ABB generation protection and control systems
NERC/PRC reporting

As the owner/operator of critical generation assets identified as part of the NERC Bulk Electric System (BES), you need confidence that your generator protection system can ensure maximum protection and provide post event logging. ABB generation protection solutions deliver core information where it is needed, while cost-effectively safeguarding your assets.

Challenges
Your unit was delivered more than 10 years ago and is approaching its first, or perhaps second, protection upgrade. Regulatory requirements, grid modernization phenomena such as subsynchronous oscillations, operational and footprint challenges are all driving the requirements for your next upgrade decision. Your current system has served you well, but aspects of its design will become increasingly problematic:

• It is based on electromechanical or first generation microprocessor generator protection relays deploying antiquated protection philosophies, exposing generation assets to greater risk.
• It shuts down when the frequency is less than 55 Hz, leaving your unit unprotected.
• It does not offer protection against stator or rotor winding earth faults.
• NERC/PRC regulations have significantly increased your disturbance reporting obligations and maintenance efforts.
• It cannot detect and respond to subsynchronous oscillations and subsynchronous resonance coming from your grid connection.
• It is not compatible with the latest protection and control technologies available in the digital world.

Situational analysis/background
To meet the challenges of today, and tomorrow, aging generation assets must continue to operate efficiently with minimal downtime, under increasing regulatory reliability pressure. Unfortunately, many generation owners deploy systems operating on outdated technology making it difficult or costly to comply with reliability standards. Advanced solutions delivering improved reliability and system performance are essential to securely protect generation assets.

ABB delivers the power of one solution for protection and control. Complying with NERC reliability standards is essential to ensure your assets are protected, and when an event occurs, the critical data is available to enable forensic examination.

• General guideline for BES classification (ever-changing)
  - Generating stations with > 1000 MVA production
  - Generators stations with a unit > 100 MVA
  - Generating stations with a transmission grid connection > 100 kV

• Applicable standards
  - PRC-002 Disturbance Monitoring and Reporting Requirements
  - PRC-005 Transmission and Generation Protection System Maintenance and Testing
PRC-002 standard defines the requirements for post-event analysis of disturbances that would result in the generator’s unplanned disconnection from the grid. The standard requires sequence of events (SOE) recording, fault recording, and dynamic disturbance recording (DDR).

PRC-005 standard defines the requirements for maintenance and testing of generation protection systems. Periodic testing is required to ensure that the protection system is fully functional.

Electromechanical and first generation microprocessor protection systems have limited self-diagnostics capabilities. Therefore, legacy protection systems must be tested every six years to ensure they will work when a system fault is present.

Points to consider
• What components of your generator protection and control system are original equipment?
• Which components have previously been upgraded? When were the upgrades performed?
• When is your next planned generator outage? Upgrade outage?
• Do you operate as a base load unit or as a peaking unit? If peaking, roughly how many starts per year?
• Do your existing generation assets utilize advanced protection solutions capable of protecting 100% of the stator and rotor windings from earth faults?
• Have you been impacted by subsynchronous oscillations or subsynchronous resonance?
• Are you in proximity to:
  - HVDC devices
  - Series capacitance, STATCOM, SVC or other active devices
  - Wind farms
• Are you able to comply with all the requirements of NERC/PRC as it pertains to generators?

The solution
ABB protection and control solutions allow for increased capability at a significantly smaller footprint while easily interfacing to your existing primary system to monitor and protect generator assets. ABB’s REG670 protection and control solution offers state-of-the-art microprocessor technology to support your compliance with PRC-005 through extensive self-diagnostics. This ensures system dependability, maximum asset protection and minimizes costly maintenance and testing efforts. The REG670 also supports your compliance to PRC-002 by tracking the source of key event data to the event reliability and post-mortem analysis system.

Coupled with ABB’s automation portfolio, ABB’s generation protection, control and monitoring solutions provide improved system visibility through information availability, improved maintenance logging and audit trails, with improved system diagnostics to support your road to compliance.

Advanced applications
• Generator and unit transformer protection in one protection device
• ABB’s patented turn-to-turn winding detection for ultrafast fault detection and clearance
• ABB’s patented frequency tracking algorithm to protect the asset during generator startup and shutdown
• Smaller footprint, reduced control system wiring and integrated control for flexible automation
• NERC/PRC compliant trending, reporting and display
• Synchronizing and excitation systems for automatic voltage regulations for synchronous generators

Next steps:
Arrange a visit from our technical team to discuss:
• The latest technological advances in generator protection and control
• Support of NERC/PRC compliance requirements for your system
• Requirements for your next generator protection and control upgrade and a budgetary estimate for ABB solutions

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