



542+ Relay Logic Configuration and Programming Training

22 – 26 November 2026
Manama (Bahrain)



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Introduction:

The 542+ Relay Logic Configuration and Programming training course provides in-depth technical insight into the functionalities, configuration, and programming aspects of the ABB REF542plus control and protection relay. It is for professionals working in electrical protection, automation, and control systems. It provides both theoretical foundations and practical applications.

Participants will explore the relay's logic programming capabilities, inputs and outputs, communication settings, and protection elements. The 542+ Relay Logic Configuration and Programming course emphasizes hands-on programming using ABB's configuration software:

- ABB REF542plus Configuration Tool V4F.08b, V4F.09b, or V4F.11A - for relay configuration and internal logic.
- REF542plus SCL Tool Ver. 4.0 - for IEC 61850 configuration and communication integration.

The 542+ Relay Logic Configuration and Programming program bridges the knowledge gap between theory and field applications. Attendees will master relay logic sequences, programming ladder logic functions, and managing relay settings. Professionals will confidently configure, test, and troubleshoot REF542plus relays in various electrical systems with confidence.

Targeted Groups:

This 542+ Relay Logic Configuration and Programming training targets professionals seeking specialized knowledge and skills:

- Electrical engineers working in power systems.
- Control engineers are involved in the automation of substations.
- Protection and relay technicians.
- Maintenance engineers in utilities and industries.
- Supervisors manage electrical installations.
- Technicians working in electrical substations.
- SCADA system engineers.
- Energy consultants and technical staff in the power sector.
- Professionals transitioning into protection and control.
- Electrical trainers and instructors.

Course Objectives:

Participants will achieve the following objectives by completing the 542+ Relay Logic Configuration and Programming course:

- Understand the core components and functions of the ABB REF542plus Relay.
- Identify the application scope of 542+ logic control systems.
- Interpret technical manuals and logic diagrams accurately.
- Analyze system requirements and apply relay configurations accordingly.
- Demonstrate the proper setup of a relay using the manufacturer's software:
 - ABB REF542plus Configuration Tool for logic and control setup.
 - REF542plus SCL Tool for IEC 61850 communication design.
- Apply logical operations in protection coordination.
- Diagnose and troubleshoot relay logic faults effectively.
- Configure communication protocols and interface settings.
- Design and simulate logic sequences using ladder logic.
- Verify operational sequences and perform functional tests to ensure the system's proper functionality.
- Validate and document configuration processes.
- Adapt relay configurations to fit diverse industrial scenarios.
- Recognize industry best practices in relay programming.
- Execute programming tasks with accuracy and clarity.
- Assess risks and ensure reliability of protection systems.
- Maintain secure and optimized control schemes in critical environments.

Targeted Competencies:

Participants will gain the following competencies during the 542+ Relay Logic Configuration and Programming program:

- Skillfully configure the ABB REF542plus relay system.
- Program logic functions using ladder diagrams.
- Diagnose common relay errors and faults.
- Adapt protection schemes to different applications.
- Set up digital inputs and outputs effectively.
- Utilize ABB configuration software proficiently:
 - REF542plus Configuration Tool.
 - SCL Tool for IEC 61850 configuration.
- Apply communication protocols like Modbus or DNP3.
- Understand the integration of relays in substation control systems.
- Ensure relay configurations align with protection objectives.
- Document relay settings and perform test procedures.

Course Content:

Unit 1: Introduction to 542+ Relay Systems and Protection Principles:

- Overview of ABB REF542plus protective relay features.
- Fundamentals of protection systems in power distribution.
- Understanding digital protection logic and applications.
- Relay system components include CTs, PTs, and auxiliary contacts.
- Navigating hardware interfaces and control inputs/outputs.
- Relay Mounting, Wiring, and Commissioning Basics.
- Protection zones and functional block diagrams.
- Overview of common failure modes in protection schemes.
- Importance of proper configuration in reducing system downtime.

Unit 2: Logic Configuration Principles in the 542+ Relay:

- Introduction to logic programming concepts in relays.
- Basic and advanced logic gates and functions.
- Setting up relay schemes using the ABB REF542plus Configuration Tool.
- Configuring digital input and output mappings.
- Using timers, counters, and sequence logic.
- Programming protection interlocks and safety schemes.
- Reviewing logic event sequences and execution timing.
- Best practices for naming conventions and logic structuring.
- Case studies of logic implementations in substations.

Unit 3: Communication Settings and Protocol Integration:

- Relay communication architecture and serial ports.
- Introduction to Modbus, DNP3, and IEC 61850.
- Assigning addresses and managing communication parameters.
- Configuring the integration of remote terminal units RTUs.
- Network topology for SCADA communication.
- Setting up HMI displays and remote access points.
- Using REF542plus SCL Tool Ver. 4.0 for IEC 61850 configuration.
- Troubleshooting communication link failures.
- Hands-on exercises with real relay interface software.
- Enhancing data transfer reliability and security protocols.

Unit 4: Protection Programming and Coordination Techniques:

- Defining and programming overcurrent protection.
- Ground Fault and Phase Unbalance Protection Settings.
- Integrating voltage and frequency protection functions.
- Relay setting calculations and time/current coordination.
- Backup vs primary relay coordination strategies.
- Simulating protection scenarios in test environments.
- Configuring event recording and sequence of events SOE.
- Viewing and interpreting trip logs and system alarms.
- Reviewing standards and compliance for protection settings.

Unit 5: Testing, Troubleshooting, and Real-World Implementation:

- Procedures for functional testing of ABB REF542plus relays.
- Using secondary injection methods to validate logic.
- Relay firmware updates and configuration backup.
- Analyzing real faults and identifying misconfigurations.
- Troubleshooting unexpected relay behavior.
- Developing standard operating procedures for relay testing.
- Integration of relay settings into maintenance programs.
- Hands-on configuration simulation of substation equipment.
- Final assessment: configure and test a full relay logic scheme.

Final Insights & Key Takeaways:

The 542+ Relay Logic Configuration and Programming training equips participants with in-demand skills for working with ABB REF542plus protective relay systems in real-world applications. Learners gain confidence in handling relay programming, configuration, and testing using ABB industry-standard tools and equipment. The structured course content ensures readiness for tackling system integration challenges. By mastering these skills, professionals contribute to more reliable, safe, and efficient electrical systems.