

# Industrial Maintenance

## Industrial Electrical Controls Fundamentals Course Description

### COURSE AGENDA

#### Day 1

- Electrical Safety
- Electrical Fundamentals
  - Fundamental concepts and terms
  - Sources of electricity
  - Transformers
  - Wiring Devices
  - Wiring Standards
- Hands-on lab

#### Day 2

- Input Devices
  - Push Buttons
  - Limit, Proximity, Toggle, Rotary Switches
  - Relays
- Output Devices
  - Motors
  - Heaters
  - Panel Meters
  - Light Indicators
- Disconnect Devices
  - Fuses
  - Circuit Breakers
  - Overloads
- Contactors
- Use of Multimeter
- Hands-on lab

#### Day 3

- Logic Devices
  - Timers
  - Counters
- Hands-on Lab
- Schematic Diagrams
  - BOM
  - Title blocks
  - Basic Schematic Symbols
  - Wire identification



### COURSE NUMBER: MFG213

#### Course Purpose

This course is designed to provide knowledge and skills required to install, maintain and troubleshoot machine controls.

At the completion of this course, you will be able to:

- Define the safety considerations that must be observed when installing, checking or locking out electrical equipment
- Define uses and functions of input and output devices, relays, and motors
- Demonstrate the reading of schematic diagrams and logic
- Define an open and short condition and perform voltage and current measurements
- Demonstrate the proper use of the following test equipment in lab to measure voltage, current, resistance and continuity: VOM, DVM, Multi-meters, continuity tester and amp probe
- Approximate secondary voltage, secondary current and primary current of a transformer when given its turns ratio, primary voltage and secondary load
- Identify the proper wiring configurations of a control transformer's primary current for 240V and 480V operation
- Approximate a transformer's maximum primary current for 480V operation, using the nameplate information

## COURSE AGENDA

### *Day 3 continued*

- Logic Diagrams
  - Switches
  - Timers
  - Relays
  - Truth Tables
- Ladder Diagrams
  - Rung Identification
  - Power Rail Identification
- Hands-on lab

### *Day 4*

- Basic Machine Control Systems
- Distribution
  - Three-Phase Devices
- Hands-on lab
- Build Circuits
- Circuit Troubleshooting
- Grounded and Ungrounded Control Circuits
- Hands-on lab

### *Who Should Attend*

Individuals who are responsible to install, maintain and troubleshoot electromechanical machine controls should attend this course.

### *Prerequisites*

To successfully complete this course, the following prerequisite is required:

- Familiar with basic electricity

### *Technology Requirements*

All technology is provided for student use in the classroom by Rockwell Automation. It is not necessary for students to bring any technology with them when attending this course.

### *Student Materials*

To enhance and facilitate your learning experience, the following materials are provided as part of the course package:

- *Student Manual*, which contains the key concepts, definitions, and examples presented in the course and includes hands-on exercises.

### *Hands-On Practice*

Throughout this course, you will have the opportunity to practice the skills you have learned through a variety of hands-on exercises. These exercises focus on the skills introduced in each lesson.

To complete the exercises, you will use a basic electrical training workstation. Because the basic skills taught in the course apply to all electrical control applications, the hands-on exercises permit you to apply what you have learned in your workplace environment.

### *Course Length*

This is a four-day course.

### *Course Number*

The course number is MFG213.

### *To Register*

Please register online at [Kendallelectric.com/training](http://Kendallelectric.com/training) or contact Camie White at 260.824.4545 x6059 or [camie.white@kendallelectric.com](mailto:camie.white@kendallelectric.com).

Lunch will be provided

You can also access course information via the Web at <http://www.rockwellautomation.com/training>

**LOCATION:** Four Points by Sheraton,  
3600 E. Cork St. Ct., Kalamazoo, MI  
49001

**DATE:** August 2-5, 2022

**COST:** \$2,720.00 per student

**CLASS ID:** 57218

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

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