



De-Energized Testing & Motor Circuit Analysis (MCA)[™]

What is MCA?[™]

Motor Circuit Analysis (MCA)[™] is a de-energized test method to assess the health of a motor. This method can be initiated from the Motor Control Center (MCC) or directly at the motor. The advantage to testing from the MCC is that the entire electrical portion of the motor system, including the connections and cables between the test point and the motor, is evaluated.

How does it work?

The electrical portion of a three-phase motor system contains the basic motor circuit, which is nothing more than 3 simple RCL circuits (resistive, capacitive, inductive). Each basic circuit represents one phase of the three-phase motor system. Since each phase of the motor system is identical, each basic circuit should respond the same way to an applied signal. This is also true for single-phase and DC motors.

ALL-TEST Pro instruments apply a series of low voltage, non-destructive sinusoidal AC signals through the motor windings and measure the response to these signals. Winding faults are indicated by variances in the response to the applied signal through the windings. This de-energized test takes only a few minutes and can even be performed by an entry-level technician.

The measurements* rendered by MCA[™] include:

- Resistance for connection and cable related issues.
- Impedance and inductance for rotor issues, such as air gap, casting voids, and broken/fractured rotor bars.
- Dissipation Factor to determine if the winding to ground is contaminated or overheated.
- Developing winding shorts, turn to turn, coil to coil, or phase to phase are detected and trended using Fi (phase angle) & I/F (current frequency response) measurements.**
- TVS[™] (Test Value Static) is compared to a Reference TVS[™] and if a change occurs then indicates that a change in the condition of the stator and/or rotor has occurred.
- Dynamic Stator and Rotor Signatures*** is used to automatically assess the condition of the stator and rotor, and provides the Stator & Rotor 'OK', 'Warn', or 'Bad'. It is important to note that TVS[™] is independent of rotor position in a motor in good condition. TVS[™] and the Dynamic Stator and Rotor Signatures are patent and patent-pending and represent a significant breakthrough in motor testing technology. Insulation to ground is also tested looking for issues related to the ground wall.

**Number of measurements depend upon model of MCA instrument.*



***Fi is the phase angle of the applied voltage and the resulting flow of current measured in degrees.
I/F is the percent reduction in current flow when the applied frequency is exactly doubled.*

**** Dynamic Stator and Rotor Signature is for testing AC induction with squirrel-cage rotor motors <1000V.*

Why Traditional Megohmmeter Testing Isn't Enough

Avoid unplanned downtime by proactively and thoroughly testing your motor for faults. This means going beyond the capabilities of a traditional Megohmmeter. Megohmmeter insulation testing will only detect faults to ground. **Since only a fraction of motor electrical winding failures begin as ground faults, they will go undetected using this method alone.** Moreover, surge testing requires the application of high voltages. This can be destructive when testing a motor, making it an unsuitable method for troubleshooting and true predictive maintenance testing.

ALL-TEST Pro offers more complete motor testing than any other options on the market. [Our instruments](#) go above and beyond normal testing equipment for accurate, safe, and fast motor testing. Motor testing using an MCA™ tool is very easy to implement, and the test takes less than 3 minutes. Save money and time by proactively detecting developing faults before they cause irreversible motor failures.

Successful Applications Using MCA™

- AC/DC Motors
- AC/DC Traction Motors
- Generators/Alternators
- Machine Tool Motors
- Servo Motors
- Control Transformers
- Transmission & Distribution Transformers (Virtually Any Size)
- For Commissioning Testing
- For Troubleshooting
- For Reliability Testing



Application Success Stories

Hear first-hand examples from our customers on how de-energized testing saved them time and money:

[What is 3 Minutes of Testing Worth to You?](#)

[Lessons Learned from Modern Motor Testing](#)

[MUD Prevents Motor Failure & Avoids Down Time by Testing Motors Prior to Receipt and Installation](#)

[Read All Case Studies](#)

[MCA™ FAQs](#)