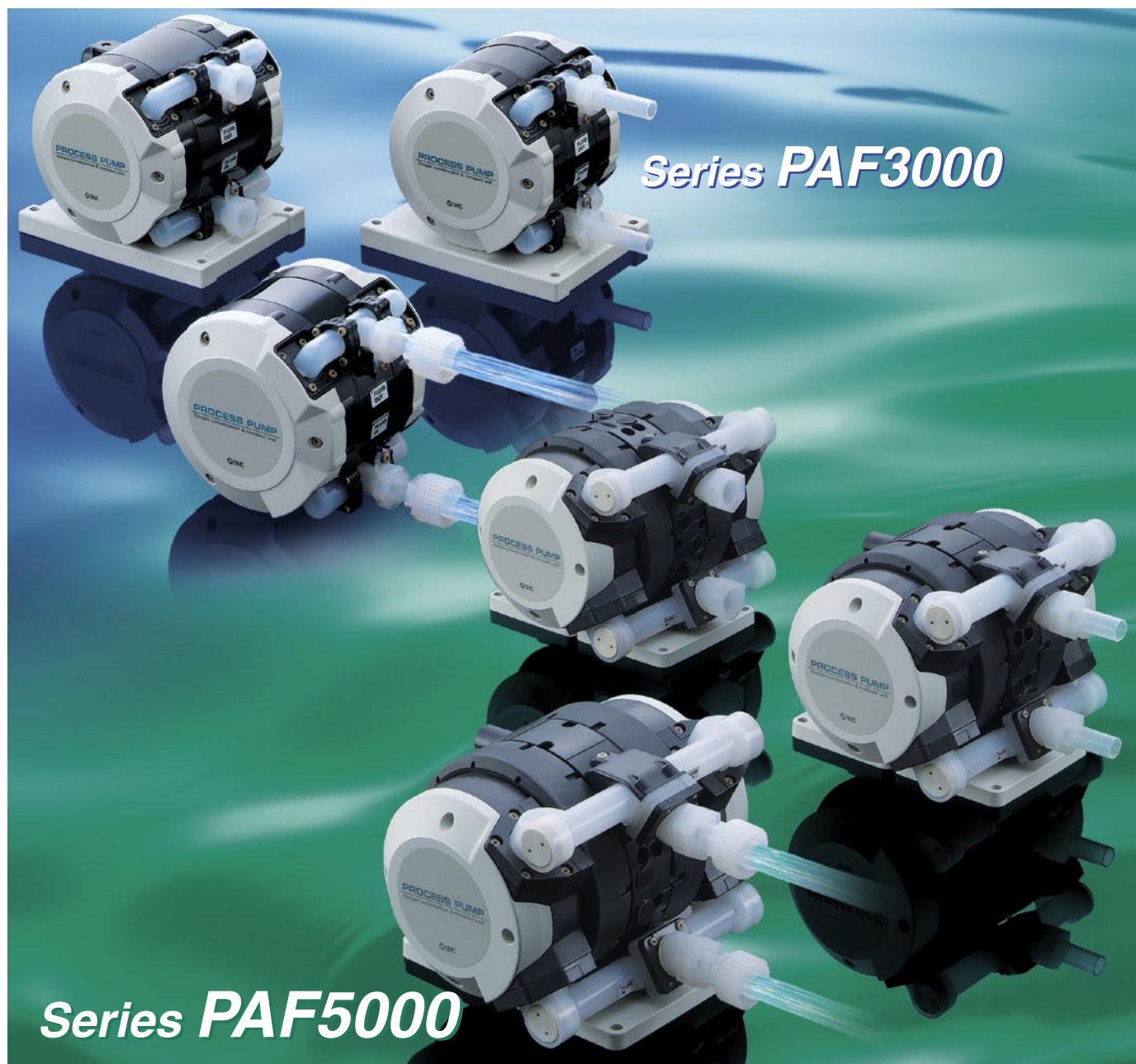


Process Pump

Clean Wet Series



New Flare type (LQ3 fitting) added to the type with nut
Excellent corrosion resistance is achieved
due to the **new PFA** wetted material construction!

- **No metallic parts are used** (Metal-free),
Pump fully made of fluororesin (PAF5000 Series)
- **Max. flow rate: 45 ℓ/min** (Automatically operated) (PAF5000 Series)
- **Connection: Female threaded/Tube extension/With nut** (Insert bushing type, Flare type)

Series PAF



CAT.EUS100-59C-UK

Excellent corrosion resistance is achieved due

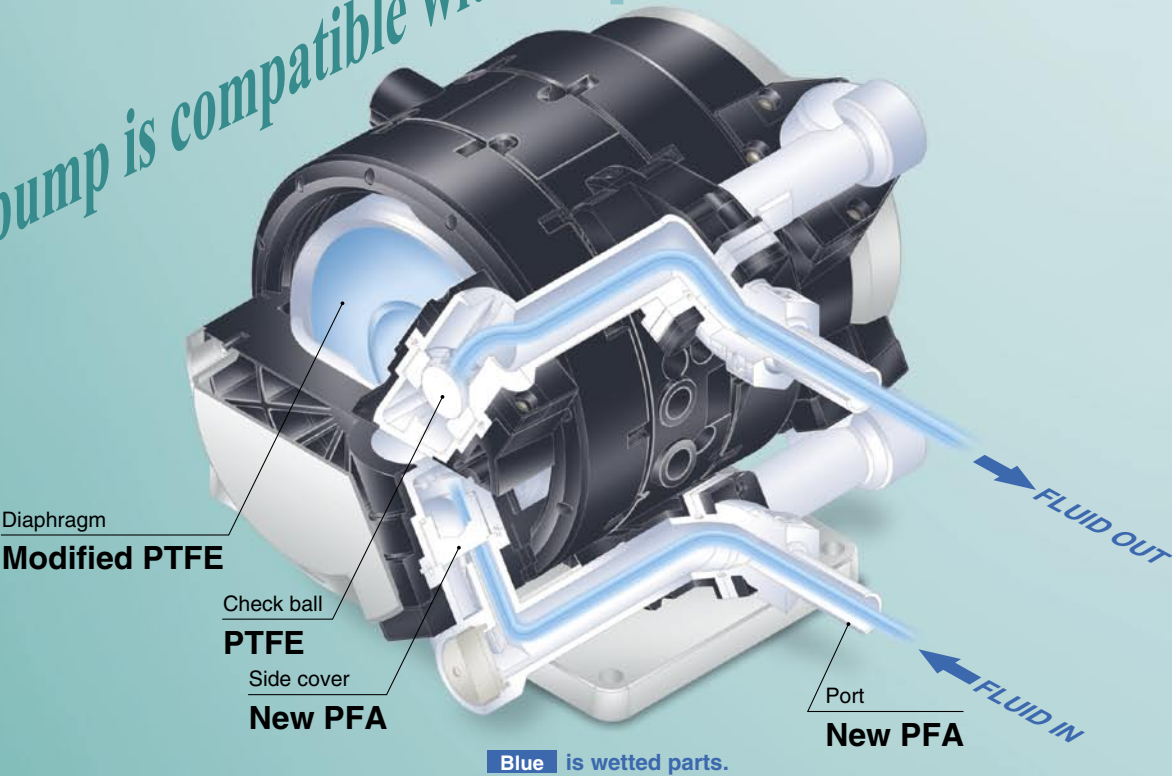
Body material

Diaphragm/Seal material

New PFA PTFE

Excellent corrosion resistance/
withstand pressure

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	Modified PTFE	1 to 20	Female threaded Tube extension With nut	• Foot <small>Note 1)</small> • Silencer <small>Note 2)</small>
	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.

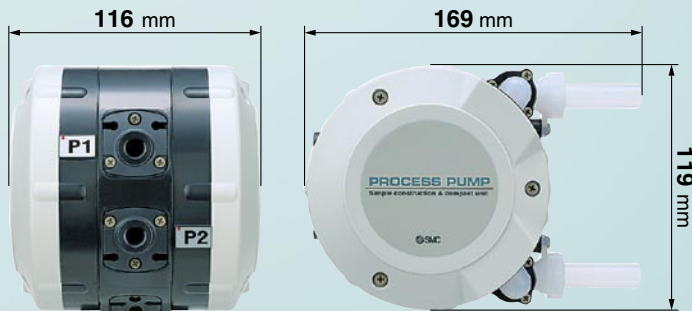


to the new PFA wetted material construction!

- **Lightweight and Compact**

- **Weight: 1.3 kg**

(PAF3000/Air operated, without foot bracket)



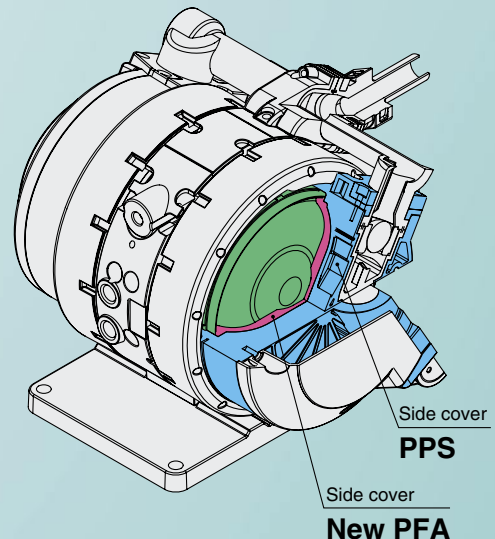
- **Clean**

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

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

- **dual PPS/PFA construction**

Withstand pressure and heat cycle performance have been improved.

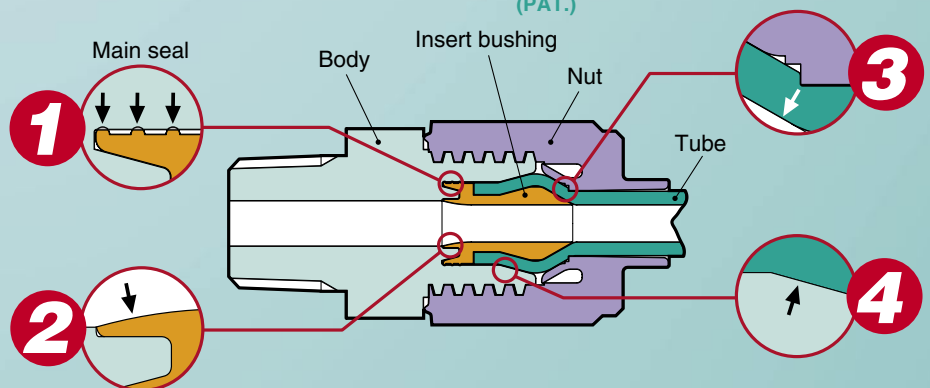


- **Variations of types with nuts**

Insert bushing type (LQ1 fitting)



Quadruple-seal construction (PAT.)

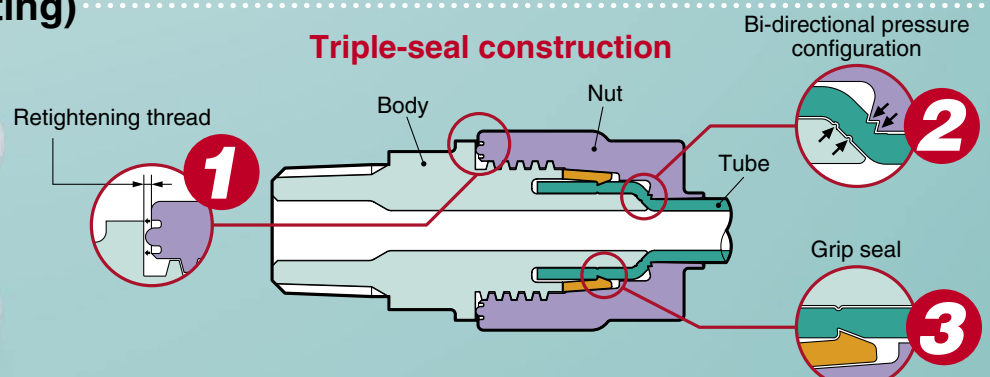


New

Flare type (LQ3 fitting)



Triple-seal construction



Bi-directional pressure configuration

Grip seal

Process Pump

Automatically Operated Type (Internal Switching Type)

Air Operated Type (External Switching Type)

Series *PAF3000*

How to Order

Female threaded



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

Option

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

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

Port size

Symbol	Port size
03	3/8"

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"

Option

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

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

Thread type Note 2)

Symbol	Type
-	Rc
N	NPT
F	G

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
3	LQ3

Fitting size

Symbol	IN side	OUT side	Fitting type	
			LQ1	LQ3
13	4	4	●	●
1319	4	5	●	—
1913	5	4	●	—
19	5	5	●	—

* Refer to page 3 for applicable fittings.

Option

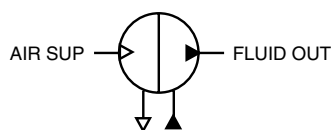
Symbol	Option	Applicable actuation	
		Automatically operated	Air operated
-	None	●	●
B	With foot	●	●
N	With silencer	●	—

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

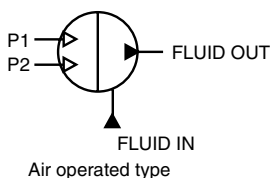
Thread type Note 2)

Symbol	Type
-	Rc
N	NPT
F	G

Symbol



Automatically operated type



Air operated type

Note 1) The pilot port size 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 and female threaded piping connection.

*1 Refer to page 23 for "Maintenance Parts."

*2 Refer to pages 21 and 22 for "Related Products."

Process Pump

Automatically Operated Type (Internal Switching Type)

Air Operated Type (External Switching Type)

Series *PAF5000*

How to Order

Female threaded



PAF541 **0** - **06** -

Actuation ^{Note 1)}

Symbol	Actuation
0	Automatically operated
3	Air operated

Option

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

Thread type ^{Note 2)}

Symbol	Type
-	Rc
N	NPT
F	G

Port size

Symbol	Port size
06	3/4"

Tube extension



PAF541 **0** - P19 -

Actuation ^{Note 1)}

Symbol	Actuation
0	Automatically operated
3	Air operated

Option

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

Tubing size

Symbol	Main fluid connection size
19	3/4"

Thread type ^{Note 2)}

Symbol	Type
-	Rc
N	NPT
F	G

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
3	LQ3

Option

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

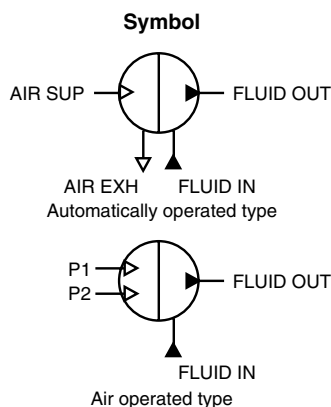
Fitting size

Symbol	IN side	OUT side	Fitting type	
			LQ1	LQ3
19	5	5	●	●
1925	5	6	●	—
2519	6	5	●	—
25	6	6	●	—

Thread type ^{Note 2)}

Symbol	Type
-	Rc
N	NPT
F	G

* Refer to page 3 for applicable fittings.



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

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

*1 Refer to page 23 for "Maintenance Parts."

*2 Refer to pages 21 and 22 for "Related Products."

Series PAF

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

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

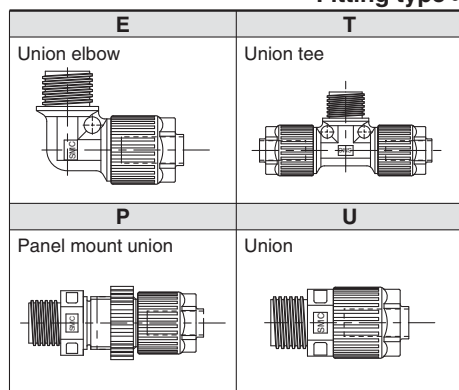
When using the process pump with nut type, use the fittings which have one nut (including the insert bushing) removed.

LQ1 fitting

LQ1E41-SN

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	Symbol	Applicable tubing size (inch)	* 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



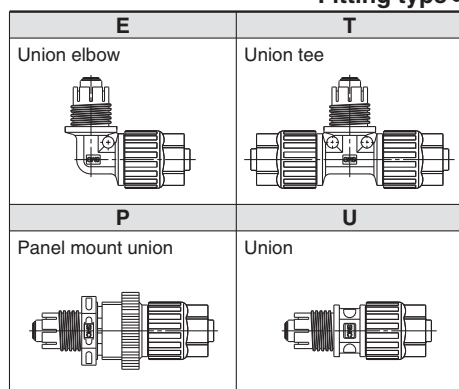
Note) Select the fitting after confirming the IN/OUT side fitting size and fitting type.

LQ3 fitting

LQ3E4A-SN

Fitting type

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



Applicable tubing size

Class	Symbol	Applicable tubing size (inch)	Applicable process pump	
			PAF341□S	PAF541□S
4	A	1/2" x 3/8"	■	—
5	A	3/4" x 5/8"	—	■



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

Ordering Example

PAF3410S-1S13-B
Process pump

Tubing size
12 x 10

LQ1E41-SN
Union elbow

LQ1U4B-SN
Union

Tubing size
3/8" x 1/4"

OUT side

IN side

PAF3410S-1S13-B 1

LQ1E41-SN (Union elbow) 1

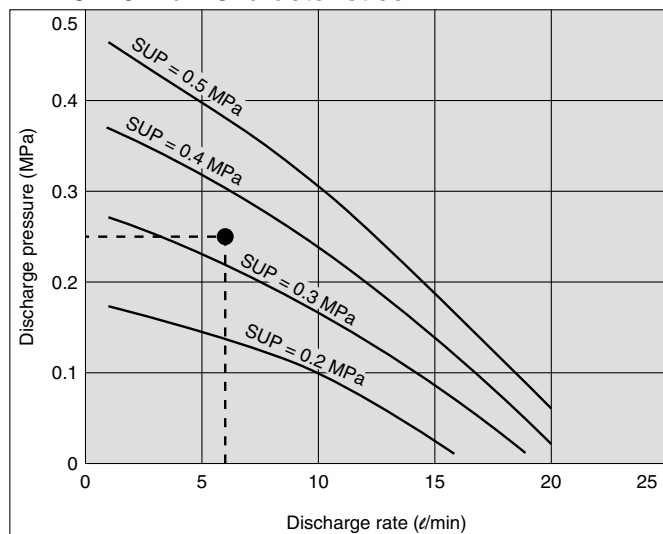
LQ1U4B-SN (Union) 1

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

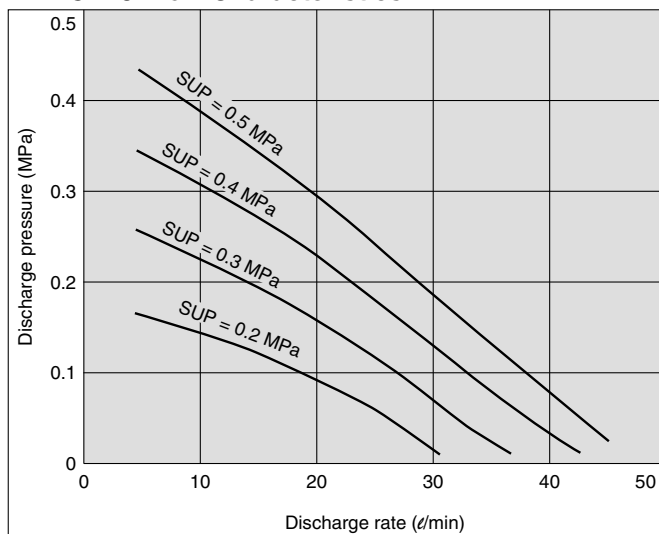
Series PAF

Performance Curve: Automatically Operated Type

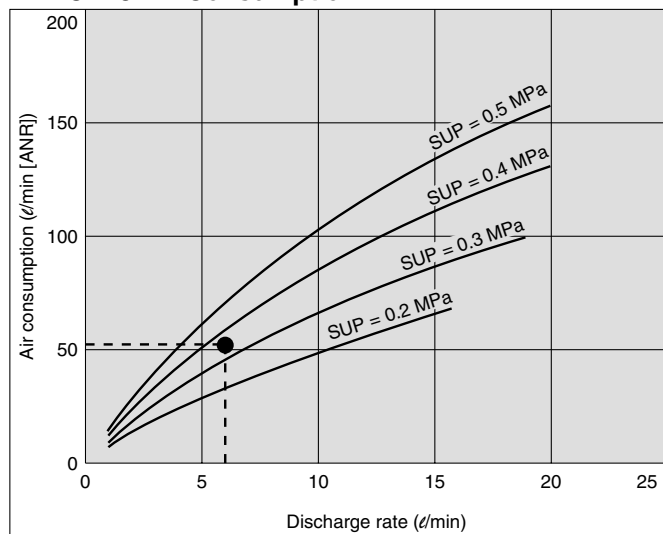
PAF3410 Flow Characteristics



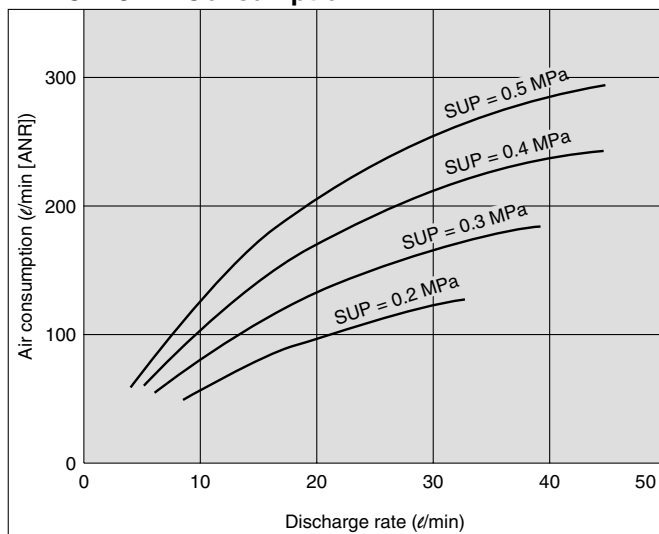
PAF5410 Flow Characteristics



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.

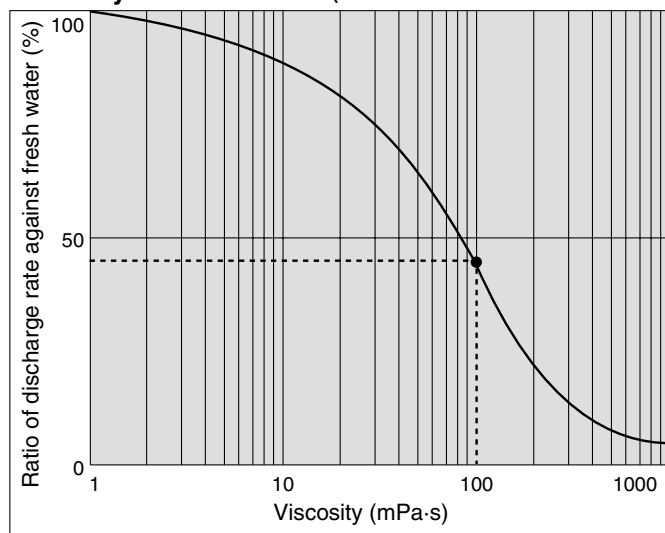
Selection procedures:

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

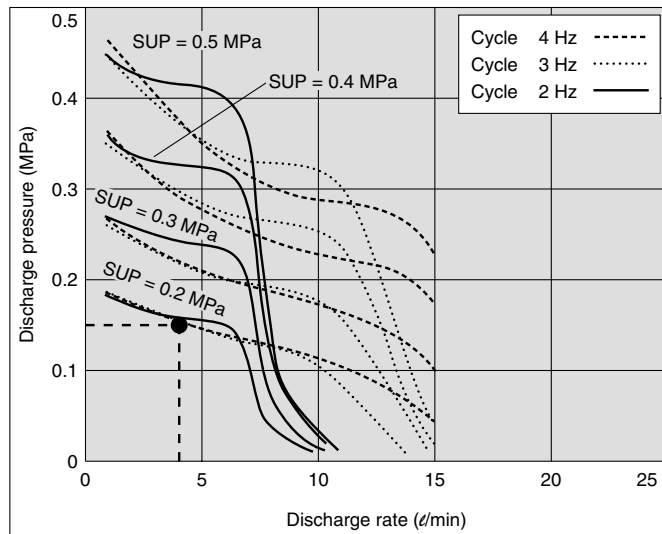
Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity ν = Viscosity μ /Density ρ .

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

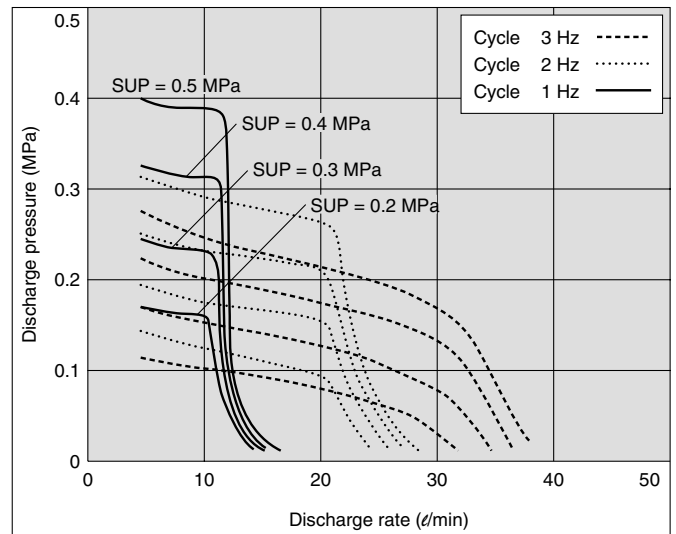
$$\nu(10^{-3} \text{ m}^2/\text{s}) = \mu(\text{mPa}\cdot\text{s})/\rho(\text{kg}/\text{m}^3)$$

Performance Curve: Air Operated Type

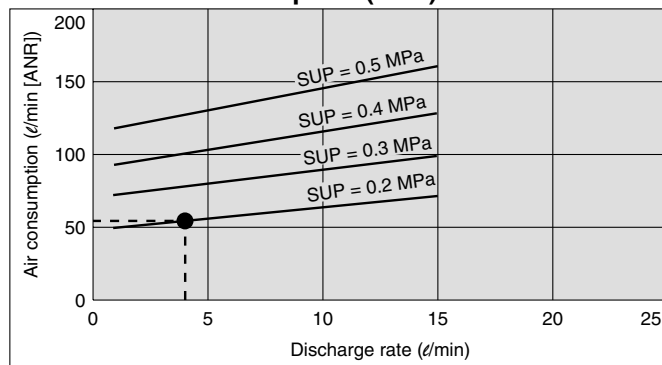
PAF3413 Flow Characteristics



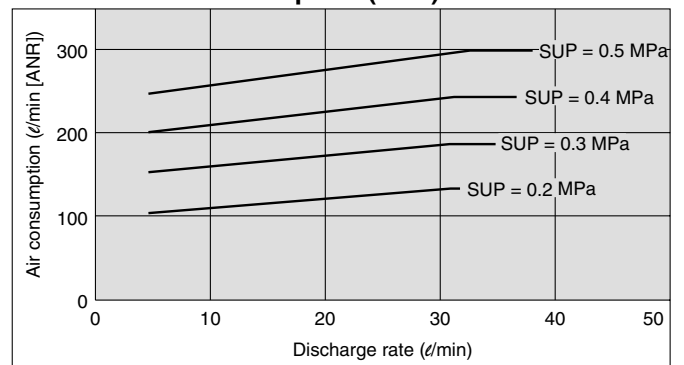
PAF5413 Flow Characteristics



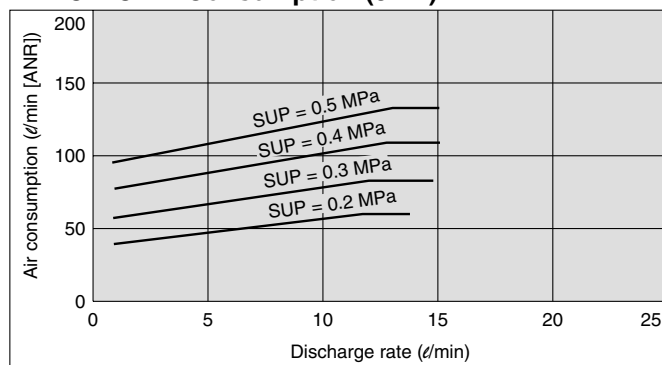
PAF3413 Air Consumption (4 Hz)



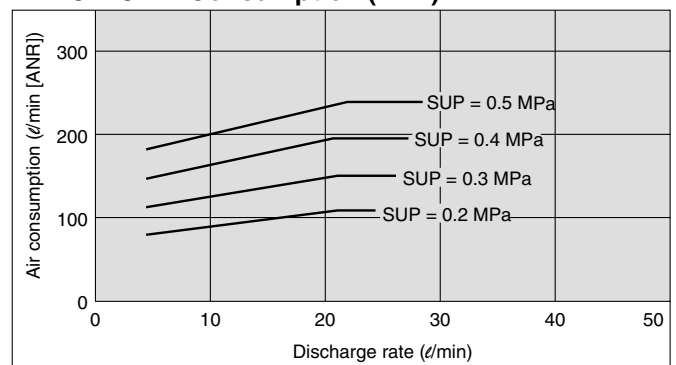
PAF5413 Air Consumption (3 Hz)



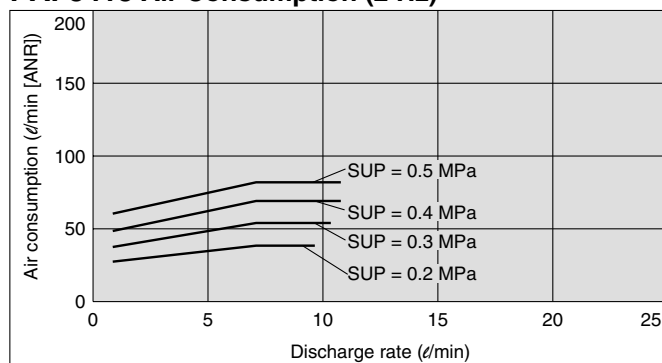
PAF3413 Air Consumption (3 Hz)



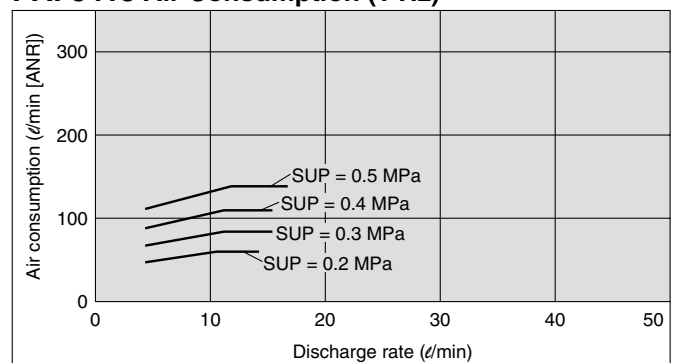
PAF5413 Air Consumption (2 Hz)



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.

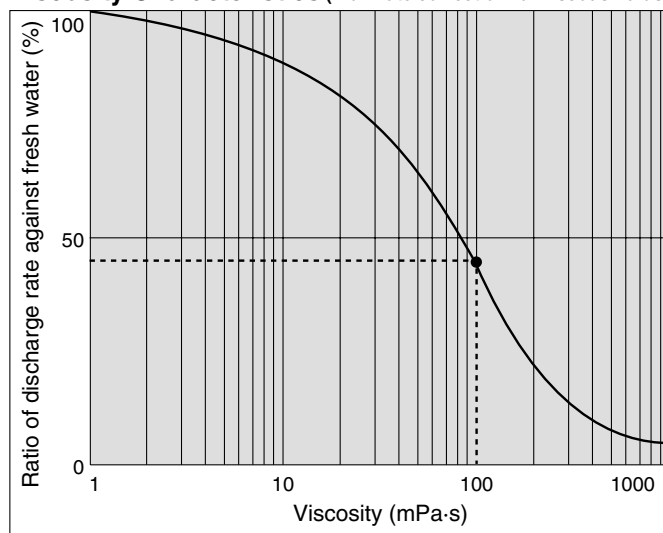
Selection procedures:

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 $\nu = \text{Viscosity } \mu / \text{Density } \rho$.

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

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

Series PAF

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	

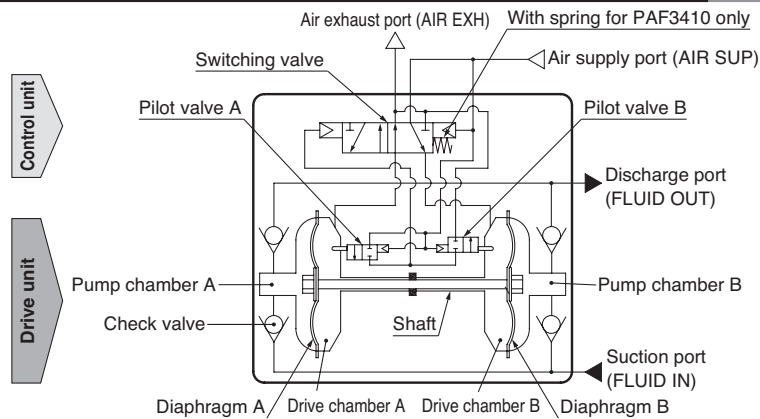
Note) Values in the table are measured at room temperature using fresh water.

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)



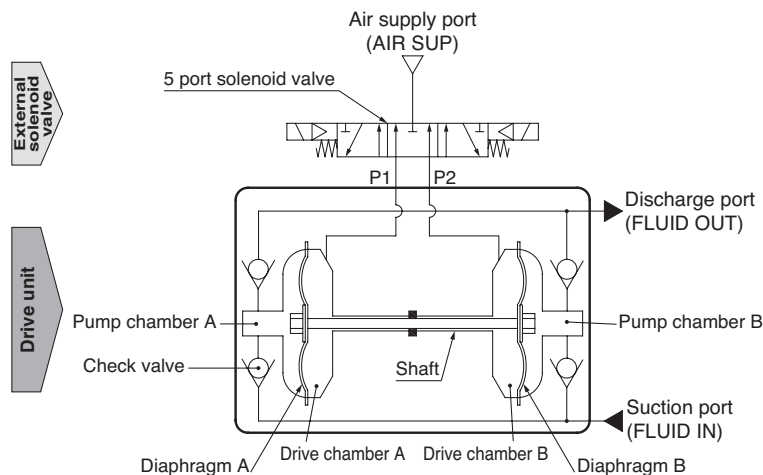
Control unit

- 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).

Maintenance Parts



- While it is not possible to disassemble this product without voiding the warranty, if disassembly is to be carried out anyway due to necessity, be sure to follow the maintenance procedures.
- When carrying out this work, wear appropriate protective equipment.

Series PAF3000/5000

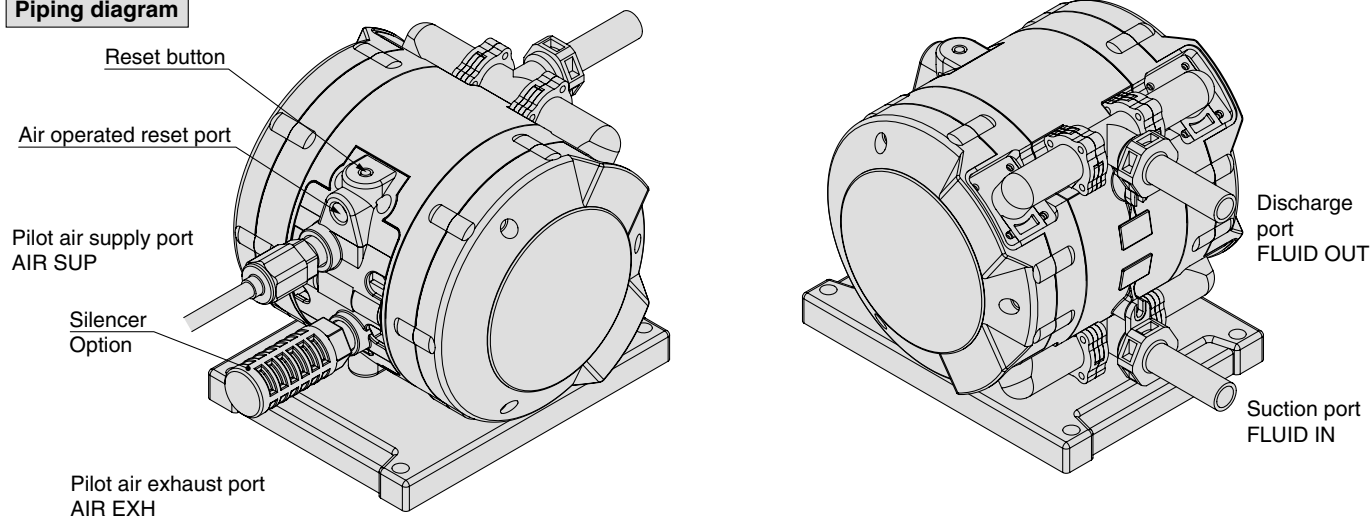
Description	Series PAF3000		Series PAF5000	
	PAF3410	PAF3413	PAF5410	PAF5413
Diaphragm kit	KT-PAF3-31		—	
Check valve kit	KT-PAF3-36		KT-PAF5-36	
Switching valve kit	KT-PAF3-37□ (Note)	—	KT-PAF5-37□ (Note)	—
Pilot valve kit	KT-PAF3-38	—	—	
Foot kit	KT-PAF3-40		KT-PAF5-40	
Leakage sensor	KT-PAF3-47		KT-PAF5-47	

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

Note) One of —, F or N is entered as thread symbol.

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

Piping diagram



⚠ Caution

Mounting orientation of the pump is set with the mounting bracket facing downwards. Air to be supplied to the air supply port <AIR SUP> should be cleaned and filtered through a filter, 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 operates when power is applied to the 3 port solenoid valve of the air supply port <AIR SUP>, the exhaust noise 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 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 the 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 by 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 the ball valve connected to the discharge side or the throttle connected to the air exhaust side. For adjustment from the air side, use of the needle valve restrictor 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 bypass 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>

Press the reset button by 3 to 4 mm when the pump does not start even though air is supplied.

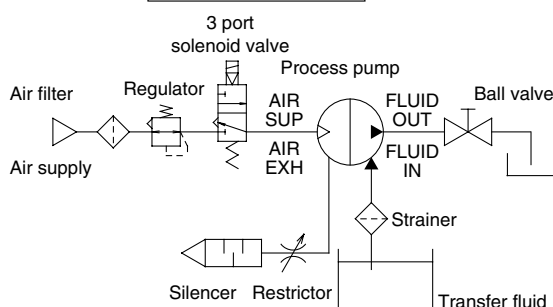
<Air-operated Reset Port>

It is possible to restart by supplying air to the air-operated reset port by remote control, without pressing the reset button directly. Reset air requires equal or greater pressure (less than 0.5 MPa, however) than the pilot air. Refer to air-operated reset circuit examples (1) (2).

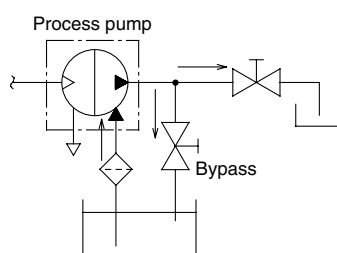
<Operation Count: PAF3000 only>

It is possible to keep track of the number of times the pump has been operated by connecting a pressure switch to the air-operated reset port. The distance between the pressure switch and the air-operated reset port should not exceed 50 mm. Refer to the air-operated reset circuit example (1).

Circuit example (1)

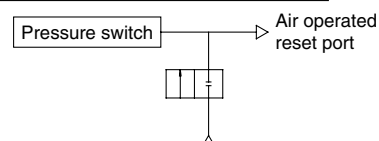


Circuit example (2)

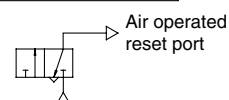


Air operated reset

Circuit example (1) [PAF3000]



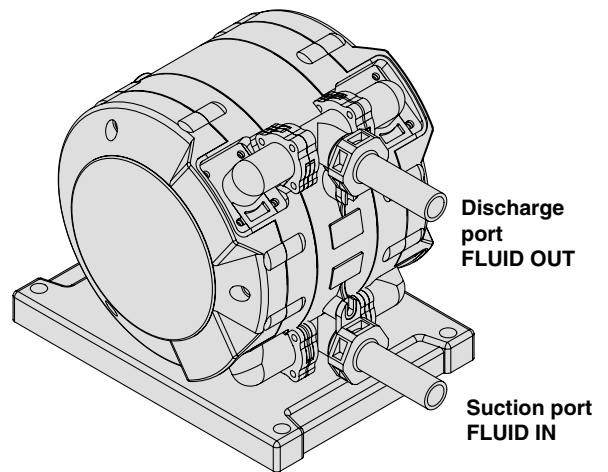
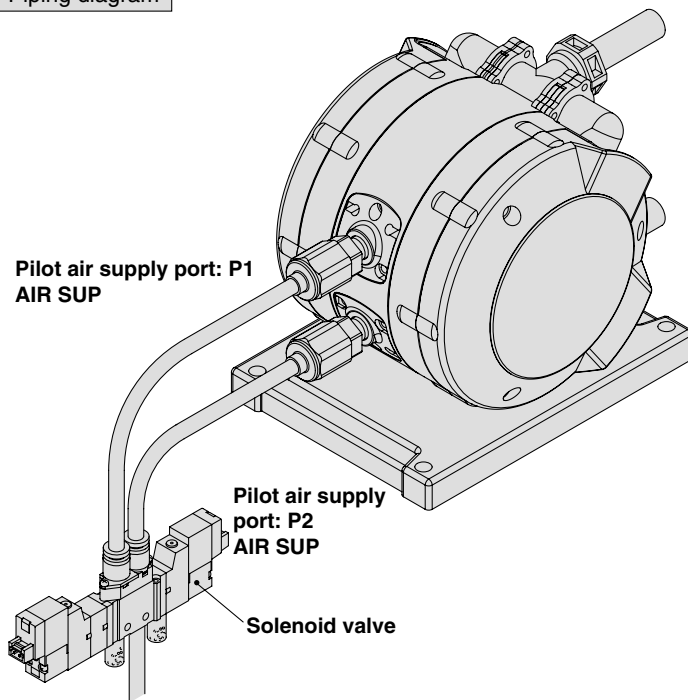
Circuit example (2) [PAF5000]



For related products, refer to pages 21, 22.

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 21 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.

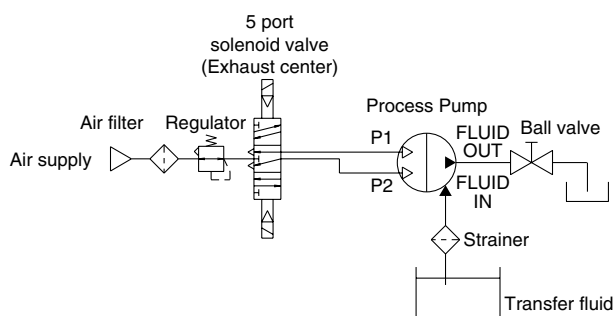
Note 2) For the solenoid valve, use an exhaust centre 5 port valve, or a combination of a residual exhaust 3 port valve and a pump drive 4 port valve. If air in the drive chamber is not released when the pump is stopped, the diaphragm will be subjected to pressure and its life will be shortened.

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.

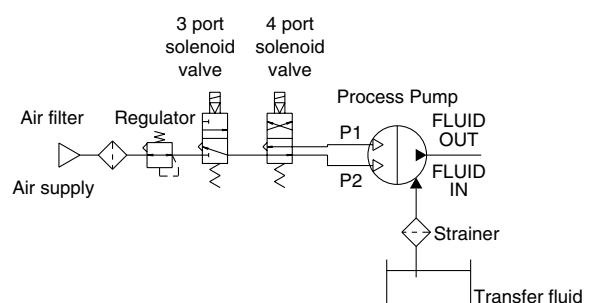
<Discharge Flow Rate Adjustment>

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)

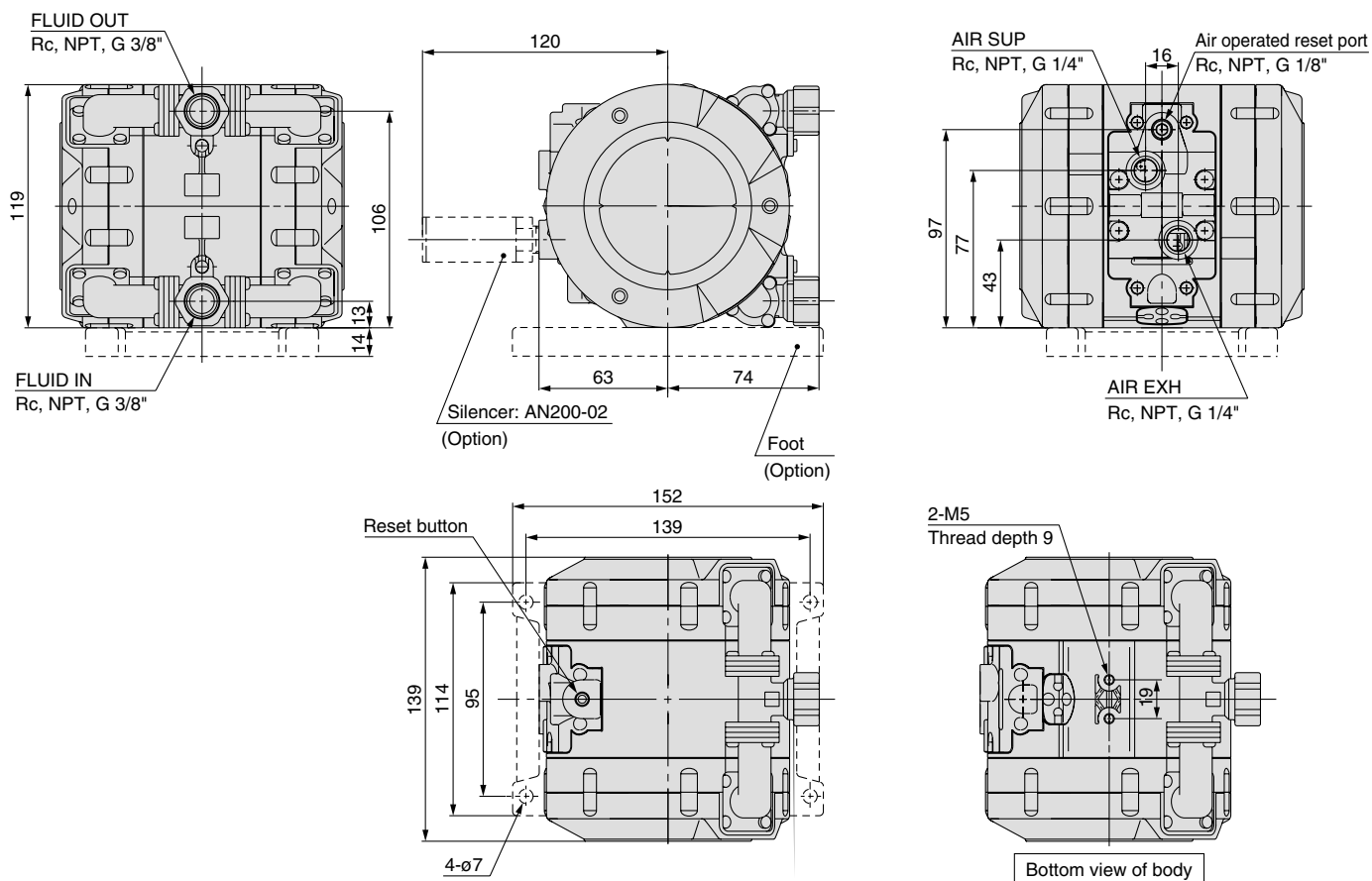


For the related products, refer to page 21, 22.

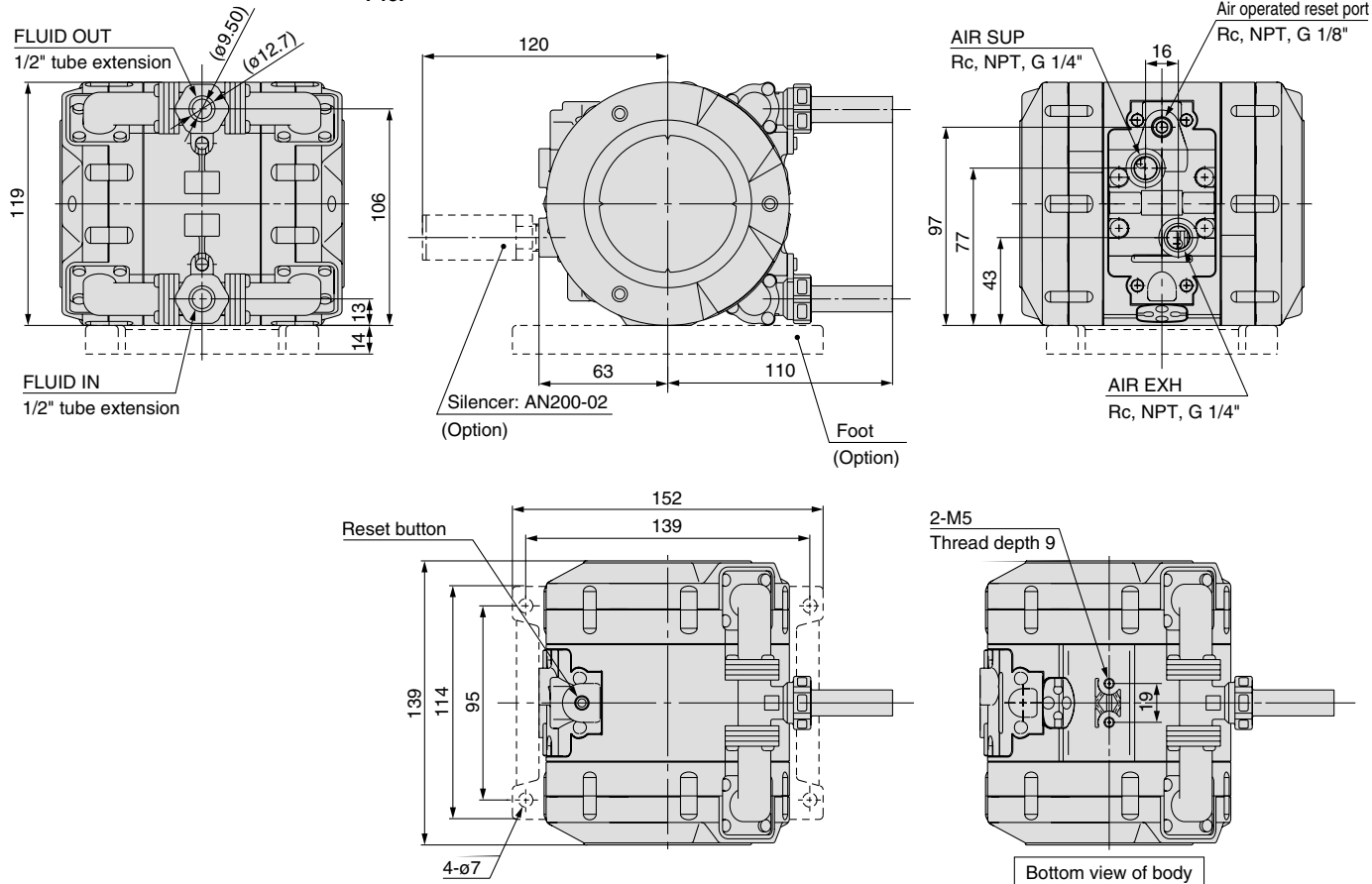
Series PAF

Dimensions: Automatically Operated Type (Series PAF3000)

Female thread: PAF3410-⁰³
N03
F03

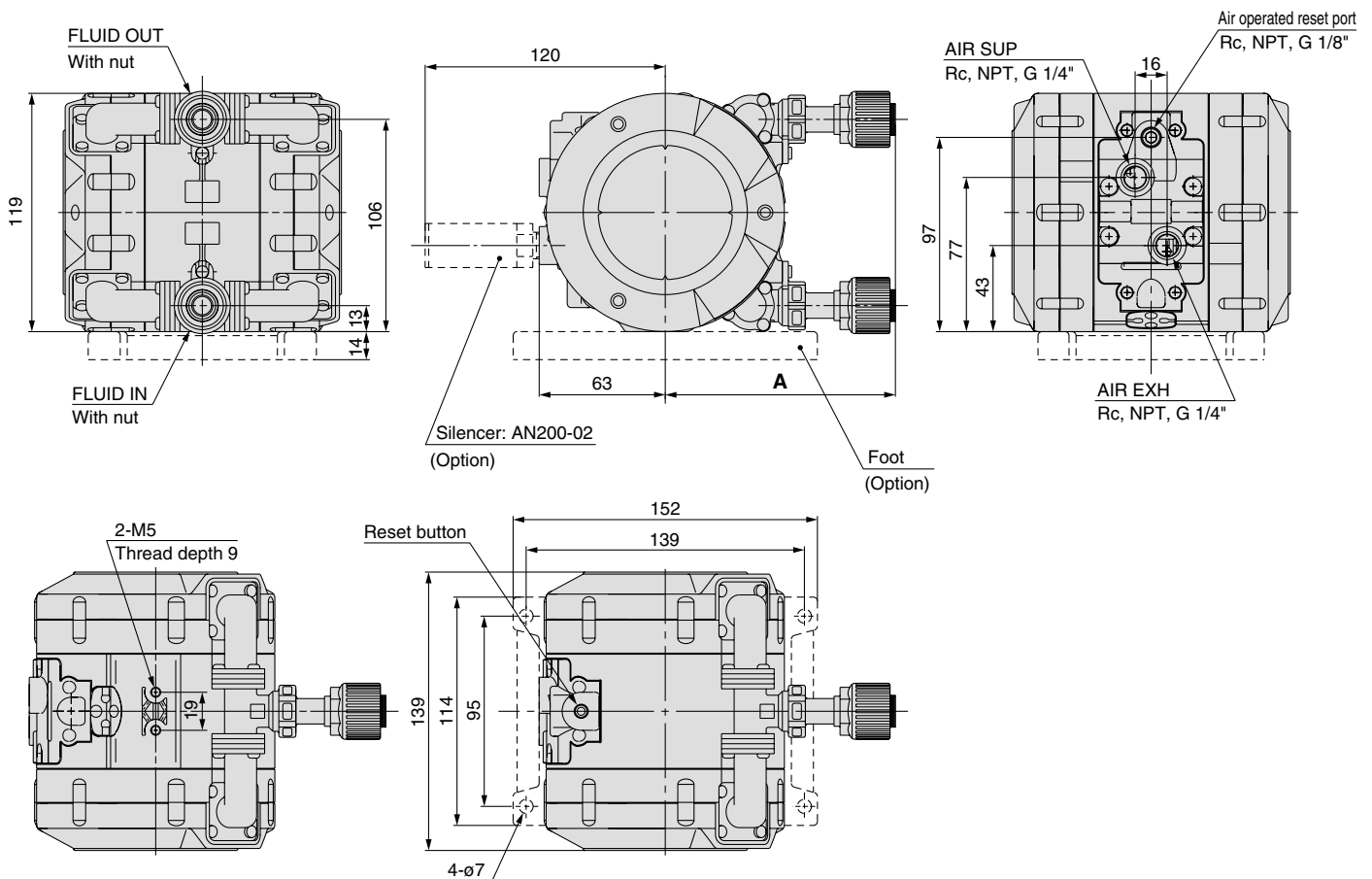


Tube extension: PAF3410-^{P13}
P13N
P13F



Dimensions: Automatically Operated Type (Series PAF3000)

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



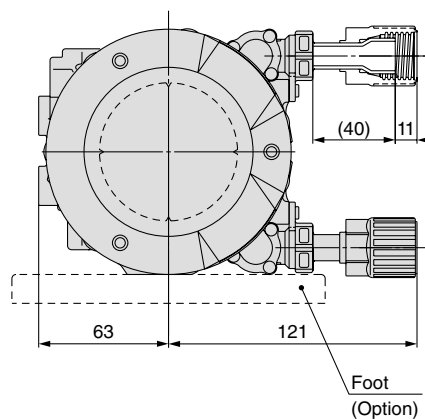
Applicable Tube Size for each Nut Size

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

Model	A (mm)
PAF3410S-1S13□	115
PAF3410S-1S19□	118

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"

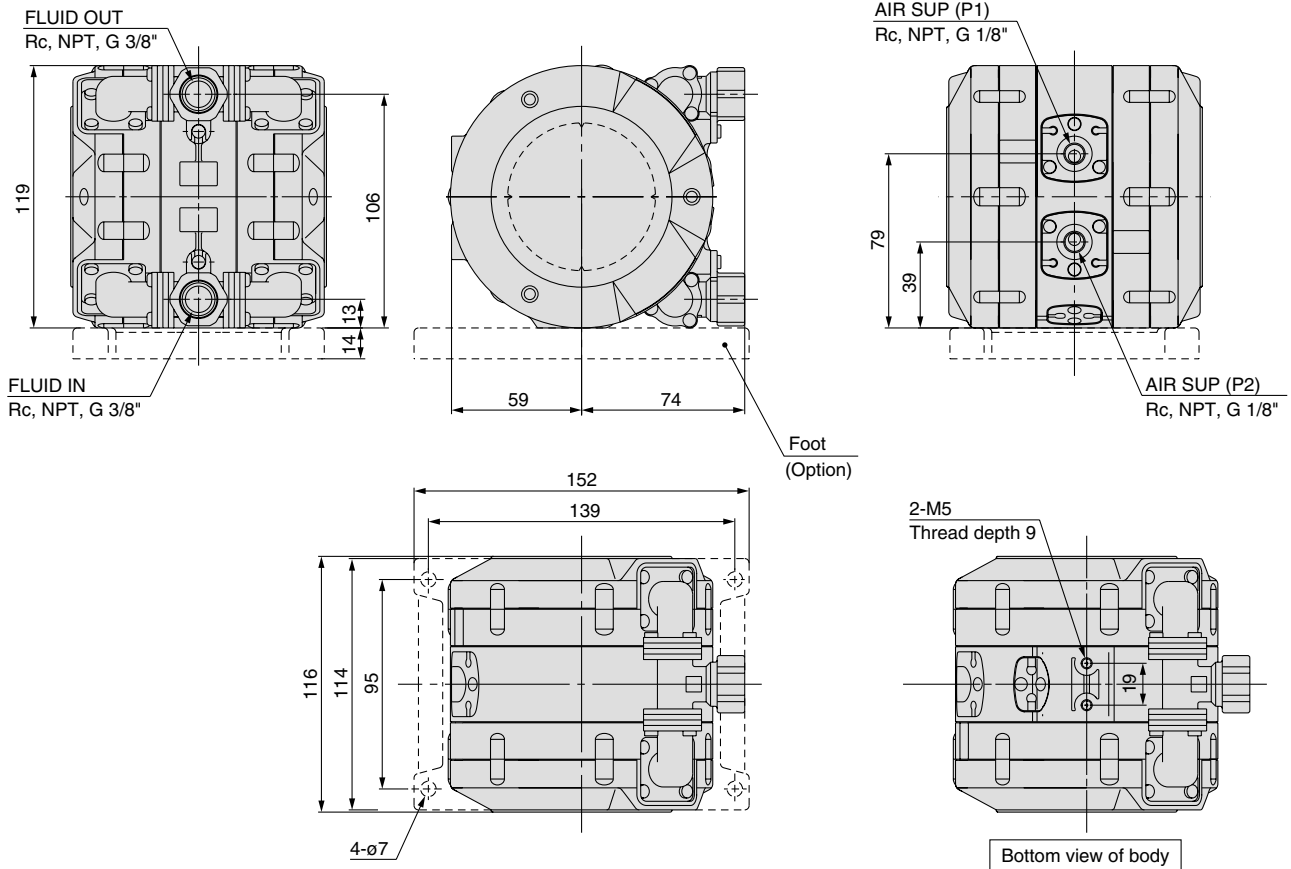
With nut (with LQ3 fitting): PAF3410S-3S13□



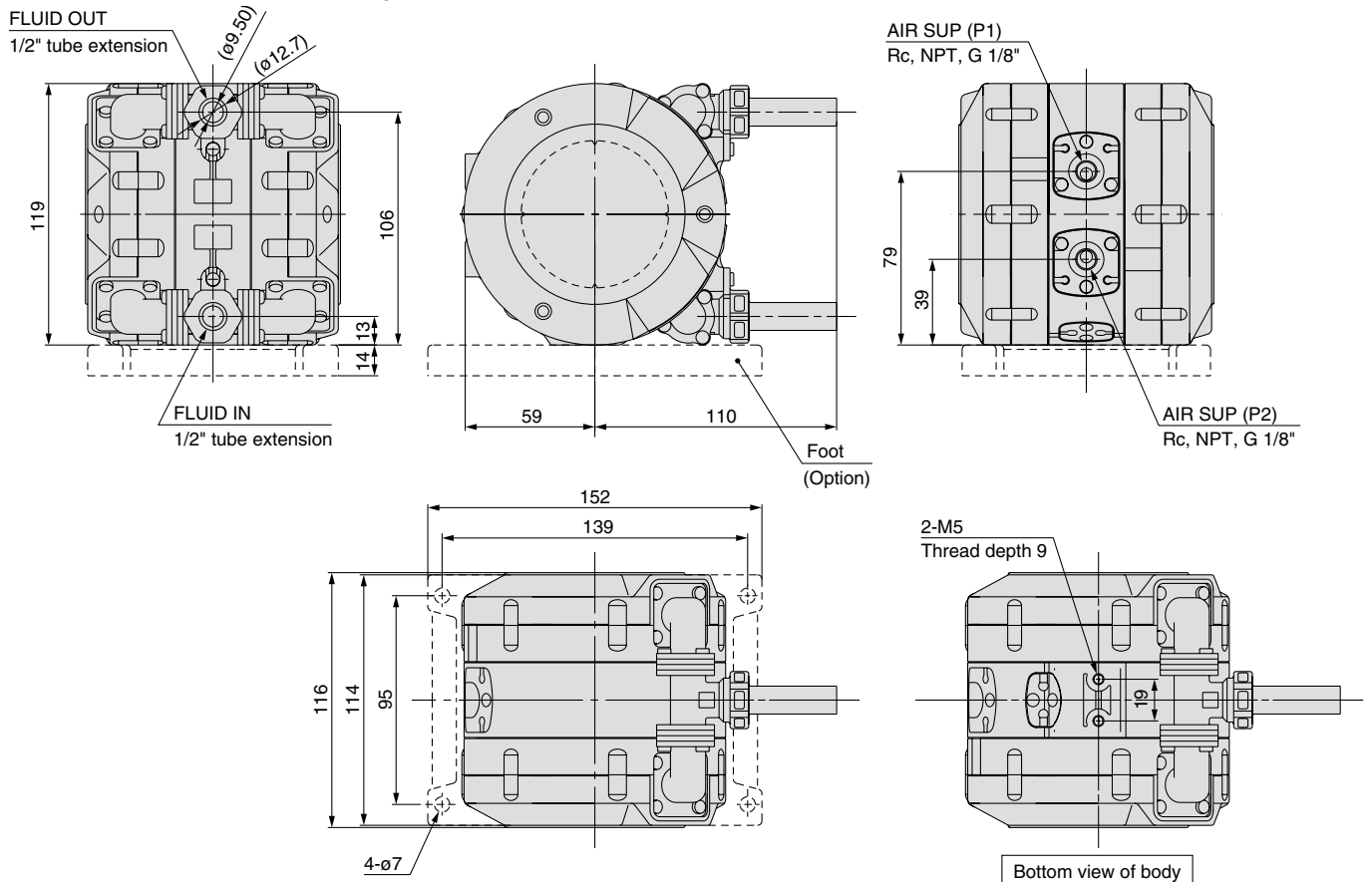
Series PAF

Dimensions: Air Operated Type (Series PAF3000)

Female thread: PAF3413⁰³
-N03
F03

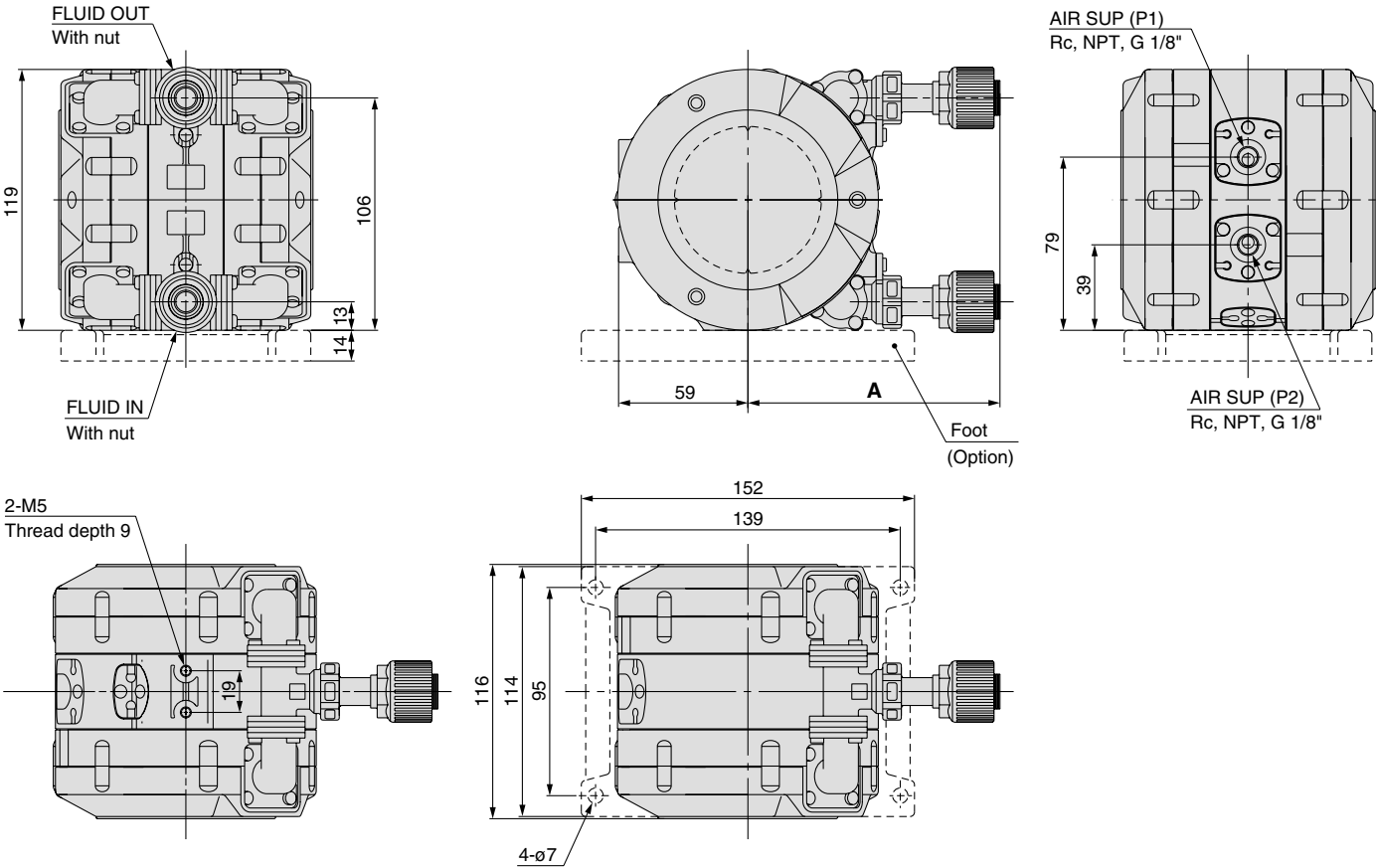


Tube extension: PAF3413^{P13}
-P13N
P13F



Dimensions: Air Operated Type (Series PAF3000)

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



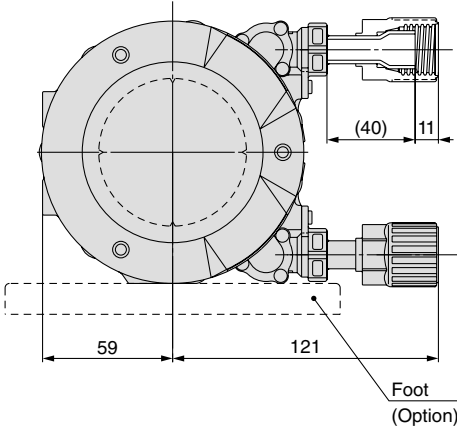
Applicable Tube Size for each Nut Size

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

Model	(mm)
PAF3413S-1S13□	115
PAF3413S-1S19□	118

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"

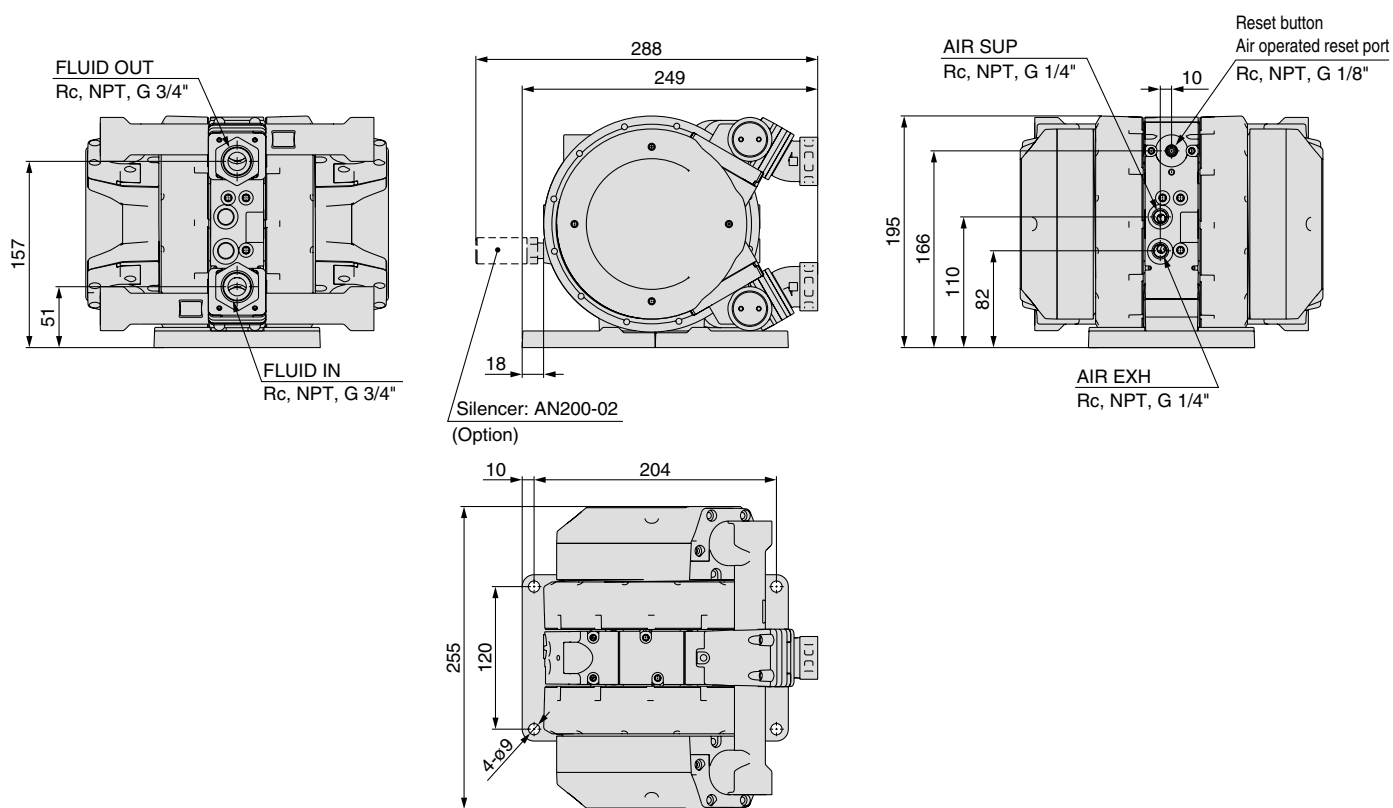
With nut (with LQ3 fitting): PAF3413S-3S13□



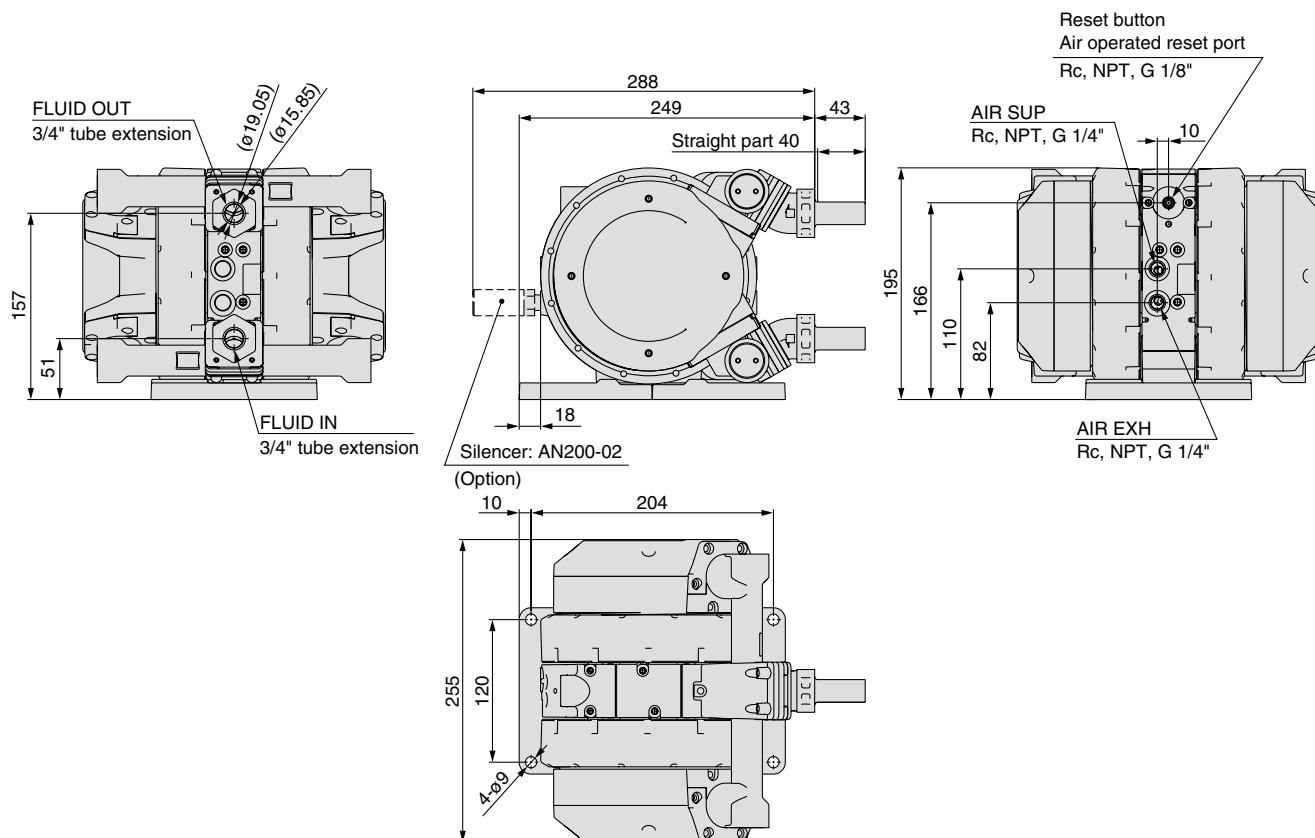
Series PAF

Dimensions: Automatically Operated Type (Series PAF5000)

Female thread: PAF5410-⁰⁶N06
F06

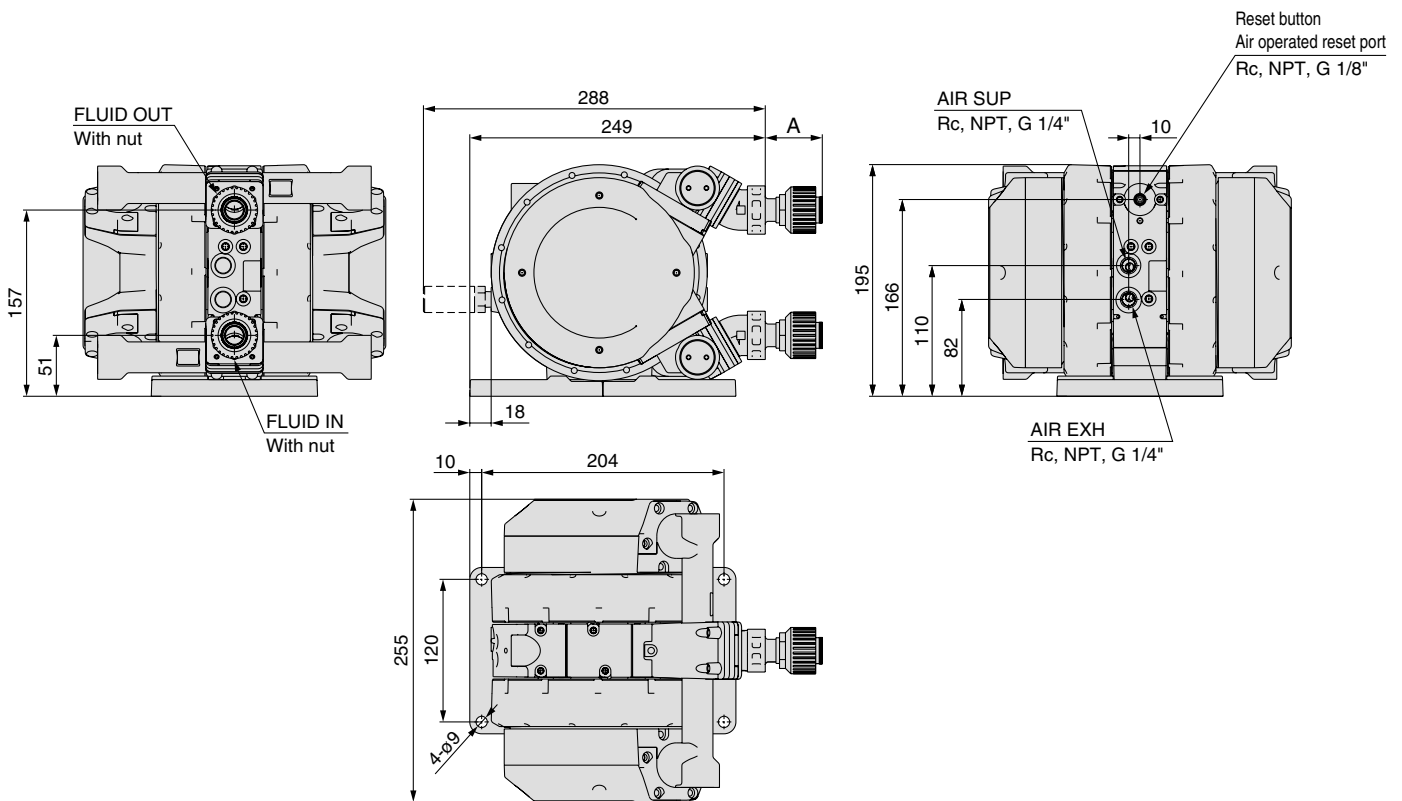


Tube extension: PAF5410-^{P19}P19N
P19F



Dimensions: Automatically Operated Type (Series PAF5000)

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



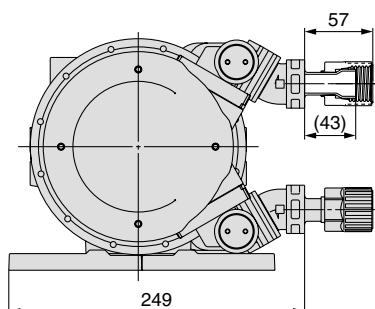
Applicable Tube Size for each Nut Size

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

Model	(mm)
PAF5410S-1S19□	48
PAF5410S-1S25□	55

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"

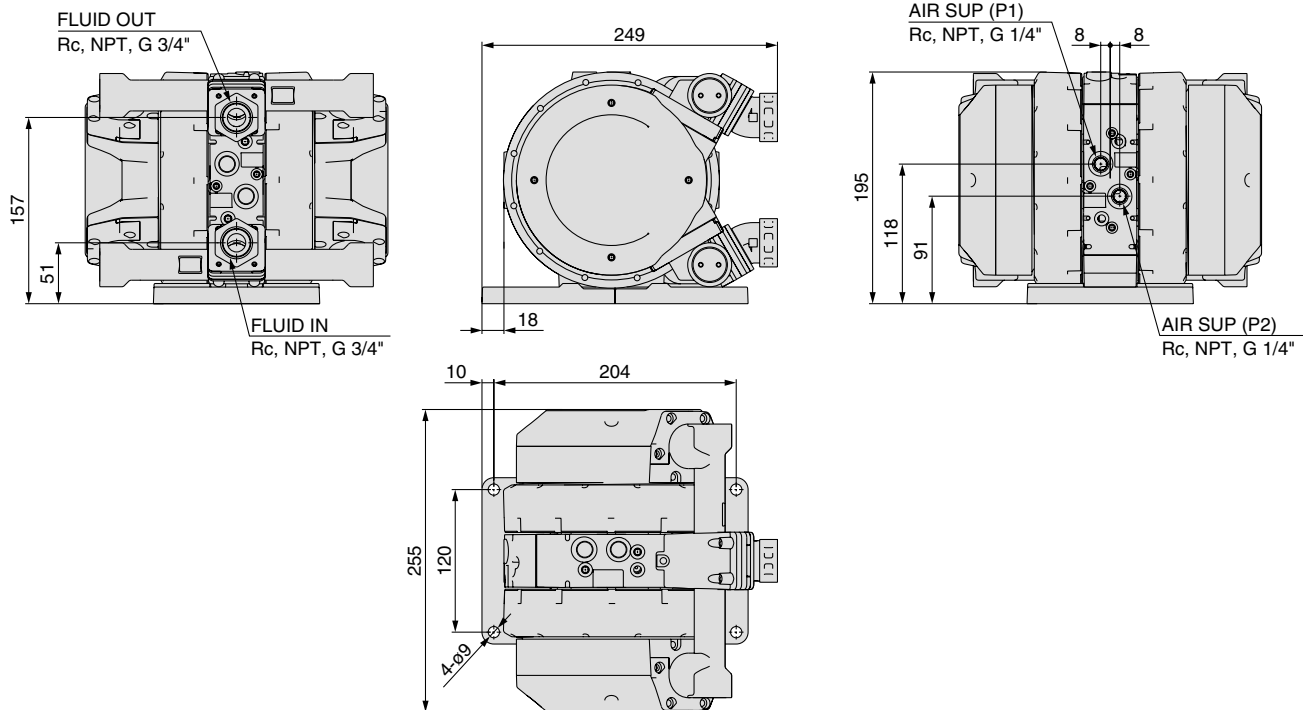
With nut (with LQ3 fitting): PAF5410S-3S19□



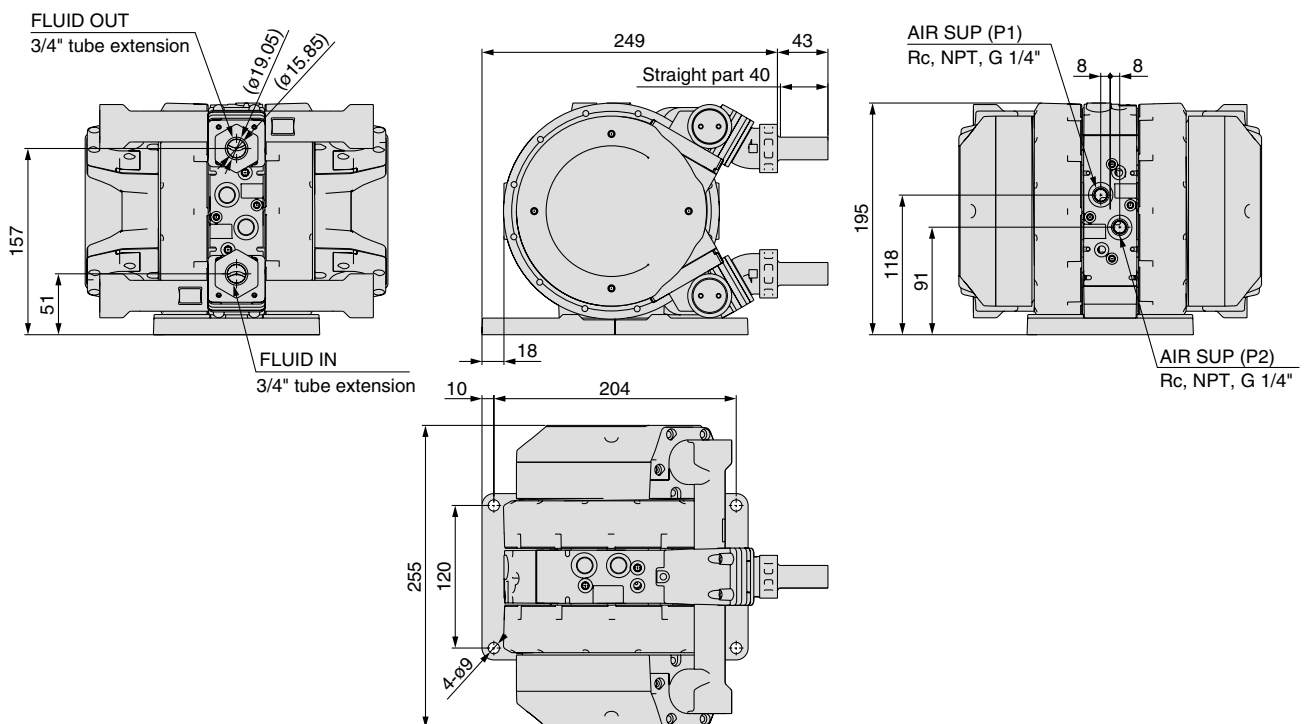
Series PAF

Dimensions: Air Operated Type (Series PAF5000)

Female thread: PAF5413-⁰⁶N06
F06

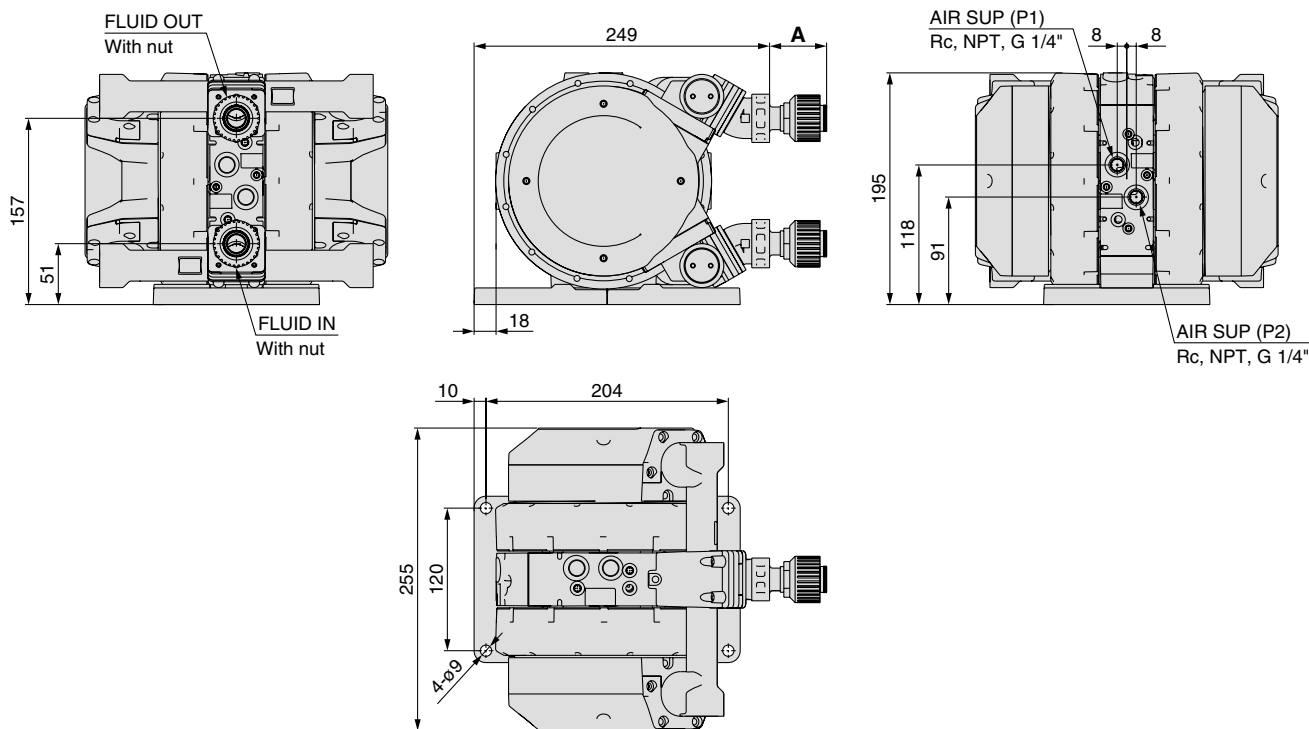


Tube extension: PAF5413-^{P19}P19N
P19F



Dimensions: Air Operated Type (Series PAF5000)

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

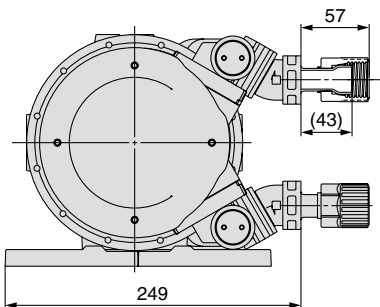


Model	(mm)
PAF5413S-1S19□	48
PAF5413S-1S25□	55

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"

With nut (with LQ3 fitting): PAF5413S-3S19□



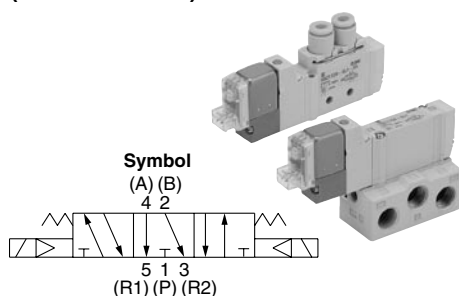
Related Products

<For driving the PAF3413 series>

5 Port Solenoid Valve

VQZ14□0/24□0

(Exhaust centre)

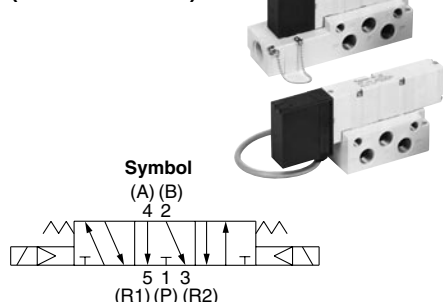


<For driving the PAF5413 series>

5 Port Solenoid Valve

VQ44□0

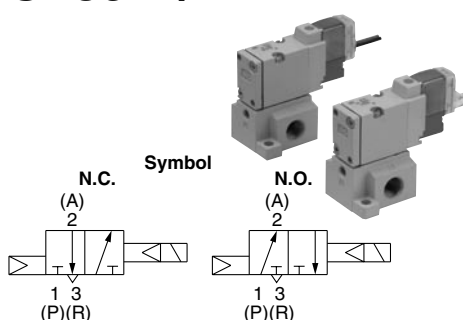
(Exhaust centre)



<For driving the PAF3413 series>

3 Port Solenoid Valve

SYJ514/714



<For extending the maintenance cycle>

Micro Mist Separator

Series AMD

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



Specifications

Model			VQZ1420	VQZ2420	VQZ1450	VQZ2450
Piping			Body ported		Base mounted	
Valve construction			Metal seal			
Type of actuation			3 position exhaust center			
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[dm³/(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[dm³/(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		Metal 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		SYJ314	SYJ514	SYJ714	
Piping		Base mounted			
Valve construction		Rubber seal			
Type of actuation		N.C.			
Max. operating pressure		0.7 MPa			
Min. operating pressure		0.15 MPa			
Flow characteristics	1→2 (P→A)	C[dm³/(s·bar)]	0.41	1.2	2.9
		b	0.18	0.41	0.32
		Cv	0.086	0.32	0.71
	2→3 (A→R)	C[dm³/(s·bar)]	0.35	1.1	2.7
		b	0.33	0.46	0.34
		Cv	0.086	0.32	0.69

Note) Two 3-port valves are needed to drive a double acting pump.



Refer to "Best Pneumatics Catalogue" for further details.

Model

Model	AMD250C	AMD350C
Rated flow (Note) (ℓ/min (ANR))	500	1000
Port size (Nominal size B)	1/4, 3/8	3/8, 1/2
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 (99.9% filtered particle diameter)
Downstream oil mist concentration	Max. 0.1 mg/m ³ (ANR) (Note 2) (As saturation point with oil, less than 0.01 mg/m ³ (ANR) \approx 0.008 ppm)
Element service life	When 2 years passed, or pressure drop reached 0.1 MPa.

Note 1) With auto drain is 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).

<For extending the maintenance cycle>

Mist Separator Series AM

The AM series separates and removes the oil mist in compressed air and removes fine particles of rust and carbon, etc., of 0.3 μm or larger.



Model

Model	AM150C	AM250C
Rated flow (ℓ/min (ANR))	300	750
Port size (Nominal size B)	1/8, 1/4	1/4, 3/8
Weight (kg)	0.38	0.55



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	0.3 μm (99.9% filtered particle diameter)
Downstream oil mist concentration	Max. 1.0 mg/m ³ (ANR)(= 0.8 ppm) ^{Note 2)}
Element service life	After 2 years or when pressure drops to 0.1 MPa.

Note 1) With auto drain is 0.15 MPa.

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

<For supplying air and regulating pressure>

Filter Regulator + Mist Separator Air Combination Series AC20D/30D/40D



Model

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



Refer to "Best Pneumatics Catalogue" for further details.

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.

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 (ℓ/min (ANR)) ^{Note 1)}	150	330	800	800
Ambient and fluid temperature	-5 to 60°C (No freezing)			
Nominal filtration rating	AW: 5 μm, AFM: 0.3 μm (99.9% filtered particle diameter)			
Downstream oil mist concentration	Max. 1.0 mg/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 easily 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. Use it when it is necessary to remove, but the air does not have to be as dry as that when an air dryer is used.



Model

Model	AMG150C	AMG250C
Rated flow ^{Note)} (ℓ/min (ANR))	300	750
Port size (Nominal size B)	1/8, 1/4	1/4, 3/8
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	After 2 years or when pressure drops to 0.1 MPa.

Note) With auto drain is 0.15 MPa.

<When it is desired to easily remove moisture from the system.>

Membrane Dryer Series IDG

Macromolecular membrane dryers that act like filters. It is possible to achieve a low dew point at -20°C simply by mounting a dryer to the air pressure line. A power supply is not required.



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 IDG1, 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	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)

<For strainers>

Industrial Filter Vessel type Series FGD



Specifications

Model	Port size Rc	Set pressure	Set temperature	Number of elements	Element size	Main material			
						Cover	Case	Gasket O-ring	Seal
FGDCA	3/8	0.7 MPa	80°C	1	Ø65 x ℓ250	Aluminium	SPCD	NBR	Nylon
FGDTA	3/8	1 MPa	80°C	1	Ø65 x ℓ250	SCS 14	Stainless steel 316L	Fluororesin	Fluororesin

Note) Consult SMC for wetted material compatibility.



Refer to CAT.E90 for further details.

Maintenance Parts

PAF3000/5000 Series

Content	PAF3000 series		PAF5000 series	
	PAF3410	PAF3413	PAF5410	PAF5413
Diaphragm kit	KT-PAF3-31		KT-PAF5-31	
Check valve kit	KT-PAF3-36		KT-PAF5-36	
Switching valve parts kit	KT-PAF3-37□	—	KT-PAF5-37□	—
Pilot valve kit	KT-PAF3-38	—	KT-PAF5-38	—
Foot set	KT-PAF3-40		—	
Water leakage sensor	KT-PAF3-47		KT-PAF5-47	
Stroke sensor	—	KT-PAF3-48	—	KT-PAF5-48



Applicable Fluids

Material and Fluid Compatibility Check List for Process Pumps

- The data below is based on the information provided by the material manufacturers.
- SMC is not responsible of its accuracy and any damage happened because of this data.
- The material and fluid compatibility check list provides reference values for reference only, therefore we do not guarantee the application to our product.

⚠ Caution

1. Select models by choosing wetted materials suitable for fluid to be transferred.
 - Use fluids which will not corrode the wetted materials.
2. These products are not suitable for use in medical applications or with food products.
3. Possible applications will change depending on the additive agents. Take note of the additives.
4. Possible applications will change depending on impurities. Take note of impurities.
5. Some examples of transfer fluids are shown below. As the applicability of various fluids can change according to the conditions of usage, confirm these with experimental trials.
6. Compatibility is indicated for fluid temperatures of 90°C or less.

PAF3000/5000 Series

Table symbols ○: Can be used. X: Cannot be used.
 —: Since the possible applications will change depending on the operating conditions, consult SMC.

Model		PAF3410	PAF3413
		PAF5410	PAF5413
Body material		New PFA	
Diaphragm material		PTFE	
Chemical	Acetone	○ Note 1, 2)	
	Ammonium hydroxide	○ Note 2)	
	Isobutyl alcohol	○ Note 1, 2)	
	Isopropyl alcohol	○ Note 1, 2)	
	Hydrochloric acid	○	
	Ozone	○	
	Hydrogen peroxide Concentration 5% or less 50°C or less	○	
	Ethyl acetate	○ Note 1, 2)	
	Butyl acetate	○ Note 1, 2)	
	Nitric acid (Except fuming nitric acid) Concentration 10% or less	○ Note 2)	
	Pure water	○	
	Sodium hydroxide Concentration 50% or less	○	
	Super pure water	○	
	Toluene	○ Note 1, 2)	
	Hydrofluoric acid	○ Note 2)	
	Sulfuric acid (Except fuming sulfuric acid)	○ Note 2)	
	Phosphoric acid Concentration 80% or less	○	

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.



Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution,**” “**Warning**” or “**Danger.**” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC), Japan Industrial Standards (JIS)*¹⁾ and other safety regulations*²⁾.

* 1) ISO 4414: Pneumatic fluid power – General rules relating to systems.

ISO 4413: Hydraulic fluid power – General rules relating to systems.

IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)

ISO 10218-1992: Manipulating industrial robots -Safety.

JIS B 8370: General rules for pneumatic equipment.


JIS B 8361: General rules for hydraulic equipment.


JIS B 9960-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)


JIS B 8433-1993: Manipulating industrial robots - Safety.

etc.

* 2) Labour Safety and Sanitation Law, etc.

 **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 possibility of serious injury or loss of life.

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and/or malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.

3. An application which could have negative effects on people, property, and/or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



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 stabilized 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 recommend that our super mist separator (AME series) should be used.

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

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

4. Compressed air at low dew points

When extremely dry air is used with a fluid, a reduction of the lubrication properties can affect the reliability (service life) of the equipment. Consult SMC before using.

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 blocked off.)
- 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 operating manual.

When undertaking maintenance, you should refer to the equipment's operating 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, consult SMC or our Distributor.

4. Drain discharge

If drain accumulates in the 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 for 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 checking 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 fluororesin, 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>

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

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.

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

Caution on Handling

Warning

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

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) ¹⁾, and other safety regulations.

Danger:

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning:

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

Caution:

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

- 1) ISO 4414: Pneumatic fluid power – General rules and safety requirements for systems and their components.
ISO 4413: Hydraulic fluid power – General rules and safety requirements for systems and their components.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Robots and robotic devices – Safety requirements for industrial robots – Part 1: Robots.
etc.

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments.

Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogues and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first. ²⁾ Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.
- 2) Vacuum pads are excluded from this 1 year warranty.
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Safety Instructions

Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.

SMC Corporation (Europe)

Austria	+43 (0)2262622800	www.smc.at	office@smc.at
Belgium	+32 (0)33551464	www.smc.be	info@smc.be
Bulgaria	+359 (0)2807670	www.smc.bg	office@smc.bg
Croatia	+385 (0)13707288	www.smc.hr	office@smc.hr
Czech Republic	+420 541424611	www.smc.cz	office@smc.cz
Denmark	+45 70252900	www.smc.dk.com	smc@smcdk.com
Estonia	+372 651 0370	www.smcee.ee	info@smcee.ee
Finland	+358 207513513	www.smc.fi	smcffi@smc.fi
France	+33 (0)164761000	www.smc-france.fr	supportclient@smc-france.fr
Germany	+49 (0)61034020	www.smc.de	info@smc.de
Greece	+30 210 2717265	www.smchellas.gr	sales@smchellas.gr
Hungary	+36 23513000	www.smc.hu	office@smc.hu
Ireland	+353 (0)14039000	www.smcautomation.ie	sales@smcautomation.ie
Italy	+39 03990691	www.smcitalia.it	mailbox@smcitalia.it
Latvia	+371 67817700	www.smc.lv	info@smc.lv

Lithuania	+370 5 2308118	www.smclt.lt	info@smclt.lt
Netherlands	+31 (0)205318888	www.smc.nl	info@smc.nl
Norway	+47 67129020	www.smc-norge.no	post@smc-norge.no
Poland	+48 222119600	www.smc.pl	sales@smc.pl
Portugal	+351 214724500	www.smc.eu	apoioclientept@smc.smces.es
Romania	+40 213205111	www.smcromania.ro	smcromania@smcromania.ro
Russia	+7 (812)3036600	www.smc.eu	sales@smcru.com
Slovakia	+421 (0)413213212	www.smc.sk	office@smc.sk
Slovenia	+386 (0)73885412	www.smc.si	office@smc.si
Spain	+34 945184100	www.smc.eu	post@smc.smces.es
Sweden	+46 (0)86031240	www.smc.nu	smc@smc.nu
Switzerland	+41 (0)523963131	www.smc.ch	helpcenter.ch@smc.com
Turkey	+90 212 489 0 440	www.smcturkey.com.tr	info@smcturkey.com.tr
UK	+44 (0)845 121 5122	www.smc.uk	sales@smc.uk

South Africa	+27 10 900 1233	www.smcza.co.za	zasales@smcza.co.za
--------------	-----------------	-----------------	---------------------