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SOLID STATE STARTERS FOR WOUND ROTOR MOTORS

Wound Rotor Induction Motors (or WRIM's) differ slightly from standard "Squirrel Cage" Induction Motors in that the rotor circuit is actually "wound" on an armature. The windings are brought out to terminals by a set of three "Slip Rings" on the armature shaft.

By inserting resistance into the rotor circuit (in series with the windings) we can increase the "Slip" of the motor, multiplying starting torque and reducing current inrush. As the motor accelerates the resistance is removed in steps (see Fig. 1) and the motor is gradually brought up to speed. Once all the resistance is completely removed the slip is minimized, drastically improving the running efficiency of the motor.

Typical existing applications will have a complicated and cumbersome electromechanical control which applies full voltage to the stator and then uses contacts to progressively short out steps of resistance as the motor accelerates. The weak link in this system is the contacts used to short the resistor steps. These electromechanical contacts require periodic maintenance, and by sheer quantity, become serious expenses. (see Fig. 1)

Saftronics can provide a simple, cost effective alternative by using a Solid State Starter on the stator with a single step of resistance on the rotor (see Fig. 2). The Solid State Starter smoothly ramps the motor to the slip speed (determined by the resistance value) and then activates the contactor to short the rotor, which allows the motor to accelerate to full (minimum slip, maximum efficiency) speed. This arrangement provides a smooth "stepless" start, with the same high torque and low inrush as the electromechanical starter, but without the constant maintenance.

To simplify application, installation, and serviceability, we utilize a standard starter package (chassis, NEMA 1, or NEMA 12) with the optional bypass contactor control card. We also supply a three phase resistor bank (sized according to the application data) with a built-in shorting contactor. The starter is wired to the stator of the motor, and the resistor is wired to the rotor. The only connection between the two circuits is a single pair of control wires (usually #12 AWG) to energize the resistor shorting contactor from the bypass contact in the starter. This results in a clean, simple, application that is easy to maintain and troubleshoot and provides the benefits of a Solid State Starter with a WRIM.

Since the rotor resistor must be matched to the rotor characteristics of the motor and the application, the following data is required to accurately quote the starter package:

- Motor Horsepower and RPM
- Stator Amps and Volts
- Rotor Amps (short circuit) and volts (open circuit)
- Duty Cycle
- Application

Given this information, we can quote a package that will be extremely competitive, and give trouble free service for years to come. So look for those Wound Rotor applications today!

