

APPLICATION INFORMATION NEWS

PREMATURE A.C. MOTOR FAILURES ON SMALL MOTOR APPLICATIONS

THE PROBLEM

The high speed switching which is characteristic of IGBT drives can stress the insulation system of small motors (less than 5HP). Insulation of these motors is typically less tolerant of peak and fast rising voltage due to the motors small size and low cost. The insulation failure can occur when multiple fractional HP motors are controlled by an IGBT type drive and the drive to motor wire length is less than 150 feet. This problem is not related to any particular manufacturer but is a characteristic of IGBT switching rates and motor design.

THE CAUSE

There are two main factors that cause this failure.

1. **PEAK VOLTAGE** - This is the maximum voltage rating that the insulation of a fractional A.C. motor can handle. A typical motor insulation rating for fractional motors is approx. 1200V. It is possible for an IGBT drive to develop more than 1500V.
2. **DV/DT** - This is an expression that relates to the rate-of-rise of voltage to a motor when voltage has been applied to its windings. A typical motor DV/DT rating for fractional motors is approx. 3100V/u Sec.. It is possible for an IGBT drive to develop a DV/DT capable of approx. 5200V/u Sec.

WE HAVE A SOLUTION !!!

With the addition of our standard Output Filter (option # 1788) the drive's output characteristics can be brought within the motor guideline and provide a very harmonious system. This has been documented under test by Fincor with a reputable motor manufacturer. With the use of output filters, the Peak Voltage was reduced to 1030V and the DV/DT was reduced to 2000V/u Sec. which is well within the motor's ratings of 1200V PV and 3100V/u Sec. respectively.

The output filter may be wired directly to the drive terminals or to the motor leads at the motor. For applications involving over 150ft. controller to motor wiring lengths, the filter is more effective at the motor terminals.

