Process Pump

PAF3000 Series/PAF5000 Series

The excellent corrosion resistance is achieved due to the new PFA wetted material construction!

PPS/PFA dual construction, withstand pressure and heat cycle performance have been improved.

- No metallic parts are used. (Metal-free)

- Max. flow rate: 45 L/min (Automatically operated) (PAF5000 series)
- Fitting type: Female thread/Tube extension/With nut (Insert bushing type, Flare type)
The excellent corrosion resistance is achieved due to the use of New PFA and PTFE in the body material and diaphragm/seal material, respectively. One pump is compatible with various fluids, and the variation options include:

<table>
<thead>
<tr>
<th>Variation</th>
<th>Model</th>
<th>Body material</th>
<th>Diaphragm material</th>
<th>Discharge flow rate (L/min)</th>
<th>Fitting type</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatically operated</td>
<td>PAF3410</td>
<td>New PFA</td>
<td>Modified PTFE</td>
<td>1 to 20</td>
<td>Female thread</td>
<td>Foot Note 1)</td>
</tr>
<tr>
<td></td>
<td>PAF5410</td>
<td></td>
<td></td>
<td>5 to 45</td>
<td>Tube extension With nut</td>
<td></td>
</tr>
<tr>
<td>Air operated</td>
<td>PAF3413</td>
<td>New PFA</td>
<td>Modified PTFE</td>
<td>1 to 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PAF5413</td>
<td></td>
<td></td>
<td>5 to 38</td>
<td></td>
<td>Silencer Note 2)</td>
</tr>
</tbody>
</table>

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)

- **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.

- **Variation on fittings with nut**
  Insert bushing type (LQ1 fittings)

  Quadruple seal construction

  Flare type (LQ3 fittings)

  Triple seal construction

- **PPS/PFA dual construction**
  Withstand pressure and heat cycle performance have been improved.

- **Variation on fittings with nut**
  Insert bushing type (LQ1 fittings)

  Quadruple seal construction

  Flare type (LQ3 fittings)

  Triple seal construction

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

### How to Order

#### Female thread

**PAF341 0**  
**Symbol**  
**Actuation**  
- **Symbol**  
- **Actuation**  
  - Automatically operated  
  - Air operated  
**Thread type**  
- **Symbol**  
- **Type**  
  - Rc  
  - NPT  
**Port size**  
- **Symbol**  
- **Port size**  
  - 3/8”

#### Tube extension

**PAF341 0**  
**Symbol**  
**Actuation**  
- **Symbol**  
- **Actuation**  
  - Automatically operated  
  - Air operated  
**Tubing size**  
- **Symbol**  
- **Main fluid connection size**  
  - 1/2”

#### With nut

**PAF341 0 S**  
**Symbol**  
**Actuation**  
- **Symbol**  
- **Actuation**  
  - Automatically operated  
  - Air operated  
**Fitting size**  
- **Symbol**  
- **IN side**  
- **OUT side**  
  - **Symbol**  
  - **Fitting type**  
    - LG1  
    - LG3  
**Thread type**  
- **Symbol**  
- **Type**  
  - Rc  
  - NPT  
  - G

### Note 1)

- The port size of the pilot port is as follows. Automatically operated type is 1/4”; Air operated type is 1/8”.
- Refer to page 600 for the compatible fittings.

### Note 2)

- The thread type is applied to the pilot port thread and the female thread piping connection.
- Refer to pages 622 and 623 for related products.

### Applicable actuation

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Option</th>
<th>Applicable actuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>None</td>
<td>Automatically operated</td>
</tr>
<tr>
<td>B</td>
<td>With foot</td>
<td>•</td>
</tr>
<tr>
<td>N</td>
<td>With silencer</td>
<td>•</td>
</tr>
</tbody>
</table>

- When option is more than one, suffix in alphabetical order.
- **For AIR EXH: AN20-02** ( Either Nil or N is entered as a thread symbol.)
Process Pump: Automatically Operated Type (Internal Switching Type)
Air Operated Type (External Switching Type)
PAF5000 Series

How to Order

Female thread

PAF5410-06-

Actuation (Note 1)
Symbol | Actuation
---|---
0 | Automatically operated
3 | Air operated

Option
Symbol | Option | Applicable actuation
---|---|---
Nil | None | ● ●
N | With silencer | ● —

Thread type (Note 2)
Symbol | Type
---|---
Nil | Rc
N | NPT
F | G

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

Tube extension

PAF5410-P19-

Actuation (Note 1)
Symbol | Actuation
---|---
0 | Automatically operated
3 | Air operated

Option
Symbol | Option | Applicable actuation
---|---|---
Nil | None | ● ●
N | With silencer | ● —

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

Thread type (Note 2)
Symbol | Type
---|---
Nil | Rc
N | NPT
F | G

With nut

PAF5410-S1S19-

Actuation (Note 1)
Symbol | Actuation
---|---
0 | Automatically operated
3 | Air operated

Option
Symbol | Option | Applicable actuation
---|---|---
Nil | None | ● ●
N | With silencer | ● —

Fitting type
Symbol | Fitting type
---|---
1 | LQ1
3 | LG3

Fitting size
Symbol | IN side | OUT side | Fitting type
---|---|---|---
19 | 5 | 6 | LQ1
1025 | 5 | 6 | ● —
2519 | 6 | 5 | ● —
25 | 6 | 6 | ● —

Thread type (Note 2)
Symbol | Type
---|---
Nil | Rc
N | NPT
F | G

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.
* Refer to page 606 or maintenance parts.
* Refer to pages 622 and 623 for related products.
How to Order Fittings for Products with Nut (PAF341□S, PAF541□S Series)

Fittings compatible for the process pump with nut / PAF341□S, PAF541□S.
Product without nut (insert bushing), 1 piece nut removed, which is not necessary in cases when using the products with nut.

**LQ1 fittings**

<table>
<thead>
<tr>
<th>Fitting type</th>
<th>E</th>
<th>T</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union elbow</td>
<td>E</td>
<td>T</td>
<td>U</td>
</tr>
<tr>
<td>Union tee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel mount union</td>
<td>P</td>
<td>U</td>
<td></td>
</tr>
</tbody>
</table>

**Applicable tubing size**

- **Metric size**
  - Class | No | Applicable tubing size (mm) | Reducing |
  - 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                      | ■       |

- **Inch size**
  - Class | Symbol | Applicable tubing size (inch) | Reducing |
  - 4     | A      | 1/2" x 3/8"                  | ○       |
  - 4     | B      | 5/8" x 1/4"                  | ■       |
  - 5     | A      | 3/4" x 5/8"                  | ○       |
  - 5     | B      | 1" x 3/8"                    | ■       |
  - 6     | A      | 1" x 7/8"                    | ○       |
  - 6     | B      | 3/4" x 5/8"                  | ■       |

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

**Ordering Example**

Pump: PAF3410S-1S13-B

- Tubing size: 12 x 10
- LQ1E41-SN (Union elbow)
- LQ1U4B-SN (Union)

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

## PAF3000 Series

<table>
<thead>
<tr>
<th>Model</th>
<th>PAF3410</th>
<th>PAF3413</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation method</td>
<td>Automatically operated</td>
<td>Air operated</td>
</tr>
<tr>
<td>Port size</td>
<td>Main fluid: Suction/Discharge port</td>
<td>Pilot air: Supply/Exhaust port</td>
</tr>
<tr>
<td></td>
<td>Rc, NPT, G 3/8” Female thread, 1/2” Tube extension, With nut (size 4, 5)</td>
<td>Rc, NPT, G 1/4” Female thread</td>
</tr>
<tr>
<td>Discharge flow rate</td>
<td>1 to 15 L/min</td>
<td>1 to 20 L/min</td>
</tr>
<tr>
<td>Average discharge pressure</td>
<td>0 to 0.4 MPa</td>
<td></td>
</tr>
<tr>
<td>Pilot air pressure</td>
<td>0.2 to 0.5 MPa (for 0 to 60°C)</td>
<td></td>
</tr>
<tr>
<td>Air consumption</td>
<td>230 L/min (ANR) or less</td>
<td></td>
</tr>
<tr>
<td>Suction lift</td>
<td>Dry: Up to 1 m (inside the pump is dry)</td>
<td>Wet: Up to 4 m (with fluid inside the pump)</td>
</tr>
<tr>
<td>Noise</td>
<td>80 dB (A) or less</td>
<td>80 dB (A) or less</td>
</tr>
<tr>
<td></td>
<td>(Option: with silencer, AN20)</td>
<td>(excluding the noise from the quick exhaust and solenoid valve)</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td></td>
<td>0.75 MPa</td>
</tr>
<tr>
<td>Service life</td>
<td></td>
<td>50 million cycles (for water)</td>
</tr>
<tr>
<td>Operating fluid temperature</td>
<td></td>
<td>0 to 90°C (No freezing)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>0 to 70°C (No freezing)</td>
</tr>
<tr>
<td>Maximum viscosity</td>
<td>1000 mPa·s</td>
<td></td>
</tr>
<tr>
<td>Recommended operation cycle</td>
<td>—</td>
<td>2 to 4 Hz</td>
</tr>
<tr>
<td>Weight (without foot bracket)</td>
<td>1.6 kg</td>
<td>1.3 kg</td>
</tr>
<tr>
<td>Mounting</td>
<td>Horizontal (mounting on the bottom surface)</td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>Clean double packaging</td>
<td></td>
</tr>
</tbody>
</table>

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

## PAF5000 Series

<table>
<thead>
<tr>
<th>Model</th>
<th>PAF5410</th>
<th>PAF5413</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation method</td>
<td>Automatically operated</td>
<td>Air operated</td>
</tr>
<tr>
<td>Port size</td>
<td>Main fluid: Suction/Discharge port</td>
<td>Pilot air: Supply/Exhaust port</td>
</tr>
<tr>
<td></td>
<td>Rc, NPT, G 3/4” Female thread, 3/4” Tube extension, With nut (size 5, 6)</td>
<td>Rc, NPT, G 1/4” Female thread</td>
</tr>
<tr>
<td>Discharge flow rate</td>
<td>5 to 45 L/min</td>
<td>5 to 38 L/min</td>
</tr>
<tr>
<td>Average discharge pressure</td>
<td>0 to 0.4 MPa</td>
<td></td>
</tr>
<tr>
<td>Pilot air pressure</td>
<td>0.2 to 0.5 MPa (for 0 to 60°C)</td>
<td></td>
</tr>
<tr>
<td>Air consumption</td>
<td>300 L/min (ANR) or less</td>
<td></td>
</tr>
<tr>
<td>Suction lift</td>
<td>Dry: Up to 1 m (inside the pump is dry)</td>
<td>Wet: Up to 4 m (with fluid inside the pump)</td>
</tr>
<tr>
<td>Noise</td>
<td>80 dB (A) or less</td>
<td>80 dB (A) or less</td>
</tr>
<tr>
<td></td>
<td>(Option: with silencer, AN20)</td>
<td>(excluding the noise from the quick exhaust and solenoid valve)</td>
</tr>
<tr>
<td>Withstand pressure</td>
<td></td>
<td>0.75 MPa</td>
</tr>
<tr>
<td>Service life</td>
<td></td>
<td>50 million cycles (for water)</td>
</tr>
<tr>
<td>Operating fluid temperature</td>
<td></td>
<td>0 to 90°C (No freezing)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>0 to 70°C (No freezing)</td>
</tr>
<tr>
<td>Maximum viscosity</td>
<td>1000 mPa·s</td>
<td></td>
</tr>
<tr>
<td>Recommended operation cycle</td>
<td>—</td>
<td>1 to 3 Hz</td>
</tr>
<tr>
<td>Weight (without foot bracket)</td>
<td>16 kg</td>
<td></td>
</tr>
<tr>
<td>Mounting</td>
<td>Horizontal (mounting on the bottom surface)</td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>Clean double packaging</td>
<td></td>
</tr>
</tbody>
</table>

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

## Tube Size Applicable for Nut Size

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

<table>
<thead>
<tr>
<th>Size</th>
<th>Applicable tubing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>10 x 8, 12 x 10, 3/8” x 1/4”, 1/2” x 3/8”</td>
</tr>
<tr>
<td>5</td>
<td>12 x 10, 19 x 16, 1/2” x 3/8”, 3/4” x 5/8”</td>
</tr>
<tr>
<td>6</td>
<td>19 x 16, 25 x 22, 3/4” x 5/8”, 1” x 7/8”</td>
</tr>
</tbody>
</table>
Selection from Flow Characteristic Graph (PAF3410)

Required specifications example:
Find the pilot air pressure and pilot air consumption for a discharge rate of 6 L/min and 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 discharge pressure of 0.25 MPa.
2. 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 rate characteristics are for fresh water (viscosity 1 mPa·s, specific gravity 1.0).
2. The discharge rate differs greatly depending on properties (viscosity, specific gravity) of the fluid being transferred and 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.

Selection from Viscosity Characteristic Graph

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

Selection procedures:
1. First find the ratio of the discharge rate for 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 L/min ÷ 0.45 = 6 L/min, indicating that a discharge rate of 6 L/min is required for fresh water.
3. Finally, find the pilot air pressure and pilot air consumption based on selection from the flow characteristic graphs.

Caution
Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity \( \nu = \frac{\mu}{\rho} \)
\( \nu \left(10^{-2} \text{m}^2/\text{s}\right) = \frac{\mu \text{(mPa·s)}}{\rho \text{(kg/m}^3\text{)}} \)
Required specification example:
Find the pilot air pressure and pilot air consumption for a discharge rate of 4 L/min and 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 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, 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 rate characteristics are for fresh water (viscosity 1 mPa·s, specific gravity 1.0).
2. The discharge rate differs greatly depending on properties (viscosity, specific gravity) of the fluid being transferred and 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 pilot air consumption for a discharge rate of 2.7 L/min, discharge pressure of 0.25 MPa, and a viscosity of 100 mPa·s.

Selection procedures:
1. First find the ratio of the discharge rate for 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 L/min ÷ 0.45 = 6 L/min, indicating that a discharge rate of 6 L/min is required for fresh water.
3. Finally, find the pilot air pressure based on selection from the flow characteristic graphs.

⚠️ Caution
Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity \( \nu = \text{Viscosity} \frac{\mu}{\text{Density} \ \rho} \)
\( \nu(10^{-3} \text{m}^2/\text{s}) = \frac{\mu(\text{mPa·s})}{\rho(\text{kg/m}^3)} \)
**Working Principle: Automatically Operated Type (PAF3410, 5410)**

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.

**Working Principle: Air Operated Type (PAF3413, 5413)**

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.

### Maintenance Parts

**Basic Instruction**

- **Basically, it is not recommended to disassemble the process pump. However, if this is necessary, be sure to follow the instructions in the maintenance procedure.
- **When carrying out this work, wear appropriate protective equipment.

#### PAF3000/5000 Series

<table>
<thead>
<tr>
<th>Description</th>
<th>PAF3000 series</th>
<th>PAF5000 series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PAF3410</td>
<td>PAF3413</td>
</tr>
<tr>
<td></td>
<td>PAF5410</td>
<td>PAF5413</td>
</tr>
<tr>
<td>Diaphragm kit</td>
<td>KT-PAF3-31</td>
<td>KT-PAF5-31</td>
</tr>
<tr>
<td>Check valve kit</td>
<td>KT-PAF3-36</td>
<td>KT-PAF5-36</td>
</tr>
<tr>
<td>Switching valve kit</td>
<td>KT-PAF3-37</td>
<td>KT-PAF5-37</td>
</tr>
<tr>
<td>Pilot valve kit</td>
<td>KT-PAF3-38</td>
<td>KT-PAF5-38</td>
</tr>
<tr>
<td>Foot kit</td>
<td>KT-PAF3-40</td>
<td>KT-PAF5-40</td>
</tr>
<tr>
<td>Leakage sensor</td>
<td>KT-PAF3-47</td>
<td>KT-PAF5-47</td>
</tr>
</tbody>
</table>

* Note: The maintenance procedure is to be distributed individually. Please contact your SMC sales representative for details.

Note: One of Nil, F or N is entered as thread symbol.
Piping and Operation: Automatically Operated Type (PAF3410, 5410)

**Caution**
Mounting posture 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 transfered 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 operates 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 flows from the suction port <FLUID IN> to the discharge port <FLUID OUT>. At this time, the throttle 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 (AN20-02: option) to the air exhaust port <AIR EXH>.
3. To stop the pump, exhaust the air pressure being supplied to the pump by the 3 port solenoid valve of the air supply port <AIR SUP>. The pump stops even when the throttle on the discharge side is closed. But the pressure supply to the pump should be exhausted quickly.

**<Discharge Flow Rate Adjustment>**
1. To adjust the flow rate from the discharge port <FLUID OUT>, use the throttle connected to the discharge side. Refer to circuit example (1). Note that this product cannot be used as a fixed quantity liquid dispense pump.
2. When operating with a discharge flow rate below the specification range, provide a by-pass circuit from 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.

**<Air Operated Reset Port>**
It is possible to restore operation by supplying air to the air operated reset port without directly pressing the reset button, such as by remote control. Pressure equivalent to or greater than pilot air pressure (but less than 0.5 MPa) is required to reset air. Refer to air operated reset circuit example (1) and (2).

**<Counting The Operating Cycle: PAF3000 Only>**
The pump's operating cycle can be counted by applying a pressure switch to the air operated reset port. Keep the distance between the pressure switch and the air operated reset port within 50 mm. Refer to air operated reset circuit example (1).

For the related products, refer to pages 622 and 623.
**PAF Series**

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

---

**Piping diagram**

- Pilot air supply port: P1
- Pilot air supply port: P2
- Solenoid valve
- Discharge port
- Suction port

**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 circuit example

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 operates when power is applied to the solenoid valve **Note 2)** of the pilot air supply port and fluid flows from the suction port <FLUID IN> to the discharge port <FLUID OUT>. At this time, the throttle 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 center 5 port valve, or a combination of 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.

---

**Recommended Valve**

<table>
<thead>
<tr>
<th>Model</th>
<th>Recommended Valve</th>
<th>Use for</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAF3413</td>
<td>VQZ14□□ (Exhaust center)</td>
<td>PAF3413</td>
</tr>
<tr>
<td>PAF5413</td>
<td>VQ44□□ (Exhaust center)</td>
<td>PAF5413</td>
</tr>
</tbody>
</table>

Refer to page 622 for further details.

---

**Circuit example (1)**

**Circuit example (2)**

For the related products, refer to pages 622 and 623.
Dimensions: Automatically Operated Type (PAF3000 Series)

Female thread: PAF3410-03

Reset button

2 x M5 x 0.8
Thread depth 9

Air operated reset port
Rc, NPT, G 1/8"

AIR SUP
Rc, NPT, G 1/4"

Silencer: AN20-02
(Option)

Foot
(Option)

4 x ø7 mounting hole
(Option is selected)

FLUID OUT
Rc, NPT, G 3/8"

FLUID IN
Rc, NPT, G 3/8"

AIR EXH
Rc, NPT, G 1/4"

Tube extension: PAF3410-P13

Reset button

2 x M5 x 0.8
Thread depth 9

Air operated reset port
Rc, NPT, G 1/8"

AIR SUP
Rc, NPT, G 1/4"

Silencer: AN20-02
(Option)

Foot
(Option)

4 x ø7 mounting hole
(Option is selected)

FLUID OUT
1/2" tube extension

FLUID IN
1/2" tube extension
### Dimensions: Automatically Operated Type (PAF3000 Series)

**With nut (with LQ1 fittings): PAF3410S-1S13**

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAF3410S-1S13</td>
<td>115</td>
</tr>
<tr>
<td>PAF3410S-1S19</td>
<td>118</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>Applicable tubing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>10 x 8, 12 x 10, 3/8&quot; x 1/4&quot;, 1/2&quot; x 3/8&quot;</td>
</tr>
<tr>
<td>5</td>
<td>12 x 10, 19 x 16, 1/2&quot; x 3/8&quot;, 3/4&quot; x 5/8&quot;</td>
</tr>
</tbody>
</table>

**With nut (with LQ3 fittings): PAF3410S-3S13**

- **Model**: PAF Series
- **Type**: Dimensions: Automatically Operated Type
- **Nut Size**: With nut (with LQ1 fittings)
- **Foot**: (Option)
- **FLUID OUT**: With nut
- **FLUID IN**: With nut
- **AIR EXH**: Rc, NPT, G 1/4" Silencer: AN20-02 (Option)
- **AIR SUP**: Rc, NPT, G 1/8"
- **Air operated reset port**: Rc, NPT, G 1/4" (Option B is selected)
- **4 x ø7 mounting hole**: Bottom view of body
- **Reset button**: Bottom view of body
- **Thread depth 9**: Bottom view of body
- **Tube Size Applicable for Nut Size**
  (Tube size can be altered, using a reducer even within the same nut size.)

- **Model** | **A** |
  - PAF3410S-1S13 | 115 |
  - PAF3410S-1S19 | 118 |
Dimensions: Air Operated Type (PAF3000 Series)

Female thread: PAF3413-N03

AIR SUP (P2)
Rc, NPT, G 1/8"

AIR SUP (P1)
Rc, NPT, G 1/8"

FLUID IN
Rc, NPT, G 3/8"

FLUID OUT
Rc, NPT, G 3/8"

Tube extension: PAF3413-P13N-P13F

AIR SUP (P1)
Rc, NPT, G 1/8"

AIR SUP (P2)
Rc, NPT, G 1/8"

Foot (Option)

Foot (Option)

2 x M5 x 0.8
Thread depth 9

2 x M5 x 0.8
Thread depth 9

4 x ø7

4 x ø7

Dimensions: Air Operated Type (PAF3000 Series)

PAF Series

Automatically Operated Type/Air Operated Type
**PAF Series**

**Dimensions: Air Operated Type (PAF3000 Series)**

With nut (with LQ1 fittings): PAF3413S-1S13

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAF3413S-1S13</td>
<td>115</td>
</tr>
<tr>
<td>PAF3413S-1S19</td>
<td>118</td>
</tr>
</tbody>
</table>

- AIR SUP (P1) Rc, NPT, G 1/8”
- AIR SUP (P2) Rc, NPT, G 1/8”
- FLUID OUT
- FLUID IN

**Tube Size Applicable for Nut Size**
(Tube size can be altered, using a reducer even within the same nut size.)

<table>
<thead>
<tr>
<th>Size</th>
<th>Applicable tubing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>10 x 8, 12 x 10, 3/8&quot; x 1/4&quot;, 1/2&quot; x 3/8&quot;</td>
</tr>
<tr>
<td>5</td>
<td>12 x 10, 19 x 16, 1/2&quot; x 3/8&quot;, 3/4&quot; x 5/8&quot;</td>
</tr>
</tbody>
</table>

With nut (with LQ3 fittings): PAF3413S-3S13

Bottom view of body

Foot
(Option)

Foot
(Option)

Bottom view of body

Foot
(Option)
Dimensions: Automatically Operated Type (PAF5000 Series)

Female thread: PAF5410-006

Female thread: PAF5410-006

Reset button
Air operated reset port
Rc, NPT, G 1/8"

Silencer: AN20-02
(Option)

FLUID IN
Rc, NPT, G 3/4"

FLUID OUT
Rc, NPT, G 3/4"

Tube extension: PAF5410-P19
P19N
P19F

Reset button
Air operated reset port
Rc, NPT, G 1/8"

Silencer: AN20-02
(Option)

FLUID IN
3/4" tube extension

FLUID OUT
3/4" tube extension

PA
PA(P)
PAX
PB
PAF

PA
PA(P)
PAX
PB

Dimensions: Automatically Operated Type (PAF5000 Series)

Female thread: PAF5410-006

Female thread: PAF5410-006

Reset button
Air operated reset port
Rc, NPT, G 1/8"

Silencer: AN20-02
(Option)

FLUID IN
Rc, NPT, G 3/4"

FLUID OUT
Rc, NPT, G 3/4"

Tube extension: PAF5410-P19
P19N
P19F

Reset button
Air operated reset port
Rc, NPT, G 1/8"

Silencer: AN20-02
(Option)

FLUID IN
3/4" tube extension

FLUID OUT
3/4" tube extension
Dimensions: Automatically Operated Type (PAF5000 Series)

With nut (with LQ1 fittings): PAF5410S-1S19

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAF5410S-1S19</td>
<td>48</td>
</tr>
<tr>
<td>PAF5410S-1S25</td>
<td>55</td>
</tr>
</tbody>
</table>

Tube Size Applicable for Nut Size
(Tube size can be altered, using a reducer even within the same nut size.)

<table>
<thead>
<tr>
<th>Size</th>
<th>Applicable tubing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>12 x 10, 19 x 16, 1/2&quot; x 3/8&quot;, 3/4&quot; x 5/8&quot;</td>
</tr>
<tr>
<td>6</td>
<td>19 x 16, 25 x 22, 3/4&quot; x 5/8&quot;, 1&quot; x 7/8&quot;</td>
</tr>
</tbody>
</table>

With nut (with LQ3 fittings): PAF5410S-3S19
Dimensions: Air Operated Type (PAF5000 Series)

Female thread: PAF5413-06 F06

Tube extension: PAF5413-P19 P19N P19F

Dimensions: Air Operated Type (PAF5000 Series)
**PAF Series**

Dimensions: Air Operated Type (PAF5000 Series)

With nut (with LQ1 fittings): PAF5413S-1S19

**Tube Size Applicable for Nut Size**
(Tube size can be altered, using a reducer even within the same nut size.)

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>Size</th>
<th>Applicable tubing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAF5413S-1S19</td>
<td>48</td>
<td>5</td>
<td>12 x 10, 19 x 16, 1/2&quot; x 3/8&quot;, 3/4&quot; x 5/8&quot;</td>
</tr>
<tr>
<td>PAF5413S-1S25</td>
<td>55</td>
<td>6</td>
<td>19 x 16, 25 x 22, 3/4&quot; x 5/8&quot;, 1&quot; x 7/8&quot;</td>
</tr>
</tbody>
</table>

With nut (with LQ3 fittings): PAF5413S-3S19

---

[Image of a PAF series component with dimensions and tube size specifications.]

<table>
<thead>
<tr>
<th>Dimensions: Air Operated Type (PAF5000 Series)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With nut (with LQ1 fittings): PAF5413S-1S19</td>
</tr>
<tr>
<td>Tube Size Applicable for Nut Size</td>
</tr>
<tr>
<td>(Tube size can be altered, using a reducer even within the same nut size.)</td>
</tr>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>PAF5413S-1S19</td>
</tr>
<tr>
<td>PAF5413S-1S25</td>
</tr>
<tr>
<td>With nut (with LQ3 fittings): PAF5413S-3S19</td>
</tr>
</tbody>
</table>
Compatible with various liquids (DI water (Deionized water), solvent) *

* Tightening bolt, Air switching valve: Stainless steel
Use the PAF series standard products when metal-free pump is necessary for hydrofluoric acid, etc.

Lightweight/Compact (PAF3000-X68 without foot)
Weight: 1.8 kg

PPS/PFA dual construction
Withstand pressure and heat cycle performance have been improved.

Connection type: Female thread/Tube extension/With nut (Insert bushing type, Flare type)

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>PAF3410-X68</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operation method</strong></td>
<td>Automatically operated</td>
</tr>
<tr>
<td><strong>Port size</strong></td>
<td></td>
</tr>
<tr>
<td>Main fluid: Suction/Discharge port</td>
<td>Rc, NPT, G 3/8” Female thread, 1/2” Tube extension, With nut (Size 4, 5)</td>
</tr>
<tr>
<td>Pilot air: Supply/Exhaust port</td>
<td>Rc, NPT, G 1/4” Female thread</td>
</tr>
<tr>
<td><strong>Discharge flow rate</strong></td>
<td>1 to 20 L/min</td>
</tr>
<tr>
<td><strong>Average discharge pressure</strong></td>
<td>0 to 0.4 MPa</td>
</tr>
<tr>
<td><strong>Pilot air pressure</strong></td>
<td>0.2 to 0.5 MPa (for 0 to 60°C)</td>
</tr>
<tr>
<td><strong>Air consumption</strong></td>
<td>230 L/min (ANR) or less</td>
</tr>
<tr>
<td><strong>Suction lift</strong></td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td>Up to 1 m (Dry interior of the pump)</td>
</tr>
<tr>
<td>Wet</td>
<td>Up to 4 m (Liquid inside the pump)</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>80 dB (A) or less (Option: with silencer, AN20)</td>
</tr>
<tr>
<td><strong>Withstand pressure</strong></td>
<td>0.75 MPa</td>
</tr>
<tr>
<td><strong>Service life</strong></td>
<td>50 million cycles (for water)</td>
</tr>
<tr>
<td><strong>Fluid temperature</strong></td>
<td>0 to 90°C (No freezing)</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>0 to 70°C (No freezing)</td>
</tr>
<tr>
<td><strong>Maximum viscosity</strong></td>
<td>1000 mPa·s</td>
</tr>
<tr>
<td><strong>Weight (without foot)</strong></td>
<td>1.8 kg</td>
</tr>
<tr>
<td><strong>Mounting orientation</strong></td>
<td>Horizontal (mounting on the bottom surface)</td>
</tr>
<tr>
<td><strong>Packaging</strong></td>
<td>General environment</td>
</tr>
</tbody>
</table>

* Values in the table are measured at room temperature using fresh water.
**Process Pump/Wetted Part: Fluoropolymer**

**Automatically Operated Type (Internal Switching Type)**

**PAF3000-X68**

---

**How to Order**

**Female thread**

### PAF3410

- **Thread**
  - Note 2)
  - Symbol Type
  - Nil, Rc, N, NPT, F, G
  - **Option**
  - Symbol
  - N
  - Port size
  - 03, 3/8"

### Tube extension

### PAF3410-P13

- **Tubing size**
  - Symbol
  - 13, 1/2"

---

**With nut**

### PAF3410S

- **Fitting type**
  - Symbol
  - LO1
  - LO3

---

### Performance Curve

**Flow Rate Characteristics**

- **Discharge pressure (MPa)**
  - SUP = 0.5 MPa
  - SUP = 0.4 MPa
  - SUP = 0.3 MPa
  - SUP = 0.2 MPa

**Discharge flow rate (L/min)**

- 0
- 5
- 10
- 15
- 20
- 25

**Air Consumption**

- **Discharge flow rate (L/min)**
  - 0
  - 5
  - 10
  - 15
  - 20
  - 25

---

**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.

* Refer to pages 622 and 623 for related products.

* SUP: Pilot air pressure
Dimensions: Automatically Operated Type (PAF3000 Series)

Female thread: PAF3410-□-X68

Air operated reset port
Rc, NPT, G 1/8"

AIR EXH
Rc, NPT, G 1/4"

Foot
(Option)

(102)

AIR SUP
Rc, NPT, G 1/4"

2 x M5 x 0.8
Thread depth 9

FLUID IN
Rc, NPT, G 3/8"

FLUID OUT
Rc, NPT, G 3/8"

Silencer: AN20-02
(Option)

PAF3000-X68

Bottom view of body

Tube extension: PAF3410-□-X68

AIR EXH
Rc, NPT, G 1/4"

Foot
(Option)

(102)

AIR SUP
Rc, NPT, G 1/4"

2 x M5 x 0.8
Thread depth 9

FLUID IN
1/2" Tube extension

FLUID OUT
1/2" Tube extension

619
PAF3000-X68

Dimensions: Automatically Operated Type (PAF3000 Series)

With nut (with LQ1 fittings): PAF3410S-1S13□□-X68

With nut (with LQ3 fittings)
PAF3410S-3S13□□-X68

AIR SUP
Rc, NPT, G 1/4"

Air operated reset port
Rc, NPT, G 1/8"

Silencer: AN20-02
(Option)

FLUID OUT
With nut

FLUID IN
With nut

PAF3000-X68

Applicable Fluids

Material and Fluid Compatibility Check List for Process Pumps
• The data below is prepared based on data provided by the material manufacturers.
• SMC assumes no responsibility for the accuracy of the data or for any damages arising from the data.
• The material and fluid compatibility check list provides reference values as a guide only; therefore SMC does not guarantee the application to our product.

Table symbols: ○: Can be used, ×: Cannot be used.

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Body material</th>
<th>Fluid compatibility check list</th>
<th>Diaphragm material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>β</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Ammonium hydroxide</td>
<td>β</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Isobutyl alcohol</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Nitric acid (except fuming nitric acid) Concentration 10% or less</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Pure water</td>
<td>β</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Sodium hydroxide Concentration 50% or less</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Super pure water</td>
<td>β</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Toluene</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Hydrofluoric acid</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Sulfuric acid (except fuming sulfuric acid)</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
<tr>
<td>Phosphoric acid Concentration 80% or less</td>
<td>X</td>
<td>○ (Note 1, 2)</td>
<td>○ (Note 1, 2)</td>
</tr>
</tbody>
</table>

Caution
1. Select the wetted parts material in accordance with the transfer liquid for determining the model.
2. Do not use fluid which corrode the wetted parts material.
3. The applicability may vary depending on additives. Take note also of additives.
4. The applicability may vary depending on impurities. Take note also of impurities.
5. Examples of transfer liquids are shown in the table on the left. Since the applicability may vary depending on your operating conditions, be sure to check it by means of experimentation.
6. The compatibility shown in the table is when the fluid temperature is within the product specification (90°C or less).

Note 1) Static electricity may be generated. Take measures to prevent static electricity.
Note 2) Fluid may permeate through and affect parts made of other materials.