
# Electrical Series - 0.8 CEUs*

The Electrical series of modules covers the fundamentals of electrical systems and components in an industrial facility. Subject areas within this series include Motor and Motor Control, Variable Frequency Drives, Circuit Protection, and Transformers.

## Motor and Motor Control - 0.4 CEUs

### Direct Current Motors

- Operating Principle
- DC Motor Types

### Alternating Current Motors

- AC Motor Theory
- Induction Motors
- Synchronous Motors
- Wound Rotor Motors

### Motor Fundamentals

- Motor Control Basics
- Types of Controllers
- Magnetic Contactors

### Motor Protection and Nameplate Data

- Motor Fundamentals
- Nameplate Data
- Motor Protection

### Electrical Diagrams

- Diagram Types
- Control Devices and Symbols
- Interlocking Methods for Reversing Controls

### Control Circuit Diagrams

- Sequence Control
- Motor Control Center Single Line Diagrams

### Motor Starters

- Full and Reduced Voltage Starters
- Wye-Delta and Part Winding Starters
- Speed and Consequent Pole Controllers
- Control Power

## Variable Frequency Drives - 0.1 CEUs

### Variable Frequency Drive Fundamentals

- Functions and Operations of an AC Drive
- Interface Methods
- Advantages and Disadvantages of AC Drives

### Variable Frequency Drive Troubleshooting

- Common Fault and Alarm Indications
- Common Types of Faults and Alarm
- Troubleshooting Tables

### Variable Frequency Drive Installation and Programming

- Installation Requirements
- Start Up
- Programming and Parameters

**CEUs are calculated and awarded at the subject area level. Series level totals are to show the available amount of CEUs that can be earned for completing all subject areas in a particular series.*

## Circuit Protection - 0.2 CEUs

### Basic Relaying I
- Attributes of a Protection Relay System
- Functional Categories
- Basic Sensing Quantities for Relays
- Operating Characteristics of Relays

### Basic Relaying II
- Time Delay Characteristics
- Zones of Protection
- Electromagnetic Induction Devices
- Electromagnetic Attraction Units
- Static and Microprocessor Relays

### Advanced Circuit Breakers
- Circuit Breakers
- Circuit Breaker Main Functions
- Types of Circuit Breakers

## Transformers - 0.1 CEUs

### Power Transformers I
- Types of Power Transformers
- Transformer Nameplates

### Power Transformers II
- Construction of a Power Transformer
- Testing Requirements for Power Transformers

### Transformers
- Purpose of Instrument Transformers
- Burden and Saturation
- Types of Current Transformers
- Coupling Capacitor Voltage Transformers
- Transformer Monitoring and Protection