

Mechanical Booster Pump Selection Guide

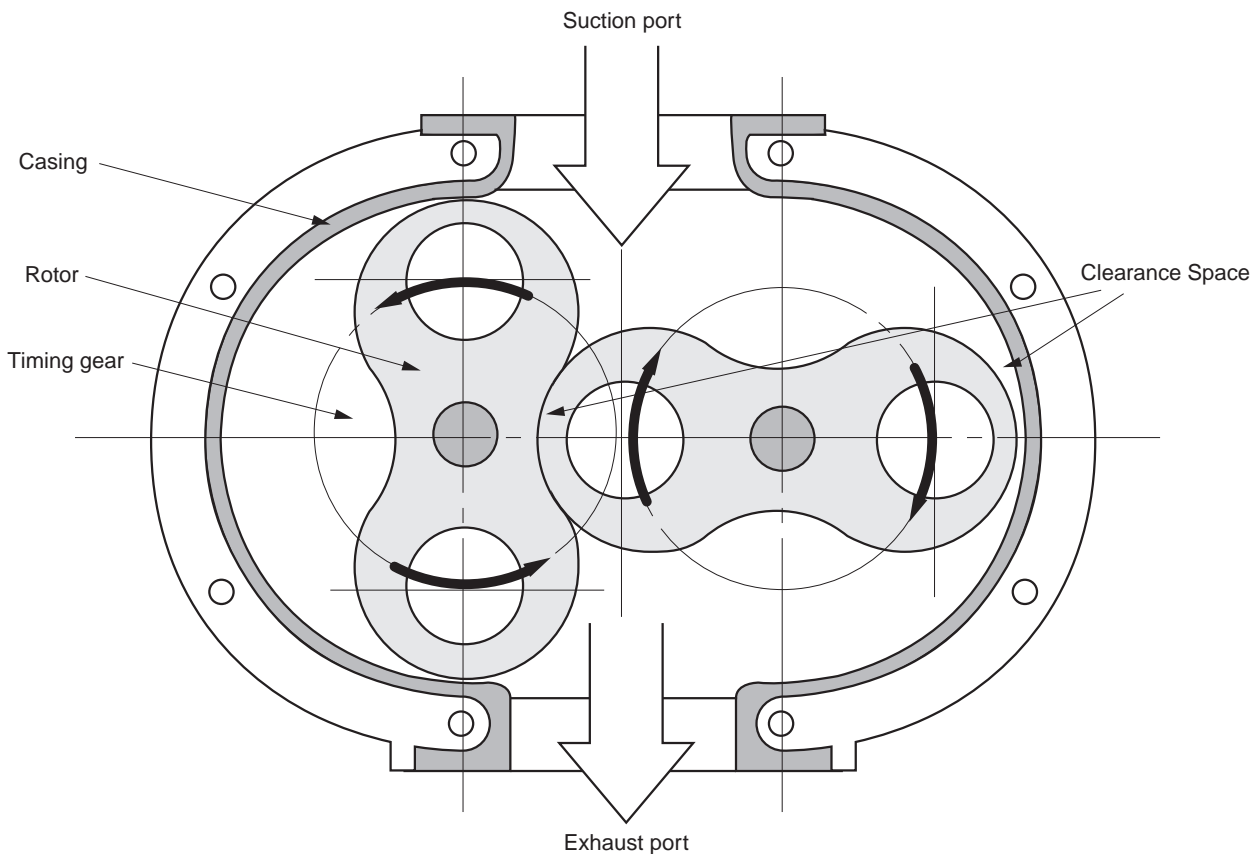
Mechanical booster pumps are used with other roughing vacuum pumps, such as oil rotary pumps, dry vacuum pumps, and water sealed pumps. As the name implies, they are used to “boost” the pumping speed of the pump to which they are connected. Mechanical booster pumps greatly increase the pumping speeds of the roughing pumps within their normal vacuum range. ULVAC has developed the PRC-A, PMB-C series pumps for use in leading-edge technology field, such as sub-micron level semiconductor processes. The product line includes models capable of pumping speeds from 100 m³/h up to 2400 m³/h. In addition, the PMB-040B and 060B are designed for evacuating the very large chamber volumes typically found in applications such as vacuum heat-treating furnaces and space simulation chambers.



Operation Principles and Structure

Mechanical booster pumps contain dual lobe-shaped rotors, which are mounted onto separate shafts within a pump housing or casing. The drive gears at the ends of the shafts that hold the rotors turn simultaneously in opposite directions. Gas entering from the suction side of the pump is trapped in the space between the pump casing and the rotors where it is then pumped through the exhaust port by the rotation of the rotors. The gas is then finally released to the atmosphere

after it passes through the connected roughing pump. Since a small space is maintained between the rotors as well as between each rotor and the casing during rotation, no lubricating oil is required within the rotor chamber. Oil-free rough vacuum pumping is therefore possible. In addition, the rotors can rotate at high speeds without worry of contact abrasion of the rotors with each other or with the pump casing.



Advantages of Using Mechanical Booster Pumps

Mechanical booster pumps can be combined with roughing vacuum pumps in order to greatly reduce the time required to reach the ultimate pressure of the roughing pump. If the roughing pump is a 2-stage oil rotary vacuum pump, maximum performance can be attained in the 10 k-0.1 Pa range. This characteristic leads to the following merits:

- (1) A very large oil rotary vacuum pump would be required to maintain pressure, in the 10 k-0.1 Pa range, in a chamber with gas flow.
 - > Use of a mechanical booster pump is well suited in this situation. Since combination with only a small oil rotary vacuum pump is needed, the vacuum system is more compact.
- (2) Mechanical booster pumps are well-suited for reducing

- evacuation time.
- * When this merit is sought, the time can be further reduced through the use of the PRC-A, PMB-CM model (atmospheric pressure driven model).
- * Selection of suitable backing pump for PRC & PMB series
A backing pump (oil rotary pump) for the PRC & PMB series should have a pumping speed equal to 1/3-1/8 of the designed pumping speed of the model to which it will be coupled. Use a standard backing pump listed in the specification table. Be advised that pumping performance may change when a pump not listed as a standard in the table is used.