

Vacuum Pumps

Introduction

The vacuum pump is one of the largest energy users on the dairy farm. The function of the vacuum pump is to remove air from the milking system creating a partial vacuum and maintaining a balance between the vacuum and airflow.

Vacuum pump

To maintain a vacuum with little fluctuation during milking air must be removed from the vacuum system at the same rate as it enters. The rate that air enters the vacuum system varies as the milking units are attached and fall off the cows. Air is also continually entering through air leaks and controlled air bleeds. A fixed speed vacuum pump is sized to remove the maximum air flow that can possibly enter the vacuum system. This pump runs at full speed during the entire milking. Because the pump is continually removing the maximum amount of air from the system a controller must vary the amount of air entering the system to always equal the amount being removed.

Variable Frequency Drives

Variable frequency drives (VFD) also known as variable speed drives control the speed of an electric motor by controlling the frequency of the electrical power supplied to the motor. This allows the motor speed of the vacuum pump to vary, depending on the demand of the vacuum. The VSD monitors the vacuum of the system and adjusts the pump speed to supply more or less air.



Source:

Energy Savings

Since the variable speed controlled pump only runs at the speed required for a specific purpose and can vary as demand varies energy savings are possible. This is more efficient than having a pump run constantly at a high speed when the higher speed is only needed occasionally.

\$\$ Savings

Annual cost to operate a 5 hp fixed speed vacuum pump for five hours each day is about \$800. A 50% reduction in operating cost would save about \$400 annually.

Vacuum Pump Maintenance

Vacuum pumps require annual maintenance as described in the operating manual for the pump. Variable speed controlled vacuum pumps should be checked to ensure there is enough airflow to keep the motor and pump cool. Overheating can reduce the life of the equipment.

Variable Speed Benefits

- Improved vacuum level control
- At least 50% less energy is required
- Increased vacuum pump life
- Less noise produced by the motor and pump
- Less air emissions

Available Funding

Programs and Business Risk Management Division, NS Department of Agriculture administers federal and provincial funding under the Farm Investment Fund for energy-efficiency implementation. There is funding of up to 50% of the costs of a variable speed control for the vacuum pump, with a cap of up to \$20,000/yr (\$40,000 max), depending on farm income level.

What Next?

After deciding to install a variable speed vacuum pump controller you should speak with your dairy equipment supplier for a cost estimate. Apply for funding the Farm Investment Fund.