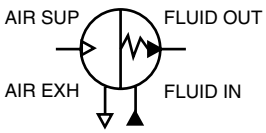
Process Pump
Automatically Operated Type, Built-in Pulsation Attenuator (Internal Switching Type)
Series PAX1000

JIS Symbol



Automatically operated type, built-in pulsation attenuator

How to Order

PAX1 [1] 1 2 — [ ] [02] — [ ]

Body material

1	ADC12 (Aluminum)
2	SCS14 (Stainless steel)

Diaphragm material

1	PTFE (Fluoro resin)

Type

2	Automatically operated type built-in pulsation attenuator

Thread type

Nil	Rc
T*	NPTF
F*	G
N*	NPT

* T, F, N are options.

Port size

02	1/4 (8A)
03	3/8 (10A)

Option

Nil	Body only
N	With silencer *

* For AIR EXH: AN200-02

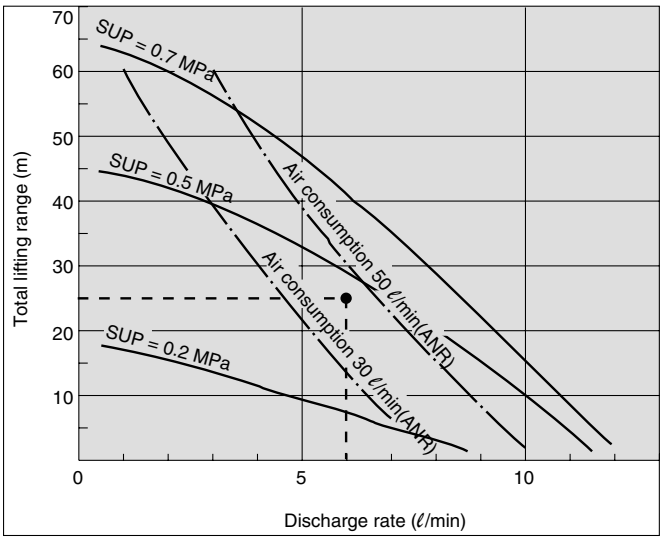
Specifications

Model		PAX1112	PAX1212
Port size	Main fluid suction discharge port	1/4, 3/8	
	Pilot air supply/ exhaust port	1/4	
Material	Body wetted areas	ADC12	SCS14
	Diaphragm	PTFE	
	Check valve	PTFE, SCS14	
Discharge rate		0.5 to 10 ℓ/min	
Average discharge pressure		0 to 0.6 MPa	
Pilot 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)	
Discharge pulsation attenuating capacity		30% or less of maximum discharge pressure	
Fluid temperature		0 to 60°C (No freezing)	
Ambient temperature		0 to 60°C	
Pilot air pressure		0.2 to 0.7 MPa	
Withstand pressure		1.05 MPa	
Mounting position		Horizontal (Bottom facing down)	
Weight		2.0 kg	3.5 kg

* Each value of above represents at normal temperatures with fresh water.

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

PAX1000 Flow Characteristics



Selection from Flow Characteristic Graph

Required specification example:
Find the pilot air pressure and pilot air consumption for a discharge rate of 6 ℓ/min and a total lifting range of 25 m. <The transfer fluid is fresh water (viscosity 1 mPa·s, specific gravity 1.0).>

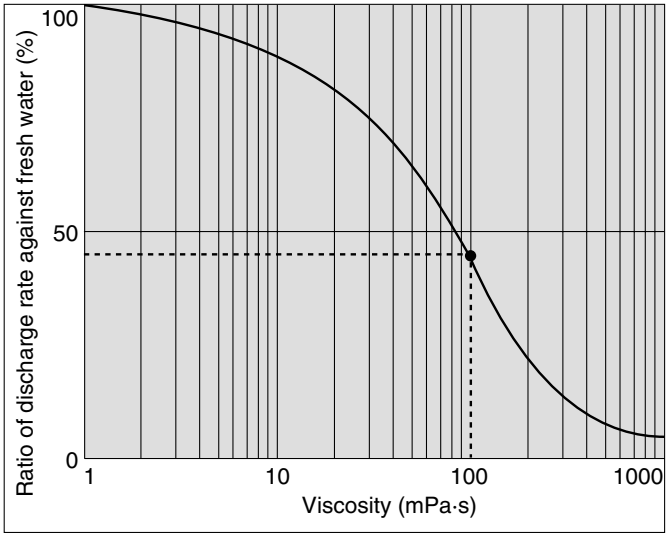
∗ If the discharge pressure is required instead of the total lifting height, a total lift of 10 m corresponds to discharge pressure of 0.1 MPa.

1. First mark the intersection point for a discharge rate of 6 ℓ/min and a lifting range of 25 m.

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 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, a total lifting range of 25 m, 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

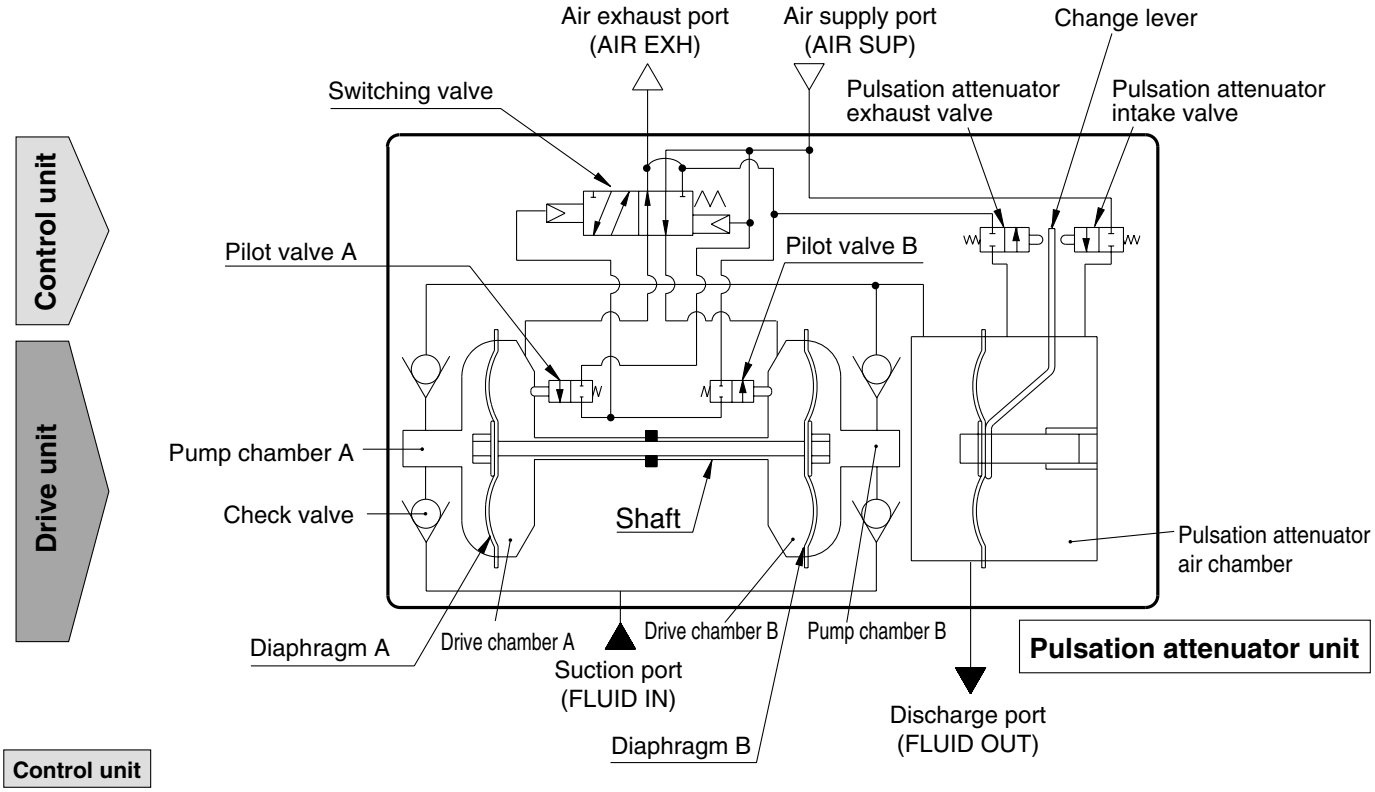
⚠ Caution

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

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

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

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.

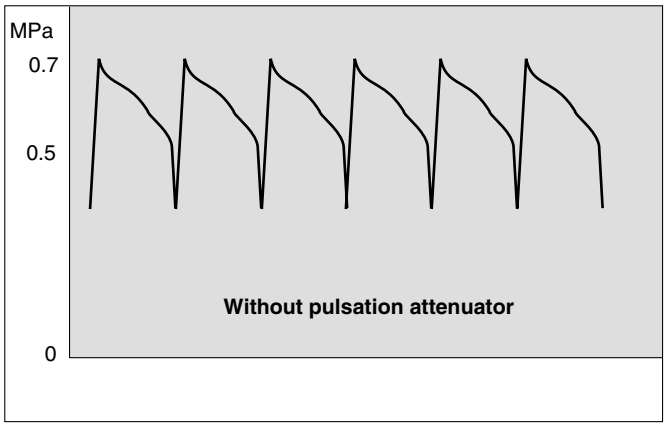
Drive unit

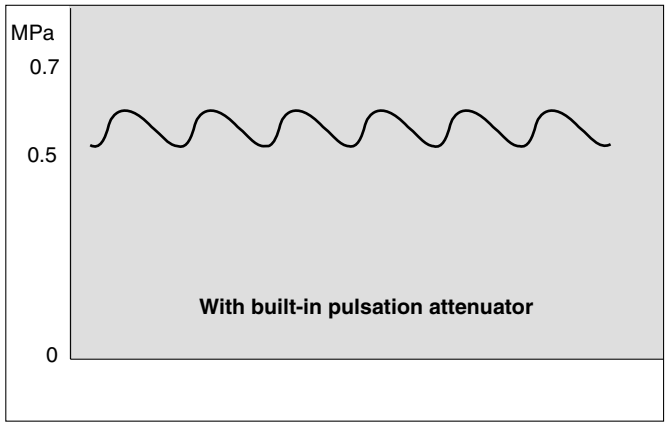
1. When air enters drive chamber B, the fluid in pump chamber B is forced out, and at the same time fluid is sucked into pump chamber A.
2. When the diaphragm moves in the opposite direction, the fluid in pump chamber A is forced out, and fluid is sucked into pump chamber B.
3. The pressure of the fluid 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.

Pulsation Attenuating Capacity

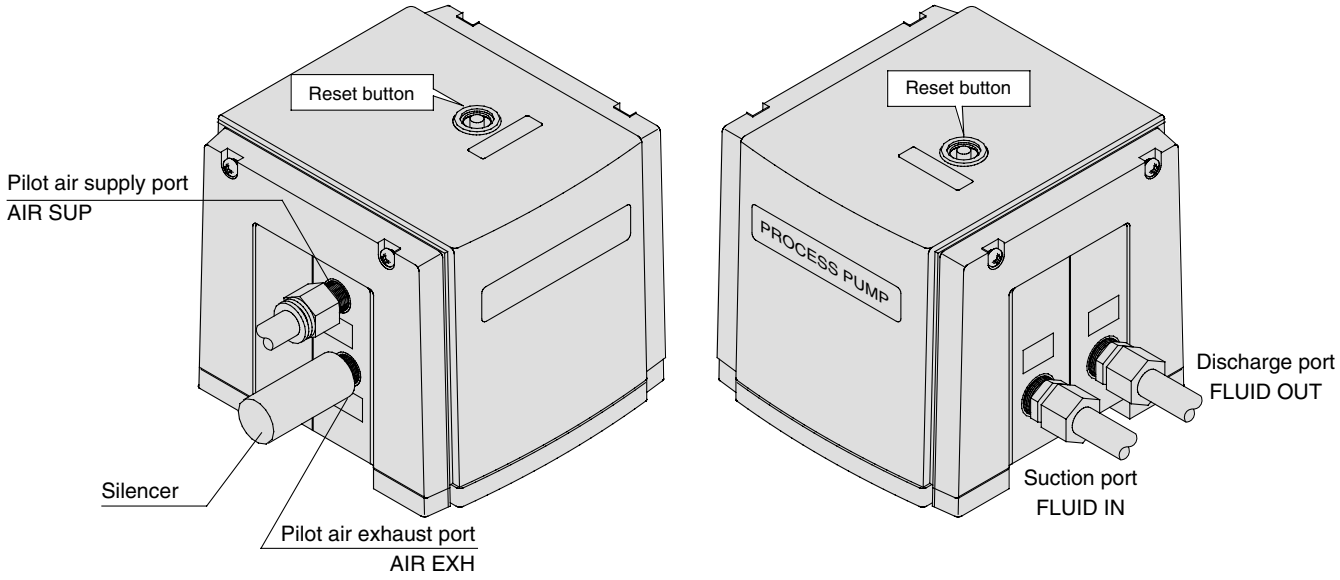




The process pump generates pulsation because it discharges a liquid using two diaphragms. The pulsation attenuator absorbs pressure when discharge pressure increases, and compensates the pressure when discharge pressure decreases. By this means pulsation is controlled.

Piping: Automatically Operated Type, Built-in Pulsation Attenuator

Piping diagram



⚠ 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)

1. Connect air piping to the air supply port <AIR SUR> 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 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. 2 m) To restrict exhaust noise, attach a silencer (AN200-02: option) to the air exhaust port <AIR EXH>.

3. To stop the pump, exhaust the air pressure being supplied to the pump by the 3 port solenoid valve of the air supply port <AIR SUP>. The pump will also stop if the ball valve on the discharge side is closed.

<Discharge Flow Rate Adjustment>

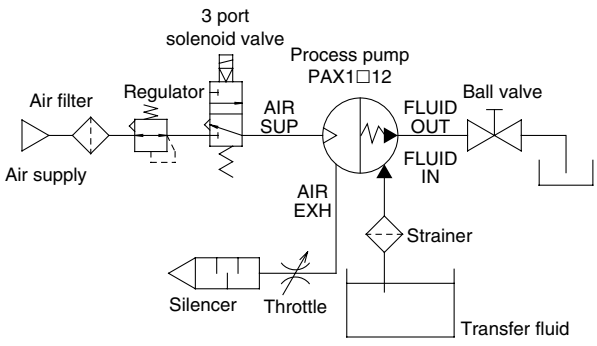
1. Adjustment of the flow rate from the discharge port <FLUID OUT> is performed with the ball valve connected on the discharge side or the throttle connected on the air exhaust side. For adjustment from the air side, use of the silencer with throttle ASN2 (port size 1/4) connected to the air exhaust 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. (Minimum flow rate: PAX1000 0.5 ℓ/min)

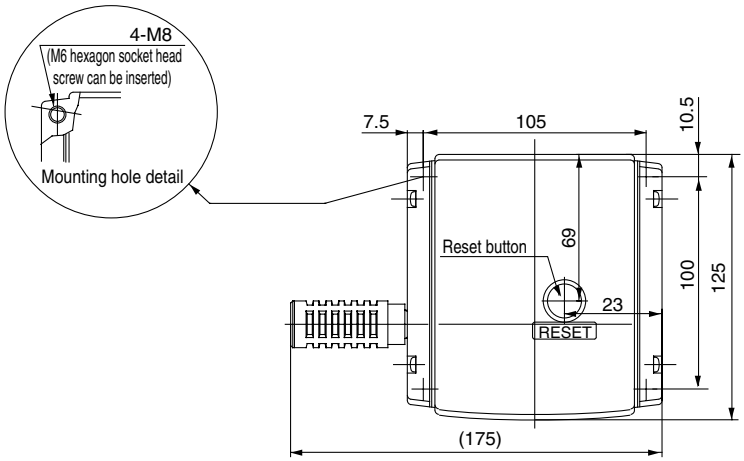
<Reset Button>

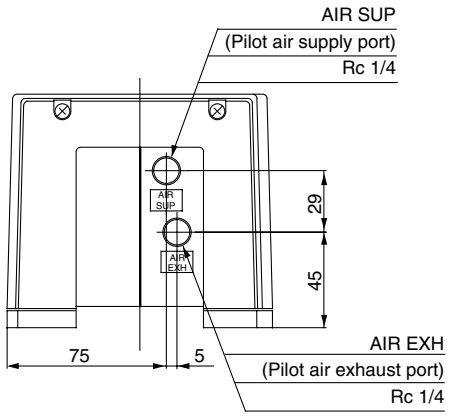
1. When the pump stops during operation, press the reset button. This makes it possible to restore operation in case the switching valve becomes clogged due to foreign matter in the supply air.

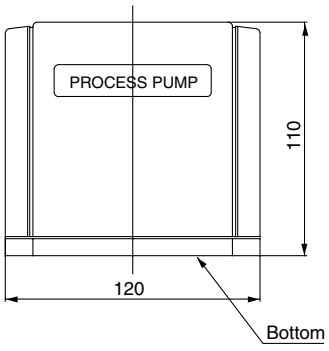
Circuit example (1)

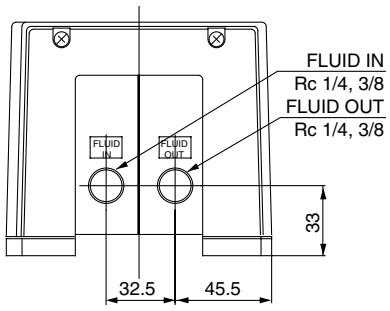


Dimensions


4-M8
(M6 hexagon socket head screw can be inserted)
Mounting hole detail
7.5
105
10.5
Reset button
69
100
125
23
RESET
(175)


AIR SUP
(Pilot air supply port)
Rc 1/4
AIR SUP
AIR EXH
29
45
75
5
AIR EXH
(Pilot air exhaust port)
Rc 1/4


PROCESS PUMP
110
120
Bottom


FLUID IN
Rc 1/4, 3/8
FLUID OUT
Rc 1/4, 3/8
FLUID IN
FLUID OUT
33
32.5
45.5