Process Pump
Automatically Operated Type (Internal Switching Type)
Air Operated Type (External Switching Type)
PA3000 Series

RoHS

How to Order

PA3000

PA 3 [1] [1] [0] – [ ] 03 – [ ]

Material of body wetted areas

Symbol	Material of body wetted areas
1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Diaphragm material

Symbol	Diaphragm material	Applicable actuation	
		Automatically operated	Air operated
1	PTFE	●	●
2	NBR	●	—

Actuation

Symbol	Actuation
0	Automatically operated
3	Air operated

Thread type

Symbol	Type
Nil	Rc
N	NPT
F	G
T	NPTF

Port size

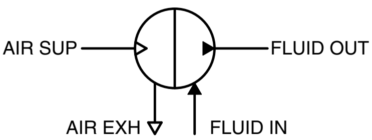
Symbol	Port size
03	3/8"

Option

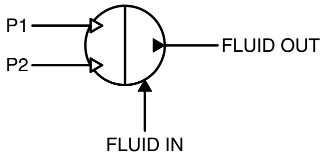
Symbol	Option	Applicable actuation	
		Automatically operated	Air operated
Nil	Body only	●	●
N	With silencer*	●	—

* For AIR EXH: AN20-□02
(□: Either Nil or N is entered as a thread symbol.)

Symbol



Automatically operated type



Air operated type

Made to Order

Made to order specifications
(For details, refer to pages 407 and 408)

Products complying with ATEX
With air operated reset port Note)
With operating cycle counting port Note)

Note) For automatically operated type only.

Specifications

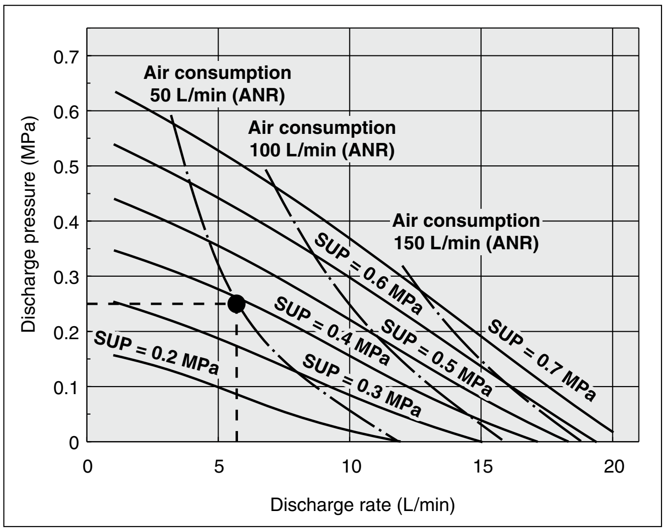
Model		PA3110	PA3120	PA3210	PA3220	PA3113	PA3213
Actuation		Automatically operated				Air operated	
Port size	Main fluid suction discharge port	Rc, NPT, G, NPTF 3/8" Female thread					
	Pilot air supply/exhaust port	Rc, NPT, G, NPTF 1/4" Female thread					
Material	**Body wetted areas**	ADC12		SCS14		ADC12	SCS14
	Diaphragm	PTFE	NBR	PTFE	NBR	PTFE	
	Check valve	PTFE, PFA					
Fluid		Refer to the applicable fluids on page 485.					
Discharge rate		1 to 20 L/min				0.1 to 12 L/min	
Average discharge pressure		0 to 0.6 MPa				0 to 0.4 MPa	
Pilot air pressure		0.2 to 0.7 MPa				0.1 to 0.5 MPa	
Air consumption		Max. 200 L/min (ANR) or less				Max. 150 L/min (ANR) or less	
Suction Note 1) lifting range	**Dry**	Up to 1 m (Interior of pump dry)					
	Wet	Up to 6 m (liquid inside pump)					
Noise		80 dB (A) or less (Option: with silencer, AN20)				72 dB (A) or less (excluding the noise from the quick exhaust and solenoid valve)	
Withstand pressure		1.05 MPa				0.75 MPa	
Diaphragm life Note 4)		100 million times	50 million times	100 million times	50 million times	50 million times	
Fluid temperature		0 to 60°C (No freezing)					
Ambient temperature		0 to 60°C (No freezing)					
Maximum viscosity		1000 mPa·s					
Recommended operating cycle		—				1 to 7 Hz (0.2 to 1 Hz also possible depending on conditions) Note 2)	
Pilot air solenoid valve Note 3) **recommended Cv factor**		—				0.20	
Weight		1.7 kg		2.2 kg		1.7 kg	2.2 kg
Mounting orientation		Horizontal (with mounting foot at bottom)					
Packaging		General environment					

* Each of the values above are for normal temperatures and when the transferred fluid is fresh water.
* Refer to page 403 for maintenance parts.
* For related products, refer to pages 483 and 484.

Note 1) With cycles at 2 Hz or more
Note 2) After initial suction of liquid operating at 1 to 7 Hz, it can be used with operation at lower cycles.
Since a large quantity of liquid will be pumped out, use a suitable throttle in the discharge port if problems occur.
Note 3) With a low number of operating cycles, even a valve with a small Cv factor can be operated.
Note 4) These are reference values for room temperature and fresh water. These are not guaranteed. For details, refer to page 489.
(Notes on the service life of the diaphragm in the “Specific Product Precautions”)

Performance Curve: Automatically Operated Type

PA3□□0 Flow Rate Characteristics



Selection from Flow Rate Characteristic Graph (PA3□□0)

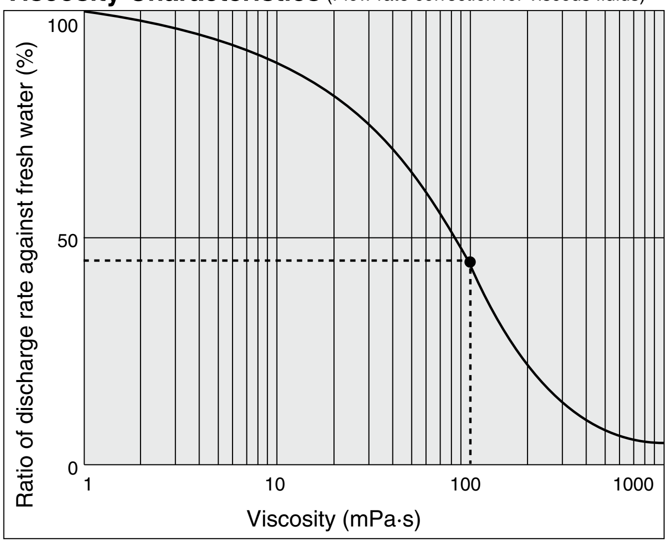
Required specifications example:
Find the pilot air pressure and pilot air consumption for a discharge rate of 6 L/min and a discharge pressure of 0.25 MPa. <The transfer fluid is fresh water (viscosity 1 mPa·s, specific gravity 1.0).>
∗ If the total lifting height is required instead of the discharge pressure, a 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 (solid lines) for SUP = 0.3 MPa and SUP = 0.4 MPa, and based on the proportional relationship to these lines, the pilot air pressure for this point is approximately 0.38 MPa.
3. Next find the air consumption rate. Since the marked point is below the curve for 50 L/min (ANR), the maximum rate will be about 50 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.

Viscosity Characteristics (Flow rate correction for viscous fluids)



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, 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

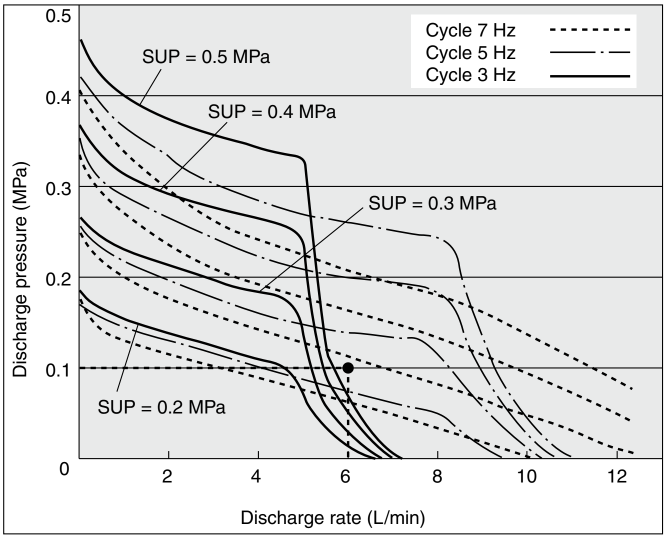
Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity ν = Viscosity μ/Density ρ.

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

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

Performance Curve: Air Operated Type

PA3□13 Flow Rate Characteristics



Selection from Flow Rate Characteristic Graph (PA3□13)

Required specification example: Find the pilot air pressure and pilot air consumption for a discharge rate of 6 L/min. <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, a discharge pressure of 0.1 MPa corresponds to a total lift of 10 m.

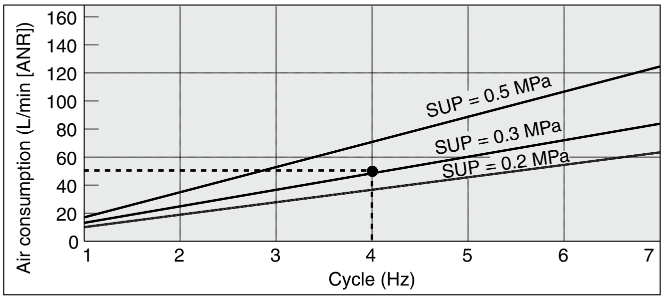
Selection procedures:

1. First mark the intersection point for a discharge rate of 6 L/min and a discharge pressure of 0.1 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 SUP = 0.3 MPa, and based on the proportional relationship to these lines, the pilot air pressure for this point is approximately 0.25 MPa.

⚠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).

PA3□13 Air Consumption



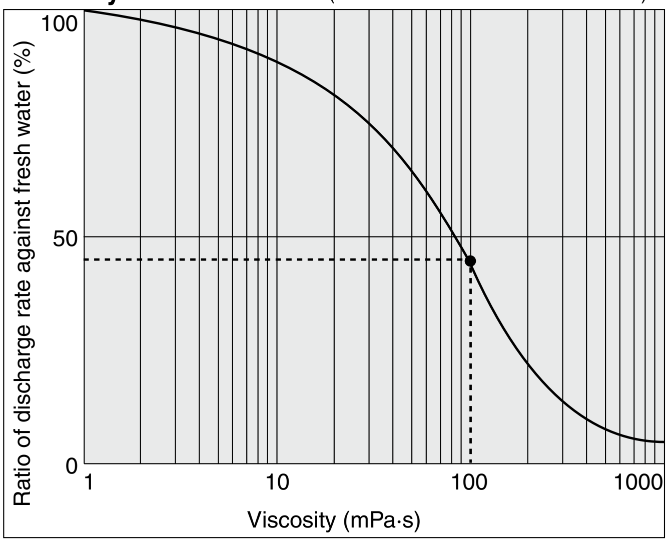
Calculating Air Consumption (PA3□13)

Find the air consumption for operation with a 4 Hz switching cycle and pilot air pressure of 0.3 MPa from the air consumption graph.

Selection procedures:

1. Look up from the 4 Hz switching cycle to find the intersection with SUP = 0.3 MPa.
2. From the point just found, draw a line to the Y-axis to find the air consumption. The result is approximately 50 L/min (ANR).

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, 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 100m Pa·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.

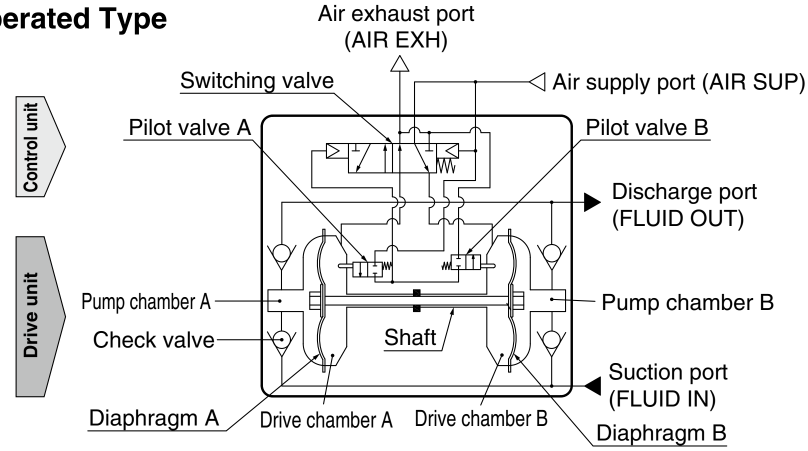
Dynamic viscosity ν = Viscosity μ/Density ρ.

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

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

Working Principle

Automatically Operated Type



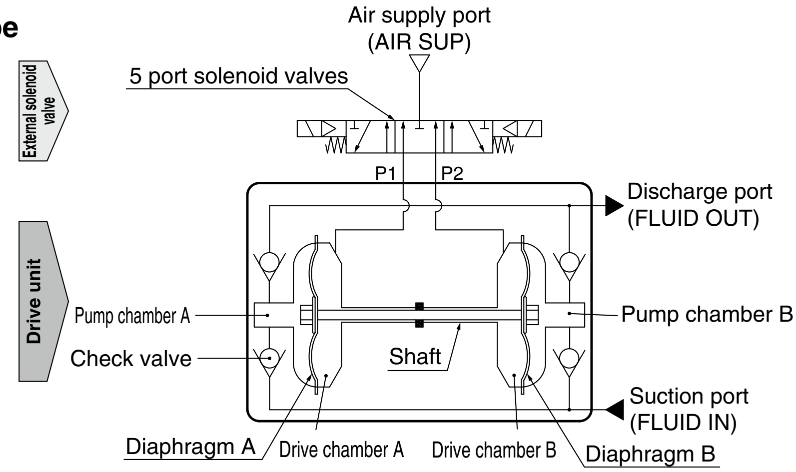
Control unit

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.

Air Operated Type



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.**

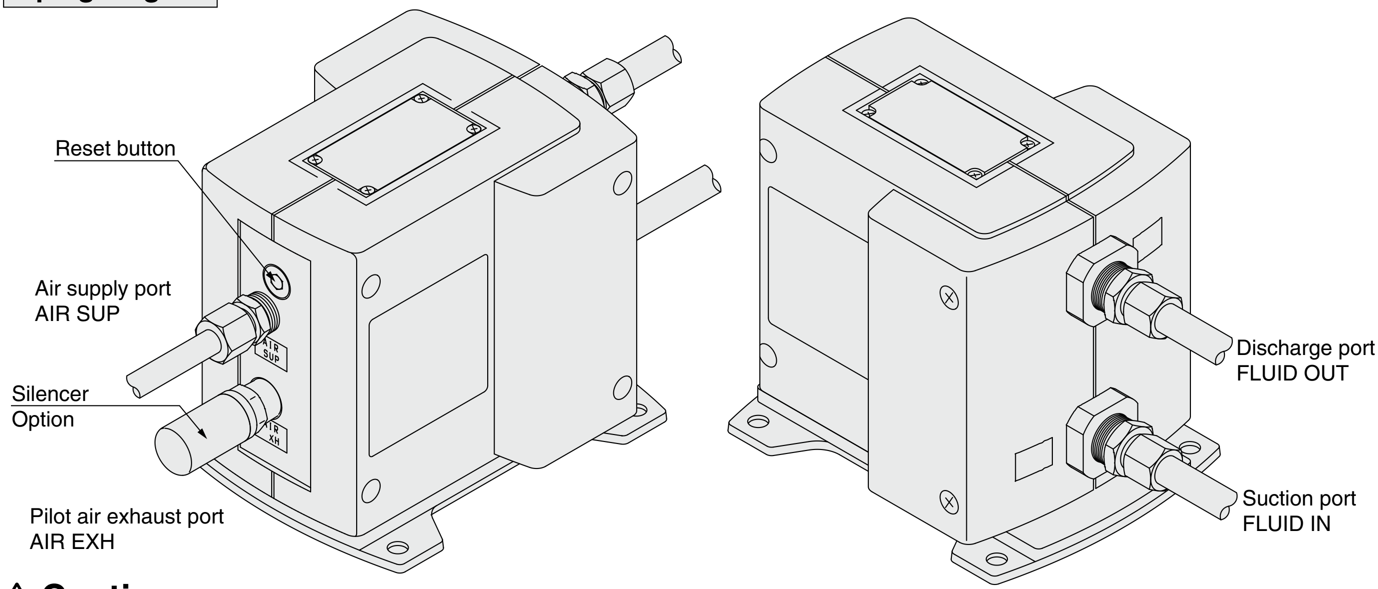
PA3000 Series

Description	PA3000 series		
	PA3□10	**PA3□20**	**PA3□13**
Diaphragm kit	KT-PA3-31	KT-PA3-32	KT-PA3-31
Check valve kit	KT-PA3-36		
Switching valve assembly kit	KT-PA3-37□ Note)		—
Pilot valve kit	KT-PA5-38		—
Manual cap assembly kit	KT-PA3-45		—

Note) One of Nil, N, F or T is entered as a thread symbol.

Piping and Operation: Automatically Operated Type

Piping diagram



⚠ Caution

Mounting posture of the pump is set with the foot bracket facing downward. Air to be supplied to the air supply port <AIR SUP> should be cleaned and filtered through AF filter, etc. Air with foreign matter or drainage etc. will have negative effects on the built-in directional control valve and will lead to malfunction. When air needs additional purification, use a filter (AF series), and a mist separator (AM series) together.
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 0.7 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 will also stop if the throttle on the discharge side is closed.

<Discharge Flow Rate Adjustment>

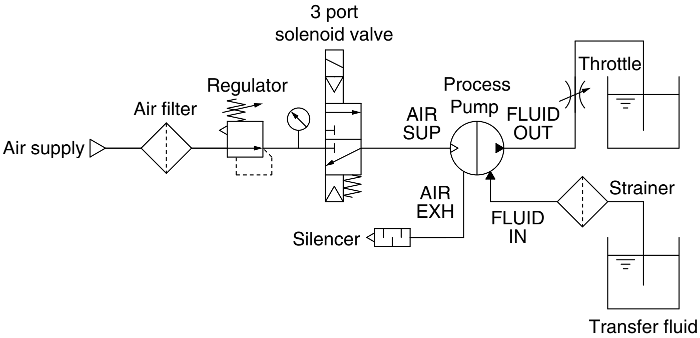
1. To adjust the flow rate from the discharge port <FLUID OUT>, use the throttle connected to the discharge side. Refer to circuit example (1). Note that this product cannot be used as a fixed quantity liquid dispense pump.

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 rate: 1 L/min)

<Reset Button>

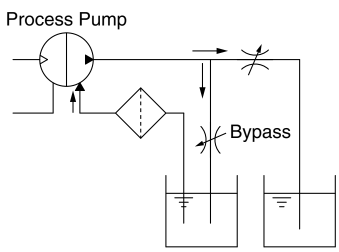
When the pump stops during operation, press the reset button. This makes it possible to restore operation in case the switching valve becomes clogged due to foreign matter in the supply air.

Circuit example (1)



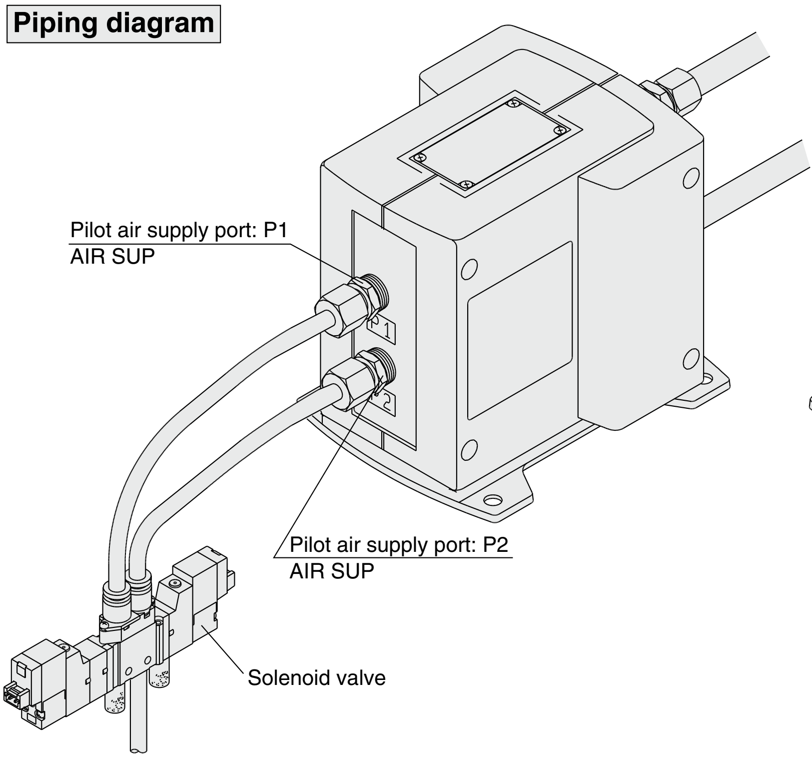
Circuit example (2)

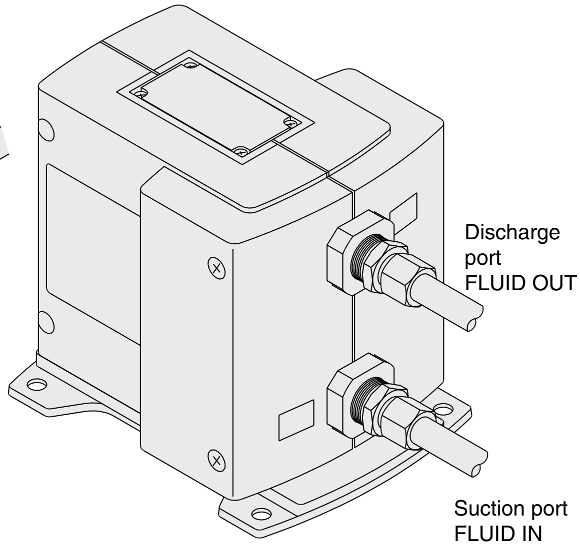
For related products, refer to pages 483 and 484.



Piping and Operation: Air Operated Type

Piping diagram





Recommended Valve

PA3□13	VQZ14□0 (Exhaust center)

⚠ 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 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 0.1 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. (Dry state suction lifting range: 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.

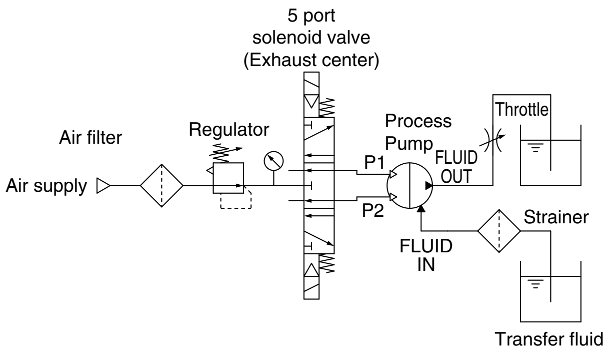
Note 2) For the solenoid valve, use an exhaust center 5 port valve, or a combination of residual exhaust 3 port valve and a pump drive 4 port valve. If air in the drive chamber is not released when the pump is stopped, the diaphragm will be subjected to pressure and its life will be shortened.

Note 3) When the pump is dry, operate the solenoid valve at a switching cycle of 1 to 7 Hz. If operated outside of this range, the suction capacity will be reduced.

<Discharge Flow Rate Adjustment>

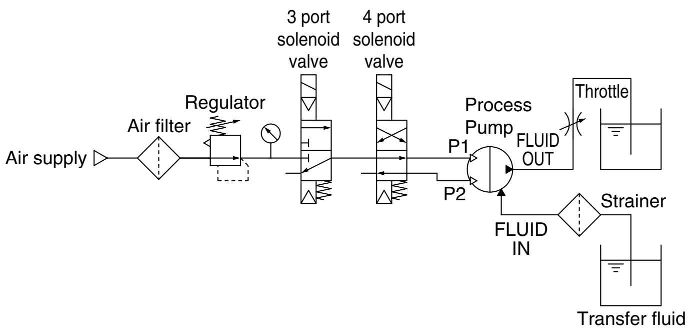
1. The flow rate from the discharge port <FLUID OUT> can be adjusted easily by changing the switching cycle of the solenoid valve on the air supply port.

Circuit example (1)



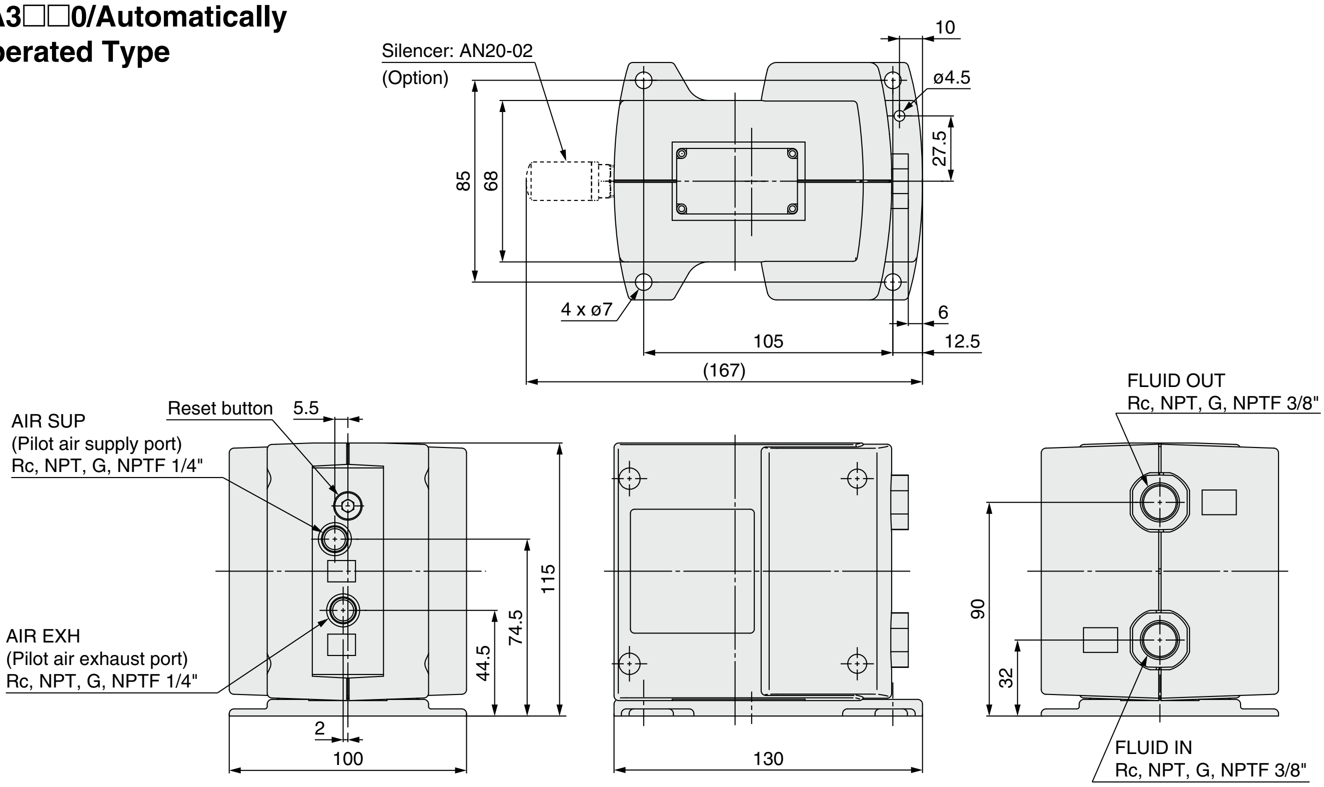
Circuit example (2)

For related products, refer to pages 483 and 484.

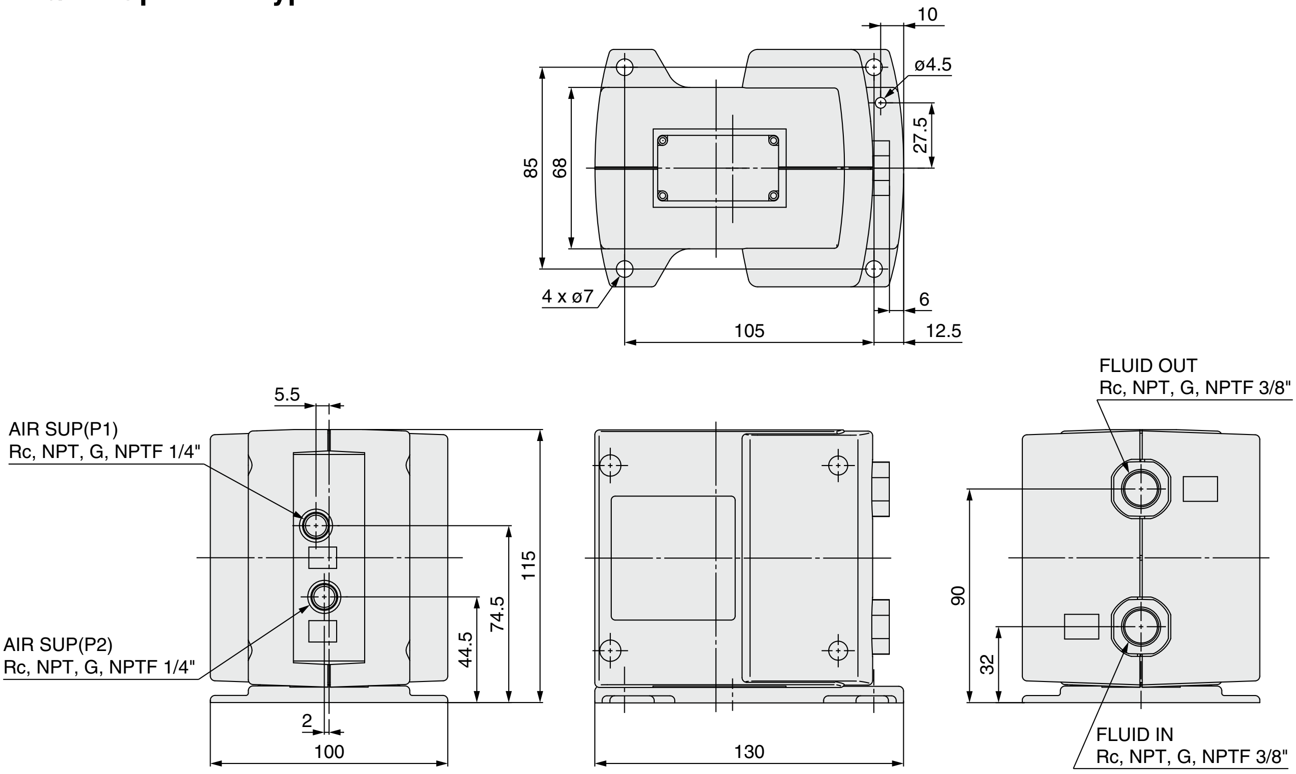


Dimensions

PA3□□0/Automatically Operated Type



PA3□13/Air Operated Type



PA3000 Series
Made to Order Specifications

Please contact SMC for detailed dimensions, specifications and lead times.

Made to Order

CE Ex For 55-PA3□□0: II2G Ex h IIB T6 Gb
II2D Ex h IIIB T68°C Db
For 55-PA3□□3: II2G Ex h IIB T5 Gb
II2D Ex h IIIB T89°C Db
0°C ≤ Ta ≤ +60°C

CE Ex For 56-PA3□□0: II3G Ex h IIB T6 Gc
II3D Ex h IIIB T68°C Dc
For 56-PA3□□3: II3G Ex h IIB T5 Gc
II3D Ex h IIIB T89°C Dc
0°C ≤ Ta ≤ +60°C

●PA3000 Series

1. Products Complying with ATEX

55 − PA 3 1 1 0 − □ 03 − □

Products complying with the ATEX Directive

55	Products complying with the ATEX Directive, Category 2
56	Products complying with the ATEX Directive, Category 3

Body size

Symbol	Body size
3	3/8"

Wetted body material

Symbol	Body material
1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Diaphragm material

Symbol	Diaphragm material	Operating method	
		Automatically operated	Air operated
1	PTFE	●	●
2	NBR	●	—

∗ Dimensions are the same as those of the standard products.

Actuation

Symbol	Actuation
0	Automatic operation
3	Air operated

Thread type

Symbol	Type
Nil	Rc
N	NPT
F	G
T	NPTF

Port size

Symbol	Port size
03	3/8"

Option

Symbol	Option	Operating method	
		Automatically operated	Air operated
Nil	None	●	●
N	With silencer∗	●	—

∗ This product is equipped with a 2504-002 (NPT: 2504-N002) silencer.
∗ For AIR EXH
55-PA: 2504-□002
56-PA: AN20-□02
(□: Either Nil or N is entered as a thread symbol.)

2. With Air Operated Reset Port

PA 3 [1] [1] 0 – [ ] 03 – [ ] – X2

Body size

Symbol	Body size
3	3/8

Wetted body material

Symbol	Body material
1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Diaphragm material

Symbol	Diaphragm material
1	PTFE
2	NBR

Thread type

Symbol	Type
Nil	Rc
N	NPT
F	G
T	NPTF

Port size

Symbol	Port size
03	3/8"

Option

Symbol	Option
Nil	None
N	With silencer*

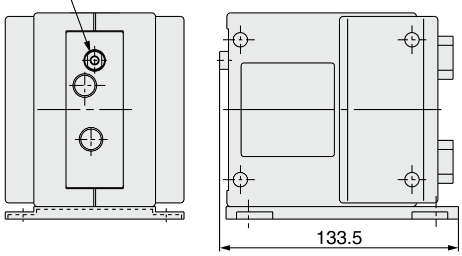
Made to order specifications

X2	With air operated reset port

* For AIR EXH: AN20-□02
(□: Either Nil or N is entered as a thread symbol.)

Reset circuit example

PA3□□0



3. With Operating Cycle Counting Port

PA 3 [1] [1] 0 – [ ] 03 – [ ] – X8

Body size

Symbol	Body size
3	3/8

Wetted body material

Symbol	Body material
1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Diaphragm material

Symbol	Diaphragm material
1	PTFE
2	NBR

Thread type

Symbol	Type
Nil	Rc
N	NPT
F	G
T	NPTF

Port size

Symbol	Port size
03	3/8"

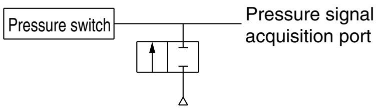
Option

Symbol	Option
Nil	None
N	With silencer*

Made to order specifications

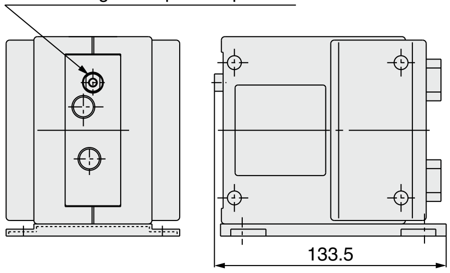
X8	With operating cycle counting port

* For AIR EXH: AN20-□02
(□: Either Nil or N is entered as a thread symbol.)



Counting circuit example

PA3□□0



Automatically Operated Type, Built-in Pulsation Attenuator (Internal Switching Type)

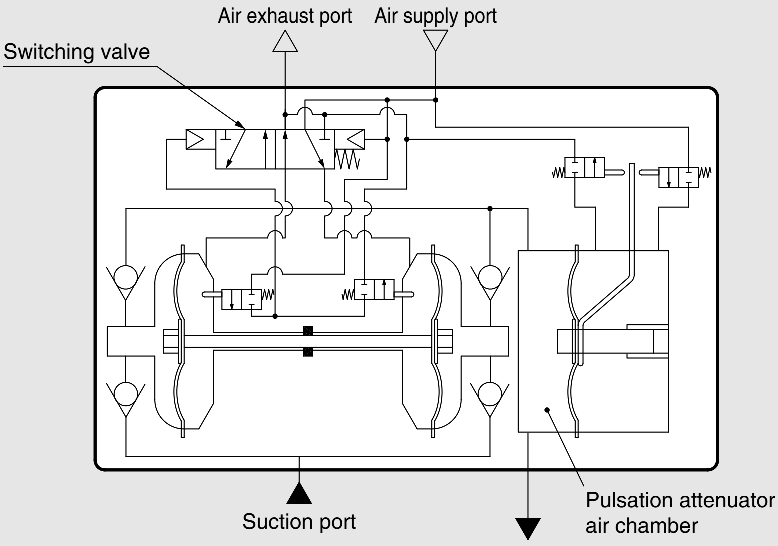
Process Pump

RoHS

PAX1000 Series

Prevents spraying of discharge and foaming in tank

- **Space-saving design eliminates separate piping with built-in pulsation attenuator**



Process Pump
Automatically Operated Type, Built-in Pulsation Attenuator (Internal Switching Type)
PAX1000 Series RoHS

How to Order

PAX1 [1] 1 2 – [ ] [02] – [ ]

Body material

Symbol	Body material
1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Actuation

Symbol	Actuation
2	Automatically operated type built-in pulsation attenuator

Thread type

Symbol	Type
Nil	Rc
N	NPT
F	G
T	NPTF

Port size

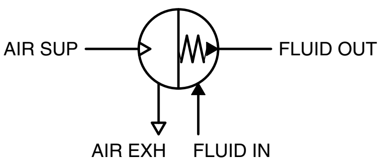
Symbol	Port size
02	1/4"
03	3/8"

Option

Symbol	Option
Nil	Body only
N	With silencer *

* For AIR EXH: AN20-□02 (□: Either Nil or N is entered as a thread symbol.)

Symbol



Automatically operated type, built-in pulsation attenuator

Specifications

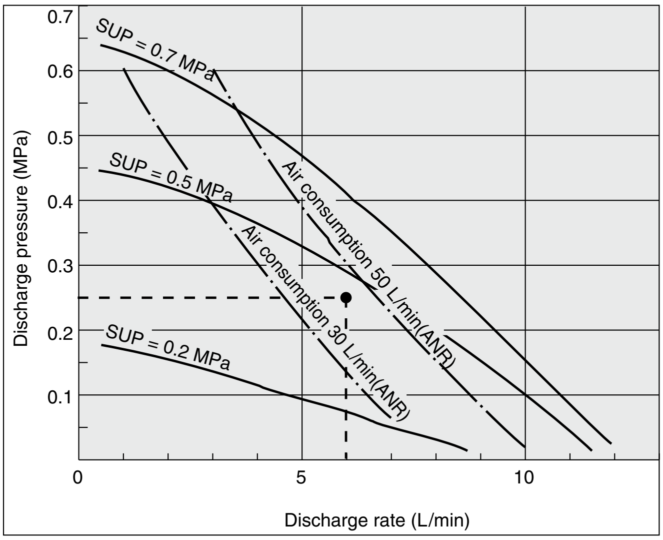
Model		PAX1112	PAX1212
Actuation		Automatic operation	
Port size	**Main fluid suction discharge port**	Rc, NPT, G, NPTF 1/4", 3/8" Female thread	
	Pilot air supply/ exhaust port	Rc, NPT, G, NPTF 1/4" Female thread	
Material	**Body wetted areas**	ADC12	SCS14
	Diaphragm	PTFE	
	Check valve	PTFE, SCS14	
Fluid		Refer to the applicable fluids on page 485.	
Discharge rate		0.5 to 10 L/min	
Average discharge pressure		0 to 0.6 MPa	
Pilot air pressure		0.2 to 0.7 MPa	
Air consumption		Max. 150 L/min (ANR)	
Suction lifting range	**Dry**	Up to 2 m (Interior of pump dry)	
	Wet	Up to 6 m (Liquid inside pump)	
Noise		84 dB(A) or less (Option: with silencer, AN20)	
Withstand pressure		1.05 MPa	
Diaphragm life Note)		50 million cycles (For water)	
Fluid temperature		0 to 60°C (No freezing)	
Ambient temperature		0 to 60°C (No freezing)	
Maximum viscosity		1000 mPa·s	
Weight		2.0 kg	3.5 kg
Mounting position		Horizontal (Bottom facing down)	
Packaging		General environment	

* Each of the values above are for normal temperatures and when the transferred fluid is fresh water.
* Refer to page 467 for maintenance parts.
* Refer to pages 483 and 484 for related products.

Note) These are reference values for room temperature and fresh water. These are not guaranteed. For details, refer to page 489.
(Notes on the service life of the diaphragm in the "Specific Product Precautions")

Performance Curve: Automatically Operated Type, Built-in Pulsation Attenuator

PAX1000 Flow Rate Characteristics



Selection from Flow Rate Characteristic Graph

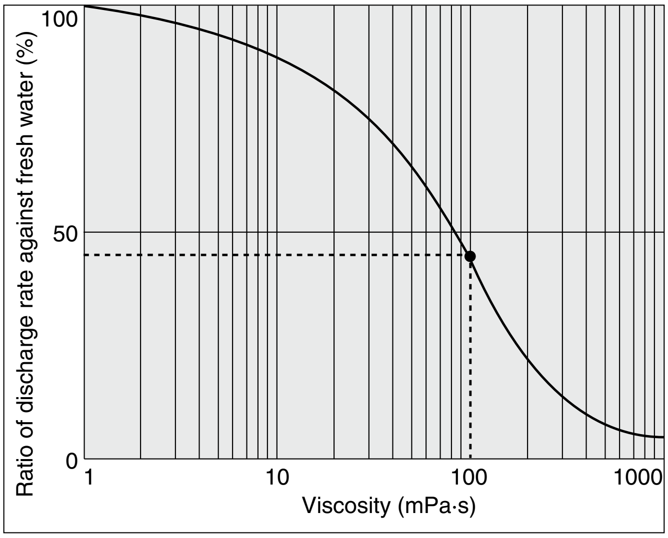
Required specification example:
Find the pilot air pressure and pilot air consumption for a discharge rate of 6 L/min and a discharge pressure of 0.25 MPa. <The transfer fluid is fresh water (viscosity 1 mPa·s, specific gravity 1.0).>
∗ If the total lifting height is required instead of the discharge pressure, a discharge pressure of 0.1 MPa corresponds to a total lift of 10 m.

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 (solid lines) for SUP = 0.2 MPa and SUP = 0.5 MPa, and based on the proportional relationship to these lines, the pilot air pressure for this point is approximately 0.45 MPa.
3. Next find the air consumption. Since the marked point is below the curve for 50 L/min (ANR), the maximum rate will be about 45 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.

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, 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 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.

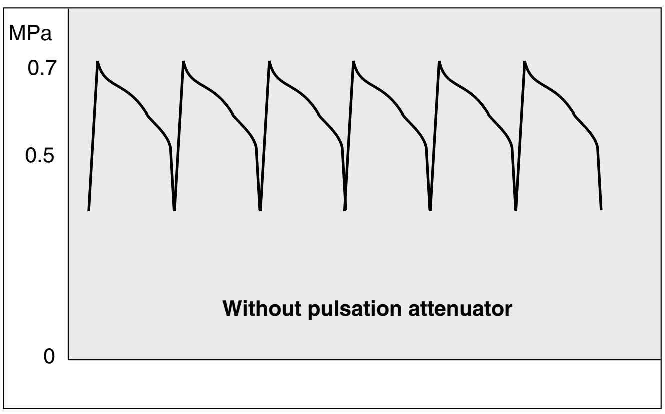
⚠ Caution

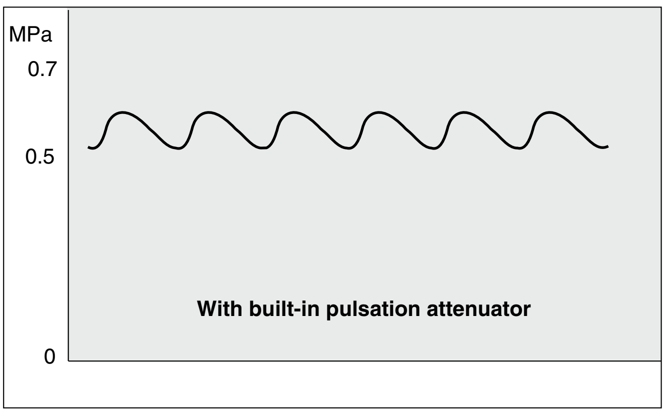
Viscosities up to 1000 mPa·s can be used.
Dynamic viscosity ν = Viscosity μ/Density ρ.

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

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

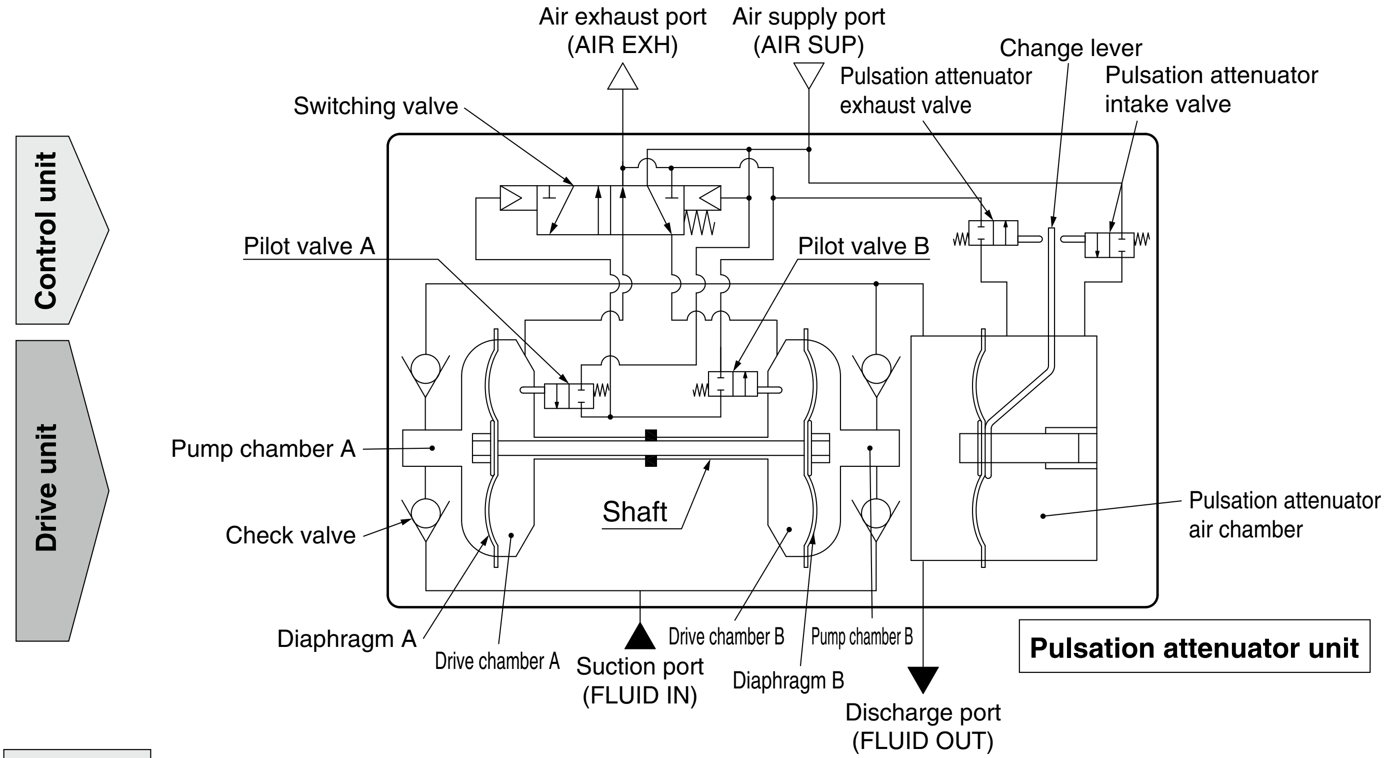
Pulsation Attenuating Capacity





The process pump generates pulsation because it discharges a liquid using two diaphragms. The pulsation attenuator absorbs pressure when discharge pressure increases, and compensates the pressure when discharge pressure decreases. By this means pulsation is controlled.

Working Principle: Automatically Operated Type, Built-in Pulsation Attenuator



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. The pressure of the fluid that is forced out of the pump chamber is adjusted in the pulsation attenuation chamber and is then exhausted.
4. Continuous suction/discharge is performed by the reciprocal motion of the diaphragm.

Pulsation attenuation chamber

1. Pulsation is attenuated by the elastic force of the diaphragm and air in the pulsation attenuation chamber.
2. When the pressure in the pulsation attenuation chamber rises, the change lever presses the pulsation attenuator intake valve, and air enters the pulsation attenuator air chamber.
3. Conversely, when pressure drops, the change lever presses the pulsation attenuator exhaust valve, exhausting the air from the air chamber and keeping the diaphragm in a constant position. Note that some time is required for the pulsation attenuator to operate normally.

Maintenance Parts

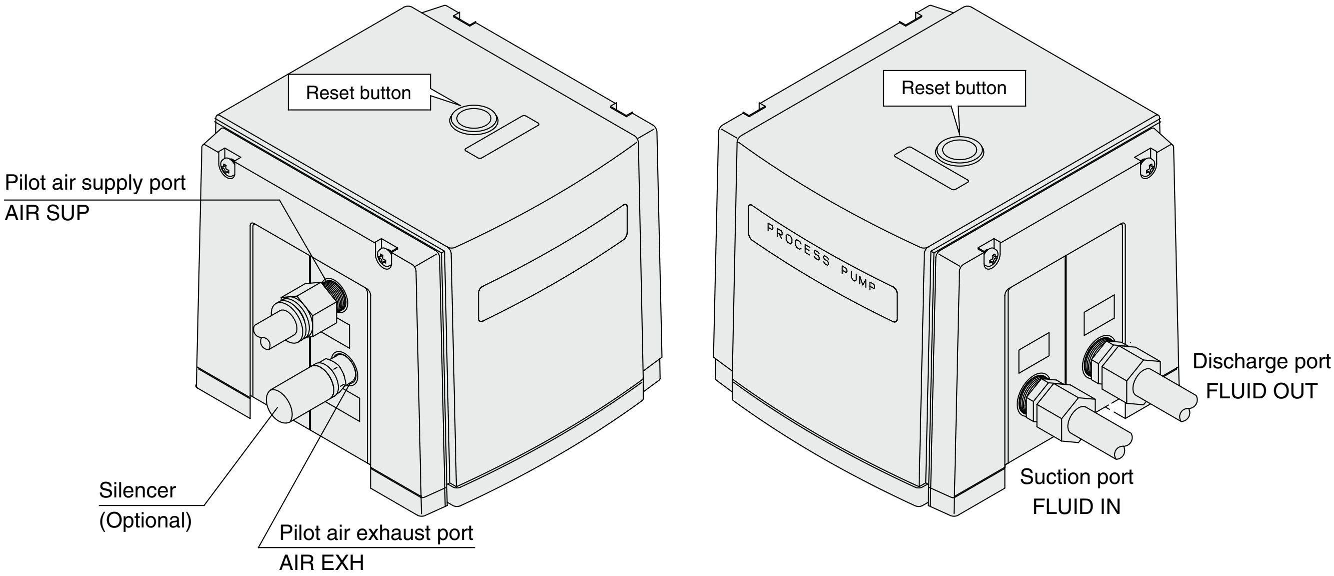
⚠ ●**While it is not possible to disassemble this product without voiding the warranty, if disassembly is to be carried out anyway due to necessity, be sure to follow the maintenance procedures.**
●**When carrying out this work, wear appropriate protective equipment.**

PAX1000 Series

Description	PAX1000 series
	PAX1□12
Diaphragm kit	KT-PAX1-31
Check valve kit	KT-PAX1-36
Switching valve parts kit	KT-PAX1-37#1
Pilot valve kit	KT-PA5-38
Pulsation attenuator control valve kit	KT-PAX1-39

Piping: Automatically Operated Type, Built-in Pulsation Attenuator

Piping diagram



⚠ Caution

Mounting posture of the pump is set with the bottom surface at the bottom. Air to be supplied to the AIR SUP port should be cleaned and filtered through AF filter, etc. Air with foreign matter or drainage etc. will have negative effects on the built-in switching valve and will lead to malfunction. When air needs additional purification, use a filter (AF series), and a mist separator (AM series) together.
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 SUR> 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 0.7 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. 2 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 will also stop if the throttle on the discharge side is closed.

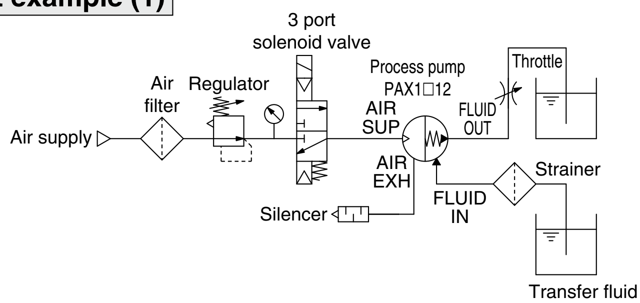
<Discharge Flow Rate Adjustment>

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: PAX1000 0.5 L/min)

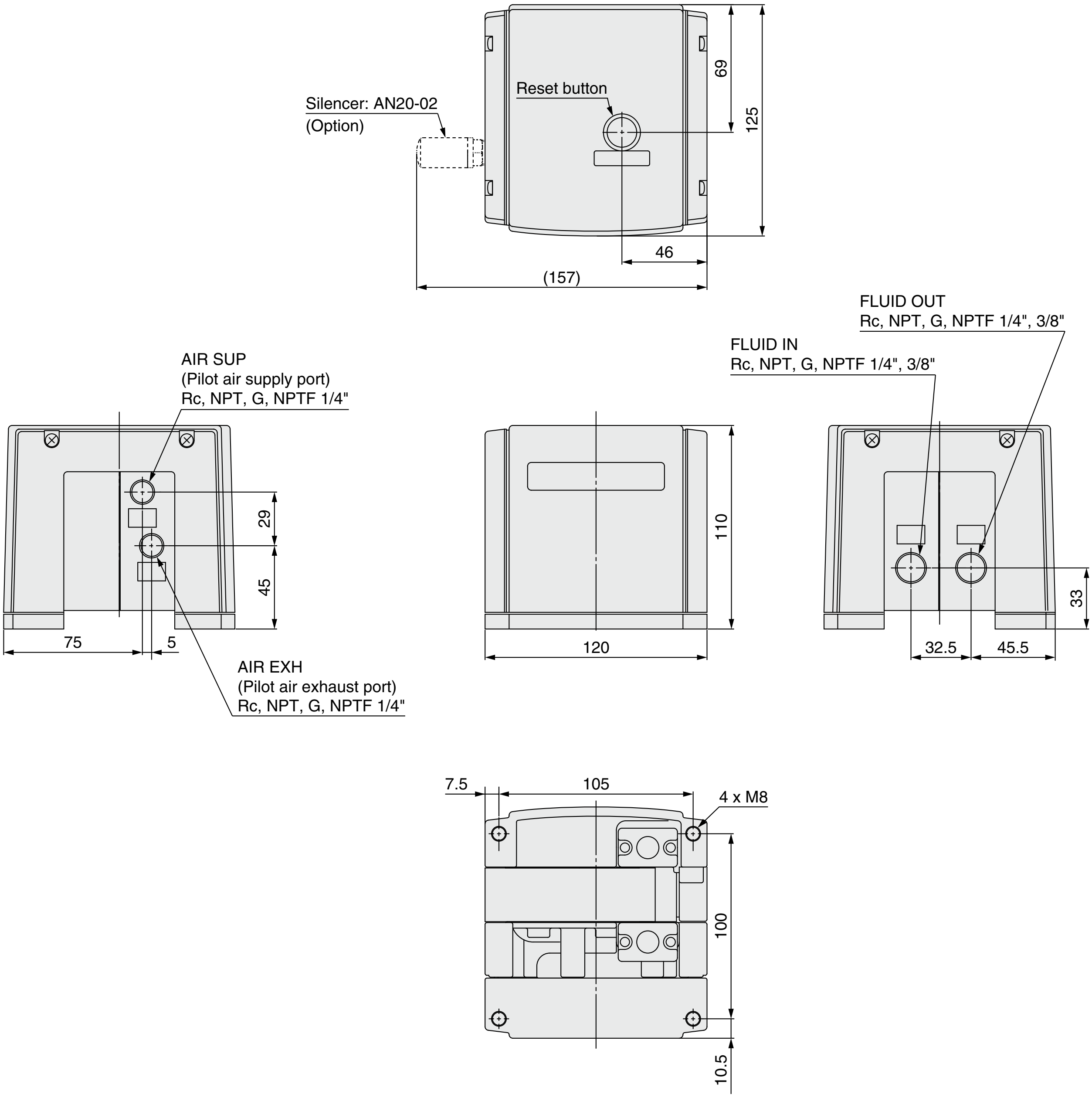
<Reset Button>

1. 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. Maintenance is necessary if the reset button needs to be pressed frequently.

Circuit example (1)



Dimensions


Reset button
Silencer: AN20-02
(Option)
69
125
46
(157)
AIR SUP
(Pilot air supply port)
Rc, NPT, G, NPTF 1/4"
29
45
75
5
AIR EXH
(Pilot air exhaust port)
Rc, NPT, G, NPTF 1/4"
110
120
FLUID OUT
Rc, NPT, G, NPTF 1/4", 3/8"
FLUID IN
Rc, NPT, G, NPTF 1/4", 3/8"
33
32.5
45.5
7.5
105
4 x M8
100
10.5