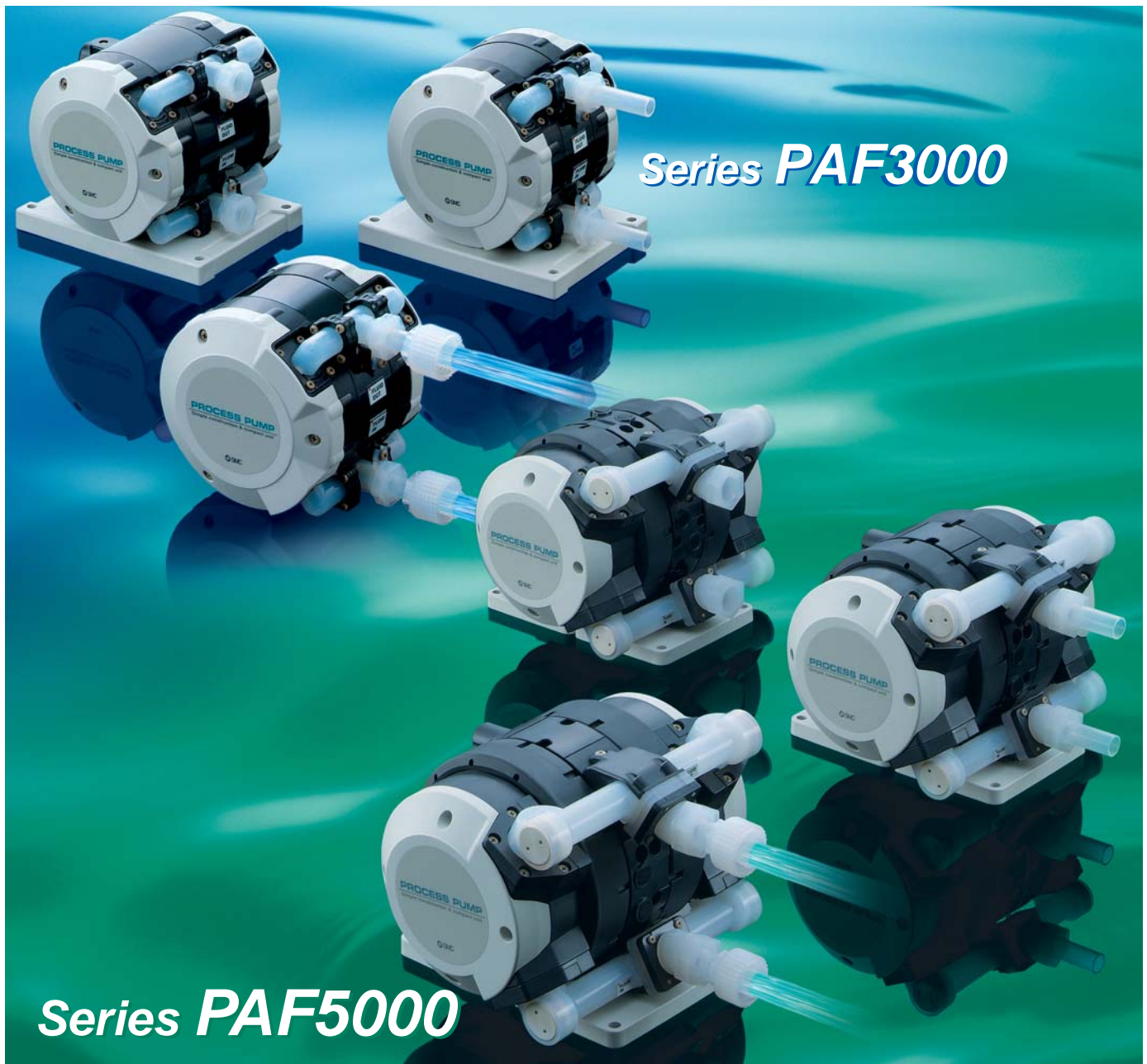


Clean Wet Series

Process Pump



Excellent corrosion resistance is achieved due to the **new PFA** wetted material construction!

New Series **PAF5000** is now available!

- No metallic parts are used (Metal-free), Pump made from fluororesin
- Max. flow rate: **45** ℓ/min (Automatically operated)

Excellent corrosion resistance is achieved due

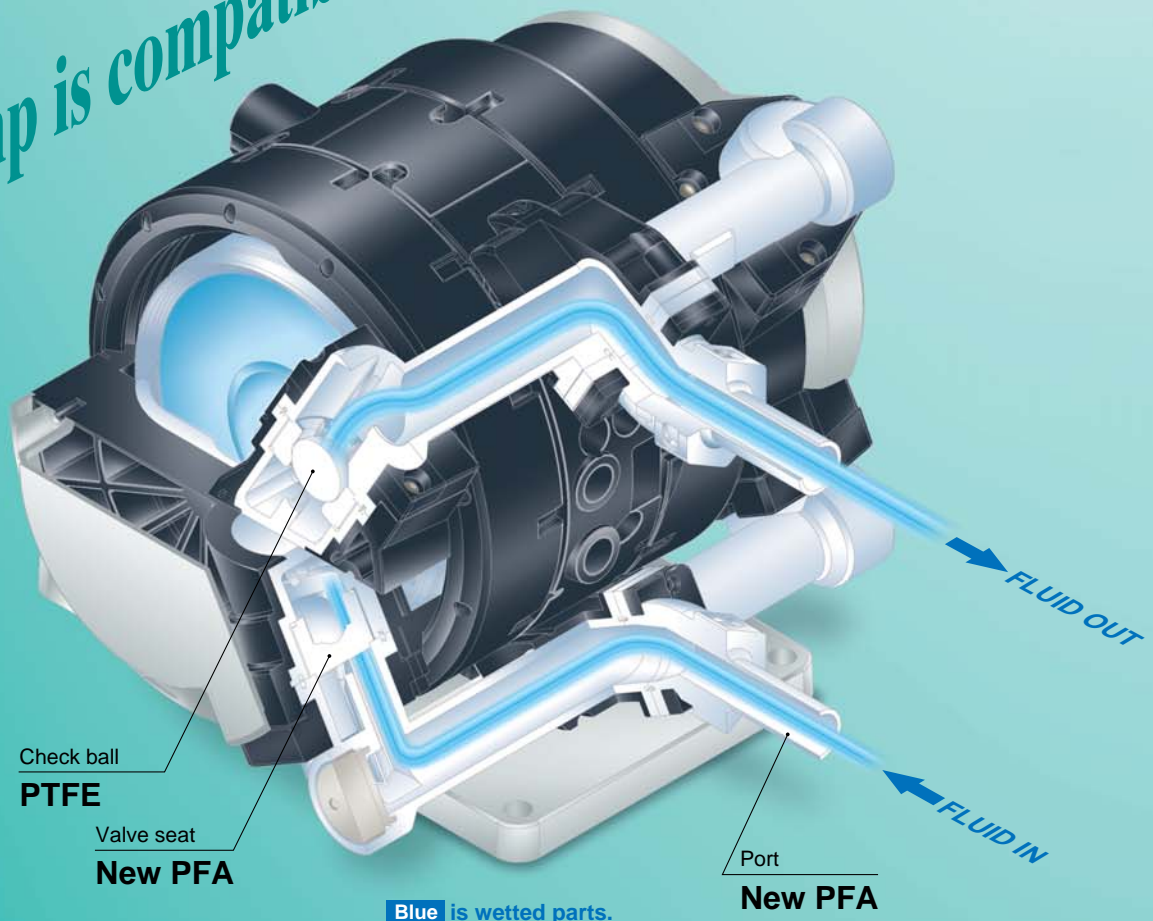
Body material

Diaphragm/Seal material

New PFA PTFE

Excellent corrosion resistance

One pump is compatible with various fluids.



Variations

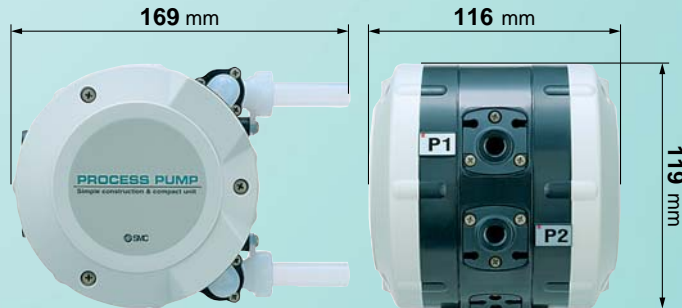
| Model | | Body material | Diaphragm material | Discharge flow rate (ℓ/min) | Fitting type | Option |
|------------------------|---------|---------------|--------------------|-----------------------------|---|--|
| Automatically operated | PAF3410 | New PFA | Denatured PTFE | 1 to 20 | Female thread Tube extension With nut | <ul style="list-style-type: none"> • Foot ^{Note 1)} • Silencer ^{Note 2)} |
| | PAF5410 | | | 5 to 45 | | |
| Air operated | PAF3413 | | | 1 to 15 | | |
| | PAF5413 | | | 5 to 38 | | |

Note 1) Equipped with the PAF5000 series as standard equipment. Note 2) Automatically operated only.

to the new PFA wetted material construction!

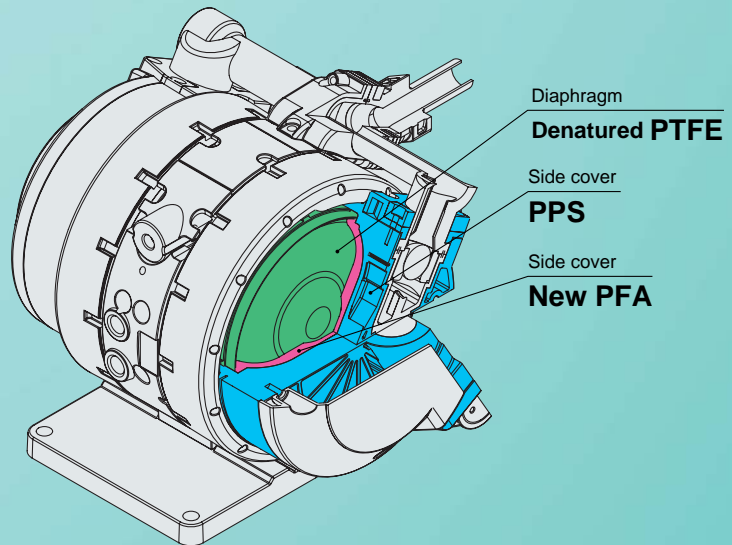
- Light weight and Compact

- Weight: **1.3 kg**
(PAF3000 / air operated, without foot)



- **Dual PPS/PFA construction**

Withstand pressure and heat cycle performance have been improved.



- **Clean**

Assembled in a **clean room** and double-packaged.

By using a **molded side cover** and port, it effectively reduces the amount of dust generation.



Female thread



Tube extension



With nut

Process Pump: Automatically Operated Type (Internal Switching Type) Air Operated Type (External Switching Type) Series *PAF3000*

How to Order

Female thread

PAF341 0 — 03 —



Actuation Note 1)

| Symbol | Actuation |
|--------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Thread type Note 2)

| Symbol | Type |
|--------|------|
| - | Rc |
| N | NPT |
| F | G |

Port size

| Symbol | Port size |
|--------|-----------|
| 03 | 3/8" |

Option

| Symbol | Option | Applicable actuation | |
|--------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| B | With foot | ● | ● |
| N | With silencer | ● | — |

* When none than one option is required, add suffix in alphabetical order.

Tube extension

PAF341 0 — P13 —



Actuation Note 1)

| Symbol | Actuation |
|--------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Tubing size

| Symbol | Main fluid connection size |
|--------|----------------------------|
| 13 | 1/2" |

Thread type Note 2)

| Symbol | Type |
|--------|------|
| Nil | Rc |
| N | NPT |
| F | G |

Option

| Symbol | Option | Applicable actuation | |
|--------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| B | With foot | ● | ● |
| N | With silencer | ● | — |

* When more than one option is required, add suffix in alphabetical order.

With nut

PAF341 0 S — 1 S 13 —



Actuation Note 1)

| Symbol | Actuation |
|--------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Fitting type

| Symbol | Fitting type |
|--------|--------------|
| 1 | LQ1 |

Fitting size

| Symbol | IN side | OUT side |
|--------|---------|----------|
| 13 | | 4 |
| 1319 | 4 | 5 |
| 1913 | 5 | 4 |
| 19 | | 5 |

* Refer to page 3 for the compatible fittings.

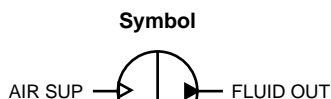
Option

| Symbol | Option | Applicable actuation | |
|--------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| B | With foot | ● | ● |
| N | With silencer | ● | — |

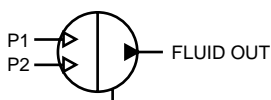
* When more than one option is required, add suffix in alphabetical order.

Thread type Note 2)

| Symbol | Type |
|--------|------|
| - | Rc |
| N | NPT |
| F | G |



AIR EXH FLUID IN
Automatically operated type



FLUID IN
Air operated type

Note 1) The port size of the pilot port is as follows. Automatically operated type is 1/4"; Air operated type is 1/8".
Note 2) The thread type is applied to the pilot port thread and the female thread piping connection.

Process Pump: Automatically Operated Type (Internal Switching Type) Air Operated Type (External Switching Type) Series *PAF5000*

How to Order

Female thread

PAF541 **0** — **06** —



Actuation ^{Note 1)}

| Symbol | Actuation |
|----------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Thread type ^{Note 2)}

| Symbol | Type |
|----------|------|
| - | Rc |
| N | NPT |
| F | G |

Port size

| Symbol | Port size |
|-----------|-----------|
| 06 | 3/4" |

Option

| Symbol | Option | Applicable actuation | |
|----------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| N | With silencer | ● | — |

Tube extension

PAF541 **0** — **P19** —



Actuation ^{Note 1)}

| Symbol | Actuation |
|----------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Tubing size

| Symbol | Main fluid connection size |
|-----------|----------------------------|
| 19 | 3/4" |

Thread type ^{Note 2)}

| Symbol | Type |
|----------|------|
| - | Rc |
| N | NPT |
| F | G |

Option

| Symbol | Option | Applicable actuation | |
|----------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| N | With silencer | ● | — |

With nut

PAF541 **0** **S** — **1** **S** **19** —



Actuation ^{Note 1)}

| Symbol | Actuation |
|----------|------------------------|
| 0 | Automatically operated |
| 3 | Air operated |

Fitting type

| Symbol | Fitting type |
|----------|--------------|
| 1 | LQ1 |

Fitting size

| Symbol | IN side | OUT side |
|-------------|---------|----------|
| 19 | | 5 |
| 1925 | 5 | 6 |
| 2519 | 6 | 5 |
| 25 | | 6 |

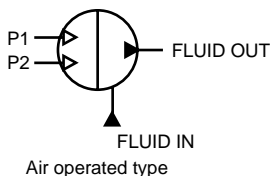
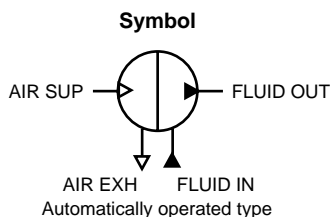
Option

| Symbol | Option | Applicable actuation | |
|----------|---------------|------------------------|--------------|
| | | Automatically operated | Air operated |
| - | None | ● | ● |
| N | With silencer | ● | — |

Thread type ^{Note 2)}

| Symbol | Type |
|----------|------|
| - | Rc |
| N | NPT |
| F | G |

* Refer to page 3 for the compatible fittings.



Note 1) The port size of the pilot port is 1/4".

Note 2) The thread type is applied to the pilot port thread and the female thread piping connection.

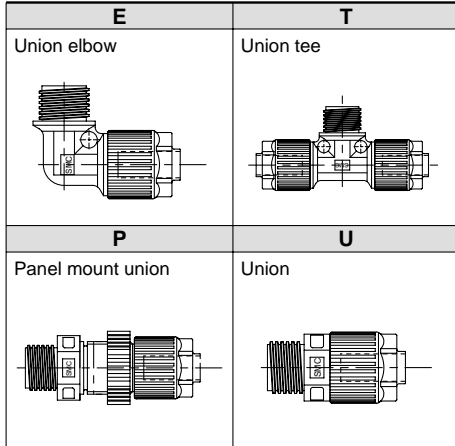
How to Order Fittings for Products with Nut (Series PAF341□S, PAF541□S)

Fittings compatible for the process pump with nut / PAF341□S, PAF541□S.

For the case when using the process pump with nut type, use the fittings which have one nut (including the insert bushing) removed..

LQ1E41-S

Fitting type



• A Nut (including the insert bushing) is removed from one location

• Applicable tubing size
Metric size

| Class | No. | Applicable tubing size (mm) | Reducing* | Applicable process pump | |
|-------|-----|-----------------------------|-----------|-------------------------|----------|
| | | | | PAF341□S | PAF541□S |
| 4 | 1 | 12 x 10 | ○ | ● | — |
| 4 | 2 | 10 x 8 | ● | ● | — |
| 5 | 1 | 19 x 16 | ○ | ● | ● |
| 5 | 2 | 12 x 10 | ● | ● | ● |
| 6 | 1 | 25 x 22 | ○ | — | ● |
| 6 | 2 | 19 x 16 | ● | — | ● |

* ○: Basic size ●: With reducer

Inch size

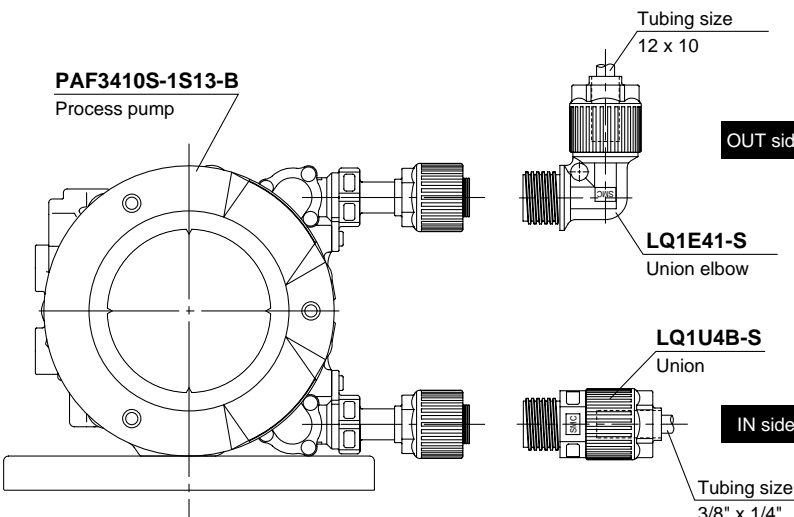
| Class | No. | Applicable tubing size (mm) | Reducing* | Applicable process pump | |
|-------|-----|-----------------------------|-----------|-------------------------|----------|
| | | | | PAF341□S | PAF541□S |
| 4 | A | 1/2" x 3/8" | ○ | ● | — |
| 4 | B | 3/8" x 1/4" | ● | ● | — |
| 5 | A | 3/4" x 5/8" | ○ | ● | ● |
| 5 | B | 1/2" x 3/8" | ● | ● | ● |
| 6 | A | 1" x 7/8" | ○ | — | ● |
| 6 | B | 3/4" x 5/8" | ● | — | ● |

* ○: Basic size ●: With reducer



Note) Select the fitting after confirming the IN / OUT side fitting size and fitting type.

Ordering Example



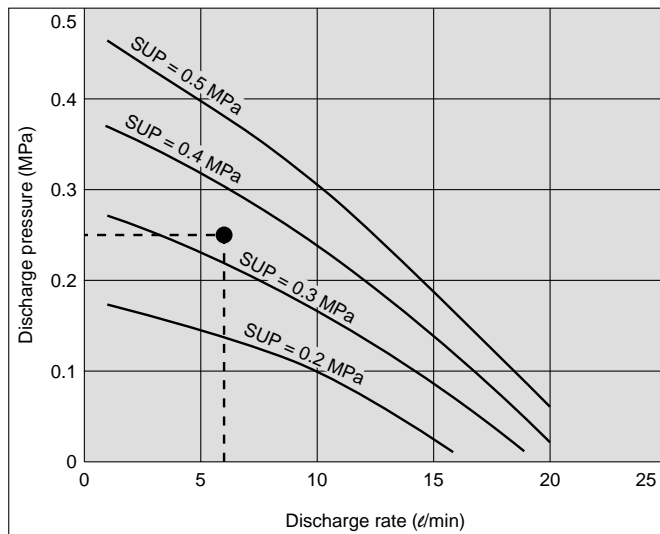
| | |
|--|---|
| PAF3410S-1S13-B Process pump | 1 |
| LQ1E41-S (Union elbow) | 1 |
| LQ1U4B-S (Union) | 1 |

Note) Fittings which are ordered with the process pump at the same time will be shipped in a separate package.

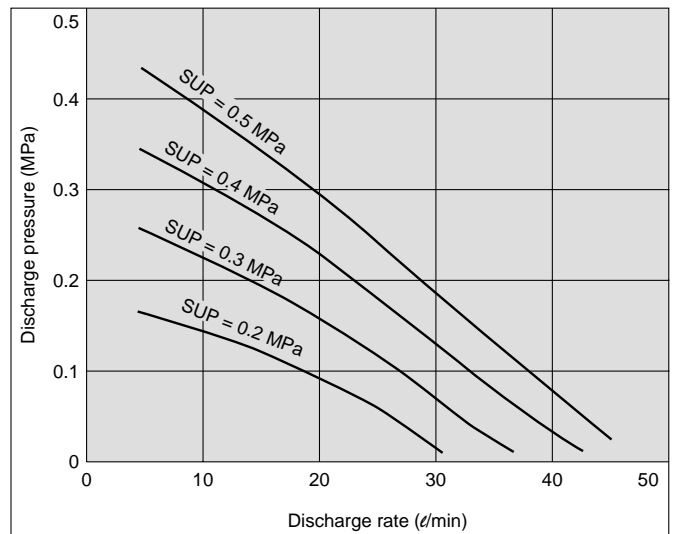
Series PAF

Performance Curve: Automatically Operated Type

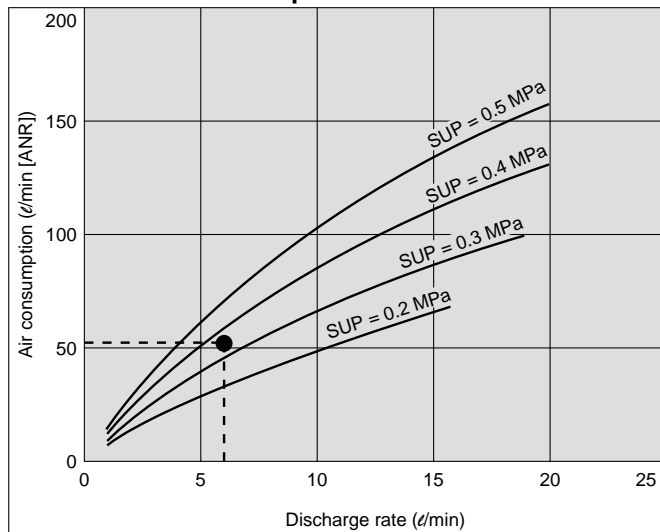
PAF3410 Flow Characteristics



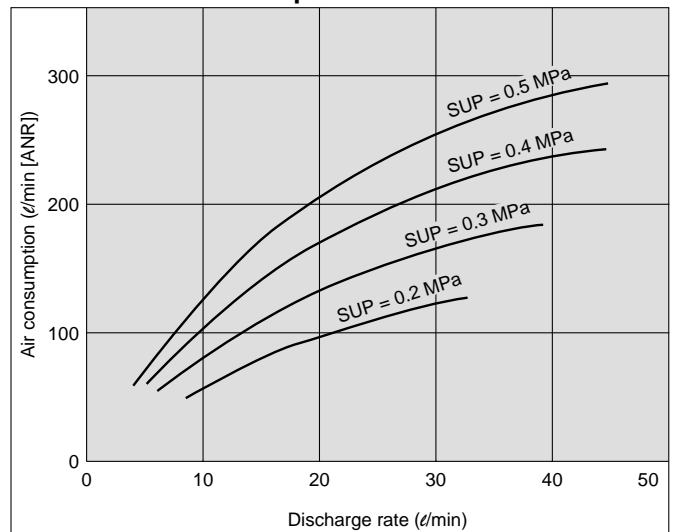
PAF5410 Flow Characteristics



PAF3410 Air Consumption



PAF5410 Air Consumption



Selection from Flow Characteristic Graph (PAF3410)

Required specifications example:

Find the pilot air pressure and the pilot air consumption for a discharge rate of 6 ℓ/min and a discharge pressure of 0.25 MPa. <The transfer fluid is fresh water (viscosity 1 mPa·s, specific gravity 1.0).>

* If the total lifting height is required instead of the discharge pressure, discharge pressure of 0.1 MPa corresponds to a total lift of 10 m.

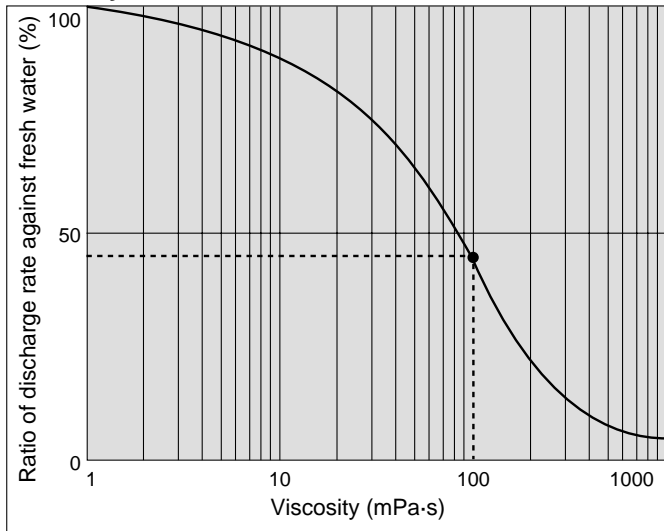
Selection procedures:

1. First mark the intersection point for a discharge rate of 6 ℓ/min and a discharge pressure of 0.25 MPa.
2. Find the pilot air pressure for the marked point. In this case, the point is between the discharge curves for SUP = 0.3 MPa and SUP = 0.4 MPa, and based on the proportional relationship between these lines, the pilot air pressure for this point is approximately 0.35 MPa.
3. Next find the air consumption rate. Trace the discharge rate, 6 ℓ/min, up to the point between the discharge curves for SUP = 0.3 MPa and 0.4 MPa, then trace to the Y-axis, finding the air consumption to be around 55 ℓ/min (ANR).

⚠ Caution

- ① These flow characteristics are for fresh water (viscosity 1 mPa·s, specific gravity 1.0).
- ② The discharge rate differs greatly depending on the properties (viscosity, specific gravity) of the fluid being transferred and the operating conditions (lifting range, transfer distance), etc.
- ③ Use 0.75 kW per 100 ℓ/min of air consumption as a guide for the relationship of the air consumption to the compressor.

Viscosity Characteristics (Flow rate correction for viscous fluids)



Selection from Viscosity Characteristic Graph

Required specifications example:

Find the pilot air pressure and the pilot air consumption for a discharge rate of 2.7 ℓ/min, with a discharge pressure of 0.25 MPa, and a viscosity of 100 mPa·s.

Selection procedures:

1. First find the ratio of the discharge rate against fresh water when the viscosity is 100 mPa·s from the graph on the left. It is determined to be 45%.
2. Next, in the required specification example, the viscosity is 100 mPa·s and the discharge rate is 2.7 ℓ/min. Since this is equivalent to 45% of the discharge rate for fresh water, $2.7 \text{ ℓ/min} \div 0.45 = 6 \text{ ℓ/min}$, indicating that a discharge rate of 6 ℓ/min is required for fresh water.
3. Finally, find the pilot air pressure and the pilot air consumption based on selection from the performance curves.

⚠ Caution

Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity $\nu = \text{Viscosity } \mu / \text{Density } \rho$.

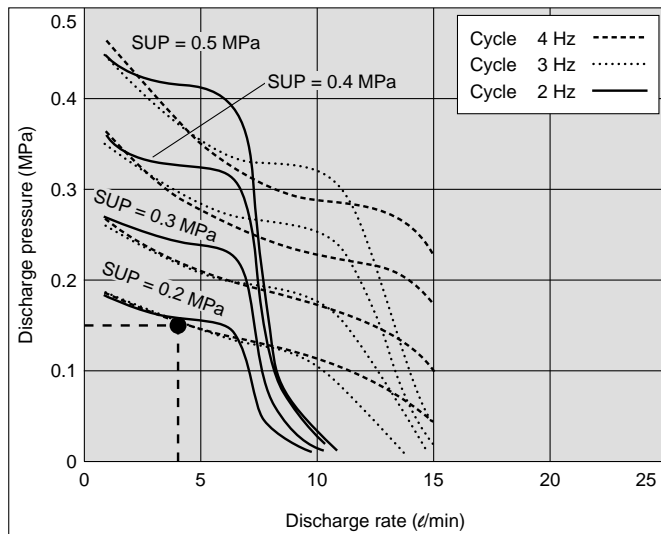
$$\nu = \frac{\mu}{\rho}$$

$$\nu(10^{-3} \text{ m}^2/\text{s}) = \mu(\text{mPa}\cdot\text{s})/\rho(\text{kg}/\text{m}^3)$$

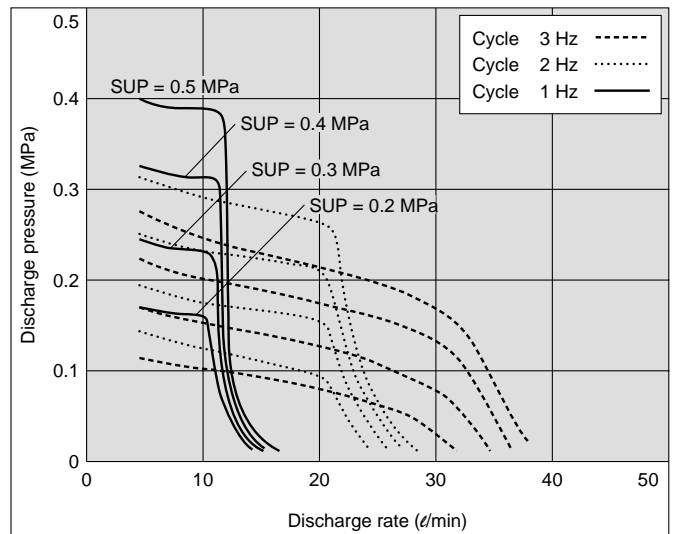
Series PAF

Performance Curve: Air Operated Type

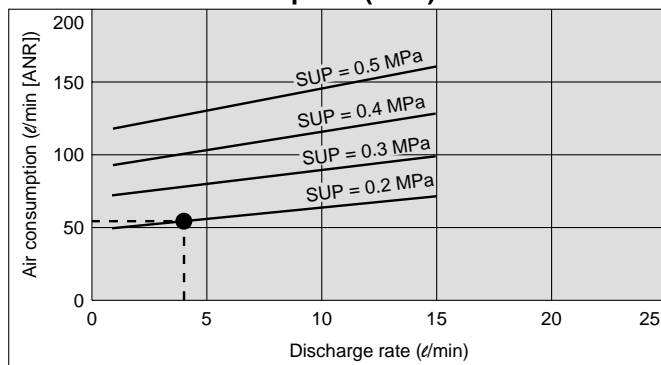
PAF3413 Flow Characteristics



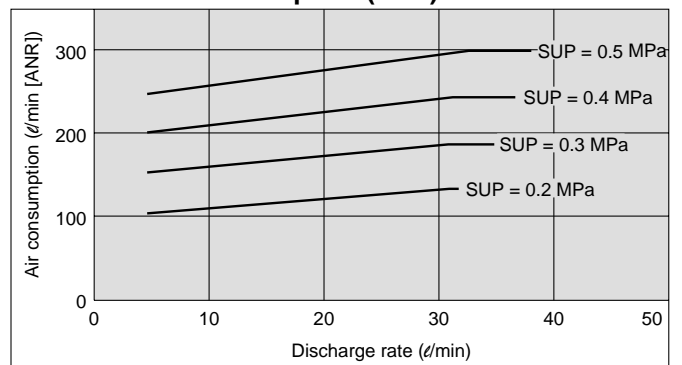
PAF5413 Flow Characteristics



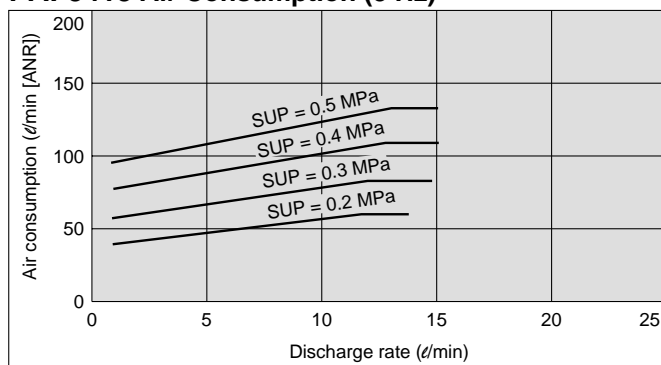
PAF3413 Air Consumption (4 Hz)



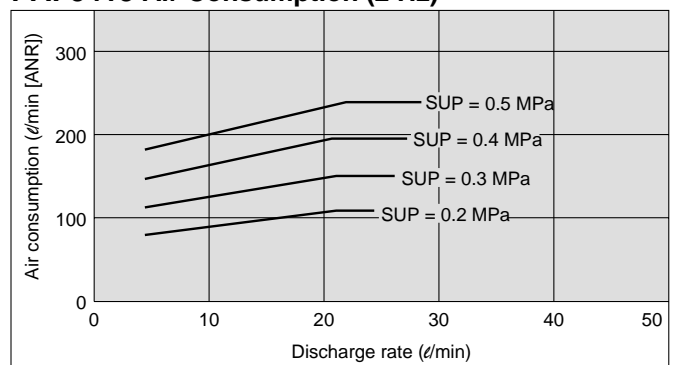
PAF5413 Air Consumption (3 Hz)



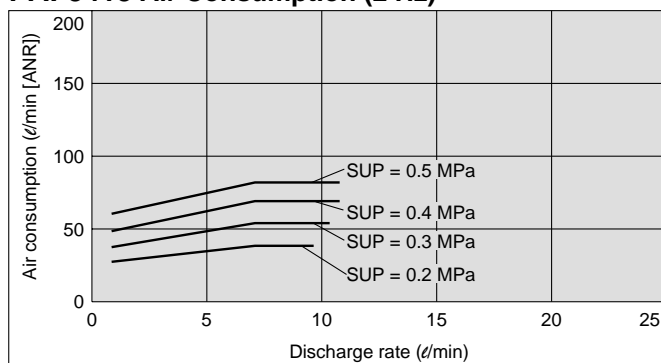
PAF3413 Air Consumption (3 Hz)



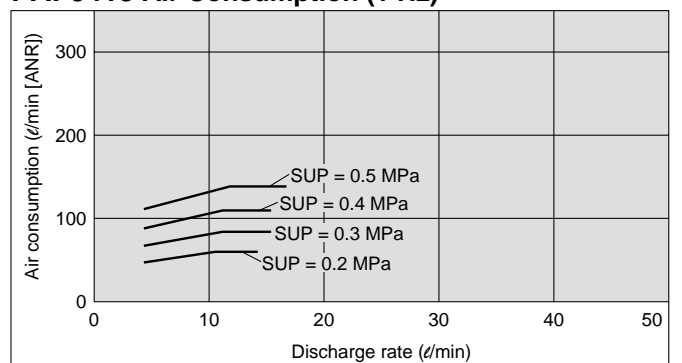
PAF5413 Air Consumption (2 Hz)



PAF3413 Air Consumption (2 Hz)



PAF5413 Air Consumption (1 Hz)



Selection from Flow Characteristic Graph (PAF3413)

Required specification example: Find the pilot air pressure and the pilot air consumption for a discharge rate of 4 ℓ/min and a discharge pressure of 0.15 MPa. <The transfer fluid is fresh water (viscosity 1 mPa·s, specific gravity 1.0).>

Note 1) If the total lifting height is required instead of the discharge pressure, discharge pressure of 0.1 MPa corresponds to a total lift of 10 m.

Note 2) Discharge per cycle: Approx. 50 mℓ

Selection procedures:

1. First mark the intersection point for a discharge rate of 4 ℓ/min and a discharge pressure of 0.15 MPa.
2. Find the pilot air pressure for the marked point. In this case, the point is between the discharge curves (solid lines) for SUP = 0.2 MPa, and the pilot air pressure for this point is approx. 0.2 MPa.

Calculating Air Consumption (PAF3413)

Find the air consumption for operation with a discharge rate of 4 ℓ/min, with a 4 Hz switching cycle and pilot air pressure of 0.2 MPa from the air consumption graph.

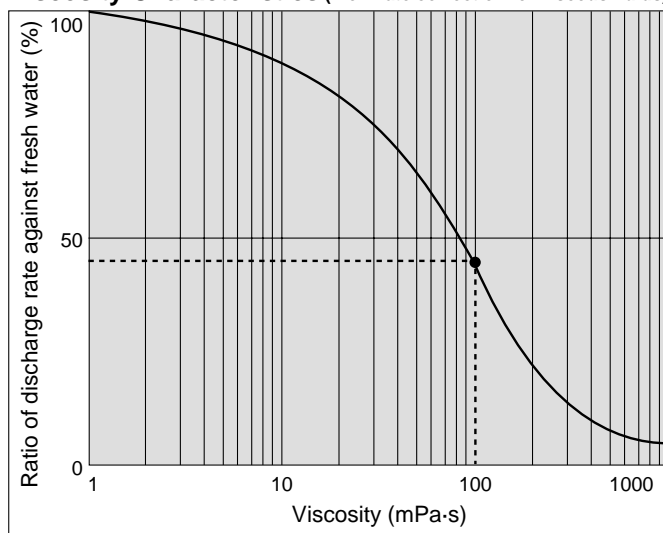
Selection procedures:

1. Look up from the discharge rate of 4 ℓ/min to find the intersection with SUP = 0.2 MPa.
2. From the point just found, draw a line to the Y-axis to find the air consumption. The result is approximately 54 ℓ/min (ANR).

⚠ Caution

- ① These flow characteristics are for fresh water (viscosity 1 mPa·s, specific gravity 1.0).
- ② The discharge rate differs greatly depending on the properties (viscosity, specific gravity) of the fluid being transferred and the operating conditions (density, lifting range, transfer distance).

Viscosity Characteristics (Flow rate correction for viscous fluids)



Selection from Viscosity Characteristic Graph

Required specification example: Find the pilot air pressure and the pilot air consumption for a discharge rate of 2.7 ℓ/min, with a discharge pressure of 0.25 MPa, and a viscosity of 100 mPa·s.

Selection procedures:

1. First find the ratio of the discharge rate against fresh water when viscosity is 100 mPa·s from the graph below. It is determined to be 45%.
2. Next, in the required specification example, the viscosity is 100 mPa·s and the discharge rate is 2.7 ℓ/min. Since this is equivalent to 45% of the discharge rate for fresh water, $2.7 \text{ ℓ/min} \div 0.45 = 6 \text{ ℓ/min}$, indicating that a discharge rate of 6 ℓ/min is required for fresh water.
3. Finally, find the pilot air pressure and the pilot air consumption based on selection from the performance curves.

⚠ Caution

Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity $v = \text{Viscosity } \mu / \text{Density } \rho$.

$$v = \frac{\mu}{\rho}$$

$$v(10^{-3} \text{ m}^2/\text{s}) = \mu(\text{mPa}\cdot\text{s})/\rho(\text{kg}/\text{m}^3)$$

Series PAF

Specifications

Series PAF3000

| Model | | PAF3410 | PAF3413 |
|-------------------------------|------------------------------------|--|--|
| Operation method | | Automatically operated | Air operated |
| Port size | Main fluid: Suction/Discharge port | Rc, G, NPT 3/8" Female thread, 1/2" Tube extension, With nut (size 4, 5) | |
| | Pilot air: Supply/Exhaust port | Rc, G, NPT 1/4" | Rc, G, NPT 1/8" |
| Discharge flow rate | | 1 to 20 ℓ/min | 1 to 15 ℓ/min |
| Average discharge pressure | | 0 to 0.4 MPa | |
| Pilot air pressure | | 0.2 to 0.5 MPa (for 0 to 60°C) | |
| Air consumption | | 230 ℓ/min (ANR) or less | |
| Suction lift | Dry | Up to 1 m (inside the pump is dry) | |
| | Wet | Up to 4 m (with fluid inside the pump) | |
| Noise | | 80 dB (A) or less (Option: with silencer, AN200) | 80 dB (A) or less (excluding the noise from the quick exhaust and solenoid valve) |
| Withstand pressure | | 0.75 MPa | |
| Service life | | 50 million cycles (for water) | |
| Operating fluid temperature | | 0 to 90°C (with no freezing) | |
| Ambient temperature | | 0 to 70°C (with no freezing) | |
| Recommended operation cycle | | — | 2 to 4 Hz |
| Weight (without foot bracket) | | 1.6 kg | 1.3 kg |
| Mounting | | Horizontal (mounting on the bottom surface) | |
| Packaging | | Clean double packaging | |

Note) Values in the table are measured at room temperature using fresh water.

Series PAF5000

| Model | | PAF5410 | PAF5413 |
|-------------------------------|------------------------------------|--|--|
| Operation method | | Automatically operated | Air operated |
| Port size | Main fluid: Suction/Discharge port | Rc, G, NPT 3/4" Female thread, 1/2" Tube extension, With nut (size 5, 6) | |
| | Pilot air: Supply/Exhaust port | Rc, G, NPT 1/4" | |
| Discharge flow rate | | 5 to 45 ℓ/min | 5 to 38 ℓ/min |
| Average discharge pressure | | 0 to 0.4 MPa | |
| Pilot air pressure | | 0.2 to 0.5 MPa (for 0 to 60°C) | |
| Air consumption | | 300 ℓ/min (ANR) or less | |
| Suction lift | Dry | Up to 1 m (inside the pump is dry) | |
| | Wet | Up to 4 m (with fluid inside the pump) | |
| Noise | | 80 dB (A) or less (Option: with silencer, AN200) | 80 dB (A) or less (excluding the noise from the quick exhaust and solenoid valve) |
| Withstand pressure | | 0.75 MPa | |
| Service life | | 50 million cycles (for water) | |
| Operating fluid temperature | | 0 to 90°C (with no freezing) | |
| Ambient temperature | | 0 to 70°C (with no freezing) | |
| Recommended operation cycle | | — | 1 to 3 Hz |
| Weight (without foot bracket) | | 6 kg | |
| Mounting | | Horizontal (mounting with holes located on the bottom surface.) | |
| Packaging | | Clean double packaging | |

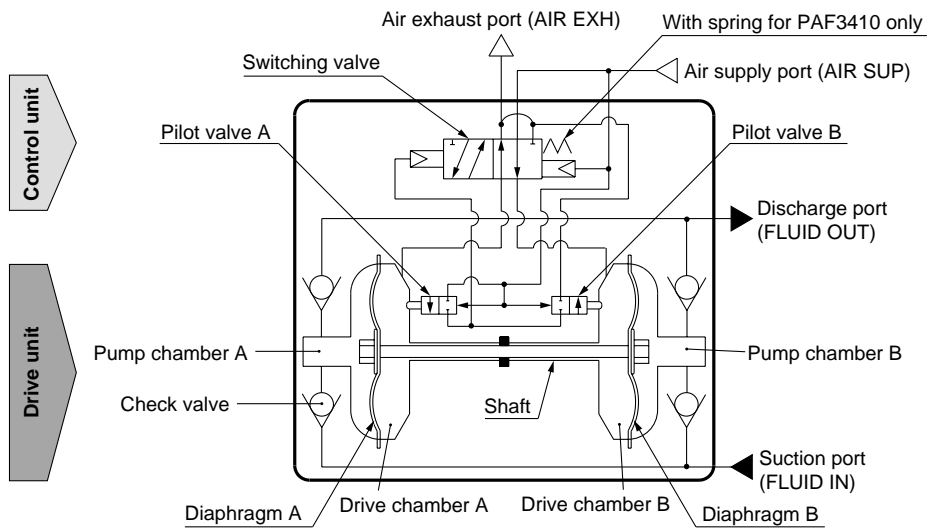
Note) Values in the table are measured at room temperature using fresh water.

Applicable Tube Size for each Nut Size

(Tube size can be altered by using a reducer, even within the same nut size.)

| Size | Applicable tubing size |
|------|--|
| 4 | 10 x 8, 12 x 10, 3/8" x 1/4", 1/2" x 3/8" |
| 5 | 12 x 10, 19 x 16, 1/2" x 3/8", 3/4" x 5/8" |
| 6 | 19 x 16, 25 x 22, 3/4" x 5/8", 1" x 7/8" |

Working Principle: Automatically Operated Type (PAF3410, 5410)



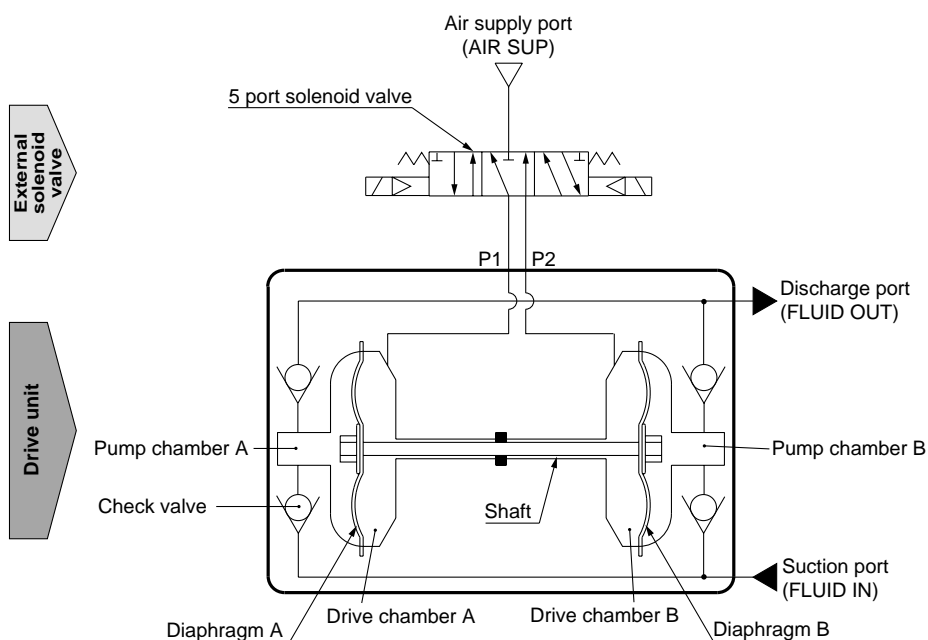
Control unit

- ① When air is supplied, it passes through the switching valve and enters drive chamber B.
- ② Diaphragm B moves to the right, and at the same time diaphragm A also moves to the right pushing pilot valve A.
- ③ When pilot valve A is pushed, air acts upon the switching valve, drive chamber A switches to a supply state, and the air which was in drive chamber B is exhausted to the outside.
- ④ When air enters drive chamber A, diaphragm B moves to the left pushing pilot valve B.
- ⑤ When pilot valve B is pushed, the air which was acting upon the switching valve is exhausted, and drive chamber B once again switches to a supply state. A continuous reciprocal motion is generated by this repetition.

Drive unit

- ① When air enters drive chamber B, the fluid in pump chamber B is forced out, and at the same time fluid is sucked into pump chamber A.
- ② When the diaphragm moves in the opposite direction, the fluid in pump chamber A is forced out, and fluid is sucked into pump chamber B.
- ③ Continuous suction and discharge is performed by the reciprocal motion of the diaphragm.

Working Principle: Air Operated Type (PAF3413, 5413)

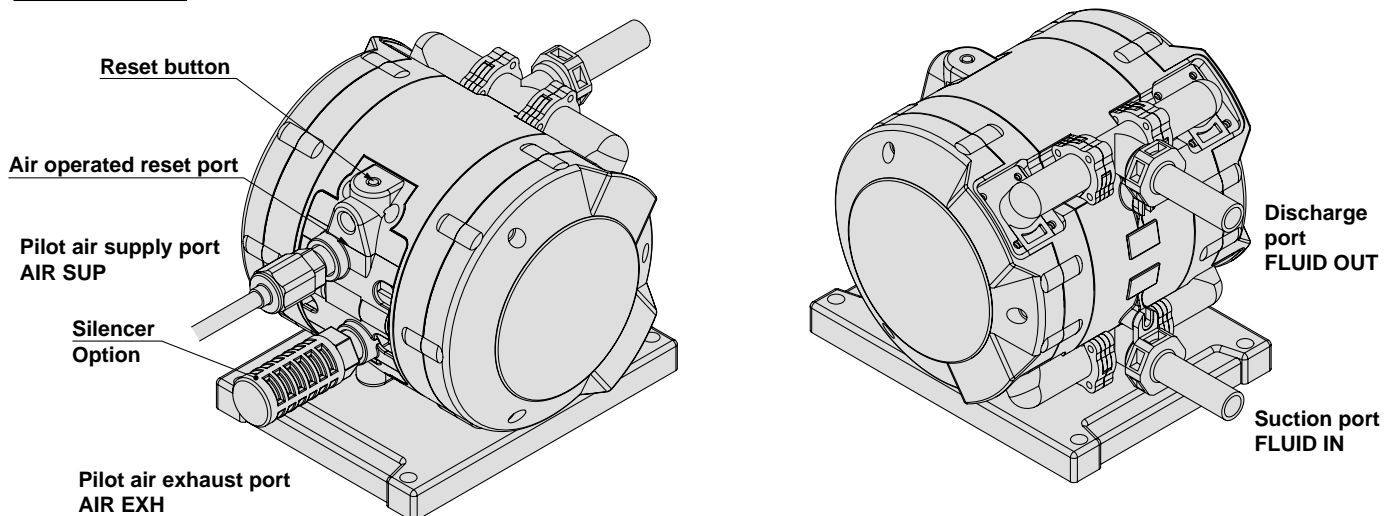


- ① When air is supplied to P1 port, it enters drive chamber A.
- ② Diaphragm A moves to the left, and at the same time diaphragm B also moves to the left.
- ③ The fluid in pump chamber A is forced out to the discharge port, and the fluid is sucked into pump chamber B from the suction port.
- ④ If air is supplied to the P2 port, the opposite will occur. Continuous suction and discharge of fluid is performed by repeating this process with the control of an external solenoid valve (5 port valve).

Series PAF

Piping and Operation: Automatically Operated Type (PAF3410, 5410)

Piping diagram



⚠ Caution

The mounting orientation of the pump is set with the mounting bracket facing downward. Air to be supplied to the air supply port <AIR SUP> should be cleaned and filtered through a filter, or a mist separator etc. Air with foreign matter or drainage etc. will have negative effects on the built-in solenoid valve and will lead to malfunction.

Maintain the proper tightening torque for fittings and mounting bolts, etc. Looseness can cause problems such as fluid and air leaks, while over tightening can cause damage to threads and parts, etc.

Operation

<Starting and Stopping> Refer to circuit example (1)

1. Connect air piping to the air supply port <AIR SUP> and connect piping for the fluid to be transferred to the suction port <FLUID IN> and the discharge port <FLUID OUT>.

2. Using a regulator, set the pilot air pressure within the range of 0.2 to 0.5 MPa. Then, the pump will operate when power is applied to the 3 port solenoid valve of the air supply port <AIR SUP>, the sound of exhaust begins from the air exhaust port <AIR EXH> and fluid will flow from the suction port <FLUID IN> to the discharge port <FLUID OUT>.

At this time, the ball valve on the discharge side is in an open state. The pump performs suction with its own power even without priming. (Dry state suction lifting range: max. 1 m) To restrict exhaust noise, attach a silencer (AN200-02: option) to the air exhaust port <AIR EXH>.

3. To stop the pump, exhaust the air pressure being supplied to the pump with the 3 port solenoid valve of the air supply port <AIR SUP>. The pump stops even when the ball valve on the discharge side is closed. But the pressure supply to the pump should be exhausted quickly.

<Discharge Flow Rate Adjustment>

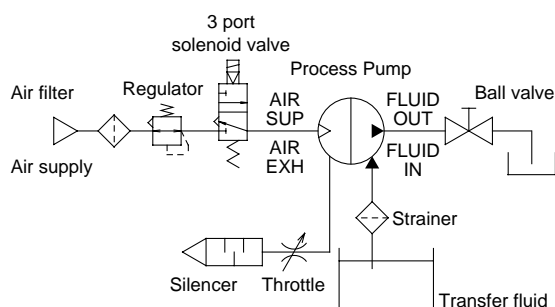
1. Adjustment of the flow rate from the discharge port <FLUID OUT> is performed with a ball valve connected to the discharge side or a throttle connected on the air exhaust side. For adjustment from the air side, use of the silencer with throttle ASN2 (port size 1/4) or a needle valve connected to the air exhaust port <AIR EXH> is effective. Refer to circuit example (1).

2. When operating with a discharge flow rate below the specification range, provide a by-pass circuit on the discharge side to the suction side to ensure the minimum flow rate inside the process pump. With a discharge flow rate below the minimum flow rate, the process pump may stop due to unstable operation. Refer to circuit example (2). (Minimum flow rates: PAF3000 1 ℓ/min, PAF5000 5 ℓ/min)

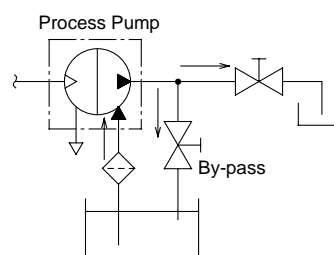
<Reset Button>

When the pump stops during operation, press the reset button. This makes it possible to restore operation in case the switching valve becomes clogged due to foreign matter in the supply air.

Circuit example (1)



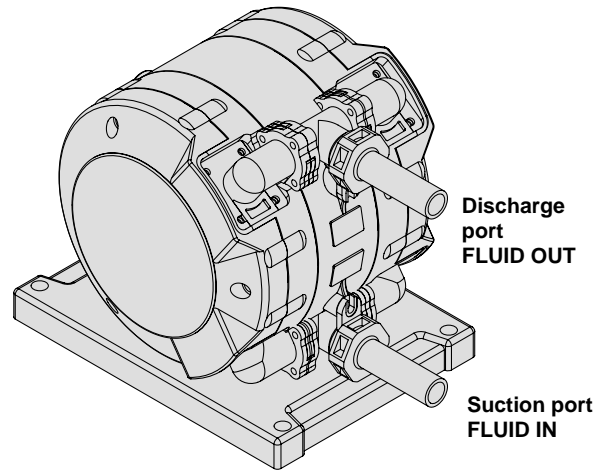
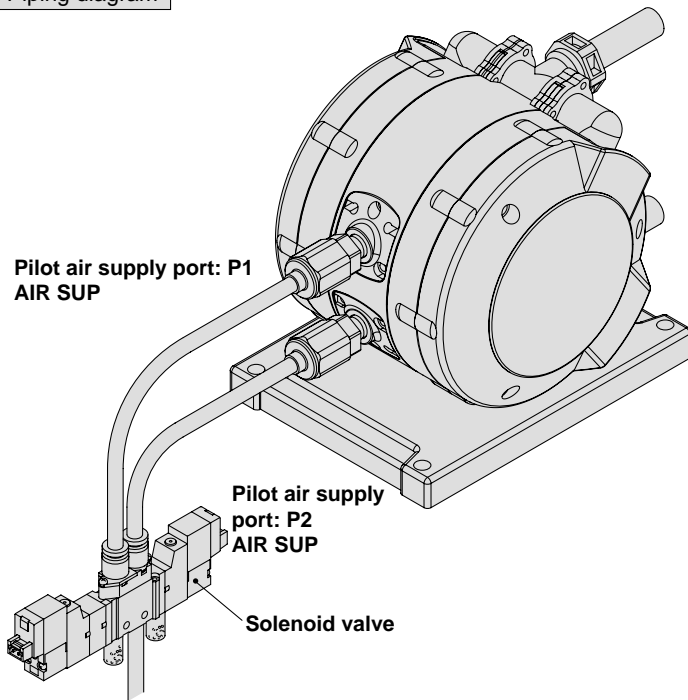
Circuit example (2)



For the related products, refer to page 20.

Piping and Operation: Air Operated Type (PAF3413, 5413)

Piping diagram



Recommended Valve

| | |
|---------|--------------------------|
| PAF3413 | VQZ14□0 (Exhaust centre) |
| PAF5413 | VQ44□0 (Exhaust centre) |

Refer to page 20 for further details.

⚠ Caution

Maintain the proper tightening torque for fittings and mounting bolts, etc. Looseness can cause problems such as fluid and air leaks, while over tightening can cause damage to threads and parts, etc.

Operation

<Starting and Stopping> Refer to the circuit examples (1) and (2)

1. Connect air piping ^{Note 1)} to the pilot air supply port <P1>, <P2> and connect piping for the fluid to be transferred to the suction port <FLUID IN> and the discharge port <FLUID OUT>.
2. Using a regulator, set the pilot air pressure within the range of 0.2 to 0.5 MPa. Then, the pump will operate when power is applied to the solenoid valve ^{Note 2)} of the pilot air supply port and fluid will flow from the suction port <FLUID IN> to the discharge port <FLUID OUT>. At this time, the ball valve on the discharge side is in an open state. The pump performs suction with its own power even without priming. ^{Note 3)} (Dry state suction lifting range: Max. 1 m) To restrict exhaust noise, attach a silencer to the solenoid valve air exhaust port.
3. To stop the pump, exhaust the air pressure being supplied to the pump with the solenoid valve of the air supply port.

Note 1) When used for highly permeable fluids, the solenoid valve may malfunction due to the gas contained in the exhaust. Implement measures to keep the exhaust from going to the solenoid valve side.

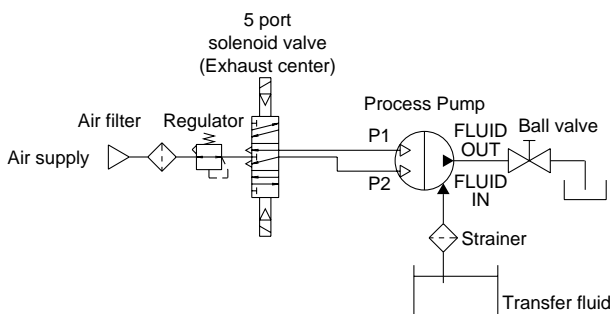
Note 2) For the solenoid valve, use an exhaust centre 5 port valve, or a combination of a residual exhaust 3 port valve and a pump drive 4 port valve. If air in the drive chamber is not released when the pump is stopped, the diaphragm will be subjected to pressure and its life will be shortened.

Note 3) When the pump is dry, operate the solenoid valve at a switching cycle of 2 to 4 Hz for PAF3000, 1 to 3 Hz for PAF5000. If operated outside of this range, the suction lifting height may not reach the prescribed value.

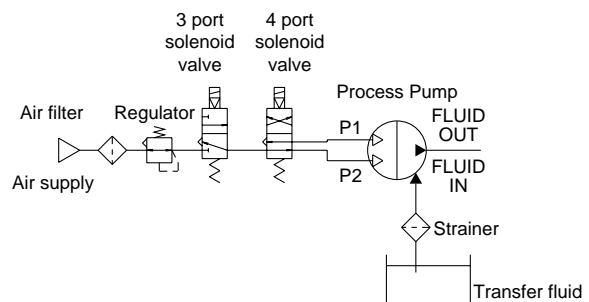
<Discharge Flow Rate Adjustment>

1. The flow rate from the discharge port <FLUID OUT> can be adjusted easily by changing the switching cycle of the solenoid valve on the air supply port.

Circuit example (1)



Circuit example (2)

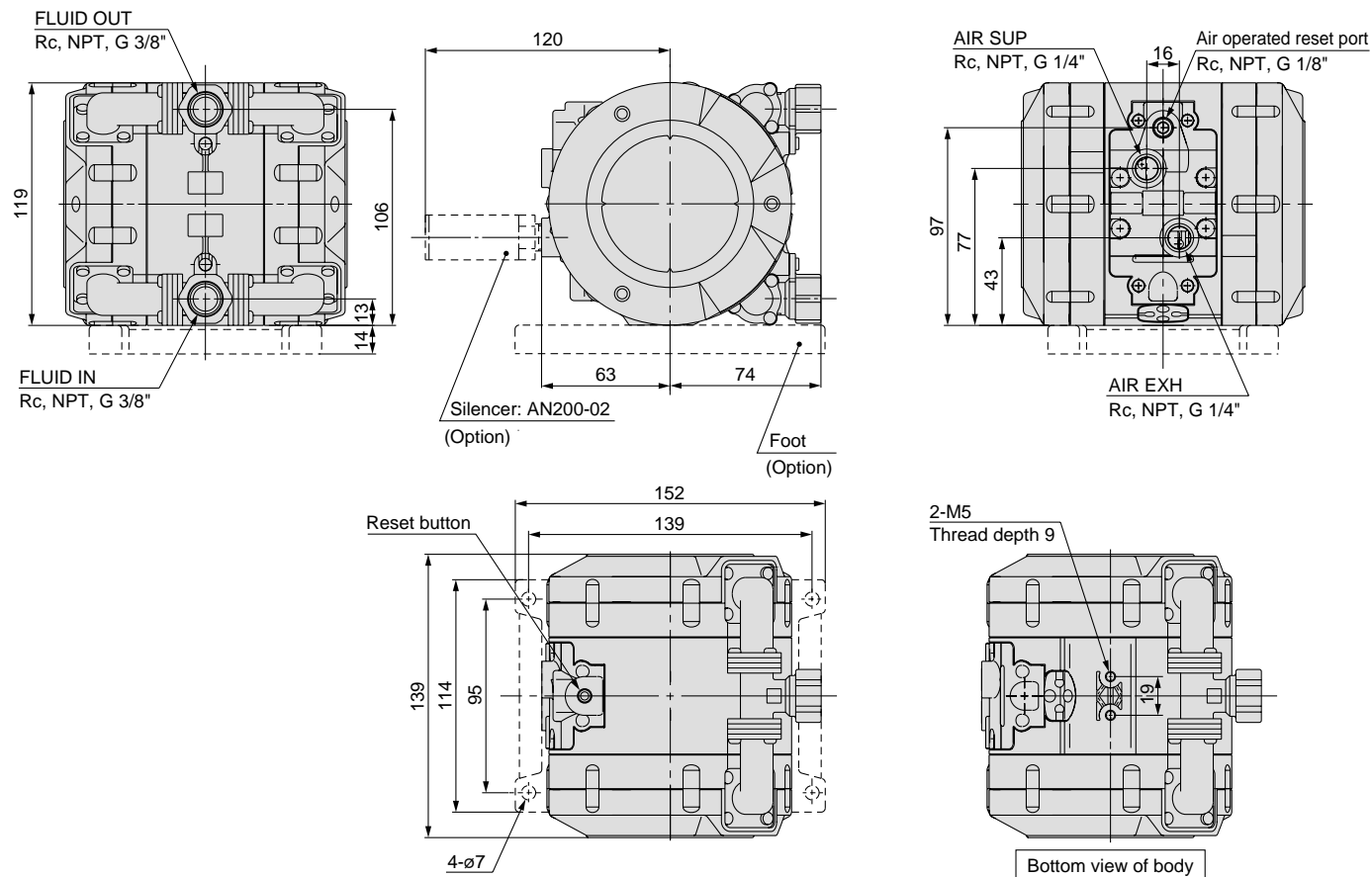


For the related products, refer to page 20.

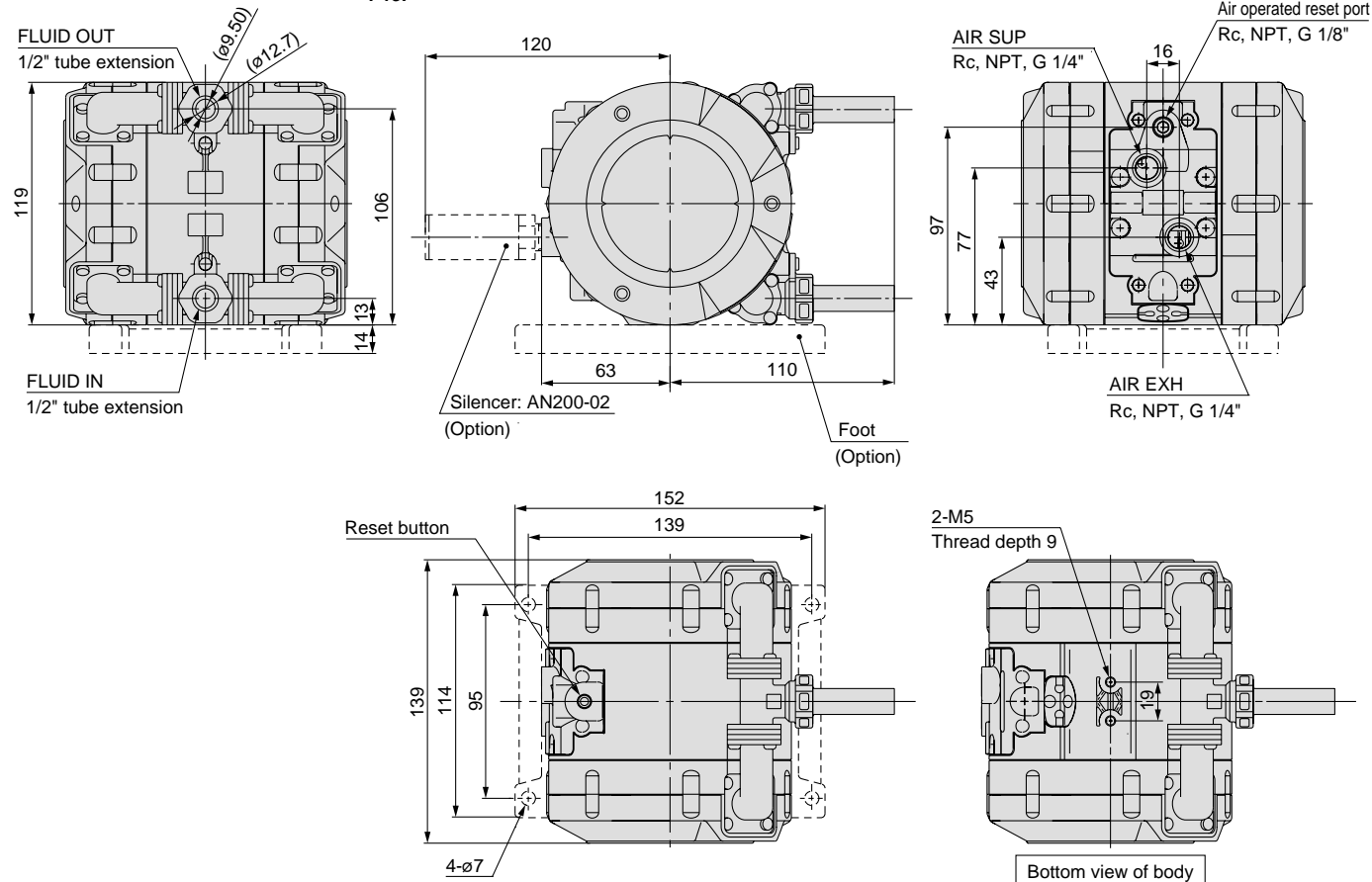
Series PAF

Dimensions: Automatically Operated Type (Series PAF3000)

Female thread: PAF3410-⁰³N03
F03

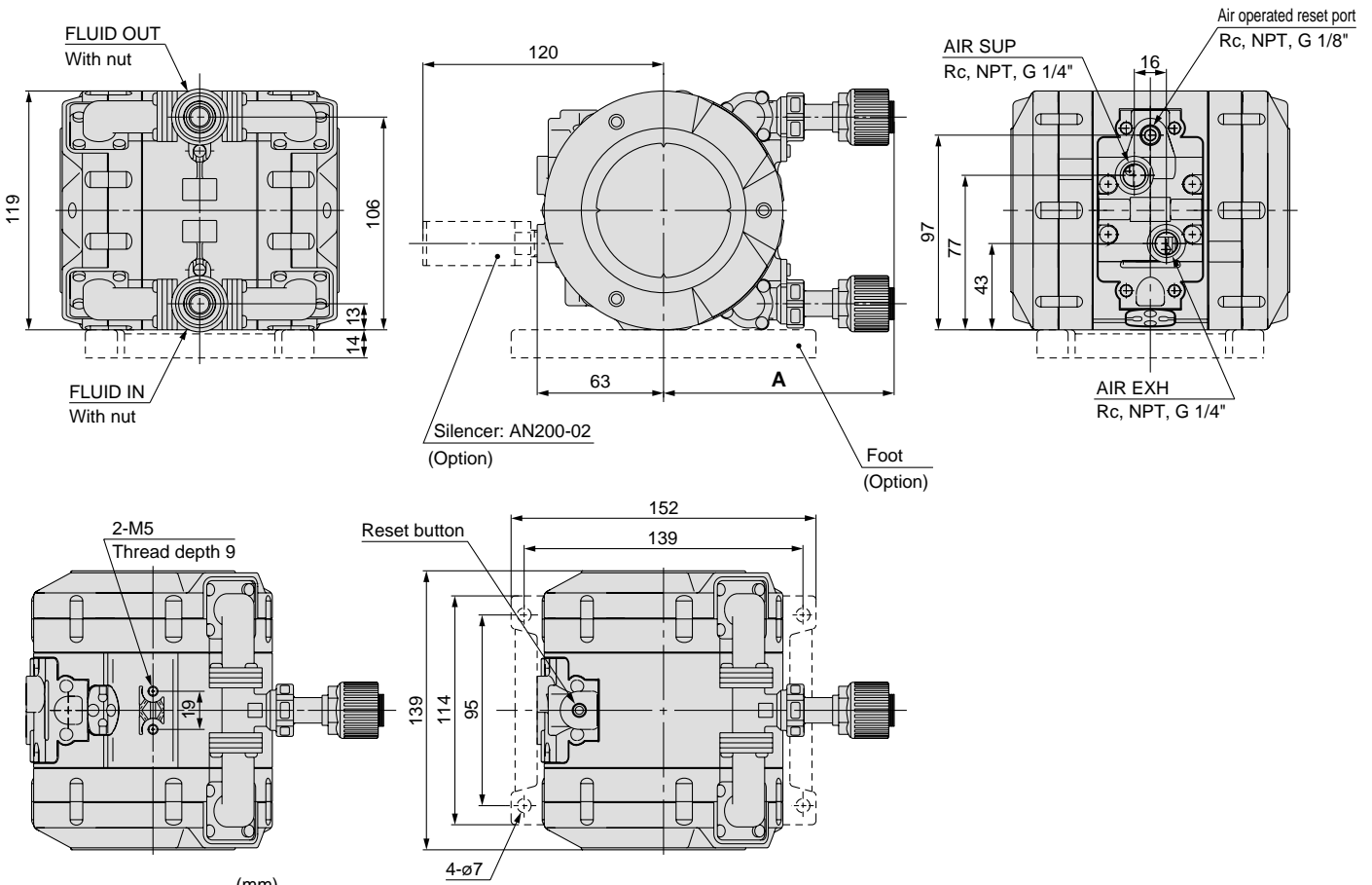


Tube extension: PAF3410-^{P13}P13N
P13F



Dimensions: Automatically Operated Type (Series PAF3000)

With nut (with LQ1 fitting): PAF3410S-1S13□
PAF3410S-1S19□



(mm)

| Model | A |
|----------------|-----|
| PAF3410S-1S13□ | 115 |
| PAF3410S-1S19□ | 118 |

Applicable Tube Size for each Nut Size

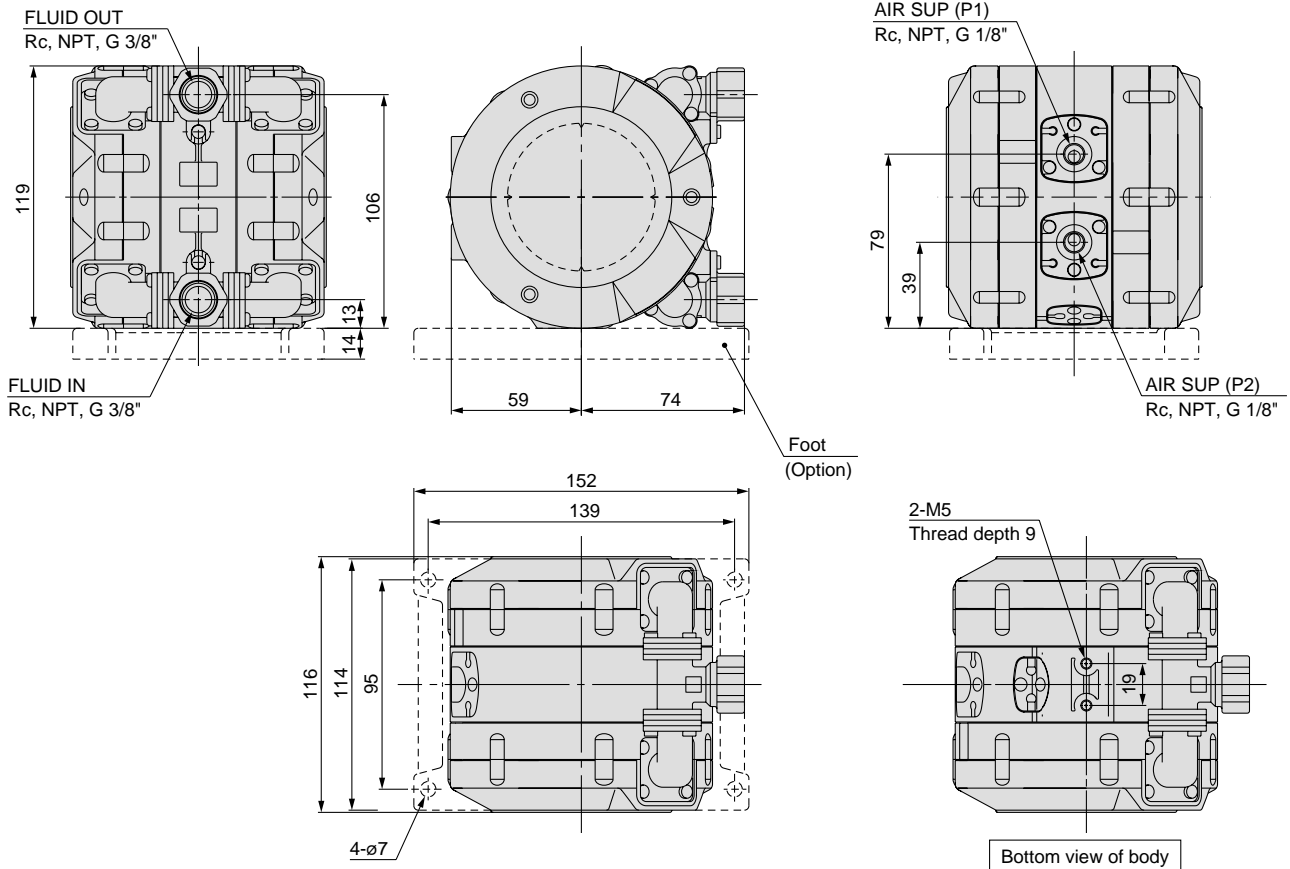
(Tube size can be altered by using a reducer, even within the same nut size.)

| Size | Applicable tubing size |
|------|--|
| 4 | 10 x 8, 12 x 10, 3/8" x 1/4", 1/2" x 3/8" |
| 5 | 12 x 10, 19 x 16, 1/2" x 3/8", 3/4" x 5/8" |

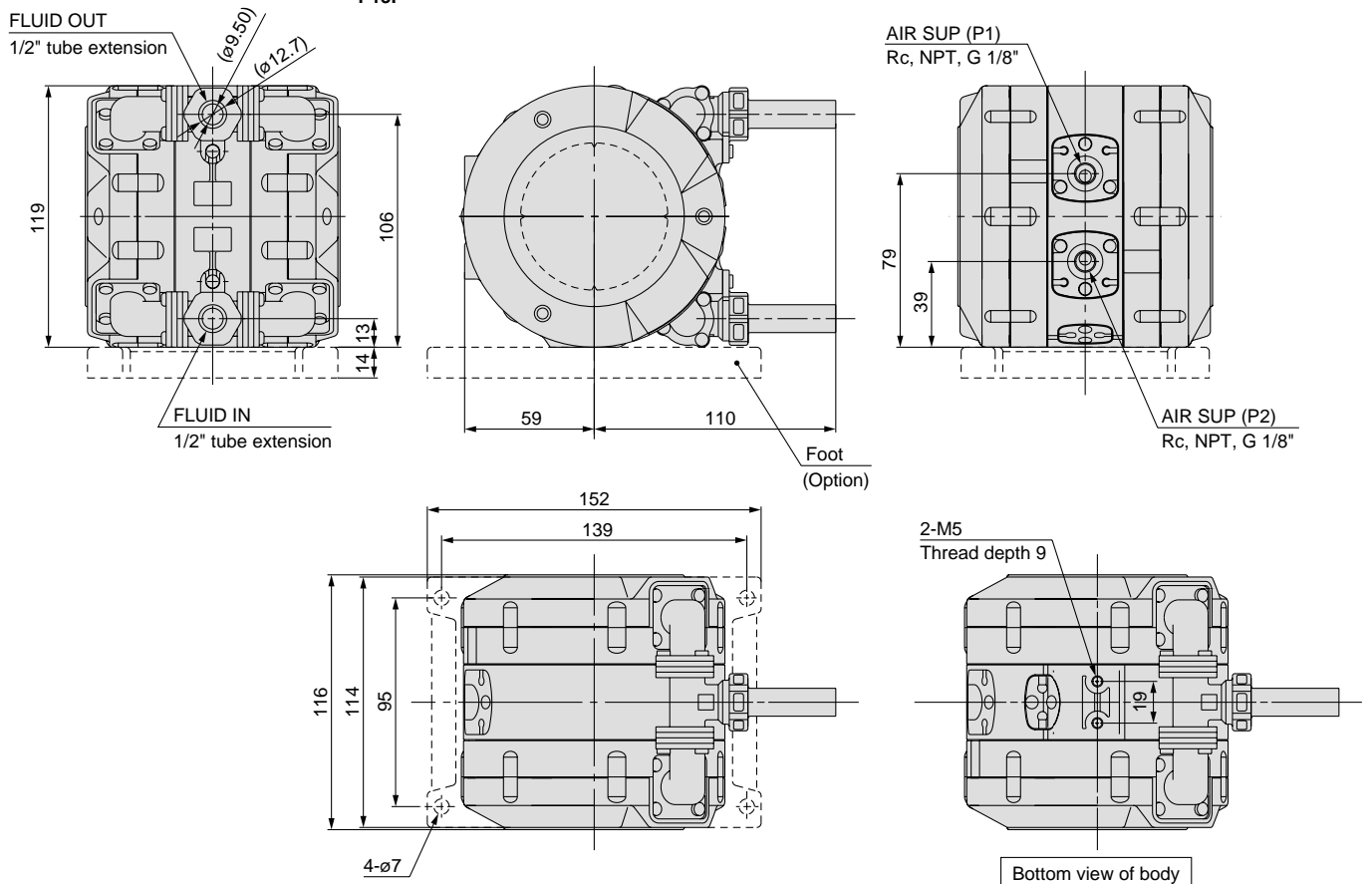
Series PAF

Dimensions: Air Operated Type (Series PAF3000)

Female thread: PAF3413-⁰³N03
F03

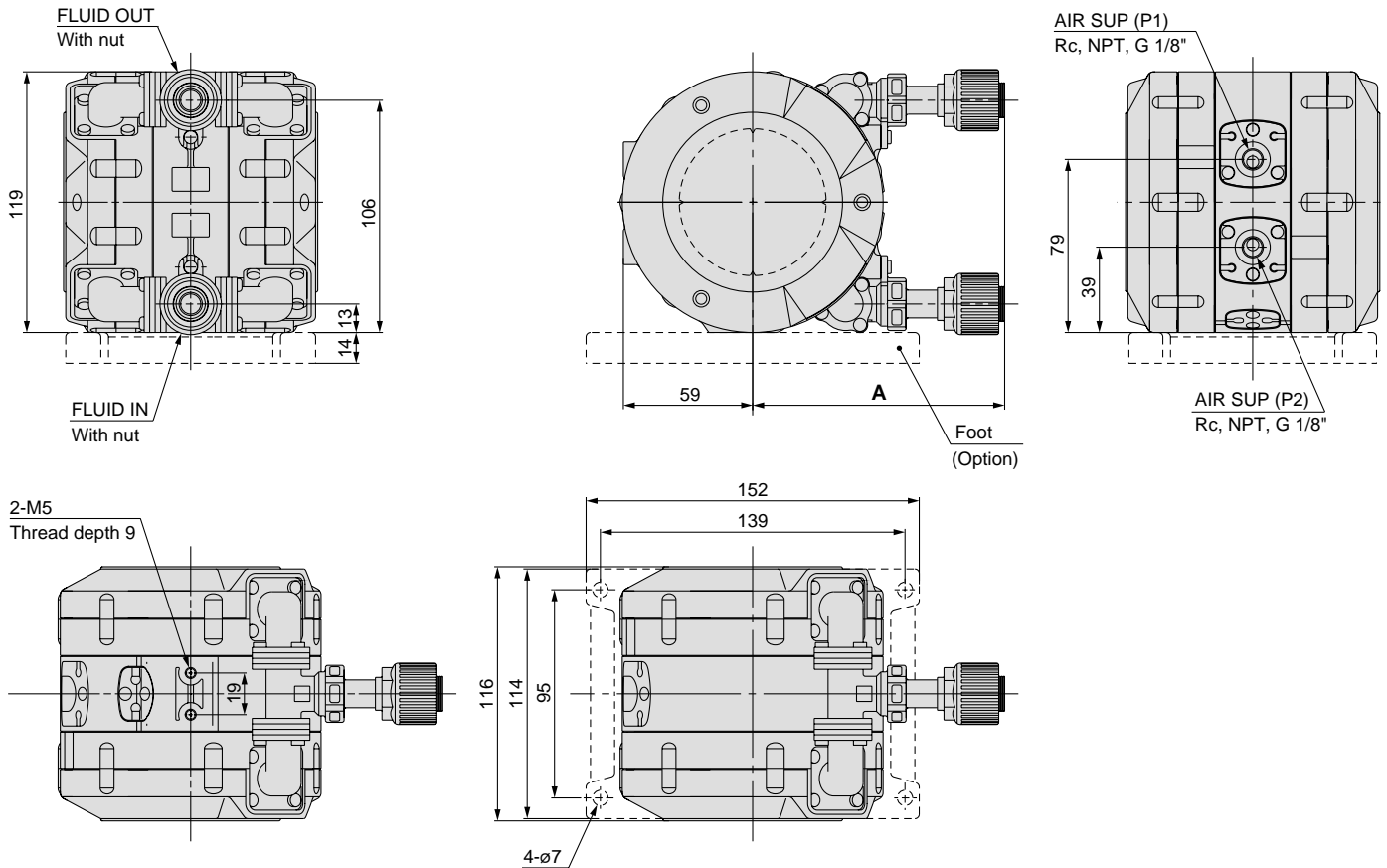


Tube extension: PAF3413-^{P13}P13N
P13F



Dimensions: Air Operated Type (Series PAF3000)

With nut (with LQ1 fitting): PAF3413S-^{1S13}□
^{1S19}□



(mm)

| Model | A |
|----------------|-----|
| PAF3413S-1S13□ | 115 |
| PAF3413S-1S19□ | 118 |

Applicable Tube Size for each Nut Size

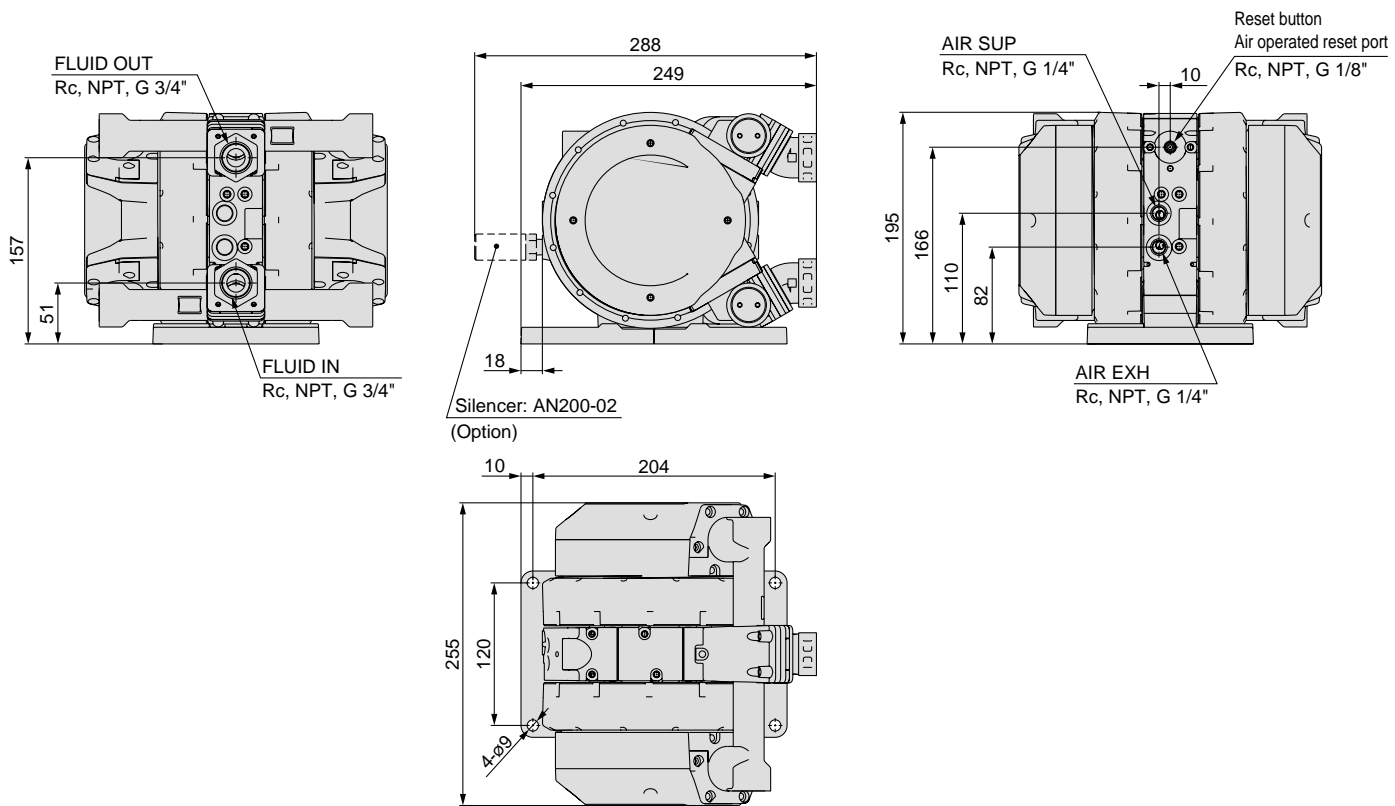
(Tube size can be altered by using a reducer, even within the same nut size.)

| Size | Applicable tubing size |
|------|--|
| 4 | 10 x 8, 12 x 10, 3/8" x 1/4", 1/2" x 3/8" |
| 5 | 12 x 10, 19 x 16, 1/2" x 3/8", 3/4" x 5/8" |

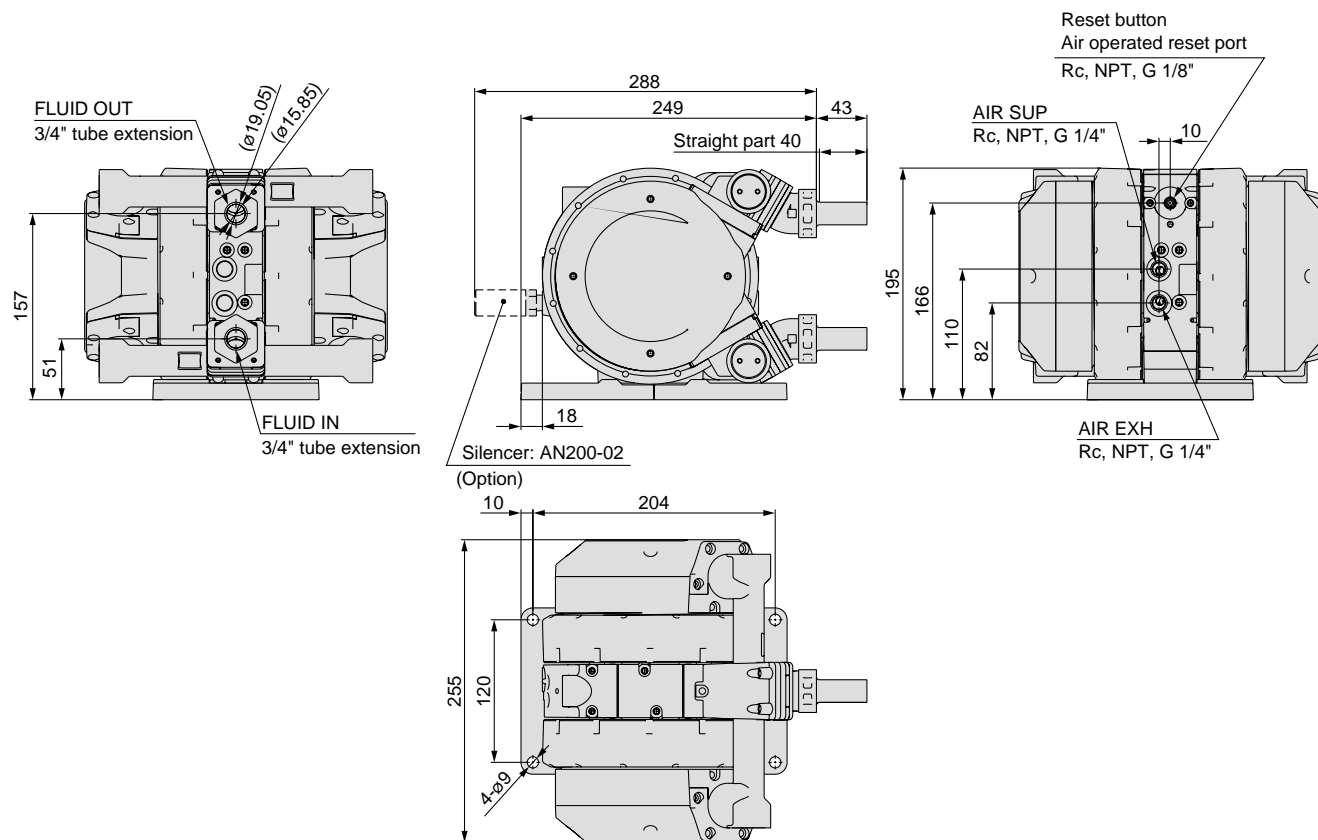
Series PAF

Dimensions: Automatically Operated Type (Series PAF5000)

Female thread: PAF5410-⁰⁶N06
F06

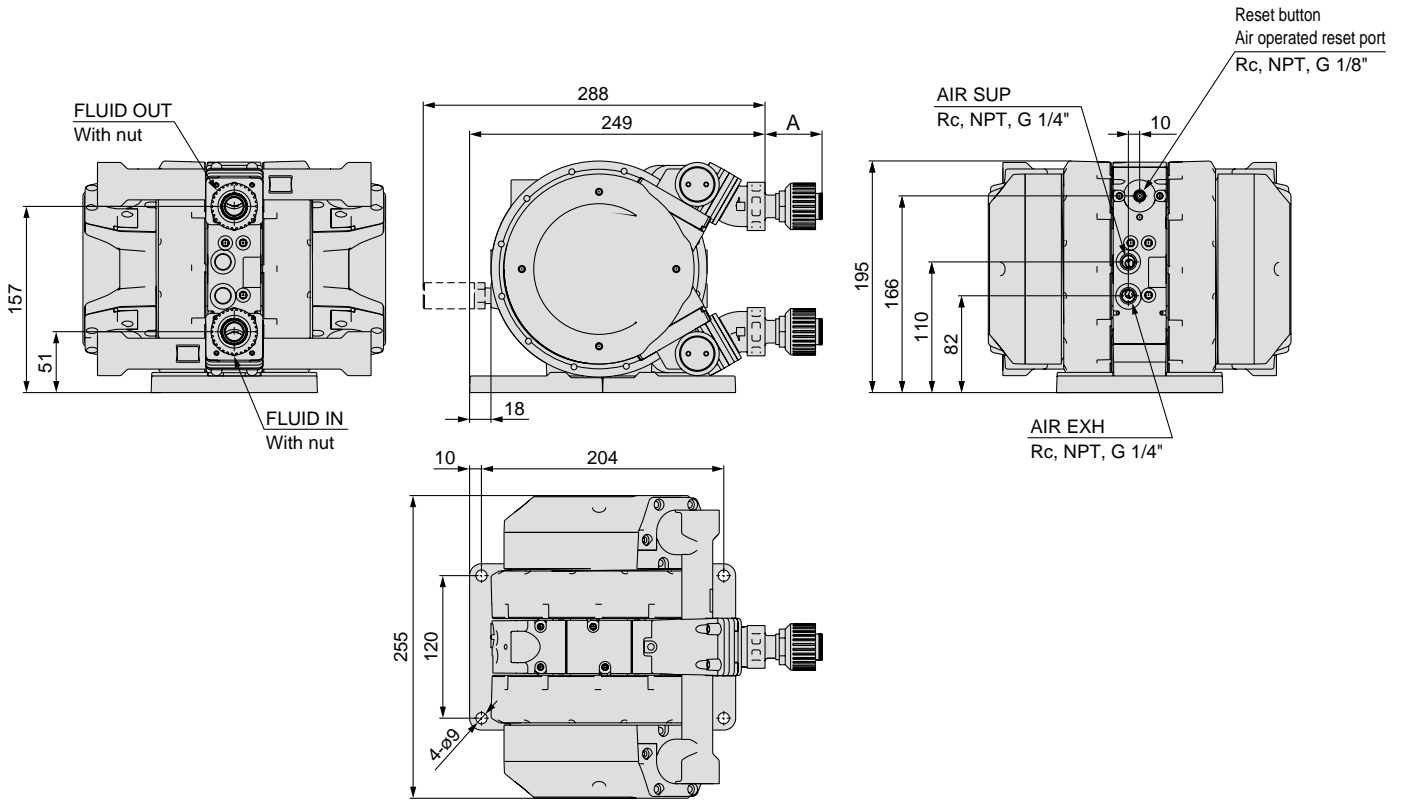


Tube extension: PAF5410-^{P19}P19N
P19F



Dimensions: Automatically Operated Type (Series PAF5000)

With nut (with LQ1 fitting): PAF5410S-1S19□
PAF5410S-1S25□



(mm)

| Model | A |
|----------------|----|
| PAF5410S-1S19□ | 48 |
| PAF5410S-1S25□ | 55 |

Applicable Tube Size for each Nut Size

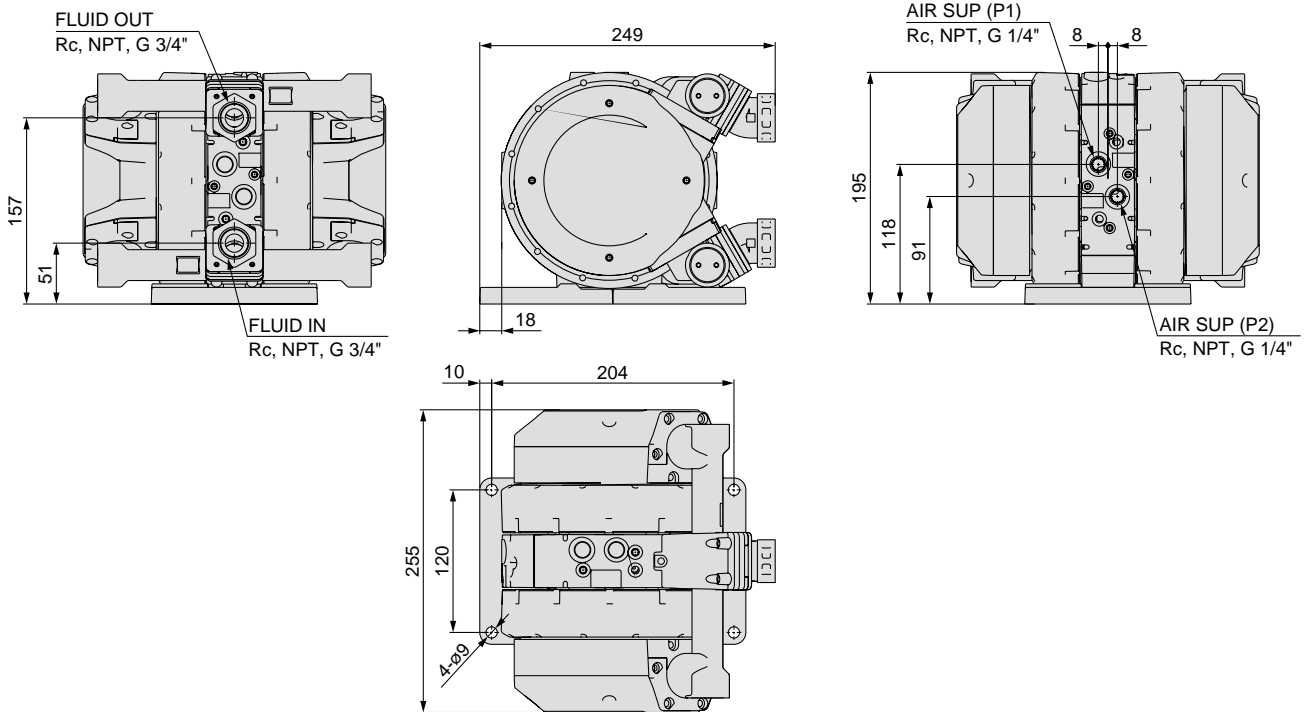
(Tube size can be altered by using a reducer even within the same nut size.)

| Size | Applicable tubing size |
|------|--|
| 5 | 12 x 10, 19 x 16, 1/2" x 3/8", 3/4" x 5/8" |
| 6 | 19 x 16, 25 x 22, 3/4" x 5/8", 1" x 7/8" |

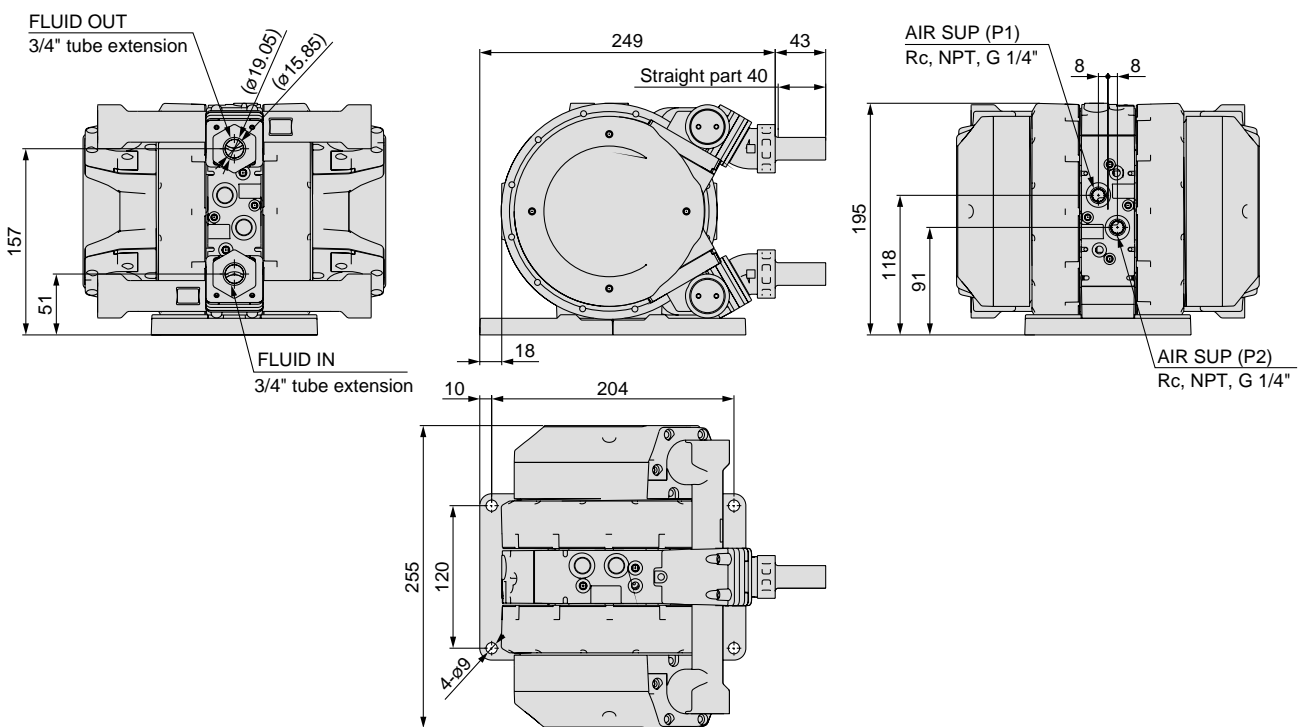
Series PAF

Dimensions: Air Operated Type (Series PAF5000)

Female thread: PAF5413-⁰⁶N06
F06

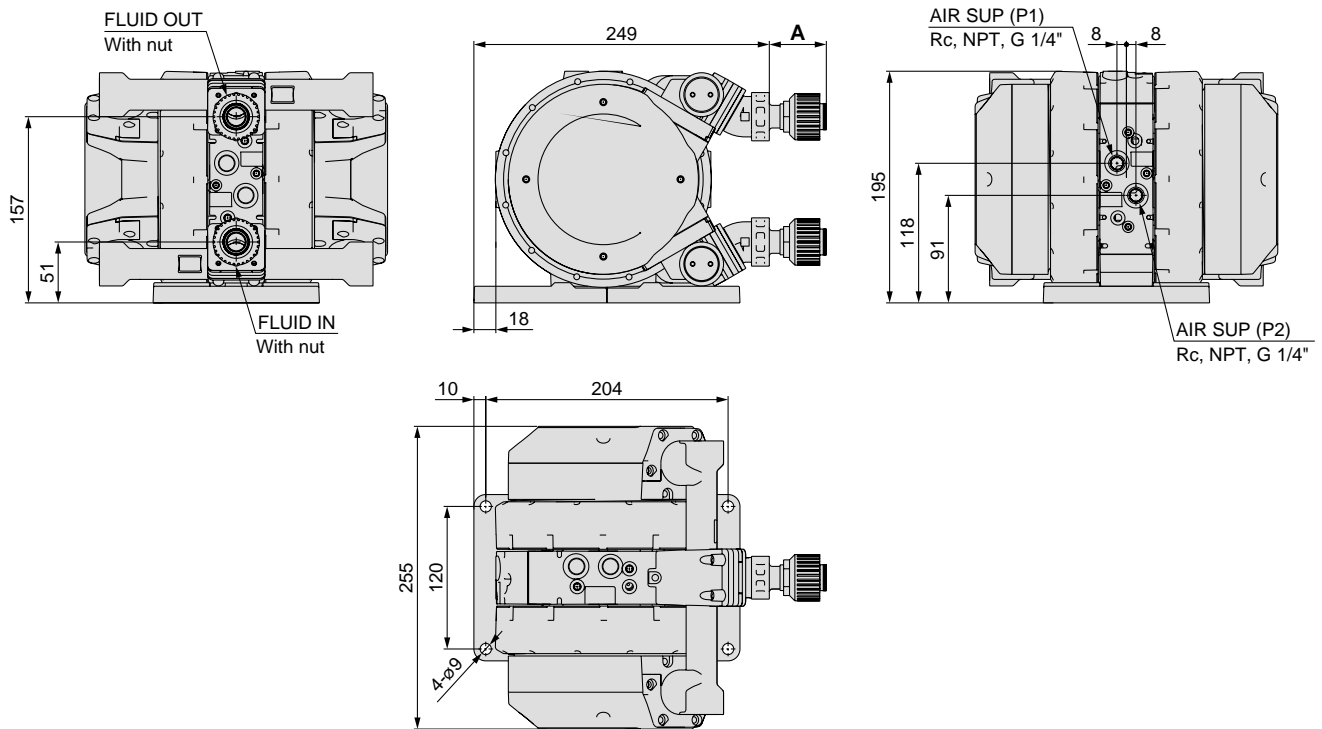


Tube extension: PAF5413-^{P19}P19N
P19F



Dimensions: Air Operated Type (Series PAF5000)

With nut (with LQ1 fitting): PAF5413S-1S19□
1S25□



(mm)

| Model | A |
|----------------|----|
| PAF5413S-1S19□ | 48 |
| PAF5413S-1S25□ | 55 |

Applicable Tube Size for each Nut Size

(Tube size can be altered by using a reducer even within the same nut size.)

| Size | Applicable tubing size |
|------|--|
| 5 | 12 x 10, 19 x 16, 1/2" x 3/8", 3/4" x 5/8" |
| 6 | 19 x 16, 25 x 22, 3/4" x 5/8", 1" x 7/8" |

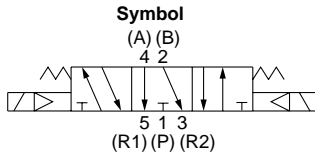
Related Products

<For driving the PAF3413 series>

5 port solenoid valve

VQZ14□ 0/24□ 0

(Exhaust centre)

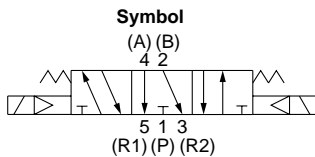


<For driving the PAF5413 series>

5 port solenoid valve

VQ44□ 0

(Exhaust centre)

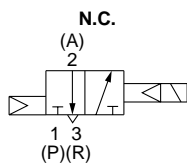


<For driving the PAF3413 series>

3 port solenoid valve

SYJ514/714

Symbol



<For extending the maintenance cycle>

Micro mist separator

Series AMD

Series AMD can separate and remove aerosol state oil mist in compressed air and remove carbon or dust of more than 0.01 μm.

It should be used as prefilter of compressed air for precision instruments or clean room required for higher clean air.

Specifications

| Model | | VQZ1420 | VQZ2420 | VQZ1450 | VQZ2450 | |
|--------------------------|------------------------|--------------------------------------|---------|--------------|---------|------|
| Piping | | Body ported | | Base mounted | | |
| Valve construction | | Metal seal | | | | |
| Type of actuation | | 3 position exhaust centre | | | | |
| Max. operating pressure | | 0.7 MPa (high-pressure type 1.0 MPa) | | | | |
| Min. operating pressure | | 0.1 MPa | | | | |
| Flow characteristics | 1→4/2 (P→A/B) | C[dm ³ /(s·bar)] | 0.55 | 1.1 | 0.56 | 1.5 |
| | | b | 0.28 | 0.23 | 0.2 | 0.16 |
| | | Cv | 0.13 | 0.28 | 0.13 | 0.35 |
| | 4/2→5/3 (A/B→EA/EB) | C[dm ³ /(s·bar)] | 0.54 | 1.4 | 0.7 | 1.9 |
| | | b | 0.26 | 0.2 | 0.21 | 0.16 |
| | | Cv | 0.13 | 0.32 | 0.17 | 0.4 |
| Max. operating frequency | | 10 Hz | | | | |



Refer to "Best Pneumatics catalogue" for further details.

Specifications

| Model | | VQ44□ 0 | |
|-------------------------|------------------------|-----------------------------|------|
| Piping | | Base mounted | |
| Valve construction | | Rubber seal | |
| Type of actuation | | 3 position exhaust center | |
| Max. operating pressure | | 1.0 MPa (0.7 MPa) | |
| Min. operating pressure | | 0.15 MPa | |
| Flow characteristics | 1→4/2 (P→A/B) | C[dm ³ /(s·bar)] | 6.2 |
| | | b | 0.18 |
| | | Cv | 1.5 |
| | 4/2→5/3 (A/B→EA/EB) | C[dm ³ /(s·bar)] | 6.9 |
| | | b | 0.17 |
| | | Cv | 1.7 |

Note) () : Low wattage (0.5 W) specifications



Refer to "Best Pneumatics catalogue" for further details.

Specifications

| Model | | SYJ514 | SYJ714 | |
|-------------------------|-----------|-----------------------------|--------|------|
| Piping | | Base mounted | | |
| Valve construction | | Rubber seal | | |
| Type of actuation | | N.C. | N.C. | |
| Max. operating pressure | | 0.7 MPa | | |
| Min. operating pressure | | 0.15 MPa | | |
| Flow characteristics | 1→2 (P→A) | C[dm ³ /(s·bar)] | 1.2 | 2.9 |
| | | b | 0.41 | 0.32 |
| | | Cv | 0.32 | 0.71 |
| | 2→3 (A→R) | C[dm ³ /(s·bar)] | 1.1 | 2.7 |
| | | b | 0.46 | 0.34 |
| | | Cv | 0.32 | 0.69 |



Refer to catalogue .ES11-86B for further details.

Model

| Model | AMD250 | AMD350 |
|------------------------------------|---------------|---------------|
| Rated flow (Note) (ℓ/min (ANR)) | 500 | 1000 |
| Port size (Nominal size B) | 1/4, 3/8, 1/2 | 3/8, 1/2, 3/4 |
| Weight (kg) | 0.55 | 0.9 |

Note) Maximum flow rate at pressure 0.7 MPa
Maximum flow rate varies depending on the operating pressure.



Refer to "Best Pneumatics catalogue" for further details.

Specifications

| | |
|-----------------------------------|---|
| Fluid | Compressed air |
| Max. operating pressure | 1.0 MPa |
| Min. operating pressure (Note 1) | 0.05 MPa |
| Proof pressure | 1.5 MPa |
| Ambient and fluid temperature | 5 to 60°C |
| Nominal filtration rating | 0.01 μm (95% filtered particle diameter) |
| Downstream oil mist concentration | Max. 0.1 mg/m ³ (ANR) (Note 2) (At saturation of element oil, less than 0.01 mg/m ³ (ANR) = 0.008 ppm) |
| Element service life | 2 years when the, or pressure drop reaches 0.1 MPa. |

Note 1) With auto drain: 0.1 MPa (N.O. type), 0.15 MPa (N.C. type).

Note 2) When compressor discharge oil mist concentration is 30 mg/m³ (ANR).

Related Products

<For supplying air and for regulating pressure>
Filter regulator + Mist separator
Air combination
Series AC20D/30D/40D

Model

| Model | | AC20D | AC30D |
|--------------------------|------------------|-------|-------|
| Component devices | Filter regulator | AW20 | AW30 |
| | Mist separator | AFM20 | AFM30 |
| Port size | | 1/8 | 1/4 |
| Pressure gauge port size | | 1/4 | 3/8 |
| Pressure gauge port size | | 1/8 | 1/8 |

Note 1) Conditions: Upstream pressure 0.7 MPa, set pressure 0.5 MPa. The rated flow rate varies depending on the set pressure.

Note 2) When compressor discharge concentration is 30 mg/N·m³.



Refer to "Best Pneumatics catalogue" for further details.

Specifications

| Model | AC20D | AC30D | AC40D | AC40D-06 |
|--|--|-------|-------|----------|
| Proof pressure | 1.5 MPa | | | |
| Max. operating pressure | 1.0 MPa | | | |
| Min. operating pressure | 0.05 MPa | | | |
| Set pressure range | 0.05 to 0.85 MPa | | | |
| Rated flow rate ^{Note 1)} (ℓ/min (ANR)) | 150 | 330 | 800 | 800 |
| Ambient and fluid temperature | -5 to 60°C (No freezing) | | | |
| Nominal filtration rating | AW: 5 μm, AFM: 0.3 μm (95% filtered particle diameter) | | | |
| Downstream oil mist concentration | Max. 1.0 mgf/N·m ³ (= 0.8 ppm) ^{Note 2)} | | | |
| Bowl material | Polycarbonate | | | |
| Construction/Filter regulator | Relieving type | | | |
| Weight (kg) | 0.57 | 0.74 | 1.38 | 1.43 |

<When it is desired to remove water droplets from the system.>
Water separator
Series AMG

The AMG series is installed in air pressure lines to remove water droplets from compressed air. It is suitable for use in cases where water must be removed, but the air does not have to be as dry as that for when an air dryer is used. It may also be used when a power supply for an air dryer is not available, etc.

Model

| Model | AMG150 | AMG250 |
|---|---------------|---------------|
| Rated flow ^{Note)} (ℓ/min (ANR)) | 300 | 750 |
| Port size (Nominal size B) | 1/8, 1/4, 3/8 | 1/4, 3/8, 1/2 |
| Weight (kg) | 0.38 | 0.55 |

Note) Maximum flow rate at pressure 0.7 MPa



Refer to "Best Pneumatics catalogue" for further details.

Specifications

| | |
|--|---|
| Fluid | Compressed air |
| Max. operating pressure | 1.0 MPa |
| Min. operating pressure ^{Note)} | 0.05 MPa |
| Proof pressure | 1.5 MPa |
| Ambient and fluid temperature | 5 to 60°C |
| Dehumidification rate | 99% |
| Element service life | 2 years when the, or pressure drop reaches 0.1 MPa. |

Note) With auto drain: 0.15 MPa.

<When it is desired to remove moisture from the system.>
Membrane dryer
Series IDG

Macromolecular membrane dryers that act like filters

Note 1) No freezing

Note 2) ANR represents the flow rate converted to the value under 20°C at atmospheric pressure.

Note 3) Including the dew point indicator purge air flow rate of 1 ℓ/min (ANR) (inlet air pressure at 0.7 MPa) (Except for IDG5)



Refer to "Best Pneumatics catalogue" for further details.

Standard Specifications/Single Unit (Standard Dew Point -20°C)

| Model | | Standard dew point: -20°C | | | | |
|---|--|---------------------------|-------------|-------------|-------------|-------|
| | | IDG5 | IDG10 | IDG20 | IDG30 | IDG50 |
| Range of operating conditions | Fluid | Compressed air | | | | |
| | Inlet air pressure (MPa) | 0.3 to 0.85 | | | 0.3 to 1.0 | |
| | Inlet air temperature (°C) ^{Note 1)} | -5 to 55 | | | -5 to 50 | |
| | Ambient temperature (°C) | -5 to 55 | | | -5 to 50 | |
| Standard performance area | Outlet air atmospheric pressure dew point (°C) | -20 | | | | |
| | | | | | | |
| Standard performance conditions | Inlet air flow rate (ℓ/min (ANR)) ^{Note 2)} | 62 | 125 | 250 | 375 | 625 |
| | Outlet air flow rate (ℓ/min (ANR)) | 50 | 100 | 200 | 300 | 500 |
| | Purge air flow rate (ℓ/min (ANR)) ^{Note 3)} | 12 | 25 | 50 | 75 | 125 |
| | Inlet air pressure (MPa) | 0.7 | | | | |
| | Inlet air temperature (°C) | 25 | | | | |
| | Inlet air saturation temperature (°C) | 25 | | | | |
| | Ambient temperature (°C) | 25 | | | | |
| Dew point indicator purge air flow rate | — | 1 ℓ/min (ANR) | | | | |
| Port size (Nominal size B) | 1/8, 1/4 | 1/4, 3/8 | | | | |
| Weight (kg) (with bracket) | 0.25 (0.31) | 0.43 (0.51) | 0.66 (0.76) | 0.74 (0.87) | 0.77 (0.90) | |

Maintenance Parts List

PAF3410/Automatically Operated Type

| | |
|---------------------------|------------|
| Diaphragm kit (PTFE) | KT-PAF3-31 |
| Check valve kit | KT-PAF3-36 |
| Switching valve parts kit | KT-PAF3-37 |
| Pilot valve kit | KT-PAF3-38 |
| Foot set | KT-PAF3-40 |
| Water leakage sensor* | KT-PAF3-47 |

PAF3413/Air Operated Type

| | |
|-----------------------|------------|
| Diaphragm kit (PTFE) | KT-PAF3-31 |
| Check valve kit | KT-PAF3-36 |
| Foot set | KT-PAF3-40 |
| Water leakage sensor* | KT-PAF3-47 |

PAF5413/Air Operated Type

| | |
|-----------------------|------------|
| Diaphragm kit (PTFE) | KT-PAF5-31 |
| Check valve kit | KT-PAF5-36 |
| Water leakage sensor* | KT-PAF5-47 |

PAF5410/Automatically Operated Type

| | |
|---------------------------|------------|
| Diaphragm kit (PTFE) | KT-PAF5-31 |
| Check valve kit | KT-PAF5-36 |
| Switching valve parts kit | KT-PAF5-37 |
| Pilot valve kit | KT-PAF5-38 |
| Water leakage sensor* | KT-PAF5-47 |

* 2 water leakage sensors are required per process pump.



Applicable Fluids

Material and Fluid Compatibility Check List for Process Pumps

| Chemical | Compatibility |
|---|---|
| Acetone | <input type="radio"/> Note 1, 2) |
| Ammonium hydroxide | <input type="radio"/> Note 2) |
| Isobutyl alcohol | <input type="radio"/> Note 1, 2) |
| Isopropyl alcohol | <input type="radio"/> Note 1, 2) |
| Hydrochloric acid | <input type="radio"/> |
| Ozone | <input type="radio"/> |
| Hydrogen peroxide | Concentration 5% or less 50°C or less <input type="radio"/> |
| Ethyl acetate | <input type="radio"/> Note 1, 2) |
| Butyl acetate | <input type="radio"/> Note 1, 2) |
| Nitric acid (Except fuming nitric acid) | Concentration 10% or less <input type="radio"/> Note 2) |
| Pure water | <input type="radio"/> |
| Sodium hydroxide | Concentration 50% or less <input type="radio"/> |
| Super pure water | <input type="radio"/> |
| Toluene | <input type="radio"/> Note 1, 2) |
| Hydrofluoric acid | <input type="radio"/> Note 2) |
| Sulfuric acid (Except fuming sulfuric acid) | <input type="radio"/> Note 2) |
| Phosphoric acid | Concentration 80% or less <input type="radio"/> |

Table symbols : Can be used.
: Can be used under certain conditions.
X: Cannot be used.



The material and fluid compatibility check list provides values for reference only.

Note 1) Take measures against static electricity, since static electricity may occur.


Note 2) Transmitted fluid may affect other material parts when in contact with fluids.


- Compatibility is indicated for fluid temperatures of 90°C or less.
- The material and fluid compatibility check list provides values for reference only, therefore SMC does not guarantee the application to our product.
- The data above is based on information provided by the material manufacturers.
- SMC is not responsible for its accuracy and any damage that may happen because of this data.




Process Pump Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of "**Caution**", "**Warning**" or "**Danger**". To ensure safety, be sure to observe ISO 4413 ^{Note 1)}, ISO 4414 ^{Note 2)}, JIS B 8361 ^{Note 3)}, JIS B 8370 ^{Note 4)}, JIS Z 9102 ^{Note 5)} and other safety practices.

 **Caution:** Operator error could result in injury or equipment damage.

 **Warning:** Operator error could result in serious injury or loss of life.

 **Danger :** In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4413: Hydraulic fluid power – General rules for the application of equipment to transmission and control systems.

Note 2) ISO 4414: Pneumatic fluid power – General rules relating to systems.

Note 3) JIS B 8361: General Rules for Hydraulic Systems

Note 4) JIS B 8370: General Rules for Pneumatic Equipment

Note 5) JIS Z 9102: Piping identification markings

Warning

1. The compatibility of the equipment is the responsibility of the person who designs the system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalogue information with a view to giving due consideration to any possibility of equipment failure when configuring a system. Be particularly careful in determining the compatibility with the fluid to be used.

2. Only trained personnel should operate machinery and equipment.

The fluid can be dangerous if handled incorrectly. Assembly, handling or repair of the systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove components until the safety is confirmed.

1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven objects have been confirmed. Measures to prevent danger from a fluid should also be confirmed.

2. When equipment is removed, confirm the safety process as mentioned above. Release the fluid pressure and be certain there is no danger from fluid leakage or fluid remaining in the system.

3. Carefully restart the machinery, confirming that safety measures are being implemented.

4. Do not use the product if it will use in an of the following conditions:

1. Conditions or environments beyond the specifications given in the catalogue and instruction manual.

2. With fluids whose application causes concern due to the type of fluid or additives, etc.

3. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.

4. An application which has the possibility of having negative effects on people, property, requiring special safety analysis.



Process Pump Precautions 1

Be sure to read this before handling.

Refer to the main catalogue sections for detailed precautions on each series.

Caution on Design

Warning

1. Check the specifications.

Give careful consideration to operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalogue.

2. Fluid

Regarding the component parts material and the fluid compatibility, check the applicable fluid check list (see back page 1) prior to use. Please consult with SMC for fluids other than those on the check list. Also, please use within the operating fluid temperature range.

3. Maintenance space

The installation should allow sufficient space for maintenance activities. Use the product, considering that liquid may leak from the product.

4. Fluid pressure

Do not apply and/or reduce pressure to the operating fluid.

5. Ambient environment

Operate within the ambient operating temperature range. After confirming the compatibility of the product's component materials with the ambient environment, operate so that fluid does not adhere to the product's exterior surfaces.

6. Liquid rings

In cases with a flowing liquid, provide a by-pass valve in the system to prevent the liquid from entering the liquid seal circuit.

7. Measures against static electricity

Take measures against static electricity as static electricity may occur depending on a fluid.

8. Suspension of the pump operation

For the automatic operation type, use a 3-port solenoid valve when the process pump is started or stopped by the pilot air. If the pump should stop while consuming the residual pressure, the integral switch part of the pilot air may not be stabilised or cannot be restarted. If it should not restart, press the reset button.

9. Cannot be used for gaseous transfer.

When used for gaseous transfer, sufficient transfer volume cannot be gained due to the nature of compression. Besides, as the operational cycle is too fast, unexpected malfunctions may occur within short periods of time.

10. Use constant pilot air pressure.

The pump may malfunction and stop when the pilot air pressure fluctuation exceeds 50 kPa because the automatically operated type adopts an air spring for the in-built air control circuit.

11. Use a design which prevents reverse pressure and reverse flow.

If reverse pressure or flow occurs, this can cause equipment damage or malfunction, etc. Take measures in designing the circuit diagram.

Warning

12. Condensation and freezing of the pilot port

For the automatically operated type, the location around the switching valve and the air exhaust port can cool down quickly due to expansion of the supply air, this may cause the pipes to freeze. Take measures to ensure that water droplets are not splashed onto any electric parts or equipment.

Mounting

Caution

1. The sealed package should only be opened inside a clean room.

This product is double packed inside a clean room. We recommend that the inner package should be opened inside a clean room or clean environment.

2. Confirm the mounting orientation of the product.

Mount the product, with its bottom surface facing downwards. Fix all the mounting locations prior to use.

Piping

Caution

1. Flush the pipes.

Connect the product after flushing and washing the pipes. If any foreign matter is left in the pipes, malfunction or failure may occur.

2. Use the fittings with a resin thread when piping to the pilot port.

Using fittings with metal threads may result in damage to the pilot port.

3. Always tighten threads with the proper tightening torque.

When screwing fittings into valves, tighten with the proper tightening torque shown below.

| Connection thread | Proper tightening torque (N·m) |
|-------------------|--------------------------------|
| Rc, NPT, G 1/8 | 0.4 to 0.5 |
| Rc, NPT, G 1/4 | 0.8 to 1 |
| Rc, NPT, G 3/8 | 2 to 2.5 |
| Rc, NPT, G 3/4 | 4 to 5 |



Process Pump Precautions 2

Be sure to read this before handling.

Refer to the main catalogue sections for detailed precautions on each series.

Air Supply

Warning

1. Use clean air.

If the compressed air includes synthetic oil containing chemicals, organic solvents, salt, corrosive gas, etc., this may cause damage to the product resulting in malfunction.

2. Quality of operating air

Be sure to use only air filtrated by a micro mist separator (AMD series). However, if you would like to extend the products service life, we would recommend using our super mist separator (AME series).

3. When operating this product in low temperatures, please pay special attention to avoid freezing.

Compressed air is expanded while the equipment operates. During this, the temperature inside the product decreases due to adiabatic expansion. This will cause freezing if compressed air with a high moisture content is used. In this case, take freeze prevention measures against freezing by using a membrane air dryer. (IDG series)

Operating Environment

Warning

1. Do not use in the following environments, as this can cause failure.

- 1) Locations with an atmosphere of corrosive gases, organic solvents or chemical solutions, and where there may be contact with the same.
- 2) Locations where there is contact with sea spray, water or steam.
- 3) Locations where there is contact with direct sunlight. (Sunlight should be blocked to prevent deterioration of resin from ultra violet rays and over heating, etc.)
- 4) Locations near heat sources with poor ventilation. (Heat sources should be shielded.)
- 5) Locations with impact or vibration.
- 6) Locations with high moisture and dust.

2. Do not use the product under water.

Do not use the product under water. Otherwise, liquid will enter the inside of the product, resulting in malfunction.

Maintenance

Warning

1. Only undertake maintenance after consulting the instruction manual.

When undertaking maintenance, you should refer to the equipment's instruction manual supplied by SMC or our Distributor. Incorrect handling may cause damage to the product resulting in malfunction.

2. Only undertake maintenance once the system has been confirmed as safe.

Turn off the compressed air and the power supply voltage and exhaust any remaining compressed air in the pipes before removing or attaching the equipment or removing the compressed air supply / exhaust equipment. Exhaust any residual liquid as considered necessary. Also, when the equipment is mounted again or restarted after replacement, check that it's safe and then confirm that the product runs normally.

3. Do not disassemble the product, as disassembly will invalidate the products warranty.

When disassembly is necessary, please consult with SMC or our Distributor.

4. Drain discharge

If drain accumulates in equipment, in piping or other areas, this can cause malfunction of the equipment or unexpected trouble due to splash over into the downstream side, etc. Exhaust the drain from air filter, etc. periodically.

5. Caution when transferring a high-temperature fluid

This product will become hot due to its high-temperature operation. Touching the product directly may cause burns. Before transferring a high-temperature fluid, please allow sufficient time for the fluid to cool slightly. We also recommend that the system is safe prior to fluid transfer by detecting the product's temperature.

6. Caution when a thermal heat cycle is applied.

When a heat cycle is applied, the resin thread may extend. Additionally tighten with the specified torque (M3: 0.11 to 0.12 N•m) to prevent liquid leakage.



Process Pump Precautions 3

Be sure to read this before handling.

Refer to the main catalogue sections for detailed precautions on each series.

Maintenance

⚠ Caution

1. Caution for transferring a highly permeable liquid

Compared with the fluoro-resin, when a highly permeable liquid is transferred, an ingredient of the transfer liquid may ingress into the openings inside the equipment. Additionally, it may become attached to the external surface on the equipment. In this case, take the same measures as handling the transfer liquid.

2. Service life

When the process pump exceeds the diaphragm service life, the diaphragm may become degraded or damaged. Furthermore, the internal pilot air circuit will not be able to work, making operation impossible. We recommend that the diaphragm be replaced before its service life has expired.

[Reference life expectancy]

<Automatically operated type>

$$\text{Reference life expectancy (days)} = \frac{\text{A (Amount of discharge per cycle)} \times 50 \text{ million cycles (reference number for the pump's life expectancy)}}{\text{Flow (}\ell/\text{min)} \times \text{Running time per day (hour)} \times 60 \text{ (min)}}$$

| Model | Amount of discharge A per cycle | Volume inside the pump (wetted parts) |
|---------|---------------------------------|---------------------------------------|
| PAF3410 | Approx. 0.054 ℓ | Approx. 105 mℓ |
| PAF3413 | Approx. 0.050 ℓ* | Approx. 100 mℓ |
| PAF5410 | Approx. 0.130 ℓ | Approx. 600 mℓ |
| PAF5413 | Approx. 0.190 ℓ* | |

* The amount of discharge A per cycle for the air-operated type is for the case where there is no piping resistance.

<Air operated type>

The amount of discharge per cycle for the air-operated type varies depending on the piping resistance. Thus calculate the life expectancy, beginning with the operating frequency of a solenoid valve.

$$\text{Reference life expectancy (days)} = \frac{50 \text{ million cycles (reference number for the pump's life expectancy)}}{\text{Solenoid valve's operating frequency (Hz)} \times 60 \text{ (sec)} \times \text{Running time per day (hour)} \times 60 \text{ (min)}}$$

Caution on Handling

⚠ Warning

1. If unused for long periods of time, perform a trial run prior to operation.


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