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Ready For a Long Hot Summer, Part 2

Last week's Tip of the Week discussed Harmonic Voltage Factor, one of several indications provided in the Power Analysis test that allows you to monitor conditions that may contribute to the increased operating temperatures of your motors. Another critical component of keeping the operating temperature low is voltage imbalance. The *Motors and Generators* standard published by the National Electrical Manufacturers Association (NEMA MG-1) tells us that a small voltage imbalance will result in a much larger current imbalance and increased temperature rise compared with a motor running on three balanced phases of voltage. NEMA recommends derating a motor running on unbalanced voltage in order to keep the operating temperature within acceptable levels. The Power Analysis test displays the voltage imbalance calculation as well as the NEMA derating factor for you to ensure your motors are operating at an acceptable load for the level of imbalance in the voltage being supplied.

Another factor that affects a motor's operating temperature is the condition of the motor's power circuit. Even if the bus voltage is perfectly balanced, a high resistance connection in one phase of the power circuit will cause the voltage at the motor leads to be imbalanced, which will lead to excess current imbalance and increase the motor's operating temperature. The Power Analysis test allows you to monitor the current imbalance to look for high resistance connections in the power circuit. Keep in mind that whereas the voltage will only indicate high resistance connections if the voltage leads are placed downstream of the fault, the current will be the same regardless of the location of the current probes within the power circuit. Therefore, another powerful tool is to take multiple Power Analysis tests with the voltage leads connected to different locations within the power circuit in order to determine where to look for high resistance connections. (For motors run on Variable Frequency Drives, both voltage leads and current probes need to be on the drive output to provide relevant information on the condition of the motor.)

The EMAX Power Analysis test is a powerful tool that allows you to monitor voltage imbalance, voltage harmonics, and current imbalance to look for any conditions that will result in elevated operating temperatures. For further information, we recommend that those who operate and maintain motors obtain copies of the National Electrical Manufacturers Association standard *Motors and Generators* (MG-1), which can be obtained from NEMA at:

<https://www.nema.org/Standards/Pages/Motors-and-Generators.aspx>

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA[®] mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.