

SERVICE FEATURE / **COMPREHENSIVE RELAY SETTINGS**

GRID RELIABILITY DEPENDS ON SOPHISTICATED PROTECTIVE RELAYS

As power grids grow more complex, sophisticated protective relays are essential for the reliability and resilience utilities require. Programming, installation and commissioning of these relays calls for a team that understands that every utility system has a unique operating profile.



DIGITAL RELAYS FORM THE HEART OF A ROBUST, FLEXIBLE AND ADAPTABLE PROTECTION SYSTEM

Faults may occur on any part of the power delivery system. From transmission lines to distribution feeders, with bus bars, transformers and circuit interrupting devices in between, faults can interrupt the flow of power. If not quickly isolated, the flow of heavy fault current through the system can seriously damage equipment, causing a lengthy loss of service until repairs are made.

Protection systems are the guardrails against that kind of extensive damage and service interruptions. Today's digital systems are fast and selective in isolating only the section where the fault occurred in the shortest possible time. When the system works properly, faults will cause only minimal disturbance to the system and often go unnoticed by customers.

PROGRAMMING THROUGH MANUFACTURERS' SOFTWARE

As utilities increase automation of transmission and distribution grids, relay programming needs are growing. This comprehensive approach starts with an analysis of the protection scheme that is appropriate for the needs and configuration of each system.

All elements of the electrical grid are modeled in power system analysis software to simulate fault currents, terminal voltages and impedance reaches. Calculations are performed on the basis of the data obtained and relays are set to protect the subsystem

of interest as well as to coordinate with adjacent relaying. In addition, custom automation tools are developed within power system analysis software, thus enabling settings to be developed efficiently and accurately.

FULL SCOPE OF COMPREHENSIVE RELAY PROTECTION

Comprehensive relay protection services are designed to optimize protection schemes so that the smallest area possible is subject to tripping and a loss of service.

OUR SCOPE OF SERVICES PROTECTIVE RELAY SETTINGS

Programming for applications is performed in collaboration with utility engineering teams, developing protective settings for systems all the way up to 500-kV. This can include line and feeder protection (piloted and non-piloted), transformer protection, bus protection, breaker control and protection, capacitor bank protection, and reactor protection. Programming includes relay systems from leading manufacturers like SEL, GE, ABB and Siemens.

PROTECTION REQUIREMENTS

The protection configuration is created based on each utility's specific design standards, meeting all North American Electric Reliability Corp. (NERC) Critical Infrastructure Protection (CIP) standards. We have worked alongside utilities to implement standards that exceed current NERC CIP protocols.

NERC COMPLIANCE

Protection and control (PRC) and CIP reliability standards are always evolving. Complying with these standards is vital and many utilities rely on partners with in-depth knowledge to keep ahead of these changes.

IEC 61850 IMPLEMENTATION

Implementing IEC 61850 standards can help improve service reliability, decrease substation wiring or move toward a standards-based approach for substation communications. Working with consultants with a deep base of experience with IEC 61850 scheme design, testing and implementation helps make this transition a smooth one.

COORDINATION STUDIES

Protection coordination studies are recommended for transmission systems up to 500-kV. Studies typically encompass protection data collection, power system model validation, protection data modeling, extensive fault studies and coordination reviews — finding and resolving miscoordinations to address specific needs.

EVENT ANALYSIS

COMTRADE event reports are reviewed to evaluate performance of protective systems and provide protection recommendations when necessary.

TESTING AND COMMISSIONING SUPPORT

Startup and commissioning support includes drafting and



overseeing execution of checkout procedures complying with NERC CIP requirements. Our Networks, Integration & Automation (NIA) Lab is available for testing and comprehensive evaluation of protective relay logic and communication devices, firmware upgrades and a wide range of communication network integration services.

EXPERIENCE, KNOWLEDGE AND COMMITMENT TO QUALITY

The Substation Protection Application Group at Burns & McDonnell provides the custom programming support utilities need when upgrading and automating substations and related power delivery equipment. With experience on dozens of systems

throughout North America, ranging from 12.5-kilovolts (kV) up to 500-kV, protection engineers work alongside the utility's engineering team to develop protection application solutions that are tailored to meet specific operational requirements. In-depth knowledge, commitment to quality and timely project delivery are the formula for success in addressing utility protection needs.

THE BURNS & McDONNELL DIFFERENCE

True partnerships lead to successful projects. At Burns & McDonnell, we dedicate experienced and innovative leaders to your work, beyond the specific needs of a particular job and always with safety in mind. We build long-term relationships as

our people — engineers, architects, construction professionals, scientists and more — become valued extensions of your own teams, often for decades at a time. It's a point of pride that our clients find it difficult to tell the difference between a

Burns & McDonnell employee and one of their own. And that's no surprise, considering that we, as employee-owners, carry the commitment of ownership: We succeed when you do.

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