

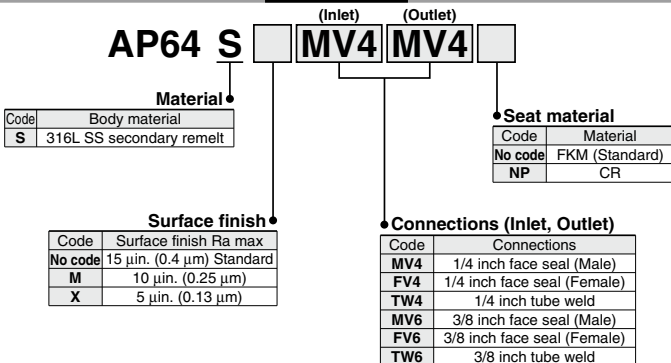
Check Valve

Series AP64

- Simple design with free of springs and poppets
- Reseals with minimal back pressure
- Low cracking pressure



How to Order



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 backpressure		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 x 10 ⁻¹¹ Pa·m ³ /sec
	Outboard leakage	2 x 10 ⁻¹¹ Pa·m ³ /sec ^{*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 cm ³)
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).

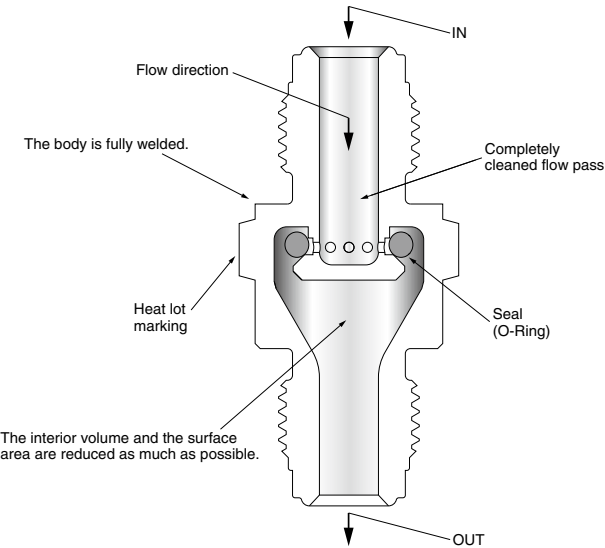
*4) Weight, including individual boxed weight, may vary depending on connections or options.

Wetted Parts Material

Wetted Parts	S
Body	316L SS secondary remelt
Surface finish	Electropolish + Passivation
Seal	FKM (Option: CR)

Construction

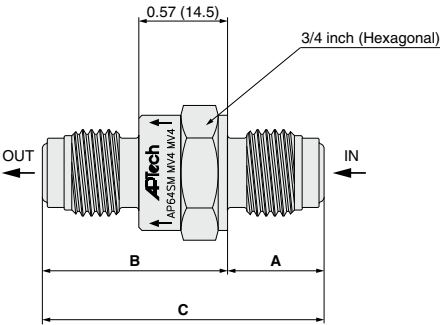
AP64



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					2.43	(61.7)
FV4	MV4	0.93	(23.6)	1.19	(30.2)	2.12	(53.8)
TW4	TW4			0.91	(23.1)	1.25	(31.8)

AP

SL

AZ

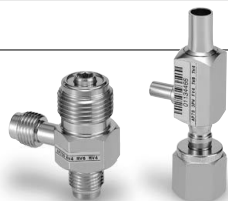
AK

BP

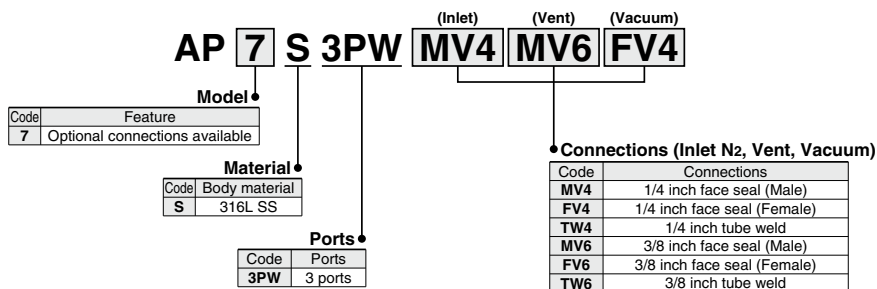
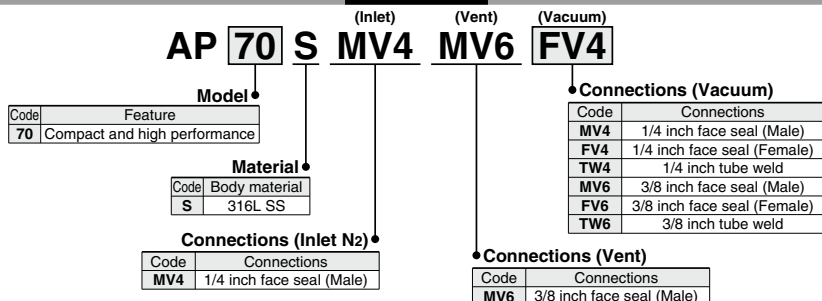
Vacuum Generator

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



How to Order



Specifications

Operating Parameters		AP7	AP70
Gas (Inlet N2 port)		N2	
Gas (Vacuum port)		Select compatible materials of construction for the gas	
N2 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.

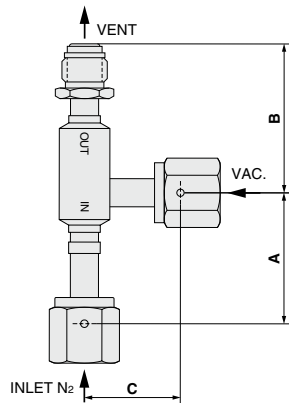
Wetted Parts Material

Wetted Parts	S
Body	316L SS

Dimensions

inch (mm)

AP7

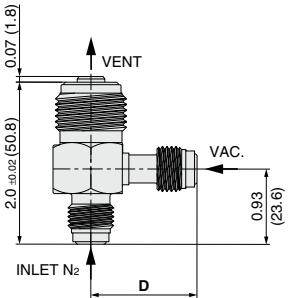


Connections (Inlet)	A	
	inch	(mm)
MV4	1.62	(41.1)
FV4		
TW4	1.25	(31.8)
MV6	2.13	(54.1)
FV6		
TW6	1.25	(31.8)

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)

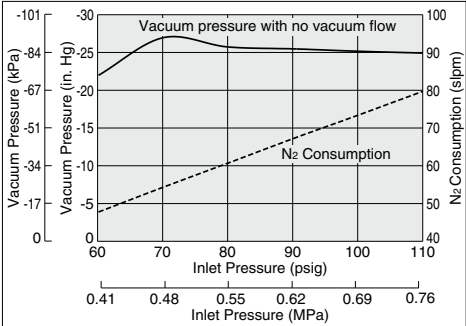
AP70



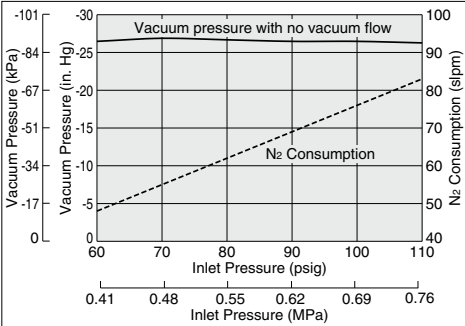
Connections (Vacuum)	D	
	inch	(mm)
MV4	1.31	(33.3)
FV4		
TW4	0.97	(24.6)
MV6	1.85	(47.0)
FV6		
TW6	0.97	(24.6)

Exhaust Characteristics

AP7

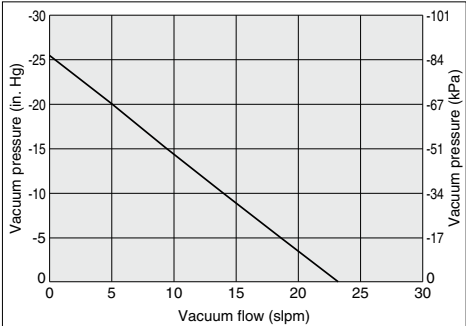


AP70

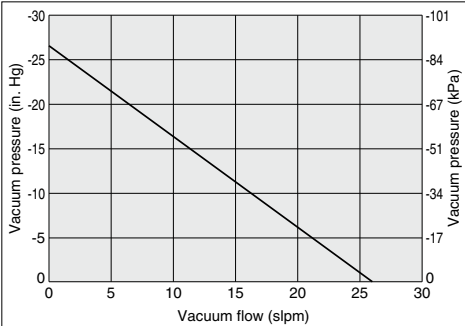


Flow Characteristics

AP7



AP70



AP

SL

AZ

AK

BP

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



How to Order

(Inlet) (Vent) (Vacuum)

AP71 S MV4 FV6 TW4

Material

Code	Body material
S	316L SS

Connections (Inlet N2 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 N2 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	10-32 UNF 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 N₂ 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

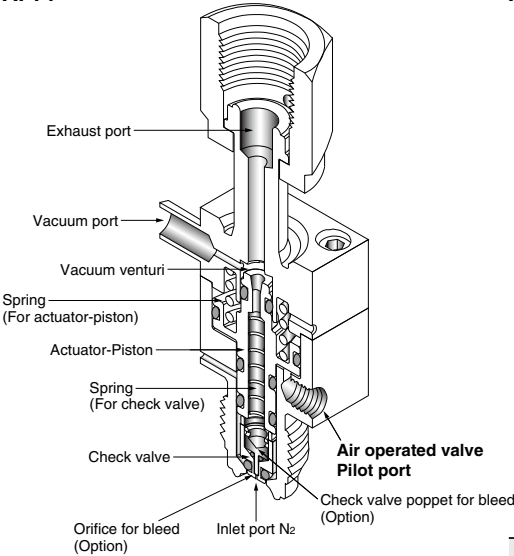
* At 80 psig (0.55 MPa) N₂ gas.

Wetted Parts Material

Wetted Parts	AP71
Body	316L SS
Poppet	303 SS
Piston	303 SS
Spring	302 SS
Check valve seat	FKM

Construction

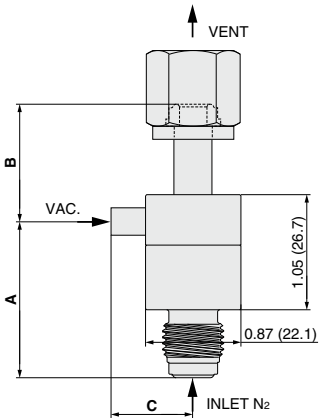
AP71



Dimensions

inch (mm)

AP71



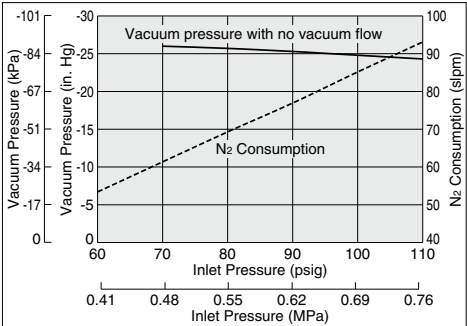
Connections (Inlet)	A	
	inch	(mm)
MV4	1.43	(36.3)

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)
TW4	0.75	(19.1)

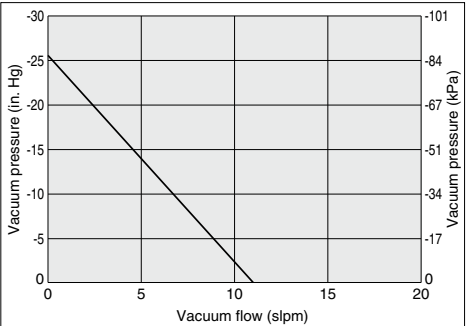
Exhaust Characteristics

AP71



Flow Characteristics

AP71



AP

SL

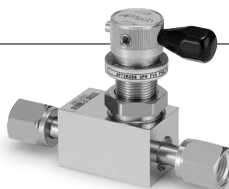
AZ

AK

BP

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



How to Order

AP72 **625** **S** **3PW** **MV4** **FV6** **TW4**

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		
625	Manual operated	Multi turn round knob
650		1/4 turn lever knob
		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

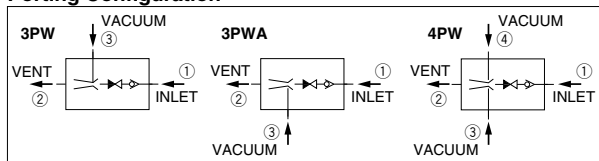
Diaphragm valve seat material

Code	Material
No code	PCTFE (Standard)
VS	Polyimide

Connections (Inlet N2 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 N2 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 x 10 ⁻¹¹ Pa·m ³ /s				
	Outboard leakage	2 x 10 ⁻¹⁰ Pa·m ³ /s *3)				
Across the seat leak		4 x 10 ⁻⁹ Pa·m ³ /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 N₂ to maintain inert atmosphere in vent line.

Following 3 options are available:

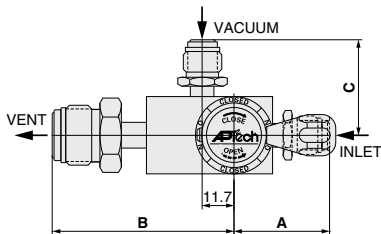
Option	Bleed *
CB009	2 to 5 slpm
CB013	5 to 8 slpm
CB023	10 to 15 slpm

* At 80 psig (0.55 MPa) N₂ gas.

Dimensions

inch (mm)

AP72



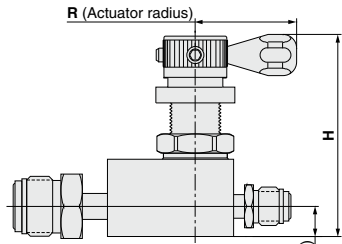
Top view

Model	R		H		Connections (Inlet)		A	
	inch	(mm)	inch	(mm)			inch	(mm)
AP72540	0.73	(18.5)	3.49	(88.6)	MV4		1.39	(35.3)
AP72550	0.69	(17.4)	3.28	(83.3)	FV4			
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)				

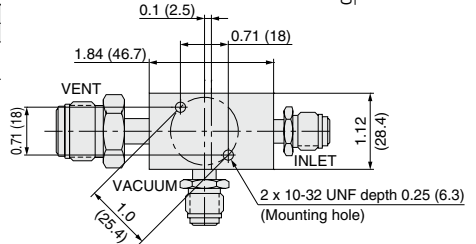
Connections (Vent)	B		Connections (Vacuum)	C	
	inch	(mm)		inch	(mm)
MV4	2.11	(53.6)	MV4	1.39	(35.3)
FV4			FV4		
MV6	2.65	(67.3)	TW4	1.06	(26.9)
FV6					
TW6	2.05	(52.0)			

Material

Material	S
Body	316L SS
Surface finish	Electropolish + Passivation
Diaphragm	Ni-Co alloy
Diaphragm valve seat	PCTFE (Option: Polyimide)
Check valve seat	FKM



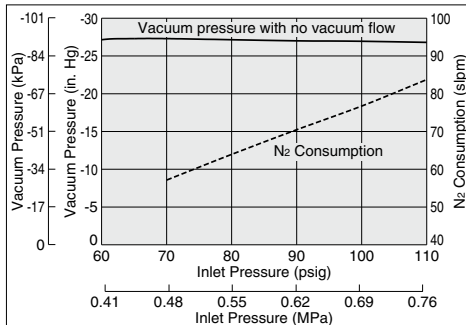
Side view



Bottom view

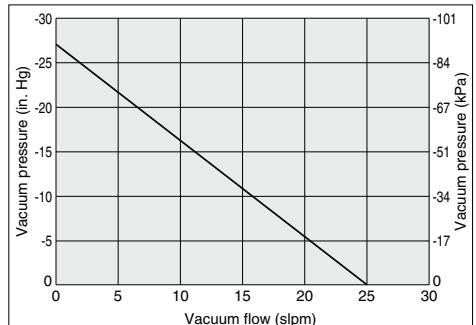
Exhaust Characteristics

AP72



Flow Characteristics

AP72



AP

SL

AZ

AK

BP

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)



How to Order

AP74 100 S (Inlet) (Outlet) MV4 MV4

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 100psig (0.69 MPa), please refer to the Precaution of Selection (P.1103).

•Connections (Inlet, Outlet)

Code	Connections
MV4	1/4 inch face seal (Male)
FW4	1/4 inch face seal (Female)
TW4	1/4 inch tube weld

•Surface finish

Code	Surface finish Ra max
No code	15 $\mu\text{in.}$ (0.4 μm) Standard
M	10 $\mu\text{in.}$ (0.25 μm)

•Material

Code	Body material
S	316L SS secondary remelt

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		0.5psi (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 x 10 ⁻¹¹ Pa·m ³ /s					
	Outboard leakage	2 x 10 ⁻¹¹ Pa·m ³ /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	DC 30 V (3 W max)					
	Switching current	0.2A max					
	Carrying current	0.5A 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 in ³ (1.9 cm ³)					
Weight		0.11 kg *5)					

*1) Trip point varies slightly with temperature change, $\pm 2\%$ over the specified operating range.

*2) At N₂ 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.1103).

*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.

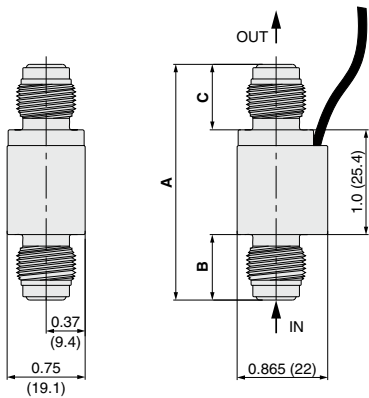
Wetted Parts Material

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)
MV4	FV4	3.12	(79.3)	0.625	(15.9)	1.495	(38.0)
MV4	TW4	2.25	(57.2)				
FV4	MV4	3.12	(79.3)	1.495	(38.0)	0.625	(15.9)
FV4	TW4						
TW4	MV4	2.25	(57.2)	0.625	(15.9)		
TW4	FV4	3.12	(79.3)			1.495	(38.0)

AP

SL

AZ

AK

BP

Flow Switch

For high flow

Series AP74B

- 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



How to Order

AP74B **V** **500** **S** **M** **FV8** **MV8**

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

*1) As N₂ 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.1103).

Surface finish

Code	Surface finish Ra max
M	10 µin. (0.25 µm)

Material

Code	Body material
S	316L SS

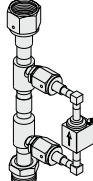
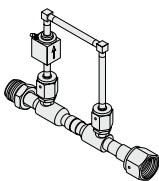
Connections

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)					●	●	●
FV12	3/4 inch face seal (Female)					●	●	●
TW12	3/4 inch tube weld					●	●	●

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 2400 psig (16.3 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		5000psig (34.5 MPa)						
Burst pressure		10000psig (69 MPa)						
Ambient and operating temperature		-23 to 80 °C (No freezing)						
Leak rate	Inboard leakage	2 x 10 ⁻¹¹ Pa·m³/s						
	Outboard leakage	2 x 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, 3wire / 2 position						
	Power	DC 30 V (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	10ft. (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 N₂ 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.1103).

*3) Pressure drop at trip point

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

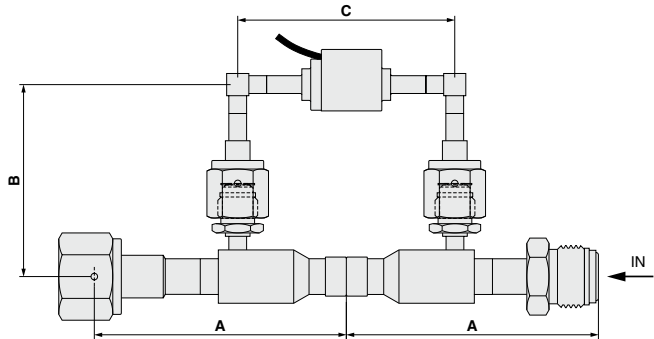
Wetted Parts Material

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	
	inch	(mm)	Horizontal		Vertical		inch	(mm)
MV8	3.55	(90.2)	4.55	(115.6)	2.70	(68.6)	3.05	(77.5)
FV8	2.59	(65.8)						
TW8	5.51	(140.0)	5.44	(138.2)	3.59	(91.2)		
MV12	3.53	(89.7)						

⚠️ Precaution on Selection

Nominal flow trip reference points are at 100 psig (0.69 MPa) of N₂ gas.
In order to obtain the nominal trip point for operating pressure, other than 100 psig (0.69 MPa), and for gas, other than N₂, calculate the correction factors (F_p, F_g) with the following formula and then, multiply both factors.

1. Change in operating pressure

$$F_p = \sqrt{\frac{OP}{114.7}}$$
$$\left(F_p = \sqrt{\frac{OP_{MPa}}{0.79}} \right)$$

OP: Operating pressure (abs) psia
(OP_{MPa}: Operating pressure (abs) MPa abs)

2. Change in gas type

$$F_g = \sqrt{\frac{28}{MW}}$$

MW: Molecular weight of the gas

E.g) Nominal trip point when gas type is hydrogen gas (molecular weight: 2) and operating pressure is 0.5 MPa:

1. Calculation of F_p

$$F_p = \sqrt{\frac{(0.5 + 0.1)}{0.79}} = 0.871$$

2. Calculation of F_g

$$F_g = \sqrt{\frac{28}{2}} = 3.742$$

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)).

AP

SL

AZ

AK

BP



Process Gas Equipment/Check Valve Specific Product Precautions

Be sure to read before handling. Refer to front matter 41 for Safety Instructions and pages 941 and 942 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 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 before handling. Refer to front matter 41 for Safety Instructions and pages 941 and 942 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 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 backpressure 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.

AP

SL

AZ

AK

BP



Process Gas Equipment/Flow Switch Specific Product Precautions

Be sure to read before handling. Refer to front matter 41 for Safety Instructions and pages 941 and 942 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 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.

Recommended Model Selection Table

Please read page 964 before selecting a product.

How to read model number listed as recommendation.

Example

Valve	Regulator			
AP3650	AP/AZ/AK1200	S	VS	HF
1	1	2	3	4

Regulator	Valve		
AP/AZ1402T	S	A	
1	2	5	

1 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.

2 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

3 VS: Seat material is made of Polyimide. (Only for specific series)

No code: PCTFE as standard design.

4 Option (Only for specific series)

- HF: High flow
- FC: Force compensation
- HR: High inlet pressure

5 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 ₂ H ₂)	230	AP3000	25	AP3540	3	AP/AZ/AK1500S	3	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		AP/AZ/AK1000S HF
		AP3002		AP4540		AP/AZ/AK1200S		AP/AZ/AK1400TS
	280	AP3650	45	AP4650			75	AP/AZ/AK1200S
				AP3700			95	AP/AZ/AK1200S HF
Air	185		90	AP3800	30	AP/AZ/AK1500S	30	AZ/AK1300S
		AP3000		AP3540				AP/AZ/AK1000S
		AP3650		AP3650		AP1900S		AP/AZ/AK1000S HF
	225	AP3002	160	AP4540	200	AP/AZ/AK1400TS	150	AP/AZ/AK1400TS
		AP3650		AP4650				AP/AZ/AK1200S
		AP3100		AP3800				AP/AZ/AK1200S HF
	550	AP3130	890	AP3700			600	AZ/AK1300S
	475	AP3125		AP3800				
Ammonia (NH ₃)	250	AP3540	100	AP3540	5	AP/AZ/AK1500S	5	AP/AZ/AK1000S
		AP3650		AP3650				AP/AZ/AK1000S HF
		AP4540		AP4540		AP/AZ/AK1200S		AP/AZ/AK1400TS
	450	AP4650	225	AP4650	400	AP/AZ/AK1200S	125	AP/AZ/AK1200S
		AP3113		AP3700				AP/AZ/AK1200S HF
	1000	AP3125	1000	AP3800	1100	AP/AZ/AK1200S HF	250	AZ/AK1300S
								AP/AZ/AK1200S FC
Argon (Ar)	200	AP3000	80	AP3540	10	AP/AZ/AK1500S	10	AP/AZ/AK1000S
		AP3650		AP3650				AP/AZ/AK1000S HF
		AP3002		AP4540		AP1900S HF		AP/AZ/AK1400TS
	350	AP3650	150	AP4650	1500	AP/AZ/AK1200S HR	100	AP/AZ/AK1200S
		AP3130		AP3700				AP/AZ/AK1200S HF
	1000	AP3125	800	AP3800			200	AZ/AK1300S
								AP/AZ/AK1200S FC
								AP9100S

* 15 psig (0.1MPa) maximum source regulator outlet pressure.

■ denotes heating required to achieve stated flow.



Recommended Model Selection Table

Please read page 964 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 AP4650	95	AP4540 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 AP3650	160	AP4540 AP4650	150	AP/AZ/AK1400TS	150	AP/AZ/AK1400TS
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 AP3650	160	AP4540 AP4650			60	AP/AZ/AK1400TS
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 AP3650	100	AP4540 AP4650			25	AP/AZ/AK1400TS
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 AP3650	100	AP4540 AP4650			25	AP/AZ/AK1400TS
Butene-1 (C ₄ H ₆)	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 AP4650	60	AP4540 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		① AP/AZ/AK1225S VS	100	AP/AZ/AK1200S
	2500	AP3113 AP3125	750	AP3700 AP3800	500	② AP/AZ/AK1200S VS HF	160	AP/AZ/AK1200S HF
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				
					1000	① AP9030S VS ② AP9100S VS	325	AP/AZ/AK1200S FC
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 AP3125	400	AP3700 AP3800			125	AP/AZ/AK1200SH HF
Chlorine Trifluoride (ClF ₃)	20	AP4540 AP4650	15	AP4540 AP4650	6	AP/AZ/AK1402TSA	0.5	AZ/AK1300S
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 AP3650	160	AP4540 AP4650				
Dichlorosilane (SiH ₂ Cl ₂)	20	AP4540 AP4650	20	AP4540 AP4650	7	AP/AZ/AK1402TSA	1	AP1001S
Diethyltelluride (Te(C ₂ H 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 AP3650	60	AP4540 AP4650	25	AP/AZ/AK1400TS	25	AP/AZ/AK1400TS
Dimethylsilane (C ₂ SiH ₆)	14	AP4540	7	AP4540	3	AP/AZ/AK1500S	3	AP/AZ/AK1000S
		AP4650		AP4650	50	AP/AZ/AK1400TS	50	AP/AZ/AK1400TS
	150	AP3700 AP3800	75	AP3700 AP3800	75	AP/AZ/AK1200S	75	AP/AZ/AK1200S
Disilane (Si ₂ H ₆)	14	AP4540	7	AP4540	1	AP/AZ/AK1000S	1	AP/AZ/AK1000S
		AP4650		AP4650	7	AP/AZ/AK1402TSA	7	AP/AZ/AK1402TSA

■ denotes heating required to achieve stated flow.
Please read page 965 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 964 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
Ethylene (C ₂ H 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 ₂ F 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 ₂ F ₂)	15	AP4540	15	AP4540	5	AP/AZ/AK1400TSA	0.5	AP/AZ/AK1000S
		AP4650		AP4650			5	AP/AZ/AK1402TSA
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
Halocarbon 21 (CHCl ₂ F)	25	AP4540	15	AP4540	5	AP/AZ/AK1402TSA	500	AP9100S
		AP4650		AP4650				AP/AZ/AK1000S
							0.5	AP/AZ/AK1000S
								AP1001S
Halocarbon 23 (CHF ₃)	115	AP3000	145	AP3540	10	AP/AZ/AK1500S	5	AP/AZ/AK1402TSA
		AP3650		AP3650	50	AP/AZ/AK1400TS	10	AP/AZ/AK1000S
	140	AP3002	250	AP4540			20	AP/AZ/AK1000S HF
		AP3650		AP4650			50	AP/AZ/AK1400TS
Halocarbon 32 (CH ₂ F 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
Halocarbon 114 (C ₂ Cl ₂ F 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 ₂ ClF 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 ₂ F 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

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AP
SL
AZ
AK
BP

Recommended Model Selection Table

Please read page 964 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 125 (C ₂ H ₂ F ₆)	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
Halocarbon 134A (C ₂ H ₂ F 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				AP/AZ/AK1000S
Halocarbon R218 (C ₃ F 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 ₄ F ₈)	25	AP4540	20	AP4540	6	AP/AZ/AK1402TSA	1	AP/AZ/AK1101S
		AP4650		AP4650			6	AP/AZ/AK1402TSA
							65	AP/AZ/AK1000S
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
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
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			85	AP/AZ/AK1200SH
	2000	AP3113	850	AP3700	600	① AP1225SH	160	AP/AZ/AK1200SH HF
		AP3125		AP3800		② AP1210SH HF		AZ/AK1300S
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 ₂ Se)	125	AP3540	55	AP3540	5	AP/AZ/AK1500S	5	AP/AZ/AK1000S
		AP3650		AP3650	40	AP/AZ/AK1400TS	20	AP/AZ/AK1000S HF
	215	AP4540	95	AP4540			40	AP/AZ/AK1400TS
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 ₂ S)	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				

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Recommended Model Selection Table

Please read page 964 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
Krypton (Kr)	105	AP3000	50	AP3540	20	AP/AZ/AK1500S	20	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		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		AP1900S		AP/AZ/AK1000S HF
	295	AP3002	210	AP4540	40	AP/AZ/AK1400TS	40	AP/AZ/AK1400TS
		AP3650		AP4650				
Methanol (CH ₃ OH)	40	AP3540	25	AP3540	3	AP/AZ/AK1500S	3	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		AP/AZ/AK1000S HF
	70	AP4540	40	AP4540				
		AP4650		AP4650				
Methyl Chloride (CH ₃ Cl)	60	AP4540	45	AP4540	1	AP/AZ/AK1000S	10	AP/AZ/AK1402TSA
		AP4650		AP4650		AP/AZ/AK1402TSA		
Methylsilane (CH ₃ SiH ₃)	200	AP3540	70	AP3540	3	AP/AZ/AK1500S	3	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		AP/AZ/AK1000S HF
	350	AP4540	120	AP4540	75	AP/AZ/AK1200S	50	AP/AZ/AK1400TS
		AP4650		AP4650				AP/AZ/AK1200S
Methyl Fluoride (CH ₃ F)	400	AP3000	120	AP3540	5	AP/AZ/AK1500S	5	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		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		AP1900S		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		AP1900S		AP/AZ/AK1000S HF
	400	AP3002	200	AP4540	250	AP1900S HF	150	AP/AZ/AK1400TS
		AP3650		AP4650		AP2700		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
								AP9100S
Nitrogen Trifluoride (NF ₃)	75	AP3000	60	AP3540	5	AP/AZ/AK1500S	6	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		AP/AZ/AK1000S HF
	100	AP3002	110	AP4540	150	AP/AZ1400TS	30	AP/AZ/AK1400TS
		AP3650		AP4650		AP2700S		AP/AZ/AK1200S
	350	AP3130	500	AP3700	400	AP/AZ1200S HR	125	AP/AZ/AK1200 S HF
		AP3125		AP3800		① AP9030		AZ/AK1300S
					1000	② AP9110	250	AP/AZ/AK1200S FC
								AP9100S
Nitric Oxide (NO)	310	AP3000	75	AP3540	3	AP/AZ/AK1500S	3	AP/AZ/AK1000S
		AP3650		AP3650		AP/AZ/AK1400TS		AP/AZ/AK1000S HF
	380	AP3002	125	AP4540	75	AP/AZ/AK1200S	50	AP/AZ/AK1400TS
		AP3650		AP4650				AP/AZ/AK1200S
Nitrous Oxide (N ₂ O)	300	AP3000	70	AP3540	3	AP/AZ/AK1500S VS	8	AP/AZ/AK1000S VS
		AP3650		AP3650		AP/AZ/AK1400TS VS		AP/AZ/AK1000S VS HF
	500	AP3002	140	AP4540	100	AP/AZ/AK1200S VS	35	AP/AZ/AK1400TS VS
		AP3650		AP4650		AP/AZ1200S VS HF		AP/AZ/AK1200S VS
	1500	AP3113	750	AP3700	500	① AP/AZ1225S VS	160	AP/AZ/AK1200S VS HF
		AP3125		AP3800		② AP/AZ1200S VS HF		AZ/AK1300S
Octafluorocyclopentene (C ₅ F ₈)	15	AP4540	15	AP4540	5	AP/AZ/AK1402TSA	0.3	AP/AZ1101S
		AP4650		AP4650				AP/AZ/AK1402TSA
Oxygen (O ₂)	250	AP3000	75	AP3540	10	AP/AZ/AK1500S	10	AP/AZ/AK1000S
		AP3650		AP3650		AP1900S		AP/AZ/AK1000S HF
	400	AP3002	150	AP4540	150	AP1900S HF	50	AP/AZ/AK1400TS
		AP3650		AP4650		AP/AZ/AK1200S HR		AP/AZ/AK1200S
			1000	AP3700			200	AP/AZ/AK1200S HF
				AP3800				AZ/AK1300S
							400	AP/AZ/AK1200S FC
							1000	AP9100S

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AP

SL

AZ

AK

BP

Recommended Model Selection Table

Please read page 964 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
Perfluorobutadiene (C₄F₆)	25	AP4540 AP4650	25	AP4540 AP4650	5	AP/AZ/AK1402TSA	0.5	AP/AZ1101S AP/AZ/AK1402TSA
Phosphine (PH₃)	320	AP3000 AP3650	80	AP3540 AP3650	5 40	AP/AZ/AK1500S AP/AZ/AK1400TS	5 10	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650				
Phosphine Mixtures (Nitrogen Balance)	185	AP3000 AP3650	90	AP3540 AP3650	10 20	AP/AZ/AK1500S AP1900S	10 20	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650				
Phosphorous Pentafluoride (PF₅)	15	AP3000 AP3650	5	AP3540 AP3650	10 20	AP/AZ/AK1500S AP1900S	10 20	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650				
Propane (C₃H₈)	65	AP3540 AP3650	42	AP3540 AP3650	3 50	AP/AZ/AK1500S AP/AZ/AK1400TS	3 5	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP4450 AP4650		AP4540 AP4650	75	AP/AZ/AK1200S	50	AP/AZ/AK1400TS
Propene (C₃H₆)	185	AP3540 AP3650	75	AP3540 AP3650	3 50	AP/AZ/AK1500S AP/AZ/AK1400TS	3 5	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP4540 AP4650		AP4540 AP4650			50	AP/AZ/AK1400TS
Silane (SiH₄)	150	AP3000 AP3650	75	AP3540 AP3650	5 40	AP/AZ/AK1500S AP/AZ/AK1400TS	10 25	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650	50 60	AP2700S AP/AZ/AK1200S	50 120	AP/AZ/AK1400TS AP/AZ/AK1200S
		AP3130 AP3125		AP3700 AP3800	100 500	AP/AZ/AK1200S HF AP/AZ/AK1200S HF	200 400	AP/AZ/AK1200S HF AP/AZ/AK1200S FC
Silane Mixtures (Nitrogen Balance)	185	AP3000 AP3650	90	AP3540 AP3650	10 20	AP/AZ/AK1500S AP1900S	10 20	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650	40	AP/AZ/AK1400TS	40	AP/AZ/AK1400TS
Silicon Tetrachloride (SiCl₄)	10	AP4540 AP4650	10	AP4540 AP4650	5	AP/AZ/AK1402TSA	0.5	AP/AZ/AK1101S AP/AZ/AK1402TSA
							5	
Silicon Tetrafluoride (SiF₄)	95	AP3000 AP3650	45	AP3540 AP3650	10 40	AP/AZ/AK1500S AP/AZ/AK1400TS	10 20	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650			40	AP/AZ/AK1400TS
Sulfur Dioxide (SO₂)	80	AP4540 AP4650	30	AP4540 AP4650	1 6	AP/AZ/AK1000S AP/AZ/AK1402TSA	6	AP/AZ/AK1402TSA
Sulfur Hexafluoride (SF₆)	125	AP3000 AP3650	35	AP3540 AP3650	3 40	AP/AZ/AK1500S AP/AZ/AK1400TS	5 12	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3000 AP3650		AP4540 AP4650	60 150	AP/AZ/AK1200S AP/AZ/AK1200S HF	25 60	AP/AZ/AK1400TS AP/AZ/AK1200S
		AP3113 AP3125		AP3700 AP3800	500	AP9100S	90	AP/AZ/AK1200S HF AZ/AK1300S
Sulfur Tetrafluoride (SF₄)	200	AP4540 AP4650	80	AP4540 AP4650	3 15	AP/AZ/AK1500S AP/AZ/AK1400TS	3 5	AP/AZ/AK1000S AP/AZ/AK1000S HF
							15	AP/AZ/AK1400TS
Trichlorosilane (SiHCl₃)	35	AP4540 AP4650	30	AP4540 AP4650	10	AP/AZ/AK1402TSA	0.5	AP/AZ/AK1101S AP/AZ/AK1402TSA
							10	
Trimethylsilane ((CH₃)₃SiH)	30	AP4540 AP4650	25	AP4540 AP4650	7	AP/AZ/AK1402TSA	0.5	AP/AZ1101S AP/AZ/AK1402TSA
							7	
Tungsten Hexafluoride (WF₆)	10	AP4540 AP4650	10	AP4540 AP4650	5	AP/AZ/AK1402TSA	0.3	AP/AZ/AK1101SH AP/AZ/AK1402TSA
							5	
Xenon (Xe)	85	AP3000 AP3650	40	AP3540 AP3650	5 25	AP/AZ/AK1500S AP/AZ/AK1400TS	5 10	AP/AZ/AK1000S AP/AZ/AK1000S HF
		AP3002 AP3650		AP4540 AP4650			25	AP/AZ/AK1400TS

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