



A Leader in Electric Motor Testing

# Tip Of The Week

July 22, 2019

## Electric Motor Reliability Trifecta - Troubleshooting (Part 3)

*(Continuing the Trifecta series, picking the top three finishers in a horse race can be worth a lot of money. Applying the Trifecta theme to motor reliability, the top three applications of test technology to ensure you win big in reliability are: Quality Control, Trending, and Troubleshooting.)* This week we continue the Trifecta conversation of Troubleshooting.

Keeping the focus on Troubleshooting, Part 2 and 3 of Troubleshooting focused on testing an energized motor. This week we look at troubleshooting techniques and considerations when a motor is not running (de-energized), requiring controlled test signals to be sent into the motor. The fault zones related to a de-energized motor are power circuit, insulation, stator, rotor, and air gap. In less than five minutes the MCE® test can give a basic evaluation of the insulation health using resistance and capacitance-to-ground measurements, and power circuit and stator winding health using phase resistance and inductance readings. For insulation health, the PdMA default setpoints for resistance-to-ground, based on accepted industry standards, is a good place to start in determining if the insulation is acceptable for continued operation. If the resistance-to-ground is close to the limit, additional insulation tests such as a Polarization Index or Step Voltage Test may be required. For power circuit and stator health of a three phase motor, resistance and inductance values of each phase should be nearly the same depending on the rotor influence. A comparison to baseline or last test can be critical in a troubleshooting situation, so work very hard to get a baseline test as soon as possible when the motor is running normally. Elevated phase resistance on one of the phases indicates a power circuit or high resistance connection anomaly. Reduced inductance in one phase can indicate lost or shorted turns in the stator windings. Remember that copper winding has a positive temperature coefficient, so higher temperatures means higher phase resistance. However, changing temperatures has little to no effect on inductance values.

Visit our PdMA YouTube Channel at <https://www.youtube.com/watch?v=4ACW-AZddtQ> to listen to Todd and Noah discuss details on Troubleshooting for electric motor reliability. The next tip, Troubleshooting (Part 4), will discuss the considerations for troubleshooting the rotor and air gap fault zones of a de-energized motor.

*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. 166 or [lou@pdma.com](mailto:lou@pdma.com).*

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