



Shop Tech Talk August 2009

Q. Use of Capacitors with Single Phase Motors



Electric motor electrolytic capacitor: electrolytic capacitors of the correct size help to create a rotating magnetic field that starts the motor. The capacitor's voltage rating must be as high or higher than the voltage applied to the start winding circuit. They range in size from 25 to 1,400 microfarads . They are the type used in all **capacitor-start** motors and the **start capacitor used in capacitor-start, capacitor-run motors**. They are not designed to stay permanently in circuit(only a few seconds) so they are always used with a start winding and a start -winding switch assembly (stationary switch and rotor device), potential relay or electronic start switch. The start switch assembly is responsible for connecting and disconnecting the start winding.

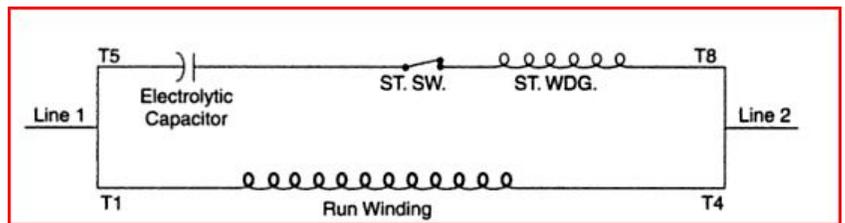
An electrolytic capacitor can fail either

1. Shorted: motor has very little starting torque
2. Open: motor won't start
3. Becomes weak: reduces the motor's starting torque

Capacitors can be connected in

- Parallel: do not need the same microfarad(mfd) rating, ratings of each capacitor added together
- Series: must have the same microfarad rating, combined rating is rating of 1 capacitor divided by the number of capacitors in series. There are never more than 2 capacitors connected in series with each other.

The "at rest" position of a capacitor-start motor's start contacts



Electric motor oil-filled capacitor: used mainly in **permanent-split capacitor (PSC) motors** (often called capacitor -run motors) and in **two-value capacitor motors(capacitor-start,capacitor-run motors)**. They are designed to be connected continuously in the circuit and are physically much larger than an electrolytic capacitor of equal microfarad value. They range in size from 1 to 70 microfarads (μF). The voltage rating of the oil-filled capacitor should be at least 2 x that of the motor.

This type of capacitor is used to improve the power factor of a capacitor-start,capacitor-run motor and in a PSC motor it shifts the current flow of the start winding ahead (in time) of the current flow in the run winding. The result is a rotating magnetic field.