

Electrical Training for Substation Systems & Operations

Two-Day Course Outline



Ensuring Electrical Power Reliability and Safety

Substations serve a critical role in the overall power system network. Ensuring the protection of substation equipment and the power entering and leaving the substation is imperative in delivering consistent power availability, quality, and reliability.

Additionally, having a solid understanding of substation systems and operations helps reduce safety incidents and offers protection to personnel. Although there has been progress made in electrical safety improvements over the years, there are still too many injuries and fatalities each year due to a lack of understanding and knowledge of electricity and its dangers. Having knowledge of protective relays and substation systems helps proactively identify areas of potential faults before they occur. Having the proper protective relays minimizes risks of arc flash, equipment damage, and personal injury or death.

Participants who complete this course will learn about the language of protective relaying, substation systems and operations, basic relay programming, safety considerations, and the practical application of their learnings to ensure safety and reliability at substations.

Experts in Electrical Reliability

To learn more about HVM's Training Services, please contact us at 866-HVM-TEAM (486-8326).

Course Overview

The installation, application and coordination of protective relays and systems for substations can be complex. This involves many disciplines and is both challenging and interesting. Understanding the basics gives you tools to manage and operate these systems properly. Using the information presented during this course, you will have the ability to make decisions about the suitability, maintenance and testing of your relay system.

This course will introduce the basic operating concepts of protective relays for generation, transmission and distribution of electrical systems. Utilizing ANSI and IEEE standards you will be given the basic understanding of how various relays protect specific applications of an electrical system.

Substation electricians, technicians and operators should attend this course.

Course Duration: 16 Hours.

Two Day Seminar Course Outline:

Day 1

Introduction

- Safety
- Overview of Systems
- Instrument Transformers
- Relay Inputs and Sensing
- Sensing Circuits

The Language Of Protective Relaying

- IEEE-ANSI Abbreviations
- IEEE-ANSI Device Numbers
- ASA-Standard Symbols
- Drawing Examples

Systems & Relay Theory and Operations

- Incoming Power Considerations
- Vacuum Breakers
- SF₆ Breakers
- Applicable Devices
- Current Transformers
- Potential Transformer
- Auxiliary Transformers

Relay Applications

- Over Voltage / Under Voltage
- Time Delay / Instantaneous Over Current
- Comparative Sensing
- Metering
- Sensing / Communications
- Transmission, Transformer, Generator, Motors & Feeder Relays

Basic Programming

- Binary
- Analog
- Alarms
- Safeties/Interlocks
- Equipment Specific Applications

Day 2

Practical Exercises

- Use of Single Line Drawings
- Identification of Devices
- Identification of Distribution of Power
- Identification of Applicable Relays

Site Specific Safety

- Stored Energy
- NFPA 70E Compliance
- PPE Requirements
- Arc Flash Considerations & Boundaries

Training Materials

High Voltage Maintenance (HVM) will provide student manuals, supplemental materials, video presentations, and demonstration equipment. A "Certificate of Completion" is provided for students meeting or exceeding minimum course standards. Minimum course standards are defined as a 80% score on the written post-course examination.

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