Generator Protection Application and Testing

Solutions: CMC-Family, Test Universe

Summary: Get a thorough introduction to generator protection in a combination of theoretical and hands-on sessions. Get familiar with generator protection relays from different manufacturers. Learn how to efficiently test generator protection relays.

Prerequisites: Basic knowledge of protection testing

Duration: 3 days Language: English Code: C.0182.AAX

Objectives

> Become familiar with synchronous generator types used by utilities and industry
> Understand the key principals of generator protection
> Use Test Universe to effectively commission or test modern generator protective relays
> Learn to avoid common testing and maintenance pitfalls
> Become familiar with generator protection event record analysis

Topics

> Generator Introduction
> Generator grounding and protection connections
> Stator ground fault protection schemes
> Stator phase fault protection schemes
> Abnormal operating conditions
> System Backup Protection
> Generator relay control functions

Solutions

> Test Universe Software
> CMC-Family

Audience

Technical staff from electric utilities or companies involved in commissioning or maintenance of generator relays.

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Content

- Introduction and Basic Concepts
  - Fundamental concepts
  - Generator types
  - Basics of generator control
- Protection connections
  - Generator Grounding
  - Open delta and wye potential transformer connections
  - CT polarity conventions
  - Efficient test connections
  - Metering checks
- Stator Ground Fault Protection
  - Ground fault protection for direct and low impedance grounded machines
  - Ground fault protection for high impedance grounded machines
- Stator phase fault protection schemes
  - Generator phase differential
  - Split phase differential
  - Overcurrent protection
- Abnormal Operating Conditions
  - Phase over/under voltage
  - Reverse power
  - Loss of field
  - Negative sequence overcurrent protection
  - Over current protection
  - Potential fuse loss
  - Out of step
  - Over/under frequency protection
- System Backup Protection
  - Phase Distance
  - Phase overcurrent
  - Neutral overcurrent
- Laboratory Testing
  - Beckwith M-3425A
  - SEL 300G

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Agenda

Day 1:

Afternoon session

1:00 PM Welcome, Agenda Overview
1:15 PM Introduction and Basic Concepts
3:00 PM Protection Connections and Laboratory Practice
5:00 PM Adjourn

Day 2:

Morning session

8:00 AM Stator Ground Fault Protection Theory and Laboratory Practice
10:00 AM Phase Fault Protection Theory and Laboratory Practice
12:00 PM Lunch Break

Afternoon session

1:00 PM Abnormal Operating Condition Theory and Laboratory Practice
4:00 PM Adjourn

Day 3:

Morning session

8:00 AM Abnormal Operating Condition Theory and Laboratory Practice (Continued)
12:00 PM Lunch Break

Afternoon session

1:00 PM System Backup Protection and Laboratory Practice
4:00 PM Adjourn

Day 4:

Morning session

8:00 AM System Backup Protection and Laboratory Practice (Continued)
9:00 AM Generator Fault Event Analysis
11:30 AM Feedback and Wrap Up,
12:00 PM Adjourn