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COURSE BROCHURE

Automated Protection Relay Testing and Test Plan Design Training Course

4 – 8 January 2027
Geneva

Automated Protection Relay Testing and Test Plan Design Training Course

Ref: 2708_103389 **Date:** 4 – 8 January 2027 **Location:** Geneva **Fees:** 7500 GBP

Automated Protection Relay Testing and Test Plan Design is a 1-week training course for protection and commissioning engineers who prepare, run and sign off relay tests, and it ends with a reusable automated relay test plan for one protection scheme. Utilities and industrial plants now rely on numerical relays with many interacting elements, so manual test sheets miss settings and slow outages. Jupiter Prime Training delivers this course on automated protection relay testing.

Why Automated Protection Relay Testing Matters Now

Three forces are reshaping relay testing. Numerical relays carry many functions, logic equations and communication links, so pickup and timing checks alone leave much unproven. Outage windows are shrinking as networks carry more load and inverter-based generation, leaving less time per bay. And experienced relay testers are retiring, taking unwritten test habits with them. Organisations in utilities and heavy industry that capture methods in version-controlled automated test plans find setting errors before energisation; others risk maloperation and disputed commissioning evidence.

Who Gains Most from Automated Protection Relay Testing

- Engineers commissioning new substations and plant switchboards
- Engineers running periodic tests on in-service relays
- Engineers issuing relay settings that need proving
- Engineers accepting contractor test reports for asset owners
- Engineers investigating relay maloperations

A protection testing section gains most when several members attend and agree one shared template library.

Automated Protection Relay Testing Capabilities

Participants move from single injections to sequences that prove a whole scheme.

- Specify a test set configuration and wiring arrangement for a relay — the test engineer preparing for site
- Design an automated test plan from a relay settings file — the settings engineer issuing new settings
- Test distance zone boundaries with search and shot tests — the commissioning lead
- Test differential slope and harmonic blocking — the asset owner accepting a scheme
- Apply synchronised end-to-end line testing — the teams coordinating an outage
- Assess test reports for gaps, tolerances and failed assertions — the engineer approving energisation

Key Automated Protection Relay Testing Terms

- Secondary injection — applying test currents and voltages to the relay inputs from a test set.
- Test plan — ordered test modules, each linked to a setting with an expected result and tolerance.
- Search test — an automated sequence that moves fault values stepwise to find where an element operates.
- Shot test — a single fault applied at a chosen point to confirm that an element trips or stays stable as predicted.
- End-to-end test — simultaneous fault simulation at both ends of a line to prove the scheme and its channel.
- Assessment — automatic comparison of a measured trip time or pickup with its expected value and tolerance.

Automated Protection Relay Testing Day by Day

Day 1: Test Sets and Relay Inputs

- Secondary Injection Test Set Architecture — Choosing Current and Voltage Outputs
- Relay Input Wiring and Test Plugs — Safe Isolation of Trip Circuits
- Binary Inputs, Outputs and Timing Contacts — Measuring Real Operating Times
- Relay Settings Files and Parameter Export — Linking Tests to Issued Settings
- Test Object Definition and Tolerances — Setting Pass Criteria Before Testing

Day 2: Building Automated Test Plans

- Test Module Libraries and Templates — Reusing Proven Sequences Across Bays
- Overcurrent Pickup and Inverse Time Curves — Proving Grading Margins
- Ramping and Sequencer Modules — Checking Voltage and Frequency Elements
- Protection Logic and Scheme Interlocks — Confirming Configured Trip Paths
- Test Plan Version Control — Aligning Tests With Setting Changes

Day 3: Distance and Differential Elements

- Distance Zone Reach and Impedance Characteristics — Locating Boundaries With Search Tests
- Power Swing Blocking and Load Encroachment — Proving Stability Under Heavy Load
- Differential Slope and Restraint Characteristics — Balancing Sensitivity and Stability
- Second Harmonic Inrush Blocking — Avoiding Trips on Transformer Energisation
- Through-Fault Stability Shots — Confirming No Operation for External Faults

Day 4: End-to-End Line Scheme Testing

- Time-Synchronised Test Sets at Both Terminals — Coordinating Remote Fault Simulation
- Teleprotection Signalling and Channel Delay — Verifying Permissive and Blocking Schemes
- Line Differential Communication Paths — Checking Alignment and Channel Failure Response
- Autoreclose Sequences and Breaker Simulation — Proving Dead Times and Lockout
- Disturbance Record Playback — Replaying Real Faults Through Relays

Day 5: Practising the Automated Relay Test Plan

- Settings File to Test Object Conversion — Applying Day 1 Methods to a Case Bay
- Distance and Differential Module Selection — Applying Day 3 Tests to the Case
- End-to-End Sequence Planning — Applying Day 4 Coordination to the Outage Window
- Test Report Analysis and Failed Assertions — Deciding Retest or Setting Review
- Automated Relay Test Plan — Completing the Scheme Test Package for Sign-Off

Applying Automated Protection Relay Testing After the Course

- Convert one existing manual test sheet into an automated template with stated tolerances and assessments, and trial it on the next maintenance outage.
- Run a test report review on a recent commissioning package, marking untested settings and failed assertions for the settings engineer.

Automated Protection Relay Testing Questions FAQ

What is automated protection relay testing and why does it matter now?

Automated protection relay testing uses test set software to run predefined sequences against relay settings and assess the results automatically. It matters now because relays hold many functions and outage windows are short.

Which roles gain most from automated protection relay testing?

Commissioning and maintenance test engineers gain most, followed by settings engineers and asset owner representatives who witness tests. The methods apply in utilities, industrial plants and generating stations.

How does automated protection relay testing differ from a protection settings course?

Automated protection relay testing focuses on proving settings, not calculating them. A settings or coordination course works out reaches, slopes and grading margins; this course builds the test sequences and report checks that prove them.

What do you bring back from automated protection relay testing training?

You bring back a test plan for one protection scheme, built from its settings file, with modules, tolerances and assessments ready to run. You also bring a method for reviewing failed results.

Automated Protection Relay Testing: The Way Forward

The automated relay test plan is the first thing to put to use: it informs the test sequence for the next outage on the case bay. Test engineers run it, settings engineers check it against the issued file and asset owners accept its report. After first use, revisit the tolerances and end-to-end sequence where site conditions showed gaps.