MERCURY

# Electrical Power System Protection: Devices & Design Course

19 – 23 April 2027
Barcelona (Spain)



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# Electrical Power System Protection: Devices & Design Course

**Ref:** 3_270239 **Date:** 19 – 23 April 2027 **Location:** Barcelona (Spain) **Fees:** 6200 Euro

## Introduction:

This course offers an in-depth look at the fundamental principles and cutting-edge techniques in electrical power protection. It provides valuable insights into protection systems used in electrical systems and covers many protection devices, such as relays.

These protective devices are essential for safeguarding each significant component in the power distribution network against various forms of electrical distress. When a relay operates, it is a protection device in the electrical system that isolates any defective components. Understanding these protection mechanisms is vital for professionals who aim to excel in electrical power system protection training.

This comprehensive electrical power system protection course covers the essential concepts and technologies in electrical power protection. Professionals undertaking this power system training will gain expertise in a wide range of protection devices in electrical systems, understanding the critical role of electrical protection systems in maintaining the integrity of power distribution networks. From protective relay training to electrical power system protection training, this course promises a robust commitment to safeguarding electrical infrastructure. It ensures that participants are well-prepared for a power systems certificate.

## Targeted Groups:

- Engineers and Technicians from the Electricity Supply Industry
- Technical Management Professionals and Department Leaders
- Engineering Professionals involved in manufacturing and operating power and distribution transformers
- Engineers and Technical Personnel in power utilities, petrochemical plants, and large infrastructure projects
- Maintenance and Operations Technicians are interested in electrical protection training courses and power system protection courses.

## Course Objectives:

By the end of this electrical system training and power system training course, participants will:

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- Comprehend the types and causes of electrical faults.
- Understand the practical considerations for specifying the appropriate variety of electrical protection systems.
- Gain a comprehensive understanding of principles and selection of protective relay training and relays.
- Develop and design effective protection schemes.
- Become proficient in the construction and functionalities of instrument transformers.
- Learn about various grounding systems and earthing fault protection techniques.

## Targeted Competencies:

- Operational Principles and Types of Electrical Power System Protection
- Design and Implementation of Different Types of Relays
- Protection Coordination and System Architecture
- Protection Mechanisms for Feeders, Motors, and Transformers
- Short Circuit Current Calculations
- Acquiring Power Systems Certificate knowledge

## Course Content:

### Unit 1: Types of Electrical Protection Devices and Faults:

- Importance of Electrical Power Protection and Control Devices
- Types of Electrical Faults
- Characteristics of High Voltage Fuses for Electrical Protection
- Characteristics of Circuit Breakers for Electrical Protection
- Microprocessor Overcurrent Relays
- Time, Current, Curves, and Logic Discrimination
- Hot and Cold Tripping Curves
- Low Voltage Switchboard Protection against Short Circuit

### Unit 2: Protection Functions and Instrument Transformers:

- Overview of Power System Architecture
- Introduction to Protection Functions
- Understanding Selective Coordination
- Features of Lockout and Anti-pumping Relays
- Sensors in Electrical Systems
- Current and Voltage Instrument Transformers
- Various Types of Relays
- Numerical Relays and their Functions

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## Unit 3: Busbar, Transformer, and Motor Protection Systems:

- Busbar Protection Mechanisms
- Transformer Protection Techniques
- Motor Protection Systems
- Capacitor Protection Mechanisms
- Overhead Line Protection
- Types of Related Faults
- Relevant Protection Functions
- Protection Device Coordination
- Circuit Breaker Relay Settings
- Current Transformer Sizing Calculations
- Short-Circuit-Current Calculation Methods
- Busbar Rating Selections
- Designing a New 11kV Air-Insulated Switchgear Substation

## Unit 4: Grounding Systems and Earth Fault Protection:

- Overcurrent Protection Mechanisms for Phase and Earth Faults
- Unit Protection Schemes
- Understanding Distance Protection
- Protection of Feeders against Overload and Short Circuit
- Types of Grounding Systems in Electrical Power Systems
- Restricted Earth Fault Protection Techniques
- Sensitive Earth Fault Protection Mechanisms
- Protection against Over-voltages in Electrical Systems

## Unit 5: Methods of Commissioning Relays, Short Circuit Current Calculation, and Harmonics:

- Commissioning Process of Protective Relays
- Calculation Methods for Short Circuit Current
- Understanding Fault Topologies
- Calculation of Short Circuit Current at the Fault Point
- Positive, Negative, and Zero Sequence Systems in Electrical Power Systems
- Impact of Triple Harmonics and Mitigation Techniques