



PROTECTIVE RELAY SETTINGS

A critical factor for meeting your overall power system safety and reliability objectives is properly designed and coordinated protection settings. PGE's Relay Settings engineers have a broad range of experience creating setting files to protect Transmission, Distribution, and Generation systems up to 500kV. Our Relay Settings engineers are experienced in finding the optimum balance between security and reliability while also adhering to NERC standards. Contact us today for all of your Relay Settings needs.

PROTECTIVE RELAY SETTINGS SERVICES

www.powergridengineering.com/substation-engineering-services

TRANSMISSION LINE PROTECTION

- Multi-zone Step Distance
 - Mho
 - Quadrilateral
- Communication Assisted Tripping Power
 - Line Carrier
 - Fiber Optic
 - Microwave
 - Phone Lines
- Line Current Differential
- Shunt Reactor Protection

SUBSTATION PROTECTION

- Breaker Control
 - Breaker Failure
 - Reclosing
- Switchgear
 - Arc Flash Fiber Optic Protection
- Bus Differential
 - High Impedance
 - Low Impedance
- Transformer Differential
- Capacitor Control and Protection
 - Grounded and Ungrounded Single and Dual Stage

GENERATION PROTECTION

- GSU Protection
- Motor Bus Protection
- Switchgear Protection

DISTRIBUTION LINE AND SUBSTATION PROTECTION

- Differential Protection
- Backup Overcurrent Protection
- Fast Bus Differential Blocking Schemes
- Automation Schemes

SHORT CIRCUIT AND BREAKER PROTECTION

- ASPEN Oneliner™ Software
- CAPE Software

INTERCONNECTION STUDIES

- Short Circuit Studies
- Breaker Duty Studies
- Interface Protection

ARC FLASH HAZARD ANALYSIS

- IEEE 1584
- ArcPro

NERC STUDIES

- PRC-023-3
- PRC-025-1

ASPEN Oneliner™ is a Trademark of Advanced Systems for Power Engineering, Inc.



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RELAY SETTINGS PORTFOLIO HIGHLIGHTS

www.powergridengineering.com/protection-relay-settings

230/115 kV Transmission Substation Rebuild Arkansas	Developed relay settings for a three terminal 230 kV Ring Bus, 10 terminal 115 kV Double Bus, 22.5 MVAR Capacitor Bank and 230/115 kV Autotransformer.
Relay Settings Cross-Checking Review Illinois	Protective relay setting cross-checking review process including Relay coordination, I/O programming and logic settings. Ensure NERC PRC-023 Loading Criteria evaluation over multiple transmission substation projects.
230/115/46 kV Substation QA Review Georgia	QA Review of proposed Relay Settings, logic diagrams and coordination studies for the addition of 230/115 kV Autotransformer, and complete rebuild and relocation of existing 115/46 kV transmission substation. This included replacement of protective relay and controls, and coordination of surrounding transmission systems.
Distribution Protection Coordination Design Study Florida	Developed Relay Settings philosophy to protect feeders at 15 kV, 25 kV and 35 kV voltage levels including minimizing I _{2t} values. Coordinated feeder breakers with main breakers and power transformer backup overcurrent relays and protected gateway underground cables and overhead main feeder conductors.
Distribution Substation Relay Coordination Review Florida	Reviewed Distribution Protection and Control philosophies and Relay Settings.
Fault-Breaker-Protection Logic Study Georgia	Short circuit logic model fault study, breaker duty logic study and protection logic recommendations for interconnection of generation.
Origin Wind Farm Oklahoma	150MW 138/34 kV Wind Collector Substation. Protection Application logic, Short circuit model, Overcurrent Coordination Study, Relay Setting Files, SCADA Setting Files and PRC-023-2 report.
Solar Collector Protection & Control Settings Ontario, Canada	Solar Collector Protection & Control Settings Ontario, Canada
500 kV Line Protection Master Template Florida	Designed a company-wide standard for Relay settings when applying protection to 500 kV buses connected in a breaker and half configuration. The design also included a Primary-1, Primary-2 and Primary-3 panels and all associated drawings. The result was a standard that could be used by engineering staff to apply the protective scheme to either new or existing facilities.
Autotransformer Relay Settings Massachusetts	Replaced two existing 345/115 kV autotransformers with two higher-capacity autotransformers. Upgraded transformer and bus differential relays for both autotransformers. Provided relay settings for new relays.
Autotransformer replacement Relay Settings Massachusetts	Replacement of an existing 345/115 kV autotransformer with a new higher capacity Autotransformer. Provided relay settings for existing relays that required modifications.

To learn more about *PGE* services and solutions, visit powergridengineering.com or call (321) 244-0170

