

## CDN-Automation TIA Portal Basics

### General Information

Course Code: CDN-ST-TIABAS  
Length: 2 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
- Basics of communication
- Basics of PLC and automation
- Basics of HMI
- Review of "Basics of PLCs" and Basics of Control Components" [QuickStep courses](#) (login required)

### Profile

This course is a two-day introduction to TIA Portal.

The course format consists of instruction and hands-on exercises, with a strong emphasis on lab work.

### 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.
- Program using the processed analog values.
- Generate data blocks.
- Establish communication to an HMI.
- Establish communication to a Drive.

### Topics

1. S7 System Overview and Training Devices
  - a. S7-1500, S7-1200, S7-300, and S7-400: function comparison, modules, rack rules, addressing rules, module installation
  - b. Configuration of the training S71500 and ET200SP stations
  - c. Operating and Display Elements: HMI
  - d. Conveyor simulator Setup
  - e. Networking
2. TIA Portal Engineering Software
  - a. Working in Portal View
  - b. Working in Project View
  - c. GUI arrangement and setup: menu, windows, task cards
  - d. Project saving, archiving
  - e. Help, Libraries
3. Devices and Networks, Distributed IO

- a. Online Access of Devices
  - b. Devices & Networks Views
  - c. Creating a Project
  - d. Uploading/Downloading Hardware Configurations
  - e. Creating the Hardware Configuration
  - f. Parameterizing the CPU and Modules
  - g. PROFINET Communication
  - h. Assigning Device Names
4. PLC Tags
    - a. Types of tags
    - b. Adding a Tag table to a Library or Project
    - c. Monitoring Global Tags in PLC Tag Table
    - d. Retentiveness of PLC Tags
  5. Program Blocks Editor and Binary Instructions
    - a. S7 Block Types
    - b. Structured Programming
    - c. Process Image of Inputs/Outputs
    - d. Ladder Logic and Function Block Diagram
    - e. NO, NC, AND, OR logic
    - f. Program Testing & Troubleshooting using the "Monitor Block" function
    - g. Comparing Online/Offline Blocks: view at a glance
    - h. Using the Block Editor
  6. Binary and Digital Operations
    - a. Set/Reset Flip Flops
    - b. Edge Detection (one-shots)
    - c. Program Jump instructions
    - d. Number types
    - e. SIMATIC Counters & Timers
    - f. IEC Counters & Timers
    - g. Mathematical Functions
    - h. Comparison Operations
    - i. Date & Time Functions
  7. HMI Commissioning
    - a. Data Exchange between HMI and PLC
    - b. Configuring a Touch Panel Project
    - c. Networking the Touch Panel
    - d. PLC-HMI Connections in Software
    - e. Commissioning the HMI
    - f. HMI Screen Elements in TIA WinCC
  8. G120 Commissioning
    - a. Communication CPU - G120
    - b. Control word, status word
    - c. G120 in PLC project: configuration
    - d. StartDrive: Commissioning wizard
    - e. StartDrive: Control Panel
  9. Troubleshooting
    - a. Hardware and System Diagnostics
    - b. Interpreting Errors with the Diagnostic Buffer
    - c. Monitor/Modify and Force Tools
    - d. Reference Data Tools
    - e. Comparing Online/Offline Blocks
    - f. TRACE Analyzer