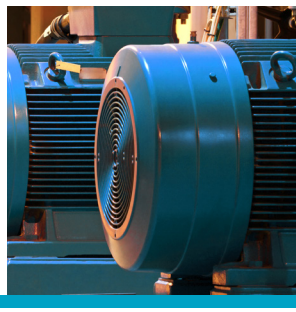
APPLICATION NOTE



UNDERSTANDING HOW CAPACITORS WORK

The easiest way to understand how a capacitor works is to compare it to a battery. They both store and release electrical energy. Their purpose and functionality, however, is much different. Capacitors are able to release energy much more rapidly—often in less than a few seconds—by storing energy in an electrostatic field.

Capacitors are attached to motors and constructed to release electrical power in different methods. The energy can either be released instantly to start the motor, or released over a period of time to keep it running. They come in many different shapes, sizes and materials to accommodate a wide range of applications.

The Function of Start and Run Capacitors

Start and run capacitors are internally constructed to meet various HVAC electrical load requirements. In an air conditioner or furnace, capacitors work with three different motors: the compressor, the blower and the outside fan. Finding the correct capacitor size is critical for motor efficiency and the life of the motor. They are sized by capacitance—their ability to collect and store energy—which is measured in microfarads (μF).

Start capacitors send an electric jolt to start the motor. Since they are designed only for motor start-up, they have higher capacitance ratings (70 μF or above) than a run capacitor. They must rapidly bring the motor to a sufficient, predetermined speed and then they are disconnected from the circuit.

Run capacitors are left connected to the auxiliary coil after the start capacitor is disconnected. Since they are designed for continuous duty they have low capacitance ratings, typically below 70 μF. They help the motor maintain a charge by changing the phase angle when the motor is powered up so its rotor turns more easily. This enables the motor to run more efficiently.

Dual Run Capacitors

Depending on the application, some can have dual run capacitors, which is a start and run capacitor housed together. By combining the two capacitors in a single unit, you get a more cost-effective option and can save space which is very helpful when you have a small mounting area.

For more information on transformers visit HartlandControls.com

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