Controller Programming - Logic Developer PLC

Instructor-led

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), Function Block Diagram (FBD), and Structured Text (ST)

- Understand and program Arithmetic, Timer, Counter, and Move operations

- 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

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 advanced 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), Function Block Diagram (FBD) and Structured Text (ST) programming languages.

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.
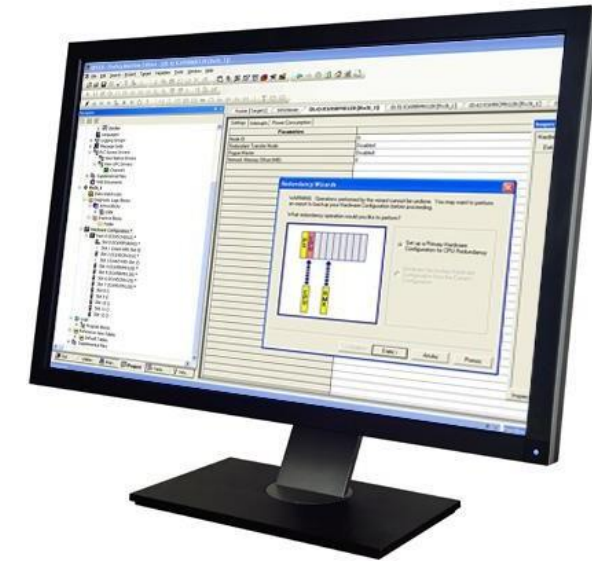
Are there any pre-requisites?

Participants should be comfortable operating in a Microsoft Windows environment, and have a basic understanding of electrical/control fundamentals.

Duration

32 hours

Delivery

Classroom

On-Site

Virtual

Part

7701

7701V

Suggested class size

10 Students

Session 1

Control System Fundamentals
Introduction to Controller application components and 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

Session 2

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.

Session 3

Ladder Diagram Basics
Understand basic operation of the Ladder Diagram (LD) programming language.

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

Session 4

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

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

Contacts 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.
Include Toolchest Program Blocks in an application.

Session 5

Timers and Counters
Understand the basic operation of LD Timers and Counters.
Understand the organization of Timer and Counter Instance Data.
Use 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 Operations
Understand the basic operation of LD Math instructors.
Understand the concept of Typed Instructions.
Change Variable data values directly in the LD Editor.

Relational Operations
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

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.
Understand how to display Controller ASCII String information formats in the LD Editor.

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

• View our Training Catalog

• Manage your training account with MyConnect

• View Course Advisor and build a training path based on a job role, processes or brand preference

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Session 6

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.

FBD Programming
Introduction to Function Block Diagram (FBD) programming.
Create FBD Blocks and Logic.
FBD logic solve order, Comments and Instructions.
Edit and wire FBD logic, negative Boolean flow.
Assign FBD logic variables, change online values.
Monitor FBD logic.
Call UDFBs from FBD logic.
FBD Editor configuration options.
Print FBD logic.
Considerations when programming in FBD.
Build FBD Blocks for Re-use.

Session 7

Structured Text Programming
Create ST Blocks, Logic and Comments.
ST language Statements, Operators, and Syntax.
Types of ST statements: Assignment, CASE, Function Call, RETURN, EXIT, IF, FOR, WHILE, Repeat, and Empty.
Edit ST logic.
Use/Create variables in ST logic.
Monitor ST logic.
Call UDFBs from ST logic.
ST Editor configuration options.
Considerations when programming in ST.
Build ST Blocks for Re-use.

Session 8

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

User Defined Function Blocks
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.

Session 9 (Optional)

PROFINET Fundamentals
Introduction to PROFINET
PROFINET Overview.
PROFINET LAN Definition & Configuration.
PROFINET Tools.
PROFINET Media Redundancy.
Programming PROFINET Solutions.
Debugging PROFINET Solutions.

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