Engineering Services

Power Systems Engineering

High resistance grounding conversions

SQUARE D Services offers engineering services to assess, design and apply power system conversions using component-based or packaged high resistance grounded (HRG) systems.

HRG power systems are used in facilities with continuous, uninterrupted power requirements. They allow non-stop power system operation during a ground fault due to low ground fault current levels. Facilities with ungrounded (delta) electric power systems often experience equipment damage, excessive voltage transients and high maintenance costs associated with ground faults.

Considerations for Converting to High-R Grounded Systems:

Facilities that rely upon uninterrupted power

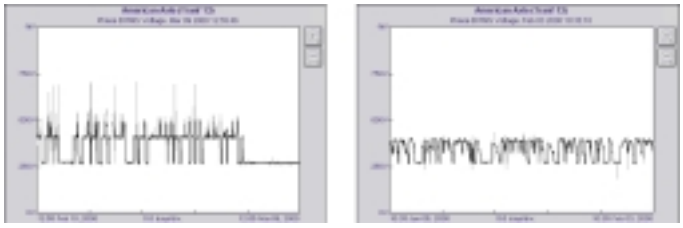
Facilities with existing ungrounded systems

Facilities that require continuous operation

Circuits with line-line connected loads

Advantages of a System Conversion Engineering Assessment

- Optimizes your time and resources
- Ensures the HRG conversion is specific to your needs
- Relieves concerns regarding harmonics, protective relaying and sensitive loads
- Minimizes your HRG conversion costs
- Leverages your facility's technical staff and resources



Left: Damaging voltage transients measured on 480 V ungrounded system. Right: Same circuit converted to high resistance grounding; transients eliminated.

A System Conversion Includes

- Onsite engineering assessment by a professional engineer
- Assessment of ground fault maintenance and repair practices
- Evaluation of ground fault relaying requirements
- Codes and standards compliance review
- Selection of HRG conversion equipment, whether free-standing or mounted in existing enclosures
- Bills of material, drawings and specifications to facilitate procurement and installation
- Start-up and commissioning services (optional)

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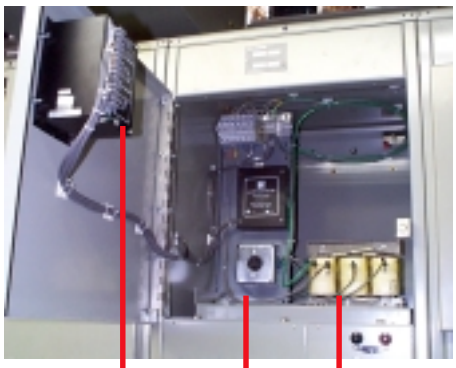
Case Study: Ungrounded to High-R Conversion

The conductor and locknut (shown at right) were the result of an arcing ground fault, an intermittent contact between the energized wire and its conduit enclosure. This was initiated by a nick in the wire insulation. The arcing caused numerous, repetitive voltage transients of 2-3 times normal voltage to cascade throughout the power system. These transients caused more insulation breakdown, which resulted in more ground faults. Occasionally, a second ground fault would appear on a different phase. The resulting phase-to-phase fault caused further catastrophic results at both ground fault locations.

SQUARE D Services identified the ground fault problems and offered a three-fold solution:



Convert the ungrounded substations to high-resistance grounded system: SQUARE D Services utilized a zig-zag transformer to create a neutral point on each substation. The zig-zag transformer consisted of 3 small coils on a common core, wound to form a neutral for the system.

Design a portable pulsing system to facilitate ground fault location: Next, SQUARE D Services designed a portable pulsing system, consisting of a portable test unit which could be moved among the 22 substations. The unit, when plugged into a special receptacle in each substation, generated a unique signal that could be detected by a common ammeter and current probe.

Install a power monitoring system to provide early warning on gound fault and to measure a variety of additional power system parameters: Finally, each substation was equipped with a POWERLOGIC® CM3000 Circuit Monitor. Each circuit monitor was connected to a central computer workstation so that detected ground faults would immediately trigger an alarm at the central workstation.

SQUARE D Services designed and implemented a cost-effective solution with no delay in productivity. Plant electricians can now locate and repair ground faults quickly and effectively, with minimal disruption to the process.

Did You Know?
Many facilities also convert their solidly-grounded systems to HRG to improve process continuity and reliability.

Contact your SQUARE D sales representative for additional information, call 1-888-778-2733, or visit www.SquareD.com.

Emergency Services Available
24 Hours/Day-7 Days/Week

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