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We invite you to attend one of our Emerson Automation and Controls Product Training Courses. These courses use lecture and hands-on workshops to teach students to properly install, configure, program, troubleshoot, and maintain a variety of products.

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ENSURE THAT THE TIME YOU INVEST IN TRAINING LEADS TO MEANINGFUL PROGRESS AND REAL RESULTS.

Emerson certified trainers understand your industry, and bring our deep expertise into the classroom. With ready access to the collective Emerson knowledge and talent pool, your local trainer can provide a precise answer to your most complex questions.

Emerson certified trainers have the following qualifications:
Experienced with field expertise in each specific Emerson Automation and Control product

Educated through rigorous technology coursework and certification processes

Trained on Emerson Automation and Control products and trained in adult learning techniques

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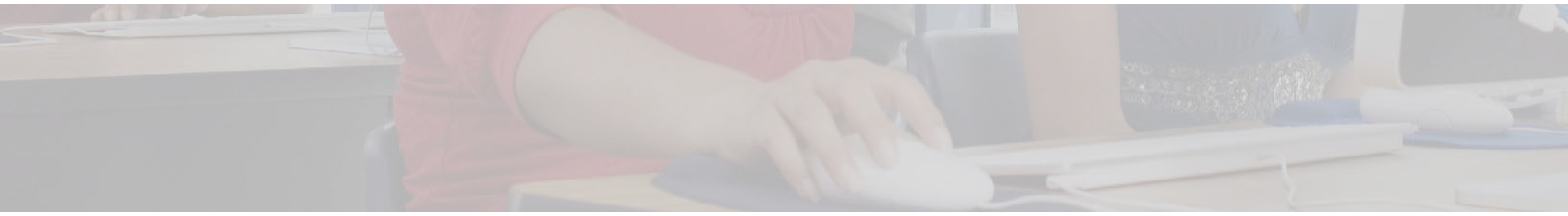

Controller Programming - Logic Developer PLC - 7701

Course Description
Learn programming for Emerson Controllers in this PAC Machine Edition class featuring the PACSystems RX3i Controller. This class covers programming techniques and the basic features of the PACSystems Controller using Logic Developer PLC PAC Machine Edition software. Starting with the controller software architecture, students are taught how to effectively develop control applications using building block concepts. This course builds upon Object-Oriented concepts with PACSystems User-Defined Function Blocks (UDFBs), as well as the development of application components using Ladder Diagram (LD) programming language.

This class also covers PROFINET I/O basic concepts and tools used to configure and debug PROFINET I/O networks.

Who Should Attend?
This course is intended for those who are or will be involved in the development, modification, and troubleshooting of control systems using PAC Logic Developer PLC and PACSystems Controllers.

Are There Any Prerequisites?
Participants should be comfortable operating in a Microsoft Windows environment. Participants should have a basic understanding of electrical/control fundamentals.

Training Details

- Duration: 32 Hours
- Delivery: Classroom, Onsite, Virtual
- Part #: 7701/7701V
- Suggested Class Size: 10 Students
- CEUs: 3.2

Topics:

- Describe Control System Architecture & Operational Fundamentals
- Operate PAC Machine Edition
- Establish and Utilize Communications to the Controller
- Configure a Controller and its Associated Hardware Modules
- Effectively Use and Create Controller Variables
- Create Projects in Ladder Diagram (LD)
- Understand and Program Arithmetic, Timer, Counter, and Move Operations
- Use Compute instruction to solve mathematical expressions
- Utilize Programming Guidelines for Developing Robust Control Applications
- Use User Defined Function Blocks (UDFBs) to Build Structured Applications
- Effectively Use the Machine Edition Toolchest as a Repository for Application Building Blocks
- Create, Monitor, and Modify Running Controller Applications
- Use monitoring tools to view application execution
- Configure basic PROFINET I/O network and use PROFINET diagnostic and debugging tools

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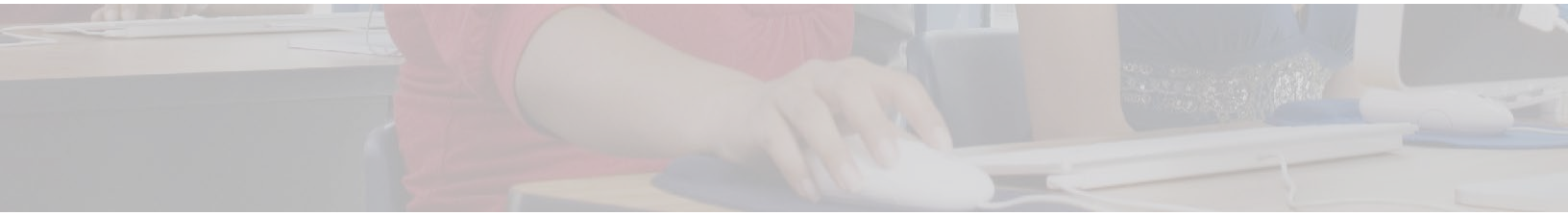

Course Topics

Control System Fundamentals
- Introduction to Controller application components, Logic Structure, Basic Controller Variables, Data Types, and Numbering Systems
- Understanding the Controller Scan

Operating PAC Machine Edition
- Orientation to the Machine Edition programming environment and its tools
- Machine Edition "Best-Kept Secrets"
- Work with Projects and Targets
- Machine Edition Options

Working with Controllers
- Communications over Serial and Ethernet connections
- Validate a Machine Edition Project
- Download to and Upload from a Controller
- Verify Information between a Project and a Controller
- Work with Fault Tables
- View Controller Status information

Controller Hardware Overview
- Basic controller system hardware components
- Find information using Emerson web sites

Configuring Controller and IO
- Configure the Controller, IO, and Option Modules
- Understand Hardware Configuration Status indicators
- Assign Reference Addresses to I/O Modules
- Use the Hardware Reference View
- Import and Export Hardware Configuration

Ladder Diagram Basics
- Understand basic operation of the Ladder Diagram (LD) programming language
- Become familiar with the LD Editor layout and operation
- Review the basic LD logic elements, such as contacts, coils, counters, timers, and relational operators
- Learn how to monitor LD logic executing in the Controller

PAC Machine Edition Toolchest
- Navigating through the Toolchest
- Create and share Toolchest Drawers
- Save logic to a Toolchest drawer
- Use Toolchest logic in application

Online Monitoring Tools
- Monitor programs using online Logic Monitoring, Data Watches, Reference View Tables, & the Data Monitor

Online Application Modifications
- Make program changes while the Controller is running
- Understand online change methods: Word-for-Word, Run Mode Store, and Test Edit

Contact and Coils
- Understand basic operation of LD Contacts & Coils
- Develop Series and Parallel LD logic
- Utilize System Bits in LD logic
- Find Variable references in a Project. Monitor, modify, and force Boolean Variables

Program Flow Operations
- Understand LD Program Flow operations
- Understand the Controller Block Architecture and the operation of _MAIN and Interrupt Blocks
- Create and call Program Blocks

Timers and Counters
- Understand the basic operation of LD Timers and Counters
- Understand the organization of Timer and Counter Instance Data
- User Timers and Counters in LD Logic

Conversion Operations
- Understand the basic operation of LD Conversion instructions
- Understand how to change data display formats in the LD Editor

Math and Advanced Math Operations
- Understand the basic operation of LD Math and Advanced Math instructions, including COMPUTE
- Understand the concept of Typed Instructions
- Change Variable data values directly in the LD Editor

Relational Operation
- Understand the basic operation of LD Relational instructions

Data Operations
- Understand the basic operation of LD Data instructors
- Understand how to initialize application data using Data

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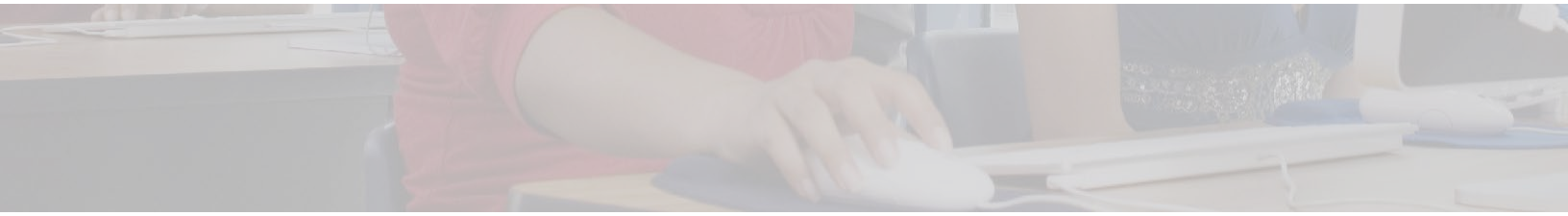

Course Topics

Move Functions
- Understand the basic operation of a Shift Register

Control Operations
- Understand the basic operation of LD Control instructions
- Understand the PID Function Block parameters and its data structure
- Understand the Service Request Function parameters, parameter block, and its uses
- Understand how to display Controller ASCII String information

Bit Operations
- Understand the basic operation of LD Bit instructors
- Understand the operation of the Masked Compare Function

Working with Variables
- Understand basic Variable concepts, along with Universal, Local, Global, and Alias scoping of Variables
- Understand Variable Types, Variable access, and the various Variable attributes

Programming Guidelines
- Guidelines such as program organization and naming conventions for Variables and blocks

User Defined Function Blocks (UDFBs)
- Basic UDFB facts
- UDFB Input, Output, and Member Variables
- How UDFBs operate. How to create and monitor UDFBs
- UDFB Toolchest considerations
- Update an existing UDFB with a new UDFB
- Build UDFB Blocks for Re-use

Advanced Programming Exercises
- Demonstrate the power and versatility of creating building block using UDFBs
- Understand the advantages of the various programming languages

PROFINET I/O and Configuration
- PROFINET Introduction
- PROFINET Fundamentals
- PROFINET LAN Definition & Configuration
- PROFINET Tools
- PROFINET Media Redundancy
- Programming PROFINET Solutions
- Debugging PROFINET Solutions

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Registration Information

To register online: Click here, **MyTraining**
To register by phone: Call Emerson Education Services at **1-800-338-8158**
For additional questions or a list of courses, please visit **www.Emerson.com/Education**

Purchase order or credit card required for enrollment.

Credit cards preferred: Most major credit cards accepted. Purchase

orders must be made out to:
Emerson Process Management LLLP
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Payment Terms: Net 30 days
Please Include on PO: Student's Name, Course Number
Emerson's Payment Terms (Net 30 Days), and Course Tuition Price

Please email all purchase orders to **Education@Emerson.com**

Please Note: To complete the registration process, attendees must register through **MyTraining** or call the registration center (800-338-8158). Only receipt of purchase order guarantees a seat.

Cancellations

You may cancel your reservations up to 14 calendar days prior to the start of the course without incurring a cancellation fee. 50 percent of the full tuition will be charged for cancellations received during the 14 days prior to the start of the course, and full tuition will be charged for failure to attend without cancelling. Substitutions are accepted until the first day of class. Scheduled courses may be cancelled due to low enrollment.

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