

Siemens TIA Portal STEP 7 Basic Reference Sheet

Overview

Siemens refer to their software suite as the Totally Integrated Automation portal (TIA portal). This includes the STEP 7 Basic component used for configuring and programming a Siemens S7-1200 PLC.

The TIA portal comes with extensive built-in and on-line help, covering all areas of the software. The help is fully searchable and often context sensitive – only information relevant to the current area is displayed.

This help is an essential resource and it is worth spending time becoming familiar with its operation.



Key areas covered in this reference sheet:

- Creating a STEP 7 project
- Connecting and Configuring PLC hardware
- Writing ladder logic programs
- Loading ladder programs to the PLC
- Running, testing and debugging programs

Software Installation

The TIA Portal software is supplied on DVDs. In addition, service packs and updates may be delivered over the Internet.

This is a comprehensive industrial software product and will take time to install and configure. Administrator permissions will be required during this process.

The software is supplied with comprehensive installation instructions (accessed via the DVDs). It is important that these are followed carefully.



Licensing

The software may be supplied with a licence key contained on a USB memory stick. The licence can be accessed directly from this device or it can be transferred to the hard disk of the computer running the software. Refer to the instructions supplied with the 'Automation Licence Manager' utility.

To prevent loss of the licence, IT IS IMPORTANT that the licence is removed from a computer (back to the USB memory stick) if the computer's hard disk is to be erased.

Configuring the PLC on a LAN

The PLC can be connected directly to a programming computer using the supplied Ethernet cable. More typically, the PLC will be connected into a Local Area Network (LAN) using the supplied cable where it can then be addressed from any PC on the network using the TIA Portal application.

An IP address and subnet mask will need to be assigned to the PLC. Network administrators should refer to the instructions supplied with the TIA Portal.

Operating Modes

The TIA portal operates in one of two modes:

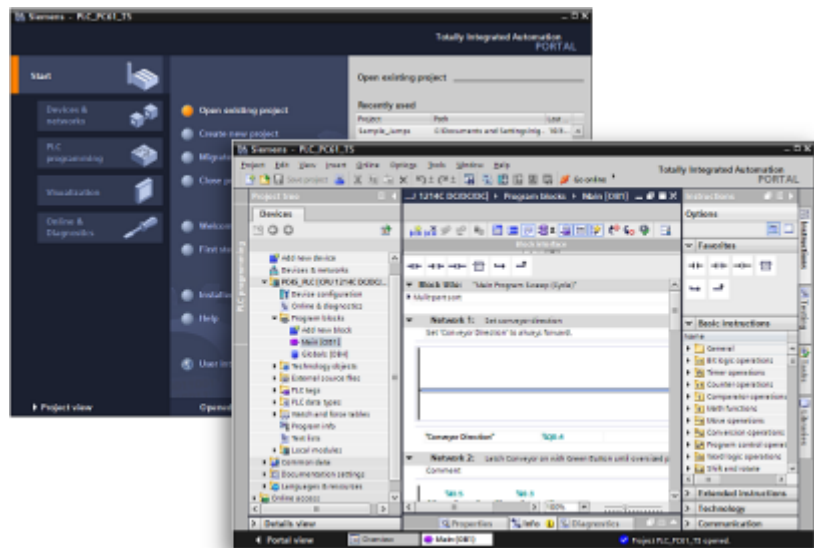
Portal View

Portal mode is a task-based view that provides access to a selection of the most common tasks. This is a simple restricted view more suited to first time users.

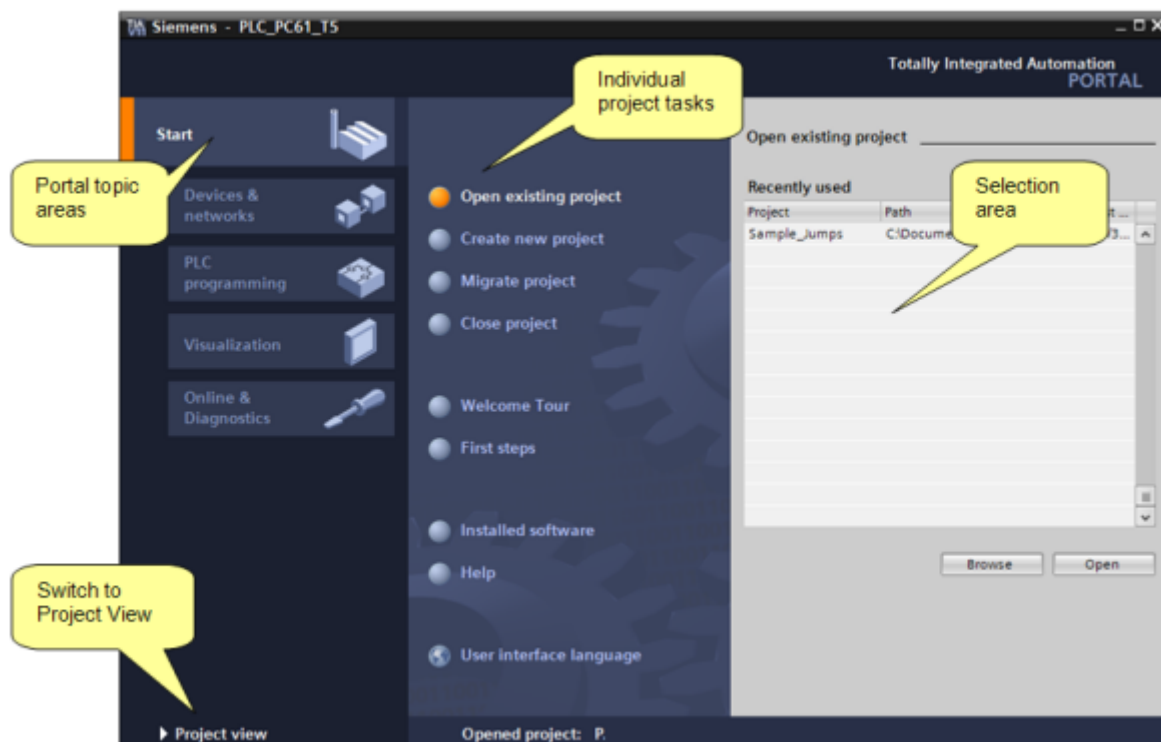
Project View

Project mode provides a complete structured view of the entire software suite, providing access to all objects and tools. This view is necessarily more complex and will be needed when projects and tasks become more advanced.

The views can be switched at any time using the link in the bottom left corner of the application.

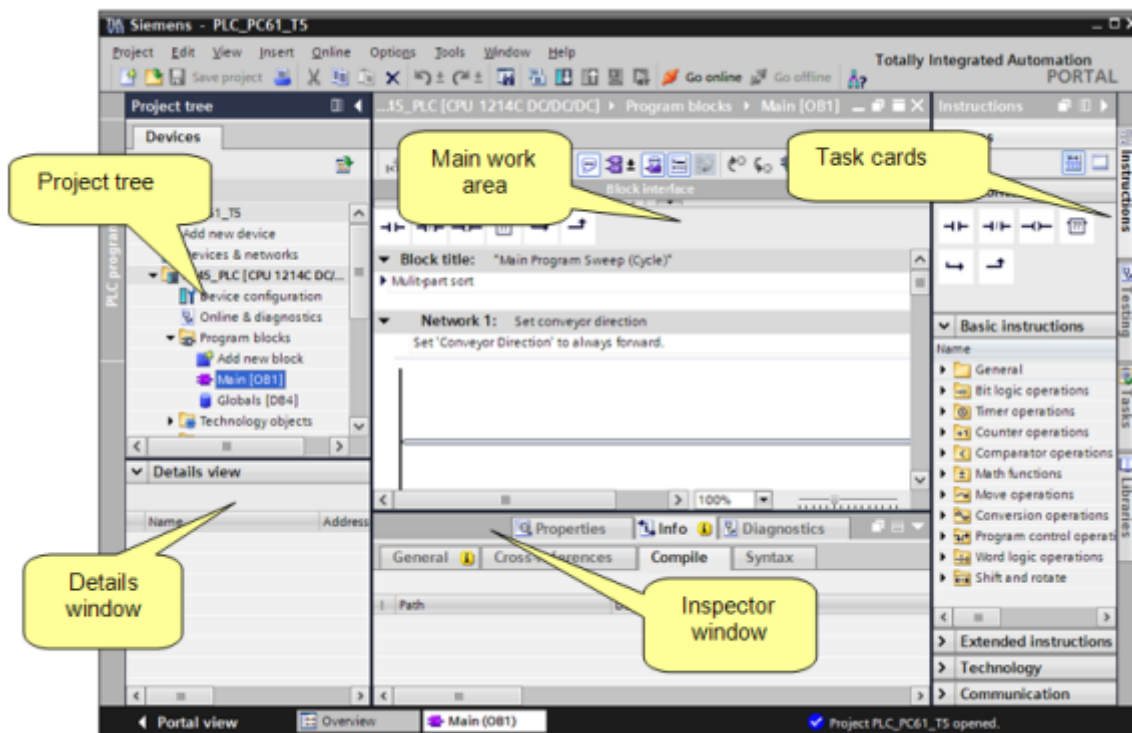


Portal View



For a complete explanation of the various elements of the Portal View, press the F1 key while it is displayed and search the Help system.

Project View



For a complete explanation of the various elements of the Project View, press the F1 key while it is loaded and search the Help system.

Connect and Configure a PLC

It is assumed that the S7-1200 series PLC has been connected into the local area network (LAN), assigned an IP address and configured to communicate with the TIA Portal application.

Note: Depending on this configuration, you may be asked to allow the addition of a temporary IP address to your computer's network card.

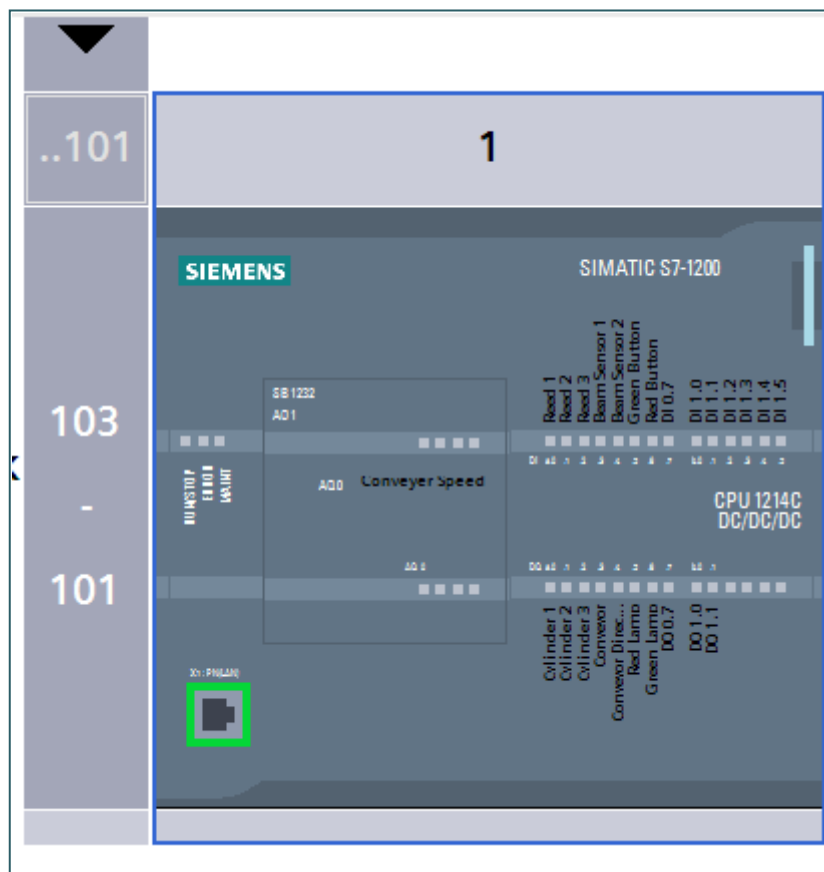
When creating a STEP 7 project using the TIA Portal application, it is important that it is configured with the correct PLC device, including any expansion modules and signal boards.

The type of device and its configuration can be manually selected from a library of available items. Alternatively, an 'unspecified' unit can be selected and the TIA portal instructed to detect compatible devices on the network. Using this method, all configuration information is automatically extracted.

Once a device has been selected, detailed information on a range of settings can be viewed. Some properties, including the startup mode, system time and High Speed Counters (HSC) can be configured.

This information is stored as part of the project configuration.

Use the built-in Help for more details on connecting and configuring devices.

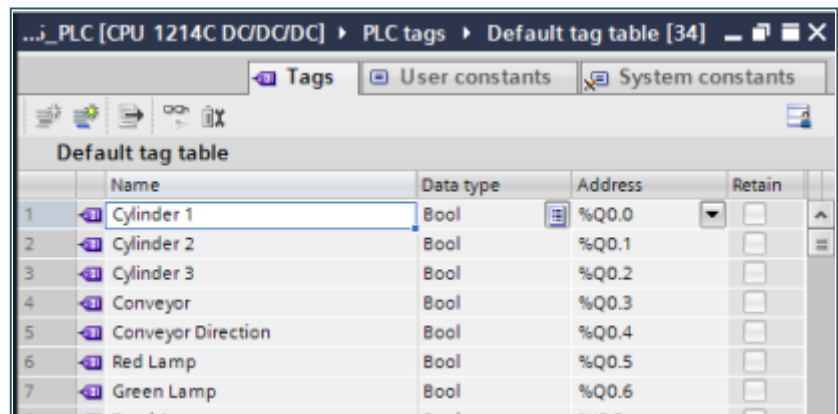


Add PLC Tags

A PLC tag is a symbolic name associated with an addressable element within the PLC.

Assigning memorable tag names to the relays of a PLC has two advantages:

- A programmer can more easily interpret the code
- Changes to relay assignments only require a change to the tag table and not the program.



	Name	Data type	Address	Retain
1	Cylinder 1	Bool	%Q0.0	☐
2	Cylinder 2	Bool	%Q0.1	☐
3	Cylinder 3	Bool	%Q0.2	☐
4	Conveyor	Bool	%Q0.3	☐
5	Conveyor Direction	Bool	%Q0.4	☐
6	Red Lamp	Bool	%Q0.5	☐
7	Green Lamp	Bool	%Q0.6	☐

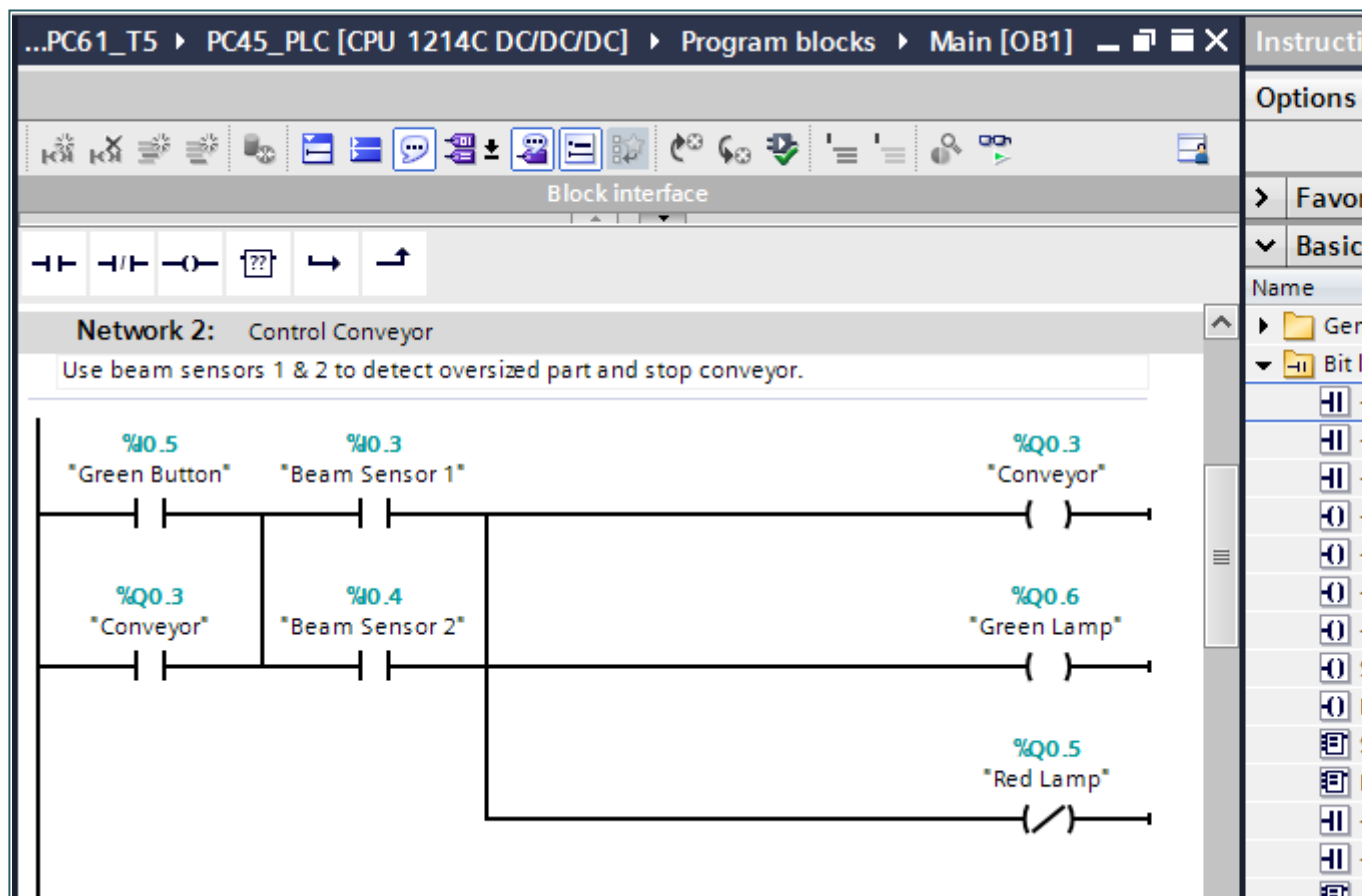
PLC tags are stored in the PLC tag table. Each tag has to be assigned a data type, address and unique name. The TIA portal Device view simplifies this process by allowing input/output relays to be 'dragged' from the PLC representation to the tag table – only the memorable name has to be entered.

Each STEP 7 project has its own default tag table.

Use the STEP 7 built-in Help for more details on adding PLC tags.

Use the reference sheet supplied with the trainer for specific details on inputs and outputs.

Enter a Ladder Program



Ladder programs are stored in Organisation Blocks (OB). The Main OB is added to a project automatically and is the block that is executed when the PLC is switched to run mode.

Each 'rung' of a ladder program is referred to as a 'Network'. An empty network is added automatically.

The Instruction Task Card provides a library of all available ladder elements. Instructions are categorised into folders by type, with the simpler, more common instructions appearing in the first folders. Using the mouse, hover over any element in the Instruction task card for more information on that instruction.

A ladder program is built by dragging instructions, including branch open and close elements, from the Instructions Task Card onto the network. After placing on the network, most instructions require their address or tag to be assigned. Some instructions will require additional properties to be configured.

Comments and labels can be added to networks and provide a convenient way of documenting the program.

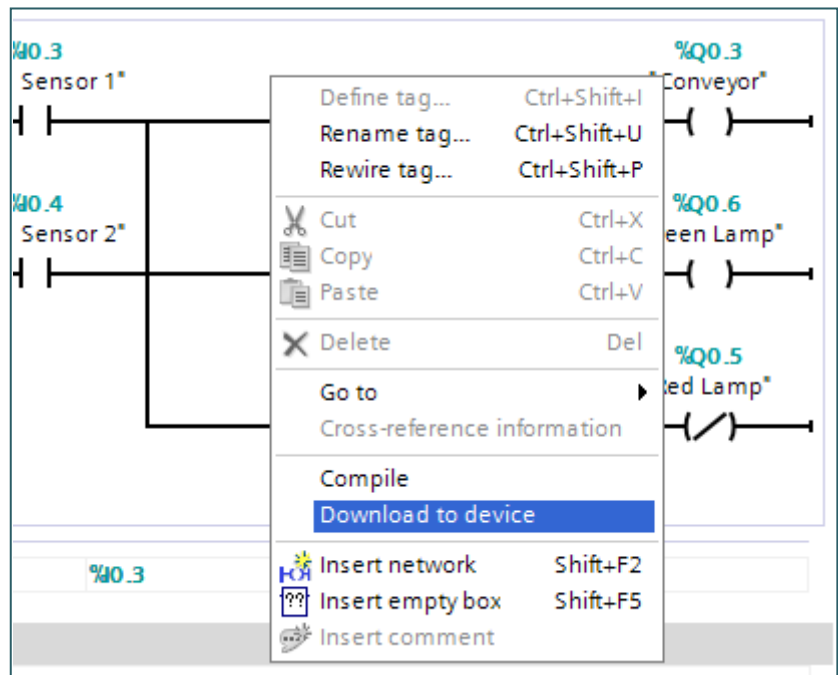
Use the built-in Help for more information on entering ladder programs.

Download a Project

Before a ladder program can be run, it must be compiled and loaded into the PLC:

- Compile the Ladder program
- Establish a connection with the PLC
- Download the device configuration to the PLC
- Download the ladder program to the PLC
- Instruct the PLC to run the ladder program

Fortunately, all these processes can be completed using a single command - right-click on the ladder program and select 'Download to device'.



During compilation, the ladder program will be checked and converted into a form that the PLC understands. Any errors detected at this stage, such as un-configured relays, will be displayed and must be corrected before the program can be downloaded.

Communication will be established with the PLC – the same method used during initial configuration of the device.

The device configuration will be downloaded to the PLC first, including hardware and network connections. This will be followed by the software configuration, including the ladder program and tag information.

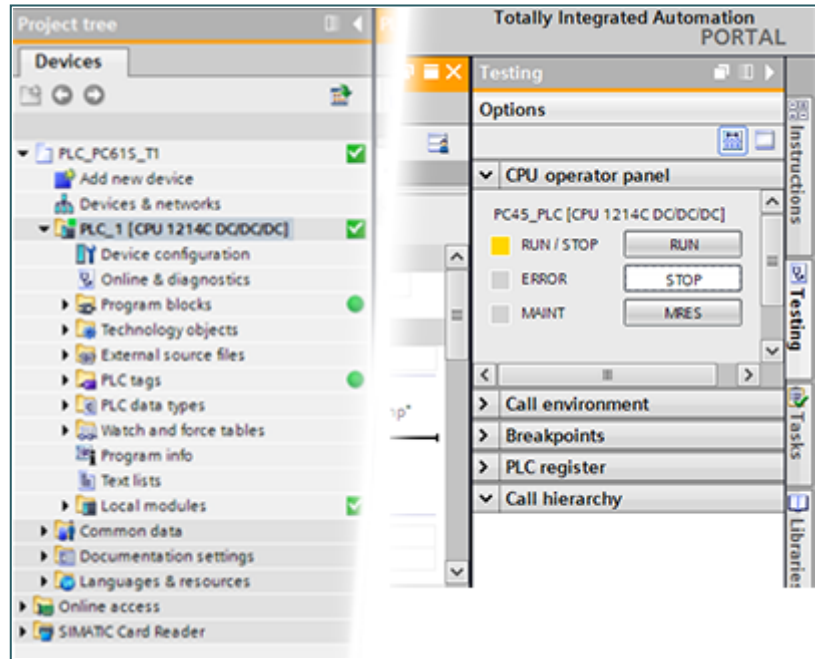
After downloading, the ladder program may start automatically.

Use the built-in Help for more information on downloading projects.

Enter Online Mode

The TIA Portal provides functionality to remotely control and monitor a Siemens S7 PLC in real-time – this is referred to as Online mode.

To indicate that Online mode has been entered, a number of window captions change colour. Once in Online mode, the PLC's internal configuration is compared against the current project. Any differences will be highlighted and necessitate a download to the PLC to synchronise the two.



While in Online mode, the TIA portal application has direct, real-time access to the PLC, including the ability to do these things:

- Start and Stop a running program – use the 'Testing' Task Card
- Monitor the status of inputs and outputs – use a 'Watch table'
- Monitor the current values of timers and counters – use a 'Watch table'
- Force the status of any input and output – use a 'Force table'
- Monitor the active paths of a ladder program – use ladder 'Monitor'