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**
- **Hastelloy internals available for corrosion resistance**

How to Order

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

Port Number: ① ② ③ ④ ⑤

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)

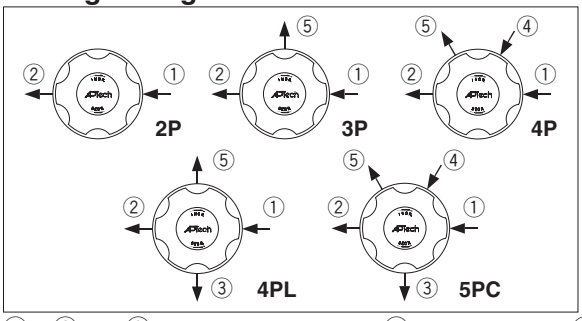
Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	316 SS
S	316 SS		
SH		Hastelloy® C-22	Hastelloy® C-22

Ports

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

Porting Configuration



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 unitunit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch NPT)	
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
2	0 to 200 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) Other range available. Refer to gauge guide (P.94,95).

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
	5PC	4	4	0	1	V3	MPA

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	Vespel® ∗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	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 160°F (–40 to 71°C) (No freezing) ∗2)							
Cv	0.09							
Leak rate	1 x 10^{-10} Pa·m^3/sec							
Connections	NPT female, Compression							
Supply pressure effect	0.38 pisg (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)							
Mass	2.4 lbs (1.09 kg) ∗3)							

∗1) Max 300 psig (2.1 MPa) for PTFE seat.
∗2) 14 to 194°F (–10 to 90°C) for Vespel® and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.
∗3) Mass, 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							

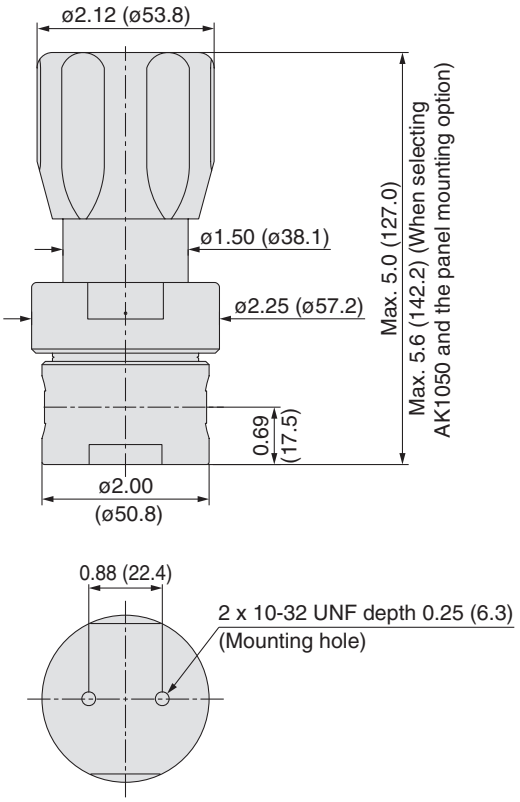
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Hastelloy® C-22
Diaphragm	316 SS		Hastelloy® C-22
Seat	PCTFE (Option: Vespel®, PEEK, PTFE)		PCTFE (Option: PEEK, PTFE)

Dimensions

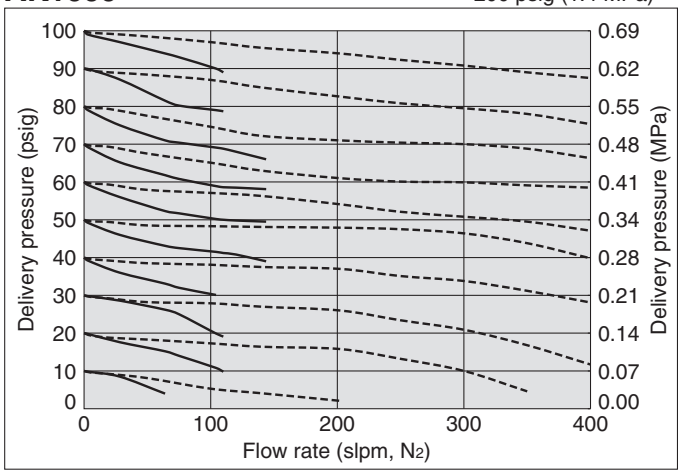
inch (mm)

AK1000

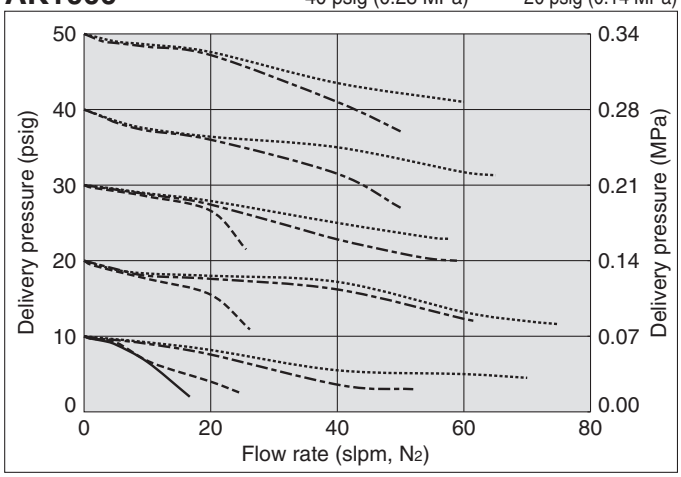


Flow Characteristics

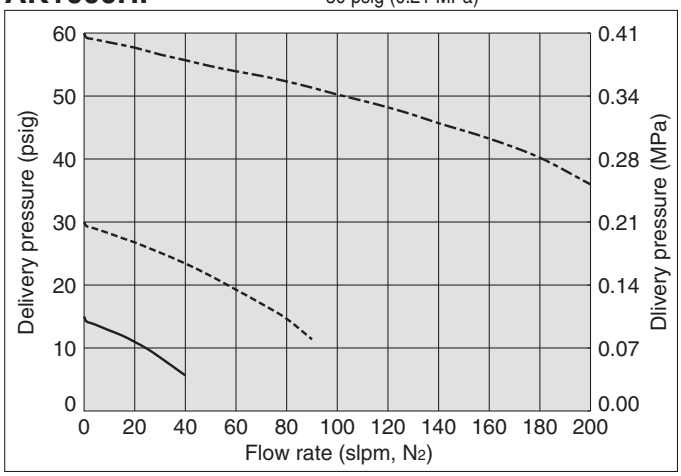
AK1000



AK1000



AK1000HF



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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**
- **Hastelloy internals available for corrosion resistance**
- **Tied-diaphragm design**

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		Hastelloy® C-22	Hastelloy® C-22

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 (Connections: 1/4 inch NPT)	
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
2	0 to 200 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) Other range available. Refer to gauge guide (P.94,95).

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).

Seat material

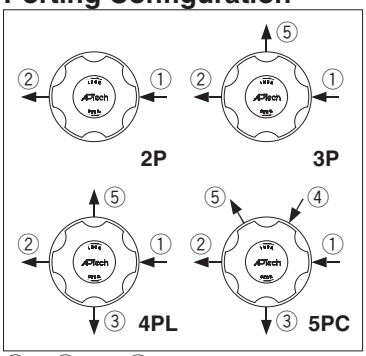
Code	Material
No code	PCTFE (Standard)
VS	Vespel® ∗3)
PK	PEEK

∗3) Not available with SH material.

Sample Order Number

	Port	①	②	③	④	⑤	
AK1510S	2P	4	4				
	3P	4	4			1	MPA
	4PL	4	4	0		1	MPA
	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 160°F (–40 to 71°C) (No freezing) ∗1)			
Cv	0.09			
Leak rate	1 x 10^{-10} Pa·m³/sec			
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)			
Mass	2.6 lbs (1.18 kg) ∗2)			

∗1) 14 to 194°F (–10 to 90°C) for Vespel® and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.
∗2) Mass, including individual boxed weight, may vary depending on connections or options.

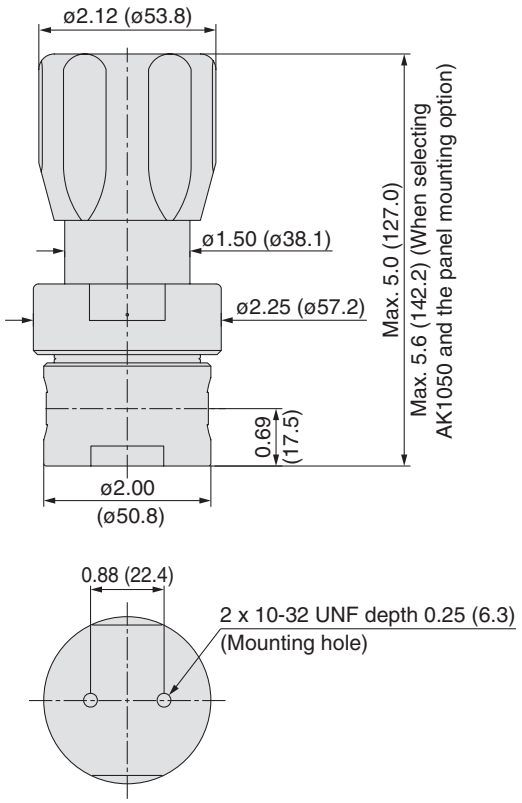
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Hastelloy® C-22
Diaphragm	316 SS		Hastelloy® C-22
Seat	PCTFE (Option: Vespel®, PEEK)		PCTFE (Option: PEEK)

Dimensions

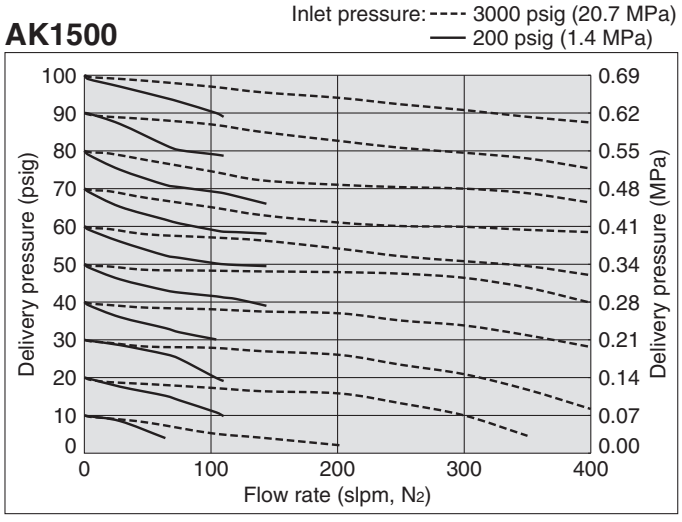
inch (mm)

AK1500

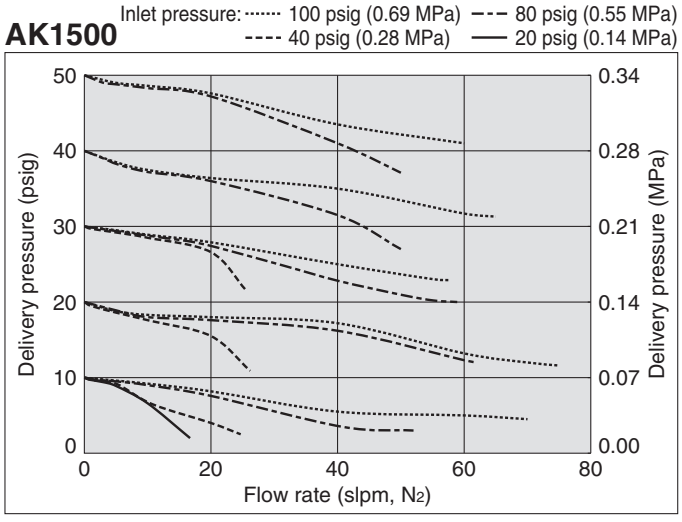


Flow Characteristics

AK1500



AK1500



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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 (20.7MPa)**
- **Flow capacity to 400 slpm**
- **Body material: Stainless steel and Brass available**
- **Hastelloy internals standard**
- **Sub-atmospheric pressure delivery option**
- **Tied-diaphragm design**

How to Order

Port Number ① ② ③ ④ ⑤

AK14 [02] T [S] [ ] [4PL] [6] [6] [0] [0] [ ] [ ] [ ] [ ] [ ]

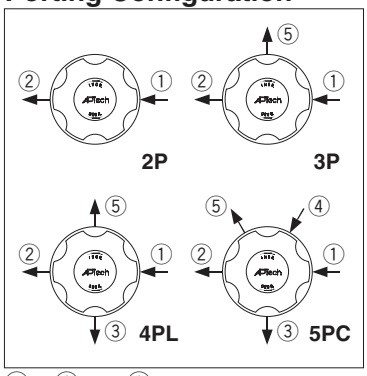
Delivery pressure

Code	Delivery pressure
02	1 to 30 psig (0.007 to 0.2 MPa)
	Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88kPa 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	Hastelloy® C-22	Hastelloy® C-22	316 SS
S	316 SS			
SH				Hastelloy® C-22

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

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.

Gauge port (Extra bottom outlet③, Inlet④, Outlet⑤)

Code	Pressure gauge ∗2) psig/bar unit	MPa unit
No code	No gauge port	
0	No pressure gauge (Connections: 1/4 inch NPT)	
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
2	0 to 200 psig	0 to 1.5 MPa
10	0 to 1000 psig	0 to 7 MPa
40	0 to 4000 psig	0 to 28 MPa

∗2) Other range available. Refer to gauge guide (P.94,95).

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.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Vespel® ∗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.

Sample Order Number

	Port	①	②	③	④	⑤	
AK1410TS	2P	6	6				
	3P	6	6			1	MPA
	4PL	6	6	0		1	MPA
	5PC	6	6	0	40	1	MPA

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 160°F (–40 to 71°C) (No freezing) ∗2)				
Cv	0.45				
Leak rate	1 x 10^{-10} Pa·m^3/sec				
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 in^3 (10.6 cm^3)				
Mass	4.5 lbs (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) 14 to 194°F (–10 to 90°C) for Vespel® seat.

∗3) Mass, 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)	

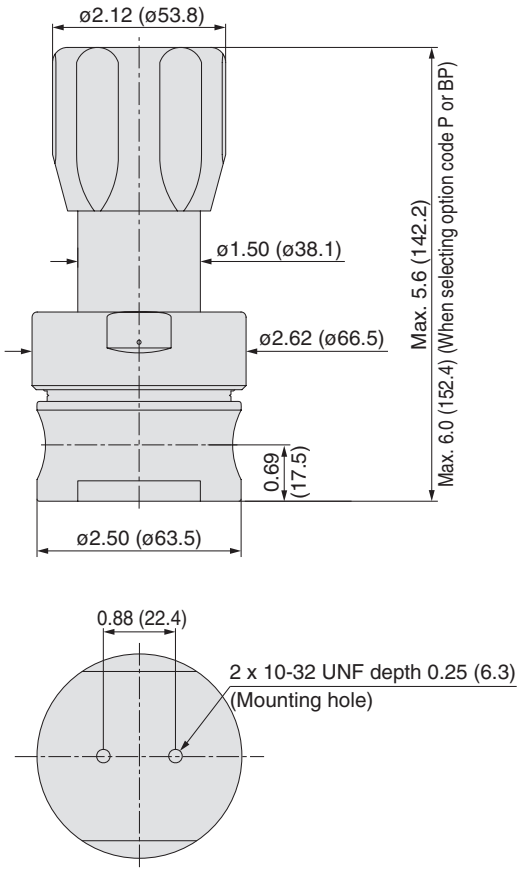
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	Hastelloy® C-22		
Diaphragm	Hastelloy® C-22		
Nozzle	316 SS		Hastelloy® C-22
Seat	PCTFE (Option: Vespel®)		PCTFE

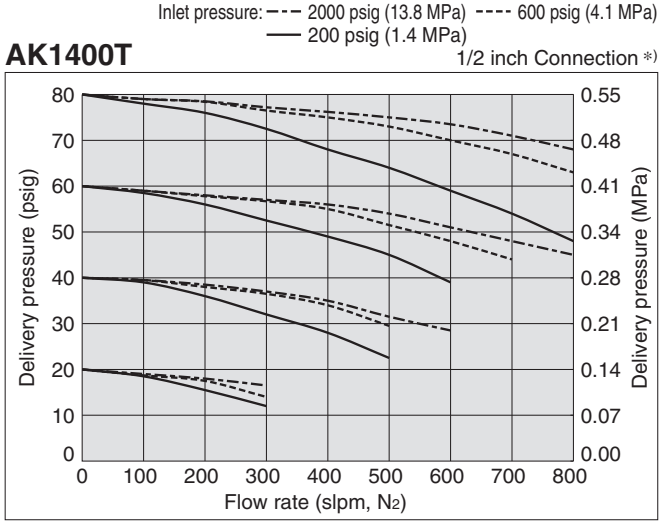
Dimensions

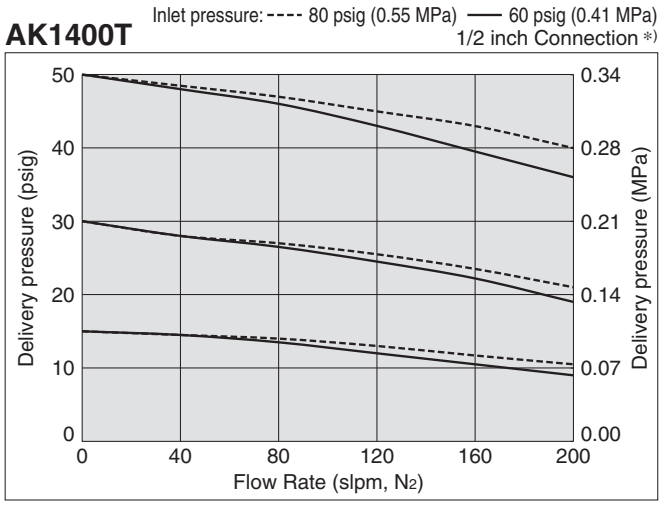
inch (mm)

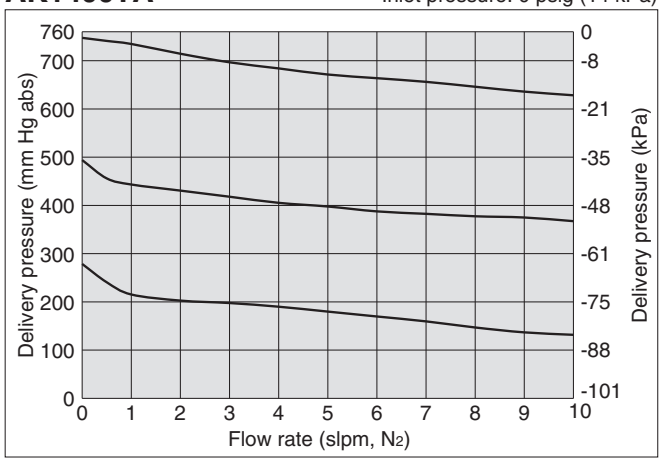
AK1400T



Flow Characteristics







*) If connection size differs, flow characteristics also differ.

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Single Stage Regulator for General Applications | High flow

Series AK1300

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

How to Order

Port Number ① ② ③ ④

AK13 [02] [S] [4PL] [8] [8] [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	Hastelloy® C-22
S	316 SS		

Ports

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

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 (Connections: 1/4 inch NPT)	
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
2	0 to 200 psig	0 to 1.5 MPa

∗1) Other range available. Refer to gauge guide (P.94,95).

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)

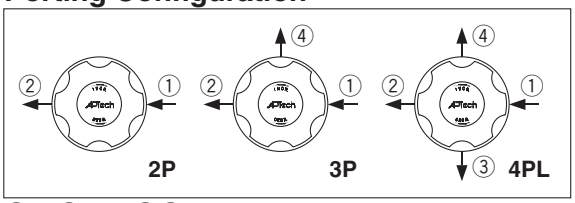
Code	Unit
No code	psig/bar
MPA	MPa

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

Sample Order Number

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

Porting Configuration



①IN ②OUT ③④Gauge port (Outlet)

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 160°F (–40 to 71°C) (No freezing)			
Cv	1.1			
Leak rate	1 x 10^{-10} Pa·m³/sec			
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 in³ (10.6 cm³)			
Mass	4.4 lbs (2.0 kg) ∗			

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

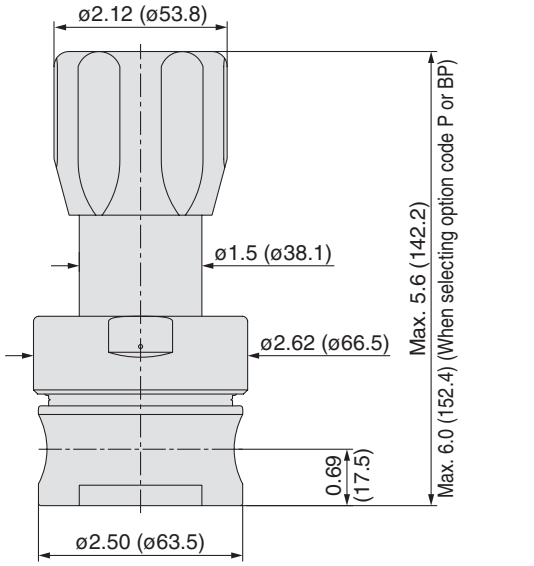
Wetted Parts Material

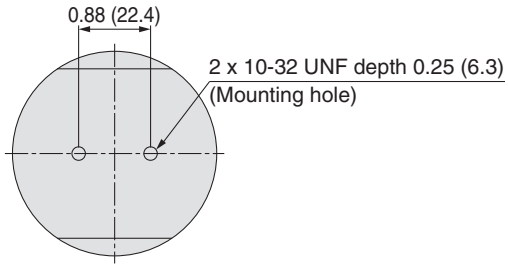
Wetted Parts	B	S
Body	Brass	316 SS
Poppet	316 SS	
Diaphragm	Hastelloy® C-22	
Seat	PCTFE (Option: PTFE)	

Dimensions

inch (mm)

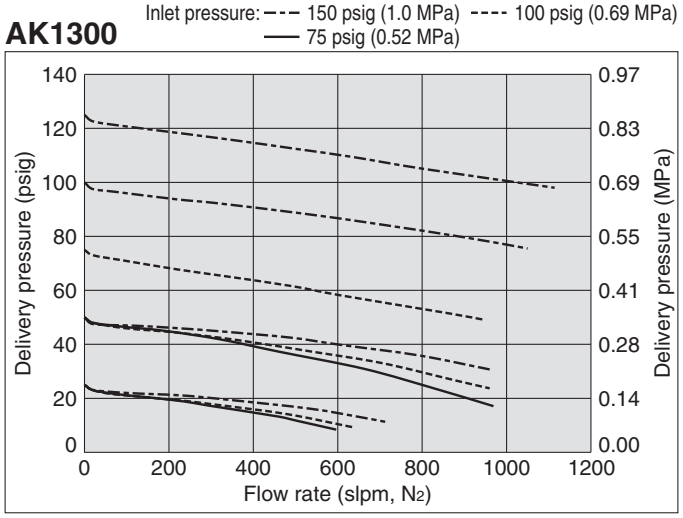
AK1300



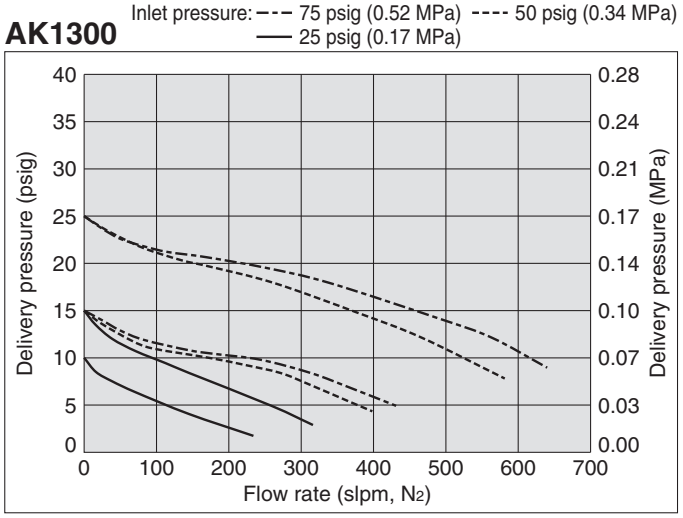


Flow Characteristics

AK1300



AK1300



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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**
- **Hastelloy internals available for corrosion resistance**
- **Tied-diaphragm design**

How to Order

AK12 [02] [S] [4PL] [8] [8] [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)
15	5 to 150 psig (0.034 to 1.0 MPa)
25	Preset to 250 psig (1.7 MPa)

Material

Code	Body	Poppet	Diaphragm
B	Brass	316 SS	Hastelloy® C-22
S	316 SS		
SH		Hastelloy® C-22	

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
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 (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 (Connections: 1/4 inch NPT)	
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
2	0 to 200 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) Other range available. Refer to gauge guide (P.94,95).

Sample Order Number

	Port ①	②	③	④	④		
AK1202S	2P	8	8				
	3P	8	8			V3	MPA
	4PL	8	8	0		V3	MPA
	5PC	8	8	0	40	V3	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 option is not available with AK1202, AK1206 and AK1225.
∗5) FC option is available with 1/2 inch NPT or 1/2 inch compression.

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Vespel® ∗3)

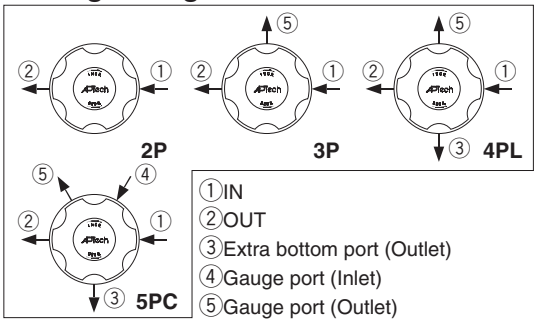
∗3) Not available with SH material.

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
③Extra bottom port (Outlet)
④Gauge port (Inlet)
⑤Gauge port (Outlet)

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 160°F (–40 to 71°C) (No freezing) ∗3)				
Cv	0.65				
Leak rate	1 x 10^{-10} Pa·m^3/sec				
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 in^3 (10.6 cm^3)				
Mass	4.4 lbs (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) 14 to 194°F (–10 to 90°C) for Vespel® seat. Optional ambient and operating temperature range available. Please contact SMC.
∗4) Mass, including individual boxed weight, may vary depending on connections or options.

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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)	

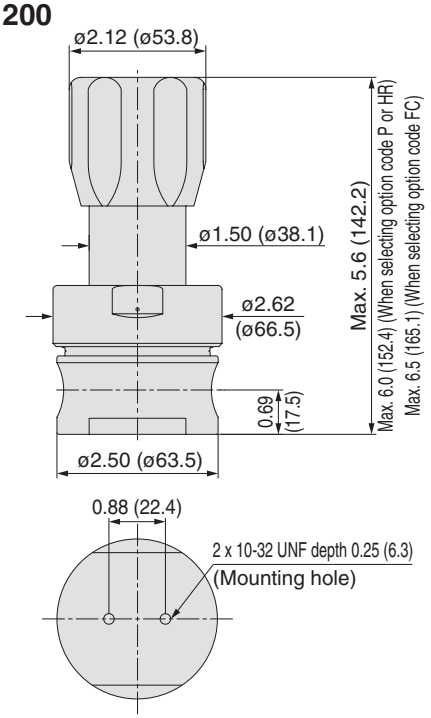
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Hastelloy® C-22
Diaphragm	Hastelloy® C-22		
Seat	PCTFE (Option: Vespel®)		PCTFE

Dimensions

inch (mm)

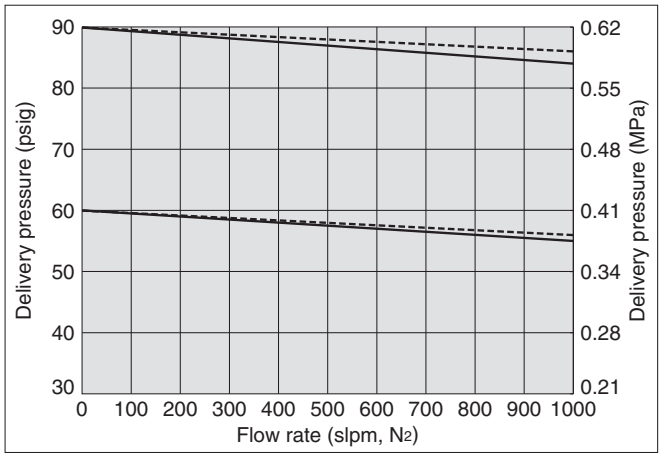
AK1200



Flow Characteristics

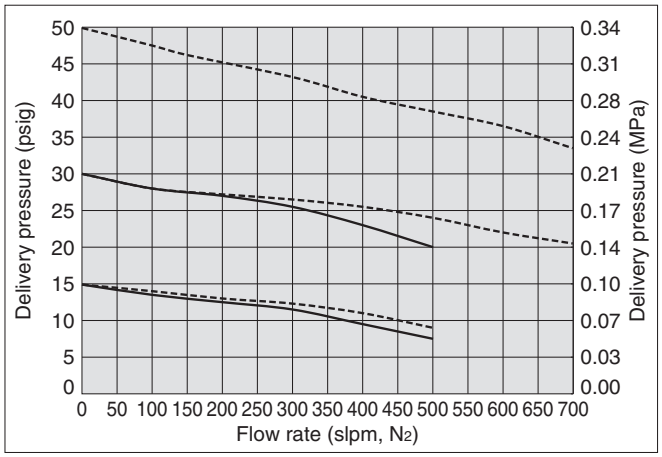
AK1200

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



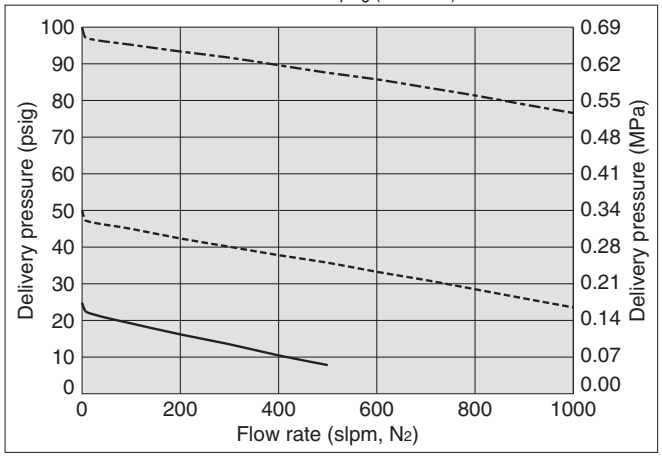
AK1200

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



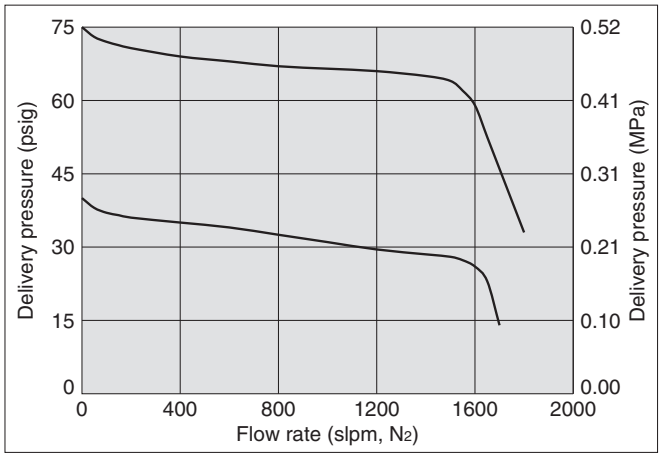
AK1200HF

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 *)



*) If connection size differs, flow characteristics also differ.

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**

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	Hastelloy® C-22

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 (Connections: 1/4 inch NPT)	
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
2	0 to 200 psig	0 to 1.5 MPa

∗1) Other range available. Refer to gauge guide (P.94, 95).

Pressure gauge unit ∗2)

Code	Unit
No code	psig/bar
MPA	MPa

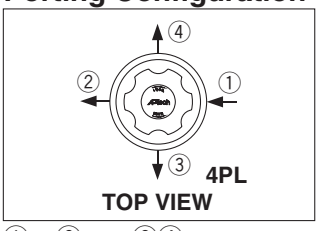
∗2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

Bonnet option

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

∗3) Panel mounting hole: dia.39.6 mm.

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 160°F (–40 to 71°C) (No freezing)			
Cv	1.6			
Leak rate	1 x 10^{-10} Pa·m^3/sec			
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 in^3 (36 cm^3)			

Wetted Parts Material

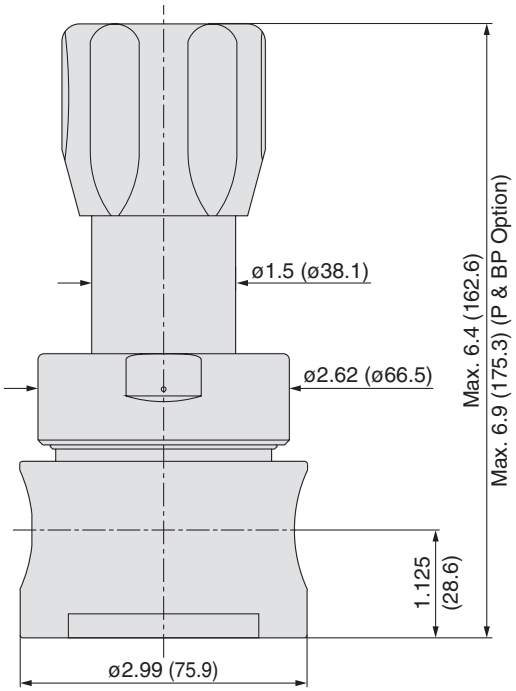
Wetted Parts	S
Body	316 SS
Nozzle	316 SS
Poppet	316 SS
Diaphragm	Hastelloy® C-22
Seat	PFA

SMC

Dimensions

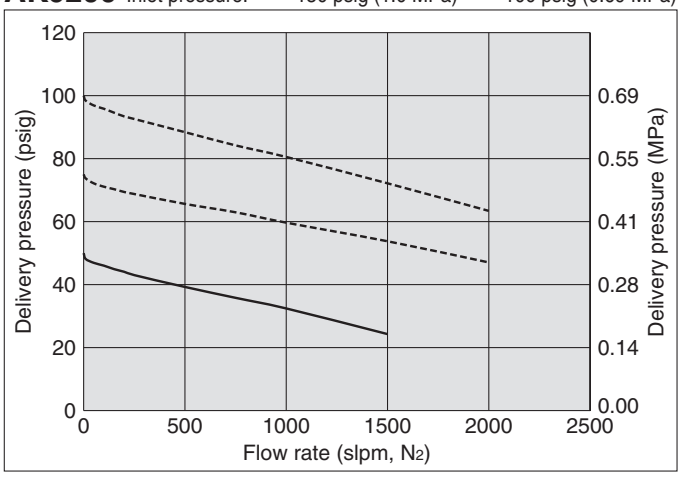
inch (mm)

AK9200



Flow Characteristics

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



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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**
- **Hastelloy internals available for corrosion resistance**
- **Minimizes supply pressure effect by two stage regulation**
- **Tied-diaphragm design**

How to Order

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

Port Number: ① ② ③ ④ ⑤

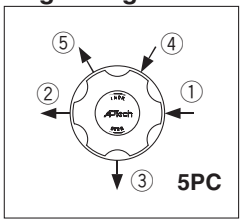
Delivery pressure

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		Hastelloy® C-22	Hastelloy® C-22

Porting configuration



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

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 (Connections: 1/4 inch NPT)	
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
2	0 to 200 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) Other range available. Refer to gauge guide (P.94,95).

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)
VS	Vespel® ∗3)
PK	PEEK

∗3) Not available with SH material.

Poppet feature option

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

Bonnet option

Code	Bonnet
No code	Standard
P	Panel installation ∗4)

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

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 160°F (–40 to 71°C) (No freezing) ∗1)			
Cv	0.05			
Leak rate	1 x 10^{-10} Pa·m³/sec			
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 in³ (15 cm³)			
Mass	4.3 lbs (1.95 kg) ∗2)			

∗1) 14 to 194°F (–10 to 90°C) for Vespel® and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.
∗2) Mass, including individual boxed weight, may vary depending on connections or options.

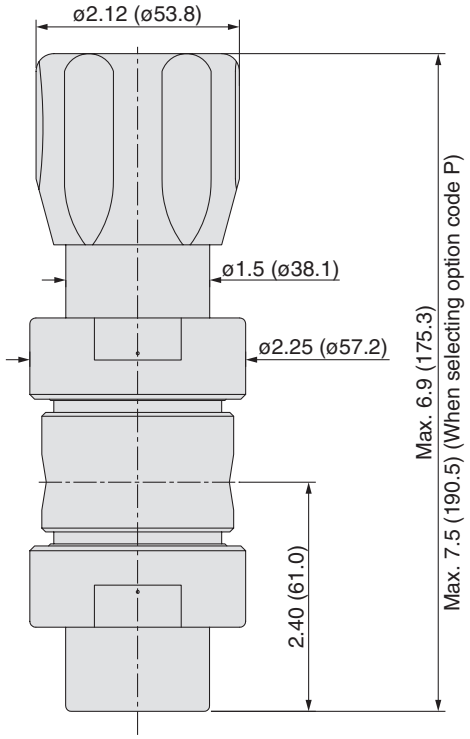
Wetted Parts Material

Wetted Parts	B	S	SH
Body	Brass	316 SS	
Poppet	316 SS		Hastelloy® C-22
Diaphragm	316 SS		Hastelloy® C-22
Seat	PCTFE (Option: Vespel®, PEEK)		PCTFE (Option: PEEK)

Dimensions

inch (mm)

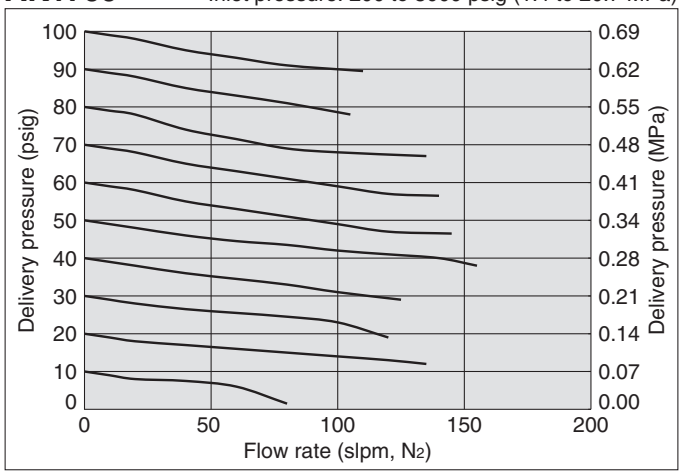
AK1700



Flow Characteristics

AK1700

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



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Vespel® is a registered trademark of DuPont.

Process Gas

Diaphragm Valve

New

RoHS

For wide variety of applications from semiconductor to general.

Multiple port available in various configurations Compression, Rc, R, NPT

Cleaned for O_2 service

Air Operated Type

Series AK3542/4542

- Compact and lightweight by making the actuator shorter
- M5 actuation port

Weight **280 g** Height **57 mm**

Manually Operated Type

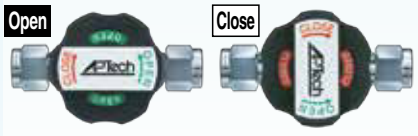
Series AK3652/4652

- Compact and lightweight by modifying the knob design
- The knob is a unique design that combines a scalloped round knob with a raised rectangular section to provide two choices of gripping.

  Actuation is 90 degrees open to closed with a cutout window, on both sides of raised rectangular section, providing visual status of open or closed state.

Weight **260 g** Height **55 mm**

Direction of a raised rectangular section indicate open/close status



Series AK

APTech SMC

CAT.NAS100-106A

Air Operated Type

Series AK3542/AK4542

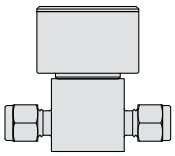
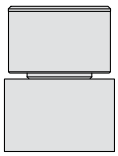
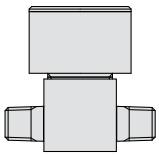
Manually Operated Type

Series AK3652/AK4652

Body material

316 SS
Passivation internals

Various configurations available

Body			
Connection	Compression	Rc NPT female	R NPT male
Connection size (inch)	1/4, 3/8		

Air Operated Type

 Female thread type	 Compression	Series	Status	Body material	Max. operating pressure psig (MPa)	Cv Note)	Connections: Fitting	Page
		AK3542	N.C.	316 SS	125 (0.9)	0.29	Compression Rc, R, NPT	P.1
		AK4542				0.5		

Manually Operated Type

 Female thread type	 Compression	Series	Knob	Body material	Max. operating pressure psig (MPa)	Cv Note)	Connections: Fitting	Page
		AK3652	Knob with a raised section on top (indication window)	316 SS	250 (1.7)	0.29	Compression Rc, R, NPT	P.3
		AK4652				0.5		

Note) Cv calculation based on SEMI Standard

Series AK
Applicable Fluid

Precautions for selection

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. 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.

Applicable Fluid

Process Gas	Molecular Formula
Argon	**Ar**
Halocarbon 114	**C2Cl2F4**
Halocarbon 115	**C2ClF5**
Halocarbon 116	**C2F6**
Acetylene	**C2H2**
Halocarbon 134A	**C2H2F4**
Halocarbon 125	**C2HF5**
Halocarbon R218	**C3F8**
Propene	**C3H6**
Propane	**C3H8**
Halocarbon C318	**C4F8**
Butene-1	**C4H8**
Halocarbon 13B1	**CBrF3**
Halocarbon 12	**CCl2F2**

Process Gas	Molecular Formula
Halocarbon 13	**CClF3**
Halocarbon 14	**CF4**
Halocarbon 32	**CH2F2**
Methane	**CH4**
Halocarbon 23	**CHF3**
Carbon Dioxide	**CO2**
Hydrogen	**H2**
Helium	**He**
Krypton	**Kr**
Nitrogen	**N2**
Neon	**Ne**
Oxygen	**O2**
Xenon	**Xe**

· Following* symbols indicate toxic gas (allowable concentration 200 ppm or less). In Japan, according to METI, pipe thread (Rc, R, NPT etc) should not be used as connections of piping, fittings, and valves installed in gas systems.

Process Gas	Molecular Formula
Boron 11 Trifluoride*	**11BF3**
Arsine*	**AsH3**
Boron Trichloride*	**BCl3**
Boron Trifluoride*	**BF3**
Ethylene*	**C2H4**
Dimethylsilane*	**C2SiH8**
Perfluoro-butadiene*	**C4F6**
Octafluorocyclopentene*	**C5F8**
Halocarbon 12B2*	**CBr2F2**
Trimethylsilane*	**(CH3)3SiH**
Methyl Chloride*	**CH3Cl**
Methyl Fluoride*	**CH3F**
Methanol*	**CH3OH**
Methylsilane*	**CH3SiH3**
Halocarbon 21*	**CHCl2F**
Chlorine*	**Cl2**
Chlorine Trifluoride*	**ClF3**
Carbon Monoxide*	**CO**
Germane*	**GeH4**
Hydrogen Sulfide*	**H2S**
Hydrogen Selenide*	**H2Se**

Process Gas	Molecular Formula
Hydrogen Bromide*	**HBr**
Hydrogen Chloride*	**HCl**
Hydrogen Fluoride*	**HF**
Nitrogen Oxide*	**N2O**
Nitrogen Trifluoride*	**NF3**
Ammonia*	**NH3**
Nitric Oxide*	**NO**
Phosphorous Pentafluoride*	**PF5**
Phosphine*	**PH3**
Sulfur Tetrafluoride*	**SF4**
Sulfur Hexafluoride*	**SF6**
Disilane*	**Si2H6**
Silicon Tetrachloride*	**SiCl4**
Silicon Tetrafluoride*	**SiF4**
Dichlorosilane*	**SiH2Cl2**
Silane*	**SiH4**
Trichlorosilane*	**SiHCl3**
Sulfur Dioxide*	**SO2**
Diethyltelluride*	**Te(C2H5)2**
Tungsten Hexafluoride*	**WF6**

· This applicable fluid is a reference guide and does not apply to product guarantee.
· Please consult SMC for a specific recommendation beyond the scope of this document.

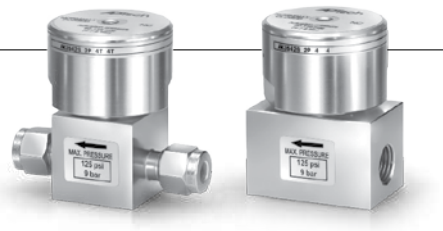
⚠ Caution **Since the product specified here is used under various operating conditions, its compatibility with fluid and specific equipment must be decided by the person who designs the equipment or decided its specifications based on necessary analysis and test results. The expected performance and 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.**

Diaphragm Valves for General Applications

Air operated type

Series AK3542 & 4542

- **Body material: 316 SS**
- **Normally closed**



RoHS

How to Order

AK 3 542 S 2P (Inlet) 4T (Outlet) 4T

Size

Code	Cv
3	0.29
4	0.5

Model

Code	Status	Maximum operating pressure
542	Normally closed (N.C.)	125 psig (0.9 MPa)

Material

Code	Body material
S	316 SS

Ports

Code	Ports
2P	2 ports

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

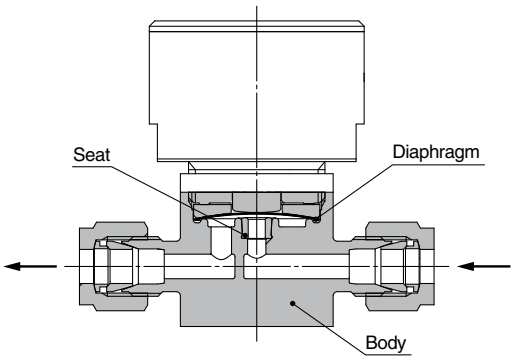
Connections

Code	Connections	AK3	AK4
4T	1/4 inch compression	●	—
4BR	Rc 1/4		
4BRN	R 1/4		
4	NPT 1/4 female		
4N	NPT 1/4 male		
6T	3/8 inch compression	—	●
6BR	Rc 3/8		
6BRN	R 3/8		
6	NPT 3/8 female		
6N	NPT 3/8 male		

Note) Only available with same type fittings inlet and outlet.

Construction

AK3542



Wetted Parts Material

Wetted Parts	S
Body	316 SS
Diaphragm	Ni-Co Alloy
Seat	PCTFE (Option: Polyimide)

SMC

Specifications

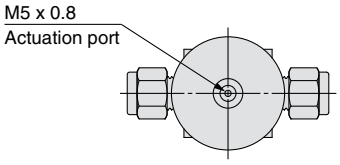
Operating Parameters	AK3542	AK4542
Status	Normally closed (N.C.)	
Gas	Select compatible materials of construction for the gas	
Operating pressure	Vacuum to 125 psig (0.9 MPa)	
Proof pressure	200 psig (1.4 MPa)	
Ambient and operating temperature	14 to 160°F (–10 to 71°C) (No freezing)	
Cv	0.29	0.5
Leak rate	1 x 10^{-10} Pa·m^3/sec	
Connections	Compression, Rc, R, NPT	
Actuation pressure	60 to 110 psig (0.4 to 0.76 MPa)	
Actuation port connection	M5 x 0.8	
Actuation port location	Top	
Installation	Bottom mount	
Internal volume	0.06 in^3 (1.07 cm^3)	
Weight	0.28 kg Note)	

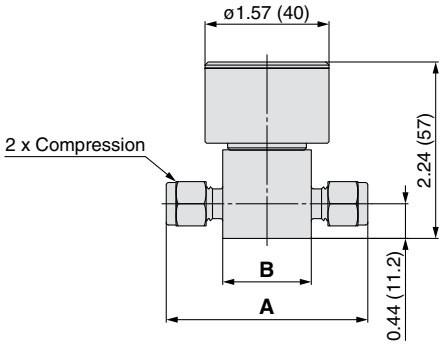
Note) Weight for AK3542S2P4T4T including individual boxed weight. It may vary depending on connections or options.

Dimensions

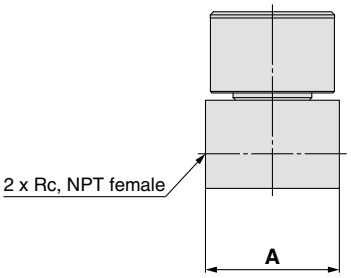
inch (mm)

AK3542 & 4542

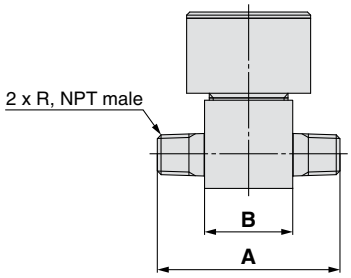




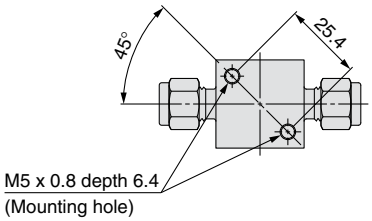
Connections: 4T, 6T



Connections: 4, 6, $^{4}_{6}$BR



Connections: $^{4}_{6}$N, $^{4}_{6}$BRN



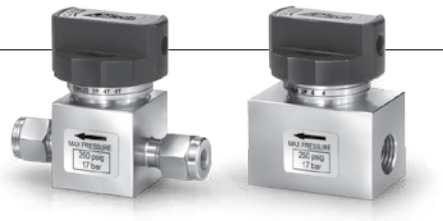
Ports	A		B		Connections
	inch	(mm)	inch	(mm)	
4T	2.56	(65.0)	1.12 sq.	(28.4)	1/4 inch compression
4BR	1.70	(43.2)	—	—	Rc 1/4
4BRN	2.32	(58.9)	1.12 sq.	(28.4)	R 1/4
4	1.70	(43.2)	—	—	NPT 1/4 female
4N	2.32	(58.9)	1.12 sq.	(28.4)	NPT 1/4 male
6T	2.68	(68.1)	1.12 sq.	(28.4)	3/8 inch compression
6BR	2.32	(58.9)	—	—	Rc 3/8
6BRN	2.32	(58.9)	1.12 sq.	(28.4)	R 3/8
6	2.32	(58.9)	—	—	NPT 3/8 female
6N	2.32	(58.9)	1.12 sq.	(28.4)	NPT 3/8 male

Diaphragm Valves for General Applications

Manually operated type

Series AK3652 & 4652

- **Body material: 316 SS**



RoHS

How to Order

AK 3 652 S 2P 4T 4T

(Inlet) (Outlet)

Size

Code	Cv
3	0.29
4	0.5

Model

Code	Knob	Max. operating pressure
652	1/4 turn indicating round knob with a raised rectangular section	250 psig (1.7 MPa)

Material

Code	Body material
S	316 SS

Ports

Code	Ports
2P	2 ports

Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

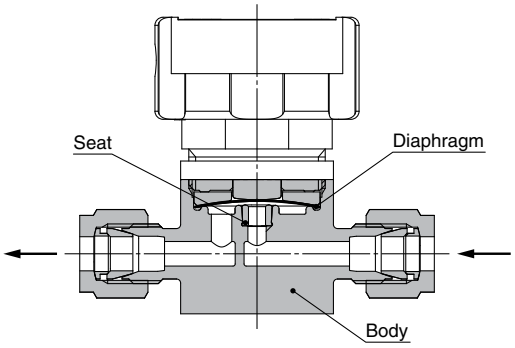
Connections

Code	Connections	AK3	AK4
4T	1/4 inch compression	●	—
4BR	Rc 1/4		
4BRN	R 1/4		
4	NPT 1/4 female		
4N	NPT 1/4 male		
6T	3/8 inch compression	—	●
6BR	Rc 3/8		
6BRN	R 3/8		
6	NPT 3/8 female		
6N	NPT 3/8 male		

Note) Only available with same type fittings inlet and outlet.

Construction

AK3652



Wetted Parts Material

Wetted Parts	S
Body	316 SS
Diaphragm	Ni-Co Alloy
Seat	PCTFE (Option: Polyimide)

SMC

Specifications

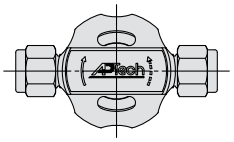
Operating Parameters	AK3652	AK4652
Gas	Select compatible materials of construction for the gas	
Operating pressure	Vacuum to 250 psig (1.7 MPa)	
Proof pressure	375 psig (2.6 MPa)	
Ambient and operating temperature	–40 to 160°F (–40 to 71°C)(No freezing)	
Cv	0.29	0.5
Leak rate	1 x 10^{-10} Pa·m^3/sec	
Connections	Compression, Rc, R, NPT	
Installation	Bottom mount	
Internal volume	0.06 in^3 (1.07 cm^3)	
Weight	0.26 kg Note)	
Knob	1/4 turn indicating round knob with a raised rectangular section	

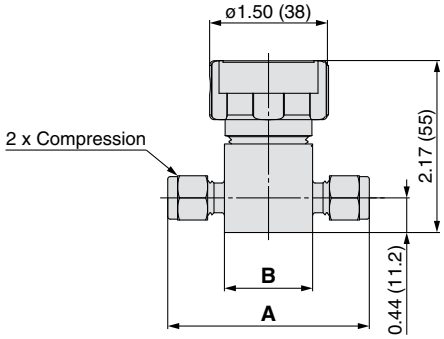
Note) Weight for AK3652S2P4T4T including individual boxed weight. It may vary depending on connections.

Dimensions

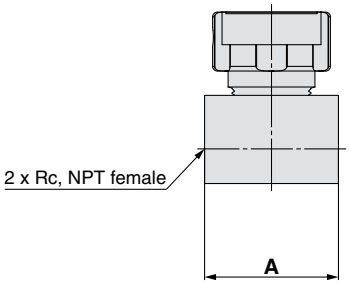
inch (mm)

AK3652 & 4652

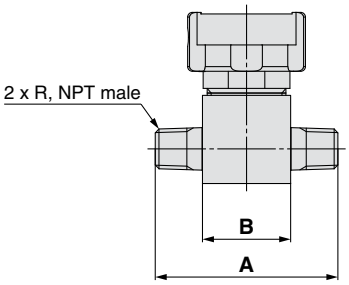




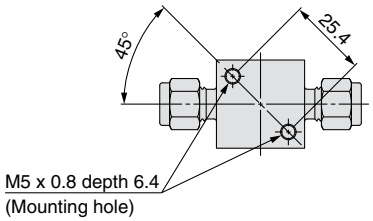
Connections: 4T, 6T



Connections: 4, 6, $^4_6$BR



Connections: $^4_6$N, $^4_6$BRN



Ports	A		B		Connections
	inch	(mm)	inch	(mm)	
4T	2.56	(65.0)	1.12 sq.	(28.4)	1/4 inch compression
4BR	1.70	(43.2)	—	—	Rc 1/4
4BRN	2.32	(58.9)	1.12 sq.	(28.4)	R 1/4
4	1.70	(43.2)	—	—	NPT 1/4 female
4N	2.32	(58.9)	1.12 sq.	(28.4)	NPT 1/4 male
6T	2.68	(68.1)	1.12 sq.	(28.4)	3/8 inch compression
6BR	2.32	(58.9)	—	—	Rc 3/8
6BRN	2.32	(58.9)	1.12 sq.	(28.4)	R 3/8
6	2.32	(58.9)	—	—	NPT 3/8 female
6N	2.32	(58.9)	1.12 sq.	(28.4)	NPT 3/8 male

Process Gas Equipment Common Precautions 1

Be sure to read 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. Ensure sufficient space for maintenance activities.

Ensure sufficient space for maintenance activities.

4. 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.

Mounting

⚠Caution

5. Connect 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.

6. 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 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) **2B999.g** <Applicable conditions>
(1) Product name : Diaphragm valve
(2) Body material : 316 SS

Process Gas Equipment / Diaphragm Valve Specific Product Precautions

Be sure to read before handling. Refer to back cover for Safety Instructions and page 5 and 6 and the Operation Manual for common precautions. Operation manual is available from the SMC website. 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.

Direction of gas flow from inlet to outlet is indicated by an arrow on each label.
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 M5 thread. Tighten thread to recommended torque value.

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 or sales representative.

Operation (Air operate type)

⚠Warning

1. Use nitrogen or clean dry air as actuation pressure.

2. Confirm the valve type (N.C.).

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.

3. Apply actuation pressure within the range of specifications.

Operation (Manually operated type)

⚠Warning

1. 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.

2. 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.

3. 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.

⚠ 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: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ Danger : **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*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 specific equipment must be decided by the person who designs the equipment or decides 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 continuously 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 operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or 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 use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and 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.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ 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. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Safety Instructions	Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

Global Manufacturing, Distribution and Service Network

Worldwide Subsidiaries

North & South America

- U.S.A. **SMC Corporation of America**
- CANADA **SMC Pneumatics (Canada) Ltd.**
- MEXICO **SMC Corporation(México), S.A. de C.V.**
- BRAZIL **SMC Pneumãticos do Brasil Ltda.**
- CHILE **SMC Pneumatics (Chile) S.A.**
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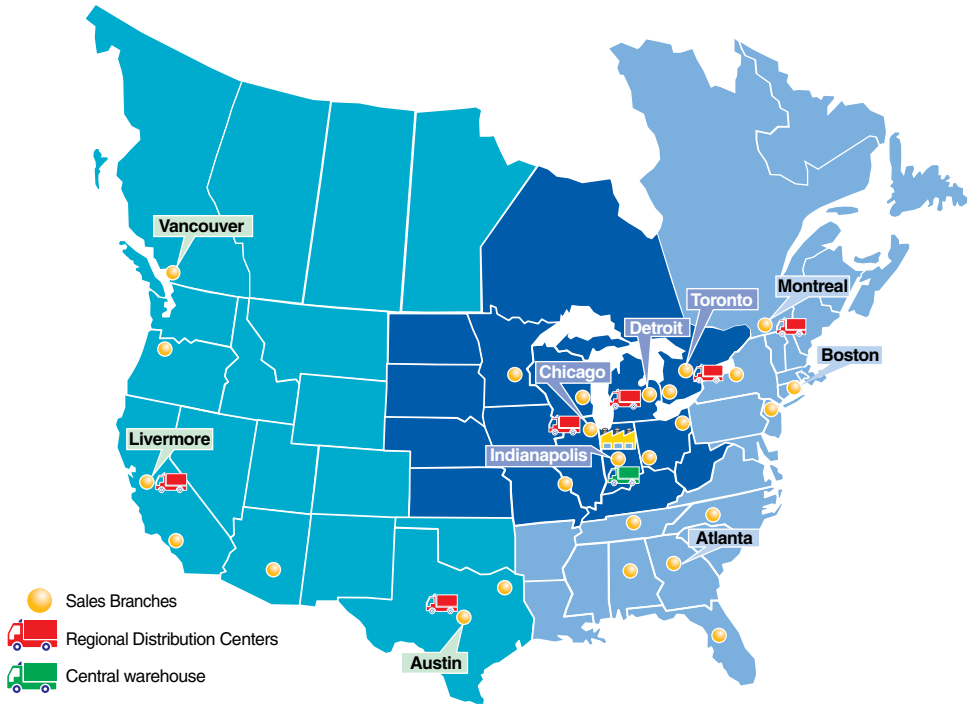

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