

Regulator for General Applications

AK1000T Series

RoHS

For wide variety of applications from semiconductor to general.

Compact and lightweight

Weight **0.52 kg** Height **97.5 mm**

Minimum dead leg construction

Multiple port available in various configurations

Selectable by • Compression • NPT female • Rc thread

High inlet pressure

Max. **24.1 MPa**

- Wetted parts material including diaphragm SUS316 (fluoropolymer seat)
Ni-Cr-Mo alloy internals available for corrosion resistance

Flow capacity

<120 slpm

- Passivation internals

Leak rate

1.0×10^{-10} Pa·m³/s

- No oil
- Cleaned for O₂ service



A-Tech

SMC

AP

SL

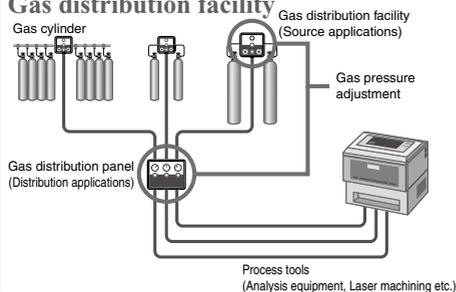
AZ

AK

BP

Application Examples

Gas distribution facility



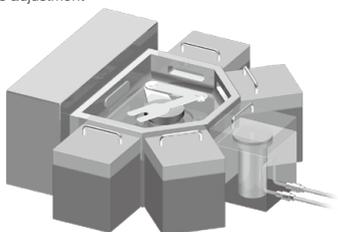
Cylinder cabinet

Supply pressure adjustment



Vacuum chamber

Purge gas adjustment



Leak Tester

Inspection helium gas adjustment



Laser machining

Assist gas adjustment



Analysis equipment

Carrier gas adjustment



Gas filling packing machine

Adjustment of inert gas to prevent spoilage



Related Products

Diaphragm Valve for General Applications AK Series

For details, refer to page 811.



- Rc, R and NPT connections are added to series.
- For wide variety of applications from semiconductor to general.
- Cleaned for O₂ service.
- Compact and lightweight by making the actuator shorter. (AK3542/4542)
- M5 actuation port. (AK3542/4542)
- Compact and lightweight by modifying the knob design. (AK3652/4652)
- The knob is a unique design that combines a scalloped round knob with a raised rectangular section to provide two choices of gripping. (AK3652/4652)

Series	Type	Body material	Connection	Connection size
AK	Air operated type	316 SS	Compression Rc, R, NPT	1/4", 3/8"
AK	Manually operated type			



AK Series 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	C ₂ Cl ₂ F ₄
Halocarbon 115	C ₂ ClF ₅
Halocarbon 116	C ₂ F ₆
Acetylene	C ₂ H ₂
Vinylidene Fluoride	C ₂ H ₂ F ₂
Halocarbon 134A	C ₂ H ₂ F ₄
Halocarbon 125	C ₂ HF ₅
Hexafluoropropylene	C ₃ F ₆
Halocarbon R218	C ₃ F ₈
Hexafluoropropane	C ₃ H ₂ F ₆
Propene	C ₃ H ₆
Propane	C ₃ H ₈
Halocarbon C318	C ₄ F ₈
Butene-1	C ₄ H ₈
n-Butane	C ₄ H ₁₀

Process Gas	Molecular Formula
Halocarbon 13B1	CBrF ₃
Halocarbon 12	CCl ₂ F ₂
Halocarbon 13	CClF ₃
Halocarbon 14	CF ₄
Halocarbon 32	CH ₂ F ₂
Methane	CH ₄
Halocarbon 23	CHF ₃
Carbon Dioxide	CO ₂
Hydrogen	H ₂
Helium	He
Krypton	Kr
Nitrogen	N ₂
Neon	Ne
Oxygen	O ₂
Xenon	Xe

AP

SL

AZ

AK

BP

· 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*	11BF ₃
Arsine*	AsH ₃
Boron Trichloride*	BCl ₃
Boron Trifluoride*	BF ₃
Ethylene*	C ₂ H ₄
Dimethylsilane*	C ₂ SiH ₆
Perfluoro-butadiene*	C ₄ F ₆
Butadiene*	C ₄ H ₆
Octafluorocyclopentene*	C ₅ F ₈
Halocarbon 12B2*	CBr ₂ F ₂
Trimethylsilane*	(CH ₃) ₃ SiH
Methyl Bromide*	CH ₃ Br
Methyl Chloride*	CH ₃ Cl
Methyl Fluoride*	CH ₃ F
Methanol*	CH ₃ OH
Methylsilane*	CH ₃ SiH ₃
Halocarbon 21*	CHCl ₂ F
Chlorine*	Cl ₂
Chlorine Trifluoride*	ClF ₃
Carbon Monoxide*	CO
Carbonyl Fluoride*	COF ₂
Germane*	GeH ₄

Process Gas	Molecular Formula
Hydrogen Sulfide*	H ₂ S
Hydrogen Selenide*	H ₂ Se
Hydrogen Bromide*	HBr
Hydrogen Chloride*	HCl
Hydrogen Fluoride*	HF
Nitrogen Oxide*	N ₂ O
Nitrogen Trifluoride*	NF ₃
Ammonia*	NH ₃
Nitric Oxide*	NO
Phosphorous Pentafluoride*	PF ₅
Phosphine*	PH ₃
Sulfur Tetrafluoride*	SF ₄
Sulfur Hexafluoride*	SF ₆
Disilane*	Si ₂ H ₆
Silicon Tetrachloride*	SiCl ₄
Silicon Tetrafluoride*	SiF ₄
Dichlorosilane*	SiH ₂ Cl ₂
Silane*	SiH ₄
Trichlorosilane*	SiHCl ₃
Sulfur Dioxide*	SO ₂
Diethyltelluride*	Te(C ₂ H ₅) ₂
Tungsten Hexafluoride*	WF ₆

· 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.

Regulator for General Applications

Low to intermediate flow

AK1000T Series

- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity < 120 slpm
- Ni-Cr-Mo alloy internals available for corrosion resistance



How to Order

Code	Ports	Ports	Connections			
			4	4BR	4T	6T
4PL	4 ports	Refer to the following porting configurations.	●	●	●	●
5PC	5 ports		●	—	●	●

AK10 01 T S 4PL 4 4 0 0 0

Delivery pressure

Code	Delivery 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	2 to 100 psig (0.014 to 0.7 MPa)
15	5 to 150 psig (0.034 to 1.0 MPa)

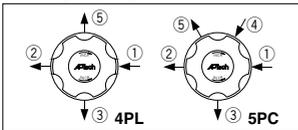
Material

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

Connections (Inlet ①, Outlet ②)

Code	Connections	Connections			
		4	4BR	4T	6T
4	NPT1/4	●	—	●	●
4BR	Rct1/4	—	●	—	—
4T	1/4 inch compression	●	—	●	●
6T	3/8 inch compression	●	—	●	●

Porting Configuration



Sample Order Number

AK1002TS	Port ①	②	③	④	⑤
	4PL	4	4	0	0
5PC	4T	4T	0	40	1 MPA

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

Specifications

Operating Parameters	AK1001T	AK1002T	AK1006T	AK1010T	AK1015T
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)
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)			
Proof pressure	Inlet	1.5 times the maximum source pressure			
	Outlet	1.5 times the maximum delivery pressure			
Burst pressure	Inlet	3 times the maximum source pressure			
	Outlet	3 times the maximum delivery pressure			
Ambient and operating temperature	-40 to 71°C (No freezing)				
Leak rate	1 x 10 ⁻¹⁰ Pa·m ³ /s				
Connections	NPT female, Rc thread, Compression				
Supply pressure effect	1.2 psig (0.008 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop				
Installation	Bottom mount (Option: Bracket mount/Order separately)				
Internal volume	0.3 in ³ (4.8 cm ³)				
Weight	0.52 kg ^{Note)}				

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

Port Number



Seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide ^{Note)}

Note) Not available with SH material.

Pressure gauge unit

Code	Unit
No code	psig/bar
MPA	MPa

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

Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤) ^{Note 1)}

Code	Pressure gauge		Connections ^{Note 3)}			
	psig/bar unit	MPa unit	4	4BR	4T	6T
No code	No gauge port		●	●	●	●
0	No pressure gauge ^{Note 2)}		●	●	●	●
C	No pressure gauge (Shipped with port plug installed)		●	●	●	●
V15	-30 in.Hg to 15 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	0 to 200 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	●	—	●	●

Note 1) Other range available. Refer to gauge guide (P824).

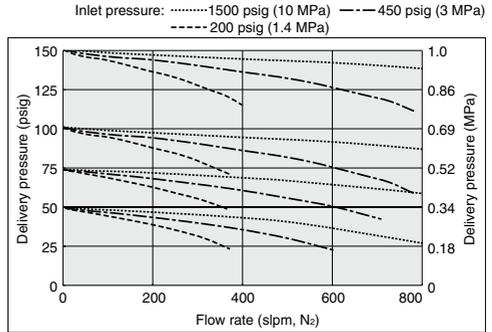
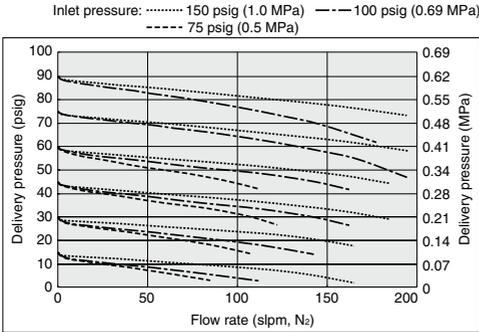
Note 2) If no pressure gauge, gauge port is NPT1/4 for connections 4, 4T, 6T and Rct1/4 for 4BR. And port plugs will be shipped bagged.

Note 3) If connection 4BR, pressure gauges cannot be installed.

Wetted Parts Material

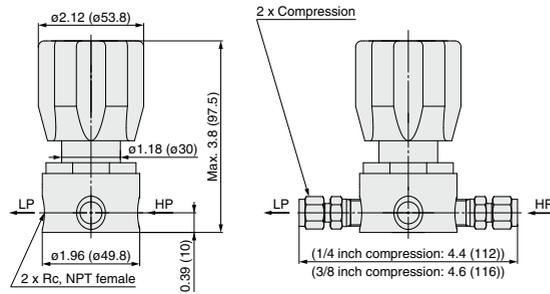
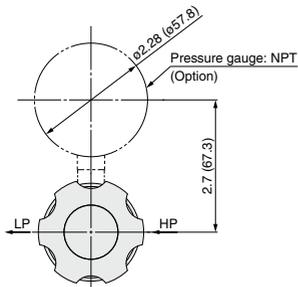
Wetted Parts	S	SHP
Body	316 SS	316 SS
Poppet	316 SS	Ni-Cr-Mo alloy
Diaphragm	316 SS	Ni-Cr-Mo alloy
Seat	PCTFE (Option: Polyimide)	PCTFE

Flow Rate Characteristics



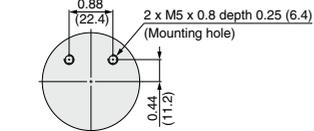
Dimensions

inch (mm)

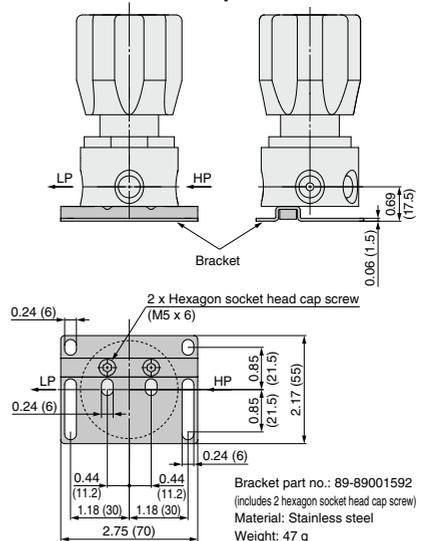


Connections: 4, 4BR

Connections: 4T, 6T



Bracket mount/Option



Bracket part no.: 89-89001592
 (includes 2 hexagon socket head cap screw)
 Material: Stainless steel
 Weight: 47 g

- AP
- SL
- AZ
- AK
- BP

AK1000T Series

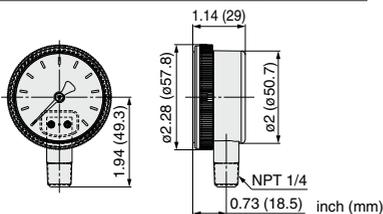


For AK series (Installed before shipment/Order separately)

Stainless steel/Lower mount/NPT 1/4

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: $\pm 2\%$ F.S. Other than above: $\pm 3\%$ 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	316 SS
	Bourdon tube	316 SS



Model

Regulator Code ^{Note 2)}		Pressure range	Unit	Part number ^{Note 1)}			
material	gauge port unit						
S SHP	V15	(No code)	psig/bar	00-83000102			
	V3				-30 in.Hg to 15 psig		
	L				-30 in.Hg to 30 psig		
	1				-30 in.Hg to 60 psig		
	H				-30 in.Hg to 100 psig		
	V2				-30 in.Hg to 160 psig		
	2				-30 in.Hg to 200 psig		
	4				0 to 200 psig		
	10				0 to 400 psig		
	30				0 to 1000 psig		
	40				0 to 3000 psig		
	V15				0 to 4000 psig		
	V3				0 to 200 psig	MPa	00-83000287
	L				0 to 400 psig		
	1				0 to 1000 psig		
	H				0 to 3000 psig		
V2	0 to 4000 psig						
2	-0.1 to 0.1 MPa						
4	-0.1 to 0.2 MPa						
10	-0.1 to 0.4 MPa						
30	-0.1 to 0.7 MPa						
40	-0.1 to 1.1 MPa						
V15	-0.1 to 1.4 MPa						
V3	0 to 1.5 MPa						
L	0 to 3 MPa						
1	0 to 7 MPa						
H	0 to 21 MPa						
V2	0 to 28 MPa						

Note 1) Part number of pressure gauge itself. Gauge are shipped separately.

Note 2) When pressure gauge needs to be assembled with regulator when shipment, put this code as gauge port in How to Order.

Note 3) Under Japanese regulation, psig/bar unit gauge is not sold in Japan.

Warning

- ① Please make sure operating pressure does not exceed maximum pressure range of the pressure gauge
- ② For pressure gauge installation, follow the Mounting section in the Common Precautions 1 (P.633).
- ③ After installation, perform leak test.



Process Gas Equipment/Regulator Specific Product Precautions

Be sure to read this before handling the products.

Refer to back page 50 for Safety Instructions and pages 633 and 634 for Process Gas Equipment Precautions.

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. 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.

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