



## Energy Efficiency Solutions

### Energy efficient motors in Heating Ventilation Air-Conditioning applications

You probably have noticed that space heating and cooling is one of the largest energy consuming activities within your hotel. What you probably do not know is that the motors of the ventilators, compressors and pumps involved in your HVAC applications are responsible for a large share of your electricity consumption because they generally work at full load all the time!

In fact, motors do not need to work continuously at full load. Energy efficient solutions like variable frequency drive (VFDs) are available to adjust the speed of the motors to the actual needs of your hotel and can help reduce the electricity consumption of your HVAC applications.

#### Why will I save on electricity by adjusting the speed of motors?



*Variable speed drive for asynchronous motors*

Most systems that involve flow rates (like pumps, ventilators and compressors) are used without any regulation of the motors' speed. Most of the time, the flow rate is adjusted conventionally by modifying the flow section, using valves or air shutters. The problem with this type of regulation is that motors keep running at full load, while HVAC systems rarely require maximum flow rate, thus resulting in a waste of electricity.

Adjustment of the speed of motors with an electronic device may save up to 70% on electricity compared to on-off systems. Indeed, the electricity consumption is proportional to the motor's speed cubed!

#### Which types of equipment are involved?

Most HVAC equipment (i.e. equipment used for heating, ventilation, air conditioning) is involved. For instance, water circulation pumps used in water heating systems may use a variable speed motor.



*Water circulation pump of a water heating system*



## How can variable frequency drive been used to adjust the speed of motors?

Most electric motors used in HVAC applications and hydraulics applications are asynchronous motors. To modify the speed of such motors, it is necessary to modify the frequency of the alternating current at its entrance. Variable frequency drives are electronic devices that are able to progressively adjust the speed of such motors.

### Related criteria of the EU Eco-label:



- *Not explicitly treated by the EU Eco-label criteria.*

## Which are the benefits of variable frequency drives?

- Variable frequency drives usually provide regulation functions, so the regulation of the whole system is improved. Moreover, they can also provide protection to other components of the system.
- Mechanical overload and peak pressures implied by on-off systems are avoided, thus resulting in an improved system lifetime.

## What should I take into account before installing a variable frequency drive?

- Before deciding to install a variable frequency drive, it is recommended to have a HVAC design company evaluate the energy saving that could result from this system, because this may fluctuate depending on your installation.

- More generally, the opportunity to have variable frequency drives installed on your HVAC motors really depends on the configuration of your system. Given the complexity of this evaluation, we advise you to consult a qualified HVAC design company or installer.

## Can all existing equipment work with a variable frequency drive?

Some equipment may not be able to work with a variable frequency drive – or only after motor replacement. That is why we advise you to consult a qualified HVAC design company or installer before making a decision.

## How much will my hotel save when installing a variable frequency drive?

- Cost reduction: Adjustment of the speed of motors can save up to 70% on electricity compared to on-off systems.
- Energy savings achieved result in important cost saving over a pump (or ventilator) lifetime: When looking at the lifetime of a pump (or ventilator), one can see that the initial cost of a pump (or a ventilator) is about 5% of its lifetime cost, maintenance is also about 5%, while energy consumption is about 90%! Energy saving thus results in important cost savings.

## Link with other solutions in the database

- Installation of efficient heating and cooling equipment (solutions n°XVII and XIX), and regulation of space heating and cooling (solution n°XVI) should also be considered in order to reduce energy consumption for space heating and cooling.

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