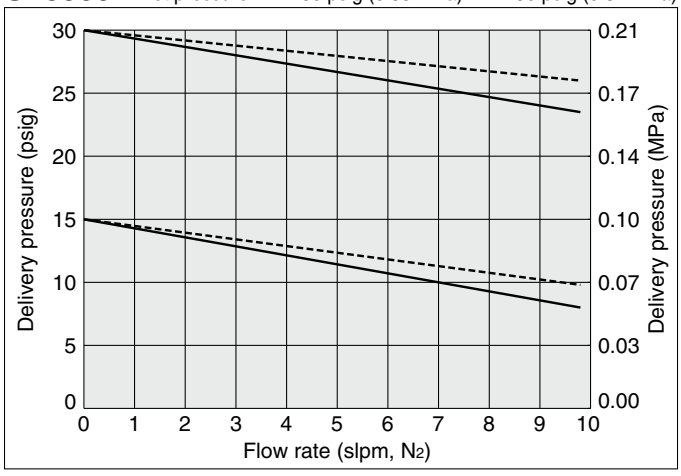
SL5500



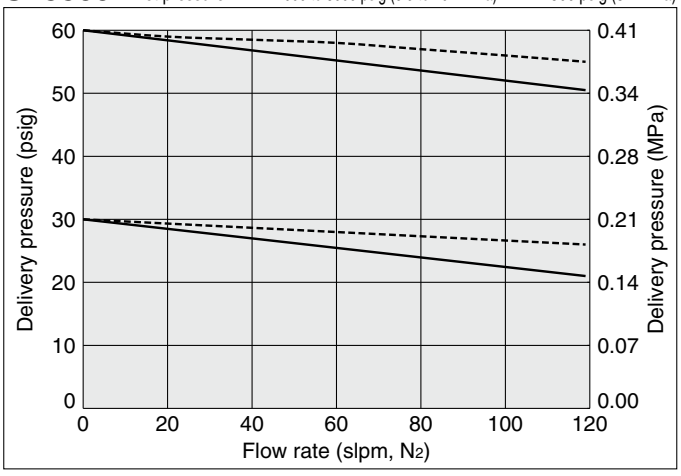
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

SL5500 Inlet pressure: ---- 80 psig (0.55 MPa) —— 50 psig (0.34 MPa)



SL5500 Inlet pressure: ---- 1000 to 3000 psig (6.9 to 20.7 MPa) —— 500 psig (3.4 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Intermediate flow

Series SL5400

- For UHP gas delivery
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Springless design (No poppet spring in the wetted area)

RoHS

How to Order

Port Number ① ② ③ ④

SL54 | 02 | S | M | 2PW | FV4 | FV4 | | | | | | |

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS secondary remelt	316L SS	316L SS
SH		Ni-Cr-Mo alloy	

Surface finish

Code	Surface finish Ra max
M	10 µin. (0.25 µm) Standard
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
2	0 to 200 psig	0 to 1.4 MPa
10	0 to 1000 psig	0 to 7 MPa

∗1) Other range available. Refer to gauge guide (P.115).
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Pressure gauge unit ∗2)

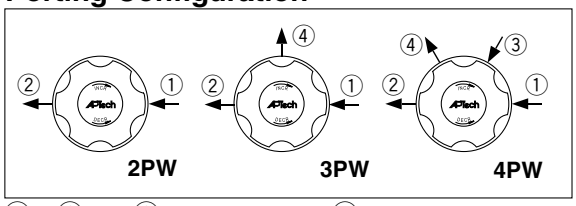
Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Sample Order Number

				Port	③	④		
SL54	∗	∗	∗	2PW	∗	∗		
				3PW	∗	∗	0	
				3PW	∗	∗	1	MPA
				4PW	∗	∗	0	0

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Specifications

Operating Parameters		SL5402	SL5406	SL5410
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas		
Source pressure		Vacuum to 1000 psig (6.9 MPa)		
Proof pressure (Inlet)		3000 psig (20.7 MPa)		
Burst pressure		6000 psig (41.4 MPa)		
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)		
Cv		0.23		
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s		
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)		
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)		
Surface finish		Ra max 10 µin. (0.25 µm) Option: 7 µin. (0.18 µm), 5 µin. (0.13 µm)		
Connections		Face seal, Tube weld		
Bonnet port		NPT 1/8 inch ∗3)		
Supply pressure effect		1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop		
Installation		Bottom mount (Option: panel mount)		
Internal volume		1.2 in³ (19.7 cm³)		
Weight		1.91 kg ∗4)		

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗3) On panel mount option, bonnet port is not threaded.
∗4) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

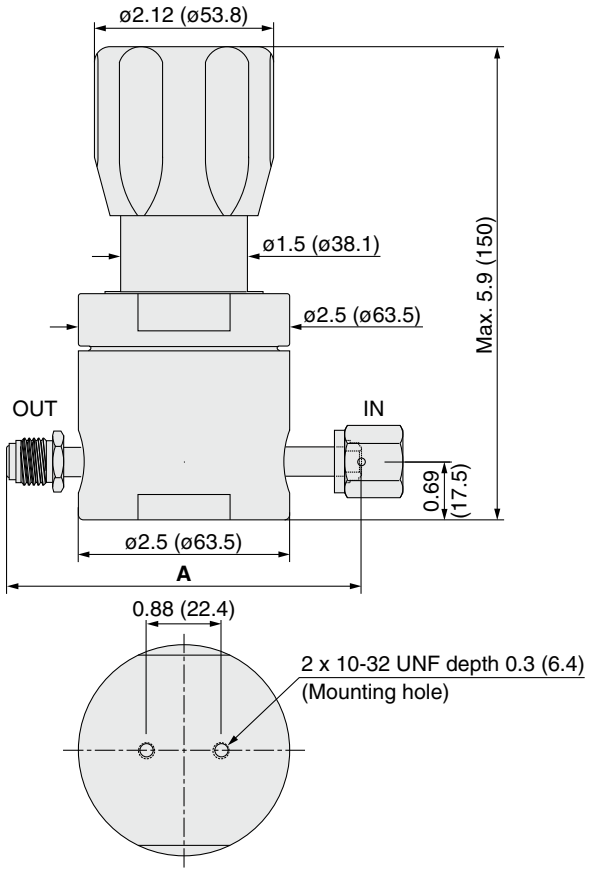
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

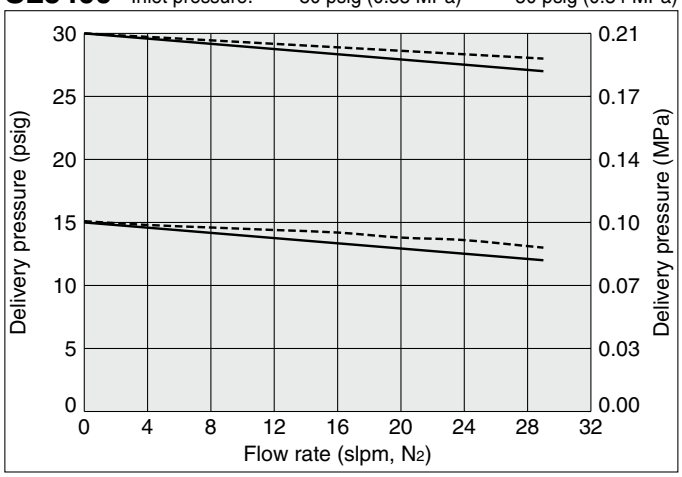
SL5400



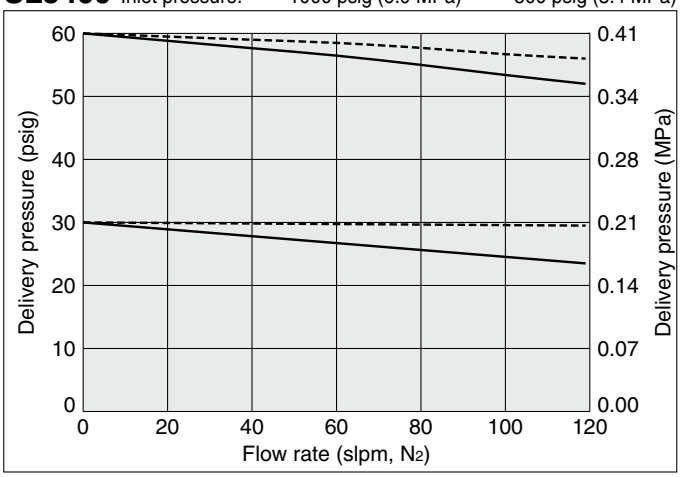
Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
TW4	3.46	(87.9)
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

SL5400 Inlet pressure: ---- 80 psig (0.55 MPa) —— 50 psig (0.34 MPa)



SL5400 Inlet pressure: ---- 1000 psig (6.9 MPa) —— 500 psig (3.4 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Intermediate flow

Series SL5800

- For UHP gas delivery
- Inlet pressure: Max. 300 psig (2.1 MPa)
- Flow capacity to 200 slpm
- Body material: 316L SS secondary remelt
- Springless design (No poppet spring in the wetted area)

RoHS

How to Order

Port Number ① ② ③ ④

SL58 | 02 | S | M | 2PW | FV4 | FV4 | | | | | |

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS secondary remelt	316L SS	316L SS

Surface finish

Code	Surface finish Ra max
M	10 µin. (0.25 µm) Standard
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa

∗1) Other range available. Refer to gauge guide (P.115). Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗3)

∗3) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

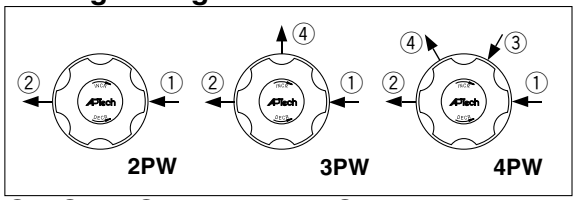
Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japan's regulation, only MPa is available in Japan.

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Sample Order Number

				Port			③	④	
SL58	∗	∗	∗	2PW	∗	∗			
				3PW	∗	∗		0	
				3PW	∗	∗		1	MPA
				4PW	∗	∗	0	0	

Specifications

Operating Parameters		SL5802	SL5806	SL5810
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)
Gas		Select compatible materials of construction for the gas		
Source pressure		Vacuum to 300 psig (2.1 MPa)		
Proof pressure (Inlet)		2000 psig (13.8 MPa)		
Burst pressure		4000 psig (27.6 MPa)		
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)		
Cv		0.4		
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s		
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)		
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)		
Surface finish		Ra max 10 µin. (0.25 µm) Option: 7 µin. (0.18 µm), 5 µin. (0.13 µm)		
Connections		Face seal, Tube weld		
Bonnet port		NPT 1/8 inch ∗4)		
Supply pressure effect		5 psig (0.035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop		
Installation		Bottom mount (Option: panel mount)		
Internal volume		1.2 in³ (19.7 cm³)		
Weight		1.91 kg ∗5)		

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).
∗3) Tested with Helium gas inlet pressure 100 psig (0.7 MPa).
∗4) On panel mount option, bonnet port is not threaded.
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

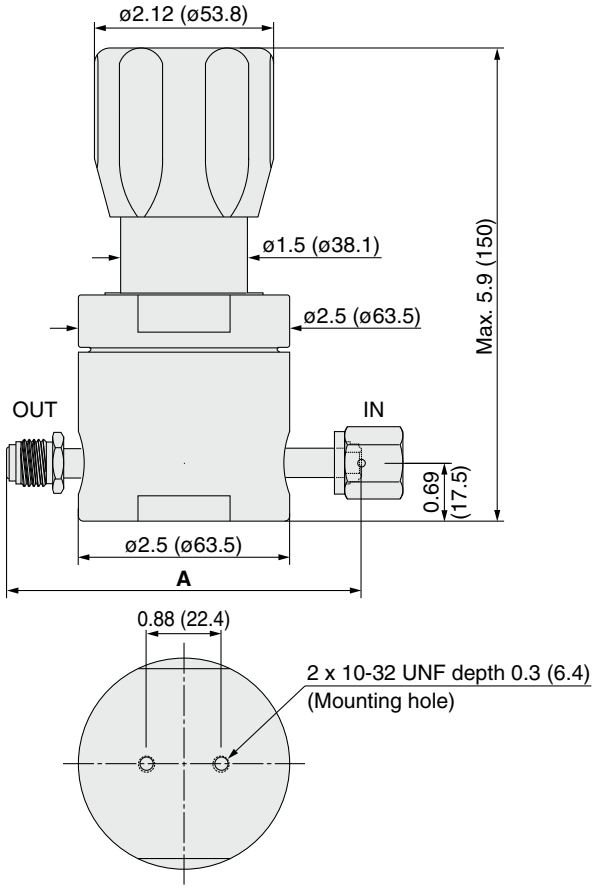
Wetted Parts Material

Wetted Parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Poppet	316L SS
Diaphragm	316L SS
Nozzle	316L SS
Seat	PCTFE (Option: Polyimide)

Dimensions

inch (mm)

SL5800

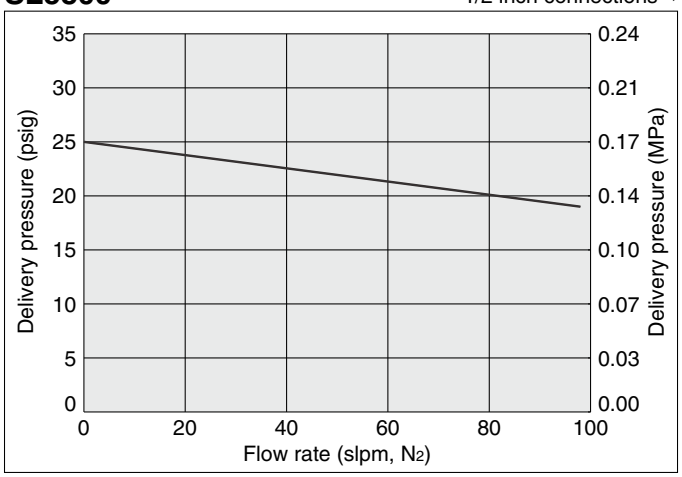


Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
TW4	3.46	(87.9)
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

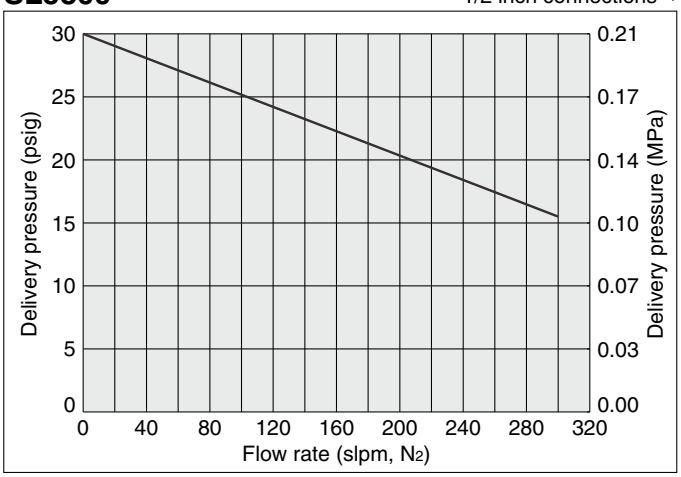
SL5800

Inlet pressure: 30 psig (0.21 MPa)
1/2 inch connections *)



SL5800

Inlet pressure: 100 psig (0.69 MPa)
1/2 inch connections *)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Low to intermediate flow

Series AZ1000

- **For UHP gas delivery**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Body material: 316L SS**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

AZ10 [01] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ] [ ]

Port Number: ① ② ③ ④

Delivery pressure

Code	Delivery pressure
01	1 to 10 psig (0.007 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	

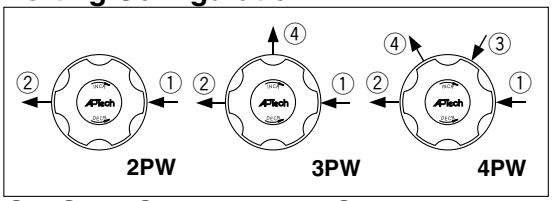
Surface finish

Code	Surface finish Ra
No code	10 μin. (0.25 μm) Standard
Q	25 μin. (0.62 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④		
AZ1001S	2PW	FV4	FV4			
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	1	V3	MPA
	4PW	FV4	FV4	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗6)
BP	Bonnet port (NPT 1/8 inch)

∗6) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15)

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
TF	PTFE ∗4) ∗5)

∗3) Not available with SHP material.
∗4) PTFE recommended for applications such as within a process tool.
∗5) Source pressure rating is limited to 300 psig (2.1 MPa) or less.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ1001	AZ1002	AZ1006	AZ1010	AZ1015
Delivery pressure		1 to 10 psig (0.007 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 300 psig (2.1 MPa)	Vacuum to 3500 psig (24.1 MPa) ∗1)			
Proof pressure (Inlet)		5000 psig (34.5 MPa)				
Burst pressure		10000 psig (69 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗2)				
Cv		0.09				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗4)				
Surface finish		Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)				
Connections		Face seal, Tube weld				
Supply pressure effect		0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		0.49 in³ (8 cm³)				
Weight		1.25 kg ∗5)				

∗1) Max. 300 psig (2.1MPa) for PTFE seat.
∗2) Max. 90°C for Polyimide seat.
∗3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AZ1001	AZ1002	AZ1006	AZ1010	AZ1015
HF	**Cv**	0.15				
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

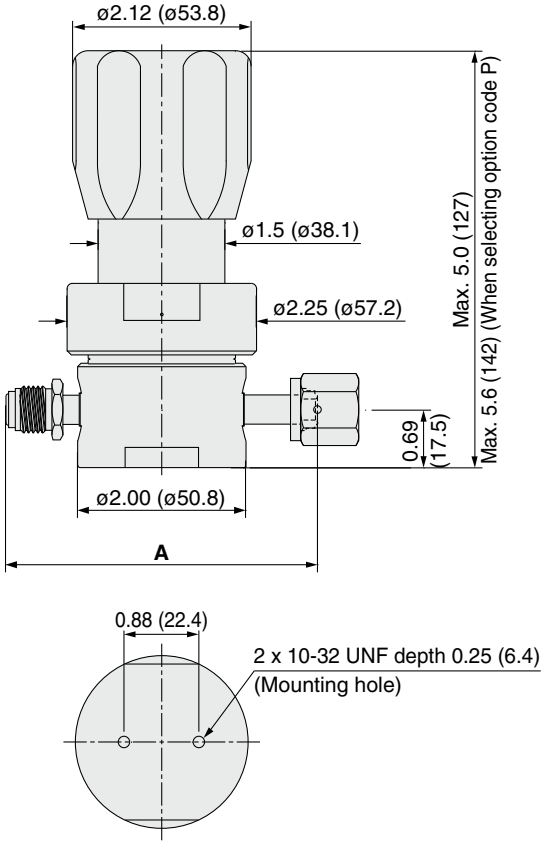
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide, PTFE)	PCTFE (Option: PTFE)

Dimensions

inch (mm)

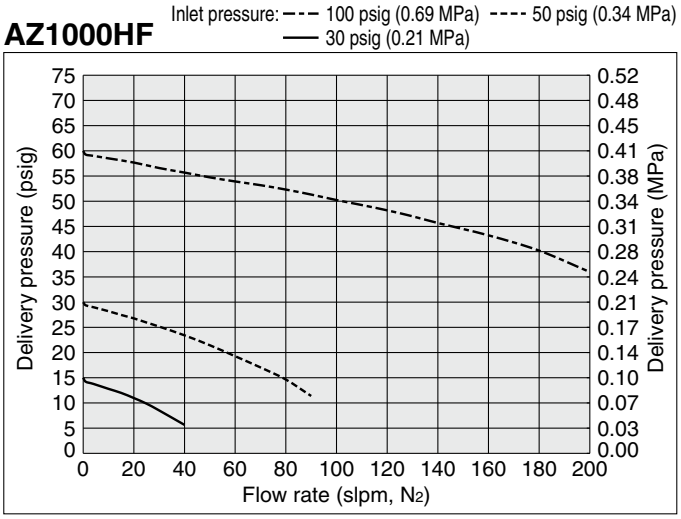
AZ1000



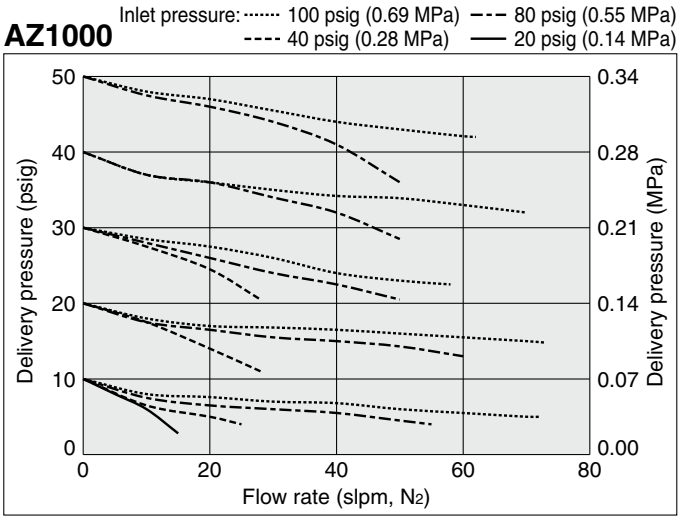
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

AZ1000HF



AZ1000



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Low flow (Tied-diaphragm)

Series AZ1500

- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Body material: 316L SS
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④

AZ15 [02] [S] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	

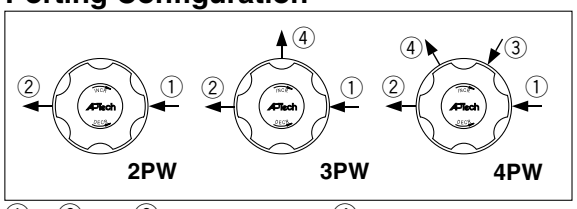
Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications.
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)
BP	Bonnet port (NPT 1/8 inch)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE(Standard)
VS	Polyimide ∗3)

∗3) Not available with SHP material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Sample Order Number

	Port ①	②	③	④		
AZ1510S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		1	MPA
	4PW	FV4	FV4	40	1	MPA
	4PW	FV4	FV4	0	0	

Specifications

Operating Parameters		AZ1502	AZ1506	AZ1510	AZ1515
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 3500 psig (24.1 MPa)			
Proof pressure (Inlet)		5000 psig (34.5 MPa)			
Burst pressure		10000 psig (69 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.09			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)			
Surface finish		Ra 10 µin.(0.25 µm) Option: 25 µin.(0.62 µm)			
Connections		Face seal, Tube weld			
Supply pressure effect		0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.51 in³ (8.4 cm³)			
Weight		1.27 kg ∗4)			

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗4) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

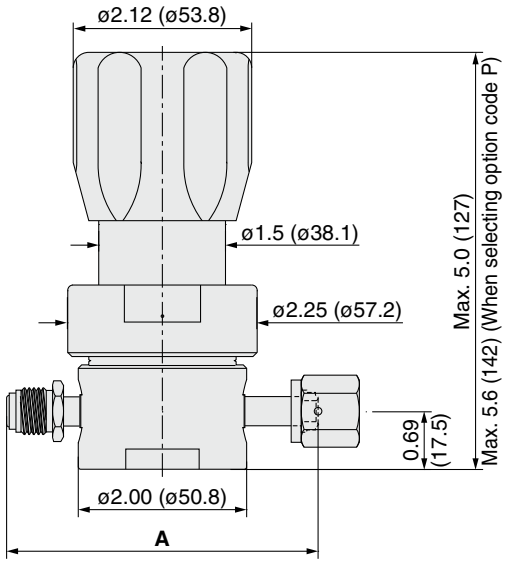
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

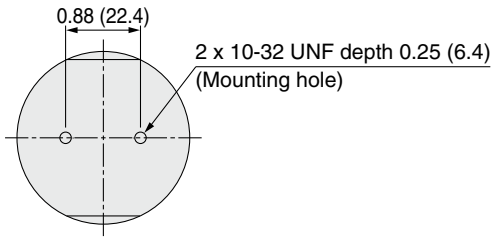
Dimensions

inch (mm)

AZ1500

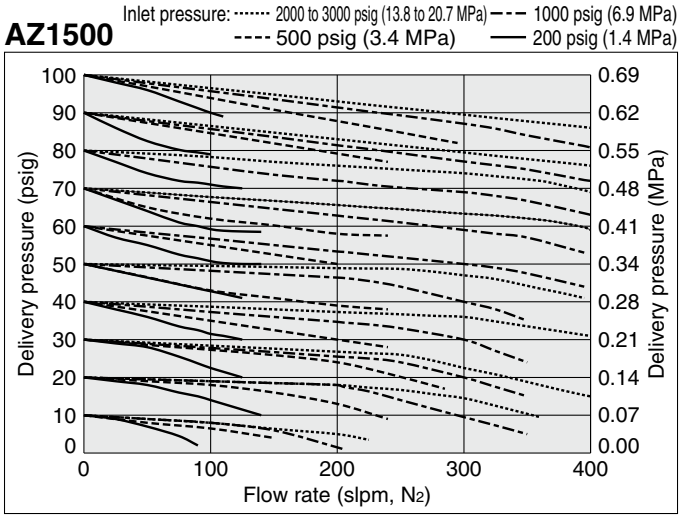


Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

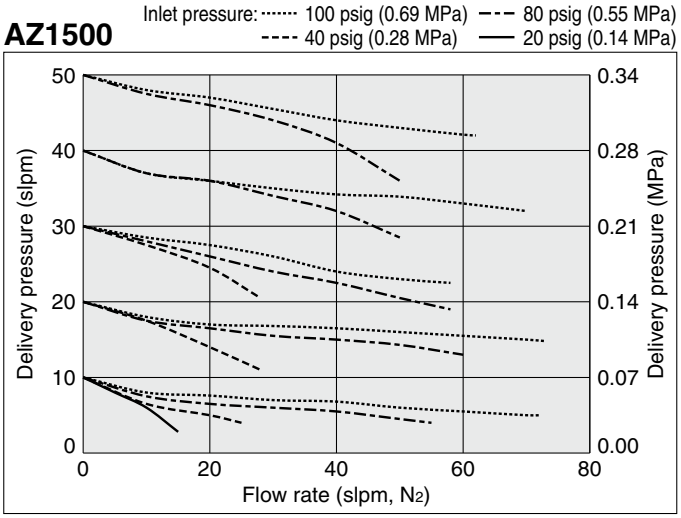


Flow Characteristics

AZ1500



AZ1500



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | Intermediate flow (Tied-diaphragm)

Series AZ1400T

- For UHP gas delivery
- High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)
  HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity to 400 slpm
- Body material: 316L SS
- Ni-Cr-Mo alloy internals standard
- Sub-atmospheric pressure delivery option
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④

AZ14 [02] T [S] [ ] [ ] [2PW] [FV4] [FV4] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Surface finish

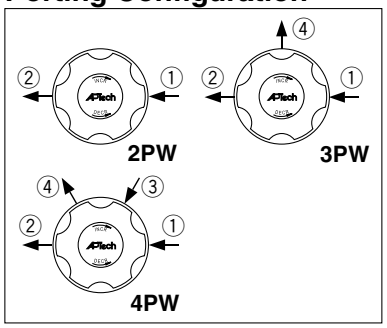
Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Range options *1)

Code	Specification
No code	Standard
A	Sub-atmospheric

*1) Only available with AZ1402T.

Porting Configuration



①IN
②OUT
③Gauge port (Inlet)
④Gauge port (Outlet)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge *2)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa
40	0 to 4000 psig	0 to 28 MPa

*2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④		
AZ1402TS	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		1	MPA
	4PW	FV4	FV4	40	1	MPA
	4PW	FV4	FV4	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation*5)
BP	Bonnet port (1/8 inch)

*5) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Option

Code	Specification
No code	Standard
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *4)

*4) Not available with AZ1402T and AZ1406T.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Pressure gauge unit *3)

Code	Unit
No code	psig/bar
MPA	MPa

*3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ1402T□□A	AZ1402T	AZ1406T	AZ1410T	AZ1415T
Delivery pressure		100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) *1)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 300 psig (2.1 MPa)	Vacuum to 2300 psig (15.9 MPa)			
Proof pressure (Inlet)		4000 psig (27.6 MPa)				
Burst pressure		8000 psig (55.2 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) *2)				
Cv		0.45				
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s *3)				
Across the seat leak		4×10^{-9} Pa·m³/s *4)				
Surface finish		Ra 10 µin. (0.25 µm) Option: 25 µin. (0.62 µm)				
Connection		Face seal, Tube weld				
Supply pressure effect		1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		1.06 in³ (17.4 cm³)				
Weight		2.04 kg *5)				

*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 2300 psig (15.9 MPa), achievable delivery pressure is around 129 psig (0.89 MPa).

*2) Max. 90°C for Polyimide seat.

*3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

*4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

*5) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AZ1410T	AZ1415T
HR	**Source pressure**	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

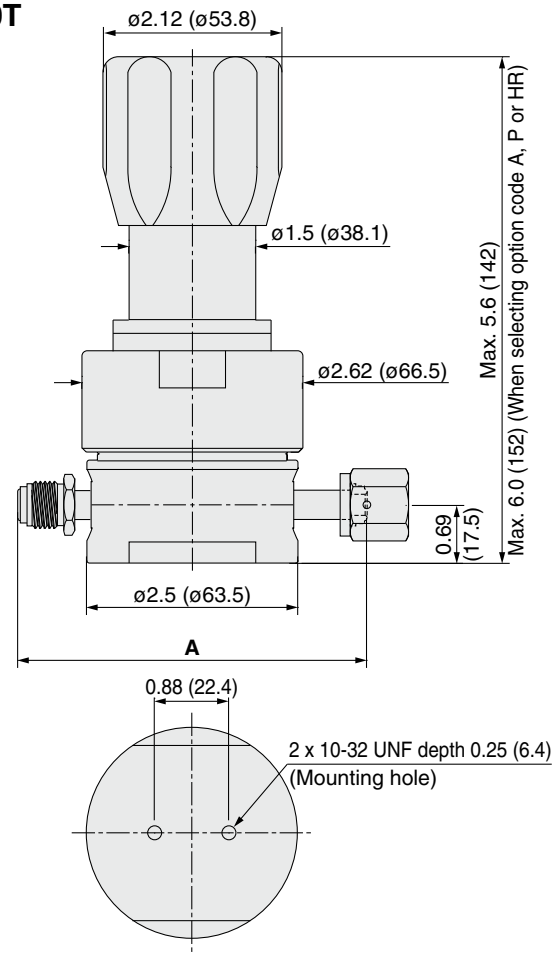
Wetted Parts Material

Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Poppet	Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy
Nozzle	316L SS
Seat	PCTFE (Option: Polyimide)

Dimensions

inch (mm)

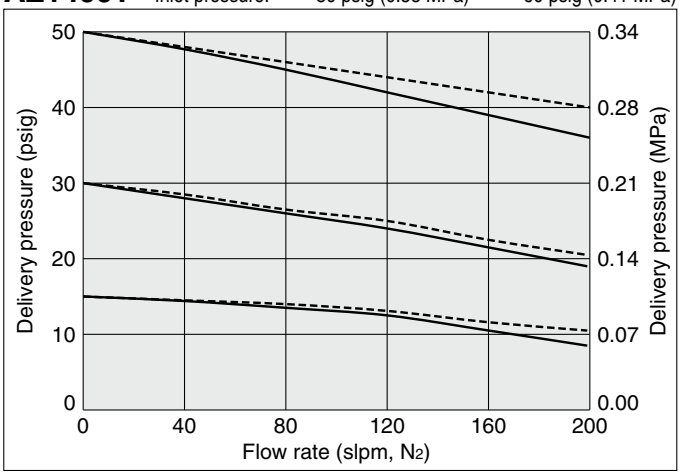
AZ1400T



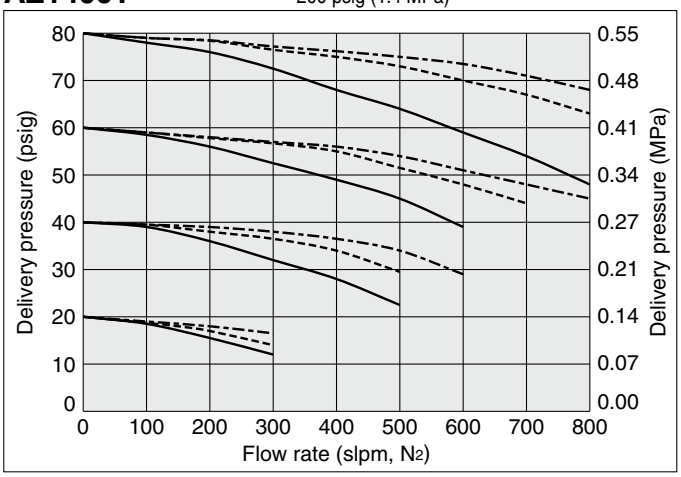
Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

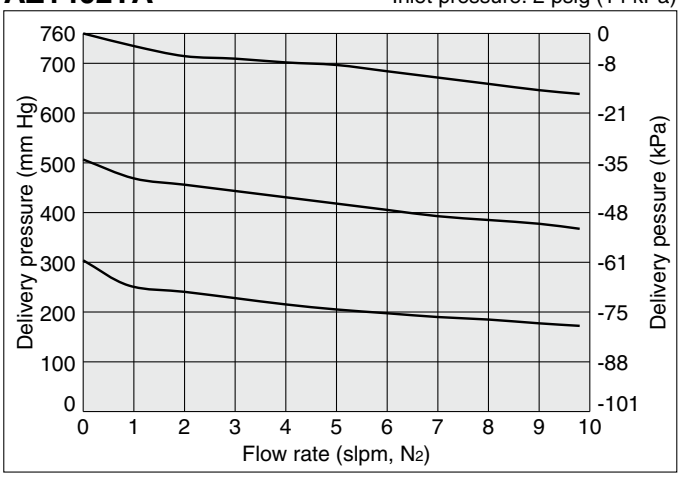
AZ1400T Inlet pressure: ---- 80 psig (0.55 MPa) —— 60 psig (0.41 MPa)



AZ1400T Inlet pressure: - - - 2000 psig (13.8 MPa) ---- 600 psig (4.1 MPa) —— 200 psig (1.4 MPa)



AZ1402TA Inlet pressure: 2 psig (14 kPa)



Note) slpm N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity | High flow

Series AZ1300

- For UHP gas delivery
- Flow capacity to 1000 slpm
- Body material: 316L SS
- Inlet pressure: Max. 300 psig (2.1 MPa)

RoHS

How to Order

Port Number ① ② ③

AZ13 [02] S [ ] [2PW] [FV8] [FV8] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS	316L SS	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port	①	②	③	
AZ1302S	2PW	FV8	FV8		
	3PW	FV8	FV8	0	
	3PW	FV8	FV8	V3	MPA

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation∗4)
BP	Bonnet port (NPT 1/8 inch)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
TF	PTFE ∗3)

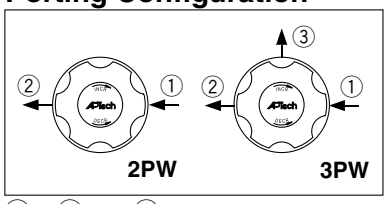
∗3) PTFE recommended for applications such as within a process tool.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration



①IN ②OUT ③Gauge port (Outlet)

Specifications

Operating Parameters		AZ1302	AZ1306	AZ1310	AZ1315
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 300 psig (2.1 MPa)			
Proof pressure (Inlet)		450 psig (3.1 MPa)			
Burst pressure		1200 psig (8.3 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing)			
Cv		1.1			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	1×10^{-10} Pa·m³/s ∗1)			
Across the seat leak		4×10^{-9} Pa·m³/s			
Surface finish		Ra 10 µin. (0.25 µm) Option: 25 µin. (0.62 µm)			
Connections		Face seal, Tube weld			
Supply pressure effect		4.6 psig (0.031 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		1.19 in³ (19.6 cm³)			
Weight		2.0 kg ∗2)			

∗1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

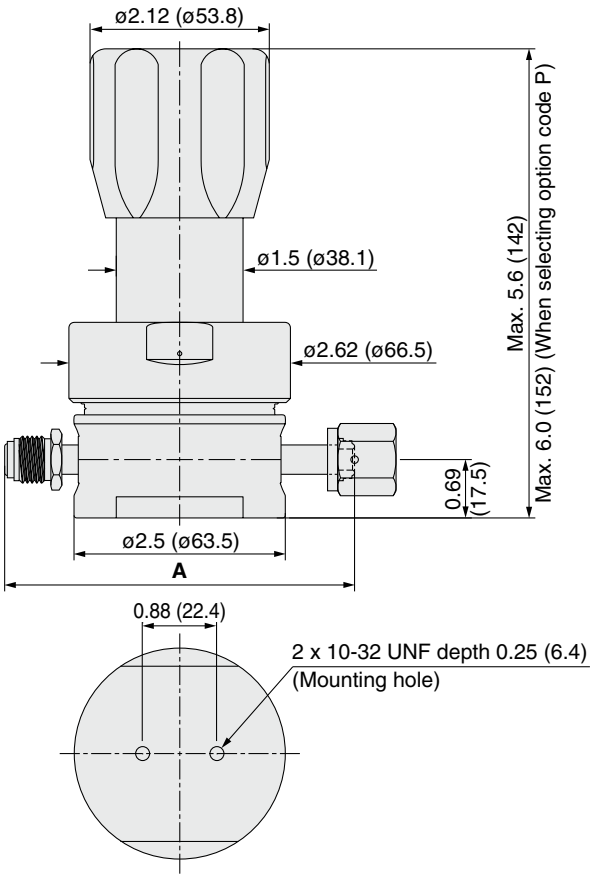
Wetted Parts Material

Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Nozzle	316L SS
Poppet	316L SS
Diaphragm	Ni-Cr-Mo alloy
Seat	PCTFE (Option: PTFE)

Dimensions

inch (mm)

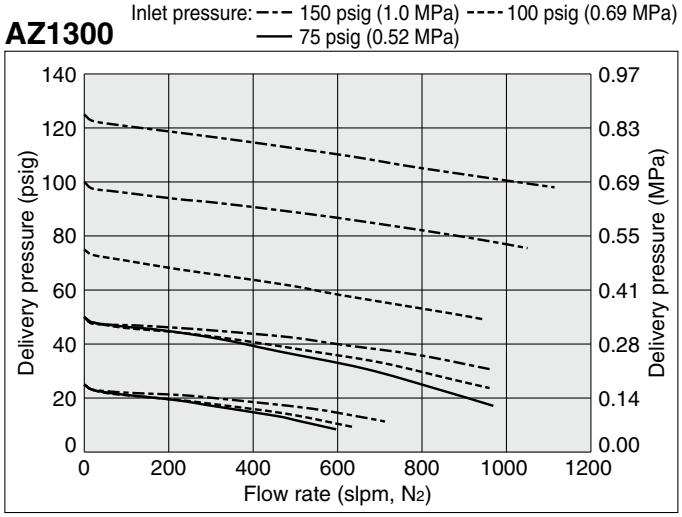
AZ1300



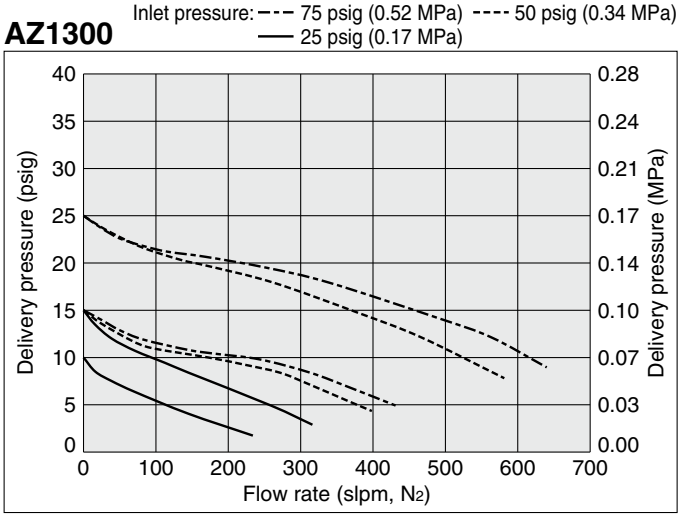
Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

AZ1300



AZ1300



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

High flow (Tied-diaphragm)

Series AZ1200

- For UHP gas delivery
- High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)
  HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity Standard to 800 slpm
  HF (option): to 1000 slpm
  FC (option): to 1500 slpm
- Body material: 316L SS
- Ni-Cr-Mo alloy internals available for corrosion resistance

RoHS

How to Order

Port Number ① ② ③ ④

AZ12 [02] [S] [ ] [2PW] [FV8] [FV8] [ ] [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)
25	Preset to 250 psig (1.7 MPa (Preset))

Material

Code	Body	Poppet	Diaphragm
S	316L SS	316L SS	Ni-Cr-Mo alloy
SHP		Ni-Cr-Mo alloy	

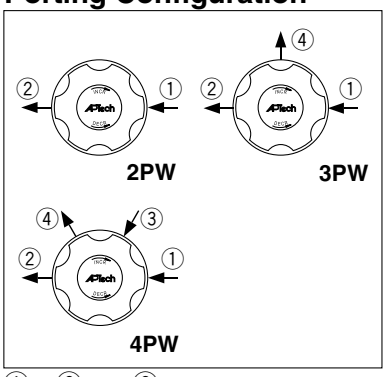
Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Sample Order Number

	Port ①	②	③	④		
AZ1210S	2PW	FV8	FV8			
	3PW	FV8	FV8		0	
	3PW	FV8	FV8		1	MPA
	4PW	FV8	FV8	40	1	MPA

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation∗6)
BP	Bonnet port (NPT 1/8 inch)

∗6) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1)
FC	Force compensation (Cv: 0.65) ∗4)∗5)
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) ∗4)

∗4) FC and HR options are not available with AZ1202, AZ1206 and AZ1225.
∗5) FC option is available with 1/2 inch face seal or 1/2 inch tube weld.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SHP material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ1202	AZ1206	AZ1210	AZ1215	AZ1225
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) ∗1)	Preset to 250 psig (1.7 MPa) ∗2)
Gas		Select compatible materials of construction for the gas				
Source pressure		Vacuum to 1700 psig (11.7 MPa)				
Proof pressure (Inlet)		2550 psig (17.6 MPa)				
Burst pressure		8000 psig (55.2 MPa)				
Ambient and operating temperature		-40 to 71°C (No freezing) ∗3)				
Cv		0.65				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗4)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗5)				
Surface finish		Ra 10 µin.(0.25 µm) Option: 25 µin.(0.62 µm)				
Connections		Face seal, Tube weld				
Supply pressure effect		3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation		Bottom mount (Option: panel mount)				
Internal volume		1.07 in³ (17.6 cm³)				
Weight		2.0 kg ∗6)				

∗1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 1700 psig (11.7 MPa), achievable delivery pressure is around 125 psig (0.86 MPa) (HF and FC option 120 psig (0.83 MPa)).
∗2) 250 psig outlet pressure preset at 800 psig (5.5MPa) inlet pressure. Custom inlet/outlet pressure settings available. Please contact SMC.
∗3) Max. 90°C for Polyimide seat.
∗4) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗5) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
∗6) Weight, including individual boxed weight, may vary depending on connections or options.

SMC

Options

1. High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AZ1202	AZ1206	AZ1210	AZ1215	AZ1225
HF	**Cv**	1.1				
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

2. Force compensation

Force compensation feature added to HF option and has wider flow capacity than HF option.
Changes from the standard type are:

Option	Other Parameters	AZ1210	AZ1215
FC	**Source pressure**	Vacuum to 300 psig (2.1 MPa)	
	Cv	0.65	
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop	
	Connections	1/2 inch face seal 1/2 inch tube weld	

3. High inlet pressure

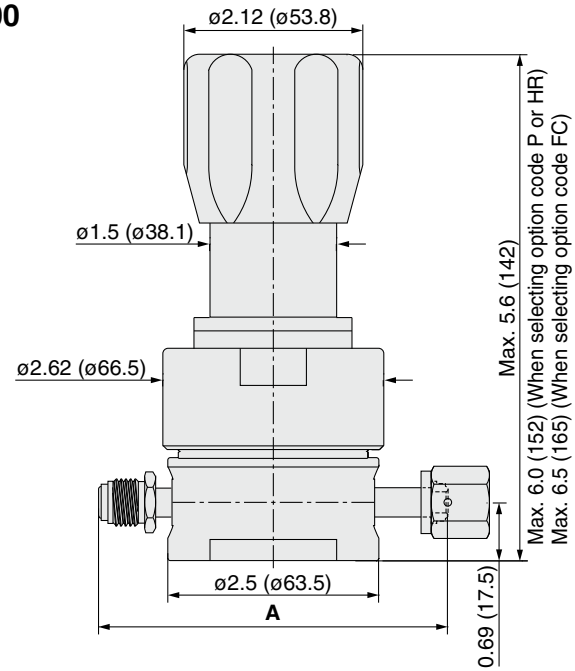
Changes from the standard type are:

Option	Other Parameters	AZ1210	AZ1215
HR	**Source pressure**	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

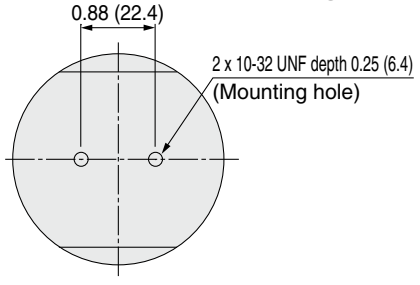
Dimensions

inch (mm)

AZ1200



Connections	A	
	inch	(mm)
FV4 / MV4	4.30	(109.2)
FV6 / MV6	5.22	(132.6)
TW6	4.00	(101.6)
FV8 / MV8	5.22	(132.6)
TW8	4.34	(110.2)



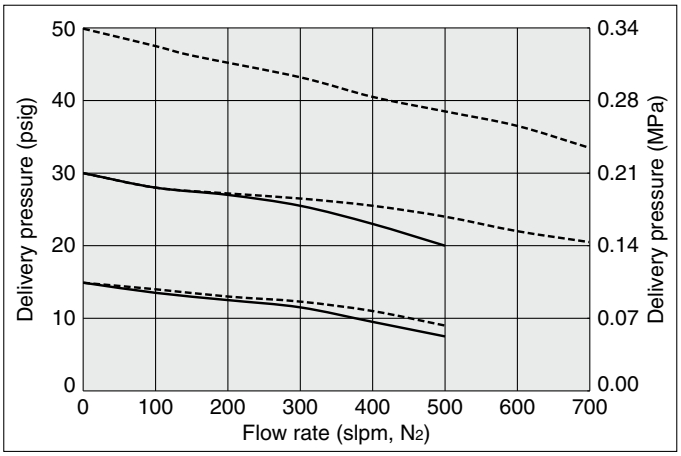
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy	
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

Flow Characteristics

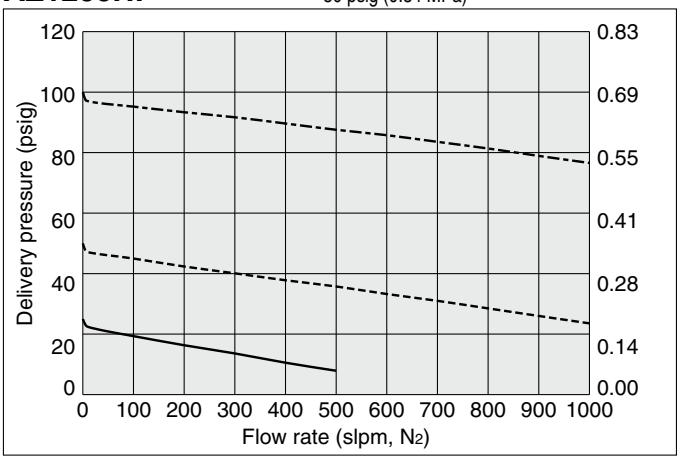
AZ1200

Inlet pressure: ---- 80 psig (0.55 MPa) —— 60 psig (0.41 MPa)
1/2 inch connections *)



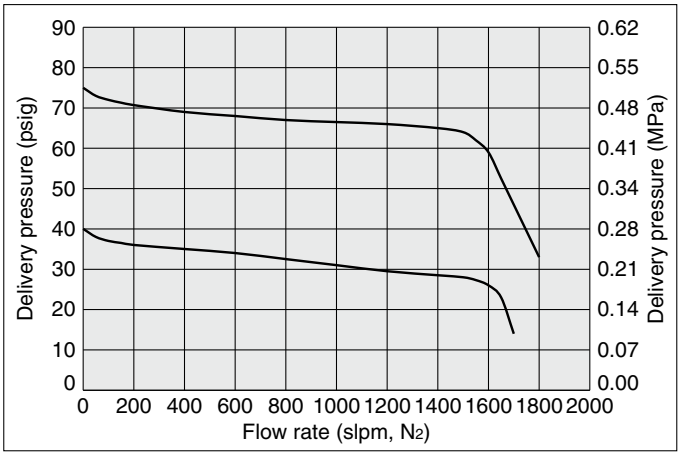
AZ1200HF

Inlet pressure: ---- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)
—— 50 psig (0.34 MPa)



AZ1200FC

Inlet pressure: 150 psig (1.0 MPa)
3/4 inch connections *)



*1) If connection size differs, flow characteristics also differ.
*2) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

High flow (Tied-diaphragm)

Series AZ9200

- **For UHP gas delivery**
- **Inlet pressure: Max. 300 psig (2.1 MPa)**
- **Flow capacity to 2000 slpm**
- **Body material: 316L SS**

RoHS

How to Order

AZ92 [02] [S] [2PW] [FV12] [FV12] [ ] [ ] [ ]

Port Number: ① ②, ③

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

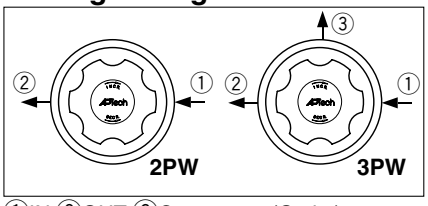
Material

Code	Body	Poppet	Diaphragm
S	316L SS	316L SS	Ni-Cr-Mo alloy

Ports

Code	Ports
2PW	2 ports
3PW	3 ports

Porting Configuration



①IN ②OUT ③Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV12	3/4 inch face seal (Female)
MV12	3/4 inch face seal (Male)
TW12	3/4 inch tube weld
FV16	1 inch face seal (Female)
MV16	1 inch face seal (Male)
TW16	1 inch tube weld

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗3)
BP	Bonnet port (NPT 1/8 inch)

∗3) Panel mounting hole: dia. 39.6 mm.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Gauge port ∗1) (Outlet③)

Code	Pressure gauge	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa

∗1) Other range available. Refer to gauge guide (P.115).

Specifications

Operating Parameters		AZ9202	AZ9206	AZ9210	AZ9215
Delivery pressure		1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas			
Source pressure		Vacuum to 300 psig (2.1 MPa)			
Proof pressure (Inlet)		450 psig (3.1 MPa)			
Burst pressure		1500 psig (10.3 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing)			
Cv		1.6			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	1×10^{-10} Pa·m³/s ∗1)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)			
Surface finish		Ra 10 μin. (0.25 μm)			
Connections		Face seal, Tube weld			
Supply pressure effect		7 psig (0.048 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation		Bottom mount (Option: panel mount)			
Internal volume		2.2 in³ (36 cm³)			

∗1) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗2) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

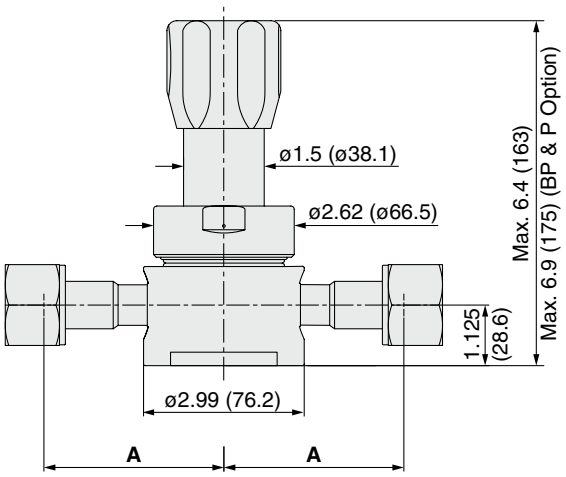
Wetted Parts Material

Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Nozzle	316L SS
Poppet	316L SS
Diaphragm	Ni-Cr-Mo alloy
Seat	PFA

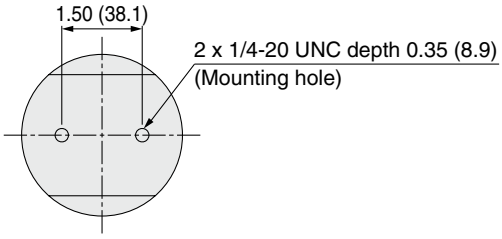
Dimensions

inch (mm)

AZ9200

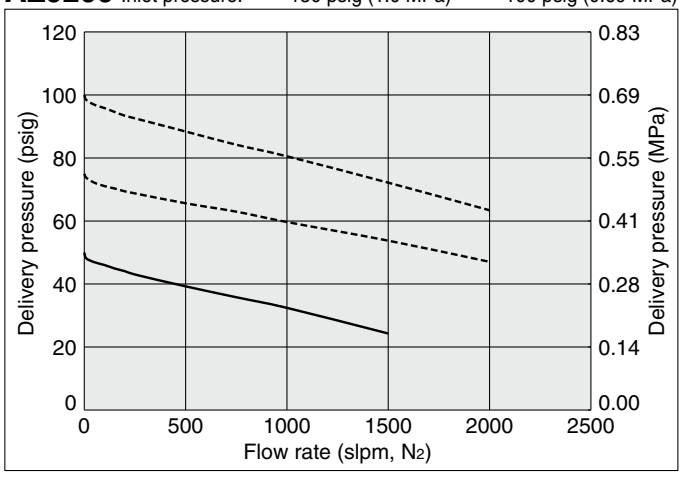


Connections	A	
	inch	(mm)
FV12	3.39	(86.1)
MV12		
TW12	3.00	(76.2)
FV16	3.67	(93.2)
MV16		
TW16	3.00	(76.2)



Flow Characteristics

AZ9200 Inlet pressure: ---- 150 psig (1.0 MPa) —— 100 psig (0.69 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for Ultra High Purity

Delivery of sub-atmospheric pressure

Series AZ1100

- **For UHP gas delivery**
- **Sub-atmospheric to low positive pressure delivery**
- **Flow capacity to 0.5 slpm**
- **Body material: 316L SS**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

Port Number ① ② ③ ④

AZ11 01 S □ 2PW FV4 FV4 □ □ □ □ □

Delivery pressure

Code	Delivery pressure
01	100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	

Surface finish

Code	Surface finish Ra
No code	10 μin. (0.25 μm) Standard
Q	25 μin. (0.62 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa

∗1) Other range available. Refer to gauge guide (P.115). Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Seat material

Code	Material
No code	PCTFE (Standard)
TF	PTFE ∗3)

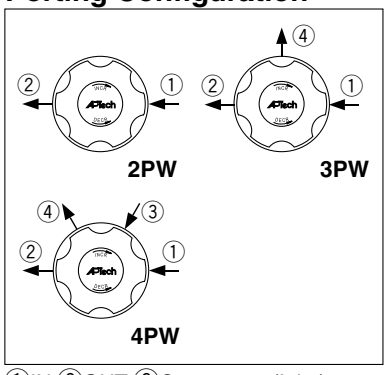
∗3) PTFE recommended for applications such as within a process tool.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)
BP	Bonnet port (NPT 1/8 inch)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet)

Sample Order Number

	Port	①	②	③	④	
AZ1101S	2PW	FV4	FV4			
	3PW	FV4	FV4		0	
	3PW	FV4	FV4		V3	MPA
	4PW	FV4	FV4	V3	V3	MPA
	4PW	FV4	FV4	0	0	

Specifications

Operating Parameters		AZ1101
Delivery pressure		100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 300 psig (2.1 MPa)
Proof pressure (Inlet)		500 psig (3.4 MPa)
Burst pressure		8000 psig (55.2 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing)
Cv		0.05
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)
Across the seat leak		4×10^{-9} Pa·m³/s ∗1)
Surface finish		Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)
Connections		Face seal, Tube weld
Installation		Bottom mount (Option: panel mount)
Internal volume		0.49 in³ (8 cm³)
Weight		1.25 kg ∗2)

∗1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

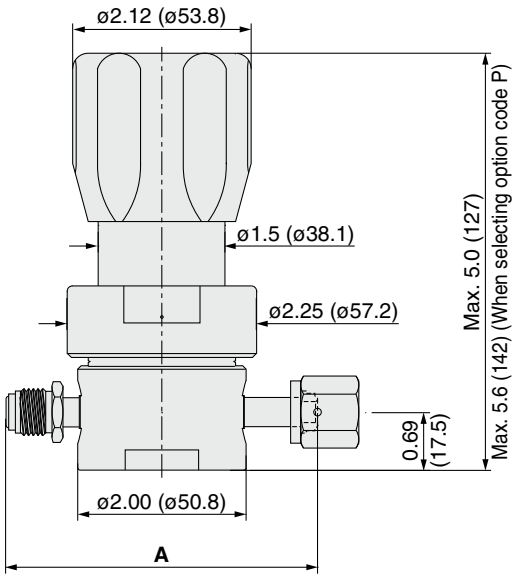
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	
Seat	PCTFE (Option: PTFE)	

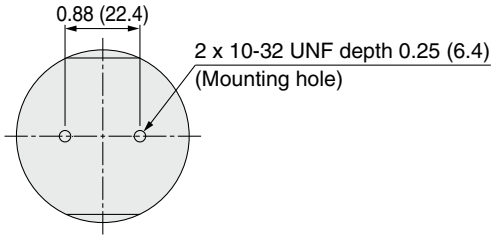
Dimensions

inch (mm)

AZ1100



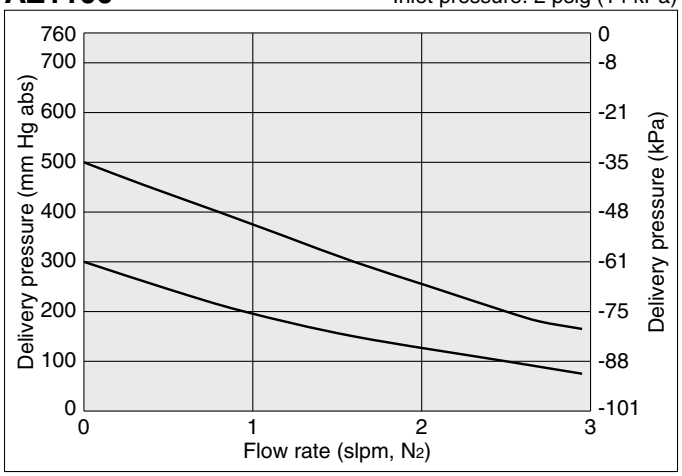
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)



Flow Characteristics

AZ1100

Inlet pressure: 2 psig (14 kPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for General Applications | Low to intermediate flow

Series AK1000

- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Body material: Stainless steel and Brass available**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK10 [01] [S] [4PL] [4] [4] [0] [ ] [0] [ ] [ ] [ ] [ ]

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4P			●
4PL		●	●
5PC		●	●

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression
6T	3/8 inch compression

Delivery pressure

Code	Delivery pressure	Code	Delivery pressure
01	0.5 to 10 psig (0.0034 to 0.07 MPa)	**15**	5 to 150 psig (0.034 to 1.0 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)	**20**	5 to 200 psig (0.034 to 1.4 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)	**30**	5 to 300 psig (0.034 to 2.1 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)	**50**	10 to 500 psig (0.07 to 3.4 MPa)

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗1) psig/bar unit	Pressure gauge ∗1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
10	0 to 1000 psig	0 to 7 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗6)

∗6) Panel mounting hole: dia. 1.42 inch (36.1 mm).

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15)

Seat material

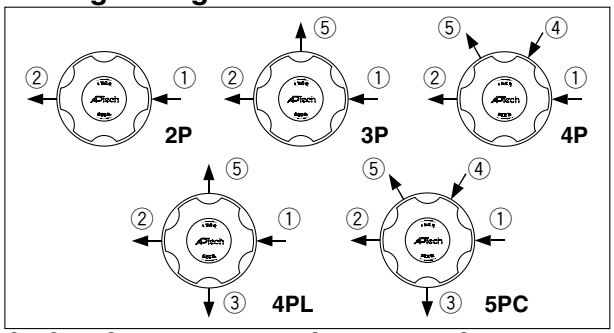
Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
PK	PEEK
TF	PTFE ∗4) ∗5)

∗3) Not available with SH material.
∗4) Source pressure rating is limited to 300 psig (2.1 MPa) or less.
∗5) PTFE seats reduce seat abrasion for flow cycle application. Gas permeation is greater with PTFE than PCTFE.

Sample Order Number

	Port ①	②	③	④	⑤		
AK1002S	2P	4	4				
	3P	4	4			V3	MPA
	4P	4	4		1	V3	MPA
	4PL	4	4	0		V3	MPA
	4PL	4	4	0		0	
	5PC	4	4	0	1	V3	MPA

Porting Configuration



①IN ②OUT ③Extra bottom port (Outlet) ④Gauge port (Inlet) ⑤Gauge port (Outlet)

Specifications

Operating Parameters	AK1001	AK1002	AK1006	AK1010	AK1015	AK1020	AK1030	AK1050
Delivery pressure	0.5 to 10 psig (0.0034 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)	5 to 200 psig (0.034 to 1.4 MPa)	5 to 300 psig (0.034 to 2.1 MPa)	10 to 500 psig (0.07 to 3.4 MPa)
Gas	Select compatible materials of construction for the gas							
Source pressure	Vacuum to 300 psig (2.1 MPa)	Vacuum to 3500 psig (24.1 MPa) ∗1)						
Proof pressure (Inlet)	4500 psig (30.7 MPa)							
Burst pressure	10000 psig (69 MPa)							
Ambient and operating temperature	-40 to 71°C (No freezing) ∗2)							
Cv	0.09							
Leak rate	1 x 10^{-10} Pa·m^3/s							
Connections	NPT female, Compression							
Supply pressure effect	0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop							
Installation	Bottom mount (Option: panel mount)							
Internal volume	0.49 in^3 (8 cm^3)							
Weight	1.09 kg ∗3)							

∗1) Max. 300 psig (2.1 MPa) for PTFE seat.
∗2) Max. 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.
∗3) Weight, including individual boxed weight, may vary depending on connections or options.

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AK1001	AK1002	AK1006	AK1010	AK1015	AK1020	AK1030	AK1050
HF	**Cv**	0.15							
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop							

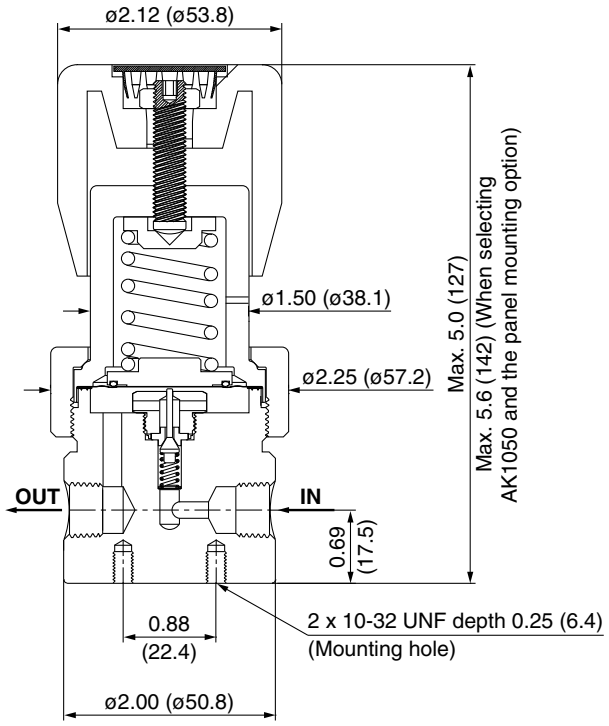
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide, PEEK, PTFE)		PCTFE (Option: PEEK, PTFE)

Dimensions

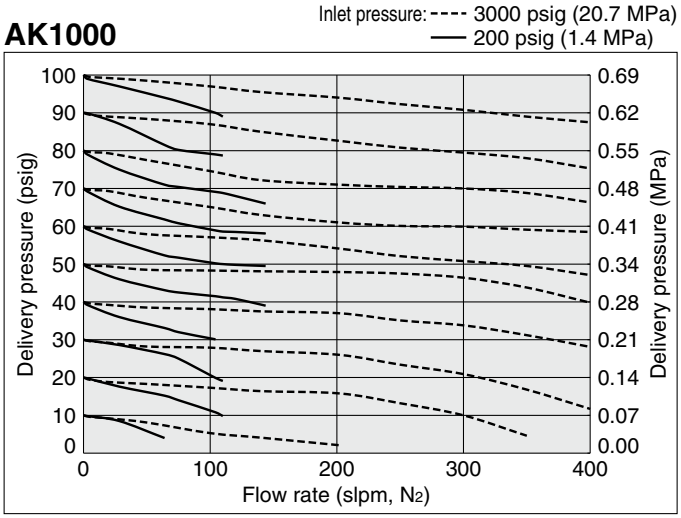
inch (mm)

AK1000

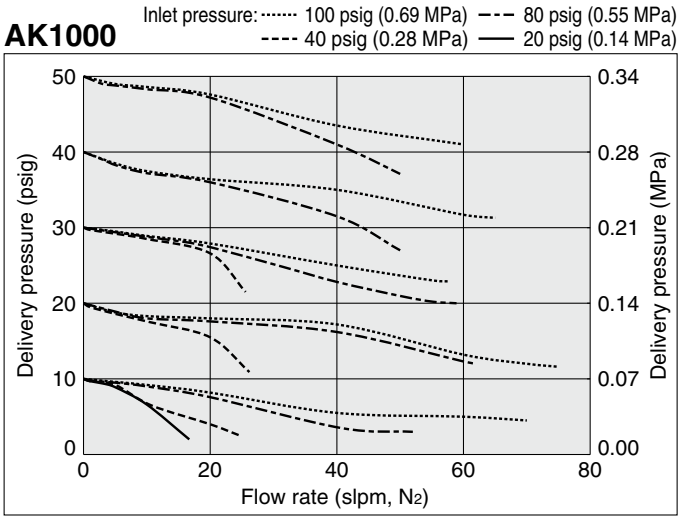


Flow Characteristics

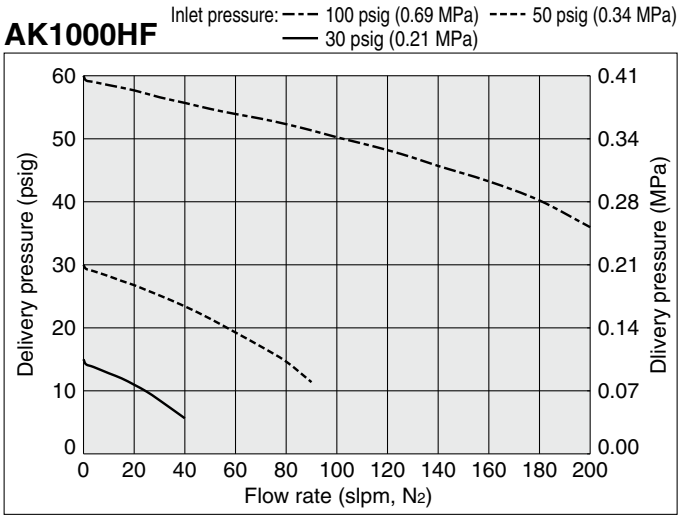
AK1000



AK1000



AK1000HF



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for General Applications | Low flow (Tied-diaphragm)

Series AK1500

- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity: to 30 slpm**
- **Body material: Stainless steel and Brass available**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Tied-diaphragm design**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK15 [02] [S] [4PL] [4] [4] [0] [ ] [0] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression
6T	3/8 inch compression

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗1) psig/bar unit	Pressure gauge ∗1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
10	0 to 1000 psig	0 to 7 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

∗2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.42 inch (36.1 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
PK	PEEK

∗3) Not available with SH material.

Pressure gauge unit ∗2)

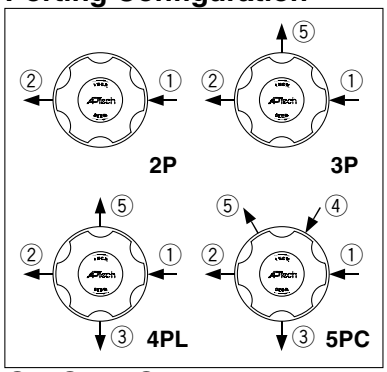
Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Sample Order Number

	Port ①	②	③	④	⑤	
AK1510S	2P 4	4				
	3P 4	4			1	MPA
	4PL 4	4	0		1	MPA
	4PL 4	4	0		0	
	5PC 4	4	0	40	1	MPA

Porting Configuration



①IN ②OUT ③Extra bottom port (Outlet) ④Gauge port (Inlet) ⑤Gauge port (Outlet)

Specifications

Operating Parameters	AK1502	AK1506	AK1510	AK1515
Delivery pressure	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas			
Source pressure	Vacuum to 3500 psig (24.1 MPa)			
Proof pressure (inlet)	4500 psig (30.7 MPa)			
Burst pressure	10000 psig (69 MPa)			
Ambient and operating temperature	-40 to 71°C (No freezing) ∗1)			
Cv	0.09			
Leak rate	1 x 10^{-10} Pa·m³/s			
Connections	NPT female, Compression			
Supply pressure effect	0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation	Bottom mount (Option: panel mount)			
Internal volume	0.49 in³ (8 cm³)			
Weight	1.18 kg ∗2)			

∗1) Max. 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

∗2) Weight, including individual boxed weight, may vary depending on connections or options.

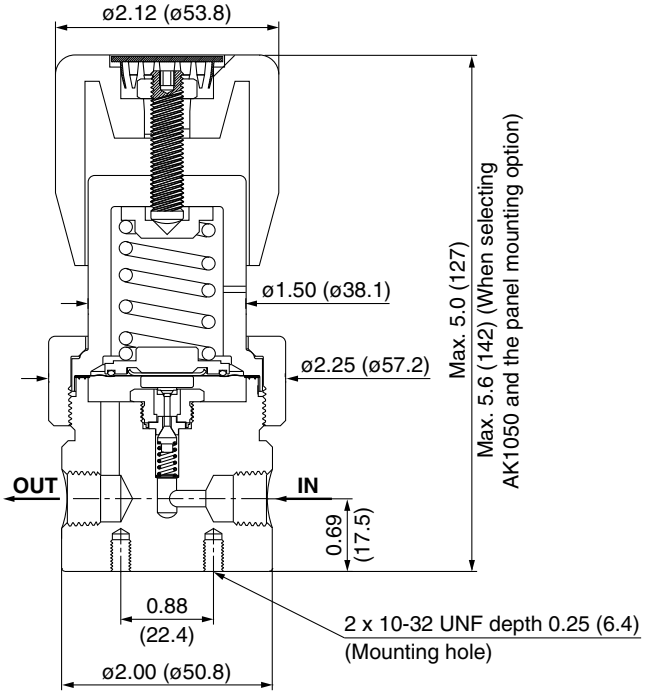
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide, PEEK)		PCTFE (Option: PEEK)

Dimensions

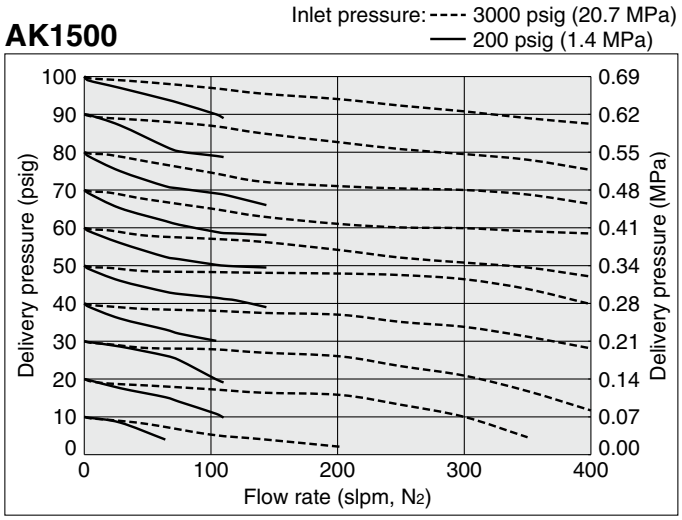
inch (mm)

AK1500

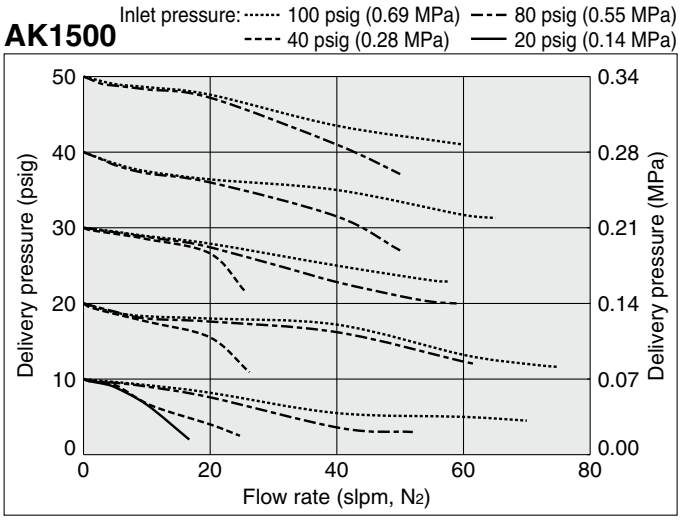


Flow Characteristics

AK1500



AK1500



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for General Applications | Intermediate flow (Tied-diaphragm)

Series AK1400T

- High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)
  HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity to 400 slpm
- Body material: Stainless steel and Brass available
- Ni-Cr-Mo alloy internals standard
- Sub-atmospheric pressure delivery option
- Tied-diaphragm design

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK14 02 T S □ 4PL 6 6 0 □ 0 □ □ □ □

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)
06	1 to 60 psig (0.007 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
B	Brass	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	316 SS
S	316 SS			
SH				Ni-Cr-Mo alloy

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Range options *1)

Code	Specification
No code	Standard
A	Sub-atmospheric

*1) Only available with AK1402T.

Pressure gauge unit *3)

Code	Unit
No code	psig/bar
MPA	MPa

*3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *4)

*4) Not available with SH material.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation*6)
BP	Bonnet port (NPT 1/8 inch)

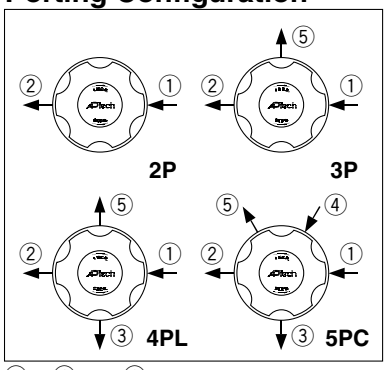
*6) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Option

Code	Specification
No code	Standard
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *5)

*5) Not available with AK1402T and AK1406T.

Porting Configuration



①IN ②OUT ③Extra bottom port (Outlet)
④Gauge port (Inlet) ⑤Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
6	NPT 3/8 inch
8	NPT 1/2 inch
4T	1/4 inch compression
6T	3/8 inch compression
8T	1/2 inch compression

Sample Order Number

AK1410TS

Port	①	②	③	④	⑤	
2P	6	6				
3P	6	6			1	MPA
4PL	6	6	0		1	MPA
4PL	6	6	0		0	
5PC	6	6	0	40	1	MPA

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge *2) psig/bar unit	Pressure gauge *2) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) *2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa
30	0 to 3000 psig	0 to 21 MPa
40	0 to 4000 psig	0 to 28 MPa

*1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Specifications

Operating Parameters	AK1402T□A	AK1402T	AK1406T	AK1410T	AK1415T
Delivery pressure	100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	1 to 60 psig (0.007 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) *1)
Gas	Select compatible materials of construction for the gas				
Source pressure	Vacuum to 300 psig (2.1 MPa)	Vacuum to 2300 psig (15.9 MPa)			
Proof pressure (Inlet)	4000 psig (27.6 MPa)				
Burst pressure	8000 psig (55.2 MPa)				
Ambient and operating temperature	-40 to 71°C (No freezing) *2)				
Cv	0.45				
Leak rate	1 x 10^{-10} Pa·m³/s				
Connections	NPT female, Compression				
Supply pressure effect	1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation	Bottom mount (Option: panel mount)				
Internal volume	0.65 in³ (10.6 cm³)				
Weight	2.04 kg *3)				

*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 2300 psig (15.9 MPa), achievable delivery pressure is around 129 psig (0.89 MPa).
*2) Max. 90°C for Polyimide seat.
*3) Weight, including individual boxed weight, may vary depending on connections or options.

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AK1410T	AK1415T
HR	**Source pressure**	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

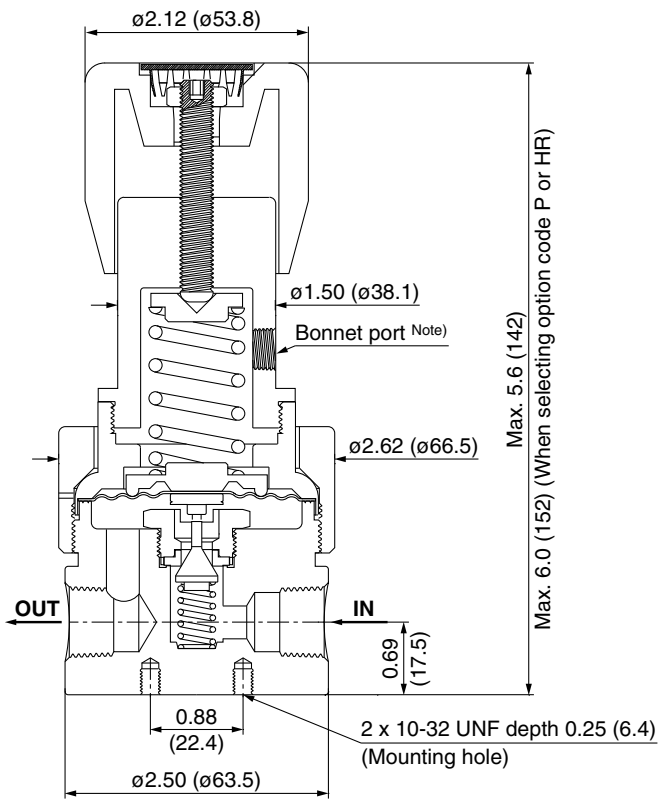
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	Ni-Cr-Mo alloy		
Diaphragm	Ni-Cr-Mo alloy		
Nozzle	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)		PCTFE

Dimensions

inch (mm)

AK1400T



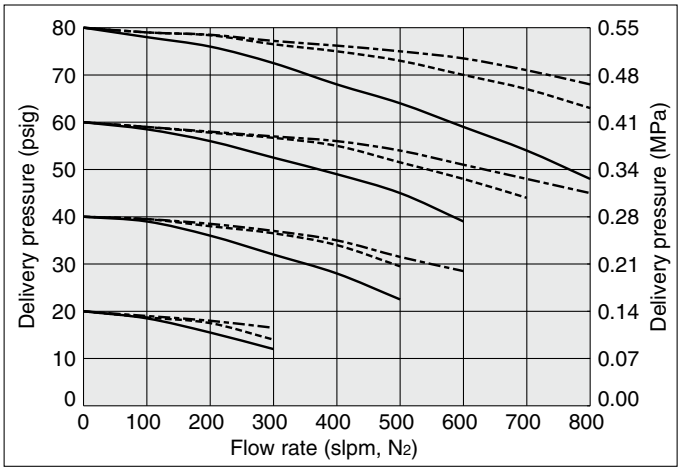
Note) The standard port is ø1.5. When selecting the AK1402TA or the option code P or HR, the connection is NPT1/8 female thread.

Flow Characteristics

Inlet pressure: 2000 psig (13.8 MPa) 600 psig (4.1 MPa) 200 psig (1.4 MPa)

AK1400T

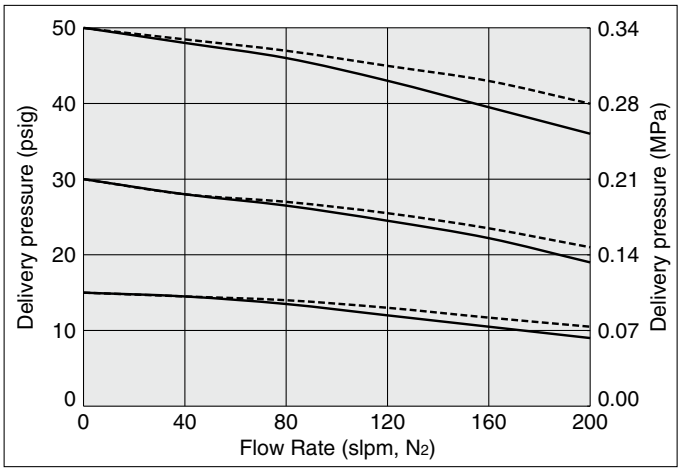
1/2 inch Connection *)



Inlet pressure: 80 psig (0.55 MPa) 60 psig (0.41 MPa)

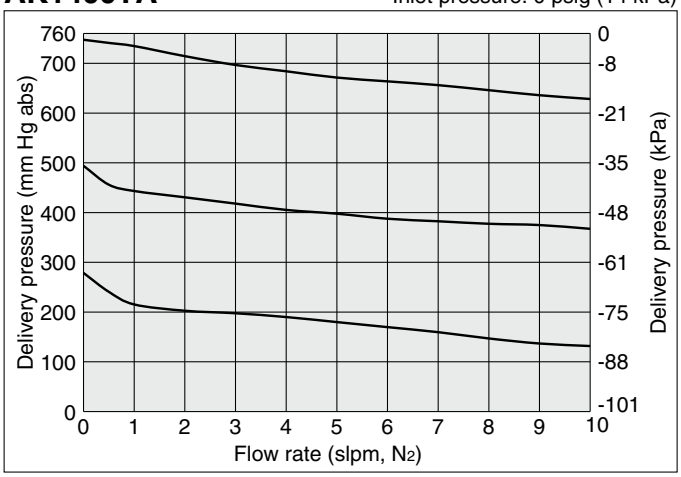
AK1400T

1/2 inch Connection *)



AK1400TA

Inlet pressure: 0 psig (14 kPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Series AK1300

- **Flow capacity to 1000 slpm**
- **Body material: Stainless steel and Brass available**
- **Inlet pressure: Max. 300 psig (2.1 MPa)**

RoHS

How to Order

AK13 [02] [S] [4PL] [8] [8] [0] [0] [ ] [ ] [ ]

Port Number: ① ② ③ ④

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

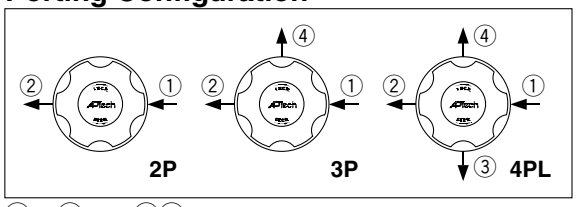
Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	Ni-Cr-Mo alloy
S	316 SS		

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●

Porting Configuration



①IN ②OUT ③④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
6	NPT 3/8 inch
8	NPT 1/2 inch
4T	1/4 inch compression
6T	3/8 inch compression
8T	1/2 inch compression

Gauge port (Outlet③, ④)

Code	Pressure gauge ∗1) psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

∗2) 1/4 inch NPT plug is included only for port code 4PL.

Sample Order Number

	Port	①	②	③	④	
AK1302S	2P	6	6			
	3P	6	6		V3	MPA
	4PL	6	6	0	V3	MPA
	4PL	8	8	0	0	

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation∗4)
BP	Bonnet port (NPT 1/8 inch)

∗4) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
TF	PTFE ∗3)

∗3) PTFE seats reduce seat abrasion for flow cycle application. Gas permeation is greater with PTFE than PCTFE.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters	AK1302	AK1306	AK1310	AK1315
Delivery pressure	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas			
Source pressure	Vacuum to 300 psig (2.1 MPa)			
Proof pressure (Inlet)	450 psig (3.1 MPa)			
Burst pressure	1200 psig (8.3 MPa)			
Ambient and operating temperature	-40 to 71°C (No freezing)			
Cv	1.1			
Leak rate	1 x 10^{-10} Pa·m^3/s			
Connections	NPT female, Compression			
Supply pressure effect	4.6 psig (0.031 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation	Bottom mount (Option: panel mount)			
Internal volume	0.65 in^3 (10.6 cm^3)			
Weight	2.0 kg ∗			

∗ Weight, including individual boxed weight, may vary depending on connections or options.

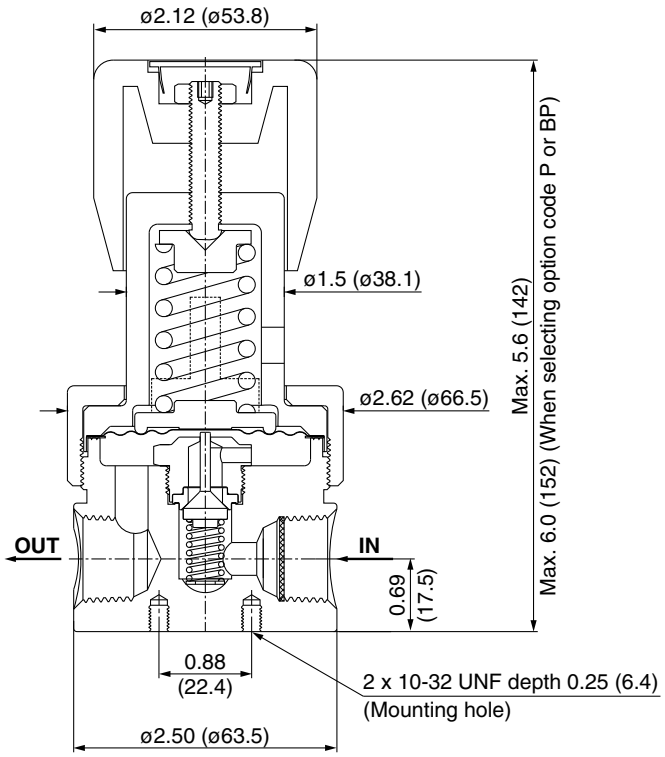
Wetted Parts Material

Wetted Parts	B	S
Body	Brass	316 SS
Poppet	316 SS	
Diaphragm	Ni-Cr-Mo alloy	
Seat	PCTFE (Option: PTFE)	

Dimensions

inch (mm)

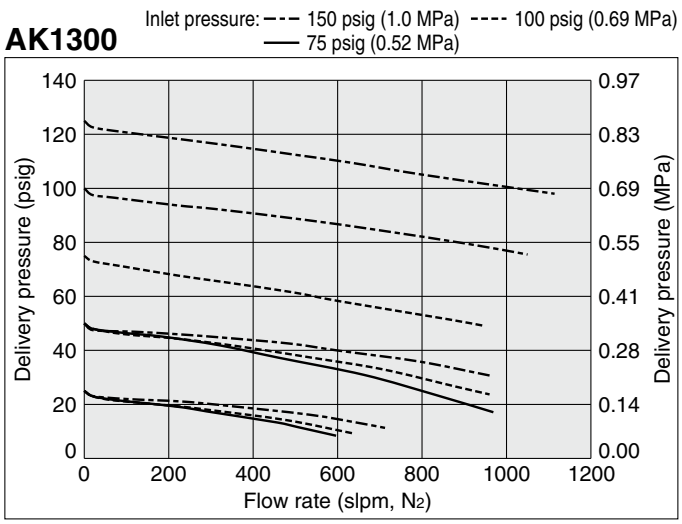
AK1300



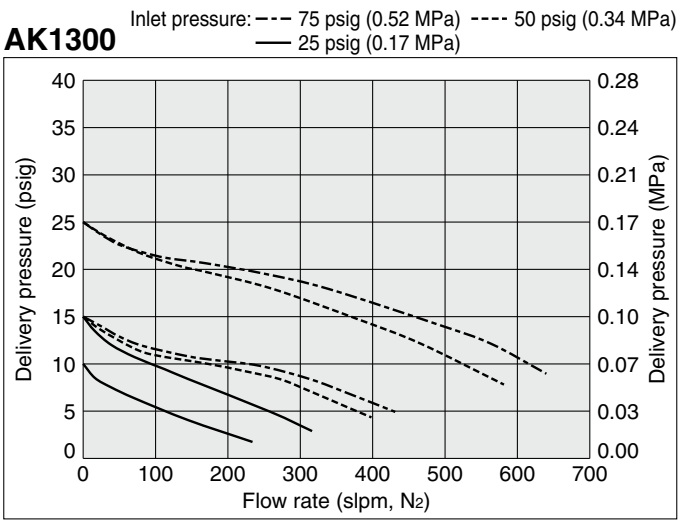
Note) The standard port is ø1.5. When selecting the option code P, the connection is NPT1/8 female thread.

Flow Characteristics

AK1300



AK1300



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for General Applications | High flow (Tied-diaphragm)

Series AK1200

- **High inlet pressure type** Standard: Max. 1700 psig (11.7 MPa)
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity** Standard: to 800 slpm
  HF (option): to 1000 slpm
  FC (option): to 1500 slpm
- **Body material: Stainless steel and Brass available**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Tied-diaphragm design**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK12 [02] [S] [4PL] [8] [8] [0] [ ] [0] [ ] [ ] [ ] [ ]

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	Ni-Cr-Mo alloy
S	316 SS	Ni-Cr-Mo alloy	
SH			

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Pressure gauge unit *2)

Code	Unit
No code	psig/bar
MPA	MPa

*2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation *6)
BP	Bonnet port (NPT 1/8 inch)

*6) Panel mounting hole: dia. 1.56 inch (39.6 mm).

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)
25	Preset to 250 psig (1.7 MPa)

Connections (Inlet①, Outlet②)

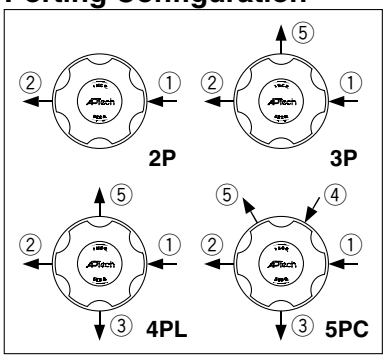
Code	Connections
4	NPT 1/4 inch
6	NPT 3/8 inch
8	NPT 1/2 inch
4T	1/4 inch compression
6T	3/8 inch compression
8T	1/2 inch compression

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1)
FC	Force compensation(Cv: 0.65) *4) *5)
HR	High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *4)

*4) FC option is not available with AK1202, AK1206 and AK1225.
*5) FC option is available with 1/2 inch NPT or 1/2 inch compression.

Porting Configuration



①IN ②OUT ③Extra bottom port (Outlet)
④Gauge port (Inlet) ⑤Gauge port (Outlet)

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge *1) psig/bar unit	Pressure gauge *1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) *2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
10	0 to 1000 psig	0 to 7 MPa
40	0 to 4000 psig	0 to 28 MPa

*1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *3)

*3) Not available with SH material.

Sample Order Number

	Port	①	②	③	④	④		
AK1202S	2P	8	8					
	3P	8	8			V3	MPA	
	4PL	8	8	0		V3	MPA	
	4PL	8	8	0		0		
	5PC	8	8	0	40	V3	MPA	

Specifications

Operating Parameters	AK1202	AK1206	AK1210	AK1215	AK1225
Delivery pressure	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) *1)	Preset to 250 psig (1.7 MPa) *2)
Gas	Select compatible materials of construction for the gas				
Source pressure	Vacuum to 1700 psig (11.7 MPa)				
Proof pressure (Inlet)	2550 psig (17.6 MPa)				
Burst pressure	9000 psig (62 MPa)				
Ambient and operating temperature	-40 to 71°C (No freezing) *3)				
Cv	0.65				
Leak rate	1 x 10^{-10} Pa·m³/s				
Connections	NPT female, Compression				
Supply pressure effect	3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation	Bottom mount (Option: panel mount)				
Internal volume	0.65 in³ (10.6 cm³)				
Weight	2.0 kg *4)				

*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 1700 psig (11.7 MPa), achievable delivery pressure is around 125 psig (0.86 MPa) (HF and FC option 120 psig (0.83 MPa)).
*2) 250 psig outlet pressure preset at 800 psig (5.5MPa) inlet pressure. Custom inlet/outlet pressure settings available. Please contact SMC.
*3) Max. 90°C for Polyimide seat. Optional ambient and operating temperature range available. Please contact SMC.
*4) Weight, including individual boxed weight, may vary depending on connections or options.

Options

1.High flow Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AK1202	AK1206	AK1210	AK1215	AK1225
HF	Cv	1.1				
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				

2. Force compensation Force compensation feature added to HF option and has higher flow capacity than HF option. Changes from the standard type are:

Option	Other Parameters	AK1210	AK1215
FC	Source pressure	Vacuum to 300 psig (2.1 MPa)	
	Cv	0.65	
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop	
	Connections	NPT 1/2 inch, 1/2 inch compression	

3. High inlet pressure Changes from the standard type are:

Option	Other Parameters	AK1210	AK1215
HR	Source pressure	Vacuum to 3000 psig (20.7 MPa)	
	Proof pressure (Inlet)	4500 psig (31 MPa)	
	Burst pressure	9000 psig (62 MPa)	

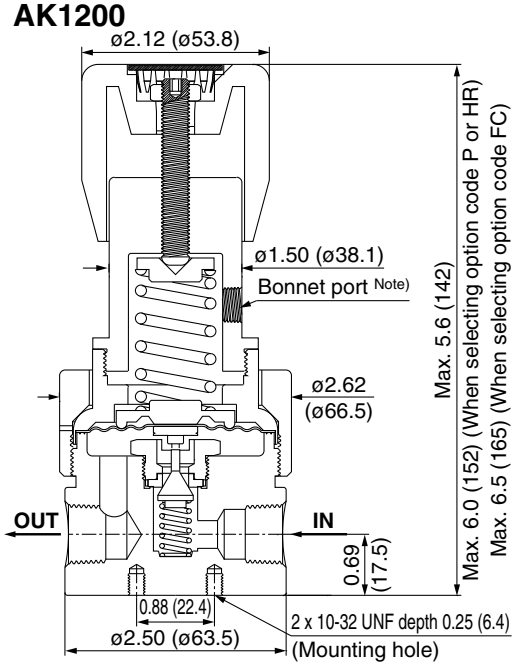
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy		
Seat	PCTFE (Option: Polyimide)		PCTFE

Dimensions

inch (mm)

AK1200

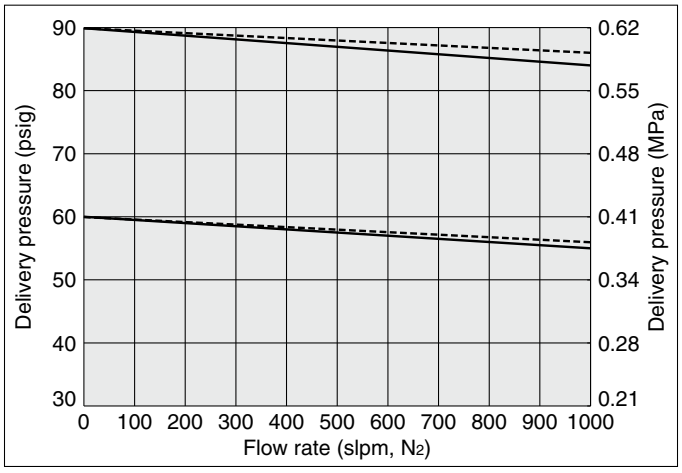


Note) The standard port is ø1.5. When selecting the option code P, HR, or FC, the connection is NPT1/8 female thread.

Flow Characteristics

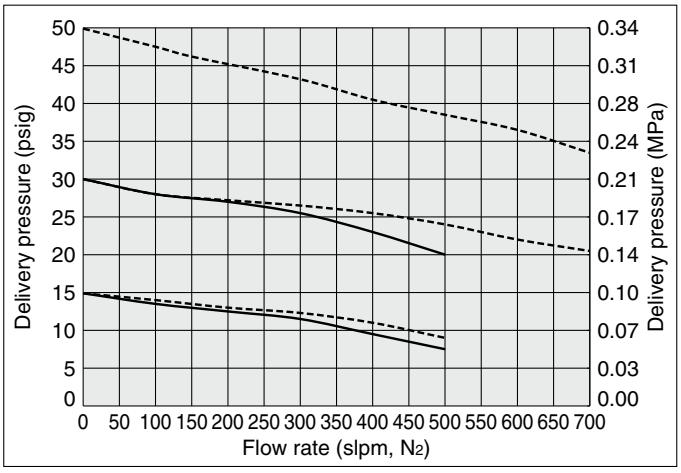
AK1200

Inlet pressure: ---- 1700 psig (11.7 MPa) —— 500 to 1000 psig (3.4 to 6.9 MPa)
1/2 inch connections *)



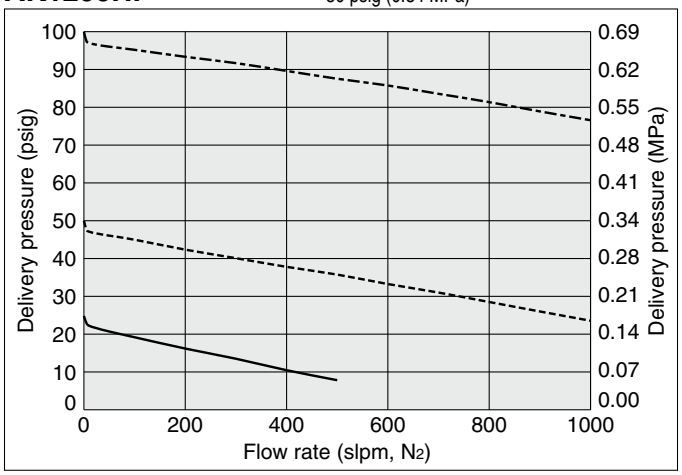
AK1200

Inlet pressure: ---- 80 psig (0.55 MPa) —— 60 psig (0.41 MPa)
1/2 inch connections *)



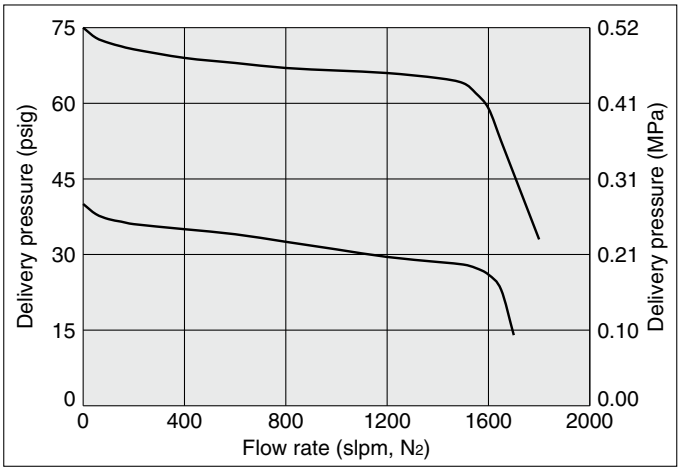
AK1200HF

Inlet pressure: - - - 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)
—— 50 psig (0.34 MPa)



AK1200FC

Inlet pressure: 150 psig (1.0 MPa)
3/4 inch connections *)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Single Stage Regulator for General Applications | High flow (Tied-diaphragm)

Series AK9200

- 3/4 inch port size
- Inlet pressure: Max. 300 psig (2.1 MPa)
- Flow capacity: to 2000 slpm
- Body material: 316 SS

RoHS

How to Order

Port Number ① ② ③ ④

AK92 [02] [S] [4PL] [12] [12] [0] [0] [ ] [ ]

Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316 SS	316 SS	Ni-Cr-Mo alloy

Ports

Code	Ports
4PL	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
12	NPT 3/4 inch

Gauge port (Outlet③, ④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗3)
BP	Bonnet port (NPT 1/8 inch)

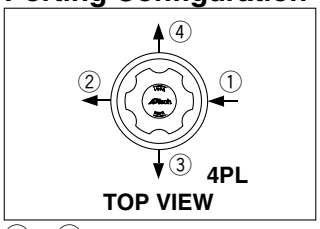
∗3) Panel mounting hole: dia.39.6 mm.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration



①IN ②OUT
③④Gauge port (Outlet)

Specifications

Operating Parameters	AK9202	AK9206	AK9210	Ak9215
Delivery pressure	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 150 psig (0.034 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas			
Source pressure	Vacuum to 300 psig (2.1 MPa)			
Proof pressure (Inlet)	450 psig (3.1 MPa)			
Burst pressure	1500 psig (10.3 MPa)			
Ambient and operating temperature	-40 to 71°C (No freezing)			
Cv	1.6			
Leak rate	1 x 10^{-10} Pa·m³/s			
Connections	NPT 3/4 inch			
Supply pressure effect	7 psig (0.048 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation	Bottom mount (Option: panel mount)			
Internal volume	2.2 in³ (36 cm³)			

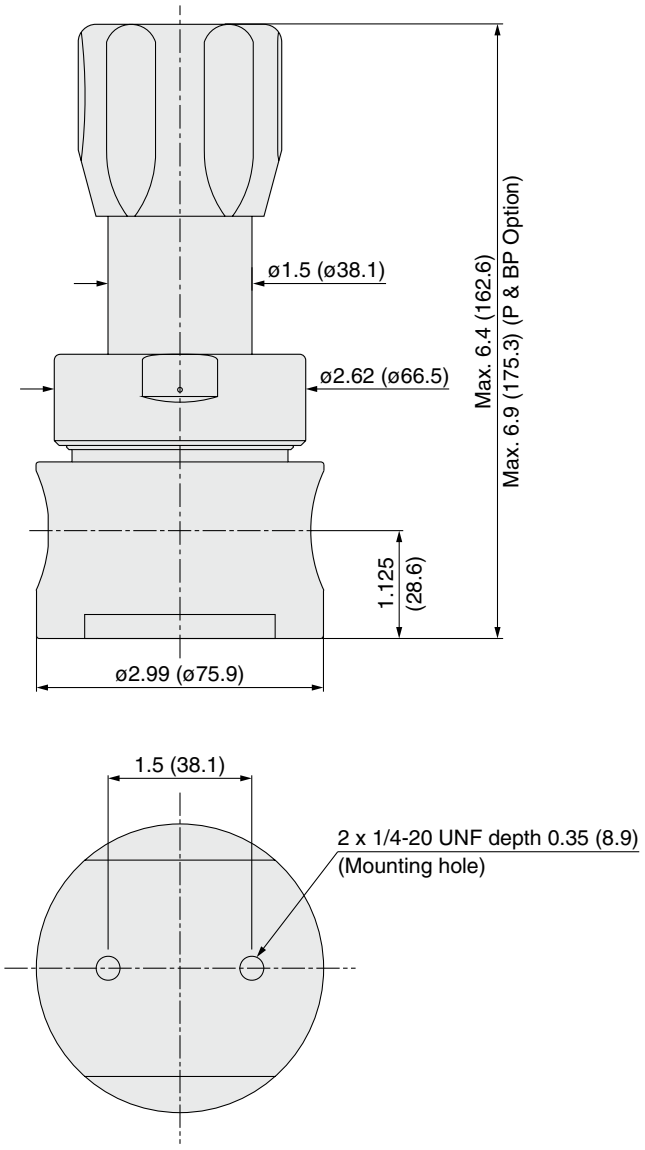
Wetted Parts Material

Wetted Parts	S
Body	316 SS
Nozzle	316 SS
Poppet	316 SS
Diaphragm	Ni-Cr-Mo alloy
Seat	PFA

Dimensions

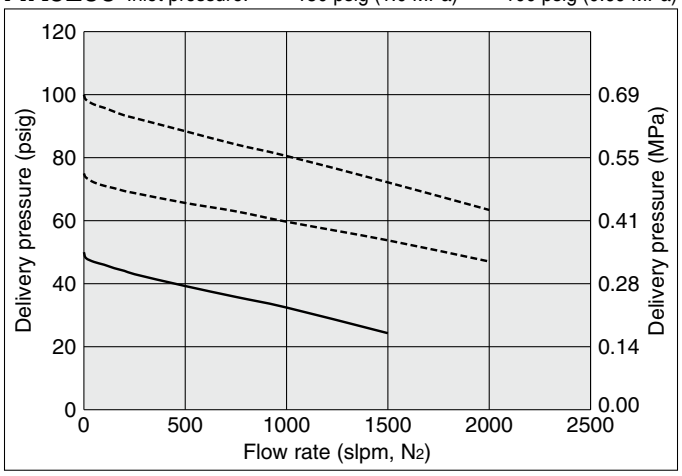
inch (mm)

AK9200



Flow Characteristics

AK9200 Inlet pressure: ---- 150 psig (1.0 MPa) —— 100 psig (0.69 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Two Stage Regulator for General Applications | Low flow (Tied-diaphragm)

Series AK1700

- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
- **Body material: Stainless steel and Brass available**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **Minimizes supply pressure effect by two stage regulation**
- **Tied-diaphragm design**

RoHS

How to Order

AK17 [02] [S] [5PC] [4] [4] [0] [0] [0] [ ] [ ] [ ] [ ]

Port Number: ① ② ③ ④ ⑤

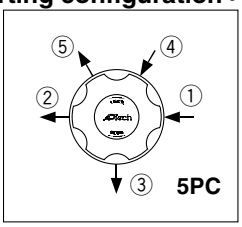
Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	2 to 100 psig (0.014 to 0.7 MPa)
20	5 to 200 psig (0.034 to 1.4 MPa)

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Porting configuration



①IN ②OUT
③Extra bottom port (Outlet)
④Gauge port (Inlet)
⑤Gauge port (Outlet)

Sample Order Number

	Port ①	②	③	④	⑤	
AK1702S	5PC 4	4	0	0	0	
	5PC 4	4	0	V3	40	MPA

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
10	0 to 1000 psig	0 to 7 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

∗4) Panel mounting hole: dia. 1.42 inch (36.1 mm).

Poppet feature option

Code	Feature
No code	Standard (First and second stage tied diaphragm)
NT	First stage tied, second stage free poppet

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
PK	PEEK

∗3) Not available with SH material.

Specifications

Operating Parameters	AK1702	AK1706	AK1710	AK1720
Delivery pressure	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	2 to 100 psig (0.014 to 0.7 MPa)	5 to 200 psig (0.034 to 1.4 MPa)
Gas	Select compatible materials of construction for the gas			
Source pressure	Vacuum to 3500 psig (24.1 MPa)			
First stage pressure	175 psig (1.2 MPa)			
Proof pressure (Inlet)	4500 psig (30.7 MPa)			
Burst pressure	8000 psig (55.2 MPa)			
Ambient and operating temperature	-40 to 71°C (No freezing) ∗1)			
Cv	0.05			
Leak rate	1 x 10^{-10} Pa·m^3/s			
Connections	NPT female, Compression			
Supply pressure effect	0.05 psig (0.00035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop			
Installation	Option: panel mount			
Internal volume	0.9 in^3 (15 cm^3)			
Weight	1.95 kg ∗2)			

∗1) Max. 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

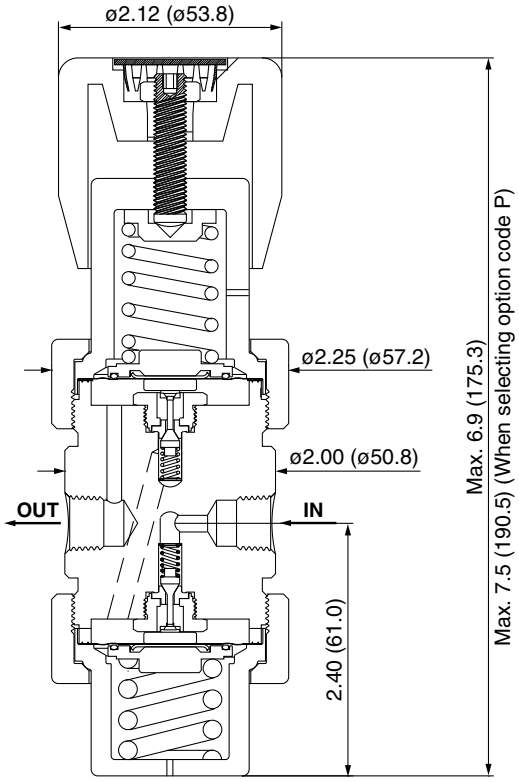
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide, PEEK)		PCTFE (Option: PEEK)

Dimensions

inch (mm)

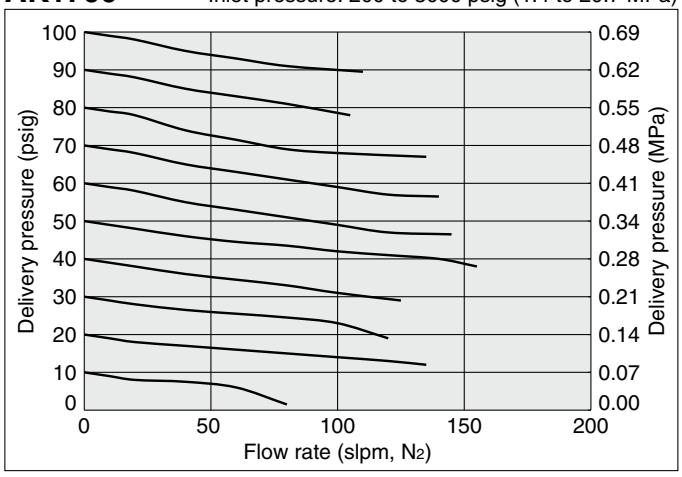
AK1700



Flow Characteristics

AK1700

Inlet pressure: 200 to 3000 psig (1.4 to 20.7 MPa)



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Back Pressure Regulator for General Applications

Series ***BP1000***

- **Operating pressure: 0.5 to 300 psig (0.0034 to 2.1 MPa)**
- **Body material: Stainless steel and Brass available**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

Port Number ① ② ③ ④

BP10 [01] [S] [4PL] [4] [4] [0] [0] [ ] [ ] [ ]

Operating pressure

Code	pressure
01	0.5 to 10 psig (0.0034 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
06	2 to 60 psig (0.014 to 0.4 MPa)
10	5 to 100 psig (0.034 to 0.7 MPa)
20	15 to 200 psig (0.1 to 1.4 MPa)
30	15 to 300 psig (0.1 to 2.1 MPa)

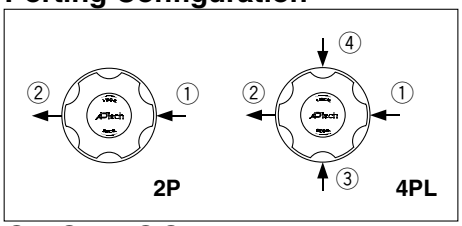
Material

Code	Body	Nozzle	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Ports

Code	Ports	Material	
		B	**S, SH**
2P	Please refer to the following porting configurations.		●
4PL		●	●

Porting Configuration



①IN ②OUT ③④Gauge port (Inlet)

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression

Gauge port (Inlet③, ④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge ∗2) (Gauge port: 1/4 inch NPT)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included only for port code 4PL.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗3)

∗3) Panel mounting hole: dia. 1.42 inch (36.1 mm).

Seat material

Code	Material
No code	FKM (Standard)
TF	PTFE
KZ	FFKM

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Sample Order Number

			Port	③	④			
BP10	01	S	2P	4	4			
			4PL	4	4	0	1	MPA

Specifications

Operating Parameters	BP1001	BP1002	BP1006	BP1010	BP1020	BP1030
Operating pressure	0.5 to 10 psig (0.0034 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	2 to 60 psig (0.014 to 0.4 MPa)	5 to 100 psig (0.034 to 0.7 MPa)	15 to 200 psig (0.1 to 1.4 MPa)	15 to 300 psig (0.1 to 2.1 MPa)
Gas	Select compatible materials of construction for the gas					
Proof pressure (Inlet)	15 psig (0.105 MPa)	45 psig (0.3 MPa)	90 psig (0.6 MPa)	150 psig (1.05 MPa)	300 psig (2.1 MPa)	450 psig (3.15 MPa)
Burst pressure	30 psig (0.2 MPa)	90 psig (0.6 MPa)	180 psig (1.2 MPa)	300 psig (2.1 MPa)	600 psig (4.1 MPa)	900 psig (6.2 MPa)
Ambient and operating temperature	-10 to 71°C (No freezing) ∗1)					
Cv	0.3					
Leak rate	1 x 10^{-10} Pa·m^3/s					
Connections	NPT female, Compression					
Installation	Bottom mount (Option: panel mount)					
Internal volume	0.49 in^3 (8 cm^3)					
Weight	1.2 kg ∗2)					

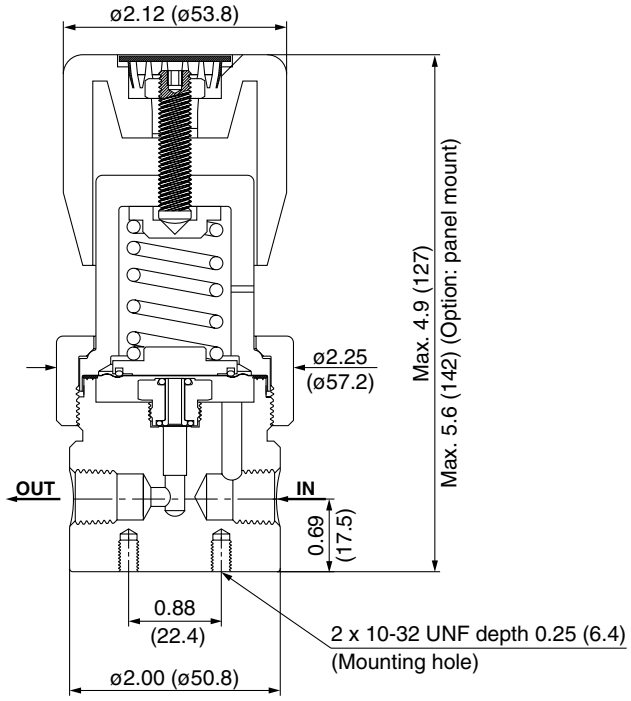
∗1) Min. -30°C for PTFE seat. Optional ambient and operating temperature range available. Please contact SMC.
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Diaphragm	316 SS		Ni-Cr-Mo alloy
Nozzle	316 SS		Ni-Cr-Mo alloy
Seat	FKM (Option: PTFE, FFKM)		
Seal	PTFE		

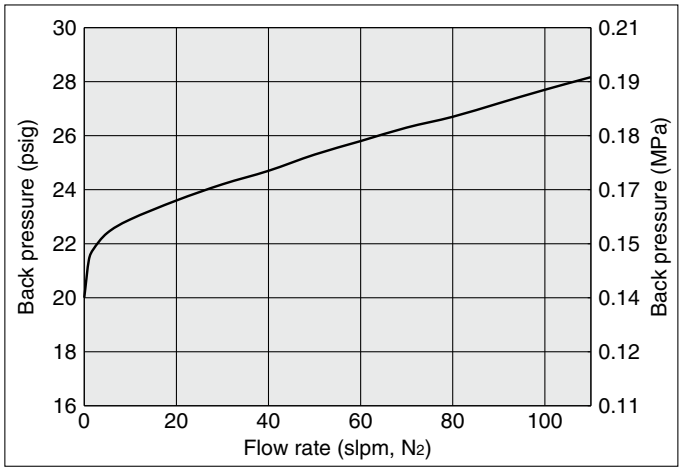
Dimensions

BP1000



Flow Characteristics

BP1000



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Welded Connection Series Back Pressure Regulator for Ultra High Purity

Series ***BP1000***

- **For UHP gas delivery**
- **Operating pressure: 0.5 to 300 psig (0.0034 to 2.1 MPa)**
- **Body material: 316L SS secondary remelt**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**

RoHS

How to Order

BP10 01 S 2PW FV4 FV4

Port Number: ① ② ③

Operating pressure

Code	Pressure
01	0.5 to 10 psig (0.0034 to 0.07 MPa)
02	1 to 30 psig (0.007 to 0.2 MPa)
10	5 to 100 psig (0.034 to 0.7 MPa)
20	15 to 200 psig (0.1 to 1.4 MPa)
30	15 to 300 psig (0.1 to 2.1 MPa)

Material

Code	Body	Nozzle	Diaphragm
S	316L SS	316L SS	
SH	secondary remelt	Ni-Cr-Mo alloy	

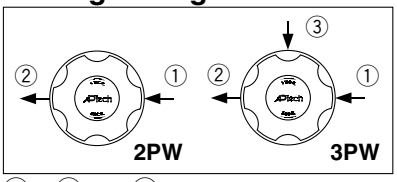
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports

Porting Configuration



①IN ②OUT ③Gauge port (Inlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.4 MPa
4	0 to 400 psig	0 to 3 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗3)

∗3) Panel mounting hole: dia. 1.42 inch (36.1 mm).

Seat material

Code	Material
No code	FKM (Standard)
TF	PTFE
KZ	FFKM

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Sample Order Number

	Port					③	
BP10	01	S	2PW	FV4	FV4		
			3PW	FV4	FV4	V3	MPA

Specifications

Operating Parameters		BP1001	BP1002	BP1010	BP1020	BP1030
Operating pressure		0.5 to 10 psig (0.0034 to 0.07 MPa)	1 to 30 psig (0.007 to 0.2 MPa)	5 to 100 psig (0.034 to 0.7 MPa)	15 to 200 psig (0.1 to 1.4 MPa)	15 to 300 psig (0.1 to 2.1 MPa)
Gas		Select compatible materials of construction for the gas				
Proof pressure (Inlet)		15 psig (0.105 MPa)	45 psig (0.3 MPa)	150 psig (1.05 MPa)	300 psig (2.1 MPa)	450 psig (3.15 MPa)
Burst pressure		30 psig (0.2 MPa)	90 psig (0.6 MPa)	300 psig (2.1 MPa)	600 psig (4.1 MPa)	900 psig (6.2 MPa)
Ambient and operating temperature		-10 to 71°C (No freezing) ∗1)				
Cv		0.3				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s He				
Across the seat leak		Bubble tight				
Surface finish		Ra ma x 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)				
Connections		Face seal, Tube weld				
Installation		Bottom mount (Option: panel mount)				
Internal volume		0.49 in³ (8 cm³)				
Weight		1.2 kg ∗2)				

∗1) Min. -30°C for PTFE seat. Optional ambient and operating temperature range available. Please contact SMC.
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

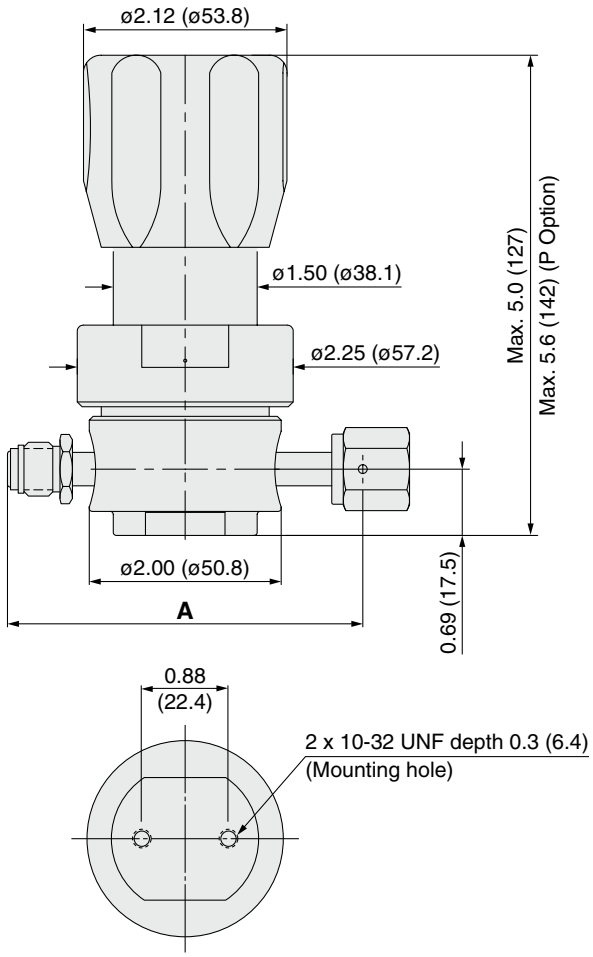
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	FKM (Option: PTFE, FFKM)	
Seal	PTFE	

Dimensions

inch (mm)

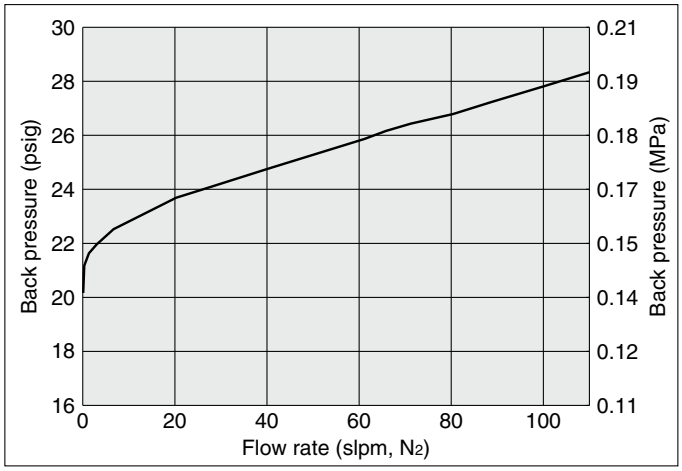
BP1000



Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

BP1000



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Pneumatic Actuation Pressure Regulator | Low flow

Series AP10PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AP10 PA S □ 2PW FV4 FV4 □ □ □ □ □

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP	secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy
SH				
H	Ni-Cr-Mo alloy			

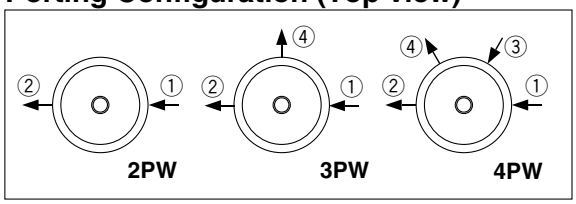
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration (Top view)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications.
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15) ∗6)

∗6) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
TF	PTFE ∗4) ∗5)

∗3) Not available with SHP, SH, H materials.
∗4) Source pressure rating is limited to 300 psig (2.1 MPa) or less.
∗5) PTFE seats reduce seat abrasion for flow cycle application. Gas permeation is greater with PTFE than PCTFE.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AP10PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 3500 psig (24.1 MPa) ∗1)
Proof pressure (Inlet)		5000 psig (34.5 MPa)
Burst pressure		10000 psig (69 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗2)
Cv		0.09
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)
Across the seat leak		4×10^{-9} Pa·m³/s ∗4)
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		0.49 in³ (8 cm³)

∗1) Max. 300 psig (2.1 MPa) for PTFE seat.
∗2) Max. 90°C for Polyimide seat.
∗3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

SMC

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP10PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) *)
	Cv	0.15
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

*) HF option will not achieve rated outlet pressure at all inlet pressures.

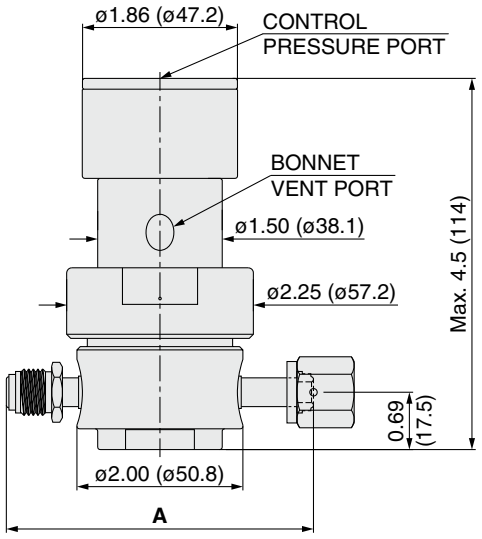
Wetted Parts Material

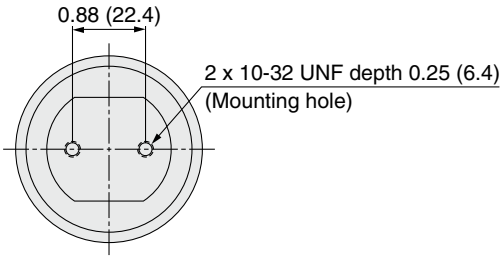
Wetted Parts	S	SHP	SH	H
Body	316L SS secondary remelt			Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation			Electropolish
Poppet	316L SS	Ni-Cr-Mo alloy		
Diaphragm	316L SS	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy	
Seat	PCTFE (Option: Polyimide, PTFE)	PCTFE (Option: PTFE)		

Dimensions

inch (mm)

AP10PA

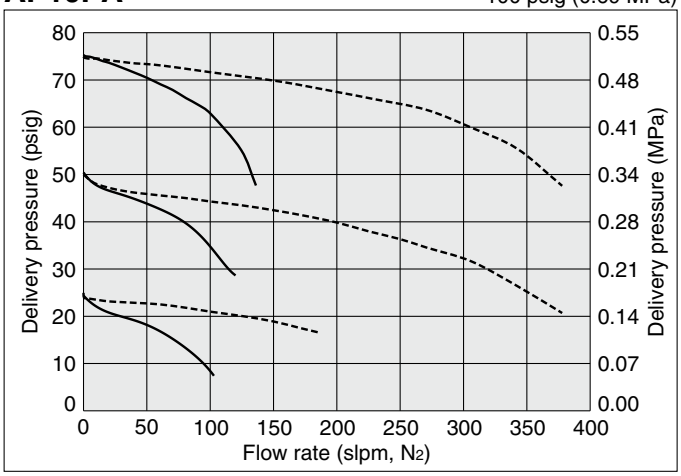




Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

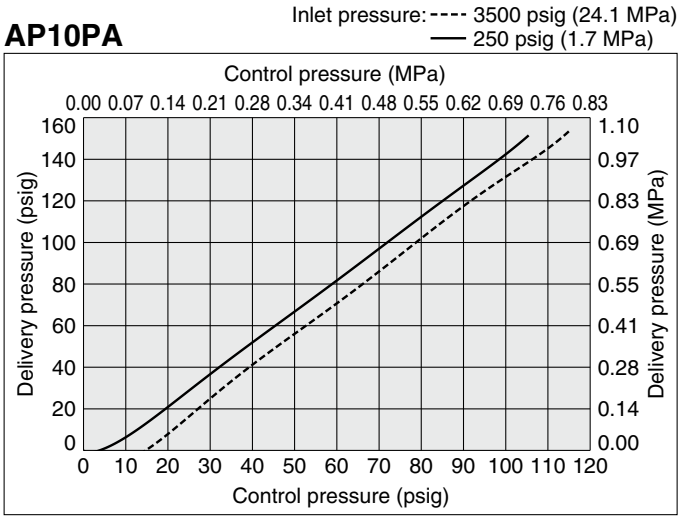
AP10PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input/Output Characteristics

AP10PA



Pneumatic Actuation Pressure Regulator

Low flow (Tied-diaphragm)

Series AP15PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 800 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

AP15 PA S □ 2PW FV4 FV4 □ □ □ □

Port Number: ① ② ③ ④

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy
SH				
H	Ni-Cr-Mo alloy			

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

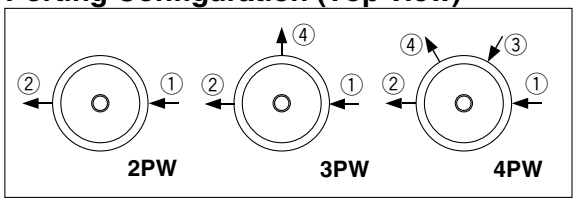
∗3) Not available with SHP, SH, H materials.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration (Top view)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Specifications

Operating Parameters		AP15PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 3500 psig (24.1 MPa)
Proof pressure (Inlet)		5000 psig (34.5 MPa)
Burst pressure		10000 psig (69 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)
Cv		0.09
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		0.51 in³ (8.4 cm³)

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

SMC

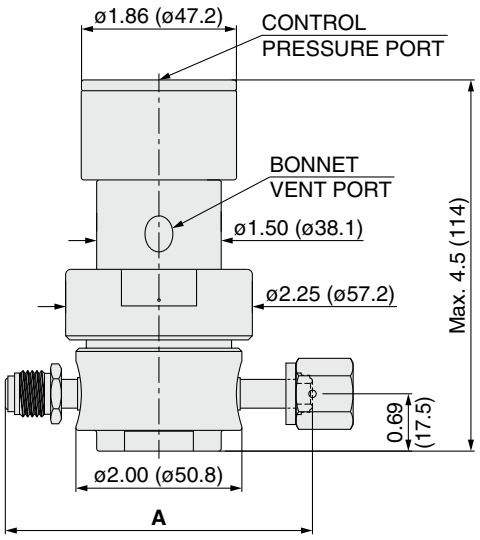
Wetted Parts Material

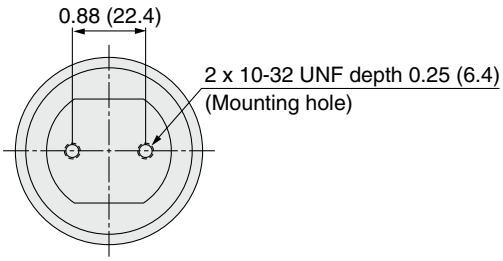
Wetted Parts	S	SHP	SH	H
Body	316L SS secondary remelt			Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation			Electropolish
Poppet	316L SS	Ni-Cr-Mo alloy		
Diaphragm	316L SS	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE		

Dimensions

inch (mm)

AP15PA

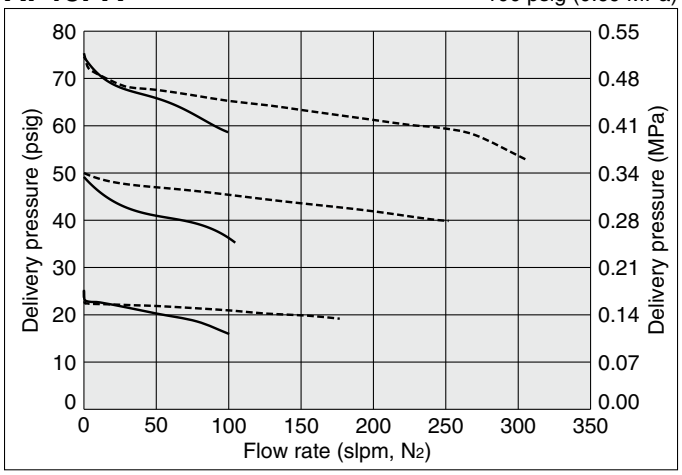




Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
TW4	2.96	(75.2)
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

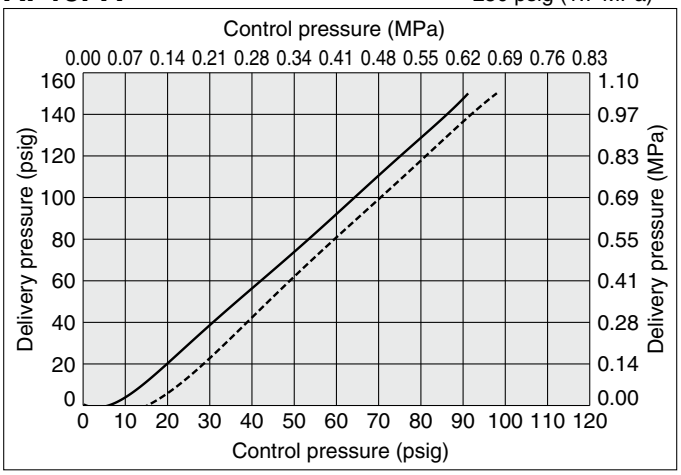
AP15PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AP15PA



Pneumatic Actuation Pressure Regulator

Intermediate flow (Tied-diaphragm)

Series AP14PAT

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity: to 400 slpm**
- **Ni-Cr-Mo alloy internals standard**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AP14 PA T S □ 2PW FV4 FV4 □ □ □ □ □

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	316L SS
SH				Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge *1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

*1) Refer to gauge guide (P.115) for gauge specifications.
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard
HR	High inlet pressure *4) (Max. inlet pressure 3000 psig (20.7 MPa))

*4) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *4)

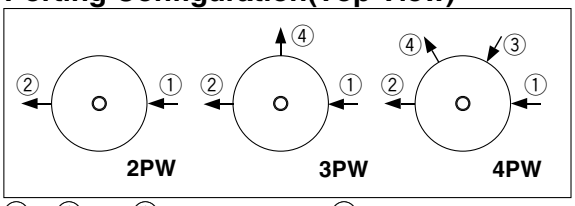
*3) Not available with SH material.

Pressure gauge unit *2)

Code	Unit
No code	psig/bar
MPA	MPa

*2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration(Top View)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Specifications

Operating Parameters		AP14PAT
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 2300 psig (15.9 MPa)
Proof pressure (Inlet)		4000 psig (27.6 MPa)
Burst pressure		8000 psig (55.2 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) *1)
Cv		0.45
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s *2)
Across the seat leak		4×10^{-9} Pa·m³/s *3)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		1.06 in³ (17.4 cm³)

*1) Max. 90°C for Polyimide seat.
*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AP14PAT
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

∗) HR option will not achieve rated outlet pressure at all inlet pressures.

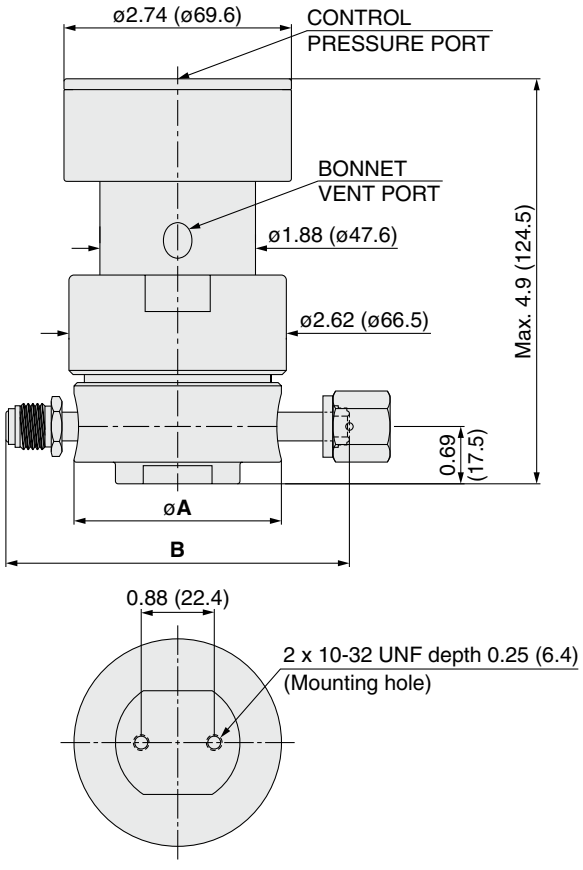
Wetted Parts Material

Wetted Parts	S	SH
Body	316L SS secondary remelt	
Surface finish	Electropolish + Passivation	
Poppet	Ni-Cr-Mo alloy	
Diaphragm	Ni-Cr-Mo alloy	
Nozzle	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

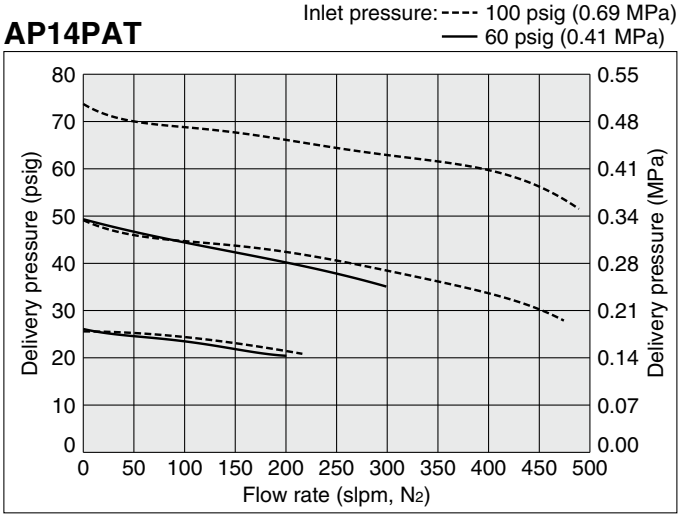
AP14PAT



Connections	A		B	
	inch	(mm)	inch	(mm)
FV4	2.00	(50.8)	3.70	(94.0)
MV4			4.00	(101.6)
TW4			3.46	(87.9)
FV6	2.50	(63.5)	5.22	(132.6)
MV6				
TW6			4.00	(101.6)
FV8			5.22	(132.6)
MV8				
TW8			4.34	(110.2)

Flow Characteristics

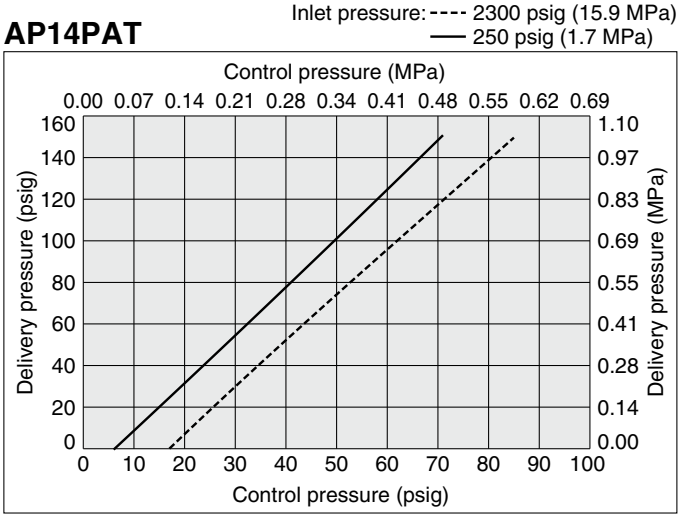
AP14PAT



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AP14PAT



Pneumatic Actuation Pressure Regulator

High flow (Tied-diaphragm)

Series AP12PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity Standard: to 800 slpm**
  HF (option): to 1000 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AP12 PA S □ 2PW FV8 FV8 □ □ □ □ □

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS secondary remelt	316L SS	Ni-Cr-Mo alloy	316L SS
SHP		Ni-Cr-Mo alloy		Ni-Cr-Mo alloy
SH				

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female) *1)
MV12	3/4 inch face seal (Male) *1)
TW12	3/4 inch tube weld

*1) Prepare a suitable mating fitting with a rated pressure.

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge *2)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

*2) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1) *5)
HR	High inlet pressure *5) (Max. inlet pressure 3000 psig (20.7 MPa))

*5) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *4)

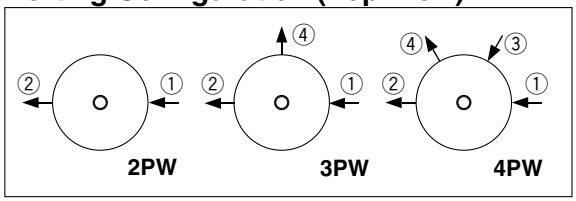
*4) Not available with SHP and SH materials.

Pressure gauge unit *3)

Code	Unit
No code	psig/bar
MPA	MPa

*3) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration (Top View)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Specifications

Operating Parameters		AP12PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 1700 psig (11.7 MPa)
Proof pressure (Inlet)		2550 psig (17.6 MPa)
Burst pressure		8000 psig (55.2 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) *1)
Cv		0.65
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s *2)
Across the seat leak		4×10^{-9} Pa·m³/s *3)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		1.20 in³ (19.6 cm³)

*1) Max. 90°C for Polyimide seat.

*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

SMC

Options

1. High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AP12PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Cv	1.1
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

2. High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AP12PA
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

∗) HF and HR option will not achieve rated outlet pressure at all inlet pressures.

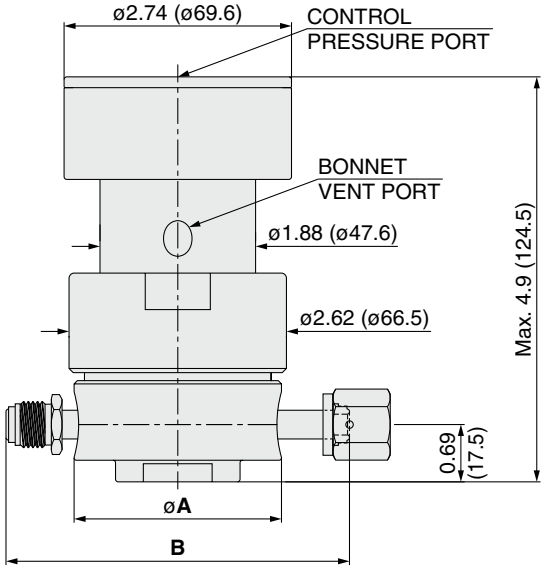
Wetted Parts Material

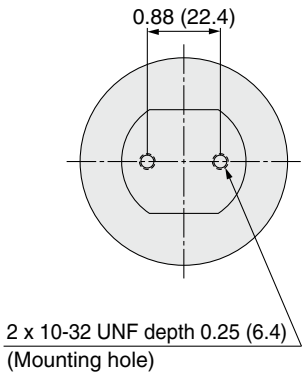
Wetted Parts	S	SHP	SH
Body	316L SS secondary remelt		
Surface finish	Electropolish + Passivation		
Poppet	316L SS	Ni-Cr-Mo alloy	
Diaphragm	Ni-Cr-Mo alloy		
Nozzle	316L SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE	

Dimensions

inch (mm)

AP12PA

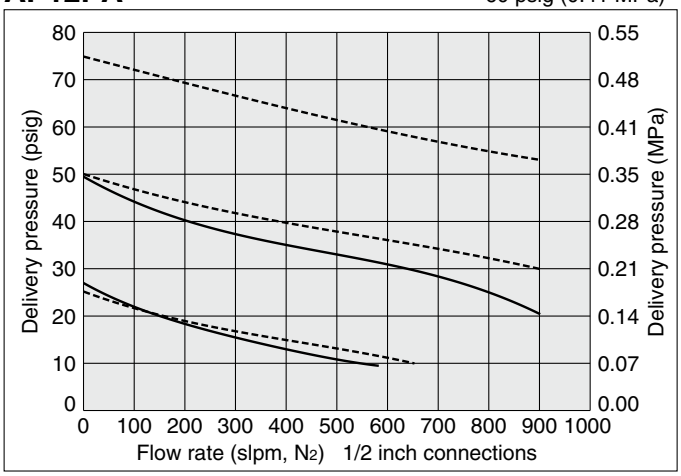




Connections	A		B	
	inch	(mm)	inch	(mm)
FV4	2.00	(50.8)	3.70	(94.0)
MV4			4.00	(101.6)
TW4			3.46	(87.9)
FV6	2.50	(63.5)	5.22	(132.6)
MV6				
TW6			4.00	(101.6)
FV8			5.22	(132.6)
MV8				
TW8			4.34	(110.2)
FV12			6.26	(159.0)
MV12				
TW12			5.00	(127.0)

Flow Characteristics

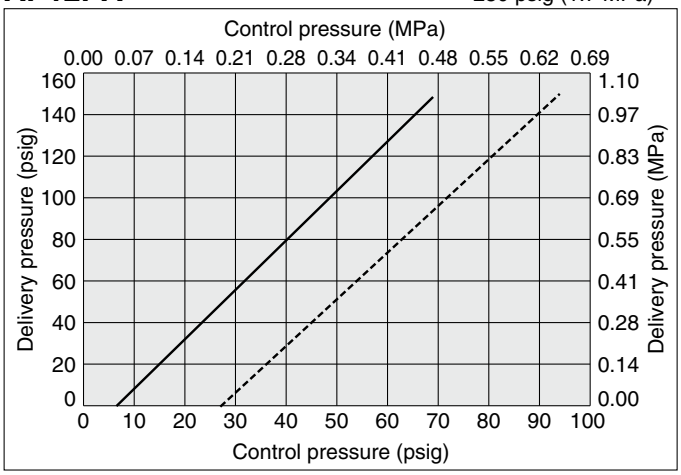
AP12PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AP12PA



Pneumatic Actuation Pressure Regulator | Low flow

Series AZ10PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AZ10 PA S [ ] 2PW FV4 FV4 [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	

Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15) ∗6)

∗6) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
TF	PTFE ∗4)∗5)

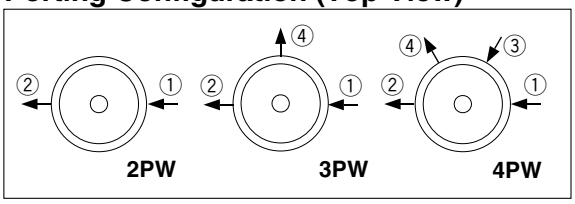
∗3) Not available with SHP material.
∗4) PTFE recommended for applications such as within a process tool.
∗5) Source pressure rating is limited to 300 psig (2.1 MPa) or less.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration (Top View)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Specifications

Operating Parameters		AZ10PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 3500 psig (24.1 MPa) ∗1)
Proof pressure (Inlet)		5000 psig (34.5 MPa)
Burst pressure		10000 psig (69 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗2)
Cv		0.09
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)
Across the seat leak		4×10^{-9} Pa·m³/s ∗4)
Surface finish		Ra 10 µin. (0.25 µm) Option: 25 µin. (0.62 µm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		0.49 in³ (8 cm³)

∗1) Max. 300 psig (2.1 MPa) for PTFE seat.
∗2) Max. 90°C for Polyimide seat.
∗3) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗4) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AZ10PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Cv	0.15
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

∗) HF option will not achieve rated outlet pressure at all inlet pressures.

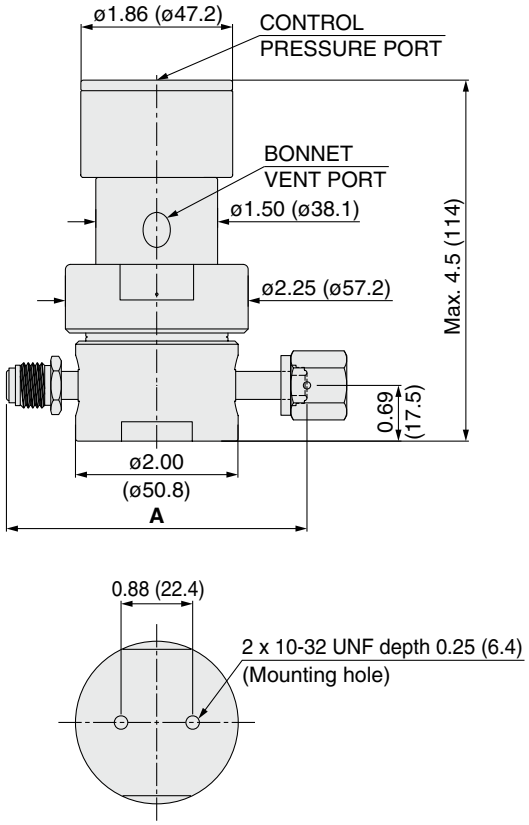
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide, PTFE)	PCTFE (Option: PTFE)

Dimensions

inch (mm)

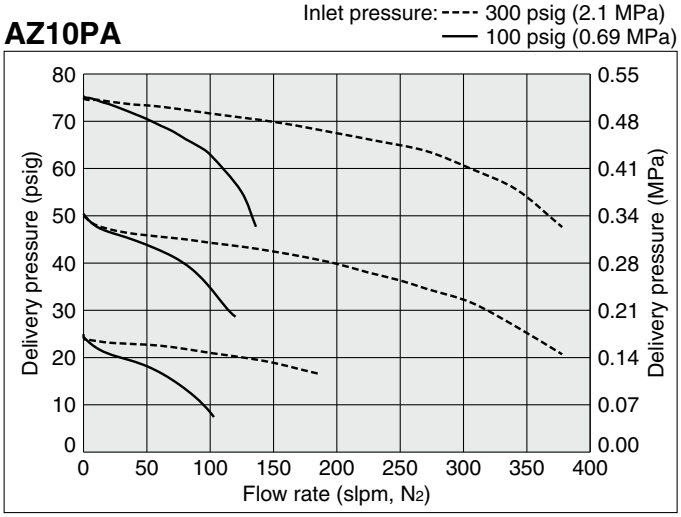
AZ10PA



Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)

Flow Characteristics

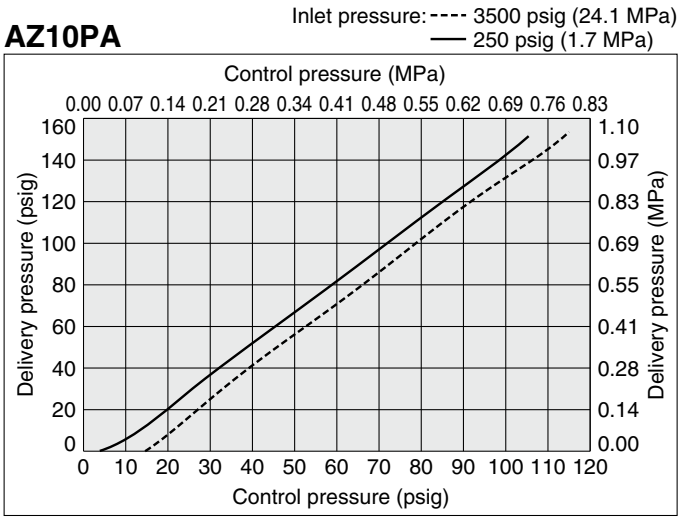
AZ10PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AZ10PA



Pneumatic Actuation Pressure Regulator | Low flow (Tied-diaphragm)

Series AZ15PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AZ15 PA S [ ] 2PW FV4 FV4 [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

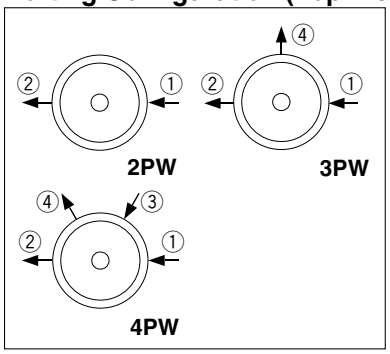
Material

Code	Body	Poppet	Diaphragm	Nozzle
S	316L SS	316L SS	316L SS	316L SS
SHP		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	

Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Porting Configuration (Top View)



①IN ②OUT ③Gauge port (Inlet)
④Gauge port (Outlet)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Other range available. Refer to gauge guide (P.115). Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SHP material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ15PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 3500 psig (24.1 MPa)
Proof pressure (Inlet)		5000 psig (34.5 MPa)
Burst pressure		10000 psig (69 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)
Cv		0.09
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)
Surface finish		Ra 10 µin. (0.25 µm) Option: 25 µin. (0.62 µm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		0.51 in³ (8.4 cm³)

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

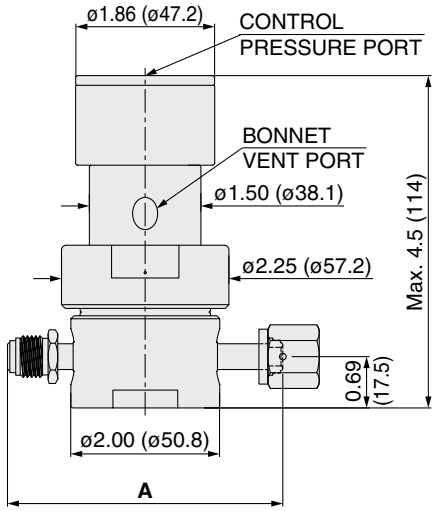
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	316L SS	Ni-Cr-Mo alloy
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

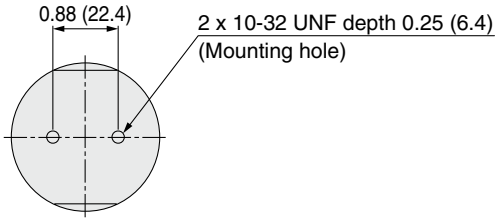
Dimensions

inch (mm)

AZ15PA



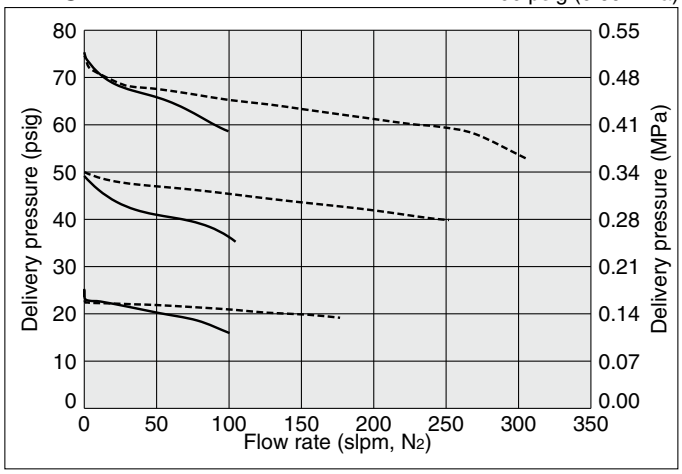
Connections	A	
	inch	(mm)
FV4	3.70	(94.0)
MV4		
FV6	4.70	(119.4)
MV6		
TW6	2.96	(75.2)



Flow Characteristics

AZ15PA

Inlet pressure: ---- 300 psig (2.1 MPa)
—— 100 psig (0.69 MPa)

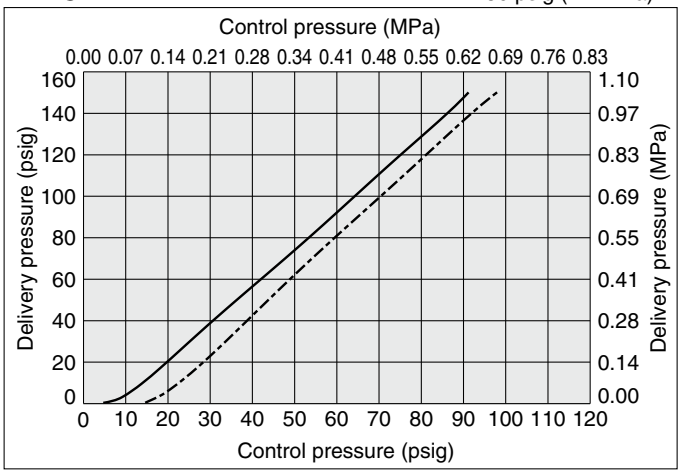


Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AZ15PA

Inlet pressure: -·- 3500 psig (24.1 MPa)
—— 250 psig (1.7 MPa)



Pneumatic Actuation Pressure Regulator

Intermediate flow (Tied-diaphragm)

Series AZ14PAT

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316 SS secondary remelt**
- **High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity: to 400 slpm**
- **Ni-Cr-Mo alloy internals standard**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④

AZ14 PA T S [ ] 2PW FV4 FV4 [ ] [ ] [ ] [ ] [ ]

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

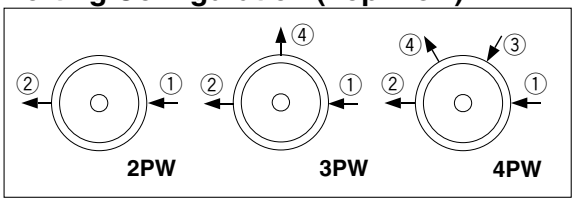
Surface finish

Code	Surface finish Ra
No code	10 µin. (0.25 µm) Standard
Q	25 µin. (0.62 µm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration (Top View)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
2	0 to 200 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications.
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard
HR	High inlet pressure ∗3) (Max. inlet pressure 3000 psig (20.7 MPa))

∗3) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ14PAT
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 2300 psig (15.9 MPa)
Proof pressure (Inlet)		4000 psig (27.6 MPa)
Burst pressure		8000 psig (55.2 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)
Cv		0.45
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)
Surface finish		Ra 10 µin. (0.25 µm) Option: 25 µin. (0.62 µm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		1.06 in³ (17.4 cm³)

∗1) Max. 90°C for Polyimide seat.
∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

SMC

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AZ14PAT
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

∗) HR option will not achieve rated outlet pressure at all inlet pressures.

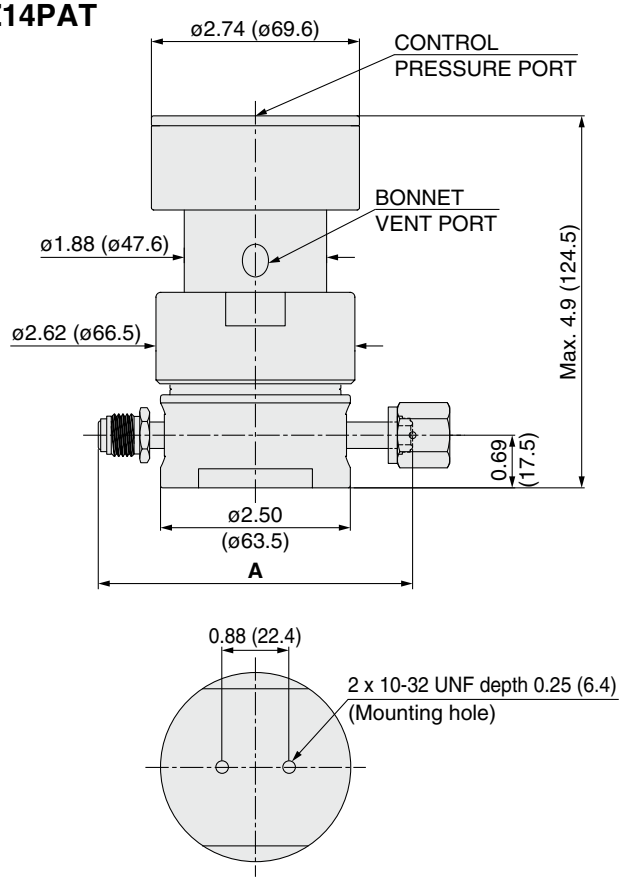
Wetted Parts Material

Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Poppet	Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy
Nozzle	316L SS
Seat	PCTFE (Option: Polyimide)

Dimensions

inch (mm)

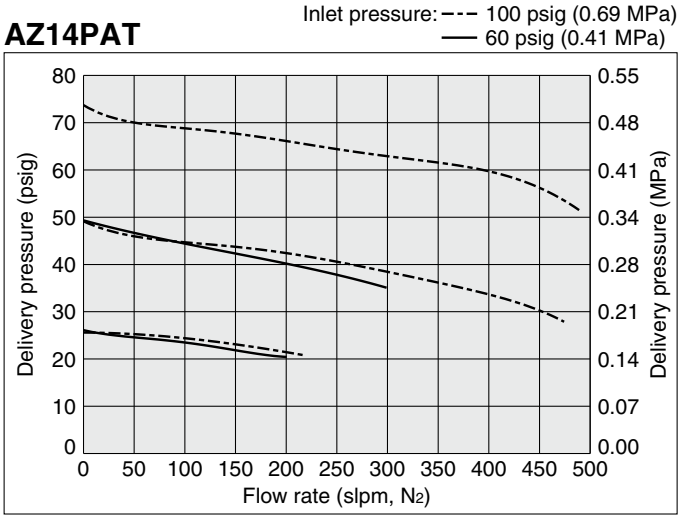
AZ14PAT



Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

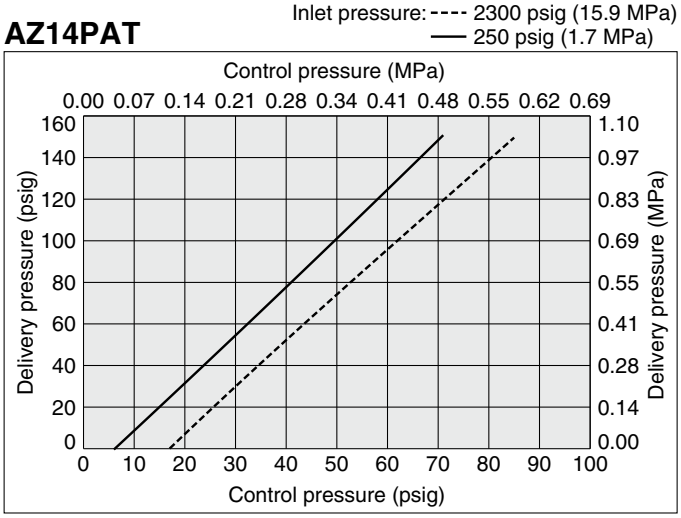
AZ14PAT



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AZ14PAT



Pneumatic Actuation Pressure Regulator

High flow (Tied-diaphragm)

Series AZ12PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS**
- **High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity Standard: to 800 slpm**
  HF (option): to 1000 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

AZ12 PA S □ 2PW FV8 FV8 □ □ □ □ □

Port Number: ① ② ③ ④

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
S	316L SS	316L SS	Ni-Cr-Mo alloy
SHP		Ni-Cr-Mo alloy	

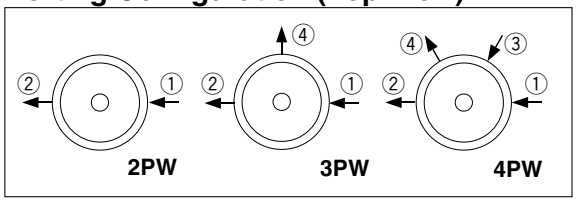
Surface finish

Code	Surface finish Ra
No code	10 μin. (0.25 μm) Standard
Q	25 μin. (0.62 μm)

Ports

Code	Ports
2PW	2 ports
3PW	3 ports
4PW	4 ports

Porting Configuration (Top View)



①IN ②OUT ③Gauge port (Inlet) ④Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld

Gauge port (Inlet③, Outlet④)

Code	Pressure gauge ∗1)	
	psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch face seal male)	
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
2	-30 in.Hg to 160 psig	0 to 1.4 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1) ∗4)
HR	High inlet pressure ∗4) (Max. inlet pressure 3000 psig (20.7 MPa))

∗4) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SHP material.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters		AZ12PA
Delivery pressure		7 to 150 psig (0.05 to 1.0 MPa)
Gas		Select compatible materials of construction for the gas
Source pressure		Vacuum to 1700 psig (11.7 MPa)
Proof pressure (Inlet)		2550 psig (17.6 MPa)
Burst pressure		8000 psig (55.2 MPa)
Maximum control pressure		150 psig (1.0 MPa)
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)
Cv		0.65
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)
Surface finish		Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)
Connections		Face seal, Tube weld
Control pressure port		NPT 1/8 inch
Bonnet port		NPT 1/8 inch
Supply pressure effect		3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation		Bottom mount
Internal volume		1.20 in³ (19.6 cm³)

∗1) Max. 90°C for Polyimide seat.

∗2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

∗3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

Options

1. High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AZ12PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) *)
	Cv	1.1
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

2. High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AZ12PA
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) *)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

*) HF and HR option will not achieve rated outlet pressures at all inlet pressures.

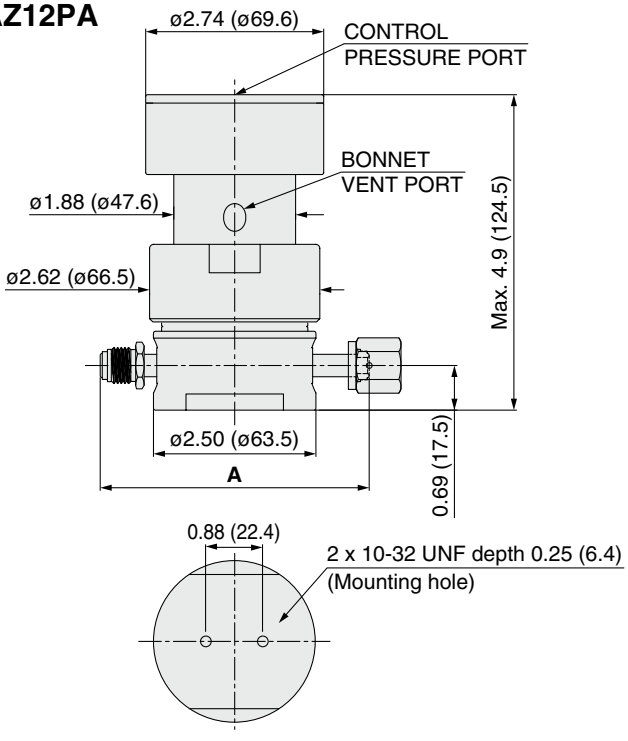
Wetted Parts Material

Wetted Parts	S	SHP
Body	316L SS	
Surface finish	Electropolish + Passivation	
Poppet	316L SS	Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy	
Nozzle	316L SS	
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

inch (mm)

AZ12PA

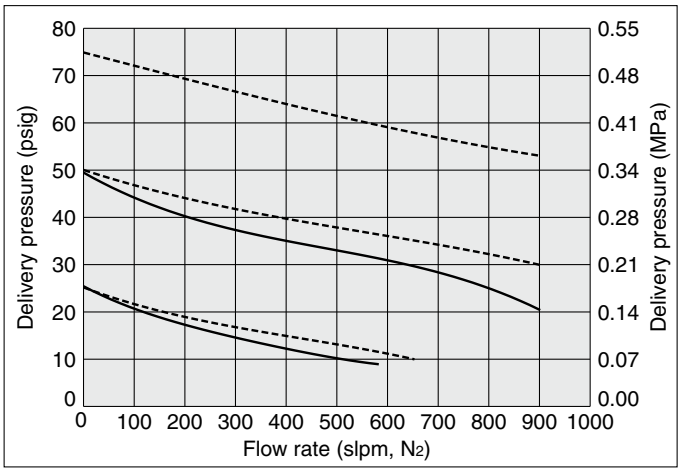


Connections	A	
	inch	(mm)
FV4	4.30	(109.2)
MV4		
FV6	5.22	(132.6)
MV6		
TW6	4.00	(101.6)
FV8	5.22	(132.6)
MV8		
TW8	4.34	(110.2)

Flow Characteristics

AZ12PA

Inlet pressure: ---- 100 psig (0.69 MPa) —— 60 psig (0.41 MPa)
1/2 inch connections

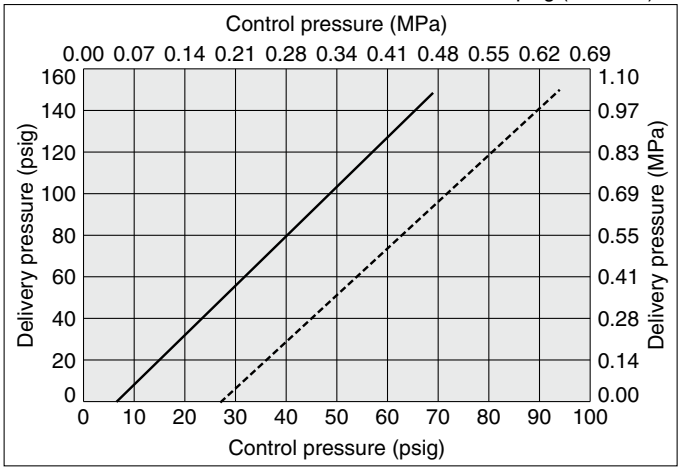


Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AZ12PA

Inlet pressure: ---- 1700 psig (11.7 MPa)
—— 250 psig (1.7 MPa)



Pneumatic Actuation Pressure Regulator | Low flow

Series AK10PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316 SS**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
  HF (option): to 120 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK10 PA S 4PL 4 4 0 0

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

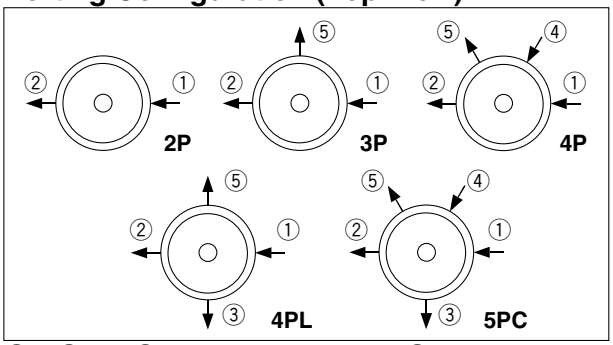
Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4P			●
4PL		●	●
5PC		●	●

Porting Configuration (Top View)



①IN ②OUT ③Extra bottom port (Outlet) ④Gauge port (Inlet) ⑤Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression
6T	3/8 inch compression

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge *1) psig/bar unit	Pressure gauge *1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) *2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V15	-30 in.Hg to 30 psig	-0.1 to 0.1 MPa
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa
30	0 to 3000 psig	0 to 21 MPa
40	0 to 4000 psig	0 to 28 MPa

*1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Option

Code	Specification
No code	Standard (Cv: 0.09)
HF	High flow (Cv: 0.15) *6)

*6) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *3)
PK	PEEK
TF	PTFE *4) *5)

*3) Not available with SH material.
*4) Source pressure rating is limited to 300 psig (2.1 MPa) or less.
*5) PTFE seats reduce seat abrasion for flow cycle application. Gas permeation is greater with PTFE than PCTFE.

Pressure gauge unit *2)

Code	Unit
No code	psig/bar
MPA	MPa

*2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Specifications

Operating Parameters	AK10PA
Delivery pressure	7 to 150 psig (0.05 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas
Source pressure	Vacuum to 3500 psig (24.1 MPa) *1)
Proof pressure (Inlet)	4500 psig (30.7 MPa)
Burst pressure	10000 psig (69 MPa)
Maximum control pressure	150 psig (1.0 MPa)
Ambient and operating temperature	-40 to 71°C (No freezing) *2)
Cv	0.09
Leak rate	1 x 10^{-10} Pa·m^3/s
Connections	NPT female, Compression
Control pressure port	NPT 1/8 inch
Bonnet port	NPT 1/8 inch
Supply pressure effect	0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation	Bottom mount
Internal volume	0.49 in^3 (8 cm^3)

*1) Max. 300 psig (2.1 MPa) for PTFE seat.
*2) Max. 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

Option

High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AK10PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Cv	0.15
	Supply pressure effect	0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

∗) HF option will not achieve rated outlet pressure at all inlet pressures.

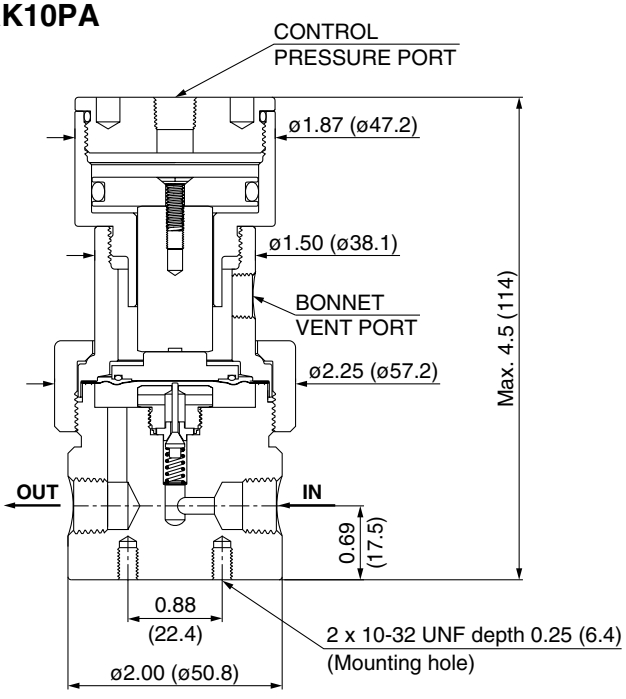
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide, PEEK, PTFE)		PCTFE (Option: PEEK, PTFE)

Dimensions

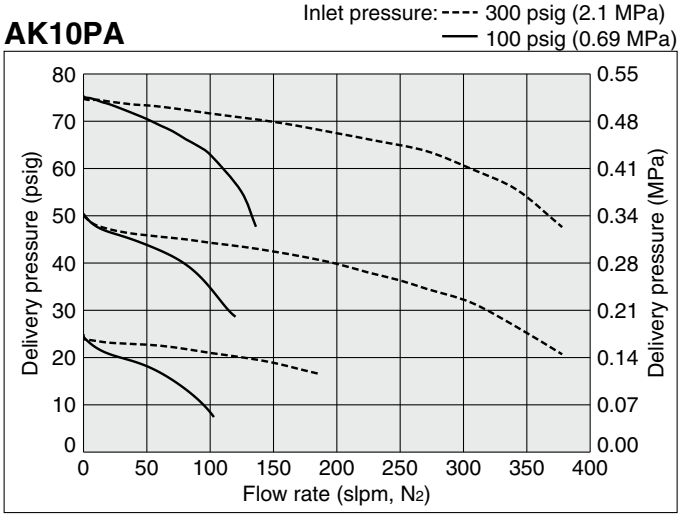
inch (mm)

AK10PA



Flow Characteristics

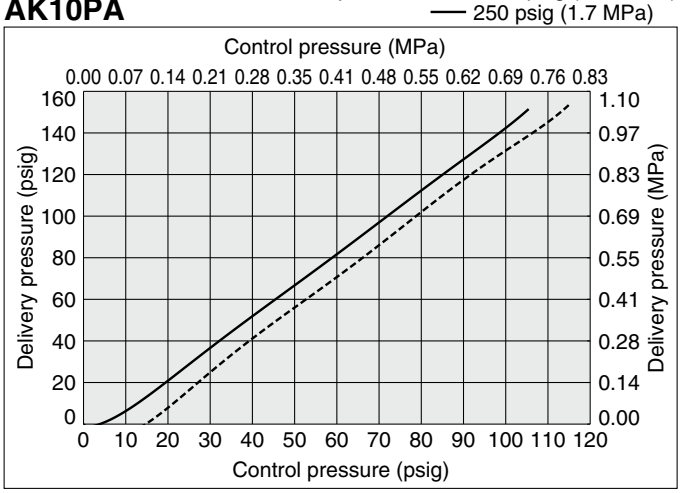
AK10PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input / Output Characteristics

AK10PA



Pneumatic Actuation Pressure Regulator

Low flow (Tied-diaphragm)

Series AK15PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316L SS secondary remelt**
- **High inlet pressure type: Max. 3500 psig (24.1 MPa)**
- **Flow capacity Standard: to 30 slpm**
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK15 PA S 4PL 4 4 0 0

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Ni-Cr-Mo alloy	Ni-Cr-Mo alloy

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
4T	1/4 inch compression
6T	3/8 inch compression

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)
PK	PEEK

∗3) Not available with SH material.

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗1) psig/bar unit	Pressure gauge ∗1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V15	-30 in.Hg to 30 psig	-0.1 to 0.1 MPa
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa
30	0 to 3000 psig	0 to 21 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

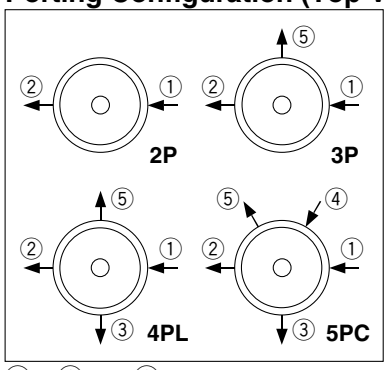
∗2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Porting Configuration (Top View)



①IN ②OUT ③Extra bottom port (Outlet)
④Gauge port (Inlet) ⑤Gauge port (Outlet)

Specifications

Operating Parameters	AK15PA
Delivery pressure	7 to 150 psig (0.05 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas
Source pressure	Vacuum to 3500 psig (24.1 MPa)
Proof pressure (Inlet)	4500 psig (30.7 MPa)
Burst pressure	10000 psig (69 MPa)
Maximum control pressure	150 psig (1.0 MPa)
Ambient and operating temperature	-40 to 71°C (No freezing) ∗)
Cv	0.09
Leak rate	1 x 10^{-10} Pa·m^3/s
Connections	NPT female, Compression
Control pressure port	NPT 1/8 inch
Bonnet port	NPT 1/8 inch
Supply pressure effect	0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation	Bottom mount
Internal volume	0.53 in^3 (8.7 cm^3)

∗) Max. 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

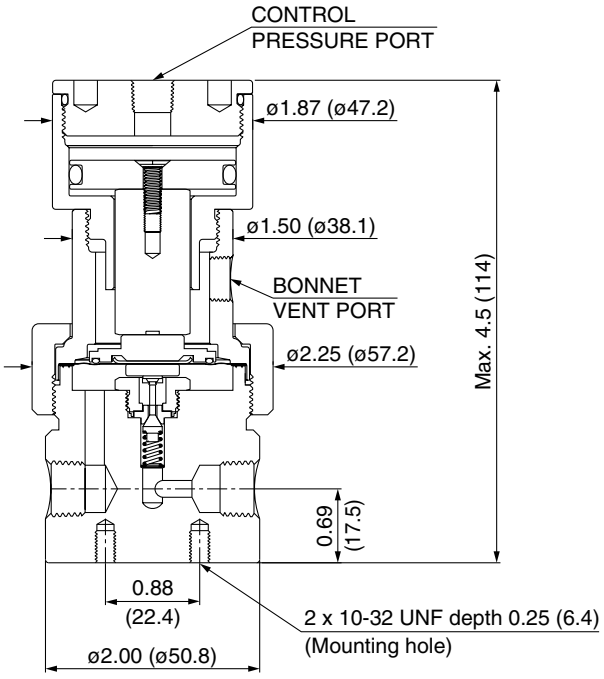
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide, PEEK)		PCTFE (Option: PEEK)

Dimensions

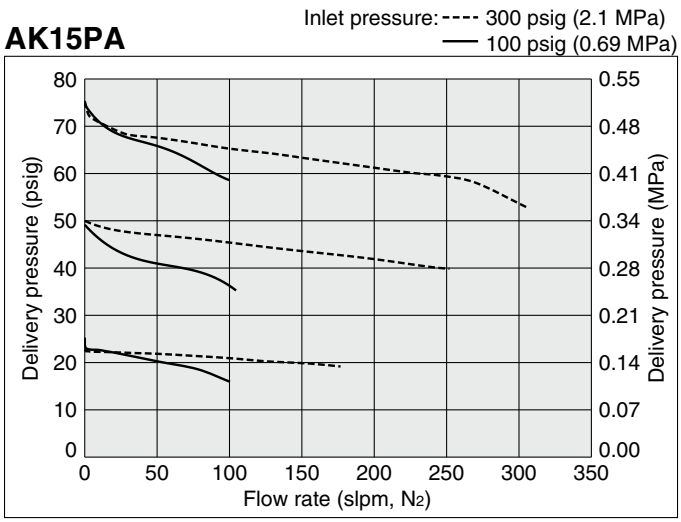
inch (mm)

AK15PA



Flow Characteristics

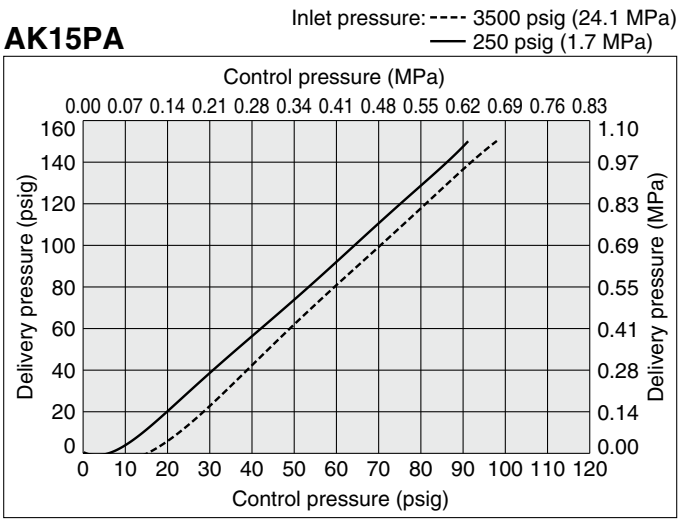
AK15PA



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input/Output Characteristics

AK15PA



Pneumatic Actuation Pressure Regulator

Intermediate flow (Tied-diaphragm)

Series AK14PAT

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316 SS**
- **High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity: to 400 slpm**
- **Ni-Cr-Mo alloy internals standard**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa)**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK14 PA T S 4PL 6 6 0 0

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

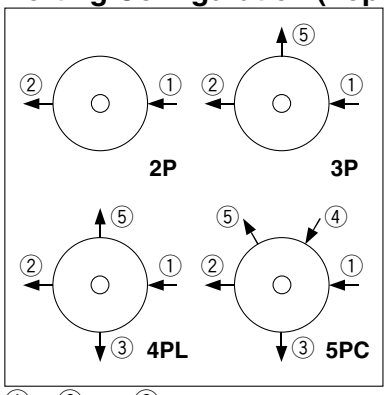
Material

Code	Body	Poppet	Diaphragm	Nozzle
B	Brass	Ni-Cr-Mo alloy	Ni-Cr-Mo alloy	316 SS
S	316 SS			
SH				Ni-Cr-Mo alloy

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Porting Configuration (Top View)



①IN ②OUT ③Extra bottom port (Outlet)
④Gauge port (Inlet) ⑤Gauge port (Outlet)

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
6	NPT 3/8 inch
8	NPT 1/2 inch
4T	1/4 inch compression
6T	3/8 inch compression
8T	1/2 inch compression

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Option

Code	Specification
No code	Standard
HR	High inlet pressure ∗4) (Max. inlet pressure 3000 psig (20.7 MPa))

∗4) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗1) psig/bar unit	Pressure gauge ∗1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V15	-30 in.Hg to 30 psig	-0.1 to 0.1 MPa
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa
30	0 to 3000 psig	0 to 21 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Specifications

Operating Parameters	AK14PAT
Delivery pressure	7 to 150 psig (0.05 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas
Source pressure	Vacuum to 2300 psig (15.9 MPa)
Proof pressure (Inlet)	4000 psig (27.6 MPa)
Burst pressure	8000 psig (55.2 MPa)
Maximum control pressure	150 psig (1.0 MPa)
Ambient and operating temperature	-40 to 71°C (No freezing) ∗)
Cv	0.45
Leak rate	1 x 10^{-10} Pa·m^3/s
Connections	NPT female, Compression
Control pressure port	NPT 1/8 inch
Bonnet port	NPT 1/8 inch
Supply pressure effect	1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation	Bottom mount
Internal volume	1.14 in^3 (18.7 cm^3)

∗) Max. 90°C for Polyimide seat.

SMC

Option

High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AK14PAT
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

∗) HR option will not achieve rated outlet pressure at all inlet pressures.

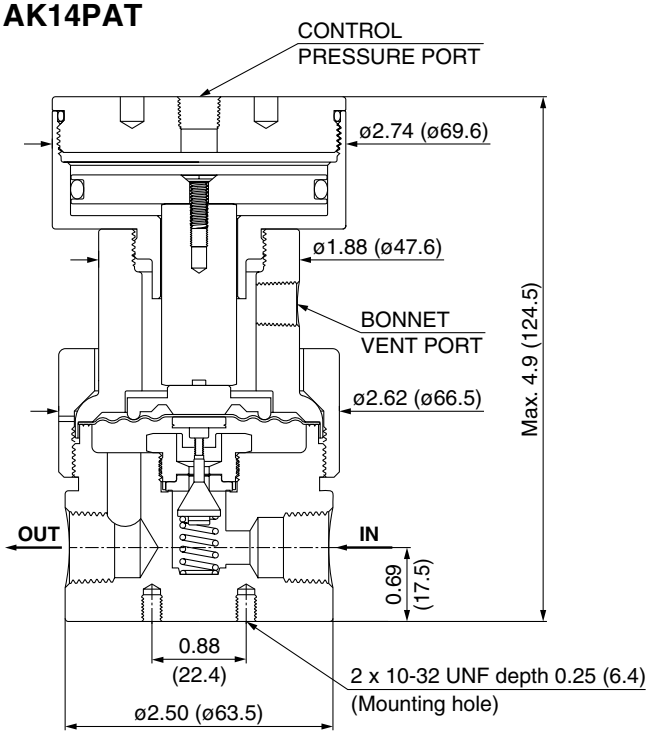
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	Ni-Cr-Mo alloy		
Diaphragm	Ni-Cr-Mo alloy		
Nozzle	316 SS		Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)		PCTFE

Dimensions

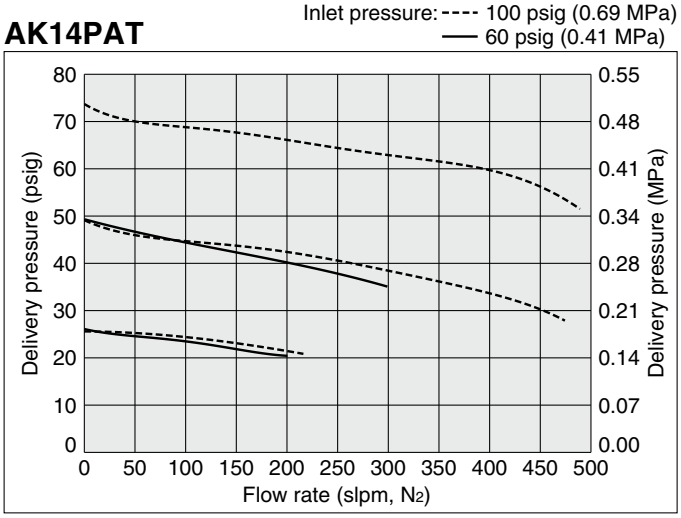
inch (mm)

AK14PAT



Flow Characteristics

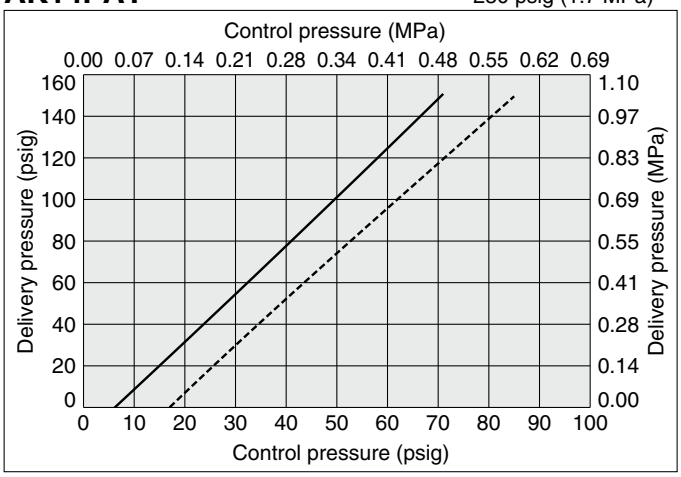
AK14PAT



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input/Output Characteristics

AK14PAT



Pneumatic Actuation Pressure Regulator

High flow (Tied-diaphragm)

Series AK12PA

- **Actuation control pressure isolated from process gas by two seals**
- **Body material: 316 SS**
- **High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)**
  HR (option): Max. 3000 psig (20.7 MPa)
- **Flow capacity Standard: to 800 slpm**
  HF (option): to 1000 slpm
- **Ni-Cr-Mo alloy internals available for corrosion resistance**
- **100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less**

RoHS

How to Order

Port Number ① ② ③ ④ ⑤

AK12 PA S 4PL 8 8 0 0

Delivery pressure

Code	Delivery pressure
PA	7 to 150 psig (0.05 to 1.0 MPa)

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	Ni-Cr-Mo alloy
S	316 SS		
SH		Ni-Cr-Mo alloy	

Ports

Code	Ports	Material B	Material S, SH
2P	Refer to the following porting configurations.		●
3P			●
4PL		●	●
5PC		●	●

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Option

Code	Specification
No code	Standard (Cv: 0.65)
HF	High flow (Cv: 1.1) ∗4)
HR	High inlet pressure ∗4) (Max. inlet pressure 3000 psig (20.7 MPa))

∗4) Full outlet pressure rating may not be achieved at all inlet pressure.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗3)

∗3) Not available with SH material.

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

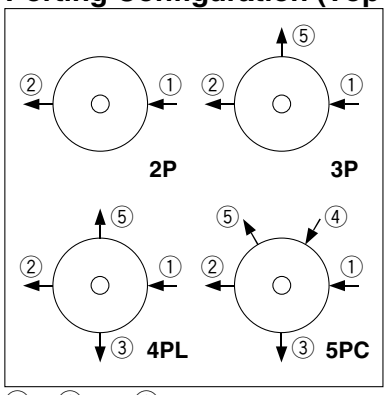
Code	Pressure gauge ∗1) psig/bar unit	Pressure gauge ∗1) MPa unit
No code	No gauge port	
0	No pressure gauge (Gauge port: 1/4 inch NPT) ∗2)	
C	No pressure gauge (1/4 inch NPT plug is installed before shipment.)	
V15	-30 in.Hg to 30 psig	-0.1 to 0.1 MPa
V3	-30 in.Hg to 30 psig	-0.1 to 0.2 MPa
L	-30 in.Hg to 60 psig	-0.1 to 0.4 MPa
1	-30 in.Hg to 100 psig	-0.1 to 0.7 MPa
H	-30 in.Hg to 160 psig	-0.1 to 1.1 MPa
V2	-30 in.Hg to 200 psig	-0.1 to 1.4 MPa
2	-30 in.Hg to 160 psig	0 to 1.5 MPa
4	0 to 400 psig	0 to 3 MPa
10	0 to 1000 psig	0 to 7 MPa
30	0 to 3000 psig	0 to 21 MPa
40	0 to 4000 psig	0 to 28 MPa

∗1) Refer to gauge guide (P.115) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.
∗2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

Connections (Inlet①, Outlet②)

Code	Connections
4	NPT 1/4 inch
6	NPT 3/8 inch
8	NPT 1/2 inch
4T	1/4 inch compression
6T	3/8 inch compression
8T	1/2 inch compression

Porting Configuration (Top View)



①IN ②OUT ③Extra bottom port (Outlet)
④Gauge port (Inlet) ⑤Gauge port (Outlet)

Specifications

Operating Parameters	AK12PA
Delivery pressure	7 to 150 psig (0.05 to 1.0 MPa)
Gas	Select compatible materials of construction for the gas
Source pressure	Vacuum to 1700 psig (11.7 MPa)
Proof pressure (Inlet)	2550 psig (17.6 MPa)
Burst pressure	8000 psig (55.2 MPa)
Maximum control pressure	150 psig (1.0 MPa)
Ambient and operating temperature	-40 to 71°C (No freezing) ∗)
Cv	0.65
Leak rate	1 x 10^{-10} Pa·m^3/s
Connections	NPT female, Compression
Control pressure port	NPT 1/8 inch
Bonnet port	NPT 1/8 inch
Supply pressure effect	3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop
Installation	Bottom mount
Internal volume	1.32 in^3 (21.6 cm^3)

∗) Max. 90°C for Polyimide seat. Optional ambient and operating temperature range available. Please contact SMC.

SMC

Options

1. High flow

Higher flow capacity with internal changes only, no change in external dimensions. Changes from the standard type are:

Option	Other Parameters	AK12PA
HF	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Cv	1.1
	Supply pressure effect	4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop

2. High inlet pressure

Changes from the standard type are:

Option	Other Parameters	AK12PA
HR	**Delivery pressure**	7 to 150 psig (0.05 to 1.0 MPa) ∗)
	Source pressure	Vacuum to 3000 psig (20.7 MPa)
	Proof pressure (Inlet)	4500 psig (31 MPa)
	Burst pressure	9000 psig (62 MPa)

∗) HR and HF options will not achieve rated outlet pressure at all inlet pressures.

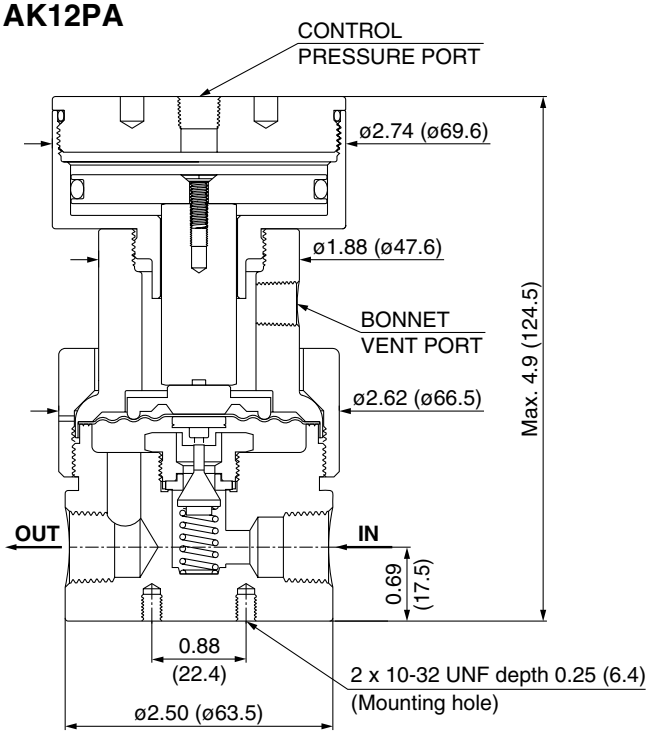
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Ni-Cr-Mo alloy
Diaphragm	Ni-Cr-Mo alloy		
Seat	PCTFE (Option: Polyimide)		PCTFE

Dimensions

inch (mm)

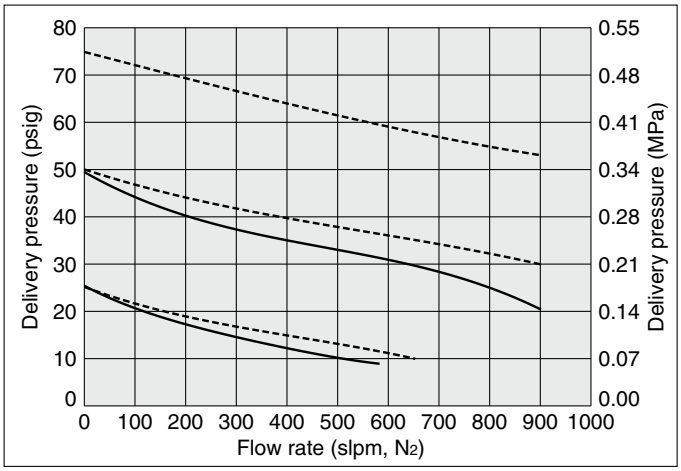
AK12PA



Flow Characteristics

AK12PA

Inlet pressure: ---- 100 psig (0.69 MPa) —— 60 psig (0.41 MPa)
1/2 inch connections

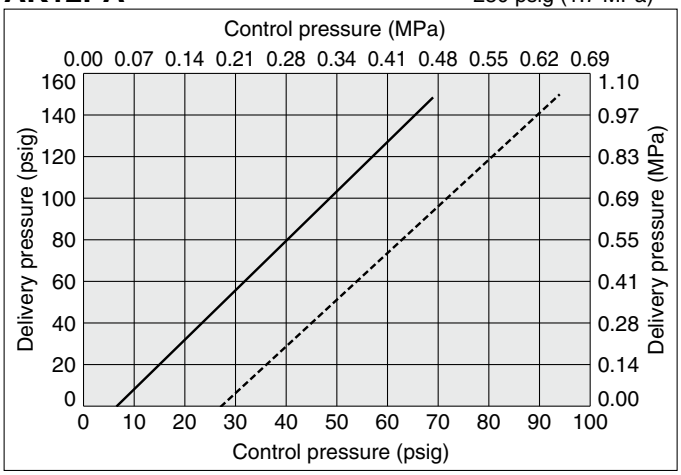


Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Input/Output Characteristics

AK12PA

Inlet pressure: ---- 1700 psig (11.7 MPa)
—— 250 psig (1.7 MPa)

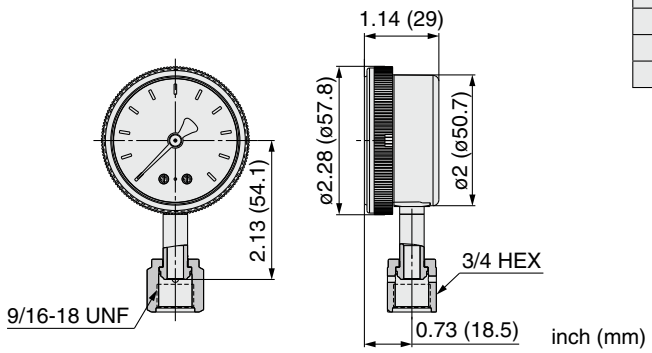


Regulator
Pressure Gauges Guide

For AP/SL/AZ series (Installed before shipment *1) / Order separately)

Specifications

Installation		Lower mount
Gas		Select compatible materials of construction for the gas
Connections		1/4 inch face seal (Female)
Temperature range		-40 to 60°C (No freezing)
Accuracy		25% to 75% of the scale: ±1%F.S. Other than above: ±2%F.S. (ASME B40.1 Grade A)
Cleanliness		ASME B40.1 level IV
No oil		No oil
Material	**Case**	Stainless steel
	Window	Polycarbonate
	Socket	316L SS
	Bourdon tube	316L SS



inch (mm)

Model

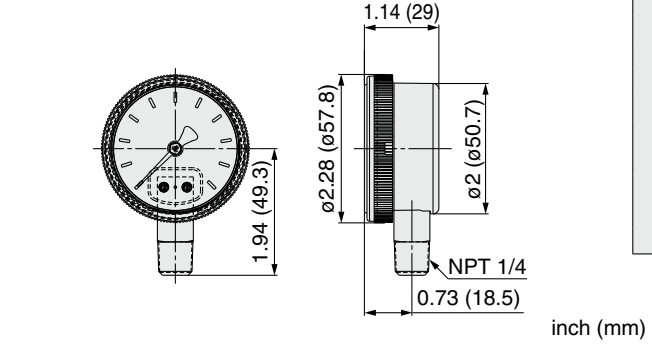
Regulator Code *2)		Pressure range	Unit	Part number *3)
gauge port	unit			
V3	**(No code)**	-30 in.Hg to 30 psig	psig/bar *4)	**00-83000023**
L		-30 in.Hg to 60 psig		**00-83000026**
1		-30 in.Hg to 100 psig		**00-83000021**
H		-30 in.Hg to 160 psig		**00-83000116**
2		0 to 200 psig		**00-83000020**
4		0 to 400 psig		**00-83000007**
10		0 to 1000 psig		**00-83000022**
40		0 to 4000 psig		**00-83000024**
V3	**MPA**	-0.1 to 0.2 MPa	MPa	**00-83000304**
L		-0.1 to 0.4 MPa		**00-83000305**
1		-0.1 to 0.7 MPa		**00-83000300**
H		-0.1 to 1.1 MPa		**00-83000297**
2		0 to 1.4 MPa		**00-83000299**
4		0 to 3 MPa		**00-83000301**
10		0 to 7 MPa		**00-83000302**
40		0 to 28 MPa		**00-83000303**

For AK/BP series (Installed before shipment / Order separately)

Stainless steel / Lower mount

Specifications

Installation		Lower mount
Gas		Select compatible materials of construction for the gas
Connections		NPT 1/4 inch
Temperature range		-40 to 60°C (No freezing)
Accuracy		25% to 75% of the scale: ±2%F.S. Other than above: ±3%F.S. (ASME B40.1 Grade B or better)
Cleanliness		ASME B40.1 level IV
No oil		No oil
Material	**Case**	Stainless steel
	Window	Polycarbonate
	Socket	316L SS
	Bourdon tube	316L SS



inch (mm)

Model

Regulator Code *2)			Pressure range	Unit	Part number *3)
material	gauge port	unit			
S **SH**	**V15**	**(No code)**	-30 in.Hg to 15 psig	psig/bar *4)	**00-83000102**
	V3		-30 in.Hg to 30 psig		**00-83000184**
	L		-30 in.Hg to 60 psig		**00-83000181**
	1		-30 in.Hg to 100 psig		**00-83000182**
	H		-30 in.Hg to 160 psig		**00-83000196**
	V2		-30 in.Hg to 200 psig		**00-83000033**
	2		0 to 200 psig		**00-83000193**
	4		0 to 400 psig		**00-83000194**
	10		0 to 1000 psig		**00-83000187**
	30		0 to 3000 psig		**00-83000234**
	40		0 to 4000 psig		**00-83000183**
	V15	**MPA**	-0.1 to 0.1 MPa	MPa	**00-83000287**
	V3		-0.1 to 0.2 MPa		**00-83000288**
	L		-0.1 to 0.4 MPa		**00-83000289**
	1		-0.1 to 0.7 MPa		**00-83000290**
	H		-0.1 to 1.1 MPa		**00-83000291**
	V2		-0.1 to 1.4 MPa		**00-83000292**
	2		0 to 1.5 MPa		**00-83000286**
	4		0 to 3 MPa		**00-83000285**
	10		0 to 7 MPa		**00-83000284**
	30		0 to 21 MPa		**00-83000283**
	40		0 to 28 MPa		**00-83000282**

*1) If one prefers shipment with the pressure gauges installed on the regulator, the material of gasket to be used on the connections will be Nickel (no plated). Please contact SMC for details if one prefers changing this material.
*2) When pressure gauge needs to be assembled with regulator when shipment, put this code as gauge port in How to Order.

For AK/BP series (Installed before shipment / Order separately)

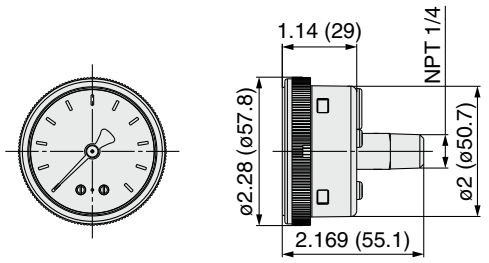
Stainless steel / Center back mount

Specifications

Installation		Center back mount
Gas		Select compatible materials of construction for the gas
Connections		NPT 1/4 inch
Temperature range		-40 to 60°C (No freezing)
Accuracy		25% to 75% of the scale: ±2%F.S. Other than above: ±3%F.S. (ASME B40.1 Grade B or better)
Cleanliness		ASME B40.1 level IV
No oil		No oil
Material	**Case**	Stainless steel
	Window	Polycarbonate
	Socket	316L SS
	Bourdon tube	316L SS

Model

Regulator Code	Pressure range	Unit	Part number *3)
*5)	-30 in.Hg to 100 psig	psig/bar *4)	**00-83000224**
	-30 in.Hg to 160 psig		**00-83000272**
	-0.1 to 0.7 MPa	MPa	**00-83000293**
	-0.1 to 1.1 MPa		**00-83000294**



inch (mm)

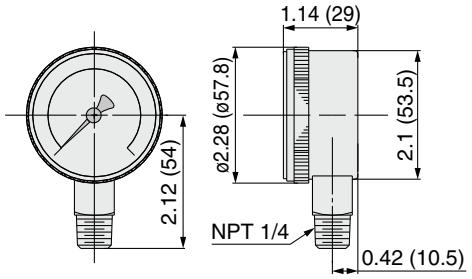
Brass / Lower mount

Specifications

Installation		Lower mount
Gas		Select compatible materials of construction for the gas
Connections		NPT 1/4 inch
Temperature range		-40 to 60°C (No freezing)
Accuracy		25% to 75% of the scale: ±2%F.S. Other than above: ±3%F.S. (ASME B40.1 Grade B or better)
Cleanliness		ASME B40.1 level IV
No oil		No oil
Material	**Case**	Brass or Stainless steel + ZrN Coating
	Window	Polycarbonate
	Socket	Brass
	Bourdon tube	Phosphor bronze

Model

Regulator Code *2)			Pressure range	Unit	Part number *3)
material	gauge port	unit			
B	**V3**	**(No code)**	-30 in.Hg to 30 psig	psig/bar *4)	**00-83000265**
	L		-30 in.Hg to 60 psig		**00-83000177**
	1		-30 in.Hg to 100 psig		**00-83000178**
	H		-30 in.Hg to 160 psig		**00-83000239**
	2		0 to 200 psig		**00-83000218**
	4		0 to 400 psig		**00-83000205**
	10		0 to 1000 psig		**00-83000186**
	40		0 to 4000 psig		**00-83000179**
	V3	**MPA**	-0.1 to 0.2 MPa	MPa	**00-83000278**
	L		-0.1 to 0.4 MPa		**00-83000279**
	1		-0.1 to 0.7 MPa		**00-83000280**
	H		-0.1 to 1.1 MPa		**00-83000281**
	2		0 to 1.5 MPa		**00-83000277**
	4		0 to 3 MPa		**00-83000276**
	10		0 to 7 MPa		**00-83000275**
	40		0 to 28 MPa		**00-83000274**



inch (mm)

*3) Part number of pressure gauge itself. Gauge are shipped separately.
*4) Under Japanese regulation, psig/bar unit gauge is not sold in Japan.
*5) Available for special order. Please contact SMC.

Process Gas Equipment/Regulator Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠Warning

1. Confirm the specifications.

When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/ environments. Check the compatibility of the product materials with the process gas.
Design the equipment and select the product by understanding the characteristics of gas.

2. Confirm allowable pressure of any pressure gauges.

When installing a pressure gauge to the product, operating pressure should not exceed the maximum allowable pressure of the pressure gauge.

Mounting

⚠Warning

1. Confirm the mounting direction of the product.

The high pressure (inlet) port is labeled with an “HP” mark and the low pressure (outlet) port is labeled with an “LP” mark. In the case of two stage regulator, the monitor port of first stage outlet pressure is labeled with “MP” mark.
Make sure to connect the port labeled with “HP” mark, to the high pressure. If any of the ports, other than “HP”, are connected to the high pressure, it may cause damage or gas leakage.

2. After installation, check internal leakage (leakage across seat) of the product.

Check internal leakage (leakage across seat) with inert gases such as nitrogen, etc., and select the most appropriate test method depending on the application. The following procedures are an example of how a test may be performed. It is intended as an overview and not as an all inclusive description.

1) Rotate the adjustment wheel counterclockwise (DECR) completely to relieve spring force. Then gradually open the valve at inlet side to supply gas to the regulator.
2) Close the valves on the inlet and outlet side and hold for at least 10 minutes. Then confirm the outlet pressure.
3) Rotate the adjustment wheel clockwise (INCR) until the outlet pressure reaches the outlet pressure setting. Then hold for at least 10 minutes and confirm the outlet pressure.

If outlet pressure continues increasing in steps 2) and 3) above, the regulator may have internal leakage (leakage across seat) and you should stop using the regulator immediately and contact SMC or sales representative.

3. Purge hazardous gases from system before removing regulator from system.

Before removing regulators from system, fully open regulator by turning adjustment wheel clockwise (INCR), and follow proper procedures to flush system with inert gas such as nitrogen to remove any residual hazardous gases.

Maintenance

⚠Warning

1. If a regulator requires repair, contact SMC.

Operation

⚠Warning

1. Do not use the regulator as shutoff valve or safety valve.

2. Do not rotate the adjustment wheel counterclockwise (DECR) under no flow conditions.

If the adjustment wheel is rotated counterclockwise (DECR) under no flow conditions but there is residual pressure remaining in outlet side, it may cause damage to the regulator. Decreasing of the setting pressure should be done under flow conditions.

3. Do not pressurize the regulator from outlet side. If high pressure, which exceeds the setting pressure, is supplied from outlet side, it may cause damage to the regulator.

4. Supply gas to the regulator.

Rotate the adjustment wheel counterclockwise (DECR) completely to relieve spring force. Then, gradually open the valve at inlet side to supply gas to the regulator. When operating the valve, do not stand in front of the regulator and pressure gauge. If the valve at inlet side is opened rapidly, high pressure gas might be supplied into outlet side of the regulator and it may cause severe damage or burst the device.

5. Adjust pressure.

When rotating the adjustment wheel clockwise (INCR), outlet pressure will increase.
In order to adjust precisely, the wheel should be adjusted at the desired flow conditions.

6. Decreasing the setting pressure under flow conditions.

When decreasing the setting pressure, make sure to open the valve at outlet side to keep flow conditions. When rotating the adjustment wheel counterclockwise (DECR) under flow conditions, setting pressure will decrease.

7. Stop using the regulator immediately if resonance occurs.

Loud audible noise as well as vibration of device or fluctuation of outlet pressure (resonance) may occur depending on operating conditions etc. If this situation occurs, stop using the regulator immediately and contact SMC or sales representative.

Process Gas Equipment/Back Pressure Regulator Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠ Warning

1. Confirm the specifications.

When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, operating temperature etc., and use within the operating range specified in the catalog. Verify flow capacity of regulator and vent or return line, are large enough to vent off gas source without creating excessive back pressure. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas.
Design the equipment and select the product by understanding the characteristics of gas.

2. Confirm allowable pressure of any pressure gauges.

When installing pressure gauges to the product, operating pressure should not exceed the maximum allowable pressure of the pressure gauge.

Mounting

⚠ Warning

1. Confirm the mounting direction of the product.

The high pressure (inlet) port is labeled with an “IN” mark and the low pressure (outlet) port is labeled with an “OUT” mark. Make sure to connect the port labeled with “IN” mark, to the high pressure. If any of the ports, other than “IN”, is connected to the high pressure, it may cause damage or gas leakage.

Maintenance

⚠ Warning

1. If a back pressure regulator requires repair, contact SMC.

Operation

⚠ Warning

1. Do not use the back pressure regulator as shutoff valve or safety valve.

2. Pressure control

1) Rotate the adjustment wheel counterclockwise completely to relieve spring force.
2) Partially open the valve at inlet side to supply gas to the back pressure regulator.
3) Increase the inlet pressure to the setting pressure by rotating the adjustment wheel clockwise.
4) Continue opening the valve at inlet side monitoring the inlet pressure. When the inlet pressure increases above the setting pressure, rotate the adjustment wheel counterclockwise to relieve the inlet pressure to the setting pressure.
5) Open the valve at inlet side completely and confirm that the inlet pressure reaches the setting pressure.

3. Decreasing the setting pressure.

When decreasing the setting pressure, make sure to gradually rotate the adjustment wheel counterclockwise until the inlet pressure reaches the setting pressure.

4. Stop using the regulator immediately if resonance occurs.

Loud audible noise as well as vibration of device or fluctuation of outlet pressure (resonance) may occur depending on operating conditions, etc. If this situation occurs, stop using the regulator immediately and contact SMC or sales representative.

Diaphragm Valves

Series Page

For ultra high purity (UHP)

Air operated type

Diaphragm Valves: Air operated type (For low pressure) — **AP3500** ····· P.121
Diaphragm Valves: Air operated type (For low pressure) — **AP4500** ····· P.123
Diaphragm Valves: Air operated type (For high pressure) — **AP3000** ····· P.125
Diaphragm Valves: Air operated type (For high pressure and high flow) – **AP3130 & 3113** ····· P.127
Diaphragm Valves: Air operated type (For high flow) — **AP3700** ····· P.129
Diaphragm Valves: Air operated type / Two Step — **AP3571 & 4571** ····· P.131
Diaphragm Valves: Air operated type (Metal seated) — **AP3200** ····· P.133

Manually operated type

Diaphragm Valves: Manually operated type — **AP3600** ····· P.135
Diaphragm Valves: Manually operated type — **AP4600** ····· P.137
Diaphragm Valves: Manually operated type (For high pressure and high flow) – **AP3100** ····· P.139
Diaphragm Valves: Manually operated type (For high flow) — **AP3800 & 3900** ····· P.141
Diaphragm Valves: Manually operated type (Metal seated) — **AP3260** ····· P.143

LOTO Options for Diaphragm Valves ····· P.145
Diaphragm Valve Porting Guide ····· P.146
Diaphragm Valve/Specific Product Precautions ····· P.147

Diaphragm Valve for Ultra High Purity

Air operated type (For low pressure)

Series AP3500

- Suitable for UHP gas supply line
- Body material : 316L SS secondary remelt
- Pneumatically actuated normally closed or normally open
- LOTO option available as an option (AP3540)
- Indicator switch available as an option (AP3550)

RoHS

How to Order

AP 3 540 S □ 2PW FV4 FV4 □ □ □

(Inlet) (Outlet)

Size

Code	Cv
3	0.29

Model

Code	Status	Maximum operating pressure
540	Normally closed (N.C.)	150 psig (1.0 MPa)
550		300 psig (2.1 MPa)
580	Normally open (N.O.)	250 psig (1.7 MPa)

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to S material with TW4 connections.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗2)

∗2) Not available with H material.

Option (AP3550 only)

Code	Specification
No code	—
ISC	N.C. Indicator switch ∗3)
ISO	N.O. Indicator switch ∗4)

∗3) Indication of closed status.
∗4) Indication of opened status.

Specifications

Operating Parameters		AP3540	AP3550	AP3580
Status		Normally closed (N.C.)		Normally open (N.O.)
Gas		Select compatible materials of construction for the gas		
Operating pressure		Vacuum to 150 psig (1.0 MPa) ∗1)	Vacuum to 300 psig (2.1 MPa)	Vacuum to 250 psig (1.7 MPa)
Proof pressure		1000 psig (6.9 MPa)		
Burst pressure		8000 psig (55.2 MPa)		
Ambient and operating temperature		-10 to 71°C (No freezing) ∗2)		
Cv		0.29		
Leak rate	Inboard leakage	2×10^{-11} Pa·m³/s		
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)		
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)		
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)	
Connections		Face seal, Tube weld		
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)		
Actuation port connection		NPT 1/8 inch	10-32 UNF thread	NPT 1/8 inch
Actuation port location		Top	Side (360° rotatable)	Top
Installation		Bottom mount		
Internal volume		0.06 in³ (1.07 cm³)		
Weight		0.68 kg ∗4)	0.82 kg ∗4)	0.68 kg ∗4)
LOTO (Lockout)		Option (Part number: AP PL 210) ∗5)	N/A	

∗1) Vacuum to 125 psig (0.9 MPa) for Polyimide seat.
∗2) Max. 90°C for Polyimide seat. High temperature available. Please contact SMC.
∗3) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗4) Weight, including individual boxed weight, may vary depending on connections or options.
∗5) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code	ISO	ISC
Switch type	SPST	
Contacts	NO (When the valve is open, the circuit is closed.)	NC (When the valve is closed, the circuit is closed.)
Rated voltage	Max. 50 VDC	
Rated current	Max. 100 mA	
Contact capacity	1.0 VA	
Initial contact resistance	0.1 Ω or less	
Terminal shape	Soldered terminal	

Wetted Parts Material

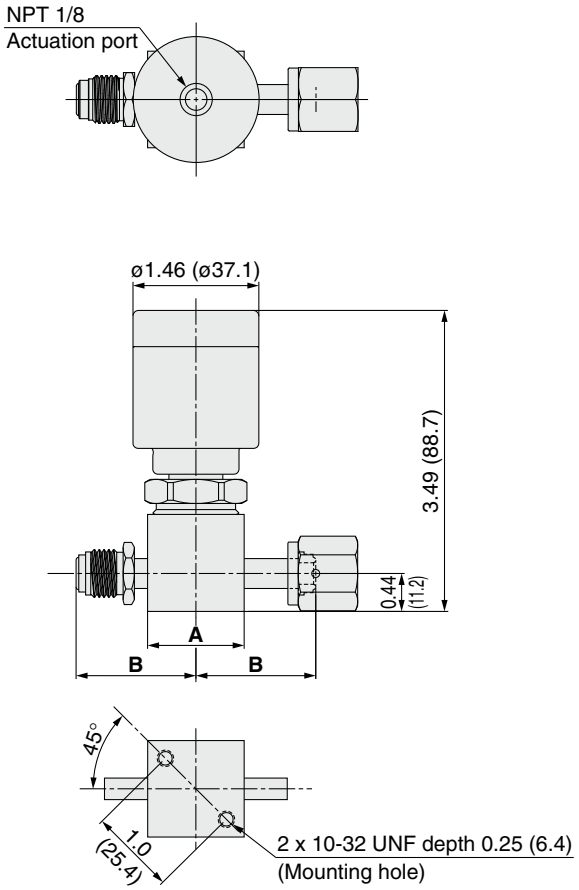
Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Diaphragm	Ni-Co alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE

SMC

Dimensions

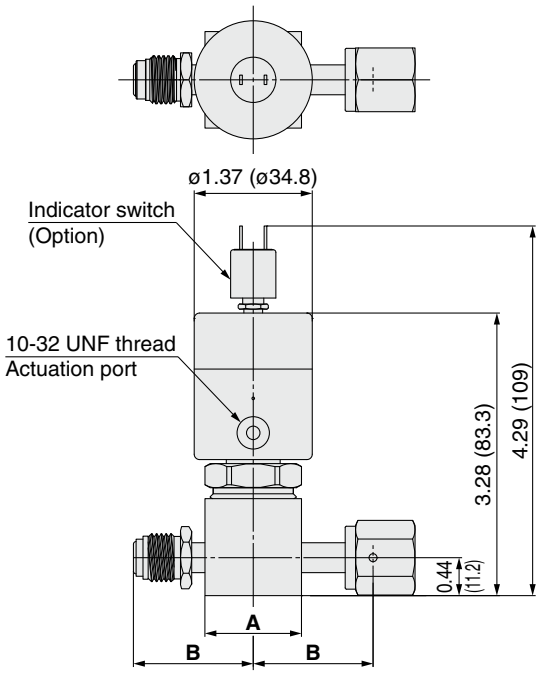
inch (mm)

AP3540

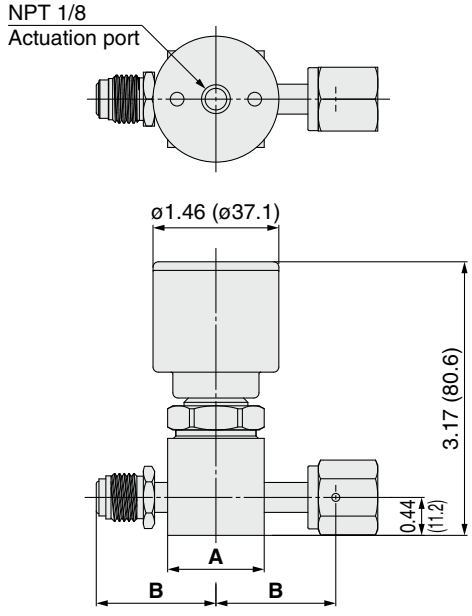


Bottom view

AP3550



AP3580

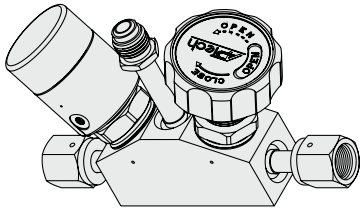


Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)
H	FV4	1.25 dia. *)	(ø31.8)	1.45	(36.8)
	MV4				
	TW4			1.08	(27.4)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

*) Ni-Cr-Mo alloy valve body is round not square.

Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



Diaphragm Valve for Ultra High Purity

Air operated type (For low pressure)

Series AP4500

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **Pneumatically actuated normally closed or normally open**
- **LOTO option available as an option (AP4540)**
- **Indicator switch available as an option (AP4550)**

RoHS

How to Order

AP 4 | 540 | S | | 2PW | FV6 (Inlet) | FV6 (Outlet) | | | | |

Size

Code	Cv
4	0.5

Model

Code	Status	Maximum operating pressure
540	Normally closed (N.C.)	125 psig (0.9 MPa)
550		300 psig (2.1 MPa)
580	Normally open (N.O.)	250 psig (1.7 MPa)

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to S material with TW4 connections.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗2)

∗2) Not available with H material.

Option (AP4550 only)

Code	Specification
No code	—
ISC	N.C. indicator switch ∗3)
ISO	N.O. indicator switch ∗4)

∗3) Indication of closed status.
∗4) Indication of opened status.

Specifications

Operating Parameters		AP4540	AP4550	AP4580
Status		Normally closed (N.C.)		Normally open (N.O.)
Gas		Select compatible materials of construction for the gas		
Operating pressure		Vacuum to 125 psig (0.9 MPa)	Vacuum to 300 psig (2.1 MPa)	Vacuum to 250 psig (1.7 MPa)
Proof pressure		1000 psig (6.9 MPa)		
Burst pressure		8000 psig (55.2 MPa)		
Ambient and operating temperature		-10 to 71°C (No freezing) ∗1)		
Cv		0.5		
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s		
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)		
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)		
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)	
Connections		Face seal, Tube weld		
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)		
Actuation port connection		NPT 1/8 inch	10-32 UNF thread	NPT 1/8 inch
Actuation port location		Top	Side (360° rotatable)	Top
Installation		Bottom mount		
Internal volume		0.06 in³ (1.07 cm³)		
Weight		0.68 kg ∗3)	0.82 kg ∗3)	0.68 kg ∗3)
LOTO (Lockout)		Option (Part number: AP PL 210) ∗4)	N/A	

∗1) Max. 90°C for Polyimide seat. High temperature available. Please contact SMC.
∗2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗3) Weight, including individual boxed weight, may vary depending on connections or options.
∗4) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code	ISO	ISC
Switch type	SPST	
Contacts	NO (When the valve is open, the circuit is closed.)	NC (When the valve is closed, the circuit is closed.)
Rated voltage	Max. 50 VDC	
Rated current	Max. 100 mA	
Contact capacity	1.0 VA	
Initial contact resistance	0.1 Ω or less	
Terminal shape	Soldered terminal	

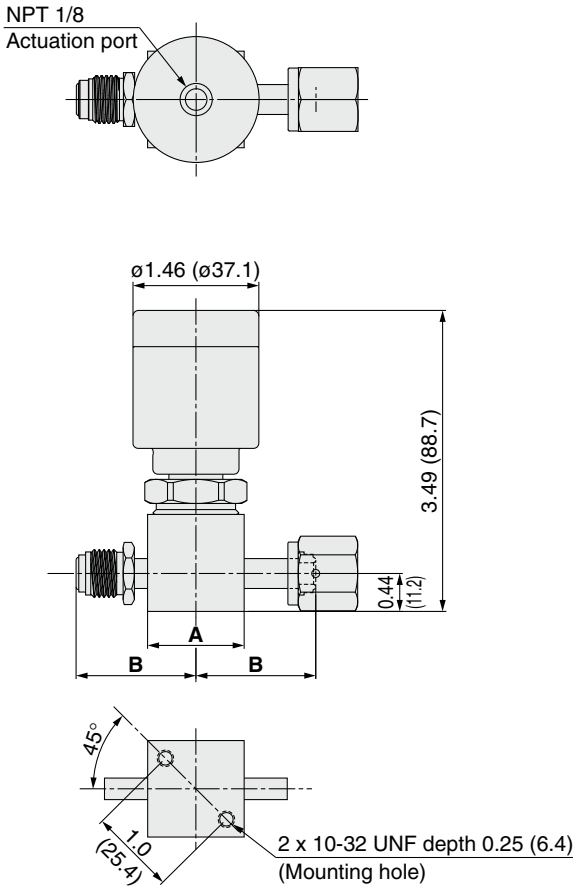
Wetted Parts Material

Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Diaphragm	Ni-Co alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

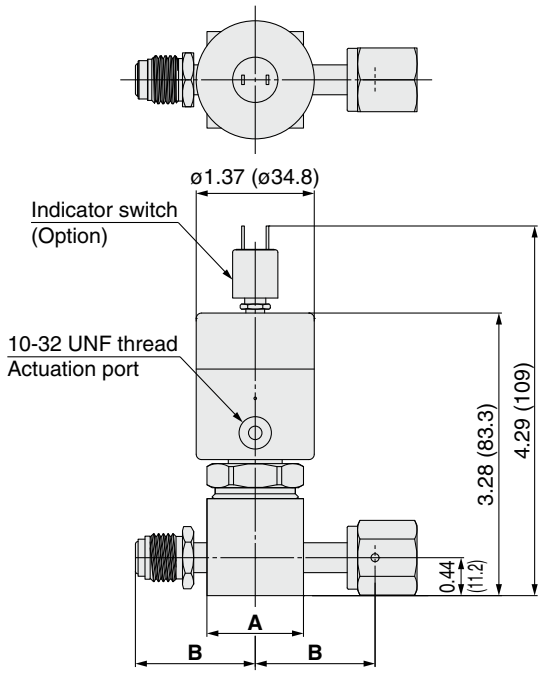
inch (mm)

AP4540

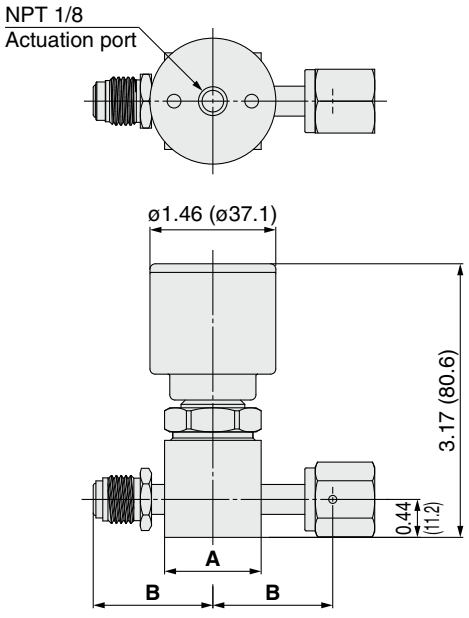


Bottom view

AP4550



AP4580

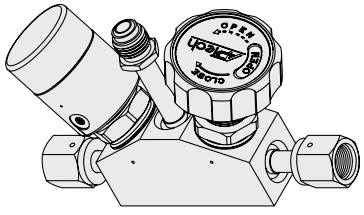


Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)
H	FV4	1.25 dia. *)	(ø31.8)	1.45	(36.8)
	MV4				
	TW4			1.08	(27.4)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

*) Ni-Cr-Mo alloy valve body is round not square.

Made to Order

Products such as three port dual valves can be made with monoblock configuration. Please contact SMC for details.



Diaphragm Valve for Ultra High Purity

Air operated type (For high pressure)

Series AP3000

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **Pneumatically actuated normally closed**
- **High pressure type: Max. 3000 psig (20.7 MPa)**
- **LOTO option available as an option**
- **Indicator switch available as an option**

RoHS

How to Order

AP30 [00] [S] [ ] 2PW [FV4] [FV4] [ ] [ ] [ ]

(Inlet) (Outlet)

Model

Code	Cv
00	0.23
02	0.28

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to S material with TW4 connections.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗2)

∗2) Not available with H material.

Option

Code	Specification
No code	—
IS	Indicator switch ∗3)

∗3) Indication of opened/closed status.

Specifications

Operating Parameters		AP3000	AP3002
Status		Normally closed (N.C.)	
Gas		Select compatible materials of construction for the gas	
Operating pressure		Vacuum to 3000 psig (20.7 MPa)	
Proof pressure		4000 psig (27.6 MPa)	
Burst pressure		8000 psig (55.2 MPa)	
Ambient and operating temperature		-10 to 71°C (No freezing)	
Cv		0.23	0.28
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s	
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)	
Across the seat leak		4×10^{-9} Pa·m³/s ∗1)	
Surface finish		Ra max 15 μin. (0.4 μm)	Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld	
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)	
Actuation port connection		NPT 1/8 inch	
Actuation port location		Top	
Installation		Bottom mount	
Internal volume		0.06 in³ (1.07 cm³)	
Weight		1.27 kg ∗2)	
LOTO (Lockout)		Option (Part number: AP PL 210) ∗3)	

∗1) Tested with Helium gas inlet pressure 1000 psig (6.9 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.
∗3) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code		IS
Switch type		SPDT
Rated voltage		Max. 30 VDC
Contact capacity		Max. 3 VA
Switching current		Max. 0.2 A
Carrying current		Max. 0.5 A
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue: Common line
		Brown: NC (When the valve is closed, the circuit is closed.)
		Black: NO (When the valve is open, the circuit is closed.)

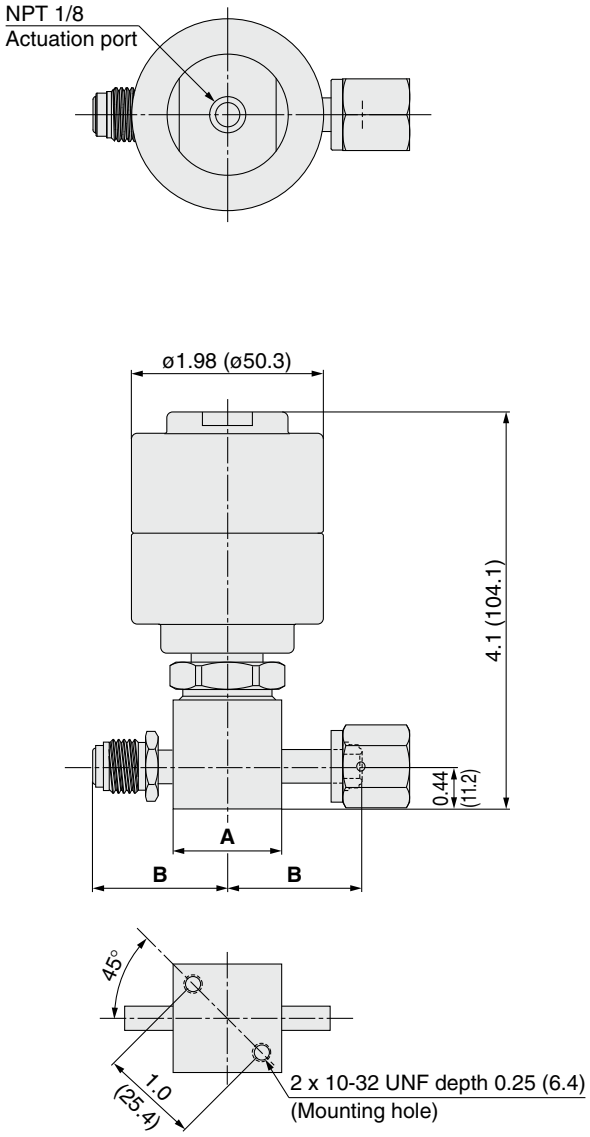
Wetted Parts Material

Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Diaphragm	Ni-Co alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

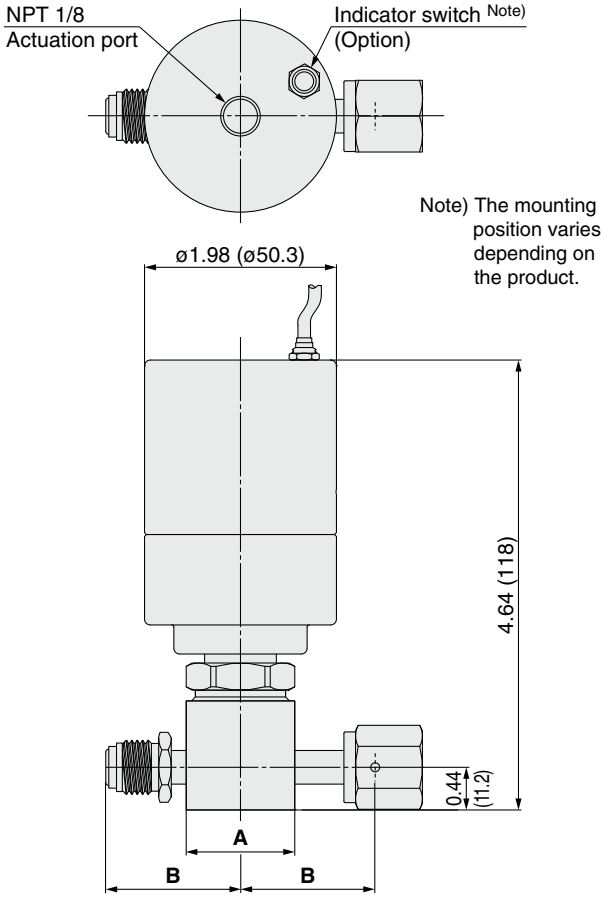
inch (mm)

AP3000



Bottom view

Indicator switch



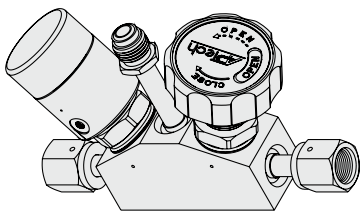
Note) The mounting position varies depending on the product.

Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)
H	FV4	1.25 dia. *)	(ø31.8)	1.45	(36.8)
	MV4				
	TW4			1.08	(27.4)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

*) Ni-Cr-Mo alloy valve body is round not square.

Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



Diaphragm Valve for Ultra High Purity

Air operated type
(For high pressure and high flow)

Series AP3130 & 3113

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **Pneumatically actuated normally closed**
- **High pressure type: 20.7 MPa and 9 MPa**
- **Designed for bulk specialty gas (BSGS) delivery**
- **LOTO option available as an option**

RoHS

How to Order

AP31 [30] [S] [ ] [2PW] [MV8 (Inlet)] [MV8 (Outlet)] [ ] [ ]

Model

Code	Maximum operating pressure	Cv
13	1300 psig (9.0 MPa)	1.0
30	3000 psig (20.7 MPa) ∗1)	0.7

∗1) 2400 psig (16.5 MPa) for connection size 3/4 inch.

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy ∗2)

∗2) Special export controls apply to Ni-Cr-Mo alloy body with 1/2 inch or greater size connection.

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)

Ports

Code	Ports
2PW	2 ports

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female) ∗3)
MV12	3/4 inch face seal (Male) ∗3)
TW12	3/4 inch tube weld

∗3) Prepare a suitable mating fitting with a rated pressure.

Option

Code	Specification
No code	—
IS	Indicator switch ∗5)

∗5) Indication of opened/closed status.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗4)

∗4) Not available with H material.

Specifications

Operating Parameters		AP3113	AP3130
Status		Normally closed (N.C.)	
Gas		Select compatible materials of construction for the gas	
Operating pressure		Vacuum to 1300 psig (9.0 MPa)	Vacuum to 3000 psig (20.7 MPa)
Proof pressure		4500 psig (31 MPa)	
Burst pressure		10000 psig (69 MPa)	
Ambient and operating temperature		-10 to 65°C (No freezing)	
Cv ∗1)		1.0	0.7
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s	
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)	
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)	
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm)	
Connections		Face seal, Tube weld	
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)	
Actuation port connection		NPT 1/8 inch	
Actuation port location		Top	
Installation		Bottom mount	
Internal volume		0.36 in³ (6.0 cm³) for body	
Weight		1.27 kg ∗3)	
LOTO (Lockout)		Option (Part number: AP PL 210) ∗4)	

∗1) Figure of 1/2 inch connection.
∗2) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).
∗3) Weight, including individual boxed weight, may vary depending on connections or options.
∗4) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code		IS
Switch type		SPDT
Rated voltage		Max. 30 VDC
Contact capacity		Max. 3 VA
Switching current		Max. 0.2 A
Carrying current		Max. 0.5 A
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue: Common line
		Brown: NC (When the valve is closed, the circuit is closed.)
		Black: NO (When the valve is open, the circuit is closed.)

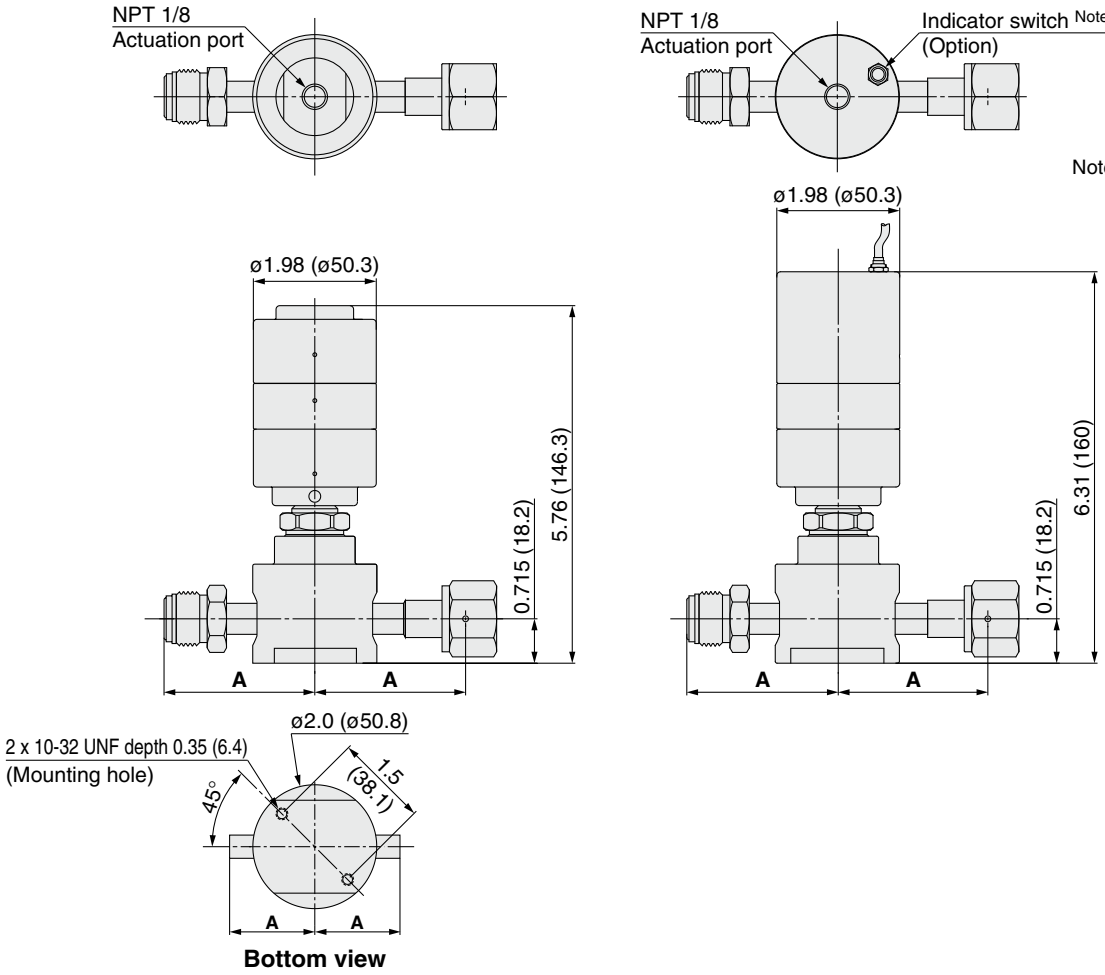
Wetted Parts Material

Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Spring	316L SS	Ni-Cr-Fe alloy
Diaphragm	Ni-Co alloy	
Poppet	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

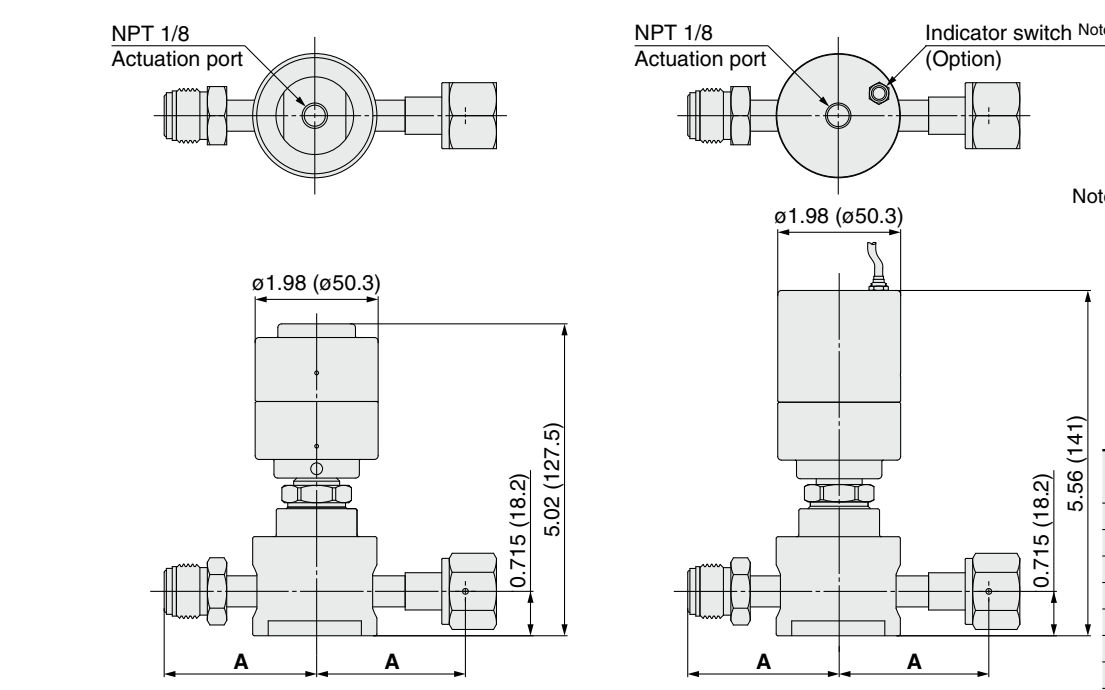
Dimensions

inch (mm)

AP3113



AP3130



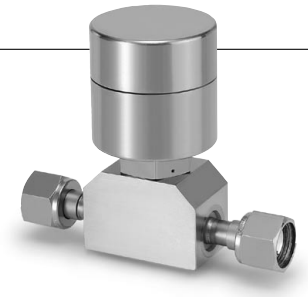
Connections	A	
	inch	(mm)
FV4	2.00	(50.8)
MV4		
TW6	1.375	(34.9)
FV8	2.425	(61.6)
MV8		
TW8	1.79	(45.4)
FV12	3.50	(88.9)
MV12		
TW12	3.25	(82.6)

Diaphragm Valve for Ultra High Purity

Air operated type (For high flow)

Series ***AP3700***

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **Pneumatically actuated normally closed or normally open**
- **Purge ports and monoblock configurations available**



RoHS

How to Order

AP37 [00] [S] [ ] [MV8] [MV8] [00] [ ] [ ] [ ]

(Inlet) (Outlet)

Model

Code	Status
00	Normally closed (N.C.)
08	Normally open (N.O.)

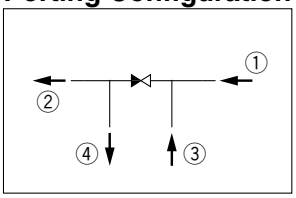
Material

Code	Body material
S	316L SS secondary remelt

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Porting Configuration



Connections (Inlet①, Outlet②)

Code	Connections
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female)
MV12	3/4 inch face seal (Male)
TW12	3/4 inch tube weld

Purge port ∗1)

Code	Inlet③	Outlet④
00	None	None
M0	Available	None
0B	None	Available
MB	Available	Available

∗1) 1/4 inch face seal (Male) as standard.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Purge port option

Code	Specification
No code	—
C	Capped purge port

Option (AP3700 Only)

Code	Specification
No code	—
ISC	N.C. indicator switch ∗2)
ISO	N.O. indicator switch ∗3)

∗2) Indication of closed status.
∗3) Indication of opened status.

Specifications

Operating Parameters		AP3700	AP3708
Status		Normally closed (N.C.)	Normally open (N.O.)
Gas		Select compatible materials of construction for the gas	
Operating pressure		Vacuum to 250 psig (1.7 MPa)	
Proof pressure		500 psig (3.4 MPa)	
Burst pressure		1000 psig (6.9 MPa)	
Ambient and operating temperature		-10 to 71°C (No freezing)	
Cv		2.8	
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s	
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)	
Across the seat leak		4×10^{-9} Pa·m³/s ∗1)	
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)
Connections		Face seal, Tube weld	
Actuation pressure		80 to 100 psig (0.55 to 0.7 MPa)	
Actuation port connection		10-32 UNF thread	
Actuation port location		Side (360° rotatable)	
Installation		Bottom mount	
Internal volume		0.76 in³ (12.52 cm³)	
Weight		1.54 kg ∗2)	

∗1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

Indicator Switch (Option) Specification

Code	ISO	ISC
Switch type	SPST	
Contacts	NO (When the valve is open, the circuit is closed.)	NC (When the valve is closed, the circuit is closed.)
Rated voltage	Max. 50 VDC	
Rated current	Max. 100 mA	
Contact capacity	1.0 VA	
Initial contact resistance	0.1 Ω or less	
Terminal shape	Soldered terminal	

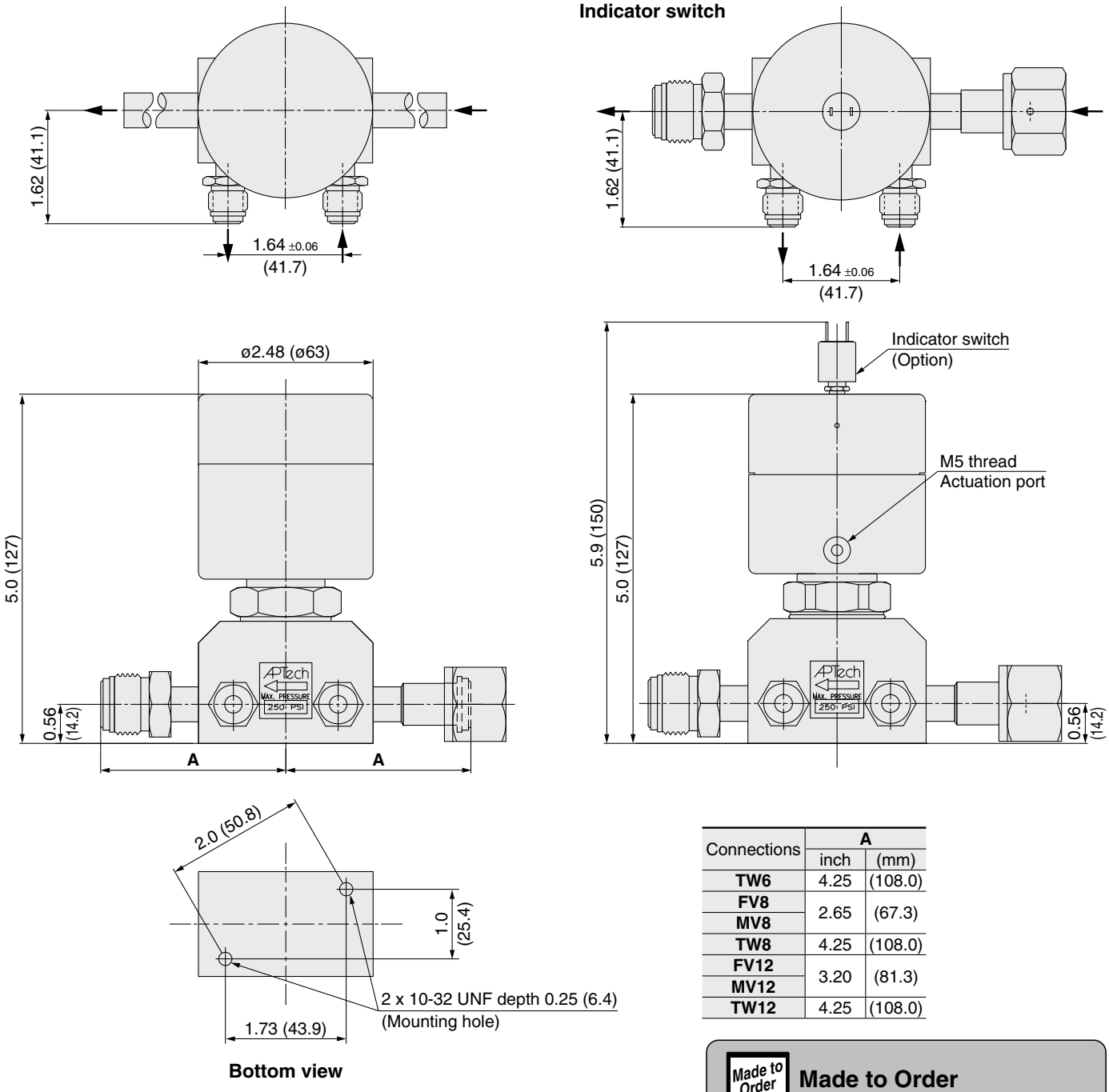
Wetted Parts Material

Wetted Parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Diaphragm	316L SS
Seat	PCTFE (Option: Polyimide)

Dimensions

inch (mm)

AP3700



Connections	A	
	inch	(mm)
TW6	4.25	(108.0)
FV8	2.65	(67.3)
MV8		
TW8	4.25	(108.0)
FV12	3.20	(81.3)
MV12		
TW12	4.25	(108.0)

Made to Order

Change of porting configuration and products such as three port dual valves can be made. Please contact SMC for details.

Diaphragm Valve for Ultra High Purity

Air operated type
Two Step

Series AP3571 & 4571

- **Two step mode - metered flow and full open**
- **Two separate actuation ports**
- **Soft start valve to minimize vacuum chamber pressurization turbulence**
- **Metered flow adjustable AP3571: 10 to 200 slpm*
  AP4571: 10 to 350 slpm***
- **Pneumatically actuated normally closed**
- **Body material: 316L SS secondary remelt**

* At 80 psig (0.55 MPa) of N_2

RoHS

How to Order

AP 3 571 S □ 2PW FV4 FV4 □ M 050
(Inlet) (Outlet)

Size

Code	Cv
3	0.29
4	0.5

Model

Code	Mode	Status
571	Two step mode	Normally closed (N.C.)

Material

Code	Body material
S	316L SS secondary remelt

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld *1)
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

*1) TW4 is not available with AP4571

Face to face dimension *2)

Code	Face to face
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

*2) Only applies to S material with TW4 connections.

Metered flow

Code	Metered adjusted flow in slpm
XXX (3 digits)	Metered adjusted flow in slpm at 80 psig (0.55 MPa) N_2. Replace XXX with flow rate using 3 digits, example 50 slpm = "050" Adjustable range: AP3571= 10 to 200 slpm AP4571= 10 to 350 slpm

Specifications

Operating Parameters		AP3571	AP4571
Status		Normally closed (N.C.)	
Gas		Select compatible materials of construction for the gas	
Operating pressure		Vacuum to 125 psig (0.9 MPa)	
Proof pressure		200 psig (1.4 MPa)	
Burst pressure		1000 psig (6.9 MPa)	
Ambient and operating temperature		0 to 51°C (No freezing)	
Cv		0.29	0.5
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s	
	Outboard leakage	2×10^{-10} Pa·m³/s *1)	
Across the seat leak		4×10^{-9} Pa·m³/s *1)	
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)
Connections		Face seal, Tube weld	
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)	
Actuation port connection		M5 thread (2 each)	
Actuation port location		Sides (2 each)	
Installation		Bottom mount	
Internal volume		0.06 in³ (1.07 cm³)	
Adjustable range of metered flow *2)		10 to 200 slpm	10 to 350 slpm
Tolerance of *2) **metered flow**	**10 to 20 slpm**	±6 slpm	
	21 to 50 slpm	±10 slpm	
	51 to 100 slpm	±15 slpm	
	101 to 200 slpm	±20 slpm	
	201 to 350 slpm	N/A	±25 slpm

*1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa)
*2) At 80 psig (0.55 MPa) N_2

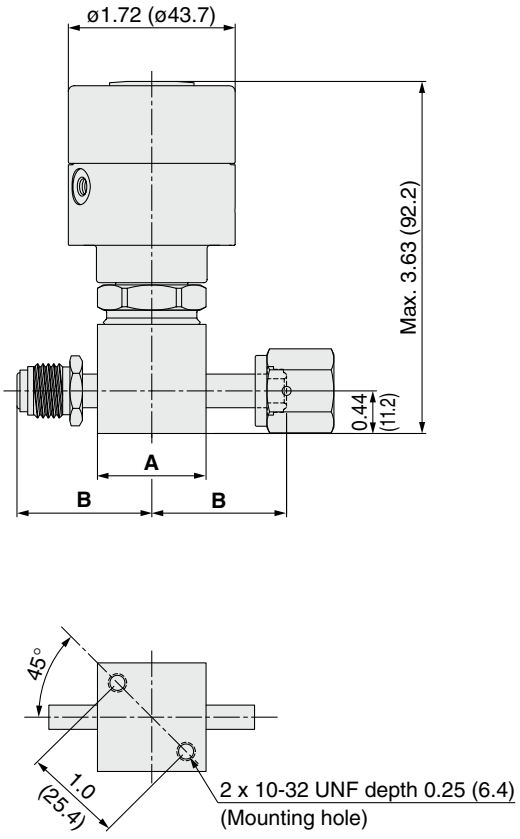
Wetted Parts Material

Wetted parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Diaphragm	Ni-Co alloy
Seat	PCTFE

Dimensions

inch (mm)

AP3571 & 4571



Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

Diaphragm Valve for Ultra High Purity

Air operated type (Metal seated)

Series AP3200

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **All metal wetted parts**
- **Pneumatically actuated normally closed**
- **Indicator switch available as an option**

RoHS

How to Order

AP32 00 S □ 2PW MV4 MV4 □ □

(Inlet) (Outlet)

Air operated

Material

Code	Body material
S	316L SS secondary remelt

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to TW4 connections.

Option

Code	Specification
No code	—
IS	Indicator switch ∗2)

∗2) Indication of opened/closed status

Specifications

Operating Parameters		**AP3200**
Status		Normally closed (N.C.)
Gas		Select compatible materials of construction for the gas
Operating pressure		Vacuum to 125 psig (0.9 MPa)
Proof pressure		1000 psig (6.9 MPa)
Burst pressure		8000 psig (55.2 MPa)
Ambient and operating temperature		-10 to 100°C (No freezing)
Cv		0.27
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)
Across the seat leak		1×10^{-7} Pa·m³/s ∗1)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Actuation pressure		70 to 110 psig (0.48 to 0.76 MPa)
Actuation port connection		NPT 1/8 inch
Actuation port location		Top
Installation		Bottom mount
Internal volume		0.06 in³ (1.07 cm³)
Weight		1.27 kg ∗2)

∗1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

Indicator Switch (Option) Specification

Code		**IS**
Switch type		SPDT
Rated voltage		Max. 30 VDC
Contact capacity		Max. 3 VA
Switching current		Max. 0.2 A
Carrying current		Max. 0.5 A
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue: Common line
		Brown: NC (When the valve is closed, the circuit is closed.)
		Black: NO (When the valve is open, the circuit is closed.)

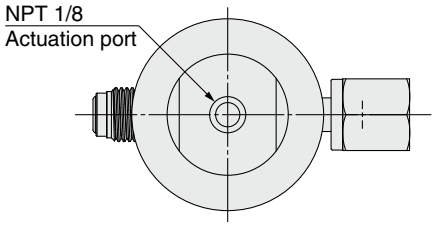
Wetted Parts Material

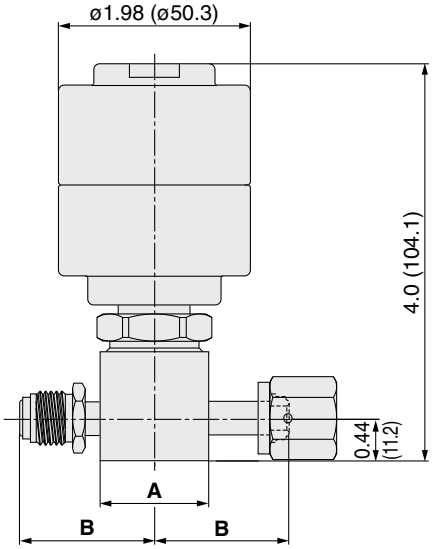
Wetted Parts	**S**
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Diaphragm	Ni-Co alloy

Dimensions

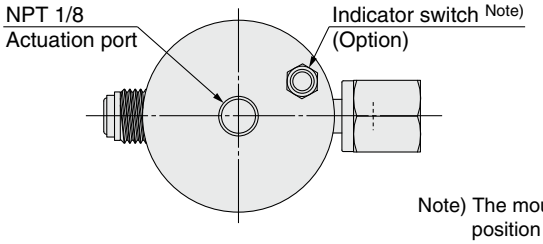
inch (mm)

AP3200

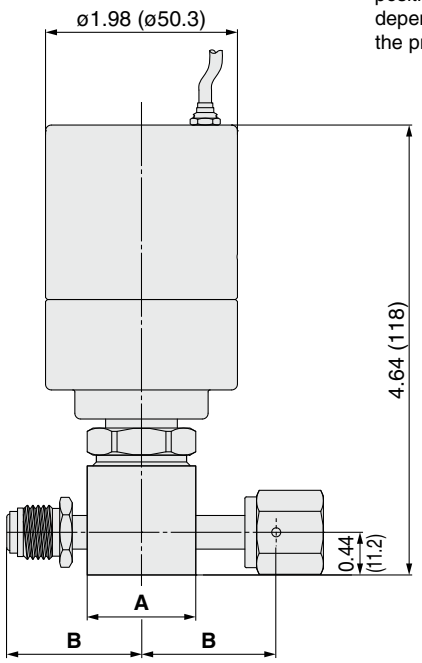


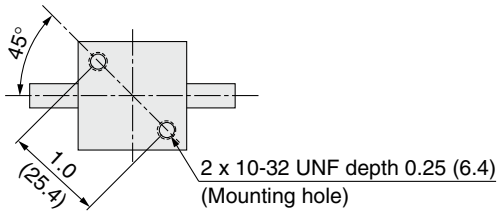


Indicator switch



Note) The mounting position varies depending on the product.





Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

Diaphragm Valve for Ultra High Purity

Series AP3600

Manually operated type

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **LOTO standard with AP3657, optional AP3625**
- **Indicator switch available as an option (AP3650)**

RoHS

How to Order

AP 3 650 S □ 2PW FV4 FV4 □ □ □ □

(Inlet) (Outlet)

Size

Code	Cv
3	0.29

Model

Code	Knob
600	Multi turn round knob
625	1/4 turn lever knob
650	1/4 turn round knob with open/close indication window
657	Pull twist knob with LOTO

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available. Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to S material with TW4 connections.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗2)

∗2) Not available with H material.

Installation option

Code	Installation
No code	Bottom mount (Standard)
P	Panel Installation ∗3)

∗3) Panel mounting hole: dia.0.78 inch (19.8 mm).

Option (AP3650 only)

Code	Specification
No code	—
ISH	Indicator switch ∗4)

∗4) Indication of opened/closed status.

Specifications

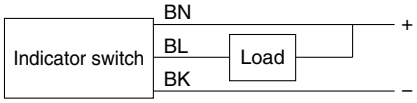
Operating Parameters		AP3600	AP3625	AP3650	AP3657
Gas		Select compatible materials of construction for the gas			
Operating pressure		Vacuum to 3000 psig (20.7 MPa)			
Proof pressure		4000 psig (27.6 MPa)			
Burst pressure		8000 psig (55.2 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.29			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)			
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)		
Connections		Face seal, Tube weld			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.06 in³ (1.07 cm³)			
Weight		0.36 kg ∗3)	0.45 kg ∗3)	0.73 kg ∗3)	0.4 kg ∗3)
Knob		Multi turn round knob	1/4 turn lever knob ∗4)	1/4 turn round knob with open/close indication window	Pull twist knob with LOTO ∗5)
Operational Safety Device (OSD)		N/A	Option (Part number: AP PL227) ∗6)	N/A	Standard
LOTO (Lockout)			Option (Part number: AP PL225) ∗6)		

∗1) Max. 90°C for Polyimide seat. High temperature available. Please contact SMC.
∗2) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).
∗3) Weight, including individual boxed weight, may vary depending on connections or options.
∗4) Optional lever color available. Please contact SMC.
∗5) Handle must be pulled to turn open from closed.
∗6) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code		ISH
Output type		NPN
Power supply voltage		3.8 to 30 VDC
Output voltage		Max. 0.4 VDC
Supply current		Max. 11 mA
Output current		Max. 20 mA
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue (BL), Brown (BN), Black (BK)

Wiring Diagram



Wetted Parts Material

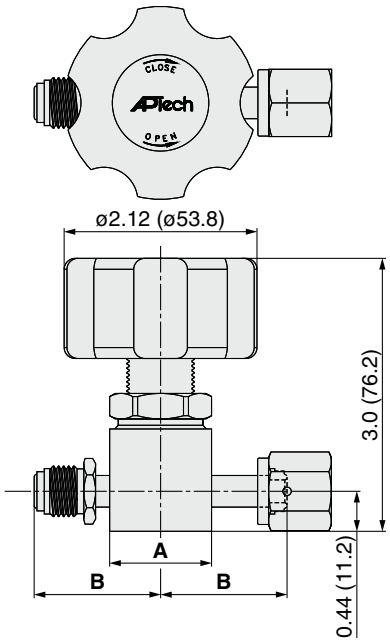
Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Diaphragm	Ni-Co alloy	
Seat	PCTFE (Option: Polyimide)	PCTFE

SMC

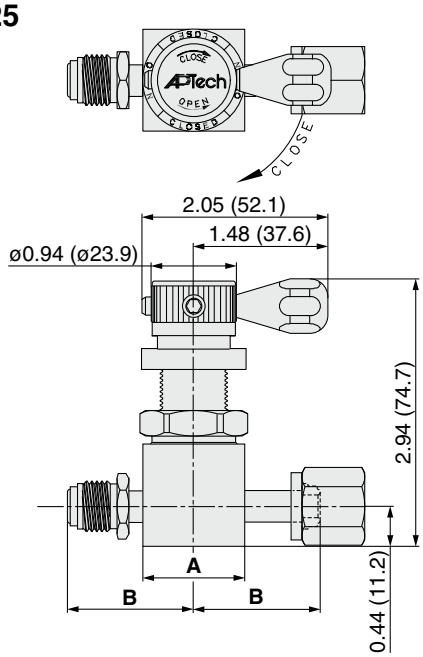
Dimensions

inch (mm)

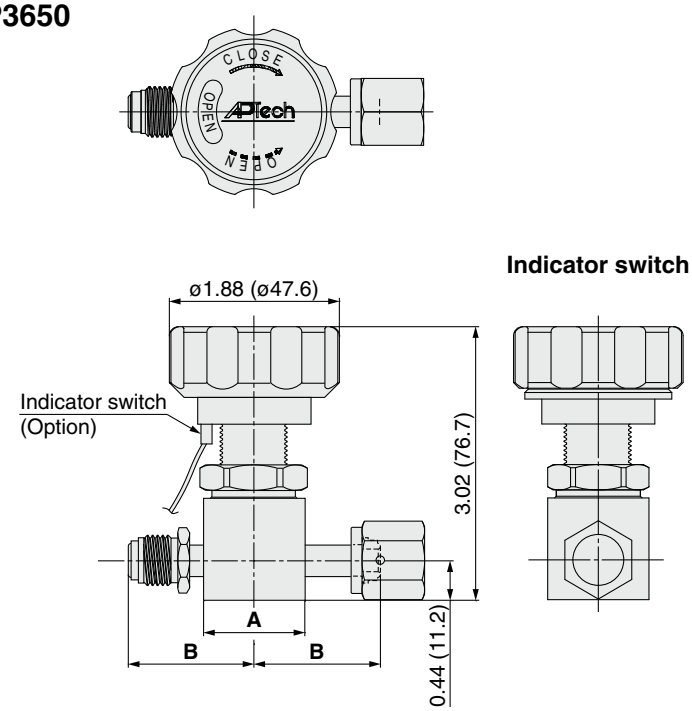
AP3600



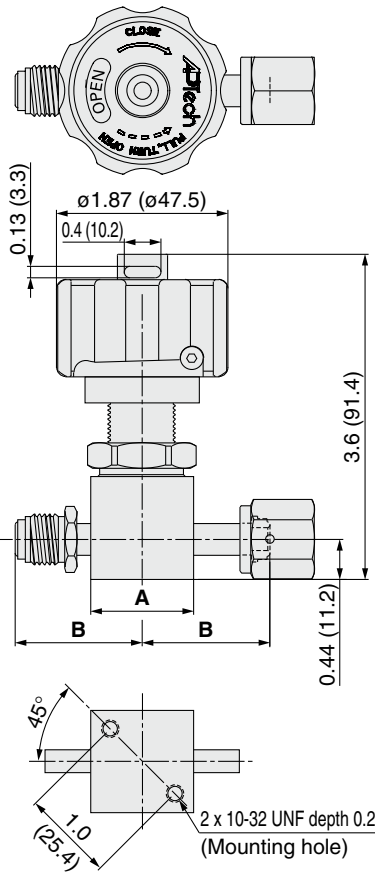
AP3625



AP3650



AP3657



Bottom view

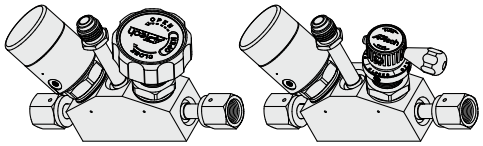
Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)
H	FV4	1.25 dia.*)	(ø31.8)	1.45	(36.8)
	MV4				
	TW4			1.08	(27.4)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

*) Ni-Cr-Mo alloy valve body is round not square.

Made to Order

Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



Diaphragm Valve for Ultra High Purity

Series AP4600

Manually operated type

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **LOTO standard with AP4657, optional AP4625**
- **Indicator switch available as an option (AP4650)**

RoHS

How to Order

AP 4 650 S □ 2PW FV6 FV6 □ □ □ □

(Inlet) (Outlet)

Size

Code	Cv
4	0.5

Model

Code	Knob
600	Multi turn round knob
625	1/4 turn lever knob
650	1/4 turn round knob with open/close indication window
657	Pull twist knob with LOTO

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available. Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to S material with TW4 connections.

Option (AP4650 only)

Code	Specification
No code	—
ISH	Indicator switch ∗4)

∗4) Indication of opened/closed status.

Installation option

Code	Installation
No code	Bottom mount (Standard)
P	Panel Installation ∗3)

∗3) Panel mounting hole: dia.0.78 inch (19.8 mm).

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ∗2)

∗2) Not available with H material.

Specifications

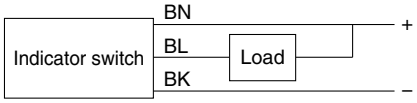
Operating Parameters		AP4600	AP4625	AP4650	AP4657
Gas		Select compatible materials of construction for the gas			
Operating pressure		Vacuum to 300 psig (2.1 MPa)			
Proof pressure		1000 psig (6.9 MPa)			
Burst pressure		8000 psig (55.2 MPa)			
Ambient and operating temperature		-40 to 71°C (No freezing) ∗1)			
Cv		0.5			
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s			
	Outboard leakage	2×10^{-10} Pa·m³/s ∗2)			
Across the seat leak		4×10^{-9} Pa·m³/s ∗2)			
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)			
Connections		Face seal, Tube weld			
Installation		Bottom mount (Option: panel mount)			
Internal volume		0.06 in³ (1.07 cm³)			
Weight		0.36 kg ∗3)	0.45 kg ∗3)	0.73 kg ∗3)	0.4 kg ∗3)
Knob		Multi turn round knob	1/4 turn lever knob ∗4)	1/4 turn round knob with open/close indication window	Pull twist knob with LOTO ∗5)
Operational Safety Device (OSD)		N/A	Option (Part number: AP PL227) ∗6)	N/A	Standard
LOTO (Lockout)			Option (Part number: AP PL225) ∗6)		

∗1) Max. 90°C for Polyimide seat. High temperature available. Please contact SMC.
∗2) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).
∗3) Weight, including individual boxed weight, may vary depending on connections or options.
∗4) Optional lever color available. Please contact SMC.
∗5) Knob must be pulled to turn open from closed.
∗6) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code		ISH
Output type		NPN
Power supply voltage		3.8 to 30 VDC
Output voltage		Max. 0.4 VDC
Supply current		Max. 11 mA
Output current		Max. 20 mA
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue (BL), Brown (BN), Black (BK)

Wiring Diagram



Wetted Parts Material

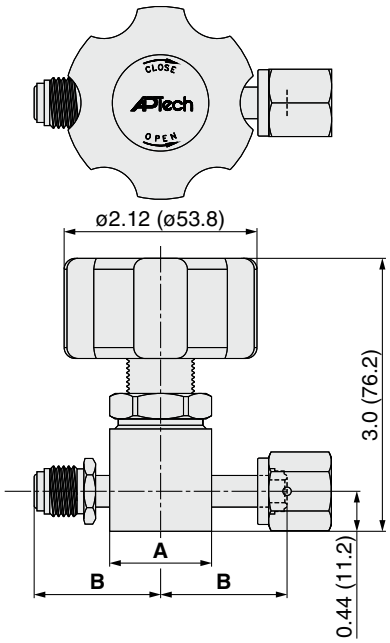
Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Diaphragm	Ni-Co alloy	
Seat	PCTFE(Option: Polyimide)	PCTFE

SMC

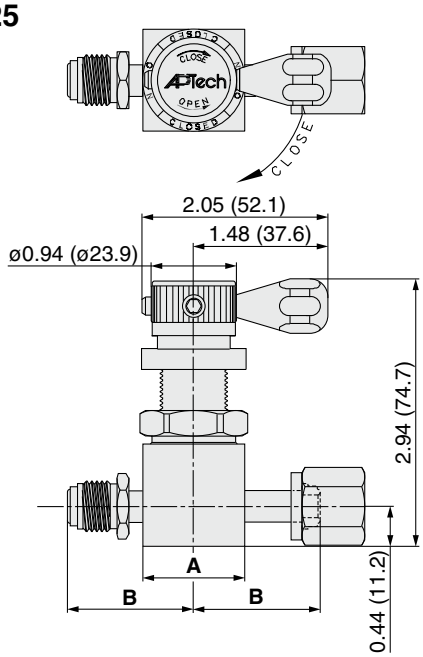
Dimensions

inch (mm)

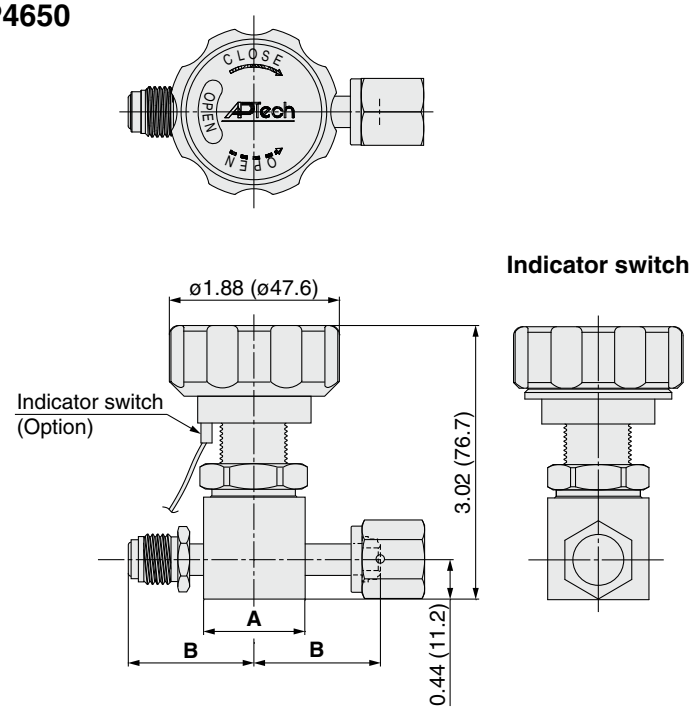
AP4600



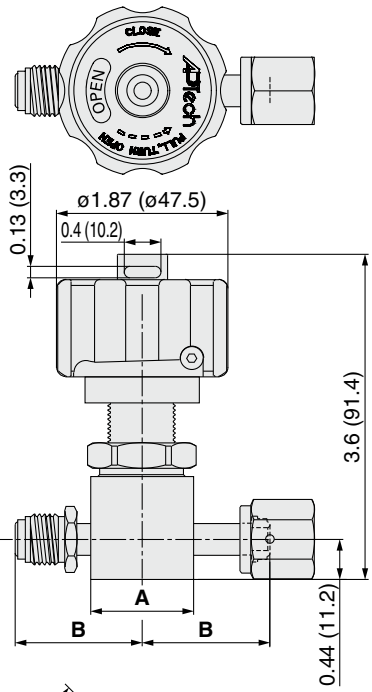
AP4625

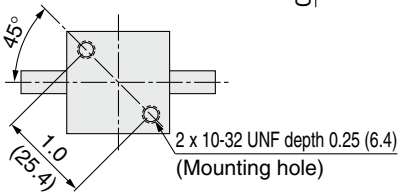


AP4650



AP4657





Bottom view

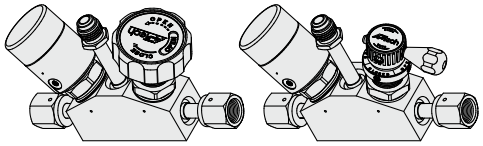
Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)
H	FV4	1.25 dia.*)	(ø31.8)	1.45	(36.8)
	MV4				
	TW4			1.08	(27.4)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

*) Ni-Cr-Mo alloy valve body is round not square.

Made to Order

Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



Diaphragm Valve for Ultra High Purity

Manually operated type
(For high pressure and high flow)

Series AP3100

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **High pressure type: 20.7 MPa and 9 MPa**
- **Designed for bulk specialty gas (BSGS) delivery**
- **LOTO standard with AP3157, optional AP3125**

RoHS

How to Order

AP31 [00] [S] [ ] 2PW [MV8] [MV8] [ ] [ ]

(Inlet) (Outlet)

Model

Code	Maximum operating pressure	Cv	Knob
00	3000 psig (20.7 MPa) *1)	0.7	Multi turn round knob
02	1300 psig (9.0 MPa)	1.3	
25	3000 psig (20.7 MPa) *1)	1.0	1/4 turn lever knob
50	1300 psig (9.0 MPa)	1.0	1/4 turn round knob
57	1300 psig (9.0 MPa)	1.0	Pull twist knob with LOTO

*1) 2400 psig (16.5 MPa) for connection size 3/4 inch.

Material

Code	Body material
S	316L SS secondary remelt
H	Ni-Cr-Mo alloy *2)

*2) Special export controls apply to Ni-Cr-Mo alloy body with 1/2 inch or greater size connection.

Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)

Ports

Code	Ports
2PW	2 ports

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female) *3)
MV12	3/4 inch face seal (Male) *3)
TW12	3/4 inch tube weld

*3) Prepare a suitable mating fitting with a rated pressure.

Option (AP3150 only)

Code	Specification
No code	—
ISH	Indicator switch *5)

*5) Indication of opened/closed status.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide *4)

*4) Not available with H material.

Specifications

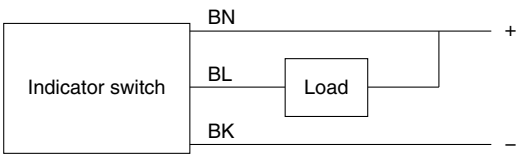
Operating Parameters		AP3100	AP3102	AP3125	AP3150	AP3157
Gas		Select compatible materials of construction for the gas				
Operating pressure		Vacuum to 3000 psig (20.7 MPa)	Vacuum to 1300 psig (9.0 MPa)	Vacuum to 3000 psig (20.7 MPa)	Vacuum to 1300 psig (9.0 MPa)	
Proof pressure		4500 psig (31 MPa)				
Burst pressure		10000 psig (69 MPa)				
Ambient and operating temperature		-40 to 65°C (No freezing) *1)				
Cv *2)		0.7	1.3	1.0		
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s *3)				
Across the seat leak		4×10^{-9} Pa·m³/s *3)				
Surface finish		Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm)				
Connections		Face seal , Tube weld				
Installation		Bottom mount				
Internal volume		0.36 in³ (6.0 cm³)				
Weight		1.27 kg *4)				
Knob		Multi turn round knob (1 1/2 turn)		1/4 turn lever knob *5)	1/4 turn round knob with open/close indication window *6)	Pull twist knob *7)
Operational Safety Device (OSD)		N/A		Option (Part number: AP PL227) *8)	N/A	Standard
LOTO (Lockout)				Option (Part number: AP PL225) *8)		

*1) Max. 90°C for Polyimide seat.
*2) Figure of 1/2 inch connection.
*3) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).
*4) Weight, including individual boxed weight, may vary depending on connections or options.
*5) Optional lever color available. Please contact SMC.
*6) Optional indicator switch available. Please contact SMC.
*7) Knob must be pulled to turn open from closed.
*8) Refer to the specification for options. (P.145)

Indicator Switch (Option) Specification

Code		ISH
Output type		NPN
Power supply voltage		3.8 to 30 VDC
Output voltage		Max. 0.4 VDC
Supply current		Max. 11 mA
Output current		Max. 20 mA
Cable	**Lead wire**	AWG 24
	Cable length	3 m
	Color (Lead wire)	Blue (BL), Brown (BN), Black (BK)

Wiring Diagram



SMC

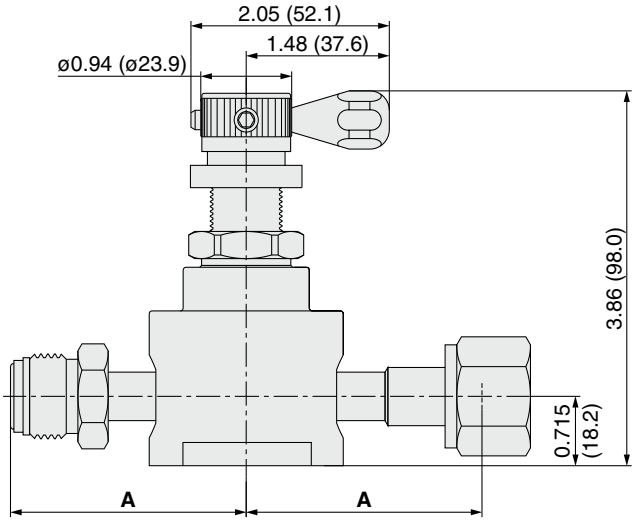
Wetted Parts Material

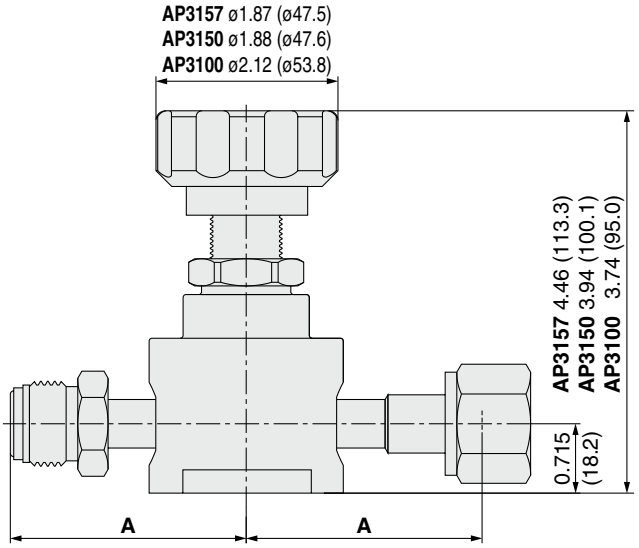
Wetted Parts	S	H
Body	316L SS secondary remelt	Ni-Cr-Mo alloy
Surface finish	Electropolish + Passivation	Electropolish
Spring	316L SS	Ni-Cr-Fe alloy
Diaphragm	Ni-Co alloy	
Poppet	316L SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Dimensions

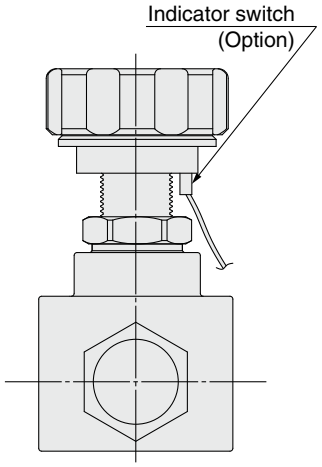
inch (mm)

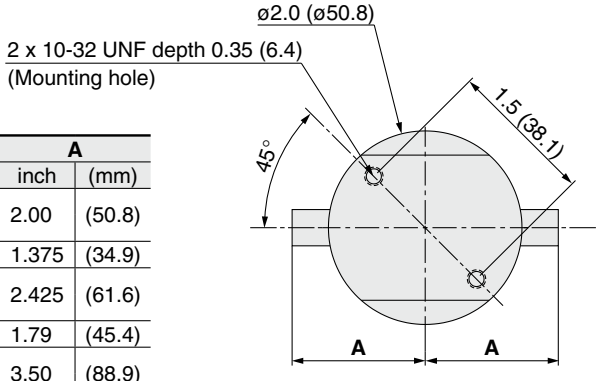
AP3125





AP3150
Indicator switch





Bottom view

Connections	A	
	inch	(mm)
FV4	2.00	(50.8)
MV4		
TW6	1.375	(34.9)
FV8	2.425	(61.6)
MV8		
TW8	1.79	(45.4)
FV12	3.50	(88.9)
MV12		
TW12	3.25	(82.6)

Diaphragm Valve for Ultra High Purity

Manually operated type (For high flow)

Series AP3800 & 3900

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **Purge ports and monoblock configurations available**
- **LOTO available (AP3900)**

RoHS

How to Order

AP | **3800** | **S** | **M** | **MV8** (Inlet) | **MV8** (Outlet) | **00** | | |

Model

Code	Knob
3800	Round knob with open/close indication window
3900	Pull twist knob with LOTO

Material

Code	Body material
S	316L SS secondary remelt

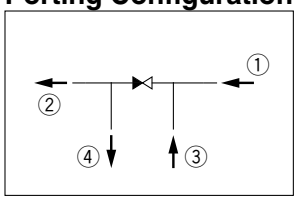
Surface finish

Code	Surface finish Ra max
No code	15 µin. (0.4 µm) Standard
M	10 µin. (0.25 µm)
V	7 µin. (0.18 µm)
X	5 µin. (0.13 µm)

Connections (Inlet①, Outlet②)

Code	Connections
TW6	3/8 inch tube weld
FV8	1/2 inch face seal (Female)
MV8	1/2 inch face seal (Male)
TW8	1/2 inch tube weld
FV12	3/4 inch face seal (Female)
MV12	3/4 inch face seal (Male)
TW12	3/4 inch tube weld

Porting Configuration



Purge port ∗1)

Code	Inlet③	Outlet④
00	None	None
M0	Available	None
0B	None	Available
MB	Available	Available

∗1) 1/4 inch face seal (Male) as standard.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Purge port option

Code	Specification
No code	—
C	Capped purge port

Specifications

Operating Parameters		AP3800	AP3900
Gas		Select compatible materials of construction for the gas	
Operating pressure		Vacuum to 250 psig (1.7 MPa)	
Proof pressure		500 psig (3.4 MPa)	
Burst pressure		1000 psig (6.9 MPa)	
Ambient and operating temperature		-40 to 71°C (No freezing)	
Cv		2.8	
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s	
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)	
Across the seat leak		4×10^{-9} Pa·m³/s ∗1)	
Surface finish		Ra max 15 µin. (0.4 µm)	Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)
Connections		Face seal, Tube weld	
Installation		Bottom mount	
Internal volume		0.76 in³ (12.52 cm³)	
Weight		1.36 kg ∗2)	1.45 kg ∗2)
Knob		Round knob with open/close indication window	Pull twist knob ∗3)
LOTO (Lockout)		N/A	Standard

∗1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.
∗3) Knob must be pulled to turn open from closed.

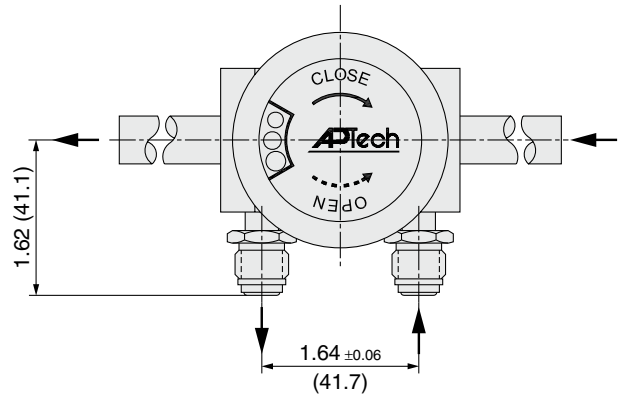
Wetted Parts Material

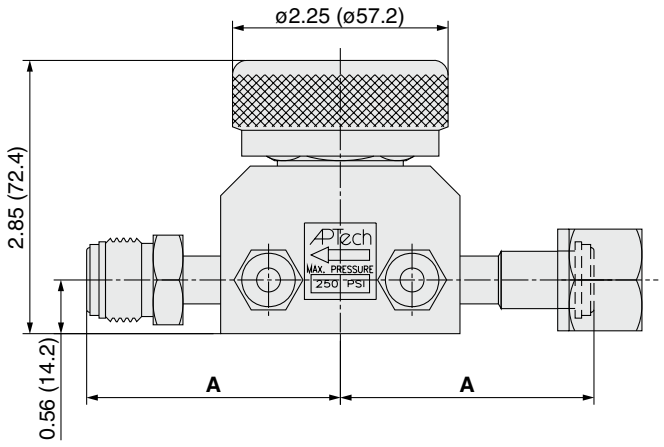
Wetted Parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Diaphragm	316L SS
Seat	PCTFE (Option: Polyimide)

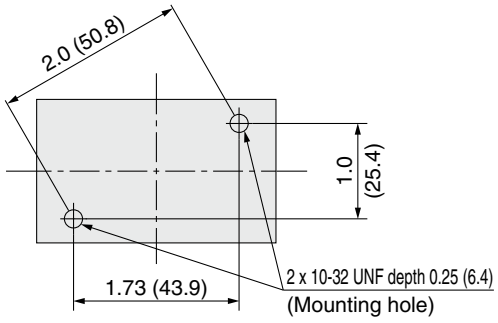
Dimensions

inch (mm)

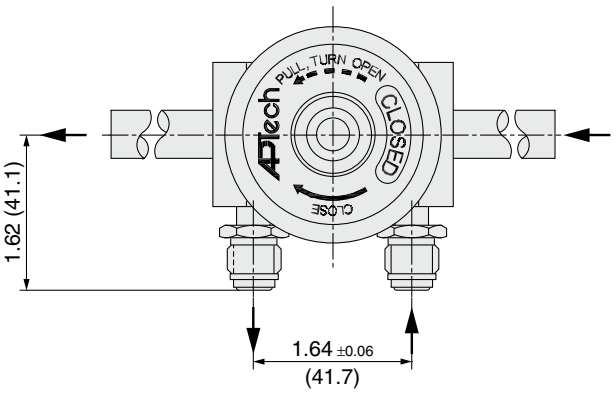
AP3800

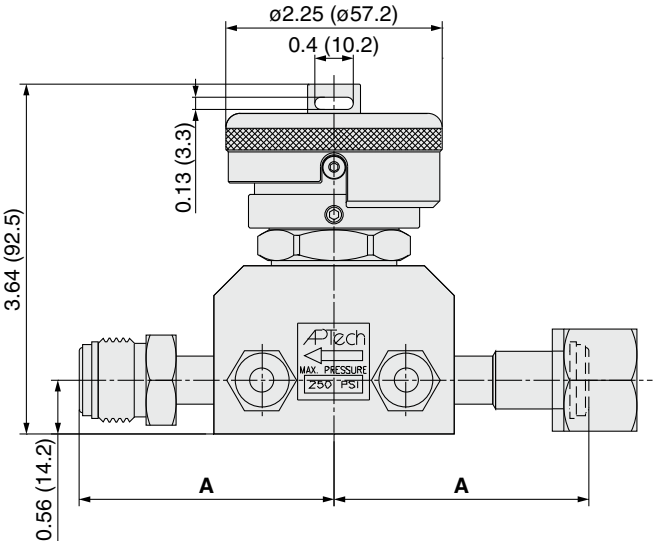


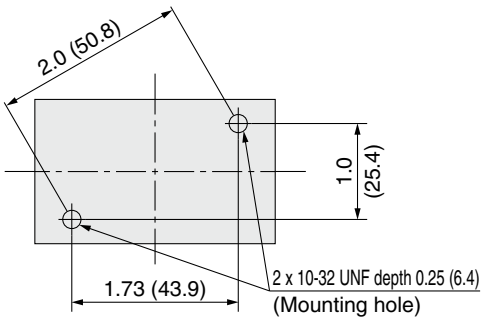




AP3900







Connections	A	
	inch	(mm)
TW6	4.25	(108.0)
FV8	2.65	(67.3)
MV8		
TW8	4.25	(108.0)
FV12	3.20	(81.3)
MV12		
TW12	4.25	(108.0)

Made to Order

Change of porting configuration and products such as three port dual valves can be made. Please contact SMC for details.

Diaphragm Valve for Ultra High Purity

Manually operated type (Metal seated)

Series AP3260

- **Suitable for UHP gas supply line**
- **Body material: 316L SS secondary remelt**
- **All metal wetted parts**

RoHS

How to Order

AP32 60 S □ 2PW MV4 (Inlet) MV4 (Outlet) □ □

Manually operated type

Material

Code	Body Material
S	316L SS secondary remelt

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
V	7 μin. (0.18 μm)
X	5 μin. (0.13 μm)

Ports

Code	Ports
2PW	2 ports

Optional portings and porting configurations available.
Please refer to page 146.

Connections (Inlet, Outlet)

Code	Connections
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Face to face dimension ∗1)

Code	Dimension
No code	2.12 inch (53.8 mm) Standard
1.75	1.75 inch (44.5 mm)

∗1) Only applies to TW4 connections.

Installation option

Code	Installation
No code	Bottom mount (Standard)
P	Panel Installation ∗2)

∗2) Panel mounting hole: dia. 0.78 inch (19.8 mm).

Specifications

Operating Parameters		**AP3260**
Gas		Select compatible materials of construction for the gas
Operating pressure		Vacuum to 125 psig (0.9 MPa)
Proof pressure		1000 psig (6.9 MPa)
Burst pressure		8000 psig (55.2 MPa)
Ambient and operating temperature		-40 to 90°C (No freezing)
Cv		0.27
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-10} Pa·m³/s ∗1)
Across the seat leak		1×10^{-7} Pa·m³/s ∗1)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Installation		Bottom mount (Option: panel mount)
Internal volume		0.06 in³ (1.07 cm³)
Weight		0.36 kg ∗2)
Knob		Multi turn round knob

∗1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).
∗2) Weight, including individual boxed weight, may vary depending on connections or options.

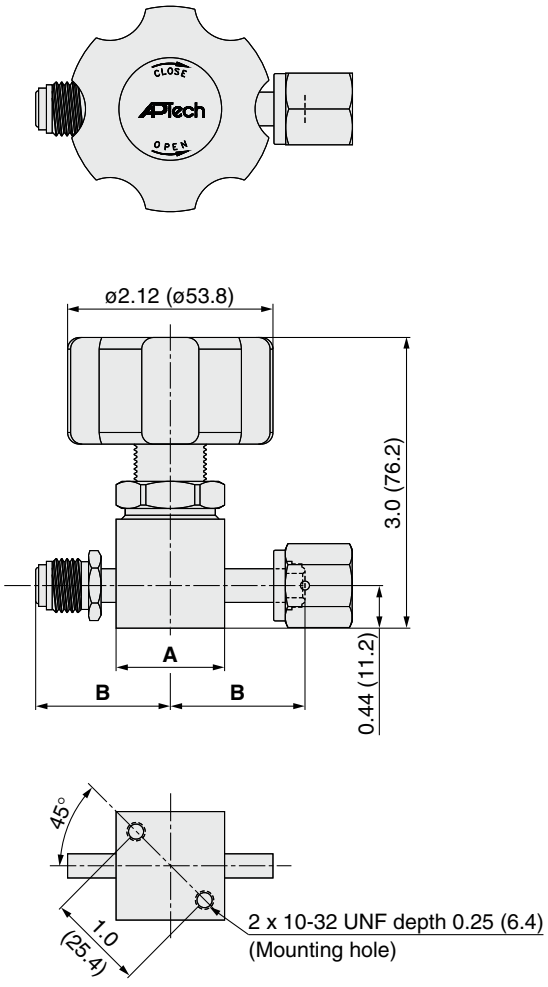
Wetted Parts Material

Wetted Parts	**S**
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Diaphragm	Ni-Co alloy

Dimensions

inch (mm)

AP3260



Material	Connections	A		B	
		inch	(mm)	inch	(mm)
S	FV4	1.12 sq.	(□28.4)	1.39	(35.3)
	MV4				
	TW4			1.06	(26.9)
	FV6			1.93	(49.0)
	MV6				
	TW6			1.325	(33.7)

LOTO Options
for Diaphragm Valves
* Made to order specifications

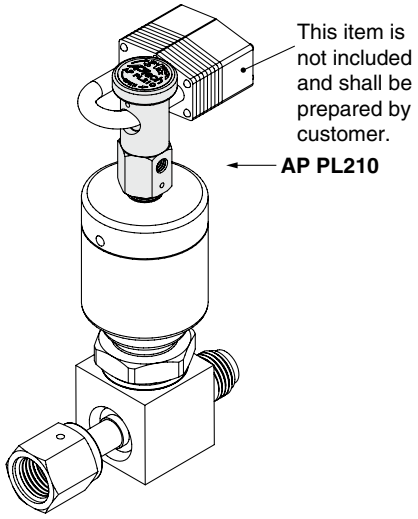
Lockout Device/For Air Operated Valve (Order Separately)

Product number: AP PL210

Feature
- Lockable by installing the AP PL210 to the actuation port of air operated valve (only available for N.C. with actuation port connection NPT 1/8 inch)
- Prevent accidental valve opening by manually shutting off actuation pressure
- Lockable only in the closed position
- Accept standard pad lock with 1/4 inch shackle
- Actuation port connection:10-32 UNF thread
- Actuation port pressure rating: Maximum 150 psig (1.0 MPa)

Operation
Push top button down and twist to close the valve. This feature allows the valve to stay in closed position even if actuation pressure is supplied into an actuation port. Valve opens by repositioning the button, then pressurizing the actuation port.

Series
AP3000, AP3113, AP3130, AP3540, AP4540, AP3200

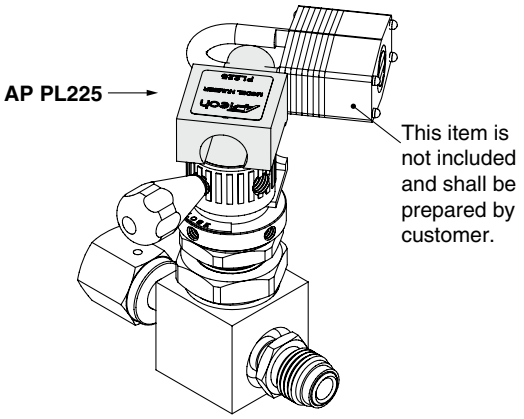


Lockout Device/For Manually Operated Valve (Order Separately)

Product number: AP PL225

Feature
- Lockable by installing the AP PL225 to the manually operated valve (only available for lever knob)
- Lockable in the closed position
- Accept standard pad lock with 1/4 inch shackle.

Series
AP3125, AP3625, AP4625

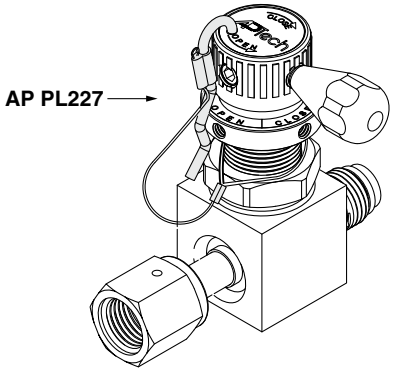


Hook for Operational Safety Device (OSD) (Order Separately)

Product number: AP PL227

Feature
- Secure valve in the closed position by installing the AP PL227 to the top of the handle.
- Prevents accidental opening of the valve.

Series
AP3125, AP3625, AP4625



Diaphragm Valve
Porting Guide

∗ Made to order specifications

How to Order

AP 3650 S [ ] 4PWM (①) MV4 (②) TW4 (③) FV4 (④) FV4 [ ] [ ] [ ]

Available series

Code	Series
30□□	AP3000 series
32□□	AP3200 series
35□□	AP3500 series
45□□	AP4500 series
36□□	AP3600 series
46□□	AP4600 series

Materials
Stainless steel

Surface finish
Depends on the product series

Ports

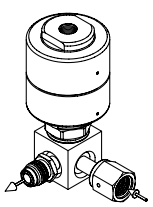
Code	Ports	Configuration
2PW	2 ports	Refer to the following (Port specification)
2PWA		
2PWB		
2PWC		
3PWD	3 ports	
3PWE		
3PWF		
3PWG		
3PWH		
3PWJ		
4PWK	4 ports	
4PWL		
4PWM		
4PWN		

Connections
(Number indicates the port location)

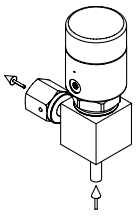
Code	Connections
No code	No port
FV4	1/4 inch face seal (Female)
MV4	1/4 inch face seal (Male)
TW4	1/4 inch tube weld
FV6	3/8 inch face seal (Female)
MV6	3/8 inch face seal (Male)
TW6	3/8 inch tube weld

Option
Depends on the product series

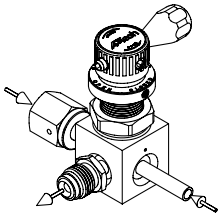
Examples of The Many Available options



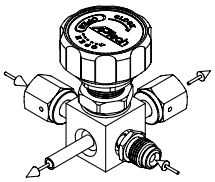
AP3000S
2PWC FV4 MV4



AP3550S
2PWB TW4 FV4



AP3625S
3PWD TW4 MV4 FV4



AP3650S
4PWM MV4 TW4 FV4 FV4

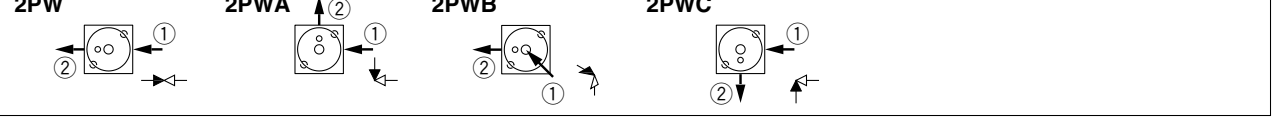
Port Specifications

Valves are illustrated top view looking down through the valve.
The traditional flow direction is INLET to OUTLET, but AP Tech valves may be employed in either flow direction.
Port locations are indicated by numbers.
INLET (Upstream) is defined as a port connected to the region below the valve seat. It is illustrated with an arrow pointing towards the valve body or an "empty" triangle on the schematic.
OUTLET (Downstream) is defined as a port connected to the region above the seat and below the diaphragm. It is illustrated with an arrow pointing away from the valve body or a "filled" triangle on the schematic.

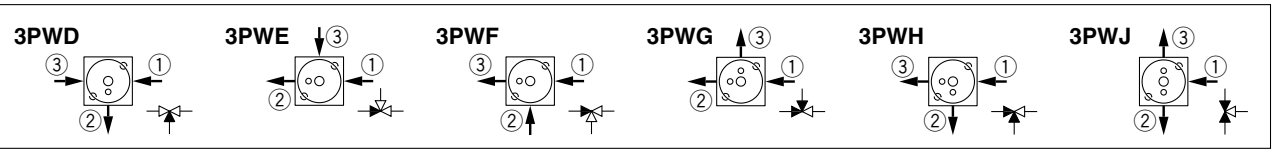
Top view (Mounting hole on bottom)

Porting Symbols

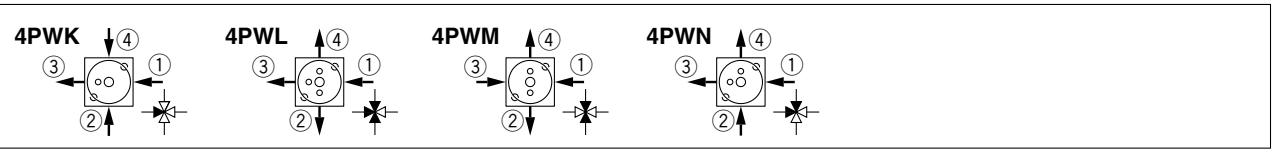
2 Ports



3 Ports



4 Ports



Process Gas Equipment/Diaphragm Valve Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠Warning

1. Confirm the specifications.

This product is used in gas delivery systems to shutoff gas flow. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, actuating pressure, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas.
Design the equipment and select the product by understanding the characteristics of gas.

Mounting

⚠Warning

1. Confirm the mounting direction of the product.

Inlet ports are labeled with an “IN” mark. The outlet ports are usually not labeled but may be labeled with an “OUT” mark. Orient the valve as specified by the system designer.

2. Connect actuation pressure to the valve actuator connection. (Air operated type)

Use nitrogen or clean dry air for actuation pressure. The connection may be a 1/8 inch NPT female thread or M5 female thread depending on the valve model.

3. After installation, check internal leakage (leakage across seat) with inert gases.

Perform a helium leak test depending on applications.

Maintenance

⚠Warning

1. If a valve requires repair, contact SMC.

Operation (Air operate type)

⚠Warning

1. Use nitrogen or clean dry air as actuation pressure.

2. Confirm the valve type (N.C. or N.O.).

In the case of N.C. (Normally Closed), valve will open when applying actuation pressure to the valve actuator connection and valve will close when actuation pressure is vented to atmospheric pressure. In the case of N.O. (Normally Open), its actuation mechanism is opposite to the N.C. type. Valve will close when applying actuation pressure to the valve actuator connection.

3. Apply actuation pressure within the range of specifications.

Operation (Manually operated type)

⚠Warning

4. When closing the valve, rotate the handle clockwise until it completely stops.

There is the internal stop in the handle or in the valve body. Rotate the handle clockwise until the internal stop is reached and it completely stops.

5. When closing the valve with LOTO feature, rotate the handle fully clockwise until the stop.
(AP3657, AP4657, AP3157, AP3900)

When the handle is fully clockwise, the indicator plate roller is aligned with a vertical slot in the handle allowing the handle to drop downward. This feature prevents the valve from being accidentally opened.

6. When opening the valve, rotate the handle counterclockwise until it completely stops.

There is the internal stop in the handle. Rotate the handle counterclockwise until the internal stop is reached and it completely stops.

7. When opening the valve with LOTO feature, the handle must first be lifted up, away from the valve body, and rotated counterclockwise until it completely stops.
(AP3657, AP4657, AP3157, AP3900)

When valve is closed, handle will not rotate as the fixed indicator plate roller is positioned within the vertical slot in the handle.The handle must first be lifted up away from the valve body and rotated counterclockwise until it completely stops.

8. Do not use a tool when rotating the handle.

When the handle is rotated with a tool, it may apply excessive torque to the handle or inside the valve body and it may cause damage. Rotate the handle by hand.

9. When locking the valve with LOTO feature in the closed position, use safety lockout hasp. (AP3657, AP4657, AP3157, AP3900)

The valve with LOTO feature has a built in LOTO capability. When using LOTO feature, rotate the handle clockwise and insert safety lockout hasp into lock stem slot.

Check Valve

	Series	Page
Check Valve	**AP64**	P.149

Vacuum Generator

	Series	Page
Vacuum Generator	**AP7 & 70**	P.151
Vacuum Generator Module	**AP71**	P.153
Vacuum Generator Module	**AP72**	P.155

Flow Switch

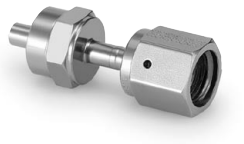
	Series	Page
Flow Switch	**AP74**	P.157
Flow Switch (For high flow)	**AP74B**	P.159

Check Valve, Vacuum Generator and Flow Switch/
Specific Product Precautions P.161

Check Valve

Series AP64

- **Simple design with free of springs and poppets**
- **Reseals with minimal back pressure**
- **Low cracking pressure**



RoHS

How to Order

AP64 S [ ] MV4 MV4 [ ]

(Inlet) (Outlet)

Material

Code	Body material
S	316L SS secondary remelt

Seat material

Code	Material
No code	FKM (Standard)
NP	CR

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)
X	5 μin. (0.13 μm)

Connections (Inlet, Outlet)

Code	Connections
MV4	1/4 inch face seal (Male)
FV4	1/4 inch face seal (Female)
TW4	1/4 inch tube weld
MV6	3/8 inch face seal (Male)
FV6	3/8 inch face seal (Female)
TW6	3/8 inch tube weld

Specifications

Operating Parameters		**AP64**
Gas		Select compatible materials of construction for the gas
Inlet pressure		Vacuum to 3500 psig (24.1 MPa)
Cracking pressure *1)		3 psi (0.023 MPa) differential *2)
Maximum back pressure		3500 psig (24.1 MPa)
Proof pressure		4000 psig (27.6 MPa)
Burst pressure		10000 psig (69 MPa)
Ambient and operating temperature		-10 to 71°C (No freezing)
Cv		0.4 max
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s
	Outboard leakage	2×10^{-11} Pa·m³/s *3)
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 5 μin. (0.13 μm)
Connections		Face seal, Tube weld
Internal volume		0.122 in.³ (2 cm³)
Weight		0.02 kg *4)

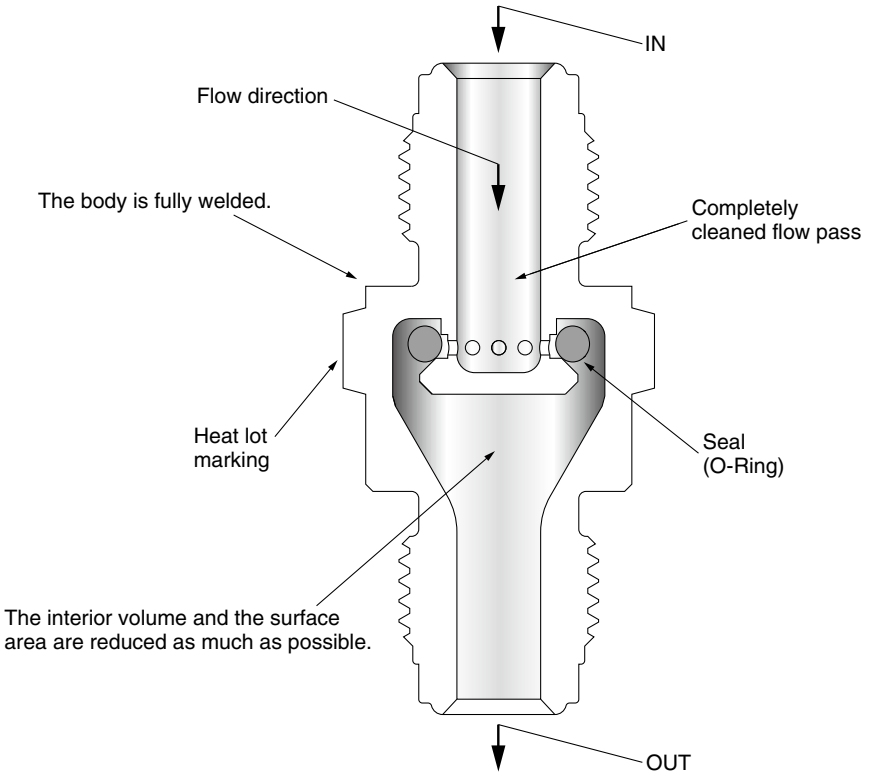
*1) Cracking pressure is a nominal value which may vary depending on the application and operating conditions.
*2) 6 psi (0.04 MPa) differential for CR seat.
*3) Tested with inlet pressure 500 psig (3.5 MPa).
*4) Weight, including individual boxed weight, may vary depending on connections or options.

Wetted Parts Material

Wetted Parts	**S**
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Seal	FKM (Option: CR)

Construction

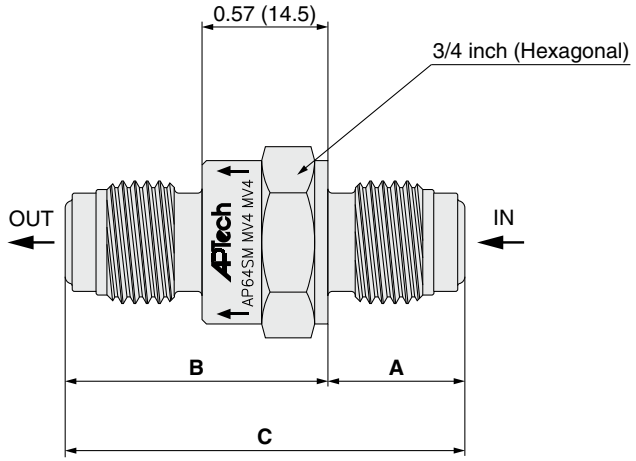
AP64



Dimensions

inch (mm)

AP64

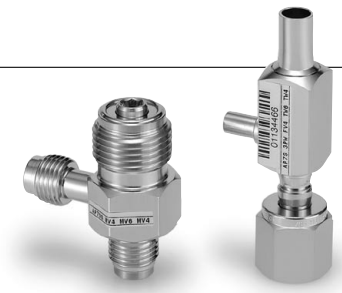


Connections		A		B		C	
Inlet	Outlet	inch	(mm)	inch	(mm)	inch	(mm)
MV4	**MV4**	0.62	(15.7)	1.19	(30.2)	1.81	(46.0)
MV4	**FV4**			1.50	(38.1)	2.12	(53.8)
FV4	**FV4**	0.93	(23.6)			2.43	(61.7)
FV4	**MV4**			1.19	(30.2)	2.12	(53.8)
TW4	**TW4**	0.34	(8.6)	0.91	(23.1)	1.25	(31.8)
MV6	**MV6**	1.83	(46.5)	2.40	(61.0)	4.23	(107.4)
MV6	**FV6**						
FV6	**MV6**						
FV6	**MV6**						
TW6	**TW6**	0.34	(8.6)	0.91	(23.1)	1.25	(31.8)

Vacuum Generator

Series AP7 & 70

- **Max. vacuum pressure: -26 in.Hg (-88 kPa)**
- **AP70 series**
  - **Compact**
  - **Fine vacuum efficiency**
- **AP7 series**
  - **All connections available with all ports**



RoHS

How to Order

AP 70 S MV4 MV6 FV4

(Inlet) (Vent) (Vacuum)

Model

Code	Feature
70	Compact and high performance

Material

Code	Body material
S	316L SS

Connections (Inlet N_2)

Code	Connections
MV4	1/4 inch face seal (Male)

Connections (Vent)

Code	Connections
MV6	3/8 inch face seal (Male)

Connections (Vacuum)

Code	Connections
MV4	1/4 inch face seal (Male)
FV4	1/4 inch face seal (Female)
TW4	1/4 inch tube weld
MV6	3/8 inch face seal (Male)
FV6	3/8 inch face seal (Female)
TW6	3/8 inch tube weld

AP 7 S 3PW MV4 MV6 FV4

(Inlet) (Vent) (Vacuum)

Model

Code	Feature
7	Optional connections available

Material

Code	Body material
S	316L SS

Ports

Code	Ports
3PW	3 ports

Connections (Inlet N_2, Vent, Vacuum)

Code	Connections
MV4	1/4 inch face seal (Male)
FV4	1/4 inch face seal (Female)
TW4	1/4 inch tube weld
MV6	3/8 inch face seal (Male)
FV6	3/8 inch face seal (Female)
TW6	3/8 inch tube weld

Specifications

Operating Parameters		AP7	AP70
Gas (Inlet N_2 port)		N_2	
Gas (Vacuum port)		Select compatible materials of construction for the gas	
N_2 Inlet pressure		70 to 110 psig (0.48 to 0.76 MPa)	
Vacuum port maximum pressure		3500 psig (24.1 MPa)	
Proof pressure (Vacuum)		5000 psig (34.5 MPa)	
Burst pressure		10000 psig (69 MPa)	
Maximum vacuum pressure		-26 in.Hg (-88 kPa) ∗1)	
Ambient and operating temperature		-40 to 71°C	
Connections	**Inlet**	Face seal, Tube weld	1/4 inch face seal (Male)
	Vent	Face seal, Tube weld	3/8 inch face seal (Male)
	Vacuum	Face seal, Tube weld	
Weight		0.11 kg ∗2)	0.13 kg ∗2)

∗1) At inlet pressure 80 psig (0.55 MPa) and flow rate 60 slpm.

∗2) Weight, including individual boxed weight, may vary depending on connections or options.

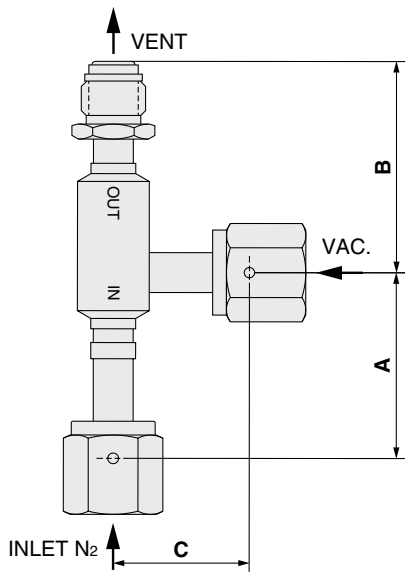
Wetted Parts Material

Wetted Parts	S
Body	316L SS

Dimensions

inch (mm)

AP7

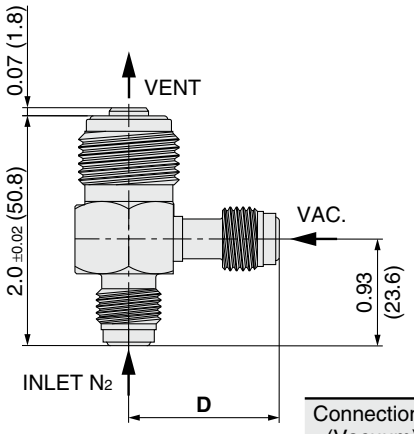


Connections (Inlet)	A	
	inch	(mm)
MV4	1.62	(41.1)
FV4		
TW4	1.25	(31.8)
MV6	2.13	(54.1)
FV6		
TW6	1.25	(31.8)

Connections (Vent)	B	
	inch	(mm)
MV4	1.83	(46.5)
FV4		
TW4	1.46	(37.1)
MV6	2.34	(59.4)
FV6		
TW6	1.46	(37.1)

Connections (Vacuum)	C	
	inch	(mm)
MV4	1.18	(30.0)
FV4		
TW4	0.81	(20.6)
MV6	1.69	(42.9)
FV6		
TW6	0.81	(20.6)

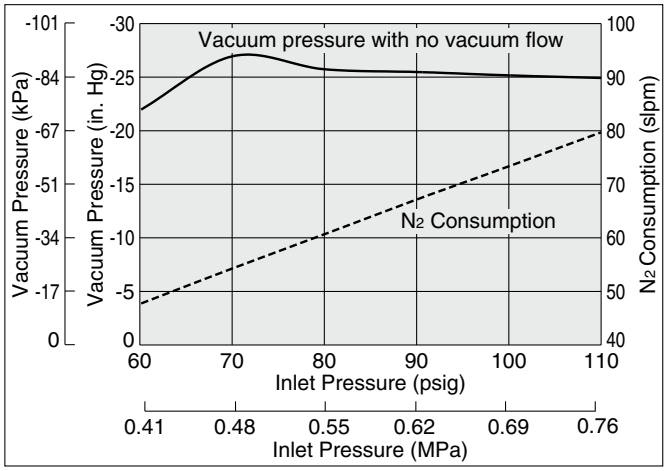
AP70



Connections (Vacuum)	D	
	inch	(mm)
MV4	1.31	(33.3)
FV4		
TW4	0.97	(24.6)
MV6	1.85	(47.0)
FV6		
TW6	0.97	(24.6)

Exhaust Characteristics

AP7



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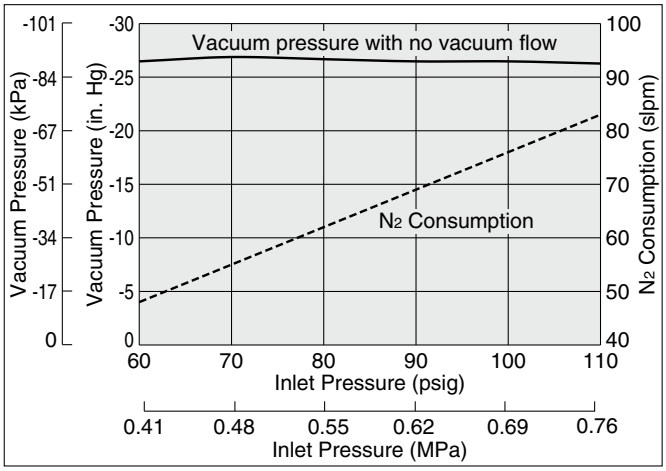
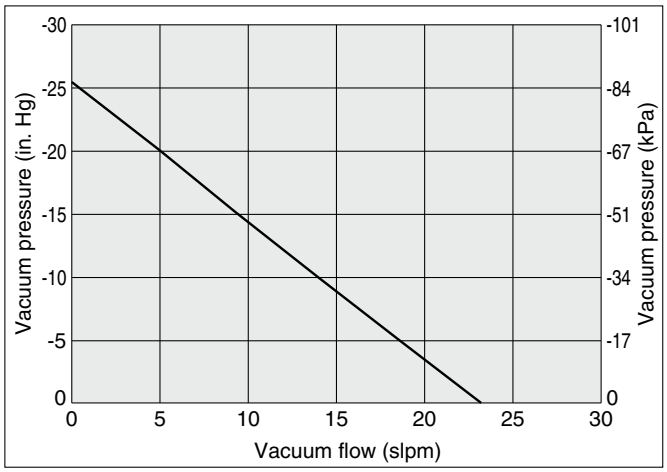
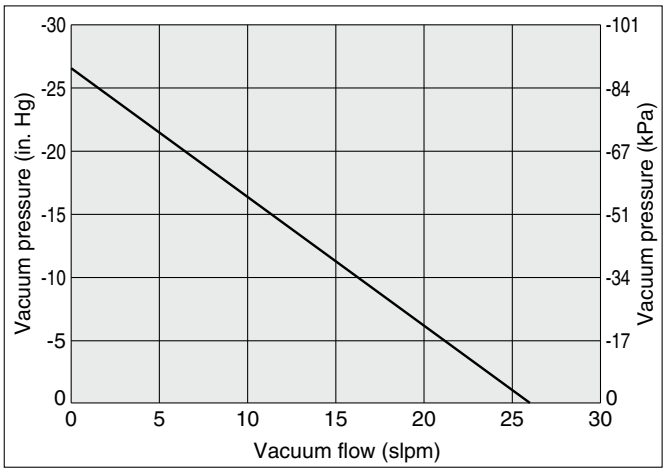


Flow Characteristics

AP7



AP70



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Vacuum Generator | Module

Series AP71

- **Unique compact design by integrating vacuum generator, air operated valve and check valve**
- **Max. vacuum pressure: -26 in.Hg (-88 kPa)**
- **Integrate N.C. air operated valve**
- **Constant bleed option to maintain inert vent line**

RoHS

How to Order

AP71 S MV4 FV6 TW4 ☐

(Inlet) (Vent) (Vacuum)

Material

Code	Body material
S	316L SS

Connections (Inlet N_2 port, Vent, Vacuum)

Code	Connections	Inlet	Vent	Vacuum
MV4	1/4 inch face seal (Male)	●	●	●
FV4	1/4 inch face seal (Female)		●	●
TW4	1/4 inch tube weld			●
MV6	3/8 inch face seal (Male)		●	
FV6	3/8 inch face seal (Female)		●	
TW6	3/8 inch tube weld		●	

Bleed options

Code	Bleed options
No code	No bleed option (Standard)
CB005	2.5 slpm
CB009	5 slpm
CB013	8 slpm
CB023	15 slpm

Specifications

Operating Parameters		**AP71**
Gas (Inlet N_2 port)		N_2
Gas (Vacuum)		Select compatible materials of construction for the gas
N_2 Inlet pressure		70 to 110 psig (0.48 to 0.76 MPa)
Vacuum port maximum pressure		3500 psig (24.1 MPa)
Proof pressure (Vacuum)		5000 psig (34.5 MPa)
Burst pressure (Vacuum)		10000 psig (69 MPa)
Maximum vacuum pressure		-26 in.Hg (-88 kPa) *1)
Ambient and operating temperature		-10 to 71°C
Cracking pressure (Check valve)		3 psid (0.023 MPa)*2)
Air operated	**Status**	Normally closed (N.C.)
	Actuation pressure	60 to 110 psig (0.4 to 0.76 MPa)
	Actuation port	M5 thread
Connections	**Inlet**	1/4 inch face seal (Male)
	Vent	1/4, 3/8 inch face seal, 3/8 inch tube weld
	Vacuum	1/4 inch face seal, Tube weld
Weight		0.14 kg *3)

∗1) At inlet pressure 80 psig (0.55 MPa) and flow rate 60 slpm.
∗2) Cracking pressure is a nominal value which may vary depending on the application and operating conditions.
∗3) Weight, including individual boxed weight, may vary depending on connections or options.

Option

Bleed

Bleed option provides constant low flow of N_2 to maintain inert atmosphere in vent line.
Following 4 options are available:

Option	Bleed ∗
CB005	1 to 2.5 slpm
CB009	2 to 5 slpm
CB013	5 to 8 slpm
CB023	10 to 15 slpm

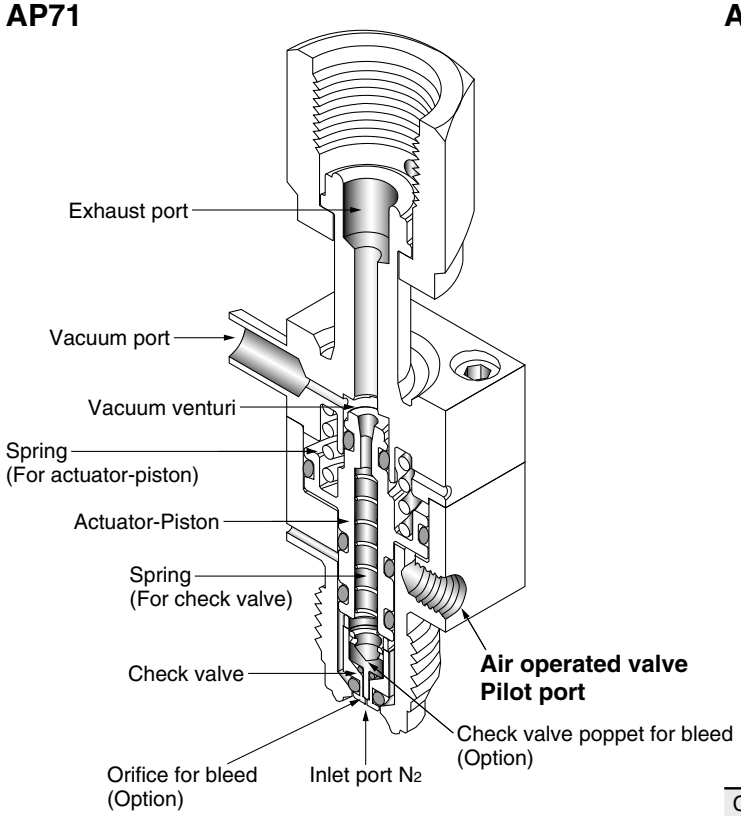
∗ At 80 psig (0.55 MPa) N_2 gas.

Wetted Parts Material

Wetted Parts	**AP71**
Body	316L SS
Poppet	303 SS
Piston	303 SS
Spring	302 SS
Check valve seat	FKM

Construction

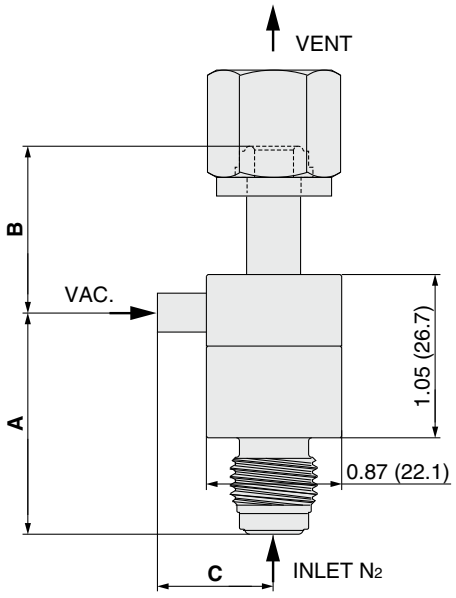
AP71



Dimensions

inch (mm)

AP71



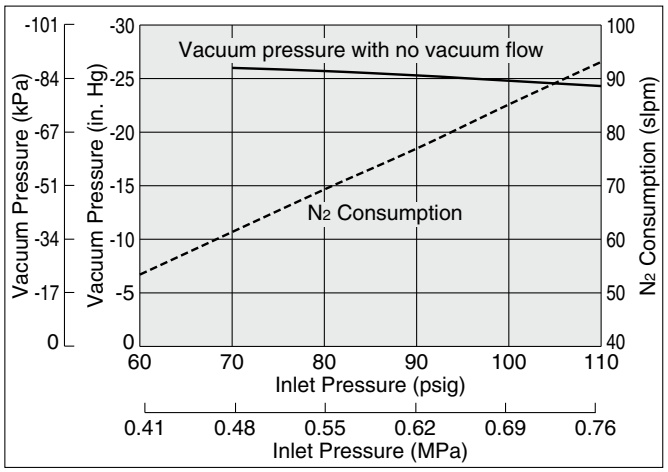
Connections (Inlet)	A	
	inch	(mm)
MV4	1.43	(36.3)

Connections (Vent)	B	
	inch	(mm)
MV4	1.07	(27.2)
FV4		
MV6	1.64	(41.7)
FV6		
TW6	0.96	(24.4)

Connections (Vacuum)	C	
	inch	(mm)
MV4	1.39	(35.3)
FV4		
TW4	0.75	(19.1)

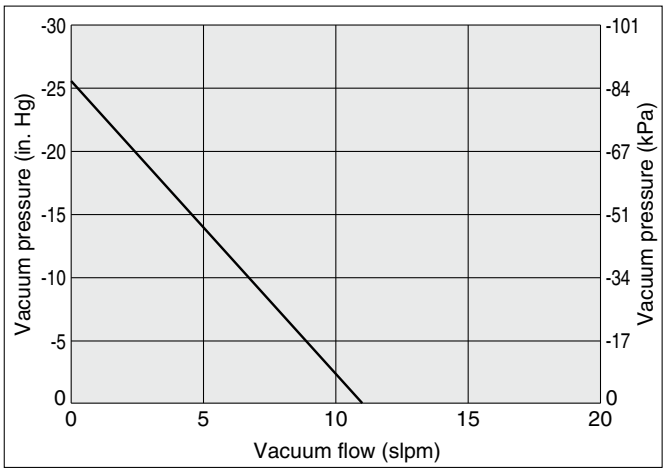
Exhaust Characteristics

AP71



Flow Characteristics

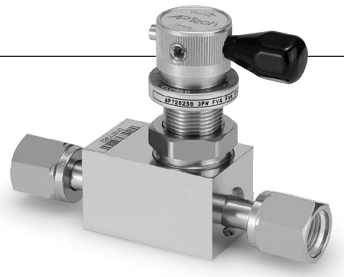
AP71



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Series AP72

- **Unique compact design by integrating vacuum generator, diaphragm valve and check valve**
- **Max. vacuum pressure: -26 in.Hg (-88 kPa)**
- **Air operated or manually operated type is available as diaphragm valve**
- **Constant bleed option to maintain inert vent line**



RoHS

How to Order

AP72 [625] [S] [3PW] [MV4] [FV6] [TW4] [ ] [ ]

(Inlet) (Vent) (Vacuum)

Material

Code	Body material
S	316L SS

Ports (Refer to the porting configuration)

Code	Ports
3PW	3 ports
3PWA	3 ports (Angle type)
4PW	4 ports

Model

Code	Actuation	Knob
540	Air operated	—
550		
600	Manual operated	Multi turn round knob
625		1/4 turn lever knob
650		1/4 turn round knob with open/close indication window

Bleed options

Code	Bleed options
No code	No bleed option (Standard)
CB009	5 slpm
CB013	8 slpm
CB023	15 slpm

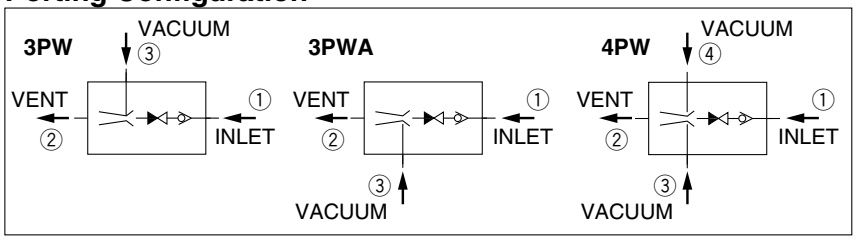
Diaphragm valve seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Connections (Inlet N_2 port, Vent, Vacuum)

Code	Connections	Inlet	Vent	Vacuum
MV4	1/4 inch face seal (Male)	●	●	●
FV4	1/4 inch face seal (Female)	●	●	●
TW4	1/4 inch tube weld			●
MV6	3/8 inch face seal (Male)		●	
FV6	3/8 inch face seal (Female)		●	
TW6	3/8 inch tube weld		●	

Porting Configuration



Specifications

Operating Parameters		AP72540	AP72550	AP72600	AP72625	AP72650
Gas (Inlet N_2 port)		N_2				
Gas (Vacuum)		Select compatible materials of construction for the gas				
N_2 Inlet pressure		70 to 110 psig (0.48 to 0.76 MPa)				
Vacuum port maximum pressure		3000 psig (20.7 MPa)				
Proof pressure (Vacuum)		5000 psig (34.5 MPa)				
Burst pressure		10000 psig (69 MPa)				
Maximum vacuum pressure		-26 in.Hg (-88 kPa) ∗1)				
Ambient and operating temperature		-10 to 71°C				
Cracking pressure (Check valve)		3 psid (0.023 MPa) ∗2)				
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s				
	Outboard leakage	2×10^{-10} Pa·m³/s ∗3)				
Across the seat leak		4×10^{-9} Pa·m³/s ∗3)				
Connections	**Inlet**	1/4 inch face seal				
	Vent	1/4, 3/8 inch face seal, 3/8 inch tube weld				
	Vacuum	1/4 inch face seal, 1/4 inch tube weld				
Weight		0.82 kg ∗4)				

∗1) At inlet pressure 80 psig (0.55 MPa) and flow rate 60 slpm.
∗2) Cracking pressure is a nominal value which may vary depending on the application and operating conditions.
∗3) Tested with Helium gas inlet pressure 250 psig (1.7 MPa). 125 psig (0.9 MPa) for AP72540
∗4) Weight, including individual boxed weight, may vary depending on connections or options.

Air operated type

Model	AP72540	AP72550
Status	Normally closed (N.C.)	
Actuation pressure	70 to 110 psig (0.48 to 0.76 MPa)	
Actuation port connection	NPT 1/8 inch	10-32 UNF thread
Actuation port location	Top	Side

Manually operated type

Model	AP72600	AP72625	AP72650
Knob	Multi turn round knob	1/4 turn lever knob	1/4 turn round knob with open/close indication window

Option

Bleed

Provides constant low flow of N_2 to maintain inert atmosphere in vent line.

Following 3 options are available:

Option	Bleed *
CB009	2 to 5 slpm
CB013	5 to 8 slpm
CB023	10 to 15 slpm

* At 80 psig (0.55 MPa) N_2 gas.

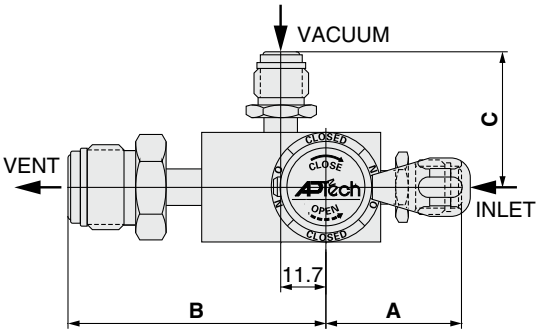
Material

Material	S
Body	316L SS
Surface finish	Electropolish + Passivation
Diaphragm	Ni-Co alloy
Diaphragm valve seat	PCTFE (Option: Polyimide)
Check valve seat	FKM

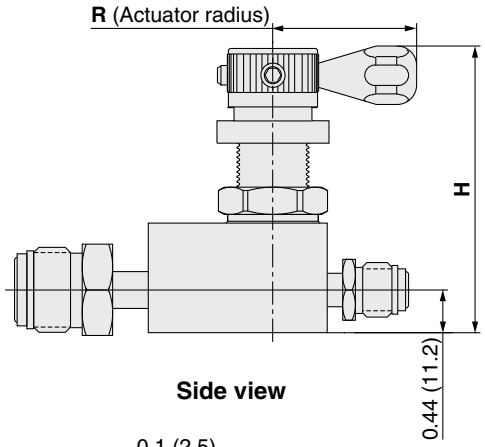
Dimensions

inch (mm)

AP72



Top view



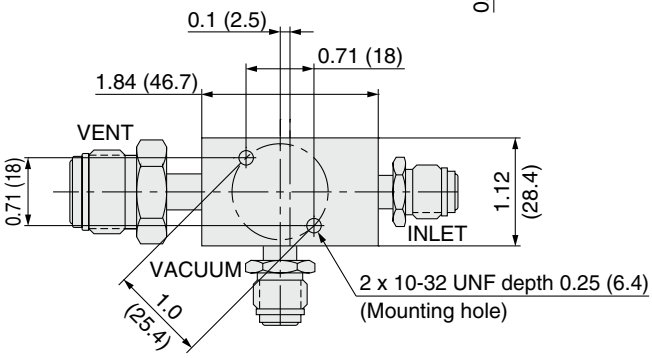
Side view

Model	R		H	
	inch	(mm)	inch	(mm)
AP72540	0.73	(18.5)	3.49	(88.6)
AP72550	0.69	(17.4)	3.28	(83.3)
AP72600	1.06	(26.9)	3.00	(67.1)
AP72625	1.48	(37.6)	2.94	(74.7)
AP72650	0.94	(23.9)	3.02	(76.7)

Connections (Inlet)	A	
	inch	(mm)
MV4	1.39	(35.3)
FV4		

Connections (Vent)	B	
	inch	(mm)
MV4	2.11	(53.6)
FV4		
MV6	2.65	(67.3)
FV6		
TW6	2.05	(52.0)

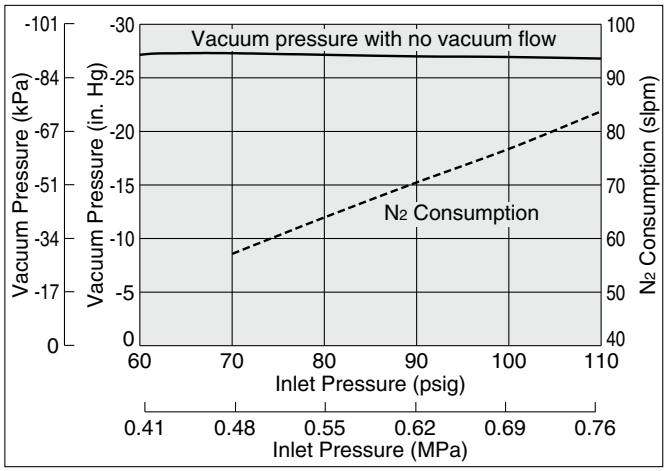
Connections (Vacuum)	C	
	inch	(mm)
MV4	1.39	(35.3)
FV4		
TW4	1.06	(26.9)



Bottom view

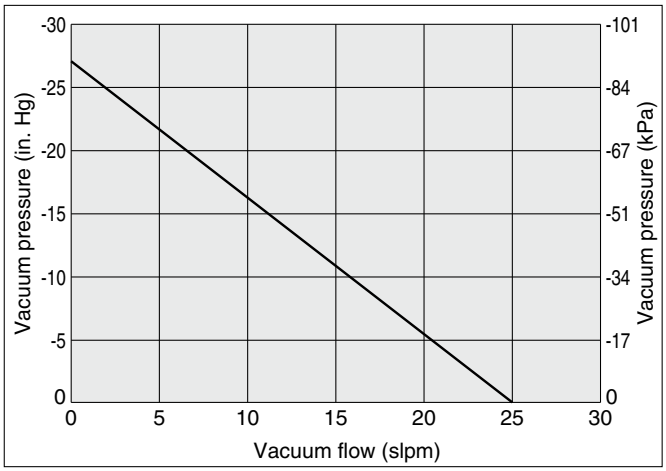
Exhaust Characteristics

AP72



Flow Characteristics

AP72



Note) slpm, N_2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N_2 gas is flowing.

Flow Switch

Series AP74

- **6 flow trip points available, from 2 to 100 slpm**
- **Body material: 316L SS secondary remelt**
- **High pressure Max. 3500 psig (24.1 MPa)**
- **Detect excess flow by N.C. or N.O. contact output with non-wetted reed switch tripped by float with encapsulated magnet (SPDT, 3 wire / 2 position)**

RoHS

How to Order

AP74 [100] [S] [ ] [MV4] [MV4]

(Inlet) (Outlet)

Size

Code	Flow trip reference points ∗1)
002	2 slpm
005	5 slpm
010	10 slpm
025	25 slpm
050	50 slpm
100	100 slpm

∗1) To obtain the nominal trip point in process gases other than nitrogen or pressures other than 100 psig (0.69 MPa), please refer to the Precaution of Selection (P.160).

Material

Code	Body material
S	316L SS secondary remelt

Surface finish

Code	Surface finish Ra max
No code	15 μin. (0.4 μm) Standard
M	10 μin. (0.25 μm)

Connections (Inlet, Outlet)

Code	Connections
MV4	1/4 inch face seal (Male)
FV4	1/4 inch face seal (Female)
TW4	1/4 inch tube weld

Specifications

Operating Parameters		AP74002	AP74005	AP74010	AP74025	AP74050	AP74100
Gas		Select compatible materials of construction for the gas					
Source pressure		Vacuum to 3500 psig (24.1 MPa)					
Flow trip reference points ∗1) ∗2)		2 slpm	5 slpm	10 slpm	25 slpm	50 slpm	100 slpm
Accuracy		±10% of trip point or 0.5 slpm, whichever is greater					
Installation orientation		Inlet port at the bottom (Vertical within 8°)					
Pressure drop at trip point		0.5 psi (0.0034 MPa) differential ∗3)					
Proof pressure		5000 psig (34.5 MPa)					
Burst pressure		10000 psig (69 MPa)					
Ambient and operating temperature		-23 to 80°C (No freezing)					
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s					
	Outboard leakage	2×10^{-11} Pa·m³/s ∗4)					
Surface finish		Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm)					
Connections		Face seal, Tube weld					
Reed switch	**Type**	SPDT (3 wire / 2 position)					
	Power	30 VDC (3 W max)					
	Switching current	0.2 A max					
	Carrying current	0.5 A max					
	Initial contact resistance	0.1 Ω or less					
Cable	**Wire gauge**	AWG24 (PVC jacket)					
	Cable length	10 ft. (3 m)					
	Lead color	Blue: common					
		Brown: normally closed					
		Black: normally open					
Internal volume		0.12 in³ (1.9 cm³)					
Weight		0.11 kg ∗5)					

∗1) Trip point varies slightly with temperature change, ±2% over the specified operating range.
∗2) At N_2 gas 100 psig (0.69 MPa). To obtain the nominal trip point in process gases other than nitrogen or pressures other than 100 psig (0.69 MPa), please refer to the Precaution on Selection (P.160).
∗3) Pressure drop at trip point.
∗4) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).
∗5) Weight, including individual boxed weight, may vary depending on connections or options.

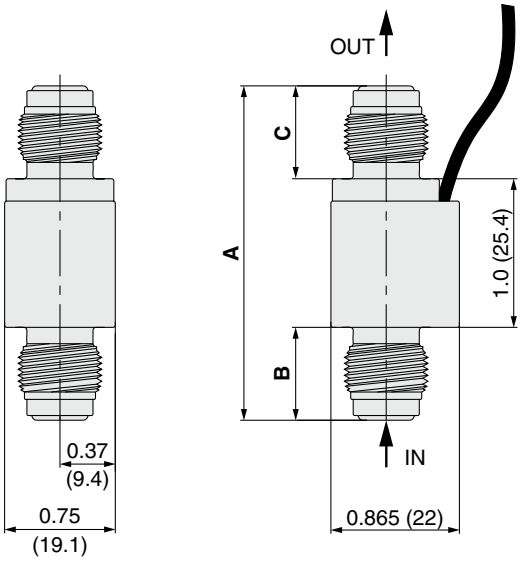
Wetted Parts Material

Wetted Parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Float	316L SS

Dimensions

inch (mm)

AP74

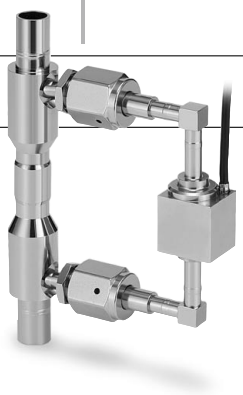


Connections		A		B		C	
Inlet	Outlet	inch	(mm)	inch	(mm)	inch	(mm)
MV4	**MV4**	2.25	(57.2)	0.625	(15.9)	0.625	(15.9)
FV4	**FV4**	3.99	(101.4)	1.495	(38.0)	1.495	(38.0)
TW4	**TW4**	2.25	(57.2)	0.625	(15.9)	0.625	(15.9)
MV4	**FV4**	3.12	(79.3)			1.495	(38.0)
MV4	**TW4**	2.25	(57.2)			0.625	(15.9)
FV4	**MV4**	3.12	(79.3)	1.495	(38.0)		
FV4	**TW4**						
TW4	**MV4**	2.25	(57.2)	0.625	(15.9)		
TW4	**FV4**	3.12	(79.3)			1.495	(38.0)

Flow Switch

Series AP74B

For high flow



- **Bypass design suitable for high flow (BSGS) application**
- **7 flow trip points available, from 225 to 2600 slpm**
- **Horizontal or vertical installation orientation is available**
- **Main line 1/2 inch or 3/4 inch size available**

RoHS

How to Order

AP74B [V] [500] [S] [M] [FV8] [MV8]

(Inlet) (Outlet)

Installation orientation

Code	Orientation
H	Horizontal
V	Vertical

Size

Code	Flow trip reference points ∗1)
225	225 slpm
350	350 slpm
500	500 slpm
950	950 slpm
1100	1100 slpm
1650	1650 slpm
2600	2600 slpm

Material

Code	Body material
S	316L SS

Surface finish

Code	Surface finish Ra max
M	10 μin. (0.25 μm)

∗1) As N_2 gas 100 psig (0.69 MPa). To obtain the nominal trip point in process gases other than nitrogen or pressures other than 100 psig (0.69 MPa), please refer to the Precaution on Selection (P.160).

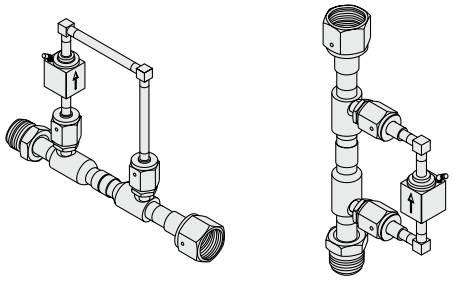
Connections

Code	Connections (Inlet, Outlet)	Size						
		225	350	500	950	1100	1650	2600
MV8	1/2 inch face seal (Male)	●	●	●	●			
FV8	1/2 inch face seal (Female)	●	●	●	●			
TW8	1/2 inch tube weld	●	●	●	●			
MV12	3/4 inch face seal (Male) ∗2)					●	●	●
FV12	3/4 inch face seal (Female) ∗2)					●	●	●
TW12	3/4 inch tube weld					●	●	●

∗2) Prepare a suitable mating fitting with a rated pressure.

Installation Orientation

AP74BH Horizontal **AP74BV Vertical**



Specifications

Operating parameters		AP74B□225	AP74B□350	AP74B□500	AP74B□950	AP74B□1100	AP74B□1650	AP74B□2600
Gas		Select compatible materials of construction for the gas						
Source pressure		Vacuum to 3500 psig (24.1 MPa)				Vacuum to 3000 psig (20.7 MPa)		
Flow trip reference points ∗1) ∗2)		225 slpm	350 slpm	500 slpm	950 slpm	1100 slpm	1650 slpm	2600 slpm
Accuracy		±20% of trip point						
Proof pressure		5000 psig (34.5 MPa)						
Burst pressure		10000 psig (69 MPa)						
Ambient and operating temperature		-23 to 80°C (No freezing)						
Leak rate	**Inboard leakage**	2×10^{-11} Pa·m³/s						
	Outboard leakage	2×10^{-11} Pa·m³/s						
Surface finish		Ra max 10 μin. (0.25 μm)						
Connections		1/2 inch face seal, Tube weld				3/4 inch face seal, Tube weld		
Pressure drop at trip point		0.5 psi (0.0034 MPa) differential ∗3)						
Reed switch	**Type**	SPDT, 3 wire / 2 position						
	Power	30 VDC (3 W max)						
	Switching current	0.2 A max						
	Carrying current	0.5 A max						
	Initial contact resistance	0.1 Ω max						
Cable	**Wire gauge**	AWG24 (PVC jacket)						
	Cable length	10 ft. (3 m)						
	Lead color	Blue: common						
		Brown: normally closed						
		Black: normally open						
Weight		0.56 kg ∗4)						

∗1) Trip point varies slightly with temperature change, ±2% over the specified operating range.

∗2) At N_2 gas 100 psig (0.69 MPa). To obtain the nominal trip point in process gases other than nitrogen or pressures other than 100 psig (0.69 MPa), please refer to the Precautions on Selection (P.160).

∗3) Pressure drop at trip point

∗4) Weight, including individual boxed weight, may vary depending on connections or options.

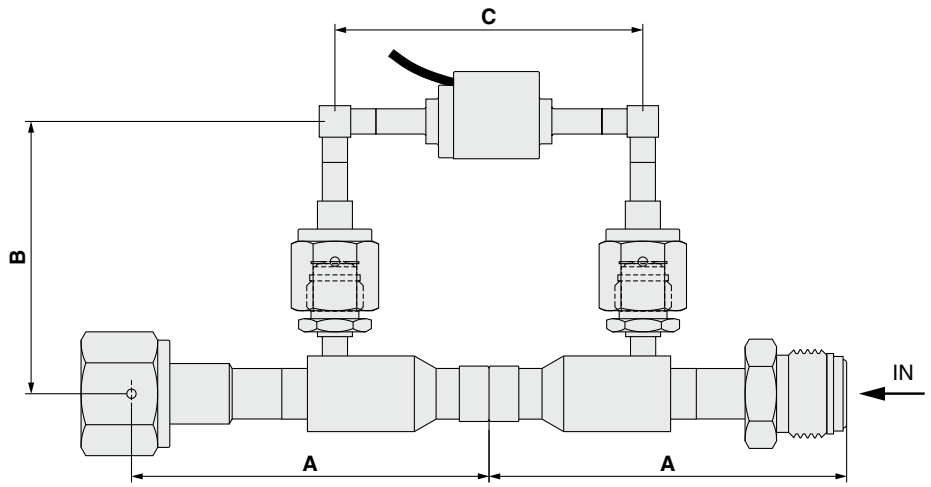
Wetted Parts Material

Wetted Parts	S
Body	316L SS
Surface finish	Electropolish + Passivation
Float	316L SS
Metal gasket	Nickel 200

Dimensions

inch (mm)

AP74B



Connections	A		B				C	
			Horizontal		Vertical			
	inch	(mm)	inch	(mm)	inch	(mm)	inch	(mm)
MV8	3.55	(90.2)	4.55	(115.6)	2.70	(68.6)	3.05	(77.5)
FV8								
TW8	2.59	(65.8)						
MV12	5.51	(140.0)	5.44	(138.2)	3.59	(91.2)		
FV12								
TW12	3.53	(89.7)						

⚠ Precaution on Selection

Nominal flow trip reference points are at 100 psig (0.69 MPa) of N_2 gas.
In order to obtain the nominal trip point for operating pressure, other than 100 psig (0.69 MPa), and for gas, other than N_2, calculate the correction factors (Fp, Fg) with the following formula and then, multiply both factors.

1. Change in operating pressure

$$Fp = \sqrt{\frac{OP}{114.7}}$$

$$\left(Fp = \sqrt{\frac{OP_{MPa}}{0.79}} \right)$$

2. Change in gas type

$$Fg = \sqrt{\frac{28}{MW}}$$

***MW*: Molecular weight of the gas**

***OP*: Operating pressure (abs) psia**
(*OP_{MPa}*: Operating pressure (abs) MPa abs)

E.g) Nominal trip point when gas type is hydrogen gas (molecular weight: 2) and operating pressure is 0.5 MPa:

1. Calculation of Fp

$$Fp = \sqrt{\frac{(0.5 + 0.1)}{0.79}} = 0.871$$

2. Calculation of Fg

$$Fg = \sqrt{\frac{28}{2}} = 3.742$$

When using the flow switch, whose nominal trip point is 10 slpm (AP74010S□), under these conditions, its nominal trip point will be 32.6 slpm (10 (slpm) x 0.871 x 3.742 = 32.6 (slpm)).

Process Gas Equipment/Check Valve Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠ Warning

1. Confirm the specifications.

This product is used in gas delivery systems to prevent reverse gas flow. This product can only supply gas from inlet to outlet side. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure, flow rate, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/ environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product materials with the process gas in the catalog selection guide. Design the equipment and select the product by understanding the characteristics of gas.

Mounting

⚠ Caution

1. Confirm the mounting direction of the product.

An arrow is indicated on the product. The arrow points in the direction flow are allowed from the inlet side towards the outlet side.

Maintenance

⚠ Warning

1. AP64 check valves cannot be repaired.

AP Tech AP64 check valves are welded shut and internal problems usually cannot be repaired.

Operation

⚠ Caution

1. Do not use the check valve as shutoff valve.

Do not rely on a check valve exclusively to absolutely prevent any reverse flow, especially when the pressure differential is small. For situations where it is known the downstream pressure will exceed the upstream pressure, use a diaphragm valve to positively shut off reverse flow.

Process Gas Equipment/Vacuum Generator Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠Warning

1. Confirm the specifications.

This product is used in gas delivery systems to assist in purging of piping systems. When selecting the product, confirm the operating conditions, such as type of process gas being vented, nitrogen supply pressure and flow rate, vent line back pressure generated by the nitrogen supply flow rate, actuation pressure, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/ environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product with the process gas in the catalog selection guide.
Design the equipment and select the product by understanding the characteristics of gas.

Mounting

⚠Caution

1. Confirm the mounting direction of the product.

Inlet port is labeled with “IN” mark and outlet port is labeled with “OUT” mark. Alternatively, the nitrogen flow direction may be indicated with an arrow instead of “IN” and “OUT” marks. Inlet and outlet ports run in line with each other. The vacuum port runs perpendicular to the inlet and outlet ports. The vacuum port may be labeled with “VAC” mark. Confirm the mounting direction and install at correct direction.

2. Connect actuation pressure to the valve actuator connection.

If an air operated valve is built in the product, connect actuation pressure to the valve actuator connection. Use nitrogen or clean dry air for actuation pressure.

Maintenance

⚠Warning

1. If a product requires repair, contact SMC.

Operation

⚠Warning

1. Supply nitrogen to the inlet port.

2. If an air operated valve is built in the product, use nitrogen or clean dry air for actuation pressure.

3. Apply nitrogen within the specified pressure range to the inlet port in order to generate a vacuum.

When applying nitrogen to the inlet port, vacuum will be generated. If a valve is built in the product, vacuum will be generated after applying nitrogen to the inlet port and opening the built-in valve. In the case of an air operated valve, it will open when applying actuation pressure to the actuation port. In the case of a manually operated valve, it will open when the handle is rotated counterclockwise until it completely stops.

4. Shut off nitrogen supply in order to shut off vacuum.

When shutting off nitrogen supply to the inlet port, vacuum will be shut off. If a valve is built in the product, vacuum will be shut off when closing the valve. In the case of an air operated valve, it will close when venting off actuation pressure. In the case of a manually operated valve, it will close when rotating the handle clockwise until it completely stops.

5. In the case the check valve is built in the product, back flow through the inlet port will be prevented when pressure on the vacuum or vent ports exceeds the inlet port pressure.

Check valve is used for preventing back flow through the inlet port when pressure on the vacuum or vent ports exceeds the inlet port pressure, regardless of whether the built-in valve is opened or closed, and regardless of whether or not the product has a constant bleed option. However, the check valve does not prevent back flow from the outlet port through the vacuum port.

6. If the product with built-in valve is selected with constant bleed option, when supplying nitrogen pressure to the inlet port, nitrogen will bleed through a small hole to the vacuum and vent ports even when the built-in valve is closed.

Process Gas Equipment/Flow Switch Specific Product Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions and pages 166 and 167 and the Operation Manual for common precautions.
http://www.smcworld.com

Selection

⚠Warning

1. Confirm the specifications.

This product is used in gas delivery systems to signal an increase in flow above a trip point. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure, flow rate, operating temperature, etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product with the process gas in the catalog selection guide.
Design the equipment and select the product by understanding the characteristics of gas.

2. Confirm the flow trip reference point of the product.

Flow trip reference point is fixed. Select the product which meets the desired flow rate. Flow trip reference point, specified in the How To Order, is the trip point value with nitrogen at 0.69 MPa inlet pressure. When the products are used with other inlet pressures or gases, use the conversion formula to calculate the flow trip reference point for such application.

Mounting

⚠Caution

1. Do not drop or bump the products.

When dropping, bumping, or applying excessive impacts to the products, it may damage inside of the product and cause malfunction.

2. Confirm the mounting direction of the products.

An arrow is indicated on the product. In the case of the AP74B Series, an arrow is indicated on the bypass line. The arrow points in the forward flow direction from inlet port to outlet port.

3. Install the products vertically with the inlet port on the bottom in order to supply gases from bottom to top.

In the case of the AP74 Series, install the product within 8 degrees of vertical in order to supply gas from bottom to top. In the case of the AP74B Series, install the product with its arrow indicated on the bypass line within 8 degrees of vertical in order to make its arrow direction upward.

Wiring

⚠Warning

1. Avoid bending repeatedly or stretching the lead wires.

Lead wire may break when applying bending stress repeatedly or stretching force to the lead wires.

2. Do not wire in conjunction with power lines or high voltage lines.

Wire separately from power lines and high voltage lines and avoid wiring in the same conduit with these lines. Close proximity between power lines or high voltage lines and the product may result in malfunction due to electrical noise.

Wiring

⚠Warning

3. Confirm proper insulation of wiring.

Make sure that there is no insulation failure (contact with other circuits, insulation failure between terminal, etc.). Damage may occur due to excessive current applied to the product.

4. Connect wires properly.

Use brown and blue wires for normally closed contact installation.
Use black and blue wires for normally open contact installation.

5. Do not connect wiring while product is energized.

6. Make sure to connect a load before energizing the product.

Energizing the product without connecting a load (load short-circuit) can create excessive current and damage the switch.

7. Confirm operation of the product by supplying nitrogen after installation and wiring.

Confirm the product trips when supplying nitrogen above the flow trip reference point and that it resets when the flow is shut off.

Operating Environment

⚠Warning

1. Do not use in an area, where a magnetic field is generated. It may cause malfunction.

Maintenance

⚠Warning

1. AP Tech flow switches cannot be repaired.

AP Tech flow switches are welded shut and internal problems usually cannot be repaired.

Operation

⚠Warning

1. Initial pressurization of system lines can cause a temporary flow surge that trips the flow switch.

Confirm flow switch resets once system lines are filled with gas. If it does not reset after system lines are filled, stop supplying gas and check for leakage of the system.

Technical Data/Glossary of Terms

1. Applications

[Process Gas]
A generic term describing gases used in manufacturing which contact the product being manufactured (processed).

[Specialty Gas]
A generic term describing gases stored in cylinders (bottles). These gases range from non-hazardous inert to hazardous - corrosive, poisonous, flammable, oxidizer and pyrophoric.

[Bulk Gas]
A generic term used to describe gases stored in large vessels. The most common bulk gases are stored in liquid phase, such as nitrogen and oxygen.

[CDA]
Clean dry air, generally supplied by a compressor rather than a cylinder (bottle).

[Ultra High Purity (UHP)]
A term common to the semiconductor industry and other clean industries such as solar, LED and flat panel display, used to describe extremely high purity and very low contamination requirements. Gases are of the highest level of purity attainable and gas handling systems and components are designed to maintain such purity without contributing contamination to the gas stream.

[General Applications]
This term indicates all industries other than semiconductor and clean industries such as solar, LED and flat panel display, and applications that are not UHP.

[Source (Cylinder) Applications]
Defines products used at gas storage vessel, such as a cylinder (bottle) pressure regulator used to decrease source pressure to a lower line pressure. For the purposes of this catalog, components are defined as 'source' if they are the cylinder pressure regulator or upstream of the cylinder regulator.

[Distribution Applications]
Defines products used downstream of source regulator which includes point of use, distribution panels such as valve manifold boxes (VMB) and within the process tool. For the purposes of this catalog, components downstream of the source regulator are defined as 'distribution'.

[Bulk Gas Applications]
Defines products used for source and distribution applications of bulk gases, including BSGS (bulk specialty gas systems).

[Sub–atmospheric Applications]
Source and distribution applications where pressure delivery is less than atmospheric pressure. This is common for low vapor pressure specialty gas delivery.

2. Products

[Regulator]
A control valve that works by reducing the valve inlet pressure and delivering a lower outlet pressure. Most AP Tech regulators are non-relieving type, which means pressure above set point is not vented automatically.

[Single stage]
Single stage pressure regulators drop pressure only once in a single step.

[Two stage]
Two stage regulation drops pressure twice, in two steps. A two stage regulator is simply two regulators in series with a common body. Two stage regulations are two separate regulators in series.

[Tied-diaphragm]
This is a regulator design in which the diaphragm and poppet are linked together. The tied diaphragm feature pulls the poppet closed as the pressure rises above set point and stops leak due to contamination or some other failures.

[Springless Regulator]
These are pressure regulators which do not have wetted springs below the poppet. The diaphragm and poppet are linked, as with the tied diaphragm, but it is also does not have a poppet spring.

[Back pressure regulator]
This is a control valve that if the pressure on the inlet side exceeds a set level, the over pressure is vented to outlet side to keep the inlet pressure stable.

[Diaphragm valve]
This is a shut off valve which uses a diaphragm for a moving element to open and close the valve. Springless diaphragm valves do not have a wetted spring. Diaphragm valves from AP Tech are two way valves, available with multiple ports.

[LOTO]
Stands for Lock-out/Tag-out and is used to ensure worker's safety.
Lock-out refers to physically locking the device to shutoff gas supply to equipment. Tag-out refers to the practice of attaching a warning tag to the device to prevent potential accidents caused by erroneous operations.

[Purge port]
Purge ports can be located on the inlet and/or outlet side of the valve. It can be used in applications, such as applying purge gas when welding on the line or maintenance service while valve is closed.

[Check valve]
A check valve is a safety device intended to prevent reverse flow. The AP 64 is a unique design with only one moving part in the gas stream, an O-ring. It is a springless design, free of springs and poppets.

[Vacuum generator]
A venturi device that creates vacuum by flowing gas through a nozzle. The AP 71 and 72 are module devices which combine a supply valve and check valve with the venturi.

[Constant bleed]
A feature that provides a continuous flow of gas through the valve via an orifice when it is closed. This feature is used with the AP 71 and AP 72 series to keep exhaust lines inert. It is also available as an option to certain standard shut off valves to provide a bleed to keep the cylinder connection inert while disconnected from a cylinder.

[Flow switch]
A sensor that detects excess flow above a given flow rate, caused by pipe breakage etc.
Note that the AP 4 and AP 74B series are simple switches and do not have a flow rate display function.

3. Materials

[316 SS]
An austenitic stainless steel with a higher nickel content to improve its corrosion resistance.

[316L SS]
A low-carbon form of 316 SS which has better intergranular corrosion resistance than 316 SS.

[316L SS secondary remelt]
A high-grade form of 316L SS to reduce impurities to the utmost limit.
AP Tech 316L SS secondary remelt steel conforms to the SEMI standard F20 UHP grade.

[Ni-Cr-Mo alloy]
A nickel-chromium-molybdenum alloy with excellent corrosion resistance.

[Ni-Co alloy]
A cobalt-chromium-nickel alloy with excellent corrosion resistance and superelasticity. This material is used as diaphragm of the diaphragm valves.

[PCTFE]
Poly Chloro Tri Furuoro Ethylene. This is high transparency fluoroplastic material with mechanically superior in rigidity and excellent low temperature. This material is used as standard seat material of the regulators and diaphragm valves.

[PTFE]
Fully fluorinated material. This is virtually chemically inert. PTFE should have equivalent or superior chemical compatibility compared to PCTFE in every application.
PTFE (TF) option available for the AP 500, AP, AZ & AK 1000 & 1100 and AZ & AK 1300. The primary application for this material is for pressure regulators inside process tools.

[Polyimide]
Plastic with excellent heat resistance (polyimide resin). This material has excellent heat and wear resistance. This seat is available as an option for high temperature applications or specific gas applications, such as N_2O or CO_2.

[PEEK]
Polyetheretherketone. This material has excellent heat, fatigue and chemical resistances as thermoplastic resin. This seat is available as an option for the regulators.

[FKM]
Fluoro-rubber (FKM). This material has excellent heat and chemical resistances.

[FFKM]
Perfluoroelastomer (FFKM). This material has excellent heat and chemical resistances compared to fluoro-rubber (FKM).

4. Surface treatment

[Electropolish]
Commonly referred to as EP, is an electrolytic process for metals to enhance a surface chemistry and smooth the surface finish.

[Passivation]
A process for metals to form a passivation layer on the surface, typically by removing surface Fe in a nitric acid bath.

5. Connections

[Face seal fitting]
A fitting type in which a metal gasket effects a seal with mating fittings, forming high leak integrity, metal to metal seal. The most common face seal fitting is VCR® compatible type.

[Tube weld]
Components with tube stubs are installed by welding into the piping system directly without using fittings.

[Compression fitting]
A self aligning tube fitting that uses a ferrule to compress on the tubing effecting a seal when the nut is tightened. A common compression fitting is that of Swagelok®.

[NPT]
A tapered pipe thread which is a U.S.A standard (ANSI).

6. Specifications

[Surface finish Ra]
Surface finish of the inner surface (wetted parts). A standard for measuring surface roughness which averages the peak to valley of the surface profile over a given distance (stroke). Multiple readings on a part are also averaged for Ra, but for Ra max, the worst reading is the value for that part.

[Cv factor]
The flow coefficient, Cv, is defined as the volume of 15.6°C water passing through a valve with specific differential inlet to outlet pressures. Cv is calculated in accordance with the SEMI standard F32. Cv measurements of regulators are taken with the orifice of the regulators wide open.

[Cracking pressure]
This is the pressure at which a check valve first opens and achieves a given flow rate as pressure increase.

[Ultimate vacuum]
The maximum vacuum generated by a vacuum generator.

[slpm]
Abbreviation for standard liter per minute.
Indicates the volumetric flow in liters per minute of time at standard conditions of a temperature of 0°C and a pressure of 1 atmosphere.

[Supply pressure effect]
The change in a pressure regulator's outlet pressure resulting from a change in source (supply) pressure. The most typical is an increase in outlet pressure as the inlet pressure decays – often stated as a given rise per a given drop in pressure.

[Inboard leakage]
Leakage rate from outside to inside of the products occurring when an internal pressure is less than the external pressure. This can be detected by spraying helium on outside of the products and detecting helium entering into the products from any leak path while internal cavities are evacuated. This detection method conforms to the SEMI standard F1.

[Outboard leakage]
Leakage rate from inside to outside of the products occurring when an internal pressure is more than the external pressure. This can be detected by pressurizing helium inside the products and detecting helium leaking outside from the products. This detection method conforms to the SEMI standard F1.

[Across the seat leak]
Leak rate from inlet to outlet of a device in the closed position. Often also referred to as 'internal leakage' meaning leak is only internal from inlet to outlet side.

[SEMI standards]
Voluntary standards issued by Semiconductor Equipment and Materials International (SEMI) an international industry association made up of companies that supply manufacturing equipment, materials and related services to the semiconductor, flat panel display, nanotechnology, MEMS, solar power generation and other related industries.

Process Gas Equipment Common Precautions 1

Be sure to read this before handling.

Design

⚠Warning

1. Confirm the specifications.

The compatibility of the product with specific equipment must be decided by the person who designs the equipment or decided its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

Selection

⚠Warning

1. Confirm the specifications.

When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/ environments. Check the compatibility of the product materials with the process gas.

Design the equipment and select the product by understanding the characteristics of gas.

2. Follow the regulations and laws, defined by the country or local government, or organization standards.

Reference: High Pressure Gas Safety Act, Labor Safety and Sanitation Law etc.

Mounting

⚠Warning

1. Operation Manual

Mount and operate the product after reading the manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

⚠Caution

1. Flush the piping thoroughly with inert gas before installing the products.

Remove any dust or scales thoroughly as they could cause malfunction or failure of the product. Do not flush with gas other than inert gas, as this could cause dangerous situations.

2. Do not touch the fitting or the wetted parts of the products by hand. Do not apply grease or oil to the products.

3. Unpack the hermetically-sealed package under clean environment (other than AK series).

The products intended for high purity processes are double packed inside the clean room. Make sure to unpack the sealed inner bag inside the clean room or clean environment.

4. Ensure sufficient space for maintenance activities.

Ensure sufficient space for maintenance activities.

Mounting

⚠Caution

5. Connect face seal fittings.

Use same size face seal fitting (metal gasket sealing type) for mating connections.

Place gasket at the end of fitting and tighten female nut, and then tighten the nut 1/8 using torque wrench. For gasket material, use either stainless or nickel.

6. Connect tube welds.

Follow the industry standards (refer to SEMI F78) to weld the piping.

Make sure the valve is in open position when supplying purge gas and if welding the inlet side, supply purge gas from the outlet side of the product, and if welding the outlet side, supply purge gas from the inlet side of the product.

7. Connect compression fittings.

Typically 1-1/4 turn past finger tight of the nut after inserting the tube into the fitting. Please use stainless steel material for piping. After installation, perform a leak test.

8. Connect tapered pipe thread fittings.

Thread fitting or piping into body and tighten it at recommended torque. When holding the product, hold its body section.

Apply PTFE tape or sealant on the thread of the piping, fitting, etc. When using the sealant, other than the PTFE, it will be difficult to fully remove the sealant and this could cause malfunction or failure of the product.

9. After installation, perform a leak test.

Perform a leak test, such as helium leak test, pressure decay test, bubble leak test, etc., depending on the application. It is recommended to perform a helium leak test on all face seal connections and tube welds per the industry standards (refer to SEMI F1).

Storage and Operating Environment

⚠Warning

1. Do not use in an area having chemicals, sea water or water, or where there is direct contact with any of these.

2. Do not use in a place subject to heavy vibration and/or shock.

3. Keep ambient temperature and use gas within the specified operating temperature. Remove any sources of excessive heat.

4. Do not keep the products in stock in an area, where any dust or water coming in, and keep in dry conditions, where there is no contact with humidity.

Process Gas Equipment Common Precautions 2

Be sure to read this before handling.

Maintenance

⚠ Warning

1. Perform a routine maintenance.

Perform a routine maintenance at customer's responsibility by taking into consideration the operating conditions of the equipment. It is recommended to perform a routine maintenance for the following:
External leakage, Internal leakage (Across the seat leak), Performance etc.

2. Shut down system before removing the product from system for repair or replacement.

Follow the proper procedures to shut off the process gas supply and vent the system.

3. Purge hazardous gases from system before removing the product from system.

4. Do not disassemble products under warranty.

The warranty may be voided if product is disassembled.

Operation

⚠ Warning

1. Do not put the heavy objects on the products. Do not use the products as scaffold.

2. Do not use the products in conditions that do not meet the product specifications.

Product Returns

When returning the product to SMC, make sure to properly purge to remove all hazardous materials and return the product complying with SMC specified procedures.
For details, please contact SMC.

Export

⚠ Warning

The products fall within the United States Export Administration Regulations (EAR) regarding sale, export and re-exports. It is the exporter's responsibility to assure that these regulations are followed when the products are exported. Export Control Classification Number (ECCN) related to the products is as follows.
Regulations (including ECCN) are subject to change with amendment of law.
Latest information regarding these regulations should be checked by customer.

Reference: Bureau of Industry and Security (USA)
http://www.bis.doc.gov/

1) **2B350.g.2** <Applicable conditions>
   (1) Product name : Regulator, Diaphragm valve
   (2) Body material : Ni-Cr-Mo alloy
   (3) Connection size : 1/2 inch or more

2) **2B999.g** <Applicable conditions>
   (1) Product name : Regulator, Back pressure regulator, Diaphragm valve, Check valve, Vacuum generator module (integrated with valve and check valve)
   (2) Body material : 316 SS, 316L SS, 316L SS secondary remelt, Ni-Cr-Mo alloy* regardless of connection size.
   * 2B350.g.2 supersedes for regulator and diaphragm valve of Hastelloy body with 1/2 or more connection size.

3) **EAR99** <Applicable conditions>
   (1) Regulator and Back pressure regulator with brass bodies
   (2) Vacuum generator, Flow switch, Other options (Pressure gauge, LOTO)

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution", "Warning"** or **"Danger"**. They are all important notes for safety and must be followed in addition to International Standards (ISO)*1), Japan Industrial Standards (JIS)*2) and other safety regulations*3).

⚠ Caution: Operator error could result in injury or equipment damage.

⚠ Warning: Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possibility of serious injury or loss of life.

*1) ISO 4414: Pneumatic fluid power -- General rules relating to systems.
*2) JIS B 8370: General rules for pneumatic equipment.
*3) High Pressure Gas Safety Act, Labor Safety and Sanitation Law etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with fluid and specific equipment must be decided by the person who designs the equipment or decided its specifications based on necessary analysis and test results.
The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.
This person should also thoroughly review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should install and operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.
The assembly, installation operation maintenance of the given equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or outdoors (use in a place protected from adverse environmental).
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion, or recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

⚠ Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited Warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited Warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited Warranty and Disclaimer

1. The warranty period of the product is 1 year after the product is delivered to customer from SMC.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using the products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

Compliance Requirements

1. When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).
2. The products printed in the catalog are USA manufactured products of AP Tech. As such, they fall within the United States Export Administration Regulations (EAR) regarding re-exports.
   It is the exporter's responsibility to assure that these regulations are followed when the products are exported.

Revision history

Edition B
* Not available

Edition C
* High flow type is added to the regulator AZ/AK series.
* Air operated type is added to the regulator AP/AZ/AK series.
* The product specifications for UHP gas (electropolish, face seal) are added to the back pressure regulator BP1000 series.
* Air operated two step mode is added to the diaphragm valve AP series.
* Max. operating pressure (Max. inlet pressure for regulators) is changed: 16.5 MPa → 20.7 MPa
  <Applicable models> Regulators/Series AP1200, AP12PA; Diaphragm valve/Series AP31□□; Flow switch/Series AP74B
* Operating pressure range is changed: Vacuum to 1.7 MPa → Vacuum to 2.1 MPa
  <Applicable models> Diaphragm valves/Series AP3550, 4550, 4600, 4625, 4650, 4657
* Operating pressure range is changed: Vacuum to 0.9 MPa → Vacuum to 1.0 MPa
  <Applicable model> Diaphragm valve/Series AP3540 (Seat material: PCTFE)
* The external dimension is changed: 136.7 → 146.3
  <Applicable models> Regulators/Series AP9000, AP9100
* The material of pressure gauge case is changed: Brass → Stainless steel + Zirconium nitride coating
* The part number with gauge port plug installed before shipment is changed. The code number C is added.
  <Applicable models> Regulator/Series AK; Back pressure regulator/Series BP1000
* Inlet pressure range is changed: Vacuum to 1.7 MPa → Vacuum to 5.5 MPa
  <Applicable model> Regulator/AP9115
* The leakage and flow rate display units are changed to SI units: Pa·m³/sec → Pa·m³/s
  <Applicable models> All models
* Number of pages increased from 132 to 172. TR

⚠ Safety Instructions | Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

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