

Solution Spotlight: When VFDs Can't Detect A Ground Fault

Written by MT Staff

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You may be putting your personnel and motors at risk.

Driven by concerns over arc-flash hazards, more plants are converting to high-resistance ground (HRG) electrical systems.

Unfortunately, many maintenance managers don't realize that the ground-fault protection built into their variable frequency drives (VFDs) won't work with a high-resistance grounded system. They assume their personnel and motors are protected, when in truth they may be placing both at risk.

HRG limits ground-fault current and prevents a phase-to-ground condition from escalating to an arcing fault. Many VFDs are designed for use with solidly grounded systems—*where large ground-fault currents are possible*

. Typically, a VFD's on-board ground-fault protection is set to trip at a high value, such as 50% of full load. In an HRG system, however, the ground-fault current will never reach the 50% set point. Consequently, a ground fault may go undetected and cause costly damage to the drive and motor.

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Littelfuse engineers noticed this problem after investigating a situation at a refinery that had suffered damage to a low-voltage motor. Their research revealed that 29 of 30 popular-brand VFDs appeared to have ground-fault protection incompatible with HGR systems.

For the refinery, the solution was to install PGR-5701 Ground-Fault Relays from Littelfuse. The PGR-5701 is a microprocessor-based ground-fault relay compatible with solidly and resistance-grounded systems. It can detect a ground fault across the commonly used variable-frequency range of a VFD, and can—*thanks to advanced digital filtering technology*—work reliably in the presence of considerable harmonic noise. The output contacts can be connected to an alarm system, such as a PLC, can be connected to stop the VFD or trip an upstream circuit-interrupting device. Properly located, the relay can detect a ground fault in the VFD and downstream (load side) of the VFD.

Beyond detecting fault current, the relay can reveal leakage currents as they develop. Motor insulation can be damaged due to moisture, vibration, chemicals and dust. A sensitive ground-fault relay with advanced filtering will detect insulation breakdown at an early stage without nuisance tripping. In fact, the PGR-5701 relay acts as a preventive-maintenance device, alerting operators to a problem before equipment is severely damaged. This could save thousands of dollars in downtime, replacement parts and liability lawsuits.

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For more info, enter 30 at www.MT-freeinfo.com