

Variable-speed drive



ABB Technology Guide

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What is a variable-speed drive?

A variable-speed drive is a piece of equipment that regulates the speed and rotational force, or torque output, of an electric motor.

The background and technology

There are millions of motors in use in industry and offices around the world. They operate sewage and irrigation pumps, milking machines and ski lifts, paper machines and power-plant fans, sawmill conveyors and hospital ventilation systems, to name just a few examples.



In fact, more than 65 percent of industrial electrical energy is consumed by motors.

In many cases, motors are controlled by means of a valve that regulates the flow of fuel or a vane that controls the airflow while the speed of the motor itself remains unchanged. These and other methods, such as using two-speed motors or controlling them by switching on or off, are inefficient from an energy point of view.

One of the main reasons why drives save energy is because they can change the speed of an electrical motor by controlling the power that is fed into the machine.

Drives and energy efficiency

ABB estimates that its drives in operation worldwide save about 115 million megawatt hours of electricity every year, the equivalent of 14 nuclear reactors.

That also amounts to a reduction of carbon dioxide emissions by 97 million tons per year, more than the annual emissions of Finland.

Using a drive with a 30 kilowatt (kW) motor running 5,000 hours a year to control the air flow in a ventilation system brings an annual saving of 76,500 kW hours of electricity compared with regulating the flow rate by adjusting a damper.

The saving is 51,000 kW hours per year compared with modulating the fans on or off and 52,500 kW hours versus the use of a two-speed motor.

The energy savings achieved can result in the investment to install drives being recovered in as little as a few months. For many pump and fan applications expenditure is often recouped in less than a year.

Still, less than 10 percent of the motors in use worldwide are equipped with drives.

Drives come in many different sizes and are typically encased in boxes that can be as small as a milk carton or as big as a wardrobe, depending on the size of the motor or motors they regulate.



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