

BEST AUTOMATION

# Process Gas Equipment



Regulators

Diaphragm Valves

Flow Switches

**APTech**<sup>®</sup>

**SVC**<sup>®</sup>

CAT.ES100-88D

# Regulators

For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries



# Regulators

## For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries

<Air Operated Type>



AP10PA/AP15PA



AP12PA/AP14PAT



**New** AP90PA/AP91PA

### AP□PA Series

p. 67 to 76



AZ10PA/AZ15PA



AZ12PA/AZ14PAT

### AZ□PA Series

p. 99 to 106

## For general applications

For a wide variety of applications from semiconductor to general



**New** AK100



AK1700



AK1000/AK1500



AK1000T



**New** AK1100



AK1200/  
AK1300/  
AK1400T



AK9200

### AK Series

p. 107 to 126



BP1000

Back Pressure Regulator

### BP Series

p. 137, 138

<Air Operated Type>



AK10PA/AK15PA



AK12PA/AK14PAT

### AK□PA Series

p. 127 to 134

# Diaphragm Valves

## For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries



AP3700



AP3130



AP3000/AP3200



New AP4000



New AP4141



AP3550/AP4550

Air operated type

**AP Series**

p. 145 to 162



AP3540/AP4540



AP3571/AP4571



AP3100



AP3800



AP3900



AP3600/AP4600/AP3260



AP3627



New AP4150



New AP3672/AP3675/AP4675



AP3150



AP3125



AP3650/AP4650

Manually operated type

**AP Series**

p. 163 to 178



AP3625/AP4625



AP3657/AP4657

# Diaphragm Valves

## For ultra high purity (UHP)

For UHP gas delivery in semiconductor and other clean industries



**New** AZ3700



AZ3007



**New** AZ3000/AZ4000



**New** AZ4141



AZ3580/AZ4580



AZ3550/AZ4550



**New** AZ3571/AZ4571

Air operated type

**AZ Series**

p. 181 to 194



**New** AZ3800



AZ3650/AZ4650



**New** AZ3627



**New** AZ4150



**New** AZ3672/AZ3675/AZ4675

Manually operated type

**AZ Series**

p. 195 to 206

# Diaphragm Valves

## For general applications

For a wide variety of applications from semiconductor to general



**New AK3000**



**New AK4000**



**AK3540**



**AK4542**



**New AK3571**

Air operated type

**AK Series**

p. 209 to 218



**AK4650**



**New AK3627**



**AK3659**



**New AK3672/AK3675**

Manually operated type

**AK Series**

p. 219 to 226

## Check Valve



**AP64**

**AP64 Series**

p. 231, 232

## Vacuum Generators



**AP72**



**AP7**



**AP70**



**AP71**

**AP7, 70/71/72 Series**

p. 233 to 238

## Flow Switches



**AP74B**



**AP74**

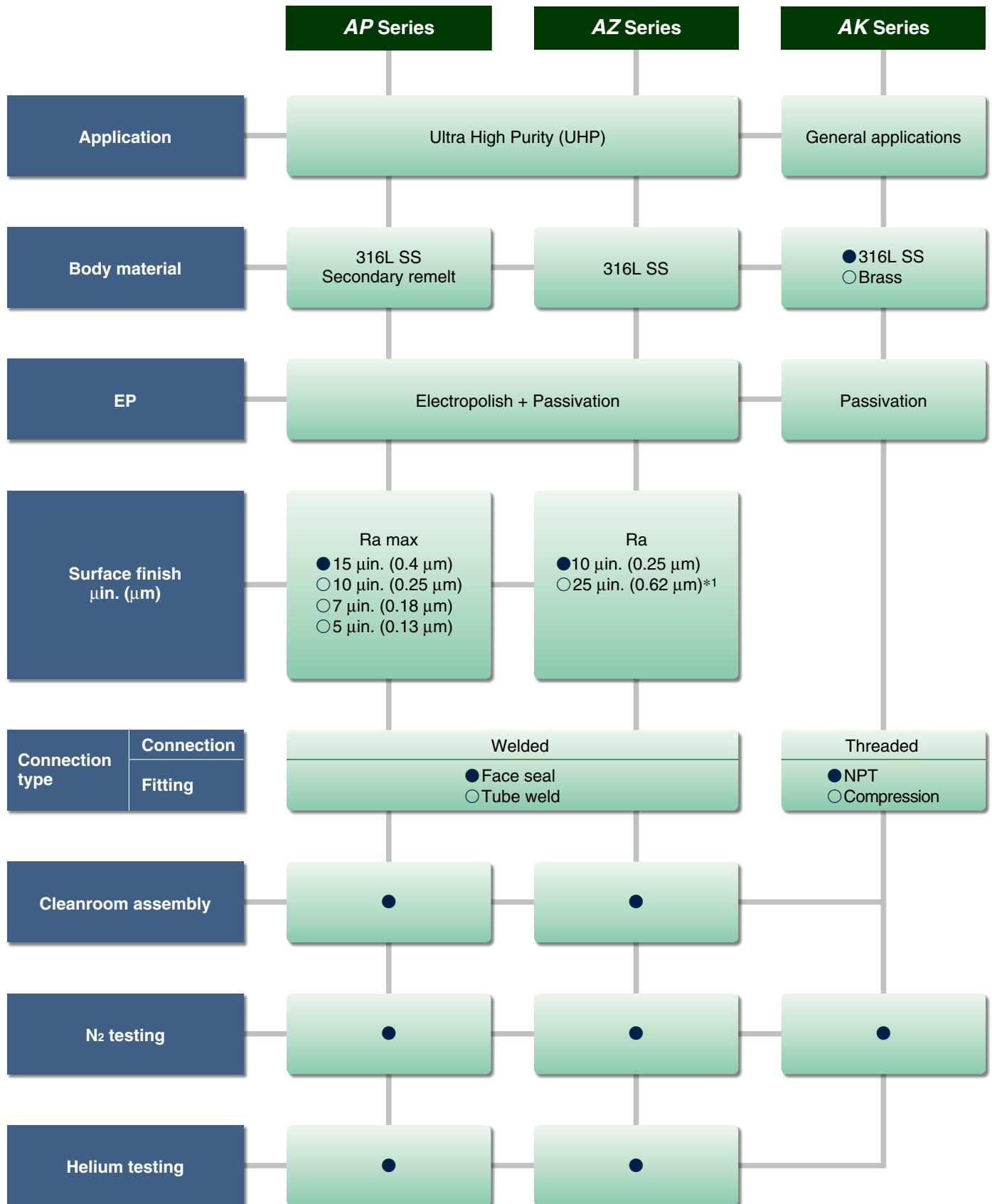
**AP74/74B Series**

p. 239 to 242

# Series Features

● Standard

○ Selectable by model or option



\*1 Optional finish not available on all AZ series

# Regulator AP Series

| Series                    |             |                                                                                                | Application                    |                      | Construction      |            | Material |                             | Max. inlet pressure             |                                 |  |
|---------------------------|-------------|------------------------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------|------------|----------|-----------------------------|---------------------------------|---------------------------------|--|
|                           |             |                                                                                                | Distribution<br>(Point of use) | Source<br>(Cylinder) | Tied<br>diaphragm | Springless | Body*1   | Ni-Cr-Mo alloy<br>internals | psig                            | MPa                             |  |
| Single Stage<br>(Compact) | AP500       |               | ●                              |                      |                   |            | 316L VAR | ○                           | ● 150<br>○ 3000                 | ● 1.0<br>○ 20.7                 |  |
|                           | AP1000      |               | ●                              | △                    |                   |            | 316L VAR | ○                           | 300<br>3500                     | 2.1<br>24.1                     |  |
| Single Stage              | AP1100      |               | ●                              | ●*3                  |                   |            | 316L VAR | ○                           | 300                             | 2.1                             |  |
|                           | AP1500      |               |                                | ●                    | ●                 |            | 316L VAR | ○                           | ● 3500<br>○ 4500                | ● 24.1<br>○ 31                  |  |
|                           | AP1600      |               | ●                              |                      |                   |            | 316L VAR | ○                           | 100<br>3500                     | 0.7<br>24.1                     |  |
|                           | AP1900      |              |                                | ●                    | ●                 |            | 316L VAR | ○                           | 3500                            | 24.1                            |  |
|                           | AP1400T     |             | ●                              | ●                    | ●                 |            | 316L VAR | ●                           | 300<br>2300<br>● 2300<br>○ 3000 | 2.1<br>15.9<br>● 15.9<br>○ 20.7 |  |
|                           | AP1200      |             | ●                              | ●                    | ●                 |            | 316L VAR | ○                           | 1700<br>● 1700<br>○ 3000        | 11.7<br>● 11.7<br>○ 20.7        |  |
|                           | AP1300      |  <b>New</b> | ●                              |                      |                   |            | 316L VAR | ○                           | 300                             | 2.1                             |  |
|                           | AP9000      |             | ●                              | ●                    | ●                 |            | 316L     | ●                           | 1700                            | 11.7                            |  |
|                           | AP9100      |                                                                                                | ●                              | ●                    | ●                 |            | 316L     | ●                           | 800                             | 5.5                             |  |
|                           | AP9115      |                                                                                                | ●                              | ●                    | ●                 |            | 316L     | ●                           | 250                             | 1.7                             |  |
|                           | AP9000 VSHR |  <b>New</b> | ●                              | ●                    | ●                 |            | 316L     | ●                           | ● 3000                          | ● 20.7                          |  |
| Two Stage                 | AP1700      |             |                                | ●                    | ●                 |            | 316L VAR | ○                           | ● 3500<br>○ 4500                | ● 24.1<br>○ 31                  |  |
|                           | AP2700      |             |                                | ●                    | ●                 |            | 316L VAR | ○                           | 3500                            | 24.1                            |  |

\*1 316L VAR: 316L SS secondary remelt, 316L: 316L SS

\*2 At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

\*3 For low vapor pressure gases

● Standard ○ Selectable by model or option

△ May be selected for source applications of inert gases, though tied diaphragm is recommended

|  | Delivery pressure         |                               |                                                                                     | Flow, N <sub>2</sub> *2<br>slpm               | Connection<br>size<br>[inch] | Connection type |                            | Page       |    |    |
|--|---------------------------|-------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------|-----------------|----------------------------|------------|----|----|
|  | psig                      | MPa                           | Sub-atmospheric<br>(Absolute)                                                       |                                               |                              | Connection      | Fitting                    |            |    |    |
|  | 100 mmHg abs. to 10 psig  | -88 kPa to 0.07 MPa           |    | ● 15<br>○ 30 (HF opt.)                        | 1/4                          | Welded          | ● Face seal<br>○ Tube weld | 41         |    |    |
|  | 0.5 to 10                 | 0.0034 to 0.07                |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 0.5 to 30                 | 0.0034 to 0.2                 |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 60                   | 0.007 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 100                  | 0.007 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 150                  | 0.014to 1.0                   |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 0.5 to 10                 | 0.0034 to 0.07                |                                                                                     | ● 30<br>○ 120 (HF opt.)                       | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 43         |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 300                  | 0.034 to 2.1                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 100 mmHg abs. to 10 psig  | -88 kPa to 0.07 MPa           | ●                                                                                   | 0.5                                           | 1/4<br>3/8                   |                 |                            |            |    | 45 |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     | ● 30<br>○ 120 (HF opt.)                       | 1/4<br>3/8                   |                 |                            |            |    | 47 |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 10                   | 0.007 to 0.07                 |                                                                                     | 100                                           | 1/4<br>3/8                   |                 |                            |            |    | 49 |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 10                   | 0.007 to 0.07                 |                                                                                     | ● 100<br>○ 150 (HF opt.)                      | 1/4<br>3/8<br>1/2            |                 |                            | 51         |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 100 mmHg abs. to 30 psig  | -88 kPa to 0.2 MPa            |  | 400                                           | 1/4<br>3/8<br>1/2            | Welded          | ● Face seal<br>○ Tube weld | 53         |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 60                   | 0.007 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     | ● 800<br>○ 1000 (HF opt.)<br>○ 1500 (FC opt.) | 1/4<br>3/8<br>1/2<br>3/4     |                 |                            | 55         |    |    |
|  | 1 to 60                   | 0.007 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     | 1000                                          | 1/4<br>3/8<br>1/2<br>3/4     |                 |                            | 57         |    |    |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 100<br>Preset to 300 | 0.034 to 0.7<br>Preset to 2.1 |                                                                                     | 2000                                          | 1/2<br>3/4<br>1              | 59              |                            |            |    |    |
|  | 5 to 100                  | 0.034 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 150                  | 0.034 to 1.0                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 100<br>Preset to 300 | 0.034 to 0.7<br>Preset to 2.1 |                                                                                     | 4000                                          | 1/2<br>3/4                   | Welded          | ● Face seal<br>○ Tube weld | 61         |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     | ● 15<br>○ 120                                 | 1/4<br>3/8                   |                 |                            |            | 63 |    |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 5 to 200                  | 0.035 to 1.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 1 to 30                   | 0.007 to 0.2                  |                                                                                     |                                               |                              |                 | 150                        | 1/4<br>3/8 |    | 65 |
|  | 2 to 60                   | 0.014 to 0.4                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 2 to 100                  | 0.014 to 0.7                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  | 3 to 120                  | 0.021 to 0.8                  |                                                                                     |                                               |                              |                 |                            |            |    |    |
|  |                           |                               |                                                                                     |                                               |                              |                 |                            |            |    |    |

Recommendations

Regulators

AP

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Precautions

# Regulator SL Series

| Series                    |        |                                                                                   | Application                    |                      | Construction      |            | Material |                             | Max. inlet pressure |      |  |
|---------------------------|--------|-----------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------|------------|----------|-----------------------------|---------------------|------|--|
|                           |        |                                                                                   | Distribution<br>(Point of use) | Source<br>(Cylinder) | Tied<br>diaphragm | Springless | Body*1   | Ni-Cr-Mo alloy<br>internals | psig                | MPa  |  |
| Single Stage<br>(Compact) | SL5200 |  | ●                              |                      | ●                 | ●          | 316L VAR | ○                           | 150                 | 1.0  |  |
|                           | SL5500 |  | ●                              | ●                    | ●                 | ●          | 316L VAR | ○                           | 3500                | 24.1 |  |
| Single Stage              | SL5400 |  | ●                              | ●                    | ●                 | ●          | 316L VAR | ○                           | 1000                | 6.9  |  |
|                           | SL5800 |                                                                                   | ●                              |                      | ●                 | ●          | 316L VAR |                             | 300                 | 2.1  |  |

\*1 316L VAR: 316L SS secondary remelt, 316L: 316L SS

\*2 At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

# Regulator AZ Series

| Series                                                                                                                                                                                   |                                                                                     |                                                                                     | Application                                                                         |                                                                                        | Construction                                                                        |            | Material                                                                                                                                                                                 |                                                                                       | Max. inlet pressure                                                                                                                                                                      |                                                                                                                                                                                          |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                                          |                                                                                     |                                                                                     | Distribution<br>(Point of use)                                                      | Source<br>(Cylinder)                                                                   | Tied<br>diaphragm                                                                   | Springless | Body*1                                                                                                                                                                                   | Ni-Cr-Mo alloy<br>internals                                                           | psig                                                                                                                                                                                     | MPa                                                                                                                                                                                      |  |
| Single Stage                                                                                                                                                                             | AZ1000                                                                              |  |  |     |                                                                                     |            | 316L                                                                                                                                                                                     |  | 300                                                                                                                                                                                      | 2.1                                                                                                                                                                                      |  |
|                                                                                                                                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                        |                                                                                     |            |                                                                                                                                                                                          |                                                                                       | 3500                                                                                                                                                                                     | 24.1                                                                                                                                                                                     |  |
|                                                                                                                                                                                          | AZ1100                                                                              |  |  |  *3 |                                                                                     |            |                                                                                                                                                                                          |  | 300                                                                                                                                                                                      | 2.1                                                                                                                                                                                      |  |
|                                                                                                                                                                                          | AZ1500                                                                              |  |                                                                                     |     |  |            |                                                                                                                                                                                          |  |  3500<br> 4500 |  24.1<br> 31   |  |
|                                                                                                                                                                                          | AZ1400T                                                                             |  |  |     |  |            |                                                                                                                                                                                          |  | 300                                                                                                                                                                                      | 2.1                                                                                                                                                                                      |  |
|                                                                                                                                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                        |                                                                                     |            |                                                                                                                                                                                          |                                                                                       | 2300                                                                                                                                                                                     | 15.9                                                                                                                                                                                     |  |
|                                                                                                                                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                        |                                                                                     |            |                                                                                                                                                                                          |                                                                                       |  2300<br> 3000 |  15.9<br> 20.7 |  |
|                                                                                                                                                                                          | AZ1200                                                                              |  |  |     |  |            |                                                                                                                                                                                          |  | 1700                                                                                                                                                                                     | 11.7                                                                                                                                                                                     |  |
|  1700<br> 3000 |                                                                                     |                                                                                     |                                                                                     |                                                                                        |                                                                                     |            |  11.7<br> 20.7 |                                                                                       |                                                                                                                                                                                          |                                                                                                                                                                                          |  |
| AZ1300                                                                                                                                                                                   |  |  |                                                                                     |                                                                                        |                                                                                     |            |                                                                                                                                                                                          | 300                                                                                   | 2.1                                                                                                                                                                                      |                                                                                                                                                                                          |  |
| AZ9200                                                                                                                                                                                   |  |  |                                                                                     |                                                                                        |  |            |                                                                                                                                                                                          |                                                                                       | 300                                                                                                                                                                                      | 2.1                                                                                                                                                                                      |  |

\*1 316L: 316L SS, B: Brass

\*2 At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

\*3 For low vapor pressure gases

● Standard ○ Selectable by model or option

△ May be selected for source applications of inert gases, though tied diaphragm is recommended

|  | Delivery pressure        |                     |                               | Flow, N <sub>2</sub> *2<br>slpm | Connection<br>size<br>[inch] | Connection type |                            | Page |
|--|--------------------------|---------------------|-------------------------------|---------------------------------|------------------------------|-----------------|----------------------------|------|
|  | psig                     | MPa                 | Sub-atmospheric<br>(Absolute) |                                 |                              | Connection      | Fitting                    |      |
|  | 100 mmHg abs. to 10 psig | -88 kPa to 0.07 MPa | ○                             | ● 30<br>○ 130 (HF opt.)         | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 77   |
|  | 0.5 to 10                | 0.0034 to 0.07      |                               |                                 |                              |                 |                            |      |
|  | 0.5 to 30                | 0.0034 to 0.2       |                               |                                 |                              |                 |                            |      |
|  | 1 to 60                  | 0.007 to 0.4        |                               |                                 |                              |                 |                            |      |
|  | 1 to 100                 | 0.007 to 0.7        |                               |                                 |                              |                 |                            |      |
|  | 100 mmHg abs. to 30 psig | -88 kPa to 0.2 MPa  | ○                             | 30                              | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 79   |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                 |                              |                 |                            |      |
|  | 1 to 60                  | 0.007 to 0.4        |                               |                                 |                              |                 |                            |      |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                 |                              |                 |                            |      |
|  | 1 to 30                  | 0.007 to 0.2        |                               | 120                             | 1/4<br>3/8<br>1/2            | Welded          | ● Face seal<br>○ Tube weld | 81   |
|  | 1 to 60                  | 0.007 to 0.4        |                               |                                 |                              |                 |                            |      |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                 |                              |                 |                            |      |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                 |                              |                 |                            |      |
|  | 1 to 60                  | 0.007 to 0.4        |                               | 200                             | 1/4<br>3/8<br>1/2            | Welded          | ● Face seal<br>○ Tube weld | 83   |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                 |                              |                 |                            |      |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                 |                              |                 |                            |      |
|  | 1 to 60                  | 0.007 to 0.4        |                               |                                 |                              |                 |                            |      |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                 |                              |                 |                            |      |

● Standard ○ Selectable by model or option

△ May be selected for source applications of inert gases, though tied diaphragm is recommended

|  | Delivery pressure        |                     |                               | Flow, N2*2<br>slpm                            | Connection<br>size<br>[inch] | Connection type |                            | Page |  |  |
|--|--------------------------|---------------------|-------------------------------|-----------------------------------------------|------------------------------|-----------------|----------------------------|------|--|--|
|  | psig                     | MPa                 | Sub-atmospheric<br>(Absolute) |                                               |                              | Connection      | Fitting                    |      |  |  |
|  | 1 to 10                  | 0.007 to 0.07       |                               | ● 30<br>○ 120 (HF opt.)                       | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 85   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 60                  | 0.014 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 300                 | 0.034 to 2.1        |                               |                                               |                              |                 |                            |      |  |  |
|  | 100 mmHg abs. to 10 psig | -88 kPa to 0.07 MPa | ●                             | 0.5                                           | 1/4<br>3/8                   |                 |                            | 87   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               | ● 30<br>○ 120 (HF opt.)                       | 1/4<br>3/8                   |                 |                            | 89   |  |  |
|  | 2 to 60                  | 0.014 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               |                                               |                              |                 |                            |      |  |  |
|  | 100 mmHg abs. to 30 psig | -88 kPa to 0.2 MPa  | ○                             | 400                                           | 1/4<br>3/8<br>1/2            |                 |                            | 91   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                               |                              |                 |                            |      |  |  |
|  | 1 to 60                  | 0.007 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               | ● 800<br>○ 1000 (HF opt.)<br>○ 1500 (FC opt.) | 1/4<br>3/8<br>1/2            |                 |                            | 93   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 60                  | 0.014 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               | 1000                                          | 1/4<br>3/8<br>1/2            |                 |                            | 95   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 60                  | 0.014 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               | 2000                                          | 3/4<br>1                     |                 |                            | 97   |  |  |
|  | 1 to 30                  | 0.007 to 0.2        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 60                  | 0.014 to 0.4        |                               |                                               |                              |                 |                            |      |  |  |
|  | 2 to 100                 | 0.014 to 0.7        |                               |                                               |                              |                 |                            |      |  |  |
|  | 5 to 150                 | 0.034 to 1.0        |                               |                                               |                              |                 |                            |      |  |  |

Recommendations

Regulators

AP

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AZ

AK

BP

Diaphragm Valves

AP

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AK

Check Valves

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# Regulator AK Series

| Series                    |           |                                                                                     | Application                                                                         |                                                                                     | Construction                                                                        |                                                                                     | Material                                                                                                                                                                       |                                                                                       | Max. inlet pressure                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|---------------------------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                           |           |                                                                                     | Distribution<br>(Point of use)                                                      | Source<br>(Cylinder)                                                                | Tied<br>diaphragm                                                                   | Springless                                                                          | Body <sup>*1</sup>                                                                                                                                                             | Ni-Cr-Mo alloy<br>internals                                                           | psig                                                                                                                                                                           | MPa                                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
| Single Stage<br>(Compact) | AK100     |    |    |    |                                                                                     |                                                                                     | 316L                                                                                                                                                                           |                                                                                       | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       | 3000                                                                                                                                                                           | 20.7                                                                                                                                                                           |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
| Single Stage              | AK1000    |    |    |    |                                                                                     |                                                                                     | <br>     |    | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       | 3500                                                                                                                                                                           | 24.1                                                                                                                                                                           |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           | AK1000T   |    |    |    |                                                                                     |                                                                                     | 316L                                                                                                                                                                           |    | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       | 3500                                                                                                                                                                           | 24.1                                                                                                                                                                           |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           | AK1100    |    |    |    |                                                                                     |                                                                                     | <br> |  | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           | AK1500    |   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                           | <br>  |                                                                                                                                                                                | <br>  |                                                                                                                                                                                |  |
|                           | AK1400T   |  |  |  |  |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                | <br> |                                                                                           | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       | 2300                                                                                                                                                                           |                                                                                                                                                                                |                                                                                                                                                                                | 15.9                                                                                                                                                                           |                                                                                                                                                                                |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       | <br> |                                                                                                                                                                                |                                                                                                                                                                                | <br> |                                                                                                                                                                                |  |
|                           | AK1200    |  |  |  |  |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                |                                                                                           | 1700                                                                                                                                                                           | 11.7                                                                                                                                                                           |                                                                                                                                                                                |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                |                                                                                                                                                                                | <br> | <br> |                                                                                                                                                                                |  |
|                           | AK1300    |  |  |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                |                                                                                                                                                                                | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |                                                                                                                                                                                |  |
|                           | AK9200    |  |  |                                                                                     |  |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                | 316L                                                                                                                                                                           |                                                                                                                                                                                | 300                                                                                                                                                                            | 2.1                                                                                                                                                                            |  |
|                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |                                                                                                                                                                                |  |
|                           | Two Stage | AK1700                                                                              |  |                                                                                     |  |  |                                                                                                                                                                                |                                                                                       |                                                                                                                                                                                | <br> |                                                                                           | <br> | <br> |  |

\*1 316L: 316L SS, B: Brass

\*2 At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

\*3 For low vapor pressure gases

● Standard ○ Selectable by model or option

△ May be selected for source applications of inert gases, though tied diaphragm is recommended

|  | Delivery pressure                                                               |                                                                                                             |                                                                                     | Flow, N <sub>2</sub> *2<br>slpm                                                                                                                                                                                                                                   | Connection<br>size<br>[inch] | Connection type |                                                                                                                                                                                        | Page                                                                                                                                                                       |     |
|--|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|  | psig                                                                            | MPa                                                                                                         | Sub-atmospheric<br>(Absolute)                                                       |                                                                                                                                                                                                                                                                   |                              | Connection      | Fitting                                                                                                                                                                                |                                                                                                                                                                            |     |
|  | 100 mmHg abs. to 10 psig<br>0.5 to 10                                           | -88 kPa to 0.07 MPa<br>0.003 to 0.07                                                                        |    | 30                                                                                                                                                                                                                                                                | 1/8<br>1/4                   | Threaded        |  NPT<br> Compression | 107                                                                                                                                                                        |     |
|  | 1 to 30<br>2 to 100<br>5 to 150                                                 | 0.007 to 0.2<br>0.014 to 0.7<br>0.02 to 1.0                                                                 |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 0.5 to 10                                                                       | 0.0034 to 0.07                                                                                              |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150<br>5 to 200<br>5 to 300<br>10 to 500 | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0<br>0.034 to 1.4<br>0.034 to 2.1<br>0.07 to 3.5 |                                                                                     | <br>                                                                                            | 1/4<br>3/8                   | Threaded        | <br>                 | 109                                                                                                                                                                        |     |
|  | 0.5 to 10                                                                       | 0.0034 to 0.07                                                                                              |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>1 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.007 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 100 mmHg abs. to 10 psig                                                        | -88 kPa to 0.07 MPa                                                                                         |    | 0.5                                                                                                                                                                                                                                                               | 1/4<br>3/8                   |                 |                                                                                                                                                                                        |                                                                                                                                                                            | 113 |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 100 mmHg abs. to 30 psig                                                        | -88 kPa to 0.2 MPa                                                                                          |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>1 to 60                                                              | 0.007 to 0.2<br>0.007 to 0.4                                                                                |  | 400                                                                                                                                                                                                                                                               | 1/4<br>3/8<br>1/2            |                 | Threaded                                                                                                                                                                               | <br> | 117 |
|  | 2 to 100<br>5 to 150                                                            | 0.014 to 0.7<br>0.034 to 1.0                                                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>2 to 60                                                              | 0.007 to 0.2<br>0.014 to 0.4                                                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 2 to 100<br>5 to 150                                                            | 0.014 to 0.7<br>0.034 to 1.0                                                                                |                                                                                     | <br><br> | 1/4<br>3/8<br>1/2            |                 |                                                                                                                                                                                        |                                                                                                                                                                            | 119 |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     |                                                                                                                                                                                                                                                                   |                              |                 |                                                                                                                                                                                        |                                                                                                                                                                            |     |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     | 1000                                                                                                                                                                                                                                                              | 1/4<br>3/8<br>1/2            |                 |                                                                                                                                                                                        | 121                                                                                                                                                                        |     |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 150                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.0                                                |                                                                                     | 2000                                                                                                                                                                                                                                                              | 3/4                          |                 |                                                                                                                                                                                        | 123                                                                                                                                                                        |     |
|  | 1 to 30<br>2 to 60<br>2 to 100<br>5 to 200                                      | 0.007 to 0.2<br>0.014 to 0.4<br>0.014 to 0.7<br>0.034 to 1.4                                                |                                                                                     | <br>                                                                                        | 1/4<br>3/8                   | Threaded        |                                                                                                                                                                                        | <br> | 125 |

Recommendations

Regulators

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Diaphragm Valves

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Check Valves

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# Air Operated Regulator AP/AZ/AK Series

| Series       |         |                                                                                     | Application                    |                      | Construction      |            | Material      |                             | Max. inlet pressure |                  |  |  |
|--------------|---------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------|------------|---------------|-----------------------------|---------------------|------------------|--|--|
|              |         |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) | Tied<br>diaphragm | Springless | Body*1        | Ni-Cr-Mo alloy<br>internals | psig                | MPa              |  |  |
| Single Stage | AP10PA  |    | ●                              | △                    |                   |            | 316L VAR      | ○                           | 3500                | 24.1             |  |  |
|              | AP15PA  |    |                                | ●                    | ●                 |            |               | ○                           | 3500                | 24.1             |  |  |
|              | AP14PAT |    | ●                              | ●                    | ●                 |            |               | ●                           | 300                 | 2.1              |  |  |
|              |         |                                                                                     |                                |                      |                   |            |               |                             | ● 2300<br>○ 3000    | ● 15.9<br>○ 20.7 |  |  |
|              | AP12PA  |    | ●                              | ●                    | ●                 |            |               | ○                           | ● 1700<br>○ 3000    | ● 11.7<br>○ 20.7 |  |  |
|              | AP90PA  |    | ●                              | ●                    | ●                 |            |               | ●                           | 1700                | 11.7             |  |  |
|              | AP91PA  |                                                                                     |                                |                      |                   |            |               |                             | 800                 | 5.5              |  |  |
|              | AZ10PA  |   | ●                              | △                    |                   |            | 316L          | ○                           | 3500                | 24.1             |  |  |
|              | AZ15PA  |  |                                | ●                    | ●                 |            |               | ○                           | 3500                | 24.1             |  |  |
|              | AZ14PAT |  | ●                              | ●                    | ●                 |            |               | ●                           | 300                 | 2.1              |  |  |
|              |         |                                                                                     |                                |                      |                   |            |               |                             | ● 2300<br>○ 3000    | ● 15.9<br>○ 20.7 |  |  |
|              | AZ12PA  |  | ●                              | ●                    | ●                 |            |               | ○                           | ● 1700<br>○ 3000    | ● 11.7<br>○ 20.7 |  |  |
|              | AK10PA  |  | ●                              | △                    |                   |            | ● 316L<br>○ B | ○                           | 3500                | 24.1             |  |  |
|              | AK15PA  |  |                                | ●                    | ●                 |            |               | ○                           | 3500                | 24.1             |  |  |
|              | AK14PAT |  | ●                              | ●                    | ●                 |            |               | ●                           | 300                 | 2.1              |  |  |
|              |         |                                                                                     |                                |                      |                   |            |               |                             | ● 2300<br>○ 3000    | ● 15.9<br>○ 20.7 |  |  |
|              | AK12PA  |  | ●                              | ●                    | ●                 |            |               | ○                           | ● 1700<br>○ 3000    | ● 11.7<br>○ 20.7 |  |  |

\*1 316L VAR: 316L SS secondary remelt, 316L: 316L SS, B: Brass

\*2 At 150 psig (1.0 MPa) inlet pressure. Figure varies depending on gas and operating pressures.

● Standard ○ Selectable by model or option

△ May be selected for source applications of inert gases, though tied diaphragm is recommended

|  | Delivery pressure        |                    |                               | Cv*2             | Flow, N <sub>2</sub> *2<br>slpm | Connection<br>size<br>[inch] | Connection type |                            | Page |
|--|--------------------------|--------------------|-------------------------------|------------------|---------------------------------|------------------------------|-----------------|----------------------------|------|
|  | psig                     | MPa                | Sub-atmospheric<br>(Absolute) |                  |                                 |                              | Connection      | Fitting                    |      |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.09<br>○ 0.15 | ● 30<br>○ 120 (HF opt.)         | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 67   |
|  | 7 to 150                 | 0.05 to 1.0        |                               | 0.09             | 30                              | 1/4<br>3/8                   |                 |                            | 69   |
|  | 100 mmHg abs. to 30 psig | -88 kPa to 0.2 MPa | ○                             | 0.45             | 400                             | 1/4<br>3/8<br>1/2            |                 |                            | 71   |
|  | 7 to 150                 | 0.05 to 1.0        |                               |                  |                                 |                              |                 |                            |      |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.65<br>○ 1.1  | ● 800<br>○ 1000 (HF opt.)       | 1/4<br>3/8<br>1/2<br>3/4     | Welded          | ● Face seal<br>○ Tube weld | 73   |
|  | 10 to 100                | 0.07 to 0.7        |                               | 3.0              | 5000                            | 1/2<br>3/4<br>1              |                 |                            | 75   |
|  | 10 to 150                | 0.07 to 1.0        |                               | 4.0              |                                 |                              |                 |                            |      |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.09<br>○ 0.15 | ● 30<br>○ 120 (HF opt.)         | 1/4<br>3/8                   | Welded          | ● Face seal<br>○ Tube weld | 99   |
|  | 7 to 150                 | 0.05 to 1.0        |                               | 0.09             | 30                              | 1/4<br>3/8                   |                 |                            | 101  |
|  | 100 mmHg abs. to 30 psig | -88 kPa to 0.2 MPa | ○                             | 0.45             | 400                             | 1/4<br>3/8<br>1/2            |                 |                            | 103  |
|  | 7 to 150                 | 0.05 to 1.0        |                               |                  |                                 |                              |                 |                            |      |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.65<br>○ 1.1  | ● 800<br>○ 1000 (HF opt.)       | 1/4<br>3/8<br>1/2            |                 |                            | 105  |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.09<br>○ 0.15 | ● 30<br>○ 120 (HF opt.)         | 1/4<br>3/8                   | Threaded        | ● NPT<br>○ Compression     | 127  |
|  | 7 to 150                 | 0.05 to 1.0        |                               | 0.09             | 30                              | 1/4<br>3/8                   |                 |                            | 129  |
|  | 100 mmHg abs. to 30 psig | -88 kPa to 0.2 MPa | ○                             | 0.45             | 400                             | 1/4<br>3/8<br>1/2            |                 |                            | 131  |
|  | 7 to 150                 | 0.05 to 1.0        |                               |                  |                                 |                              |                 |                            |      |
|  | 7 to 150                 | 0.05 to 1.0        |                               | ● 0.65<br>○ 1.1  | ● 800<br>○ 1000 (HF opt.)       | 1/4<br>3/8<br>1/2            |                 |                            | 133  |

Recommendations

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Check Valves

Check Valves

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# Back Pressure Regulator BP Series

● Standard ○ Selectable by model or option

| Series |                                                                                   | Body material*1 | Operating pressure                                                    |                                                                                            | Connection size [inch] | Connection type |                            | Page |
|--------|-----------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------|-----------------|----------------------------|------|
|        |                                                                                   |                 | psig                                                                  | MPa                                                                                        |                        | Connection      | Fitting                    |      |
| BP1000 |  | 316L VAR        | 0.5 to 10<br>1 to 30<br>2 to 60<br>5 to 100<br>15 to 200<br>15 to 300 | 0.0034 to 0.07<br>0.007 to 0.2<br>0.014 to 0.4<br>0.034 to 0.7<br>0.1 to 1.4<br>0.1 to 2.1 | 1/4<br>3/8             | Welded          | ● Face seal<br>○ Tube weld | 135  |
|        |  | ● 316<br>○ B    |                                                                       |                                                                                            | 1/4                    | Threaded        | ● NPT<br>○ Compression     | 137  |

\*1 316L VAR: 316L SS secondary remelt, 316: 316 SS, B: Brass



Recommendations

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# Diaphragm Valve AP Series (Air Operated)

| Series                        |        |                                                                                     | Application                    |                      | Status |      | Body material*1                |  |
|-------------------------------|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|--------|------|--------------------------------|--|
|                               |        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) | N.C.   | N.O. |                                |  |
| Air Operated                  | AP3542 |    | ●                              |                      | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP3540 |                                                                                     | ●                              |                      | ●      |      |                                |  |
|                               | AP3550 |                                                                                     | ●                              | △                    | ●      |      |                                |  |
|                               | AP3580 |                                                                                     | ●                              | △                    |        | ●    |                                |  |
|                               | AP3000 |    |                                | ●                    | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP3002 |                                                                                     |                                | ●                    | ●      |      |                                |  |
|                               | AP3080 |                                                                                     |                                | ●                    |        | ●    |                                |  |
|                               | AP3004 |                                                                                     |                                | ●                    | ●      |      | 316L VAR                       |  |
|                               | AP3007 |    |                                | ●                    | ●      |      |                                |  |
|                               | AP4542 |                                                                                     | ●                              |                      | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP4540 |                                                                                     | ●                              |                      | ●      |      |                                |  |
|                               | AP4550 |                                                                                     | ●                              | △                    | ●      |      |                                |  |
|                               | AP4580 |                                                                                     | ●                              | △                    |        | ●    |                                |  |
|                               | AP4000 |  |                                | ●                    | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP4141 |                                                                                     | ●                              | △                    | ●      |      |                                |  |
|                               | AP3113 |                                                                                     | ●                              | ●                    | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP3130 |                                                                                     | ●                              | ●                    | ●      |      |                                |  |
|                               | AP3700 |  | ●                              | △                    | ●      |      | 316L VAR                       |  |
|                               | AP3708 |                                                                                     | ●                              | △                    |        | ●    |                                |  |
| Air Operated<br>Two Step Mode | AP3571 |  | ●                              |                      | ●      |      | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                               | AP4571 |                                                                                     | ●                              |                      | ●      |      |                                |  |

\*1 316L VAR: 316L SS secondary remelt

\*2 In accordance with SEMI F32

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

|  | Max. operating pressure |      | Cv*2 | LOTO | Connection size<br>[inch] | Connection type |                            | Page   |                            |        |        |                            |        |                            |                            |     |
|--|-------------------------|------|------|------|---------------------------|-----------------|----------------------------|--------|----------------------------|--------|--------|----------------------------|--------|----------------------------|----------------------------|-----|
|  | psig                    | MPa  |      |      |                           | Connection      | Fitting                    |        |                            |        |        |                            |        |                            |                            |     |
|  | 125                     | 0.9  | 0.29 |      | 1/4<br>3/8                | Welded          | ● Face seal<br>○ Tube weld | 145    |                            |        |        |                            |        |                            |                            |     |
|  | 145                     | 1    | 0.29 | ○    |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 300                     | 2.1  | 0.29 |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 250                     | 1.7  | 0.29 |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 3000                    | 20.7 | 0.23 | ○    | 1/4<br>3/8                |                 |                            | Welded | ● Face seal<br>○ Tube weld | 149    |        |                            |        |                            |                            |     |
|  | 3000                    | 20.7 | 0.28 | ○    |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 3000                    | 20.7 | 0.23 |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 3700                    | 25.5 | 0.23 | ○    | 1/4                       |                 |                            |        |                            |        | Welded | ● Face seal<br>○ Tube weld | 147    |                            |                            |     |
|  | 4500                    | 31   | 0.23 | ○    |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 125                     | 0.9  | 0.5  |      | 1/4<br>3/8                |                 |                            |        |                            | Welded |        |                            |        | ● Face seal<br>○ Tube weld | 147                        |     |
|  | 125                     | 0.9  | 0.5  | ○    |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 300                     | 2.1  | 0.5  |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 250                     | 1.7  | 0.5  |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 3000                    | 20.7 | 0.35 | ○    | 1/4<br>3/8                |                 |                            |        |                            |        |        |                            | Welded |                            | ● Face seal<br>○ Tube weld | 151 |
|  | 250                     | 1.7  | 0.8  |      | 1/4<br>3/8<br>1/2         |                 |                            |        |                            |        |        |                            |        |                            |                            | 153 |
|  | 1300                    | 9.0  | 1.0  | ○    | 1/4<br>3/8<br>1/2<br>3/4  |                 |                            |        |                            |        |        |                            |        |                            |                            | 155 |
|  | 3000                    | 20.7 | 0.7  | ○    |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 250                     | 1.7  | 2.8  |      | 3/8<br>1/2<br>3/4         |                 |                            |        |                            |        |        |                            |        |                            |                            | 157 |
|  | 250                     | 1.7  | 2.8  |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |
|  | 125                     | 0.9  | 0.29 |      | 1/4<br>3/8                | Welded          | ● Face seal<br>○ Tube weld |        |                            |        |        |                            |        |                            |                            | 159 |
|  | 125                     | 0.9  | 0.5  |      |                           |                 |                            |        |                            |        |        |                            |        |                            |                            |     |

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# Diaphragm Valve AP Series (Manually Operated)

| Series            |        |                                                                                     | Application                    |                      | Knob                                                                          | Body material*1                |  |
|-------------------|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------------------------------------------------------------------|--------------------------------|--|
|                   |        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |                                                                               |                                |  |
| Manually Operated | AP3600 |    | ●                              | ●                    | Multi turn round knob                                                         | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                   | AP3625 |                                                                                     | ●                              | ●                    | 1/4 turn lever knob                                                           |                                |  |
|                   | AP3650 |                                                                                     | ●                              | ●                    | 1/4 turn round knob with open/close indication window                         |                                |  |
|                   | AP3652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                                |  |
|                   | AP3659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                                |  |
|                   | AP3657 |                                                                                     |                                | ●                    | Pull twist round knob                                                         |                                |  |
|                   | AP3604 |    |                                | ●                    | Multi turn round knob                                                         | 316L VAR                       |  |
|                   | AP3624 |                                                                                     |                                | ●                    | Lever knob                                                                    |                                |  |
|                   | AP3627 |                                                                                     |                                | ●                    | T handle                                                                      |                                |  |
|                   | AP4600 |   | ●                              | △                    | Multi turn round knob                                                         | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                   | AP4625 |                                                                                     | ●                              | △                    | 1/4 turn lever knob                                                           |                                |  |
|                   | AP4650 |                                                                                     | ●                              | △                    | 1/4 turn round knob with open/close indication window                         |                                |  |
|                   | AP4652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                                |  |
|                   | AP4659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                                |  |
|                   | AP4657 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                                |  |
|                   | AP4150 |  | ●                              | △                    | Round knob with open/close indication window                                  | 316L VAR                       |  |
|                   | AP4157 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                                |  |
|                   | AP3100 |  | ●                              | ●                    | Multi turn round knob                                                         | ● 316L VAR<br>○ Ni-Cr-Mo alloy |  |
|                   | AP3125 |                                                                                     | ●                              | ●                    | 1/4 turn lever knob                                                           |                                |  |
|                   | AP3150 |                                                                                     | ●                              | ●                    | 1/4 turn round knob with open/close indication window                         |                                |  |
|                   | AP3157 |                                                                                     | ●                              | ●                    | Pull twist round knob                                                         |                                |  |
|                   | AP3800 |  | ●                              | △                    | Round knob                                                                    | 316L VAR                       |  |
|                   | AP3900 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                                |  |

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

Option (LOTO, Operational Safety Device) >>> p. 227 Optional Porting Configuration >>> p. 179

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

|  | Max. operating pressure |                 | Cv*2           | LOTO | Connection size<br>[inch] | Connection type |                            | Page   |                            |        |                            |        |                            |        |                            |        |
|--|-------------------------|-----------------|----------------|------|---------------------------|-----------------|----------------------------|--------|----------------------------|--------|----------------------------|--------|----------------------------|--------|----------------------------|--------|
|  | psig                    | MPa             |                |      |                           | Connection      | Fitting                    |        |                            |        |                            |        |                            |        |                            |        |
|  | 3000                    | 20.7            | 0.29           |      | 1/4<br>3/8                | Welded          | ● Face seal<br>○ Tube weld | 163    |                            |        |                            |        |                            |        |                            |        |
|  |                         |                 |                | ○    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  |                         |                 |                |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 250                     | 1.7             |                |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  |                         |                 |                | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 3000                    | 20.7            |                | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 3700                    | 25.5            | 0.29           |      | 1/4                       |                 |                            | Welded | ● Face seal<br>○ Tube weld | 167    |                            |        |                            |        |                            |        |
|  |                         |                 |                | ○    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 4500                    | 31              |                |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5            |      | 1/4<br>3/8                |                 |                            |        |                            | Welded | ● Face seal<br>○ Tube weld | 165    |                            |        |                            |        |
|  |                         |                 |                | ○    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  |                         |                 |                |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 250                     | 1.7             |                |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  |                         |                 |                | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 |                | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 250                     | 1.7             | 0.8            |      | 1/4<br>3/8<br>1/2         |                 |                            |        |                            |        |                            | Welded | ● Face seal<br>○ Tube weld | 169    |                            |        |
|  | 250                     | 1.7             | 0.8            | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 3000                    | 20.7            | ● 0.7<br>○ 1.3 |      | 1/4<br>3/8<br>1/2<br>3/4  |                 |                            |        |                            |        |                            |        |                            | Welded | ● Face seal<br>○ Tube weld | 171    |
|  | 3000                    | 20.7            | 1.0            | ○    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 1300                    | 9.0             | 1.0            |      |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 1300                    | 9.0             | 1.0            | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |
|  | 250                     | 1.7             | 2.8            |      | 3/8<br>1/2<br>3/4         |                 |                            |        |                            |        |                            |        |                            |        |                            | Welded |
|  |                         |                 |                | ●    |                           |                 |                            |        |                            |        |                            |        |                            |        |                            |        |

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## Diaphragm Valve AP Series (Metal Seated)

| Series            |        |                                                                                   | Application                    |                      | Status or Knob        | Body material*1 |  |
|-------------------|--------|-----------------------------------------------------------------------------------|--------------------------------|----------------------|-----------------------|-----------------|--|
|                   |        |                                                                                   | Distribution<br>(Point of use) | Source<br>(Cylinder) |                       |                 |  |
| Air Operated      | AP3200 |  | ●                              |                      | N.C.                  | 316L VAR        |  |
|                   | AP3202 |                                                                                   | ●                              | △                    |                       |                 |  |
| Manually Operated | AP3260 |  | ●                              |                      | Multi turn round knob |                 |  |
|                   | AP3262 |                                                                                   | ●                              | △                    |                       |                 |  |
|                   | AP3225 |                                                                                   | ●                              |                      | 1/4 turn lever knob   |                 |  |

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

## Metering Valve AP Series

| Series |                                                                                     | Application                    |                      | Knob       | Body material*1 |  |
|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|------------|-----------------|--|
|        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |            |                 |  |
| AP3672 |  | ●                              |                      | Multi turn | 316L VAR        |  |
| AP3675 |                                                                                     | ●                              |                      |            |                 |  |
| AP4675 |                                                                                     | ●                              |                      |            |                 |  |

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

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

|  | Max. operating pressure |     | Cv*2 | LOTO | Connection size<br>[inch] | Connection type |                            | Page |
|--|-------------------------|-----|------|------|---------------------------|-----------------|----------------------------|------|
|  | psig                    | MPa |      |      |                           | Connection      | Fitting                    |      |
|  | 125                     | 0.9 | 0.27 |      | 1/4<br>3/8                | Welded          | ● Face seal<br>○ Tube weld | 161  |
|  | 508                     | 3.5 | 0.27 |      |                           |                 |                            |      |
|  | 125                     | 0.9 | 0.27 |      |                           | Welded          | ● Face seal<br>○ Tube weld | 175  |
|  | 508                     | 3.5 | 0.27 |      |                           |                 |                            |      |
|  | 125                     | 0.9 | 0.27 |      |                           |                 |                            |      |

|  | Max. operating pressure |     | Cv*2 | Connection size<br>[inch] | Connection type |                            | Page |
|--|-------------------------|-----|------|---------------------------|-----------------|----------------------------|------|
|  | psig                    | MPa |      |                           | Connection      | Fitting                    |      |
|  | 145                     | 1.0 | 0.02 | 1/4<br>3/8                | Welded          | ● Face seal<br>○ Tube weld | 177  |
|  | 145                     | 1.0 | 0.08 |                           |                 |                            |      |
|  | 145                     | 1.0 | 0.15 |                           |                 |                            |      |

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# Diaphragm Valve AZ Series (Air Operated)

| Series                        |        |                                                                                     | Application                    |                      | Status |      | Body material*1 |  |
|-------------------------------|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|--------|------|-----------------|--|
|                               |        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) | N.C.   | N.O. |                 |  |
| Air Operated                  | AZ3542 |    | ●                              |                      | ●      |      | 316L            |  |
|                               | AZ3540 |                                                                                     | ●                              |                      | ●      |      |                 |  |
|                               | AZ3550 |                                                                                     | ●                              | △                    | ●      |      |                 |  |
|                               | AZ3580 |                                                                                     | ●                              | △                    |        | ●    |                 |  |
|                               | AZ3000 |    |                                | ●                    | ●      |      | 316L            |  |
|                               | AZ3002 |                                                                                     |                                | ●                    | ●      |      |                 |  |
|                               | AZ3080 |                                                                                     |                                | ●                    |        | ●    |                 |  |
|                               | AZ3004 |                                                                                     |                                | ●                    | ●      |      |                 |  |
|                               | AZ3007 |                                                                                     |                                | ●                    | ●      |      |                 |  |
|                               | AZ4542 |  | ●                              |                      | ●      |      | 316L            |  |
|                               | AZ4540 |                                                                                     | ●                              |                      | ●      |      |                 |  |
|                               | AZ4550 |                                                                                     | ●                              | △                    | ●      |      |                 |  |
|                               | AZ4580 |                                                                                     | ●                              | △                    |        | ●    |                 |  |
|                               | AZ4000 |  |                                | ●                    | ●      |      | 316L            |  |
|                               | AZ4141 |  | ●                              | △                    | ●      |      | 316L            |  |
|                               | AZ3700 |  | ●                              | △                    | ●      |      | 316L            |  |
|                               | AZ3708 |                                                                                     | ●                              | △                    |        | ●    |                 |  |
| Air Operated<br>Two Step Mode | AZ3571 |  | ●                              |                      | ●      |      | 316L            |  |
|                               | AZ4571 |                                                                                     | ●                              |                      | ●      |      |                 |  |

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

|  | Max. operating pressure |      | Cv*2 | LOTO | Connection size<br>[inch] | Connection type    |                            | Page |
|--|-------------------------|------|------|------|---------------------------|--------------------|----------------------------|------|
|  | psig                    | MPa  |      |      |                           | Connection         | Fitting                    |      |
|  | 125                     | 0.9  | 0.29 |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 181  |
|  | 145                     | 1.0  | 0.29 | ○    |                           |                    |                            |      |
|  | 300                     | 2.1  | 0.29 |      |                           |                    |                            |      |
|  | 250                     | 1.7  | 0.29 |      |                           |                    |                            |      |
|  | 3000                    | 20.7 | 0.23 | ○    | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 185  |
|  | 3000                    | 20.7 | 0.28 | ○    |                           |                    |                            |      |
|  | 3000                    | 20.7 | 0.23 |      |                           |                    |                            |      |
|  | 3700                    | 25.5 | 0.23 | ○    | 1/4                       | Welded             | ● Face seal<br>○ Tube weld |      |
|  | 4500                    | 31   | 0.23 | ○    |                           |                    |                            |      |
|  | 125                     | 0.9  | 0.5  |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 183  |
|  | 125                     | 0.9  | 0.5  | ○    |                           |                    |                            |      |
|  | 300                     | 2.1  | 0.5  |      |                           |                    |                            |      |
|  | 250                     | 1.7  | 0.5  |      |                           |                    |                            |      |
|  | 3000                    | 20.7 | 0.35 |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 187  |
|  | 250                     | 1.7  | 0.8  |      | 1/4<br>3/8<br>1/2         | Welded             | ● Face seal<br>○ Tube weld | 189  |
|  | 250                     | 1.7  | 2.8  |      | 3/8<br>1/2<br>3/4         | Welded             | ● Face seal<br>○ Tube weld | 191  |
|  | 250                     | 1.7  | 2.8  |      |                           |                    |                            |      |
|  | 125                     | 0.9  | 0.29 |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 193  |
|  | 125                     | 0.9  | 0.5  |      |                           |                    |                            |      |

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# Diaphragm Valve AZ Series (Manually Operated)

| Series            |        |                                                                                     | Application                    |                      | Knob                                                                          | Body material*1 |  |
|-------------------|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------------------------------------------------------------------|-----------------|--|
|                   |        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |                                                                               |                 |  |
| Manually Operated | AZ3600 |    | ●                              | ●                    | Multi turn round knob                                                         | 316L            |  |
|                   | AZ3625 |                                                                                     | ●                              | ●                    | 1/4 turn lever knob                                                           |                 |  |
|                   | AZ3650 |                                                                                     | ●                              | ●                    | 1/4 turn round knob with open/close indication window                         |                 |  |
|                   | AZ3652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                 |  |
|                   | AZ3659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AZ3657 |                                                                                     |                                | ●                    | Pull twist round knob                                                         |                 |  |
|                   | AZ3604 |    |                                | ●                    | Multi turn round knob                                                         | 316L            |  |
|                   | AZ3624 |                                                                                     |                                | ●                    | Lever knob                                                                    |                 |  |
|                   | AZ3627 |                                                                                     |                                | ●                    | T handle                                                                      |                 |  |
|                   | AZ4600 |   | ●                              | △                    | Multi turn round knob                                                         | 316L            |  |
|                   | AZ4625 |                                                                                     | ●                              | △                    | 1/4 turn lever knob                                                           |                 |  |
|                   | AZ4650 |                                                                                     | ●                              | △                    | 1/4 turn round knob with open/close indication window                         |                 |  |
|                   | AZ4652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                 |  |
|                   | AZ4659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AZ4657 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AZ4150 |  | ●                              | △                    | Round knob with open/close indication window                                  | 316L            |  |
|                   | AZ4157 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AZ3800 |  | ●                              | △                    | Round knob                                                                    | 316L            |  |
|                   | AZ3900 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |

## Metering Valve AZ Series

| Series |                                                                                     | Application                    |                      | Knob       | Body material*1 |  |
|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|------------|-----------------|--|
|        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |            |                 |  |
| AZ3672 |  | ●                              |                      | Multi turn | 316L            |  |
| AZ3675 |                                                                                     | ●                              |                      |            |                 |  |
| AZ4675 |                                                                                     | ●                              |                      |            |                 |  |

\*1 316L: 316L SS \*2 In accordance with SEMI F32

● Standard ○ Selectable by model or option

△ Source applications for max. source pressure of 250 psig (1.7 MPa) or less

|  | Max. operating pressure |                 | Cv*2 | LOTO | Connection size<br>[inch] | Connection type    |                            | Page |
|--|-------------------------|-----------------|------|------|---------------------------|--------------------|----------------------------|------|
|  | psig                    | MPa             |      |      |                           | Connection         | Fitting                    |      |
|  | 3000                    | 20.7            | 0.29 |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 195  |
|  | 3000                    | 20.7            | 0.29 | ○    |                           |                    |                            |      |
|  | 3000                    | 20.7            | 0.29 |      |                           |                    |                            |      |
|  | 250                     | 1.7             | 0.29 |      |                           |                    |                            |      |
|  | 250                     | 1.7             | 0.29 | ●    |                           |                    |                            |      |
|  | 3000                    | 20.7            | 0.29 | ●    |                           |                    |                            |      |
|  | 3700                    | 25.5            | 0.29 |      | 1/4                       | Welded             | ● Face seal<br>○ Tube weld | 199  |
|  | 3700                    | 25.5            | 0.29 | ○    |                           |                    |                            |      |
|  | 4500                    | 31              | 0.29 |      |                           |                    |                            |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  |      | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 197  |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  | ○    |                           |                    |                            |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  |      |                           |                    |                            |      |
|  | 250                     | 1.7             | 0.5  |      |                           |                    |                            |      |
|  | 250                     | 1.7             | 0.5  | ●    |                           |                    |                            |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  | ●    |                           |                    |                            |      |
|  | 250                     | 1.7             | 0.8  |      | 1/4<br>3/8<br>1/2         | Welded             | ● Face seal<br>○ Tube weld | 201  |
|  | 250                     | 1.7             | 0.8  | ●    |                           |                    |                            |      |
|  | 250                     | 1.7             | 2.8  |      | 3/8<br>1/2<br>3/4         | Welded             | ● Face seal<br>○ Tube weld | 203  |
|  | 250                     | 1.7             | 2.8  | ●    |                           |                    |                            |      |

|  | Max. operating pressure |     | Cv*2 | Connection size<br>[inch] | Connection type    |                            | Page |
|--|-------------------------|-----|------|---------------------------|--------------------|----------------------------|------|
|  | psig                    | MPa |      |                           | Connection         | Fitting                    |      |
|  | 145                     | 1.0 | 0.02 | 1/4<br>3/8                | Machined<br>Welded | ● Face seal<br>○ Tube weld | 205  |
|  | 145                     | 1.0 | 0.08 |                           |                    |                            |      |
|  | 145                     | 1.0 | 0.15 |                           |                    |                            |      |

Recommendations

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AK

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Diaphragm Valves

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# Diaphragm Valve AK Series (Air Operated)

| Series                        |        |                                                                                     | Application                                                                         |                                                                                     | Status                                                                                |                                                                                       | Body material*1 |  |
|-------------------------------|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|--|
|                               |        |                                                                                     | Distribution<br>(Point of use)                                                      | Source<br>(Cylinder)                                                                | N.C.                                                                                  | N.O.                                                                                  |                 |  |
| Air Operated                  | AK3542 |    |    |                                                                                     |    |                                                                                       | 316L            |  |
|                               | AK3540 |                                                                                     |    |                                                                                     |    |                                                                                       |                 |  |
|                               | AK3550 |                                                                                     |    |    |    |                                                                                       |                 |  |
|                               | AK3580 |                                                                                     |    |    |                                                                                       |    |                 |  |
|                               | AK3000 |    |                                                                                     |    |    |                                                                                       | 316L            |  |
|                               | AK3002 |                                                                                     |                                                                                     |    |    |                                                                                       |                 |  |
|                               | AK3004 |                                                                                     |                                                                                     |    |    |                                                                                       |                 |  |
|                               | AK3007 |                                                                                     |                                                                                     |  |  |                                                                                       |                 |  |
|                               | AK3080 |    |  |  |                                                                                       |  | 316L            |  |
|                               | AK4542 |                                                                                     |  |                                                                                     |  |                                                                                       |                 |  |
|                               | AK4540 |                                                                                     |  |                                                                                     |  |                                                                                       |                 |  |
|                               | AK4550 |                                                                                     |  |  |  |                                                                                       |                 |  |
|                               | AK4580 |                                                                                     |  |  |                                                                                       |  |                 |  |
|                               | AK4000 |  |                                                                                     |  |  |                                                                                       | 316L            |  |
| Air Operated<br>Two Step Mode | AK3571 |  |  |                                                                                     |  |                                                                                       | 316L            |  |
|                               | AK4571 |                                                                                     |  |                                                                                     |  |                                                                                       |                 |  |

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

|  | Max. operating pressure |      | Cv*2 | LOTO | Connection size<br>[inch] | Connection type                       | Page |
|--|-------------------------|------|------|------|---------------------------|---------------------------------------|------|
|  | psig                    | MPa  |      |      |                           |                                       |      |
|  | 125                     | 0.9  | 0.29 |      | 1/4                       | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 209  |
|  | 145                     | 1.0  | 0.29 | ○    |                           |                                       |      |
|  | 300                     | 2.1  | 0.29 |      |                           |                                       |      |
|  | 250                     | 1.7  | 0.29 |      |                           |                                       |      |
|  | 3000                    | 20.7 | 0.23 | ○    | 1/4                       | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 213  |
|  | 3000                    | 20.7 | 0.28 | ○    |                           |                                       |      |
|  | 3700                    | 25.5 | 0.23 | ○    |                           |                                       |      |
|  | 4500                    | 31.0 | 0.23 | ○    |                           |                                       |      |
|  | 3000                    | 20.7 | 0.23 |      |                           |                                       |      |
|  | 125                     | 0.9  | 0.5  |      | 3/8                       | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 211  |
|  | 125                     | 0.9  | 0.5  | ○    |                           |                                       |      |
|  | 300                     | 2.1  | 0.5  |      |                           |                                       |      |
|  | 250                     | 1.7  | 0.5  |      |                           |                                       |      |
|  | 3000                    | 20.7 | 0.35 |      | 3/8                       | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 215  |
|  | 125                     | 0.9  | 0.29 |      | 1/4                       | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 217  |
|  | 125                     | 0.9  | 0.5  |      | 3/8                       |                                       |      |

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# Diaphragm Valve AK Series (Manually Operated)

| Series            |        |                                                                                     | Application                    |                      | Knob                                                                          | Body material*1 |  |
|-------------------|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|-------------------------------------------------------------------------------|-----------------|--|
|                   |        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |                                                                               |                 |  |
| Manually Operated | AK3600 |    | ●                              | ●                    | Multi turn round knob                                                         | 316L            |  |
|                   | AK3625 |                                                                                     | ●                              | ●                    | 1/4 turn lever knob                                                           |                 |  |
|                   | AK3650 |                                                                                     | ●                              | ●                    | 1/4 turn round knob with open/close indication window                         |                 |  |
|                   | AK3652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                 |  |
|                   | AK3659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AK3657 |                                                                                     |                                | ●                    | Pull twist round knob                                                         |                 |  |
|                   | AK3604 |    |                                | ●                    | Multi turn round knob                                                         | 316L            |  |
|                   | AK3624 |                                                                                     |                                | ●                    | Lever knob                                                                    |                 |  |
|                   | AK3627 |                                                                                     |                                | ●                    | T handle                                                                      |                 |  |
|                   | AK4600 |  | ●                              | △                    | Multi turn round knob                                                         | 316L            |  |
|                   | AK4625 |                                                                                     | ●                              | △                    | 1/4 turn lever knob                                                           |                 |  |
|                   | AK4650 |                                                                                     | ●                              | △                    | 1/4 turn round knob with open/close indication window                         |                 |  |
|                   | AK4652 |                                                                                     | ●                              | △                    | Round knob with a raised rectangular section and open/close indication window |                 |  |
|                   | AK4659 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |
|                   | AK4657 |                                                                                     | ●                              | △                    | Pull twist round knob                                                         |                 |  |

## Metering Valve AK Series

| Series |                                                                                     | Application                    |                      | Knob       | Body material*1 |  |
|--------|-------------------------------------------------------------------------------------|--------------------------------|----------------------|------------|-----------------|--|
|        |                                                                                     | Distribution<br>(Point of use) | Source<br>(Cylinder) |            |                 |  |
| AK3672 |  | ●                              |                      | Multi turn | 316L            |  |
| AK3675 |                                                                                     | ●                              |                      |            |                 |  |
| AK4675 |                                                                                     | ●                              |                      |            |                 |  |

\*1 316L: 316L SS \*2 In accordance with SEMI F32

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

|  | Max. operating pressure |                 | Cv*2 | LOTO | Connection size [inch] | Connection type                       | Page |
|--|-------------------------|-----------------|------|------|------------------------|---------------------------------------|------|
|  | psig                    | MPa             |      |      |                        |                                       |      |
|  | 3000                    | 20.7            | 0.29 |      | 1/4                    | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 219  |
|  | 3000                    | 20.7            | 0.29 | ○    |                        |                                       |      |
|  | 3000                    | 20.7            | 0.29 |      |                        |                                       |      |
|  | 250                     | 1.7             | 0.29 |      |                        |                                       |      |
|  | 250                     | 1.7             | 0.29 | ●    |                        |                                       |      |
|  | 3000                    | 20.7            | 0.29 | ●    |                        |                                       |      |
|  | 3700                    | 25.5            | 0.29 |      | 1/4                    | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 223  |
|  | 3700                    | 25.5            | 0.29 | ○    |                        |                                       |      |
|  | 4500                    | 31.0            | 0.29 |      |                        |                                       |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  |      | 3/8                    | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 221  |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  | ○    |                        |                                       |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  |      |                        |                                       |      |
|  | 250                     | 1.7             | 0.5  |      |                        |                                       |      |
|  | 250                     | 1.7             | 0.5  | ●    |                        |                                       |      |
|  | ● 300<br>○ 3000         | ● 2.1<br>○ 20.7 | 0.5  | ●    |                        |                                       |      |

|  | Max. operating pressure |     | Cv*2 | Connection size [inch] | Connection type                       | Page |
|--|-------------------------|-----|------|------------------------|---------------------------------------|------|
|  | psig                    | MPa |      |                        |                                       |      |
|  | 145                     | 1.0 | 0.02 | 1/4                    | ● Compression<br>○ Rc<br>○ R<br>○ NPT | 225  |
|  | 145                     | 1.0 | 0.08 |                        |                                       |      |
|  | 145                     | 1.0 | 0.15 | 3/8                    |                                       |      |

Recommendations

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Diaphragm Valves

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# Check Valve

● Standard ○ Selectable by model or option

| Series |  | Body material*1 | Max. operating pressure |      | Cracking pressure |       | Cv*2    | Connection size [inch] | Connection type |                            | Page |
|--------|-----------------------------------------------------------------------------------|-----------------|-------------------------|------|-------------------|-------|---------|------------------------|-----------------|----------------------------|------|
|        |                                                                                   |                 | psig                    | MPa  | psid              | MPa   |         |                        | Connection      | Fitting                    |      |
| AP64   |                                                                                   | 316L VAR        | 3500                    | 24.1 | 3                 | 0.023 | 0.4 max | 1/4                    | Welded          | ● Face seal<br>○ Tube weld | 231  |

# Vacuum Generators

| Series |  | Body material*1 | Max. operating pressure |     | Modules*3 | Check valve cracking pressure |       | Constant bleed | Connection size [inch] | Connection type |                            | Page |
|--------|-----------------------------------------------------------------------------------|-----------------|-------------------------|-----|-----------|-------------------------------|-------|----------------|------------------------|-----------------|----------------------------|------|
|        |                                                                                   |                 | in.Hg (Torr)            | kPa |           | psid                          | MPa   |                |                        | Connection      | Fitting                    |      |
| AP7    |                                                                                   | 316L            | -26 (100)               | -88 |           | —                             | —     |                | 1/4<br>3/8             | Welded          | ● Face seal<br>○ Tube weld | 233  |
| AP70   |                                                                                   | 316L            | -26 (100)               | -88 |           | —                             | —     |                | 1/4<br>3/8             |                 |                            |      |
| AP71   |                                                                                   | 316L            | -26 (100)               | -88 | ●         | 3                             | 0.023 | ○              | 1/4<br>3/8             |                 |                            | 235  |
| AP72   |                                                                                   | 316L VAR        | -26 (100)               | -88 | ●         | 3                             | 0.023 | ○              | 1/4<br>3/8             |                 |                            | 237  |

# Flow Switches

| Series |                                                                                     | Body material*1 | Max. operating pressure |      | Flow, at 100 psig (0.69 MPa) N2 slpm | Connection size [inch] | Connection type |                            | Page |
|--------|-------------------------------------------------------------------------------------|-----------------|-------------------------|------|--------------------------------------|------------------------|-----------------|----------------------------|------|
|        |                                                                                     |                 | psig                    | MPa  |                                      |                        | Connection      | Fitting                    |      |
| AP74   |  | 316L VAR        | 3500                    | 24.1 | 2<br>5<br>10<br>25<br>50<br>100      | 1/4                    | Welded          | ● Face seal<br>○ Tube weld | 239  |
| AP74B  |  | 316L            | 3500                    | 24.1 | 225<br>350<br>500<br>950             | 1/2                    |                 |                            | 241  |
|        |                                                                                     |                 | 3000                    | 20.7 | 1100<br>1650<br>2600                 | 3/4                    |                 |                            |      |
|        |                                                                                     |                 | 2200                    | 15.2 | 3000<br>4000                         | 1                      |                 | ● Tube weld                |      |
|        |                                                                                     |                 | 1300                    | 9.0  | 5000<br>6000                         | 1 1/2                  |                 |                            |      |

\*1 316L VAR: 316L SS secondary remelt, 316L: 316L SS

\*2 In accordance with SEMI F32

\*3 Monoblock vacuum generator, N2 supply valve and check valve

# Regulator and Valve Selection Guide

## Valve and Regulator Recommendations

### for source and distribution application

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

#### Precautions for selection

This guide's general recommendations are based upon typical applications and conditions. The proper regulator 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. Restated, one may achieve higher or lower flow capacities than stipulated in this guide due to the parameters and conditions of a specific application and system design.

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

#### ⚠ Caution

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

# Recommended Model Selection Table

Please read page 32 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  |

### 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 ... 316L 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<br>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*<br>(C <sub>2</sub> H <sub>2</sub> ) | 230                 | AP3000         | 25                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S    |
|                                                |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 6                         | AP/AZ/AK1000S HF |
|                                                | 280                 | AP3002         | 45                        | AP4540         | 75                  | AP/AZ/AK1200S    | 50                        | AP/AZ/AK1400TS   |
|                                                |                     | AP3650         |                           | AP4650         |                     |                  | 75                        | AP/AZ/AK1200S    |
|                                                |                     |                | 400                       | AP3700         |                     |                  | 95                        | AP/AZ/AK1200S HF |
|                                                |                     |                |                           | AP3800         |                     |                  |                           | AZ/AK1300S       |
| Air                                            | 185                 | AP3000         | 90                        | AP3540         | 30                  | AP/AZ/AK1500S    | 30                        | AP/AZ/AK1000S    |
|                                                |                     | AP3650         |                           | AP3650         | 100                 | AP1900S          | 50                        | AP/AZ/AK1000S HF |
|                                                | 225                 | AP3002         | 160                       | AP4540         | 200                 | AP/AZ/AK1400TS   | 150                       | AP/AZ/AK1400TS   |
|                                                |                     | AP3650         |                           | AP4650         | 800                 | AP/AZ/AK1200S HR | 400                       | AP/AZ/AK1200S    |
|                                                | 550                 | AP3100         |                           | AP3800         |                     |                  | 600                       | AP/AZ/AK1200S HF |
|                                                | 475                 | AP3130         | 890                       | AP3700         |                     |                  |                           | AZ/AK1300S       |
| Ammonia<br>(NH <sub>3</sub> )                  |                     | AP3125         |                           | AP3800         |                     |                  |                           |                  |
|                                                | 250                 | AP3540         | 100                       | AP3540         | 5                   | AP/AZ/AK1500S    | 5                         | AP/AZ/AK1000S    |
|                                                |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 30                        | AP/AZ/AK1000S HF |
|                                                | 450                 | AP4540         | 225                       | AP4540         | 75                  | AP/AZ/AK1200S    | 60                        | AP/AZ/AK1400TS   |
|                                                |                     | AP4650         |                           | AP4650         | 400                 | AP/AZ/AK1200S    | 125                       | AP/AZ/AK1200S    |
|                                                | 1000                | AP3113         | 1000                      | AP3700         | 600                 | AP/AZ/AK1200S HF | 250                       | AP/AZ/AK1200S HF |
| Argon<br>(Ar)                                  |                     | AP3125         |                           | AP3800         | 1100                | AP9100S          |                           | AZ/AK1300S       |
|                                                |                     |                |                           |                |                     |                  | 500                       | AP/AZ/AK1200S FC |
|                                                | 200                 | AP3000         | 80                        | AP3540         | 10                  | AP/AZ/AK1500S    | 10                        | AP/AZ/AK1000S    |
|                                                |                     | AP3650         |                           | AP3650         | 100                 | AP1900S          | 25                        | AP/AZ/AK1000S HF |
|                                                | 350                 | AP3002         | 150                       | AP4540         | 300                 | AP1900S HF       | 50                        | AP/AZ/AK1400TS   |
|                                                |                     | AP3650         |                           | AP4650         | 1500                | AP/AZ/AK1200S HR | 100                       | AP/AZ/AK1200S    |
|                                                | 1000                | AP3130         | 800                       | AP3700         |                     |                  | 200                       | AP/AZ/AK1200S HF |
|                                                |                     | AP3125         |                           | AP3800         |                     |                  |                           | AZ/AK1300S       |
|                                                |                     |                |                           |                |                     |                  | 400                       | AP/AZ/AK1200S FC |
|                                                |                     |                |                           |                |                     |                  | 1000                      | AP9100S          |

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

■ denotes heating required to achieve stated flow.

# Recommended Model Selection Table

Please read page 32 before selecting a product.

| Application<br><br>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 <sub>3</sub> )                         | 140                 | AP3540         | 55                        | AP3540         | 5                   | AP/AZ/AK1500S         | 5                         | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 40                  | AP/AZ/AK1400TS        | 20                        | AP/AZ/AK1000S HF  |
|                                                    | 240                 | AP4540         | 95                        | AP4540         |                     |                       |                           |                   |
|                                                    |                     | AP4650         |                           | AP4650         |                     |                       |                           |                   |
| Arsine Mixtures (Nitrogen Balance)                 | 185                 | AP3000         | 90                        | AP3540         | 15                  | AP/AZ/AK1500S         | 15                        | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 50                  | AP1900S               | 50                        | AP/AZ/AK1000S HF  |
|                                                    | 225                 | AP3002         | 160                       | AP4540         | 150                 | AP/AZ/AK1400TS        | 150                       | AP/AZ/AK1400TS    |
|                                                    |                     | AP3650         |                           | AP4650         |                     |                       |                           |                   |
| Boron Trichloride (BCl <sub>3</sub> )              | 20                  | AP4540         | 15                        | AP4540         | 6                   | AP/AZ/AK1402TSA       | 0.4                       | AP/AZ/AK1101SH    |
|                                                    |                     | AP4650         |                           | AP4650         |                     |                       | 6                         | AP/AZ/AK1402TSA   |
| Boron Trichloride Mix (Nitrogen Balance)           | 185                 | AP3000         | 90                        | AP3540         | 15                  | AP/AZ/AK1500S         | 15                        | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 60                  | AP/AZ/AK1400TS        | 30                        | AP/AZ/AK1000S HF  |
|                                                    | 225                 | AP3002         | 160                       | AP4540         |                     |                       | 60                        | AP/AZ/AK1400TS    |
|                                                    |                     | AP3650         |                           | AP4650         |                     |                       |                           |                   |
| Boron Trifluoride (BF <sub>3</sub> )               | 115                 | AP3000         | 60                        | AP3540         | 5                   | AP/AZ/AK1500S         | 5                         | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 25                  | AP/AZ/AK1400TS        | 10                        | AP/AZ/AK1000S HF  |
|                                                    | 145                 | AP3002         | 100                       | AP4540         |                     |                       | 25                        | AP/AZ/AK1400TS    |
|                                                    |                     | AP3650         |                           | AP4650         |                     |                       |                           |                   |
| Boron 11 Trifluoride (11BF <sub>3</sub> )          | 115                 | AP3000         | 60                        | AP3540         | 5                   | AP/AZ/AK1500S         | 5                         | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 25                  | AP/AZ/AK1400TS        | 10                        | AP/AZ/AK1000S HF  |
|                                                    | 145                 | AP3002         | 100                       | AP4540         |                     |                       | 25                        | AP/AZ/AK1400TS    |
|                                                    |                     | AP3650         |                           | AP4650         |                     |                       |                           |                   |
| Butadiene (C <sub>4</sub> H <sub>6</sub> )         | 60                  | AP4540         | 60                        | AP4540         | 3                   | AP/AZ1500S            | 3                         | AP/AZ1000S        |
|                                                    |                     | AP4625         |                           | AP4625         | 40                  | AP/AZ1400T            | 5                         | AP/AZ1000S HF     |
| n-butane (C <sub>4</sub> H <sub>10</sub> )         | 60                  | AP4540         | 60                        | AP4540         | 3                   | AP/AZ/AK1500S         | 3                         | AP/AZ/AK1000S     |
|                                                    |                     | AP4625         |                           | AP4625         | 40                  | AP/AZ/AK1400T         | 5                         | AP/AZ/AK1000S HF  |
| Butene-1 (C <sub>4</sub> H <sub>8</sub> )          | 35                  | AP3540         | 30                        | AP3540         | 3                   | AP/AZ/AK1500S         | 3                         | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS        | 5                         | AP/AZ/AK1000S HF  |
|                                                    | 65                  | AP4540         | 60                        | AP4540         |                     |                       |                           |                   |
|                                                    |                     | AP4650         |                           | AP4650         |                     |                       |                           |                   |
| Carbon Dioxide (CO <sub>2</sub> )                  | 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         | 750                       | AP3700         | 500                 | ② AP/AZ/AK1200S VS HF | 160                       | AP/AZ/AK1200S HF  |
|                                                    |                     | AP3125         |                           | AP3800         |                     | ① AP9030S VS          |                           | AZ/AK1300S        |
| 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         |                     |                       |                           |                   |
|                                                    | 115                 | AP3000         | 60                        | AP3540         | 5                   | AP/AZ1500S            | 3                         | AP/AZ1000S        |
|                                                    |                     | AP3625         |                           | AP3625         | 25                  | AP/AZ1400TS           | 10                        | AP/AZ1000S HF     |
| Carbonyl fluoride (COF <sub>2</sub> )              | 200                 | AP3625         | 100                       | AP4540         |                     |                       |                           |                   |
|                                                    |                     |                |                           | AP4625         |                     |                       |                           |                   |
| Chlorine (Cl <sub>2</sub> )                        | 75                  | AP3540         | 50                        | AP3540         | 3                   | AP/AZ/AK1500SH        | 5                         | AP/AZ/AK1000SH    |
|                                                    |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS        | 15                        | AP/AZ/AK1000SH HF |
|                                                    | 150                 | AP4540         | 100                       | AP4540         | 75                  | AP/AZ/AK1200SH        | 30                        | AP/AZ/AK1400TS    |
|                                                    |                     | AP4650         |                           | AP4650         | 200                 | AP/AZ/AK1200SH HF     | 75                        | AP/AZ/AK1200SH    |
|                                                    | 300                 | AP3113         | 400                       | AP3700         |                     |                       | 125                       | AP/AZ/AK1200SH HF |
|                                                    |                     | AP3125         |                           | AP3800         |                     |                       |                           | AZ/AK1300S        |
| Chlorine Trifluoride (ClF <sub>3</sub> )           | 20                  | AP4540         | 15                        | AP4540         | 6                   | AP/AZ/AK1402TSA       | 0.5                       | AP/AZ/AK1101S     |
|                                                    |                     | AP4650         |                           | AP4650         |                     |                       | 6                         | AP/AZ/AK1402TSA   |
| Diborane Mixtures (Nitrogen Balance)               | 185                 | AP3000         | 90                        | AP3540         | 5                   | AP1700S               | 10                        | AP/AZ/AK1000S     |
|                                                    |                     | AP3650         |                           | AP3650         | 225                 | AP2700S               | 20                        | AP/AZ/AK1000S HF  |
|                                                    | 225                 | AP3002         | 160                       | AP4540         |                     |                       |                           |                   |
|                                                    |                     | AP3650         |                           | AP4650         |                     |                       |                           |                   |
| Dichlorosilane (SiH <sub>2</sub> Cl <sub>2</sub> ) | 20                  | AP4540         | 20                        | AP4540         | 7                   | AP/AZ1402TSA          | 1                         | AP1001S           |
|                                                    |                     | AP4650         |                           | AP4650         |                     |                       | 7                         | AP/AZ/AK1402TSA   |

■ denotes heating required to achieve stated flow. Please read page 33 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.

Recommendations

Regulators

AP

SL

AZ

AK

BP

Valves

Diaphragm

AP

AZ

AK

Check Valves

Vacuum

Generators

Flow

Switches

Technical Data/

Glossary of Terms

Precautions

# Recommended Model Selection Table

Please read page 32 before selecting a product.

| Application<br><br>Process Gas                                         | Valve               |                |                           |                | Regulator           |                  |                           |                   |
|------------------------------------------------------------------------|---------------------|----------------|---------------------------|----------------|---------------------|------------------|---------------------------|-------------------|
|                                                                        | Source applications |                | Distribution applications |                | Source applications |                  | Distribution applications |                   |
|                                                                        | Maximum flow (slpm) | Recommendation | Maximum flow (slpm)       | Recommendation | Maximum flow (slpm) | Recommendation   | Maximum flow (slpm)       | Recommendation    |
| Diethyltelluride<br>(Te(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> ) | 70                  | AP3000         | 35                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP3650         |                           | AP3650         | 5                   | AP1900S          | 5                         | AP/AZ/AK1000S HF  |
|                                                                        | 85                  | AP3002         | 60                        | AP4540         | 25                  | AP/AZ/AK1400TS   | 25                        | AP/AZ/AK1400TS    |
|                                                                        |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Vinylidene fluoride<br>(C <sub>2</sub> H <sub>2</sub> F <sub>2</sub> ) | 140                 | AP3000         | 55                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP3625         |                           | AP3625         | 50                  | AP/AZ/AK1400TS   | 6                         | AP/AZ/AK1000S HF  |
|                                                                        | 200                 | AP3625         | 100                       | AP4540         | 75                  | AP/AZ/AK1200S    | 50                        | AP/AZ/AK1400TS    |
|                                                                        |                     |                |                           | AP4625         |                     |                  | 75                        | AP/AZ/AK1200S     |
| Dimethylsilane<br>(C <sub>2</sub> SiH <sub>6</sub> )                   | 14                  | AP4540         | 7                         | AP4540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP4650         |                           | AP4650         | 50                  | AP/AZ/AK1400TS   | 50                        | AP/AZ/AK1400TS    |
|                                                                        | 150                 | AP3700         | 75                        | AP3700         | 75                  | AP/AZ/AK1200S    | 75                        | AP/AZ/AK1200S     |
|                                                                        |                     | AP3800         |                           | AP3800         |                     |                  |                           |                   |
| Disilane<br>(Si <sub>2</sub> H <sub>6</sub> )                          | 14                  | AP4540         | 7                         | AP4540         | 1                   | AP/AZ/AK1000S    | 1                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP4650         |                           | AP4650         | 7                   | AP/AZ/AK1402TSA  | 7                         | AP/AZ/AK1402TSA   |
| Ethylene<br>(C <sub>2</sub> H <sub>4</sub> )                           | 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 <sub>2</sub> )                                              | 10                  | AP3200         | 10                        | AP3200         | Consult Factory     |                  | Consult Factory           |                   |
| Fluorine Mixtures<br>(10 %, 3.4 MPa)<br>(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<br>(GeH <sub>4</sub> )                                         | 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<br>(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<br>(CCl <sub>2</sub> F <sub>2</sub> )                    | 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<br>(CBr <sub>2</sub> F <sub>2</sub> )                  | 15                  | AP4540         | 15                        | AP4540         | 5                   | AP/AZ1400TSA     | 0.5                       | AP/AZ1101S        |
|                                                                        |                     | AP4650         |                           | AP4650         |                     |                  | 5                         | AP/AZ1402TSA      |
|                                                                        | 140                 | AP3000         | 40                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
| Halocarbon 13<br>(CClF <sub>3</sub> )                                  | 170                 | AP3002         | 70                        | AP4540         |                     |                  | 50                        | AP/AZ/AK1400TS    |
|                                                                        |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
|                                                                        | 110                 | AP3540         | 35                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
| Halocarbon 13B1<br>(CBrF <sub>3</sub> )                                | 190                 | AP4540         | 65                        | AP4540         |                     |                  | 50                        | AP/AZ/AK1400TS    |
|                                                                        |                     | AP4650         |                           | AP4650         |                     |                  |                           |                   |
|                                                                        | 10                  | AP3000         | 50                        | AP3540         | 10                  | AP/AZ/AK1500S    | 5                         | AP/AZ/AK1000S     |
|                                                                        |                     | AP3650         |                           | AP3650         | 40                  | AP1900S          | 15                        | AP/AZ/AK1000S HF  |
| Halocarbon 14<br>(CF <sub>4</sub> )                                    | 200                 | AP3002         | 100                       | AP4540         | 80                  | AP1900S HF       | 30                        | AP/AZ/AK1400TS    |
|                                                                        |                     | AP3650         |                           | AP4650         | 500                 | AP/AZ/AK1200S HR | 60                        | AP/AZ/AK1200S     |
|                                                                        | 600                 | AP3130         | 500                       | AP3700         |                     |                  | 100                       | AP/AZ/AK1200S HF  |
|                                                                        |                     | AP3125         |                           | AP3800         |                     |                  |                           | AZ/AK1300         |
|                                                                        |                     |                |                           |                |                     |                  | 250                       | AP/AZ/AK1200S FC  |
|                                                                        |                     |                |                           |                |                     |                  | 500                       | AP9100S           |
| Halocarbon 21<br>(CHCl <sub>2</sub> F)                                 | 25                  | AP4540         | 15                        | AP4540         | 5                   | AP/AZ/AK1402TSA  | 0.5                       | AP/AZ1101S        |
|                                                                        |                     | AP4650         |                           | AP4650         |                     |                  |                           | AP1001S           |
|                                                                        |                     |                |                           |                |                     |                  | 5                         | AP/AZ/AK1402TSA   |
|                                                                        |                     |                |                           |                |                     |                  |                           |                   |
| Halocarbon 23<br>(CHF <sub>3</sub> )                                   | 115                 | AP3000         | 145                       | AP3540         | 10                  | AP/AZ/AK1500S    | 10                        | AP/AZ/AK1000S     |
|                                                                        |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 20                        | AP/AZ/AK1000S HF  |
|                                                                        | 140                 | AP3002         | 250                       | AP4540         |                     |                  | 50                        | AP/AZ/AK1400TS    |
|                                                                        |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Halocarbon 32<br>(CH <sub>2</sub> F <sub>2</sub> )                     | 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     |

■ denotes heating required to achieve stated flow.  
Please read page 33 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 32 before selecting a product.

| Application<br><br>Process Gas                                       | Valve               |                |                           |                | Regulator           |                  |                           |                   |
|----------------------------------------------------------------------|---------------------|----------------|---------------------------|----------------|---------------------|------------------|---------------------------|-------------------|
|                                                                      | Source applications |                | Distribution applications |                | Source applications |                  | Distribution applications |                   |
|                                                                      | Maximum flow (slpm) | Recommendation | Maximum flow (slpm)       | Recommendation | Maximum flow (slpm) | Recommendation   | Maximum flow (slpm)       | Recommendation    |
| Halocarbon 114<br>(C <sub>2</sub> Cl <sub>2</sub> F <sub>4</sub> )   | 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<br>(C <sub>2</sub> ClF <sub>5</sub> )                 | 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    |
| Halocarbon 116<br>(C <sub>2</sub> F <sub>6</sub> )                   | 60                  | AP3000         | 40                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                      |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 10                        | AP/AZ/AK1000S HF  |
|                                                                      | 100                 | AP3002         | 80                        | AP4540         | 75                  | AP/AZ/AK1200S    | 25                        | AP/AZ/AK1400TS    |
|                                                                      |                     | AP3650         |                           | AP4650         | 125                 | AP/AZ/AK1200S HF | 50                        | AP/AZ/AK1200S     |
|                                                                      | 275                 | AP3113         | 400                       | AP3700         |                     |                  | 90                        | AP/AZ/AK1200S HF  |
|                                                                      |                     | AP3125         |                           | AP3800         |                     |                  | AZ/AK1300                 |                   |
|                                                                      |                     |                |                           | 175            |                     |                  | AP/AZ/AK1200S FC          |                   |
|                                                                      |                     |                | 450                       | AP9100S        |                     |                  |                           |                   |
| Halocarbon 125<br>(C <sub>2</sub> HF <sub>5</sub> )                  | 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<br>(C <sub>2</sub> H <sub>2</sub> F <sub>4</sub> )   | 55                  | AP4540         | 40                        | AP4540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                      |                     | AP4650         |                           | AP4650         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
|                                                                      |                     | AP3100         |                           | AP3800         | 75                  | AP/AZ/AK1200S    | 50                        | AP/AZ/AK1400TS    |
|                                                                      | 350                 | AP3700         | 230                       | AP3700         |                     |                  | 75                        | AP/AZ/AK1200S     |
|                                                                      |                     | AP3800         |                           | AP3800         |                     |                  |                           |                   |
| Halocarbon R218<br>(C <sub>3</sub> F <sub>8</sub> )                  | 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    |
| Halocarbon C318<br>(C <sub>4</sub> F <sub>8</sub> )                  | 25                  | AP4540         | 20                        | AP4540         | 6                   | AP/AZ/AK1402TSA  | 1                         | AP/AZ/AK1101S     |
|                                                                      |                     | AP4650         |                           | AP4650         |                     |                  | 6                         | AP/AZ/AK1402TSA   |
|                                                                      |                     |                |                           |                |                     |                  |                           |                   |
| Helium<br>(He)                                                       | 750                 | AP3000         | 250                       | AP3540         | 125                 | AP/AZ/AK1500S    | 65                        | AP/AZ/AK1000S     |
|                                                                      |                     | AP3650         |                           | AP3650         | 500                 | AP1900S          | 125                       | AP/AZ/AK1000S HF  |
|                                                                      | 1000                | AP3002         | 450                       | AP4540         | 625                 | AP1900S HF       | 275                       | AP/AZ/AK1400TS    |
|                                                                      |                     | AP3650         |                           | AP4650         | 2000                | AP/AZ/AK1200S HR | 625                       | AP/AZ/AK1200S     |
|                                                                      | 2500                | AP3130         | 2500                      | AP3700         |                     |                  | 900                       | AP/AZ/AK1200S HF  |
|                                                                      |                     | AP3125         |                           | AP3800         |                     |                  | AZ/AK1300                 |                   |
|                                                                      |                     |                |                           |                |                     |                  | 1200                      | AP/AZ/AK1200S FC  |
|                                                                      |                     |                |                           | 2500           |                     |                  | AP9100S                   |                   |
| Hexafluoropropane<br>(C <sub>3</sub> H <sub>2</sub> F <sub>6</sub> ) | 20                  | AP4540         | 15                        | AP4540         | 6                   | AP/AZ/AK1402TSA  | 6                         | AP/AZ/AK1402TSA   |
| Hexafluoropropylene<br>(C <sub>3</sub> F <sub>6</sub> )              | 60                  | AP4540         | 40                        | AP4540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                                      |                     | AP4625         |                           | AP4625         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
|                                                                      |                     |                |                           |                | 75                  | AP/AZ/AK1200S    | 50                        | AP/AZ/AK1400TS    |
| Hydrogen<br>(H <sub>2</sub> )                                        | 800                 | AP3000         | 300                       | AP3540         | 125                 | AP/AZ/AK1500S    | 65                        | AP/AZ/AK1000S     |
|                                                                      |                     | AP3650         |                           | AP3650         | 500                 | AP1900S          | 125                       | AP/AZ/AK1000S HF  |
|                                                                      | 1600                | AP3002         | 600                       | AP4540         | 625                 | AP1900S HF       | 275                       | AP/AZ/AK1400TS    |
|                                                                      |                     | AP3650         |                           | AP4650         | 900                 | AP2700S          | 625                       | AP/AZ/AK1200S     |
|                                                                      | 3000                | AP3130         | 3000                      | AP3700         | 1200                | AP/AZ/AK1200S HR | 900                       | AP/AZ/AK1200S HF  |
|                                                                      |                     | AP3125         |                           | AP3800         |                     |                  | AZ/AK1300S                |                   |
|                                                                      |                     |                |                           |                |                     |                  | 1200                      | AP/AZ/AK1200S FC  |
|                                                                      |                     |                |                           | 3000           |                     |                  | AP9100S                   |                   |
| Hydrogen Bromide<br>(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    |
| Hydrogen Chloride<br>(HCl)                                           | 350                 | AP3650         | 75                        | AP4650         |                     |                  | 50                        | AP/AZ/AK1200SH    |
|                                                                      |                     | AP3000         |                           | AP3540         | 2                   | AP/AZ/AK1500SH   | 8                         | AP/AZ/AK1000SH    |
|                                                                      | 500                 | AP3650         | AP3650                    | 90             | AP/AZ/AK1400TS      | 20               | AP/AZ/AK1000SH HF         |                   |
|                                                                      |                     | AP3002         | AP4540                    | 150            | AP/AZ/AK1200SH      | 40               | AP/AZ/AK1400TS            |                   |
|                                                                      | 2000                | AP3650         | 150                       | AP4650         | 600                 | ① AP1225SH       | 85                        | AP/AZ/AK1200SH    |
|                                                                      |                     | AP3113         |                           | AP3700         |                     |                  | 160                       | AP/AZ/AK1200SH HF |
|                                                                      |                     | AP3125         | 850                       | AP3800         |                     | ② AP1210SH HF    |                           | AZ/AK1300S        |
|                                                                      |                     |                |                           | 2000           | ① AP9030S           |                  | AP/AZ/AK1200SH FC         |                   |
|                                                                      |                     |                |                           |                | ② AP9110S           |                  | AP9100S                   |                   |

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# Recommended Model Selection Table

Please read page 32 before selecting a product.

| Application<br><br>Process Gas                   | Valve               |                |                           |                | Regulator           |                  |                           |                   |
|--------------------------------------------------|---------------------|----------------|---------------------------|----------------|---------------------|------------------|---------------------------|-------------------|
|                                                  | Source applications |                | Distribution applications |                | Source applications |                  | Distribution applications |                   |
|                                                  | Maximum flow (slpm) | Recommendation | Maximum flow (slpm)       | Recommendation | Maximum flow (slpm) | Recommendation   | Maximum flow (slpm)       | Recommendation    |
| Hydrogen Chloride Mixtures (Nitrogen Balance)    | 210                 | AP3000         | 105                       | AP3540         | 10                  | AP/AZ/AK1500SH   | 10                        | AP/AZ/AK1000SH    |
|                                                  |                     | AP3650         |                           | AP3650         | 20                  | AP1900SH         | 20                        | AP/AZ/AK1000SH HF |
|                                                  | 265                 | AP3002         | 190                       | AP4540         | 40                  | AP/AZ/AK1400TS   | 40                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Hydrogen Fluoride (HF)                           | 20                  | AP4540         | 20                        | AP4540         | 5                   | AP/AZ/AK1402TSA  | 5                         | AP/AZ/AK1402TSA   |
|                                                  |                     | AP4650         |                           | AP4650         |                     |                  |                           |                   |
| Hydrogen Selenide (H <sub>2</sub> 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    |
|                                                  |                     | AP4650         |                           | AP4650         |                     |                  |                           |                   |
| Hydrogen Selenide Mixtures (Nitrogen Balance)    | 185                 | AP3000         | 90                        | AP3540         | 10                  | AP/AZ/AK1500S    | 10                        | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 20                  | AP1900S          | 20                        | AP/AZ/AK1000S HF  |
|                                                  | 225                 | AP3002         | 160                       | AP4540         | 50                  | AP/AZ/AK1400TS   | 50                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Hydrogen Sulfide (H <sub>2</sub> 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         |                     |                  |                           |                   |
| Krypton (Kr)                                     | 105                 | AP3000         | 50                        | AP3540         | 20                  | AP/AZ/AK1500S    | 20                        | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 60                  | AP/AZ/AK1400TS   | 30                        | AP/AZ/AK1000S HF  |
|                                                  | 130                 | AP3002         | 90                        | AP4540         |                     |                  | 60                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Methane (CH <sub>4</sub> )                       | 245                 | AP3000         | 120                       | AP3540         | 10                  | AP/AZ/AK1500S    | 10                        | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 20                  | AP1900S          | 20                        | AP/AZ/AK1000S HF  |
|                                                  | 295                 | AP3002         | 210                       | AP4540         | 40                  | AP/AZ/AK1400TS   | 40                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Methanol (CH <sub>3</sub> OH)                    | 40                  | AP3540         | 25                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
|                                                  | 70                  | AP4540         | 40                        | AP4540         |                     |                  |                           |                   |
|                                                  |                     | AP4650         |                           | AP4650         |                     |                  |                           |                   |
| Methyl bromide (CH <sub>3</sub> Br)              | 25                  | AP4540         | 15                        | AP4540         | 5                   | AP/AZ/AK1402TSA  | 5                         | AP/AZ/AK1402TSA   |
|                                                  |                     | AP4625         |                           | AP4625         |                     |                  |                           |                   |
| Methyl Chloride (CH <sub>3</sub> Cl)             | 60                  | AP4540         | 45                        | AP4540         | 1                   | AP/AZ/AK1000S    | 10                        | AP/AZ/AK1402TSA   |
|                                                  |                     | AP4650         |                           | AP4650         | 10                  | AP/AZ/AK1402TSA  |                           |                   |
| Methylsilane (CH <sub>3</sub> SiH <sub>3</sub> ) | 200                 | AP3540         | 70                        | AP3540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF  |
|                                                  | 350                 | AP4540         | 120                       | AP4540         | 75                  | AP/AZ/AK1200S    | 50                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP4650         |                           | AP4650         |                     |                  | 75                        | AP/AZ/AK1200S     |
| Methyl Fluoride (CH <sub>3</sub> F)              | 400                 | AP3000         | 120                       | AP3540         | 5                   | AP/AZ/AK1500S    | 5                         | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS   | 10                        | AP/AZ/AK1000S HF  |
|                                                  | 490                 | AP3002         | 200                       | AP4540         |                     |                  | 50                        | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Neon (Ne)                                        | 215                 | AP3000         | 110                       | AP3540         | 20                  | AP/AZ/AK1500S    | 20                        | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 40                  | AP1900S          | 40                        | AP/AZ/AK1000S HF  |
|                                                  | 260                 | AP3002         | 190                       | AP4540         | 300                 | AP/AZ/AK1200S HF | 100                       | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         |                     |                  |                           |                   |
| Nitrogen (N <sub>2</sub> )                       | 250                 | AP3000         | 100                       | AP3540         | 50                  | AP/AZ/AK1500S    | 25                        | AP/AZ/AK1000S     |
|                                                  |                     | AP3650         |                           | AP3650         | 200                 | AP1900S          | 50                        | AP/AZ/AK1000S HF  |
|                                                  | 400                 | AP3002         | 200                       | AP4540         | 250                 | AP1900S HF       | 150                       | AP/AZ/AK1400TS    |
|                                                  |                     | AP3650         |                           | AP4650         | 350                 | AP2700           | 250                       | AP/AZ/AK1200S     |
|                                                  | 1000                | AP3130         | 1000                      | AP3700         | 1000                | AP/AZ/AK1200S HR | 300                       | AP/AZ/AK1200S HF  |
|                                                  |                     | AP3125         |                           | AP3800         |                     |                  |                           | AZ/AK1300S        |
|                                                  |                     |                |                           |                |                     |                  | 400                       | AP/AZ/AK1200S FC  |
|                                                  |                     |                |                           |                |                     |                  | 1000                      | AP9100S           |
| Nitrogen Trifluoride (NF <sub>3</sub> )          | 75                  | AP3000         | 60                        | AP3540         | 5                   | AP/AZ1500S       | 6                         | AP/AZ1000S        |
|                                                  |                     | AP3650         |                           | AP3650         | 60                  | AP/AZ1400TS      | 15                        | AP/AZ1000S HF     |
|                                                  | 100                 | AP3002         | 110                       | AP4540         | 150                 | AP/AZ1400TS      | 30                        | AP/AZ1400TS       |
|                                                  |                     | AP3650         |                           | AP4650         |                     | AP2700S          | 75                        | AP/AZ1200S        |
|                                                  | 350                 | AP3130         | 500                       | AP3700         | 400                 | AP/AZ1200S HR    | 125                       | AP/AZ1200S HF     |
|                                                  |                     | AP3125         |                           | AP3800         |                     | ①AP9030          |                           | AZ1300S           |
|                                                  |                     |                |                           |                | 1000                | ②AP9110          | 250                       | AP/AZ1200S FC     |
|                                                  |                     |                |                           |                |                     |                  | 600                       | AP9100S           |

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# Recommended Model Selection Table

Please read page 32 before selecting a product.

| Application<br>Process Gas                              | Valve               |                |                           |                | Regulator           |                    |                           |                     |
|---------------------------------------------------------|---------------------|----------------|---------------------------|----------------|---------------------|--------------------|---------------------------|---------------------|
|                                                         | Source applications |                | Distribution applications |                | Source applications |                    | Distribution applications |                     |
|                                                         | Maximum flow (slpm) | Recommendation | Maximum flow (slpm)       | Recommendation | Maximum flow (slpm) | Recommendation     | Maximum flow (slpm)       | Recommendation      |
| Nitric Oxide (NO)                                       | 310                 | AP3000         | 75                        | AP3540         | 3                   | AP/AZ/AK1500S      | 3                         | AP/AZ/AK1000S       |
|                                                         |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS     | 6                         | AP/AZ/AK1000S HF    |
|                                                         | 380                 | AP3002         | 125                       | AP4540         | 75                  | AP/AZ/AK1200S      | 50                        | AP/AZ/AK1400TS      |
|                                                         |                     | AP3650         |                           | AP4650         |                     |                    | 75                        | AP/AZ/AK1200S       |
| Nitrous Oxide (N <sub>2</sub> O)                        | 300                 | AP3000         | 70                        | AP3540         | 3                   | AP/AZ/AK1500S VS   | 8                         | AP/AZ/AK1000S VS    |
|                                                         |                     | AP3650         |                           | AP3650         | 60                  | AP/AZ/AK1400TS VS  | 20                        | AP/AZ/AK1000S VS HF |
|                                                         | 500                 | AP3002         | 140                       | AP4540         | 100                 | AP/AZ/AK1200S VS   | 35                        | AP/AZ/AK1400TS VS   |
|                                                         |                     | AP3650         |                           | AP4650         | 150                 | AP/AZ1200S VS HF   | 85                        | AP/AZ/AK1200S VS    |
|                                                         | 1500                | AP3113         | 750                       | AP3700         | 500                 | ① AP/AZ1225S VS    | 160                       | AP/AZ/AK1200S VS HF |
|                                                         |                     | AP3125         |                           | AP3800         |                     | ② AP/AZ1200S VS HF |                           | AZ/AK1300S          |
|                                                         |                     |                |                           |                | 1000                | ① AP9030S VS       | 320                       | AP/AZ/AK1200S VS FC |
|                                                         |                     |                |                           |                |                     | ② AP9100S VS       | 800                       | AP9100S VS          |
| Octafluorocyclopentene (C <sub>5</sub> F <sub>8</sub> ) | 15                  | AP4540         | 15                        | AP4540         | 5                   | AP/AZ/AK1402TSA    | 0.3                       | AP/AZ1101S          |
|                                                         |                     | AP4650         |                           | AP4650         |                     |                    | 5                         | AP/AZ/AK1402TSA     |
| Oxygen (O <sub>2</sub> )                                | 250                 | AP3000         | 75                        | AP3540         | 10                  | AP/AZ/AK1500S      | 10                        | AP/AZ/AK1000S       |
|                                                         |                     | AP3650         |                           | AP3650         | 80                  | AP1900S            | 25                        | AP/AZ/AK1000S HF    |
|                                                         | 400                 | AP3002         | 150                       | AP4540         | 150                 | AP1900S HF         | 50                        | AP/AZ/AK1400TS      |
|                                                         |                     | AP3650         |                           | AP4650         | 1000                | AP/AZ/AK1200S HR   | 120                       | AP/AZ/AK1200S       |
|                                                         |                     |                | 1000                      | AP3700         |                     |                    | 200                       | AP/AZ/AK1200S HF    |
|                                                         |                     |                |                           | AP3800         |                     |                    |                           | AZ/AK1300S          |
| Perfluorobutadiene (C <sub>4</sub> F <sub>6</sub> )     | 25                  | AP4540         | 25                        | AP4540         | 5                   | AP/AZ1402TSA       | 0.5                       | AP/AZ1101S          |
|                                                         |                     | AP4650         |                           | AP4650         |                     |                    | 5                         | AP/AZ1402TSA        |
| Phosphine (PH <sub>3</sub> )                            | 320                 | AP3000         | 80                        | AP3540         | 5                   | AP/AZ1500S         | 5                         | AP/AZ1000S          |
|                                                         |                     | AP3650         |                           | AP3650         | 40                  | AP/AZ1400TS        | 10                        | AP/AZ1000S HF       |
|                                                         | 390                 | AP3002         | 145                       | AP4540         |                     |                    |                           |                     |
| Phosphine Mixtures (Nitrogen Balance)                   | 185                 | AP3000         | 90                        | AP3540         | 10                  | AP/AZ1500S         | 10                        | AP/AZ1000S          |
|                                                         |                     | AP3650         |                           | AP3650         | 20                  | AP1900S            | 20                        | AP/AZ1000S HF       |
|                                                         | 225                 | AP3002         | 160                       | AP4540         |                     |                    |                           |                     |
| Phosphorous Pentafluoride (PF <sub>5</sub> )            | 15                  | AP3000         | 5                         | AP3540         | 10                  | AP/AZ1500S         | 10                        | AP/AZ1000S          |
|                                                         |                     | AP3650         |                           | AP3650         | 20                  | AP1900S            | 20                        | AP/AZ1000S HF       |
|                                                         | 19                  | AP3002         | 9                         | AP4540         |                     |                    |                           |                     |
|                                                         |                     | AP3650         |                           | AP4650         |                     |                    |                           |                     |
| Propane (C <sub>3</sub> H <sub>8</sub> )                | 65                  | AP3540         | 42                        | AP3540         | 3                   | AP/AZ/AK1500S      | 3                         | AP/AZ/AK1000S       |
|                                                         |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS     | 5                         | AP/AZ/AK1000S HF    |
|                                                         | 115                 | AP4450         | 75                        | AP4540         | 75                  | AP/AZ/AK1200S      | 50                        | AP/AZ/AK1400TS      |
|                                                         |                     | AP4650         |                           | AP4650         |                     |                    |                           |                     |
| Propene (C <sub>3</sub> H <sub>6</sub> )                | 185                 | AP3540         | 75                        | AP3540         | 3                   | AP/AZ/AK1500S      | 3                         | AP/AZ/AK1000S       |
|                                                         |                     | AP3650         |                           | AP3650         | 50                  | AP/AZ/AK1400TS     | 5                         | AP/AZ/AK1000S HF    |
|                                                         | 320                 | AP4540         | 125                       | AP4540         |                     |                    | 50                        | AP/AZ/AK1400TS      |
| Silane (SiH <sub>4</sub> )                              | 150                 | AP3000         | 75                        | AP3540         | 5                   | AP/AZ1500S         | 10                        | AP/AZ1000S          |
|                                                         |                     | AP3650         |                           | AP3650         | 40                  | AP/AZ1400TS        | 25                        | AP/AZ1000S HF       |
|                                                         | 250                 | AP3002         | 150                       | AP4540         | 50                  | AP2700S            | 50                        | AP/AZ1400TS         |
|                                                         |                     | AP3650         |                           | AP4650         | 60                  | AP/AZ1200S         | 120                       | AP/AZ1200S          |
|                                                         | 600                 | AP3130         | 750                       | AP3700         | 100                 | AP/AZ1200S HF      | 200                       | AP/AZ1200S HF       |
|                                                         |                     | AP3125         |                           | AP3800         | 500                 | ① AP/AZ1225S       | 200                       | AZ1300S             |
|                                                         |                     |                |                           |                |                     | ② AP/AZ1200S HF    | 400                       | AP/AZ1200S FC       |
|                                                         |                     |                |                           |                |                     |                    | 1000                      | AP9100S             |
| Silane Mixtures (Nitrogen Balance)                      | 185                 | AP3000         | 90                        | AP3540         | 10                  | AP/AZ1500S         | 10                        | AP/AZ1000S          |
|                                                         |                     | AP3650         |                           | AP3650         | 20                  | AP1900S            | 20                        | AP/AZ1000S HF       |
|                                                         | 225                 | AP3002         | 160                       | AP4540         | 40                  | AP/AZ1400TS        | 40                        | AP/AZ1400TS         |
| Silicon Tetrachloride (SiCl <sub>4</sub> )              | 10                  | AP4540         | 10                        | AP4540         | 5                   | AP/AZ1402TSA       | 0.5                       | AP/AZ1101S          |
|                                                         |                     | AP4650         |                           | AP4650         |                     |                    | 5                         | AP/AZ1402TSA        |
| Silicon Tetrafluoride (SiF <sub>4</sub> )               | 95                  | AP3000         | 45                        | AP3540         | 10                  | AP/AZ/AK1500S      | 10                        | AP/AZ/AK1000S       |
|                                                         |                     | AP3650         |                           | AP3650         | 40                  | AP/AZ/AK1400TS     | 20                        | AP/AZ/AK1000S HF    |
|                                                         | 100                 | AP3002         | 80                        | AP4540         |                     |                    | 40                        | AP/AZ/AK1400TS      |
|                                                         |                     | AP3650         |                           | AP4650         |                     |                    |                           |                     |

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| Application<br><br>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   |
| Sulfur Dioxide (SO <sub>2</sub> )                     | 80                  | AP4540         | 30                        | AP4540         | 1                   | AP/AZ/AK1000S    | 6                         | AP/AZ/AK1402TSA  |
|                                                       |                     | AP4650         |                           | AP4650         | 6                   | AP/AZ/AK1402TSA  |                           |                  |
| Sulfur Hexafluoride (SF <sub>6</sub> )                | 125                 | AP3000         | 35                        | AP3540         | 3                   | AP/AZ/AK1500S    | 5                         | AP/AZ/AK1000S    |
|                                                       |                     | AP3650         |                           | AP3650         | 40                  | AP/AZ/AK1400TS   | 12                        | AP/AZ/AK1000S HF |
|                                                       | 200                 | AP3000         | 75                        | AP4540         | 60                  | AP/AZ/AK1200S    | 25                        | AP/AZ/AK1400TS   |
|                                                       |                     | AP3650         |                           | AP4650         | 150                 | AP/AZ/AK1200S HF | 60                        | AP/AZ/AK1200S    |
|                                                       | 500                 | AP3113         | 400                       | AP3700         | 500                 | AP9100S          | 90                        | AP/AZ/AK1200S HF |
|                                                       |                     | AP3125         |                           | AP3800         |                     |                  |                           | AZ/AK1300S       |
|                                                       |                     |                |                           |                |                     |                  | 180                       | AP/AZ/AK1200S FC |
|                                                       |                     |                |                           |                |                     |                  | 400                       | AP9100S          |
| Sulfur Tetrafluoride (SF <sub>4</sub> )               | 200                 | AP4540         | 80                        | AP4540         | 3                   | AP/AZ/AK1500S    | 3                         | AP/AZ/AK1000S    |
|                                                       |                     | AP4650         |                           | AP4650         | 15                  | AP/AZ/AK1400TS   | 5                         | AP/AZ/AK1000S HF |
|                                                       |                     |                |                           |                |                     |                  | 15                        | AP/AZ/AK1400TS   |
| Trichlorosilane (SiHCl <sub>3</sub> )                 | 35                  | AP4540         | 30                        | AP4540         | 10                  | AP/AZ/AK1402TSA  | 0.5                       | AP/AZ/AK1101S    |
|                                                       |                     | AP4650         |                           | AP4650         |                     |                  | 10                        | AP/AZ/AK1402TSA  |
| Trimethylsilane ((CH <sub>3</sub> ) <sub>3</sub> SiH) | 30                  | AP4540         | 25                        | AP4540         | 7                   | AP/AZ/AK1402TSA  | 0.5                       | AP/AZ1101S       |
|                                                       |                     | AP4650         |                           | AP4650         |                     |                  | 7                         | AP/AZ/AK1402TSA  |
| Tungsten Hexafluoride (WF <sub>6</sub> )              | 10                  | AP4540         | 10                        | AP4540         | 5                   | AP/AZ/AK1402TSA  | 0.3                       | AP/AZ/AK1101SH   |
|                                                       |                     | AP4650         |                           | AP4650         |                     |                  | 5                         | AP/AZ/AK1402TSA  |
| Xenon (Xe)                                            | 85                  | AP3000         | 40                        | AP3540         | 5                   | AP/AZ/AK1500S    | 5                         | AP/AZ/AK1000S    |
|                                                       |                     | AP3650         |                           | AP3650         | 25                  | AP/AZ/AK1400TS   | 10                        | AP/AZ/AK1000S HF |
|                                                       | 100                 | AP3002         | 70                        | AP4540         |                     |                  | 25                        | AP/AZ/AK1400TS   |
|                                                       |                     | AP3650         |                           | AP4650         |                     |                  |                           |                  |

■ denotes heating required to achieve stated flow.  
Please read page 33 regarding how to read model number listed as recommendation.

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

# Regulators/Back Pressure Regulators

## ■ For Ultra High Purity (UHP): AP Series

|                                                                                  |                   |       |
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| Single Stage Regulator (Low to intermediate flow) .....                          | AP1000 .....      | p. 43 |
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| Single Stage Regulator (Low flow, Tied-diaphragm) .....                          | AP1500 .....      | p. 47 |
| Single Stage Regulator (Low to intermediate flow) .....                          | AP1600 .....      | p. 49 |
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| Single Stage Regulator (High flow, Tied-diaphragm) .....                         | AP1200 .....      | p. 55 |
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| Single Stage Regulator (Bulk gas delivery) .....                                 | AP9000/9100 ..... | p. 59 |
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| Two Stage Regulator (Low flow, Tied-diaphragm) .....                             | AP1700 .....      | p. 63 |
| Two Stage Regulator (Intermediate flow, Tied-diaphragm) .....                    | AP2700 .....      | p. 65 |
| Pneumatic Actuation Pressure Regulator (Low flow) .....                          | AP10PA .....      | p. 67 |
| Pneumatic Actuation Pressure Regulator (Low flow, Tied-diaphragm) .....          | AP15PA .....      | p. 69 |
| Pneumatic Actuation Pressure Regulator (Intermediate flow, Tied-diaphragm) ..... | AP14PAT .....     | p. 71 |
| Pneumatic Actuation Pressure Regulator (High flow, Tied-diaphragm) .....         | AP12PA .....      | p. 73 |
| Pneumatic Actuation Pressure Regulator (Low flow) .....                          | AP90PA/91PA ..... | p. 75 |

## ■ For Ultra High Purity (UHP): SL Series

|                                                              |              |       |
|--------------------------------------------------------------|--------------|-------|
| Single Stage Compact Regulator (Springless) .....            | SL5200 ..... | p. 77 |
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| Single Stage Regulator (Intermediate flow, Springless) ..... | SL5400 ..... | p. 81 |
| Single Stage Regulator (Intermediate flow, Springless) ..... | SL5800 ..... | p. 83 |

## ■ For Ultra High Purity (UHP): AZ Series

|                                                                                  |               |        |
|----------------------------------------------------------------------------------|---------------|--------|
| Single Stage Regulator (Low to intermediate flow) .....                          | AZ1000 .....  | p. 85  |
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| Single Stage Regulator (High flow, Tied-diaphragm) .....                         | AZ1200 .....  | p. 93  |
| Single Stage Regulator (High flow) .....                                         | AZ1300 .....  | p. 95  |
| Single Stage Regulator (High flow, Tied-diaphragm) .....                         | AZ9200 .....  | p. 97  |
| Pneumatic Actuation Pressure Regulator (Low flow) .....                          | AZ10PA .....  | p. 99  |
| Pneumatic Actuation Pressure Regulator (Low flow, Tied-diaphragm) .....          | AZ15PA .....  | p. 101 |
| Pneumatic Actuation Pressure Regulator (Intermediate flow, Tied-diaphragm) ..... | AZ14PAT ..... | p. 103 |
| Pneumatic Actuation Pressure Regulator (High flow, Tied-diaphragm) .....         | AZ12PA .....  | p. 105 |

## ■ For General Applications: AK Series

|                                                                                  |               |        |
|----------------------------------------------------------------------------------|---------------|--------|
| Single Stage Compact Regulator (Low flow) .....                                  | AK100 .....   | p. 107 |
| Single Stage Regulator (Low to intermediate flow) .....                          | AK1000 .....  | p. 109 |
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| Single Stage Regulator (Delivery of sub-atmospheric pressure) .....              | AK1100 .....  | p. 113 |
| Single Stage Regulator (Low flow, Tied-diaphragm) .....                          | AK1500 .....  | p. 115 |
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| Two Stage Regulator (Low flow, Tied-diaphragm) .....                             | AK1700 .....  | p. 125 |
| Pneumatic Actuation Pressure Regulator (Low flow) .....                          | AK10PA .....  | p. 127 |
| Pneumatic Actuation Pressure Regulator (Low flow, Tied-diaphragm) .....          | AK15PA .....  | p. 129 |
| Pneumatic Actuation Pressure Regulator (Intermediate flow, Tied-diaphragm) ..... | AK14PAT ..... | p. 131 |
| Pneumatic Actuation Pressure Regulator (High flow, Tied-diaphragm) .....         | AK12PA .....  | p. 133 |

## ■ Back Pressure Regulator BP Series

|                                |                     |        |
|--------------------------------|---------------------|--------|
| For Ultra High Purity .....    | BP1000 Welded ..... | p. 135 |
| For General Applications ..... | BP1000 .....        | p. 137 |

|                                                                      |        |
|----------------------------------------------------------------------|--------|
| Pressure Gauges .....                                                | p. 139 |
| Regulator/Back Pressure Regulator Specific Product Precautions ..... | p. 141 |

# Single Stage Compact Regulator for Ultra High Purity

## AP500 Series

- For UHP gas delivery
- High inlet pressure type Standard: Max. 150 psig (1.0 MPa)  
HR: 3000 psig (20.7 MPa)
- Flow capacity Standard: to 15 slpm  
HF (option): to 30 slpm
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Sub-atmospheric pressure delivery option



RoHS

How to Order (See p. 250 for ordering syntax)

**AP5 02 S 2PW FV4 FV4**

**Delivery pressure**

| Code | Delivery pressure                                                                                              |
|------|----------------------------------------------------------------------------------------------------------------|
| 01   | 0.5 to 10 psig (0.0034 to 0.07 MPa)<br>Sub-atmospheric (A):100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa) |
| 02   | 0.5 to 30 psig (0.0034 to 0.2 MPa)                                                                             |
| 06   | 1 to 60 psig (0.007 to 0.4 MPa)                                                                                |
| 10   | 1 to 100 psig (0.007 to 0.7 MPa)                                                                               |
| 15   | 2 to 150 psig (0.014 to 1.0 MPa)                                                                               |

\*1) When AP515 is selected, select option "HR."

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PWG | 3 ports |

**Range options (Only for AP501)**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

**Gauge port (Outlet ③)**

| Code    | Connections or Pressure gauge *2)              |
|---------|------------------------------------------------|
| No code | No gauge port                                  |
| FV4     | No pressure gauge 1/4 inch face seal (Female)  |
| MV4     | pressure gauge 1/4 inch face seal (Male)       |
| TW4     | gauge 1/4 inch tube weld                       |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa           |
| L       | With -30 in.Hg to 60 psig -0.1 to 0.4 MPa      |
| 1       | pressure -30 in.Hg to 100 psig -0.1 to 0.7 MPa |
| H       | gauge -30 in.Hg to 160 psig -0.1 to 1.1 MPa    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                     |

\*2) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Option**

| Code    | Specification            |
|---------|--------------------------|
| No code | Standard                 |
| FI      | Friction dampener *8)*9) |

\*8) FI is friction dampener to slow response and reduce interaction with MFC. Cannot be selected if option "HF" is selected as it comes with a friction dampener as standard  
\*9) Cannot be selected if AP515 is selected

**Option**

| Code    | Specification                                                     |
|---------|-------------------------------------------------------------------|
| No code | Standard                                                          |
| HF      | High flow *6)                                                     |
| HR      | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa) *7) |

\*6) Cannot be selected if AP501A, AP515, or seat material "VS" is selected  
\*7) Cannot be selected if AP501A, seat material "TF," or option "HF" is selected

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| TF      | PTFE *4)         |
| VS      | Polyimide *5)    |

\*4) PTFE recommended for applications such as within a process tool.  
\*5) Not available with SH material.

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top view)**

① IN ② OUT ③ Gauge port (Outlet)

**Sample Order Number**

| Port   | ①    | ②   | ③   |
|--------|------|-----|-----|
| AP502S | 2PW  | FV4 | FV4 |
|        | 3PWG | FV4 | FV4 |
|        | 3PWG | FV4 | V3  |

## Specifications

| Operating Parameters              |                  | AP501□□A                                                                                    | AP501                               | AP502                              | AP506                           | AP510                            | AP515*4)                         |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)                                         | 0.5 to 10 psig (0.0034 to 0.07 MPa) | 0.5 to 30 psig (0.0034 to 0.2 MPa) | 1 to 60 psig (0.007 to 0.4 MPa) | 1 to 100 psig (0.007 to 0.7 MPa) | 2 to 150 psig (0.014 to 1.0 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                     |                                     |                                    |                                 |                                  |                                  |
| Source pressure                   |                  | Vacuum to 150 psig (1.0 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) *1)                                                               |                                     |                                    |                                 |                                  |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                  |                                     |                                    |                                 |                                  |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                              |                                     |                                    |                                 |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *2)                                               |                                     |                                    |                                 |                                  |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)       |                                     |                                    |                                 |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                        |                                     |                                    |                                 |                                  |                                  |
| Supply pressure effect            |                  | 0.2 psig (0.0014 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop |                                     |                                    |                                 |                                  |                                  |
| Installation                      |                  | Bottom mount                                                                                |                                     |                                    |                                 |                                  |                                  |
| Internal volume                   |                  | 0.15 in <sup>3</sup> (2.4 cm <sup>3</sup> )                                                 |                                     |                                    |                                 |                                  |                                  |
| Weight                            |                  | 0.45 kg *3)                                                                                 |                                     |                                    |                                 |                                  |                                  |

\*1) -10 to 90°C for Polyimide seat. In addition, for option "HR," the temperature range is -28 to 48°C.

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

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

\*4) The specifications are for AP515 when option "HR" is selected.

# Single Stage Compact Regulator for Ultra High Purity **AP500 Series**

## Option

### 1. High flow

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

| Option | Other Parameters       | AP501                                                                                       | AP502 | AP506 | AP510 |
|--------|------------------------|---------------------------------------------------------------------------------------------|-------|-------|-------|
| HF     | Supply pressure effect | 0.4 psig (0.0028 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop |       |       |       |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AP501                          | AP502 | AP506 | AP510 | AP515 |
|--------|------------------|--------------------------------|-------|-------|-------|-------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |       |       |       |       |

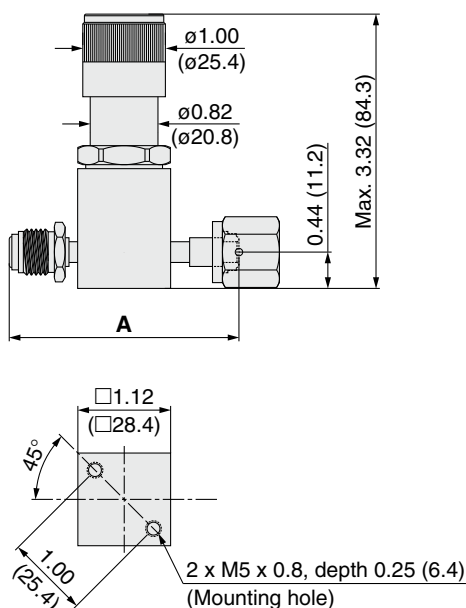
## Wetted Parts Material

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

## Dimensions

inch (mm)

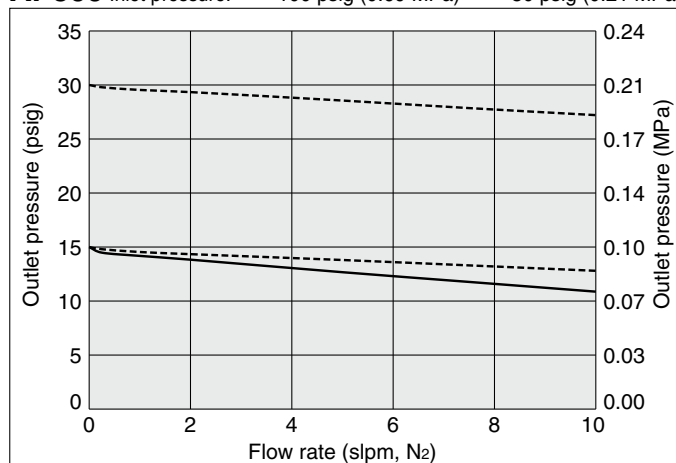
### AP500



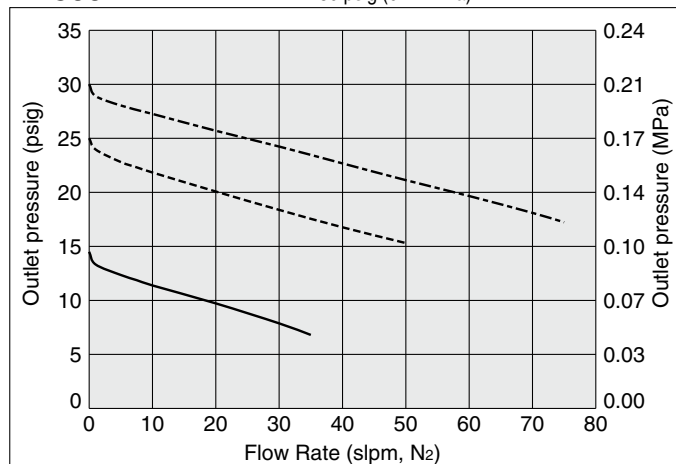
| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 2.78 | (70.6) |
| MV4         | 2.78 | (70.6) |
| TW4         | 2.12 | (53.8) |

## Flow Rate Characteristics

**AP500** Inlet pressure: ---- 100 psig (0.69 MPa) — 30 psig (0.21 MPa)

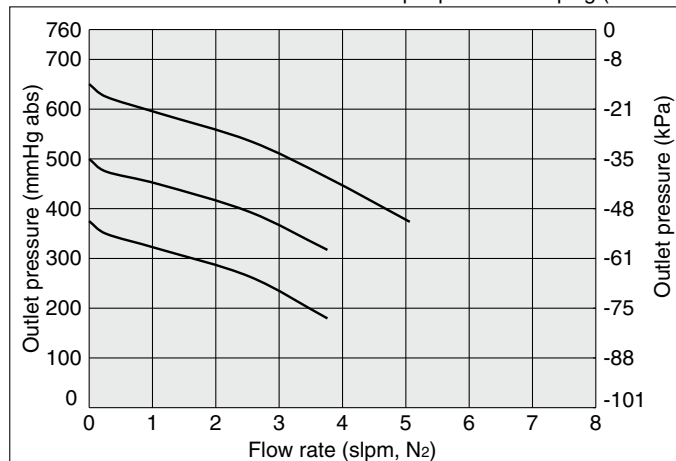


**AP500HF** Inlet pressure: --- 75 psig (0.52 MPa) --- 45 psig (0.31 MPa) — 30 psig (0.21 MPa)



### AP501A

Input pressure : 2 psig (14 kPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Low to intermediate flow

## AP1000 Series

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



RoHS

### How to Order (See p. 250 for ordering syntax)

**AP10 01 S 2PW FV4 FV4**

Port Number ① ② ③ ④

• **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)    |
| 30   | 5 to 300 psig (0.034 to 2.1 MPa)    |

• **Material**

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

• **Surface finish**

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

• **Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

• **Connections (Inlet ①, Outlet ②)**

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

• **Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1                                        |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

• **Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

• **Bonnet option**

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

\*6) Bonnet port is not threaded. Panel mounting hole: dia. 1.56 inch (39.6 mm).

• **Option**

| Code    | Specification |
|---------|---------------|
| No code | Standard      |
| HF      | High flow     |

• **Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *3)    |
| TF      | PTFE *4) *5)     |

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

• **Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

• **Porting Configuration**

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

• **Sample Order Number**

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

## Specifications

| Operating Parameters              |                  | AP1001                                                                                       | AP1002                          | AP1006                          | AP1010                           | AP1015                           | AP1030                           |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|
| 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 300 psig (0.034 to 2.1 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |                                 |                                 |                                  |                                  |                                  |
| Source pressure                   |                  | Vacuum to 300 psig (2.1MPa)                                                                  |                                 |                                 |                                  |                                  |                                  |
| 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) *2)                                                                |                                 |                                 |                                  |                                  |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                   |                                 |                                 |                                  |                                  |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)                                               |                                 |                                 |                                  |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *4)                                                |                                 |                                 |                                  |                                  |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)        |                                 |                                 |                                  |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                         |                                 |                                 |                                  |                                  |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *5)                                                                             |                                 |                                 |                                  |                                  |                                  |
| Supply pressure effect            |                  | 0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                 |                                  |                                  |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                           |                                 |                                 |                                  |                                  |                                  |
| Internal volume                   |                  | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )                                                    |                                 |                                 |                                  |                                  |                                  |
| Weight                            |                  | 1.25 kg *6)                                                                                  |                                 |                                 |                                  |                                  |                                  |

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

\*2) -10 to 90°C for Polyimide seat.

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

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

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

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

## Option

### High flow

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

| Option | Other Parameters       | AP1001                                                                                       | AP1002 | AP1006 | AP1010 | AP1015 | AP1030 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|
| HF     | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |        |        |        |        |        |

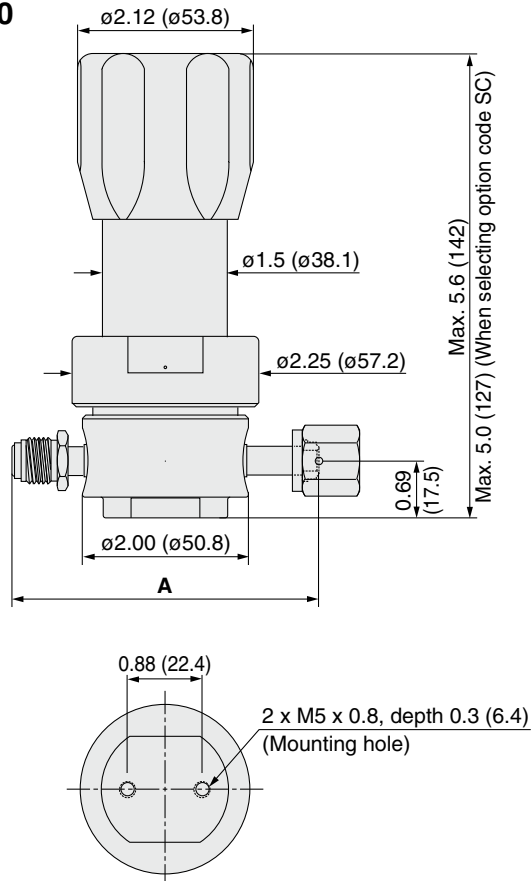
## Wetted Parts Material

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

## Dimensions

inch (mm)

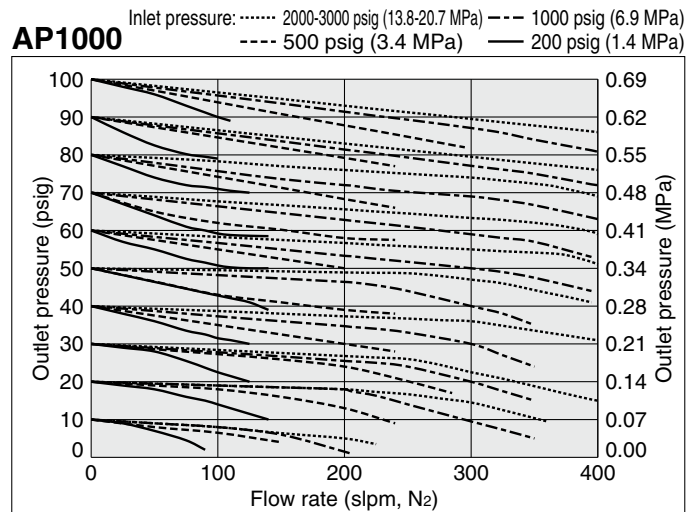
### AP1000



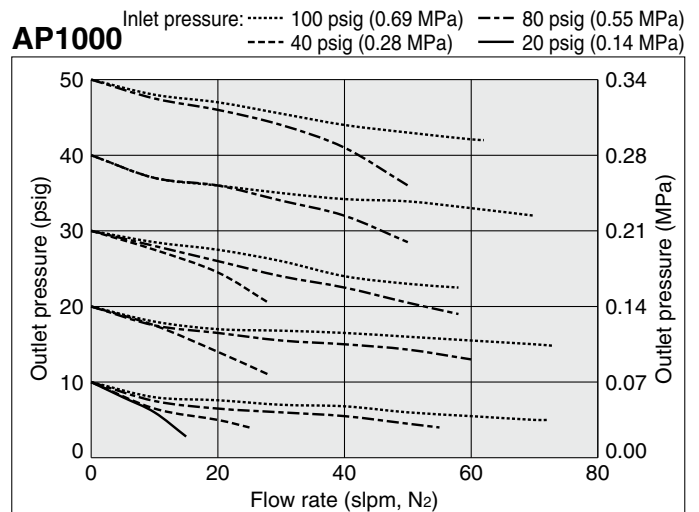
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         | 2.96 | (75.2)  |
| TW4         | 2.96 | (75.2)  |
| FV6         | 4.70 | (119.4) |
| MV6         | 2.96 | (75.2)  |
| TW6         | 2.96 | (75.2)  |

## Flow Rate Characteristics

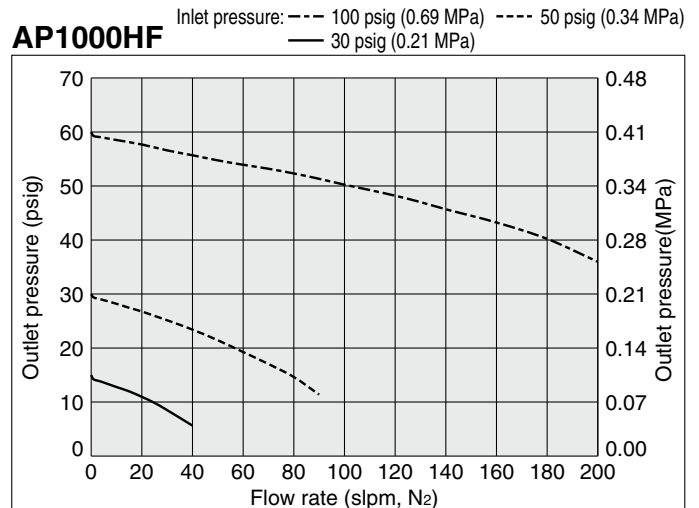
### AP1000



### AP1000



### AP1000HF



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Delivery of sub-atmospheric pressure

## AP1100 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP11 01 S 2PW FV4 FV4**

**Port Number**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

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

\*1) Other range available. Refer to gauge guide (P.139).  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *4) |
| SC      | Short type             |

\*4) Bonnet port is not threaded.  
Panel mounting hole: dia. 1.56 inch (39.6 mm).

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| TF      | PTFE *3)         |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Sample Order Number**

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

## Specifications

| Operating Parameters              |                  | AP1101                                                                                |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)                                   |
| Gas                               |                  | Select compatible materials of construction for the gas                               |
| Source pressure                   |                  | Vacuum to 300 psig (2.1 MPa)                                                          |
| Proof pressure                    | Inlet            | 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                         | Inboard leakage  | $2 \times 10^{-11}$ Pa·m <sup>3</sup> /s                                              |
|                                   | Outboard leakage | $2 \times 10^{-10}$ Pa·m <sup>3</sup> /s *1)                                          |
| Across the seat leak              |                  | $4 \times 10^{-9}$ Pa·m <sup>3</sup> /s *1)                                           |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |
| Connections                       |                  | Face seal, Tube weld                                                                  |
| Bonnet port                       |                  | NPT 1/8 inch *2)                                                                      |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                    |
| Internal volume                   |                  | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )                                             |
| Weight                            |                  | 1.25 kg *3)                                                                           |

\*1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

\*2) On panel mount option, bonnet port is not threaded.

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

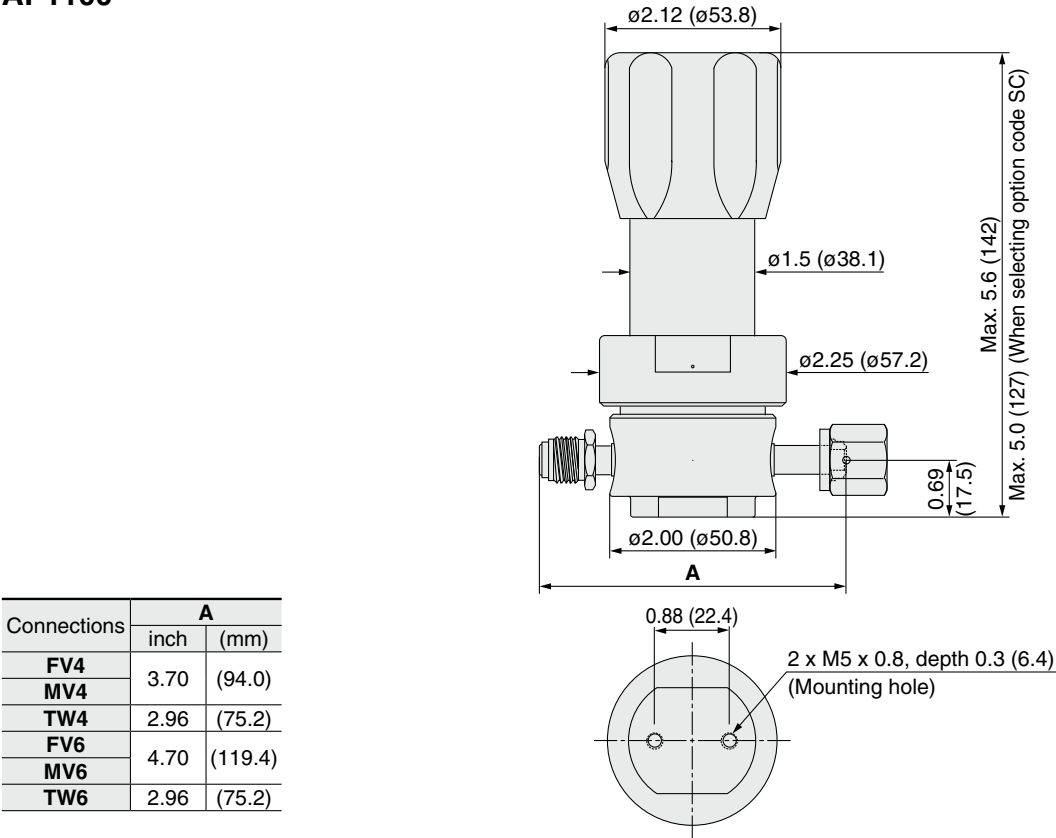
Wetted Parts Material

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

Dimensions

inch (mm)

AP1100

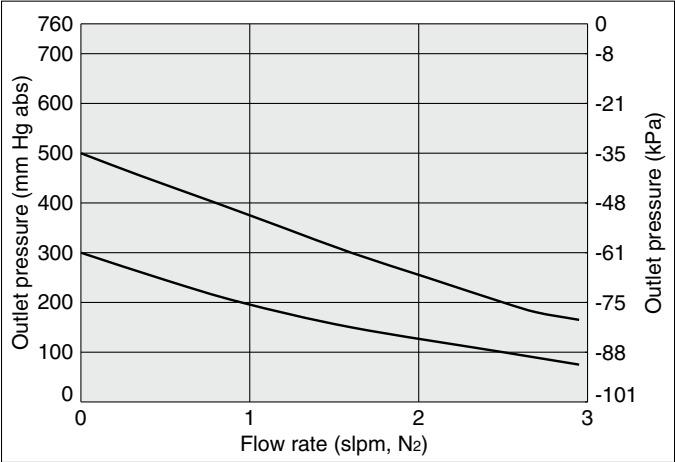


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         | 2.96 | (75.2)  |
| TW4         | 2.96 | (75.2)  |
| FV6         | 4.70 | (119.4) |
| MV6         | 2.96 | (75.2)  |
| TW6         | 2.96 | (75.2)  |

Flow Rate Characteristics

AP1100

Inlet pressure: 2 psig (14 kPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

|                                      |
|--------------------------------------|
| Recommendations                      |
| Regulators                           |
| AP                                   |
| SL                                   |
| AZ                                   |
| AK                                   |
| BP                                   |
| Diaphragm Valves                     |
| AP                                   |
| AZ                                   |
| AK                                   |
| Check Valves                         |
| Vacuum Generators                    |
| Flow Switches                        |
| Technical Data/<br>Glossary of Terms |
| Precautions                          |

### Low flow (Tied-diaphragm)

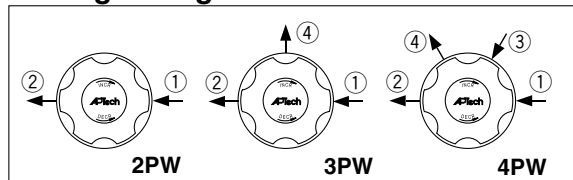


- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)  
HR (option): Max. 4500 psig (31.0 MPa)
- Flow capacity: to 30 slpm  
HF (option): to 120 slpm
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Tied-diaphragm design

## How to Order (See p. 250 for ordering syntax)

**RoHS**

## Porting Configuration



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

## Specifications

| Operating Parameters                     |                         | AP1502                                                                                       | AP1506                             | AP1510                              | AP1515                              |
|------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| <b>Delivery pressure</b>                 |                         | 1 to 30 psig<br>(0.007 to 0.2 MPa)                                                           | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(0.034 to 1.0 MPa) |
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas                                      |                                    |                                     |                                     |
| <b>Source pressure</b>                   |                         | Vacuum to 3500 psig (24.1 MPa)                                                               |                                    |                                     |                                     |
| <b>Proof pressure</b>                    | <b>Inlet</b>            | 1.5 times the maximum source pressure                                                        |                                    |                                     |                                     |
|                                          | <b>Outlet</b>           | 1.5 times the maximum delivery pressure                                                      |                                    |                                     |                                     |
| <b>Burst pressure</b>                    | <b>Inlet</b>            | 3 times the maximum source pressure                                                          |                                    |                                     |                                     |
|                                          | <b>Outlet</b>           | 3 times the maximum delivery pressure                                                        |                                    |                                     |                                     |
| <b>Ambient and operating temperature</b> |                         | -40 to 71°C (No freezing) *1)                                                                |                                    |                                     |                                     |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                                |                                    |                                     |                                     |
|                                          | <b>Outboard leakage</b> | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                            |                                    |                                     |                                     |
| <b>Across the seat leak</b>              |                         | 4 x 10 <sup>-9</sup> Pa·m³/s *3)                                                             |                                    |                                     |                                     |
| <b>Surface finish</b>                    |                         | Ra max 15 µin. (0.4 µm)    Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)     |                                    |                                     |                                     |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                                                         |                                    |                                     |                                     |
| <b>Bonnet port</b>                       |                         | NPT 1/8 inch *4)                                                                             |                                    |                                     |                                     |
| <b>Supply pressure effect</b>            |                         | 0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                     |                                     |
| <b>Installation</b>                      |                         | Bottom mount (Option: panel mount)                                                           |                                    |                                     |                                     |
| <b>Internal volume</b>                   |                         | 0.51 in³ (8.4 cm³)                                                                           |                                    |                                     |                                     |
| <b>Weight</b>                            |                         | 1.27 kg *5)                                                                                  |                                    |                                     |                                     |

- \*1) -10 to 90°C for Polyimide seat.  
\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).  
\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).  
\*4) On panel mount option, bonnet port is not threaded.  
\*5) Weight, including individual boxed weight, may vary depending on connections or options.

## 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       | AP1502                                                                                       | AP1506 | AP1510 | AP1515 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|
| HF     | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |        |        |        |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AP1502                       | AP1506 | AP1510 | AP1515 |
|--------|------------------|------------------------------|--------|--------|--------|
| HR     | Source pressure  | Vacuum to 4500 psig (31 MPa) |        |        |        |

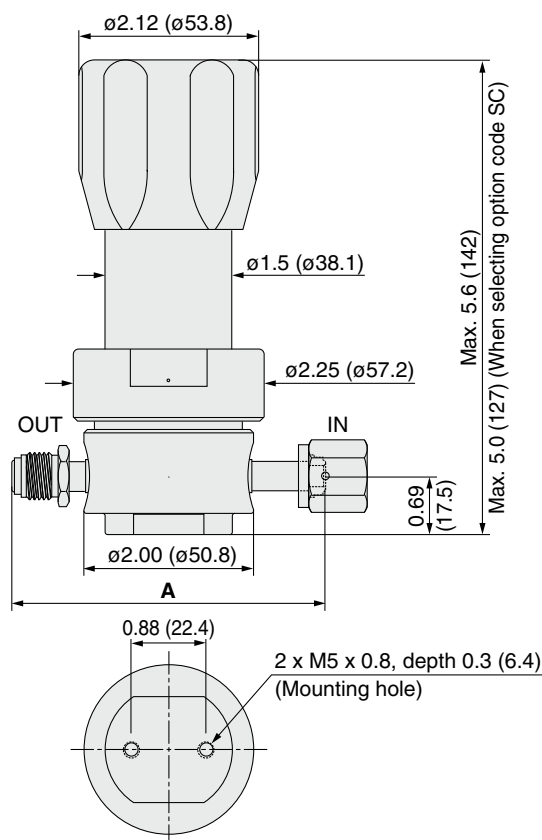
## Wetted Parts Material

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

## Dimensions

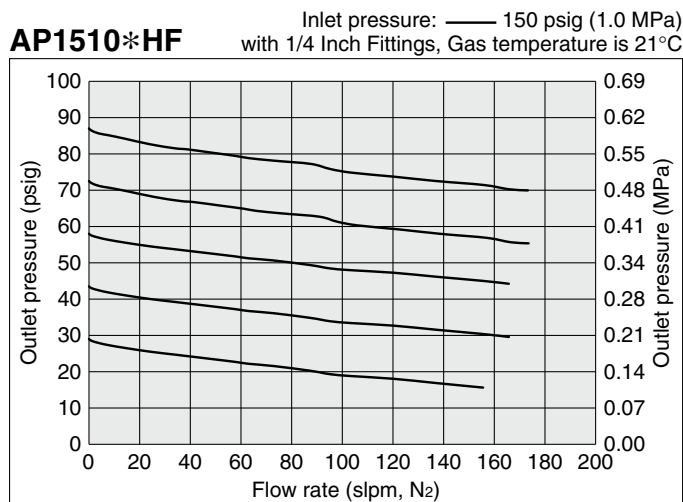
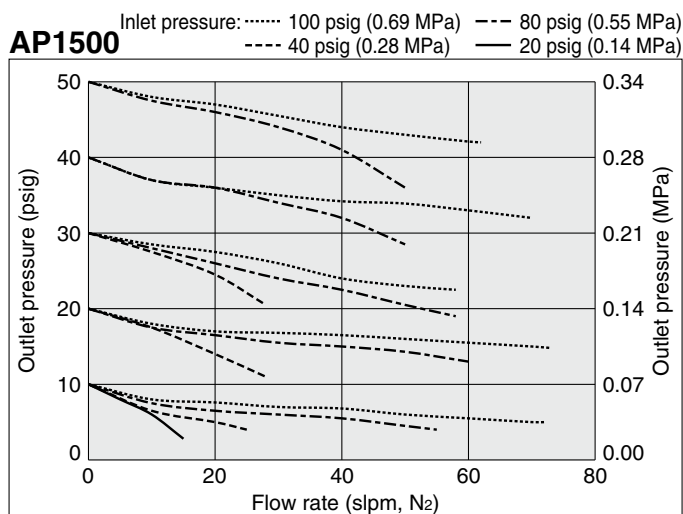
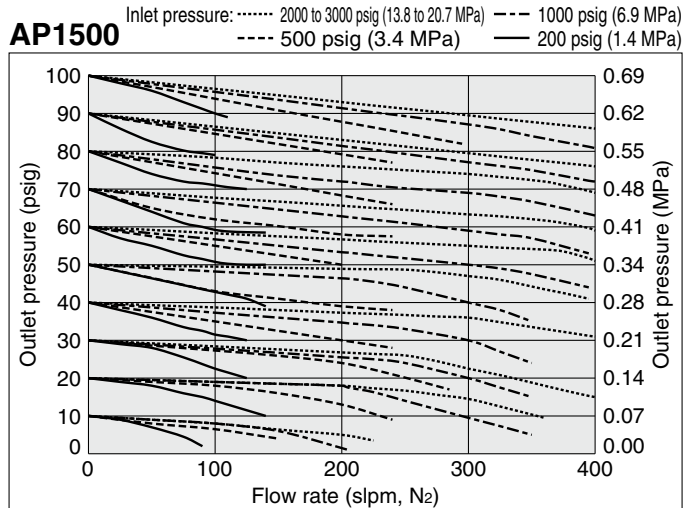
inch (mm)

### AP1500



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

## Flow Rate Characteristics



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Low to intermediate flow

## AP1600 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP16 01 S 2PW FV4 FV4**

**Port Number**  
① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1                                        |
|---------|----------------------------------------------------------|
|         | psig/bar unit      MPa unit                              |
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig      -0.1 to 0.2 MPa                |
| L       | -30 in.Hg to 60 psig      -0.1 to 0.4 MPa                |
| 1       | -30 in.Hg to 100 psig      -0.1 to 0.7 MPa               |
| H       | -30 in.Hg to 160 psig      -0.1 to 1.1 MPa               |
| 2       | 0 to 200 psig      0 to 1.4 MPa                          |
| 4       | 0 to 400 psig      0 to 3 MPa                            |
| 10      | 0 to 1000 psig      0 to 7 MPa                           |
| 40      | 0 to 4000 psig      0 to 28 MPa                          |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *4) |

\*4) Bonnet port is not threaded. Panel mounting hole: dia. 1.43 inch (36.3 mm).

**Seat material**

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

\*3) Not available with SH material.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Sample Order Number**

|         | Port ① | ②   | ③   | ④        |
|---------|--------|-----|-----|----------|
| AP1601S | 2PW    | FV4 | FV4 |          |
|         | 3PW    | FV4 | FV4 | 0        |
|         | 3PW    | FV4 | FV4 | V3 MPa   |
|         | 4PW    | FV4 | FV4 | 1 V3 MPa |
|         | 4PW    | FV4 | FV4 | 0 0      |

## Specifications

| Operating Parameters              |                  | AP1601                                                                                       | AP1602                                                        | AP1606                          | AP1610                           |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 10 psig (0.007 to 0.07 MPa)                                                             | 1 to 30 psig (0.007 to 0.2 MPa)                               | 2 to 60 psig (0.014 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |                                                               |                                 |                                  |
| Source pressure                   |                  | Vacuum to 100 psig (0.7 MPa)                                                                 | Vacuum to 3500 psig (24.1 MPa)                                |                                 |                                  |
| Proof pressure                    | Inlet            | 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) *1)                                                                |                                                               |                                 |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                                |                                                               |                                 |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                            |                                                               |                                 |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m³/s *3)                                                             |                                                               |                                 |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)                                                                      | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                 |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                         |                                                               |                                 |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *4)                                                                             |                                                               |                                 |                                  |
| Supply pressure effect            |                  | 0.25 psig (0.0017 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                                               |                                 |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                           |                                                               |                                 |                                  |
| Internal volume                   |                  | 0.82 in³ (13.5 cm³)                                                                          |                                                               |                                 |                                  |
| Weight                            |                  | 1.54 kg *5)                                                                                  |                                                               |                                 |                                  |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).

\*4) On panel mount option, bonnet port is not threaded.

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

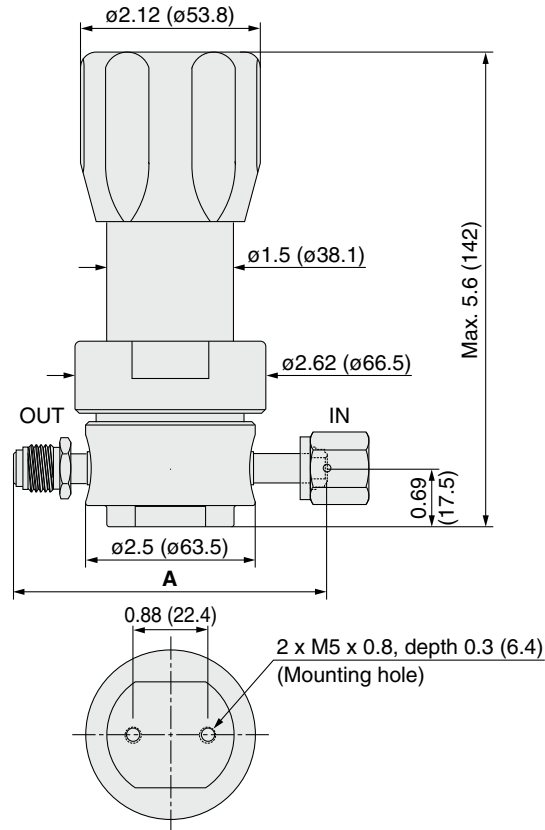
## Wetted Parts Material

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

## Dimensions

inch (mm)

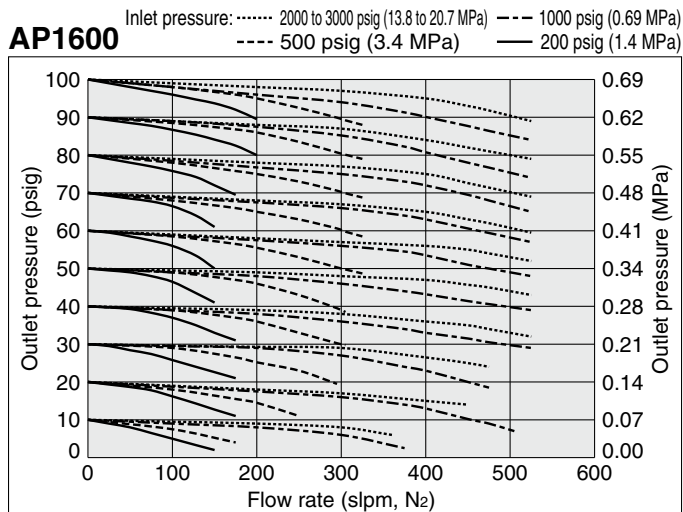
### AP1600



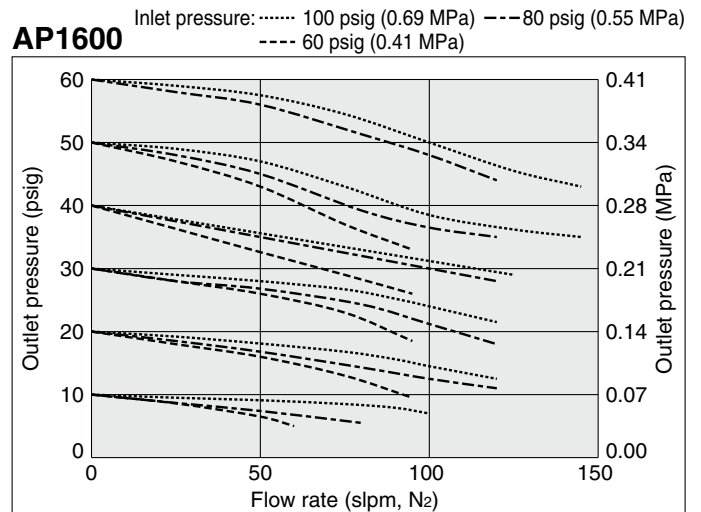
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| TW4         | 3.46 | (87.9)  |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |

## Flow Rate Characteristics

### AP1600



### AP1600



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

### Low to intermediate flow (Tied-diaphragm)



- ## How to Order (See p. 250 for ordering syntax)



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

# Single Stage Regulator for Ultra High Purity **AP1900 Series**

Low to intermediate flow (Tied-diaphragm)

## Option

### High flow

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

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

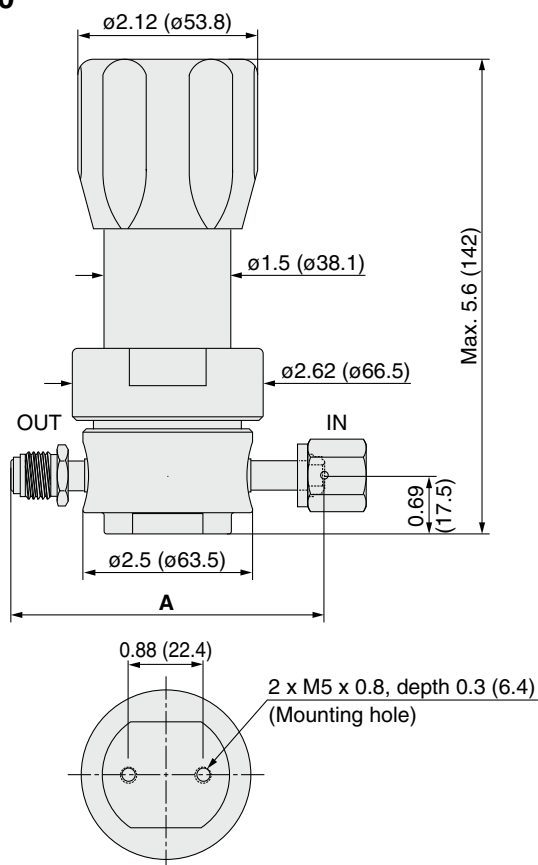
## Wetted Parts Material

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

## Dimensions

inch (mm)

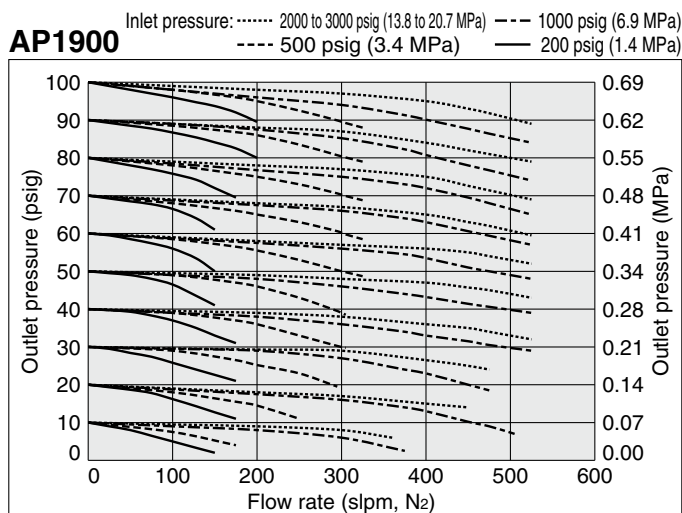
### AP1900



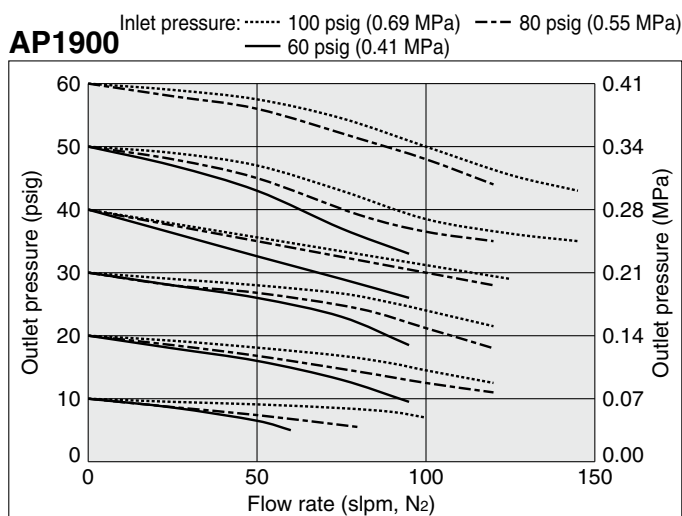
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| TW4         | 3.46 | (87.9)  |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |
| FV8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

## Flow Rate Characteristics

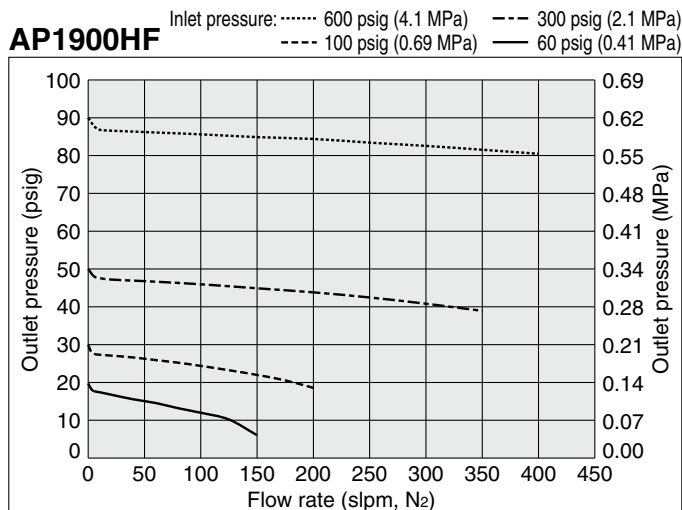
### AP1900



### AP1900



### AP1900HF



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Intermediate flow  
(Tied-diaphragm)

## AP1400T Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP14 02 T S 2PW FV4 FV4**

**Port Number**  
① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Range options** \*1)

| Code    | Range           |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with AP1402T.

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *2)                                       |
|---------|----------------------------------------------------------|
|         | psig/bar unit      MPa unit                              |
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig      -0.1 to 0.2 MPa                |
| L       | -30 in.Hg to 60 psig      -0.1 to 0.4 MPa                |
| 1       | -30 in.Hg to 100 psig      -0.1 to 0.7 MPa               |
| H       | -30 in.Hg to 160 psig      -0.1 to 1.1 MPa               |
| 2       | 0 to 200 psig      0 to 1.4 MPa                          |
| 4       | 0 to 400 psig      0 to 3 MPa                            |
| 10      | 0 to 1000 psig      0 to 7 MPa                           |
| 40      | 0 to 4000 psig      0 to 28 MPa                          |

\*2) Refer to gauge guide (P-139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

\*6) Bonnet port is not threaded. Panel mounting hole: 1.56 inch (39.6 mm).  
\*7) SC option is not available with H1402TA and HR option.

**Option**

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

\*5) Not available with AP1402T and AP1406T.

**Seat material**

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

\*4) Not available with SH material.

**Pressure gauge unit** \*3)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Sample Order Number**

| Port    | ①   | ②   | ③   | ④        |
|---------|-----|-----|-----|----------|
| AP1410T | 2PW | FV4 | FV4 |          |
|         | 3PW | FV4 | FV4 | 0        |
|         | 3PW | FV4 | FV4 | 1 MPa    |
|         | 4PW | FV4 | FV4 | 40 1 MPa |
|         | 4PW | FV4 | FV4 | 0 0      |

## Specifications

| Operating Parameters              |                  | AP1402T□□A                                                                                 | AP1402T                         | AP1406T                         | AP1410T                          | AP1415T                                                                     |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------------------------------|-----------------------------------------------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 1 to 30 psig (0.007 to 0.2 MPa) | 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)<br>(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)                                                               |                                 |                                 |                                  |                                                                             |
| 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) *2)                                                              |                                 |                                 |                                  |                                                                             |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                 |                                  |                                                                             |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)                                             |                                 |                                 |                                  |                                                                             |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *4)                                              |                                 |                                 |                                  |                                                                             |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)      Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                 |                                 |                                  |                                                                             |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                 |                                 |                                  |                                                                             |
| Bonnet port                       |                  | NPT 1/8 inch *5)                                                                           |                                 |                                 |                                  |                                                                             |
| Supply pressure effect            |                  | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                 |                                  |                                                                             |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                         |                                 |                                 |                                  |                                                                             |
| Internal volume                   |                  | 1.06 in <sup>3</sup> (17.4 cm <sup>3</sup> )                                               |                                 |                                 |                                  |                                                                             |
| Weight                            |                  | 2.04 kg *6)                                                                                |                                 |                                 |                                  |                                                                             |

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

\*2) -10 to 90°C for Polyimide seat.

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

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

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

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

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AP1410T                        | AP1415T |
|--------|------------------|--------------------------------|---------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |         |

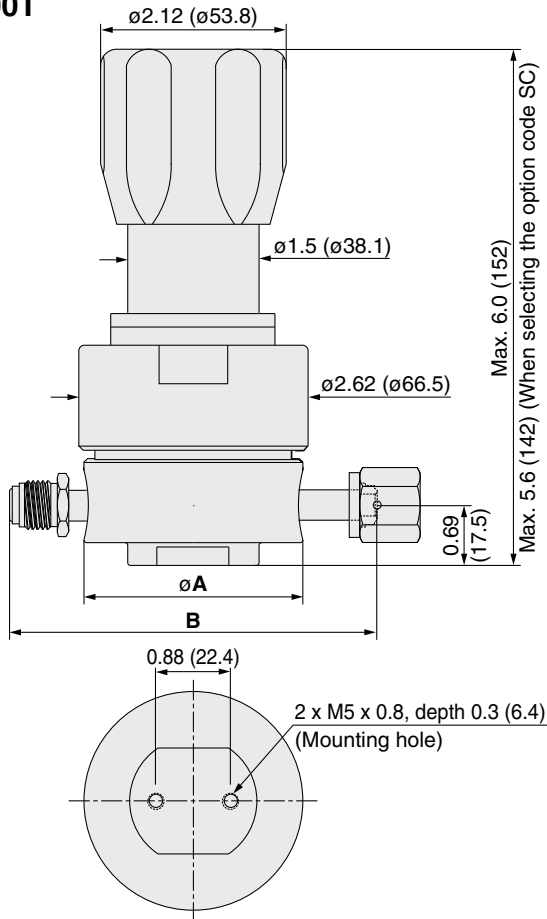
## Wetted Parts Material

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

## Dimensions

inch (mm)

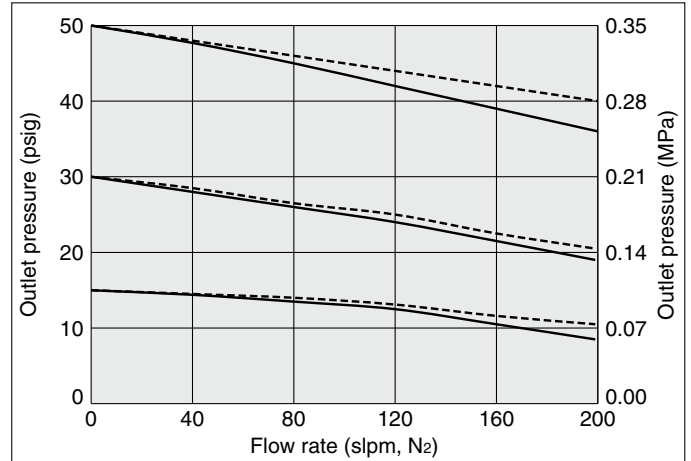
### AP1400T



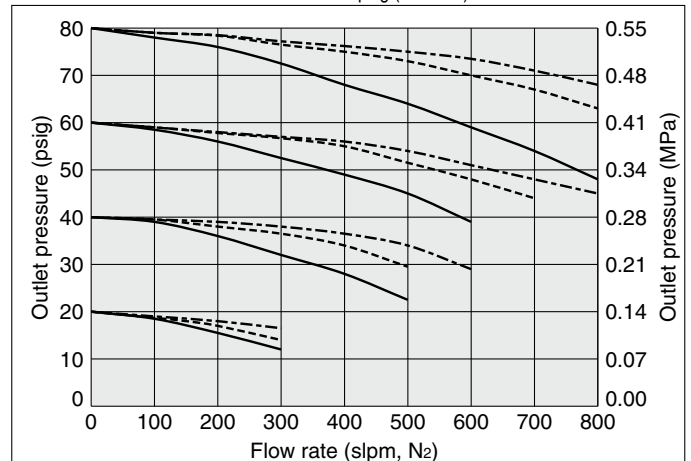
| Connections | A    |        | B    |         |
|-------------|------|--------|------|---------|
|             | inch | (mm)   | inch | (mm)    |
| FV4         | 2.00 | (50.8) | 3.70 | (94.0)  |
| MV4         |      |        | 4.00 | (101.6) |
| TW4         |      |        | 3.46 | (87.9)  |
| FV6 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

## Flow Rate Characteristics

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

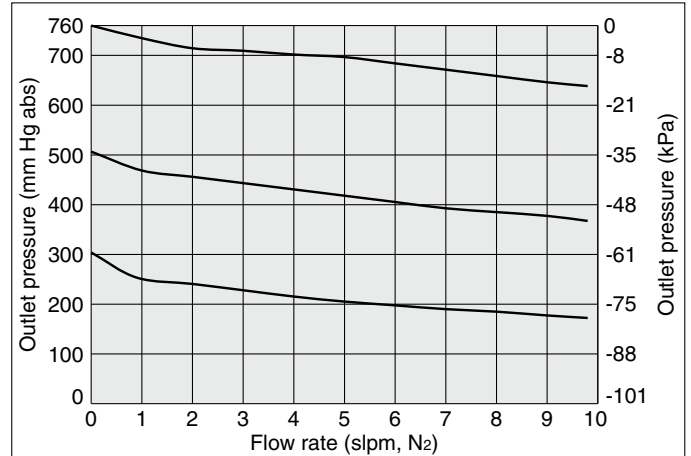


### AP1400T Inlet pressure: --- 2000 psig (13.8 MPa) --- 600 psig (4.1 MPa) — 200 psig (1.4 MPa)



### AP1402TA

Inlet pressure: 0 psig (0 kPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## High flow (Tied-diaphragm)

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

RoHS

## AP12

02

S

2PW

FV8

FV8

### Knob

| Code    | Knob           |
|---------|----------------|
| No code | Standard       |
| KL      | Knob LOTO *10) |

\*10) Not available with AP1225.

### Bonnet option

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *8) |
| SC      | Short type *9)         |

\*8) Bonnet port is not threaded. Panel mounting hole: dia. 1.56 inch (39.6 mm).  
\*9) SC option is not available with FC or HR option.

### Option

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HF      | High flow *7)                                                         |
| FC      | Force compensation *5)*7)                                             |
| HR      | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *6)*7) |

\*5) FC option is only available with connection size 1/2 or 3/4 inch, but not available with AP1202, AP1206 and AP1225.  
\*6) HR option is not available with AP1202 and AP1206.  
\*7) Options "HF," "FC," and "HR" cannot be used in combination.

### Delivery pressure

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

### Material

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

### Connections (Inlet①, Outlet②)

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

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

### Surface finish

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

### Ports

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

### Porting Configuration

2PW

3PW

4PW

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

### Gauge port (Inlet③, Outlet④)

| Code    | Pressure gauge *2)                                       | Unit            |
|---------|----------------------------------------------------------|-----------------|
| No code | No gauge port                                            |                 |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                     | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                     | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                    | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                    | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                            | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                            | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                           | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                           | 0 to 28 MPa     |

\*2) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

### 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        |
|---------|-----|-----|-----|----------|
| AP1210S | 2PW | FV8 | FV8 |          |
|         | 3PW | FV8 | FV8 | 0        |
|         | 3PW | FV8 | FV8 | 1 MPa    |
|         | 4PW | FV8 | FV8 | 40 1 MPa |
|         | 4PW | FV8 | FV8 | 0 0      |

### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
|         |                  |

## Specifications

| Operating Parameters                     |                         | AP1202                                                                                     | AP1206                             | AP1210                              | AP1215                                                                      | AP1225                              |
|------------------------------------------|-------------------------|--------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-----------------------------------------------------------------------------|-------------------------------------|
| <b>Delivery pressure</b>                 |                         | 1 to 30 psig<br>(0.007 to 0.2 MPa)                                                         | 1 to 60 psig<br>(0.007 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig (0.034 to 1.0 MPa)<br>(Source pressure 1000 psig or less) *1) | Preset to 250 psig<br>(1.7 MPa) *2) |
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas                                    |                                    |                                     |                                                                             |                                     |
| <b>Source pressure</b>                   |                         | Vacuum to 1700 psig (11.7 MPa)                                                             |                                    |                                     |                                                                             |                                     |
| <b>Proof pressure</b>                    | <b>Inlet</b>            | 1.5 times the maximum source pressure                                                      |                                    |                                     |                                                                             |                                     |
|                                          | <b>Outlet</b>           | 1.5 times the maximum delivery pressure                                                    |                                    |                                     |                                                                             |                                     |
| <b>Burst pressure</b>                    | <b>Inlet</b>            | 3 times the maximum source pressure                                                        |                                    |                                     |                                                                             |                                     |
|                                          | <b>Outlet</b>           | 3 times the maximum delivery pressure                                                      |                                    |                                     |                                                                             |                                     |
| <b>Ambient and operating temperature</b> |                         | -40 to 71°C (No freezing) *3)                                                              |                                    |                                     |                                                                             |                                     |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                              |                                    |                                     |                                                                             |                                     |
|                                          | <b>Outboard leakage</b> | 2 x 10 <sup>-10</sup> Pa·m³/s *4)                                                          |                                    |                                     |                                                                             |                                     |
| <b>Across the seat leak</b>              |                         | 4 x 10 <sup>-9</sup> Pa·m³/s *5)                                                           |                                    |                                     |                                                                             |                                     |
| <b>Surface finish</b>                    |                         | Ra max 15 µin. (0.4 µm)<br>Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm)   |                                    |                                     |                                                                             |                                     |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                                                       |                                    |                                     |                                                                             |                                     |
| <b>Bonnet port</b>                       |                         | NPT 1/8 inch *6)                                                                           |                                    |                                     |                                                                             |                                     |
| <b>Supply pressure effect</b>            |                         | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                     |                                                                             |                                     |
| <b>Installation</b>                      |                         | Bottom mount (Option: panel mount)                                                         |                                    |                                     |                                                                             |                                     |
| <b>Internal volume</b>                   |                         | 1.07 in³ (17.6 cm³)                                                                        |                                    |                                     |                                                                             |                                     |
| <b>Weight</b>                            |                         | 2.0 kg *7)                                                                                 |                                    |                                     |                                                                             |                                     |

- \*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 1700 psig (11.7 MPa), achievable delivery pressure is around 125 psig (0.86 MPa) (HF and FC option 120 psig (0.83 MPa)).
- \*2) 250 psig outlet pressure preset at 800 psig (5.5MPa) inlet pressure.
- \*3) -10 to 90°C for Polyimide seat.
- \*4) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
- \*5) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
- \*6) On panel mount option, bonnet port is not threaded.
- \*7) Weight, including individual boxed weight, may vary depending on connections or options.

# Single Stage Regulator for Ultra High Purity **AP1200 Series**

High flow (Tied-diaphragm)

## Options

### 1. High flow

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

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

### 2. Force compensation

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

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

### 3. High inlet pressure

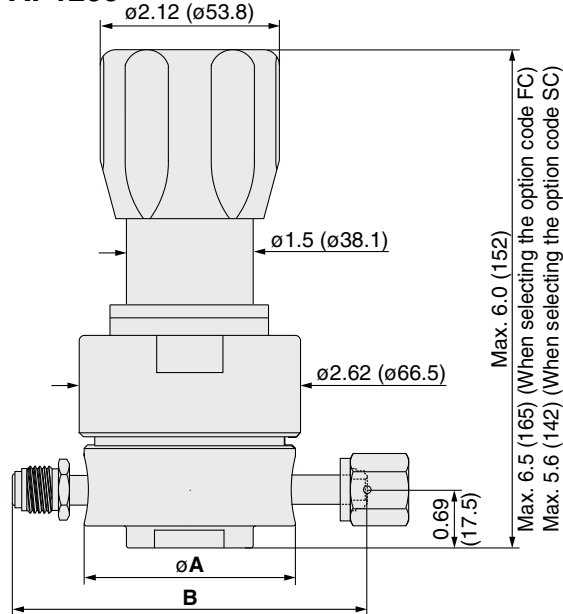
Changes from the standard type are:

| Option | Other Parameters | AP1210                         | AP1215 |
|--------|------------------|--------------------------------|--------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |        |

## Dimensions

inch (mm)

### AP1200



2 x M5 x 0.8, depth 0.3 (6.4)  
(Mounting hole)

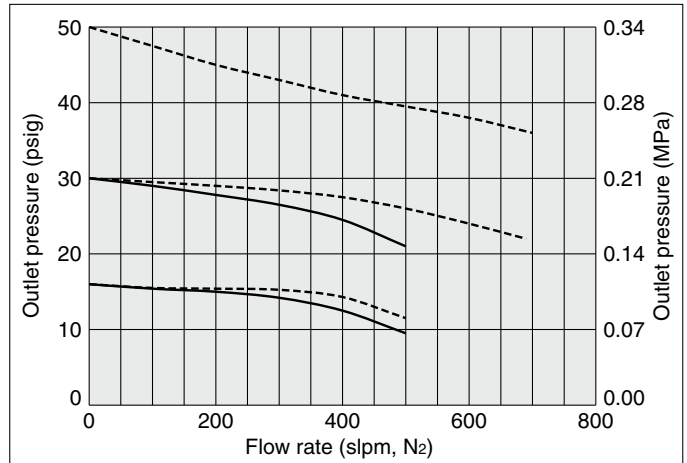
| Connections | A    |        | B    |         |
|-------------|------|--------|------|---------|
|             | inch | (mm)   | inch | (mm)    |
| FV4         | 2.00 | (50.8) | 3.70 | (94.0)  |
| MV4         |      |        | 4.00 | (101.6) |
| TW4         |      |        | 3.46 | (87.9)  |
| FV6 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

## Wetted Parts Material

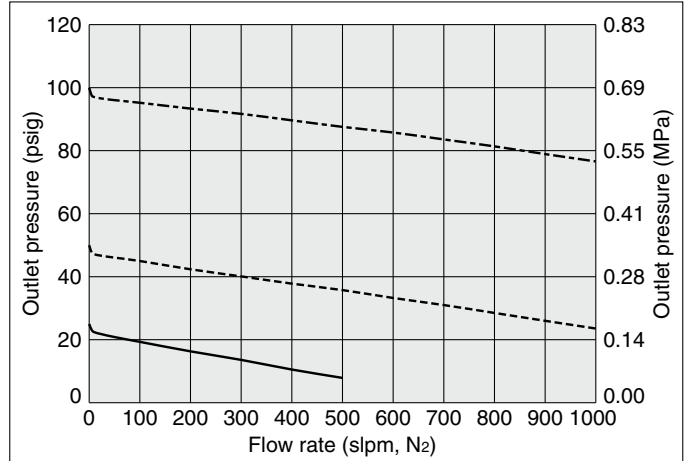
| Wetted Parts   | S                           | SHP            | SH             |
|----------------|-----------------------------|----------------|----------------|
| Body           | 316L SS secondary remelt    |                |                |
| Surface finish | Electropolish + Passivation |   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

## Flow Rate Characteristics

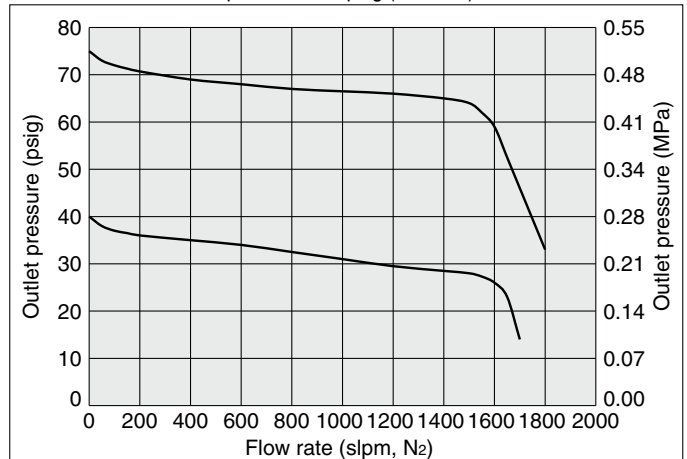
**AP1200** Inlet pressure: ---- 80 psig (0.55 MPa) — 60 psig (0.41 MPa)  
1/2 inch connections \*



**AP1200HF** Inlet pressure: --- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)  
— 50 psig (0.35 MPa)



**AP1200FC** Inlet pressure: 150 psig (1.0 MPa) 3/4 inch connections \*



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity High flow

## AP1300 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③

**AP13** **02** **S** **2PW** **FV8** **FV8**

**Delivery pressure**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet①, Outlet②)**

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

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

\*4) Bonnet port is not threaded. Panel mounting hole: dia. 1.56 inch (39.6 mm).

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| TF      | PTFE *3)         |

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

**Gauge port (Inlet③)**

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

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Material**

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

**Porting Configuration**

① IN ② OUT ③ Gauge port (Outlet)

**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   |
|---------|-----|-----|-----|
| AP1302S | 2PW | FV8 | FV8 |
|         | 3PW | FV8 | 0   |
|         | 3PW | FV8 | V3  |

## Specifications

| Operating Parameters              |                  | AP1302                                                                                | AP1306                          | AP1310                           | AP1315                           |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| 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            | 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                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                                 |                                  |                                  |
|                                   | Outboard leakage | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *1)                                        |                                 |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s                                             |                                 |                                  |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                 |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                  |                                 |                                  |                                  |
| Supply pressure effect            |                  | 4.6 psig (0.031 MPa) delivery pressure per 100 psig (0.7 MPa) source pressure drop    |                                 |                                  |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                    |                                 |                                  |                                  |
| Internal volume                   |                  | 1.19 in <sup>3</sup> (19.6 cm <sup>3</sup> )                                          |                                 |                                  |                                  |
| Weight                            |                  | 2.0 kg *2)                                                                            |                                 |                                  |                                  |

\*1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

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

## Wetted Parts Material

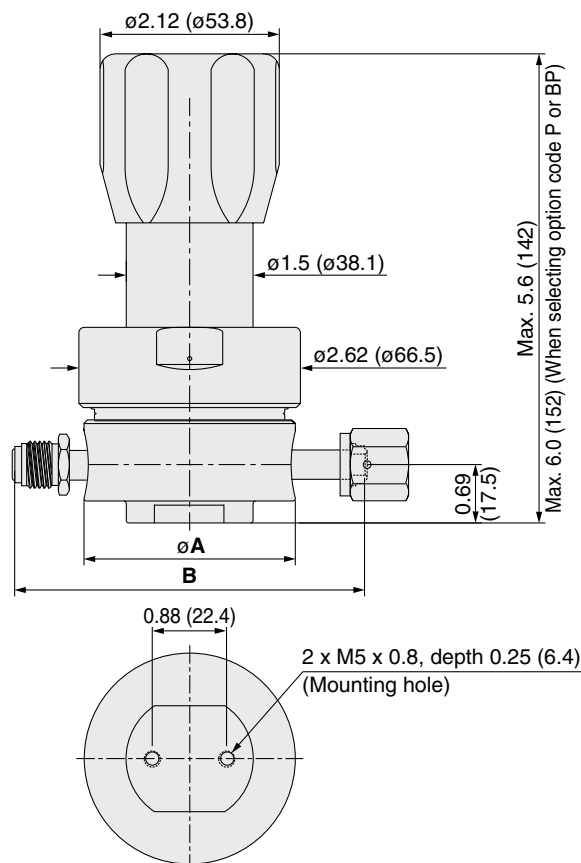
| Wetted Parts   | S                           | SHP            |
|----------------|-----------------------------|----------------|
| Body           | 316L SS secondary remelt    |                |
| Surface finish | Electropolish + Passivation |                |
| Poppet         | 316L SS          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

## Dimensions

inch (mm)

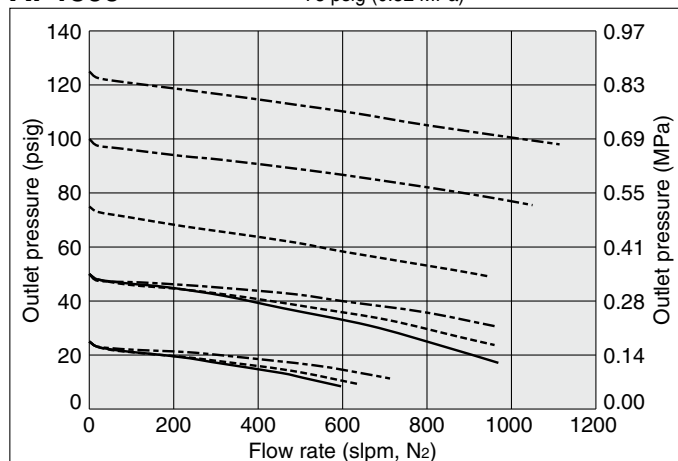
### AP1300

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

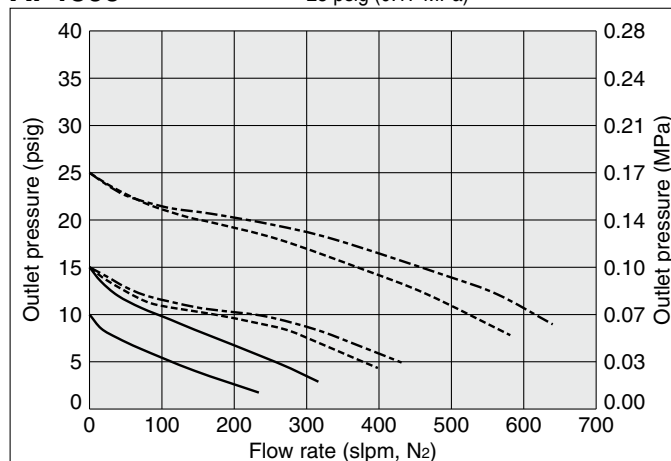


## Flow Rate Characteristics

**AP1300** Inlet pressure: --- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)  
— 75 psig (0.52 MPa)



**AP1300** Inlet pressure: --- 75 psig (0.52 MPa) ---- 50 psig (0.34 MPa)  
— 25 psig (0.17 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity Bulk gas delivery

## AP9000 & 9100 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP9 0 10 S 2PW FV16 FV16**

**Size**

| Code | Cv |
|------|----|
| 0    | 3  |
| 1    | 4  |

**Delivery pressure**

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

**Material**

| Code | Material |
|------|----------|
| S    | 316L SS  |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPa     | MPa      |

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

**Gauge ports (Outlet ③)**

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

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Porting Configuration**

① IN ② OUT ③ Gauge port (Outlet)

**Sample Order Number**

| Port    | ①   | ②    | ③     |
|---------|-----|------|-------|
| AP9010S | 2PW | FV16 | FV16  |
|         | 3PW | FV16 | FV16  |
|         |     |      | H MPa |

## Specifications

| Operating Parameters              |                  | AP9010                                                                                        | AP9030                           | AP9110                                                                                        | AP9115                                                                    |
|-----------------------------------|------------------|-----------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Delivery pressure                 |                  | 5 to 100 psig (0.034 to 0.7 MPa)                                                              | Preset to 300 psig (2.1 MPa) *1) | 5 to 100 psig (0.034 to 0.7 MPa)                                                              | 5 to 150 psig (0.034 to 1.0 MPa)<br>(Source pressure 250 psig or less)*5) |
| Gas                               |                  | Select compatible materials of construction for the gas                                       |                                  |                                                                                               |                                                                           |
| Source pressure                   |                  | Vacuum to 1700 psig (11.7 MPa)                                                                |                                  | Vacuum to 800 psig (5.5 MPa)                                                                  |                                                                           |
| Proof pressure                    | Inlet            | 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) *2)                                                                 |                                  |                                                                                               |                                                                           |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                    |                                  |                                                                                               |                                                                           |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)                                                |                                  |                                                                                               |                                                                           |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                 |                                  |                                                                                               |                                                                           |
| Surface finish                    |                  | Ra max 15 µin (0.4 µm) or 10 µin (0.25 µm)                                                    |                                  |                                                                                               |                                                                           |
| Connections                       |                  | Face seal, Tube weld                                                                          |                                  |                                                                                               |                                                                           |
| Bonnet port                       |                  | NPT 1/8 inch                                                                                  |                                  |                                                                                               |                                                                           |
| Supply pressure effect            |                  | 3.7 psig (0.026 MPa) rise in delivery pressure per<br>100 psig (0.7 MPa) source pressure drop |                                  | 5.4 psig (0.038 MPa) rise in delivery pressure per<br>100 psig (0.7 MPa) source pressure drop |                                                                           |
| Internal volume                   |                  | 12 in <sup>3</sup> (197 cm <sup>3</sup> )                                                     |                                  |                                                                                               |                                                                           |
| Weight                            |                  | 5.9 kg *4)                                                                                    |                                  |                                                                                               |                                                                           |

\*1) At 800 psig (5.5 MPa) inlet pressure.

\*2) -10 to 90°C for Polyimide seat.

\*3) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

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

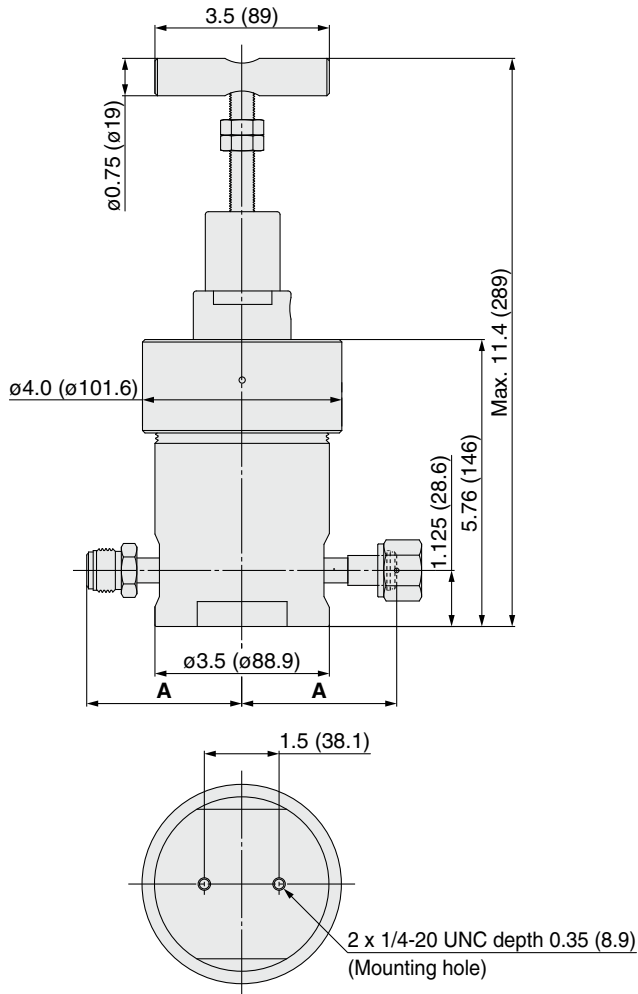
\*5) Source pressure above 250 psig (1.7 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 800 psig (5.5 MPa), achievable delivery pressure is around 119 psig (0.82 MPa).

**Wetted Parts Material**

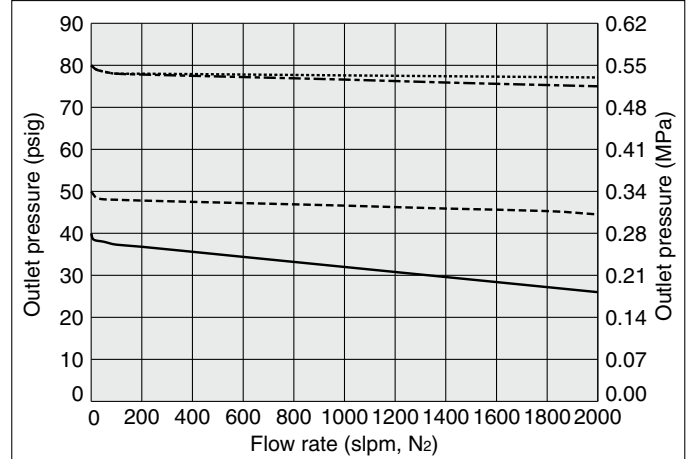
| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Poppet         | Ni-Cr-Mo alloy              |
| Bellows        | Ni-Cr-Mo alloy              |
| Nozzle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

**Dimensions**

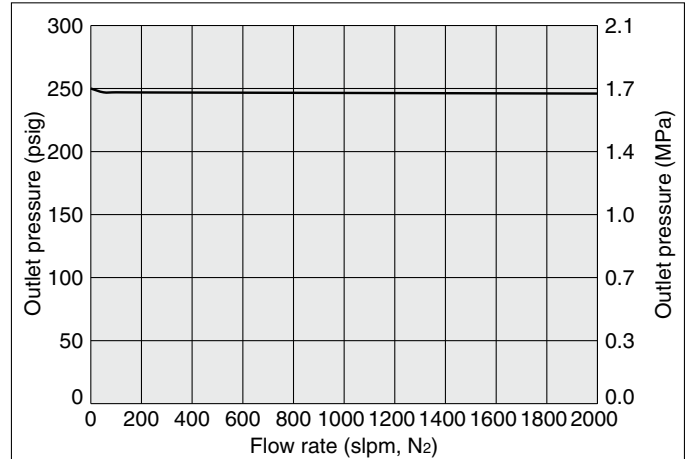
inch (mm)

**AP9000/9100**

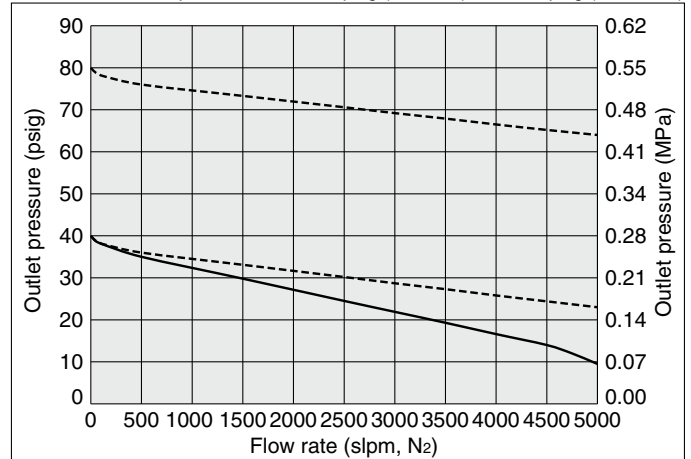
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV8         | 3.11 | (79.0)  |
| MV8         | 3.11 | (79.0)  |
| TW8         | 4.75 | (120.7) |
| FV12        | 3.64 | (92.5)  |
| MV12        | 3.64 | (92.5)  |
| TW12        | 4.75 | (120.7) |
| FV16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

**Flow Rate Characteristics****AP9010**Inlet pressure: ..... 1000 psig (6.9 MPa) --- 300 psig (2.1 MPa)  
----- 200 psig (1.4 MPa) — 75 psig (0.52 MPa)**AP9030**

Inlet pressure: — 600 psig (4.1 MPa)

**AP9110**

Inlet pressure: ---- 150 psig (1.0 MPa) — 75 psig (0.52 MPa)

Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## AP9000VSHR Series

- For UHP gas delivery
- High inlet pressure type VSHR: Max. 3000 psig (20.7 MPa)
- Flow capacity: to 4000 slpm
- Body material: 316L SS
- Tied-diaphragm design



### How to Order (See p. 250 for ordering syntax)

**AP90 10 S 2PW FV12 FV12 VS HR**

**Delivery pressure**

| Code | Delivery pressure                |
|------|----------------------------------|
| 10   | 5 to 100 psig (0.034 to 0.7 MPa) |
| 30   | Preset to 300 psig (2.1 MPa)     |

**Material**

| Code | Material |
|------|----------|
| S    | 316L SS  |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet①, Outlet②)**

| Code | Connections                     |
|------|---------------------------------|
| FV8  | 1/2 inch face seal (Female)     |
| MV8  | 1/2 inch face seal (Male)       |
| TW8  | 1/2 inch tube weld              |
| FV12 | 3/4 inch face seal (Female) *1) |
| MV12 | 3/4 inch face seal (Male) *1)   |
| TW12 | 3/4 inch tube weld              |

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

**Option**

| Code | Specification                                                  |
|------|----------------------------------------------------------------|
| HR   | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) |

**Seat material**

| Code | Material  |
|------|-----------|
| VS   | Polyimide |

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Gauge port (Outlet③)**

| Code    | Pressure gauge *1)                                       |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Porting Configuration**

① IN ② OUT ③ Gauge port (Outlet)

**Sample Order Number**

| Port    | ①   | ②    | ③    |   |     |    |    |  |
|---------|-----|------|------|---|-----|----|----|--|
| AP9010S | 2PW | FV12 | FV12 |   |     | VS | HR |  |
|         | 3PW | FV12 | FV12 | H | MPA | VS | HR |  |

## Specifications

| Operating Parameters              |                  | AP9010VSHR                                                                                 | AP9030VSHR                       |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|----------------------------------|
| Delivery pressure                 |                  | 5 to 100 psig (0.034 to 0.7 MPa)                                                           | Preset to 300 psig (2.1 MPa) *1) |
| Gas                               |                  | Select compatible materials of construction for the gas                                    |                                  |
| Source pressure                   |                  | Vacuum to 3000 psig (20.7 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 |                  | -29 to 100°C (No freezing)                                                                 |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *2)                                              |                                  |
| Surface finish                    |                  | Ra max 15 μin (0.4 μm) Option: 10 μin (0.25 μm)                                            |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                  |
| Bonnet port                       |                  | NPT 1/8 inch                                                                               |                                  |
| Supply pressure effect            |                  | 3.7 psig (0.026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                  |
| Internal volume                   |                  | 12 in <sup>3</sup> (197 cm <sup>3</sup> )                                                  |                                  |
| Weight                            |                  | 5.9 kg *3)                                                                                 |                                  |

\*1) At 800 psig (5.5 MPa) inlet pressure.

\*2) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

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

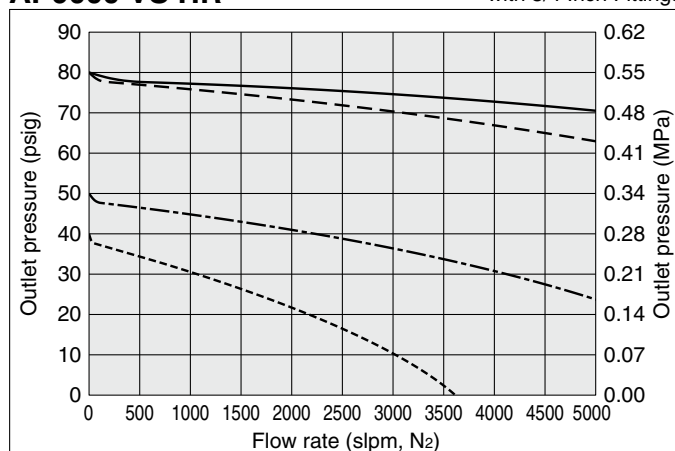
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Poppet         | Ni-Cr-Mo alloy              |
| Bellows        | Ni-Cr-Mo alloy              |
| Nozzle         | 316L SS                     |
| Seat           | Polyimide                   |
| Poppet spring  | Ni-Co alloy                 |
| Bonnet seal    | 316 SS                      |

## Flow Rate Characteristics

Inlet Pressure: — 1000 psig (6.9 MPa) --- 300 psig (2.1 MPa)  
 --- 200 psig (1.4 MPa) ----- 75 psig (0.52 MPa)  
 with 3/4 Inch Fittings

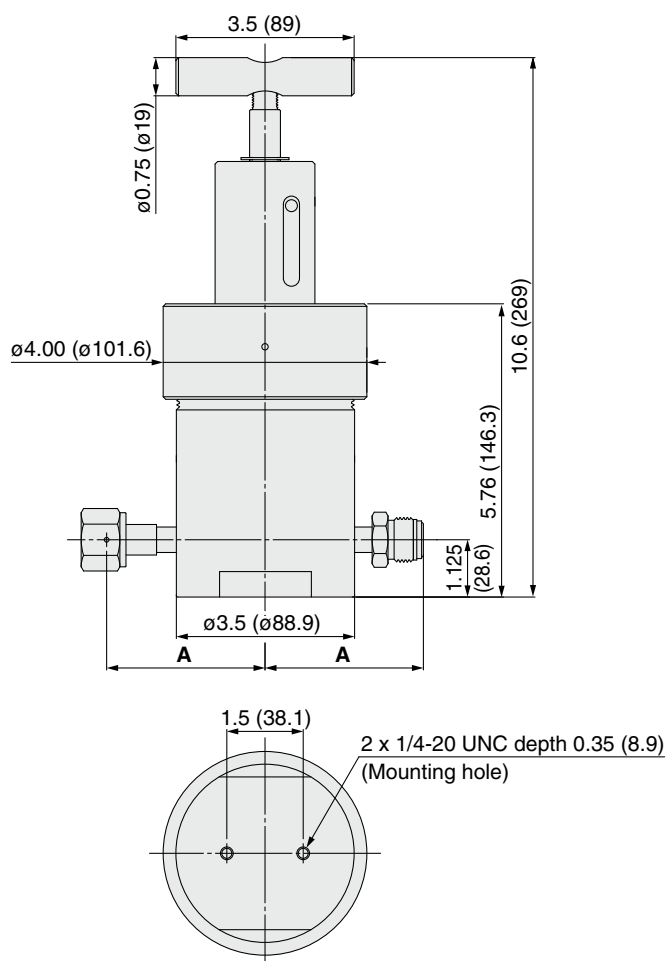
### AP9000 VS HR



## Dimensions

### AP9000VSHR

inch (mm)



| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV8         | 3.11 | (79.0)  |
| MV8         | 3.11 | (79.0)  |
| TW8         | 4.75 | (120.7) |
| FV12        | 3.64 | (92.5)  |
| MV12        | 3.64 | (92.5)  |
| TW12        | 4.75 | (120.7) |

# Two Stage Regulator for Ultra High Purity

Low flow  
(Tied-diaphragm)

## AP1700 Series

- For UHP gas delivery
- High inlet pressure type Standard: Max. 3500 psig (24.1 MPa), HR (option): Max. 4500 psig (31 MPa)
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Minimizes supply pressure effect by two stage regulation
- Tied-diaphragm design

How to Order (See p. 250 for ordering syntax)

RoHS



**Port Number**

① ② ③ ④ ⑤

**AP17 02 S 2PW FV4 FV4**

• **Delivery pressure**

| Code | Delivery pressure                    |
|------|--------------------------------------|
| 02   | 1 to 30 psig (0.007 to 0.2 MPa)      |
| 06   | 2 to 60 psig (0.014 to 0.4 MPa)      |
| 10   | 2 to 100 psig (0.014 to 0.7 MPa)     |
| 20   | 5 to 200 psig (0.035 to 1.4 MPa) *1) |

\*1) When AP1720 is selected, selecting option "NT" is required.

• **Ports**

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

• **Material**

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

• **Surface finish**

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

• **Connections (Inlet ①, Outlet ②)**

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

• **Gauge port (MP port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *2)                                       |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| H       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| 1       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |
| 50      | 0 to 5000 psig (not applied)                             |

\*2) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator. Select a range higher than 1.59 MPa for the pressure gauge to be mounted to the MP port.

• **Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

• **Bonnet option**

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

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

• **Option**

| Code    | Specification                                                    |
|---------|------------------------------------------------------------------|
| No code | Standard                                                         |
| HF      | High flow                                                        |
| HR      | High inlet pressure (Max. inlet pressure 4500 psig (31 MPa)) *5) |
| HRHF    | High inlet pressure + High flow *5)                              |

\*5) The connection is a 1/4 inch face seal.

• **Poppet feature option**

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

• **Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *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.

**Porting Configuration**

① IN ② OUT  
③ MP = Monitoring gauge port  
④ Gauge port (Inlet)  
⑤ Gauge port (Outlet)

**Sample Order Number**

| Port | ①   | ②   | ③ | ④  | ⑤      |
|------|-----|-----|---|----|--------|
| 2PW  | FV4 | FV4 |   |    |        |
| 3PW  | FV4 | FV4 |   |    | 0      |
| 3PWQ | FV4 | FV4 | 4 |    | MPA    |
| 4PW  | FV4 | FV4 |   | 0  | 0      |
| 5PWQ | FV4 | FV4 | 0 | 40 | V3 MPA |

## Specifications

| Operating Parameters              |                  | AP1702                                                                                        | AP1706                                                        | AP1710                           | AP1720                           |
|-----------------------------------|------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------|----------------------------------|
| 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 (0.035 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            | 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) *1)                                                                 |                                                               |                                  |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                                 |                                                               |                                  |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                             |                                                               |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m³/s *3)                                                              |                                                               |                                  |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)                                                                       | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                          |                                                               |                                  |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *4)                                                                              |                                                               |                                  |                                  |
| Supply pressure effect            |                  | 0.05 psig (0.00035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                                               |                                  |                                  |
| Installation                      |                  | Option: panel mount                                                                           |                                                               |                                  |                                  |
| Internal volume                   |                  | 0.92 in³ (15.1 cm³)                                                                           |                                                               |                                  |                                  |
| Weight                            |                  | 2.04 kg *5)                                                                                   |                                                               |                                  |                                  |

- \*1) -10 to 90°C for Polyimide seat.  
\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).  
\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).  
\*4) On panel mount option, bonnet port is not threaded.  
\*5) Weight, including individual boxed weight, may vary depending on connections or options.

Changes from the standard type are:

| Option | Other Parameters | AP1702                       | AP1706 | AP1710 | AP1720 |
|--------|------------------|------------------------------|--------|--------|--------|
| HB     | Source pressure  | Vacuum to 4500 psig (31 MPa) |        |        |        |

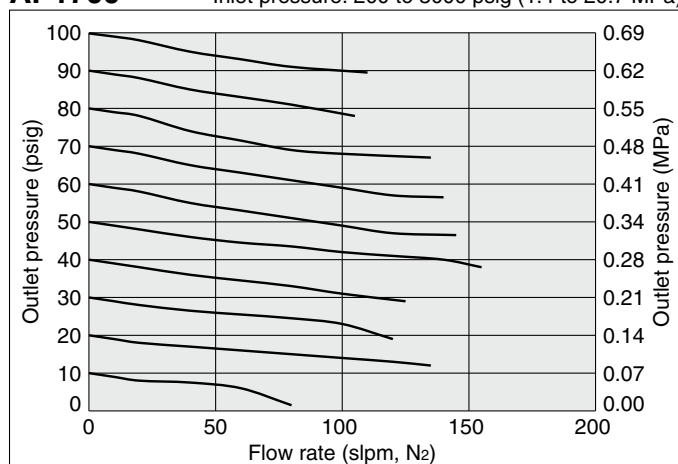
| Wetted Parts   | S                            | SH             |
|----------------|------------------------------|----------------|
| Body           | 316L SS secondary remelt     |                |
| Surface finish | Electropolish + Passivation  |                |
| Poppet         | 316L SS      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

inch (mm)

[illegible]

| Connections              | A    |         |
|--------------------------|------|---------|
|                          | inch | (mm)    |
| <b>FV4</b><br><b>MV4</b> | 3.70 | (94.0)  |
| <b>TW4</b>               | 2.96 | (75.2)  |
| <b>FV6</b><br><b>MV6</b> | 4.70 | (119.4) |
| <b>TW6</b>               | 2.96 | (75.2)  |

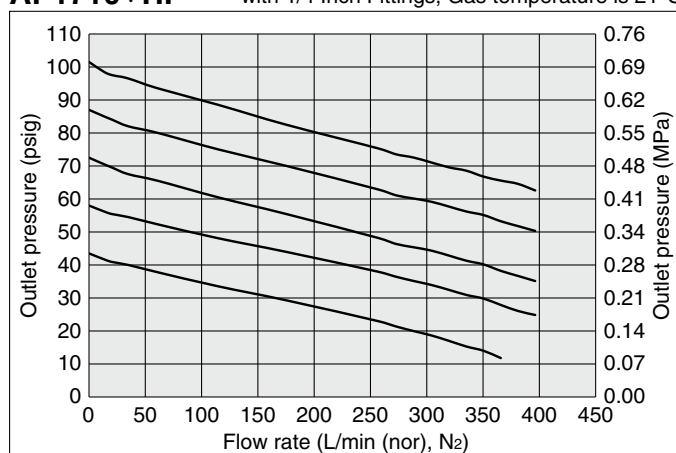
Inlet pressure: 200 to 3000 psig (1.4 to 20.7 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

Inlet pressure: — 220 psig (1.5 MPa)

with 1/4 Inch Fittings, Gas temperature is 21°C



# Two Stage Regulator for Ultra High Purity

Intermediate flow  
(Tied-diaphragm)

## AP2700 Series

- For UHP gas delivery
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity to 150 slpm (NF<sub>3</sub>)  
to 900 slpm (H<sub>2</sub>)
- Body material: 316L SS secondary remelt
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Minimizes supply pressure effect by two stage regulation

- Tied-diaphragm design



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④ ⑤

**AP27 02 S 2PW FV4 FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

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

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *4) |

\*4) Bonnet port is not threaded.  
Panel mounting hole: dia. 1.56 inch (39.6 mm).

**Seat material**

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

\*3) Not available with SH material.

**Pressure gauge unit** \*2)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (MP port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *1)                                       |
|---------|----------------------------------------------------------|
| No code | No pressure gauge (Connections: 1/4 inch face seal male) |
| 0       | No pressure gauge                                        |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |

\*1) Refer to gauge guide (P. 139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator. Select a range higher than 1.59 MPa for the pressure gauge to be mounted to the MP port.

**Porting Configuration**

① IN ② OUT ③ MP = Monitoring gauge port  
④ Gauge port (Inlet) ⑤ Gauge port (Outlet)

**Sample Order Number**

| Port    | ①    | ②   | ③   | ④ | ⑤         |
|---------|------|-----|-----|---|-----------|
| AP2702S | 2PW  | FV4 | FV4 |   |           |
|         | 3PW  | FV4 | FV4 | 0 |           |
|         | 3PWQ | FV4 | FV4 | 4 | MPA       |
|         | 4PW  | FV4 | FV4 | 0 | 0         |
|         | 5PWQ | FV4 | FV4 | 0 | 40/V3 MPA |

## Specifications

| Operating Parameters              |                  | AP2702                                                                                        | AP2706                          | AP2710                           | AP2712                           |
|-----------------------------------|------------------|-----------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig (0.007 to 0.2 MPa)                                                               | 2 to 60 psig (0.014 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) | 3 to 120 psig (0.021 to 0.8 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                       |                                 |                                  |                                  |
| Source pressure                   |                  | Vacuum to 3500 psig (24.1 MPa)                                                                |                                 |                                  |                                  |
| First stage pressure              |                  | 200 psig (1.4 MPa)                                                                            |                                 |                                  |                                  |
| Proof pressure                    | Inlet            | 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) *1)                                                                 |                                 |                                  |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                    |                                 |                                  |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                                |                                 |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                 |                                 |                                  |                                  |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)         |                                 |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                          |                                 |                                  |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *4)                                                                              |                                 |                                  |                                  |
| Supply pressure effect            |                  | 0.01 psig (0.00007 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                  |
| Installation                      |                  | Option: panel mount                                                                           |                                 |                                  |                                  |
| Internal volume                   |                  | 1.87 in <sup>3</sup> (30.6 cm <sup>3</sup> )                                                  |                                 |                                  |                                  |
| Weight                            |                  | 2.27 kg *5)                                                                                   |                                 |                                  |                                  |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

\*4) On panel mount option, bonnet port is not threaded.

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

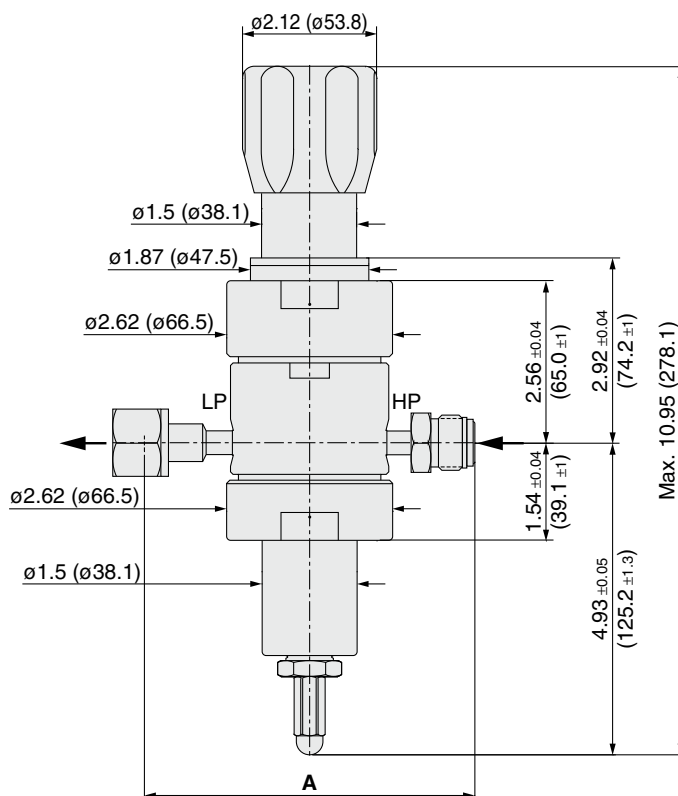
## Wetted Parts Material

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

## Dimensions

inch (mm)

### AP2700

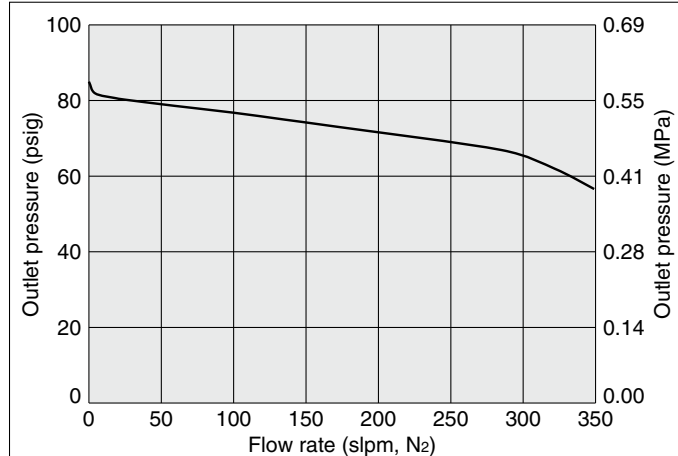


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 3.46 | (87.9)  |
| TW4         | 3.46 | (87.9)  |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |

## Flow Rate Characteristics

### AP2700

Inlet pressure: greater than 150 psig (1.0 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

### AP10PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP10 PA S 2PW FV4 FV4**

**Port Number** ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1                                        |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |

**Option**

| Code    | Specification |
|---------|---------------|
| No code | Standard      |
| HF      | High flow *6) |

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *3)    |
| TF      | PTFE *4) *5)     |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top view)**

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

### Specifications

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

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

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

\*2) -10 to 90°C for Polyimide seat.

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

## Option

### High flow

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

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

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

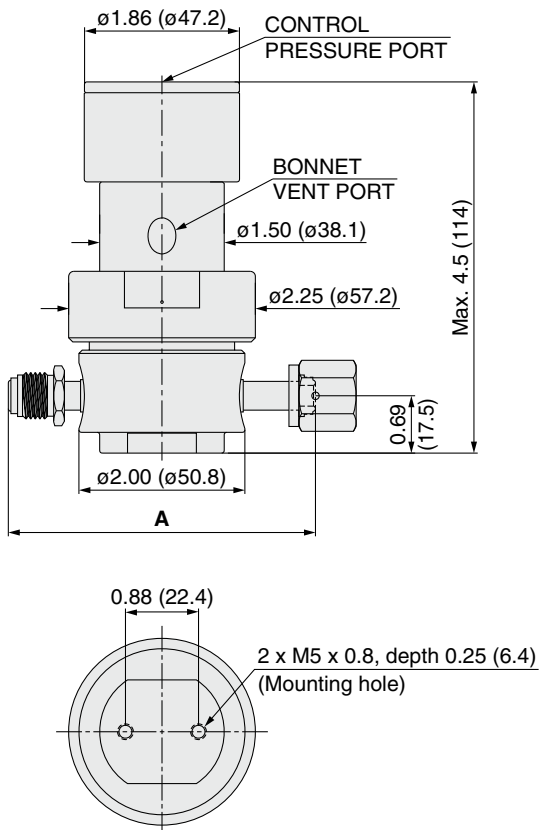
## Wetted Parts Material

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

## Dimensions

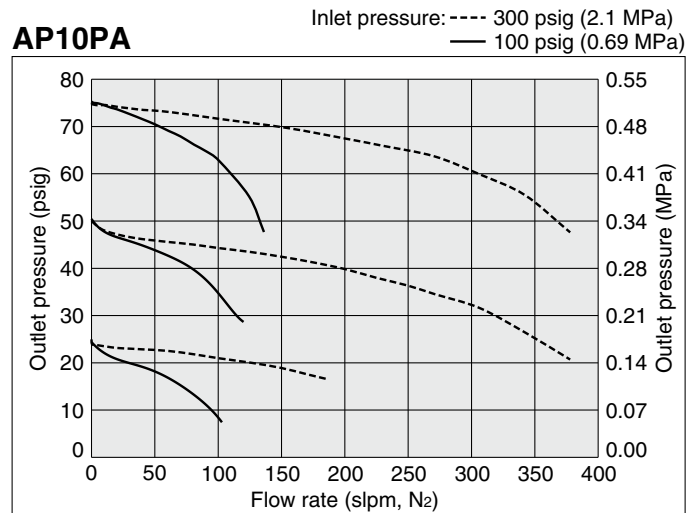
inch (mm)

### AP10PA



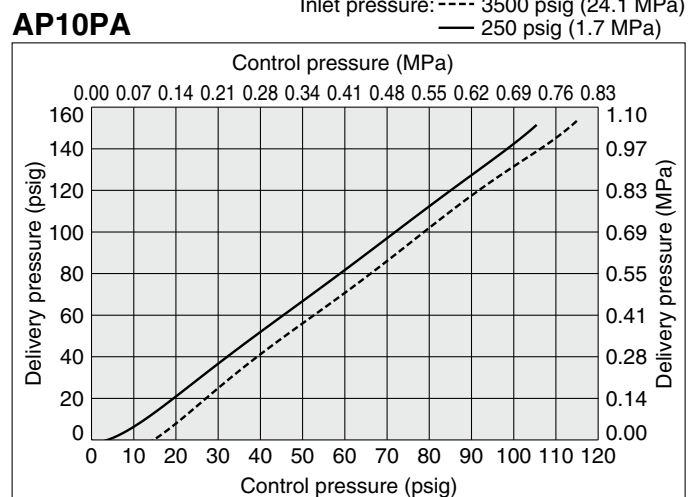
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         | 2.96 | (75.2)  |
| TW4         | 2.96 | (75.2)  |
| FV6         | 4.70 | (119.4) |
| MV6         | 2.96 | (75.2)  |
| TW6         | 2.96 | (75.2)  |

## Flow Rate Characteristics



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input/Output Characteristics



### AP15PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP15 PA S 2PW FV4 FV4**

Port Number ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Seat material**

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

\*3) Not available with SHP, SH, H materials.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                       |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Porting Configuration (Top view)**

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

## Specifications

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

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

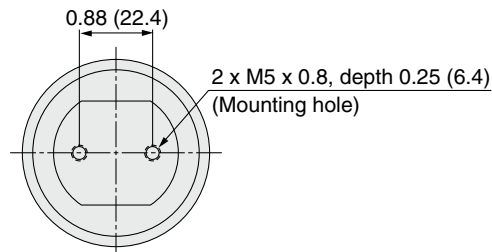
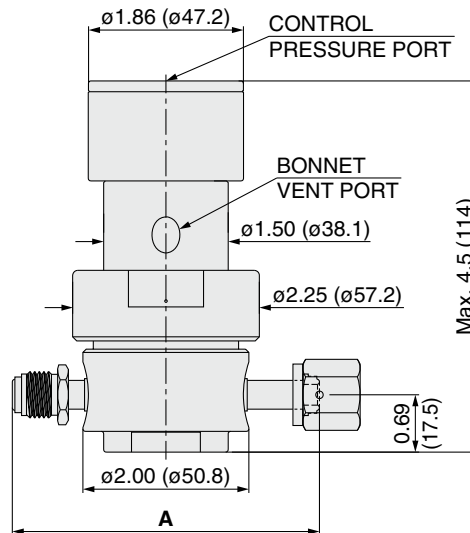
## Wetted Parts Material

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

## Dimensions

inch (mm)

### AP15PA

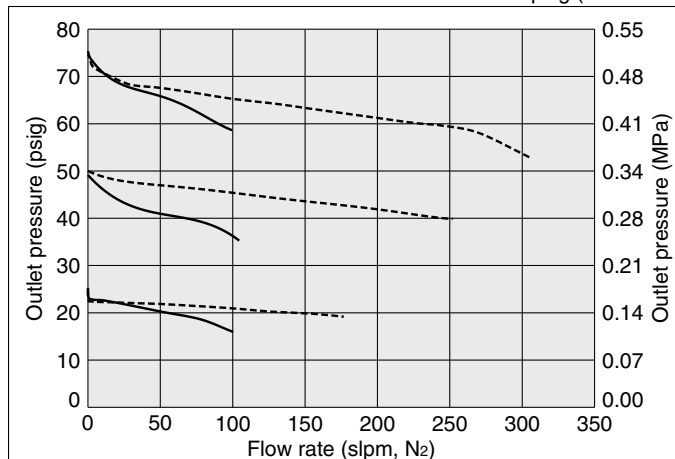


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         | 2.96 | (75.2)  |
| FW4         | 4.70 | (119.4) |
| MV6         | 2.96 | (75.2)  |

## Flow Rate Characteristics

### AP15PA

Inlet pressure: ---- 300 psig (2.1 MPa)  
— 100 psig (0.69 MPa)

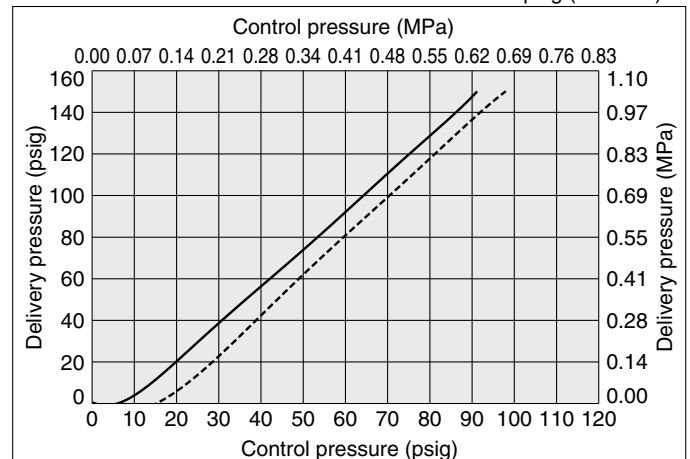


Note) slpm, N2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N2 gas is flowing.

## Input / Output Characteristics

### AP15PA

Inlet pressure: ---- 3500 psig (24.1 MPa)  
— 250 psig (1.7 MPa)



Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

AP

AZ

AK

Vacuum

Generators

Flow

Switches

Technical Data/

Glossary of Terms

Precautions

### AP14PAT Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP14 PA T S** **2PW** **FV4** **FV4**

**Port Number** ① ② ③ ④

**Delivery pressure**

| Code | Delivery pressure                                                                                          |
|------|------------------------------------------------------------------------------------------------------------|
| PA   | 7 to 150 psig (0.05 to 1.0 MPa)<br>Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa) |

**Material**

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

**Range options**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                          |                 |
|---------|-------------------------------------------------------------|-----------------|
| No code | psig/bar unit                                               | MPa unit        |
| 0       | No pressure gauge<br>(Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                        | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                        | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                       | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                       | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                               | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                               | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                              | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                              | 0 to 28 MPa     |

**Option**

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HR      | High inlet pressure *4)<br>(Max. inlet pressure 3000 psig (20.7 MPa)) |

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

**Seat material**

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

\*3) Not available with SH material.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |                  | AP14PAT□A                                                                                  | AP14PAT                         |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 7 to 150 psig (0.05 to 1.0 MPa) |
| 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            | 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                                                      |                                 |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                         |                                 |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                              |                                 |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |                                 |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                              |                                 |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)      |                                 |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                 |
| Control pressure port             |                  | NPT 1/8 inch                                                                               |                                 |
| Bonnet port                       |                  | NPT 1/8 inch                                                                               |                                 |
| Supply pressure effect            |                  | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |
| Installation                      |                  | Bottom mount                                                                               |                                 |
| Internal volume                   |                  | 1.06 in <sup>3</sup> (17.4 cm <sup>3</sup> )                                               |                                 |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AP14PAT                            |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

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

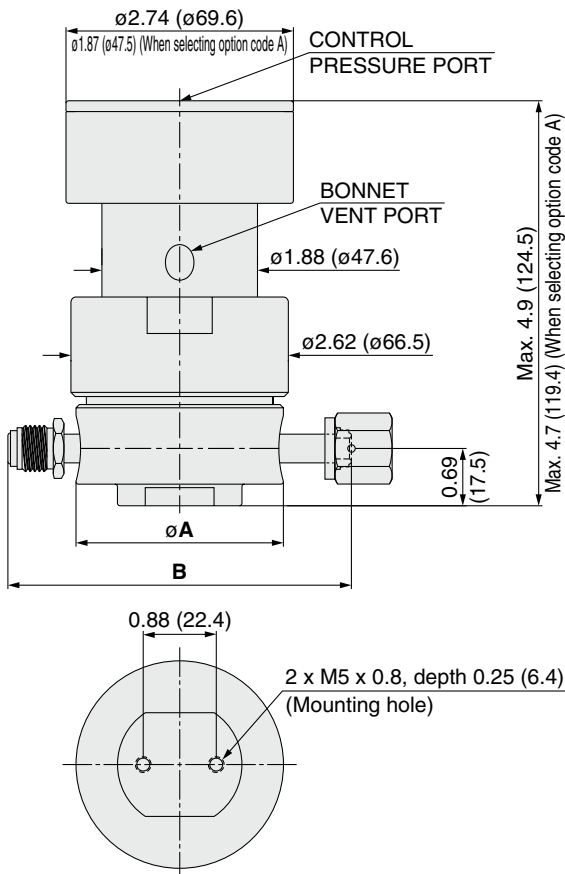
## Wetted Parts Material

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

## Dimensions

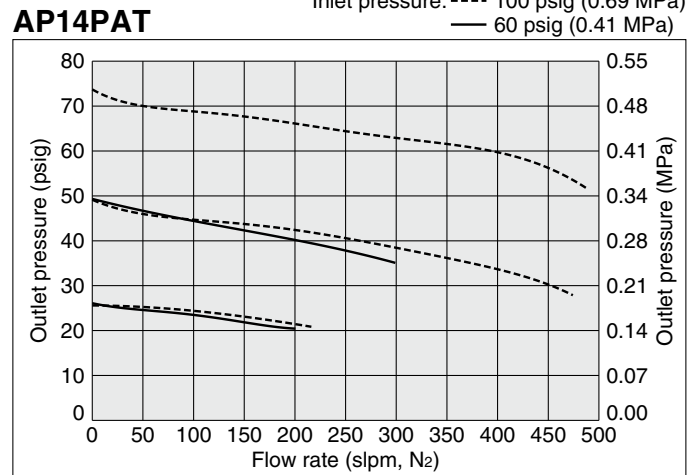
inch (mm)

### AP14PAT

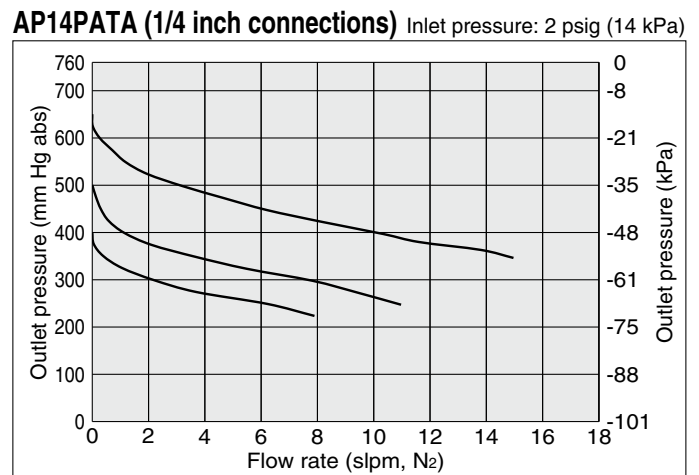


| Connections | A    |        | B    |         |
|-------------|------|--------|------|---------|
|             | inch | (mm)   | inch | (mm)    |
| FV4         | 2.00 | (50.8) | 3.70 | (94.0)  |
| MV4         |      |        | 4.00 | (101.6) |
| TW4         |      |        | 3.46 | (87.9)  |
| FV6 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

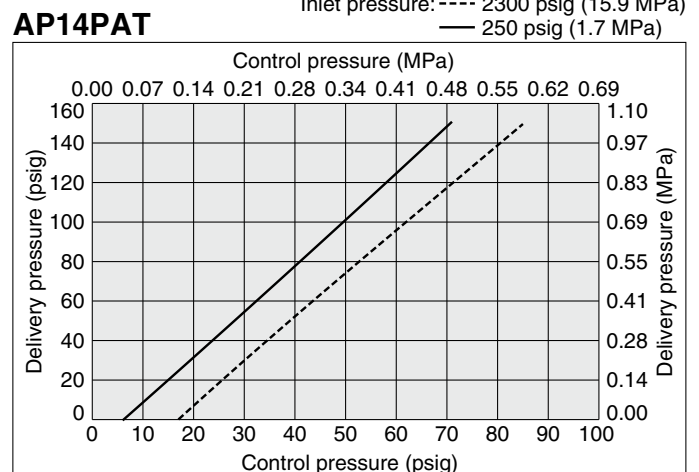
## Flow Rate Characteristics



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.



## Input / Output Characteristics



# Pneumatic Actuation Pressure Regulator

High flow  
(Tied-diaphragm)

## AP12PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AP12 PA S** **2PW** **FV8** **FV8**

**Port Number** ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

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

**Option**

| Code    | Specification                                                            |
|---------|--------------------------------------------------------------------------|
| No code | Standard                                                                 |
| HF      | High flow *5)*6)                                                         |
| HR      | High inlet pressure *5)*6)<br>(Max. inlet pressure 3000 psig (20.7 MPa)) |

\*5) Full outlet pressure rating may not be achieved at all inlet pressure.  
\*6) Options "HF" and "HR" cannot be used in combination.

**Seat material**

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

\*4) Not available with SHP and SH materials.

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *2)                                       |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |
| 40      | 0 to 4000 psig 0 to 28 MPa                               |

\*2) Refer to gauge guide (P.139) for gauge specifications.  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |                  | AP12PA                                                                                     |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 7 to 150 psig (0.05 to 1.0 MPa)                                                            |
| Gas                               |                  | Select compatible materials of construction for the gas                                    |
| Source pressure                   |                  | Vacuum to 1700 psig (11.7 MPa)                                                             |
| Proof pressure                    | Inlet            | 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                                                      |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                         |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                              |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)      |
| Connections                       |                  | Face seal, Tube weld                                                                       |
| Control pressure port             |                  | NPT 1/8 inch                                                                               |
| Bonnet port                       |                  | NPT 1/8 inch                                                                               |
| Supply pressure effect            |                  | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |                  | Bottom mount                                                                               |
| Internal volume                   |                  | 1.20 in <sup>3</sup> (19.6 cm <sup>3</sup> )                                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

## Options

### 1. High flow

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

| Option | Other Parameters       | AP12PA                                                                                     |
|--------|------------------------|--------------------------------------------------------------------------------------------|
| HF     | Delivery pressure      | 7 to 150 psig (0.05 to 1.0 MPa) *)                                                         |
|        | Supply pressure effect | 4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AP12PA                             |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

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

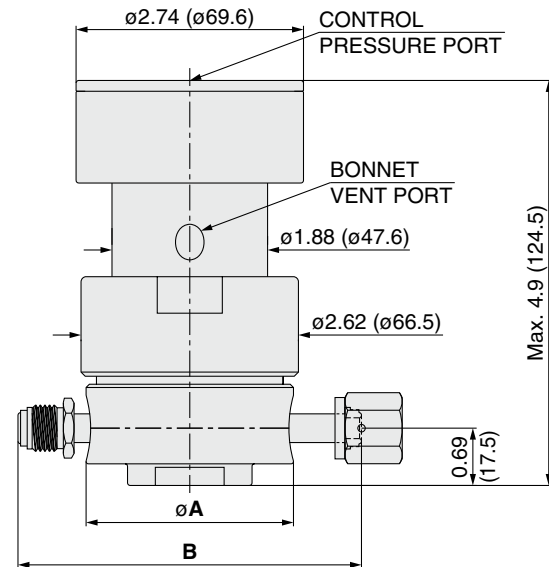
## Wetted Parts Material

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

## Dimensions

inch (mm)

### AP12PA



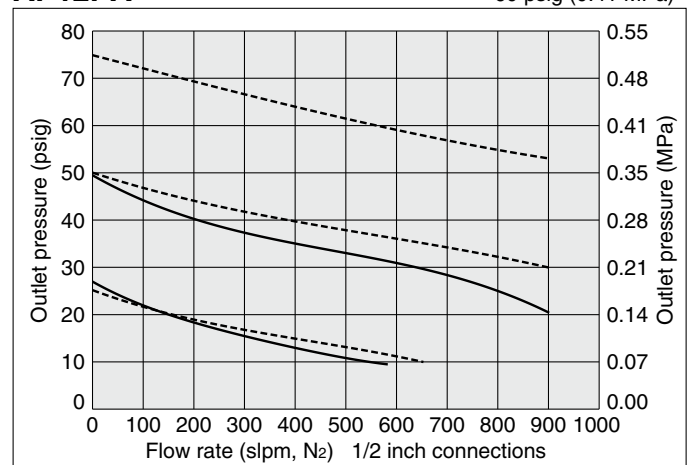
| Connections | A    |        | B    |         |
|-------------|------|--------|------|---------|
|             | inch | (mm)   | inch | (mm)    |
| FV4         | 2.00 | (50.8) | 3.70 | (94.0)  |
| MV4         |      |        | 4.00 | (101.6) |
| TW4         |      |        | 3.46 | (87.9)  |
| FV6 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

2 x M5 x 0.8, depth 0.25 (6.4)  
(Mounting hole)

## Flow Rate Characteristics

### AP12PA

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

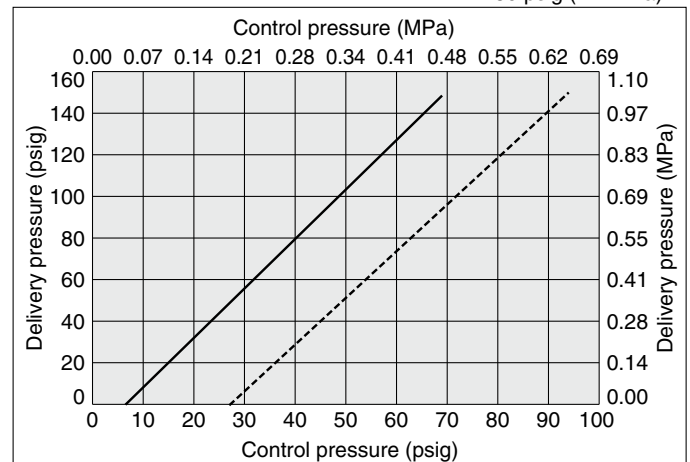


Note) slpm, N2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N2 gas is flowing.

## Input / Output Characteristics

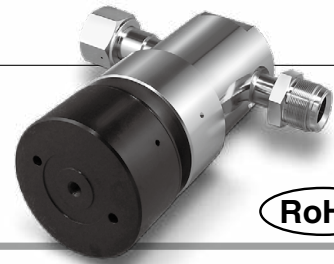
### AP12PA

Inlet pressure: ---- 1700 psig (11.7 MPa)  
— 250 psig (1.7 MPa)



## AP90PA & 91PA Series

- Actuation control pressure isolated from process gas by two seals
- Body material: 316L SS
- Flow capacity: to 5000 slpm



RoHS

How to Order (See p. 250 for ordering syntax)

**AP 90PA S 2PW FV16 FV16**

**Port Number**  
① ② ③

**Size and delivery pressure**

| Code | Cv | Delivery pressure                |
|------|----|----------------------------------|
| 90PA | 3  | 10 to 100 psig (0.07 to 0.7 MPa) |
| 91PA | 4  | 10 to 150 psig (0.07 to 1.0 MPa) |

**Material**

| Code | Material |
|------|----------|
| S    | 316L SS  |

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

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

**Gauge port (Inlet ③)**

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

\*2) Refer to gauge guide (P.139) for gauge specifications.

**Option (Only for AP90PA)**

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HR      | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *4)*5) |

\*4) When "HR" is selected, select seat material "VS."  
\*5) Cannot be selected if connection "FV16," "MV16," or "TW16" is selected

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Porting Configuration**

① IN ② OUT ③ Gauge port (Outlet)

## Specifications

| Operating Parameters              |                  | AP90PA                                                                                     | AP91PA                                                                                     |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 10 to 100 psig (0.07 to 0.7 MPa) *1)                                                       | 10 to 150 psig (0.07 to 1.0 MPa) *2)                                                       |
| Gas                               |                  | Select compatible materials of construction for the gas                                    |                                                                                            |
| Source pressure                   |                  | Vacuum to 1700 psig (11.7 MPa)                                                             | Vacuum to 800 psig (5.5 MPa)                                                               |
| Proof pressure                    | Inlet            | 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                                                      |                                                                                            |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                         |                                                                                            |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *3)                                                              |                                                                                            |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                                                                            |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                 |                                                                                            |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s                                                  |                                                                                            |
| Surface finish                    |                  | Ra max 15 μin (0.4 μm) Option: 10 μin (0.25 μm)                                            |                                                                                            |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                                                                            |
| Control pressure port             |                  | NPT 1/8 inch                                                                               |                                                                                            |
| Supply pressure effect            |                  | 3.7 psig (0.025 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop | 5.4 psig (0.037 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |                  | Bottom mount                                                                               |                                                                                            |
| Internal volume                   |                  | 12 in <sup>3</sup> (197 cm <sup>3</sup> )                                                  |                                                                                            |
| Weight                            |                  | 5.9 kg *4)                                                                                 |                                                                                            |

\*1) If the high inlet pressure option is selected, the delivery pressure range is 0.05 to 0.7 MPa.

\*2) When using a delivery pressure of 0.7 MPa or more, use a source pressure of 1.7 MPa or less. When the source pressure is 800 psig (5.5 MPa), the maximum delivery pressure is around 119 psig (0.82 MPa).

\*3) -10 to 90°C for Polyimide seat.

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

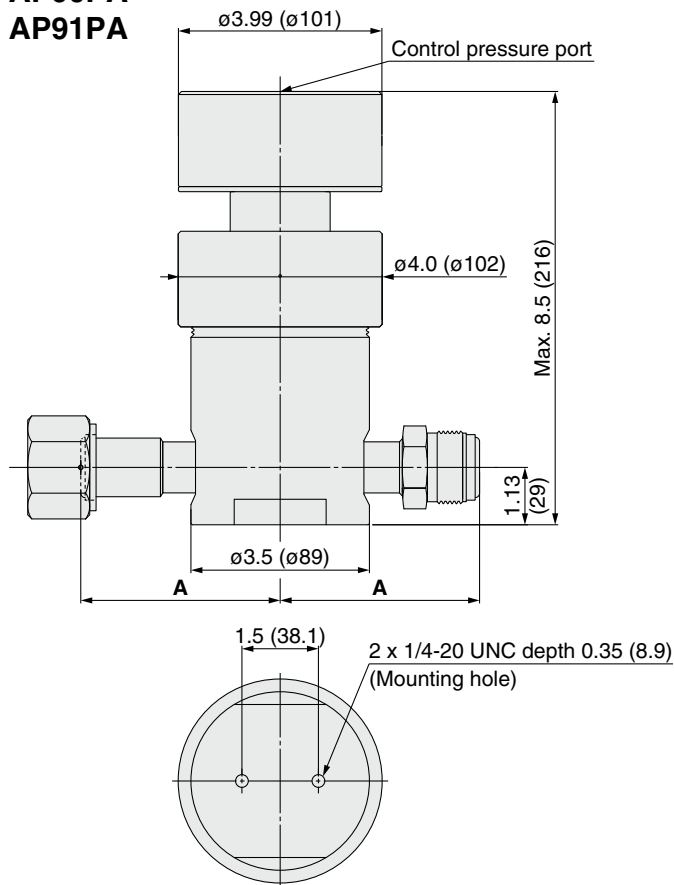
## Wetted Parts Material

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

## Dimensions

inch (mm)

### AP90PA AP91PA

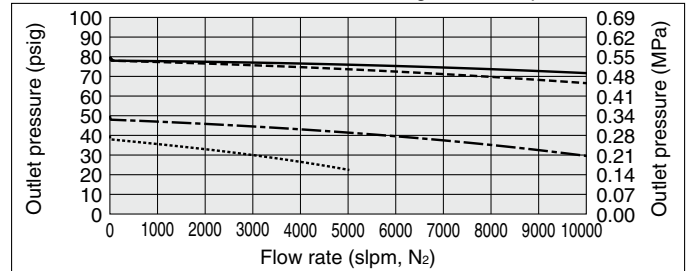


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV8         | 3.11 | (78.9)  |
| MV8         | 3.11 | (78.9)  |
| TW8         | 4.75 | (120.7) |
| FV12        | 3.64 | (92.5)  |
| MV12        | 3.64 | (92.5)  |
| TW12        | 4.75 | (120.7) |
| FV16        | 3.92 | (99.6)  |
| MV16        | 3.92 | (99.6)  |
| TW16        | 4.75 | (120.7) |

## Flow Rate Characteristics

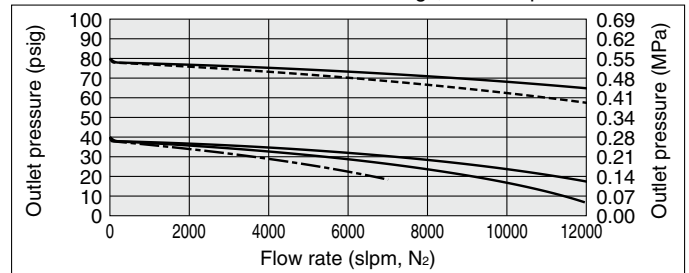
Inlet Pressure: — 1000 psig (6.9 MPa) --- 300 psig (2.1 MPa)  
 --- 200 psig (1.4 MPa) ---- 75 psig (0.52 MPa)  
 with 3/4 Inch Fittings, Gas temperature is 21°C

### AP90PA



Inlet Pressure: — 300 psig (2.1 MPa) ---- 150 psig (1 MPa) --- 75 psig (0.52 MPa)  
 with 3/4 Inch Fittings, Gas temperature is 21°C

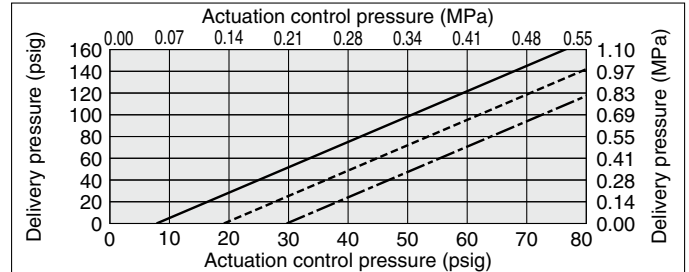
### AP91PA



## Input/Output Characteristics

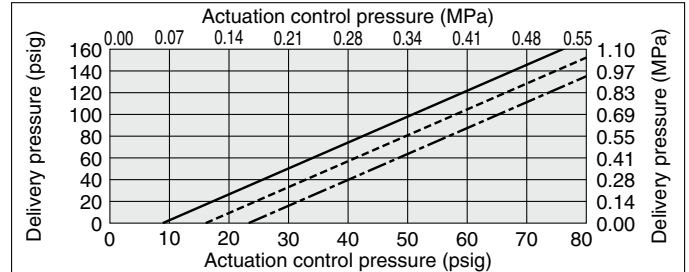
Inlet Pressure: — 250 psig (1.7 MPa) ---- 1000 psig (6.9 MPa)  
 --- 1700 psig (11.7 MPa)

### AP90PA



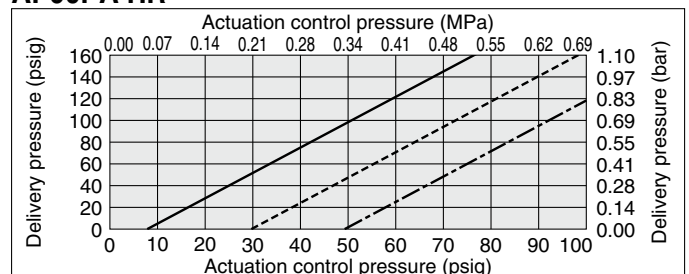
Inlet Pressure: — 200 psig (1.4 MPa) ---- 500 psig (3.5 MPa)  
 --- 800 psig (5.5 MPa)

### AP91PA



Inlet Pressure: — 250 psig (1.7 MPa) ---- 1700 psig (11.7 MPa)  
 --- 3000 psig (20.7 MPa)

### AP90PA HR



# Single Stage Compact Regulator for Ultra High Purity

## SL5200 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**SL52 02 S M 2PW FV4 FV4**

**Port Number**  
① ② ③

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Range options \*1)**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with SL5201.

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *5) |

\*5) Panel hole 1.25 inch (31.8mm) diameter.

**Option**

| Code    | Specification |
|---------|---------------|
| No code | Standard      |
| HF      | High flow     |

**Seat material**

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

\*4) Not available with SH material.

**Gauge port (Outlet ③)**

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

\*2) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

① IN  
② OUT  
③ Gauge port (Outlet)

## Specifications

| Operating Parameters              |                  | SL5201□□A                                                                                    | SL5201                                 | SL5202                                | SL5206                             | SL5210                              |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------|------------------------------------|-------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 10 psig<br>(-88 kPa to 0.07 MPa)                                       | 0.5 to 10 psig<br>(0.0034 to 0.07 MPa) | 0.5 to 30 psig<br>(0.0034 to 0.2 MPa) | 1 to 60 psig<br>(0.007 to 0.4 MPa) | 1 to 100 psig<br>(0.007 to 0.7 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |                                        |                                       |                                    |                                     |
| Source pressure                   |                  | Vacuum to 150 psig (1.0 MPa)                                                                 |                                        |                                       |                                    |                                     |
| Proof pressure                    | Inlet            | 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) *1)                                                                |                                        |                                       |                                    |                                     |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                                |                                        |                                       |                                    |                                     |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                            |                                        |                                       |                                    |                                     |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m³/s *2)                                                             |                                        |                                       |                                    |                                     |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)    Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm)     |                                        |                                       |                                    |                                     |
| Connections                       |                  | Face seal, Tube weld                                                                         |                                        |                                       |                                    |                                     |
| Supply pressure effect            |                  | 0.20 psig (0.0014 MPa) rise in delivery pressure per 20 psig (0.14 MPa) source pressure drop |                                        |                                       |                                    |                                     |
| Installation                      |                  | Bottom mount                                                                                 |                                        |                                       |                                    |                                     |
| Internal volume                   |                  | 0.19 in³ (3.1 cm³)                                                                           |                                        |                                       |                                    |                                     |
| Weight                            |                  | 0.45 kg *3)                                                                                  |                                        |                                       |                                    |                                     |

\*1) -10 to 90°C for Polyimide seat.

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

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

# Single Stage Compact Regulator for Ultra High Purity **SL5200 Series**

## Option

### High flow

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

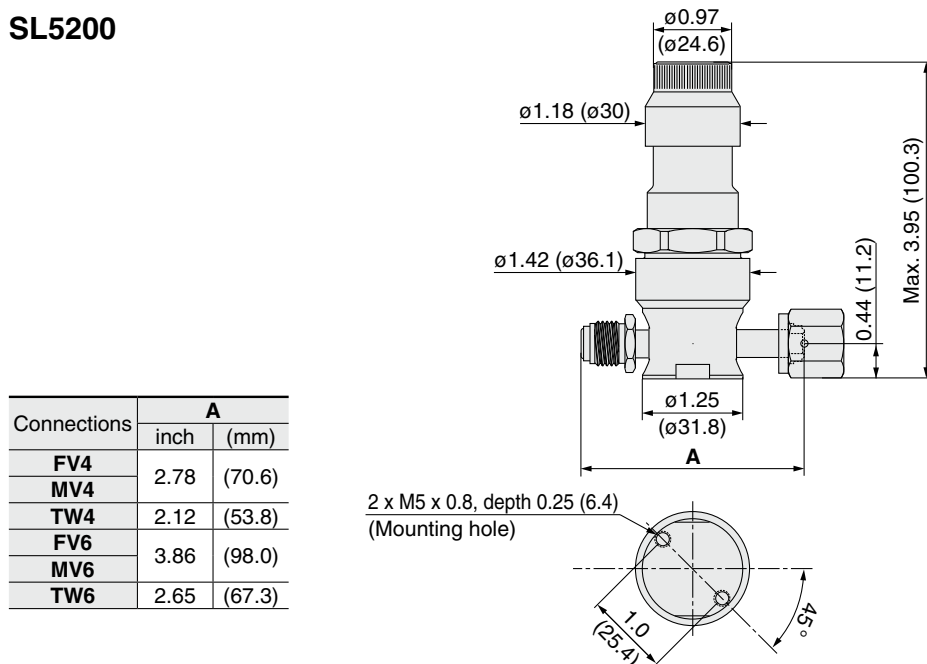
| Option | Other Parameters       | SL5201□□A                                                                                    | SL5201 | SL5202 | SL5206 | SL5210 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|--------|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

## Wetted Parts Material

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

## Dimensions

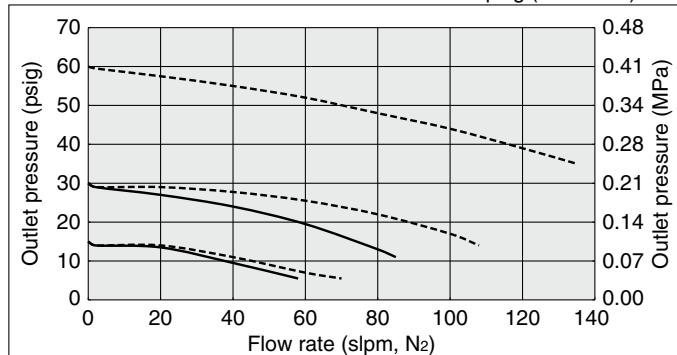
### SL5200



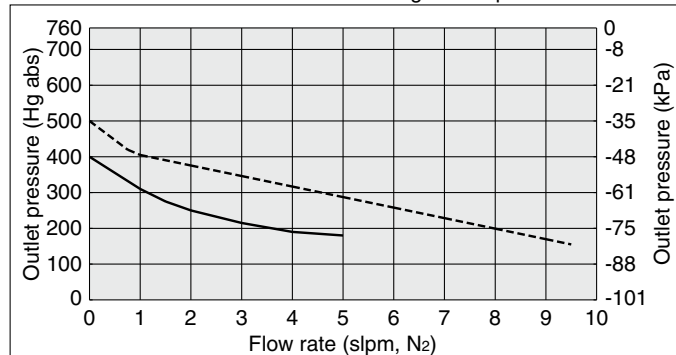
| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 2.78 | (70.6) |
| MV4         | 2.12 | (53.8) |
| FW6         | 3.86 | (98.0) |
| MV6         | 2.65 | (67.3) |

## Flow Rate Characteristics

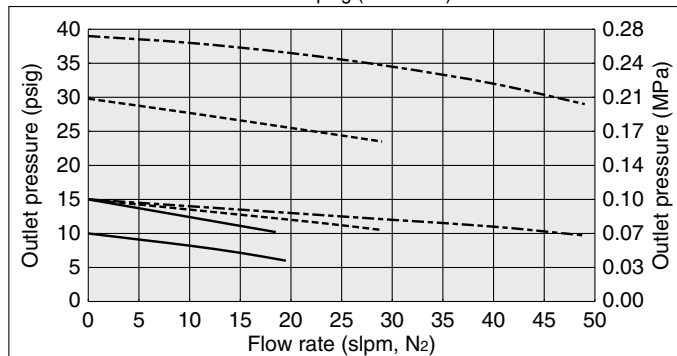
**SL5210HF** Inlet pressure: ---- 100 psig (0.69 MPa) inlet  
— 50 psig (0.34 MPa) inlet



**SL5201A** Inlet pressure: 2 psig (14 kPa)  
---- High flow option — Standard



**SL5210** Inlet pressure: --- 100 psig (0.69 MPa) --- 60 psig (0.41 MPa)  
— 30 psig (0.21 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity Low flow

## SL5500 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④

**SL55 02 S M 2PW FV4 FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Range options \*1)**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with SL5502.

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *2)                                          |
|---------|-------------------------------------------------------------|
| No code | No gauge port                                               |
| 0       | No pressure gauge<br>(Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                        |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                        |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                       |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                       |
| 2       | 0 to 200 psig 0 to 1.4 MPa                                  |
| 4       | 0 to 400 psig 0 to 3 MPa                                    |
| 10      | 0 to 1000 psig 0 to 7 MPa                                   |
| 40      | 0 to 4000 psig 0 to 28 MPa                                  |

\*2) Refer to gauge guide (P.139) for gauge specifications.  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *5) |

\*5) Bonnet port is not threaded.  
Panel mounting hole: dia. 1.56 inch (39.6 mm).

**Seat material**

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

\*4) Not available with SH material.

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Sample Order Number**

| Port    | ①   | ②   | ③   | ④        |
|---------|-----|-----|-----|----------|
| SL5510S | 2PW | FV4 | FV4 |          |
|         | 3PW | FV4 | FV4 | 0        |
|         | 3PW | FV4 | FV4 | 1 MPA    |
|         | 4PW | FV4 | FV4 | 0 0      |
|         | 4PW | FV4 | FV4 | 40 1 MPA |

## Specifications

| Operating Parameters              |                  | SL5502□□A                                                                                    | SL5502                             | SL5506                             | SL5510                              |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|-------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 30 psig<br>(-88 kPa to 0.2 MPa)                                        | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 1 to 60 psig<br>(0.007 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |                                    |                                    |                                     |
| Source pressure                   |                  | Vacuum to 3500 psig (24.1 MPa)                                                               |                                    |                                    |                                     |
| Proof pressure                    | Inlet            | 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) *1)                                                                |                                    |                                    |                                     |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                   |                                    |                                    |                                     |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                               |                                    |                                    |                                     |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                |                                    |                                    |                                     |
| Surface finish                    |                  | Ra max 10 μin. (0.25 μm) Option: 7 μin. (0.18 μm), 5 μin. (0.13 μm)                          |                                    |                                    |                                     |
| Bonnet port                       |                  | NPT 1/8 inch *4)                                                                             |                                    |                                    |                                     |
| Supply pressure effect            |                  | 0.25 psig (0.0017 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                    |                                     |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                           |                                    |                                    |                                     |
| Internal volume                   |                  | 0.55 in <sup>3</sup> (9 cm <sup>3</sup> )                                                    |                                    |                                    |                                     |
| Weight                            |                  | 1.63 kg *5)                                                                                  |                                    |                                    |                                     |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

\*4) On panel mount option, bonnet port is not threaded.

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

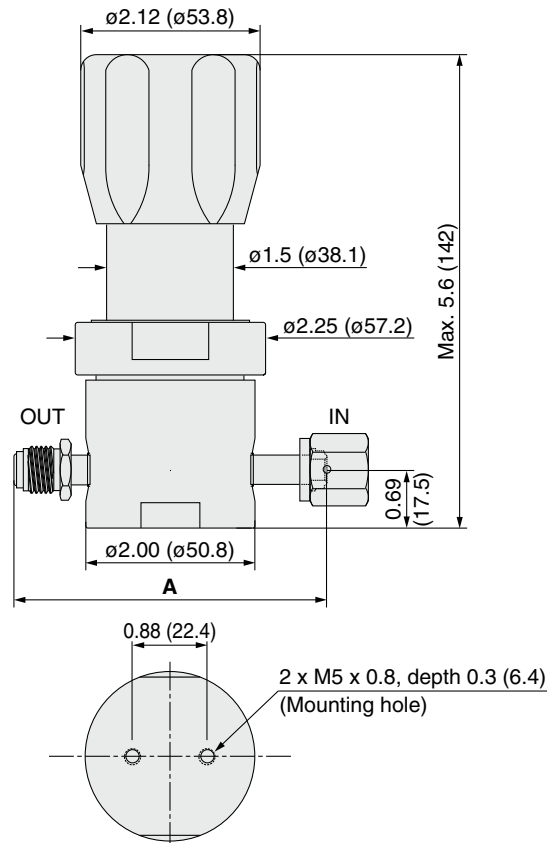
## Wetted Parts Material

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

## Dimensions

inch (mm)

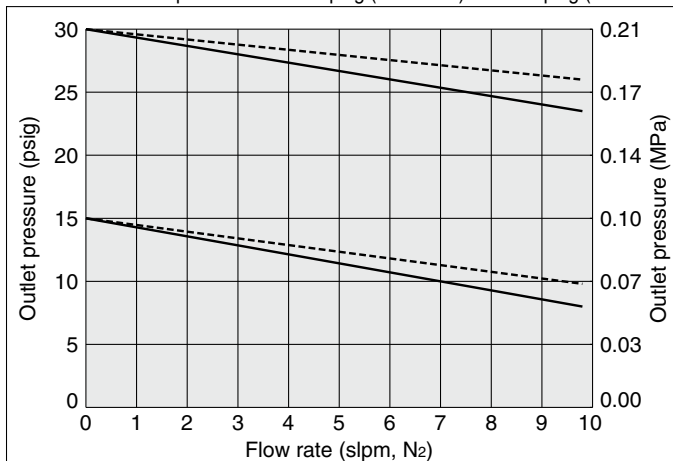
### SL5500



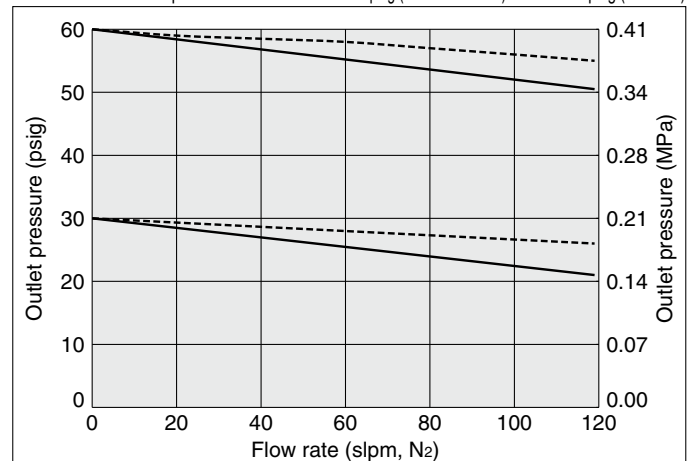
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         | 3.70 | (94.0)  |
| TW4         | 2.96 | (75.2)  |
| FV6         | 4.70 | (119.4) |
| MV6         | 4.70 | (119.4) |
| TW6         | 2.96 | (75.2)  |

## Flow Rate Characteristics

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



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



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity Intermediate flow

## SL5400 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④

**SL54** **02** **S** **M** **2PW** **FV4** **FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *4) |

\*4) Bonnet port is not threaded. Panel mounting hole: dia. 1.56 inch (39.6 mm).

**Seat material**

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

\*3) Not available with SH material.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                       |
|---------|----------------------------------------------------------|
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                     |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                     |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                    |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                    |
| 2       | 0 to 200 psig 0 to 1.4 MPa                               |
| 4       | 0 to 400 psig 0 to 3 MPa                                 |
| 10      | 0 to 1000 psig 0 to 7 MPa                                |

**Porting Configuration**

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

**Sample Order Number**

| Port    | ①   | ②   | ③   | ④     |
|---------|-----|-----|-----|-------|
| SL5410S | 2PW | FV4 | FV4 |       |
|         | 3PW | FV4 | FV4 | 0     |
|         | 3PW | FV4 | FV4 | 1 MPA |
|         | 4PW | FV4 | FV4 | 0 0   |

## Specifications

| Operating Parameters              |                  | SL5402                                                                                     | SL5406                          | SL5410                           |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig (0.007 to 0.2 MPa)                                                            | 1 to 60 psig (0.007 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                    |                                 |                                  |
| Source pressure                   |                  | Vacuum to 1000 psig (6.9 MPa)                                                              |                                 |                                  |
| Proof pressure                    | Inlet            | 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) *1)                                                              |                                 |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |                                 |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *2)                                              |                                 |                                  |
| Surface finish                    |                  | Ra max 10 μin. (0.25 μm) Option: 7 μin. (0.18 μm), 5 μin. (0.13 μm)                        |                                 |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                 |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *3)                                                                           |                                 |                                  |
| Supply pressure effect            |                  | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                         |                                 |                                  |
| Internal volume                   |                  | 1.2 in <sup>3</sup> (19.7 cm <sup>3</sup> )                                                |                                 |                                  |
| Weight                            |                  | 1.91 kg *4)                                                                                |                                 |                                  |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

\*3) On panel mount option, bonnet port is not threaded.

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

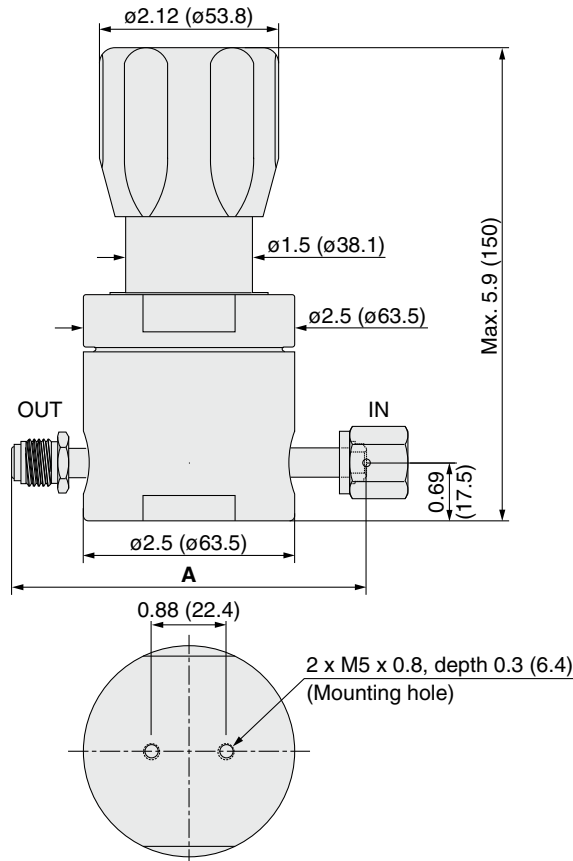
## Wetted Parts Material

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

## Dimensions

inch (mm)

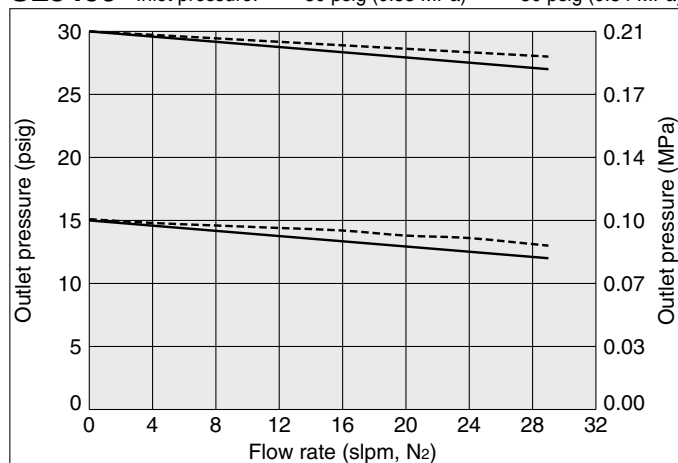
### SL5400



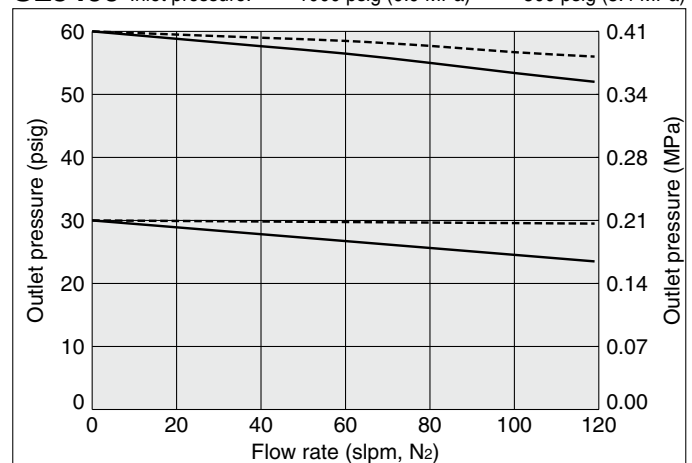
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| TW4         | 3.46 | (87.9)  |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |
| FV8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

## Flow Rate Characteristics

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



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



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity Intermediate flow

## SL5800 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④

**SL58 02 S M 2PW FV4 FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

| Code | Surface finish Ra max                |
|------|--------------------------------------|
| M    | 10 $\mu$ in. (0.25 $\mu$ m) Standard |
| V    | 7 $\mu$ in. (0.18 $\mu$ m)           |
| X    | 5 $\mu$ in. (0.13 $\mu$ m)           |

**Connections (Inlet①, Outlet②)**

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

**Bonnet option**

| Code    | Bonnet    |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

**Gauge port (Inlet③, Outlet④)**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Porting Configuration**

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

**Sample Order Number**

| Port    | ①   | ②   | ③   | ④     |
|---------|-----|-----|-----|-------|
| SL5810S | 2PW | FV4 | FV4 |       |
|         | 3PW | FV4 | FV4 | 0     |
|         | 3PW | FV4 | FV4 | 1 MPA |
|         | 4PW | FV4 | FV4 | 0 0   |

\*1) Refer to gauge guide (P.139) for gauge specifications.  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

## Specifications

| Operating Parameters              |                  | SL5802                                                                                            | SL5806                          | SL5810                           |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig (0.007 to 0.2 MPa)                                                                   | 1 to 60 psig (0.007 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                                           |                                 |                                  |
| Source pressure                   |                  | Vacuum to 300 psig (2.1 MPa)                                                                      |                                 |                                  |
| Proof pressure                    | Inlet            | 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) *1)                                                                     |                                 |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                        |                                 |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                                    |                                 |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                     |                                 |                                  |
| Surface finish                    |                  | Ra max 10 $\mu$ in. (0.25 $\mu$ m) Option: 7 $\mu$ in. (0.18 $\mu$ m), 5 $\mu$ in. (0.13 $\mu$ m) |                                 |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                              |                                 |                                  |
| Bonnet port                       |                  | NPT 1/8 inch *4)                                                                                  |                                 |                                  |
| Supply pressure effect            |                  | 5 psig (0.035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop          |                                 |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                                |                                 |                                  |
| Internal volume                   |                  | 1.2 in <sup>3</sup> (19.7 cm <sup>3</sup> )                                                       |                                 |                                  |
| Weight                            |                  | 1.91 kg *5)                                                                                       |                                 |                                  |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

\*3) Tested with Helium gas inlet pressure 100 psig (0.7 MPa).

\*4) On panel mount option, bonnet port is not threaded.

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

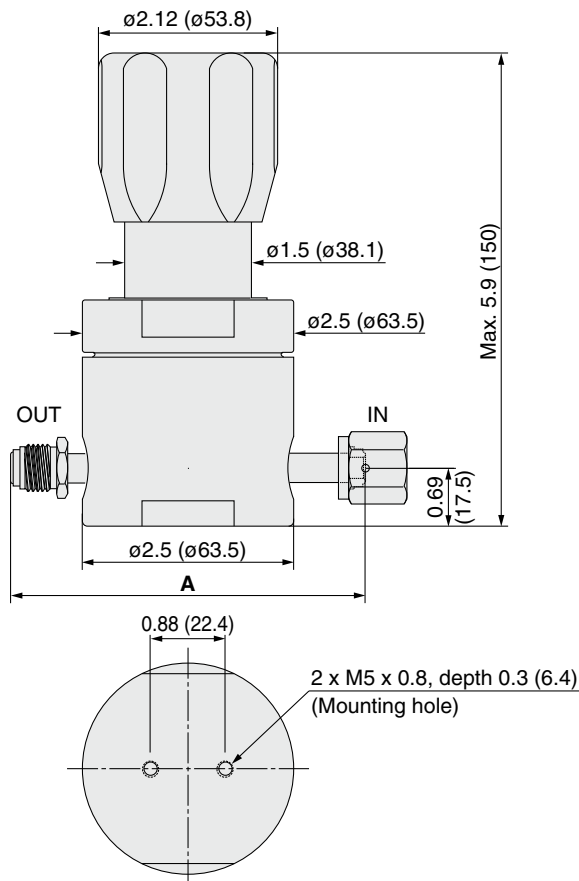
## Wetted Parts Material

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

## Dimensions

inch (mm)

### SL5800

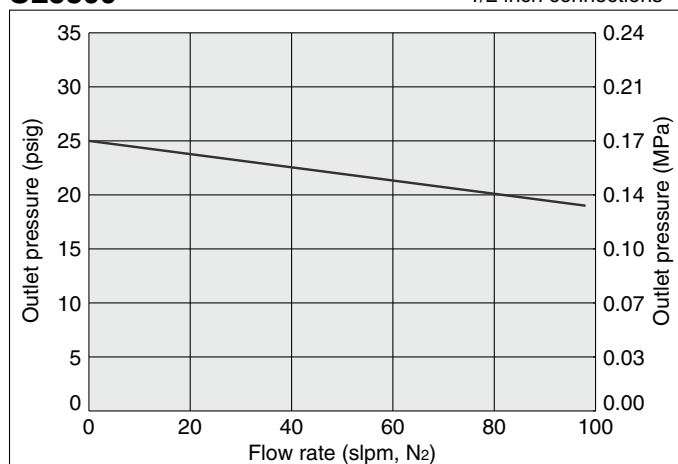


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| TW4         | 3.46 | (87.9)  |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |
| FV8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

## Flow Rate Characteristics

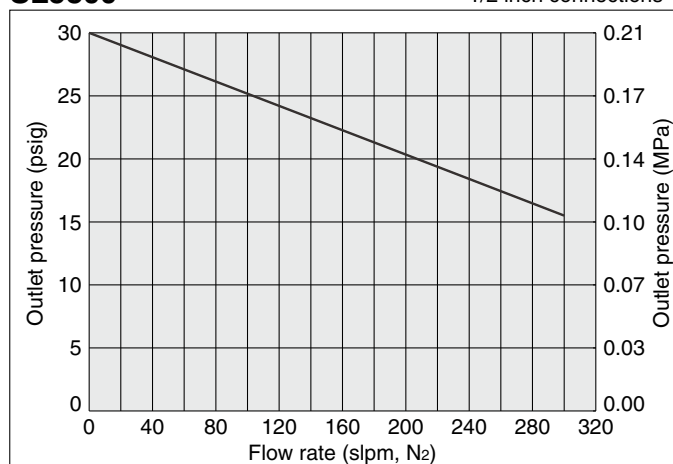
### SL5800

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



### SL5800

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



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Low to intermediate flow

## AZ1000 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

**AZ10** **01** **S** **2PW** **FV4** **FV4**

**Delivery pressure**

| Code | Delivery pressure                |
|------|----------------------------------|
| 01   | 1 to 10 psig (0.007 to 0.07 MPa) |
| 02   | 1 to 30 psig (0.007 to 0.2 MPa)  |
| 06   | 2 to 60 psig (0.014 to 0.4 MPa)  |
| 10   | 2 to 100 psig (0.014 to 0.7 MPa) |
| 15   | 5 to 150 psig (0.034 to 1.0 MPa) |
| 30   | 5 to 300 psig (0.034 to 2.1 MPa) |

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                          |
|---------|-------------------------------------------------------------|
|         | psig/bar unit      MPa unit                                 |
| No code | No gauge port                                               |
| 0       | No pressure gauge<br>(Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig      -0.1 to 0.2 MPa                   |
| L       | -30 in.Hg to 60 psig      -0.1 to 0.4 MPa                   |
| 1       | -30 in.Hg to 100 psig      -0.1 to 0.7 MPa                  |
| H       | -30 in.Hg to 160 psig      -0.1 to 1.1 MPa                  |
| 2       | 0 to 200 psig      0 to 1.4 MPa                             |
| 4       | 0 to 400 psig      0 to 3 MPa                               |
| 10      | 0 to 1000 psig      0 to 7 MPa                              |
| 40      | 0 to 4000 psig      0 to 28 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      |
| HF      | High flow     |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *3)    |
| TF      | PTFE *4) *5)     |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Sample Order Number**

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

## Specifications

| Operating Parameters              |                  | AZ1001                                                                                       | AZ1002                             | AZ1006                             | AZ1010                              | AZ1015                              | AZ1030                              |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |                  | 1 to 10 psig<br>(0.007 to 0.07 MPa)                                                          | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(0.034 to 1.0 MPa) | 5 to 300 psig<br>(0.034 to 2.1 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            | 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) *2)                                                                |                                    |                                    |                                     |                                     |                                     |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                                |                                    |                                    |                                     |                                     |                                     |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *3)                                                            |                                    |                                    |                                     |                                     |                                     |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m³/s *4)                                                             |                                    |                                    |                                     |                                     |                                     |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)    Option: 25 μin. (0.62 μm)                                            |                                    |                                    |                                     |                                     |                                     |
| Connections                       |                  | Face seal, Tube weld                                                                         |                                    |                                    |                                     |                                     |                                     |
| Supply pressure effect            |                  | 0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                    |                                     |                                     |                                     |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                           |                                    |                                    |                                     |                                     |                                     |
| Internal volume                   |                  | 0.49 in³ (8 cm³)                                                                             |                                    |                                    |                                     |                                     |                                     |
| Weight                            |                  | 1.25 kg *5)                                                                                  |                                    |                                    |                                     |                                     |                                     |

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

\*2) -10 to 90°C for Polyimide seat.

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

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

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

# AZ1000 Series

### High flow

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

| Option | Other Parameters       | AZ1001                                                                                       | AZ1002 | AZ1006 | AZ1010 | AZ1015 | AZ1030 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|
| HF     | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |        |        |        |        |        |

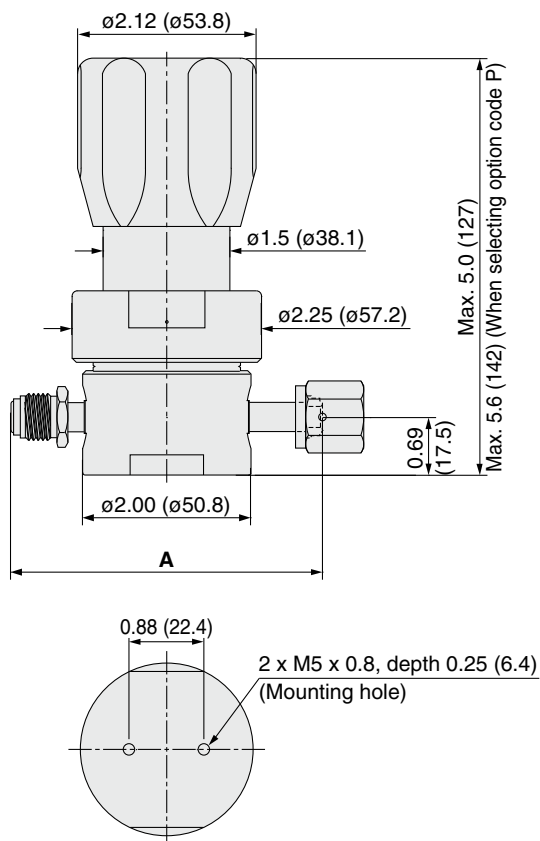
## Wetted Parts Material

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

## Dimensions

inch (mm)

## AZ1000

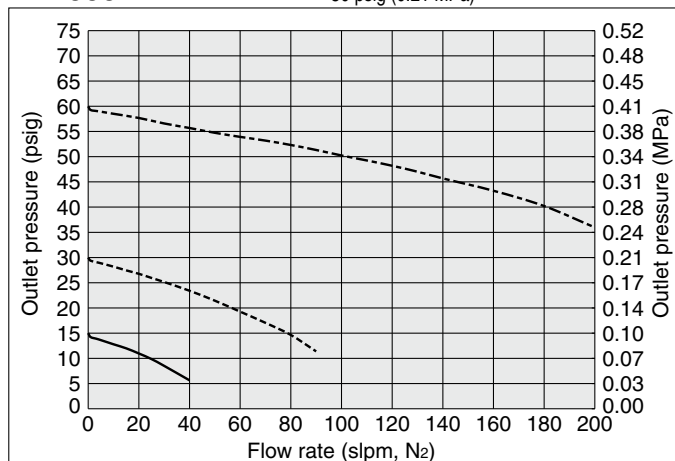


| Connections              | A    |         |
|--------------------------|------|---------|
|                          | inch | (mm)    |
| <b>FV4</b><br><b>MV4</b> | 3.70 | (94.0)  |
| <b>FV6</b><br><b>MV6</b> | 4.70 | (119.4) |
| <b>TW6</b>               | 2.96 | (75.2)  |

## Flow Rate Characteristics

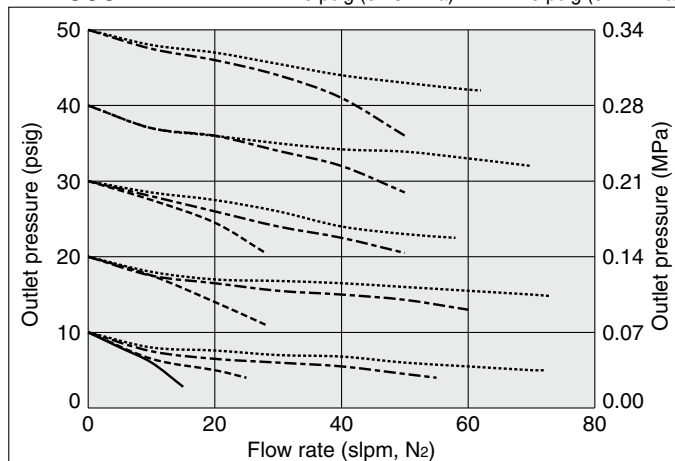
# AZ1000HF

Inlet pressure: --- 100 psig (0.69 MPa) ---- 50 psig (0.34 MPa)  
 —— 30 psig (0.21 MPa)



# AZ1000

Inlet pressure: ..... 100 psig (0.69 MPa) --- 80 psig (0.55 MPa)  
 ----- 40 psig (0.28 MPa) ——— 20 psig (0.14 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

Delivery of  
sub-atmospheric pressure

## AZ1100 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ11 01 S 2PW FV4 FV4**

**Port Number**

① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

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

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| TF      | PTFE *3)         |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Sample Order Number**

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

\*1) Refer to gauge guide (P.139) for gauge specifications.

Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

## Specifications

| Operating Parameters              |                  | AZ1101                                                  |
|-----------------------------------|------------------|---------------------------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)     |
| Gas                               |                  | Select compatible materials of construction for the gas |
| Source pressure                   |                  | Vacuum to 300 psig (2.1 MPa)                            |
| Proof pressure                    | Inlet            | 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                         | Inboard leakage  | $2 \times 10^{-11}$ Pa·m <sup>3</sup> /s                |
|                                   | Outboard leakage | $2 \times 10^{-10}$ Pa·m <sup>3</sup> /s *1)            |
| Across the seat leak              |                  | $4 \times 10^{-9}$ Pa·m <sup>3</sup> /s *1)             |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)          |
| Connections                       |                  | Face seal, Tube weld                                    |
| Installation                      |                  | Bottom mount (Option: panel mount)                      |
| Internal volume                   |                  | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )               |
| Weight                            |                  | 1.25 kg *2)                                             |

\*1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

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

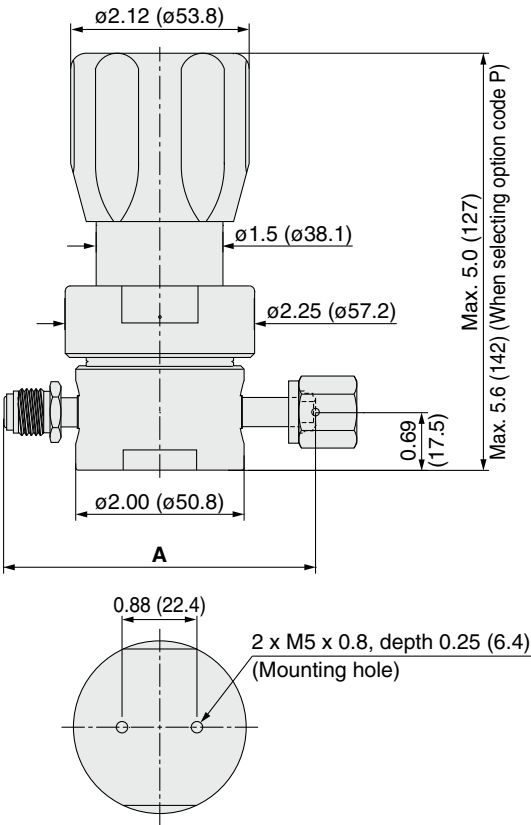
Wetted Parts Material

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

Dimensions

inch (mm)

AZ1100

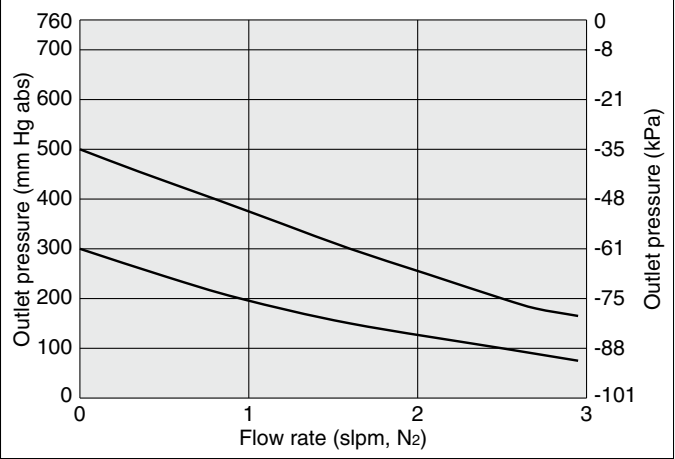


| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         |      |         |
| FV6         | 4.70 | (119.4) |
| MV6         |      |         |
| TW6         | 2.96 | (75.2)  |

Flow Rate Characteristics

AZ1100

Inlet pressure: 2 psig (14 kPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

|                                      |
|--------------------------------------|
| Recommendations                      |
| Regulators                           |
| AP                                   |
| SL                                   |
| AZ                                   |
| AK                                   |
| BP                                   |
| Diaphragm Valves                     |
| AP                                   |
| AZ                                   |
| AK                                   |
| Check Valves                         |
| Vacuum Generators                    |
| Flow Switches                        |
| Technical Data/<br>Glossary of Terms |
| Precautions                          |

## Low flow (Tied-diaphragm)



- RoHS**

**AZ15** **02** **S** **2PW** **FV4** **FV4** **Port Number** ① ② ③ ④

**• Delivery pressure**

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

**• Material**

| Code       | Body    | Poppet         | Diaphragm      | Nozzle  |
|------------|---------|----------------|----------------|---------|
| <b>S</b>   | 316L SS | 316L SS        | 316L SS        |         |
| <b>SHP</b> | 316L SS | Ni-Cr-Mo alloy | Ni-Cr-Mo alloy | 316L SS |

**• Surface finish**

| Code           | Surface finish Ra          |
|----------------|----------------------------|
| <b>No code</b> | 10 μin. (0.25 μm) Standard |
| <b>Q</b>       | 25 μin. (0.62 μm)          |

**• Ports**

| Code       | Ports   |
|------------|---------|
| <b>2PW</b> | 2 ports |
| <b>3PW</b> | 3 ports |
| <b>4PW</b> | 4 ports |

**Porting Configuration**

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

**• Connections (Inlet ①, Outlet ②)**

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

**• Gauge port (Inlet ③, Outlet ④)**

| Code           | Pressure gauge *1)                                       |                 |
|----------------|----------------------------------------------------------|-----------------|
|                | psig/bar unit                                            | MPa unit        |
| <b>No code</b> | No gauge port                                            |                 |
| <b>0</b>       | No pressure gauge (Connections: 1/4 inch face seal male) |                 |
| <b>V3</b>      | -30 in.Hg to 30 psig                                     | -0.1 to 0.2 MPa |
| <b>L</b>       | -30 in.Hg to 60 psig                                     | -0.1 to 0.4 MPa |
| <b>1</b>       | -30 in.Hg to 100 psig                                    | -0.1 to 0.7 MPa |
| <b>H</b>       | -30 in.Hg to 160 psig                                    | -0.1 to 1.1 MPa |
| <b>2</b>       | 0 to 200 psig                                            | 0 to 1.4 MPa    |
| <b>40</b>      | 0 to 4000 psig                                           | 0 to 28 MPa     |
| <b>50</b>      | 0 to 5000 psig                                           | (not applied)   |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**• Sample Order Number**

| Port    | ① ② ③ ④ |     |     |          |
|---------|---------|-----|-----|----------|
|         | 2PW     | FV4 | FV4 |          |
| AZ1510S | 2PW     | FV4 | FV4 |          |
|         | 3PW     | FV4 | FV4 | 0        |
|         | 3PW     | FV4 | FV4 | 1 MPa    |
|         | 4PW     | FV4 | FV4 | 40 1 MPa |
|         | 4PW     | FV4 | FV4 | 0 0      |

**• Knob**

| Code           | Knob      |
|----------------|-----------|
| <b>No code</b> | Standard  |
| <b>KL</b>      | Knob LOTO |

**• Bonnet option**

| Code           | Bonnet                     |
|----------------|----------------------------|
| <b>No code</b> | Standard                   |
| <b>P</b>       | Panel installation *6)     |
| <b>BP</b>      | Bonnet port (NPT 1/8 inch) |

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

**• Option**

| Code           | Specification                                                      |
|----------------|--------------------------------------------------------------------|
| <b>No code</b> | Standard                                                           |
| <b>HF</b>      | High flow *4)                                                      |
| <b>HR</b>      | High inlet pressure (Max. inlet pressure 4500 psig (31 MPa) *4)*5) |

\*4) Options "HF" and "HR" cannot be used in combination.  
\*5) The connection is a 1/4 inch face seal.

**• Seat material**

| Code           | Material        |
|----------------|-----------------|
| <b>No code</b> | PCTFE(Standard) |
| <b>VS</b>      | Polyimide *3)   |

\*3) Not available with SHP material.

**• Pressure gauge unit \*2)**

| Code           | Unit     |
|----------------|----------|
| <b>No code</b> | psig/bar |
| <b>MPA</b>     | MPa      |

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

## Specifications

| Operating Parameters                     |                         | AZ1502                                                                                       | AZ1506                          | AZ1510                           | AZ1515                           |
|------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| <b>Delivery pressure</b>                 |                         | 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) |
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas                                      |                                 |                                  |                                  |
| <b>Source pressure</b>                   |                         | Vacuum to 3500 psig (24.1 MPa)                                                               |                                 |                                  |                                  |
| <b>Proof pressure</b>                    | <b>Inlet</b>            | 1.5 times the maximum source pressure                                                        |                                 |                                  |                                  |
|                                          | <b>Outlet</b>           | 1.5 times the maximum delivery pressure                                                      |                                 |                                  |                                  |
| <b>Burst pressure</b>                    | <b>Inlet</b>            | 3 times the maximum source pressure                                                          |                                 |                                  |                                  |
|                                          | <b>Outlet</b>           | 3 times the maximum delivery pressure                                                        |                                 |                                  |                                  |
| <b>Ambient and operating temperature</b> |                         | -40 to 71°C (No freezing) *1)                                                                |                                 |                                  |                                  |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                   |                                 |                                  |                                  |
|                                          | <b>Outboard leakage</b> | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                               |                                 |                                  |                                  |
| <b>Across the seat leak</b>              |                         | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                |                                 |                                  |                                  |
| <b>Surface finish</b>                    |                         | Ra 10 µin.(0.25 µm)    Option: 25 µin.(0.62 µm)                                              |                                 |                                  |                                  |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                                                         |                                 |                                  |                                  |
| <b>Supply pressure effect</b>            |                         | 0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                  |
| <b>Installation</b>                      |                         | Bottom mount (Option: panel mount)                                                           |                                 |                                  |                                  |
| <b>Internal volume</b>                   |                         | 0.51 in <sup>3</sup> (8.4 cm <sup>3</sup> )                                                  |                                 |                                  |                                  |
| <b>Weight</b>                            |                         | 1.27 kg *4)                                                                                  |                                 |                                  |                                  |

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

# Single Stage Regulator for Ultra High Purity **AZ1500 Series**

Low flow (Tied-diaphragm)

## 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       | AZ1502                                                                                       | AZ1506 | AZ1510 | AZ1515 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|
| HF     | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |        |        |        |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AZ1502                       | AZ1506 | AZ1510 | AZ1515 |
|--------|------------------|------------------------------|--------|--------|--------|
| HR     | Source pressure  | Vacuum to 4500 psig (31 MPa) |        |        |        |

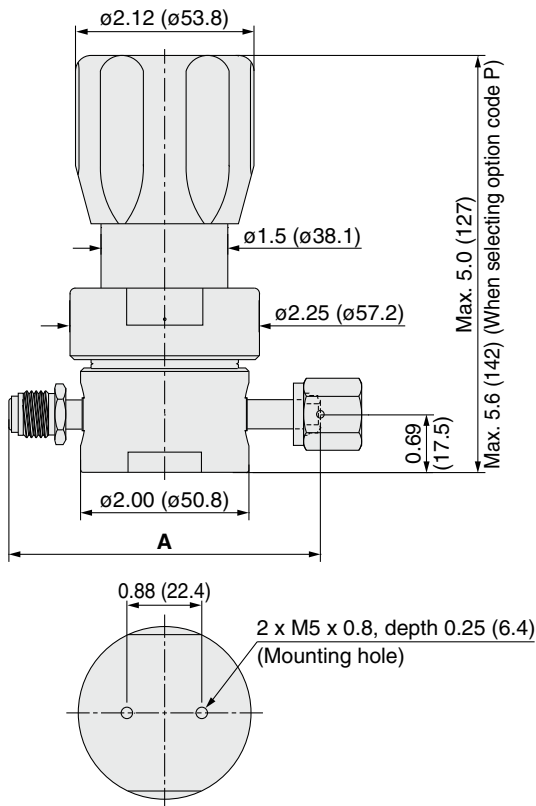
## Wetted Parts Material

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

## Dimensions

inch (mm)

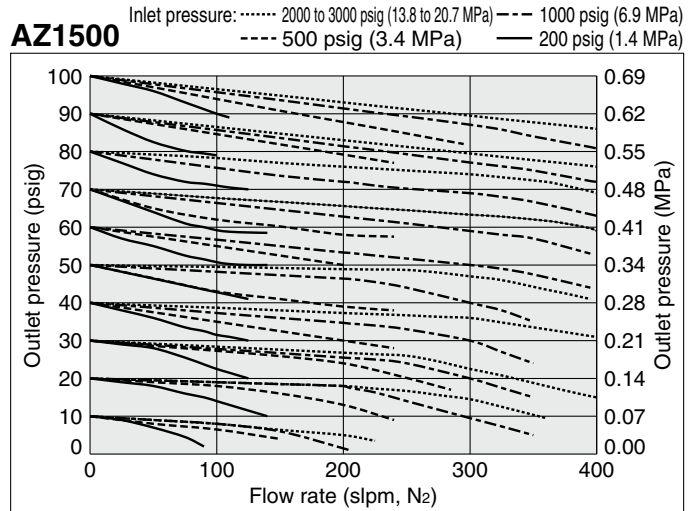
### AZ1500



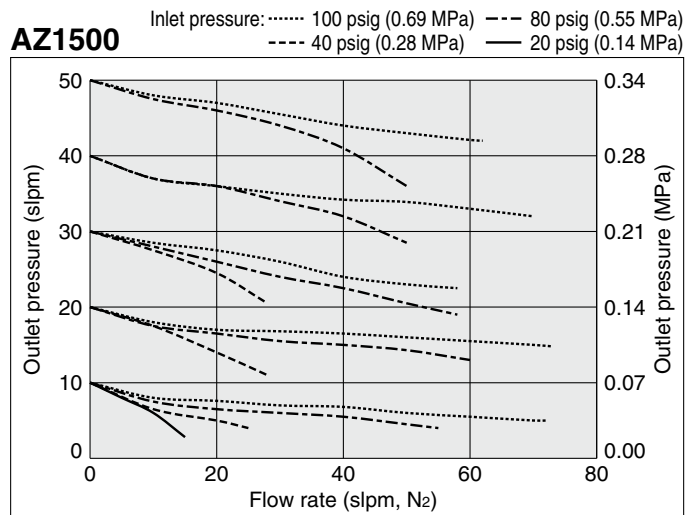
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4<br>MV4  | 3.70 | (94.0)  |
| FV6<br>MV6  | 4.70 | (119.4) |
| TW6         | 2.96 | (75.2)  |

## Flow Rate Characteristics

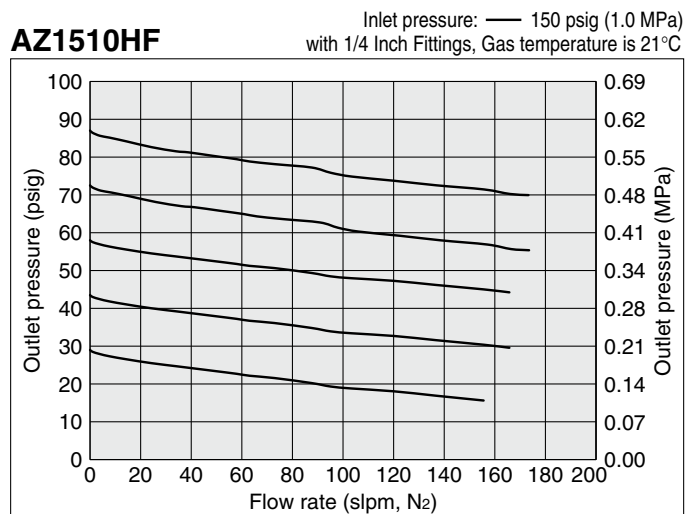
### AZ1500



### AZ1500



### AZ1510HF



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum

Generators

Flow

Switches

Technical Data/

Glossary of Terms

Precautions

# Single Stage Regulator for Ultra High Purity

Intermediate flow  
(Tied-diaphragm)

## AZ1400T Series

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



How to Order (See p. 250 for ordering syntax)

RoHS

**AZ14 02 T S 2PW FV4 FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Range options \*1)**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with AZ1402T.

**Connections (Inlet①, Outlet②)**

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

**Gauge port (Inlet③, Outlet④)**

| Code    | Pressure gauge *2)                                       |                 |
|---------|----------------------------------------------------------|-----------------|
|         | psig/bar unit                                            | MPa unit        |
| No code | No gauge port                                            |                 |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                     | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                     | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                    | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                    | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                            | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                            | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                           | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                           | 0 to 28 MPa     |

\*2) Refer to gauge guide (P.139) for gauge specifications.  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

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

**Option**

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

\*4) Not available with AZ1402T and AZ1406T.

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Pressure gauge unit \*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

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

## Specifications

| Operating Parameters              |                  | AZ1402T□□A                                                                                 | AZ1402T                         | AZ1406T                         | AZ1410T                          | AZ1415T                                                                  |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------------------------------|--------------------------------------------------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 1 to 30 psig (0.007 to 0.2 MPa) | 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            | 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) *2)                                                             |                                 |                                 |                                  |                                                                          |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                 |                                  |                                                                          |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)                                             |                                 |                                 |                                  |                                                                          |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *4)                                              |                                 |                                 |                                  |                                                                          |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)    Option: 25 μin. (0.62 μm)                                          |                                 |                                 |                                  |                                                                          |
| Connection                        |                  | Face seal, Tube weld                                                                       |                                 |                                 |                                  |                                                                          |
| Supply pressure effect            |                  | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                 |                                  |                                                                          |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                         |                                 |                                 |                                  |                                                                          |
| Internal volume                   |                  | 1.06 in <sup>3</sup> (17.4 cm <sup>3</sup> )                                               |                                 |                                 |                                  |                                                                          |
| Weight                            |                  | 2.04 kg *5)                                                                                |                                 |                                 |                                  |                                                                          |

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

\*2) -10 to 90°C for Polyimide seat.

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

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

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

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AZ1410T                        | AZ1415T |
|--------|------------------|--------------------------------|---------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |         |

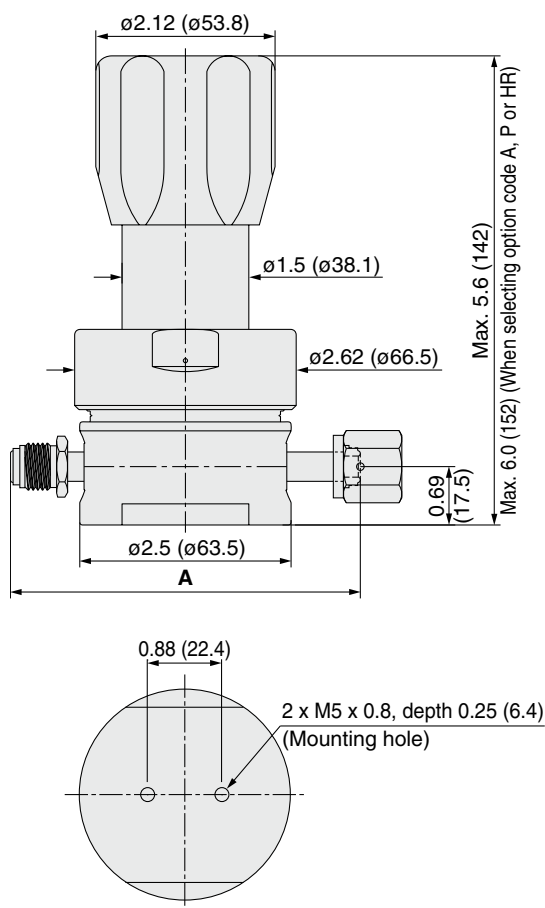
## Wetted Parts Material

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

## Dimensions

inch (mm)

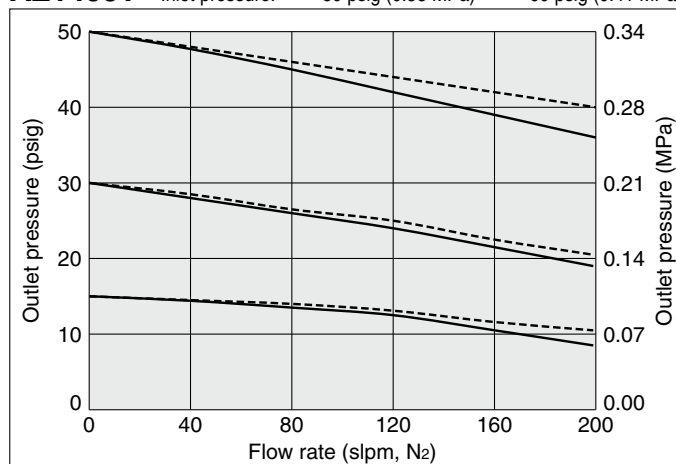
### AZ1400T



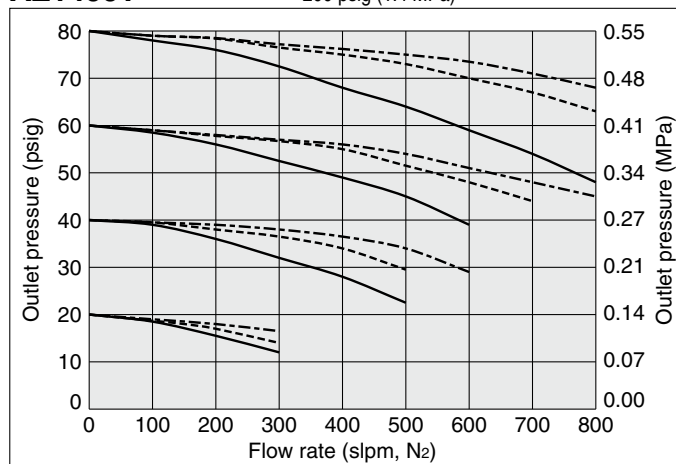
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |
| FV8         | 5.22 | (132.6) |
| MV8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

## Flow Rate Characteristics

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

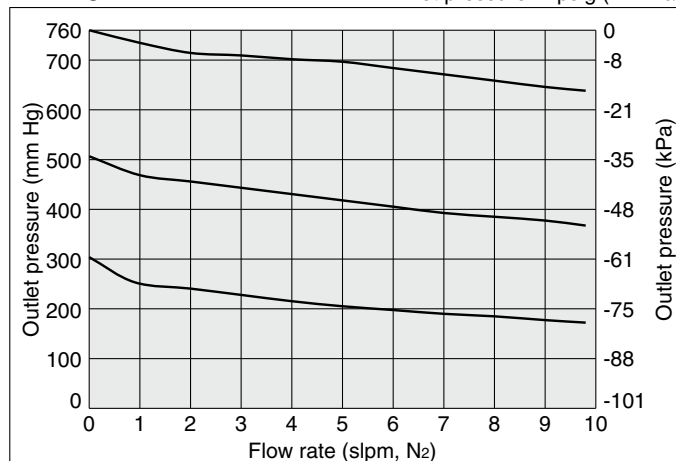


**AZ1400T** Inlet pressure: --- 2000 psig (13.8 MPa) --- 600 psig (4.1 MPa) — 200 psig (1.4 MPa)



### AZ1402TA

Inlet pressure: 2 psig (14 kPa)



Note) slpm N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

High flow  
(Tied-diaphragm)

## AZ1200 Series

- For UHP gas delivery
- High inlet pressure type Standard: Max. 1700 psig (11.7 MPa)  
HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity Standard to 800 slpm  
HF (option): to 1000 slpm  
FC (option): to 1500 slpm

- Body material: 316L SS
- Ni-Cr-Mo alloy internals available for corrosion resistance



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ12** **02** **S** **2PW** **FV8** **FV8**

**Port Number** ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**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.

**Knob**

| Code    | Knob          |
|---------|---------------|
| No code | Standard      |
| KL      | Knob LOTO *8) |

\*8) Not available with AZ1225.

**Bonnet option**

| Code    | Bonnet                     |
|---------|----------------------------|
| No code | Standard                   |
| P       | Panel installation*7)      |
| BP      | Bonnet port (NPT 1/8 inch) |

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

**Option**

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HF      | High flow *6)                                                         |
| FC      | Force compensation *4)*6)                                             |
| HR      | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *5)*6) |

\*4) FC option is only available with connection size 1/2 inch, but not available with AZ1202, AZ1206 and AZ1225.

\*5) HR option is not available with AZ1202 and AZ1206.

\*6) Options "HF," "FC," and "HR" cannot be used in combination.

**Porting Configuration**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                       |                 |
|---------|----------------------------------------------------------|-----------------|
|         | psig/bar unit                                            | MPa unit        |
| No code | No gauge port                                            |                 |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                     | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                     | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                    | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                    | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                            | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                            | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                           | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                           | 0 to 28 MPa     |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Seat material**

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

\*3) Not available with SHP material.

**Sample Order Number**

|         | Port | ①   | ②   | ③  | ④     |
|---------|------|-----|-----|----|-------|
| AZ1210S | 2PW  | FV8 | FV8 |    |       |
|         | 3PW  | FV8 | FV8 | 0  |       |
|         | 3PW  | FV8 | FV8 | 1  | MPa   |
|         | 4PW  | FV8 | FV8 | 40 | 1 MPa |

## Specifications

| Operating Parameters              |                  | AZ1202                                                                                     | AZ1206                          | AZ1210                           | AZ1215                           | AZ1225                           |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig (0.007 to 0.2 MPa)                                                            | 2 to 60 psig (0.014 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) | 5 to 150 psig (0.034 to 1.0 MPa) | 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            | 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) *3)                                                              |                                 |                                  |                                  |                                  |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                  |                                  |                                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *4)                                             |                                 |                                  |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *5)                                              |                                 |                                  |                                  |                                  |
| Surface finish                    |                  | Ra 10 μin.(0.25 μm) Option: 25 μin.(0.62 μm)                                               |                                 |                                  |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                 |                                  |                                  |                                  |
| Supply pressure effect            |                  | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                  |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                         |                                 |                                  |                                  |                                  |
| Internal volume                   |                  | 1.07 in <sup>3</sup> (17.6 cm <sup>3</sup> )                                               |                                 |                                  |                                  |                                  |
| Weight                            |                  | 2.0 kg *6)                                                                                 |                                 |                                  |                                  |                                  |

- \*1) Source pressure above 1000 psig (6.9 MPa) decreases maximum delivery pressure to less than 150 psig (1 MPa) due to supply pressure effect. When the source pressure is 1700 psig (11.7 MPa), achievable delivery pressure is around 125 psig (0.86 MPa) (HF and FC option 120 psig (0.83 MPa)).
- \*2) 250 psig outlet pressure preset at 800 psig (5.5 MPa) inlet pressure.
- \*3) -10 to 90°C for Polyimide seat.
- \*4) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).
- \*5) Tested with Helium gas inlet pressure 1000 psig (7 MPa).
- \*6) Weight, including individual boxed weight, may vary depending on connections or options.

# Single Stage Regulator for Ultra High Purity **AZ1200 Series**

High flow (Tied-diaphragm)

## Options

### 1. High flow

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

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

### 2. Force compensation

Force compensation feature added to HF option and has wider flow capacity than HF option.

Changes from the standard type are:

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

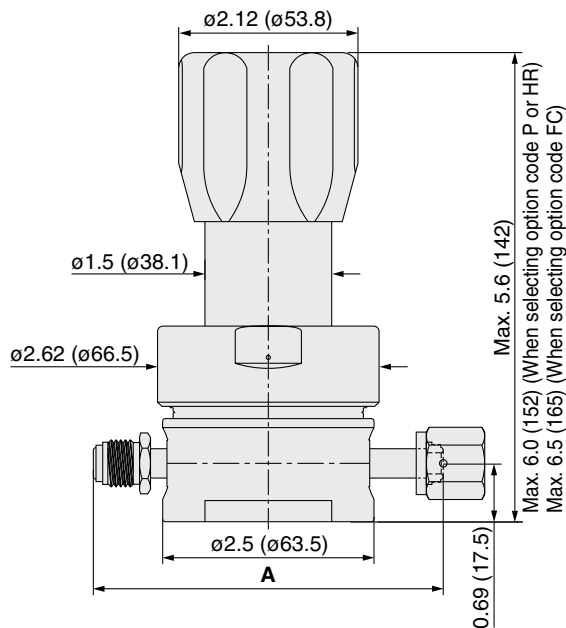
### 3. High inlet pressure

Changes from the standard type are:

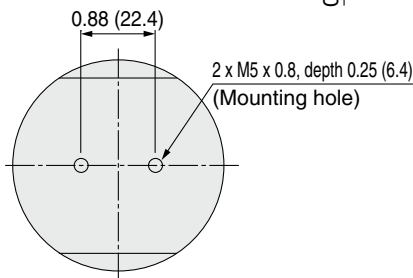
| Option | Other Parameters | AZ1210                         | AZ1215 |
|--------|------------------|--------------------------------|--------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |        |

## Dimensions

### AZ1200



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

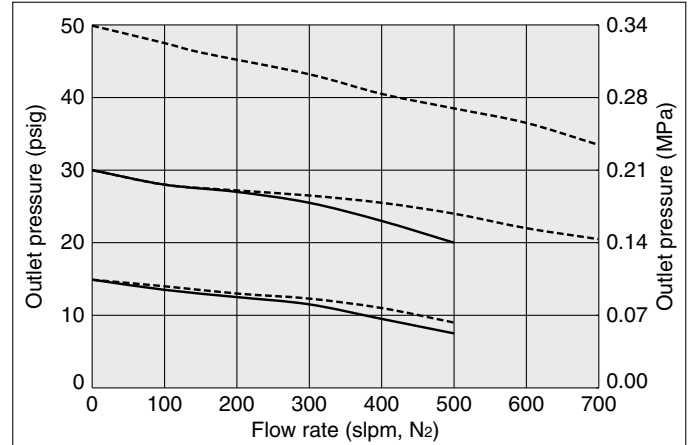


## Wetted Parts Material

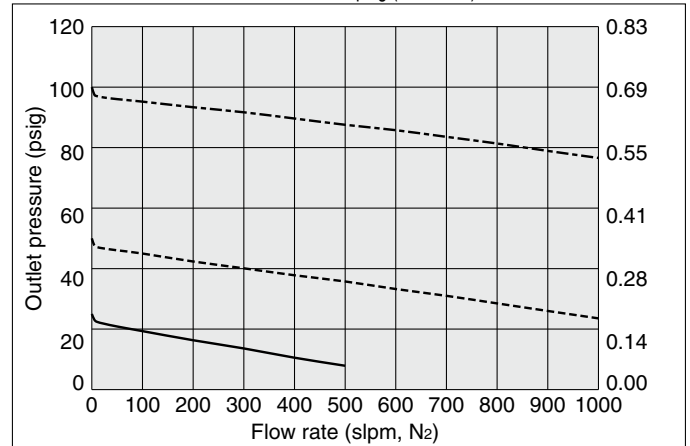
| Wetted Parts   | S                           | SH             |
|----------------|-----------------------------|----------------|
| Body           | 316L SS                     |                |
| Surface finish | Electropolish + Passivation |                |
| Poppet         | 316L SS          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

## Flow Rate Characteristics

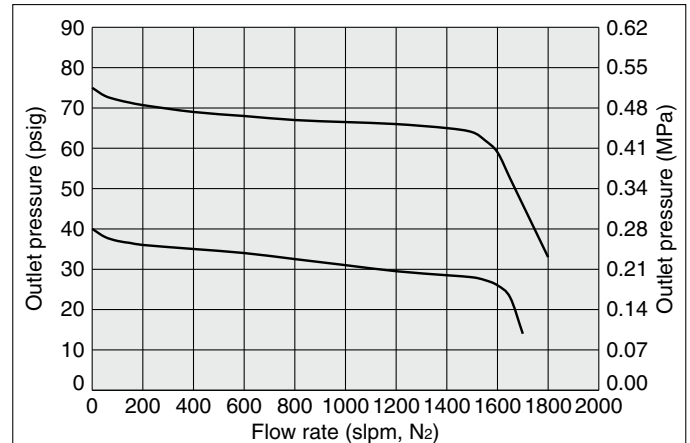
**AZ1200** Inlet pressure: ---- 80 psig (0.55 MPa) — 60 psig (0.41 MPa)  
1/2 inch connections \*)



**AZ1200HF** Inlet pressure: --- 150 psig (1.0 MPa) --- 100 psig (0.69 MPa)  
— 50 psig (0.34 MPa)



**AZ1200FC** Inlet pressure: 150 psig (1.0 MPa)  
3/4 inch connections \*)



\*1) If connection size differs, flow rate characteristics also differ.

\*2) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity High flow

## AZ1300 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ13** **02** **S** **2PW** **FV8** **FV8**

**Port Number**  
① ② ③

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet①, Outlet②)**

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

**Gauge port (Outlet③)**

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

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                        |
|---------|-------------------------------|
| No code | Standard                      |
| P       | Panel installation*4)         |
| BP      | Bonnet port<br>(NPT 1/8 inch) |

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| TF      | PTFE *3)         |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

① IN ② OUT ③ Gauge port (Outlet)

**Sample Order Number**

| Port    | ① ② ③ |     |     |
|---------|-------|-----|-----|
|         | ①     | ②   | ③   |
| AZ1302S | 2PW   | FV8 | FV8 |
|         | 3PW   | FV8 | FV8 |
|         | 3PW   | FV8 | V3  |

## Specifications

| Operating Parameters              |                  | AZ1302                                                                             | AZ1306                          | AZ1310                           | AZ1315                           |
|-----------------------------------|------------------|------------------------------------------------------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig (0.007 to 0.2 MPa)                                                    | 2 to 60 psig (0.014 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) | 5 to 150 psig (0.034 to 1.0 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                            |                                 |                                  |                                  |
| Source pressure                   |                  | Vacuum to 300 psig (2.1 MPa)                                                       |                                 |                                  |                                  |
| Proof pressure                    | Inlet            | 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                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                         |                                 |                                  |                                  |
|                                   | Outboard leakage | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *1)                                     |                                 |                                  |                                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s                                          |                                 |                                  |                                  |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)                                     |                                 |                                  |                                  |
| Connections                       |                  | Face seal, Tube weld                                                               |                                 |                                  |                                  |
| Supply pressure effect            |                  | 4.6 psig (0.032 MPa) delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                  |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                 |                                 |                                  |                                  |
| Internal volume                   |                  | 1.19 in <sup>3</sup> (19.6 cm <sup>3</sup> )                                       |                                 |                                  |                                  |
| Weight                            |                  | 2.0 kg *2)                                                                         |                                 |                                  |                                  |

\*1) Tested with Helium gas inlet pressure 300 psig (2.1 MPa).

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

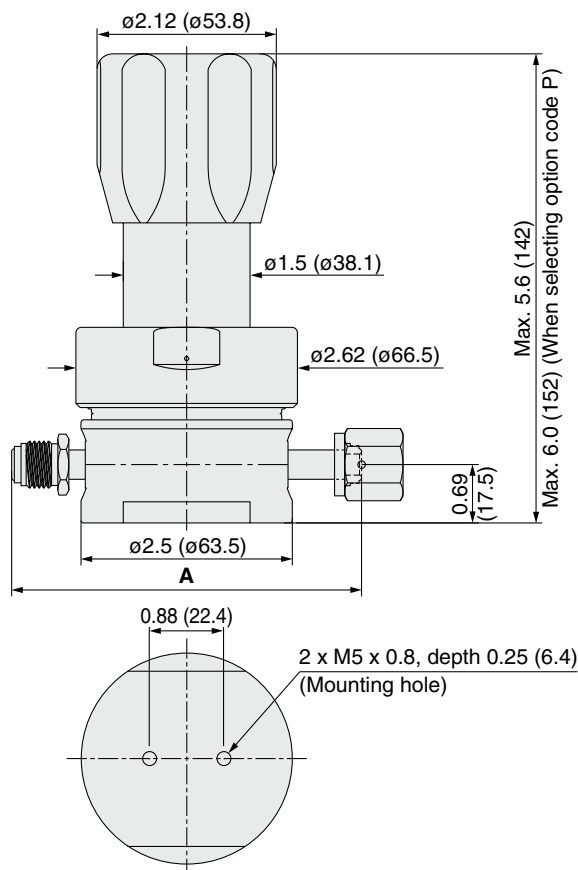
## Wetted Parts Material

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

## Dimensions

inch (mm)

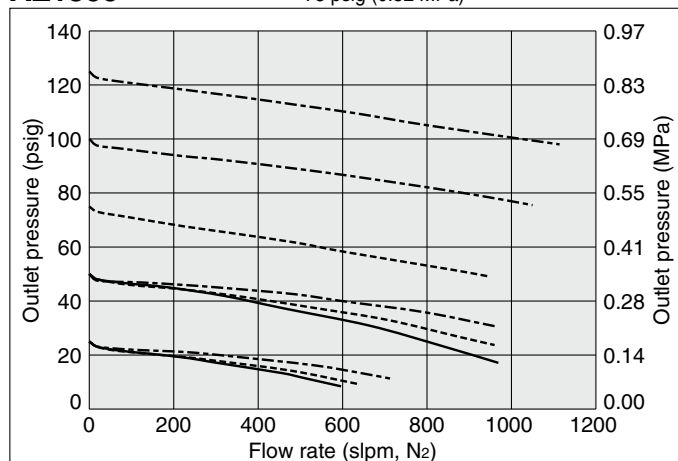
### AZ1300



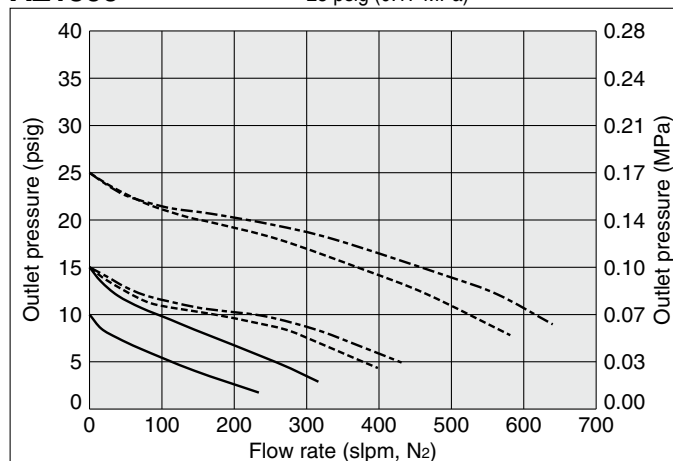
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 4.30 | (109.2) |
| MV4         | 4.30 | (109.2) |
| FV6         | 5.22 | (132.6) |
| MV6         | 5.22 | (132.6) |
| TW6         | 4.00 | (101.6) |
| FV8         | 5.22 | (132.6) |
| MV8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

## Flow Rate Characteristics

**AZ1300** Inlet pressure: --- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)  
— 75 psig (0.52 MPa)



**AZ1300** Inlet pressure: --- 75 psig (0.52 MPa) ---- 50 psig (0.34 MPa)  
— 25 psig (0.17 MPa)



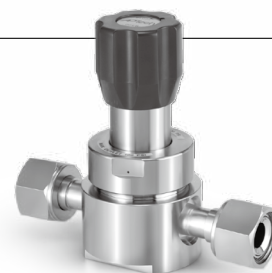
Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for Ultra High Purity

High flow  
(Tied-diaphragm)

## AZ9200 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

AZ92 02 S 2PW FV12 FV12

### Delivery pressure

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

### Material

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

### Ports

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

### Connections (Inlet①, Outlet②)

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

### Knob

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

### Bonnet option

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

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

### Pressure gauge unit \*2)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

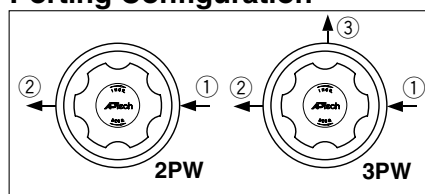
\*2) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

### Gauge port \*1) (Outlet③)

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

\*1) Refer to gauge guide (P.139) for gauge specifications.

### Porting Configuration



① IN ② OUT ③ Gauge port (Outlet)

### Specifications

| Operating Parameters              |                  | AZ9202                                                                                   | AZ9206                             | AZ9210                              | AZ9215                              |
|-----------------------------------|------------------|------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |                  | 1 to 30 psig<br>(0.007 to 0.2 MPa)                                                       | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(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            | 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                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                            |                                    |                                     |                                     |
|                                   | Outboard leakage | 1 x 10 <sup>-10</sup> Pa·m³/s *1)                                                        |                                    |                                     |                                     |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m³/s *2)                                                         |                                    |                                     |                                     |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                                                     |                                    |                                     |                                     |
| Connections                       |                  | Face seal, Tube weld                                                                     |                                    |                                     |                                     |
| Supply pressure effect            |                  | 7 psig (0.048 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                     |                                     |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                       |                                    |                                     |                                     |
| Internal volume                   |                  | 2.2 in³ (36 cm³)                                                                         |                                    |                                     |                                     |

\*1) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*2) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

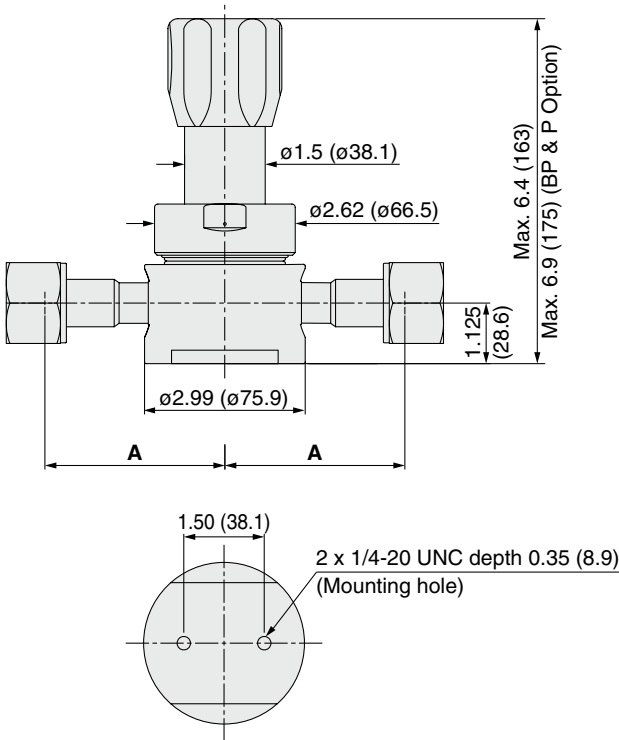
Wetted Parts Material

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

Dimensions

inch (mm)

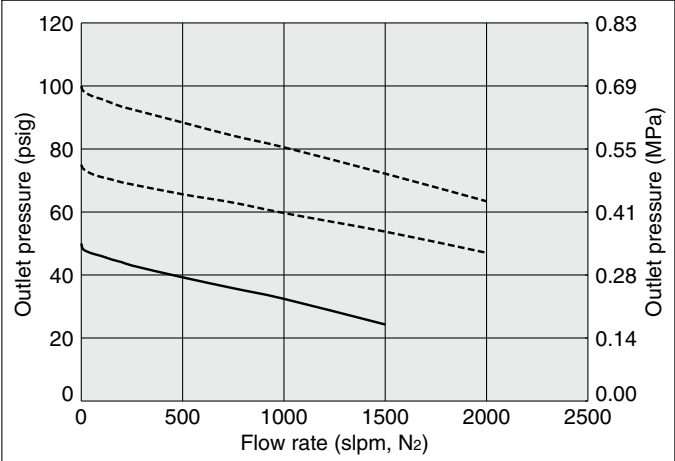
AZ9200



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

Flow Rate Characteristics

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



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

|                                      |
|--------------------------------------|
| Recommendations                      |
| Regulators                           |
| AP                                   |
| SL                                   |
| AZ                                   |
| AK                                   |
| BP                                   |
| Diaphragm Valves                     |
| AP                                   |
| AZ                                   |
| AK                                   |
| Check Valves                         |
| Vacuum Generators                    |
| Flow Switches                        |
| Technical Data/<br>Glossary of Terms |
| Precautions                          |

### AZ10PA Series



RoHS

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

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④

**AZ10 PA S 2PW FV4 FV4**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Option**

| Code    | Specification |
|---------|---------------|
| No code | Standard      |
| HF      | High flow *6) |

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *3)    |
| TF      | PTFE *4)*5)      |

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                   |                 |
|---------|------------------------------------------------------|-----------------|
|         | psig/bar unit                                        | MPa unit        |
| No code | No pressure gauge                                    |                 |
| 0       | No gauge port (Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                 | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                 | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                        | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                        | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                       | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                       | 0 to 28 MPa     |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |                  | AZ10PA                                                                                       |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 7 to 150 psig (0.05 to 1.0 MPa)                                                              |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |
| Source pressure                   |                  | Vacuum to 3500 psig (24.1 MPa) *1)                                                           |
| Proof pressure                    | Inlet            | 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                                                        |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                           |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *2)                                                                |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                   |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)                                               |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *4)                                                |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)                                               |
| Connections                       |                  | Face seal, Tube weld                                                                         |
| Control pressure port             |                  | NPT 1/8 inch                                                                                 |
| Bonnet port                       |                  | NPT 1/8 inch                                                                                 |
| Supply pressure effect            |                  | 0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |                  | Bottom mount                                                                                 |
| Internal volume                   |                  | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )                                                    |

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

\*2) -10 to 90°C for Polyimide seat.

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

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

## Option

### High flow

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

| Option | Other Parameters       | AZ10PA                                                                                       |
|--------|------------------------|----------------------------------------------------------------------------------------------|
| HF     | Delivery pressure      | 7 to 150 psig (0.05 to 1.0 MPa) *)                                                           |
|        | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |

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

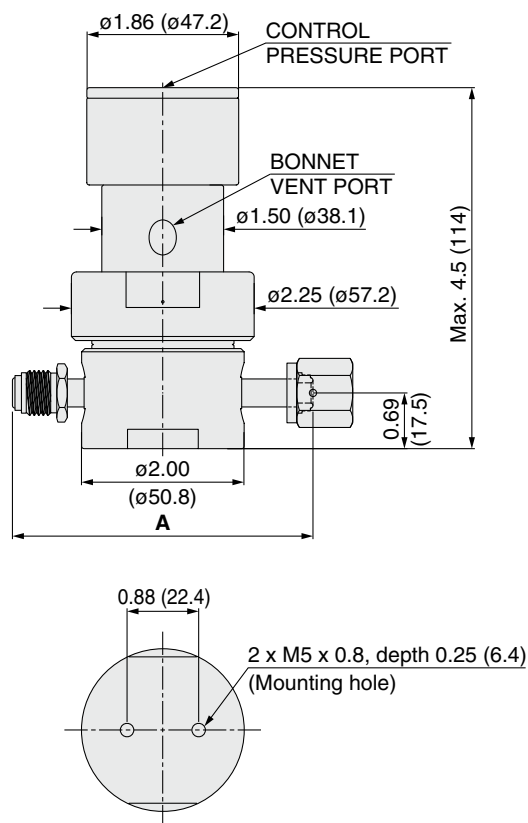
## Wetted Parts Material

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

## Dimensions

inch (mm)

### AZ10PA



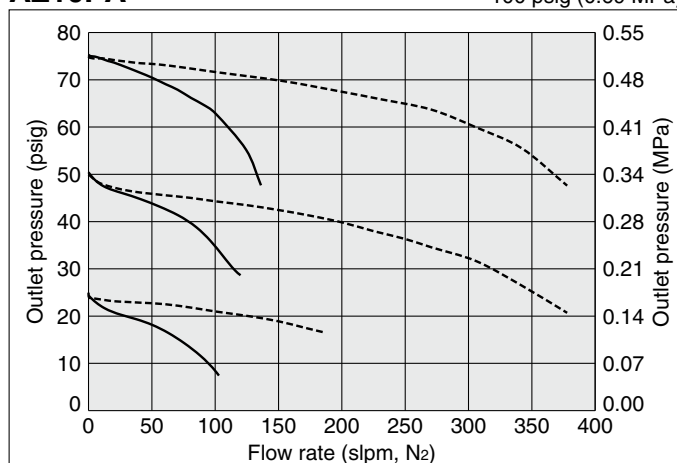
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         |      |         |
| FV6         | 4.70 | (119.4) |
| MV6         |      |         |
| TW6         | 2.96 | (75.2)  |

## Flow Rate Characteristics

### AZ10PA

Inlet pressure: ---- 300 psig (2.1 MPa)

— 100 psig (0.69 MPa)



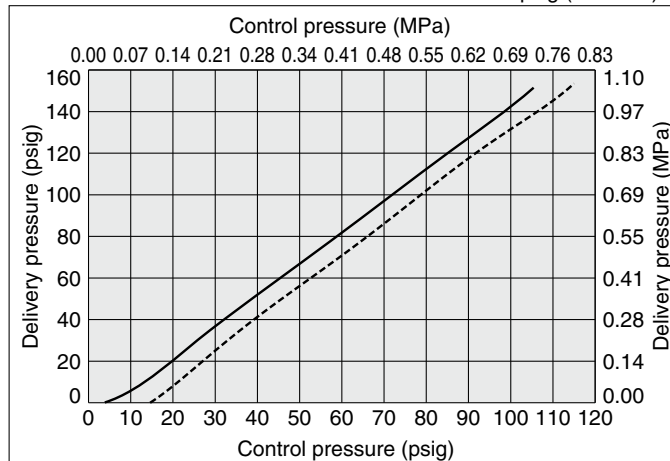
Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input / Output Characteristics

### AZ10PA

Inlet pressure: ---- 3500 psig (24.1 MPa)

— 250 psig (1.7 MPa)



### AZ15PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

① ② ③ ④

**AZ15 PA S [ ] 2PW FV4 FV4 [ ] [ ] [ ] [ ]**

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Seating material**

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

\*3) Not available with SHP material.

**Pressure gauge unit** \*2)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top View)**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                       |                 |
|---------|----------------------------------------------------------|-----------------|
|         | psig/bar unit                                            | MPa unit        |
| No code | No gauge port                                            |                 |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                     | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                     | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                    | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                    | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                            | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                            | 0 to 3 MPa      |
| 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.139). Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

## Specifications

| Operating Parameters              |                  | AZ15PA                                                                                       |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 7 to 150 psig (0.05 to 1.0 MPa)                                                              |
| Gas                               |                  | Select compatible materials of construction for the gas                                      |
| Source pressure                   |                  | Vacuum to 3500 psig (24.1 MPa)                                                               |
| Proof pressure                    | Inlet            | 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                                                        |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                           |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                                |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                   |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                               |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                                |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)                                               |
| Connections                       |                  | Face seal, Tube weld                                                                         |
| Control pressure port             |                  | NPT 1/8 inch                                                                                 |
| Bonnet port                       |                  | NPT 1/8 inch                                                                                 |
| Supply pressure effect            |                  | 0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |                  | Bottom mount                                                                                 |
| Internal volume                   |                  | 0.51 in <sup>3</sup> (8.4 cm <sup>3</sup> )                                                  |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

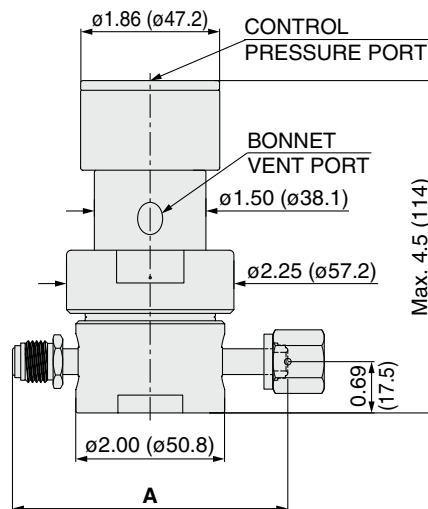
## Wetted Parts Material

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

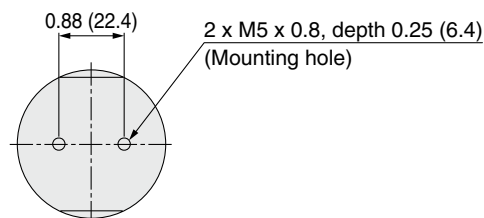
## Dimensions

inch (mm)

### AZ15PA



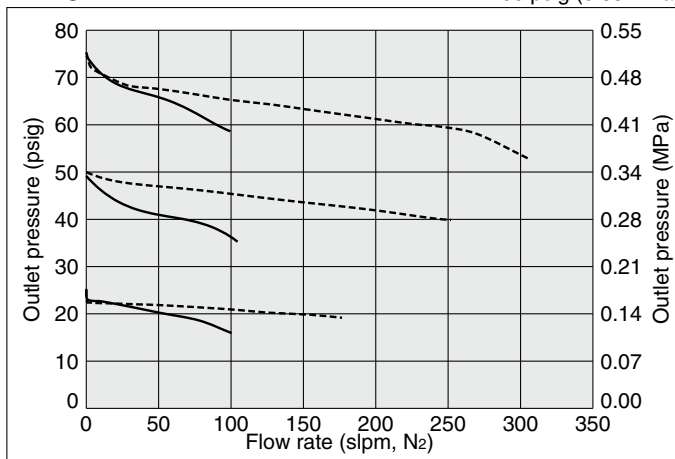
| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| FV4         | 3.70 | (94.0)  |
| MV4         |      |         |
| FV6         | 4.70 | (119.4) |
| MV6         |      |         |
| TW6         | 2.96 | (75.2)  |



## Flow Rate Characteristics

### AZ15PA

Inlet pressure: ---- 300 psig (2.1 MPa)  
— 100 psig (0.69 MPa)

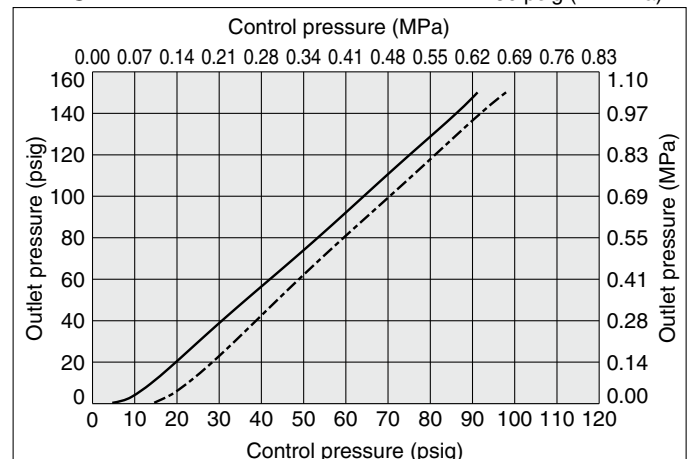


Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input / Output Characteristics

### AZ15PA

Inlet pressure: --- 3500 psig (24.1 MPa)  
— 250 psig (1.7 MPa)



# Pneumatic Actuation Pressure Regulator

Intermediate flow  
(Tied-diaphragm)

## AZ14PAT Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ14 PA T S** 2PW FV4 FV4

**Port Number**  
① ② ③ ④

**• Delivery pressure**

| Code | Delivery pressure                                                          |
|------|----------------------------------------------------------------------------|
| PA   | 7 to 150 psig<br>(0.05 to 1.0 MPa)                                         |
|      | Sub-atmospheric (A): 100 mm Hg<br>absolute to 30 psig (-88 kPa to 0.2 MPa) |

**Material**

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

**Surface finish**

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

**Range options**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

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

**• Option**

| Code    | Specification                                                            |
|---------|--------------------------------------------------------------------------|
| No code | Standard                                                                 |
| HR      | High inlet pressure *3)<br>(Max. inlet pressure<br>3000 psig (20.7 MPa)) |

\*3) Full outlet pressure rating may not be achieved at all inlet pressure.

**• Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**• Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                          |                 |
|---------|-------------------------------------------------------------|-----------------|
|         | psig/bar unit                                               | MPa unit        |
| No code | No gauge port                                               |                 |
| 0       | No pressure gauge<br>(Connections: 1/4 inch face seal male) |                 |
| V3      | -30 in.Hg to 30 psig                                        | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                        | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                       | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                       | -0.1 to 1.1 MPa |
| 2       | 0 to 200 psig                                               | 0 to 1.4 MPa    |
| 4       | 0 to 400 psig                                               | 0 to 3 MPa      |
| 10      | 0 to 1000 psig                                              | 0 to 7 MPa      |
| 40      | 0 to 4000 psig                                              | 0 to 28 MPa     |

\*1) Refer to gauge guide (P.139) for gauge specifications.  
Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |                  | AZ14PAT□A                                                                                  | AZ14PAT                         |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|---------------------------------|
| Delivery pressure                 |                  | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 7 to 150 psig (0.05 to 1.0 MPa) |
| 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            | 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                                                      |                                 |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                         |                                 |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                              |                                 |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |                                 |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |                                 |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                              |                                 |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm) Option: 25 μin. (0.62 μm)                                             |                                 |
| Connections                       |                  | Face seal, Tube weld                                                                       |                                 |
| Control pressure port             |                  | NPT 1/8 inch                                                                               |                                 |
| Bonnet port                       |                  | NPT 1/8 inch                                                                               |                                 |
| Supply pressure effect            |                  | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |
| Installation                      |                  | Bottom mount                                                                               |                                 |
| Internal volume                   |                  | 1.06 in <sup>3</sup> (17.4 cm <sup>3</sup> )                                               |                                 |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AZ14PAT                            |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

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

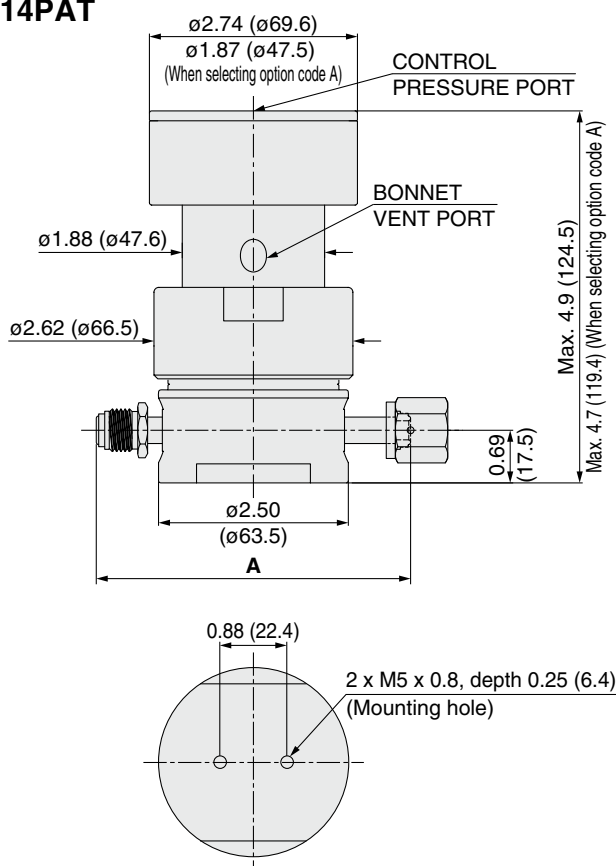
## Wetted Parts Material

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

## Dimensions

inch (mm)

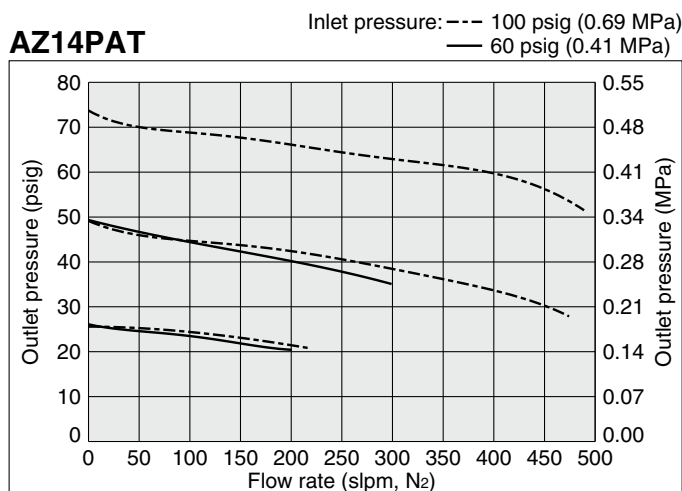
### AZ14PAT



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

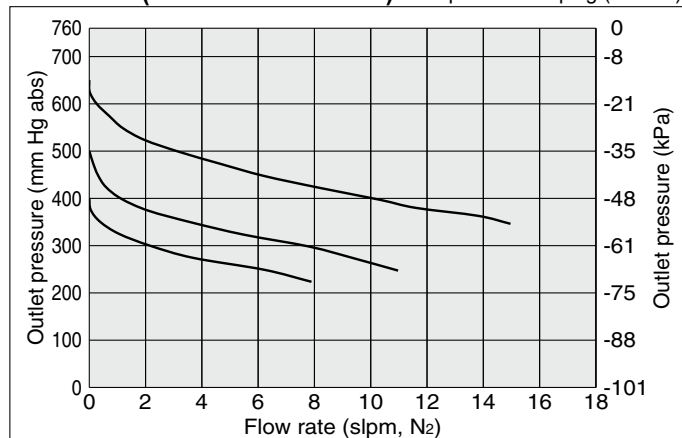
## Flow Rate Characteristics

### AZ14PAT



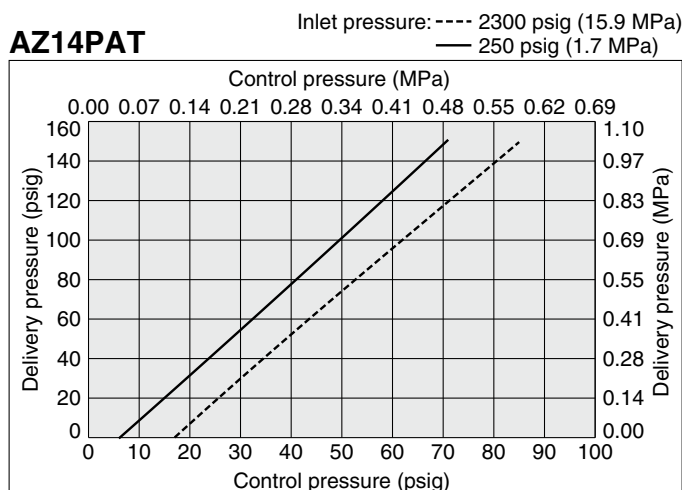
Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

### AP14PATA (1/4 inch connections)



## Input / Output Characteristics

### AZ14PAT



# Pneumatic Actuation Pressure Regulator

High flow  
(Tied-diaphragm)

## AZ12PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ12 PA S 2PW FV8 FV8**

**Port Number**  
① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Surface finish**

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

**Connections (Inlet ①, Outlet ②)**

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

**Option**

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HF      | High flow *4)                                                         |
| HR      | High inlet pressure *4)<br>(Max. inlet pressure 3000 psig (20.7 MPa)) |

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |
| 4PW  | 4 ports |

**Gauge port (Inlet ③, Outlet ④)**

| Code    | Pressure gauge *1)                                       |
|---------|----------------------------------------------------------|
|         | psig/bar unit      MPa unit                              |
| No code | No gauge port                                            |
| 0       | No pressure gauge (Connections: 1/4 inch face seal male) |
| V3      | -30 in.Hg to 30 psig      -0.1 to 0.2 MPa                |
| L       | -30 in.Hg to 60 psig      -0.1 to 0.4 MPa                |
| 1       | -30 in.Hg to 100 psig      -0.1 to 0.7 MPa               |
| H       | -30 in.Hg to 160 psig      -0.1 to 1.1 MPa               |
| 2       | 0 to 200 psig      0 to 1.4 MPa                          |
| 4       | 0 to 400 psig      0 to 3 MPa                            |
| 10      | 0 to 1000 psig      0 to 7 MPa                           |
| 40      | 0 to 4000 psig      0 to 28 MPa                          |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Seat material**

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

\*3) Not available with SHP material.

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |                  | AZ12PA                                                                                     |
|-----------------------------------|------------------|--------------------------------------------------------------------------------------------|
| Delivery pressure                 |                  | 7 to 150 psig (0.05 to 1.0 MPa)                                                            |
| Gas                               |                  | Select compatible materials of construction for the gas                                    |
| Source pressure                   |                  | Vacuum to 1700 psig (11.7 MPa)                                                             |
| Proof pressure                    | Inlet            | 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                                                      |
| Maximum control pressure          |                  | 150 psig (1.0 MPa)                                                                         |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                                 |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                             |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /s *3)                                              |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)      Option: 25 μin. (0.62 μm)                                        |
| Connections                       |                  | Face seal, Tube weld                                                                       |
| Control pressure port             |                  | NPT 1/8 inch                                                                               |
| Bonnet port                       |                  | NPT 1/8 inch                                                                               |
| Supply pressure effect            |                  | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |                  | Bottom mount                                                                               |
| Internal volume                   |                  | 1.20 in <sup>3</sup> (19.6 cm <sup>3</sup> )                                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1500 psig (10.5 MPa).

\*3) Tested with Helium gas inlet pressure 1000 psig (7 MPa).

## Options

### 1. High flow

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

| Option | Other Parameters       | AZ12PA                                                                                     |
|--------|------------------------|--------------------------------------------------------------------------------------------|
| HF     | Delivery pressure      | 7 to 150 psig (0.05 to 1.0 MPa) *)                                                         |
|        | Supply pressure effect | 4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AZ12PA                             |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

\*) HF and HR option will not achieve rated outlet pressures at all inlet pressures.

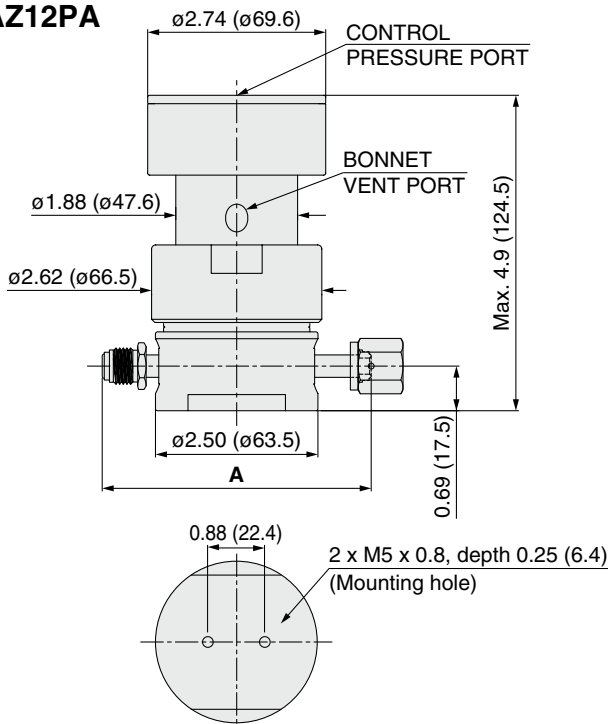
## Wetted Parts Material

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

## Dimensions

inch (mm)

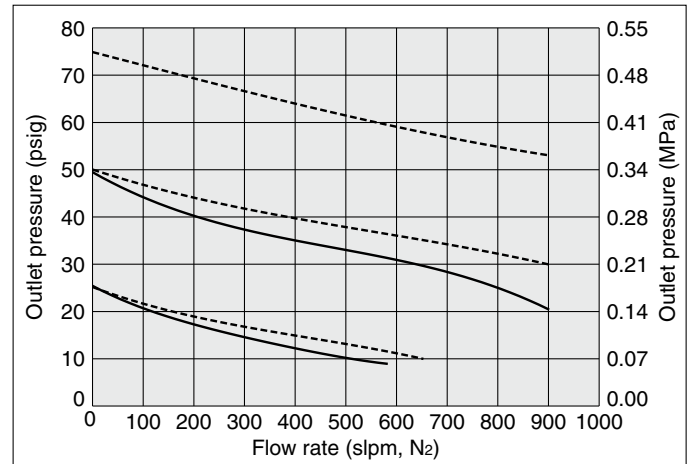
### AZ12PA



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

## Flow Rate Characteristics

AZ12PA  
Inlet pressure: ---- 100 psig (0.69 MPa) — 60 psig (0.41 MPa)  
1/2 inch connections

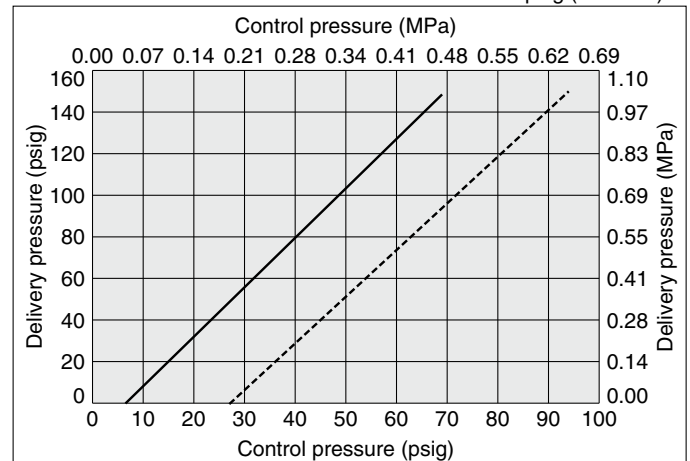


Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input / Output Characteristics

### AZ12PA

Inlet pressure: ---- 1700 psig (11.7 MPa) — 250 psig (1.7 MPa)



# AK100 Series

- High inlet pressure type: Max. 3000 psig (20.7 MPa)
- Flow capacity: to 30 slpm
- Body material: 316L SS
- Sub-atmospheric pressure delivery option



## How to Order (See p. 250 for ordering syntax)

**AK1 02 S 4PL 4 4 0 0**

Port Number ① ② ③ ④

**Delivery pressure**

| Code | Delivery pressure                                                        |
|------|--------------------------------------------------------------------------|
| 01   | 0.5 to 10 psig (0.003 to 0.07 MPa)                                       |
| 02   | Sub-atmospheric (A): 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa) |
| 10   | 1 to 30 psig (0.007 to 0.2 MPa)                                          |
| 15   | 2 to 100 psig (0.014 to 0.7 MPa)                                         |

**Material**

| Code | Body    | Poppet | Diaphragm |
|------|---------|--------|-----------|
| S    | 316L SS |        | 316 SS    |

**Range options\*1)**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with AK101.

**Port Number**

**4PL** 4 4 0 0

**Bonnet option**

| Code    | Bonnet                |
|---------|-----------------------|
| No code | Standard              |
| P       | Panel installation*3) |

\*3) Panel mounting hole: dia. 0.92 inch (23.4 mm).

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Gauge port**  
(4P: Inlet③, Outlet④, 4PL: Outlet③④)

| Code    | Specification                                |
|---------|----------------------------------------------|
| No code | Pressure gauge                               |
| 0       | No gauge port                                |
| 0       | No pressure gauge (Gauge port: 1/8 inch NPT) |

**Connections (Inlet①, Outlet②)**

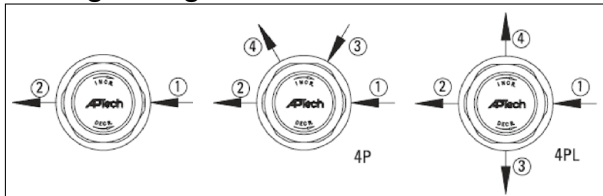
| Code | Connections          |
|------|----------------------|
| 2    | NPT 1/8 inch*2)      |
| 4    | NPT 1/4 inch         |
| 4T   | 1/4 inch compression |

\*2) Cannot be selected if port code "4P" is selected

**Ports**

| Code | Ports                                          |
|------|------------------------------------------------|
| 2P   | Refer to the following porting configurations. |
| 4P   |                                                |
| 4PL  |                                                |

## Porting Configuration



① IN ② OUT

4P: ③ Gauge port (Inlet) ④ Gauge port (Outlet)

4PL: ③④ Gauge port (Outlet)

## Sample Order Number

| Port   | ①   | ② | ③ | ④ |
|--------|-----|---|---|---|
| AK102S | 2P  | 4 | 4 |   |
|        | 4P  | 4 | 4 | 0 |
|        | 4PL | 4 | 4 | 0 |

## Specifications

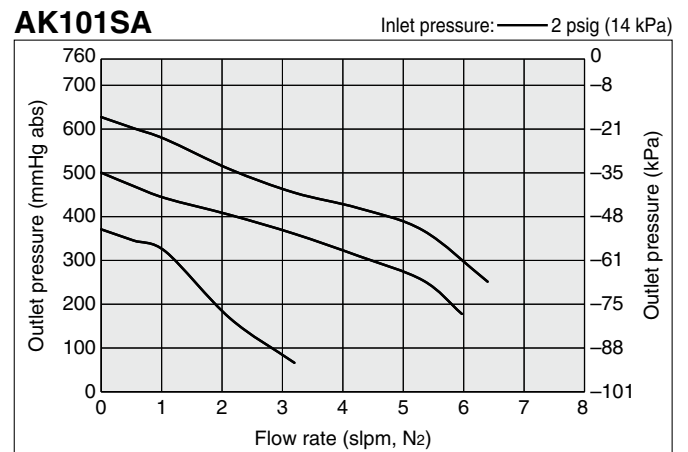
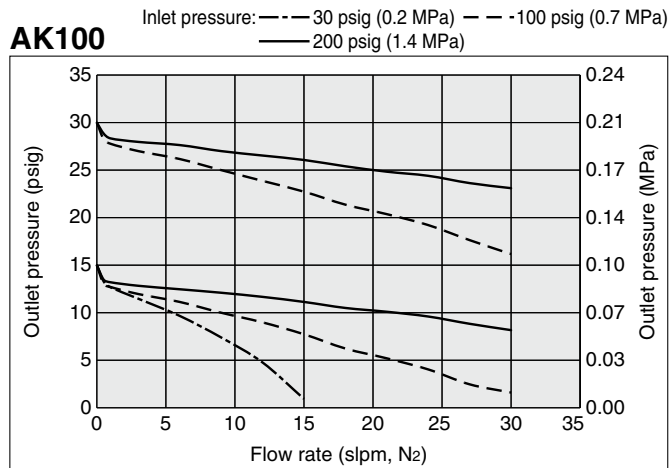
| Operating Parameters              |        | AK101□A                                                                                     | AK101                                 | AK102                              | AK110                               | AK115                               |
|-----------------------------------|--------|---------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |        | 100 mm Hg absolute to 10 psig<br>(-88 kPa to 0.07 MPa)                                      | 0.5 to 10 psig<br>(0.003 to 0.07 MPa) | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(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 3000 psig (20.7 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 <sup>-10</sup> Pa·m³/s                                                               |                                       |                                    |                                     |                                     |
| Connections                       |        | NPT female, Compression                                                                     |                                       |                                    |                                     |                                     |
| Supply pressure effect            |        | 0.4 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                   |        | 0.23 in³ (3.7 cm³)                                                                          |                                       |                                    |                                     |                                     |
| Weight                            |        | 0.45 kg *1)                                                                                 |                                       |                                    |                                     |                                     |

\*1) Weight, including individual boxed weight, may vary depending on connections or options.

## Wetted Parts Material

| Wetted Parts | S                         |
|--------------|---------------------------|
| Body         | 316L SS                   |
| Poppet       | 316 SS                    |
| Diaphragm    | 316 SS                    |
| Bonnet       | 303 SS                    |
| Seat         | PCTFE (Option: Polyimide) |

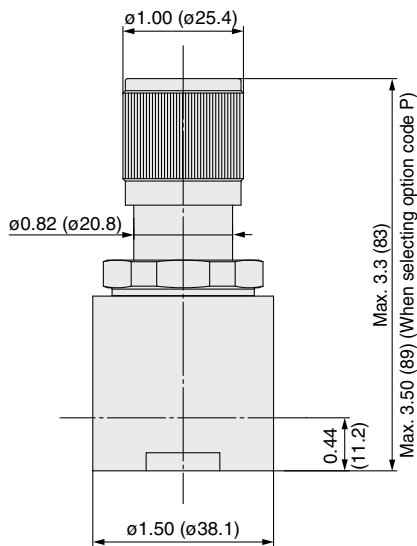
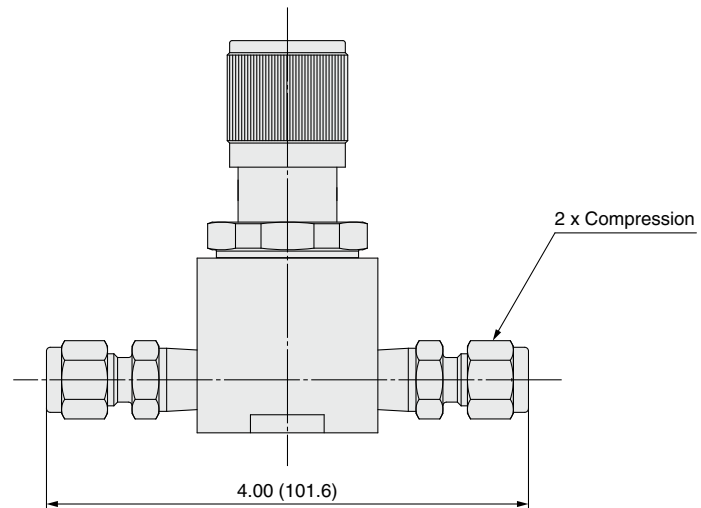
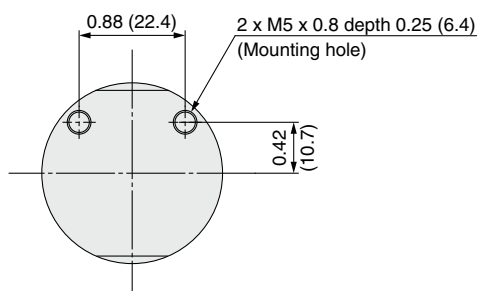
## Flow Rate Characteristics



## Dimensions

inch (mm)

### AK100

**Connections: 2, 4****Connections: 4T**

# Single Stage Regulator for General Applications

Low to intermediate flow

## AK1000 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK10 01 S 4PL 4 4 0 0 0 0 0 0 0 0 0 0**

**Port Number**  
① ② ③ ④ ⑤

**Material**

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

**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.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**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      |
| HF      | High flow     |

**Seat material**

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

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

**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 3.5 MPa) |

**Porting Configuration**

**Connections**  
(Inlet ①, Outlet ②)

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

**Gauge port**  
(Extra outlet port ③, Inlet ④, Outlet ⑤)

| Code    | Pressure gauge *1)                                                  |
|---------|---------------------------------------------------------------------|
| No code | No gauge port                                                       |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                                |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                                |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                               |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                               |
| 2       | 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) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

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

## Specifications

| Operating Parameters              |        | AK1001                                                                                       | AK1002                             | AK1006                             | AK1010                              | AK1015                              | AK1020                              | AK1030                              | AK1050                              |
|-----------------------------------|--------|----------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |        | 0.5 to 10 psig<br>(0.0034 to 0.07 MPa)                                                       | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(0.034 to 1.0 MPa) | 5 to 200 psig<br>(0.034 to 1.4 MPa) | 5 to 300 psig<br>(0.034 to 2.1 MPa) | 10 to 500 psig<br>(0.07 to 3.5 MPa) |
| Gas                               |        | Select compatible materials of construction for the gas                                      |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Source pressure                   |        | Vacuum to 300 psig<br>(2.1 MPa)                                                              | Vacuum to 3500 psig (24.1 MPa) *1) |                                    |                                     |                                     |                                     |                                     |                                     |
| 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) *2)                                                               |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                   |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Connections                       |        | NPT female, Compression                                                                      |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Supply pressure effect            |        | 0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Installation                      |        | Bottom mount (Option: panel mount)                                                           |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Internal volume                   |        | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )                                                    |                                    |                                    |                                     |                                     |                                     |                                     |                                     |
| Weight                            |        | 1.09 kg *3)                                                                                  |                                    |                                    |                                     |                                     |                                     |                                     |                                     |

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

\*2) -10 to 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

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

## Option

### High flow

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

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

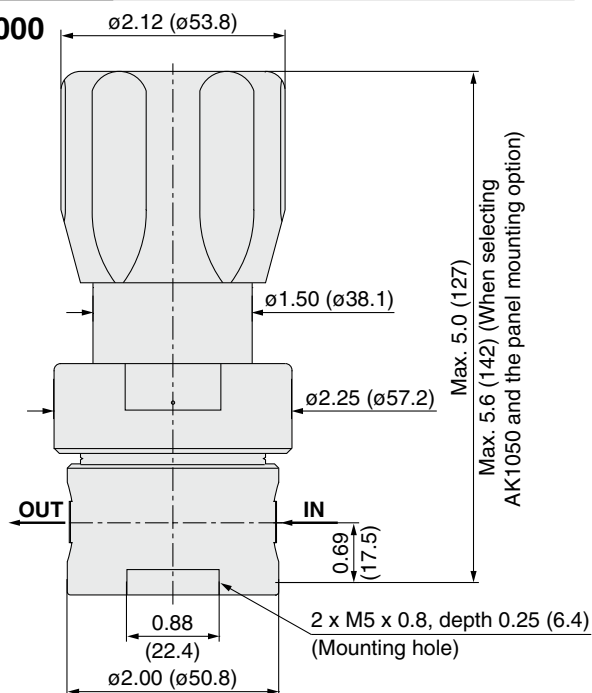
## Wetted Parts Material

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

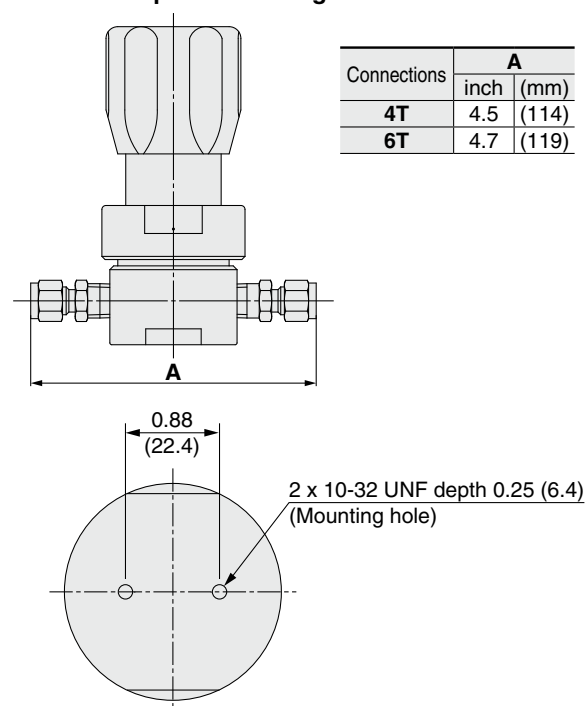
## Dimensions

inch (mm)

### AK1000



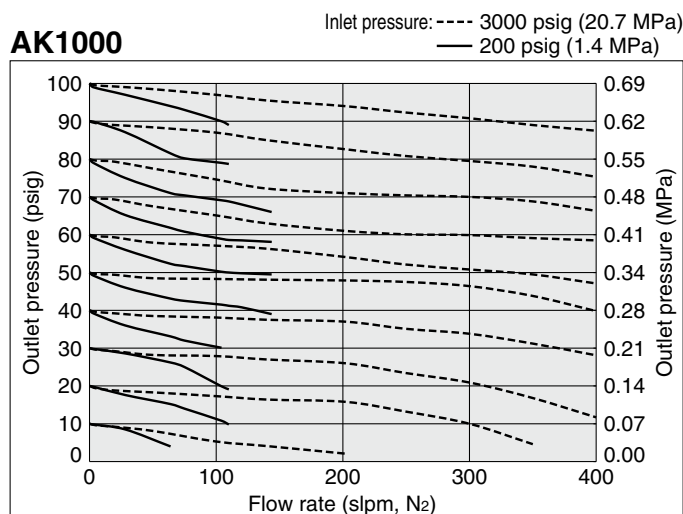
### AK1000 series compression fitting dimensions



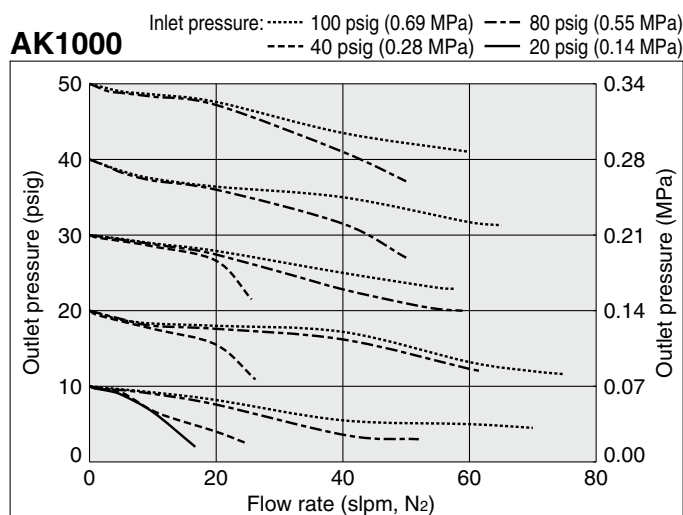
| Connections | A    |       |
|-------------|------|-------|
|             | inch | (mm)  |
| 4T          | 4.5  | (114) |
| 6T          | 4.7  | (119) |

## Flow Rate Characteristics

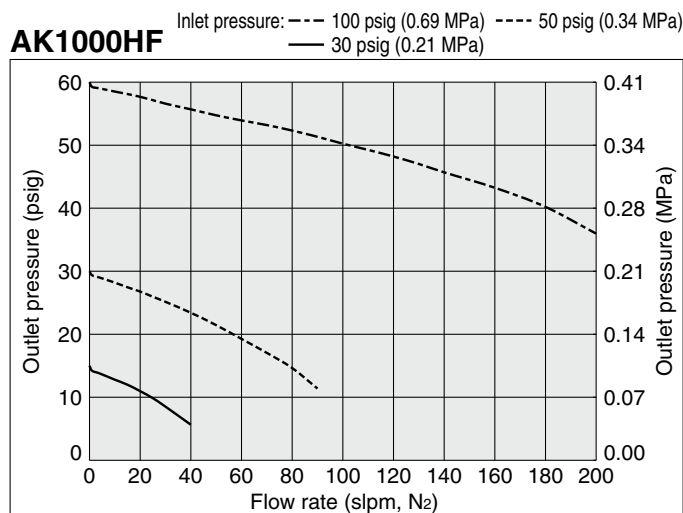
### AK1000



### AK1000



### AK1000HF



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

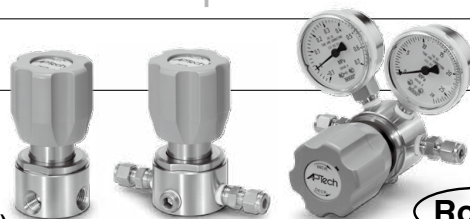
# Regulator for General Applications

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 (See p. 250 for ordering syntax)



RoHS

| 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

### 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   | 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)    |

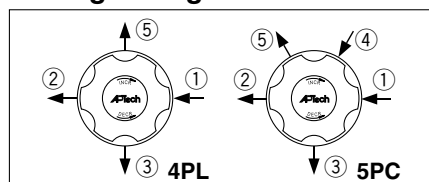
### Material

| Code | Body    | Poppet         | Diaphragm      |
|------|---------|----------------|----------------|
| S    | 316L 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  | Rc1/4                | —           | ●   | —  | —  |
| 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 |

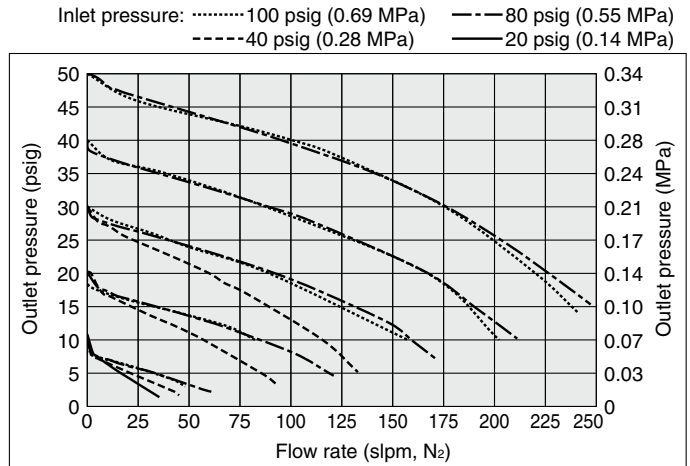
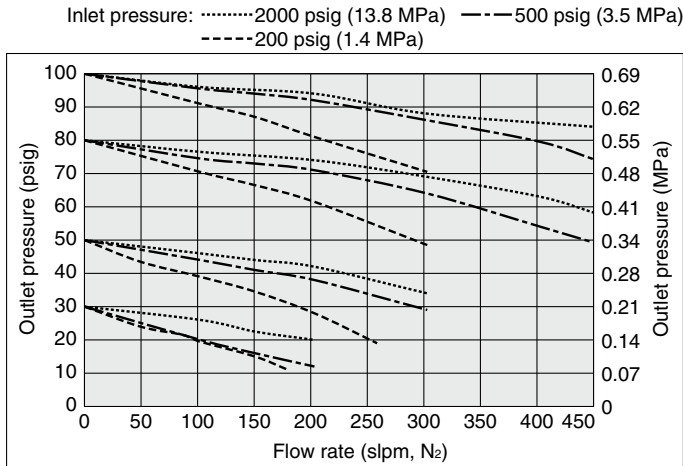
- ①IN ②OUT ③Extra outlet port  
④Gauge port (Inlet) ⑤Gauge port (Outlet)

## Specifications

| Operating Parameters              |        | AK1001T                                                                                    | AK1002T                            | AK1006T                            | AK1010T                             | AK1015T                             |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |        | 0.5 to 10 psig<br>(0.0034 to 0.07 MPa)                                                     | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 1 to 60 psig<br>(0.007 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(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) <sup>Note 1)</sup>                                               |                                    |                                    |                                     |                                     |
| Leak rate                         |        | 1 x 10 <sup>−10</sup> Pa·m³/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 in³ (4.8 cm³)                                                                          |                                    |                                    |                                     |                                     |
| Weight                            |        | 0.52 kg <sup>Note 2)</sup>                                                                 |                                    |                                    |                                     |                                     |

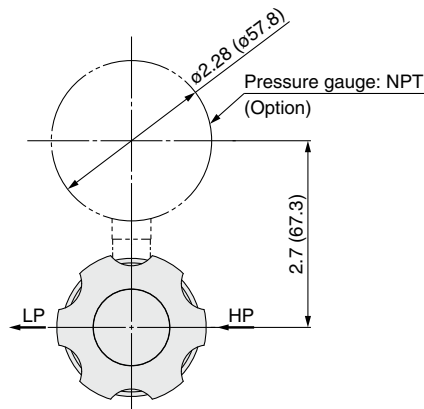
Note 1) -10 to 90°C for Polyimide seat. Note 2) Weight, including individual boxed weight, may vary depending on connections or options.

## Flow Rate Characteristics

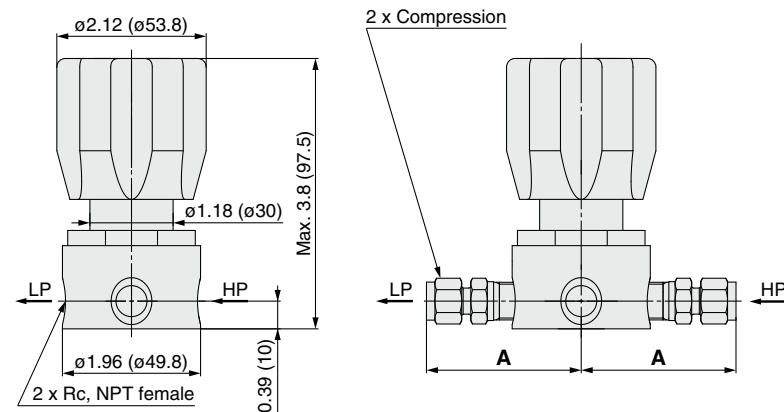


## Dimensions

inch (mm)

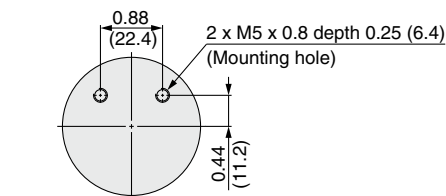


| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| 4T          | 2.25 | (57.2) |
| 6T          | 2.35 | (59.7) |

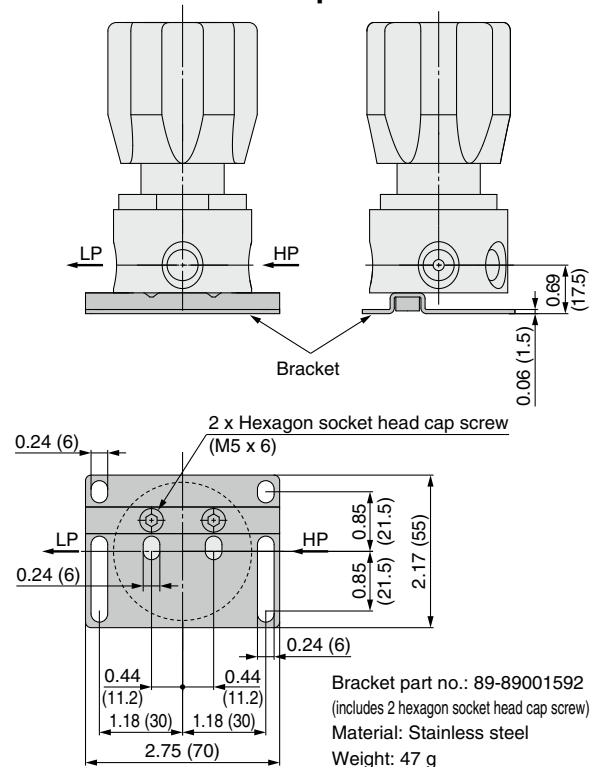


Connections: 4, 4BR

Connections: 4T, 6T



## Bracket mount/Option



## AK1100 Series

- Sub-atmospheric to low positive pressure delivery
- Flow capacity: to 0.5 slpm
- Body material: Stainless steel and Brass available
- Ni-Cr-Mo alloy internals available for corrosion resistance



RoHS

### How to Order (See p. 250 for ordering syntax)

**AK11 01 S 4PL 4 4 0 0 0 0 0 0**

**Delivery pressure**

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

**Material**

| Code | Body    | Poppet         | Diaphragm      |
|------|---------|----------------|----------------|
| B    | Brass   | 316 SS         | SUS316         |
| S    | 316L SS | Ni-Cr-Mo alloy | Ni-Cr-Mo alloy |
| SH   |         |                |                |

**Ports**

| Code | Ports                                          | Material |
|------|------------------------------------------------|----------|
| 2P   | Refer to the following porting configurations. | —        |
| 3P   |                                                | —        |
| 4P   |                                                | —        |
| 4PL  |                                                | —        |
| 5PC  |                                                | —        |

**Connections (Inlet①, Outlet②)**

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

**Port Number**

| Port Number | ① | ② | ③ | ④ | ⑤ |
|-------------|---|---|---|---|---|
| 4           | 4 | 4 | 0 | 0 | 0 |

**Gauge port (Extra outlet port③, Inlet④, Outlet⑤)**

| Code    | Pressure gauge*1)                                                   |
|---------|---------------------------------------------------------------------|
| No code | No pressure gauge                                                   |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT)*2)                     |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                                |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                                |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                               |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                               |
| 2       | 0 to 200 psig 0 to 1.5 MPa                                          |
| 4       | 0 to 400 psig 0 to 3 MPa                                            |

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                |
|---------|-----------------------|
| No code | Standard              |
| P       | Panel installation*6) |

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

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide*4)     |
| PK      | PEEK             |
| TF      | PTFE*5)          |

\*4) Not available with SH material.  
\*5) PTFE seats reduce seat abrasion for flow cycle application. Gas permeation is greater with PTFE than PCTFE.

**Pressure gauge unit\*3)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Sample Order Number**

| Port    | ①   | ② | ③ | ④ | ⑤        |
|---------|-----|---|---|---|----------|
| AK1101S | 2P  | 4 | 4 |   |          |
|         | 3P  | 4 | 4 |   | V3 MPA   |
|         | 4P  | 4 | 4 | 1 | V3 MPA   |
|         | 4PL | 4 | 4 | 0 | V3 MPA   |
|         | 4PL | 4 | 4 | 0 | 0        |
|         | 5PC | 4 | 4 | 0 | 1 V3 MPA |

## Specifications

| Operating Parameters              |        | AK1101                                                  |
|-----------------------------------|--------|---------------------------------------------------------|
| Delivery pressure                 |        | 100 mm Hg absolute to 10 psig (-88 kPa to 0.07 MPa)     |
| Gas                               |        | Select compatible materials of construction for the gas |
| Source pressure                   |        | Vacuum to 300 psig (2.1 MPa)                            |
| Proof pressure                    | Inlet  | 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) *1)                           |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |
| Connections                       |        | NPT female, Compression                                 |
| Installation                      |        | Bottom mount (Option: panel mount)                      |
| Internal volume                   |        | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )               |
| Weight                            |        | 1.09 kg *2)                                             |

\*1) -10 to 90°C for Polyimide and PEEK seat.

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

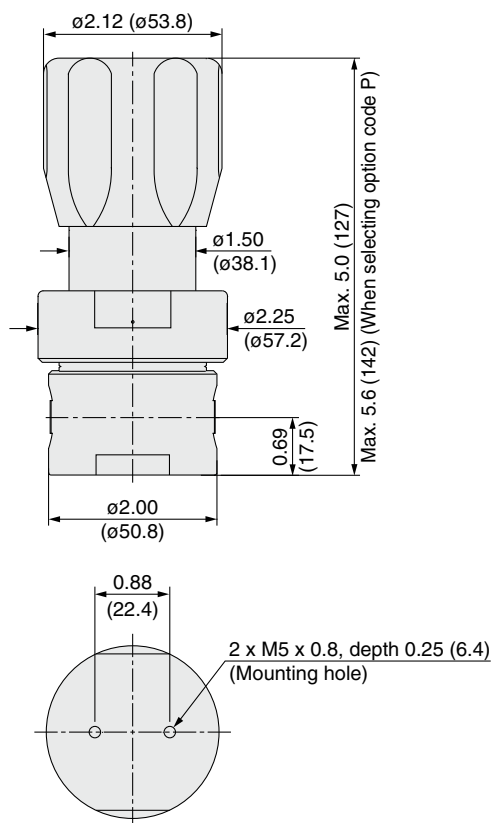
## Wetted Parts Material

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

## Dimensions

inch (mm)

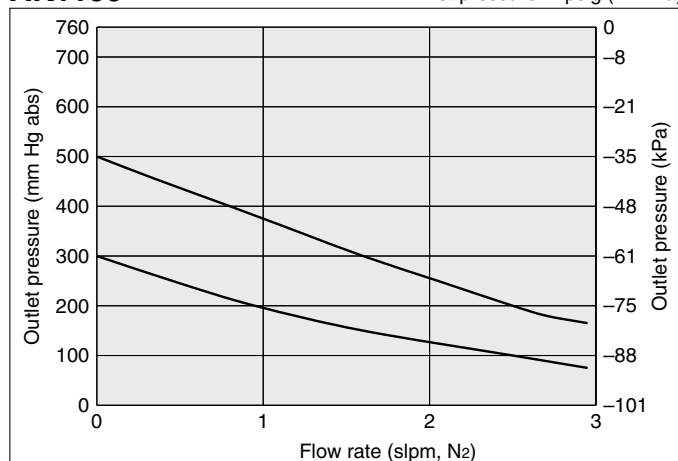
### AK1100



## Flow Rate Characteristics

### AK1100

Inlet pressure: 2 psig (14 kPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for General Applications

Low flow  
(Tied-diaphragm)

## AK1500 Series

- High inlet pressure type: Max. 3500 psig (24.1 MPa)  
HR (option): Max. 4500 psig (31 MPa)
- Flow capacity Standard: to 30 slpm  
HF (option): to 120 slpm
- Body material: Stainless steel and Brass available
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Tied-diaphragm design



RoHS

How to Order (See p. 250 for ordering syntax)

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) |

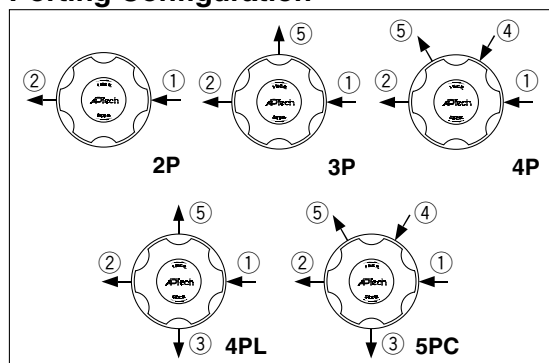
### Material

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

### Ports

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

### Porting Configuration



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

### Port Number

① ② ③ ④ ⑤

### Connections (Inlet ①, Outlet ②)

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

### Gauge port

(Extra outlet port ③, Inlet ④, Outlet ⑤)

| Code    | Pressure gauge *1                                                   |
|---------|---------------------------------------------------------------------|
|         | psig/bar unit MPa unit                                              |
| No code | No gauge port                                                       |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2                     |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                                |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                                |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                               |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                               |
| 2       | 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                                          |
| 60      | 0 to 6000 psig (not applied)                                        |

- \*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

### Sample Order Number

| Port    | ①   | ② | ③ | ④ | ⑤        |
|---------|-----|---|---|---|----------|
| AK1510S | 2P  | 4 | 4 |   |          |
|         | 3P  | 4 | 4 | 1 | MPa      |
|         | 4PL | 4 | 4 | 0 | 1 MPa    |
|         | 4PL | 4 | 4 | 0 | 0        |
|         | 5PC | 4 | 4 | 0 | 40 1 MPa |

### Knob

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

### Bonnet option

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *7) |

\*7) Panel mounting hole: dia. 1.42 inch (36.1 mm).

### Option

| Code    | Specification                                                       |
|---------|---------------------------------------------------------------------|
| No code | Standard                                                            |
| HF      | High flow *5)                                                       |
| HR      | High inlet pressure (Max. inlet pressure 4500 psig (31 MPa)) *5)*6) |

\*5) Options "HF" and "HR" cannot be used in combination.  
\*6) Not available with B material.

### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *4)    |
| PK      | PEEK             |

\*4) Not available with SH material.

### Pressure gauge unit \*3)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

## Specifications

| Operating Parameters              |        | 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  | 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) *1)                                                                |                                 |                                  |                                  |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m³/s                                                                |                                 |                                  |                                  |
| Connections                       |        | NPT female, Compression                                                                      |                                 |                                  |                                  |
| Supply pressure effect            |        | 0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                  |
| Installation                      |        | Bottom mount (Option: panel mount)                                                           |                                 |                                  |                                  |
| Internal volume                   |        | 0.49 in³ (8 cm³)                                                                             |                                 |                                  |                                  |
| Weight                            |        | 1.18 kg *2)                                                                                  |                                 |                                  |                                  |

\*1) -10 to 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

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

## 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       | AK1502                                                                                       | AK1506 | AK1510 | AK1515 |
|--------|------------------------|----------------------------------------------------------------------------------------------|--------|--------|--------|
| HF     | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |        |        |        |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AK1502                       | AK1506 | AK1510 | AK1515 |
|--------|------------------|------------------------------|--------|--------|--------|
| HR     | Source pressure  | Vacuum to 4500 psig (31 MPa) |        |        |        |

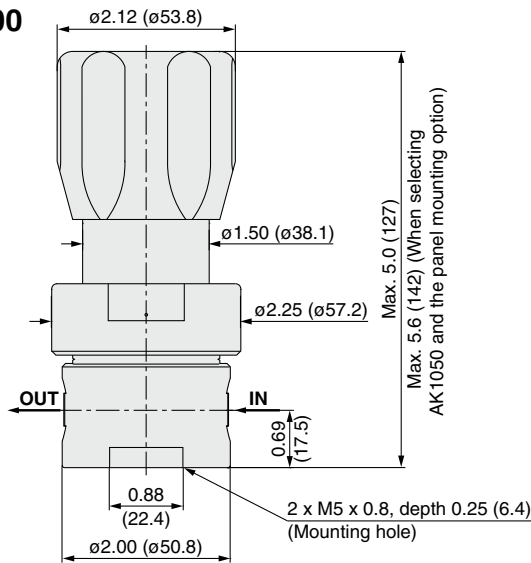
## Wetted Parts Material

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

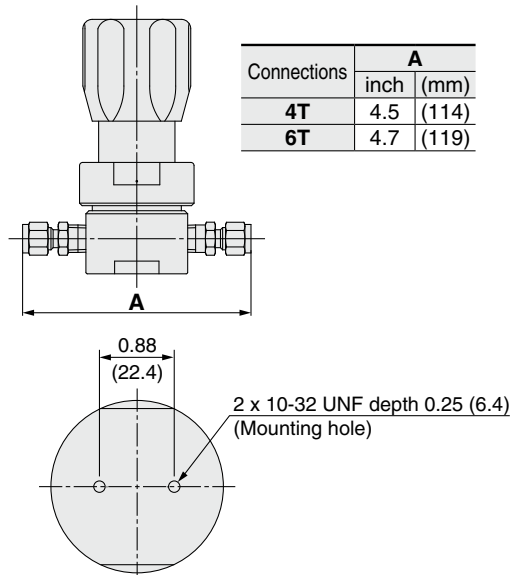
## Dimensions

inch (mm)

### AK1500

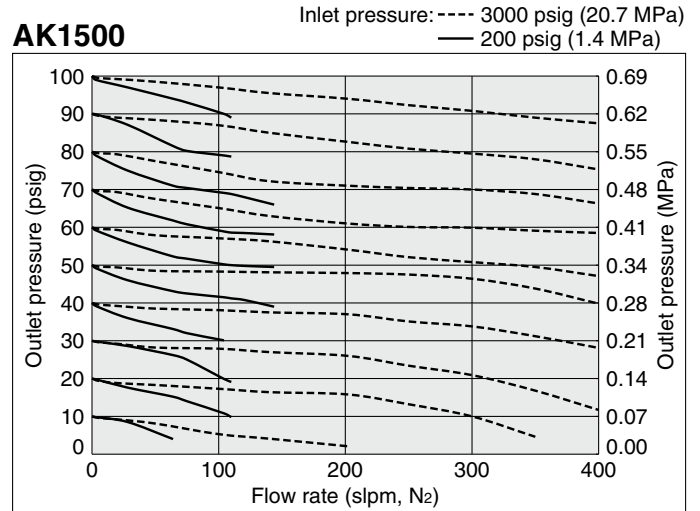


### AK1500 series compression fitting dimensions

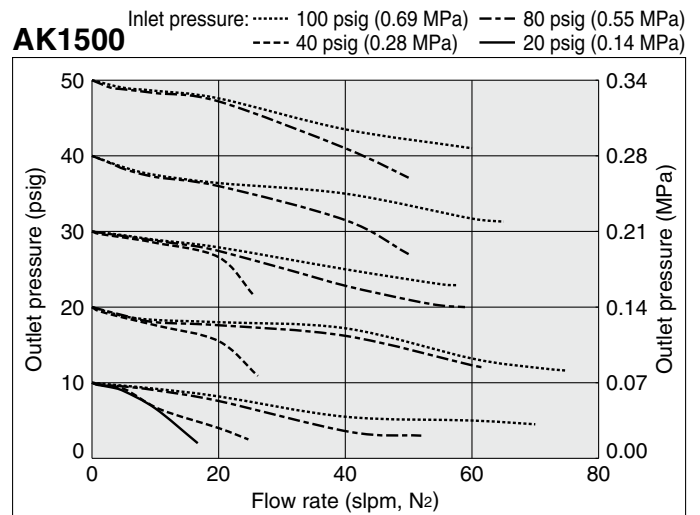


## Flow Rate Characteristics

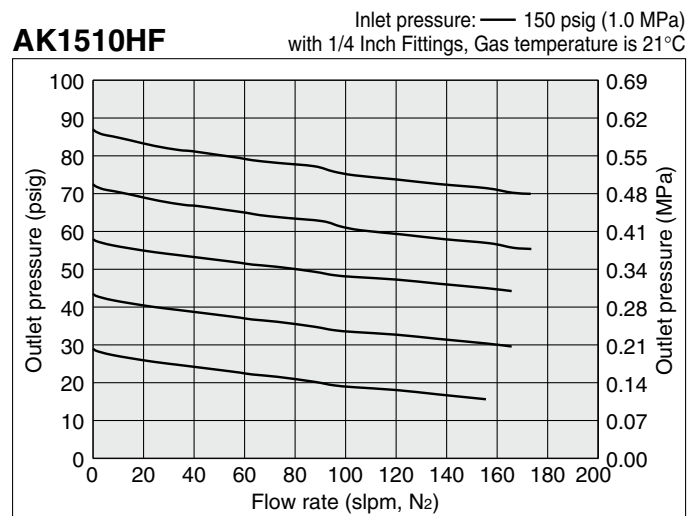
### AK1500



### AK1500



### AK1510HF



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

AK

Vacuum Generators

Flow Switches

Technical Data/ Glossary of Terms

Precautions

# Single Stage Regulator for General Applications

Intermediate flow  
(Tied-diaphragm)

## AK1400T Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**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)<br>Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa) |
| 06   | 1 to 60 psig (0.007 to 0.4 MPa)                                                                            |
| 10   | 2 to 100 psig (0.014 to 0.7 MPa)                                                                           |
| 15   | 5 to 150 psig (0.034 to 1.0 MPa)                                                                           |

**Ports**

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

**Material**

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

**Range options** \*1)

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

\*1) Only available with AK1402T.

**Pressure gauge unit** \*3)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Seat material**

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

\*4) Not available with SH material.

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

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

**Option**

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

\*5) Not available with AK1402T and AK1406T.

**Porting Configuration**

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

**Connections (Inlet①, Outlet②)**

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

**Sample Order Number**

AK1410TS

| Port | ① | ② | ③ | ④  | ⑤     |
|------|---|---|---|----|-------|
| 2P   | 6 | 6 |   |    |       |
| 3P   | 6 | 6 |   | 1  | MPa   |
| 4PL  | 6 | 6 | 0 | 1  | MPa   |
| 4PL  | 6 | 6 | 0 | 0  |       |
| 5PC  | 6 | 6 | 0 | 40 | 1 MPa |

**Pressure gauge** \*2)

| Code    | psig/bar unit                                                       | MPa unit        |
|---------|---------------------------------------------------------------------|-----------------|
| No code | No pressure gauge                                                   |                 |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |                 |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |                 |
| V3      | -30 in.Hg to 30 psig                                                | -0.1 to 0.2 MPa |
| L       | -30 in.Hg to 60 psig                                                | -0.1 to 0.4 MPa |
| 1       | -30 in.Hg to 100 psig                                               | -0.1 to 0.7 MPa |
| H       | -30 in.Hg to 160 psig                                               | -0.1 to 1.1 MPa |
| 2       | 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) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

## Specifications

| Operating Parameters              |        | AK1402T□A                                                                                  | AK1402T                         | AK1406T                         | AK1410T                          | AK1415T                                                                  |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------------------------------|--------------------------------------------------------------------------|
| Delivery pressure                 |        | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 1 to 30 psig (0.007 to 0.2 MPa) | 1 to 60 psig (0.007 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) | 5 to 150 psig (0.034 to 1.0 MPa) (Source pressure 1000 psig or less) *1) |
| Gas                               |        | Select compatible materials of construction for the gas                                    |                                 |                                 |                                  |                                                                          |
| Source pressure                   |        | Vacuum to 300 psig (2.1 MPa)                                                               | Vacuum to 2300 psig (15.9 MPa)  |                                 |                                  |                                                                          |
| Proof pressure                    | Inlet  | 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) *2)                                                              |                                 |                                 |                                  |                                                                          |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m³/s                                                              |                                 |                                 |                                  |                                                                          |
| Connections                       |        | NPT female, Compression                                                                    |                                 |                                 |                                  |                                                                          |
| Supply pressure effect            |        | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                 |                                  |                                                                          |
| Installation                      |        | Bottom mount (Option: panel mount)                                                         |                                 |                                 |                                  |                                                                          |
| Internal volume                   |        | 0.65 in³ (10.6 cm³)                                                                        |                                 |                                 |                                  |                                                                          |
| Weight                            |        | 2.04 kg *3)                                                                                |                                 |                                 |                                  |                                                                          |

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

\*2) -10 to 90°C for Polyimide seat.

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

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters | AK1410T                        | AK1415T |
|--------|------------------|--------------------------------|---------|
| HR     | Source pressure  | Vacuum to 3000 psig (20.7 MPa) |         |

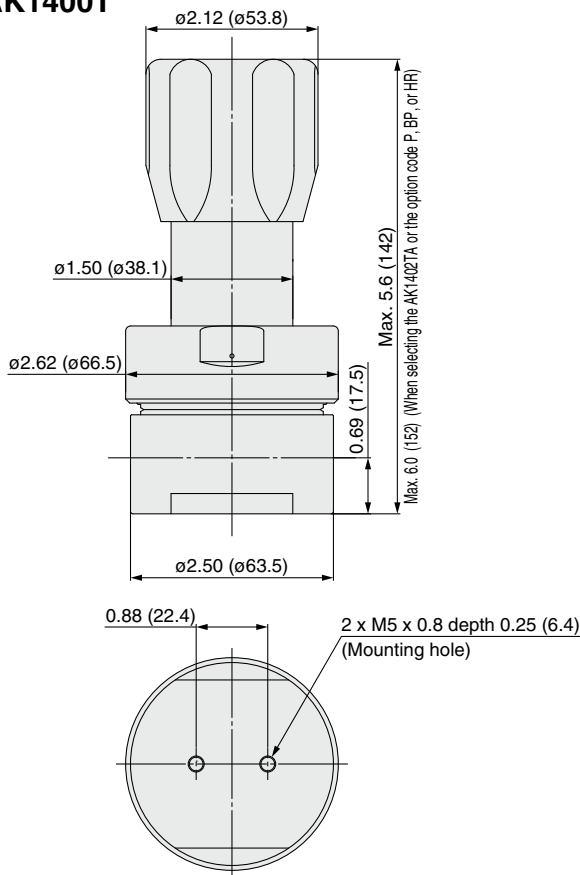
## Wetted Parts Material

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

## Dimensions

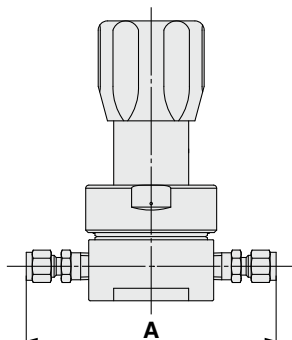
inch (mm)

### AK1400T



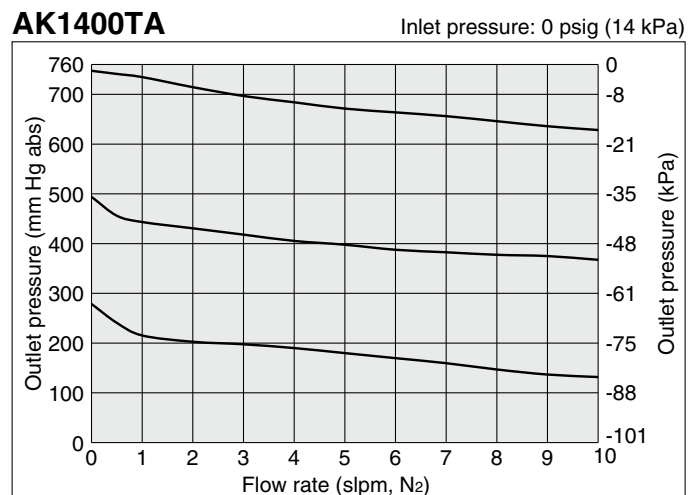
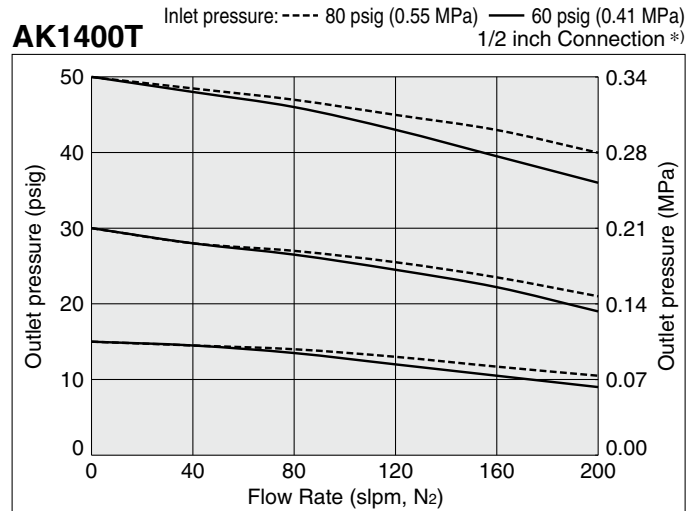
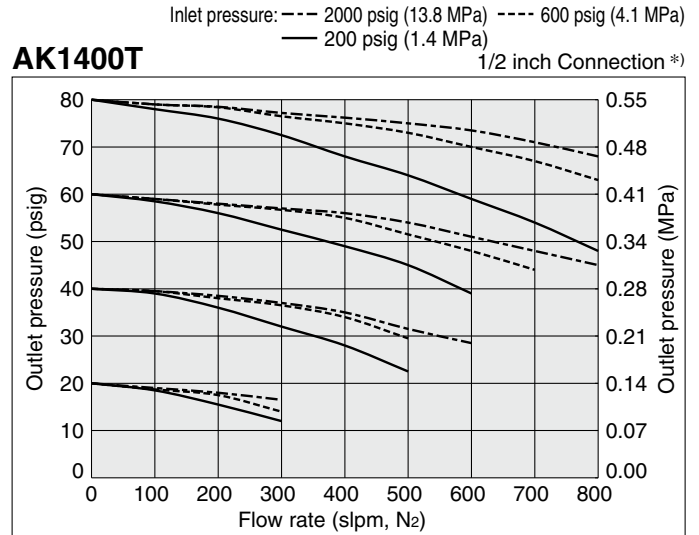
Note) The standard port is  $\phi 1.5$ . When selecting the AK1402TA or the option code P, BP, or HR, the connection is NPT1/8 female thread.

### AK1400T series compression fitting dimensions



| Connections | A    |       |
|-------------|------|-------|
|             | inch | (mm)  |
| 4T          | 5.0  | (127) |
| 6T          | 5.2  | (132) |
| 8T          | 5.7  | (145) |

## Flow Rate Characteristics



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for General Applications

High flow  
(Tied-diaphragm)

## AK1200 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK12 02 S 4PL 8 8 0 0 0 0 0 0 0 0**

**Port Number** ① ② ③ ④ ⑤

**Material**

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

**Ports**

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

**Seal material**

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

\*3) Not available with SH material.

**Knob**

| Code    | Knob          |
|---------|---------------|
| No code | Standard      |
| KL      | Knob LOTO *8) |

\*8) Not available with AK1225.

**Delivery pressure**

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

**Connections (Inlet ①, Outlet ②)**

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

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

**Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *1)                                                  |
|---------|---------------------------------------------------------------------|
| No code | No gauge port                                                       |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                                |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                                |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                               |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                               |
| 2       | 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) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

**Bonnet option**

| Code    | Bonnet                     |
|---------|----------------------------|
| No code | Standard                   |
| P       | Panel installation *7)     |
| BP      | Bonnet port (NPT 1/8 inch) |

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

**Option**

| Code    | Specification                                                          |
|---------|------------------------------------------------------------------------|
| No code | Standard                                                               |
| HF      | High flow *6)                                                          |
| FC      | Force compensation (Cv: 0.65) *4) *6)                                  |
| HR      | High inlet pressure (Max. inlet pressure 3000 psig (20.7 MPa)) *5) *6) |

\*4) FC option is only available with connection size 1/2 inch, but not available with AK1202, AK1206 and AK1225.  
\*5) HR option is not available with AK1202 and AK1206.  
\*6) Options "HF", "HC" and "HR" cannot be used in combination.

**Sample Order Number**

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

## Specifications

| Operating Parameters              |        | AK1202                                                                                     | AK1206                          | AK1210                           | AK1215                                                                      | AK1225                           |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------|---------------------------------|----------------------------------|-----------------------------------------------------------------------------|----------------------------------|
| Delivery pressure                 |        | 1 to 30 psig (0.007 to 0.2 MPa)                                                            | 2 to 60 psig (0.014 to 0.4 MPa) | 2 to 100 psig (0.014 to 0.7 MPa) | 5 to 150 psig (0.034 to 1.0 MPa)<br>(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  | 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) *3)                                                              |                                 |                                  |                                                                             |                                  |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                  |                                                                             |                                  |
| Connections                       |        | NPT female, Compression                                                                    |                                 |                                  |                                                                             |                                  |
| Supply pressure effect            |        | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |                                  |                                                                             |                                  |
| Installation                      |        | Bottom mount (Option: panel mount)                                                         |                                 |                                  |                                                                             |                                  |
| Internal volume                   |        | 0.65 in <sup>3</sup> (10.6 cm <sup>3</sup> )                                               |                                 |                                  |                                                                             |                                  |
| Weight                            |        | 2.0 kg *4)                                                                                 |                                 |                                  |                                                                             |                                  |

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

\*2) 250 psig outlet pressure preset at 800 psig (5.5 MPa) inlet pressure.

\*3) -10 to 90°C for Polyimide seat. Optional ambient and operating temperature range available. Please contact SMC.

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

## Options

### 1. High flow

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

| Option | Other Parameters       | AK1202                                                                                     | AK1206 | AK1210 | AK1215 | AK1225 |
|--------|------------------------|--------------------------------------------------------------------------------------------|--------|--------|--------|--------|
| HF     | 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)                                                               |        |
|        | 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) |        |

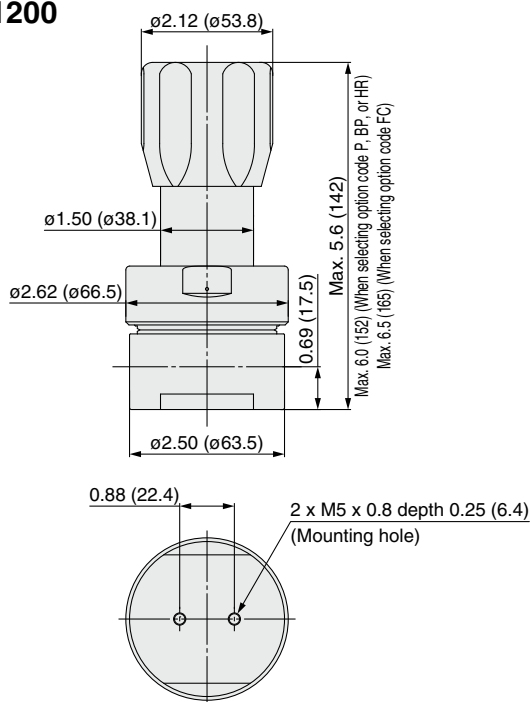
## Wetted Parts Material

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

## Dimensions

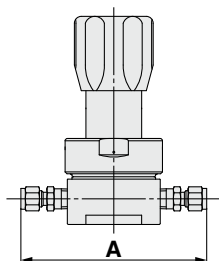
inch (mm)

### AK1200



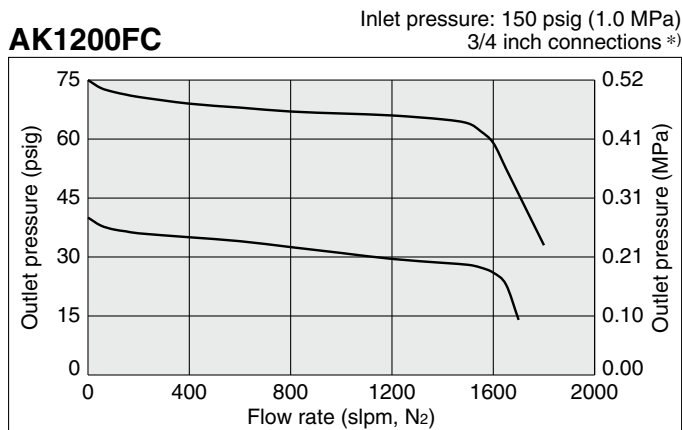
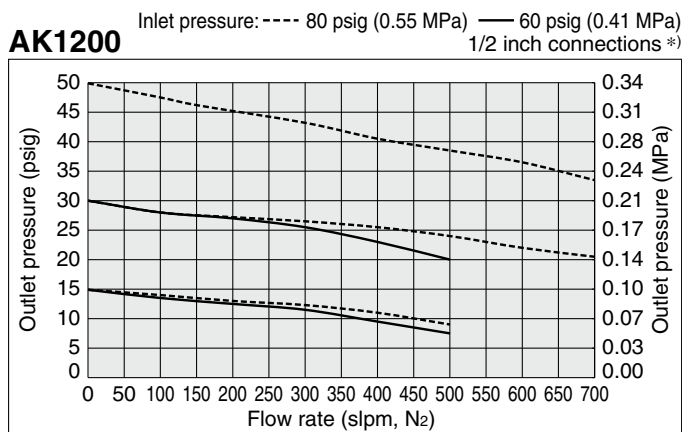
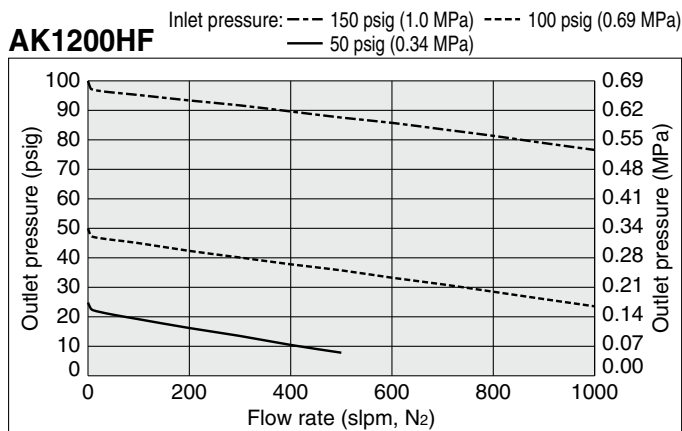
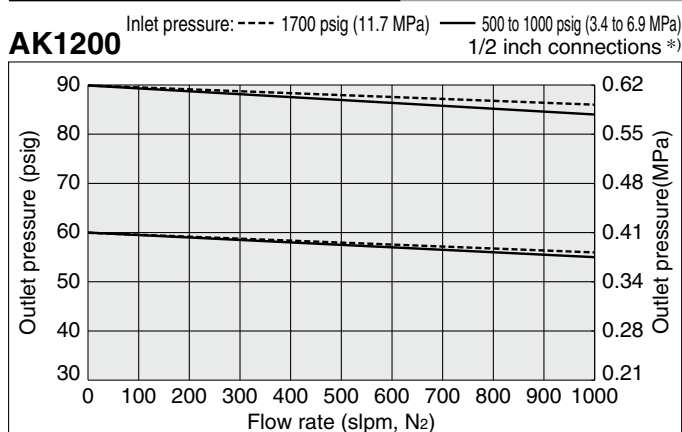
Note) The standard port is  $\phi 1.5$ . When selecting the option code P, BP, HR, or FC, the connection is NPT1/8 female thread.

### AK1200 series compression fitting dimensions



| Connections | A    |       |
|-------------|------|-------|
|             | inch | (mm)  |
| 4T          | 5.0  | (127) |
| 6T          | 5.2  | (132) |
| 8T          | 5.7  | (145) |

## Flow Rate Characteristics



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for General Applications High flow

## AK1300 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK13** **02** **S** **4PL** **8** **8** **0** **0**

**Port Number** ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Connections (Inlet ①, Outlet ②)**

| 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 (Outlet ③, ④)**

| Code    | Pressure gauge *1                                                   |
|---------|---------------------------------------------------------------------|
| No code | No gauge port                                                       |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2                     |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| V3      | -30 in.Hg to 30 psig -0.1 to 0.2 MPa                                |
| L       | -30 in.Hg to 60 psig -0.1 to 0.4 MPa                                |
| 1       | -30 in.Hg to 100 psig -0.1 to 0.7 MPa                               |
| H       | -30 in.Hg to 160 psig -0.1 to 1.1 MPa                               |
| 2       | 0 to 200 psig 0 to 1.5 MPa                                          |

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**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.

**Porting Configuration**

① IN ② OUT ③ ④ Gauge port (Outlet)

**Sample Order Number**

| Port    | ①   | ② | ③ | ④  |
|---------|-----|---|---|----|
| AK1302S | 2P  | 8 | 8 |    |
|         | 3P  | 8 | 8 | V3 |
|         | 4PL | 8 | 8 | 0  |
|         | 4PL | 8 | 8 | 0  |

## 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  | 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 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                 |                                 |                                  |                                  |
| Connections                       |        | NPT female, Compression                                                                    |                                 |                                  |                                  |
| Supply pressure effect            |        | 4.6 psig (0.032 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 <sup>3</sup> (10.6 cm <sup>3</sup> )                                               |                                 |                                  |                                  |
| Weight                            |        | 2.0 kg *                                                                                   |                                 |                                  |                                  |

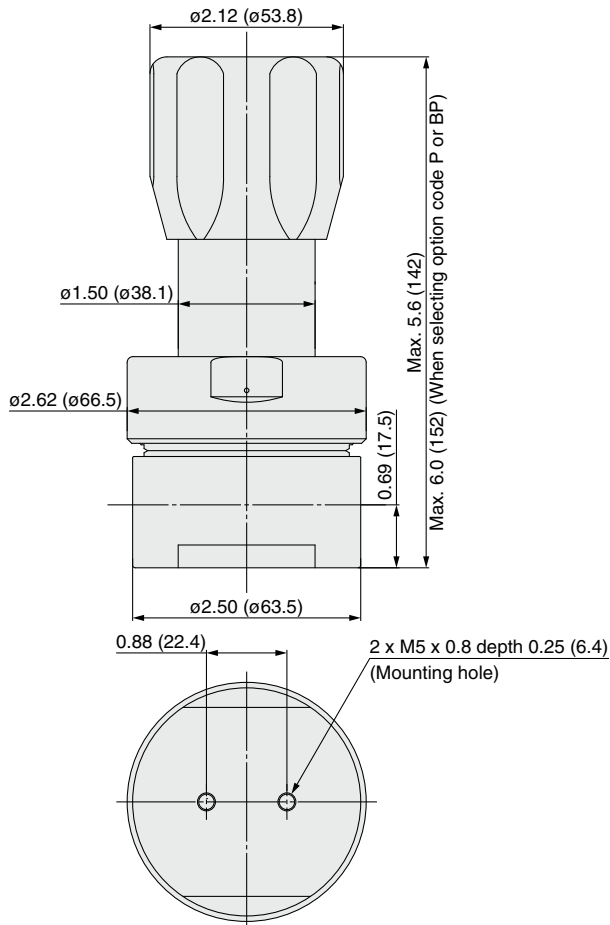
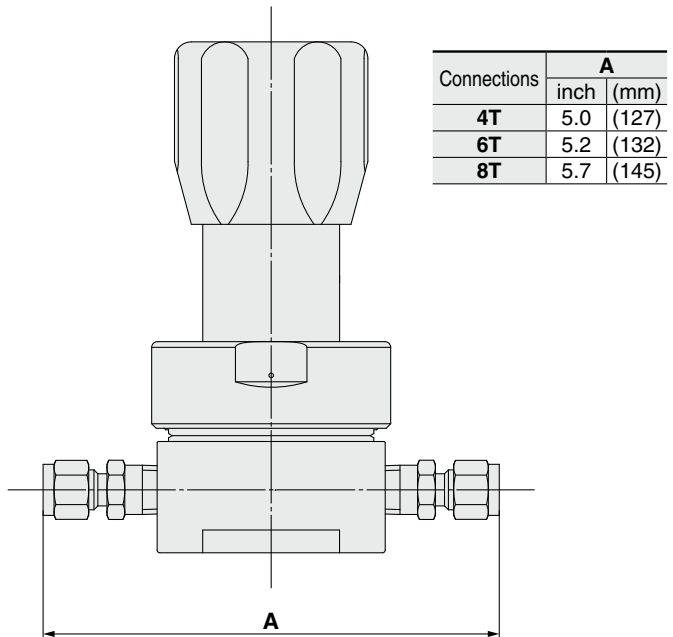
\* Weight, including individual boxed weight, may vary depending on connections or options.

**Wetted Parts Material**

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

**Dimensions**

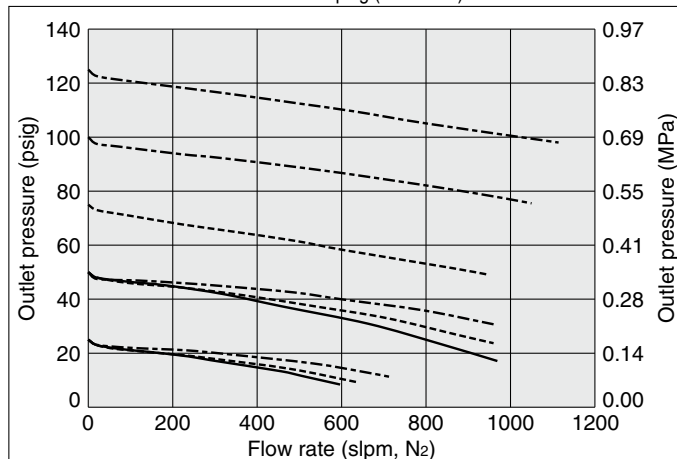
inch (mm)

**AK1300****AK1300 series compression fitting dimensions**

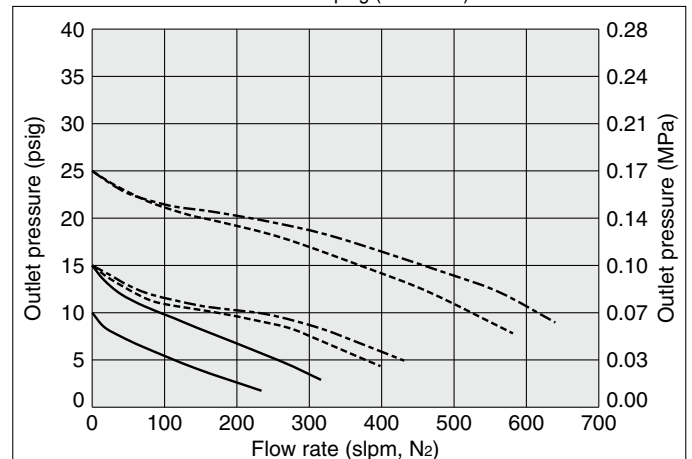
Note) The standard port is  $\phi 1.5$ . When selecting the option code P or BP, the connection is NPT1/8 female thread.

**Flow Rate Characteristics**

AK1300 Inlet pressure: --- 150 psig (1.0 MPa) ---- 100 psig (0.69 MPa)  
— 75 psig (0.52 MPa)



AK1300 Inlet pressure: --- 75 psig (0.52 MPa) ---- 50 psig (0.34 MPa)  
— 25 psig (0.17 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Single Stage Regulator for General Applications

High flow  
(Tied-diaphragm)

## AK9200 Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK92 02 S 4PL 12 12 0 0**

**Port Number** ① ② ③ ④

**Delivery pressure**

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

**Material**

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

**Ports**

| Code | Ports   |
|------|---------|
| 4PL  | 4 ports |

**Connections (Inlet ①, Outlet ②)**

| Code | Connections          |
|------|----------------------|
| 12   | NPT 3/4 inch         |
| 12T  | 3/4 inch compression |

**Gauge port (Outlet ③, ④)**

| Code | Pressure gauge *1)                                                  |                 |
|------|---------------------------------------------------------------------|-----------------|
|      | psig/bar unit                                                       | MPa unit        |
| 0    | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |                 |
| C    | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |                 |
| V3   | -30 in.Hg to 30 psig                                                | -0.1 to 0.2 MPa |
| L    | -30 in.Hg to 60 psig                                                | -0.1 to 0.4 MPa |
| 1    | -30 in.Hg to 100 psig                                               | -0.1 to 0.7 MPa |
| H    | -30 in.Hg to 160 psig                                               | -0.1 to 1.1 MPa |
| 2    | 0 to 200 psig                                                       | 0 to 1.5 MPa    |

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

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

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Porting Configuration**

① IN ② OUT  
③ ④ Gauge port (Outlet)

## Specifications

| Operating Parameters              |        | AK9202                                                                                   | AK9206                             | AK9210                              | AK9215                              |
|-----------------------------------|--------|------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |        | 1 to 30 psig<br>(0.007 to 0.2 MPa)                                                       | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 150 psig<br>(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  | 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 <sup>-10</sup> Pa·m³/s                                                            |                                    |                                     |                                     |
| Connections                       |        | NPT female, Compression                                                                  |                                    |                                     |                                     |
| Supply pressure effect            |        | 7 psig (0.048 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                     |                                     |
| Installation                      |        | Bottom mount (Option: panel mount)                                                       |                                    |                                     |                                     |
| Internal volume                   |        | 2.2 in³ (36 cm³)                                                                         |                                    |                                     |                                     |

## Wetted Parts Material

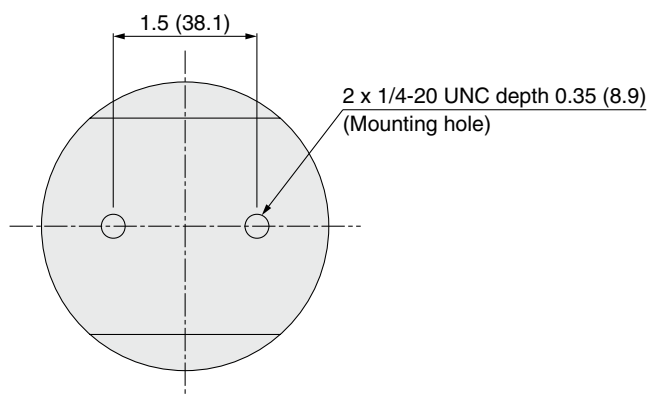
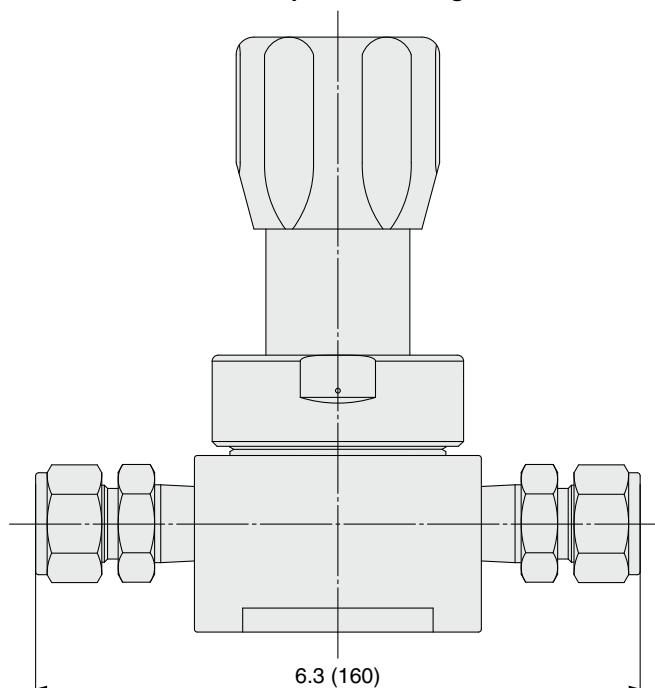
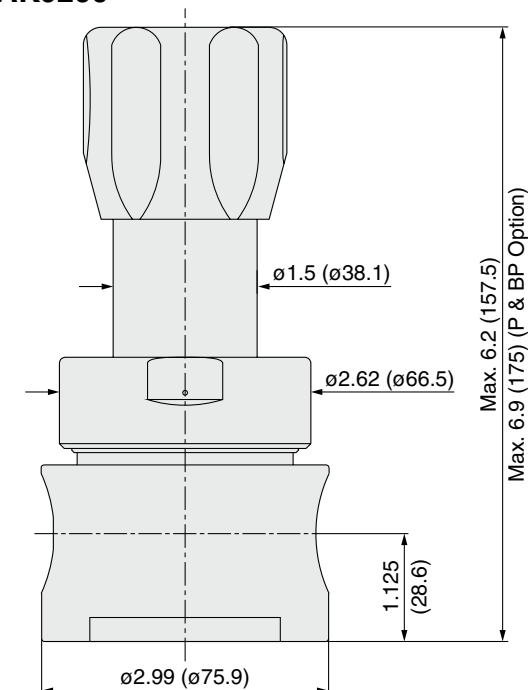
| Wetted Parts | S              |
|--------------|----------------|
| Body         | 316L SS        |
| Nozzle       | 316L SS        |
| Poppet       | 316 SS         |
| Diaphragm    | Ni-Cr-Mo alloy |
| Seat         | PFA            |

## Dimensions

inch (mm)

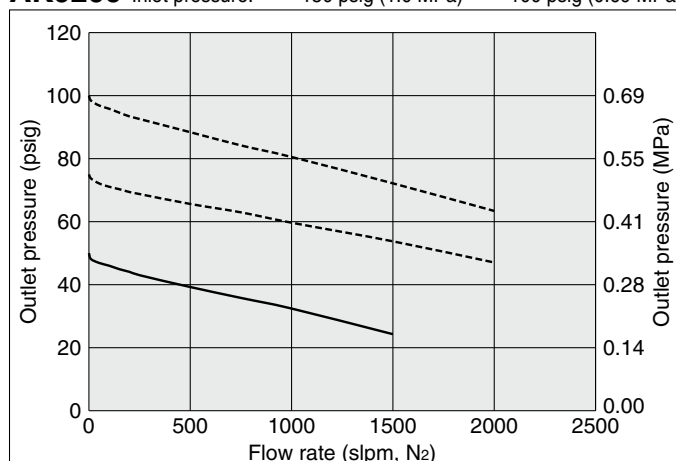
### AK9200

### AK9200 series compression fitting dimensions



## Flow Rate Characteristics

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



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Two Stage Regulator for General Applications

Low flow  
(Tied-diaphragm)

## AK1700 Series



RoHS

- High inlet pressure type: Max. 3500 psig (24.1 MPa)  
HR (option): Max. 4500 psig (31 MPa)
- Flow capacity Standard: to 30 slpm
- Body material: Stainless steel and Brass available
- Ni-Cr-Mo alloy internals available for corrosion resistance
- Minimizes supply pressure effect by two stage regulation
- Tied-diaphragm design

How to Order (See p. 250 for ordering syntax)

**AK17** **02** **S** **5PC** **4** **4** **0** **0** **0**

**Port Number** ① ② ③ ④ ⑤

**Material**

| Code      | Body    | Poppet         | Diaphragm      |
|-----------|---------|----------------|----------------|
| <b>B</b>  | Brass   | 316 SS         | 316 SS         |
| <b>S</b>  | 316L SS | 316 SS         | 316 SS         |
| <b>SH</b> | 316L SS | Ni-Cr-Mo alloy | Ni-Cr-Mo alloy |

**Delivery pressure**

| Code      | Delivery pressure                    |
|-----------|--------------------------------------|
| <b>02</b> | 1 to 30 psig (0.007 to 0.2 MPa)      |
| <b>06</b> | 2 to 60 psig (0.014 to 0.4 MPa)      |
| <b>10</b> | 2 to 100 psig (0.014 to 0.7 MPa)     |
| <b>20</b> | 5 to 200 psig (0.034 to 1.4 MPa) *1) |

\*1) When AK1720 is selected, selecting option "NT" is required.

**Connections (Inlet①, Outlet②)**

| Code      | Connections          |
|-----------|----------------------|
| <b>4</b>  | NPT 1/4 inch         |
| <b>4T</b> | 1/4 inch compression |

**Pressure gauge unit** \*4)

| Code           | Unit     |
|----------------|----------|
| <b>No code</b> | psig/bar |
| <b>MPA</b>     | MPa      |

\*4) Pressure gauge unit MPa or psig/bar selectable. However under Japanese regulation, only MPa is available in Japan.

**Seat material**

| Code           | Material         |
|----------------|------------------|
| <b>No code</b> | PCTFE (Standard) |
| <b>VS</b>      | Polyimide *5)    |
| <b>PK</b>      | PEEK             |

\*5) Not available with SH material.

**Knob**

| Code           | Knob      |
|----------------|-----------|
| <b>No code</b> | Standard  |
| <b>KL</b>      | Knob LOTO |

**Bonnet option**

| Code           | Bonnet                 |
|----------------|------------------------|
| <b>No code</b> | Standard               |
| <b>P</b>       | Panel installation *7) |

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

**Option**

| Code           | Specification                                                    |
|----------------|------------------------------------------------------------------|
| <b>No code</b> | Standard                                                         |
| <b>HF</b>      | High flow                                                        |
| <b>HR</b>      | High inlet pressure (Max. inlet pressure 4500 psig (31 MPa)) *6) |
| <b>HRHF</b>    | High inlet pressure + High flow *6)                              |

\*6) Not available with B material.

**Poppet feature option**

| Code           | Feature                                          |
|----------------|--------------------------------------------------|
| <b>No code</b> | Standard (First and second stage tied diaphragm) |
| <b>NT</b>      | First stage tied, second stage free poppet       |

**Porting configuration**

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

**Gauge port**

(Extra outlet port③, Inlet④, Outlet⑤)

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

\*2) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*3) 1/4 inch NPT plug is included.

**Sample Order Number**

| Port    | ①   | ② | ③ | ④ | ⑤  |
|---------|-----|---|---|---|----|
| AK1702S | 5PC | 4 | 4 | 0 | 0  |
|         | 5PC | 4 | 4 | 0 | 40 |

MPa

## Specifications

| Operating Parameters              |        | AK1702                                                                                        | AK1706                             | AK1710                              | AK1720                              |
|-----------------------------------|--------|-----------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| Delivery pressure                 |        | 1 to 30 psig<br>(0.007 to 0.2 MPa)                                                            | 2 to 60 psig<br>(0.014 to 0.4 MPa) | 2 to 100 psig<br>(0.014 to 0.7 MPa) | 5 to 200 psig<br>(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  | 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) *1)                                                                 |                                    |                                     |                                     |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                    |                                    |                                     |                                     |
| Connections                       |        | NPT female, Compression                                                                       |                                    |                                     |                                     |
| Supply pressure effect            |        | 0.05 psig (0.00035 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                    |                                     |                                     |
| Installation                      |        | Option: panel mount                                                                           |                                    |                                     |                                     |
| Internal volume                   |        | 0.9 in <sup>3</sup> (15 cm <sup>3</sup> )                                                     |                                    |                                     |                                     |
| Weight                            |        | 1.95 kg *2)                                                                                   |                                    |                                     |                                     |

\*1) -10 to 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

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

## Wetted Parts Material

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

## Options

### 1. High inlet pressure

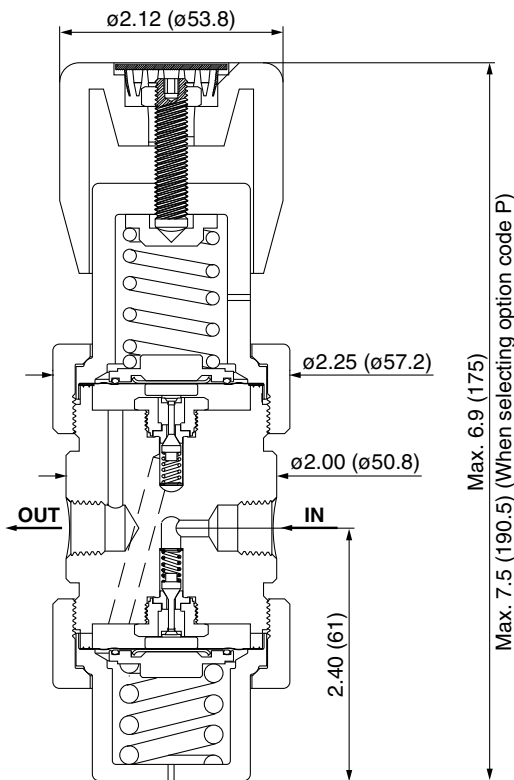
Changes from the standard type are:

| Option | Other Parameters | AK1702                       | AK1706 | AK1710 | AK1720 |
|--------|------------------|------------------------------|--------|--------|--------|
| HR     | Source pressure  | Vacuum to 4500 psig (31 MPa) |        |        |        |

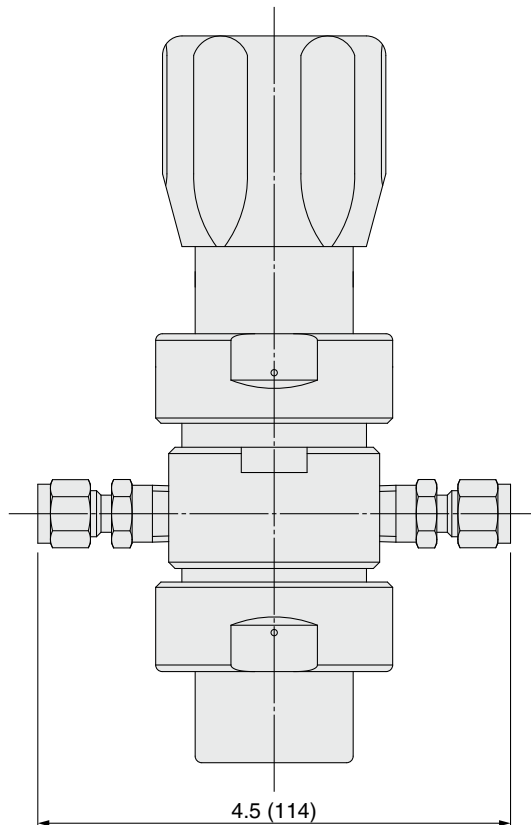
## Dimensions

inch (mm)

### AK1700



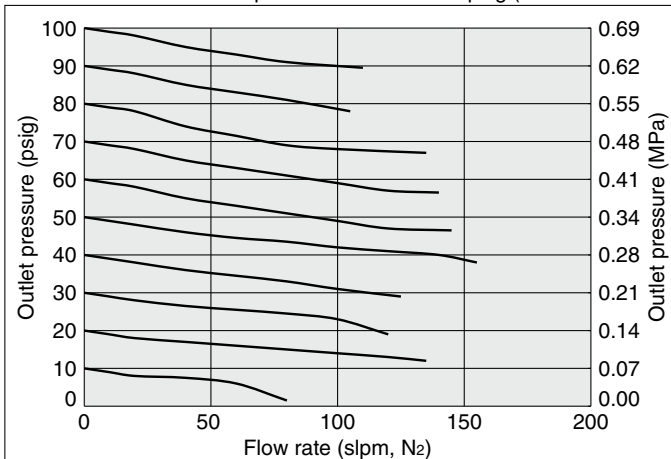
### AK1700 series compression fitting dimensions



## Flow Rate Characteristics

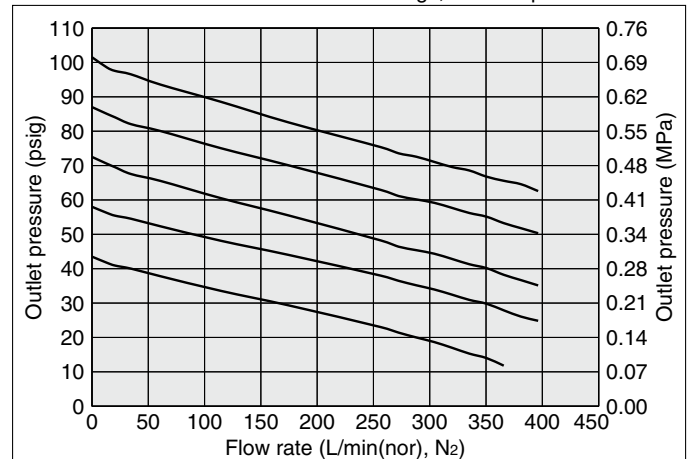
### AK1700

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



### AK1710HF

Inlet pressure: — 220 psig (1.5 MPa)  
with 1/4 Inch Fittings, Gas temperature is 21°C



Note) slpm, N2: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## AK10PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK10 PA S 4PL 4 4 0 0 0 0 0 0**

**Port Number**  
① ② ③ ④ ⑤

**Delivery pressure**

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

**Material**

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

**Connections (Inlet ①, Outlet ②)**

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

**Option**

| Code    | Specification |
|---------|---------------|
| No code | Standard      |
| HF      | High flow *6) |

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

**Ports**

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

**Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *1)                                                  |                 |
|---------|---------------------------------------------------------------------|-----------------|
|         | psig/bar unit                                                       | MPa unit        |
| No code | No gauge port                                                       |                 |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |                 |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |                 |
| 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     |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

**Seat material**

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

**Porting Configuration (Top View)**

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

## Specifications

| Operating Parameters              |        | AK10PA                                                                                       |
|-----------------------------------|--------|----------------------------------------------------------------------------------------------|
| Delivery pressure                 |        | 7 to 150 psig (0.05 to 1.0 MPa)                                                              |
| Gas                               |        | Select compatible materials of construction for the gas                                      |
| Source pressure                   |        | Vacuum to 3500 psig (24.1 MPa) *1)                                                           |
| Proof pressure                    | Inlet  | 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                                                        |
| Maximum control pressure          |        | 150 psig (1.0 MPa)                                                                           |
| Ambient and operating temperature |        | -40 to 71°C (No freezing) *2)                                                                |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                   |
| Connections                       |        | NPT female, Compression                                                                      |
| Control pressure port             |        | NPT 1/8 inch                                                                                 |
| Bonnet port                       |        | NPT 1/8 inch                                                                                 |
| Supply pressure effect            |        | 0.38 psig (0.0026 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |        | Bottom mount                                                                                 |
| Internal volume                   |        | 0.5 in <sup>3</sup> (8.2 cm <sup>3</sup> )                                                   |

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

\*2) -10 to 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

## Option

### High flow

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

| Option | Other Parameters       | AK10PA                                                                                       |
|--------|------------------------|----------------------------------------------------------------------------------------------|
| HF     | Delivery pressure      | 7 to 150 psig (0.05 to 1.0 MPa) *)                                                           |
|        | Supply pressure effect | 0.75 psig (0.0052 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |

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

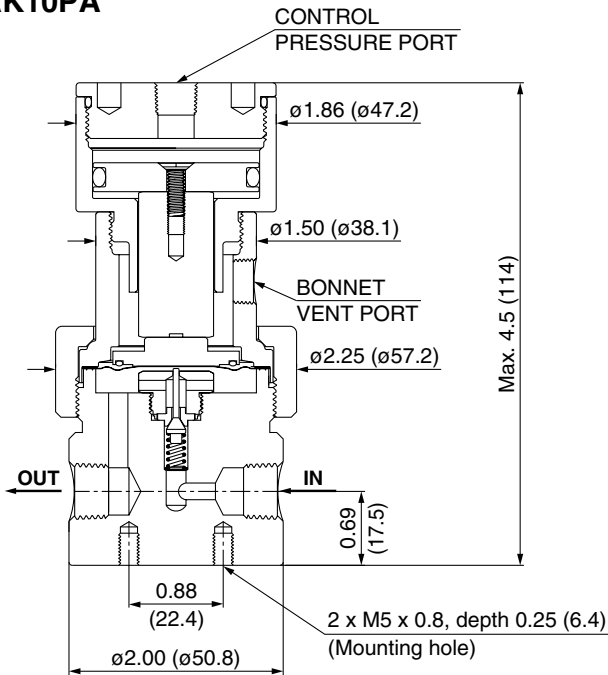
## Wetted Parts Material

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

## Dimensions

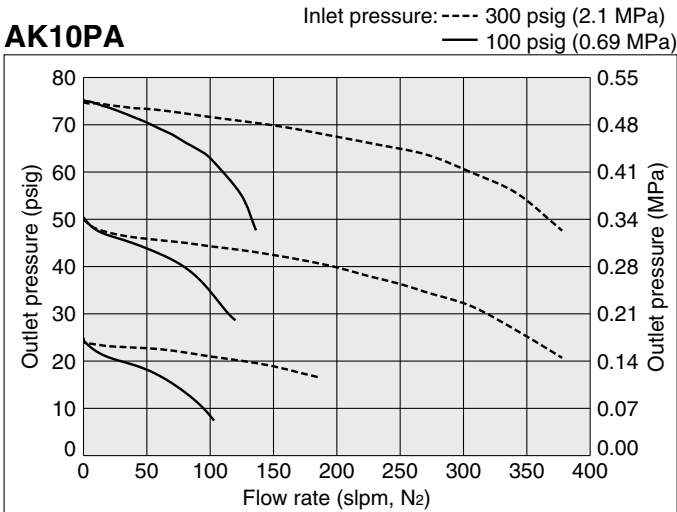
inch (mm)

### AK10PA



## Flow Rate Characteristics

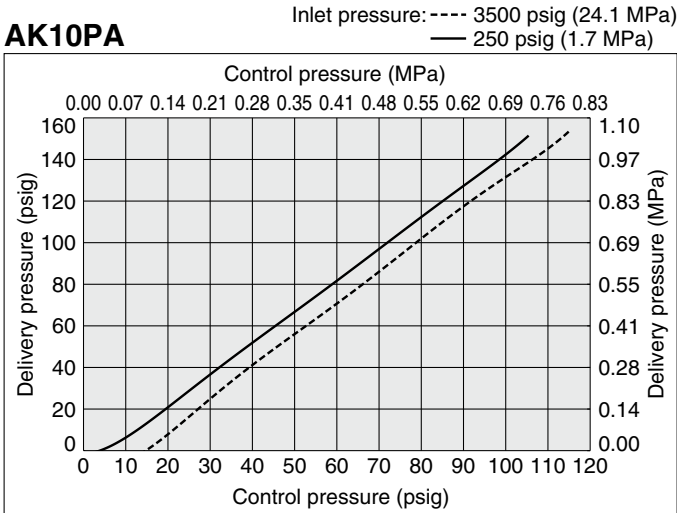
### AK10PA



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input / Output Characteristics

### AK10PA



### AK15PA Series

- Actuation control pressure isolated from process gas by two seals
- Body material: Stainless steel and Brass available
- High inlet pressure type: Max. 3500 psig (24.1 MPa)
- Flow capacity Standard: to 30 slpm
- Ni-Cr-Mo alloy internals available for corrosion resistance
- 100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa) control pressure or less



RoHS

How to Order (See p. 250 for ordering syntax)

AK15 PA S 4PL 4 4 0 0 0 0 0 0

#### Delivery pressure

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

#### Material

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

#### Connections (Inlet①, Outlet②)

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

#### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *3)    |
| PK      | PEEK             |

\*3) Not available with SH material.

#### Ports

| Code | Ports                                             | Material |       |
|------|---------------------------------------------------|----------|-------|
|      |                                                   | B        | S, SH |
| 2P   | Refer to the following<br>porting configurations. | —        | ●     |
| 3P   |                                                   | —        | ●     |
| 4PL  |                                                   | ●        | ●     |
| 5PC  |                                                   | ●        | ●     |

#### Gauge port

(Extra outlet port③, Inlet④, Outlet⑤)

| Code    | Pressure gauge *1)                                                  |                 |
|---------|---------------------------------------------------------------------|-----------------|
|         | psig/bar unit                                                       | MPa unit        |
| No code | No gauge port                                                       |                 |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |                 |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |                 |
| 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     |

\*1) Refer to gauge guide (P.139) for gauge specifications.

Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

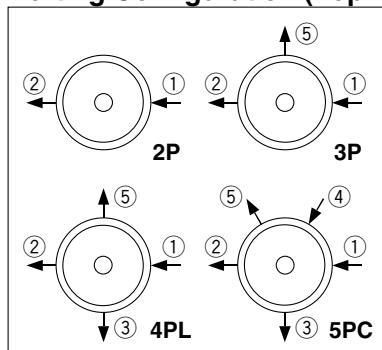
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

#### Pressure gauge unit \*2)

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

#### Porting Configuration (Top View)



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

## Specifications

| Operating Parameters              |        | AK15PA                                                                                       |
|-----------------------------------|--------|----------------------------------------------------------------------------------------------|
| Delivery pressure                 |        | 7 to 150 psig (0.05 to 1.0 MPa)                                                              |
| Gas                               |        | Select compatible materials of construction for the gas                                      |
| Source pressure                   |        | Vacuum to 3500 psig (24.1 MPa)                                                               |
| Proof pressure                    | Inlet  | 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                                                        |
| Maximum control pressure          |        | 150 psig (1.0 MPa)                                                                           |
| Ambient and operating temperature |        | -40 to 71°C (No freezing) *)                                                                 |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                   |
| Connections                       |        | NPT female, Compression                                                                      |
| Control pressure port             |        | NPT 1/8 inch                                                                                 |
| Bonnet port                       |        | NPT 1/8 inch                                                                                 |
| Supply pressure effect            |        | 0.41 psig (0.0028 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |        | Bottom mount                                                                                 |
| Internal volume                   |        | 0.53 in <sup>3</sup> (8.71 cm <sup>3</sup> )                                                 |

\*) -10 to 90°C for Polyimide and PEEK seat. Optional ambient and operating temperature range available. Please contact SMC.

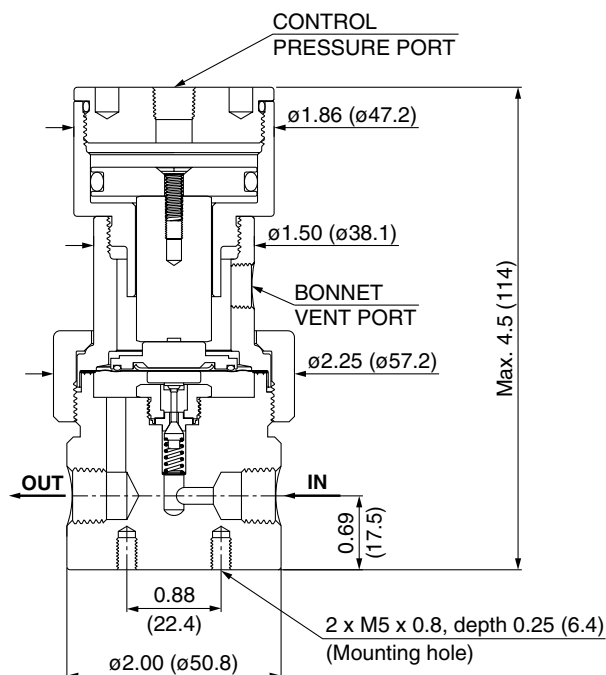
## Wetted Parts Material

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

## Dimensions

inch (mm)

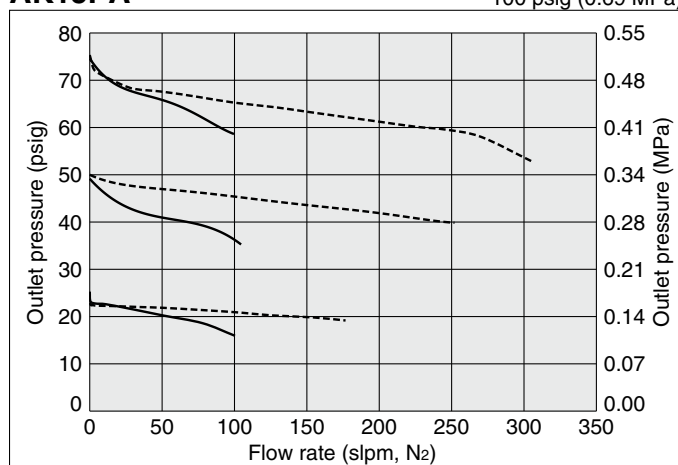
### AK15PA



## Flow Rate Characteristics

### AK15PA

Inlet pressure: --- 300 psig (2.1 MPa)  
— 100 psig (0.69 MPa)

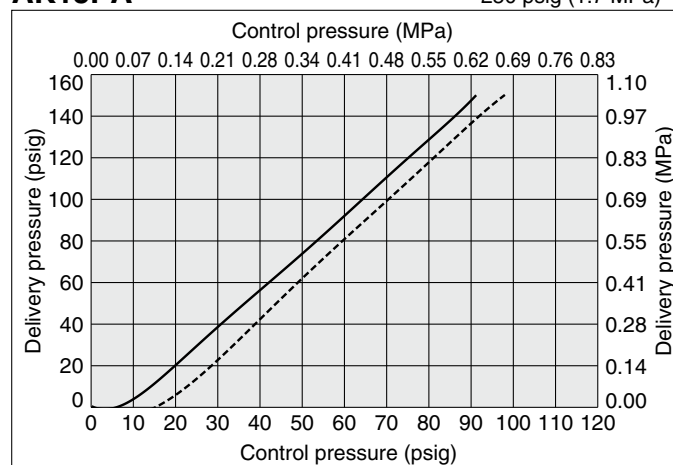


Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input/Output Characteristics

### AK15PA

Inlet pressure: --- 3500 psig (24.1 MPa)  
— 250 psig (1.7 MPa)



Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

AK

Vacuum Generators

Flow Switches

Technical Data/ Glossary of Terms

Precautions

### AK14PAT Series

- Actuation control pressure isolated from process gas by two seals
- Body material: Stainless steel and Brass available
- High inlet pressure type Standard: Max. 2300 psig (15.9 MPa)  
HR (option): Max. 3000 psig (20.7 MPa)
- Flow capacity: to 400 slpm
- Ni-Cr-Mo alloy internals standard
- 100 psig (0.69 MPa) outlet pressure achievable with 80 psig (0.55 MPa)



RoHS

How to Order (See p. 250 for ordering syntax)

**AK14 PAT S 4PL 6 6 0 0 0 0 0 0**

**Port Number**  
① ② ③ ④ ⑤

**Delivery pressure**

| Code | Delivery pressure                                                       |
|------|-------------------------------------------------------------------------|
| PA   | 7 to 150 psig (0.05 to 1.0 MPa)                                         |
|      | Sub-atmospheric (A): 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa) |

**Material**

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

**Range options**

| Code    | Specification   |
|---------|-----------------|
| No code | Standard        |
| A       | Sub-atmospheric |

**Ports**

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

**Porting Configuration (Top View)**

**Connections (Inlet ①, Outlet ②)**

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

**Option**

| Code    | Specification                                                         |
|---------|-----------------------------------------------------------------------|
| No code | Standard                                                              |
| HR      | High inlet pressure *4)<br>(Max. inlet pressure 3000 psig (20.7 MPa)) |

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

**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      | Polyimide *3)    |

\*3) Not available with SH material.

**Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *1)                                                  |
|---------|---------------------------------------------------------------------|
|         | psig/bar unit   MPa unit                                            |
| No code | No gauge port                                                       |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |
| 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                                        |

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

## Specifications

| Operating Parameters              |        | AK14PAT□A                                                                                  | AK14PAT                         |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------|---------------------------------|
| Delivery pressure                 |        | 100 mm Hg absolute to 30 psig (-88 kPa to 0.2 MPa)                                         | 7 to 150 psig (0.05 to 1.0 MPa) |
| 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  | 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                                                      |                                 |
| Maximum control pressure          |        | 150 psig (1.0 MPa)                                                                         |                                 |
| Ambient and operating temperature |        | -40 to 71°C (No freezing) *)                                                               |                                 |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                 |                                 |
| Connections                       |        | NPT female, Compression                                                                    |                                 |
| Control pressure port             |        | NPT 1/8 inch                                                                               |                                 |
| Bonnet port                       |        | NPT 1/8 inch                                                                               |                                 |
| Supply pressure effect            |        | 1.6 psig (0.011 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |                                 |
| Installation                      |        | Bottom mount                                                                               |                                 |
| Internal volume                   |        | 1.14 in <sup>3</sup> (18.7 cm <sup>3</sup> )                                               |                                 |

\*) -10 to 90°C for Polyimide seat.

## Option

### High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AK14PAT                            |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

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

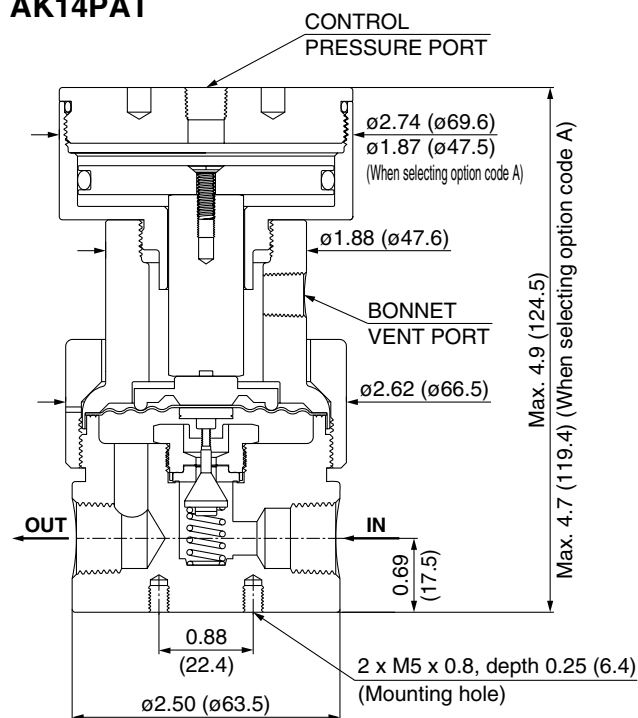
## Wetted Parts Material

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

## Dimensions

inch (mm)

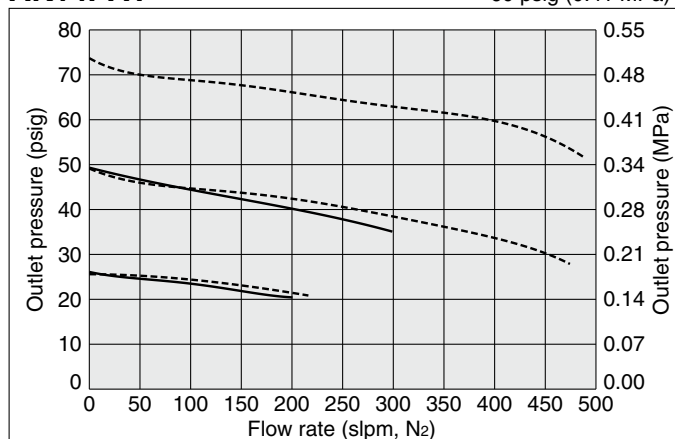
### AK14PAT



## Flow Rate Characteristics

### AK14PAT

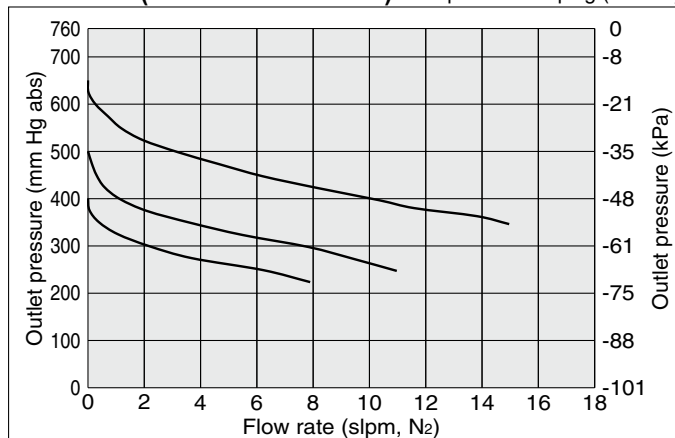
Inlet pressure: ---- 100 psig (0.69 MPa)  
— 60 psig (0.41 MPa)



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

### AP14PATA (1/4 inch connections)

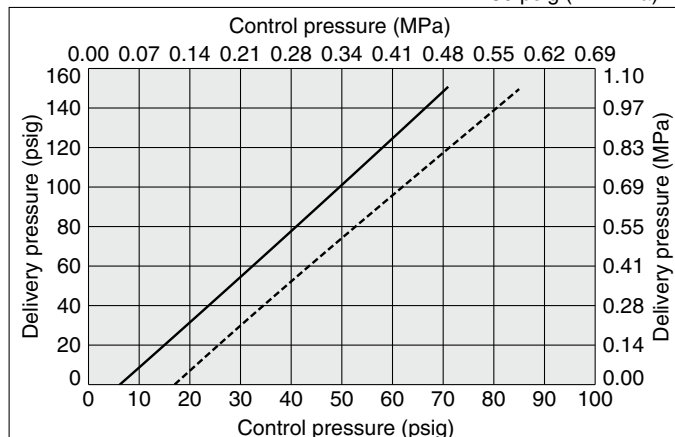
Inlet pressure: 2 psig (14 kPa)



## Input/Output Characteristics

### AK14PAT

Inlet pressure: ---- 2300 psig (15.9 MPa)  
— 250 psig (1.7 MPa)



### AK12PA Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**AK12 PA S 4PL 8 8 0 0 0 0 0 0**

**Delivery pressure**

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

**Material**

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

**Ports**

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

**Porting Configuration (Top View)**

**Connections (Inlet ①, Outlet ②)**

| 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 |

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

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

**Option**

| Code    | Specification                                                             |
|---------|---------------------------------------------------------------------------|
| No code | Standard                                                                  |
| HF      | High flow *4) *5)                                                         |
| HR      | High inlet pressure *4) *5)<br>(Max. inlet pressure 3000 psig (20.7 MPa)) |

\*4) Options "HF" and "HR" cannot be used in combination.  
\*5) Full outlet pressure rating may not be achieved at all inlet pressure.

**Seal material**

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

\*3) Not available with SH material.

**Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤)**

| Code    | Pressure gauge *1)                                                  |                 |
|---------|---------------------------------------------------------------------|-----------------|
|         | psig/bar unit                                                       | MPa unit        |
| No code | No gauge port                                                       |                 |
| 0       | No pressure gauge (Gauge port: 1/4 inch NPT) *2)                    |                 |
| C       | No pressure gauge (1/4 inch NPT plug is installed before shipment.) |                 |
| 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     |

- \*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.  
\*2) 1/4 inch NPT plug is included only for port code 4PL and 5PC.

## Specifications

| Operating Parameters              |        | AK12PA                                                                                     |
|-----------------------------------|--------|--------------------------------------------------------------------------------------------|
| Delivery pressure                 |        | 7 to 150 psig (0.05 to 1.0 MPa)                                                            |
| Gas                               |        | Select compatible materials of construction for the gas                                    |
| Source pressure                   |        | Vacuum to 1700 psig (11.7 MPa)                                                             |
| Proof pressure                    | Inlet  | 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                                                      |
| Maximum control pressure          |        | 150 psig (1.0 MPa)                                                                         |
| Ambient and operating temperature |        | -40 to 71°C (No freezing) *)                                                               |
| Leak rate                         |        | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                                 |
| Connections                       |        | NPT female, Compression                                                                    |
| Control pressure port             |        | NPT 1/8 inch                                                                               |
| Bonnet port                       |        | NPT 1/8 inch                                                                               |
| Supply pressure effect            |        | 3.5 psig (0.024 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |
| Installation                      |        | Bottom mount                                                                               |
| Internal volume                   |        | 1.32 in <sup>3</sup> (21.6 cm <sup>3</sup> )                                               |

\*) -10 to 90°C for Polyimide seat. Optional ambient and operating temperature range available. Please contact SMC.

## Options

### 1. High flow

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

| Option | Other Parameters       | AK12PA                                                                                     |
|--------|------------------------|--------------------------------------------------------------------------------------------|
| HF     | Delivery pressure      | 7 to 150 psig (0.05 to 1.0 MPa) *)                                                         |
|        | Supply pressure effect | 4.2 psig (0.029 MPa) rise in delivery pressure per 100 psig (0.7 MPa) source pressure drop |

### 2. High inlet pressure

Changes from the standard type are:

| Option | Other Parameters  | AK12PA                             |
|--------|-------------------|------------------------------------|
| HR     | Delivery pressure | 7 to 150 psig (0.05 to 1.0 MPa) *) |
|        | Source pressure   | Vacuum to 3000 psig (20.7 MPa)     |

\*) HR and HF options will not achieve rated outlet pressure at all inlet pressures.

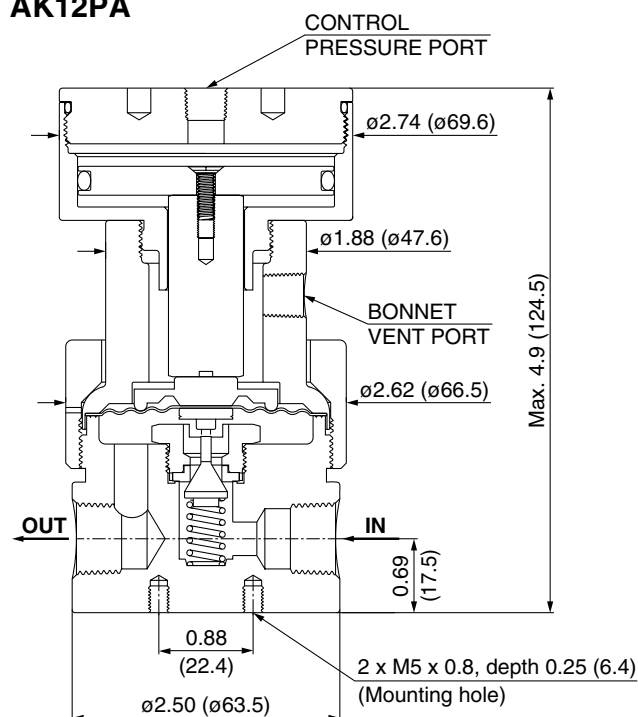
## Wetted Parts Material

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

## Dimensions

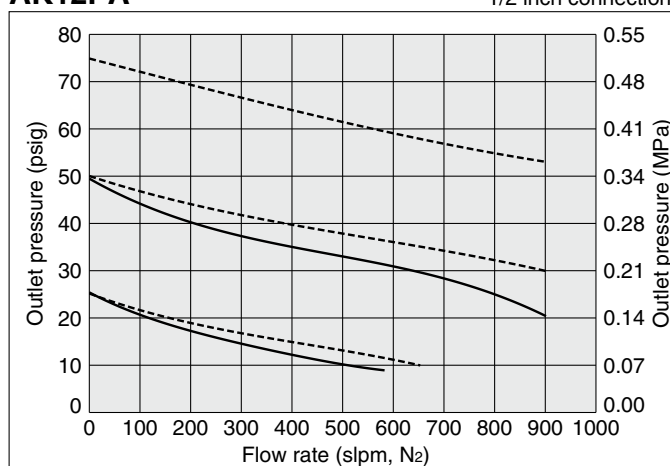
inch (mm)

### AK12PA



## Flow Rate Characteristics

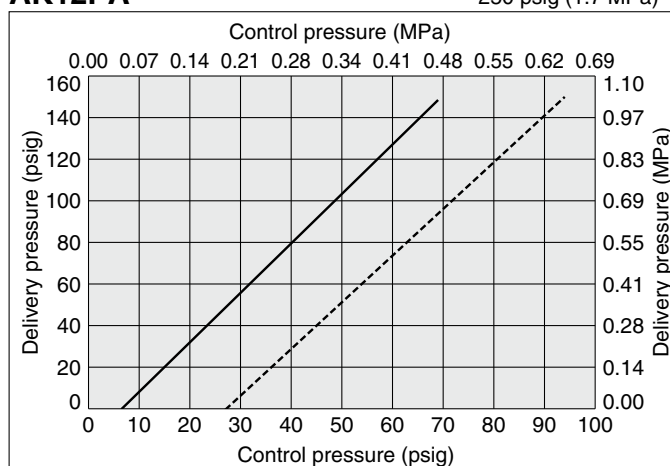
AK12PA Inlet pressure: ---- 100 psig (0.69 MPa) — 60 psig (0.41 MPa)  
1/2 inch connections



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## Input/Output Characteristics

AK12PA Inlet pressure: ---- 1700 psig (11.7 MPa) — 250 psig (1.7 MPa)



# Welded Connection Series Back Pressure Regulator for Ultra High Purity

## BP1000 Welded Series

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



RoHS

How to Order (See p. 250 for ordering syntax)

**BP1000** **01** **S** **2PW** **FV4** **FV4** **0** **V3** **L** **1** **H** **V2** **2** **4**

**Operating pressure**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PW  | 3 ports |

**Connections (Inlet ①, Outlet ②)**

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

**Surface finish**

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

**Material**

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

**Knob**

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

**Bonnet option**

| Code    | Bonnet                 |
|---------|------------------------|
| No code | Standard               |
| P       | Panel installation *3) |

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

**Seat material**

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

**Pressure gauge unit \*2)**

| Code    | Unit     |
|---------|----------|
| No code | psig/bar |
| MPA     | MPa      |

**Porting Configuration**

① IN ② OUT ③ Gauge port (Inlet)

**Gauge port (Extra outlet port ③, Inlet ④, Outlet ⑤)**

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

\*1) Refer to gauge guide (P.139) for gauge specifications. Select a pressure gauge, which has a larger pressure range than the delivery pressure range of the regulator.

**Sample Order Number**

| Port    | ①   | ②   | ③   |
|---------|-----|-----|-----|
| BP1001S | 2PW | FV4 | FV4 |
|         | 3PW | FV4 | FV4 |
|         |     | V3  | MPA |

## Specifications

| Operating Parameters              |                  | BP1001                                                                                | BP1002                             | BP1010                              | BP1020                             | BP1030                             |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|
| Operating pressure                |                  | 0.5 to 10 psig<br>(0.0034 to 0.07 MPa)                                                | 1 to 30 psig<br>(0.007 to 0.2 MPa) | 5 to 100 psig<br>(0.034 to 0.7 MPa) | 15 to 200 psig<br>(0.1 to 1.4 MPa) | 15 to 300 psig<br>(0.1 to 2.1 MPa) |
| Gas                               |                  | Select compatible materials of construction for the gas                               |                                    |                                     |                                    |                                    |
| 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 |                  | -10 to 71°C (No freezing) *1)                                                         |                                    |                                     |                                    |                                    |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                                    |                                     |                                    |                                    |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s He                                         |                                    |                                     |                                    |                                    |
| Across the seat leak              |                  | Bubble tight                                                                          |                                    |                                     |                                    |                                    |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                    |                                     |                                    |                                    |
| Connections                       |                  | Face seal, Tube weld                                                                  |                                    |                                     |                                    |                                    |
| Installation                      |                  | Bottom mount (Option: panel mount)                                                    |                                    |                                     |                                    |                                    |
| Internal volume                   |                  | 0.49 in <sup>3</sup> (8 cm <sup>3</sup> )                                             |                                    |                                     |                                    |                                    |
| Weight                            |                  | 1.2 kg *2)                                                                            |                                    |                                     |                                    |                                    |

\*1) Min. -30°C for PTFE seat. Optional ambient and operating temperature range available. Please contact SMC.

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

Wetted Parts Material

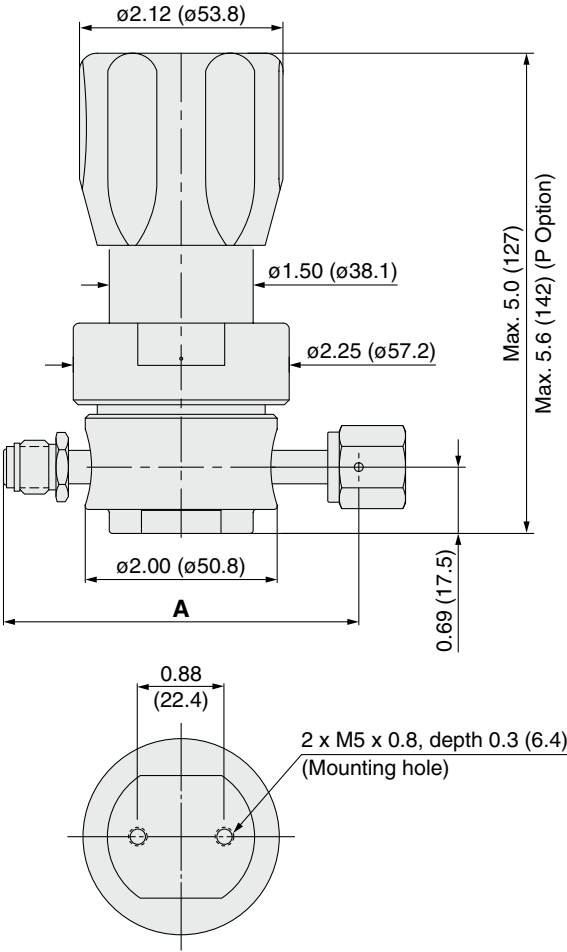
| Wetted Parts | S                        | SH             |
|--------------|--------------------------|----------------|
| Body         | 316L SS secondary remelt |                |
| Diaphragm    | 316L SS                  | Ni-Cr-Mo alloy |
| Nozzle       | 316L SS                  | Ni-Cr-Mo alloy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

Dimensions

inch (mm)

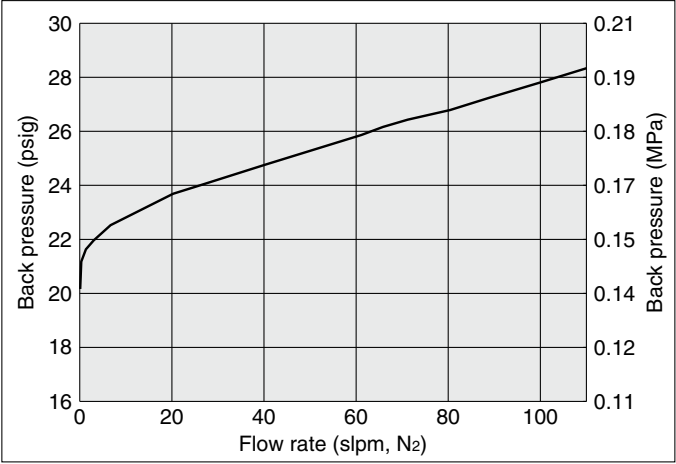
BP1000

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



Flow Rate Characteristics

BP1000 with FKM seat



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## ***BP1000 Series***

- 

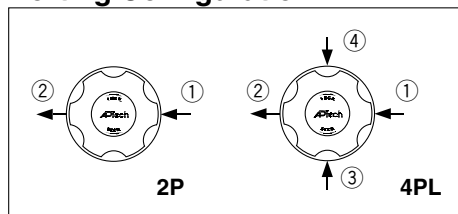
**RoHS**

**BP10** **01** **S** **4PL** **4** **4** **0** **0** **Knob**

① ② ③ ④

| Code    | Knob      |
|---------|-----------|
| No code | Standard  |
| KL      | Knob LOTO |

## Porting Configuration



| Port | ① | ② | ③ | ④ |
|------|---|---|---|---|
| 2P   | 4 | 4 |   |   |
| 4PL  | 4 | 4 | 0 | 0 |
| 4PL  | 4 | 4 | 0 | 1 |

## Specifications

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

## Wetted Parts Material

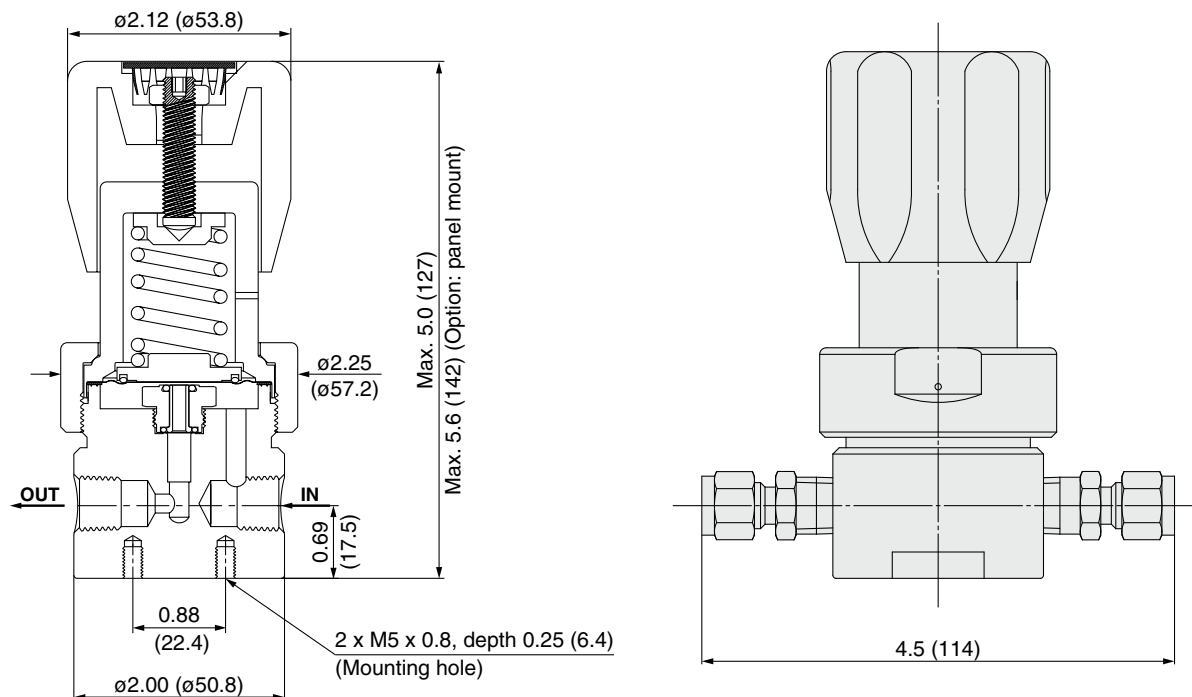
| Wetted Parts | B                        | S      | SH                |
|--------------|--------------------------|--------|-------------------|
| Body         | Brass                    | 316 SS |                   |
| Diaphragm    | 316 SS                   |        | Ni-Cr-Mo alloy*1) |
| Nozzle       | 316 SS                   |        | Ni-Cr-Mo alloy    |
| Seat         | FKM (Option: PTFE, FFKM) |        |                   |
| Seal         | PTFE                     |        |                   |

\*1) Stainless steel is used for the BP1020SH and BP1030SH.

## Dimensions

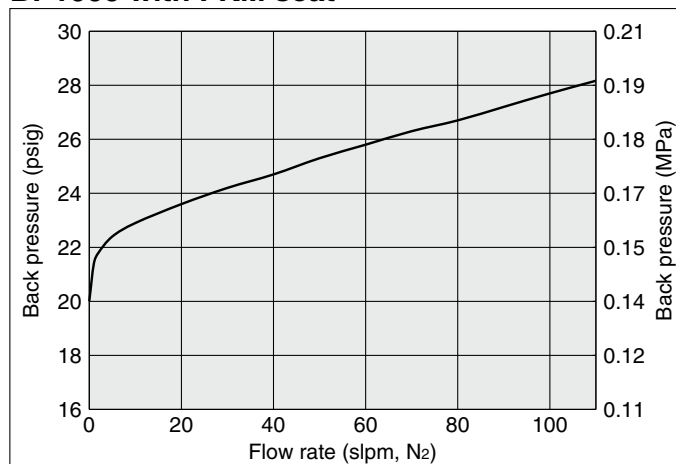
### BP1000

### BP1000 series compression fitting dimensions



## Flow Rate Characteristics

### BP1000 with FKM seat



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Regulator Pressure Gauges Guide

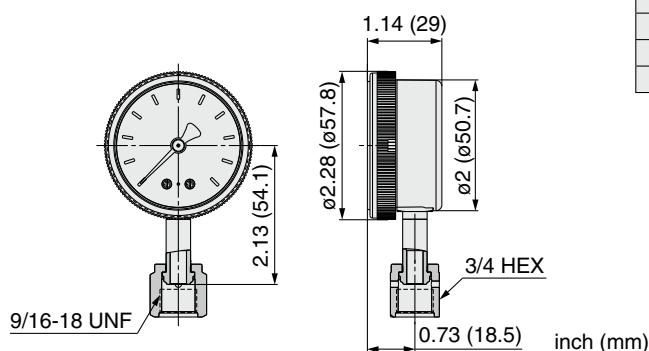
For AP/SL/AZ series (Installed before shipment <sup>\*1)</sup> / Order separately)

## Specifications

|                   |                                                                                       |                 |
|-------------------|---------------------------------------------------------------------------------------|-----------------|
| Installation      |                                                                                       | Lower mount     |
| Gas               | Select compatible materials of construction for the gas                               |                 |
| Connections       | 1/4 inch face seal (Female)                                                           |                 |
| Temperature range | -40 to 60°C (No freezing)                                                             |                 |
| Accuracy          | 25% to 75% of the scale: ±1%F.S.<br>Other than above: ±2%F.S.<br>(ASME B40.1 Grade A) |                 |
| Cleanliness       | ASME B40.1 level IV                                                                   |                 |
| No oil            | No oil                                                                                |                 |
| Material          | Case                                                                                  | Stainless steel |
|                   | Window                                                                                | Polycarbonate   |
|                   | Socket                                                                                | 316L SS         |
|                   | Bourdon tube                                                                          | 316L SS         |

## Model

| Regulator Code <sup>*2)</sup> |           | Pressure range        | Unit                    | Part number <sup>*3)</sup> |
|-------------------------------|-----------|-----------------------|-------------------------|----------------------------|
| gauge port                    | unit      |                       |                         |                            |
| V3                            | (No code) | -30 in.Hg to 30 psig  | psig/bar <sup>*4)</sup> | 00-83000023                |
| L                             |           | -30 in.Hg to 60 psig  |                         | 00-83000026                |
| 1                             |           | -30 in.Hg to 100 psig |                         | 00-83000021                |
| H                             |           | -30 in.Hg to 160 psig |                         | 00-83000116                |
| 2                             |           | 0 to 200 psig         |                         | 00-83000020                |
| 4                             |           | 0 to 400 psig         |                         | 00-83000007                |
| 10                            |           | 0 to 1000 psig        |                         | 00-83000022                |
| 40                            |           | 0 to 4000 psig        |                         | 00-83000024                |
| V3                            | MPA       | -0.1 to 0.2 MPa       | MPa                     | 00-83000304                |
| L                             |           | -0.1 to 0.4 MPa       |                         | 00-83000305                |
| 1                             |           | -0.1 to 0.7 MPa       |                         | 00-83000300                |
| H                             |           | -0.1 to 1.1 MPa       |                         | 00-83000297                |
| 2                             |           | 0 to 1.4 MPa          |                         | 00-83000299                |
| 4                             |           | 0 to 3 MPa            |                         | 00-83000301                |
| 10                            |           | 0 to 7 MPa            |                         | 00-83000302                |
| 40                            |           | 0 to 28 MPa           |                         | 00-83000303                |



For AK/BP series (Installed before shipment / Order separately)

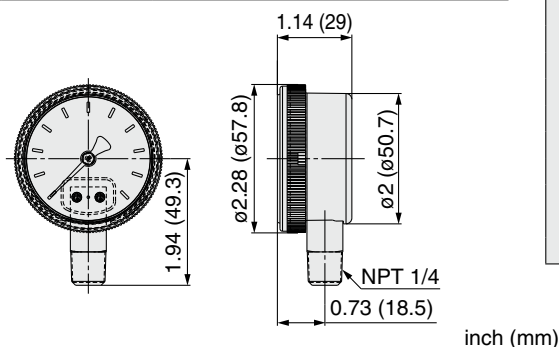
## Stainless steel / Lower mount

## Specifications

|                   |                                                                                                 |                 |
|-------------------|-------------------------------------------------------------------------------------------------|-----------------|
| Installation      |                                                                                                 | Lower mount     |
| Gas               | Select compatible materials of construction for the gas                                         |                 |
| Connections       | NPT 1/4 inch                                                                                    |                 |
| Temperature range | -40 to 60°C (No freezing)                                                                       |                 |
| Accuracy          | 25% to 75% of the scale: ±2%F.S.<br>Other than above: ±3%F.S.<br>(ASME B40.1 Grade B or better) |                 |
| Cleanliness       | ASME B40.1 level IV                                                                             |                 |
| No oil            | No oil                                                                                          |                 |
| Material          | Case                                                                                            | Stainless steel |
|                   | Window                                                                                          | Polycarbonate   |
|                   | Socket                                                                                          | 316L SS         |
|                   | Bourdon tube                                                                                    | 316L SS         |

## Model

| Regulator Code <sup>*2)</sup> |            | Pressure range        | Unit                    | Part number <sup>*3)</sup> |
|-------------------------------|------------|-----------------------|-------------------------|----------------------------|
| material                      | gauge port |                       |                         |                            |
| S<br>SH                       | V15        | -30 in.Hg to 15 psig  | psig/bar <sup>*4)</sup> | 00-83000102                |
|                               | V3         | -30 in.Hg to 30 psig  |                         | 00-83000184                |
|                               | L          | -30 in.Hg to 60 psig  |                         | 00-83000181                |
|                               | 1          | -30 in.Hg to 100 psig |                         | 00-83000182                |
|                               | H          | -30 in.Hg to 160 psig |                         | 00-83000196                |
|                               | V2         | -30 in.Hg to 200 psig |                         | 00-83000033                |
|                               | 2          | 0 to 200 psig         |                         | 00-83000193                |
|                               | 4          | 0 to 400 psig         |                         | 00-83000194                |
|                               | 10         | 0 to 1000 psig        | MPa                     | 00-83000187                |
|                               | 30         | 0 to 3000 psig        |                         | 00-83000234                |
|                               | 40         | 0 to 4000 psig        |                         | 00-83000183                |
|                               | V15        | -0.1 to 0.1 MPa       |                         | 00-83000287                |
|                               | V3         | -0.1 to 0.2 MPa       |                         | 00-83000288                |
|                               | L          | -0.1 to 0.4 MPa       |                         | 00-83000289                |
|                               | 1          | -0.1 to 0.7 MPa       |                         | 00-83000290                |
|                               | H          | -0.1 to 1.1 MPa       |                         | 00-83000291                |
|                               | V2         | -0.1 to 1.4 MPa       |                         | 00-83000292                |
|                               | 2          | 0 to 1.5 MPa          |                         | 00-83000286                |
|                               | 4          | 0 to 3 MPa            |                         | 00-83000285                |
|                               | 10         | 0 to 7 MPa            |                         | 00-83000284                |
|                               | 30         | 0 to 21 MPa           |                         | 00-83000283                |
|                               | 40         | 0 to 28 MPa           |                         | 00-83000282                |



<sup>\*1)</sup> If one prefers shipment with the pressure gauges installed on the regulator, the material of gasket to be used on the connections will be Nickel (no plated).

<sup>\*2)</sup> When pressure gauge needs to be assembled with regulator when shipment, put this code as gauge port in How to Order.

# Regulator / Pressure Gauges Guide

For AK/BP series (Installed before shipment / Order separately)

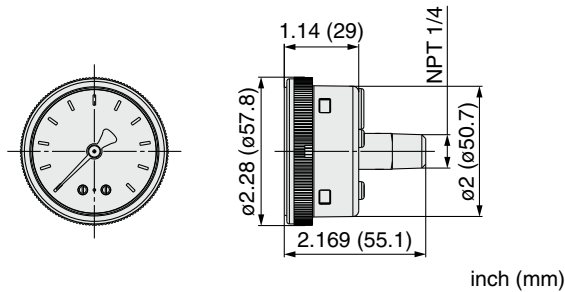
## Stainless steel / Center back mount

### Specifications

|                          |                     |                                                                                                 |
|--------------------------|---------------------|-------------------------------------------------------------------------------------------------|
| <b>Installation</b>      |                     | Center back mount                                                                               |
| <b>Gas</b>               |                     | Select compatible materials of construction for the gas                                         |
| <b>Connections</b>       |                     | NPT 1/4 inch                                                                                    |
| <b>Temperature range</b> |                     | -40 to 60°C (No freezing)                                                                       |
| <b>Accuracy</b>          |                     | 25% to 75% of the scale: ±2%F.S.<br>Other than above: ±3%F.S.<br>(ASME B40.1 Grade B or better) |
| <b>Cleanliness</b>       |                     | ASME B40.1 level IV                                                                             |
| <b>No oil</b>            |                     | No oil                                                                                          |
| <b>Material</b>          | <b>Case</b>         | Stainless steel                                                                                 |
|                          | <b>Window</b>       | Polycarbonate                                                                                   |
|                          | <b>Socket</b>       | 316L SS                                                                                         |
|                          | <b>Bourdon tube</b> | 316L SS                                                                                         |

### Model

| Regulator Code | Pressure range        | Unit         | Part number *3) |
|----------------|-----------------------|--------------|-----------------|
| (Not applied)  | -30 in.Hg to 100 psig | psig/bar *4) | 00-83000224     |
|                | -30 in.Hg to 160 psig |              | 00-83000272     |
|                | -0.1 to 0.7 MPa       | MPa          | 00-83000293     |
|                | -0.1 to 1.1 MPa       |              | 00-83000294     |



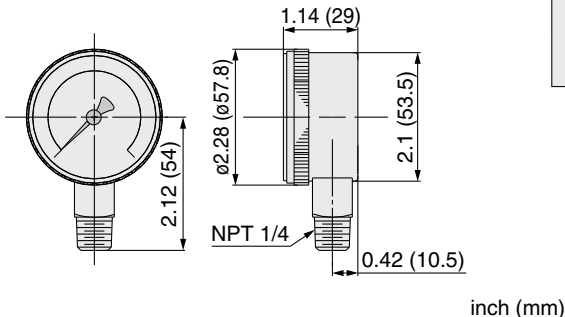
## Brass / Lower mount

### Specifications

|                          |                     |                                                                                                 |
|--------------------------|---------------------|-------------------------------------------------------------------------------------------------|
| <b>Installation</b>      |                     | Lower mount                                                                                     |
| <b>Gas</b>               |                     | Select compatible materials of construction for the gas                                         |
| <b>Connections</b>       |                     | NPT 1/4 inch                                                                                    |
| <b>Temperature range</b> |                     | -40 to 60°C (No freezing)                                                                       |
| <b>Accuracy</b>          |                     | 25% to 75% of the scale: ±2%F.S.<br>Other than above: ±3%F.S.<br>(ASME B40.1 Grade B or better) |
| <b>Cleanliness</b>       |                     | ASME B40.1 level IV                                                                             |
| <b>No oil</b>            |                     | No oil                                                                                          |
| <b>Material</b>          | <b>Case</b>         | Brass or Stainless steel + ZrN Coating                                                          |
|                          | <b>Window</b>       | Polycarbonate                                                                                   |
|                          | <b>Socket</b>       | Brass                                                                                           |
|                          | <b>Bourdon tube</b> | Phosphor bronze                                                                                 |

### Model

| Regulator Code *2) |            | Pressure range        | Unit         | Part number *3) |
|--------------------|------------|-----------------------|--------------|-----------------|
| material           | gauge port |                       |              |                 |
| B                  | V3         | -30 in.Hg to 30 psig  | psig/bar *4) | 00-83000265     |
|                    | L          | -30 in.Hg to 60 psig  |              | 00-83000177     |
|                    | 1          | -30 in.Hg to 100 psig |              | 00-83000178     |
|                    | H          | -30 in.Hg to 160 psig |              | 00-83000239     |
|                    | 2          | 0 to 200 psig         |              | 00-83000218     |
|                    | 4          | 0 to 400 psig         |              | 00-83000205     |
|                    | 10         | 0 to 1000 psig        |              | 00-83000186     |
|                    | 40         | 0 to 4000 psig        |              | 00-83000179     |
|                    | V3         | -0.1 to 0.2 MPa       | MPa          | 00-83000278     |
|                    | L          | -0.1 to 0.4 MPa       |              | 00-83000279     |
|                    | 1          | -0.1 to 0.7 MPa       |              | 00-83000280     |
|                    | H          | -0.1 to 1.1 MPa       |              | 00-83000281     |
|                    | 2          | 0 to 1.5 MPa          |              | 00-83000277     |
|                    | 4          | 0 to 3 MPa            |              | 00-83000276     |
|                    | 10         | 0 to 7 MPa            |              | 00-83000275     |
|                    | 40         | 0 to 28 MPa           |              | 00-83000274     |



### Warning

1. Use the pressure gauge within the rated pressure range.
2. When install the pressure gauge, verify the port (HP/LP), then install the gauge refer to page 141 for precautions.
3. After installation, perform a leak test.

\*3) Part number of pressure gauge itself. Gauge are shipped separately.

\*4) Under Japanese regulation, psig/bar unit gauge is not sold in Japan.



# Process Gas Equipment/Regulator Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## 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. Use the pressure gauge within the rated pressure range.

When installing a pressure gauge to the product, operating pressure should not exceed the maximum allowable pressure of the pressure gauge.

## Mounting

### Warning

#### 1. Confirm the mounting direction of the product.

The high pressure (inlet) port is labeled with an “HP” mark and the low pressure (outlet) port is labeled with an “LP” mark. In the case of two stage regulator, the monitor port of first stage outlet pressure is labeled with “MP” mark.

Make sure to connect the port labeled with “HP” mark, to the high pressure. If any of the ports, other than “HP”, are connected to the high pressure, it may cause damage or gas leakage.

#### 2. After installation, check internal leakage (leakage across seat) of the product.

Check internal leakage (leakage across seat) with inert gases such as nitrogen, etc., and select the most appropriate test method depending on the application. The following procedures are an example of how a test may be performed. It is intended as an overview and not as an all inclusive description.

- 1) Rotate the adjustment wheel counterclockwise (DECR) completely to relieve spring force. Then gradually open the valve at inlet side to supply gas to the regulator.
- 2) Close the valves on the inlet and outlet side and hold for at least 10 minutes. Then confirm the outlet pressure.
- 3) Rotate the adjustment wheel clockwise (INCR) until the outlet pressure reaches the outlet pressure setting. Then hold for at least 10 minutes and confirm the outlet pressure.

If outlet pressure continues increasing in steps 2) and 3) above, the regulator may have internal leakage (leakage across seat) and you should stop using the regulator immediately and contact SMC or sales representative.

#### 3. Purge hazardous gases from system before removing regulator from system.

Before removing regulators from system, fully open regulator by turning adjustment wheel clockwise (INCR), and follow proper procedures to flush system with inert gas such as nitrogen to remove any residual hazardous gases.

## Maintenance

### Warning

#### 1. If a regulator requires repair, contact SMC.

## Operation

### Warning

#### 1. Do not use the regulator as shutoff valve or safety valve.

#### 2. Do not rotate the adjustment wheel counterclockwise (DECR) under no flow conditions.

If the adjustment wheel is rotated counterclockwise (DECR) under no flow conditions but there is residual pressure remaining in outlet side, it may cause damage to the regulator. Decreasing of the setting pressure should be done under flow conditions.

#### 3. Do not pressurize the regulator from outlet side. If high pressure, which exceeds the setting pressure, is supplied from outlet side, it may cause damage to the regulator.

#### 4. Supply gas to the regulator.

Rotate the adjustment wheel counterclockwise (DECR) completely to relieve spring force. Then, gradually open the valve at inlet side to supply gas to the regulator. When operating the valve, do not stand in front of the regulator and pressure gauge. If the valve at inlet side is opened rapidly, high pressure gas might be supplied into outlet side of the regulator and it may cause severe damage or burst the device.

#### 5. Adjust pressure.

When rotating the adjustment wheel clockwise (INCR), outlet pressure will increase.

In order to adjust precisely, the wheel should be adjusted at the desired flow conditions.

#### 6. Decreasing the setting pressure under flow conditions.

When decreasing the setting pressure, make sure to open the valve at outlet side to keep flow conditions. When rotating the adjustment wheel counterclockwise (DECR) under flow conditions, setting pressure will decrease.

#### 7. Stop using the regulator immediately if resonance occurs.

Loud audible noise as well as vibration of device or fluctuation of outlet pressure (resonance) may occur depending on operating conditions etc. If this situation occurs, stop using the regulator immediately and contact SMC or sales representative.



# Process Gas Equipment/Back Pressure Regulator Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## Selection

### Warning

#### 1. Confirm the specifications.

When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, operating temperature etc., and use within the operating range specified in the catalog. Verify flow capacity of regulator and vent or return line, are large enough to vent off gas source without creating excessive back pressure. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Design the equipment and select the product by understanding the characteristics of gas.

#### 2. Use the pressure gauge within the rated pressure range.

When installing pressure gauges to the product, operating pressure should not exceed the maximum allowable pressure of the pressure gauge.

## Mounting

### Warning

#### 1. Confirm the mounting direction of the product.

The high pressure (inlet) port is labeled with an “IN” mark and the low pressure (outlet) port is labeled with an “OUT” mark. Make sure to connect the port labeled with “IN” mark, to the high pressure. If any of the ports, other than “IN”, is connected to the high pressure, it may cause damage or gas leakage.

## Operation

### Warning

#### 1. Do not use the back pressure regulator as shutoff valve or safety valve.

#### 2. Pressure control

- 1) Rotate the adjustment wheel counterclockwise completely to relieve spring force.
- 2) Partially open the valve at inlet side to supply gas to the back pressure regulator.
- 3) Increase the inlet pressure to the setting pressure by rotating the adjustment wheel clockwise.
- 4) Continue opening the valve at inlet side monitoring the inlet pressure. When the inlet pressure increases above the setting pressure, rotate the adjustment wheel counterclockwise to relieve the inlet pressure to the setting pressure.
- 5) Open the valve at inlet side completely and confirm that the inlet pressure reaches the setting pressure.

#### 3. Decreasing the setting pressure.

When decreasing the setting pressure, make sure to gradually rotate the adjustment wheel counterclockwise until the inlet pressure reaches the setting pressure.

#### 4. Stop using the regulator immediately if resonance occurs.

Loud audible noise as well as vibration of device or fluctuation of outlet pressure (resonance) may occur depending on operating conditions, etc. If this situation occurs, stop using the regulator immediately and contact SMC or sales representative.



# Diaphragm Valves

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum  
Generators

Flow  
Switches

Technical Data/  
Glossary of Terms

Precautions

## ■ For Ultra High Purity (UHP): AP Series

### Air Operated Type

|                                                                            |                   |        |
|----------------------------------------------------------------------------|-------------------|--------|
| Diaphragm Valve (Air operated type, For low pressure) .....                | AP3500 .....      | p. 145 |
| Diaphragm Valve (Air operated type, For low pressure) .....                | AP4500 .....      | p. 147 |
| Diaphragm Valve (Air operated type, For high pressure) .....               | AP3000 .....      | p. 149 |
| Diaphragm Valve (Air operated type, For high pressure) .....               | AP4000 .....      | p. 151 |
| Diaphragm Valve (Air operated type) .....                                  | AP4141 .....      | p. 153 |
| Diaphragm Valve (Air operated type, For high pressure and high flow) ..... | AP3130/3113 ..... | p. 155 |
| Diaphragm Valve (Air operated type, For high flow) .....                   | AP3700 .....      | p. 157 |
| Diaphragm Valve (Air operated type, Two step) .....                        | AP3571/4571 ..... | p. 159 |
| Diaphragm Valve (Air operated type, Metal seated) .....                    | AP3200 .....      | p. 161 |

### Manually Operated Type

|                                                                                 |                        |        |
|---------------------------------------------------------------------------------|------------------------|--------|
| Diaphragm Valve (Manually operated type) .....                                  | AP3600 .....           | p. 163 |
| Diaphragm Valve (Manually operated type) .....                                  | AP4600 .....           | p. 165 |
| Diaphragm Valve (Manually operated type) .....                                  | AP3604/3624/3627 ..... | p. 167 |
| Diaphragm Valve (Manually operated type) .....                                  | AP4150/4157 .....      | p. 169 |
| Diaphragm Valve (Manually operated type, For high pressure and high flow) ..... | AP3100 .....           | p. 171 |
| Diaphragm Valve (Manually operated type, For high flow) .....                   | AP3800/3900 .....      | p. 173 |
| Diaphragm Valve (Manually operated type, Metal seated) .....                    | AP3260/3262/3225 ..... | p. 175 |
| Metering Valve .....                                                            | AP3672/3675/4675 ..... | p. 177 |

|                                                |        |
|------------------------------------------------|--------|
| AP Series Optional Porting Configuration ..... | p. 179 |
|------------------------------------------------|--------|

## ■ For Ultra High Purity (UHP): AZ Series

### Air Operated Type

|                                                              |                   |        |
|--------------------------------------------------------------|-------------------|--------|
| Diaphragm Valve (Air operated type) .....                    | AZ3500 .....      | p. 181 |
| Diaphragm Valve (Air operated type) .....                    | AZ4500 .....      | p. 183 |
| Diaphragm Valve (Air operated type, For high pressure) ..... | AZ3000 .....      | p. 185 |
| Diaphragm Valve (Air operated type, For high pressure) ..... | AZ4000 .....      | p. 187 |
| Diaphragm Valve (Air operated type) .....                    | AZ4141 .....      | p. 189 |
| Diaphragm Valve (Air operated type, For high flow) .....     | AZ3700 .....      | p. 191 |
| Diaphragm Valve (Air operated type, Two step) .....          | AZ3571/4571 ..... | p. 193 |

### Manually Operated Type

|                                                |                        |        |
|------------------------------------------------|------------------------|--------|
| Diaphragm Valve (Manually operated type) ..... | AZ3600 .....           | p. 195 |
| Diaphragm Valve (Manually operated type) ..... | AZ4600 .....           | p. 197 |
| Diaphragm Valve (Manually operated type) ..... | AZ3604/3624/3627 ..... | p. 199 |
| Diaphragm Valve (Manually operated type) ..... | AZ4150/4157 .....      | p. 201 |
| Diaphragm Valve (Manually operated type) ..... | AZ3800/3900 .....      | p. 203 |
| Metering Valve .....                           | AZ3672/3675/4675 ..... | p. 205 |

|                                                |        |
|------------------------------------------------|--------|
| AZ Series Optional Porting Configuration ..... | p. 207 |
|------------------------------------------------|--------|

## ■ For General Applications: AK Series

### Air Operated Type

|                                                              |                   |        |
|--------------------------------------------------------------|-------------------|--------|
| Diaphragm Valve (Air operated type) .....                    | AK3500 .....      | p. 209 |
| Diaphragm Valve (Air operated type) .....                    | AK4500 .....      | p. 211 |
| Diaphragm Valve (Air operated type, For high pressure) ..... | AK3000 .....      | p. 213 |
| Diaphragm Valve (Air operated type, For high pressure) ..... | AK4000 .....      | p. 215 |
| Diaphragm Valve (Air operated type, Two step) .....          | AK3571/4571 ..... | p. 217 |

### Manually Operated Type

|                                                |                        |        |
|------------------------------------------------|------------------------|--------|
| Diaphragm Valve (Manually operated type) ..... | AK3600 .....           | p. 219 |
| Diaphragm Valve (Manually operated type) ..... | AK4600 .....           | p. 221 |
| Diaphragm Valve (Manually operated type) ..... | AK3604/3624/3627 ..... | p. 223 |
| Metering Valve .....                           | AK3672/3675/4675 ..... | p. 225 |

|                                         |        |
|-----------------------------------------|--------|
| LOTO Options for Diaphragm Valves ..... | p. 227 |
|-----------------------------------------|--------|

|                                                    |        |
|----------------------------------------------------|--------|
| Diaphragm Valve Specific Product Precautions ..... | p. 228 |
|----------------------------------------------------|--------|

# Diaphragm Valve for Ultra High Purity

Air operated type  
(For low pressure)

## AP3500 Series

- Suitable for UHP gas supply line
- Body material : 316L SS secondary remelt
- Pneumatically actuated normally closed or normally open
- LOTO option available as an option (AP3540)
- Indicator switch available as an option (AP3550, AP3580)

How to Order (See p. 250 for ordering syntax)



RoHS

**AP 3 540 S 2PW FV4 FV4**

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |

**Model**

| Code | Status                 | Maximum operating pressure |
|------|------------------------|----------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)         |
| 540  |                        | 145 psig (1.0 MPa)         |
| 550  |                        | 300 psig (2.1 MPa)         |
| 580  | Normally open (N.O.)   | 250 psig (1.7 MPa)         |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy           |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

**Connections (Inlet, Outlet)**

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

**Option (AP3550 and AP3580 only)**

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. Indicator switch |
| IPO     | N.O. Indicator switch |

**Seat material**

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

\*3) Not available with H material.

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)*2)   |

\*1) Only applies to S material with TW4 or TW6 connections.  
\*2) AP3542 has limited clearance for orbital weld head.

## Specifications

| Operating Parameters              |                  | AP3542                                                  | AP3540                                                        | AP3550                       | AP3580                       |
|-----------------------------------|------------------|---------------------------------------------------------|---------------------------------------------------------------|------------------------------|------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |                                                               |                              | Normally open (N.O.)         |
| Gas                               |                  | Select compatible materials of construction for the gas |                                                               |                              |                              |
| Operating pressure                |                  | Vacuum to 125 psig (0.9 MPa)                            | Vacuum to 145 psig (1.0 MPa) *1)                              | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                                               |                              |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                                               |                              |                              |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *2)                           |                                                               |                              |                              |
| Cv                                |                  | 0.29                                                    |                                                               |                              |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                                               |                              |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *3)                       |                                                               |                              |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                                               |                              |                              |
| Surface finish                    |                  | Ra max 15 µin. (0.4 µm)                                 | Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |                              |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                                               |                              |                              |
| Actuation pressure                |                  | 60 to 110 psig (0.4 to 0.76 MPa)                        | 70 to 110 psig (0.48 to 0.76 MPa)                             |                              |                              |
| Actuation port connection         |                  | M5 x 0.8                                                | NPT 1/8 inch                                                  | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           |                  | Top                                                     |                                                               | Side (360° rotatable)        | Top                          |
| Installation                      |                  | Bottom mount                                            |                                                               |                              |                              |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |                                                               |                              |                              |
| Weight                            |                  | 0.28 kg *4)                                             | 0.68 kg *4)                                                   | 0.82 kg *4)                  | 0.68 kg *4)                  |
| LOTO (Lockout)                    |                  | N/A                                                     | Option<br>(Part number: AP PL 210) *5)                        | N/A                          |                              |

- \*1) Vacuum to 125 psig (0.9 MPa) for Polyimide seat.  
\*2) Max. 90°C for Polyimide seat.  
\*3) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).  
\*4) Weight, including individual boxed weight, may vary depending on connections or options.  
\*5) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

## Wetted Parts Material

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

# Diaphragm Valve for Ultra High Purity **AP3500 Series**

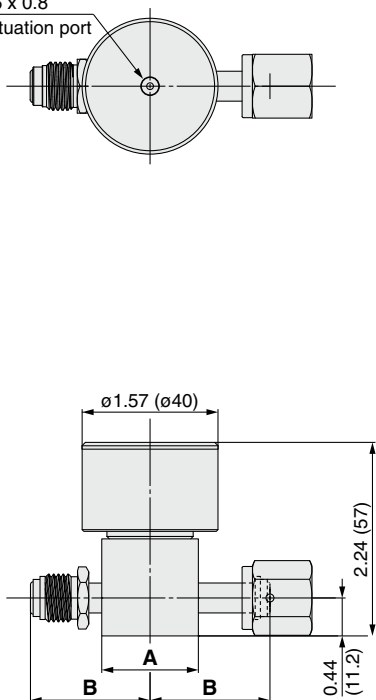
Air operated type (For low pressure)

## Dimensions

inch (mm)

### AP3542

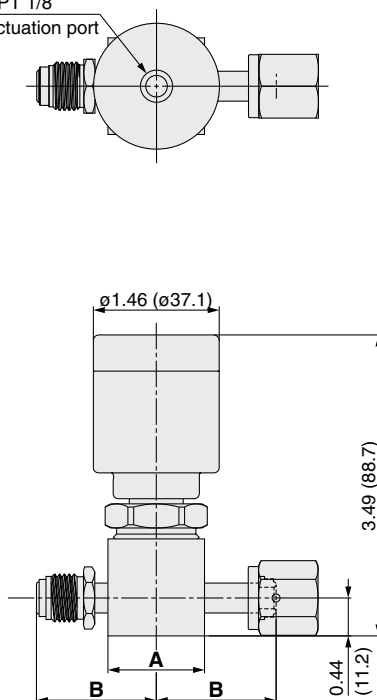
M5 x 0.8  
Actuation port



Connections: MV□, FV□

### AP3540

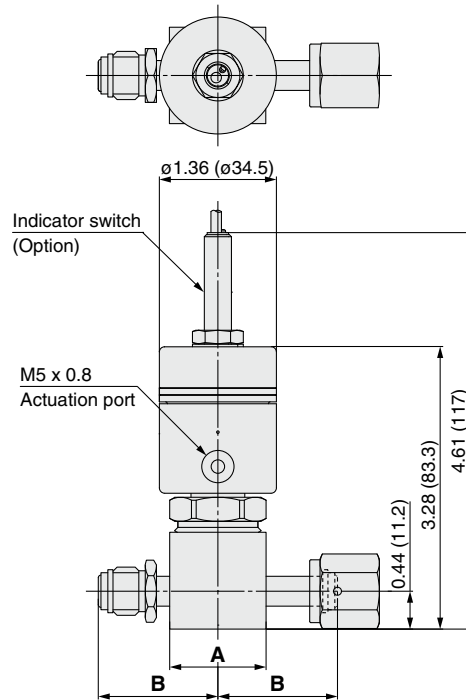
NPT 1/8  
Actuation port



Connections: MV□, FV□

### AP3550

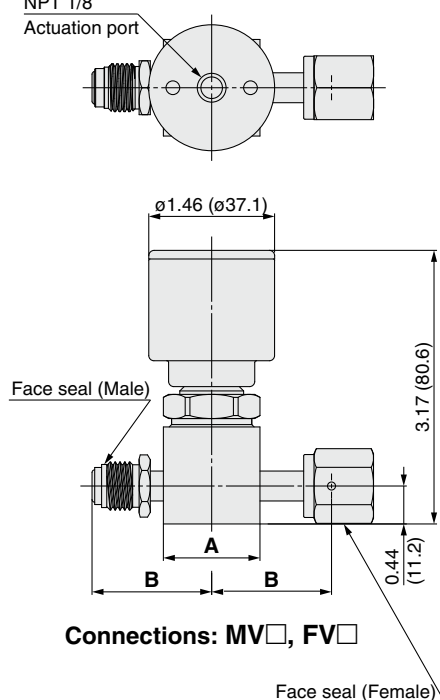
M5 x 0.8  
Actuation port



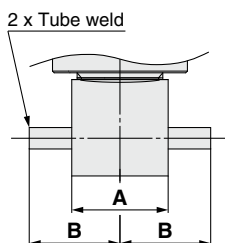
Connections: MV□, FV□

### AP3580

NPT 1/8  
Actuation port

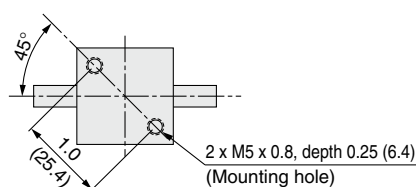


Connections: MV□, FV□

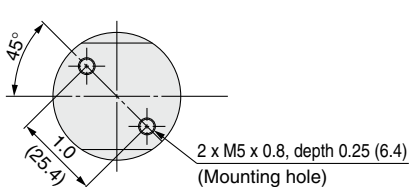


Connections: TW□

### Bottom view



Material code: S



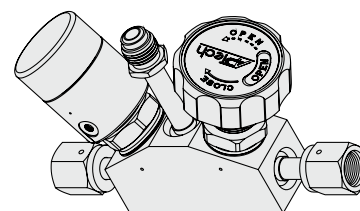
Material code: H

| Material | Connections | A         |         | B     |        |
|----------|-------------|-----------|---------|-------|--------|
|          |             | inch      | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq.  | (□28.4) | 1.39  | (35.3) |
|          | MV4         |           |         | 1.06  | (26.9) |
|          | TW4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.45  | (36.8) |
|          | TW6         |           |         | 1.08  | (27.4) |
| H        | FV4         | 1.24 dia. | (ø31.5) | 1.93  | (49.0) |
|          | MV4         |           |         | 1.325 | (33.7) |
|          | TW4         |           |         | 1.45  | (36.8) |
|          | FV6         |           |         | 1.08  | (27.4) |
|          | MV6         |           |         | 1.93  | (49.0) |
|          | TW6         |           |         | 1.325 | (33.7) |



**Made to Order**

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



# Diaphragm Valve for Ultra High Purity

Air operated type  
(For low pressure)

## AP4500 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Pneumatically actuated normally closed or normally open
- LOTO option available as an option (AP4540)
- Indicator switch available as an option (AP4550, AP4580)



RoHS

How to Order (See p. 250 for ordering syntax)

**AP 4 540 S 2PW FV6 FV6**

**Size**

| Code | Cv  |
|------|-----|
| 4    | 0.5 |

**Model**

| Code | Status                 | Maximum operating pressure |
|------|------------------------|----------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)         |
| 540  |                        | 300 psig (2.1 MPa)         |
| 550  | Normally open (N.O.)   | 300 psig (2.1 MPa)         |
| 580  |                        | 250 psig (1.7 MPa)         |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy           |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

**Connections (Inlet, Outlet)**

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

**Option (AP4550 and AP4580 only)**

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

**Seat material**

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

\*3) Not available with H material.

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)*2)   |

\*1) Only applies to S material with TW4 or TW6 connections.  
\*2) Not available with AP4542.

## Specifications

| Operating Parameters              | AP4542                                                                                | AP4540                                 | AP4550                       | AP4580                       |
|-----------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|------------------------------|------------------------------|
| Status                            | Normally closed (N.C.)                                                                |                                        |                              | Normally open (N.O.)         |
| Gas                               | Select compatible materials of construction for the gas                               |                                        |                              |                              |
| Operating pressure                | Vacuum to 125 psig (0.9 MPa)                                                          |                                        | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    | 1.5 times the maximum operating pressure                                              |                                        |                              |                              |
| Burst pressure                    | 3 times the maximum operating pressure                                                |                                        |                              |                              |
| Ambient and operating temperature | -10 to 71°C (No freezing) *1)                                                         |                                        |                              |                              |
| Cv                                | 0.5                                                                                   |                                        |                              |                              |
| Leak rate                         | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                                        |                              |                              |
| Inboard leakage                   | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                        |                                        |                              |                              |
| Outboard leakage                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                                        |                              |                              |
| Across the seat leak              | Face seal, Tube weld                                                                  |                                        |                              |                              |
| Surface finish                    | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                        |                              |                              |
| Connections                       | 60 to 110 psig (0.4 to 0.76 MPa)                                                      |                                        |                              |                              |
| Actuation pressure                | 70 to 110 psig (0.48 to 0.76 MPa)                                                     |                                        |                              |                              |
| Actuation port connection         | M5 x 0.8                                                                              | NPT 1/8 inch                           | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           | Top                                                                                   |                                        | Side (360° rotatable)        | Top                          |
| Installation                      | Bottom mount                                                                          |                                        |                              |                              |
| Internal volume                   | 0.12 in <sup>3</sup> (1.94 cm <sup>3</sup> )                                          |                                        |                              |                              |
| Weight                            | 0.28 kg *3)                                                                           | 0.68 kg *3)                            | 0.82 kg *3)                  | 0.68 kg *3)                  |
| LOTO (Lockout)                    | N/A                                                                                   | Option<br>(Part number: AP PL 210) *4) | N/A                          |                              |

- \*1) Max. 90°C for Polyimide seat.  
\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).  
\*3) Weight, including individual boxed weight, may vary depending on connections or options.  
\*4) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

## Wetted Parts Material

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

# Diaphragm Valve for Ultra High Purity **AP4500 Series**

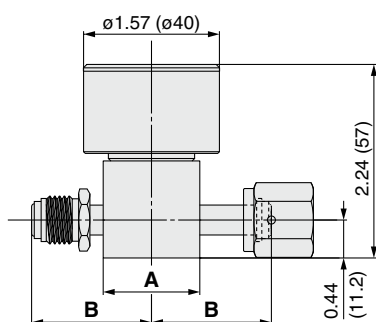
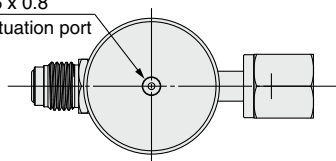
Air operated type (For low pressure)

## Dimensions

inch (mm)

### AP4542

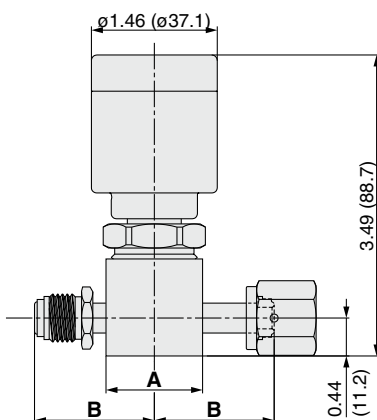
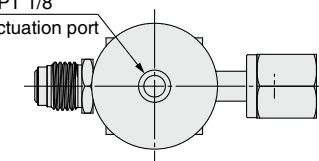
M5 x 0.8  
Actuation port



Connections: MV□, FV□

### AP4540

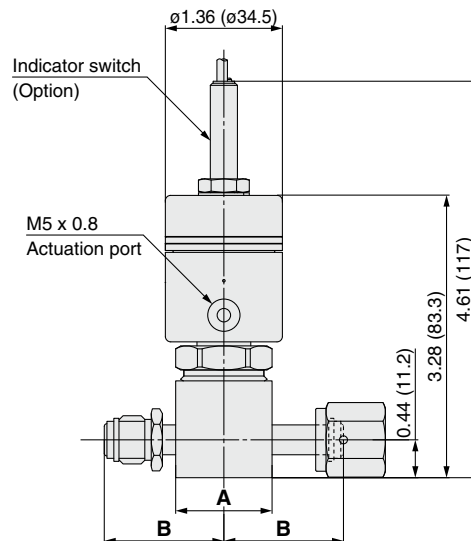
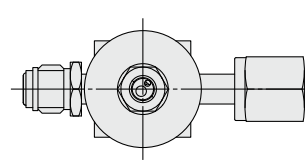
NPT 1/8  
Actuation port



Connections: MV□, FV□

### AP4550

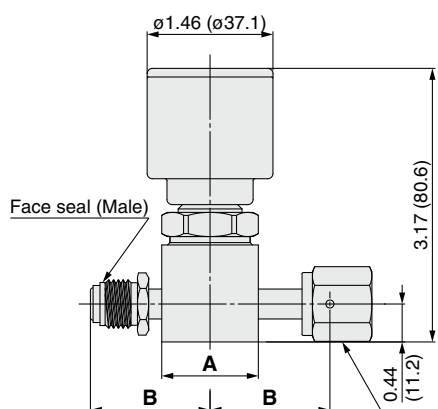
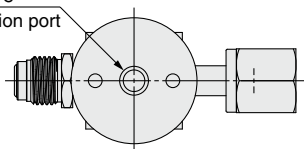
M5 x 0.8  
Actuation port



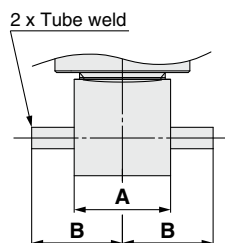
Connections: MV□, FV□

### AP4580

NPT 1/8  
Actuation port

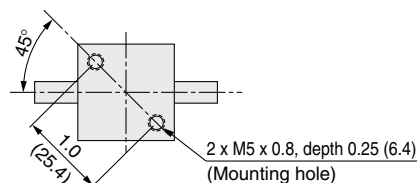


Connections: MV□, FV□

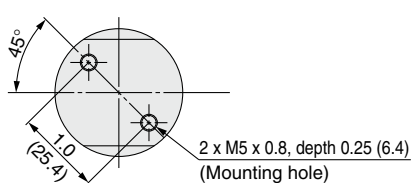


Connections: TW□

### Bottom view



Material code: S



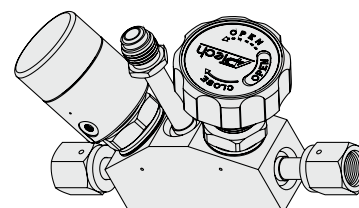
Material code: H

| Material | Connections | A         |         | B     |        |
|----------|-------------|-----------|---------|-------|--------|
|          |             | inch      | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq.  | (□28.4) | 1.39  | (35.3) |
|          | MV4         |           |         | 1.06  | (26.9) |
|          | TW4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.325 | (33.7) |
| H        | FV4         | 1.24 dia. | (ø31.5) | 1.45  | (36.8) |
|          | MV4         |           |         | 1.08  | (27.4) |
|          | TW4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.325 | (33.7) |



**Made to Order**

Products such as three port dual valves can be made with monoblock configuration. Please contact SMC for details.

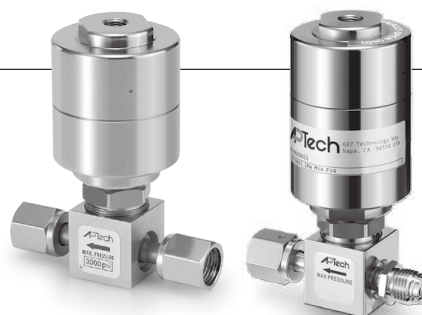


# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high pressure)

## AP3000 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Pneumatically actuated normally closed or normally open
- High pressure type: Max. 4500 psig (31 MPa)
- LOTO option available as an option
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

**Model**

AP30 00 S 2PW FV4 FV4

(Inlet) (Outlet)

| Code | Status                 | Max. operating pressure | Cv   |
|------|------------------------|-------------------------|------|
| 00   | Normally closed (N.C.) | 3000 psig (20.7 MPa)    | 0.23 |
| 02   |                        | 3700 psig (25.5 MPa)    | 0.28 |
| 04   |                        | 4500 psig (31.0 MPa)    | 0.23 |
| 07   | Normally open (N.O.)   | 3000 psig (20.7 MPa)    | 0.23 |
| 80   |                        |                         |      |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy *1)       |

\*1) Not available with AP3004 and AP3007.

**Connections (Inlet, Outlet)**

| Code | Connections                     |
|------|---------------------------------|
| FV4  | 1/4 inch face seal (Female)     |
| MV4  | 1/4 inch face seal (Male)       |
| TW4  | 1/4 inch tube weld              |
| FV6  | 3/8 inch face seal (Female) *2) |
| MV6  | 3/8 inch face seal (Male) *2)   |
| TW6  | 3/8 inch tube weld *2)          |

\*2) Not available with AP3004 and AP3007.

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Seat material**

| Code    | Material         | Model |      |      |      |      |
|---------|------------------|-------|------|------|------|------|
|         |                  | 3000  | 3002 | 3004 | 3007 | 3080 |
| No code | PCTFE (Standard) | ●     | ●    | ●    | —    | ●    |
| VS      | Polyimide *4)    | ●     | ●    | ●    | ●    | ●    |
| PK      | PEEK *4)         | —     | —    | ●    | ●    | —    |

\*4) Not available with H material.

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*3) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

**Surface finish**

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

**Face to face dimension \*3)**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm)          |

\*3) Only applies to S material with TW4 or TW6 connections.

## Specifications

| Operating Parameters              |                  | AP3000                                                  | AP3002 | AP3004                                                        | AP3007                       | AP3080                         |                      |
|-----------------------------------|------------------|---------------------------------------------------------|--------|---------------------------------------------------------------|------------------------------|--------------------------------|----------------------|
| Status                            |                  | Normally closed (N.C.)                                  |        |                                                               |                              |                                | Normally open (N.O.) |
| Gas                               |                  | Select compatible materials of construction for the gas |        |                                                               |                              |                                |                      |
| Operating pressure                |                  | Vacuum to 3000 psig (20.7 MPa)                          |        | Vacuum to 3700 psig (25.5 MPa)                                | Vacuum to 4500 psig (31 MPa) | Vacuum to 3000 psig (20.7 MPa) |                      |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |        |                                                               |                              |                                |                      |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |        |                                                               |                              |                                |                      |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |        | -10 to 49°C (No freezing)                                     | -10 to 60°C (No freezing)    | -10 to 71°C (No freezing) *1)  |                      |
| Cv                                |                  | 0.23                                                    | 0.28   | 0.23                                                          |                              |                                |                      |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |        |                                                               |                              |                                |                      |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                       |        |                                                               |                              |                                |                      |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |        |                                                               |                              |                                |                      |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)                                 |        | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                              |                                |                      |
| Connections                       |                  | Face seal, Tube weld                                    |        |                                                               |                              |                                |                      |
| Actuation pressure                |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |        |                                                               |                              |                                |                      |
| Actuation port connection         |                  | NPT 1/8 inch                                            |        |                                                               |                              |                                |                      |
| Actuation port location           |                  | Top                                                     |        |                                                               |                              |                                |                      |
| Installation                      |                  | Bottom mount                                            |        |                                                               |                              |                                |                      |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |        |                                                               |                              |                                |                      |
| Weight                            |                  | 1.27 kg *3)                                             |        |                                                               |                              |                                |                      |
| LOTO (Lockout)                    |                  | Option (Part number: AP PL 210) *4)                     |        |                                                               |                              | N/A                            |                      |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1000 psig (6.9 MPa).

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

\*4) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code              |                   | IS                                                                                                                         |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Switch type       |                   | SPDT                                                                                                                       |
| Rated voltage     |                   | Max. 30 VDC                                                                                                                |
| Contact capacity  |                   | Max. 3 VA                                                                                                                  |
| Switching current |                   | Max. 0.2 A                                                                                                                 |
| Carrying current  |                   | Max. 0.5 A                                                                                                                 |
| Cable             | Lead wire         | AWG 24                                                                                                                     |
|                   | Cable length      | 3 m                                                                                                                        |
|                   | Color (Lead wire) | Blue: Common line                                                                                                          |
|                   |                   | Brown: NC (When the valve is closed, the circuit is closed.)<br>Black: NO (When the valve is open, the circuit is closed.) |

## Wetted Parts Material

| Wetted Parts   |                    | S                                  | H              |
|----------------|--------------------|------------------------------------|----------------|
| Body           |                    | 316L SS<br>secondary remelt        | Ni-Cr-Mo alloy |
| Surface finish |                    | Electropolish +<br>Passivation     | Electropolish  |
| Diaphragm      |                    | Ni-Co alloy                        |                |
| Seat           | AP3000, 3002, 3080 | PCTFE (Option: Polyimide)          | PCTFE          |
|                | AP3004             | PCTFE<br>(Option: Polyimide, PEEK) | —              |
|                | AP3007             | Polyimide<br>or PEEK               |                |

# Diaphragm Valve for Ultra High Purity **AP3000 Series**

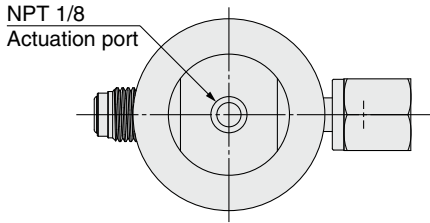
Air operated type (For high pressure)

## Dimensions

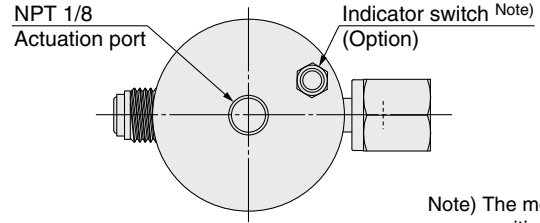
inch (mm)

### AP3000

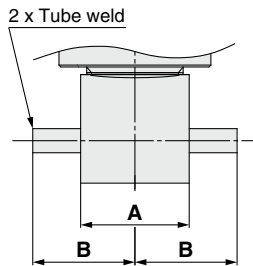
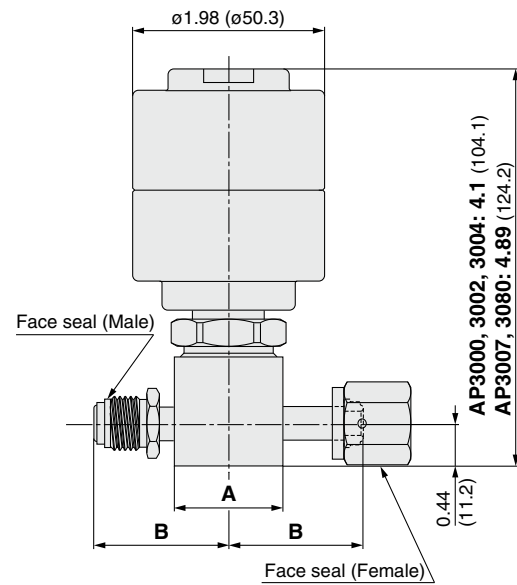
### AP3002, AP3080, AP3004, AP3007



### Indicator switch

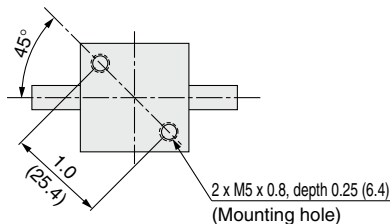


Note) The mounting position varies depending on the product.

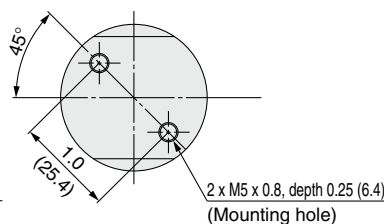


Connections: TW□

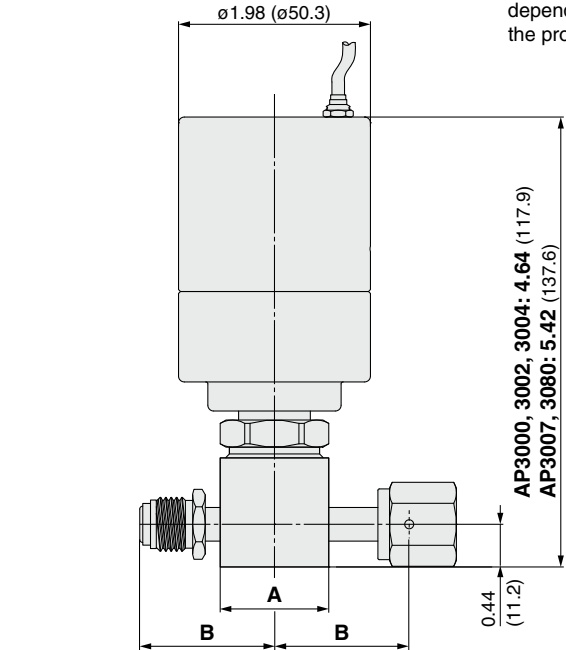
### Bottom view



Material code: S



Material code: H

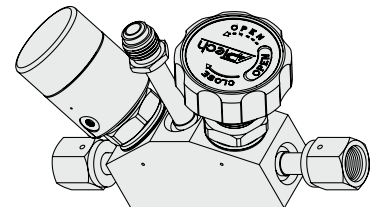


| Material | Connections | A         |         | B     |        |
|----------|-------------|-----------|---------|-------|--------|
|          |             | inch      | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq.  | (□28.4) | 1.39  | (35.3) |
|          | MV4         |           |         | 1.06  | (26.9) |
|          | TW4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.45  | (36.8) |
|          | TW6         |           |         | 1.08  | (27.4) |
| H        | FV4         | 1.24 dia. | (ø31.5) | 1.93  | (49.0) |
|          | MV4         |           |         | 1.325 | (33.7) |
|          | TW4         |           |         | 1.45  | (36.8) |
|          | FV6         |           |         | 1.08  | (27.4) |
|          | MV6         |           |         | 1.93  | (49.0) |
|          | TW6         |           |         | 1.325 | (33.7) |



### Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high pressure)

## AP4000 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Pneumatically actuated normally closed
- High pressure type: Max. 3000 psig (20.7 MPa)
- Indicator switch available as an option



RoHS

### How to Order (See p. 250 for ordering syntax)

**AP40 00 S 2PW FV4 FV4**

**Model**

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 00   | Normally closed (N.C.) | 3000 psig (20.7 MPa)    |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy           |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Please refer to page 179.

**Connections (Inlet, Outlet)**

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

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *2)    |

\*2) Not available with H material.

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)      |

\*1) Only applies to S material with TW4 or TW6 connections.

## Specifications

| Operating Parameters              |                         | AP4000                                                        |
|-----------------------------------|-------------------------|---------------------------------------------------------------|
| Status                            |                         | Normally closed (N.C.)                                        |
| Gas                               |                         | Select compatible materials of construction for the gas       |
| Operating pressure                |                         | Vacuum to 3000 psig (20.7 MPa)                                |
| Proof pressure                    |                         | 1.5 times the maximum operating pressure                      |
| Burst pressure                    |                         | 3 times the maximum operating pressure                        |
| Ambient and operating temperature |                         | -10 to 71°C (No freezing) *1)                                 |
| Cv                                |                         | 0.35                                                          |
| Leak rate                         | Inboard leakage         | $2 \times 10^{-11}$ Pa·m <sup>3</sup> /s                      |
|                                   | Outboard leakage        | $2 \times 10^{-10}$ Pa·m <sup>3</sup> /s *2)                  |
| Across the seat leak              |                         | $1 \times 10^{-10}$ Pa·m <sup>3</sup> /s                      |
| Surface finish                    | Ra max 15 µin. (0.4 µm) | Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |
| Connections                       |                         | Face seal, Tube weld                                          |
| Actuation pressure                |                         | 70 to 110 psig (0.48 to 0.76 MPa)                             |
| Actuation port connection         |                         | NPT 1/8 inch                                                  |
| Actuation port location           |                         | Top                                                           |
| Installation                      |                         | Bottom mount                                                  |
| Internal volume                   |                         | 0.12 in <sup>3</sup> (1.94 cm <sup>3</sup> )                  |
| Weight                            |                         | 1.27 kg *3)                                                   |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1000 psig (6.9 MPa).

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

## Indicator Switch (Option) Specification

| Code              |                   | IS                                                                                                                         |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Switch type       |                   | SPDT                                                                                                                       |
| Rated voltage     |                   | Max. 30 VDC                                                                                                                |
| Contact capacity  |                   | Max. 3 VA                                                                                                                  |
| Switching current |                   | Max. 0.2 A                                                                                                                 |
| Carrying current  |                   | Max. 0.5 A                                                                                                                 |
| Cable             | Lead wire         | AWG 24                                                                                                                     |
|                   | Cable length      | 3 m                                                                                                                        |
|                   | Color (Lead wire) | Blue: Common line                                                                                                          |
|                   |                   | Brown: NC (When the valve is closed, the circuit is closed.)<br>Black: NO (When the valve is open, the circuit is closed.) |

## Wetted Parts Material

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

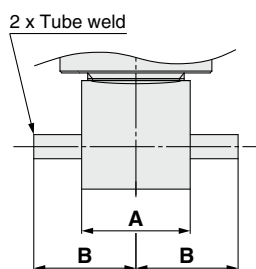
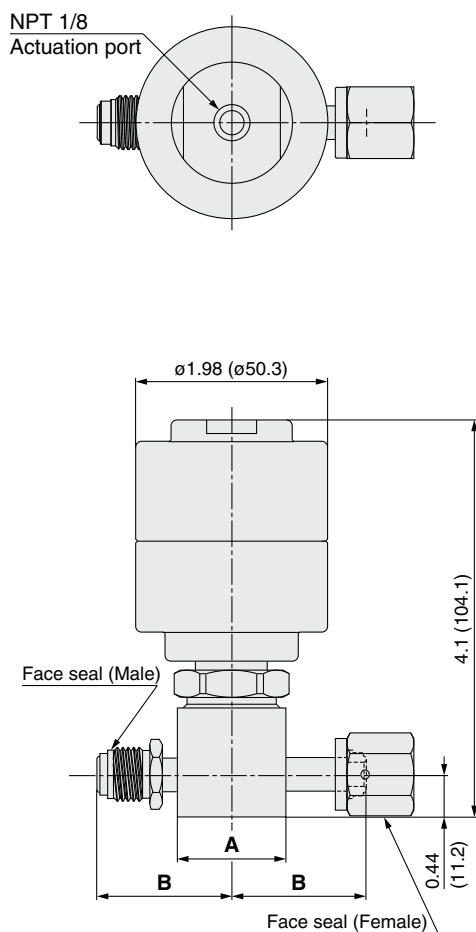
# Diaphragm Valve for Ultra High Purity **AP4000 Series**

Air operated type (For high pressure)

## Dimensions

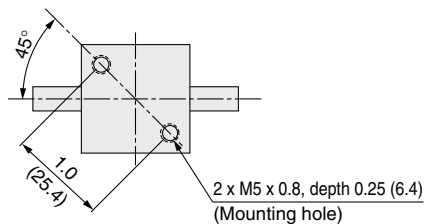
inch (mm)

### AP4000



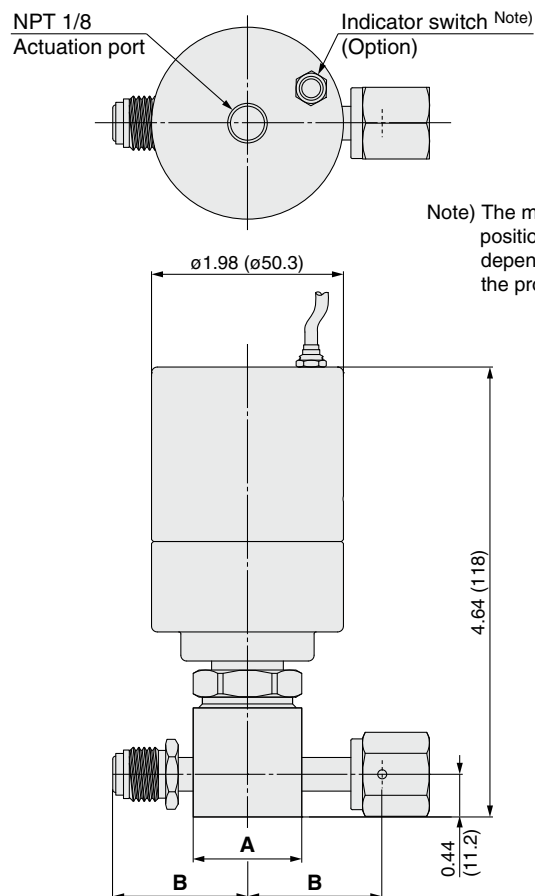
Connections: TW□

### Bottom view

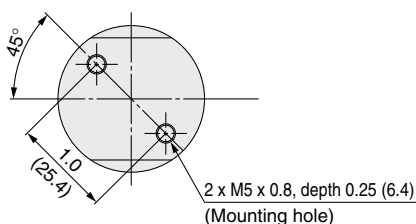


Material code: S

### Indicator switch



| Material | Connections | A         |         | B     |        |
|----------|-------------|-----------|---------|-------|--------|
|          |             | inch      | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq.  | (□28.4) | 1.39  | (35.3) |
|          | MV4         |           |         | 1.06  | (26.9) |
|          | TW4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.325 | (33.7) |
| H        | TW6         | 1.24 dia. | (ø31.5) | 1.45  | (36.8) |
|          | FV4         |           |         | 1.08  | (27.4) |
|          | MV4         |           |         | 1.93  | (49.0) |
|          | FV6         |           |         | 1.325 | (33.7) |
|          | MV6         |           |         | 1.325 | (33.7) |



Material code: H

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

### AP4141 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt



RoHS

How to Order (See p. 250 for ordering syntax)

AP41 41 S 2PW MV8 MV8      

#### Model

| Code | Max. operating pressure | Cv  |
|------|-------------------------|-----|
| 41   | 250 psig (1.7 MPa)      | 0.8 |

#### Material

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

#### Surface finish

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

#### Ports (Refer to the porting configuration.)

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PWD | 3 ports |
| 3PWE | 3 ports |
| 3PWF | 3 ports |
| 4PWM | 4 ports |

#### Connections (Refer to the porting configuration.)

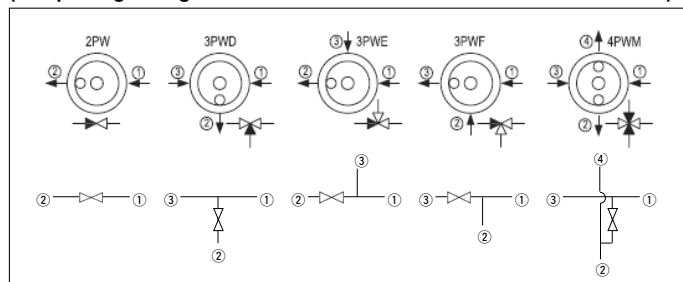
| Code    | Connections                 |
|---------|-----------------------------|
| No code | No port                     |
| FV4     | 1/4 inch face seal (Female) |
| MV4     | 1/4 inch face seal (Male)   |
| TW6     | 3/8 inch tube weld          |
| FV8     | 1/2 inch face seal (Female) |
| MV8     | 1/2 inch face seal (Male)   |
| TW8     | 1/2 inch tube weld          |

#### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

### Porting Configuration

(The porting configurations viewed from the actuator side are shown.)



#### Sample Order Number

| Port    | ①    | ②   | ③   | ④ |
|---------|------|-----|-----|---|
| AP4141S | 2PW  | MV8 | MV8 |   |
|         | 3PWD | MV8 | MV8 |   |

### Specifications

| Operating Parameters              |                         | AP4141                                                        |
|-----------------------------------|-------------------------|---------------------------------------------------------------|
| Status                            |                         | Normally closed (N.C.)                                        |
| Gas                               |                         | Select compatible materials of construction for the gas       |
| Operating pressure                |                         | Vacuum to 250 psig (1.7 MPa)                                  |
| Proof pressure                    |                         | 1.5 times the maximum operating pressure                      |
| Burst pressure                    |                         | 3 times the maximum operating pressure                        |
| Ambient and operating temperature |                         | -10 to 71°C (No freezing) *1)                                 |
| Cv                                |                         | 0.8                                                           |
| Leak rate                         | Inboard leakage         | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                    |
|                                   | Outboard leakage        | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                    |
| Across the seat leak              |                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                    |
| Surface finish                    | Ra max 15 μin. (0.4 μm) | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |
| Connections                       |                         | Face seal, Tube weld                                          |
| Actuation pressure                |                         | 70 to 110 psig (0.48 to 0.76 MPa)                             |
| Actuation port connection         |                         | M5 x 0.8                                                      |
| Actuation port location           |                         | Side                                                          |
| Installation                      |                         | Bottom mount                                                  |
| Internal volume                   |                         | 0.37 in <sup>3</sup> (6.1 cm <sup>3</sup> )                   |

\*1) Max. 90°C for Polyimide seat.

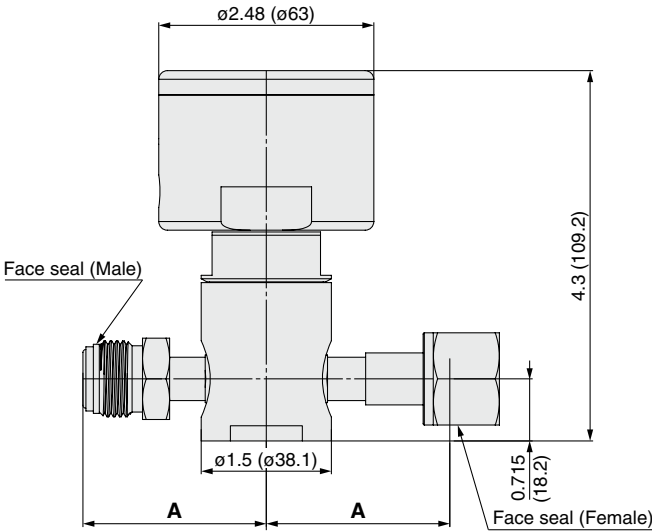
## Wetted Parts Material

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

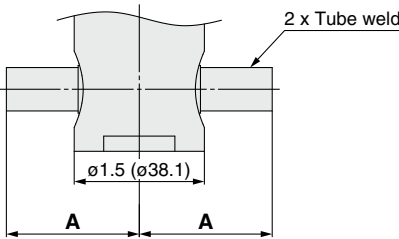
## Dimensions

inch (mm)

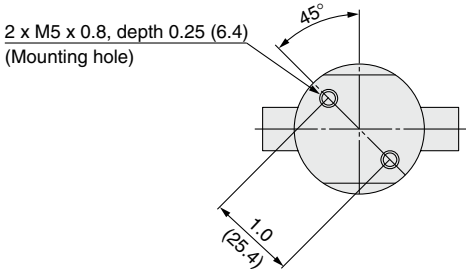
### AP4141



Connections: MV□, FV□



Connections: TW□



| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 1.59 | (40.4) |
| MV4         | 1.59 | (40.4) |
| TW6         | 1.49 | (37.8) |
| FV8         | 2.12 | (53.8) |
| MV8         | 2.12 | (53.8) |
| TW8         | 1.53 | (38.9) |

# Diaphragm Valve for Ultra High Purity

**Air operated type**  
(For high pressure and high flow)

## AP3130 & 3113 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Pneumatically actuated normally closed
- High pressure type: 20.7 MPa and 9 MPa
- Designed for bulk specialty gas (BSGS) delivery
- LOTO option available as an option



RoHS

**How to Order** (See p. 250 for ordering syntax)

**AP31** **30** **S** **2PW** **MV8** **MV8**

### Model

| Code      | Maximum operating pressure | Cv  |
|-----------|----------------------------|-----|
| <b>13</b> | 1300 psig (9.0 MPa)        | 1.0 |
| <b>30</b> | 3000 psig (20.7 MPa) *1)   | 0.7 |

\*1) 2400 psig (16.5 MPa) for connection size 3/4 inch.

### Material

| Code     | Body material            |
|----------|--------------------------|
| <b>S</b> | 316L SS secondary remelt |
| <b>H</b> | Ni-Cr-Mo alloy *2)       |

\*2) Special export controls apply to Ni-Cr-Mo alloy body with 1/2 inch or greater size connection.

### Surface finish

| Code           | Surface finish Ra max     |
|----------------|---------------------------|
| <b>No code</b> | 15 µin. (0.4 µm) Standard |
| <b>M</b>       | 10 µin. (0.25 µm)         |

### Ports

| Code       | Ports   |
|------------|---------|
| <b>2PW</b> | 2 ports |

### Option

| Code           | Specification    |
|----------------|------------------|
| <b>No code</b> | —                |
| <b>IS</b>      | Indicator switch |

### Connections (Inlet, Outlet)

| Code        | Connections                     |
|-------------|---------------------------------|
| <b>FV4</b>  | 1/4 inch face seal (Female)     |
| <b>MV4</b>  | 1/4 inch face seal (Male)       |
| <b>TW6</b>  | 3/8 inch tube weld              |
| <b>FV8</b>  | 1/2 inch face seal (Female)     |
| <b>MV8</b>  | 1/2 inch face seal (Male)       |
| <b>TW8</b>  | 1/2 inch tube weld              |
| <b>FV12</b> | 3/4 inch face seal (Female) *3) |
| <b>MV12</b> | 3/4 inch face seal (Male) *3)   |
| <b>TW12</b> | 3/4 inch tube weld              |

\*3) Prepare a suitable mating fitting with a rated pressure.

### Seat material

| Code           | Material         |
|----------------|------------------|
| <b>No code</b> | PCTFE (Standard) |
| <b>VS</b>      | Polyimide *4)    |

\*4) Not available with H material.

## Specifications

| Operating Parameters                     |                         | AP3113                                                  | AP3130                         |
|------------------------------------------|-------------------------|---------------------------------------------------------|--------------------------------|
| <b>Status</b>                            |                         | Normally closed (N.C.)                                  |                                |
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas |                                |
| <b>Operating pressure</b>                |                         | Vacuum to 1300 psig (9.0 MPa)                           | Vacuum to 3000 psig (20.7 MPa) |
| <b>Proof pressure</b>                    |                         | 1.5 times the maximum operating pressure                |                                |
| <b>Burst pressure</b>                    |                         | 3 times the maximum operating pressure                  |                                |
| <b>Ambient and operating temperature</b> |                         | -10 to 65°C (No freezing) *1)                           |                                |
| <b>Cv</b> *2)                            |                         | 1.0                                                     | 0.7                            |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                                |
|                                          | <b>Outboard leakage</b> | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)          |                                |
| <b>Across the seat leak</b>              |                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                |
| <b>Surface finish</b>                    |                         | Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm)       |                                |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                    |                                |
| <b>Actuation pressure</b>                |                         | 70 to 110 psig (0.48 to 0.76 MPa)                       |                                |
| <b>Actuation port connection</b>         |                         | NPT 1/8 inch                                            |                                |
| <b>Actuation port location</b>           |                         | Top                                                     |                                |
| <b>Installation</b>                      |                         | Bottom mount                                            |                                |
| <b>Internal volume</b>                   |                         | 0.36 in <sup>3</sup> (6.0 cm <sup>3</sup> ) for body    |                                |
| <b>Weight</b>                            |                         | 1.27 kg *4)                                             |                                |
| <b>LOTO (Lockout)</b>                    |                         | Option (Part number: AP PL 210) *5)                     |                                |

\*1) Max. 90°C for Polyimide seat.

\*2) Figure of 1/2 inch connection.

\*3) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).

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

\*5) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code              |                   | IS                                                                                                                         |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Switch type       |                   | SPDT                                                                                                                       |
| Rated voltage     |                   | Max. 30 VDC                                                                                                                |
| Contact capacity  |                   | Max. 3 VA                                                                                                                  |
| Switching current |                   | Max. 0.2 A                                                                                                                 |
| Carrying current  |                   | Max. 0.5 A                                                                                                                 |
| Cable             | Lead wire         | AWG 24                                                                                                                     |
|                   | Cable length      | 3 m                                                                                                                        |
|                   | Color (Lead wire) | Blue: Common line                                                                                                          |
|                   |                   | Brown: NC (When the valve is closed, the circuit is closed.)<br>Black: NO (When the valve is open, the circuit is closed.) |

## Wetted Parts Material

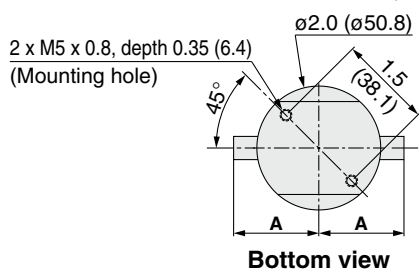
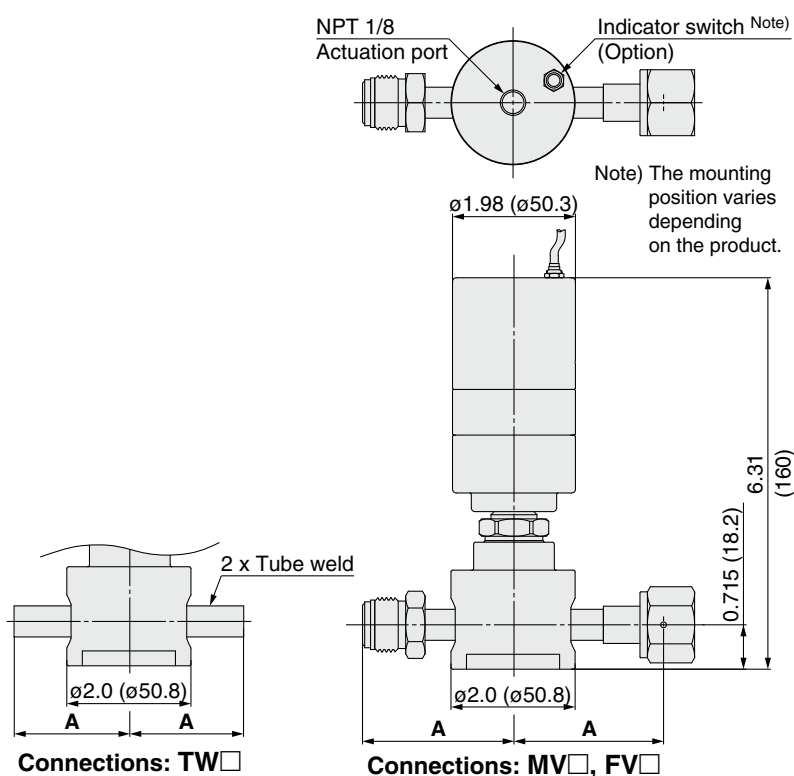
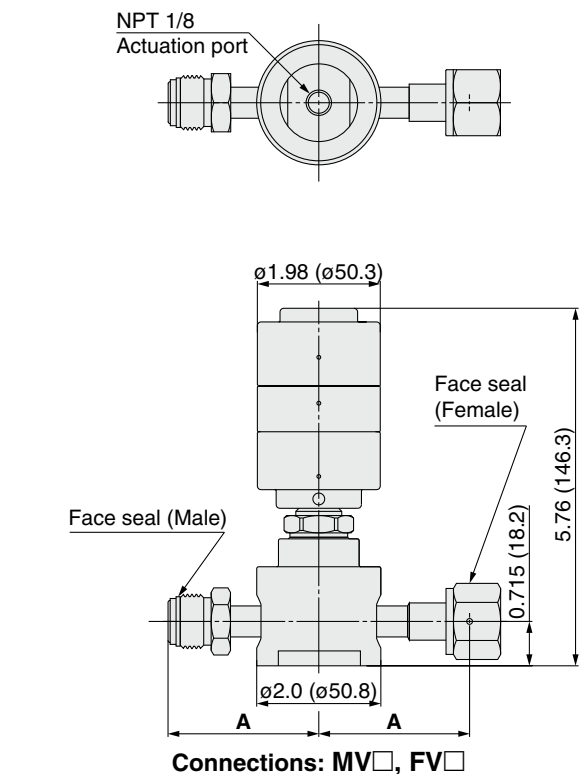
| Wetted Parts   | S                           | H              |
|----------------|-----------------------------|----------------|
| Body           | 316L SS secondary remelt    | Ni-Cr-Mo alloy |
| Surface finish | Electropolish + Passivation | Electropolish  |
| Spring         | 316 SS           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

## Dimensions

inch (mm)

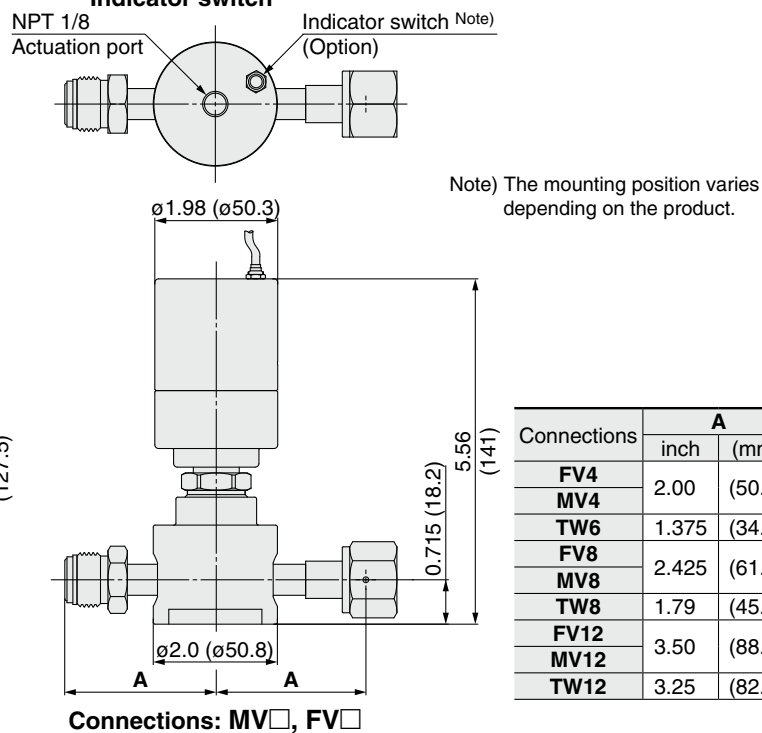
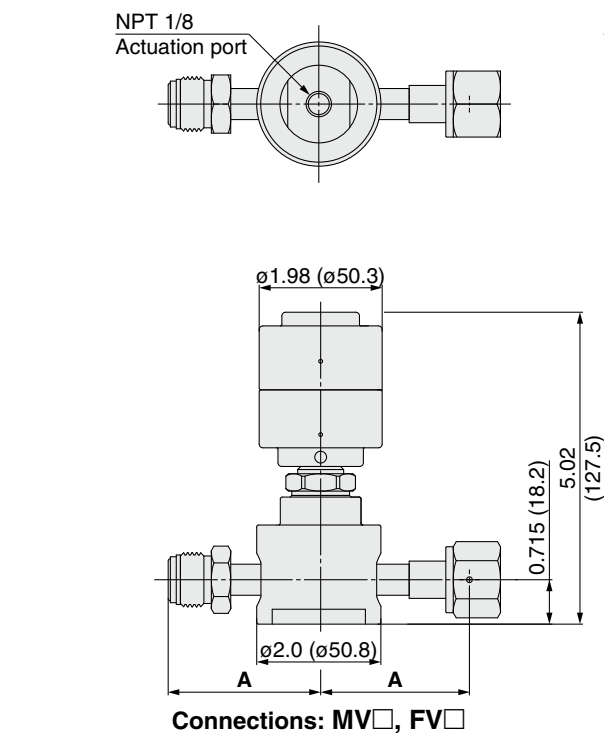
### AP3113

#### Indicator switch



### AP3130

#### Indicator switch



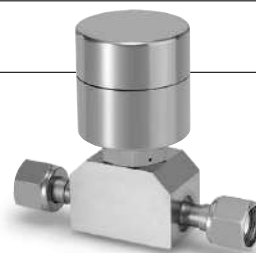
| Connections | A     |        |
|-------------|-------|--------|
|             | inch  | (mm)   |
| FV4         | 2.00  | (50.8) |
| MV4         | 2.00  | (50.8) |
| TW6         | 1.375 | (34.9) |
| FV8         | 2.425 | (61.6) |
| MV8         | 2.425 | (61.6) |
| TW8         | 1.79  | (45.5) |
| FV12        | 3.50  | (88.9) |
| MV12        | 3.50  | (88.9) |
| TW12        | 3.25  | (82.6) |

# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high flow)

## AP3700 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Pneumatically actuated normally closed or normally open
- Purge ports and monoblock configurations available
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

**Model**

AP37 **00** **S** **□** **(Inlet)** **MV8** **(Outlet)** **MV8** **00** **□** **□** **□** **□**

**Code** **Status**

|    |                        |
|----|------------------------|
| 00 | Normally closed (N.C.) |
| 08 | Normally open (N.O.)   |

**Code** **Body material**

|   |                          |
|---|--------------------------|
| S | 316L SS secondary remelt |
|---|--------------------------|

**Code** **Surface finish Ra max**

|         |                           |
|---------|---------------------------|
| No code | 15 μin. (0.4 μm) Standard |
| M       | 10 μin. (0.25 μm)         |
| V       | 7 μin. (0.18 μm)          |
| X       | 5 μin. (0.13 μm)          |

**Porting Configuration**

**Connections (Inlet<sup>①</sup>, Outlet<sup>②</sup>)**

| Code | Connections                 |
|------|-----------------------------|
| TW6  | 3/8 inch tube weld          |
| FV8  | 1/2 inch face seal (Female) |
| MV8  | 1/2 inch face seal (Male)   |
| TW8  | 1/2 inch tube weld          |
| FV12 | 3/4 inch face seal (Female) |
| MV12 | 3/4 inch face seal (Male)   |
| TW12 | 3/4 inch tube weld          |

**Option**

**Code** **Specification**

|         |                       |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

**Purge port option**

**Code** **Specification**

|         |                   |
|---------|-------------------|
| No code | —                 |
| C       | Capped purge port |

**Diaphragm material**

**Code** **Material**

|         |                    |
|---------|--------------------|
| No code | 316L SS (Standard) |
| HD      | Ni-Cr-Mo alloy     |

**Seat material**

**Code** **Material**

|         |                  |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Purge port \*1)**

| Code | Inlet <sup>③</sup> | Outlet <sup>④</sup> |
|------|--------------------|---------------------|
| 00   | None               | None                |
| M0   | Available          | None                |
| 0B   | None               | Available           |
| MB   | Available          | Available           |

\*1) 1/4 inch face seal (Male) as standard.

## Specifications

| Operating Parameters              |                  | AP3700                                                                                | AP3708               |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|----------------------|
| Status                            |                  | Normally closed (N.C.)                                                                | Normally open (N.O.) |
| Gas                               |                  | Select compatible materials of construction for the gas                               |                      |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                          |                      |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                              |                      |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                |                      |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                                                         |                      |
| Cv                                |                  | 2.8                                                                                   |                      |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                      |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                        |                      |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                      |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                      |
| Connections                       |                  | Face seal, Tube weld                                                                  |                      |
| Actuation pressure                |                  | 80 to 100 psig (0.55 to 0.7 MPa)                                                      |                      |
| Actuation port connection         |                  | M5 x 0.8                                                                              |                      |
| Actuation port location           |                  | Side (360° rotatable)                                                                 |                      |
| Installation                      |                  | Bottom mount                                                                          |                      |
| Internal volume                   |                  | 0.76 in <sup>3</sup> (12.52 cm <sup>3</sup> )                                         |                      |
| Weight                            |                  | 1.54 kg *3)                                                                           |                      |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).

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

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |

| Code                      | IPO                             | IPC                    |
|---------------------------|---------------------------------|------------------------|
| Maximum load current      | 100 A                           |                        |
| Ambient temperature range | -25 to 70°C                     |                        |
| Function indicator lamp   | Available                       |                        |
| Cable                     | Polyurethane cable 2 cores, 2 m | PVC cable 2 cores, 3 m |
| Wiring diagram            |                                 |                        |

# Diaphragm Valve for Ultra High Purity **AP3700 Series**

Air operated type (For high flow)

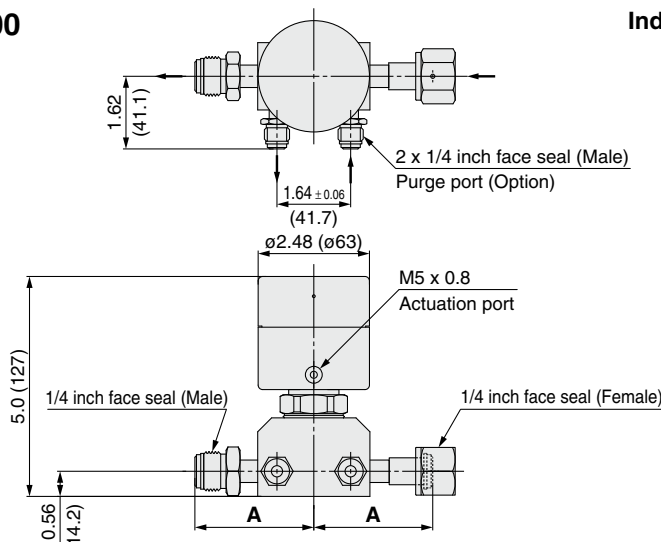
## Wetted Parts Material

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

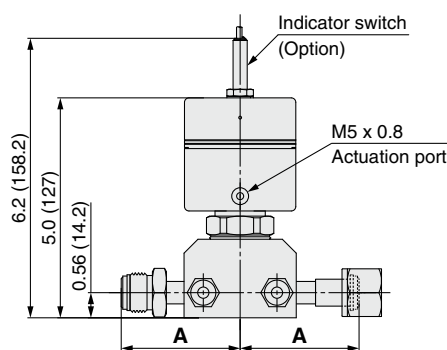
## Dimensions

inch (mm)

### AP3700

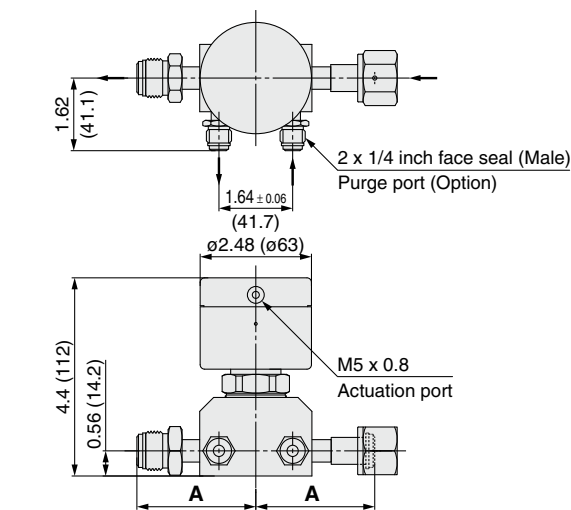


Connections: MV□, FV□

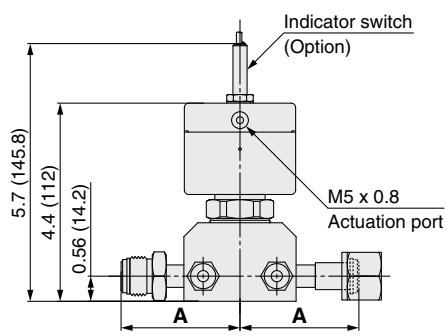


Connections: MV□, FV□

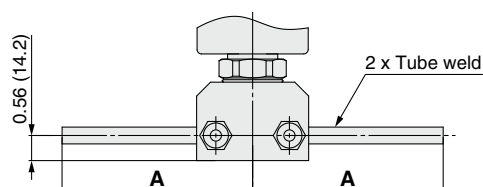
### AP3708



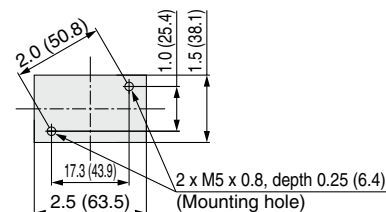
Connections: MV□, FV□



Connections: MV□, FV□



Connections: TW□



Bottom view

| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| TW6         | 4.25 | (108.0) |
| FV8         | 2.65 | (67.3)  |
| MV8         | 2.65 | (67.3)  |
| TW8         | 4.25 | (108.0) |
| FV12        | 3.20 | (81.3)  |
| MV12        | 3.20 | (81.3)  |
| TW12        | 4.25 | (108.0) |



**Made to Order**

Change of porting configuration and products such as three port dual valves can be made. Please contact SMC for details.

# Diaphragm Valve for Ultra High Purity

Air operated type  
Two Step

## AP3571 & 4571 Series

- Two step mode - metered flow and full open
- Two separate actuation ports
- Soft start valve to minimize vacuum chamber pressurization turbulence
- Metered flow adjustable AP3571: 10 to 200 slpm\*  
AP4571: 10 to 350 slpm\*
- Pneumatically actuated normally closed
- Body material: 316L SS secondary remelt

\* At 80 psig (0.55 MPa) of N<sub>2</sub>

How to Order (See p. 250 for ordering syntax)



RoHS

**AP 3 571 S 2PW FV4 FV4 M 050**

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |
| 4    | 0.5  |

**Model**

| Code | Mode          | Status                 |
|------|---------------|------------------------|
| 571  | Two step mode | Normally closed (N.C.) |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy           |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *2)    |

\*2) Not available with H material.

**Face to face dimension**

| Code    | Face to face                 |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)      |

\*1) Only applies to S material with TW4 or TW6 connections.

**Connections (Inlet, Outlet)**

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

**Metered flow**

| Code           | Metered adjusted flow in slpm                                                                                                                                                                              |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XXX (3 digits) | Metered adjusted flow in slpm at 80 psig (0.55 MPa) N <sub>2</sub> . Replace XXX with flow rate using 3 digits, example 50 slpm = "050"<br>Adjustable range: AP3571= 10 to 200 slpm AP4571= 10 to 350 slpm |

## Specifications

| Operating Parameters                 |                  | AP3571                                                                                | AP4571                                       |
|--------------------------------------|------------------|---------------------------------------------------------------------------------------|----------------------------------------------|
| Status                               |                  | Normally closed (N.C.)                                                                |                                              |
| Gas                                  |                  | Select compatible materials of construction for the gas                               |                                              |
| Operating pressure                   |                  | Vacuum to 125 psig (0.9 MPa)                                                          |                                              |
| Proof pressure                       |                  | 1.5 times the maximum operating pressure                                              |                                              |
| Burst pressure                       |                  | 3 times the maximum operating pressure                                                |                                              |
| Ambient and operating temperature    |                  | -10 to 71°C (No freezing) *1)                                                         |                                              |
| Cv                                   |                  | 0.29                                                                                  | 0.5                                          |
| Leak rate                            | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                                              |
|                                      | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                        |                                              |
| Across the seat leak                 |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                                              |
| Surface finish                       |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                              |
| Connections                          |                  | Face seal, Tube weld                                                                  |                                              |
| Actuation pressure                   |                  | 70 to 110 psig (0.48 to 0.76 MPa)                                                     |                                              |
| Actuation port connection            |                  | M5 thread                                                                             |                                              |
| Actuation port location              |                  | Sides (2 each)                                                                        |                                              |
| Installation                         |                  | Bottom mount                                                                          |                                              |
| Internal volume                      |                  | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )                                          | 0.12 in <sup>3</sup> (1.94 cm <sup>3</sup> ) |
| Adjustable range of metered flow *3) |                  | 10 to 200 slpm                                                                        | 10 to 350 slpm                               |
| Tolerance of *3)<br>metered flow     | 10 to 20 slpm    | ±6 slpm                                                                               |                                              |
|                                      | 21 to 50 slpm    | ±10 slpm                                                                              |                                              |
|                                      | 51 to 100 slpm   | ±15 slpm                                                                              |                                              |
|                                      | 101 to 200 slpm  | ±20 slpm                                                                              |                                              |
|                                      | 201 to 350 slpm  | N/A                                                                                   | ±25 slpm                                     |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa)

\*3) At 80 psig (0.55 MPa) N<sub>2</sub>

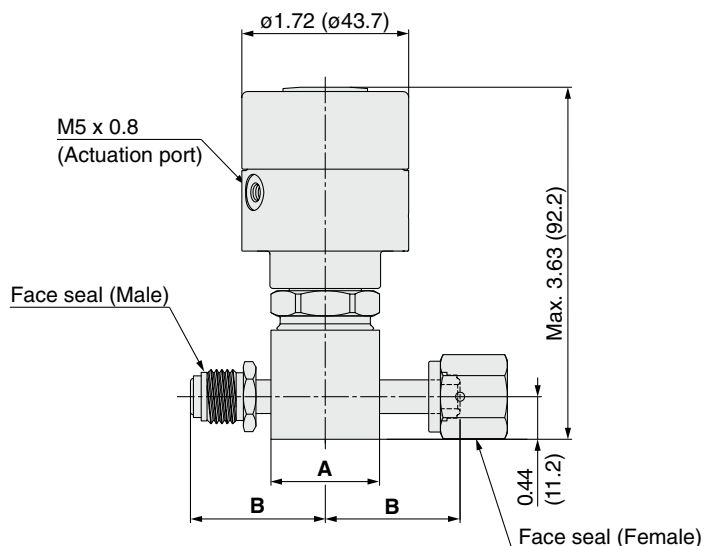
## Wetted Parts Material

| Wetted parts   | S                           | H              |
|----------------|-----------------------------|----------------|
| Body           | 316L SS secondary remelt    | Ni-Cr-Mo alloy |
| Surface finish | Electropolish + Passivation | Electropolish  |
| Diaphragm      | Ni-Co alloy                 |                |
| Seat           | PCTFE (Option: Polyimide)   | PCTFE          |

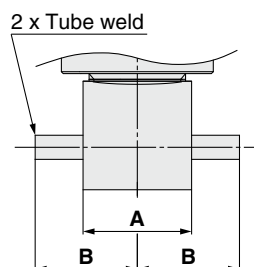
## Dimensions

inch (mm)

### AP3571 & 4571

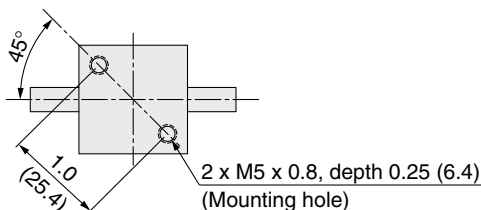


Connections: MV□, FV□

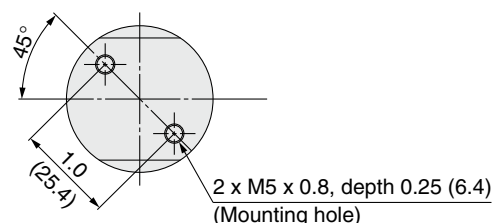


Connections: TW□

Bottom view



Material code: S



Material code: H

| Material | Connections | A        |         | B     |        |
|----------|-------------|----------|---------|-------|--------|
|          |             | inch     | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq. | (□28.4) | 1.39  | (35.3) |
|          | MV4         |          |         | 1.06  | (26.9) |
|          | TW4         |          |         | 1.93  | (49.0) |
|          | FV6         |          |         | 1.325 | (33.7) |
|          | MV6         |          |         |       |        |
|          | TW6         |          |         |       |        |
| H        | FV4         | ø1.24    | (ø31.5) | 1.45  | (36.8) |
|          | MV4         |          |         | 1.08  | (27.4) |
|          | TW4         |          |         | 1.93  | (49.0) |
|          | FV6         |          |         | 1.325 | (33.7) |
|          | MV6         |          |         |       |        |
|          | TW6         |          |         |       |        |

# Diaphragm Valve for Ultra High Purity

Air operated type  
(Metal seated)

## AP3200 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- All metal wetted parts
- Pneumatically actuated normally closed
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

**AP32 00 S 2PW FV4 FV4**

**Model**

| Code | Max. operating pressure |
|------|-------------------------|
| 00   | 125 psig (0.9 MPa)      |
| 02   | 508 psig (3.5 MPa)      |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

**Surface finish**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

**Connections (Inlet, Outlet)**

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

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)      |

\*1) Only applies to TW4 connections.

## Specifications

| Operating Parameters              |                  | AP3200                                                                                | AP3202                       |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|------------------------------|
| Status                            |                  | Normally closed (N.C.)                                                                |                              |
| Gas                               |                  | Select compatible materials of construction for the gas                               |                              |
| Operating pressure                |                  | Vacuum to 125 psig (0.9 MPa)                                                          | Vacuum to 508 psig (3.5 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                              |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                |                              |
| Ambient and operating temperature |                  | -10 to 100°C (No freezing)                                                            |                              |
| Cv                                |                  | 0.27                                                                                  |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *1)                                        |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-7</sup> Pa·m <sup>3</sup> /s                                             |                              |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                              |
| Connections                       |                  | Face seal, Tube weld                                                                  |                              |
| Actuation pressure                |                  | 70 to 110 psig (0.48 to 0.76 MPa)                                                     |                              |
| Actuation port connection         |                  | NPT 1/8 inch                                                                          |                              |
| Actuation port location           |                  | Top                                                                                   |                              |
| Installation                      |                  | Bottom mount                                                                          |                              |
| Internal volume                   |                  | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )                                          |                              |
| Weight                            |                  | 1.27 kg *2)                                                                           |                              |

\*1) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).

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

## Indicator Switch (Option) Specification

| Code                                                         | IS                |
|--------------------------------------------------------------|-------------------|
| Switch type                                                  | SPDT              |
| Rated voltage                                                | Max. 30 VDC       |
| Contact capacity                                             | Max. 3 VA         |
| Switching current                                            | Max. 0.2 A        |
| Carrying current                                             | Max. 0.5 A        |
| Cable                                                        | Lead wire         |
|                                                              | Cable length      |
|                                                              | Color (Lead wire) |
| Blue: Common line                                            |                   |
| Brown: NC (When the valve is closed, the circuit is closed.) |                   |
| Black: NO (When the valve is open, the circuit is closed.)   |                   |

## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS secondary remelt    |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |

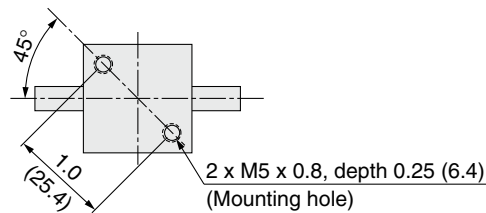
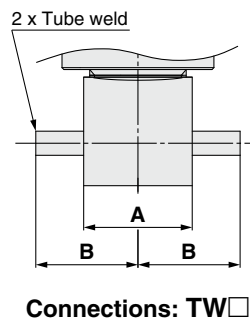
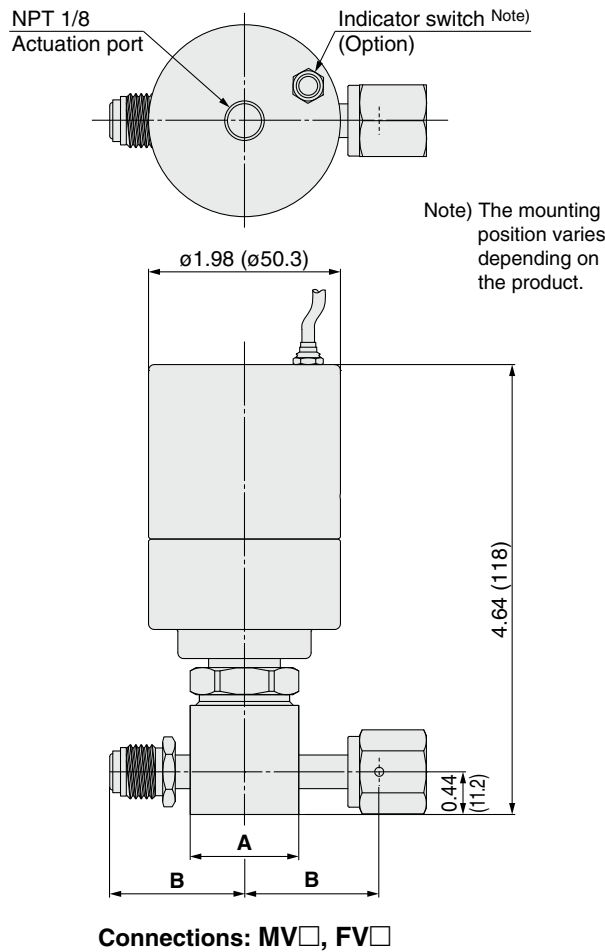
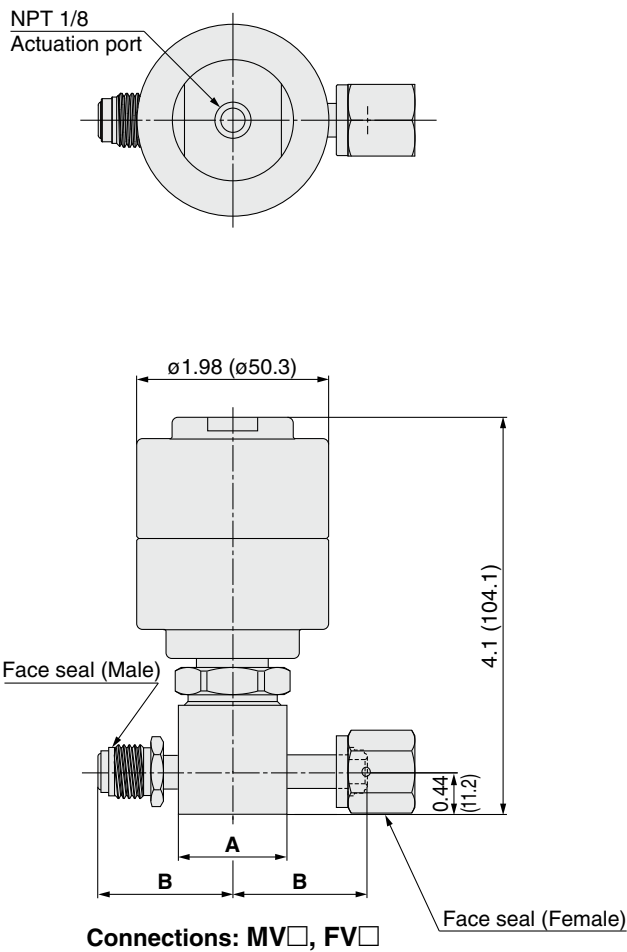
Dimensions

inch (mm)

AP3200

Indicator switch

|                                      |
|--------------------------------------|
| Recommendations                      |
| Regulators                           |
| AP                                   |
| SL                                   |
| AZ                                   |
| AK                                   |
| BP                                   |
| Diaphragm Valves                     |
| AP                                   |
| AZ                                   |
| AK                                   |
| Check Valves                         |
| Vacuum Generators                    |
| Flow Switches                        |
| Technical Data/<br>Glossary of Terms |
| Precautions                          |



| Material | Connections | A        |         | B     |        |
|----------|-------------|----------|---------|-------|--------|
|          |             | inch     | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq. | (□28.4) | 1.39  | (35.3) |
|          | MV4         |          |         | 1.06  | (26.9) |
|          | TW4         |          |         | 1.93  | (49.0) |
|          | FV6         |          |         | 1.325 | (33.7) |
|          | MV6         |          |         |       |        |
|          | TW6         |          |         |       |        |

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AP3600 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- LOTO standard with AP3657/3659, optional AP3625
- Indicator switch available as an option (AP3650)



RoHS

How to Order (See p. 250 for ordering syntax)

**AP 3 650 S 2PW FV4 FV4**

**Size**  
Code 3 Cv 0.29

**Model**  
Code Knob Max. operating pressure  
652 Round knob with a raised rectangular section 250 psig (1.7 MPa)  
659 Pull twist knob with LOTO  
600 Multi turn round knob  
625 Lever knob 3000 psig (20.7 MPa)  
650 Round knob with open/close indication window  
657 Pull twist knob with LOTO

**Material**  
Code Body material  
S 316L SS secondary remelt  
H Ni-Cr-Mo alloy

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

**Ports**  
Code Ports  
2PW 2 ports  
\*) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

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

**Face to face dimension**  
Code Dimension  
No code 2.12 inch (53.8 mm) Standard  
1.75 1.75 inch (44.5 mm) \*)

**Option (AP3650 only)**  
Code Specification  
No code —  
ISH Indicator switch

**Installation option**  
Code Installation  
No code Bottom mount (Standard)  
P Panel Installation \*)\*)

\*) Panel mounting hole: dia.0.78 inch (19.8 mm).  
\*) Not available with AP3652 and AP3659.

**Seat material**  
Code Material  
No code PCTFE (Standard)  
VS Polyimide \*)

\*) Not available with H material.

\*) Only applies to S material with TW4 or TW6 connections.

## Specifications

| Operating Parameters              |                  | AP3652                                                                                 | AP3659                        | AP3600                                                        | AP3625                             | AP3650                                                | AP3657                        |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------|------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                                |                               |                                                               |                                    |                                                       |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                           |                               |                                                               | Vacuum to 3000 psig (20.7 MPa)     |                                                       |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                               |                               |                                                               |                                    |                                                       |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                 |                               |                                                               |                                    |                                                       |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                          |                               |                                                               |                                    |                                                       |                               |
| Cv                                |                  | 0.29                                                                                   |                               |                                                               |                                    |                                                       |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                          |                               |                                                               |                                    |                                                       |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                      |                               |                                                               |                                    |                                                       |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                                                          |                               |                                                               |                                    |                                                       |                               |
| Surface finish                    |                  | Ra max 15 µin. (0.4 µm)                                                                |                               | Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |                                    |                                                       |                               |
| Connections                       |                  | Face seal, Tube weld                                                                   |                               |                                                               |                                    |                                                       |                               |
| Installation                      |                  | Bottom mount                                                                           |                               |                                                               | Bottom mount (Option: panel mount) |                                                       |                               |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                                                    |                               |                                                               |                                    |                                                       |                               |
| Weight                            |                  | 0.26 kg *3)                                                                            | 0.45 kg *3)                   | 0.36 kg *3)                                                   | 0.45 kg *3)                        | 0.73 kg *3)                                           | 0.4 kg *3)                    |
| Knob                              |                  | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *5) | Multi turn round knob                                         | 1/4 turn lever knob *4)            | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *5) |
| Operational Safety Device (OSD)   |                  | Option (Part number: AP PL227) *6)                                                     |                               |                                                               |                                    |                                                       |                               |
| LOTO (Lockout)                    |                  | N/A                                                                                    | Standard                      | N/A                                                           | Option (Part number: AP PL225) *6) | N/A                                                   | Standard                      |

\*) -10 to 90°C for Polyimide seat.

\*) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*) Optional lever color available. Please contact SMC.

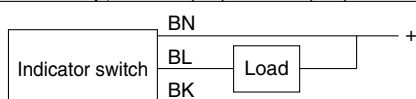
\*) Handle must be pulled to turn open from closed.

\*) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                 | ISH                               |
|----------------------|-----------------------------------|
| Output type          | NPN                               |
| Power supply voltage | 3.8 to 30 VDC                     |
| Output voltage       | Max. 0.4 VDC                      |
| Supply current       | Max. 11 mA                        |
| Output current       | Max. 20 mA                        |
| Lead wire            | AWG 24                            |
| Cable length         | 3 m                               |
| Color (Lead wire)    | Blue (BL), Brown (BN), Black (BK) |

Wiring Diagram



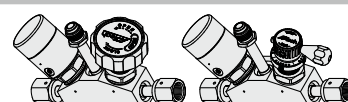
## Wetted Parts Material

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



Made to Order

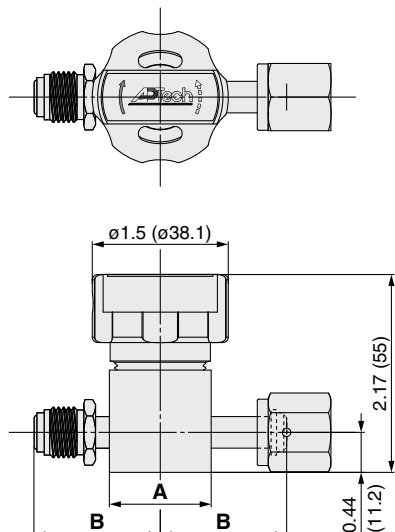
Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



## Dimensions

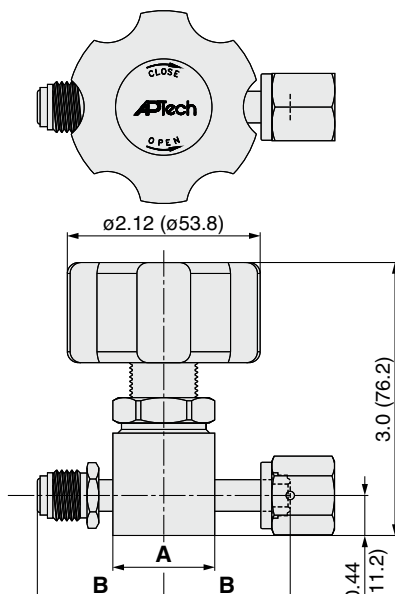
inch (mm)

### AP3652



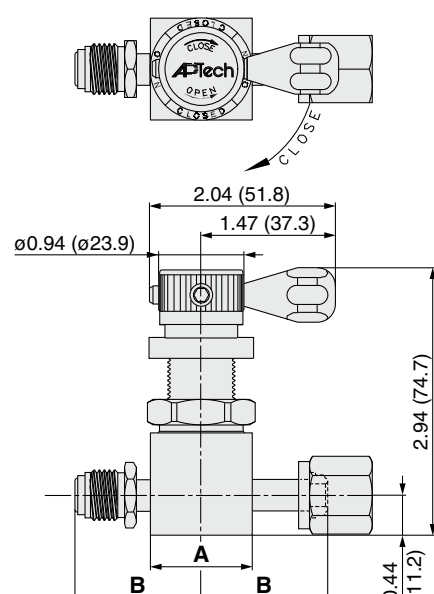
Connections: MV□, FV□

### AP3600



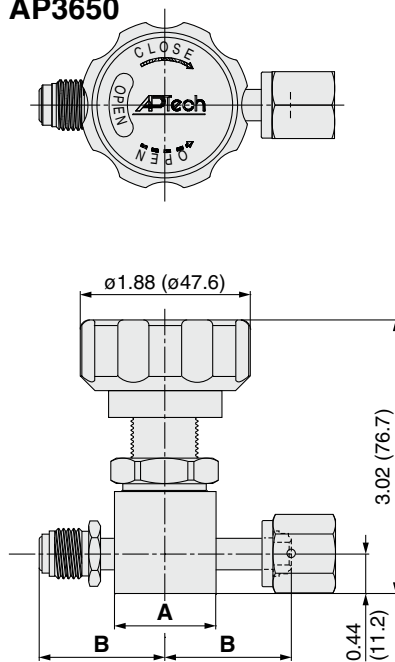
Connections: MV□, FV□

### AP3625



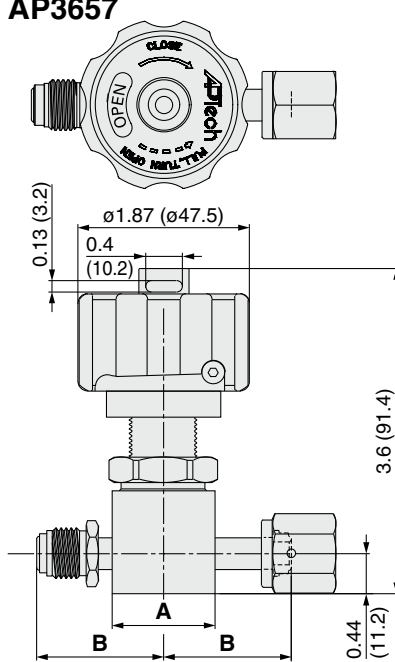
Connections: MV□, FV□

### AP3650



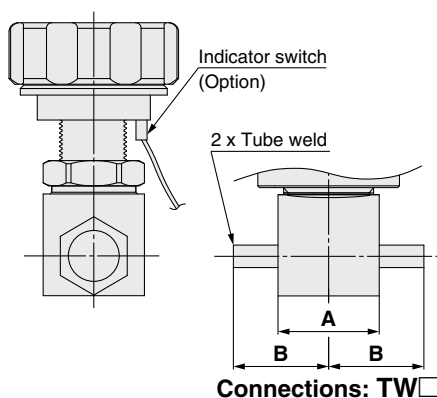
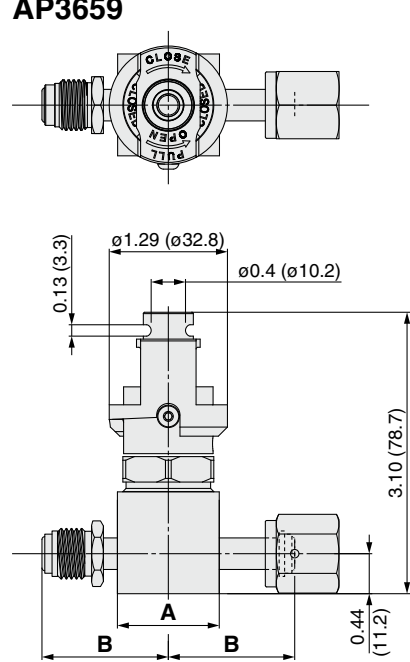
Connections: MV□, FV□

### AP3657



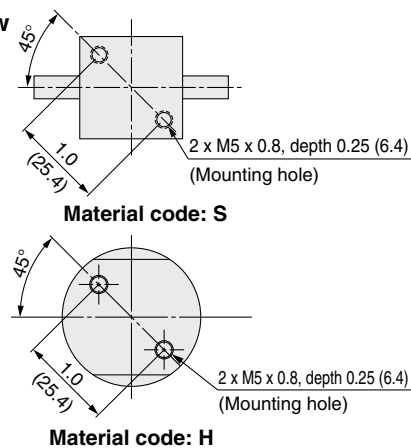
Connections: MV□, FV□

### AP3659



Connections: TW□

### Bottom view



| Material | Connections | A                 |      | B     |        |
|----------|-------------|-------------------|------|-------|--------|
|          |             | inch              | (mm) | inch  | (mm)   |
| S        | FV4         | 1.12 sq. (□28.4)  |      | 1.39  | (35.3) |
|          | MV4         |                   |      | 1.06  | (26.9) |
|          | TW4         |                   |      | 1.06  | (26.9) |
|          | FV6         |                   |      | 1.93  | (49.0) |
|          | MV6         |                   |      | 1.325 | (33.7) |
| H        | FV4         | 1.24 dia. (ø31.5) |      | 1.45  | (36.8) |
|          | MV4         |                   |      | 1.08  | (27.4) |
|          | TW4         |                   |      | 1.08  | (27.4) |
|          | FV6         |                   |      | 1.93  | (49.0) |
|          | MV6         |                   |      | 1.325 | (33.7) |

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AP4600 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- LOTO standard with AP4657/4659, optional AP4625
- Indicator switch available as an option (AP4650)



RoHS

How to Order (See p. 250 for ordering syntax)

AP 4 650 S 2PW FV6 FV6

(Inlet) (Outlet)

Size: Code 4, Cv 0.5

Model:

| Code | Knob                                         | Max. operating pressure |
|------|----------------------------------------------|-------------------------|
| 652  | Round knob with a raised rectangular section | 250 psig (1.7 MPa)      |
| 659  | Pull twist knob with LOTO                    |                         |
| 600  | Multi turn round knob                        |                         |
| 625  | Lever knob                                   | 300 psig (2.1 MPa)      |
| 650  | Round knob with open/close indication window |                         |
| 657  | Pull twist knob with LOTO                    |                         |

Material:

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy           |

Surface finish:

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

Connections (Inlet, Outlet):

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

Option (AP4650 only):

| Code    | Specification                                                       |
|---------|---------------------------------------------------------------------|
| No code | Standard                                                            |
| HR      | High pressure *3)<br>(Max. operating pressure 3000 psig (20.7 MPa)) |

\*3) Not available with AP4652 and AP4659.

Installation option:

| Code    | Installation              |
|---------|---------------------------|
| No code | Bottom mount (Standard)   |
| P       | Panel Installation *4)*5) |

\*4) Panel mounting hole: dia.0.78 inch (19.8 mm).  
\*5) Not available with AP4652 and AP4659.

Ports:

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*1) Optional porting and porting configurations available. Refer to the AP series optional porting configuration on page 179.

Face to face dimension:

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *1)      |

\*1) Only applies to S material with TW4 or TW6 connections.

Seat material:

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide *2)    |

\*2) Not available with H material.

## Specifications

| Operating Parameters              |                  | AP4652                                                                                 | AP4659                        | AP4600                                                        | AP4625                             | AP4650                                                | AP4657                        |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------|------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                                |                               |                                                               |                                    |                                                       |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                           |                               |                                                               | Vacuum to 300 psig (2.1 MPa)       |                                                       |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                               |                               |                                                               |                                    |                                                       |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                 |                               |                                                               |                                    |                                                       |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                          |                               |                                                               |                                    |                                                       |                               |
| Cv                                |                  | 0.5                                                                                    |                               |                                                               |                                    |                                                       |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                          |                               |                                                               |                                    |                                                       |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                      |                               |                                                               |                                    |                                                       |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                                                          |                               |                                                               |                                    |                                                       |                               |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)                                                                |                               | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                                    |                                                       |                               |
| Connections                       |                  | Face seal, Tube weld                                                                   |                               |                                                               |                                    |                                                       |                               |
| Installation                      |                  | Bottom mount                                                                           |                               |                                                               | Bottom mount (Option: panel mount) |                                                       |                               |
| Internal volume                   |                  | 0.12 in³ (1.94 cm³)                                                                    |                               |                                                               |                                    |                                                       |                               |
| Weight                            |                  | 0.26 kg *3)                                                                            | 0.45 kg *3)                   | 0.36 kg *3)                                                   | 0.45 kg *3)                        | 0.73 kg *3)                                           | 0.4 kg *3)                    |
| Knob                              |                  | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *5) | Multi turn round knob                                         | 1/4 turn lever knob *4)            | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *5) |
| Operational Safety Device (OSD)   |                  | Option (Part number: AP PL227) *6)                                                     |                               |                                                               |                                    | N/A                                                   | Standard                      |
| LOTO (Lockout)                    |                  | N/A                                                                                    | Standard                      | N/A                                                           | Option (Part number: AP PL225) *6) |                                                       |                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*4) Optional lever color available. Please contact SMC.

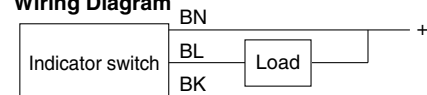
\*5) Knob must be pulled to turn open from closed.

\*6) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                 |                   | ISH                               |
|----------------------|-------------------|-----------------------------------|
| Output type          |                   | NPN                               |
| Power supply voltage |                   | 3.8 to 30 VDC                     |
| Output voltage       |                   | Max. 0.4 VDC                      |
| Supply current       |                   | Max. 11 mA                        |
| Output current       |                   | Max. 20 mA                        |
| Cable                | Lead wire         | AWG 24                            |
|                      | Cable length      | 3 m                               |
|                      | Color (Lead wire) | Blue (BL), Brown (BN), Black (BK) |

## Wiring Diagram



## Wetted Parts Material

| Wetted Parts   | S                            | H              |
|----------------|------------------------------|----------------|
| Body           | 316L SS secondary remelt     | Ni-Cr-Mo alloy |
| Surface finish | Electropolish + Passivation  | Electropolish  |
| Diaphragm      | Ni-Co alloy                  |                |
| Seat           | PCTFE<br>(Option: Polyimide) | PCTFE          |

## Option

### High pressure

| Option | Other Parameters   | AP4600                         | AP4625 | AP4650 | AP4657 |
|--------|--------------------|--------------------------------|--------|--------|--------|
| HR     | Operating pressure | Vacuum to 3000 psig (20.7 MPa) |        |        |        |

Made to Order

Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.

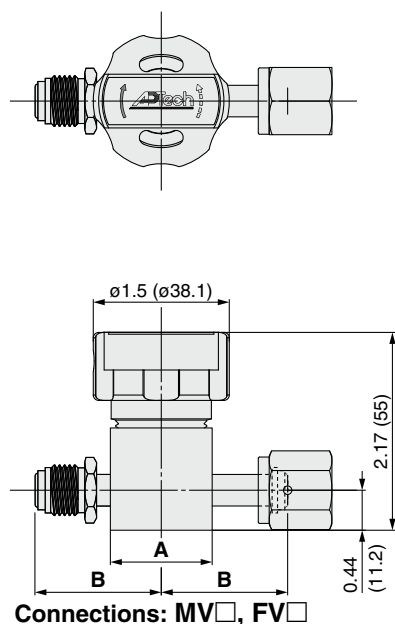
# Diaphragm Valve for Ultra High Purity **AP4600 Series**

Manually operated type

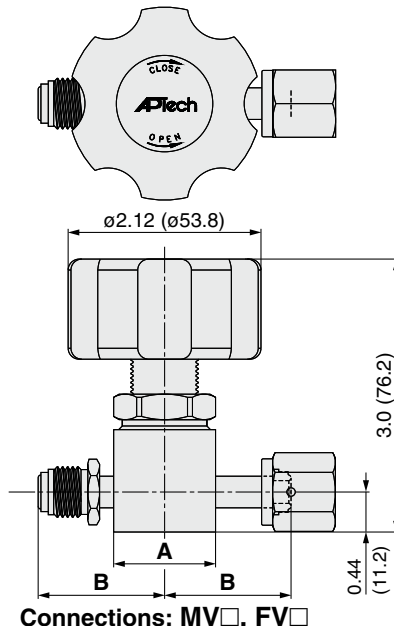
## Dimensions

inch (mm)

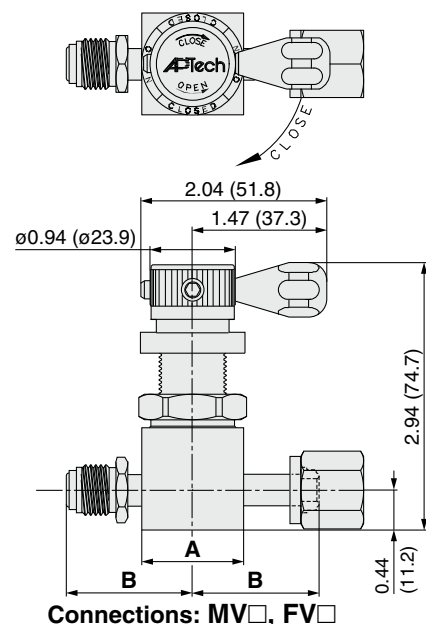
**AP4652**



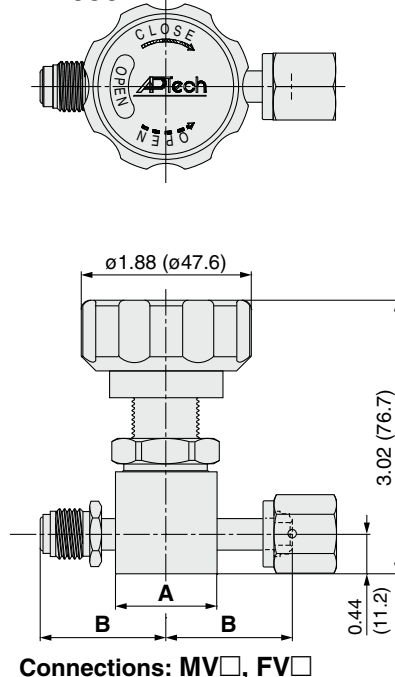
**AP4600**



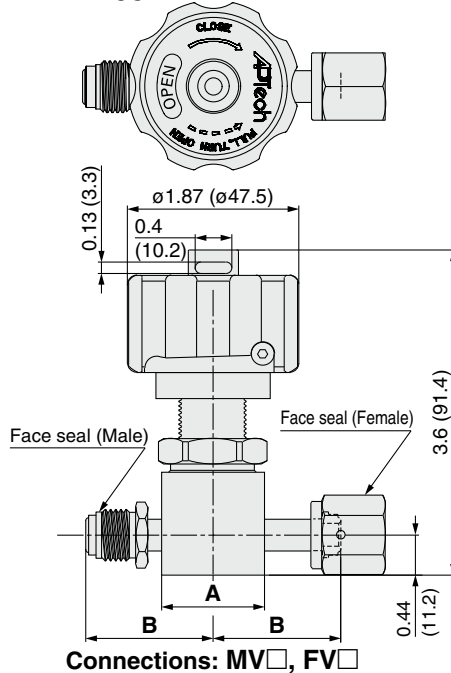
**AP4625**



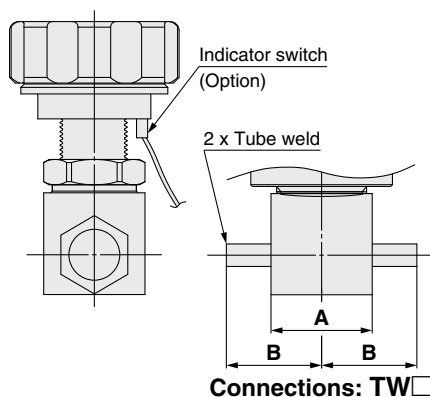
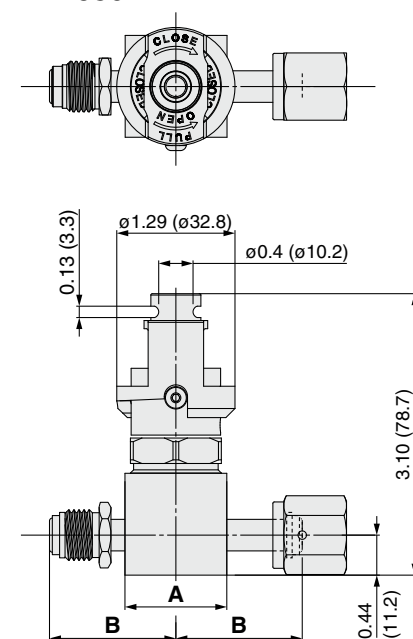
**AP4650**



**AP4657**

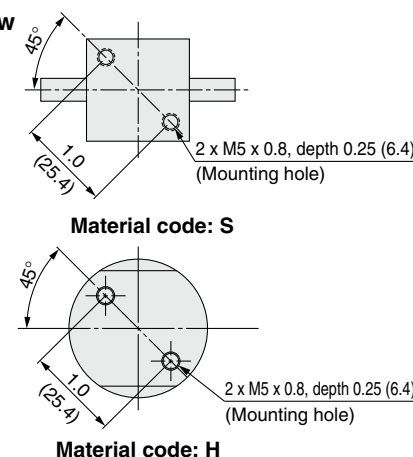


**AP4659**



**Bottom view**

| Material | Connections | A         |        | B     |        |
|----------|-------------|-----------|--------|-------|--------|
|          |             | inch      | (mm)   | inch  | (mm)   |
| S        | FV4         | 1.12 sq.  | (28.4) | 1.39  | (35.3) |
|          | MV4         |           |        | 1.06  | (26.9) |
|          | TW4         |           |        | 1.06  | (26.9) |
|          | FV6         |           |        | 1.93  | (49.0) |
|          | MV6         |           |        | 1.93  | (49.0) |
| H        | TW6         |           |        | 1.325 | (33.7) |
|          | FV4         | 1.24 dia. | (31.5) | 1.45  | (36.8) |
|          | MV4         |           |        | 1.08  | (27.4) |
|          | TW4         |           |        | 1.08  | (27.4) |
|          | FV6         |           |        | 1.93  | (49.0) |
|          | MV6         |           |        | 1.93  | (49.0) |
|          | TW6         |           |        | 1.325 | (33.7) |



### AP3604, 3624 & 3627 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- LOTO option available as an option (AP3624)



RoHS

#### How to Order (See p. 250 for ordering syntax)

**AP 3 604 S 2PW FV4 FV4**

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |

**Model**

| Code | Knob                  | Max. operating pressure |
|------|-----------------------|-------------------------|
| 604  | Multi turn round knob | 3700 psig (25.5 MPa)    |
| 624  | Lever knob            | (25.5 MPa)              |
| 627  | T handle              | 4500 psig (31 MPa)      |

**Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

**Surface finish**

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

**Connections (Inlet, Outlet)**

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

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to page 179.

**Installation option**

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *)   |

\*) Panel mounting hole: dia. 0.78 inch (19.8 mm).

**Seat material**

| Code    | Material         | Model          |
|---------|------------------|----------------|
|         |                  | 3604 3624 3627 |
| No code | PCTFE (Standard) | ● ● —          |
| VS      | Polyimide        | ● ● ●          |
| PK      | PEEK             | ● ● ●          |

●: Available  
—: Not available

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *)       |

\*) Only applies to TW4 connections.

## Specifications

| Operating Parameters              |                  | AP3604                                                  | AP3624                                                        | AP3627                       |
|-----------------------------------|------------------|---------------------------------------------------------|---------------------------------------------------------------|------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                                                               |                              |
| Operating pressure                |                  | Vacuum to 3700 psig (25.5 MPa)                          |                                                               | Vacuum to 4500 psig (31 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                                               |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                                               |                              |
| Ambient and operating temperature |                  | -40 to 49°C (No freezing)                               |                                                               | -40 to 60°C (No freezing)    |
| Cv                                |                  | 0.29                                                    |                                                               |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                                               |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *1)                       |                                                               |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                                               |                              |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)                                 | Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                                               |                              |
| Installation                      |                  | Bottom mount (Option: panel mount)                      |                                                               |                              |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |                                                               |                              |
| Weight                            |                  | 0.36 kg *2)                                             | 0.45 kg *2)                                                   | 0.45 kg *2)                  |
| Knob                              |                  | Multi turn round knob                                   | 1/4 turn lever knob *3)                                       | 1/4 turn T handle            |
| Operational Safety Device (OSD)   |                  | N/A                                                     | Option *4)<br>(Part number: AP PL227)                         | N/A                          |
| LOTO (Lockout)                    |                  |                                                         | Option *4)<br>(Part number: AP PI 225)                        |                              |

\*) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*) Optional lever color available. Please contact SMC.

\*) Refer to the specification for options. (P.227)

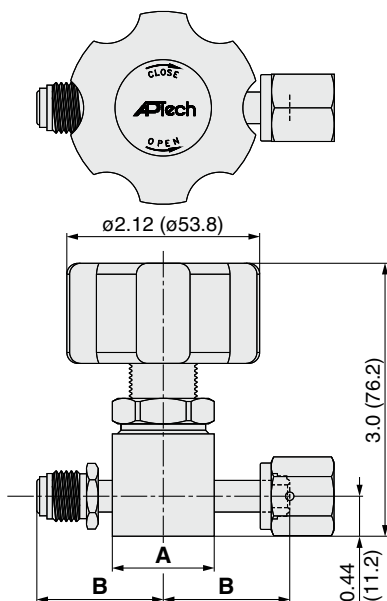
## Wetted Parts Material

| Wetted Parts   | S                                              |
|----------------|------------------------------------------------|
| Body           | 316L SS secondary remelt                       |
| Surface finish | Electropolish + Passivation                    |
| Diaphragm      | Ni-Co alloy                                    |
| Seat           | AP3604, AP3624 PCTFE (Option: Polyimide, PEEK) |
|                | AP3627 Polyimide or PEEK                       |

## Dimensions

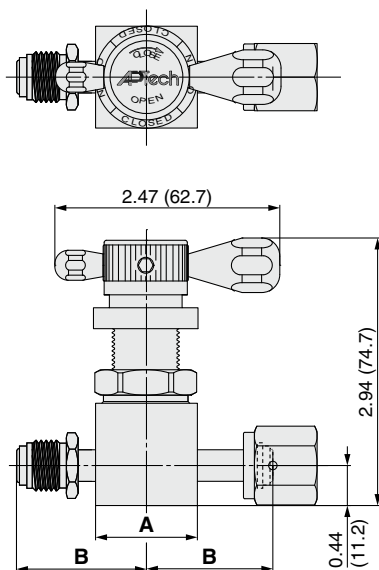
inch (mm)

### AP3604



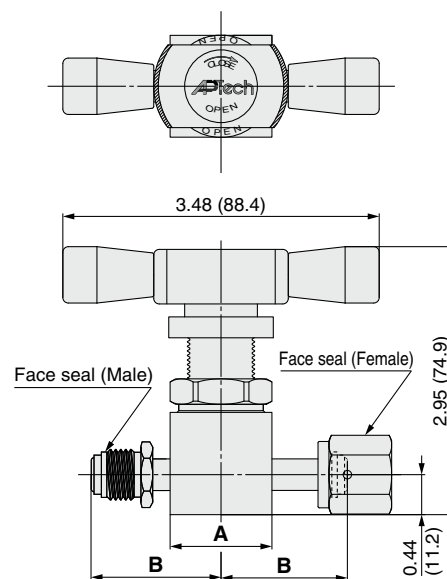
Connections: MV□, FV□

### AP3624



Connections: MV□, FV□

### AP3627



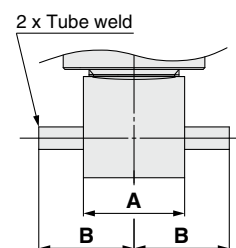
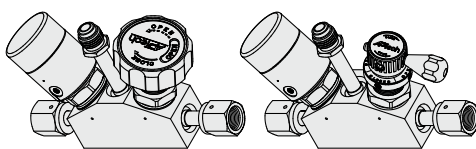
Connections: MV□, FV□

| Connections | A        |         | B    |        |
|-------------|----------|---------|------|--------|
|             | inch     | (mm)    | inch | (mm)   |
| FV4         |          |         | 1.39 | (35.3) |
| MV4         | 1.12 sq. | (□28.4) |      |        |
| TW4         |          |         | 1.06 | (26.9) |

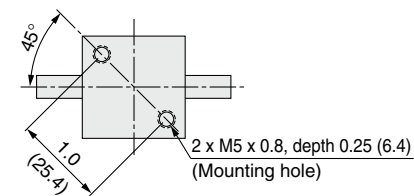


#### Made to Order

Products such as three port dual valves can be made with monoblock configurations. Please contact SMC for details.



Connections: TW□



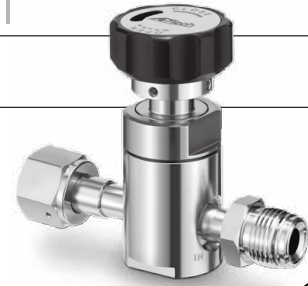
Bottom view

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AP4150 & 4157 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Springless design (No poppet spring in the wetted area)
- LOTO available (AP4157)
- Indicator switch available as an option (AP4150)



RoHS

How to Order (See p. 250 for ordering syntax)

| Model |                                              |     | Port Number |  |  |  | Option (AP4150 only) |                  | Seat material |                  |
|-------|----------------------------------------------|-----|-------------|--|--|--|----------------------|------------------|---------------|------------------|
| Code  | Knob                                         | Cv  |             |  |  |  | Code                 | Specification    | Code          | Material         |
| 50    | Round knob with open/close indication window | 0.8 |             |  |  |  | No code              | —                | No code       | PCTFE (Standard) |
| 57    | Pull twist knob with LOTO                    |     |             |  |  |  | ISH                  | Indicator switch | VS            | Polyimide        |

| Material |                          |
|----------|--------------------------|
| Code     | Body material            |
| S        | 316L SS secondary remelt |

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

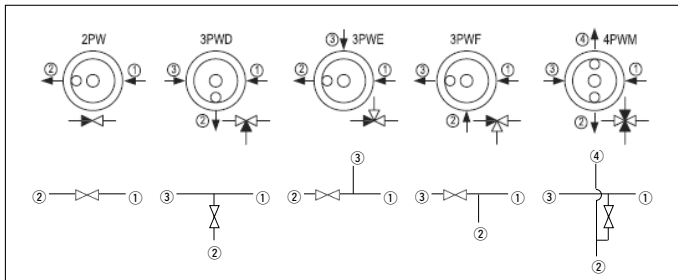
| Ports (Refer to the porting configuration.) |         |
|---------------------------------------------|---------|
| Code                                        | Ports   |
| 2PW                                         | 2 ports |
| 3PWD                                        | 3 ports |
| 3PWE                                        | 3 ports |
| 3PWF                                        | 3 ports |
| 4PWM                                        | 4 ports |

| Connections |                             |
|-------------|-----------------------------|
| Code        | Connections                 |
| No code     | No port                     |
| FV4         | 1/4 inch face seal (Female) |
| MV4         | 1/4 inch face seal (Male)   |
| TW6         | 3/8 inch tube weld          |
| FV8         | 1/2 inch face seal (Female) |
| MV8         | 1/2 inch face seal (Male)   |
| TW8         | 1/2 inch tube weld          |

### Porting Configuration

(The porting configurations viewed from the knob side are shown.)



### Sample Order Number

| Port    | ①    | ②   | ③   | ④   |
|---------|------|-----|-----|-----|
| AP4150S | 2PW  | MV8 | MV8 |     |
|         | 3PWD | MV8 | MV8 | MV8 |

### Specifications

| Operating Parameters              |                  | AP4150                                                                                | AP4157                        |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                               |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                          |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                              |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                         |                               |
| Cv                                |                  | 0.8                                                                                   |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                               |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm) Option: 10 μin. (0.25 μm), 7 μin. (0.18 μm), 5 μin. (0.13 μm) |                               |
| Connections                       |                  | Face seal, Tube weld                                                                  |                               |
| Installation                      |                  | Bottom mount                                                                          |                               |
| Internal volume                   |                  | 0.37 in <sup>3</sup> (6.1 cm <sup>3</sup> )                                           |                               |
| Knob                              |                  | 1/4 turn round knob with open/close indication window                                 | Pull twist knob with LOTO *2) |
| LOTO (Lockout)                    |                  | N/A                                                                                   | Standard                      |

\*1) -10 to 90°C for Polyimide seat.

\*2) Handle must be pulled to turn open from closed.

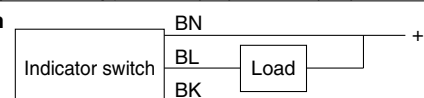
### Wetted Parts Material

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

### Indicator Switch (Option) Specification

| Code                 |                   | ISH                               |
|----------------------|-------------------|-----------------------------------|
| Output type          |                   | NPN                               |
| Power supply voltage |                   | 3.8 to 30 VDC                     |
| Output voltage       |                   | Max. 0.4 VDC                      |
| Supply current       |                   | Max. 11 mA                        |
| Output current       |                   | Max. 20 mA                        |
| Cable                | Lead wire         | AWG 24                            |
|                      | Cable length      | 3 m                               |
|                      | Color (Lead wire) | Blue (BL), Brown (BN), Black (BK) |

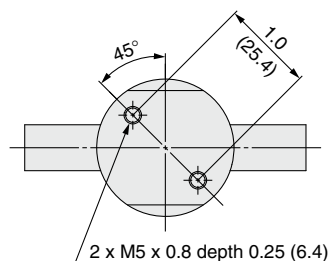
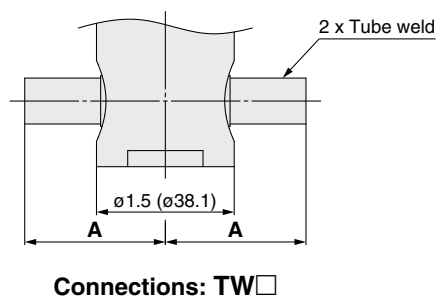
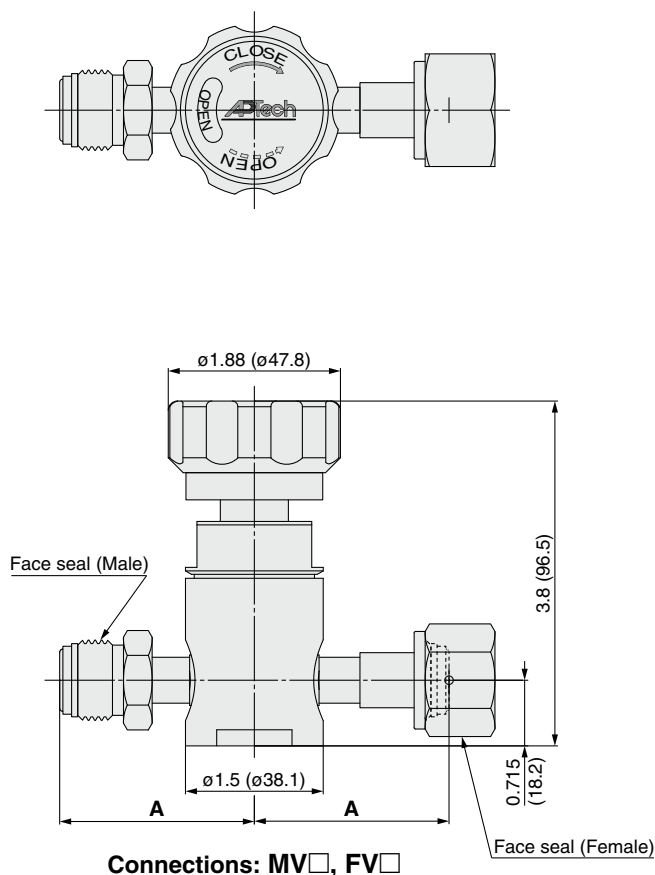
### Wiring Diagram



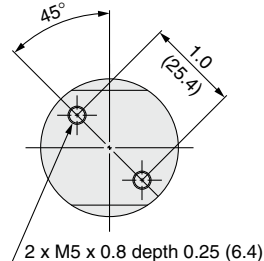
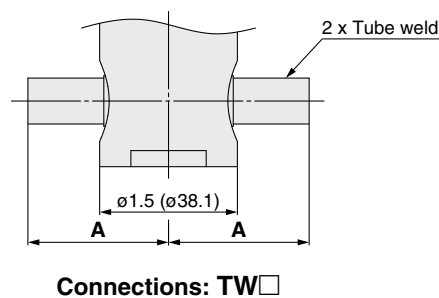
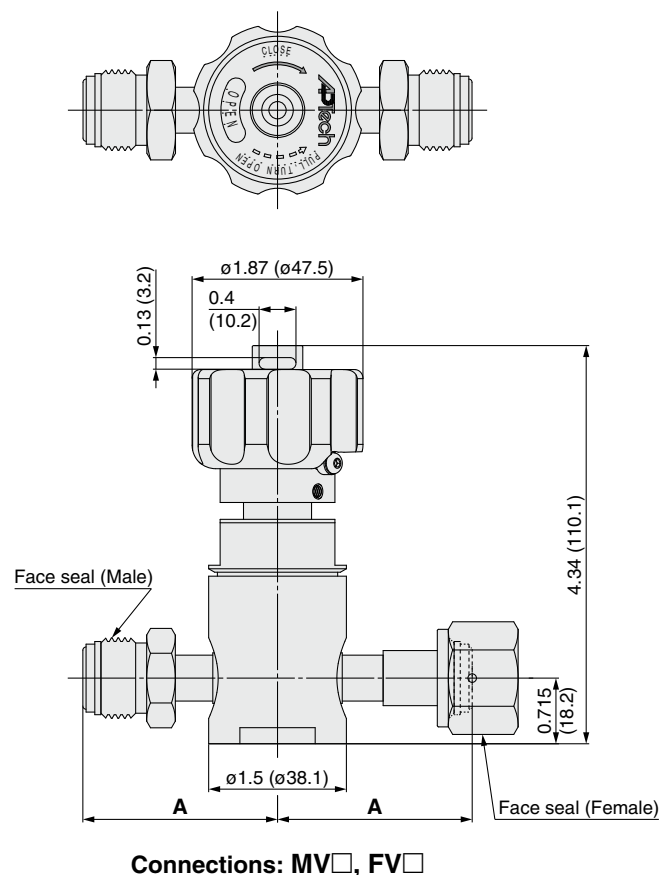
## Dimensions

inch (mm)

### AP4150



### AP4157



| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 1.59 | (40.4) |
| MV4         | 1.59 | (40.4) |
| TW6         | 1.49 | (37.8) |
| FV8         | 2.12 | (53.8) |
| MV8         | 2.12 | (53.8) |
| TW8         | 1.53 | (38.9) |

# Diaphragm Valve for Ultra High Purity

Manually operated type  
(For high pressure and high flow)

## AP3100 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- High pressure type: 20.7 MPa and 9 MPa
- Designed for bulk specialty gas (BSGS) delivery
- LOTO standard with AP3157, optional AP3125



RoHS

How to Order (See p. 250 for ordering syntax)

AP31 00 S 2PW MV8 MV8

| Code | Maximum operating pressure | Cv  | Knob                      |
|------|----------------------------|-----|---------------------------|
| 00   | 3000 psig (20.7 MPa) *1)   | 0.7 | Multi turn round knob     |
| 02   | 1300 psig (9.0 MPa)        | 1.3 |                           |
| 25   | 3000 psig (20.7 MPa) *1)   | 1.0 |                           |
| 50   | 1300 psig (9.0 MPa)        | 1.0 |                           |
| 57   | 1300 psig (9.0 MPa)        | 1.0 | Pull twist knob with LOTO |

\*1) 2400 psig (16.5 MPa) for connection size 3/4 inch.

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |
| H    | Ni-Cr-Mo alloy *2)       |

\*2) Special export controls apply to Ni-Cr-Mo alloy body with 1/2 inch or greater size connection.

| Code    | Surface finish            |
|---------|---------------------------|
| No code | 15 µin. (0.4 µm) Standard |
| M       | 10 µin. (0.25 µm)         |

### Ports

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

### Connections (Inlet, Outlet)

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

\*3) Prepare a suitable mating fitting with a rated pressure.

### Option (AP3150 only)

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| ISH     | Indicator switch |

### Seat material

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

\*4) Not available with H material.

## Specifications

| Operating Parameters              |                  | AP3100                                                  | AP3102                        | AP3125                             | AP3150                                                    | AP3157                        |
|-----------------------------------|------------------|---------------------------------------------------------|-------------------------------|------------------------------------|-----------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                               |                                    |                                                           |                               |
| Operating pressure                |                  | Vacuum to 3000 psig (20.7 MPa)                          | Vacuum to 1300 psig (9.0 MPa) | Vacuum to 3000 psig (20.7 MPa)     | Vacuum to 1300 psig (9.0 MPa)                             |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                               |                                    |                                                           |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                               |                                    |                                                           |                               |
| Ambient and operating temperature |                  | -40 to 65°C (No freezing) *1)                           |                               |                                    |                                                           |                               |
| Cv *2)                            |                  | 0.7                                                     | 1.3                           | 1.0                                |                                                           |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                               |                                    |                                                           |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *3)                       |                               |                                    |                                                           |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                               |                                    |                                                           |                               |
| Surface finish                    |                  | Ra max 15 μin. (0.4 μm)    Option: 10 μin. (0.25 μm)    |                               |                                    |                                                           |                               |
| Connections                       |                  | Face seal , Tube weld                                   |                               |                                    |                                                           |                               |
| Installation                      |                  | Bottom mount                                            |                               |                                    |                                                           |                               |
| Internal volume                   |                  | 0.36 in³ (6.0 cm³)                                      |                               |                                    |                                                           |                               |
| Weight                            |                  | 1.27 kg *4)                                             |                               |                                    |                                                           |                               |
| Knob                              |                  | Multi turn round knob (1 1/2 turn)                      |                               | 1/4 turn lever knob *5)            | 1/4 turn round knob with open/close indication window *6) | Pull twist knob with LOTO *7) |
| Operational Safety Device (OSD)   |                  | N/A                                                     |                               | Option (Part number: AP PL227) *8) | N/A                                                       | Standard                      |
| LOTO (Lockout)                    |                  |                                                         |                               | Option (Part number: AP PL225) *8) |                                                           |                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Figure of 1/2 inch connection.

\*3) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).

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

\*5) Optional lever color available. Please contact SMC.

\*6) Optional indicator switch available. Please contact SMC.

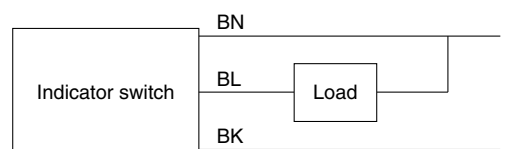
\*7) Knob must be pulled to turn open from closed.

\*8) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                 |                   | ISH                               |
|----------------------|-------------------|-----------------------------------|
| Output type          |                   | NPN                               |
| Power supply voltage |                   | 3.8 to 30 VDC                     |
| Output voltage       |                   | Max. 0.4 VDC                      |
| Supply current       |                   | Max. 11 mA                        |
| Output current       |                   | Max. 20 mA                        |
| Cable                | Lead wire         | AWG 24                            |
|                      | Cable length      | 3 m                               |
|                      | Color (Lead wire) | Blue (BL), Brown (BN), Black (BK) |

### Wiring Diagram



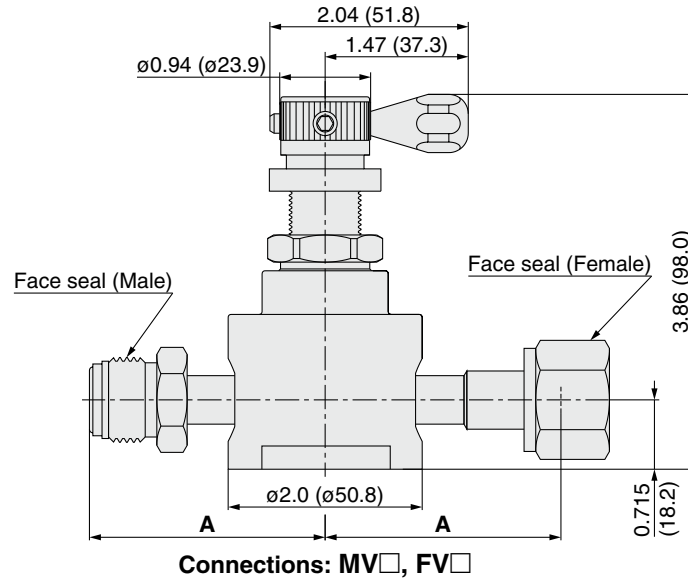
## Wetted Parts Material

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

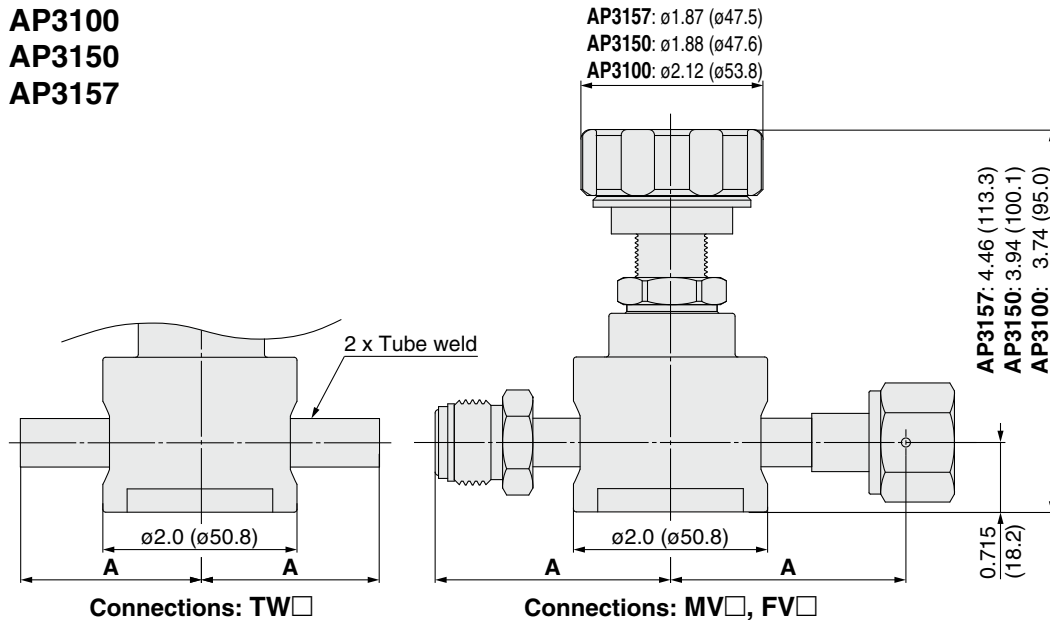
## Dimensions

inch (mm)

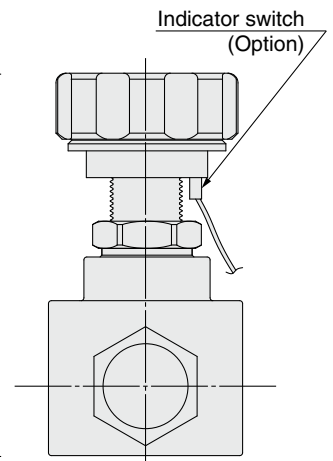
### AP3125



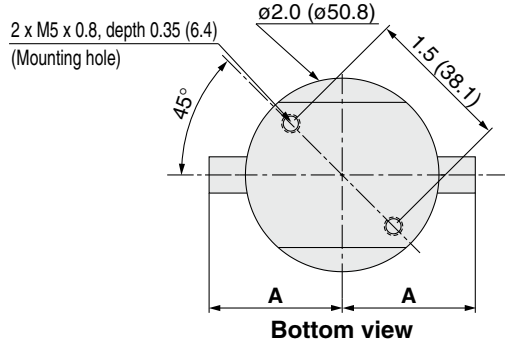
### AP3100 AP3150 AP3157



### AP3150 Indicator switch



| Connections | A     |        |
|-------------|-------|--------|
|             | inch  | (mm)   |
| FV4         | 2.00  | (50.8) |
| MV4         | 2.00  | (50.8) |
| TW6         | 1.375 | (34.9) |
| FV8         | 2.425 | (61.6) |
| MV8         | 2.425 | (61.6) |
| TW8         | 1.79  | (45.4) |
| FV12        | 3.50  | (88.9) |
| MV12        | 3.50  | (88.9) |
| TW12        | 3.25  | (82.6) |



# Diaphragm Valve for Ultra High Purity

Manually operated type  
(For high flow)

## AP3800 & 3900 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Purge ports and monoblock configurations available
- LOTO available (AP3900)



RoHS

How to Order (See p. 250 for ordering syntax)

AP 3800 S M MV8 MV8 00

### Model

| Code | Knob                                         |
|------|----------------------------------------------|
| 3800 | Round knob with open/close indication window |
| 3900 | Pull twist knob with LOTO                    |

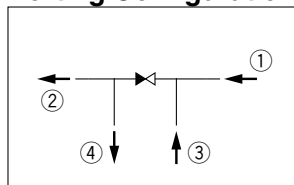
### Material

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

### Surface finish

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

### Porting Configuration



### Connections (Inlet<sup>①</sup>, Outlet<sup>②</sup>)

| Code | Connections                 |
|------|-----------------------------|
| TW6  | 3/8 inch tube weld          |
| FV8  | 1/2 inch face seal (Female) |
| MV8  | 1/2 inch face seal (Male)   |
| TW8  | 1/2 inch tube weld          |
| FV12 | 3/4 inch face seal (Female) |
| MV12 | 3/4 inch face seal (Male)   |
| TW12 | 3/4 inch tube weld          |

### Purge port option

| Code    | Specification     |
|---------|-------------------|
| No code | —                 |
| C       | Capped purge port |

### Diaphragm material

| Code    | Material           |
|---------|--------------------|
| No code | 316L SS (Standard) |
| HD      | Ni-Cr-Mo alloy     |

### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

### Purge port \*1)

| Code | Inlet <sup>③</sup> | Outlet <sup>④</sup> |
|------|--------------------|---------------------|
| 00   | None               | None                |
| M0   | Available          | None                |
| 0B   | None               | Available           |
| MB   | Available          | Available           |

\*1) 1/4 inch face seal (Male) as standard.

## Specifications

| Operating Parameters              |                  | AP3800                                                                                | AP3900              |
|-----------------------------------|------------------|---------------------------------------------------------------------------------------|---------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                               |                     |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                          |                     |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                              |                     |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                |                     |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing)*1)                                                          |                     |
| Cv                                |                  | 2.8                                                                                   |                     |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                            |                     |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)                                        |                     |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                            |                     |
| Surface finish                    |                  | Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |                     |
| Connections                       |                  | Face seal, Tube weld                                                                  |                     |
| Installation                      |                  | Bottom mount                                                                          |                     |
| Internal volume                   |                  | 0.76 in <sup>3</sup> (12.52 cm <sup>3</sup> )                                         |                     |
| Weight                            |                  | 1.36 kg *3)                                                                           | 1.45 kg *3)         |
| Knob                              |                  | Round knob with open/close indication window                                          | Pull twist knob *4) |
| LOTO (Lockout)                    |                  | N/A                                                                                   | Standard            |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).

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

\*4) Knob must be pulled to turn open from closed.

## Wetted Parts Material

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

# Diaphragm Valve for Ultra High Purity

Manually operated type (For high flow)

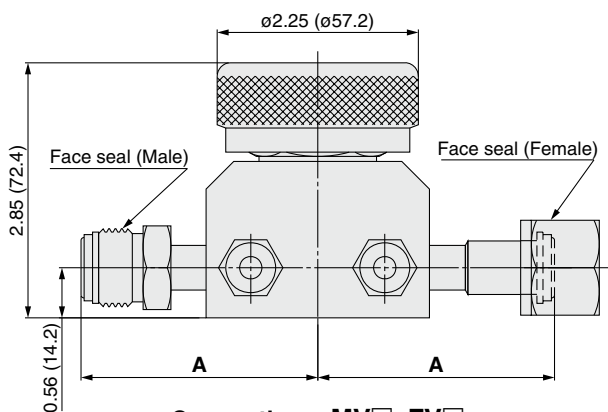
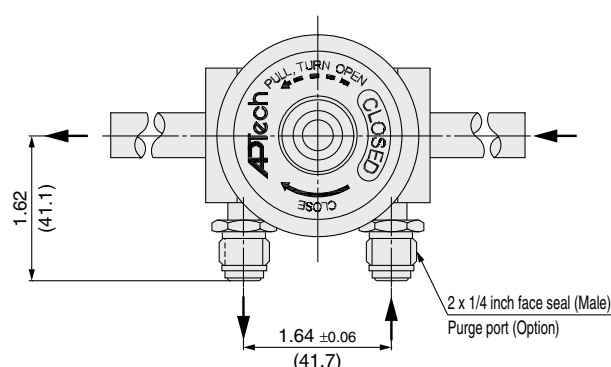
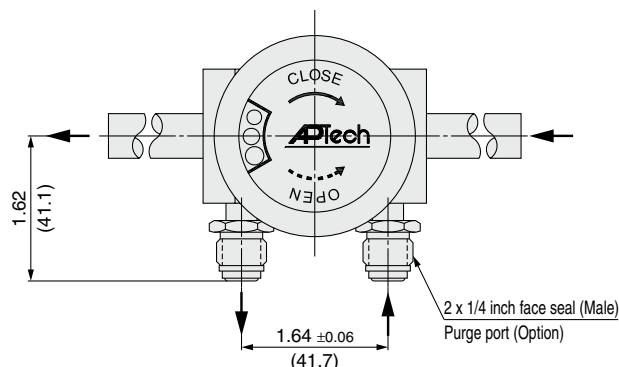
# AP3800 & 3900 Series

## Dimensions

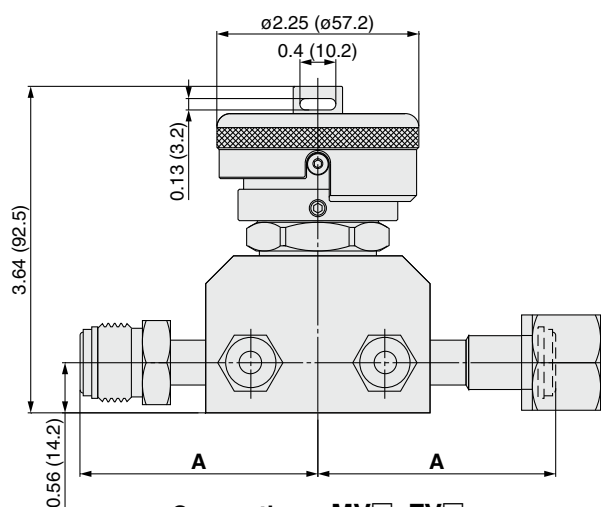
inch (mm)

### AP3800

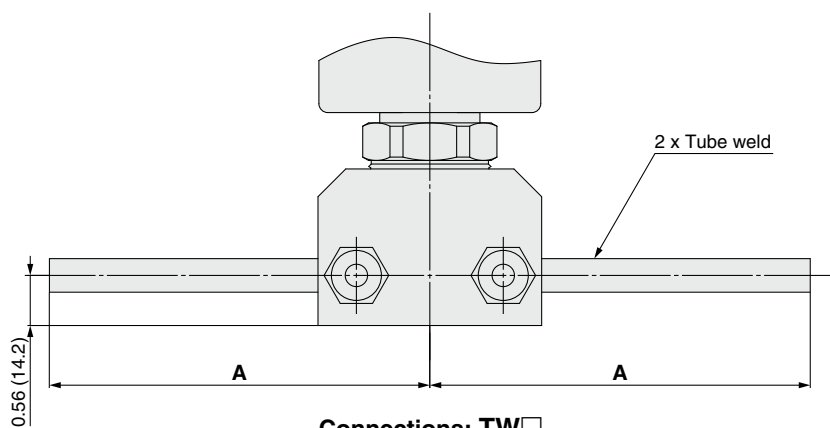
### AP3900



Connections: MV□, FV□

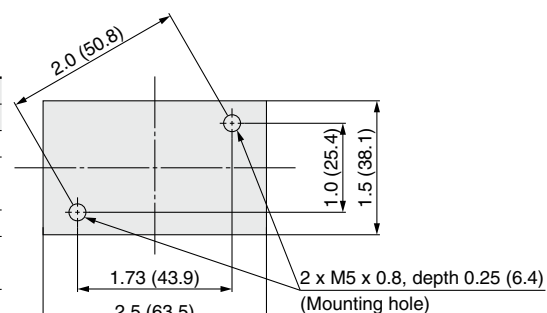


Connections: MV□, FV□



Connections: TW□

| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| TW6         | 4.25 | (108.0) |
| FV8         | 2.65 | (67.3)  |
| MV8         | 2.65 | (67.3)  |
| TW8         | 4.25 | (108.0) |
| FV12        | 3.20 | (81.3)  |
| MV12        | 3.20 | (81.3)  |
| TW12        | 4.25 | (108.0) |



Bottom view



**Made to Order**

Change of porting configuration and products such as three port dual valves can be made. Please contact SMC for details.

# Diaphragm Valve for Ultra High Purity

Manually operated type  
(Metal seated)

## AP3260, 3262 & 3225 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- All metal wetted parts



How to Order (See p. 250 for ordering syntax)

RoHS

AP32 60 S 2PW MV4 MV4

### Model

| Code | Knob                  | Max. operating pressure |
|------|-----------------------|-------------------------|
| 60   | Multi turn round knob | 125 psig (0.9 MPa)      |
| 62   |                       | 508 psig (3.5 MPa)      |
| 25   | 1/4 turn lever knob   | 125 psig (0.9 MPa)      |

### Material

| Code | Body Material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

### Surface finish

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

### Ports

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available.  
Refer to the AP series optional porting configuration on page 179.

### Installation option

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel Installation *)   |

\*) Panel mounting hole:  
dia. 0.78 inch (19.8 mm).

### Face to face dimension \*)

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm)          |

\*) Only applies to TW4 connections.

### Connections (Inlet, Outlet)

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

## Specifications

| Operating Parameters              |                  | AP3260                                                  | AP3262                                                        | AP3225                       |
|-----------------------------------|------------------|---------------------------------------------------------|---------------------------------------------------------------|------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                                                               |                              |
| Operating pressure                |                  | Vacuum to 125 psig (0.9 MPa)                            | Vacuum to 508 psig (3.5 MPa)                                  | Vacuum to 125 psig (0.9 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                                               |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                                               |                              |
| Ambient and operating temperature |                  | -40 to 90°C (No freezing)                               |                                                               |                              |
| Cv                                |                  | 0.27                                                    |                                                               |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                                               |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *1)                       |                                                               |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-7</sup> Pa·m³/s *1)                        |                                                               |                              |
| Surface finish                    |                  | Ra max 15 µin. (0.4 µm)                                 | Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                                               |                              |
| Installation                      |                  | Bottom mount (Option: panel mount)                      |                                                               |                              |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |                                                               |                              |
| Weight                            |                  | 0.45 kg *2)                                             |                                                               |                              |
| Knob                              |                  | Multi turn round knob                                   |                                                               | 1/4 turn lever knob          |

\*) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).

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

## Wetted Parts Material

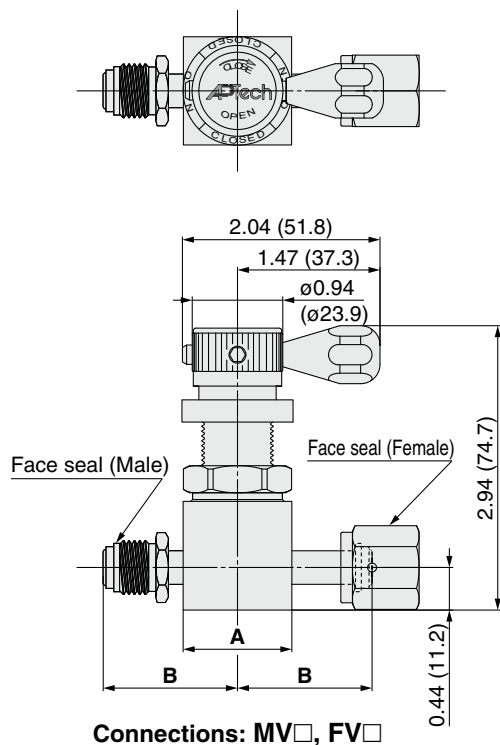
| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS secondary remelt    |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |

## Dimensions

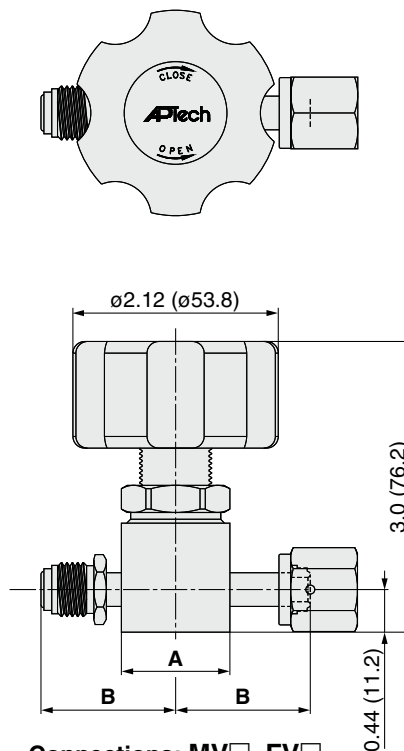
inch (mm)

### AP3225

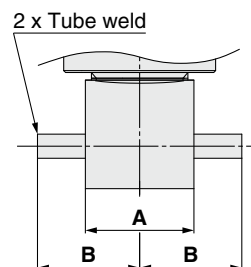
### AP3260, 3262



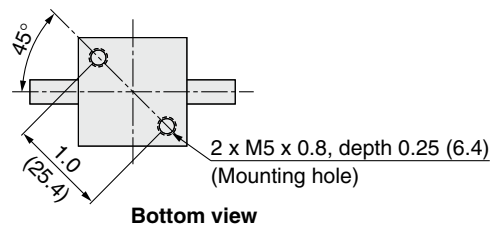
Connections: MV□, FV□



Connections: MV□, FV□



Connections: TW□



Bottom view

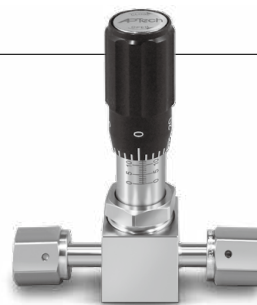
| Material | Connections | A        |         | B     |        |
|----------|-------------|----------|---------|-------|--------|
|          |             | inch     | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq. | (□28.4) | 1.39  | (35.3) |
|          | MV4         |          |         | 1.06  | (26.9) |
|          | TW4         |          |         | 1.93  | (49.0) |
|          | FV6         |          |         | 1.325 | (33.7) |
|          | MV6         |          |         |       |        |

# Metering Valve for Ultra High Purity

## AP3672, 3675 & 4675 Series

- Suitable for UHP gas supply line
- Body material: 316L SS secondary remelt
- Fine adjustment control 12 to 15 turns of the knob to wide open
- One wetted moving part - a diaphragm
- Flow rate AP3672: 10 slpm <sup>\*1)</sup>  
AP3675: 40 slpm <sup>\*1)</sup>  
AP4675: 70 slpm <sup>\*1)</sup>

<sup>\*1)</sup> At 30 psig (0.2 MPa) of N<sub>2</sub>



RoHS

### How to Order (See p. 250 for ordering syntax)

(Inlet) (Outlet)

**AP 3672 S 2PW FV4 FV4**

**Model**

| Code        | Cv        |
|-------------|-----------|
| <b>3672</b> | 0 to 0.02 |
| <b>3675</b> | 0 to 0.08 |
| <b>4675</b> | 0 to 0.15 |

**Material**

| Code     | Body material            |
|----------|--------------------------|
| <b>S</b> | 316L SS secondary remelt |

**Surface finish**

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

**Ports**

| Code       | Ports   |
|------------|---------|
| <b>2PW</b> | 2 ports |

<sup>\*)</sup> Optional porting and porting configurations available. Refer to page 179.

**Face to face dimension**

| Code           | Dimension                          |
|----------------|------------------------------------|
| <b>No code</b> | 2.12 inch (53.8 mm) Standard       |
| <b>1.75</b>    | 1.75 inch (44.5 mm) <sup>*1)</sup> |

<sup>\*1)</sup> Only applies to TW4 or TW6 connections.

**Connections (Inlet, Outlet)**

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

## Specifications

| Operating Parameters                     |                         | AP3672                                                                                | AP3675    | AP4675    |
|------------------------------------------|-------------------------|---------------------------------------------------------------------------------------|-----------|-----------|
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas                               |           |           |
| <b>Operating pressure</b>                |                         | Vacuum to 145 psig (1 MPa)                                                            |           |           |
| <b>Proof pressure</b>                    |                         | 1.5 times the maximum operating pressure                                              |           |           |
| <b>Burst pressure</b>                    |                         | 3 times the maximum operating pressure                                                |           |           |
| <b>Ambient and operating temperature</b> |                         | -40 to 71°C (No freezing)                                                             |           |           |
| <b>Cv</b>                                |                         | 0 to 0.02                                                                             | 0 to 0.08 | 0 to 0.15 |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2×10 <sup>-11</sup> Pa·m <sup>3</sup> /s                                              |           |           |
|                                          | <b>Outboard leakage</b> | 2×10 <sup>-10</sup> Pa·m <sup>3</sup> /s                                              |           |           |
| <b>Surface finish</b>                    |                         | Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm), 7 µin. (0.18 µm), 5 µin. (0.13 µm) |           |           |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                                                  |           |           |
| <b>Installation</b>                      |                         | Bottom mount                                                                          |           |           |
| <b>Internal volume</b>                   |                         | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )                                          |           |           |

## Wetted Parts Material

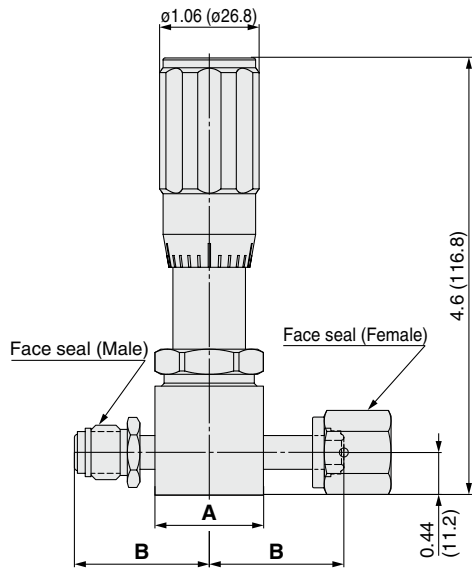
| Series         | AP3672/AP3675               | AP4675  |
|----------------|-----------------------------|---------|
| Body           | 316L SS secondary remelt    |         |
| Surface finish | Electropolish + Passivation |         |
| Diaphragm      | Ni-Co alloy                 |         |
| Seat           | PCTFE                       | 316L SS |

# Metering Valve for Ultra High Purity **AP3672, 3675 & 4675 Series**

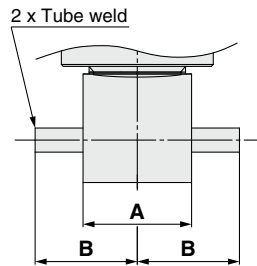
## Dimensions

inch (mm)

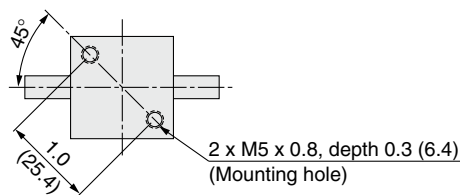
### AP3672/3675/4675



Connections: MV□, FV□



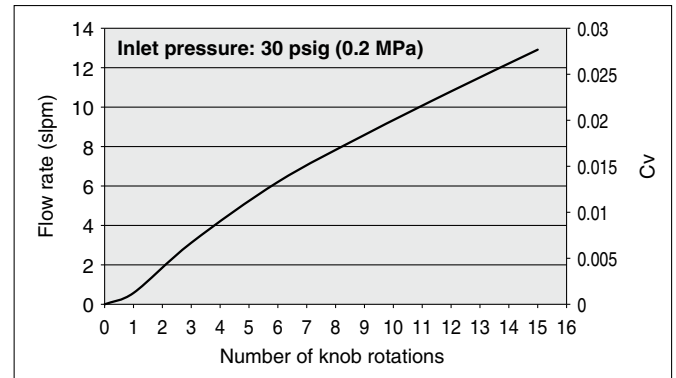
Connections: TW□



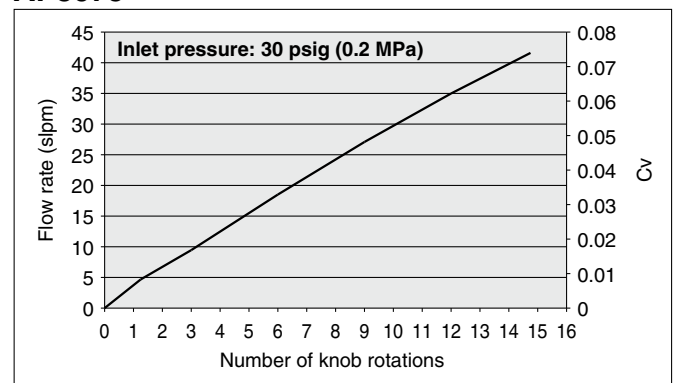
| Material | Connections | A        |         | B     |        |
|----------|-------------|----------|---------|-------|--------|
|          |             | inch     | (mm)    | inch  | (mm)   |
| S        | FV4         | 1.12 sq. | (□28.4) | 1.39  | (35.3) |
|          | MV4         |          |         | 1.06  | (26.9) |
|          | TW4         |          |         | 1.93  | (49.0) |
|          | FV6         |          |         | 1.325 | (33.7) |
|          | MV6         |          |         |       |        |
|          | TW6         |          |         |       |        |

## Flow Rate Characteristics

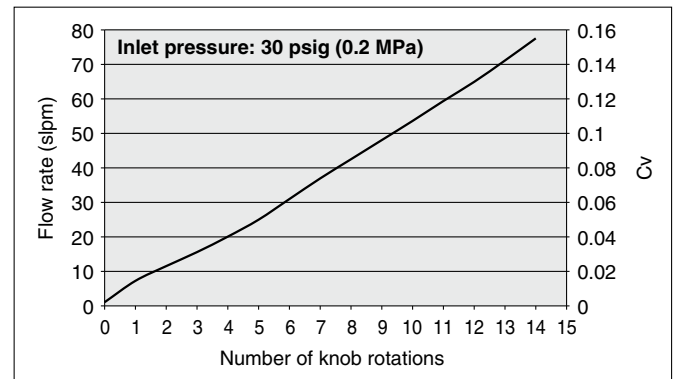
### AP3672



### AP3675



### AP4675



Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

AK

Check Valves

Check Valves

Check Valves

Check Valves

Vacuum

Generators

Flow

Switches

Flow

Switches

Technical Data/

Glossary of Terms

Precautions

Precautions

Precautions

# AP Series / Diaphragm Valve

## Optional Porting Configuration

\* Made to order specifications

How to Order (See p. 250 for ordering syntax)

**AP 3650 S 4PWM MV4 TW4 FV4 FV4**

**Available series**

| Code | Series |
|------|--------|
| 30□□ | AP3000 |
| 32□□ | AP3200 |
| 35□□ | AP3500 |
| 45□□ | AP4500 |
| 36□□ | AP3600 |
| 40□□ | AP4000 |
| 46□□ | AP4600 |

**Materials**  
Stainless steel

**Surface finish**  
Depends on the product series

**Ports**

| Code | Ports   | Configuration                                    |
|------|---------|--------------------------------------------------|
| 2PW  | 2 ports | Refer to the following.<br>(Port specifications) |
| 2PWA |         |                                                  |
| 2PWB |         |                                                  |
| 2PWC | 3 ports |                                                  |
| 3PWD |         |                                                  |
| 3PWE |         |                                                  |
| 3PWF | 3 ports |                                                  |
| 3PWG |         |                                                  |
| 3PWH |         |                                                  |
| 3PWJ | 4 ports |                                                  |
| 4PWK |         |                                                  |
| 4PWL |         |                                                  |
| 4PWM | 4 ports |                                                  |
| 4PWN |         |                                                  |

**Connections**  
(Number indicates the port location)

| Code    | Connections                 |
|---------|-----------------------------|
| No code | No port                     |
| FV4     | 1/4 inch face seal (Female) |
| MV4     | 1/4 inch face seal (Male)   |
| TW4     | 1/4 inch tube weld          |
| FV6     | 3/8 inch face seal (Female) |
| MV6     | 3/8 inch face seal (Male)   |
| TW6     | 3/8 inch tube weld          |

**Option**  
Depends on the product series

**Examples of The Many Available options**

AP3000S  
2PWC FV4 MV4

AP3550S  
2PWB TW4 FV4

AP3625S  
3PWD TW4 MV4 FV4

AP3650S  
4PWM MV4 TW4 FV4 FV4

## Port Specifications

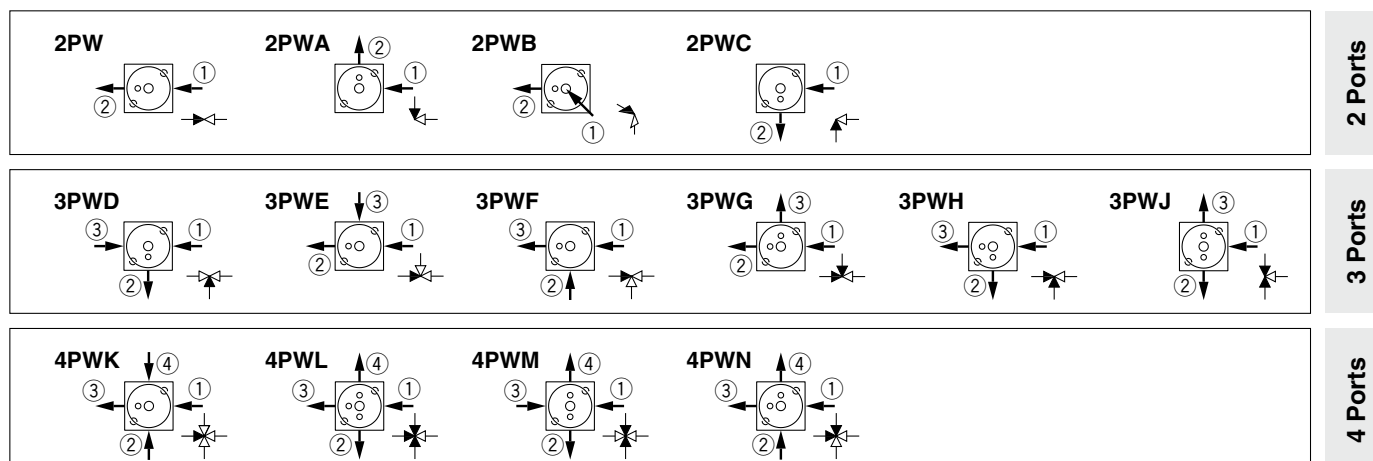
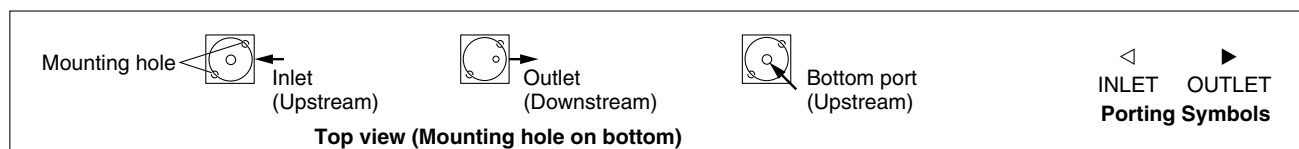
Valves are illustrated top view looking down through the valve.

The traditional flow direction is INLET to OUTLET, but AP Tech valves may be employed in either flow direction.

Port locations are indicated by numbers.

INLET (Upstream) is defined as a port connected to the region below the valve seat. It is illustrated with an arrow pointing towards the valve body or an "empty" triangle on the schematic.

OUTLET (Downstream) is defined as a port connected to the region above the seat and below the diaphragm. It is illustrated with an arrow pointing away from the valve body or a "filled" triangle on the schematic.



|             |                                      |                  |                      |              |                 |    |    |                  |  |  |  |    |    |    |    |    |            |
|-------------|--------------------------------------|------------------|----------------------|--------------|-----------------|----|----|------------------|--|--|--|----|----|----|----|----|------------|
| Precautions | Technical Data/<br>Glossary of Terms | Flow<br>Switches | Vacuum<br>Generators | Check Valves | AK              | AZ | AP | Diaphragm Valves |  |  |  | BP | AK | AZ | SL | AP | Regulators |
|             |                                      |                  |                      |              | Recommendations |    |    |                  |  |  |  |    |    |    |    |    |            |

# Diaphragm Valve for Ultra High Purity

Air operated type

## AZ3500 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- Indicator switch available as an option (AZ3550/3580)



RoHS

How to Order (See p. 250 for ordering syntax)

**Ordering Syntax:** AZ 3 542 S 2P MV4 MV4 [ ] [ ] [ ]

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |

**Model**

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)      |
| 540  |                        | 145 psig (1.0 MPa)      |
| 550  |                        | 300 psig (2.1 MPa)      |
| 580  | Normally open (N.O.)   | 250 psig (1.7 MPa)      |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   | Connection |
|------|---------|------------|
| 2P   | 2 ports | Machined   |
| 2PW  |         | Welded     |

**Connections**

| Code | Connections                   | Port |     |
|------|-------------------------------|------|-----|
|      |                               | 2P   | 2PW |
| MV4  | 1/4 inch face seal (Male) *1) | ●    | ○   |
| 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            | —    | ○   |

●: Only available with the same type fittings inlet and outlet.  
○: Male and female threads of the same size can be used in combination.  
—: Not available  
\*1) Fixed fitting (no rotating nut)

**Option (AZ3550 and AZ3580 only)**

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *2)      |

\*2) Can only be used when port code "2PW" and connection "TW4" are selected

## Specifications

| Operating Parameters              |                  | AZ3542                                                  | AZ3540                                 | AZ3550                       | AZ3580                       |
|-----------------------------------|------------------|---------------------------------------------------------|----------------------------------------|------------------------------|------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |                                        |                              | Normally open (N.O.)         |
| Gas                               |                  | Select compatible materials of construction for the gas |                                        |                              |                              |
| Operating pressure                |                  | Vacuum to 125 psig (0.9 MPa)                            | Vacuum to 145 psig (1.0 MPa) *1)       | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                        |                              |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                        |                              |                              |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *2)                           |                                        |                              |                              |
| Cv                                |                  | 0.29                                                    |                                        |                              |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                        |                              |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *3)                       |                                        |                              |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                        |                              |                              |
| Surface finish                    |                  | Ra10 μin. (0.25 μm)                                     |                                        |                              |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                        |                              |                              |
| Actuation pressure                |                  | 60 to 110 psig (0.4 to 0.76 MPa)                        | 70 to 110 psig (0.48 to 0.76 MPa)      |                              |                              |
| Actuation port connection         |                  | M5 x 0.8                                                | NPT 1/8 inch                           | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           |                  | Top                                                     |                                        | Side (360° rotatable)        | Top                          |
| Installation                      |                  | Bottom mount                                            |                                        |                              |                              |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |                                        |                              |                              |
| Weight                            |                  | 0.28 kg *4)                                             | 0.68 kg *4)                            | 0.82 kg *4)                  | 0.68 kg *4)                  |
| LOTO (Lockout)                    |                  | N/A                                                     | Option<br>(Part number: AP PL 210) *5) | N/A                          |                              |

- \*1) Vacuum to 125 psig (0.9 MPa) for Polyimide seat.  
\*2) Max. 90°C for Polyimide seat.  
\*3) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).  
\*4) Weight, including individual boxed weight, may vary depending on connections or options.  
\*5) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

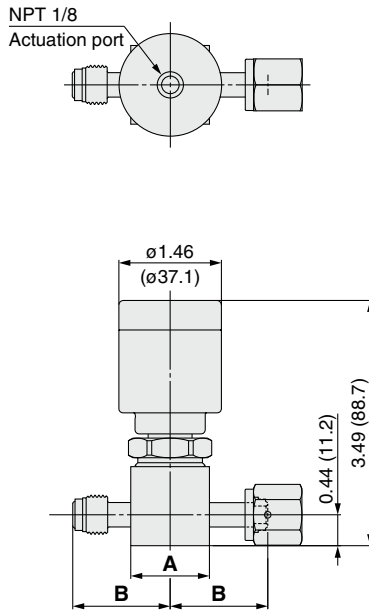
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

## Dimensions

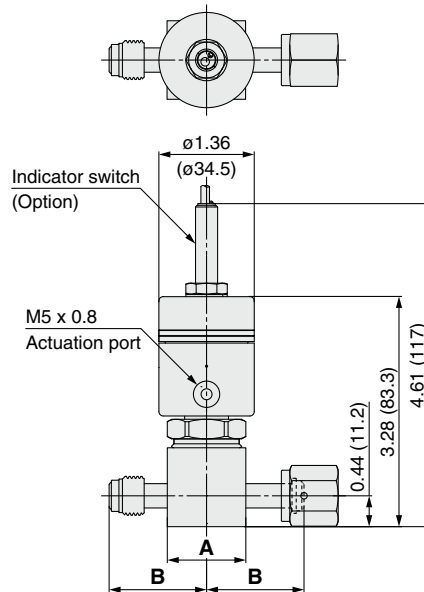
inch (mm)

### AZ3540



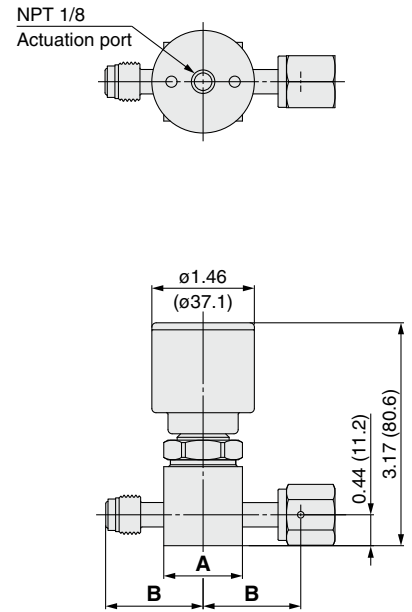
2PW (Connections: MV□, FV□)

### AZ3550



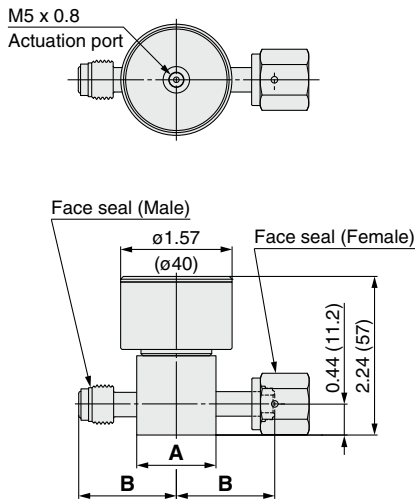
2PW (Connections: MV□, FV□)

### AZ3580

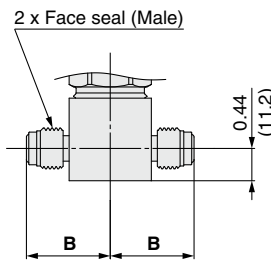


2PW (Connections: MV□, FV□)

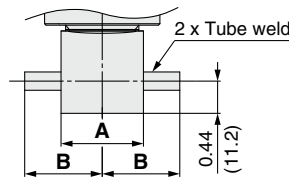
### AZ3542



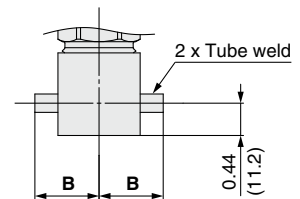
2PW (Connections: MV□, FV□)



2P (Connections: MV□)

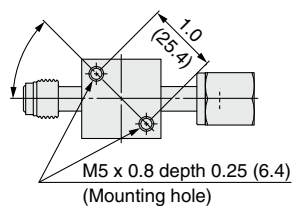


2PW (Connections: TW□)

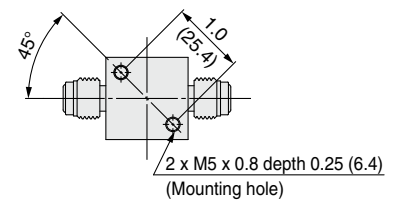


2P (Connections: TW□)

| Connections | Port code |        |                 |   |       |        |
|-------------|-----------|--------|-----------------|---|-------|--------|
|             | 2P        |        | 2PW             |   |       |        |
|             | B         |        | A               | B |       |        |
| MV4         | 1.14      | (29.0) | 1.12 sq. (28.4) |   | 1.39  | (35.3) |
| FV4         | —         | —      |                 |   |       |        |
| TW4         | 0.875     | (22.2) |                 |   | 1.06  | (26.9) |
| MV6         | —         | —      |                 |   | 1.93  | (49.0) |
| FV6         | —         | —      |                 |   |       |        |
| TW6         | —         | —      |                 |   | 1.325 | (33.7) |



2PW (Bottom view)



2P (Bottom view)

# Diaphragm Valve for Ultra High Purity

Air operated type

## AZ4500 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- Indicator switch available as an option (AZ4550/4580)



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ 4 542 S 2P MV4 MV4** (Inlet) (Outlet)

**Size**

| Code | Cv  |
|------|-----|
| 4    | 0.5 |

**Model**

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)      |
| 540  | Normally closed (N.C.) | 300 psig (2.1 MPa)      |
| 550  | Normally open (N.O.)   | 250 psig (1.7 MPa)      |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   | Connection |
|------|---------|------------|
| 2P   | 2 ports | Machined   |
| 2PW  | 2 ports | Welded     |

**Connections**

| Code | Connections                   | Port |     |
|------|-------------------------------|------|-----|
|      |                               | 2P   | 2PW |
| MV4  | 1/4 inch face seal (Male) *1) | ●    | ○   |
| FV4  | 1/4 inch face seal (Female)   | —    | ○   |
| MV6  | 3/8 inch face seal (Male) *1) | ●    | ○   |
| FV6  | 3/8 inch face seal (Female)   | —    | ○   |
| TW6  | 3/8 inch tube weld            | ●    | ○   |
| TW8  | 1/2 inch tube weld            | ●    | —   |

●: Only available with the same type fittings inlet and outlet.  
○: Male and female threads of the same size can be used in combination.  
—: Not available

**Option (AZ4550 and AZ4580 only)**

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

\*) Optional porting and porting configurations available.  
Refer to the AZ series optional porting configuration on page 207.  
The optional porting configuration can be selected when the welded type (PW) is selected.

\*) Fixed fitting (no rotating nut)  
When port code "2PW" and connection "MV6" are selected, it will be a rotating nut.

## Specifications

| Operating Parameters              |                  | AZ4542                                                  | AZ4540                                 | AZ4550                       | AZ4580                       |
|-----------------------------------|------------------|---------------------------------------------------------|----------------------------------------|------------------------------|------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |                                        |                              | Normally open (N.O.)         |
| Gas                               |                  | Select compatible materials of construction for the gas |                                        |                              |                              |
| Operating pressure                |                  | Vacuum to 125 psig (0.9 MPa)                            |                                        | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                        |                              |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                        |                              |                              |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |                                        |                              |                              |
| Cv                                |                  | 0.5                                                     |                                        |                              |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                        |                              |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                       |                                        |                              |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                        |                              |                              |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                    |                                        |                              |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                        |                              |                              |
| Actuation pressure                |                  | 60 to 110 psig (0.4 to 0.76 MPa)                        | 70 to 110 psig (0.48 to 0.76 MPa)      |                              |                              |
| Actuation port connection         |                  | M5 x 0.8                                                | NPT 1/8 inch                           | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           |                  | Top                                                     |                                        | Side (360° rotatable)        | Top                          |
| Installation                      |                  | Bottom mount                                            |                                        |                              |                              |
| Internal volume                   |                  | 0.12 in³ (2.14 cm³)                                     |                                        |                              |                              |
| Weight                            |                  | 0.28 kg *3)                                             | 0.68 kg *3)                            | 0.82 kg *3)                  | 0.68 kg *3)                  |
| LOTO (Lockout)                    |                  | N/A                                                     | Option<br>(Part number: AP PL 210) *4) | N/A                          |                              |

- \*1) Max. 90°C for Polyimide seat.  
\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa).  
\*3) Weight, including individual boxed weight, may vary depending on connections or options.  
\*4) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

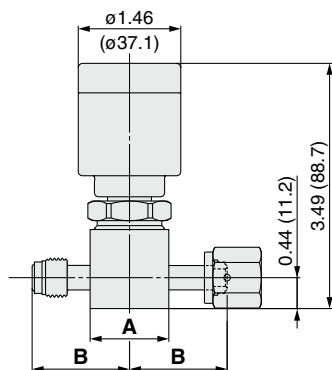
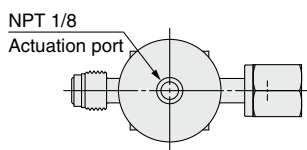
# Diaphragm Valve for Ultra High Purity

Air operated type **AZ4500 Series**

## Dimensions

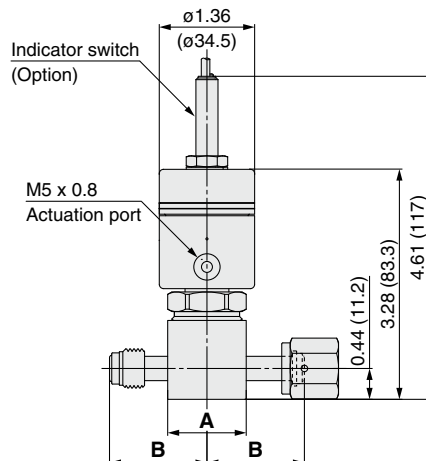
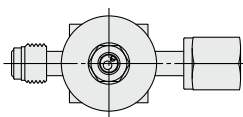
inch (mm)

### AZ4540



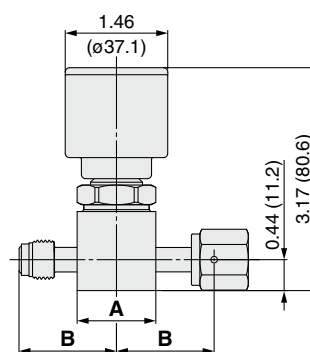
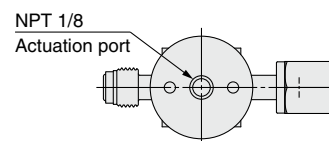
2PW (Connections: MV□, FV□)

### AZ4550



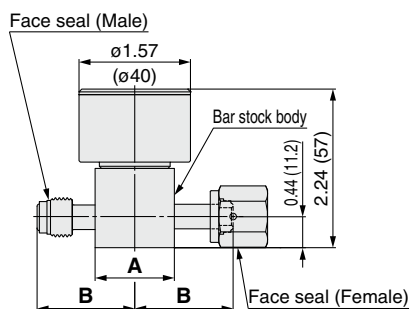
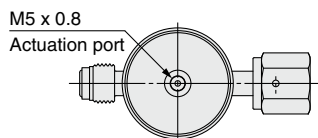
2PW (Connections: MV□, FV□)

### AZ4580

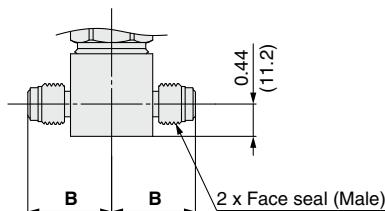


2PW (Connections: MV□, FV□)

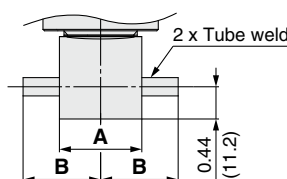
### AZ4542



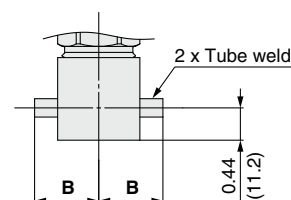
2PW (Connections: MV□, FV□)



2P (Connections: MV□)

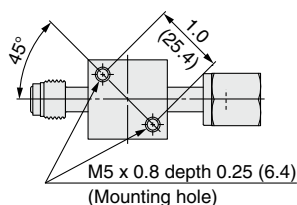


2PW (Connections: TW□)

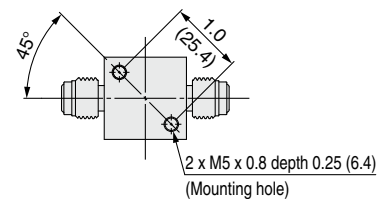


2P (Connections: TW□)

| Connections | Port code |        |                 |             |       |        |
|-------------|-----------|--------|-----------------|-------------|-------|--------|
|             | 2P        |        | 2PW             |             |       |        |
|             | B         |        | A               |             | B     |        |
|             | inch      | (mm)   | inch            | (mm)        | inch  | (mm)   |
| MV4         | 1.14      | (29.0) | 1.12 sq. (28.4) | 1.39 (35.3) | 1.39  | (35.3) |
| FV4         | —         | —      |                 |             | —     | —      |
| MV6         | 1.50      | (38.1) |                 |             | 1.93  | (49.0) |
| FV6         | —         | —      |                 |             | —     | —      |
| TW6         | 0.875     | (22.2) |                 |             | 1.325 | (33.7) |
| TW8         | 1.125     | (28.6) |                 |             | —     | —      |



2PW (Bottom view)



2P (Bottom view)

# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high pressure)

## AZ3000 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- High pressure type: Max. 4500 psig (31 MPa)
- Indicator switch available as an option

How to Order (See p. 250 for ordering syntax)



RoHS

**Model** ●

**AZ 30 00 S 2PW FV4 FV4**

**Code** **Status** **Max. operating pressure** **Cv**

|    |                        |                      |      |
|----|------------------------|----------------------|------|
| 00 | Normally closed (N.C.) | 3000 psig (20.7 MPa) | 0.23 |
| 02 |                        | 3700 psig (25.5 MPa) | 0.28 |
| 04 |                        | 4500 psig (31.0 MPa) | 0.23 |
| 07 |                        |                      |      |
| 80 | Normally open (N.O.)   | 3000 psig (20.7 MPa) |      |

**Material** ●

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports** ●

| Code | Ports   | Connection   |
|------|---------|--------------|
| 2P   | 2 ports | Machined *1) |
| 2PW  |         | Welded *2)   |

**Connections** ●

| Code | Connections                     | Port |     |
|------|---------------------------------|------|-----|
|      |                                 | 2P   | 2PW |
| MV4  | 1/4 inch face seal (Male) *3)   | ●    | ○   |
| FV4  | 1/4 inch face seal (Female)     | —    | ○   |
| TW4  | 1/4 inch tube weld              | ●    | ○   |
| MV6  | 3/8 inch face seal (Male) *4)   | —    | ○   |
| FV6  | 3/8 inch face seal (Female) *4) | —    | ○   |
| TW6  | 3/8 inch tube weld *4)          | —    | ○   |

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Seat material**

| Code    | Material         | Model |      |      |      |      |
|---------|------------------|-------|------|------|------|------|
|         |                  | 3000  | 3002 | 3004 | 3007 | 3080 |
| No code | PCTFE (Standard) | ●     | ●    | ●    | —    | ●    |
| VS      | Polyimide        | ●     | ●    | ●    | ●    | ●    |
| PK      | PEEK             | —     | —    | ●    | ●    | —    |

●: Available  
—: Not available

**Face to face dimension**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *5)      |

\*1) Not available with AZ3004 and AZ3007.  
\*2) Optional porting and porting configurations available. Refer to the AZ series optional porting configuration on page 207. The optional porting configuration can be selected when the welded type (PW) is selected.  
\*3) Fixed fitting (no rotating nut)  
\*4) Size 3/8 cannot be selected for AZ3004 and AZ3007.  
\*5) Only applies to port code 2PW with TW4 connections.

## Specifications

| Operating Parameters              |                  | AZ3000                                                  | AZ3002 | AZ3004                         | AZ3007                       | AZ3080                         |
|-----------------------------------|------------------|---------------------------------------------------------|--------|--------------------------------|------------------------------|--------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |        |                                |                              | Normally open (N.O.)           |
| Gas                               |                  | Select compatible materials of construction for the gas |        |                                |                              |                                |
| Operating pressure                |                  | Vacuum to 3000 psig (20.7 MPa)                          |        | Vacuum to 3700 psig (25.5 MPa) | Vacuum to 4500 psig (31 MPa) | Vacuum to 3000 psig (20.7 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |        |                                |                              |                                |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |        |                                |                              |                                |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |        | -10 to 49°C (No freezing)      | -10 to 60°C (No freezing)    | -10 to 71°C (No freezing) *1)  |
| Cv                                |                  | 0.23                                                    | 0.28   |                                | 0.23                         |                                |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |        |                                |                              |                                |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)          |        |                                |                              |                                |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |        |                                |                              |                                |
| Surface finish                    |                  | Ra 10 μm. (0.25 μm)                                     |        |                                |                              |                                |
| Connections                       |                  | Face seal, Tube weld                                    |        |                                |                              |                                |
| Actuation pressure                |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |        |                                |                              |                                |
| Actuation port connection         |                  | NPT 1/8 inch                                            |        |                                |                              |                                |
| Actuation port location           |                  | Top                                                     |        |                                |                              |                                |
| Installation                      |                  | Bottom mount                                            |        |                                |                              |                                |
| Internal volume                   |                  | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            |        |                                |                              |                                |
| Weight                            |                  | 1.27 kg *3)                                             |        |                                |                              |                                |
| LOTO (Lockout)                    |                  | Option (Part number: AP PL 210) *4)                     |        |                                |                              | N/A                            |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1000 psig (6.9 MPa).

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

\*4) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code              | IS                                                           |
|-------------------|--------------------------------------------------------------|
| Switch type       | SPDT                                                         |
| Rated voltage     | Max. 30 VDC                                                  |
| Contact capacity  | Max. 3 VA                                                    |
| Switching current | Max. 0.2 A                                                   |
| Carrying current  | Max. 0.5 A                                                   |
| Cable             | Lead wire                                                    |
|                   | AWG 24                                                       |
|                   | Cable length                                                 |
|                   | 3 m                                                          |
|                   | Color (Lead wire)                                            |
|                   | Blue: Common line                                            |
|                   | Brown: NC (When the valve is closed, the circuit is closed.) |
|                   | Black: NO (When the valve is open, the circuit is closed.)   |

## Wetted Parts Material

| Wetted Parts   | S                               |
|----------------|---------------------------------|
| Body           | 316L SS                         |
| Surface finish | Electropolish + Passivation     |
| Diaphragm      | Ni-Co alloy                     |
| Seat           | AZ3000, AZ3002,                 |
|                | AZ3080                          |
|                | PCTFE (Option: Polyimide)       |
|                | AZ3004                          |
|                | PCTFE (Option: Polyimide, PEEK) |
|                | AZ3007                          |
|                | Polyimide or PEEK               |

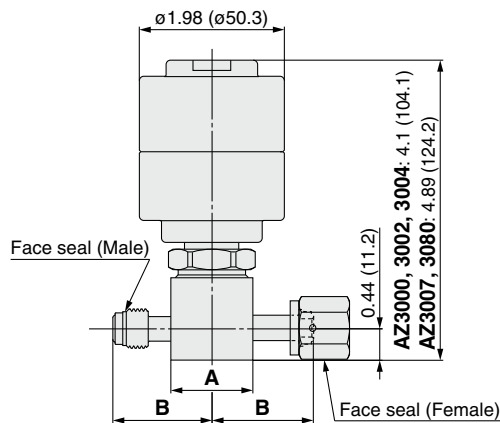
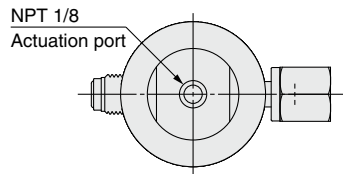
# Diaphragm Valve for Ultra High Purity **AZ3000 Series**

Air operated type (For high pressure)

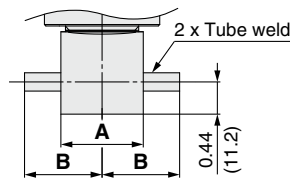
## Dimensions

inch (mm)

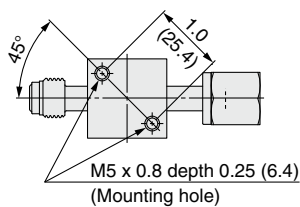
**AZ3000**  
**AZ3002**  
**AZ3004**  
**AZ3007**  
**AZ3080**



**2PW (Connections: MV□, FV□)**



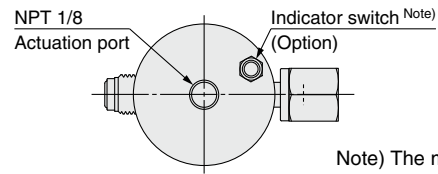
**2PW (Connections: TW□)**



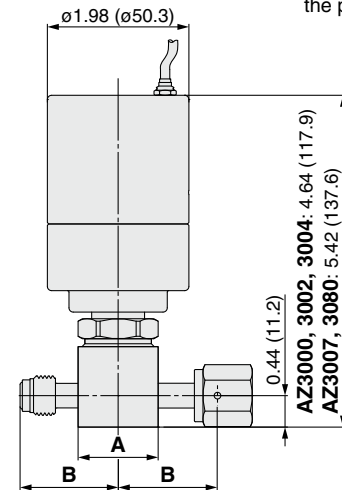
**2PW (Bottom view)**

| Connections | Port code |        |                  |      |       |        |
|-------------|-----------|--------|------------------|------|-------|--------|
|             | 2P        |        | 2PW              |      |       |        |
|             | B         |        | A                |      | B     |        |
|             | inch      | (mm)   | inch             | (mm) | inch  | (mm)   |
| <b>MV4</b>  | 1.14      | (29.0) | 1.12 sq. (□28.4) |      | 1.39  | (35.3) |
| <b>FV4</b>  | —         | —      |                  |      | 1.06  | (26.9) |
| <b>TW4</b>  | 0.875     | (22.2) |                  |      | 1.93  | (49.0) |
| <b>MV6</b>  | —         | —      |                  |      | 1.325 | (33.7) |
| <b>FV6</b>  | —         | —      |                  |      |       |        |
| <b>TW6</b>  | —         | —      |                  |      |       |        |

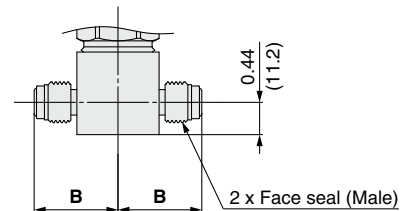
## Indicator switch



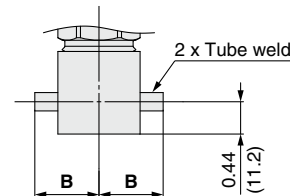
Note) The mounting position varies depending on the product.



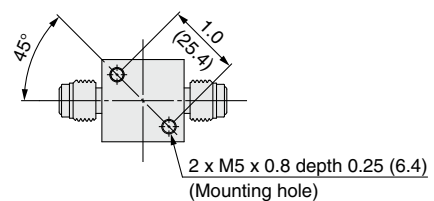
**2PW (Connections: MV□, FV□)**



**2P (Connections: MV4)**



**2P (Connections: TW4)**



**2P (Bottom view)**

# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high pressure)

## AZ4000 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed
- High pressure type: Max. 3000 psig (20.7 MPa)
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

**Model**

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 00   | Normally closed (N.C.) | 3000 psig (20.7 MPa)    |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   | Connection |
|------|---------|------------|
| 2P   | 2 ports | Machined   |
| 2PW  | 2 ports | Welded     |

**Connections**

| Code | Connections                  | Port |     |
|------|------------------------------|------|-----|
|      |                              | 2P   | 2PW |
| MV4  | 1/4 inch face seal (Male) *1 | ●    | ○   |
| FV4  | 1/4 inch face seal (Female)  | —    | ○   |
| MV6  | 3/8 inch face seal (Male) *1 | ●    | ○   |
| FV6  | 3/8 inch face seal (Female)  | —    | ○   |
| TW6  | 3/8 inch tube weld           | ●    | ○   |
| TW8  | 1/2 inch tube weld           | ●    | —   |

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

●: Only available with the same type fittings inlet and outlet.  
○: Male and female threads of the same size can be used in combination.  
—: Not available  
\*1) Fixed fitting (no rotating nut)  
When port code "2PW" and connection "MV6" are selected, it will be a rotating nut.

## Specifications

| Operating Parameters              |                  | AZ4000                                                  |
|-----------------------------------|------------------|---------------------------------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |
| Gas                               |                  | Select compatible materials of construction for the gas |
| Operating pressure                |                  | Vacuum to 3000 psig (20.7 MPa)                          |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |
| Cv                                |                  | 0.35                                                    |
| Leak rate                         | Inboard leakage  | $2 \times 10^{-11}$ Pa·m <sup>3</sup> /s                |
|                                   | Outboard leakage | $2 \times 10^{-10}$ Pa·m <sup>3</sup> /s *2)            |
| Across the seat leak              |                  | $1 \times 10^{-10}$ Pa·m <sup>3</sup> /s                |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                    |
| Connections                       |                  | Face seal, Tube weld                                    |
| Actuation pressure                |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |
| Actuation port connection         |                  | NPT 1/8 inch                                            |
| Actuation port location           |                  | Top                                                     |
| Installation                      |                  | Bottom mount                                            |
| Internal volume                   |                  | 0.12 in <sup>3</sup> (2.14 cm <sup>3</sup> )            |
| Weight                            |                  | 1.27 kg *3)                                             |

\*1) Max. 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 1000 psig (6.9 MPa).

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

## Indicator Switch (Option) Specification

| Code              | IS                                                           |
|-------------------|--------------------------------------------------------------|
| Switch type       | SPDT                                                         |
| Rated voltage     | Max. 30 VDC                                                  |
| Contact capacity  | Max. 3 VA                                                    |
| Switching current | Max. 0.2 A                                                   |
| Carrying current  | Max. 0.5 A                                                   |
| Cable             | Lead wire                                                    |
|                   | AWG 24                                                       |
|                   | Cable length                                                 |
| Color (Lead wire) | 3 m                                                          |
|                   | Blue: Common line                                            |
|                   | Brown: NC (When the valve is closed, the circuit is closed.) |
|                   | Black: NO (When the valve is open, the circuit is closed.)   |

## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

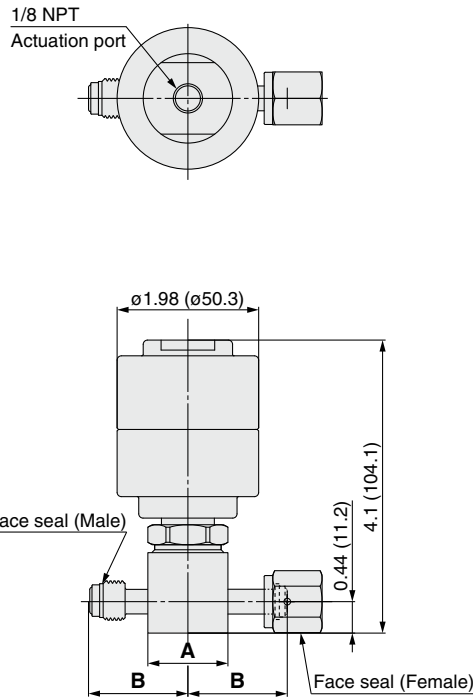
# Diaphragm Valve for Ultra High Purity **AZ4000 Series**

Air operated type (For high pressure)

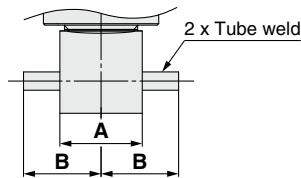
## Dimensions

inch (mm)

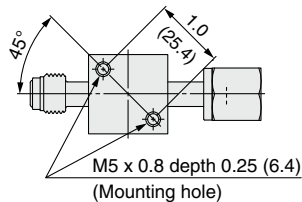
### AZ4000



**2PW (Connections: MV□, FV□)**

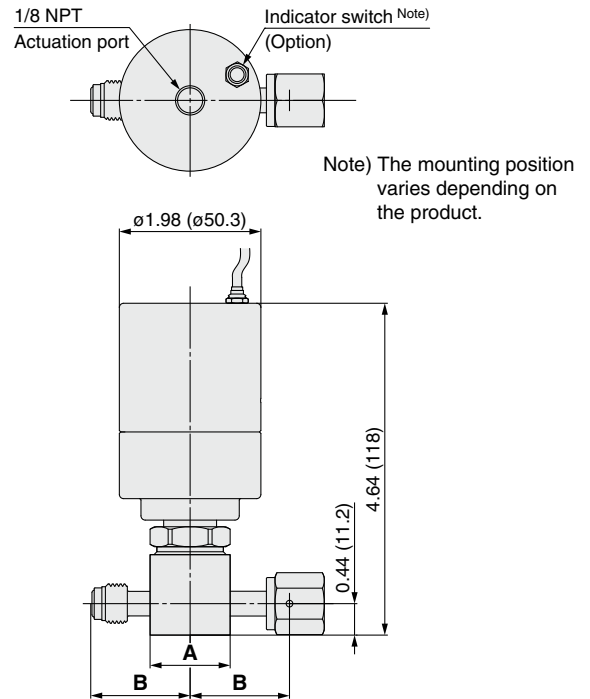


**2PW (Connections: TW□)**

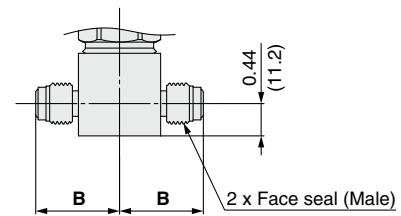


**2PW (Bottom view)**

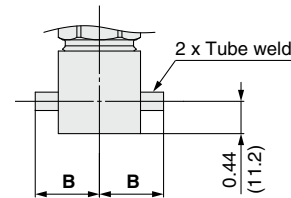
### Indicator switch



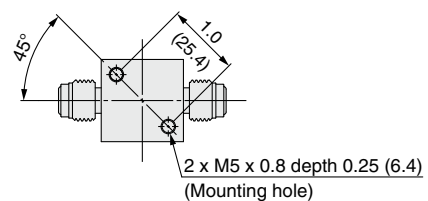
**2PW (Connections: MV□, FV□)**



**2P (Connections: MV□)**



**2P (Connections: TW□)**



**2P (Bottom view)**

| Connections | Port code |        |                 |      |       |        |
|-------------|-----------|--------|-----------------|------|-------|--------|
|             | 2P        |        | 2PW             |      |       |        |
|             | B         |        | A               |      | B     |        |
|             | inch      | (mm)   | inch            | (mm) | inch  | (mm)   |
| <b>MV4</b>  | 1.14      | (29.0) | 1.12 sq. (28.4) |      | 1.39  | (35.3) |
| <b>FV4</b>  | —         | —      |                 |      |       |        |
| <b>MV6</b>  | 1.50      | (38.1) |                 |      | 1.93  | (49.0) |
| <b>FV6</b>  | —         | —      |                 |      |       |        |
| <b>TW6</b>  | 0.875     | (22.2) |                 |      | 1.325 | (33.7) |
| <b>TW8</b>  | 1.125     | (28.6) |                 |      | —     | —      |

### AZ4141 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed



RoHS

How to Order (See p. 250 for ordering syntax)

**Port Number**

**AZ41 41 S 2PW MV8 MV8**

**Model**

| Code | Max. operating pressure | Cv  |
|------|-------------------------|-----|
| 41   | 250 psig (1.7 MPa)      | 0.8 |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports (Refer to the porting configuration.)**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |
| 3PWD | 3 ports |
| 3PWE | 3 ports |
| 3PWF | 3 ports |
| 4PWM | 4 ports |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Connections (Refer to the porting configuration.)**

| Code    | Connections                 |
|---------|-----------------------------|
| No code | No port                     |
| FV4     | 1/4 inch face seal (Female) |
| MV4     | 1/4 inch face seal (Male)   |
| TW6     | 3/8 inch tube weld          |
| FV8     | 1/2 inch face seal (Female) |
| MV8     | 1/2 inch face seal (Male)   |
| TW8     | 1/2 inch tube weld          |

**Porting Configuration**  
(The porting configurations viewed from the actuator side are shown.)

**Sample Order Number**

| Port    | ①    | ②   | ③   | ④   |
|---------|------|-----|-----|-----|
| AZ4141S | 2PW  | MV8 | MV8 |     |
|         | 3PWD | MV8 | MV8 | MV8 |

### Specifications

| Operating Parameters              |                  | AZ4141                                                  |
|-----------------------------------|------------------|---------------------------------------------------------|
| Status                            |                  | Normally closed (N.C.)                                  |
| Gas                               |                  | Select compatible materials of construction for the gas |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                            |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |
| Cv                                |                  | 0.8                                                     |
| Leak rate                         | Inboard leakage  | $2 \times 10^{-11}$ Pa·m <sup>3</sup> /s                |
|                                   | Outboard leakage | $2 \times 10^{-10}$ Pa·m <sup>3</sup> /s                |
| Across the seat leak              |                  | $1 \times 10^{-10}$ Pa·m <sup>3</sup> /s                |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                    |
| Connections                       |                  | Face seal, Tube weld                                    |
| Actuation pressure                |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |
| Actuation port connection         |                  | M5 x 0.8                                                |
| Actuation port location           |                  | Side                                                    |
| Installation                      |                  | Bottom mount                                            |
| Internal volume                   |                  | 0.37 in <sup>3</sup> (6.1 cm <sup>3</sup> )             |

\*1) Max. 90°C for Polyimide seat.

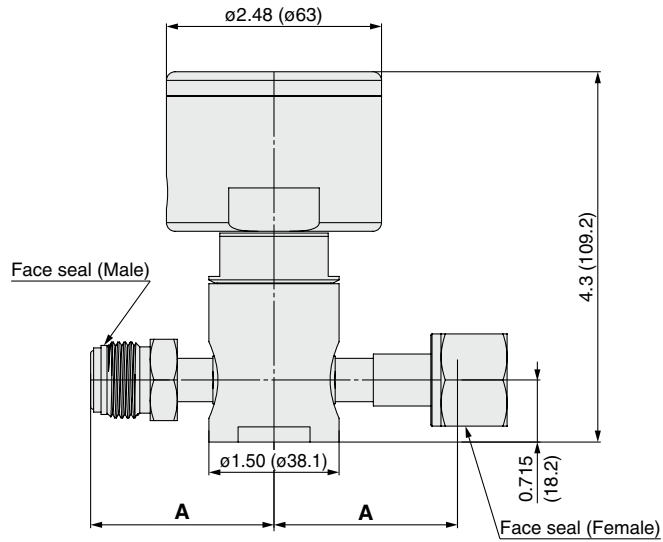
### Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

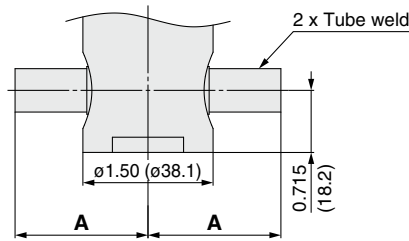
## Dimensions

inch (mm)

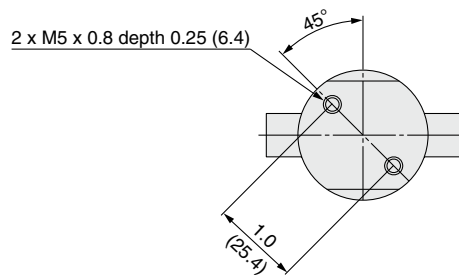
### AZ4141



Connections: MV□, FV□



Connections: TW□



Bottom view

| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 1.59 | (40.4) |
| MV4         |      |        |
| TW6         | 1.49 | (37.8) |
| FV8         | 2.12 | (53.8) |
| MV8         |      |        |
| TW8         | 1.53 | (38.9) |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

# Diaphragm Valve for Ultra High Purity

Air operated type  
(For high flow)

## AZ3700 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- Indicator switch available as an option
- Purge ports and monoblock configurations available



RoHS

How to Order (See p. 250 for ordering syntax)

**Model** AZ 37 00 S MV8 MV8

**Material** S

**Connections (Inlet, Outlet)**

**Option**

**Purge port option**

**Diaphragm material**

**Seat material**

**Purge port \*1)**

**Porting Configuration**

| Code | Status                 |
|------|------------------------|
| 00   | Normally closed (N.C.) |
| 08   | Normally open (N.O.)   |

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

| Code | Connections                 |
|------|-----------------------------|
| TW6  | 3/8 inch tube weld          |
| FV8  | 1/2 inch face seal (Female) |
| MV8  | 1/2 inch face seal (Male)   |
| TW8  | 1/2 inch tube weld          |
| FV12 | 3/4 inch face seal (Female) |
| MV12 | 3/4 inch face seal (Male)   |
| TW12 | 3/4 inch tube weld          |

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

| Code    | Specification     |
|---------|-------------------|
| No code | —                 |
| C       | Capped purge port |

| Code    | Material           |
|---------|--------------------|
| No code | 316L SS (Standard) |
| HD      | Ni-Cr-Mo alloy     |

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

| Code | Inlet (3) | Outlet (4) |
|------|-----------|------------|
| 00   | None      | None       |
| M0   | Available | None       |
| 0B   | None      | Available  |
| MB   | Available | Available  |

\*1) 1/4 inch face seal (Male) as standard.

## Specifications

| Operating Parameters              |                  | AZ3700                                                  | AZ3708               |
|-----------------------------------|------------------|---------------------------------------------------------|----------------------|
| Status                            |                  | Normally closed (N.C.)                                  | Normally open (N.O.) |
| Gas                               |                  | Select compatible materials of construction for the gas |                      |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                            |                      |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                      |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                      |
| Ambient and operating temperature |                  | -10 to 71°C (No freezing) *1)                           |                      |
| Cv                                |                  | 2.8                                                     |                      |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                      |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                      |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                      |
| Surface finish                    |                  | Ra 10 µin. (0.25 µm)                                    |                      |
| Connections                       |                  | Face seal, Tube weld                                    |                      |
| Actuation pressure                |                  | 80 to 100 psig (0.55 to 0.7 MPa)                        |                      |
| Actuation port connection         |                  | M5 x 0.8                                                |                      |
| Actuation port location           |                  | Side (360° rotatable)                                   |                      |
| Installation                      |                  | Bottom mount                                            |                      |
| Internal volume                   |                  | 0.76 in <sup>3</sup> (12.52 cm <sup>3</sup> )           |                      |

\*1) Max. 90°C for Polyimide seat.

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

## Wetted Parts Material

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

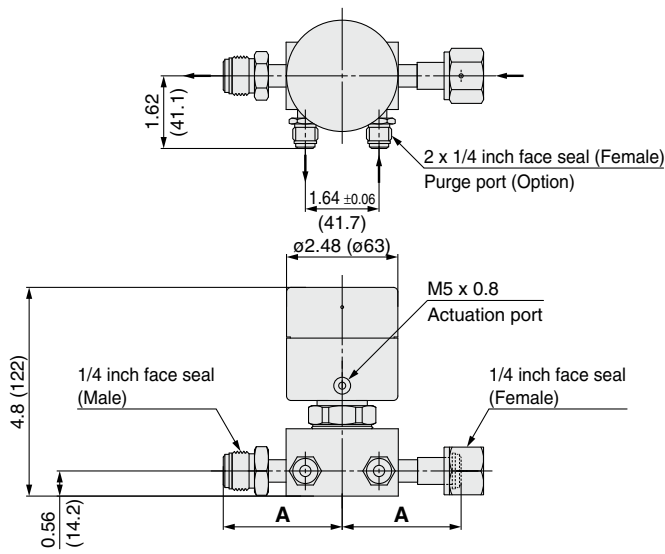
# Diaphragm Valve for Ultra High Purity **AZ3700 Series**

Air operated type (For high flow)

## Dimensions

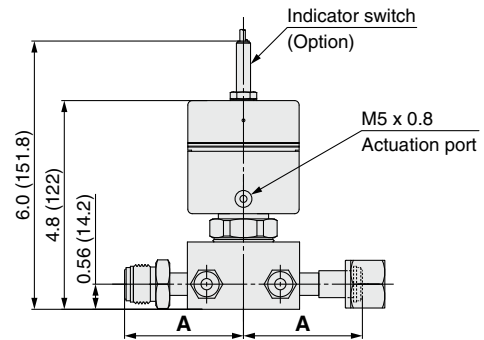
inch (mm)

### AZ3700



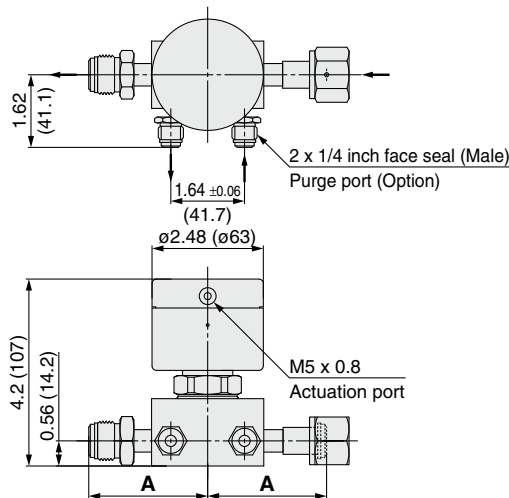
Connections: MV□, FV□

### Indicator switch

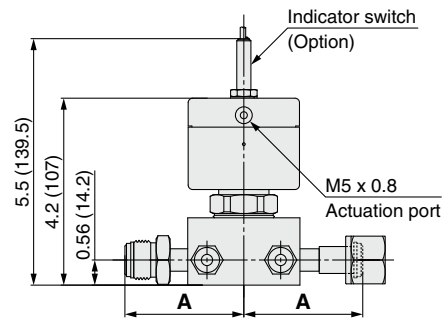


Connections: MV□, FV□

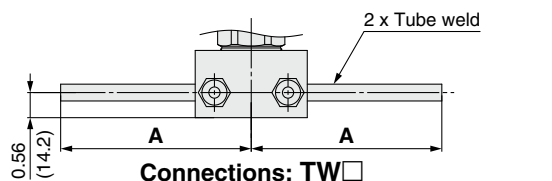
### AZ3708



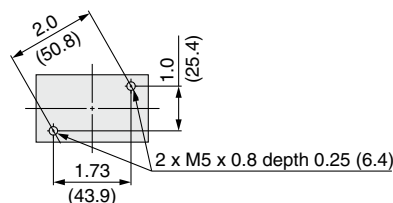
Connections: MV□, FV□



Connections: MV□, FV□



Connections: TW□



Bottom view

| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| TW6         | 4.25 | (108.0) |
| FV8         | 2.65 | (67.3)  |
| MV8         |      |         |
| TW8         | 4.25 | (108.0) |
| FV12        | 3.20 | (81.3)  |
| MV12        |      |         |
| TW12        | 4.25 | (108.0) |

### AZ3571 & 4571 Series

- Two step mode - metered flow and full open
- Two separate actuation ports
- Soft start valve to minimize vacuum chamber pressurization turbulence
- Metered flow adjustable AZ3571: 10 to 200 slpm\*  
AZ4571: 10 to 350 slpm\*
- Pneumatically actuated normally closed
- Body material: 316L SS

\* At 80 psig (0.55 MPa) of N<sub>2</sub>

How to Order (See p. 250 for ordering syntax)



**Ordering Syntax Example:** AZ 3 571 S 2PW FV4 FV4 M 050

(Inlet) (Outlet)

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |
| 4    | 0.5  |

**Model**

| Code | Mode          | Status                 |
|------|---------------|------------------------|
| 571  | Two step mode | Normally closed (N.C.) |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   | Connection |
|------|---------|------------|
| 2P   | 2 ports | Machined   |
| 2PW  |         | Welded     |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Face to face dimension \*2)**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *2)      |

**Metered flow**

| Code           | Metered adjusted flow in slpm                                                                                                                                                                               |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XXX (3 digits) | Metered adjusted flow in slpm at 80 psig (0.55 MPa) N <sub>2</sub> . Replace XXX with flow rate using 3 digits, example 50 slpm = "050". Adjustable range: AZ3571 = 10 to 200 slpm, AZ4571 = 10 to 350 slpm |

**Connections**

| Code | Connections                   | Size Port | AZ3 |     | AZ4 |     |
|------|-------------------------------|-----------|-----|-----|-----|-----|
|      |                               |           | 2P  | 2PW | 2P  | 2PW |
| MV4  | 1/4 inch face seal (Male) *1) |           | ●   | ○   | ●   | ○   |
| FV4  | 1/4 inch face seal (Female)   |           | —   | ○   | —   | ○   |
| TW4  | 1/4 inch tube weld            |           | ●   | ○   | —   | —   |
| MV6  | 3/8 inch face seal (Male) *1) |           | —   | ○   | ●   | ○   |
| FV6  | 3/8 inch face seal (Female)   |           | —   | ○   | —   | ○   |
| TW6  | 3/8 inch tube weld            |           | —   | ○   | ●   | ○   |
| TW8  | 1/2 inch tube weld            |           | —   | —   | ●   | —   |

**\*2) Can be used when size code 3, port code "2PW," and connection "TW4" are selected**

**\*1) Fixed fitting (no rotating nut)**  
When port code "2PW" and connection "MV6" are selected, it will be a rotating nut.

**\*3) Optional porting and porting configurations available.**  
Refer to the AZ series optional porting configuration on page 207.  
The optional porting configuration can be selected when the welded type (PW) is selected.

### Specifications

| Operating Parameters                 |                  | AZ3571                                                  | AZ4571                                       |
|--------------------------------------|------------------|---------------------------------------------------------|----------------------------------------------|
| 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                       |                  | 1.5 times the maximum operating pressure                |                                              |
| Burst pressure                       |                  | 3 times the maximum operating pressure                  |                                              |
| Ambient and operating temperature    |                  | -10 to 71°C (No freezing) *1)                           |                                              |
| Cv                                   |                  | 0.29                                                    | 0.5                                          |
| Leak rate                            | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                                              |
|                                      | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *2)          |                                              |
| Across the seat leak                 |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                              |
| Surface finish                       |                  | Ra 10 μin. (0.25 μm)                                    |                                              |
| Connections                          |                  | Face seal, Tube weld                                    |                                              |
| Actuation pressure                   |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |                                              |
| Actuation port connection            |                  | M5 thread                                               |                                              |
| Actuation port location              |                  | Sides (2 each)                                          |                                              |
| Installation                         |                  | Bottom mount                                            |                                              |
| Internal volume                      |                  | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            | 0.12 in <sup>3</sup> (2.14 cm <sup>3</sup> ) |
| Adjustable range of metered flow *3) |                  | 10 to 200 slpm                                          | 10 to 350 slpm                               |
| Tolerance of *3) metered flow        | 10 to 20 slpm    | ±6 slpm                                                 |                                              |
|                                      | 21 to 50 slpm    | ±10 slpm                                                |                                              |
|                                      | 51 to 100 slpm   | ±15 slpm                                                |                                              |
|                                      | 101 to 200 slpm  | ±20 slpm                                                |                                              |
|                                      | 201 to 350 slpm  | N/A                                                     | ±25 slpm                                     |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 125 psig (0.9 MPa)

\*3) At 80 psig (0.55 MPa) N<sub>2</sub>

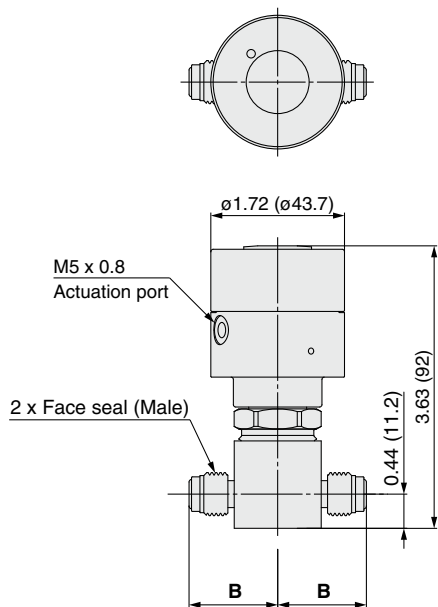
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

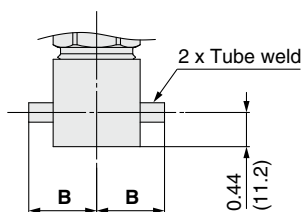
## Dimensions

inch (mm)

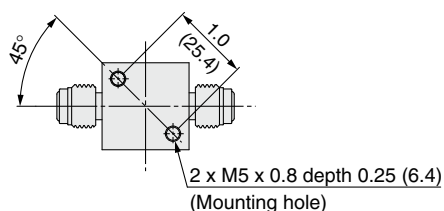
**Machined: 2P**



**Connections: MV□**

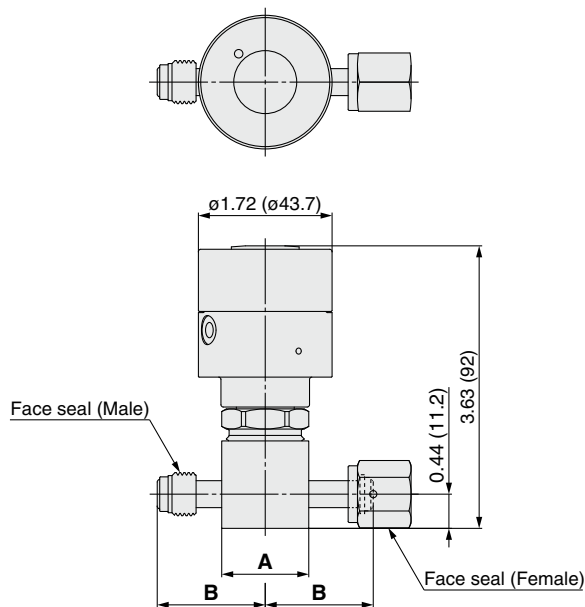


**Connections: TW□**

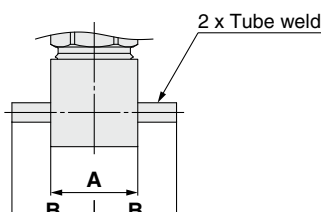


**Bottom view (2P)**

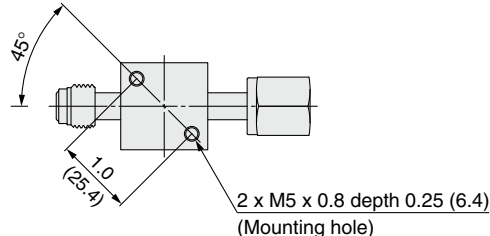
**Welded: 2PW**



**Connections: MV□, FV□**



**Connections: TW□**



**Bottom view (2PW)**

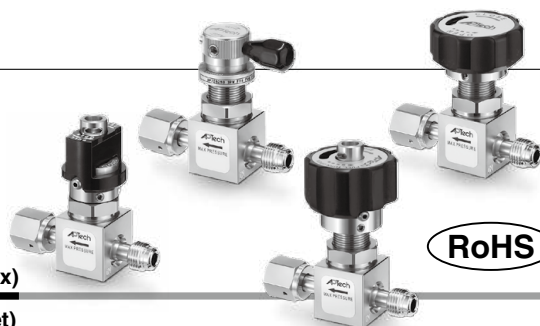
| Connections | Port code |        |                 |  |       |        |
|-------------|-----------|--------|-----------------|--|-------|--------|
|             | 2P        |        | 2PW             |  |       |        |
|             | B         |        | A               |  | B     |        |
| MV4         | 1.14      | (29.0) | 1.12 sq. (28.4) |  | 1.39  | (35.3) |
| FV4         | —         | —      |                 |  | 1.06  | (26.9) |
| TW4         | 0.875     | (22.2) |                 |  | 1.93  | (49.0) |
| MV6         | 1.50      | (38.1) |                 |  | 1.325 | (33.7) |
| FV6         | —         | —      |                 |  | —     | —      |
| TW6         | 0.875     | (22.2) |                 |  | —     | —      |
| TW8         | 1.125     | (28.6) |                 |  | —     | —      |

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AZ3600 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- LOTO standard with AZ3657/3659, optional AZ3625
- Indicator switch available as an option (AZ3650)



How to Order (See p. 250 for ordering syntax)

**Ordering Syntax:** AZ 3 652 S 2P MV4 MV4 [ ] [ ] [ ] [ ]

**Size:** Code 3, Cv 0.29

**Material:** Code S, Body material 316L SS

**Model:**

| Code | Knob                                         | Max. operating pressure |
|------|----------------------------------------------|-------------------------|
| 652  | Round knob with a raised rectangular section | 250 psig (1.7 MPa)      |
| 659  | Pull twist knob with LOTO                    | 250 psig (1.7 MPa)      |
| 600  | Multi turn round knob                        | 3000 psig (20.7 MPa)    |
| 625  | Lever knob                                   | 3000 psig (20.7 MPa)    |
| 650  | Round knob with open/close indication window | 3000 psig (20.7 MPa)    |
| 657  | Pull twist knob with LOTO                    | 3000 psig (20.7 MPa)    |

**Ports:**

| Code | Ports   | Connection |
|------|---------|------------|
| 2P   | 2 ports | Machined   |
| 2PW  | 2 ports | Welded     |

**Connections:**

| Code | Connections                   | Port 2P | Port 2PW |
|------|-------------------------------|---------|----------|
| MV4  | 1/4 inch face seal (Male) *1) | ●       | ○        |
| 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            | —       | ○        |

**Option (AZ3650 only):**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| ISH     | Indicator switch |

**Seat material:**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Installation option:**

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *3)  |

**Face to face dimension:**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm) *2)      |

**Notes:**

- \*1) Only available with the same type fittings inlet and outlet.
- : Male and female threads of the same size can be used in combination.
- : Not available
- \*1) Fixed fitting (no rotating nut)
- \*2) Can be used when port code "2PW" and connection "TW4" are selected
- \*3) Panel mounting hole: dia. 0.78 inch (19.8 mm). Not available with AZ3652 and AZ3659.

## Specifications

| Operating Parameters              |                  | AZ3652                                                                                 | AZ3659                        | AZ3600                | AZ3625                                 | AZ3650                                                | AZ3657                        |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------|-------------------------------|-----------------------|----------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                                |                               |                       |                                        |                                                       |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                           |                               |                       | Vacuum to 3000 psig (20.7 MPa)         |                                                       |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                               |                               |                       |                                        |                                                       |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                 |                               |                       |                                        |                                                       |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                          |                               |                       |                                        |                                                       |                               |
| Cv                                |                  | 0.29                                                                                   |                               |                       |                                        |                                                       |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                          |                               |                       |                                        |                                                       |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                      |                               |                       |                                        |                                                       |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                                                          |                               |                       |                                        |                                                       |                               |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                                                   |                               |                       |                                        |                                                       |                               |
| Connections                       |                  | Face seal, Tube weld                                                                   |                               |                       |                                        |                                                       |                               |
| Installation                      |                  | Bottom mount                                                                           |                               |                       | Bottom mount (Option: panel mount)     |                                                       |                               |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                                                    |                               |                       |                                        |                                                       |                               |
| Weight                            |                  | 0.26 kg *3)                                                                            | 0.45 kg *3)                   | 0.36 kg *3)           | 0.45 kg *3)                            | 0.73 kg *3)                                           | 0.4 kg *3)                    |
| Knob                              |                  | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *5) | Multi turn round knob | 1/4 turn lever knob *4)                | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *5) |
| Operational Safety Device (OSD)   |                  | N/A                                                                                    | Standard                      | N/A                   | Option *6)<br>(Part number: AP PL227)  | N/A                                                   | Standard                      |
| LOTO (Lockout)                    |                  |                                                                                        |                               |                       | Option *6)<br>(Part number: AP PI 225) |                                                       |                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*4) Optional lever color available. Please contact SMC.

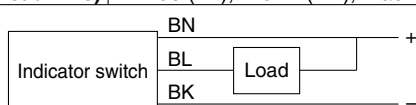
\*5) Handle must be pulled to turn open from closed.

\*6) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                 | ISH                               |
|----------------------|-----------------------------------|
| Output type          | NPN                               |
| Power supply voltage | 3.8 to 30 VDC                     |
| Output voltage       | Max. 0.4 VDC                      |
| Supply current       | Max. 11 mA                        |
| Output current       | Max. 20 mA                        |
| Lead wire            | AWG 24                            |
| Cable length         | 3 m                               |
| Color (Lead wire)    | Blue (BL), Brown (BN), Black (BK) |

Wiring Diagram



## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

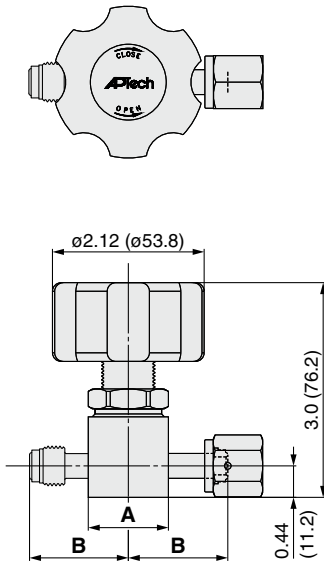
# Diaphragm Valve for Ultra High Purity **AZ3600 Series**

Manually operated type

## Dimensions

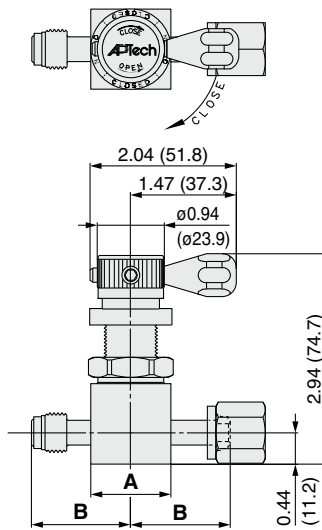
inch (mm)

### AZ3600



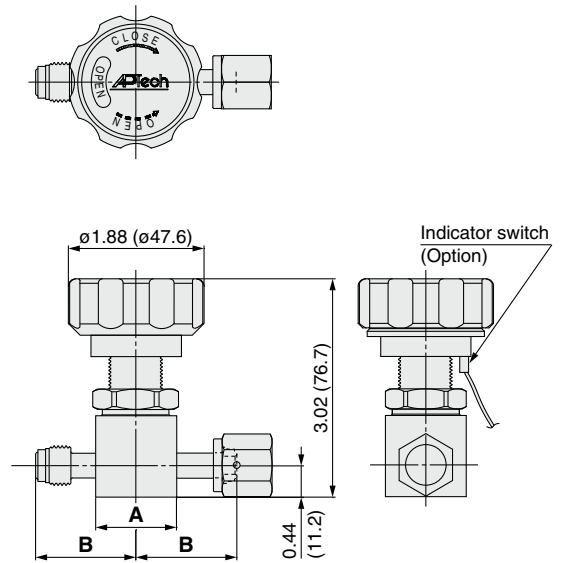
2PW (Connections: MV□, FV□)

### AZ3625



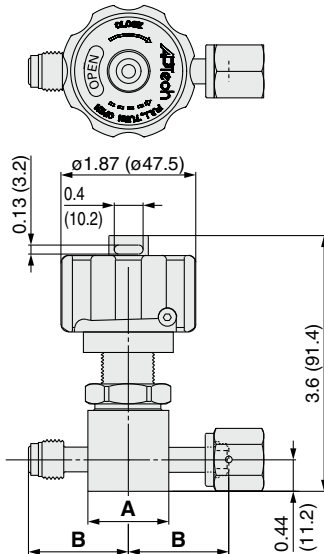
2PW (Connections: MV□, FV□)

### AZ3650



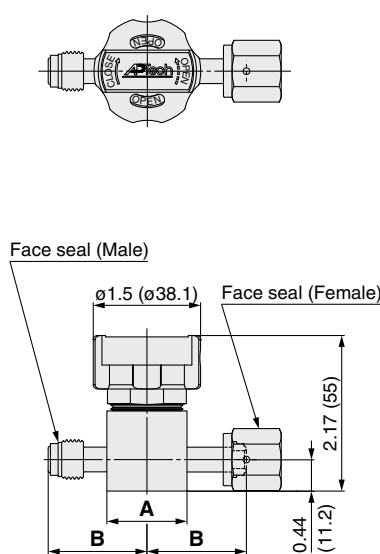
2PW (Connections: MV□, FV□)

### AZ3657



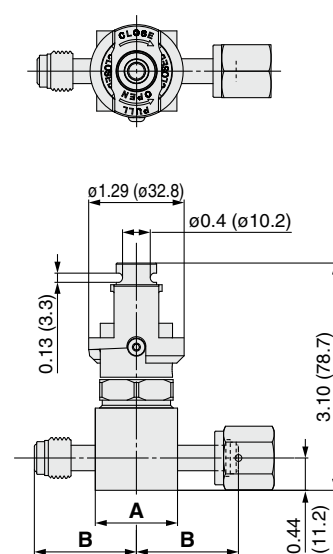
2PW (Connections: MV□, FV□)

### AZ3652

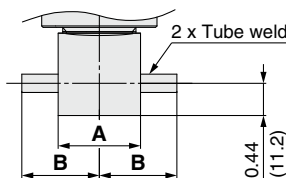


2PW (Connections: MV□, FV□)

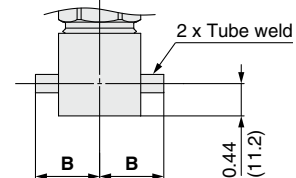
### AZ3659



2PW (Connections: MV□, FV□)

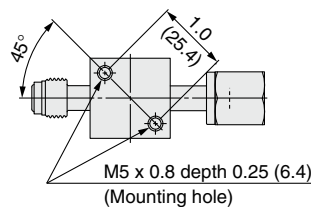


2PW (Connections: TW□)

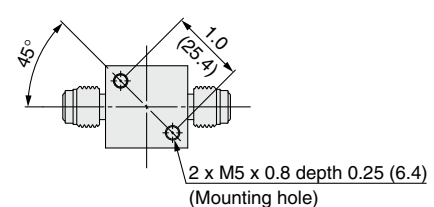


2P (Connections: TW4)

| Connections | Port code |        |                  |   |       |        |
|-------------|-----------|--------|------------------|---|-------|--------|
|             | 2P        |        | 2PW              |   |       |        |
|             | B         |        | A                | B |       |        |
| MV4         | 1.14      | (29.0) |                  |   | 1.39  | (35.3) |
| FV4         | —         | —      |                  |   | 1.06  | (26.9) |
| TW4         | 0.875     | (22.2) | 1.12 sq. (□28.4) |   | 1.93  | (49.0) |
| MV6         | —         | —      |                  |   | 1.325 | (33.7) |
| FV6         | —         | —      |                  |   |       |        |
| TW6         | —         | —      |                  |   |       |        |



2PW (Bottom view)



2P (Bottom view)

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AZ4600 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- LOTO standard with AZ4657/4659, optional AZ4625
- Indicator switch available as an option (AZ4650)



How to Order (See p. 250 for ordering syntax)

**Ordering Syntax:** AZ 4 652 S 2P MV4 MV4 [ ] [ ] [ ] [ ]

**Size:** 4 (Cv 0.5)

**Material:** S (316L SS)

**Model:** 652 (Round knob with a raised rectangular section, 250 psig (1.7 MPa)), 659 (Pull twist knob with LOTO), 600 (Multi turn round knob), 625 (Lever knob, 300 psig (2.1 MPa)), 650 (Round knob with open/close indication window), 657 (Pull twist knob with LOTO)

**Connections:** MV4 (1/4 inch face seal (Male) \*1), FV4 (1/4 inch face seal (Female)), MV6 (3/8 inch face seal (Male) \*1), FV6 (3/8 inch face seal (Female)), TW6 (3/8 inch tube weld), TW8 (1/2 inch tube weld)

**Ports:** 2P (2 ports, Machined), 2PW (2 ports, Welded)

**Option (AZ4650 only):** No code (—), ISH (Indicator switch)

**Installation option:** No code (Bottom mount (Standard)), P (Panel installation \*2)

**Option:** No code (Standard), HR (High pressure (Max. operating pressure 3000 psig (20.7 MPa)))

**Seat material:** No code (PCTFE (Standard)), VS (Polyimide)

**Notes:**

- \*1) Only available with the same type fittings inlet and outlet.
- : Male and female threads of the same size can be used in combination.
- : Not available
- \*1) Fixed fitting (no rotating nut)
- When port code "2PW" and connection "MV6" are selected, it will be a rotating nut.
- \*2) Panel mounting hole: dia. 0.78 inch (19.8 mm). Not available with AZ4652 and AZ4659.
- \*3) Not available with AZ4652 and AZ4659.

## Specifications

| Operating Parameters              |                  | AZ4652                                                                                 | AZ4659                        | AZ4600                | AZ4625                                | AZ4650                                                | AZ4657                        |
|-----------------------------------|------------------|----------------------------------------------------------------------------------------|-------------------------------|-----------------------|---------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas                                |                               |                       |                                       |                                                       |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                                                           |                               |                       | Vacuum to 300 psig (2.1 MPa)          |                                                       |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                                               |                               |                       |                                       |                                                       |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                                                 |                               |                       |                                       |                                                       |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                                                          |                               |                       |                                       |                                                       |                               |
| Cv                                |                  | 0.5                                                                                    |                               |                       |                                       |                                                       |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                                                          |                               |                       |                                       |                                                       |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *2)                                                      |                               |                       |                                       |                                                       |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                                                          |                               |                       |                                       |                                                       |                               |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                                                   |                               |                       |                                       |                                                       |                               |
| Connections                       |                  | Face seal, Tube weld                                                                   |                               |                       |                                       |                                                       |                               |
| Installation                      |                  | Bottom mount                                                                           |                               |                       | Bottom mount (Option: panel mount)    |                                                       |                               |
| Internal volume                   |                  | 0.12 in³ (2.14 cm³)                                                                    |                               |                       |                                       |                                                       |                               |
| Weight                            |                  | 0.26 kg *3)                                                                            | 0.45 kg *3)                   | 0.41 kg *3)           | 0.45 kg *3)                           | 0.4 kg *3)                                            | 0.4 kg *3)                    |
| Knob                              |                  | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *5) | Multi turn round knob | 1/4 turn lever knob *4)               | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *5) |
| Operational Safety Device (OSD)   |                  | N/A                                                                                    | Standard                      | N/A                   | Option *6)<br>(Part number: AP PL227) | N/A                                                   | Standard                      |
| LOTO (Lockout)                    |                  |                                                                                        |                               |                       | Option *6)<br>(Part number: AP PL225) |                                                       |                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*4) Optional lever color available. Please contact SMC.

\*5) Knob must be pulled to turn open from closed.

\*6) Refer to the specification for options. (P.227)

## Option

### High pressure

Changes from the standard type are:

| Option | Other Parameters   | AZ4600                         | AZ4625 | AZ4650 | AZ4657 |
|--------|--------------------|--------------------------------|--------|--------|--------|
| HR     | Operating pressure | Vacuum to 3000 psig (20.7 MPa) |        |        |        |

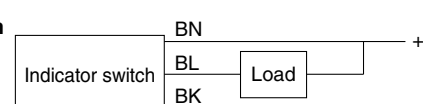
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

## Indicator Switch (Option) Specification

| Code                 | ISH               |
|----------------------|-------------------|
| Output type          | NPN               |
| Power supply voltage | 3.8 to 30 VDC     |
| Output voltage       | Max. 0.4 VDC      |
| Supply current       | Max. 11 mA        |
| Output current       | Max. 20 mA        |
| Cable                | Lead wire         |
|                      | Cable length      |
|                      | Color (Lead wire) |

### Wiring Diagram



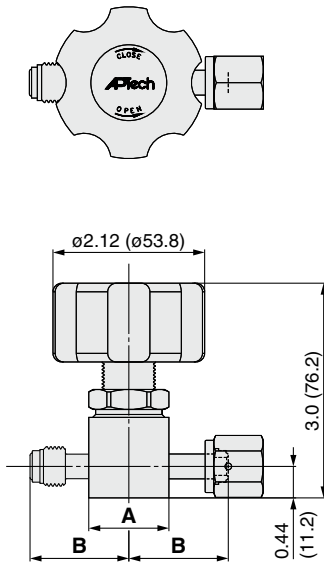
# Diaphragm Valve for Ultra High Purity **AZ4600 Series**

Manually operated type

## Dimensions

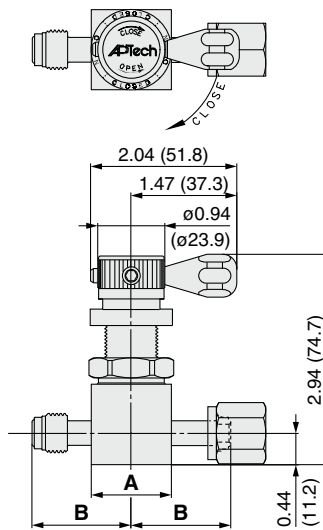
inch (mm)

### AZ4600



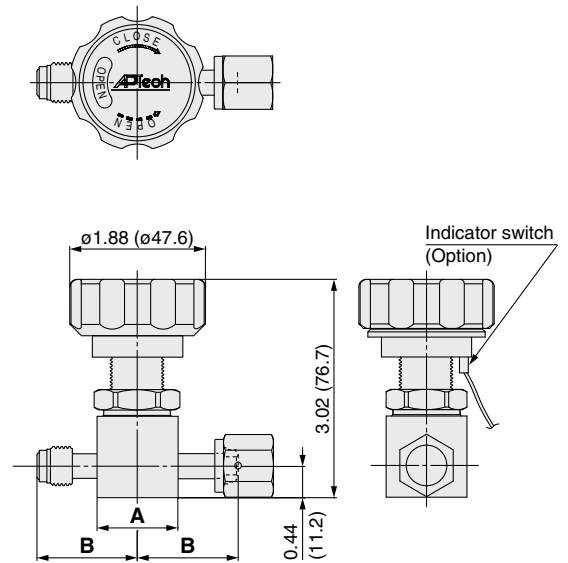
2PW (Connections: MV□, FV□)

### AZ4625



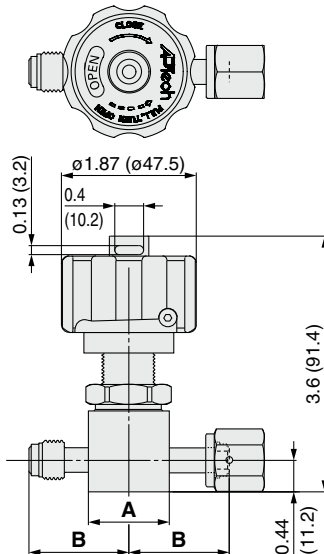
2PW (Connections: MV□, FV□)

### AZ4650



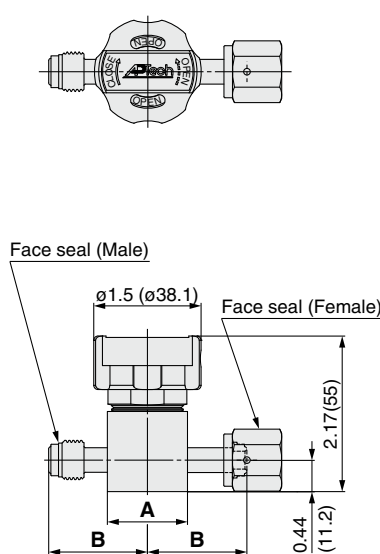
2PW (Connections: MV□, FV□)

### AZ4657



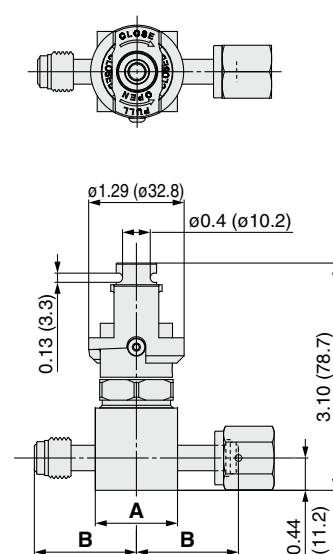
2PW (Connections: MV□, FV□)

### AZ4652

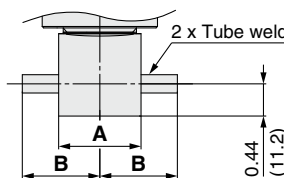


2PW (Connections: MV□, FV□)

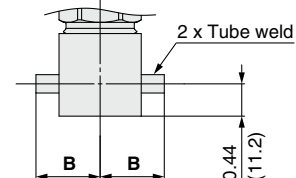
### AZ4659



2PW (Connections: MV□, FV□)

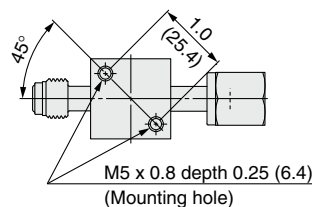


2PW (Connections: TW□)

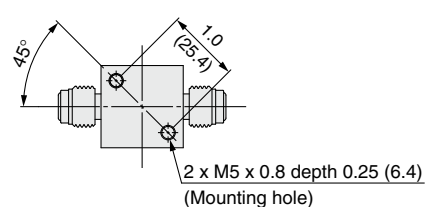


2P (Connections: TW□)

| Connections | Port code |        |                 |       |        |  |
|-------------|-----------|--------|-----------------|-------|--------|--|
|             | 2P        |        | 2PW             |       |        |  |
|             | B         |        | A               | B     |        |  |
| MV4         | 1.14      | (29.0) | 1.12 sq. (28.4) | 1.39  | (35.3) |  |
| FV4         | —         | —      |                 | 1.93  | (49.0) |  |
| MV6         | 1.50      | (38.1) |                 | 1.325 | (33.7) |  |
| FV6         | —         | —      |                 | —     | —      |  |
| TW6         | 0.875     | (22.2) |                 | —     | —      |  |
| TW8         | 1.125     | (28.6) |                 | —     | —      |  |



2PW (Bottom view)



2P (Bottom view)

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AZ3604, 3624 & 3627 Series

- Suitable for UHP gas supply line
- Body material: 316L SS



RoHS

How to Order (See p. 250 for ordering syntax)

**AZ 3 604 S 2PW MV4 MV4** (Inlet) (Outlet)

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |

**Model**

| Code | Knob                  | Max. operating pressure |
|------|-----------------------|-------------------------|
| 604  | Multi turn round knob | 3700 psig (25.5 MPa)    |
| 624  | 1/4 turn lever knob   | 3700 psig (25.5 MPa)    |
| 627  | 1/4 turn T handle     | 4500 psig (31 MPa)      |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   |
|------|---------|
| 2PW  | 2 ports |

\*) Optional porting and porting configurations available. Refer to the AZ series optional porting configuration on page 207.

**Connections**

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

\*1) Fixed fitting (no rotating nut)

**Installation option**

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *3)  |

\*3) Panel mounting hole: dia. 0.78 inch (19.8 mm).

**Seat material**

| Code    | Material         | Model |      |      |
|---------|------------------|-------|------|------|
|         |                  | 3604  | 3624 | 3627 |
| No code | PCTFE (Standard) | ●     | ●    | —    |
| VS      | Polyimide        | ●     | ●    | ●    |
| PK      | PEEK             | ●     | ●    | ●    |

●: Available  
—: Not available

**Face to face dimension \*2)**

| Code    | Dimension                    |
|---------|------------------------------|
| No code | 2.12 inch (53.8 mm) Standard |
| 1.75    | 1.75 inch (44.5 mm)          |

\*2) Can be used when connection "TW4" is selected

## Specifications

| Operating Parameters              |                  | AZ3604                                                  | AZ3624                                | AZ3627                       |
|-----------------------------------|------------------|---------------------------------------------------------|---------------------------------------|------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                                       |                              |
| Operating pressure                |                  | Vacuum to 3700 psig (25.5 MPa)                          |                                       | Vacuum to 4500 psig (31 MPa) |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                                       |                              |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                                       |                              |
| Ambient and operating temperature |                  | -40 to 49°C (No freezing)                               |                                       | -40 to 60°C (No freezing)    |
| Cv                                |                  | 0.29                                                    |                                       |                              |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                                       |                              |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s *1)                       |                                       |                              |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                       |                              |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                    |                                       |                              |
| Connections                       |                  | Face seal, Tube weld                                    |                                       |                              |
| Installation                      |                  | Bottom mount                                            |                                       |                              |
| Internal volume                   |                  | 0.06 in³ (1.07 cm³)                                     |                                       |                              |
| Weight                            |                  | 0.36 kg *2)                                             | 0.45 kg *2)                           | 0.45 kg *2)                  |
| Knob                              |                  | Multi turn round knob                                   | 1/4 turn lever knob *3)               | 1/4 turn T handle            |
| Operational Safety Device (OSD)   |                  | N/A                                                     | Option<br>(Part number: AP PL227) *4) | N/A                          |
| LOTO (Lockout)                    |                  |                                                         | Option<br>(Part number: AP PL225) *4) |                              |

\*1) Tested with Helium gas inlet pressure 250 psig (1.7 MPa).

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

\*3) Optional lever color available. Please contact SMC.

\*4) Refer to the specification for options. (P.227)

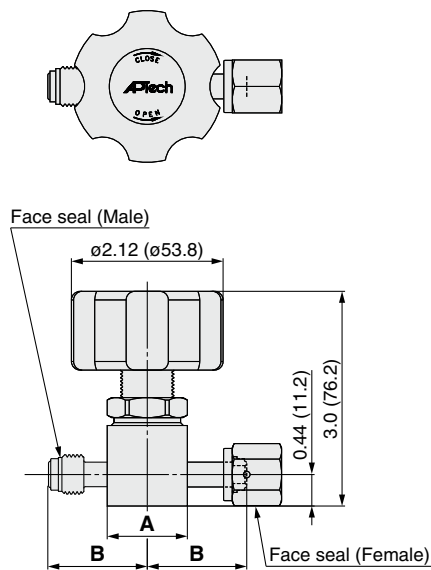
## Wetted Parts Material

| Wetted Parts   | S                                                    |
|----------------|------------------------------------------------------|
| Body           | 316L SS                                              |
| Surface finish | Electropolish + Passivation                          |
| Diaphragm      | Ni-Co alloy                                          |
| Seat           | AZ3604, AZ3624                                       |
|                | AZ3627                                               |
|                | PCTFE (Option: Polyimide, PEEK)<br>Polyimide or PEEK |

## Dimensions

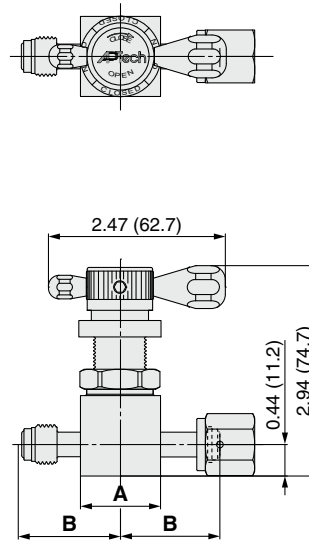
inch (mm)

### AZ3604



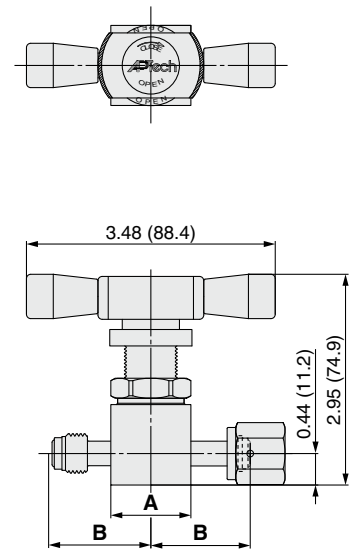
Connections: MV4, FV4

### AZ3624

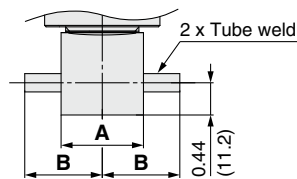


Connections: MV4, FV4

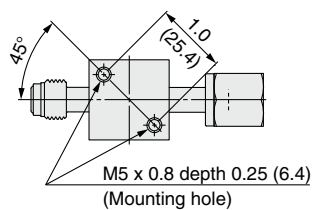
### AZ3627



Connections: MV4, FV4



Connections: TW□



Bottom view

| Connections | A        |         | B    |        |
|-------------|----------|---------|------|--------|
|             | inch     | (mm)    | inch | (mm)   |
| MV4         |          |         |      |        |
| FV4         | 1.12 sq. | (□28.4) | 1.39 | (35.3) |
| TW4         |          |         | 1.06 | (26.9) |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum

Generators

Flow

Switches

Technical Data/  
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Precautions

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AZ4150 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Springless design (No poppet spring in the wetted area)
- LOTO available (AZ4157)
- Indicator switch available as an option (AZ4150)



RoHS

How to Order (See p. 250 for ordering syntax)

**Model**

**AZ 41 50 S 2PW MV8 MV8**

**Port Number**

① ② ③ ④

**Code** **Knob** **Cv**

|    |                                              |     |
|----|----------------------------------------------|-----|
| 50 | Round knob with open/close indication window | 0.8 |
| 57 | Pull twist knob with LOTO                    |     |

**Material**

|      |               |
|------|---------------|
| Code | Body material |
| S    | 316L SS       |

**Ports**  
(Refer to the porting configuration.)

|      |         |
|------|---------|
| Code | Ports   |
| 2PW  | 2 ports |
| 3PWD | 3 ports |
| 3PWE | 3 ports |
| 3PWF | 3 ports |
| 4PWM | 4 ports |

**Option (AZ4150 only)**

|         |                  |
|---------|------------------|
| Code    | Specification    |
| No code | —                |
| ISH     | Indicator switch |

**Seat material**

|         |                  |
|---------|------------------|
| Code    | Material         |
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Connections**  
(Refer to the porting configuration.)

|         |                             |
|---------|-----------------------------|
| Code    | Connections                 |
| No code | No port                     |
| FV4     | 1/4 inch face seal (Female) |
| MV4     | 1/4 inch face seal (Male)   |
| TW6     | 3/8 inch tube weld          |
| FV8     | 1/2 inch face seal (Female) |
| MV8     | 1/2 inch face seal (Male)   |
| TW8     | 1/2 inch tube weld          |

**Porting Configuration**  
(The porting configurations viewed from the knob side are shown.)

**Sample Order Number**

|         |      |     |     |     |   |
|---------|------|-----|-----|-----|---|
|         | Port | ①   | ②   | ③   | ④ |
| AZ4150S | 2PW  | MV8 | MV8 |     |   |
|         | 3PWD | MV8 | MV8 | MV8 |   |

## Specifications

| Operating Parameters              |                  | AZ4150                                                  | AZ4157                        |
|-----------------------------------|------------------|---------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                            |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                           |                               |
| Cv                                |                  | 0.8                                                     |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                               |
| Surface finish                    |                  | Ra 10 μm. (0.25 μm)                                     |                               |
| Connections                       |                  | Face seal, Tube weld                                    |                               |
| Installation                      |                  | Bottom mount                                            |                               |
| Internal volume                   |                  | 0.37 in <sup>3</sup> (6.1 cm <sup>3</sup> )             |                               |
| Knob                              |                  | 1/4 turn round knob with open/close indication window   | Pull twist knob with LOTO *2) |
| LOTO (Lockout)                    |                  | N/A                                                     | Standard                      |

\*1) -10 to 90°C for Polyimide seat.

\*2) Handle must be pulled to turn open from closed.

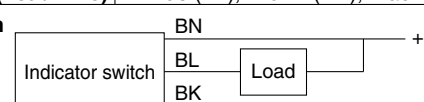
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

## Indicator Switch (Option) Specification

| Code                 | ISH                               |
|----------------------|-----------------------------------|
| Output type          | NPN                               |
| Power supply voltage | 3.8 to 30 VDC                     |
| Output voltage       | Max. 0.4 VDC                      |
| Supply current       | Max. 11 mA                        |
| Output current       | Max. 20 mA                        |
| Cable                | Lead wire                         |
|                      | Cable length                      |
|                      | Color (Lead wire)                 |
|                      | AWG 24                            |
|                      | 3 m                               |
|                      | Blue (BL), Brown (BN), Black (BK) |

## Wiring Diagram

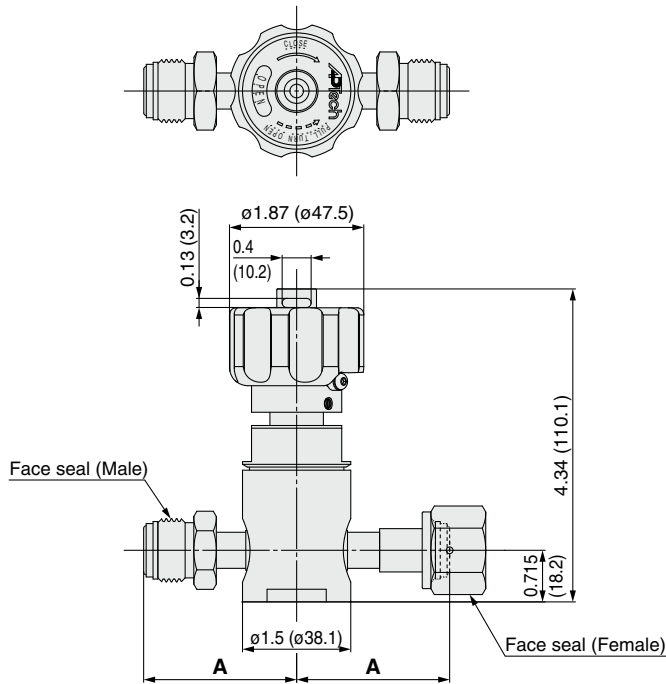


## Dimensions

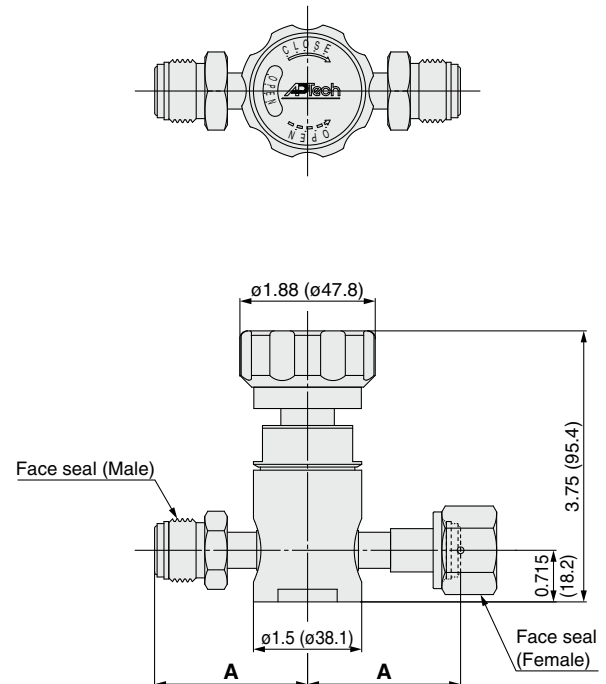
inch (mm)

### AZ4157

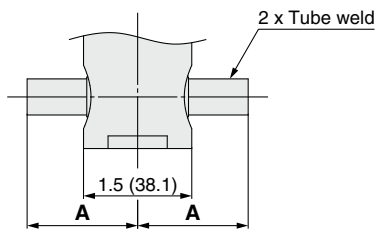
### AZ4150



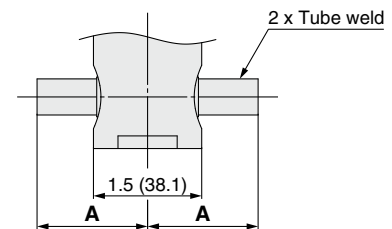
Connections: MV□, FV□



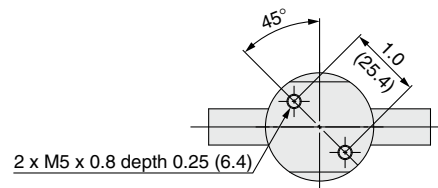
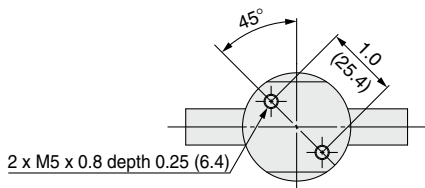
Connections: MV□, FV□



Connections: TW□



Connections: TW□



| Connections | A    |        |
|-------------|------|--------|
|             | inch | (mm)   |
| FV4         | 1.59 | (40.4) |
| MV4         | 1.59 | (40.4) |
| TW6         | 1.49 | (37.8) |
| FV8         | 2.12 | (53.8) |
| MV8         | 2.12 | (53.8) |
| TW8         | 1.53 | (38.9) |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

# Diaphragm Valve for Ultra High Purity

Manually operated type

## AZ3800 & 3900 Series

- Suitable for UHP gas supply line
- LOTO available (AZ3900)
- Purge ports and monoblock configurations available



RoHS

How to Order (See p. 250 for ordering syntax)

AZ **3800** S **FV8** **FV8** [ ] [ ] [ ] [ ]

(Inlet) (Outlet)

### Model

| Code        | Knob                                         |
|-------------|----------------------------------------------|
| <b>3800</b> | Round knob with open/close indication window |
| <b>3900</b> | Pull twist knob with LOTO                    |

### Material

| Code     | Body material |
|----------|---------------|
| <b>S</b> | 316L SS       |

### Purge port option

| Code     | Material          |
|----------|-------------------|
| No code  | —                 |
| <b>C</b> | Capped purge port |

### Diaphragm material

| Code      | Material           |
|-----------|--------------------|
| No code   | 316L SS (Standard) |
| <b>HD</b> | Ni-Cr-Mo alloy     |

### Seat material

| Code      | Material         |
|-----------|------------------|
| No code   | PCTFE (Standard) |
| <b>VS</b> | Polyimide        |

### Purge port \*1)

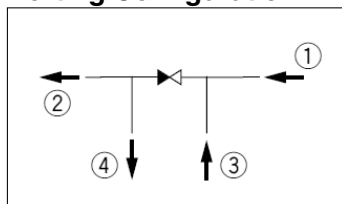
| Code      | Inlet (3) | Outlet (4) |
|-----------|-----------|------------|
| <b>00</b> | None      | None       |
| <b>M0</b> | Available | None       |
| <b>0B</b> | None      | Available  |
| <b>MB</b> | Available | Available  |

\*1) 1/4 inch face seal (Male) as standard.

### Connections (Inlet, Outlet)

| Code        | Connections                 |
|-------------|-----------------------------|
| <b>TW6</b>  | 3/8 inch tube weld          |
| <b>FV8</b>  | 1/2 inch face seal (Female) |
| <b>MV8</b>  | 1/2 inch face seal (Male)   |
| <b>TW8</b>  | 1/2 inch tube weld          |
| <b>FV12</b> | 3/4 inch face seal (Female) |
| <b>MV12</b> | 3/4 inch face seal (Male)   |
| <b>TW12</b> | 3/4 inch tube weld          |

### Porting Configuration



## Specifications

| Operating Parameters              |                  | AZ3800                                                  | AZ3900                        |
|-----------------------------------|------------------|---------------------------------------------------------|-------------------------------|
| Gas                               |                  | Select compatible materials of construction for the gas |                               |
| Operating pressure                |                  | Vacuum to 250 psig (1.7 MPa)                            |                               |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |                               |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |                               |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing) *1)                           |                               |
| Cv                                |                  | 2.8                                                     |                               |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m³/s                           |                               |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m³/s                           |                               |
| Across the seat leak              |                  | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                               |
| Surface finish                    |                  | Ra 10 µin. (0.25 µm)                                    |                               |
| Connections                       |                  | Face seal, Tube weld                                    |                               |
| Installation                      |                  | Bottom mount                                            |                               |
| Internal volume                   |                  | 0.76 in³ (12.52 cm³)                                    |                               |
| Knob                              |                  | Round knob with open/close indication window            | Pull twist knob with LOTO *2) |
| Operational Safety Device (OSD)   |                  | N/A                                                     | Standard                      |
| LOTO (Lockout)                    |                  |                                                         |                               |

\*1) -10 to 90°C for Polyimide seat.

\*2) Knob must be pulled to turn open from closed.

## Wetted Parts Material

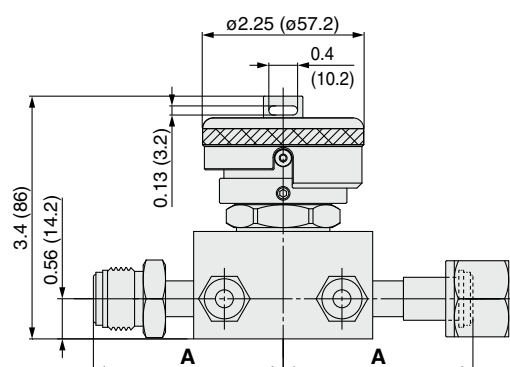
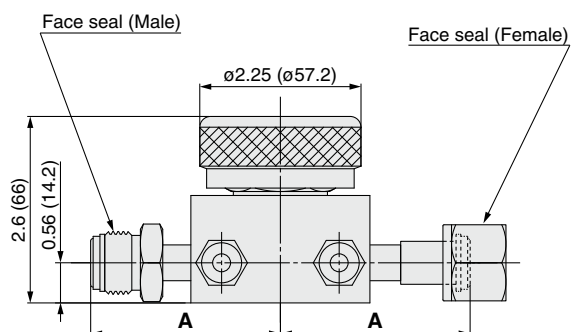
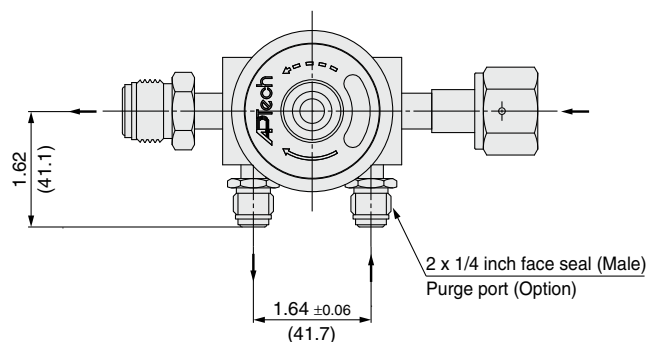
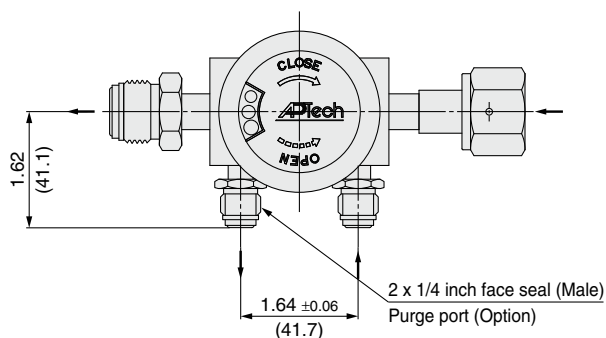
| Wetted Parts   | S                                |
|----------------|----------------------------------|
| Body           | 316L SS                          |
| Surface finish | Electropolish + Passivation      |
| Diaphragm      | 316L SS (Option: Ni-Cr-Mo alloy) |
| Seat           | PCTFE (Option: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

## Dimensions

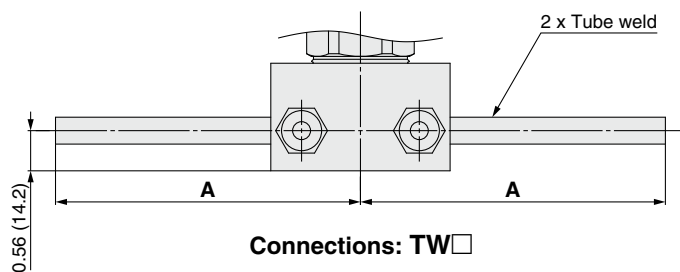
inch (mm)

### AZ3800

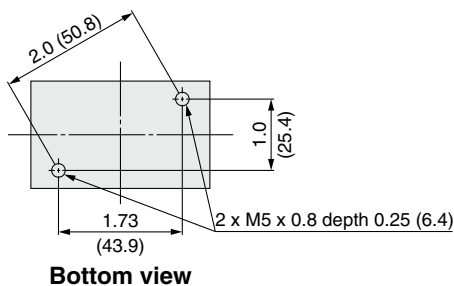
### AZ3900



Connections: MV□, FV□



Connections: TW□



Bottom view

| Connections | A    |         |
|-------------|------|---------|
|             | inch | (mm)    |
| TW6         | 4.25 | (108.0) |
| FV8         | 2.65 | (67.3)  |
| MV8         |      |         |
| TW8         | 4.25 | (108.0) |
| FV12        | 3.20 | (81.3)  |
| MV12        |      |         |
| TW12        | 4.25 | (108.0) |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

## AZ3672, 3675 & 4675 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Fine adjustment control 12 to 15 turns of the knob to wide open
- One wetted moving part - a diaphragm
- Flow rate AZ3672: 10 slpm \*1)  
AZ3675: 40 slpm \*1)  
AZ4675: 70 slpm \*1)

\*1) At 30 psig (0.2 MPa) of N<sub>2</sub>



RoHS

### How to Order (See p. 250 for ordering syntax)

AZ **3672** **S** **2P** **MV4** **MV4**

(Inlet) (Outlet)

#### Model

| Code        | Cv        |
|-------------|-----------|
| <b>3672</b> | 0 to 0.02 |
| <b>3675</b> | 0 to 0.08 |
| <b>4675</b> | 0 to 0.15 |

#### Material

| Code     | Body material |
|----------|---------------|
| <b>S</b> | 316L SS       |

#### Ports

| Code       | Ports   | Connection |
|------------|---------|------------|
| <b>2P</b>  | 2 ports | Machined   |
| <b>2PW</b> |         | Welded     |

\*) Optional porting and porting configurations available.  
Refer to the AZ series optional porting configuration on page 207.  
The optional porting configuration can only be selected when the welded type (PW) is selected.

#### Face to face dimension

| Code           | Dimension                    |
|----------------|------------------------------|
| <b>No code</b> | 2.12 inch (53.8 mm) Standard |
| <b>1.75</b>    | 1.75 inch (44.5 mm) *2)      |

\*2) Can be used when port code "2PW" and connection "TW4" are selected  
However, it cannot be used for type 4675.

#### Connections

| Code       | Connections                   | Model | AZ3672/3675 |     | AZ4675 |     |
|------------|-------------------------------|-------|-------------|-----|--------|-----|
|            |                               | Port  | 2P          | 2PW | 2P     | 2PW |
| <b>MV4</b> | 1/4 inch face seal (Male) *1) |       | ●           | ○   | ●      | ○   |
| <b>FV4</b> | 1/4 inch face seal (Female)   |       | —           | ○   | —      | ○   |
| <b>TW4</b> | 1/4 inch tube weld            |       | ●           | ○   | —      | —   |
| <b>MV6</b> | 3/8 inch face seal (Male) *1) |       | —           | ○   | ●      | ○   |
| <b>FV6</b> | 3/8 inch face seal (Female)   |       | —           | ○   | —      | ○   |
| <b>TW6</b> | 3/8 inch tube weld            |       | —           | ○   | ●      | ○   |
| <b>TW8</b> | 1/2 inch tube weld            |       | —           | —   | ●      | —   |

●: Only available with the same type fittings inlet and outlet.

○: Inlet and outlet available with any combination of fitting type and size.

—: Not available

\*1) Fixed fitting (no rotating nut)

When port code "2PW" and connection "MV6" are selected, it will be a rotating nut.

## Specifications

| Operating Parameters              |                  | AZ3672                                                  | AZ3675    | AZ4675    |
|-----------------------------------|------------------|---------------------------------------------------------|-----------|-----------|
| Gas                               |                  | Select compatible materials of construction for the gas |           |           |
| Operating pressure                |                  | Vacuum to 145 psig (1 MPa)                              |           |           |
| Proof pressure                    |                  | 1.5 times the maximum operating pressure                |           |           |
| Burst pressure                    |                  | 3 times the maximum operating pressure                  |           |           |
| Ambient and operating temperature |                  | -40 to 71°C (No freezing)                               |           |           |
| Cv                                |                  | 0 to 0.02                                               | 0 to 0.08 | 0 to 0.15 |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |           |           |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |           |           |
| Surface finish                    |                  | Ra 10 μin. (0.25 μm)                                    |           |           |
| Connections                       |                  | Face seal, Tube weld                                    |           |           |
| Installation                      |                  | Bottom mount                                            |           |           |
| Internal volume                   |                  | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            |           |           |

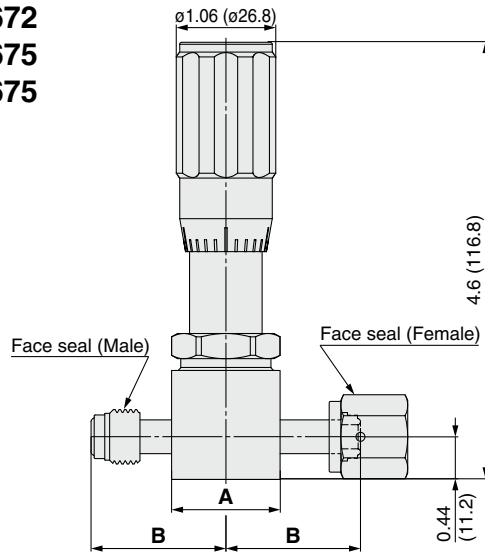
## Wetted Parts Material

| Series         | AZ3672/AZ3675               | AZ4675  |
|----------------|-----------------------------|---------|
| Body           | 316L SS                     |         |
| Surface finish | Electropolish + Passivation |         |
| Diaphragm      | Ni-Co alloy                 |         |
| Seat           | PCTFE                       | 316L SS |

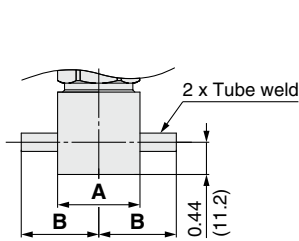
## Dimensions

inch (mm)

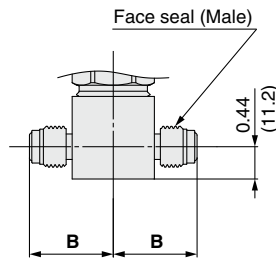
AZ3672  
AZ3675  
AZ4675



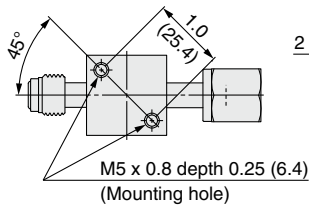
2PW (Connections: MV□, FV□)



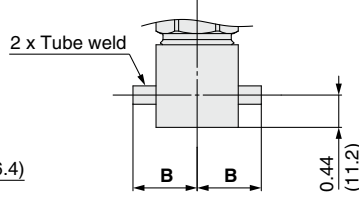
2PW (Connections: TW□)



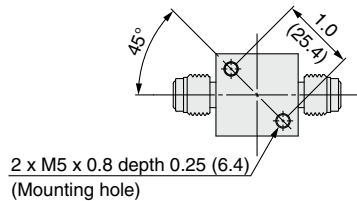
2P (Connections: MV□)



2PW (Bottom view)



2P (Connections: TW□)

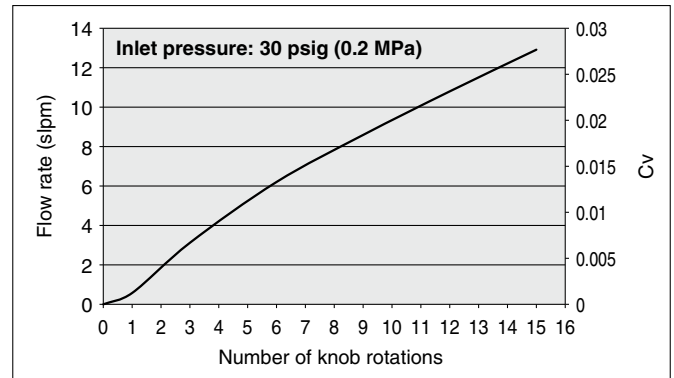


2P (Bottom view)

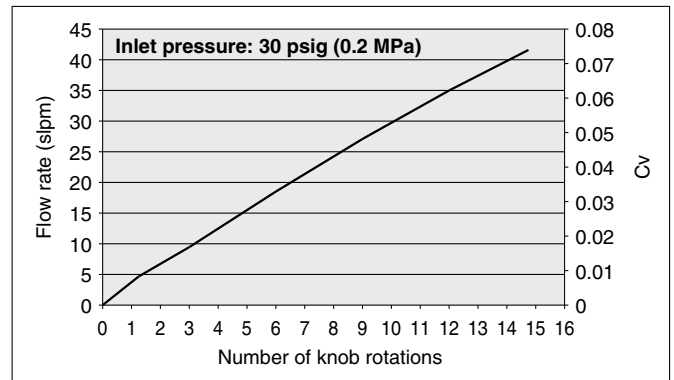
| Connections | Port code |        |          |         |       |        |
|-------------|-----------|--------|----------|---------|-------|--------|
|             | 2P        |        | 2PW      |         |       |        |
|             | B         |        | A        |         | B     |        |
|             | inch      | (mm)   | inch     | (mm)    | inch  | (mm)   |
| MV4         | 1.14      | (29.0) |          |         | 1.39  | (35.3) |
| FV4         | —         | —      |          |         | 1.06  | (26.9) |
| TW4         | 0.875     | (22.2) |          |         | 1.93  | (49.0) |
| MV6         | 1.50      | (38.1) | 1.12 sq. | (□28.4) | 1.325 | (33.7) |
| FV6         | —         | —      |          |         | —     | —      |
| TW6         | 0.875     | (22.2) |          |         | —     | —      |
| TW8         | 1.125     | (28.6) |          |         | —     | —      |

## Flow Rate Characteristics

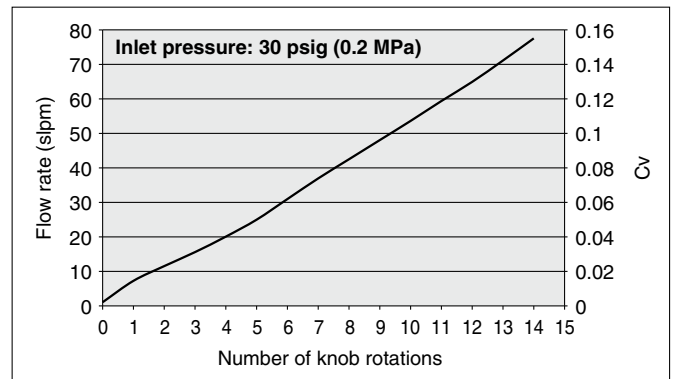
### AZ3672



### AZ3675



### AZ4675



Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

# AZ Series / Diaphragm Valve

## Optional Porting Configuration

\* Made to order specifications

How to Order (See p. 250 for ordering syntax)

**AZ 3650 S 4PWM MV4 TW4 FV4 FV4**

Port Number ① ② ③ ④

### Available series

| Code | Series |
|------|--------|
| 35□□ | AZ3500 |
| 45□□ | AZ4500 |
| 30□□ | AZ3000 |
| 36□□ | AZ3600 |
| 46□□ | AZ4600 |
| 40□□ | AZ4000 |

### Material

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

### Ports

| Code | Ports   | Configuration                                    | Connection |
|------|---------|--------------------------------------------------|------------|
| 2PW  | 2 ports | Refer to the following.<br>(Port specifications) | Welded     |
| 2PWA |         |                                                  |            |
| 2PWC |         |                                                  |            |
| 3PWD | 3 ports |                                                  |            |
| 3PWE |         |                                                  |            |
| 3PWF |         |                                                  |            |
| 3PWG |         |                                                  |            |
| 3PWH | 4 ports |                                                  |            |
| 4PWM |         |                                                  |            |

Option  
Depends on the  
product series

### Connections

| Code | Connections                   | AZ3 | AZ4 |
|------|-------------------------------|-----|-----|
| MV4  | 1/4 inch face seal (Male) *1) | ●   | ●   |
| 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            | ●   | ●   |

●: Male and female threads of the same size can be used in combination.  
—: Not available

\*1) Fixed fitting (no rotating nut)

All multiple port options are welded type.  
Please refer to the welded type for dimensions.

## Port Specifications

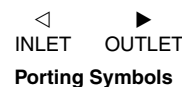
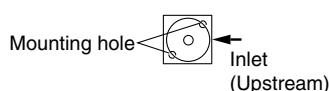
Valves are illustrated top view looking down through the valve.

The traditional flow direction is INLET to OUTLET, but AP Tech valves may be employed in either flow direction.

Port locations are indicated by numbers.

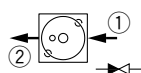
INLET (Upstream) is defined as a port connected to the region below the valve seat. It is illustrated with an arrow pointing towards the valve body or an "empty" triangle on the schematic.

OUTLET (Downstream) is defined as a port connected to the region above the seat and below the diaphragm. It is illustrated with an arrow pointing away from the valve body or a "filled" triangle on the schematic.

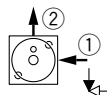


Top view (Mounting hole on bottom)

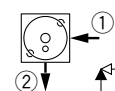
2PW



2PWA

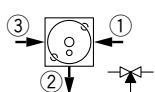


2PWC

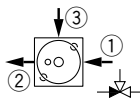


2 Ports

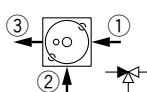
3PWD



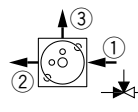
3PWE



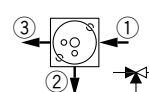
3PWF



3PWG

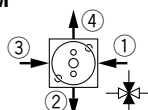


3PWH



3 Ports

4PWM



4 Ports

|             |                                      |                  |                      |              |    |    |    |                  |    |    |    |    |    |            |                 |
|-------------|--------------------------------------|------------------|----------------------|--------------|----|----|----|------------------|----|----|----|----|----|------------|-----------------|
| Precautions | Technical Data/<br>Glossary of Terms | Flow<br>Switches | Vacuum<br>Generators | Check Valves | AK | AZ | AP | Diaphragm Valves | BP | AK | AZ | SL | AP | Regulators | Recommendations |
|-------------|--------------------------------------|------------------|----------------------|--------------|----|----|----|------------------|----|----|----|----|----|------------|-----------------|

# Diaphragm Valve for General Applications

Air operated type

## AK3500 Series

- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- Indicator switch available as an option (AK3550/3580)



RoHS

How to Order (See p. 250 for ordering syntax)

AK 3 542 S 2P 4T 4T

Size

| Code | Cv   |
|------|------|
| 3    | 0.29 |

Model

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)      |
| 540  |                        | 145 psig (1.0 MPa)      |
| 550  |                        | 300 psig (2.1 MPa)      |
| 580  | Normally open (N.O.)   | 250 psig (1.7 MPa)      |

Material

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

Ports

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

Option (AK3550 and AK3580 only)

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

Connections \*1)

| Code | Connections          |
|------|----------------------|
| 4T   | 1/4 inch compression |
| 4BR  | Rc 1/4               |
| 4BRN | R 1/4                |
| 4    | NPT 1/4 female       |
| 4N   | NPT 1/4 male         |
| 6MT  | 6 mm compression     |

\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters              | AK3542                                                  | AK3540                             | AK3550                       | AK3580                       |
|-----------------------------------|---------------------------------------------------------|------------------------------------|------------------------------|------------------------------|
| Status                            | Normally closed (N.C.)                                  |                                    |                              | Normally open (N.O.)         |
| Gas                               | Select compatible materials of construction for the gas |                                    |                              |                              |
| Operating pressure                | Vacuum to 125 psig (0.9 MPa)                            | Vacuum to 145 psig (1.0 MPa) *1)   | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    | 1.5 times the maximum operating pressure                |                                    |                              |                              |
| Burst pressure                    | 3 times the maximum operating pressure                  |                                    |                              |                              |
| Ambient and operating temperature | -10 to 71°C (No freezing) *2)                           |                                    |                              |                              |
| Cv                                | 0.29                                                    |                                    |                              |                              |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                    |                              |                              |
| Connections                       | Compression, Rc, R, NPT                                 |                                    |                              |                              |
| Actuation pressure                | 60 to 110 psig (0.4 to 0.76 MPa)                        | 70 to 110 psig (0.48 to 0.76 MPa)  |                              |                              |
| Actuation port connection         | M5 x 0.8                                                | NPT 1/8 inch                       | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           | Top                                                     |                                    | Side (360° rotatable)        | Top                          |
| Installation                      | Bottom mount                                            |                                    |                              |                              |
| Internal volume                   | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            |                                    |                              |                              |
| Weight                            | 0.28 kg *3)                                             | 0.68 kg *3)                        | 0.82 kg *3)                  | 0.68 kg *3)                  |
| LOTO (Lockout)                    | N/A                                                     | Option (Part number: AP PL210) *4) |                              | N/A                          |

\*1) Vacuum to 125 psig (0.9 MPa) for Polyimide seat.

\*2) Max. 90°C for Polyimide seat.

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

\*4) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

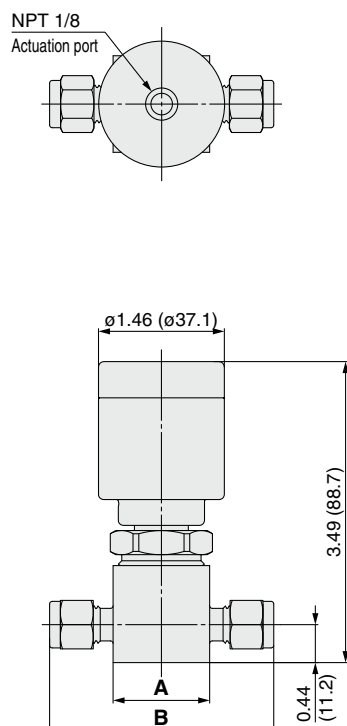
## Wetted Parts Material

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

## Dimensions

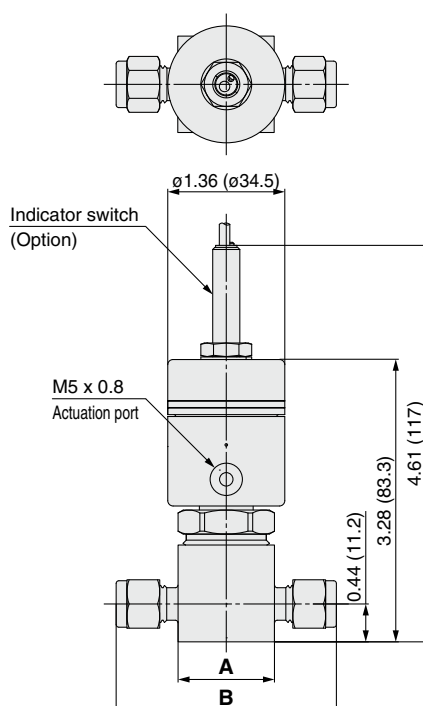
inch (mm)

### AK3540



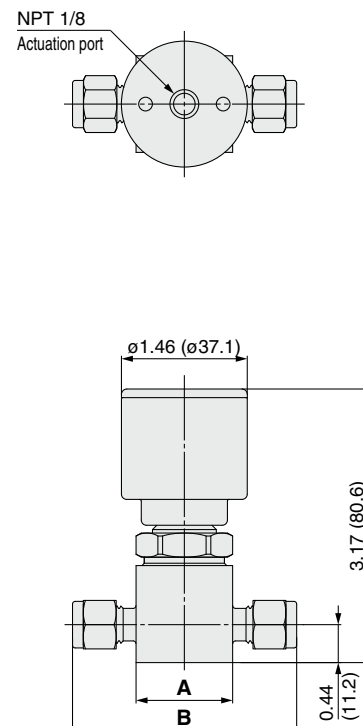
Connections: 4T, 6MT

### AK3550



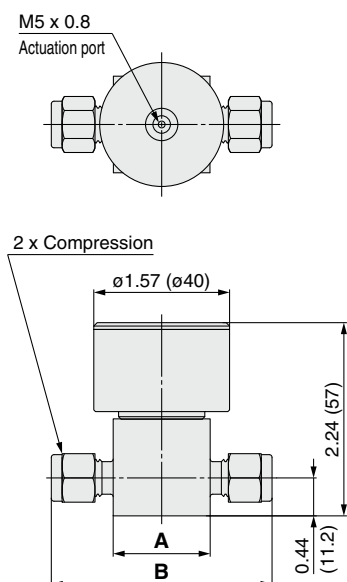
Connections: 4T, 6MT

### AK3580

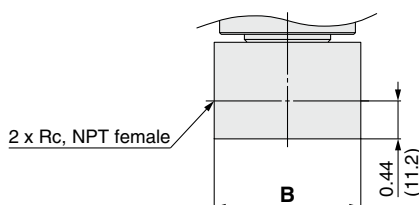


Connections: 4T, 6MT

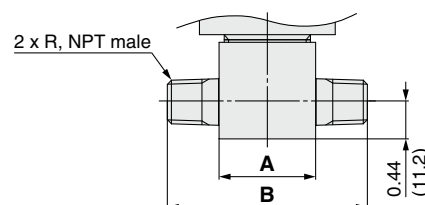
### AK3542



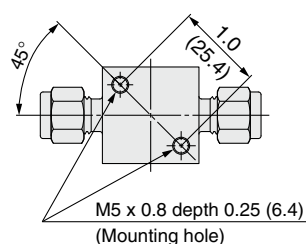
Connections: 4T, 6MT



Connections: 4, 4BR



Connections: 4N, 4BRN



Bottom view

| Connections | A        |         | B    |        | Ports                |
|-------------|----------|---------|------|--------|----------------------|
|             | inch     | (mm)    | inch | (mm)   |                      |
| 4T          | 1.12 sq. | (□28.4) | 2.56 | (65)   | 1/4 inch compression |
| 4BR         | —        | —       | 1.70 | (43.2) | Rc 1/4               |
| 4BRN        | 1.12 sq. | (□28.4) | 2.32 | (58.9) | R 1/4                |
| 4           | —        | —       | 1.70 | (43.2) | NPT 1/4 female       |
| 4N          | 1.12 sq. | (□28.4) | 2.32 | (58.9) | NPT 1/4 male         |
| 6MT         | 1.12 sq. | (□28.4) | 2.62 | (66.5) | 6 mm compression     |

# Diaphragm Valve for General Applications

Air operated type

## AK4500 Series

- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- Indicator switch available as an option (AK4550/4580)



How to Order (See p. 250 for ordering syntax)

**AK 4 542 S 2P 6T 6T** (Inlet) (Outlet)

**Size**

| Code | Cv  |
|------|-----|
| 4    | 0.5 |

**Model**

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 542  | Normally closed (N.C.) | 125 psig (0.9 MPa)      |
| 540  |                        | 300 psig (2.1 MPa)      |
| 550  | Normally open (N.O.)   | 250 psig (1.7 MPa)      |
| 580  |                        |                         |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

**Option (AK4550 and AK4580 only)**

| Code    | Specification         |
|---------|-----------------------|
| No code | —                     |
| IPC     | N.C. indicator switch |
| IPO     | N.O. indicator switch |

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Connections \*1)**

| Code | Connections          |
|------|----------------------|
| 6T   | 3/8 inch compression |
| 6BR  | Rc 3/8               |
| 6BRN | R 3/8                |
| 6    | NPT 3/8 female       |
| 6N   | NPT 3/8 male         |

\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters              | AK4542                                                  | AK4540                                | AK4550                       | AK4580                       |
|-----------------------------------|---------------------------------------------------------|---------------------------------------|------------------------------|------------------------------|
| Status                            | Normally closed (N.C.)                                  |                                       |                              | Normally open (N.O.)         |
| Gas                               | Select compatible materials of construction for the gas |                                       |                              |                              |
| Operating pressure                | Vacuum to 125 psig (0.9 MPa)                            |                                       | Vacuum to 300 psig (2.1 MPa) | Vacuum to 250 psig (1.7 MPa) |
| Proof pressure                    | 1.5 times the maximum operating pressure                |                                       |                              |                              |
| Burst pressure                    | 3 times the maximum operating pressure                  |                                       |                              |                              |
| Ambient and operating temperature | -10 to 71°C (No freezing) *1)                           |                                       |                              |                              |
| Cv                                | 0.5                                                     |                                       |                              |                              |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                       |                              |                              |
| Connections                       | Compression, Rc, R, NPT                                 |                                       |                              |                              |
| Actuation pressure                | 60 to 110 psig (0.4 to 0.76 MPa)                        | 70 to 110 psig (0.48 to 0.76 MPa)     |                              |                              |
| Actuation port connection         | M5 x 0.8                                                | NPT 1/8 inch                          | M5 x 0.8                     | NPT 1/8 inch                 |
| Actuation port location           | Top                                                     |                                       | Side (360° rotatable)        | Top                          |
| Installation                      | Bottom mount                                            |                                       |                              |                              |
| Internal volume                   | 0.12 in <sup>3</sup> (2.14 cm <sup>3</sup> )            |                                       |                              |                              |
| Weight                            | 0.28 kg *2)                                             | 0.68 kg *2)                           | 0.82 kg *2)                  | 0.68 kg *2)                  |
| LOTO (Lockout)                    | N/A                                                     | Option<br>(Part number: AP PL210) *3) | N/A                          |                              |

\*1) Max. 90°C for Polyimide seat.

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

\*3) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code                      | IPO                                                 | IPC                                                   |
|---------------------------|-----------------------------------------------------|-------------------------------------------------------|
| Contacts                  | NO (When the valve is open, the circuit is closed.) | NC (When the valve is closed, the circuit is closed.) |
| Minimum operating current | 5 mA                                                |                                                       |
| Power supply voltage      | 10 to 36 VDC                                        |                                                       |
| Rated isolation voltage   | 75 VDC                                              |                                                       |
| Rated operating current   | 100 mA                                              |                                                       |
| Rated operating voltage   | 24 VDC                                              |                                                       |
| Maximum load current      | 100 A                                               |                                                       |
| Ambient temperature range | -25 to 70°C                                         |                                                       |
| Function indicator lamp   | Available                                           |                                                       |
| Cable                     | Polyurethane cable 2 cores, 2 m                     | PVC cable 2 cores, 3 m                                |
| Wiring diagram            |                                                     |                                                       |

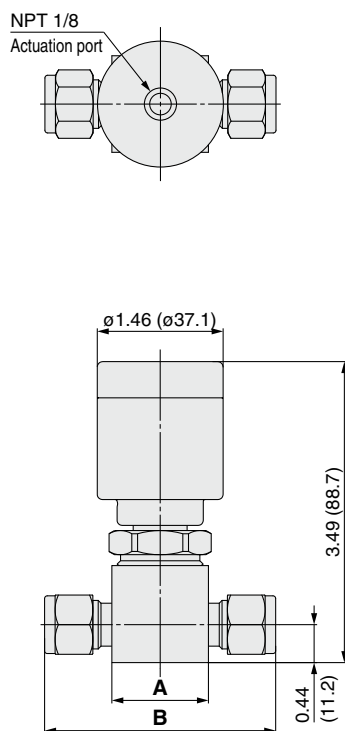
## Wetted Parts Material

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

## Dimensions

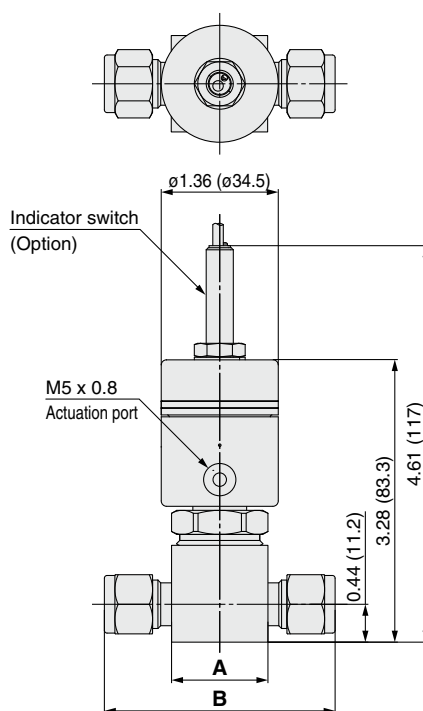
inch (mm)

### AK4540



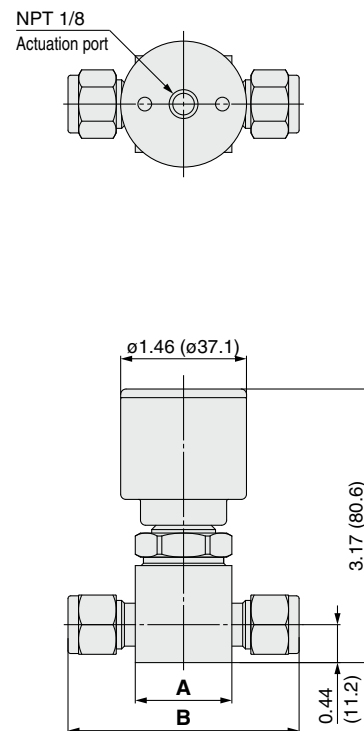
Connections: 6T

### AK4550



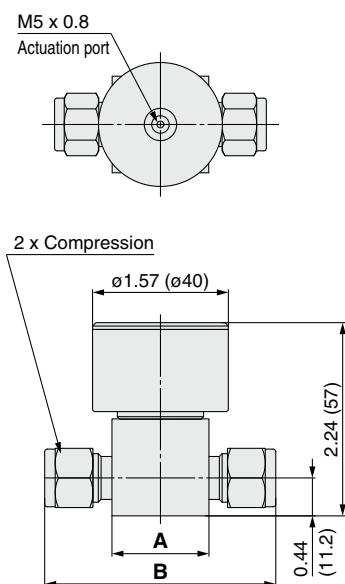
Connections: 6T

### AK4580

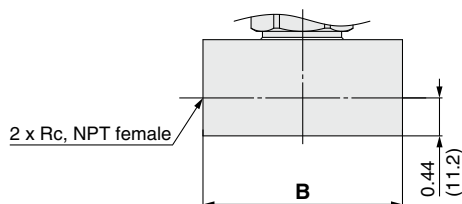


Connections: 6T

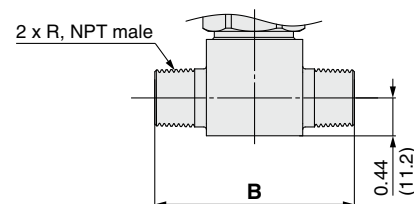
### AK4542



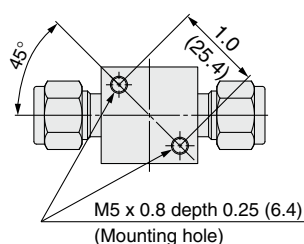
Connections: 6T



Connections: 6, 6BR



Connections: 6N, 6BRN



Bottom view

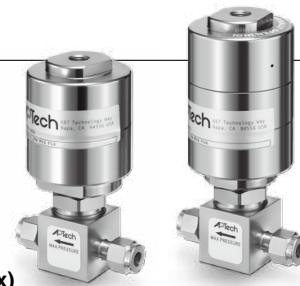
| Connections | A        |        | B    |        | Ports                |
|-------------|----------|--------|------|--------|----------------------|
|             | inch     | (mm)   | inch | (mm)   |                      |
| 6T          | 1.12 sq. | (28.4) | 2.68 | (68.1) | 3/8 inch compression |
| 6BR         | —        | —      | 2.32 | (58.9) | Rc 3/8               |
| 6BRN        | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 3/8                |
| 6           | —        | —      | 2.32 | (58.9) | NPT 3/8 female       |
| 6N          | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 3/8 male         |

# Diaphragm Valve for General Applications

Air operated type  
(For high pressure)

## AK3000 Series

- Suitable for UHP gas supply line
- Body material: 316L SS
- Pneumatically actuated normally closed or normally open
- High pressure type: Max. 4500 psig (31 MPa)
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

**AK 30 00 S 2P 4T 4T** (Inlet) (Outlet)

**Model**

| Code | Status                 | Max. operating pressure | Cv   |
|------|------------------------|-------------------------|------|
| 00   | Normally closed (N.C.) | 3000 psig (20.7 MPa)    | 0.23 |
| 02   |                        | 3700 psig (25.5 MPa)    | 0.28 |
| 04   |                        | 4500 psig (31.0 MPa)    | 0.23 |
| 07   | Normally open (N.O.)   | 4500 psig (31.0 MPa)    | 0.23 |
| 80   |                        | 3000 psig (20.7 MPa)    | 0.23 |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

**Connections \*1)**

| Code | Connections          |
|------|----------------------|
| 4T   | 1/4 inch compression |
| 4BR  | Rc 1/4               |
| 4BRN | R 1/4                |
| 4    | NPT 1/4 female       |
| 4N   | NPT 1/4 male         |
| 6MT  | 6 mm compression *2) |

**Option**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

**Seat material**

| Code    | Material         | Model |      |      |      |      |
|---------|------------------|-------|------|------|------|------|
|         |                  | 3000  | 3002 | 3004 | 3007 | 3080 |
| No code | PCTFE (Standard) | ●     | ●    | ●    | —    | ●    |
| VS      | Polyimide        | ●     | ●    | ●    | ●    | ●    |
| PK      | PEEK             | —     | —    | ●    | ●    | —    |

●: Available  
—: Not available

\*1) Only available with same type fittings inlet and outlet.  
\*2) Not available with AK3004 and AK3007.

## Specifications

| Operating Parameters              | AK3000                                                  | AK3002                         | AK3004                       | AK3007                         | AK3080                        |
|-----------------------------------|---------------------------------------------------------|--------------------------------|------------------------------|--------------------------------|-------------------------------|
| Status                            | Normally closed (N.C.)                                  |                                |                              |                                | Normally open (N.O.)          |
| Gas                               | Select compatible materials of construction for the gas |                                |                              |                                |                               |
| Operating pressure                | Vacuum to 3000 psig (20.7 MPa)                          | Vacuum to 3700 psig (25.5 MPa) | Vacuum to 4500 psig (31 MPa) | Vacuum to 3000 psig (20.7 MPa) |                               |
| Proof pressure                    | 1.5 times the maximum operating pressure                |                                |                              |                                |                               |
| Burst pressure                    | 3 times the maximum operating pressure                  |                                |                              |                                |                               |
| Ambient and operating temperature | -10 to 71°C (No freezing) *1)                           |                                | -10 to 49°C (No freezing)    | -10 to 60°C (No freezing)      | -10 to 71°C (No freezing) *1) |
| Cv                                | 0.23                                                    | 0.28                           | 0.23                         |                                |                               |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m³/s                           |                                |                              |                                |                               |
| Connections                       | Face seal, Tube weld                                    |                                |                              |                                |                               |
| Actuation pressure                | 70 to 110 psig (0.48 to 0.76 MPa)                       |                                |                              |                                |                               |
| Actuation port connection         | NPT 1/8 inch                                            |                                |                              |                                |                               |
| Actuation port location           | Top                                                     |                                |                              |                                |                               |
| Installation                      | Bottom mount                                            |                                |                              |                                |                               |
| Internal volume                   | 0.06 in³ (1.07 cm³)                                     |                                |                              |                                |                               |
| Weight                            | 1.27 kg *3)                                             |                                |                              |                                |                               |
| LOTO (Lockout)                    | Option (Part number: AP PL210) *3)                      |                                |                              |                                | N/A                           |

\*1) Max. 90°C for Polyimide seat.

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

\*3) Refer to the specification for options. (P.227)

## Indicator Switch (Option) Specification

| Code              |                   | IS                                                                                                                         |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Rated voltage     |                   | Max. 30 VDC                                                                                                                |
| Contact capacity  |                   | Max. 3 VA                                                                                                                  |
| Switching current |                   | Max. 0.2 A                                                                                                                 |
| Carrying current  |                   | Max. 0.5 A                                                                                                                 |
| Cable             | Lead wire         | AWG 24                                                                                                                     |
|                   | Cable length      | 3 m                                                                                                                        |
|                   | Color (Lead wire) | Blue: Common line                                                                                                          |
|                   |                   | Brown: NC (When the valve is closed, the circuit is closed.)<br>Black: NO (When the valve is open, the circuit is closed.) |

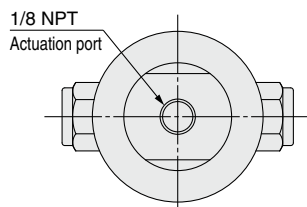
## Wetted Parts Material

| Wetted Parts |                        | S                                  |
|--------------|------------------------|------------------------------------|
| Body         |                        | 316L SS                            |
| Diaphragm    |                        | Ni-Co alloy                        |
| Seat         | AK3000, AK3002, AK3080 | PCTFE<br>(Option: Polyimide)       |
|              | AK3004                 | PCTFE<br>(Option: Polyimide, PEEK) |
|              | AK3007                 | Polyimide or PEEK                  |

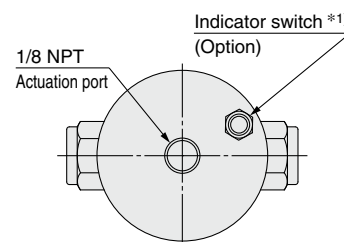
## Dimensions

inch (mm)

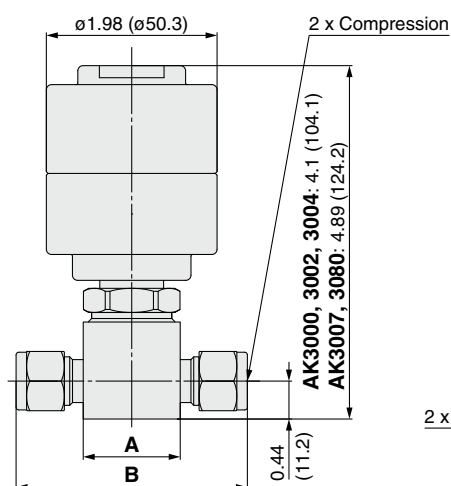
**AK3000**      **AK3007**  
**AK3002**      **AK3080**  
**AK3004**



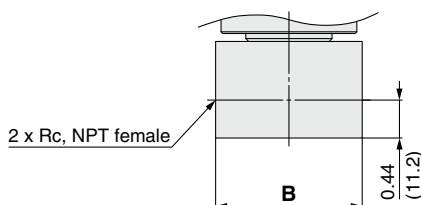
### Indicator switch



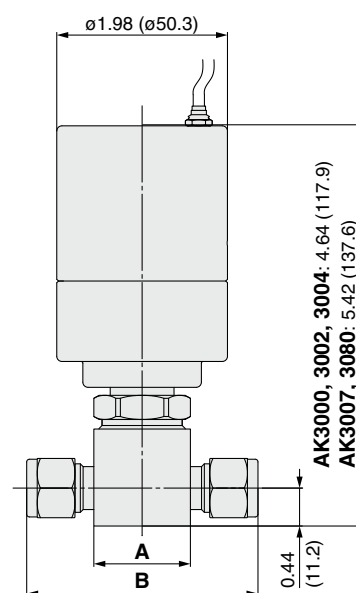
\*1) The mounting position varies depending on the product.



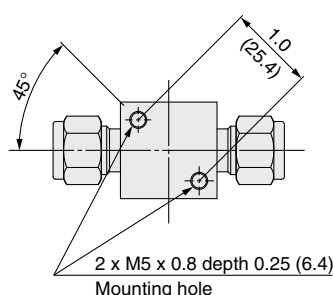
Connections: 4T, 6MT



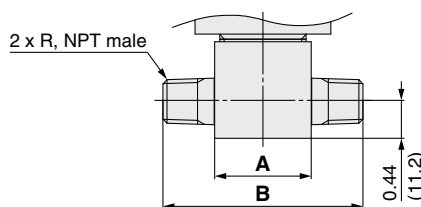
Connections: 4, 4BR



Connections: 4T



4T (Bottom view)



Connections: 4N, 4BRN

| Connections | A        |         | B    |        | Ports                |
|-------------|----------|---------|------|--------|----------------------|
|             | inch     | (mm)    | inch | (mm)   |                      |
| <b>4T</b>   | 1.12 sq. | (□28.4) | 2.56 | (65)   | 1/4 inch compression |
| <b>4BR</b>  | —        | —       | 1.70 | (43.2) | Rc 1/4               |
| <b>4BRN</b> | 1.12 sq. | (□28.4) | 2.32 | (58.9) | R 1/4                |
| <b>4</b>    | —        | —       | 1.70 | (43.2) | NPT 1/4 female       |
| <b>4N</b>   | 1.12 sq. | (□28.4) | 2.32 | (58.9) | NPT 1/4 male         |
| <b>6MT</b>  | 1.12 sq. | (□28.4) | 2.62 | (66.5) | 6 mm compression     |

# Diaphragm Valve for General Applications

Air operated type  
(For high pressure)

## AK4000 Series

- Suitable for process gas supply line
- Body material : 316L SS
- Pneumatically actuated normally closed
- High pressure type: Max. 3000 psig (20.7 MPa)
- Indicator switch available as an option



RoHS

How to Order (See p. 250 for ordering syntax)

AK 40 00 S 2P 6T 6T

### Model

| Code | Status                 | Max. operating pressure |
|------|------------------------|-------------------------|
| 00   | Normally closed (N.C.) | 3000 psig (20.7 MPa)    |

### Material

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

### Ports

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

### Option

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| IS      | Indicator switch |

### Seat material

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

### Connections \*1)

| Code | Connections          |
|------|----------------------|
| 6T   | 3/8 inch compression |
| 6BR  | Rc 3/8               |
| 6BRN | R 3/8                |
| 6    | NPT 3/8 female       |
| 6N   | NPT 3/8 male         |

\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters              | AK4000                                                  |
|-----------------------------------|---------------------------------------------------------|
| Status                            | Normally closed (N.C.)                                  |
| Gas                               | Select compatible materials of construction for the gas |
| Operating pressure                | Vacuum to 3000 psig (20.7 MPa)                          |
| Proof pressure                    | 1.5 times the maximum operating pressure                |
| Burst pressure                    | 3 times the maximum operating pressure                  |
| Ambient and operating temperature | -10 to 71°C (No freezing) *1)                           |
| Cv                                | 0.35                                                    |
| Leak rate                         | $1 \times 10^{-10}$ Pa·m <sup>3</sup> /s                |
| Connections                       | Compression, Rc, R, NPT                                 |
| Actuation pressure                | 70 to 110 psig (0.48 to 0.76 MPa)                       |
| Actuation port connection         | NPT 1/8 inch                                            |
| Actuation port location           | Top                                                     |
| Installation                      | Bottom mount                                            |
| Internal volume                   | 0.12 in <sup>3</sup> (2.14 cm <sup>3</sup> )            |
| Weight                            | 1.27 kg *2)                                             |

\*1) Max. 90°C for Polyimide seat.

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

## Indicator Switch (Option) Specification

| Code              |                   | IS                                                                                                                         |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------|
| Switch type       |                   | SPDT                                                                                                                       |
| Rated voltage     |                   | Max. 30 VDC                                                                                                                |
| Contact capacity  |                   | Max. 3 VA                                                                                                                  |
| Switching current |                   | Max. 0.2 A                                                                                                                 |
| Carrying current  |                   | Max. 0.5 A                                                                                                                 |
| Cable             | Lead wire         | AWG 24                                                                                                                     |
|                   | Cable length      | 3 m                                                                                                                        |
|                   | Color (Lead wire) | Blue: Common line                                                                                                          |
|                   |                   | Brown: NC (When the valve is closed, the circuit is closed.)<br>Black: NO (When the valve is open, the circuit is closed.) |

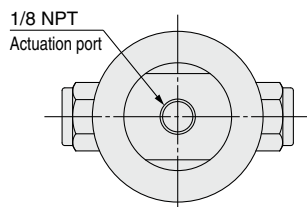
## Wetted Parts Material

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

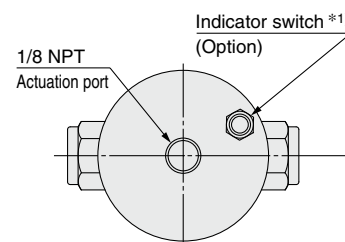
## Dimensions

inch (mm)

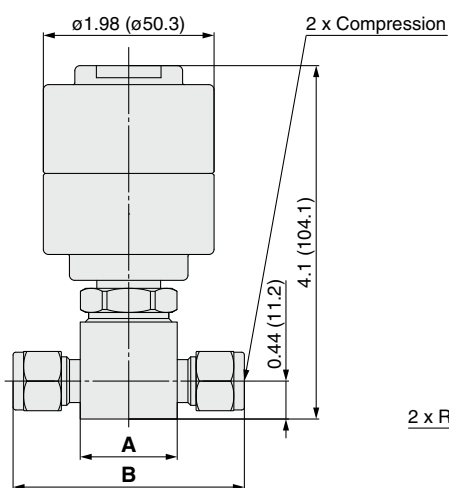
### AK4000



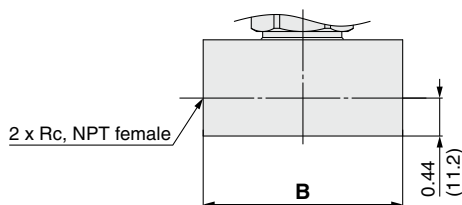
#### Indicator switch



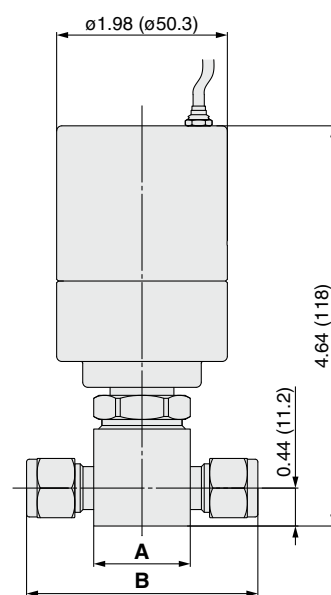
\*1) The mounting position varies depending on the product.



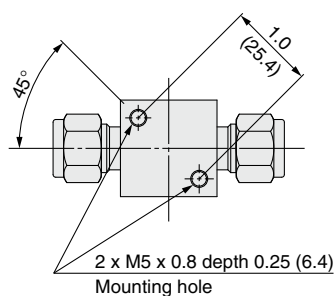
Connections: 6T



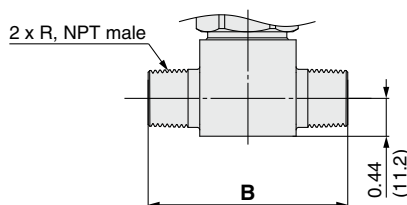
Connections: 6, 6BR



Connections: 6T



6T (Bottom view)



Connections: 6N, 6BRN

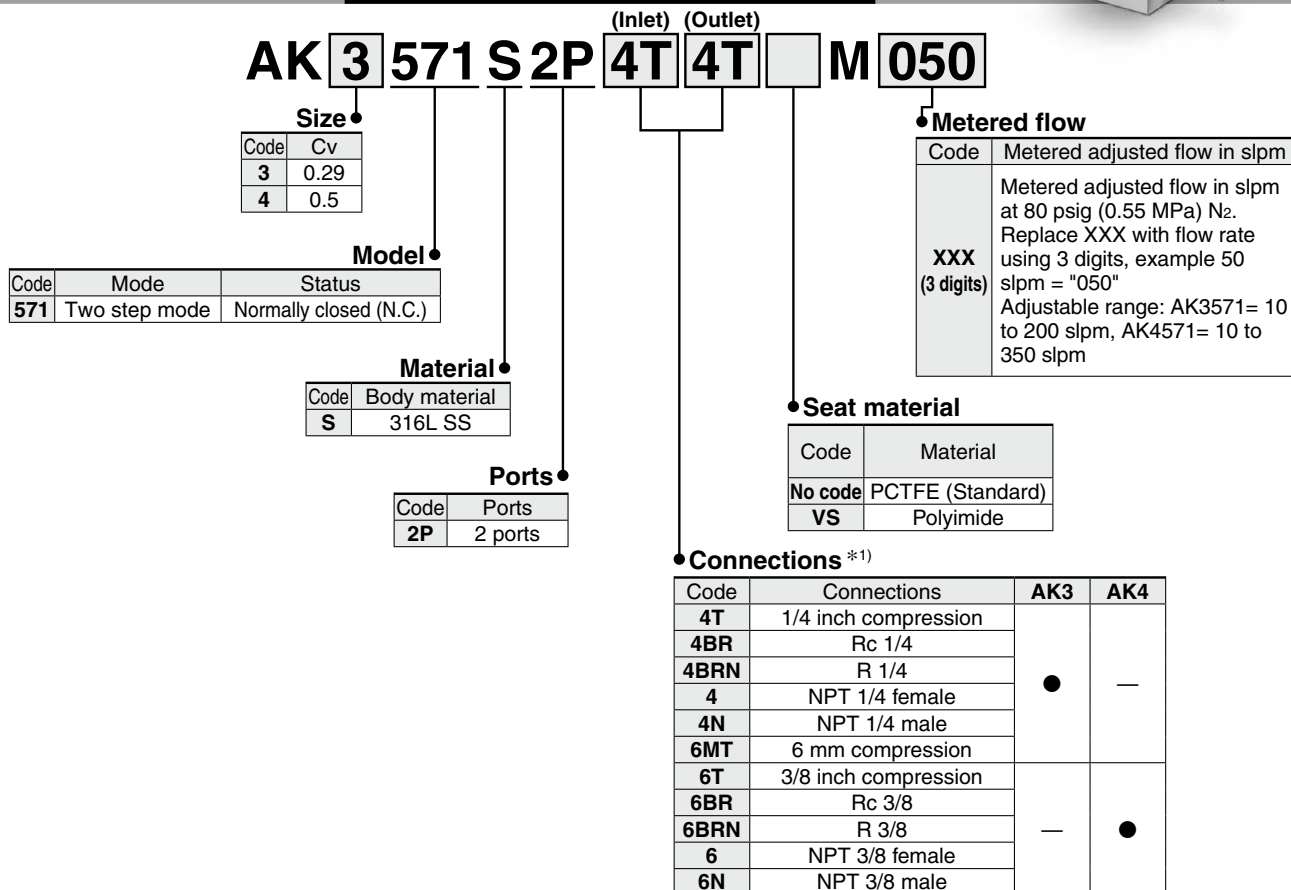
| Connections | A        |         | B    |        | Ports                |
|-------------|----------|---------|------|--------|----------------------|
|             | inch     | (mm)    | inch | (mm)   |                      |
| 6T          | 1.12 sq. | (□28.4) | 2.68 | (68.1) | 3/8 inch compression |
| 6BR         | —        | —       | 2.32 | (58.9) | Rc 3/8               |
| 6BRN        | 1.12 sq. | (□28.4) | 2.32 | (58.9) | R 3/8                |
| 6           | —        | —       | 2.32 | (58.9) | NPT 3/8 female       |
| 6N          | 1.12 sq. | (□28.4) | 2.32 | (58.9) | NPT 3/8 male         |

### AK3571 & 4571 Series

- Two step mode - metered flow and full open
- Two separate actuation ports
- Soft start valve to minimize vacuum chamber pressurization turbulence
- Metered flow adjustable AK3571: 10 to 200 slpm\*  
AK4571: 10 to 350 slpm\*
- Pneumatically actuated normally closed
- Body material: 316L SS

\* At 80 psig (0.55 MPa) of N<sub>2</sub>

**How to Order** (See p. 250 for ordering syntax)



\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters                 |                 | AK3571                                                  | AK4571                                       |
|--------------------------------------|-----------------|---------------------------------------------------------|----------------------------------------------|
| 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                       |                 | 1.5 times the maximum operating pressure                |                                              |
| Burst pressure                       |                 | 3 times the maximum operating pressure                  |                                              |
| Ambient and operating temperature    |                 | -10 to 71°C (No freezing) *1)                           |                                              |
| Cv                                   |                 | 0.29                                                    | 0.5                                          |
| Leak rate                            |                 | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                              |
| Connections                          |                 | Compression, Rc, R, NPT                                 |                                              |
| Actuation pressure                   |                 | 70 to 110 psig (0.48 to 0.76 MPa)                       |                                              |
| Actuation port connection            |                 | M5 x 0.8                                                |                                              |
| Actuation port location              |                 | Sides (2 each)                                          |                                              |
| Installation                         |                 | Bottom mount                                            |                                              |
| Internal volume                      |                 | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            | 0.12 in <sup>3</sup> (2.14 cm <sup>3</sup> ) |
| Adjustable range of metered flow *2) |                 | 10 to 200 slpm                                          | 10 to 350 slpm                               |
| Tolerance of metered flow *2)        | 10 to 20 slpm   | ±6 slpm                                                 |                                              |
|                                      | 21 to 50 slpm   | ±10 slpm                                                |                                              |
|                                      | 51 to 100 slpm  | ±15 slpm                                                |                                              |
|                                      | 101 to 200 slpm | ±20 slpm                                                |                                              |
|                                      | 201 to 350 slpm | N/A                                                     | ±25 slpm                                     |

\*1) -10 to 90°C for Polyimide seat.

\*2) At 80 psig (0.55 MPa) N<sub>2</sub>

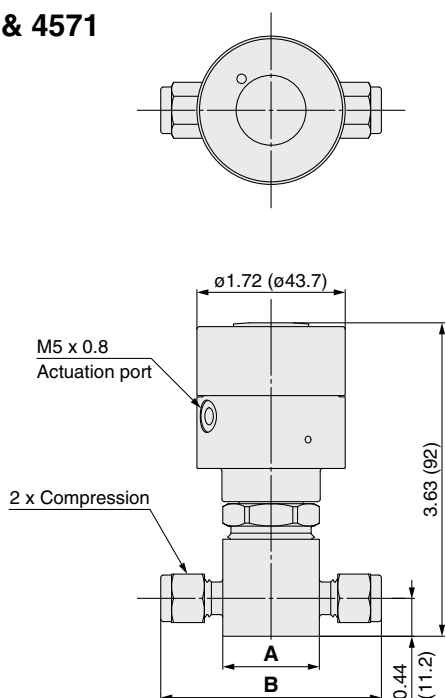
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Diaphragm      | Ni-Co alloy                 |
| Seat           | PCTFE (Option: Polyimide)   |

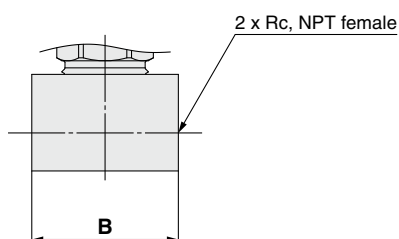
## Dimensions

inch (mm)

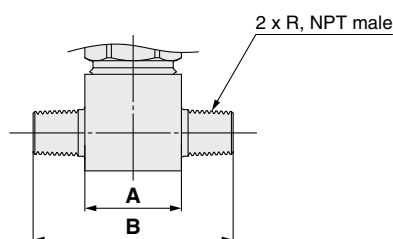
### AK3571 & 4571



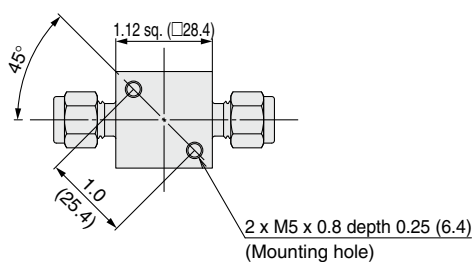
Connections: 4T, 6MT, 6T



Connections: 4, 6, 4BR, 6BR



Connections: 4N, 6N, 4BRN, 6BRN

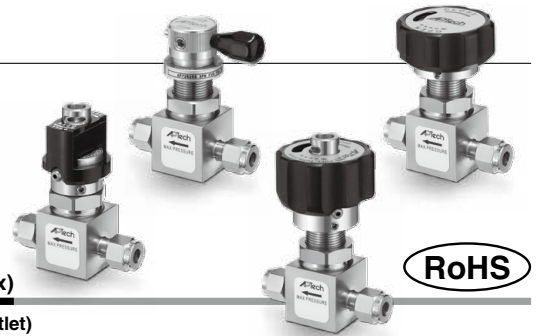


Bottom view

| Connections | A        |        | B    |        | Ports                |
|-------------|----------|--------|------|--------|----------------------|
|             | inch     | (mm)   | inch | (mm)   |                      |
| 4T          | 1.12 sq. | (28.4) | 2.56 | (65.0) | 1/4 inch compression |
| 4BR         | —        | —      | 1.70 | (43.2) | Rc 1/4               |
| 4BRN        | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 1/4                |
| 4           | —        | —      | 1.70 | (43.2) | NPT 1/4 female       |
| 4N          | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 1/4 male         |
| 6MT         | 1.12 sq. | (28.4) | 2.62 | (66.5) | 6 mm compression     |
| 6T          | 1.12 sq. | (28.4) | 2.68 | (68.1) | 3/8 inch compression |
| 6BR         | —        | —      | 2.32 | (58.9) | Rc 3/8               |
| 6BRN        | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 3/8                |
| 6           | —        | —      | 2.32 | (58.9) | NPT 3/8 female       |
| 6N          | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 3/8 male         |

### AK3600 Series

- Body material: 316L SS
- LOTO standard with AK3657/3659, optional AK3625
- Indicator switch available as an option (AK3650)



#### How to Order (See p. 250 for ordering syntax)

**AK 3 652 S 2P 4T 4T** (Inlet) (Outlet)

**Size**

| Code | Cv   |
|------|------|
| 3    | 0.29 |

**Model**

| Code | Knob                                         | Max. operating pressure |
|------|----------------------------------------------|-------------------------|
| 652  | Round knob with a raised rectangular section | 250 psig (1.7 MPa)      |
| 659  | Pull twist knob with LOTO                    | 3000 psig (20.7 MPa)    |
| 600  | Multi turn round knob                        |                         |
| 625  | Lever knob                                   |                         |
| 650  | Round knob with open/close indication window |                         |
| 657  | Pull twist knob with LOTO                    |                         |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

**Connections \*1)**

| Code | Connections          |
|------|----------------------|
| 4T   | 1/4 inch compression |
| 4BR  | Rc 1/4               |
| 4BRN | R 1/4                |
| 4    | NPT 1/4 female       |
| 4N   | NPT 1/4 male         |
| 6MT  | 6 mm compression     |

**Option (AK3650 only)**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| ISH     | Indicator switch |

**Installation option**

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *2)  |

\*2) Panel mounting hole: dia. 0.78 inch (19.8 mm).  
Not available with AK3652 and AK3659.

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

\*1) Only available with same type fittings inlet and outlet.

### Specifications

| Operating Parameters              | AK3652                                                                                 | AK3659                        | AK3600                             | AK3625                                | AK3650                                                | AK3657                        |
|-----------------------------------|----------------------------------------------------------------------------------------|-------------------------------|------------------------------------|---------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               | Select compatible materials of construction for the gas                                |                               |                                    |                                       |                                                       |                               |
| Operating pressure                | Vacuum to 250 psig (1.7 MPa)                                                           |                               | Vacuum to 3000 psig (20.7 MPa)     |                                       |                                                       |                               |
| Proof pressure                    | 1.5 times the maximum operating pressure                                               |                               |                                    |                                       |                                                       |                               |
| Burst pressure                    | 3 times the maximum operating pressure                                                 |                               |                                    |                                       |                                                       |                               |
| Ambient and operating temperature | -40 to 71°C (No freezing) *1)                                                          |                               |                                    |                                       |                                                       |                               |
| Cv                                | 0.29                                                                                   |                               |                                    |                                       |                                                       |                               |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m³/s                                                          |                               |                                    |                                       |                                                       |                               |
| Connections                       | Compression, Rc, R, NPT                                                                |                               |                                    |                                       |                                                       |                               |
| Installation                      | Bottom mount                                                                           |                               | Bottom mount (Option: panel mount) |                                       |                                                       |                               |
| Internal volume                   | 0.06 in³ (1.07 cm³)                                                                    |                               |                                    |                                       |                                                       |                               |
| Weight                            | 0.26 kg *2)                                                                            | 0.45 kg *2)                   | 0.36 kg *2)                        | 0.45 kg *2)                           | 0.73 kg *2)                                           | 0.4 kg *2)                    |
| Knob                              | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *4) | Multi turn round knob              | 1/4 turn lever knob *3)               | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *4) |
| Operational Safety Device (OSD)   | N/A                                                                                    | Standard                      | N/A                                | Option *5)<br>(Part number: AP PL227) | N/A                                                   | Standard                      |
| LOTO (Lockout)                    |                                                                                        |                               |                                    | Option *5)<br>(Part number: AP PL225) |                                                       |                               |

\*1) -10 to 90°C for Polyimide seat.

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

\*3) Optional lever color available. Please contact SMC.

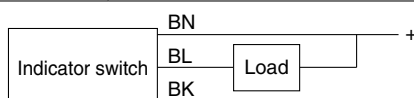
\*4) Handle must be pulled to turn open from closed.

\*5) Refer to the specification for options. (P.227)

### Indicator Switch (Option) Specification

| Code                 | ISH                               |
|----------------------|-----------------------------------|
| Output type          | NPN                               |
| Power supply voltage | 3.8 to 30 VDC                     |
| Output voltage       | Max. 0.4 VDC                      |
| Supply current       | Max. 11 mA                        |
| Output current       | Max. 20 mA                        |
| Cable                | Lead wire                         |
|                      | AWG 24                            |
|                      | Cable length                      |
|                      | 3 m                               |
|                      | Color (Lead wire)                 |
|                      | Blue (BL), Brown (BN), Black (BK) |

#### Wiring Diagram



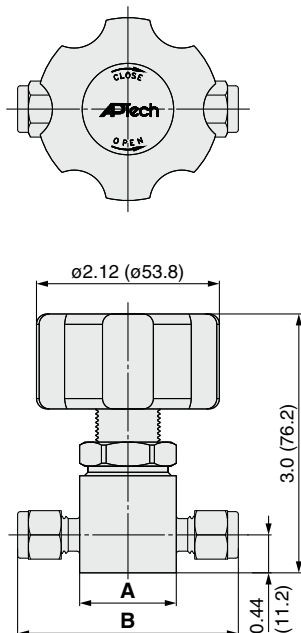
### Wetted Parts Material

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

## Dimensions

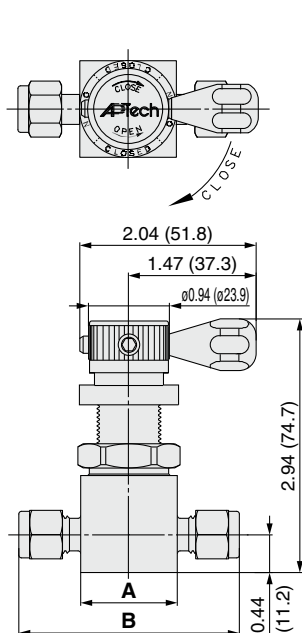
inch (mm)

### AK3600



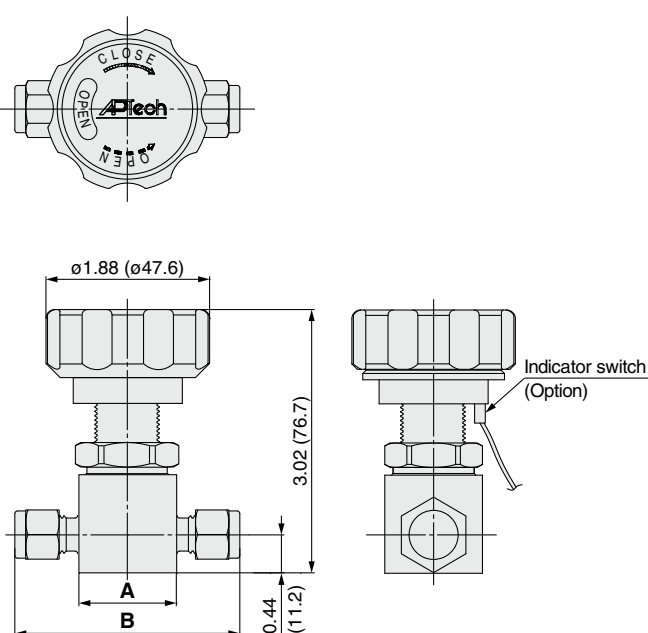
Connections: 4T, 6MT

### AK3625



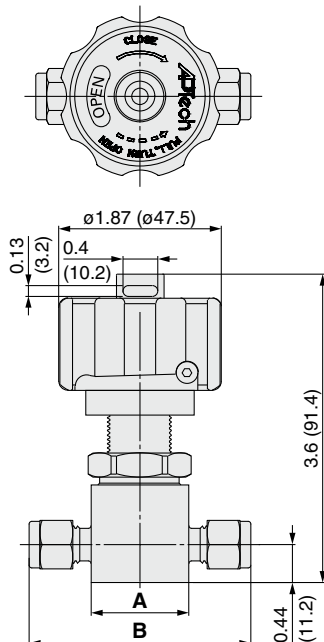
Connections: 4T, 6MT

### AK3650



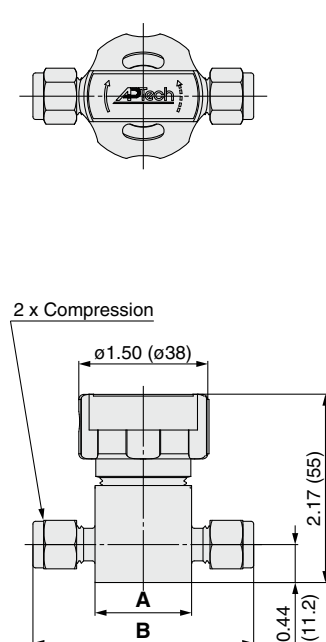
Connections: 4T, 6MT

### AK3657



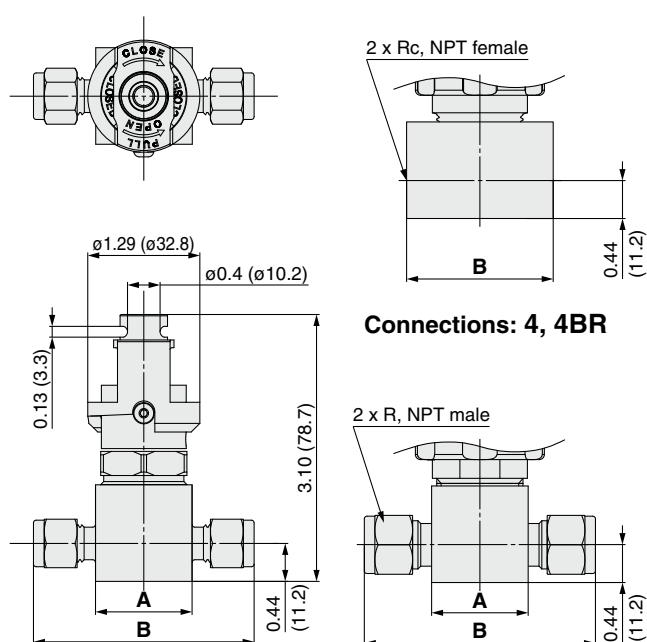
Connections: 4T, 6MT

### AK3652



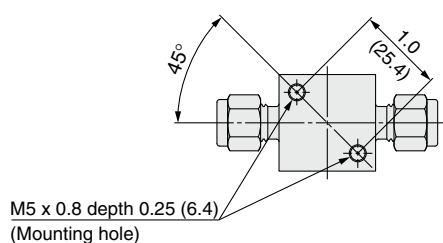
Connections: 4T, 6MT

### AK3659



Connections: 4T, 6MT

Connections: 4N, 4BRN



Bottom view

| Connections | A        |        | B    |        | Ports                |
|-------------|----------|--------|------|--------|----------------------|
|             | inch     | (mm)   | inch | (mm)   |                      |
| 4T          | 1.12 sq. | (28.4) | 2.56 | (65)   | 1/4 inch compression |
| 4BR         | —        | —      | 1.70 | (43.2) | Rc 1/4               |
| 4BRN        | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 1/4                |
| 4           | —        | —      | 1.70 | (43.2) | NPT 1/4 female       |
| 4N          | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 1/4 male         |
| 6MT         | 1.12 sq. | (28.4) | 2.62 | (66.5) | 6 mm compression     |

### AK4600 Series

- Body material: 316L SS
- LOTO standard with AK4657/4659, optional AK4625
- Indicator switch available as an option (AK4650)



#### How to Order (See p. 250 for ordering syntax)

**AK 4 652 S 2P 6T 6T** (Inlet) (Outlet)

**Size**

| Code | Cv  |
|------|-----|
| 4    | 0.5 |

**Model**

| Code | Knob                                         | Max. operating pressure |
|------|----------------------------------------------|-------------------------|
| 652  | Round knob with a raised rectangular section | 250 psig (1.7 MPa)      |
| 659  | Pull twist knob with LOTO                    | 300 psig (2.1 MPa)      |
| 600  | Multi turn round knob                        |                         |
| 625  | Lever knob                                   |                         |
| 650  | Round knob with open/close indication window |                         |
| 657  | Pull twist knob with LOTO                    |                         |

**Material**

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

**Ports**

| Code | Ports   |
|------|---------|
| 2P   | 2 ports |

**Connections \*1)**

| Code | Connections          |
|------|----------------------|
| 6T   | 3/8 inch compression |
| 6BR  | Rc 3/8               |
| 6BRN | R 3/8                |
| 6    | NPT 3/8 female       |
| 6N   | NPT 3/8 male         |

\*1) Only available with same type fittings inlet and outlet.

**Seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

**Option (AK4650 only)**

| Code    | Specification    |
|---------|------------------|
| No code | —                |
| ISH     | Indicator switch |

**Installation option**

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *3)  |

\*3) Panel mounting hole: dia. 0.78 inch (19.8 mm). Not available with AK4652 and AK4659.

**Option**

| Code    | Specification                                                       |
|---------|---------------------------------------------------------------------|
| No code | Standard                                                            |
| HR      | High pressure *2)<br>(Max. operating pressure 3000 psig (20.7 MPa)) |

\*2) Not available with AK4652 and AK4659.

### Specifications

| Operating Parameters              | AK4652                                                                                 | AK4659                        | AK4600                             | AK4625                                | AK4650                                                | AK4657                        |
|-----------------------------------|----------------------------------------------------------------------------------------|-------------------------------|------------------------------------|---------------------------------------|-------------------------------------------------------|-------------------------------|
| Gas                               | Select compatible materials of construction for the gas                                |                               |                                    |                                       |                                                       |                               |
| Operating pressure                | Vacuum to 250 psig (1.7 MPa)                                                           |                               | Vacuum to 300 psig (2.1 MPa)       |                                       |                                                       |                               |
| Proof pressure                    | 1.5 times the maximum operating pressure                                               |                               |                                    |                                       |                                                       |                               |
| Burst pressure                    | 3 times the maximum operating pressure                                                 |                               |                                    |                                       |                                                       |                               |
| Ambient and operating temperature | −40 to 71°C (No freezing) *1)                                                          |                               |                                    |                                       |                                                       |                               |
| Cv                                | 0.5                                                                                    |                               |                                    |                                       |                                                       |                               |
| Leak rate                         | 1 x 10 <sup>−10</sup> Pa·m³/s                                                          |                               |                                    |                                       |                                                       |                               |
| Connections                       | Compression, Rc, R, NPT                                                                |                               |                                    |                                       |                                                       |                               |
| Installation                      | Bottom mount                                                                           |                               | Bottom mount (Option: panel mount) |                                       |                                                       |                               |
| Internal volume                   | 0.12 in³ (2.14 cm³)                                                                    |                               |                                    |                                       |                                                       |                               |
| Weight                            | 0.26 kg *2)                                                                            | 0.45 kg *2)                   | 0.36 kg *2)                        | 0.45 kg *2)                           | 0.73 kg *2)                                           | 0.4 kg *2)                    |
| Knob                              | 1/4 turn round knob with a raised rectangular section and open/close indication window | Pull twist knob with LOTO *4) | Multi turn round knob              | 1/4 turn lever knob *3)               | 1/4 turn round knob with open/close indication window | Pull twist knob with LOTO *4) |
| Operational Safety Device (OSD)   | N/A                                                                                    | Standard                      | N/A                                | Option *5)<br>(Part number: AP PL227) | N/A                                                   | Standard                      |
| LOTO (Lockout)                    |                                                                                        |                               |                                    | Option *5)<br>(Part number: AP PL225) |                                                       |                               |

\*1) -10 to 90°C for Polyimide seat.

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

\*3) Optional lever color available. Please contact SMC.

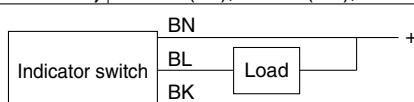
\*4) Handle must be pulled to turn open from closed.

\*5) Refer to the specification for options. (P.227)

### Indicator Switch (Option) Specification

| Code                 | ISH                               |
|----------------------|-----------------------------------|
| Output type          | NPN                               |
| Power supply voltage | 3.8 to 30 VDC                     |
| Output voltage       | Max. 0.4 VDC                      |
| Supply current       | Max. 11 mA                        |
| Output current       | Max. 20 mA                        |
| Cable                | Lead wire                         |
|                      | Cable length                      |
|                      | Color (Lead wire)                 |
|                      | AWG 24                            |
|                      | 3 m                               |
|                      | Blue (BL), Brown (BN), Black (BK) |

#### Wiring Diagram



### Wetted Parts Material

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

### Option

#### High pressure

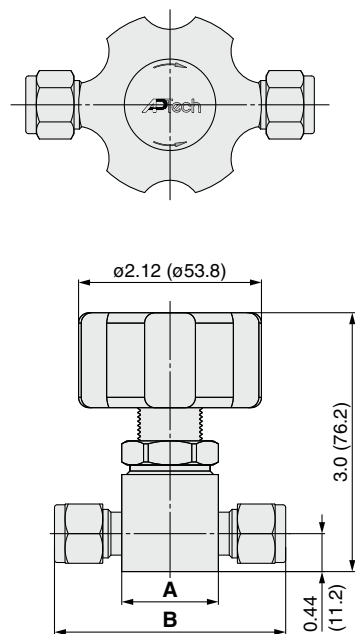
Changes from the standard type are:

| Option | Other Parameters   | AK4600                         | AK4625 | AK4650 | AK4657 |
|--------|--------------------|--------------------------------|--------|--------|--------|
| HR     | Operating pressure | Vacuum to 3000 psig (20.7 MPa) |        |        |        |

## Dimensions

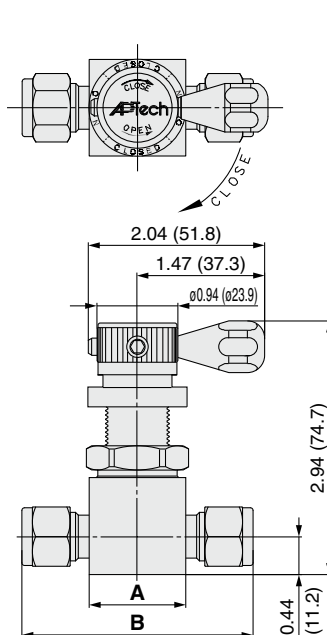
inch (mm)

### AK4600



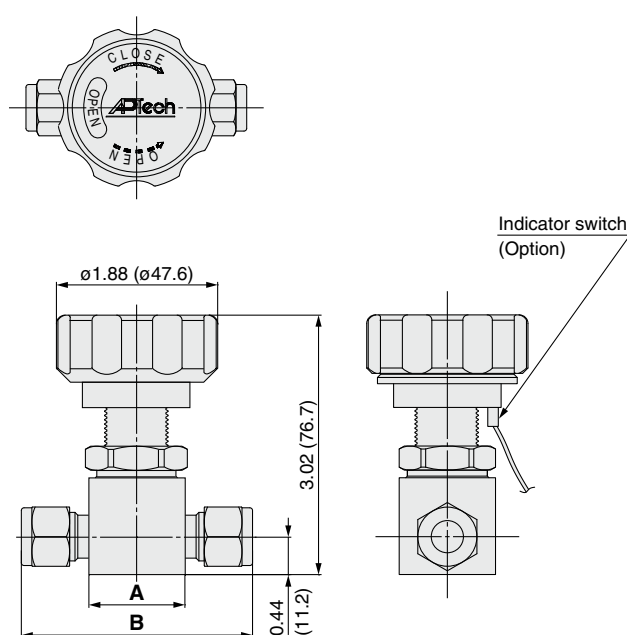
Connections: 6T

### AK4625



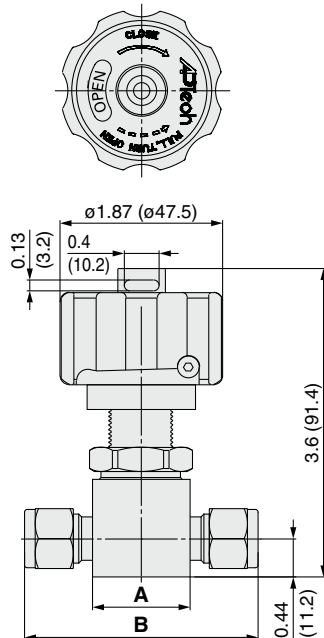
Connections: 6T

### AK4650



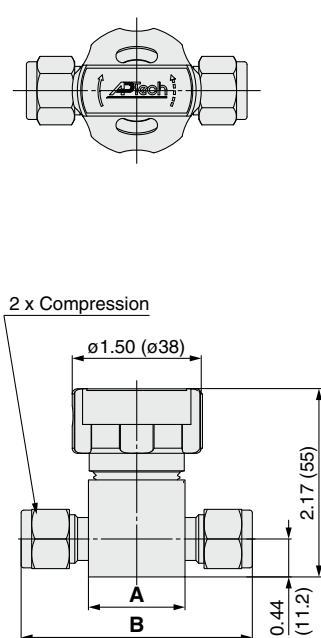
Connections: 6T

### AK4657



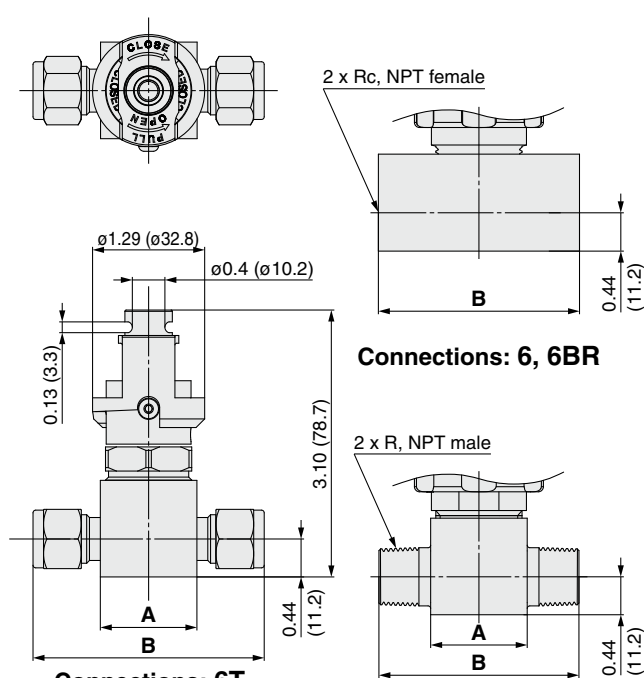
Connections: 6T

### AK4652



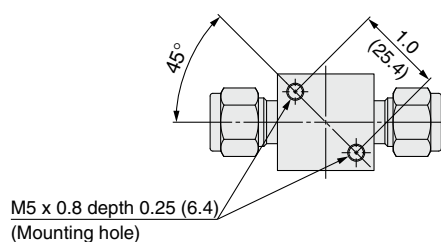
Connections: 6T

### AK4659



Connections: 6T

Connections: 6N, 6BRN



Bottom view

| Connections | A        |        | B    |        | Ports                |
|-------------|----------|--------|------|--------|----------------------|
|             | inch     | (mm)   | inch | (mm)   |                      |
| 6T          | 1.12 sq. | (28.4) | 2.68 | (68.1) | 3/8 inch compression |
| 6BR         | —        | —      | 2.32 | (58.9) | Rc 3/8               |
| 6BRN        | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 3/8                |
| 6           | —        | —      | 2.32 | (58.9) | NPT 3/8 female       |
| 6N          | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 3/8 male         |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

## AK3604, 3624 & 3627 Series

- Body material: 316L SS



RoHS

How to Order (See p. 250 for ordering syntax)

AK 3 604 S 2P 4T 4T

Size

| Code | Cv   |
|------|------|
| 3    | 0.29 |

Model

| Code | Knob                  | Max. operating pressure |
|------|-----------------------|-------------------------|
| 604  | Multi turn round knob | 3700 psig (25.5 MPa)    |
| 624  | 1/4 turn lever knob   | (25.5 MPa)              |
| 627  | T handle              | 4500 psig (31 MPa)      |

Material

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

Ports

| Code | Body material |
|------|---------------|
| 2P   | 2 ports       |

### Installation option

| Code    | Installation            |
|---------|-------------------------|
| No code | Bottom mount (Standard) |
| P       | Panel installation *2)  |

\*2) Panel mounting hole: dia. 0.78 inch (19.8 mm).

### Seat material

| Code    | Material         | Model          |
|---------|------------------|----------------|
|         |                  | 3604 3624 3627 |
| No code | PCTFE (Standard) | ● ● —          |
| VS      | Polyimide        | ● ● ●          |
| PK      | PEEK             | ● ● ●          |

●: Available  
—: Not available

### Connections \*1)

| Code | Connections          |
|------|----------------------|
| 4T   | 1/4 inch compression |
| 4BR  | Rc 1/4               |
| 4BRN | R 1/4                |
| 4    | NPT 1/4 female       |
| 4N   | NPT 1/4 male         |

\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters              | AK3604                                                  | AK3624                                | AK3627                       |
|-----------------------------------|---------------------------------------------------------|---------------------------------------|------------------------------|
| Gas                               | Select compatible materials of construction for the gas |                                       |                              |
| Operating pressure                | Vacuum to 3700 psig (25.5 MPa)                          |                                       | Vacuum to 4500 psig (31 MPa) |
| Proof pressure                    | 1.5 times the maximum operating pressure                |                                       |                              |
| Burst pressure                    | 3 times the maximum operating pressure                  |                                       |                              |
| Ambient and operating temperature | -40 to 49°C (No freezing)                               |                                       | -40 to 60°C (No freezing)    |
| Cv                                | 0.29                                                    |                                       |                              |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |                                       |                              |
| Connections                       | Compression, Rc, R, NPT                                 |                                       |                              |
| Installation                      | Bottom mount (Option: panel mount)                      |                                       |                              |
| Internal volume                   | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            |                                       |                              |
| Weight                            | 0.36 kg *1)                                             | 0.45 kg *1)                           | 0.45 kg *1)                  |
| Knob                              | Multi turn round knob                                   | 1/4 turn lever knob                   | 1/4 turn T handle            |
| LOTO (Lockout)                    | N/A                                                     | Option *2)<br>(Part number: AP PL225) | N/A                          |

\*1) Weight, including individual boxed weight, may vary depending on connections or options.

\*2) Refer to the specification for options. (P.227)

## Wetted Parts Material

| Wetted Parts | S                                  |
|--------------|------------------------------------|
| Body         | 316L SS                            |
| Diaphragm    | Ni-Co alloy                        |
| Seat         | PCTFE<br>(Option: Polyimide, PEEK) |
|              | Polyimide or PEEK                  |

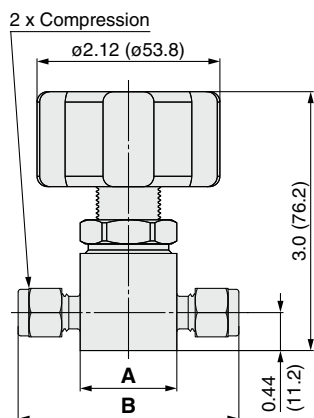
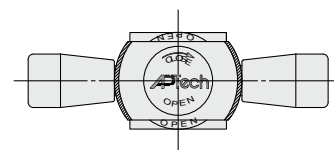
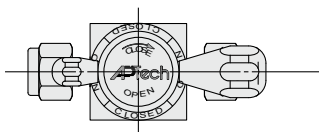
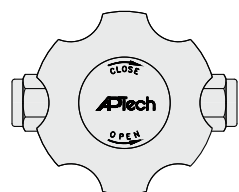
## Dimensions

inch (mm)

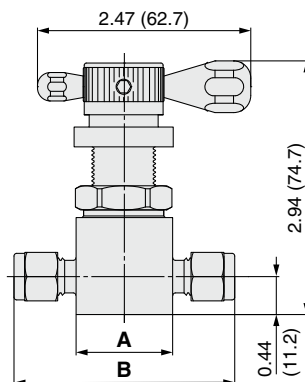
### AK3604

### AK3624

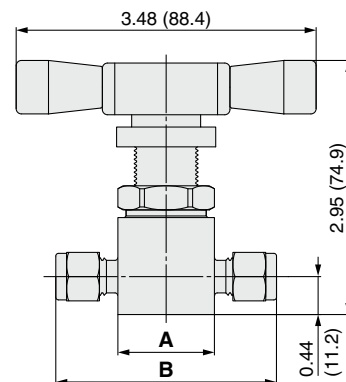
### AK3627



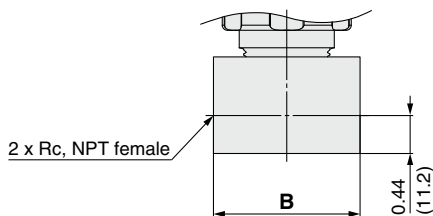
Connections: 4T



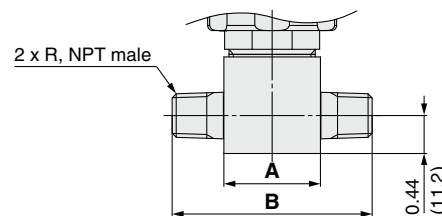
Connections: 4T



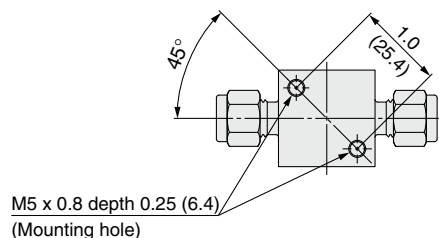
Connections: 4T



Connections: 4, 4BR



Connections: 4N, 4BRN



Bottom view

| Connections | A        |         | B    |        | Ports                |
|-------------|----------|---------|------|--------|----------------------|
|             | inch     | (mm)    | inch | (mm)   |                      |
| 4T          | 1.12 sq. | (□28.4) | 2.56 | (65)   | 1/4 inch compression |
| 4BR         | —        | —       | 1.70 | (43.2) | Rc 1/4               |
| 4BRN        | 1.12 sq. | (□28.4) | 2.32 | (58.9) | R 1/4                |
| 4           | —        | —       | 1.70 | (43.2) | NPT 1/4 female       |
| 4N          | 1.12 sq. | (□28.4) | 2.32 | (58.9) | NPT 1/4 male         |

# Metering Valve for General Applications

## AK3672, 3675 & 4675 Series

- Suitable for process gas supply line
- Body material: 316L SS
- Fine adjustment control 12 to 15 turns of the knob to wide open
- One wetted moving part - a diaphragm
- Flow rate AK3672: 10 slpm \*1)  
AK3675: 40 slpm \*1)  
AK4675: 70 slpm \*1)

\*1) At 30 psig (0.2 MPa) of N<sub>2</sub>



RoHS

**How to Order** (See p. 250 for ordering syntax)

AK **3672** **S** **2P** **4** **4**  
(Inlet) (Outlet)

Model

| Code        | Cv        |
|-------------|-----------|
| <b>3672</b> | 0 to 0.02 |
| <b>3675</b> | 0 to 0.08 |
| <b>4675</b> | 0 to 0.15 |

Material

| Code     | Body material |
|----------|---------------|
| <b>S</b> | 316L SS       |

Ports

| Code      | Ports   |
|-----------|---------|
| <b>2P</b> | 2 ports |

Connections \*1)

| Code        | Connections          | AK3672<br>AK3675 | AK4675 |
|-------------|----------------------|------------------|--------|
| <b>4T</b>   | 1/4 inch compression | ●                | —      |
| <b>4BR</b>  | Rc 1/4               |                  |        |
| <b>4BRN</b> | R 1/4                |                  |        |
| <b>4</b>    | NPT 1/4 female       |                  |        |
| <b>4N</b>   | NPT 1/4 male         | —                | ●      |
| <b>6T</b>   | 3/8 inch compression |                  |        |
| <b>6BR</b>  | Rc 3/8               |                  |        |
| <b>6BRN</b> | R 3/8                |                  |        |
| <b>6</b>    | NPT 3/8 female       | —                | ●      |
| <b>6N</b>   | NPT 3/8 male         |                  |        |

\*1) Only available with same type fittings inlet and outlet.

## Specifications

| Operating Parameters              | AK3672                                                  | AK3675    | AK4675    |
|-----------------------------------|---------------------------------------------------------|-----------|-----------|
| Gas                               | Select compatible materials of construction for the gas |           |           |
| Operating pressure                | Vacuum to 145 psig (1 MPa)                              |           |           |
| Proof pressure                    | 1.5 times the maximum operating pressure                |           |           |
| Burst pressure                    | 3 times the maximum operating pressure                  |           |           |
| Ambient and operating temperature | -40 to 71°C (No freezing)                               |           |           |
| Cv                                | 0 to 0.02                                               | 0 to 0.08 | 0 to 0.15 |
| Leak rate                         | 1 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s              |           |           |
| Connections                       | Compression, Rc, R, NPT                                 |           |           |
| Installation                      | Bottom mount                                            |           |           |
| Internal volume                   | 0.06 in <sup>3</sup> (1.07 cm <sup>3</sup> )            |           |           |

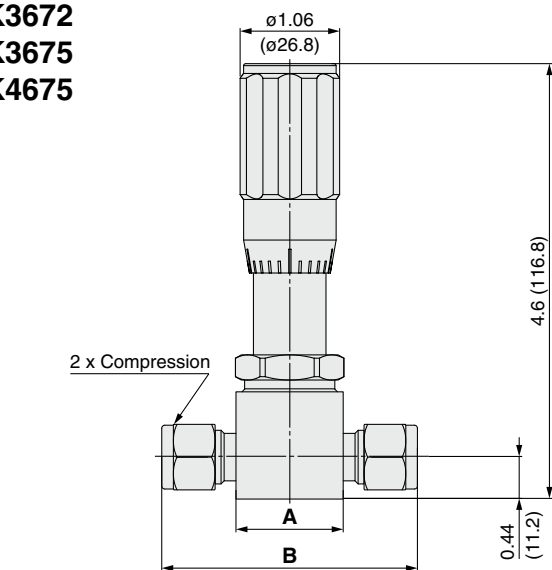
## Wetted Parts Material

| Wetted Parts | AK3672/AK3675 | AK4675  |
|--------------|---------------|---------|
| Body         | 316L SS       |         |
| Diaphragm    | Ni-Co alloy   |         |
| Seat         | PCTFE         | 316L SS |

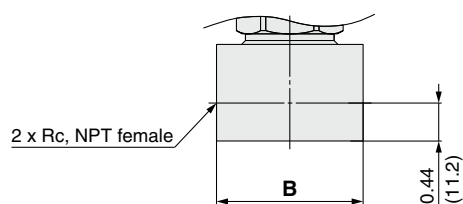
## Dimensions

inch (mm)

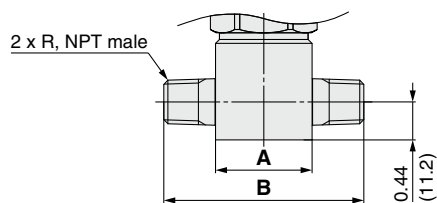
**AK3672**  
**AK3675**  
**AK4675**



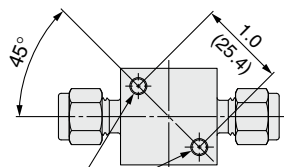
**Connections: 4T, 6T**



**Connections: 4, 6, 4BR**



**Connections: 4N, 4BRN**



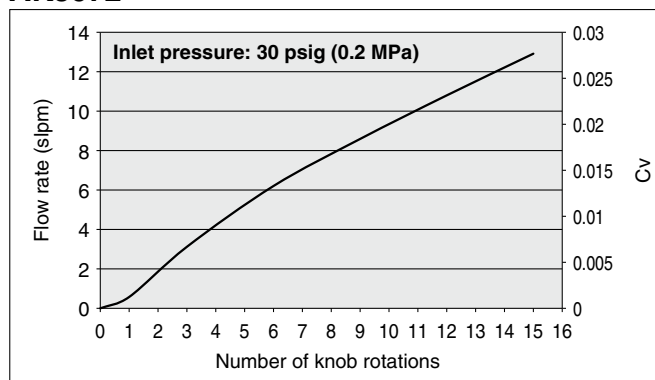
M5 x 0.8 depth 0.25 (6.4)  
(Mounting hole)

**Bottom view**

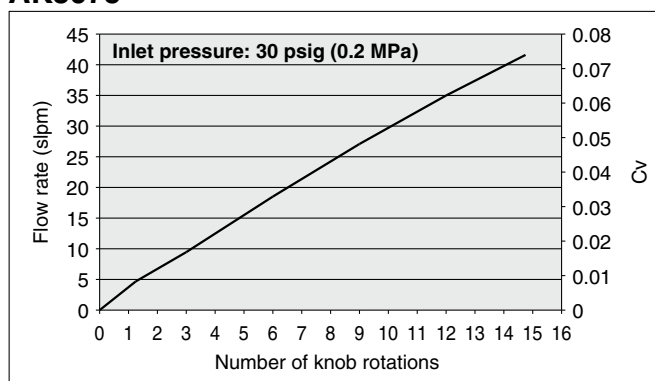
| Connections | A        |        | B    |        | Ports                |
|-------------|----------|--------|------|--------|----------------------|
|             | inch     | (mm)   | inch | (mm)   |                      |
| <b>4T</b>   | 1.12 sq. | (28.4) | 2.56 | (65)   | 1/4 inch compression |
| <b>4BR</b>  | —        | —      | 1.70 | (43.2) | Rc 1/4               |
| <b>4BRN</b> | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 1/4                |
| <b>4</b>    | —        | —      | 1.70 | (43.2) | NPT 1/4 female       |
| <b>4N</b>   | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 1/4 male         |
| <b>6T</b>   | 1.12 sq. | (28.4) | 2.68 | (68.1) | 3/8 inch compression |
| <b>6BR</b>  | —        | —      | 2.32 | (58.9) | Rc 3/8               |
| <b>6BRN</b> | 1.12 sq. | (28.4) | 2.32 | (58.9) | R 3/8                |
| <b>6</b>    | —        | —      | 2.32 | (58.9) | NPT 3/8 female       |
| <b>6N</b>   | 1.12 sq. | (28.4) | 2.32 | (58.9) | NPT 3/8 male         |

## Flow Rate Characteristics

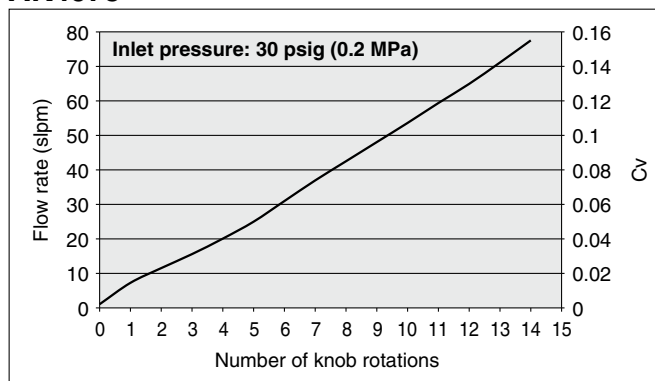
**AK3672**



**AK3675**



**AK4675**



Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions

# LOTO Options for Diaphragm Valves

\* Made to order specifications

## Lockout Device/For Air Operated Valve (Order Separately)

### Product number: AP PL210

#### Feature

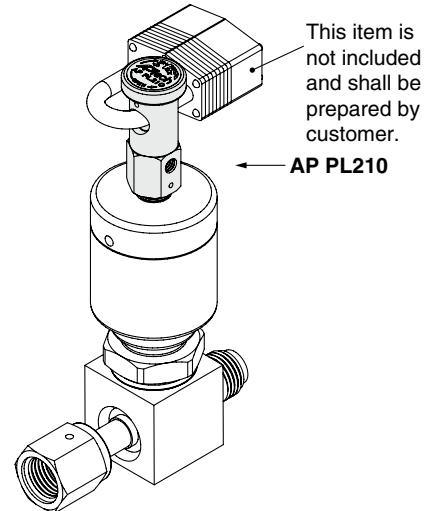
- Lockable by installing the AP PL210 to the actuation port of air operated valve (only available for N.C. with actuation port connection NPT 1/8 inch)
- Prevent accidental valve opening by manually shutting off actuation pressure
- Lockable only in the closed position
- Accept standard pad lock with 1/4 inch shackle
- Actuation port connection: 10-32 UNF thread
- Actuation port pressure rating: Maximum 150 psig (1.0 MPa)

#### Operation

Push top button down and twist to close the valve. This feature allows the valve to stay in closed position even if actuation pressure is supplied into an actuation port. Valve opens by repositioning the button, then pressurizing the actuation port.

#### Series

**AP3000, AP3113, AP3130, AP3200, AP3540, AP4540**  
**AZ3000, AZ3540, AZ4540**  
**AK3000, AK3540, AK4540**



## Lockout Device/For Manually Operated Valve (Order Separately)

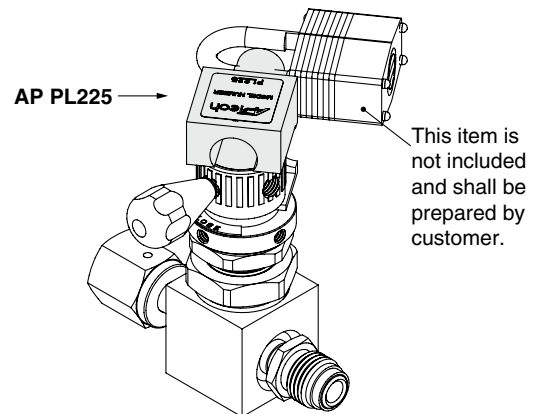
### Product number: AP PL225

#### Feature

- Lockable by installing the AP PL225 to the manually operated valve (only available for lever knob)
- Lockable in the closed position
- Accept standard pad lock with 1/4 inch shackle.

#### Series

**AP3125, AP3625, AP4625**  
**AZ3125, AZ3625, AZ4625**  
**AK3625, AK4625**



## Hook for Operational Safety Device (OSD) (Order Separately)

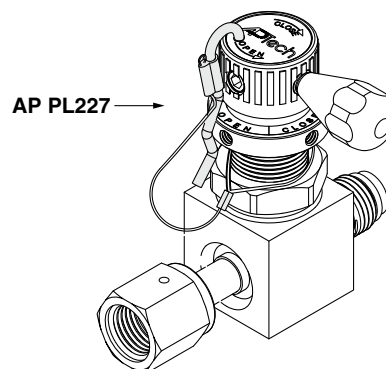
### Product number: AP PL227

#### Feature

- Secure valve in the closed position by installing the AP PL227 to the top of the handle.
- Prevents accidental opening of the valve.

#### Series

**AP3125, AP3625, AP4625**  
**AZ3125, AZ3625, AZ4625**  
**AK3625, AK4625**





# Process Gas Equipment/Diaphragm Valve Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## Selection

### ⚠ Warning

#### 1. Confirm the specifications.

This product is used in gas delivery systems to shutoff gas flow. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure (inlet and outlet), flow rate, actuating pressure, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Design the equipment and select the product by understanding the characteristics of gas.

## Mounting

### ⚠ Warning

#### 1. Confirm the mounting direction of the product.

Inlet ports are labeled with an “IN” mark. The outlet ports are usually not labeled but may be labeled with an “OUT” mark. Orient the valve as specified by the system designer.

#### 2. Connect actuation pressure to the valve actuator connection. (Air operated type)

Use nitrogen or clean dry air for actuation pressure. The connection may be a 1/8 inch NPT female thread or M5 female thread depending on the valve model.

#### 3. After installation, check internal leakage (leakage across seat) with inert gases.

Perform a helium leak test depending on applications.

## Maintenance

### ⚠ Warning

#### 1. If a valve requires repair, contact SMC.

## Operation (Air operate type)

### ⚠ Warning

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

#### 2. Confirm the valve type (N.C. or N.O.).

In the case of N.C. (Normally Closed), valve will open when applying actuation pressure to the valve actuator connection and valve will close when actuation pressure is vented to atmospheric pressure. In the case of N.O. (Normally Open), its actuation mechanism is opposite to the N.C. type. Valve will close when applying actuation pressure to the valve actuator connection.

#### 3. Apply actuation pressure within the range of specifications.

## Operation (Manually operated type)

### ⚠ Warning

#### 4. When closing the valve, rotate the handle clockwise until it completely stops.

There is the internal stop in the handle or in the valve body. Rotate the handle clockwise until the internal stop is reached and it completely stops.

#### 5. When closing the valve with LOTO feature, rotate the handle fully clockwise until the stop.

(AP/AZ/AK3657, AP/AZ/AK4657, AP3157, AP/AZ3900)

When the handle is fully clockwise, the indicator plate roller is aligned with a vertical slot in the handle allowing the handle to drop downward. This feature prevents the valve from being accidentally opened.

#### 6. When opening the valve, rotate the handle counterclockwise until it completely stops.

There is the internal stop in the handle. Rotate the handle counterclockwise until the internal stop is reached and it completely stops.

#### 7. When opening the valve with LOTO feature, the handle must first be lifted up, away from the valve body, and rotated counterclockwise until it completely stops.

(AP/AZ/AK3657, AP/AZ/AK4657, AP3157, AP/AZ3900)

When valve is closed, handle will not rotate as the fixed indicator plate roller is positioned within the vertical slot in the handle. The handle must first be lifted up away from the valve body and rotated counterclockwise until it completely stops.

#### 8. Do not use a tool when rotating the handle.

When the handle is rotated with a tool, it may apply excessive torque to the handle or inside the valve body and it may cause damage. Rotate the handle by hand.

#### 9. When locking the valve with LOTO feature in the closed position, use safety lockout hasp. (AP/AZ/AK3657, AP/AZ/AK4657, AP3157, AP/AZ3900)

The valve with LOTO feature has a built in LOTO capability. When using LOTO feature, rotate the handle clockwise and insert safety lockout hasp into lock stem slot.

## Export

### ⚠ Warning

Some of the products or technologies in this catalog are subject to list control under the laws and regulations stipulated by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Act).

When these products or technologies subject to list control are exported or provided, strictly follow the laws and regulations stipulated by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Act).

In addition, when the products or technologies in this catalog are exported or provided, be sure to ensure that they are not intended for use as weapons or in any applications related to weapons.



# Check Valve

|                   |                   |        |
|-------------------|-------------------|--------|
| Check Valve ..... | <b>AP64</b> ..... | p. 231 |
|-------------------|-------------------|--------|

# Vacuum Generators

|                                 |                     |        |
|---------------------------------|---------------------|--------|
| Vacuum Generator .....          | <b>AP7/70</b> ..... | p. 233 |
| Vacuum Generator (Module) ..... | <b>AP71</b> .....   | p. 235 |
| Vacuum Generator (Module) ..... | <b>AP72</b> .....   | p. 237 |

# Flow Switches

|                                   |                    |        |
|-----------------------------------|--------------------|--------|
| Flow Switch .....                 | <b>AP74</b> .....  | p. 239 |
| Flow Switch (For high flow) ..... | <b>AP74B</b> ..... | p. 241 |

|                                                                                   |        |
|-----------------------------------------------------------------------------------|--------|
| Check Valve, Vacuum Generator, and Flow Switch Specific Product Precautions ..... | p. 243 |
|-----------------------------------------------------------------------------------|--------|

# Check Valve

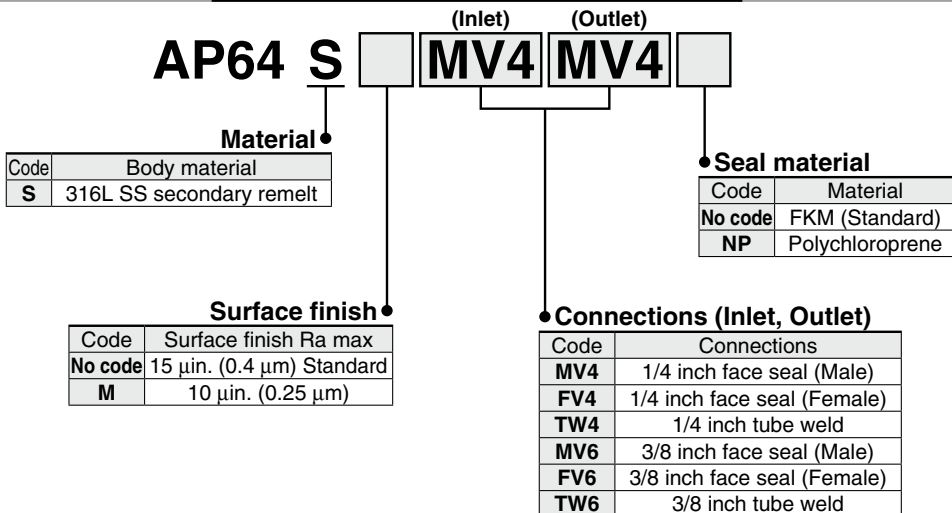
## AP64 Series

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



### How to Order (See p. 250 for ordering syntax)

RoHS



## Specifications

| Operating Parameters                     |                         | AP64                                                    |
|------------------------------------------|-------------------------|---------------------------------------------------------|
| <b>Gas</b>                               |                         | Select compatible materials of construction for the gas |
| <b>Inlet pressure</b>                    |                         | Vacuum to 3500 psig (24.1 MPa)                          |
| <b>Cracking pressure</b> *1)             |                         | 3 psi (0.023 MPa) differential *2)                      |
| <b>Maximum back pressure</b>             |                         | 3500 psig (24.1 MPa)                                    |
| <b>Proof pressure</b>                    |                         | 1.5 times the maximum operating pressure                |
| <b>Burst pressure</b>                    |                         | 3 times the maximum operating pressure                  |
| <b>Ambient and operating temperature</b> |                         | -10 to 71°C (No freezing) *3)                           |
| <b>Cv</b>                                |                         | 0.4 max                                                 |
| <b>Leak rate</b>                         | <b>Inboard leakage</b>  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |
|                                          | <b>Outboard leakage</b> | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s *4)          |
| <b>Surface finish</b>                    |                         | Ra max 15 µin. (0.4 µm) Option: 10 µin. (0.25 µm)       |
| <b>Connections</b>                       |                         | Face seal, Tube weld                                    |
| <b>Internal volume</b>                   |                         | 0.122 in. <sup>3</sup> (2 cm <sup>3</sup> )             |
| <b>Weight</b>                            |                         | 0.02 kg *5)                                             |

\*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) Polychloroprene seal is limited to a maximum temperature of 50°C.

\*4) Tested with inlet pressure 500 psig (3.5 MPa).

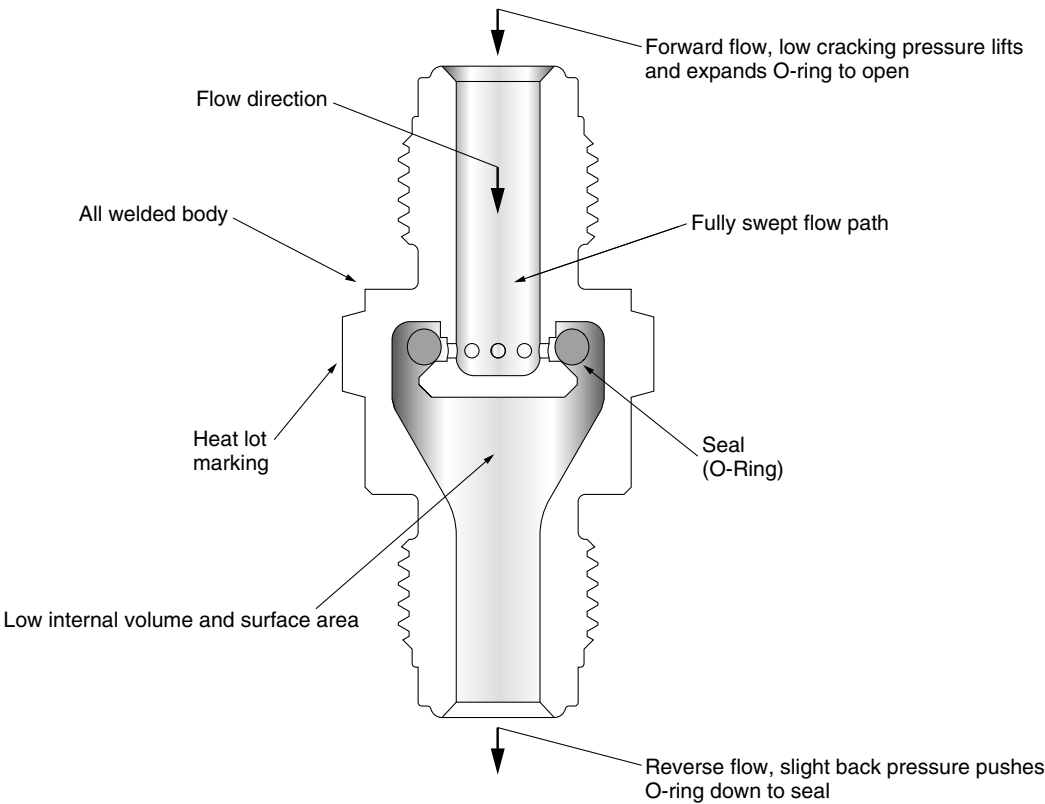
\*5) Weight, including individual boxed weight, may vary depending on connections or options.

## Wetted Parts Material

| Wetted Parts   | <b>S</b>                      |
|----------------|-------------------------------|
| Body           | 316L SS secondary remelt      |
| Surface finish | Electropolish + Passivation   |
| Seal           | FKM (Option: Polychloroprene) |

Construction

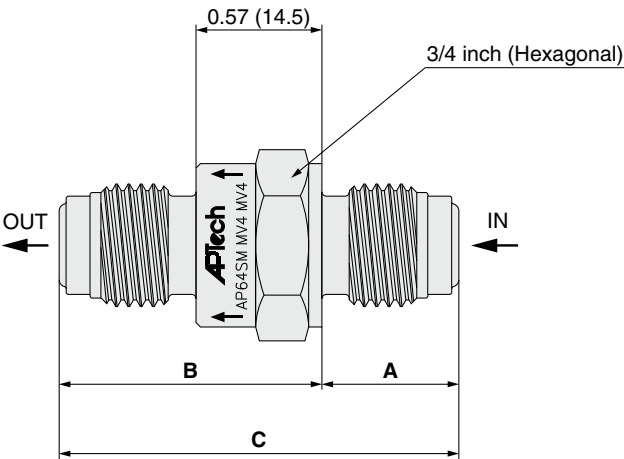
AP64



Dimensions

inch (mm)

AP64



| Connections |        | A    |        | B    |        | C    |         |
|-------------|--------|------|--------|------|--------|------|---------|
| Inlet       | Outlet | inch | (mm)   | inch | (mm)   | inch | (mm)    |
| MV4         | MV4    | 0.62 | (15.7) | 1.19 | (30.2) | 1.81 | (46.0)  |
| MV4         | FV4    |      |        | 1.50 | (38.1) | 2.12 | (53.8)  |
| FV4         | FV4    | 0.93 | (23.6) | 1.19 | (30.2) | 2.43 | (61.7)  |
| FV4         | MV4    |      |        |      |        | 2.12 | (53.8)  |
| TW4         | TW4    | 0.34 | (8.6)  | 0.91 | (23.1) | 1.25 | (31.8)  |
| MV6         | MV6    | 1.83 | (46.5) | 2.40 | (61.0) | 4.23 | (107.4) |
| MV6         | FV6    |      |        |      |        |      |         |
| FV6         | MV6    |      |        |      |        |      |         |
| FV6         | MV6    |      |        |      |        |      |         |
| TW6         | TW6    | 0.34 | (8.6)  | 0.91 | (23.1) | 1.25 | (31.8)  |

|                                      |
|--------------------------------------|
| Recommendations                      |
| Regulators                           |
| AP                                   |
| SL                                   |
| AZ                                   |
| AK                                   |
| BP                                   |
| Diaphragm Valves                     |
| AP                                   |
| AZ                                   |
| AK                                   |
| Check Valves                         |
| Vacuum Generators                    |
| Flow Switches                        |
| Technical Data/<br>Glossary of Terms |
| Precautions                          |

# Vacuum Generator

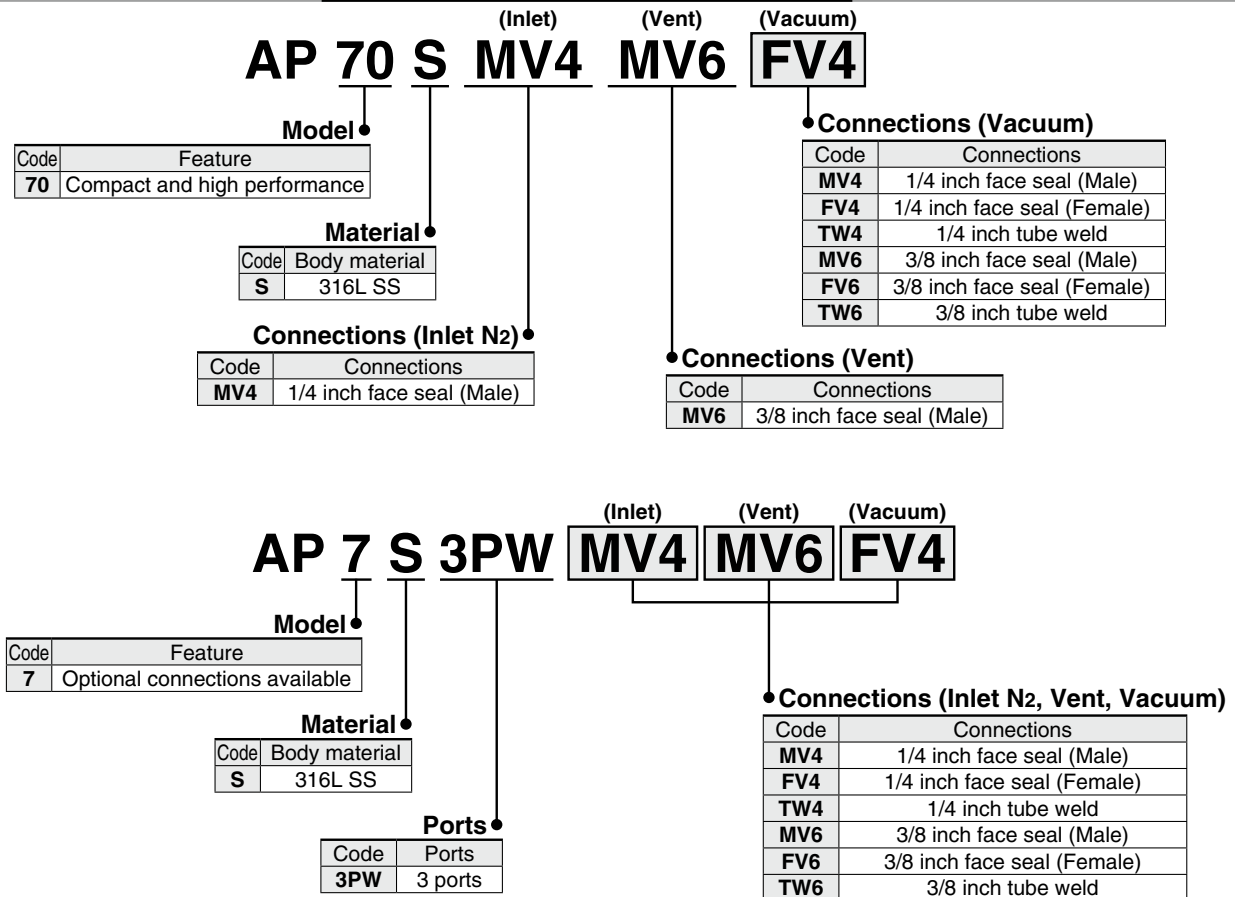
## AP7 & 70 Series

- Max. vacuum pressure: -26 in.Hg (-88 kPa)
- AP70 series
  - Compact
  - Fine vacuum efficiency
- AP7 series
  - All connections available with all ports



RoHS

How to Order (See p. 250 for ordering syntax)



## Specifications

| Operating Parameters              |                  | AP7                                                     | AP70                      |
|-----------------------------------|------------------|---------------------------------------------------------|---------------------------|
| Gas (Inlet N <sub>2</sub> port)   |                  | N <sub>2</sub>                                          |                           |
| Gas (Vacuum port)                 |                  | Select compatible materials of construction for the gas |                           |
| N <sub>2</sub> Inlet pressure     |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |                           |
| Vacuum port maximum pressure      |                  | 3500 psig (24.1 MPa)                                    |                           |
| Proof pressure (Vacuum)           |                  | 1.5 times the maximum operating pressure                |                           |
| Burst pressure (Vacuum)           |                  | 3 times the maximum operating pressure                  |                           |
| Maximum vacuum pressure           |                  | -26 in.Hg (-88 kPa) *1)                                 |                           |
| Ambient and operating temperature |                  | -40 to 71°C                                             |                           |
| Leak rate                         | Inboard leakage  | 2 x 10 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                           |
|                                   | Outboard leakage |                                                         |                           |
| 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.

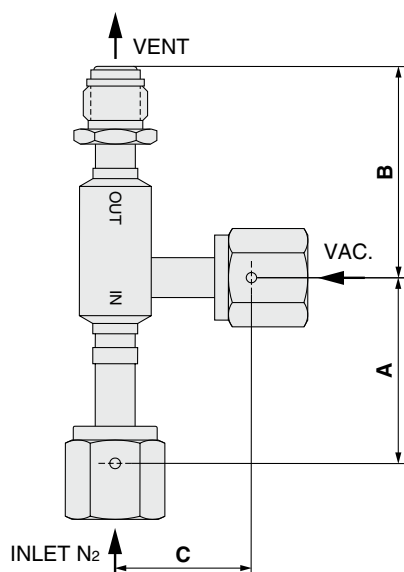
## Wetted Parts Material

| AP7          |         | AP70         |         |
|--------------|---------|--------------|---------|
| Wetted Parts | S       | Wetted Parts | S       |
| Body         | 316L SS | Body         | 316L SS |

## Dimensions

inch (mm)

### AP7

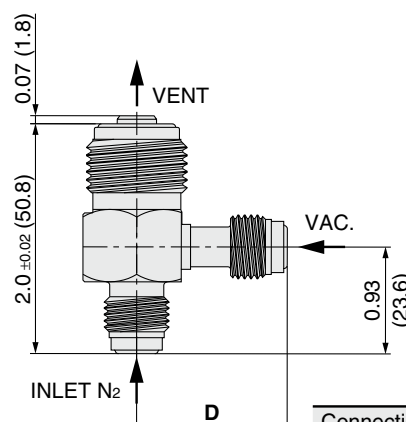


| Connections<br>(Inlet) | A    |        |
|------------------------|------|--------|
|                        | inch | (mm)   |
| MV4                    | 1.62 | (41.1) |
| FV4                    | 1.62 | (41.1) |
| TW4                    | 1.25 | (31.8) |
| MV6                    | 2.13 | (54.1) |
| FV6                    | 2.13 | (54.1) |
| TW6                    | 1.25 | (31.8) |

| Connections<br>(Vent) | B    |        |
|-----------------------|------|--------|
|                       | inch | (mm)   |
| MV4                   | 1.83 | (46.5) |
| FV4                   | 1.83 | (46.5) |
| TW4                   | 1.46 | (37.1) |
| MV6                   | 2.34 | (59.4) |
| FV6                   | 2.34 | (59.4) |
| TW6                   | 1.46 | (37.1) |

| Connections<br>(Vacuum) | C    |        |
|-------------------------|------|--------|
|                         | inch | (mm)   |
| MV4                     | 1.18 | (30.0) |
| FV4                     | 1.18 | (30.0) |
| TW4                     | 0.81 | (20.6) |
| MV6                     | 1.69 | (42.9) |
| FV6                     | 1.69 | (42.9) |
| TW6                     | 0.81 | (20.6) |

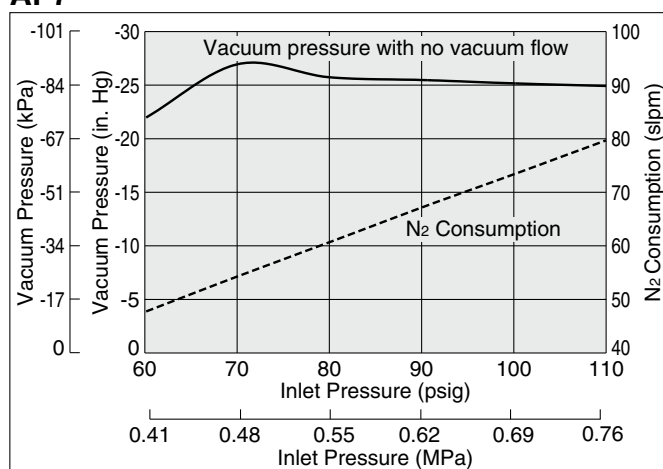
### AP70



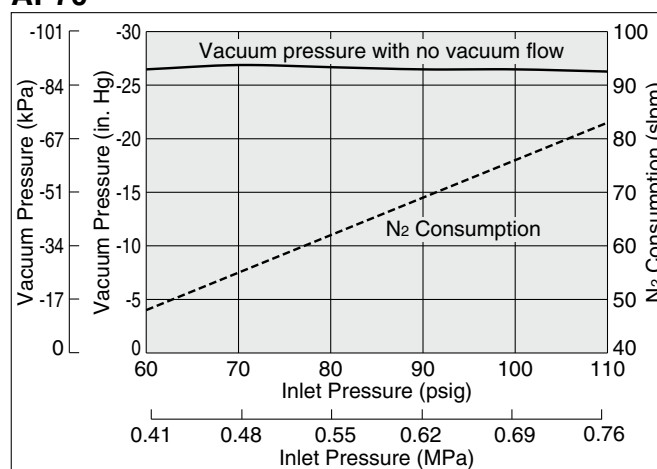
| Connections<br>(Vacuum) | D    |        |
|-------------------------|------|--------|
|                         | inch | (mm)   |
| MV4                     | 1.31 | (33.3) |
| FV4                     | 1.31 | (33.3) |
| TW4                     | 0.97 | (24.6) |
| MV6                     | 1.85 | (47.0) |
| FV6                     | 1.85 | (47.0) |
| TW6                     | 0.97 | (24.6) |

## Exhaust Characteristics

### AP7

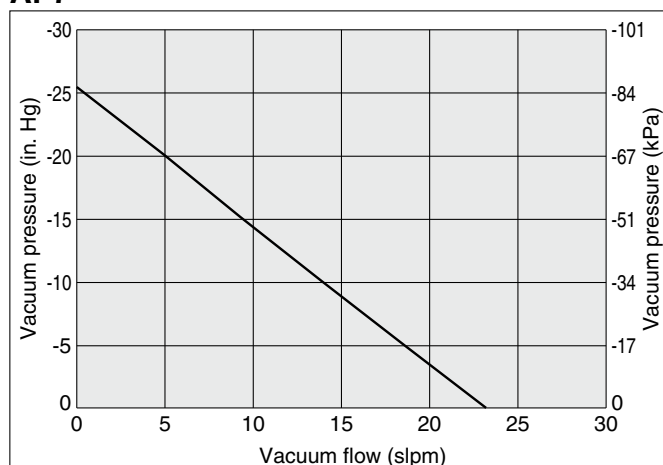


### AP70

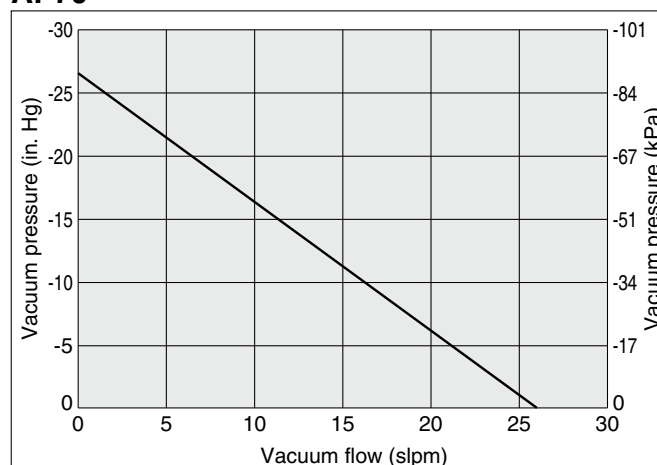


## Flow Rate Characteristics

### AP7



### AP70



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## AP71 Series

- Unique compact design by integrating vacuum generator, air operated valve and check valve
- Max. vacuum pressure: -26 in.Hg (-88 kPa)
- Integrate N.C. air operated valve
- Constant bleed option to maintain inert vent line



RoHS

### How to Order (See p. 250 for ordering syntax)

AP71 **S** (Inlet) **MV4** (Vent) **FV6** (Vacuum) **TW4**

#### Material

| Code      | Body    | Poppet  | Piston |
|-----------|---------|---------|--------|
| <b>S</b>  | 316L SS | 303 SS  |        |
| <b>S6</b> |         | 316L SS |        |

#### Seat material

| Code           | Material        |
|----------------|-----------------|
| <b>No code</b> | FMK (Standard)  |
| <b>NP</b>      | Polychloroprene |

#### Connections (Inlet N2 port, Vent, Vacuum)

| Code       | Connections                 | Inlet | Vent | Vacuum |
|------------|-----------------------------|-------|------|--------|
| <b>MV4</b> | 1/4 inch face seal (Male)   | ●     | ●    | ●      |
| <b>FV4</b> | 1/4 inch face seal (Female) | —     | ●    | ●      |
| <b>TW4</b> | 1/4 inch tube weld          | —     | —    | ●      |
| <b>MV6</b> | 3/8 inch face seal (Male)   | —     | ●    | —      |
| <b>FV6</b> | 3/8 inch face seal (Female) | —     | ●    | —      |
| <b>TW6</b> | 3/8 inch tube weld          | —     | ●    | —      |

●: Available —: Not available

#### Bleed options

| Code           | Bleed options              |
|----------------|----------------------------|
| <b>No code</b> | No bleed option (Standard) |
| <b>CB005</b>   | 2.5 slpm                   |
| <b>CB009</b>   | 5 slpm                     |
| <b>CB013</b>   | 8 slpm                     |
| <b>CB023</b>   | 15 slpm                    |

## Specifications

| Operating Parameters              |                    | AP71                                                    |
|-----------------------------------|--------------------|---------------------------------------------------------|
| Gas (Inlet N2 port)               |                    | N2                                                      |
| Gas (Vacuum)                      |                    | 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)           |                    | 1.5 times the maximum operating pressure                |
| Burst pressure (Vacuum)           |                    | 3 times the maximum operating pressure                  |
| Maximum vacuum pressure           |                    | -26 in.Hg (-88 kPa) *1)                                 |
| Ambient and operating temperature |                    | -10 to 71°C                                             |
| Cracking pressure (Check valve)   |                    | 3 psid (0.023 MPa)*2)                                   |
| Air operated                      | Status             | Normally closed (N.C.)                                  |
|                                   | Actuation pressure | 60 to 110 psig (0.4 to 0.76 MPa)                        |
|                                   | Actuation port     | M5 thread                                               |
| Connections                       | Inlet              | 1/4 inch face seal (Male)                               |
|                                   | Vent               | 1/4, 3/8 inch face seal, 3/8 inch tube weld             |
|                                   | Vacuum             | 1/4 inch face seal, Tube weld                           |
| Weight                            |                    | 0.14 kg *3)                                             |

\*1) At inlet pressure 80 psig (0.55 MPa) and flow rate 60 slpm.

\*2) Cracking pressure is a nominal value which may vary depending on the application and operating conditions.

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

## Option

### Bleed

Bleed option provides constant low flow of N2 to maintain inert atmosphere in vent line.

Following 4 options are available:

| Option       | Bleed *       |
|--------------|---------------|
| <b>CB005</b> | 1 to 2.5 slpm |
| <b>CB009</b> | 2 to 5 slpm   |
| <b>CB013</b> | 5 to 8 slpm   |
| <b>CB023</b> | 10 to 15 slpm |

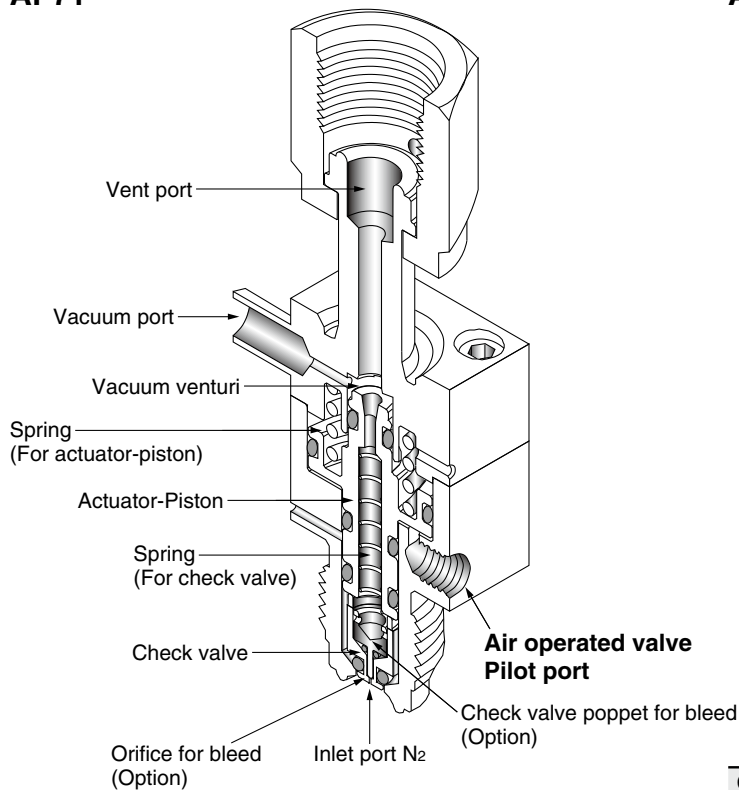
\* At 80 psig (0.55 MPa) N2 gas.

## Wetted Parts Material

| Wetted Parts     | S                             | S6      |
|------------------|-------------------------------|---------|
| Body             | 316L SS                       |         |
| Poppet           | 303 SS                        | 316L SS |
| Piston           | 303 SS                        | 316L SS |
| Spring           | 302 SS                        |         |
| Check valve seat | FKM (Option: Polychloroprene) |         |

## Construction

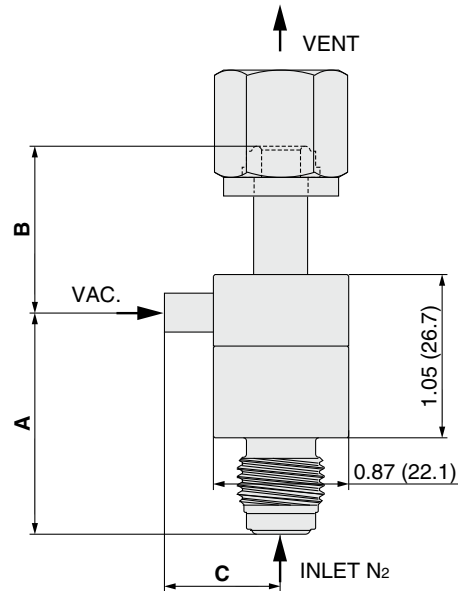
### AP71



## Dimensions

inch (mm)

### AP71



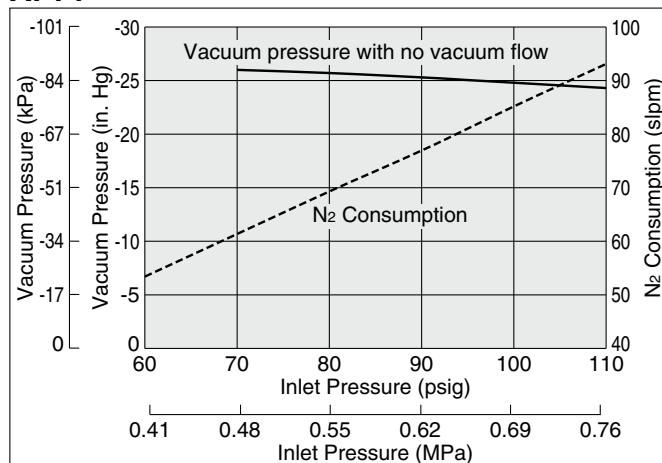
| Connections<br>(Inlet) | A    |        |
|------------------------|------|--------|
|                        | inch | (mm)   |
| <b>MV4</b>             | 1.43 | (36.3) |

| Connections<br>(Vent) | B    |        |
|-----------------------|------|--------|
|                       | inch | (mm)   |
| <b>MV4</b>            | 1.07 | (27.2) |
| <b>FV4</b>            |      |        |
| <b>MV6</b>            | 1.64 | (41.7) |
| <b>FV6</b>            |      |        |
| <b>TW6</b>            | 0.96 | (24.4) |

| Connections<br>(Vacuum) | C    |        |
|-------------------------|------|--------|
|                         | inch | (mm)   |
| <b>MV4</b>              | 1.39 | (35.3) |
| <b>FV4</b>              |      |        |
| <b>TW4</b>              | 0.75 | (19.1) |

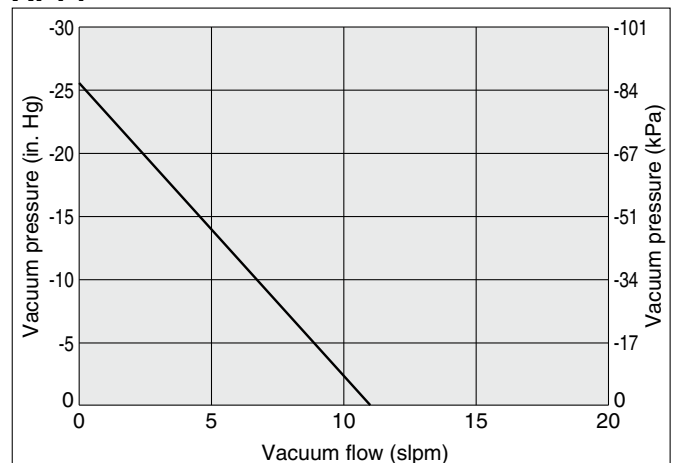
## Exhaust Characteristics

### AP71



## Flow Rate Characteristics

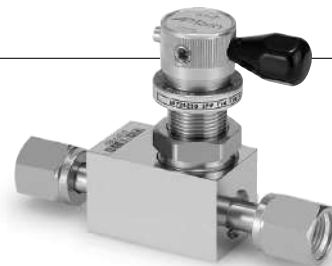
### AP71



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

## AP72 Series

- Unique compact design by integrating vacuum generator, diaphragm valve and check valve
- Flow consumption: 60 slpm, Low flow consumption type: 20 slpm
- Max. vacuum pressure: -26 in.Hg (-88 kPa)
- Air operated or manually operated type is available as diaphragm valve
- Constant bleed option to maintain inert vent line



RoHS

How to Order (See p. 250 for ordering syntax)

**AP72** **625** **S** **3PW** **MV4** **FV6** **TW4** **(Inlet)** **(Vent)** **(Vacuum<sup>③</sup>)** **(Vacuum<sup>④</sup>)**

• **Option**

| Code    | Option                         |
|---------|--------------------------------|
| No code | Standard                       |
| L       | Low N <sub>2</sub> consumption |

• **Material**

| Code | Body material            |
|------|--------------------------|
| S    | 316L SS secondary remelt |

• **Ports** (Refer to the porting configuration)

| Code | Ports                |
|------|----------------------|
| 3PW  | 3 ports              |
| 3PWA | 3 ports (Angle type) |
| 4PW  | 4 ports              |

• **Bleed options**

| Code    | Bleed options              |
|---------|----------------------------|
| No code | No bleed option (Standard) |
| CB009   | 5 slpm                     |
| CB013   | 8 slpm                     |
| CB023   | 15 slpm                    |

• **Check valve seat material**

| Code    | Material        |
|---------|-----------------|
| No code | FKM (Standard)  |
| NP      | Polychloroprene |

• **Diaphragm valve seat material**

| Code    | Material         |
|---------|------------------|
| No code | PCTFE (Standard) |
| VS      | Polyimide        |

• **Model**

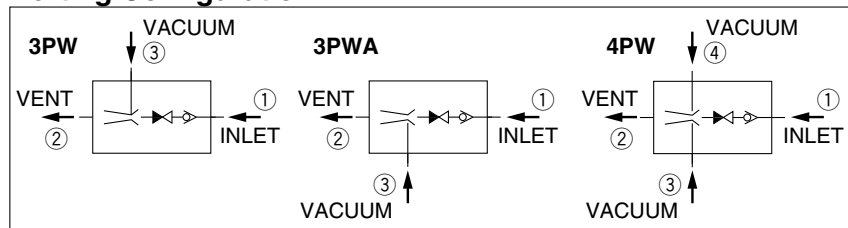
| Code | Actuation       | Knob                                                  |
|------|-----------------|-------------------------------------------------------|
| 540  | Air operated    | —                                                     |
| 550  |                 |                                                       |
| 600  |                 | Multi turn round knob                                 |
| 625  | Manual operated | 1/4 turn lever knob                                   |
| 650  |                 | 1/4 turn round knob with open/close indication window |

• **Connections** (Inlet N<sub>2</sub> port, Vent, Vacuum<sup>③</sup>, Vacuum<sup>④</sup>)

| Code | Connections                 | Inlet | Vent | Vacuum <sup>③</sup> | Vacuum <sup>④</sup> |
|------|-----------------------------|-------|------|---------------------|---------------------|
| 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          | —     | ●    | —                   | —                   |

●: Available —: Not available  
\*) Specify the piping connection method for vacuum side ④ only when port "4PW" is selected.

### Porting Configuration



### Specifications

| Operating Parameters              |                  | AP72540/AP72L540                                        | AP72550/AP72L550 | AP72600/AP72L600 | AP72625/AP72L625 | AP72650/AP72L650 |
|-----------------------------------|------------------|---------------------------------------------------------|------------------|------------------|------------------|------------------|
| Gas (Inlet N <sub>2</sub> port)   |                  | N <sub>2</sub>                                          |                  |                  |                  |                  |
| Gas (Vacuum)                      |                  | Select compatible materials of construction for the gas |                  |                  |                  |                  |
| N <sub>2</sub> Inlet pressure     |                  | 70 to 110 psig (0.48 to 0.76 MPa)                       |                  |                  |                  |                  |
| Vacuum port maximum pressure      |                  | 3000 psig (20.7 MPa)                                    |                  |                  |                  |                  |
| Proof pressure (Vacuum)           |                  | 1.5 times the maximum operating pressure                |                  |                  |                  |                  |
| Burst pressure (Vacuum)           |                  | 3 times the maximum operating pressure                  |                  |                  |                  |                  |
| 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 <sup>-11</sup> Pa·m <sup>3</sup> /s              |                  |                  |                  |                  |
|                                   | Outboard leakage | 2 x 10 <sup>-10</sup> Pa·m <sup>3</sup> /s *3)          |                  |                  |                  |                  |
| Across the seat leak              |                  | 4 x 10 <sup>-9</sup> Pa·m <sup>3</sup> /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/AP72L540                  | AP72550/AP72L550 |
|---------------------------|-----------------------------------|------------------|
| 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/AP72L600      | AP72625/AP72L625    | AP72650/AP72L650                                      |
|-------|-----------------------|---------------------|-------------------------------------------------------|
| Knob  | Multi turn round knob | 1/4 turn lever knob | 1/4 turn round knob with open/close indication window |

## Option

### Bleed

Provides constant low flow of N<sub>2</sub> to maintain inert atmosphere in vent line.

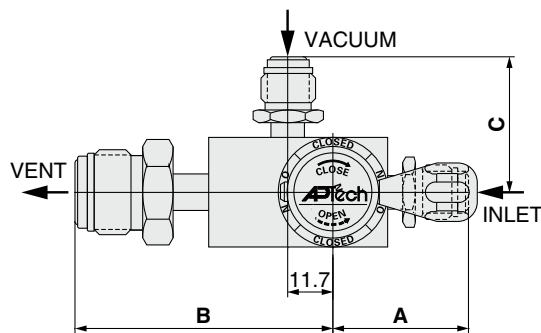
Following 3 options are available:

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

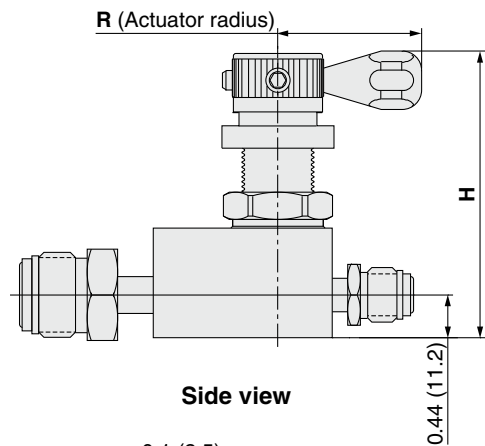
\* At 80 psig (0.55 MPa) N<sub>2</sub> gas.

## Dimensions

### AP72



Top view

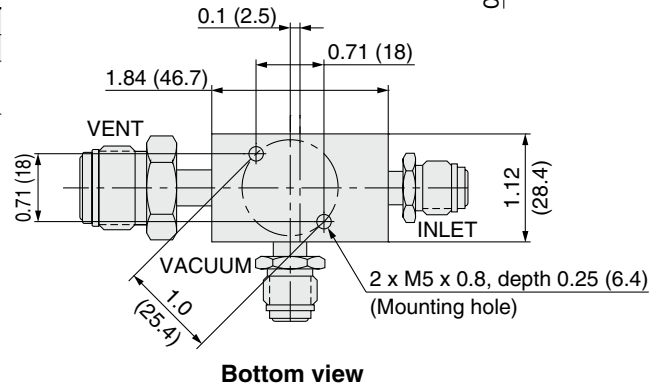


Side view

| Model            | R    |        | H    |        | Connections (Inlet) |  | A    |        |
|------------------|------|--------|------|--------|---------------------|--|------|--------|
|                  | inch | (mm)   | inch | (mm)   |                     |  | inch | (mm)   |
| AP72540/AP72L540 | 0.73 | (18.5) | 3.49 | (88.6) | MV4                 |  | 1.39 | (35.3) |
| AP72550/AP72L550 | 0.69 | (17.4) | 3.28 | (83.3) | FV4                 |  |      |        |
| AP72600/AP72L600 | 1.06 | (26.9) | 3.00 | (76.1) |                     |  |      |        |
| AP72625/AP72L625 | 1.48 | (37.6) | 2.94 | (74.7) |                     |  |      |        |
| AP72650/AP72L650 | 0.94 | (23.9) | 3.02 | (76.7) |                     |  |      |        |

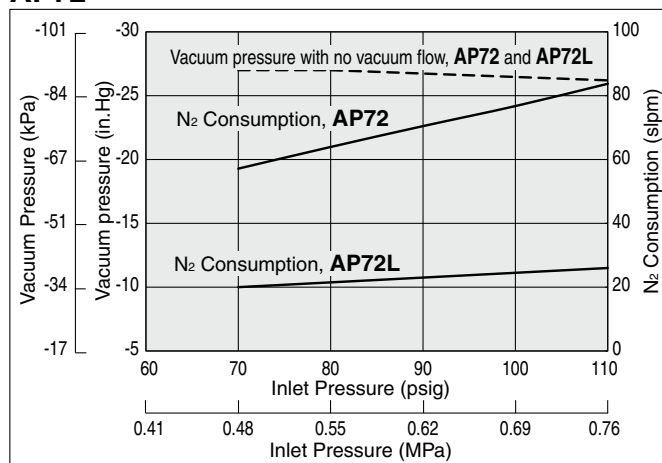
| Connections (Vent) | B    |        | Connections (Vacuum) | C    |        |
|--------------------|------|--------|----------------------|------|--------|
|                    | inch | (mm)   |                      | inch | (mm)   |
| MV4                | 2.11 | (53.6) | MV4                  | 1.39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



Bottom view

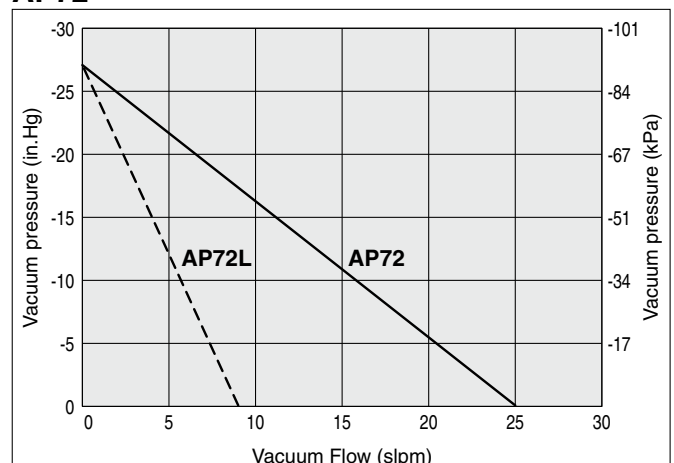
## Exhaust Characteristics

### AP72



## Flow Rate Characteristics

### AP72



Note) slpm, N<sub>2</sub>: The volumetric flow rate under normal conditions (0°C, 1 atm) when N<sub>2</sub> gas is flowing.

# Flow Switch

## AP74 Series

- 6 flow trip points available, from 2 to 100 slpm
- Body material: 316L SS secondary remelt
- High pressure Max. 3500 psig (24.1 MPa)
- Detect excess flow by N.C. or N.O. contact output with non-wetted reed switch tripped by float with encapsulated magnet (SPDT, 3 wire / 2 position)



RoHS

### How to Order (See p. 250 for ordering syntax)

AP74 **100** **S** **MV4** **MV4**

Size

| Code | Flow trip reference points *1) |
|------|--------------------------------|
| 002  | 2 slpm                         |
| 005  | 5 slpm                         |
| 010  | 10 slpm                        |
| 025  | 25 slpm                        |
| 050  | 50 slpm                        |
| 100  | 100 slpm                       |

\*1) To obtain the nominal trip point in process gases other than nitrogen or pressures other than 100 psig (0.69 MPa), please refer to the Precaution of Selection (P.242).

#### Connections (Inlet, Outlet)

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

#### Surface finish

| Code    | Surface finish Ra max              |
|---------|------------------------------------|
| No code | 15 $\mu$ m. (0.4 $\mu$ m) Standard |
| M       | 10 $\mu$ m. (0.25 $\mu$ m)         |

#### 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        |                            | 0.5 psi (0.0034 MPa) differential *3)                   |         |         |         |         |          |
| Proof pressure                     |                            | 1.5 times the maximum operating pressure                |         |         |         |         |          |
| Burst pressure                     |                            | 3 times the maximum operating pressure                  |         |         |         |         |          |
| Ambient and operating temperature  |                            | -23 to 80°C (No freezing)                               |         |         |         |         |          |
| Leak rate                          | Inboard leakage            | 2 x 10 <sup>-11</sup> Pa·m³/s                           |         |         |         |         |          |
|                                    | Outboard leakage           | 2 x 10 <sup>-11</sup> Pa·m³/s *4)                       |         |         |         |         |          |
| Surface finish                     |                            | Ra max 15 μin. (0.4 μm)      Option: 10 μin. (0.25 μm)  |         |         |         |         |          |
| Connections                        |                            | Face seal, Tube weld                                    |         |         |         |         |          |
| Reed switch                        | Type                       | SPDT (3 wire / 2 position)                              |         |         |         |         |          |
|                                    | Power                      | 30 VDC (3 W max)                                        |         |         |         |         |          |
|                                    | Switching current          | 0.2 A max                                               |         |         |         |         |          |
|                                    | Carrying current           | 0.5 A max                                               |         |         |         |         |          |
|                                    | Initial contact resistance | 0.1 Ω max                                               |         |         |         |         |          |
| Cable                              | Wire gauge                 | AWG24 (PVC jacket)                                      |         |         |         |         |          |
|                                    | Cable length               | 10 ft. (3 m)                                            |         |         |         |         |          |
|                                    | Lead color                 | Blue: common                                            |         |         |         |         |          |
|                                    |                            | Brown: normally closed                                  |         |         |         |         |          |
|                                    |                            | Black: normally open                                    |         |         |         |         |          |
| Internal volume                    |                            | 0.12 in³ (1.9 cm³)                                      |         |         |         |         |          |
| Weight                             |                            | 0.11 kg *5)                                             |         |         |         |         |          |

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

\*2) At N<sub>2</sub> 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.242).

\*3) Pressure drop at trip point.

\*4) Tested with Helium gas inlet pressure 500 psig (3.5 MPa).

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

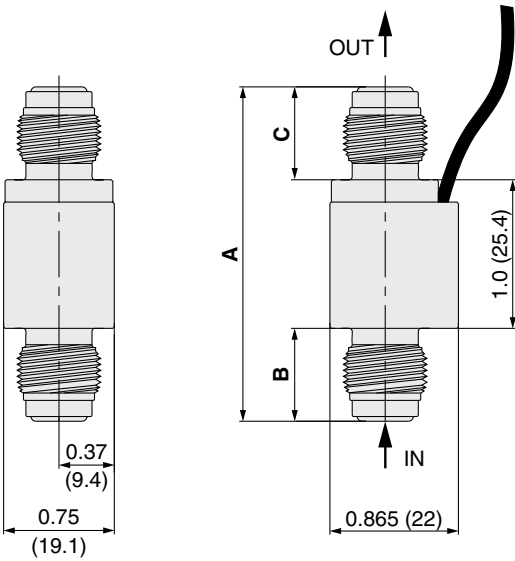
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS secondary remelt    |
| Surface finish | Electropolish + Passivation |
| Float          | 316L SS                     |

Dimensions

inch (mm)

AP74



| Connections |        | A    |         | B     |        | C     |        |  |
|-------------|--------|------|---------|-------|--------|-------|--------|--|
| Inlet       | Outlet | inch | (mm)    | inch  | (mm)   | inch  | (mm)   |  |
| MV4         | MV4    | 2.25 | (57.2)  | 0.625 | (15.9) | 0.625 | (15.9) |  |
| FV4         | FV4    | 3.99 | (101.4) | 1.495 | (38.0) | 1.495 | (38.0) |  |
| TW4         | TW4    | 2.25 | (57.2)  | 0.625 | (15.9) | 0.625 | (15.9) |  |
| MV4         | FV4    | 3.12 | (79.3)  |       |        | 1.495 | (38.0) |  |
| MV4         | TW4    | 2.25 | (57.2)  |       |        | 0.625 | (15.9) |  |
| FV4         | MV4    | 3.12 | (79.3)  | 1.495 | (38.0) |       |        |  |
| FV4         | TW4    |      |         |       |        |       |        |  |
| TW4         | MV4    | 2.25 | (57.2)  | 0.625 | (15.9) | 1.495 | (38.0) |  |
| TW4         | FV4    | 3.12 | (79.3)  |       |        |       |        |  |

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

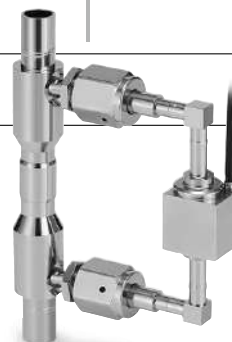
Precautions

# Flow Switch

For high flow

## AP74B Series

- Bypass design suitable for high flow (BSGS) application
- 11 flow trip points available, from 225 to 6000 slpm
- Horizontal or vertical installation orientation is available
- Main line 1/2 inch, 3/4 inch, 1 inch, or 1 1/2 inch size available



How to Order (See p. 250 for ordering syntax)

RoHS

AP74B V 500 S M FV8 MV8

### Installation orientation

| Code | Orientation |
|------|-------------|
| H    | Horizontal  |
| V    | Vertical    |

### Size

\*1) As N<sub>2</sub> 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.242).

| Code | Flow trip reference points *1) | Code | Flow trip reference points *1) |
|------|--------------------------------|------|--------------------------------|
| 225  | 225 slpm                       | 2600 | 2600 slpm                      |
| 350  | 350 slpm                       | 3000 | 3000 slpm                      |
| 500  | 500 slpm                       | 4000 | 4000 slpm                      |
| 950  | 950 slpm                       | 5000 | 5000 slpm                      |
| 1100 | 1100 slpm                      | 6000 | 6000 slpm                      |
| 1650 | 1650 slpm                      |      |                                |

### Surface finish

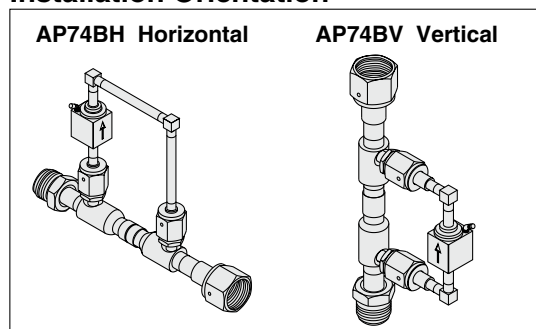
| Code | Surface finish Ra max |
|------|-----------------------|
| M    | 10 μin. (0.25 μm)     |

### Material

| Code | Body material |
|------|---------------|
| S    | 316L SS       |

### Installation Orientation

### Connections (Inlet, Outlet)



| Code | Connections                     | Size |     |     |     |      |      |      |      |      |      |      |
|------|---------------------------------|------|-----|-----|-----|------|------|------|------|------|------|------|
|      |                                 | 225  | 350 | 500 | 950 | 1100 | 1650 | 2600 | 3000 | 4000 | 5000 | 6000 |
| MV8  | 1/2 inch face seal (Male)       | ●    | ●   | ●   | ●   | —    | —    | —    | —    | —    | —    | —    |
| FV8  | 1/2 inch face seal (Female)     | ●    | ●   | ●   | ●   | —    | —    | —    | —    | —    | —    | —    |
| TW8  | 1/2 inch tube weld              | ●    | ●   | ●   | ●   | —    | —    | —    | —    | —    | —    | —    |
| MV12 | 3/4 inch face seal (Male) *2)   | —    | —   | —   | —   | ●    | ●    | ●    | —    | —    | —    | —    |
| FV12 | 3/4 inch face seal (Female) *2) | —    | —   | —   | —   | ●    | ●    | ●    | —    | —    | —    | —    |
| TW12 | 3/4 inch tube weld              | —    | —   | —   | —   | ●    | ●    | ●    | —    | —    | —    | —    |
| TW16 | 1 inch tube weld                | —    | —   | —   | —   | —    | —    | —    | ●    | ●    | —    | —    |
| TW24 | 1 1/2 inch tube weld            | —    | —   | —   | —   | —    | —    | —    | —    | —    | ●    | ●    |

●: Available —: Not available

\*2) Prepare a suitable mating fitting with a rated pressure.

## Specifications

| Operating parameters               |                            | AP74B□225                                               | AP74B□350 | AP74B□500 | AP74B□950 | AP74B□1100                     | AP74B□1650 | AP74B□2600 | AP74B□3000                     | AP74B□4000 | AP74B□5000                  | AP74B□6000 |
|------------------------------------|----------------------------|---------------------------------------------------------|-----------|-----------|-----------|--------------------------------|------------|------------|--------------------------------|------------|-----------------------------|------------|
| Gas                                |                            | Select compatible materials of construction for the gas |           |           |           |                                |            |            |                                |            |                             |            |
| Source pressure                    |                            | Vacuum to 3500 psig (24.1 MPa)                          |           |           |           | Vacuum to 3000 psig (20.7 MPa) |            |            | Vacuum to 2200 psig (15.2 MPa) |            | Vacuum to 1300 psig (9 MPa) |            |
| Flow trip reference points *1) *2) |                            | 225 slpm                                                | 350 slpm  | 500 slpm  | 950 slpm  | 1100 slpm                      | 1650 slpm  | 2600 slpm  | 3000 slpm                      | 4000 slpm  | 5000 slpm                   | 6000 slpm  |
| Accuracy                           |                            | ±20% of trip point                                      |           |           |           |                                |            |            |                                |            |                             |            |
| Proof pressure                     |                            | 1.5 times the maximum operating pressure                |           |           |           |                                |            |            |                                |            |                             |            |
| Burst pressure                     |                            | 3 times the maximum operating pressure                  |           |           |           |                                |            |            |                                |            |                             |            |
| Ambient and operating temperature  |                            | -23 to 80°C (No freezing)                               |           |           |           |                                |            |            |                                |            |                             |            |
| Leak rate                          | Inboard leakage            | 2 x 10 <sup>-11</sup> Pa·m³/s                           |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Outboard leakage           | 2 x 10 <sup>-11</sup> 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  |            |            | 1 inch tube weld               |            | 1 1/2 inch tube weld        |            |
| Pressure drop at trip point        |                            | 0.5 psi (0.0034 MPa) differential *3)                   |           |           |           |                                |            |            |                                |            |                             |            |
| Reed switch                        | Type                       | SPDT, 3 wire / 2 position                               |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Power                      | 30 VDC (3 W max)                                        |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Switching current          | 0.2 A max                                               |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Carrying current           | 0.5 A max                                               |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Initial contact resistance | 0.1 Ω max                                               |           |           |           |                                |            |            |                                |            |                             |            |
| Cable                              | Wire gauge                 | AWG24 (PVC jacket)                                      |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Cable length               | 10 ft. (3 m)                                            |           |           |           |                                |            |            |                                |            |                             |            |
|                                    | Lead color                 | Blue: common                                            |           |           |           |                                |            |            |                                |            |                             |            |
|                                    |                            | Brown: normally closed                                  |           |           |           |                                |            |            |                                |            |                             |            |
| Black: normally open               |                            |                                                         |           |           |           |                                |            |            |                                |            |                             |            |
| Weight                             |                            | 0.56 kg *4)                                             |           |           |           |                                |            |            |                                |            |                             |            |

\*1) When the flow rate exceeds the flow trip reference point, the switch turns ON. When turning the switch OFF, set the flow rate to zero.

\*2) At N<sub>2</sub> 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.242).

\*3) Pressure drop at trip point

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

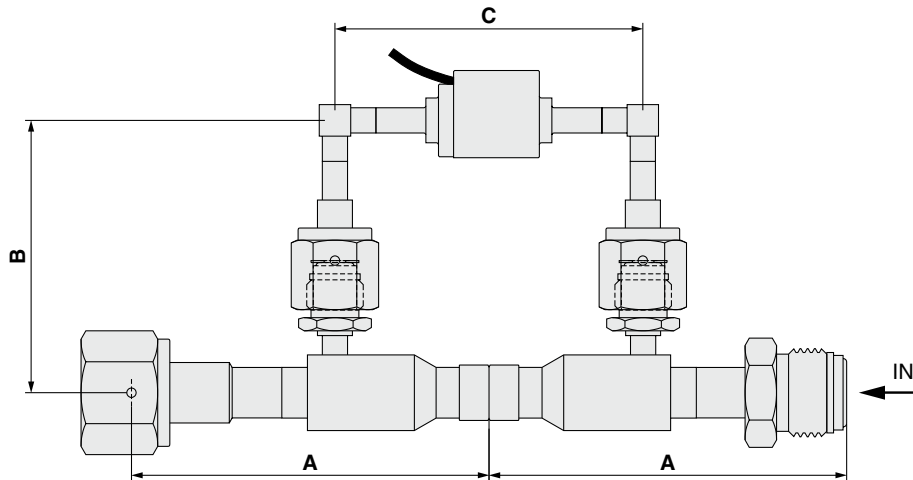
## Wetted Parts Material

| Wetted Parts   | S                           |
|----------------|-----------------------------|
| Body           | 316L SS                     |
| Surface finish | Electropolish + Passivation |
| Float          | 316L SS                     |
| Metal gasket   | Nickel 200                  |

## Dimensions

inch (mm)

### AP74B



| Connections | A    |         | B          |         |          |         | C    |        |
|-------------|------|---------|------------|---------|----------|---------|------|--------|
|             |      |         | Horizontal |         | Vertical |         |      |        |
|             | inch | (mm)    | inch       | (mm)    | inch     | (mm)    | inch | (mm)   |
| MV8         | 3.55 | (90.2)  | 4.55       | (115.6) | 2.70     | (68.6)  | 3.05 | (77.5) |
| FV8         |      |         |            |         |          |         |      |        |
| TW8         | 2.59 | (65.8)  |            |         |          |         |      |        |
| MV12        | 5.51 | (140.0) | 5.44       | (138.2) | 3.59     | (91.2)  |      |        |
| FV12        |      |         |            |         |          |         |      |        |
| TW12        |      |         |            |         |          |         |      |        |
| TW16        | 3.90 | (99.1)  | 5.57       | (141.5) | 3.72     | (94.5)  |      |        |
| TW24        | 4.15 | (105.4) | 5.82       | (147.8) | 3.97     | (100.8) |      |        |

## ⚠ Precaution on Selection

Nominal flow trip reference points are at 100 psig (0.69 MPa) of N<sub>2</sub> gas.

In order to obtain the nominal trip point for operating pressure, other than 100 psig (0.69 MPa), and for gas, other than N<sub>2</sub>, calculate the correction factors (F<sub>p</sub>, F<sub>g</sub>) 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<sub>MPa</sub>: 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<sub>p</sub>

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

### 2. Calculation of F<sub>g</sub>

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

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)).

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions



# Process Gas Equipment/Check Valve Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## Selection

### Warning

#### 1. Confirm the specifications.

This product is used in gas delivery systems to prevent reverse gas flow. This product can only supply gas from inlet to outlet side. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure, flow rate, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product materials with the process gas in the catalog selection guide. Design the equipment and select the product by understanding the characteristics of gas.

## Mounting

### Caution

#### 1. Confirm the mounting direction of the product.

An arrow is indicated on the product. The arrow points in the direction flow are allowed from the inlet side towards the outlet side.

## Maintenance

### Warning

#### 1. AP64 check valves cannot be repaired.

AP Tech AP64 check valves are welded shut and internal problems usually cannot be repaired.

## Operation

### Caution

#### 1. Do not use the check valve as shutoff valve.

Do not rely on a check valve exclusively to absolutely prevent any reverse flow, especially when the pressure differential is small. For situations where it is known the downstream pressure will exceed the upstream pressure, use a diaphragm valve to positively shut off reverse flow.



# Process Gas Equipment/Vacuum Generator Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## Selection

### ⚠ Warning

#### 1. Confirm the specifications.

This product is used in gas delivery systems to assist in purging of piping systems. When selecting the product, confirm the operating conditions, such as type of process gas being vented, nitrogen supply pressure and flow rate, vent line back pressure generated by the nitrogen supply flow rate, actuation pressure, operating temperature etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product with the process gas in the catalog selection guide. Design the equipment and select the product by understanding the characteristics of gas.

## Mounting

### ⚠ Caution

#### 1. Confirm the mounting direction of the product.

Inlet port is labeled with “IN” mark and outlet port is labeled with “OUT” mark. Alternatively, the nitrogen flow direction may be indicated with an arrow instead of “IN” and “OUT” marks. Inlet and outlet ports run in line with each other. The vacuum port runs perpendicular to the inlet and outlet ports. The vacuum port may be labeled with “VAC” mark. Confirm the mounting direction and install at correct direction.

#### 2. Connect actuation pressure to the valve actuator connection.

If an air operated valve is built in the product, connect actuation pressure to the valve actuator connection. Use nitrogen or clean dry air for actuation pressure.

## 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.

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions



# Process Gas Equipment/Flow Switch Specific Product Precautions

Be sure to read this before handling the products. Refer to page 248 for safety instructions. For process gas equipment precautions, refer to pages 249, 250, and the “Operation Manual” on the SMC website.

## Selection

### Warning

#### 1. Confirm the specifications.

This product is used in gas delivery systems to signal an increase in flow above a trip point. When selecting the product, confirm the operating conditions, such as type of gas, operating pressure, flow rate, operating temperature, etc., and use within the operating range specified in the catalog. The product may not be suitable for use with specific gases and applications/environments. Check the compatibility of the product materials with the process gas. Confirm the compatibility of the product with the process gas in the catalog selection guide.

Design the equipment and select the product by understanding the characteristics of gas.

#### 2. Confirm the flow trip reference point of the product.

Flow trip reference point is fixed. Select the product which meets the desired flow rate. Flow trip reference point, specified in the How To Order, is the trip point value with nitrogen at 0.69 MPa inlet pressure. When the products are used with other inlet pressures or gases, use the conversion formula to calculate the flow trip reference point for such application.

## Mounting

### Caution

#### 1. Do not drop or bump the products.

When dropping, bumping, or applying excessive impacts to the products, it may damage inside of the product and cause malfunction.

#### 2. Confirm the mounting direction of the products.

An arrow is indicated on the product. In the case of the AP74B series, an arrow is indicated on the bypass line. The arrow points in the forward flow direction from inlet port to outlet port.

#### 3. Install the products vertically with the inlet port on the bottom in order to supply gases from bottom to top.

In the case of the AP74 series, install the product within 8 degrees of vertical in order to supply gas from bottom to top. In the case of the AP74B series, install the product with its arrow indicated on the bypass line within 8 degrees of vertical in order to make its arrow direction upward.

## Wiring

### Warning

#### 1. Avoid bending repeatedly or stretching the lead wires.

Lead wire may break when applying bending stress repeatedly or stretching force to the lead wires.

#### 2. Do not wire in conjunction with power lines or high voltage lines.

Wire separately from power lines and high voltage lines and avoid wiring in the same conduit with these lines. Close proximity between power lines or high voltage lines and the product may result in malfunction due to electrical noise.

## Wiring

### Warning

#### 3. Confirm proper insulation of wiring.

Make sure that there is no insulation failure (contact with other circuits, insulation failure between terminal, etc.). Damage may occur due to excessive current applied to the product.

#### 4. Connect wires properly.

Use brown and blue wires for normally closed contact installation.

Use black and blue wires for normally open contact installation.

#### 5. Do not connect wiring while product is energized.

#### 6. Make sure to connect a load before energizing the product.

Energizing the product without connecting a load (load short-circuit) can create excessive current and damage the switch.

#### 7. Confirm operation of the product by supplying nitrogen after installation and wiring.

Confirm the product trips when supplying nitrogen above the flow trip reference point and that it resets when the flow is shut off.

## Operating Environment

### Warning

#### 1. Do not use in an area, where a magnetic field is generated. It may cause malfunction.

## Maintenance

### Warning

#### 1. AP Tech flow switches cannot be repaired.

AP Tech flow switches are welded shut and internal problems usually cannot be repaired.

## Operation

### Warning

#### 1. Initial pressurization of system lines can cause a temporary flow surge that trips the flow switch.

Confirm flow switch resets once system lines are filled with gas. If it does not reset after system lines are filled, stop supplying gas and check for leakage of the system.

# Technical Data/Glossary of Terms

## 1. Applications

### [Process Gas]

A generic term describing gases used in manufacturing which contact the product being manufactured (processed).

### [Specialty Gas]

A generic term describing gases stored in cylinders (bottles). These gases range from non-hazardous inert to hazardous - corrosive, poisonous, flammable, oxidizer and pyrophoric.

### [Bulk Gas]

A generic term used to describe gases stored in large vessels. The most common bulk gases are stored in liquid phase, such as nitrogen and oxygen.

### [CDA]

Clean dry air, generally supplied by a compressor rather than a cylinder (bottle).

### [Ultra High Purity (UHP)]

A term common to the semiconductor industry and other clean industries such as solar, LED and flat panel display, used to describe extremely high purity and very low contamination requirements. Gases are of the highest level of purity attainable and gas handling systems and components are designed to maintain such purity without contributing contamination to the gas stream.

### [General Applications]

This term indicates all industries other than semiconductor and clean industries such as solar, LED and flat panel display, and applications that are not UHP.

### [Source (Cylinder) Applications]

Defines products used at gas storage vessel, such as a cylinder (bottle) pressure regulator used to decrease source pressure to a lower line pressure. For the purposes of this catalog, components are defined as 'source' if they are the cylinder pressure regulator or upstream of the cylinder regulator.

### [Distribution Applications]

Defines products used downstream of source regulator which includes point of use, distribution panels such as valve manifold boxes (VMB) and within the process tool. For the purposes of this catalog, components downstream of the source regulator are defined as 'distribution'.

### [Bulk Gas Applications]

Defines products used for source and distribution applications of bulk gases, including BSGS (bulk specialty gas systems).

### [Sub-atmospheric Applications]

Source and distribution applications where pressure delivery is less than atmospheric pressure. This is common for low vapor pressure specialty gas delivery.

## 2. Products

### [Regulator]

A control valve that works by reducing the valve inlet pressure and delivering a lower outlet pressure. Most AP Tech regulators are non-relieving type, which means pressure above set point is not vented automatically.

### [Single stage]

Single stage pressure regulators drop pressure only once in a single step.

### [Two stage]

Two stage regulation drops pressure twice, in two steps. A two stage regulator is simply two regulators in series with a common body. Two stage regulations are two separate regulators in series.

### [Tied-diaphragm]

This is a regulator design in which the diaphragm and poppet are linked together. The tied diaphragm feature pulls the poppet closed as the pressure rises above set point and stops leak due to contamination or some other failures.

### [Springless Regulator]

These are pressure regulators which do not have wetted springs below the poppet. The diaphragm and poppet are linked, as with the tied diaphragm, but it is also does not have a poppet spring.

### [Back pressure regulator]

This is a control valve that if the pressure on the inlet side exceeds a set level, the over pressure is vented to outlet side to keep the inlet pressure stable.

### [Diaphragm valve]

This is a shut off valve which uses a diaphragm for a moving element to open and close the valve. Springless diaphragm valves do not have a wetted spring. Diaphragm valves from AP Tech are two way valves, available with multiple ports.

### [LOTO]

Stands for Lock-out/Tag-out and is used to ensure worker's safety.

Lock-out refers to physically locking the device to shutoff gas supply to equipment. Tag-out refers to the practice of attaching a warning tag to the device to prevent potential accidents caused by erroneous operations.

### [Purge port]

Purge ports can be located on the inlet and/or outlet side of the valve. It can be used in applications, such as applying purge gas when welding on the line or maintenance service while valve is closed.

### [Check valve]

A check valve is a safety device intended to prevent reverse flow. The AP 64 is a unique design with only one moving part in the gas stream, an O-ring. It is a springless design, free of springs and poppets.

### [Vacuum generator]

A venturi device that creates vacuum by flowing gas through a nozzle. The AP 71 and 72 are module devices which combine a supply valve and check valve with the venturi.

### [Constant bleed]

A feature that provides a continuous flow of gas through the valve via an orifice when it is closed. This feature is used with the AP 71 and AP 72 series to keep exhaust lines inert. It is also available as an option to certain standard shut off valves to provide a bleed to keep the cylinder connection inert while disconnected from a cylinder.

### [Flow switch]

A sensor that detects excess flow above a given flow rate, caused by pipe breakage etc.

Note that the AP 4 and AP 74B series are simple switches and do not have a flow rate display function.

## 3. Materials

### [316 SS]

An austenitic stainless steel with a higher nickel content to improve its corrosion resistance.

### [316L SS]

A low-carbon form of 316 SS which has better intergranular corrosion resistance than 316 SS.

# Technical Data/Glossary of Terms

## **[316L SS secondary remelt]**

A high-grade form of 316L SS to reduce impurities to the utmost limit.

AP Tech 316L SS secondary remelt steel conforms to the SEMI standard F20 UHP grade.

## **[Ni-Cr-Mo alloy]**

A nickel-chromium-molybdenum alloy with excellent corrosion resistance.

## **[Ni-Co alloy]**

A cobalt-chromium-nickel alloy with excellent corrosion resistance and superelasticity. This material is used as diaphragm of the diaphragm valves.

## **[PCTFE]**

Poly Chloro Tri Fluoro Ethylene. This is high transparency fluoroplastic material with mechanically superior in rigidity and excellent low temperature. This material is used as standard seat material of the regulators and diaphragm valves.

## **[PTFE]**

Fully fluorinated material. This is virtually chemically inert. PTFE should have equivalent or superior chemical compatibility compared to PCTFE in every application. PTFE (TF) option available for the AP 500, AP, AZ & AK 1000 & 1100 and AZ & AK 1300. The primary application for this material is for pressure regulators inside process tools.

## **[Polyimide]**

Plastic with excellent heat resistance (polyimide resin). This material has excellent heat and wear resistance. This seat is available as an option for high temperature applications or specific gas applications, such as N<sub>2</sub>O or CO<sub>2</sub>.

## **[PEEK]**

Polyetheretherketone. This material has excellent heat, fatigue and chemical resistances as thermoplastic resin. This seat is available as an option for the regulators.

## **[FKM]**

Fluoro-rubber (FKM). This material has excellent heat and chemical resistances.

## **[FFKM]**

Perfluoroelastomer (FFKM). This material has excellent heat and chemical resistances compared to fluoro-rubber (FKM).

## 4. Surface treatment

### **[Electropolish]**

Commonly referred to as EP, is an electrolytic process for metals to enhance a surface chemistry and smooth the surface finish.

### **[Passivation]**

A process for metals to form a passivation layer on the surface, typically by removing surface Fe in a nitric acid bath.

## 5. Connections

### **[Face seal fitting]**

A fitting type in which a metal gasket effects a seal with mating fittings, forming high leak integrity, metal to metal seal. The most common face seal fitting is VCR<sup>®</sup> compatible type.

### **[Tube weld]**

Components with tube stubs are installed by welding into the piping system directly without using fittings.

### **[Compression fitting]**

A self-aligning tube fitting that uses a ferrule to compress on the tubing effecting a seal when the nut is tightened. A common compression fitting is that of Swagelok<sup>®</sup>.

## **[NPT]**

A tapered pipe thread which is a U.S.A standard (ANSI).

## 6. Specifications

### **[Surface finish Ra]**

Surface finish of the inner surface (wetted parts). A standard for measuring surface roughness which averages the peak to valley of the surface profile over a given distance (stroke). Multiple readings on a part are also averaged for Ra, but for Ra max, the worst reading is the value for that part.

### **[Cv factor]**

The flow coefficient, Cv, is defined as the volume of 15.6°C water passing through a valve with specific differential inlet to outlet pressures. Cv is calculated in accordance with the SEMI standard F32. Cv measurements of regulators are taken with the orifice of the regulators wide open.

### **[Cracking pressure]**

This is the pressure at which a check valve first opens and achieves a given flow rate as pressure increase.

### **[Ultimate vacuum]**

The maximum vacuum generated by a vacuum generator.

### **[slpm]**

Abbreviation for standard liter per minute.

Indicates the volumetric flow in liters per minute of time at standard conditions of a temperature of 0°C and a pressure of 1 atmosphere.

### **[Supply pressure effect]**

The change in a pressure regulator's outlet pressure resulting from a change in source (supply) pressure. The most typical is an increase in outlet pressure as the inlet pressure decays – often stated as a given rise per a given drop in pressure.

### **[Inboard leakage]**

Leakage rate from outside to inside of the products occurring when an internal pressure is less than the external pressure. This can be detected by spraying helium on outside of the products and detecting helium entering into the products from any leak path while internal cavities are evacuated. This detection method conforms to the SEMI standard F1.

### **[Outboard leakage]**

Leakage rate from inside to outside of the products occurring when an internal pressure is more than the external pressure. This can be detected by pressurizing helium inside the products and detecting helium leaking outside from the products. This detection method conforms to the SEMI standard F1.

### **[Across the seat leak]**

Leak rate from inlet to outlet of a device in the closed position. Often also referred to as 'internal leakage' meaning leak is only internal from inlet to outlet side.

### **[SEMI standards]**

Voluntary standards issued by Semiconductor Equipment and Materials International (SEMI) an international industry association made up of companies that supply manufacturing equipment, materials and related services to the semiconductor, flat panel display, nanotechnology, MEMS, solar power generation and other related industries.

## Process Gas Equipment

### 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)\*<sup>1</sup>, Japan Industrial Standards (JIS)\*<sup>2</sup> and other safety regulations\*<sup>3</sup>.

-  **Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
-  **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
-  **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

- \*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
- \*2) JIS B 8370: Pneumatic fluid power - General rules and safety requirements for systems and their components
- \*3) High Pressure Gas Safety Act, Labor Safety and Sanitation Law etc.

### Warning

#### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

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

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also thoroughly review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, installation operation maintenance of the given equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or outdoors (use in a place protected from adverse environmental).

2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.

3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

### Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not allowed.

## Limited Warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited Warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited Warranty and Disclaimer

1. The warranty period of the product is 1 year after the product is delivered to customer from SMC.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using the products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

### Compliance Requirements

1. When the product is exported, strictly follow the laws required by the Ministry of Economy, Trade and Industry (Foreign Exchange and Foreign Trade Control Law).
2. The products printed in the catalog are USA manufactured products of AP Tech. As such, they fall within the United States Export Administration Regulations (EAR) regarding re-exports.  
It is the exporter's responsibility to assure that these regulations are followed when the products are exported.

### Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) before use.

Recommendations

Regulators

AP

SL

AZ

AK

BP

Diaphragm Valves

AP

AZ

AK

Check Valves

AK

Vacuum Generators

Flow Switches

Technical Data/  
Glossary of Terms

Precautions



# Process Gas Equipment Common Precautions 1

Be sure to read this before handling products.

## 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 a 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 certain gases and applications/environments. Check the compatibility of the product materials and the process gas.

Design the equipment and select a product with full understanding of the characteristics of gas to be used.

#### 2. Follow the regulations and laws defined by the country or local government, and 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 operation 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 product.

Remove any dust or scales thoroughly, as they could cause the malfunction or failure of the product. Do not flush with a gas other than inert gas, as this could cause dangerous situations.

#### 2. Do not touch the fitting or the wetted parts of the product by hand. Do not apply grease or oil to the product.

#### 3. Unpack the hermetically-sealed package in a clean environment (with the exception of the AK series).

Products intended for high purity processes are double packed inside a clean room. Make sure to unpack the sealed inner bag inside a clean room or clean environment.

#### 4. Ensure sufficient space for maintenance activities.

Ensure sufficient space for maintenance and inspection.

## Mounting

### Caution

#### 5. Connect face seal fittings.

Use same size face seal fittings (metal gasket sealing type) for mating connections.

Place the gasket at the end of the fitting and tighten the female nut by hand, and then tighten the nut an additional 1/8 turn using a torque wrench. For gasket material, use either stainless or nickel.

#### 6. Connect tube welds.

Follow the industry standards (refer to SEMI F78) when welding the piping. Make sure the valve is in the open position when supplying purge gas. If welding the inlet side, supply purge gas from the outlet side of the product, and if welding the outlet side, supply purge gas from the inlet side of the product.

#### 7. Connect compression fittings.

Tighten the nut an additional 1-1/4 turn after hand tightening once the tube has been inserted into the fitting. Please use stainless steel material for piping. After installation, perform a leak test.

#### 8. Connect pipe thread fittings.

Thread fitting or piping into the body and tighten it at the 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 sealant other than PTFE, it will be difficult to fully remove the sealant and this could cause the malfunction or failure of the product.

#### 9. After installation, perform a leak test.

Perform a leak test, such as a helium leak test, pressure decay test, bubble leak test, etc., appropriate for the application. It is recommended to perform a helium leak test on all face seal connections and tube welds as per the industry standards (refer to SEMI F1).

## Storage and Operating Environment

### Warning

#### 1. Do not use in an area containing 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 product in storage in an area where any dust or water may enter. Also, keep in dry conditions where there is no contact with humidity.



# Process Gas Equipment Common Precautions 2

Be sure to read this before handling products.

## Maintenance

### Warning

#### 1. Perform routine maintenance.

Performing routine maintenance, by taking into consideration the operating conditions of the equipment, is the customer's responsibility. It is recommended to perform routine maintenance for the following:

External leakage, internal leakage (across the seat leakage), performance, etc.

#### 2. Shut down the system before removing the product for repair or replacement.

Follow the proper procedures to shut off the process gas supply, and vent the system.

#### 3. Purge hazardous gases from the system before removing the product.

#### 4. Do not disassemble products under warranty.

The warranty may be voided if the product is disassembled.

## Operation

### Warning

#### 1. Do not put heavy objects on the product. Do not use the product as scaffold.

#### 2. Do not use the product in conditions that do not meet the product specifications.

## Product Returns

When returning a product to SMC, make sure to properly purge to remove all hazardous materials and return the product in accordance with SMC's specified procedures. For details, please contact SMC.

## Export

### Warning

These products fall within the United States Export Administration Regulations (EAR) regarding sale, export, and re-export. It is the exporter's responsibility to assure that these regulations are followed when the products are exported. The Export Control Classification Number (ECCN) related to the products is as follows.

Regulations (including ECCN) are subject to change with the amendment of laws.

The latest information regarding these regulations should be checked by the customer.

Reference: Bureau of Industry and Security (USA)  
<https://www.bis.gov/>

#### 1) 2B350.g.1 <Applicable conditions>

(1) Product name: Diaphragm valve

(2) Body material: Ni-Cr-Mo alloy

(3) Connection size: 1/2 inch or more to less than 1 inch \*1

\*1 Refer to 2B999.g for connections 3/8" inch or smaller

#### 2) 2B350.g.2 <Applicable conditions>

(1) Product name: Diaphragm valve

(2) Body material: Ni-Cr-Mo alloy

(3) Connection size: 1 inch or more to less than 4 inches

#### 3) 2B999.g <Applicable conditions>

(1) Product name: Regulator, Back pressure regulator, Diaphragm valve, Check valve, Vacuum generator module (integrated with valve and check valve)

(2) Body material: 316 SS, 316L SS, 316L SS secondary remelt, Ni-Cr-Mo alloy regardless of connection size

#### 4) EAR99 <Applicable conditions>

(1) Regulator and Back pressure regulator with brass bodies

(2) Vacuum generator, Flow switch, Other options (Pressure gauge, LOTO)

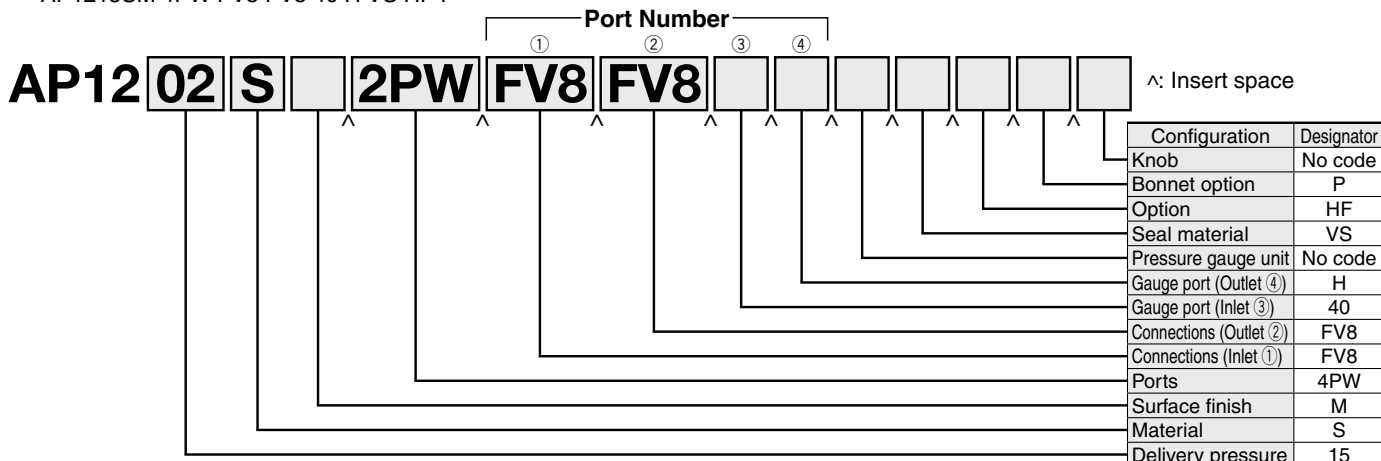
## Ordering Syntax

When ordering products, the model number should insert a space between designators, the position "A" for space insert, as shown below (except SMC Japan). However, no need a space between from the head of designator to the port designator.

(Example)

If selecting the designator as shown in the table below, the ordering model number should be as follow.

AP1215SM 4PW FV8 FV8 40 H VS HF P



For more details, please contact SMC.

## Revision History

**Edition B** \* Not available

**Edition C** \* High flow type is added to the regulator AZ/AK series.

\* Air operated type is added to the regulator AP/AZ/AK series.

\* The product specifications for UHP gas (electropolish, face seal) are added to the back pressure regulator BP1000 series.

\* Air operated two step mode is added to the diaphragm valve AP series.

\* Max. operating pressure (Max. inlet pressure for regulators) is changed: 16.5 MPa → 20.7 MPa

<Applicable models> Regulators/AP1200, AP12PA series; Diaphragm valve/AP31□□ series; Flow switch/AP74B series

\* Operating pressure range is changed: Vacuum to 1.7 MPa → Vacuum to 2.1 MPa

<Applicable models> Diaphragm valves/AP3550, 4550, 4600, 4625, 4650, 4657 series

\* Operating pressure range is changed: Vacuum to 0.9 MPa → Vacuum to 1.0 MPa

<Applicable model> Diaphragm valve/AP3540 series (Seat material: PCTFE)

\* The external dimension is changed: 136.7 → 146.3

<Applicable models> Regulators/AP9000, AP9100 series

\* The material of pressure gauge case is changed: Brass → Stainless steel + Zirconium nitride coating

\* The part number with gauge port plug installed before shipment is changed. The code number C is added.

<Applicable models> Regulator/AK series; Back pressure regulator/BP1000 series

\* Inlet pressure range is changed: Vacuum to 1.7 MPa → Vacuum to 5.5 MPa

<Applicable model> Regulator/AP9115

\* The leakage and flow rate display units are changed to SI units: Pa·m<sup>3</sup>/sec → Pa·m<sup>3</sup>/s

<Applicable models> All models

\* The number of pages has been increased from 132 to 172.

**Edition D** \* A bulk gas delivery type and a low flow rate type have been for the AP series regulator.

\* An ultra high purity type has been added for the BP series back pressure regulator.

\* A metering valve has been added for the AP series for ultra high purity.

\* AZ series diaphragm valves for ultra high purity have been added.

\* The number of pages has been increased from 172 to 260.

## Process Gas Equipment



**SMC Corporation**