GE
Intelligent Platforms

Part #: 44A728312-447

Controller Programming - Logic Developer PLC

Course Description

Learn programming for PACSystems, 90/70, 90/30, and VersaMax controllers in this 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 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) and Function Block Diagram (FBD) 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 Proficy Logic Developer PLC and PACSystems Controllers.

Are there any prerequisites?

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

What topics will be covered in this course?

Upon completion of this course, the student will be able to:

- Describe Control System Architecture & Operational Fundamentals
- Operate Proficy 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 Tool chest as a repository for Application Building Blocks
- Create, Monitor, and Modify running Controller applications

Course Length

4 days

Suggested Class Size

10 students

Class Hours

8:00 am - 5:00 pm, daily

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Course Agenda

(Schedule and timing may vary.)

Day 1

Morning

Control System Fundamentals

Introduction to Controllers components and the roles Controllers play in automation.

Controller application components and Logic Structure.

Basic Controller Variables, Data Types, and Numbering Systems.

Understanding the Controller Scan.

Operating Proficy Machine Edition

Orientation to the Machine Edition programming environment and purpose of each of its tools.

Machine Edition "Best-Kept Secrets".

Define a Project and Target.

Navigate through the Project.

Backup, Delete, and Restore a Project.

Provide Project and Target Documentation.

Afternoon

Working with Controllers

Establish communications to Controller 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.

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.

Run and Print Hardware Configuration Reports.

Day 2

Morning

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.

Ladder Diagram Basics

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

Enter a simple LD program with Contacts and Coils.

Assign Variables to logic components.

Print LD logic.

Place LD Blocks in a Toolchest Drawer for re-use.

Contacts and Coils

Understand the basic operation of LD Contacts and Coils, including contact and coil types.

Develop Series and Parallel LD logic.

Utilize System Bits in LD logic.

Find Variable references in a Project.

Monitor, modify, and force Boolean Variables.

Afternoon

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.

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.

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.

Part #: 44A728312-447

Day 3

Morning

FBD Programming

Introduction to Function Block Diagram (FBD) programming.
Create FBD Blocks.
Create FBD Logic.
FBD logic solve order.
FBD Comments.
FBD 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.

Afternoon

Structured Text Programming

Introduction to Structured Text (ST) Programming.
Create ST Logic.
Monitor ST logic.
Build ST Blocks for Re-use.

Programming Guidelines

Guidelines such as program organization and naming conventions for variables, blocks, etc.

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.

Day 4

Morning

Proficy Machine Edition Toolchest

Navigating through the Toolchest.
Create Toolchest Drawers.
Share Toolchest Drawers.
Save logic to a Toolchest drawer.
Use Toolchest logic in application.
Save logic modifications to Toolchest.
Toolchest use of Universal Variables "$".

Afternoon

Online Monitoring Tools

Monitor programs using online Logic Monitoring, Data Watches, Reference View Tables, and the Data Monitor.

Online Application Modification

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

Introduction to PROFINET [OPTIONAL]

Introduction to PROFINET industrial automation networking.
Overview of the GE PROFINET solution.
PROFINET reference resources.
Hands on PROFINET exercises.