

## CDN-Automation TIA Portal Programming 1 v15

### General Information

Course Code: CDN-ST-TIAPRO1  
Length: 4½ Days

### Audience

This course is for SIMATIC S7-1500, S7-1200, S7-300, and S7-400 PLC users who are involved with developing or sustaining automation systems and their application programs.

### Prerequisites

- MS Windows Expertise
- Introduction to Simatic PLCs

### Profile

This course is the first in a three part series which builds basic programming skills with Siemens STEP7 TIA Portal software. Students will learn S7 project management, program design and application development. This is an aggressively paced curriculum covering the S7 programming editor with Ladder, Function Block Diagram, and Statement List, programming languages, as well as key software tools. This course takes a systems approach using the S7-1500 PLC, plus basic connectivity and functionality of an TP1200, HMI, G120 Drive, and ET200SP, PROFINET I/O.

Throughout the course, students will build a STEP7 project from the beginning, learning proper program structure and documenting. Software diagnostic tools will be used for debugging both hardware and code. Various instruction sets, memory areas, program blocks, and libraries will be introduced to provide the student with solid concepts of structured programming.

The course format consists of instruction and hands-on exercises. The course uses a conveyor model for realistic demonstrations and exercises.

### Objectives

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

- Complete a system hardware configuration.
- Build, document, test and troubleshoot a structured STEP7 program.
- Program using the multiple address types.
- Use symbolic addressing.
- Use core application instructions, functions and blocks.
- Establish communication to an HMI.
- Establish communication to a Drive.

### Topics

1. Training Devices and Addressing
  - Demo hardware with S71500, ET200SP, Comfort Panel and Conveyor Setup
  - Networking and IP addressing
1. System Overview
  - TIA Concept, TIA Portal Information Center
  - Overview of available modules for S7-1200, S7-1500, S7-300 and S7-400
2. Engineering Software "TIA Portal"
  - Scope of TIA Framework
  - Engineering products and product ranges
  - TIA operator interface
  - Uploading programs for PLCs
  - Online Help
4. Devices and Networks
  - Online Access of Devices, PLC Start, Stop and Reset
  - Creating the station configuration
  - Parameterizing and addressing the CPU and Modules
5. PLC Tags
  - PLC Tags, memory areas, addresses
  - Elementary data types
  - Global and system constants
  - Monitoring and modifying Global Tags
6. Program Blocks
  - S7 Block Types
  - Structured Programming
  - Add blocks, properties and programming a block
  - Memory concept for S7-1500
7. Binary operations
  - Real and programmed NO and NC operations
  - Logic and assignment operations
  - Process images
  - Program editor, rewire and rename tags
  - Monitoring (block) function
8. Function and Function Blocks
  - Parameter-assignable blocks and their calls
  - Temporary and static variables
  - Structured programming
9. Digital Operations
  - Number data types and formats
  - Mathematical, comparison, MOVE operations
  - Counters and timers
10. Data blocks
  - Complex data types
  - Global data blocks, editing and use
  - Monitoring and initializing data blocks
  - Default, start, monitoring, setpoints and snapshot values

11. Connecting an HMI
  - HMI – PLC data exchange
  - Setting and commissioning the HMI
12. Organization Blocks
  - Types of organization blocks and interrupt execution
  - OB start information
  - Use of start-up and time-delay interrupt OBs
13. Distributed IO
  - Distributed IO types, Profinet, Profibus systems
  - Configure, network and commission a distributed Profinet IO station
14. Troubleshooting
  - Troubleshooting possibilities
  - Troubleshooting functions for STOP troubleshooting and error correction
  - Troubleshooting functions for logical errors and error correction
  - Trace analysis function
15. Integrating and Commissioning a Drive
  - Parameterize and test a drive in Startdrive
  - Integrate a drive in the PLC system
  - Reset a drive to factory settings
  - Set basic parameters via Startdrive
  - Control the drive via the PLC