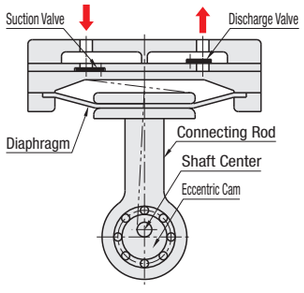
Features: Dry Vacuum Pumps emit exhaust air by utilizing reciprocating motion of thin film (diaphragm) of rubber with no use of oil or water.
Thermal protector is built in all products to ensure safety. Simple structure easy for maintenance.

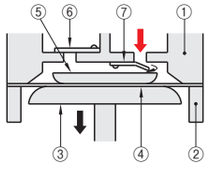
Unit Conversion Table

From \ To	Pa(N/m²)	Torr(mmHg)	atm	mbar	psi(bf/in²)	kgf/cm²	mH₂O (15°)
1 Pa(N/m²)	1	$7.5x10^{-3}$	$9.87x10^{-6}$	10^{-2}	$1.45x10^{-4}$	$1.02x10^{-5}$	$1.02x10^{-4}$
1 Torr(mmHg)	133.32	1	$1.316x10^{-3}$	1.33	$1.93x10^{-2}$	$1.359x10^{-3}$	$1.36x10^{-2}$
1 atm	$1.013x10^{5}$	760	1	$1.013x10^{3}$	14.696	1.033	10.34
1 mbar	100	0.75	$9.87x10^{-4}$	1	$1.45x10^{-2}$	$1.02x10^{-3}$	$10.206x10^{-3}$
1 psi(bf/in²)	$6.89x10^{3}$	51.71	$6.8x10^{-2}$	68.9	1	$7.031x10^{-2}$	0.703
1 kgf/cm²	$9.8x10^{4}$	735.56	0.968	$9.81x10^{2}$	14.223	1	10
1 mH₂O	$9.8x10^{3}$	73.49	$9.68x10^{-2}$	98	1.421	0.1	1

Working Principle

Diaphragm Type Dry Vacuum Pumps



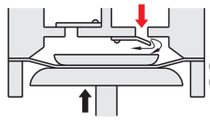


①Pump Head
②Casing
③Connecting Rod
④Diaphragm
⑤Diaphragm Washer
⑥Exhaust Valve
⑦Air Intake Valve

⑦opens by being suctioned down.
⑥will close by being pulled.

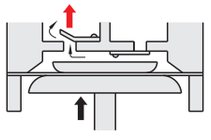
➡ indicates flow of air.
➡ indicates the motion of connecting rod into next process.
Procedure of Process: 1→2→3→4→1

2. Intake Cycle Final State (Bottom Dead Center)



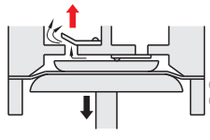
⑦will open fully.
⑥will remain closed.

3. Exhaust Cycle Time



⑦will close by being pushed.
⑥will open by being pushed.

4. Exhaust Cycle Final State (Top Dead Center)



⑦will remain closed by being pushed.
⑥will open fully by being pushed.

How to Select Pumps

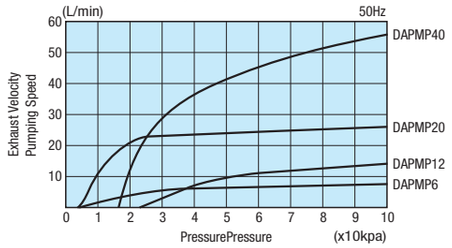
1. Calculation of Time and Velocity of Exhaust

$$t=\frac{V}{S}x2.303\log\frac{P1}{P2}$$

$$t_0=t_1+t_2+t_3+\cdots$$

t: Time of Exhaust (min)
t_0: Total Time of Exhaust (min)
V: Tank Capacity (ℓ)
S: Velocity of Pump Exhaust (L/min)
P1: Initial Pressure (Pa)
P2: Final Pressure (Pa)

• Curvature of Exhaust Velocity



• Actual Calculation Example

(Ex. 1) When decompressing a container of 25ℓ capacity from atmospheric pressure (101,324Pa) to 10,000Pa in 10 minutes,

$$S=\frac{V(25)}{t(10)}x2.303\log\frac{P1(101,324)}{P2(100,000)}\approx5.79L/min(at\ 1Pa)$$

DAPMP6 will be required as 5.79L/min or faster exhaust velocity is needed for 10,000Pa.
However, be sure to select pump safely, considering conductance of plumbing and leakage.

(Ex. 2) Time for decompressing a container of 10ℓ capacity from atmospheric pressure (101,324Pa) to 40,000Pa
In use of DAPMP12

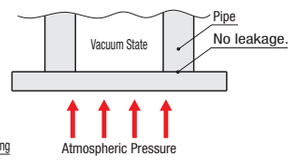
1:101,324Pa→80,000Pa	S_1=12L/min	$t_1=10/12x2.303\log(101,324/80,000)\approx0.2$
2:80,000Pa→60,000Pa	S_2=11L/min	$t_2=10/11x2.303\log(80,000/60,000)\approx0.26$
3:60,000Pa→40,000Pa	S_3=6L/min	$t_3=10/6x2.303\log(60,000/40,000)\approx0.68$

Total: t_0=1.14min

2. Calculation for Suction by Vacuum

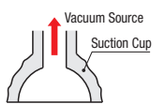
• Vacuum Suction

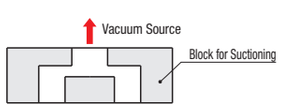
Vacuum suction means sucking an object to vacuum side utilizing differential pressure between vacuum and atmospheric pressure.
Atmospheric pressure indicates 1kg/cm². Accordingly, differential pressure is 1kg/cm² under absolute vacuum; 0.5kg/cm² under 50662Pa (1/2 pressure).

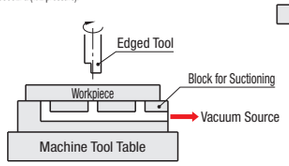


• Actual Suction

When suctioning, suction cup or suction block is generally used.

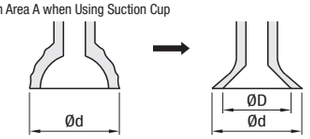






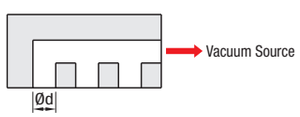
Strength of vacuum suction depends on performance of vacuum pump or the area of suction cup or suction block.

Suction Area A when Using Suction Cup



Before Suction A=πd²/4
After Actual Suction A=πD²/4

Suction Area A when Using Perforated Block



A=πd²/4x(n: Number of Holes)

• Actual Calculation Example

$$W=\frac{(101,324-P)}{101,324}xAxT$$

W: Theoretical Suction Power (kg)
P: Pressure of Suction Pad (Pa)
A: Area of Suction Pad (cm²)
T: Power by Atmospheric Pressure (1kg/cm²)

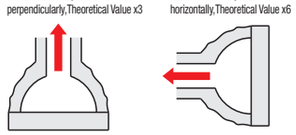
• Actual Calculation Example

(Ex.) Area of suction pad when suspending load of 0.5kg perpendicularly. Assume that pressure of suction pad is 40,000Pa.

$$A=\frac{(101,324xW)}{(101,324-P)xT}=\frac{(101,324x0.5)}{(101,324-40,000)x1}=0.83(cm^2)$$

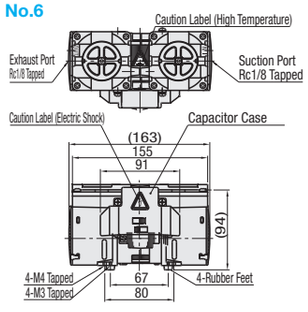
Considering that workpiece is suspended vertically: 0.83x3=2.69cm²

• Safety Factor

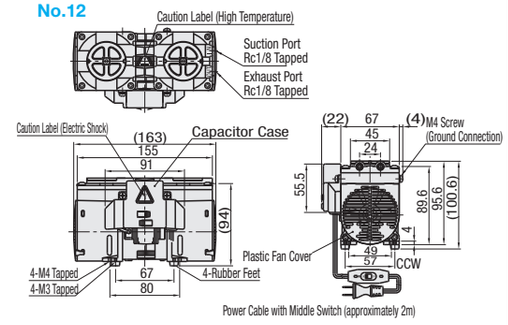


Type	Material				
	Main Body	Pump Head	Diaphragm	Head Gasket	Valve
DAPMP	SUS304	ADC	Ethylene Rubber (EPDM)		Fluororubber (FPM)

No.6



No.12



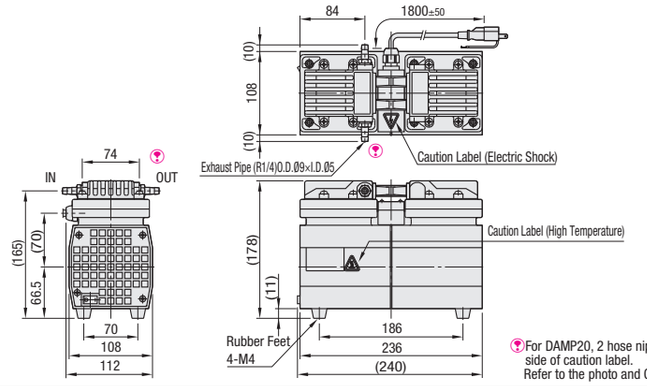
Intake/exhaust pipe (hose nipple) is not included.
For detailed dimensions, refer to CAD data.

Part Number		Effective Exhaust Velocity L/min	Pressure Obtained Pa	Applicable Motor	Full Load Current A	Mass (kg)	Diameter of Inlet and Outlet (mm)	Operating Temperature Range (°C)	Unit Price	Volume Discount Rate
Type	No.								Qty. 1 ~ 2	Qty. 3 ~ 4
DAPMP	6	6/7 (50/60Hz)	$6.65x10^{3}$	1Ø,100V,10W 4P,condenser run	0.5 (50/60Hz)	1.9	Rc1/8	0~40		
	12	12/14 (50/60Hz)	$24x10^{3}$							

Pressure obtained is equal to an absolute pressure.

Information about Tolerance and Mounting Hole
Some combination of base components may have variations on positions of M3 and M4 within the range of tolerances.
For installation of this pipe, use of slotted hole is recommended. For example of slotted hole drilling, refer to WLM3 or 4 on **P.127**.

Type	Material				
	Main Body	Diaphragm	Head Gasket	Air Filter	Suction and Exhaust Valve
DAMP	SUS304	Rigid Rubber (NBR)		Foam Urethane	SUS Spring Material



For DAMP20, 2 hose nipples are attached on the side of caution label.
Refer to the photo and CAD data.

Part Number		Effective Exhaust Velocity L/min	Pressure Obtained Pa	Applicable Motor	Full Load Current A	Mass (kg)	Diameter of Inlet and Outlet	Operating Temperature Range (°C)	Unit Price	Volume Discount Rate
Type	No.								Qty. 1 ~ 2	Qty. 3 ~ 4
DAMP	20	20/24 (50/60Hz)	$5.33x10^{3}$	Single-phase, 100V, 60W, 4P, condenser run	1.6	7.2	O.D.Ø9xI.D.Ø5 (Rc1/4)	7~40		
	40	40/46 (50/60Hz)	$19.9x10^{3}$							

Ordering Example

Part Number
DAPMP6
DAMP40

Cautions

- Pump may not restart if internally vacuum condition after stopping. Return the pump into atmospheric pressure condition, and pump will restart.
- Be sure to remove moisture, dust and corrosive gas in absorbed gas.

• Curvature of Exhaust Velocity