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Getting started manual – Axis Control Library for S7-1500(T)

SIMATIC / PLC / S7-1500(T)

<https://support.industry.siemens.com/cs/ww/en/view/109823103>

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1 Introduction

1.1 Overview

Welcome to our Getting Started Manual for trying a "Ready-to-Use" PLC application example project. This manual is designed for entry-level users with little or no experience in motion control or Siemens PLC/HMI to easily try a "Ready-to-Use" PLC application example project.

Axis Control is a PLC library for Siemens TIA Portal that simplifies the implementation of motion control systems. Its pre-configured blocks and functions make it easy to control servo and stepper motors with high precision and accuracy.

The example project used in this manual already has the Axis Control library integrated, so you do not need to integrate it yourself.

The example project has been already loaded into a cloud virtual environment for testing called VLAB. We will provide guidance on how to use this example project to learn about how to use the application Axis Control with our Siemens PLC SIMATIC S7-1500.

With our cloud virtual environment called VLAB, you do not need any hardware to try the application example. You can easily access and try the example without the need to install anything on your own machine. The virtual environment includes a simulation of the PLC and provides an HMI where users can jog the motors and experiment with the application.

1.2 Library advantages

The FB Axis Control is a function block provided by the Axis Control library that offers several features to simplify the implementation of motion control systems. Key features are:

- **Set Up Position Control:** The Axis Control library provides several functions for position control, including homing, jogging, and positioning. These functions can be used to control the position of the servo motor in a motion control system.
- **Centralized Control:** The FB Axis Control provides centralized control for all motion control functions. This allows for easier programming and commissioning of axes, as you do not need to familiarize yourself with the code of the axis module. You only use the interface of the block that behaves according to PLCopen.
- **Extensive Functions:**
 - Enable Axis
 - Homing
 - Moving in jog mode
 - Positioning
 - Torque reduction and fixed stop detection
 - Gearing
 - Cam disk synchronization
 - Convenient provision of status information (StatusWord, WarningWord, ErrorWord)

1.3 Components used.

As an alternative, you can download the application example used in this manual from the Siemens Industrial Online Support (SIOS) website. The URL to download the application example is shown in the next table:

Table 1-1: Download getting started project

Component	Entry ID	Download Link
Axis Control "LAxisCtrl" library for TIA Portal	109749348	Download from SiePortal

NOTE

The library integration isn't covered in this getting started manual, please refer directly to the SIOS entry for tutorials on [Library integration](#)

2 VLAB

2.1 Start virtual VLAB in the web browser.

Once you receive the email, you will be directed to our VLAB environment - a cloud virtual machine hosted on AWS. Simply follow the link provided in the email and start the VM to begin testing your PLC application.

Before accessing the VLAB environment, ensure that you have registered for a Siemens ID using the following link: [SiePortal](#) Once you have registered, use your Siemens ID to login to the VLAB environment and start testing your PLC application.

NOTE

vlab.siemens.com

After opening the link provided in the email on the home screen, agree to the Terms and Conditions and then press Start.

Wait for the VLAB virtual environment to be prepared (it should take approx. 5 min)

Once the virtual environment is ready, you can connect to the VLAB by pressing the Connect button, and you can start testing your PLC application in the VLAB environment.

Within the VLAB environment, all software required for testing Ready-to-use applications is already pre-installed, and no license activations are required.

VLAB vs Local Installation:

The steps for launching the PLC and HMI simulations differ between VLAB and local installation. Below are the steps for each.

Please note that VLAB provides a cloud-based environment, whereas local installation provides a standalone environment on your machine. Depending on your needs, you can choose to use either option.

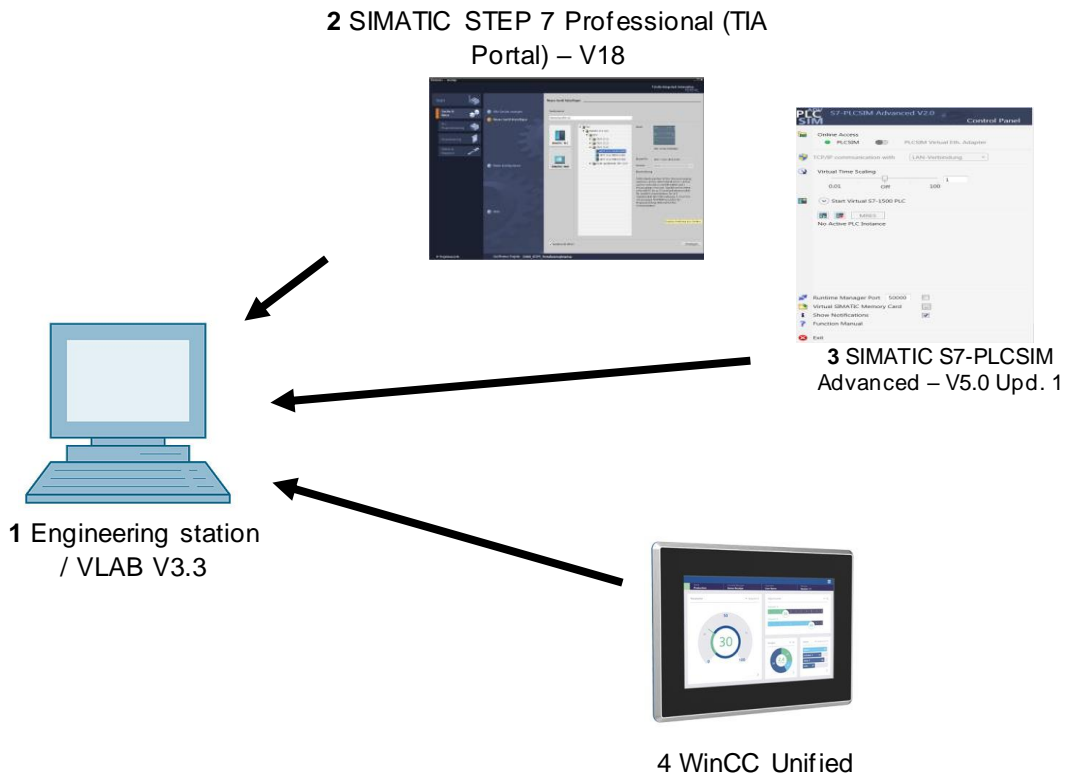
VLAB

1. Open an internet browser and navigate to the VLAB in the Siemens Premium Services website.
2. Log in using your credentials.
3. Once you are logged in, navigate to the PLC application, and click on its icon.

3 Software requirements

This chapter provides information on the software requirements needed to run the "Ready-to-Use" PLC application example project. If you are using VLAB, our cloud virtual environment, you may skip this chapter as all the necessary components will be available for use.

NOTE You may go to Chapter 4 if you are using VLAB. Otherwise, please refer to the table below for the required components.



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Table 3-1: Software requirements

Component	Version Number	SIOS entry ID	Download Link
STEP 7 Basic/Professional, WinCC Basic/Comfort/Advanced and WinCC Unified	V18	109807109	Download from SiePortal
Updates for STEP 7 V18, S7-PLCSIM V18 and WinCC V18	V18 Update 2	109817218	Download from SiePortal
SIMATIC S7-PLCSIM Advanced	V5.0 Update 2	109823215	Download PLCSIM Advanced here
WinCC Unified PC Runtime	V18	109814516	Download WinCC here

4 Downloading and Running the Getting Started Project for PLC and HMI

To run and test the "Ready-to-Use" PLC application example project, you can use VLAB's virtual environment or install the HMI and PLC simulation on your local machine.

Here are the steps:

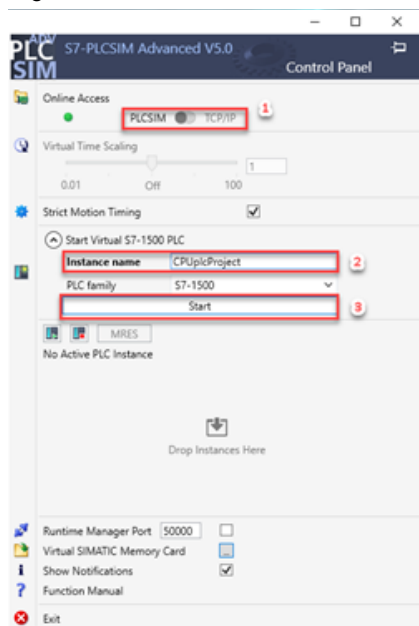
1. Navigate to the "Ready-to-Use" PLC application example project folder.
2. Open the project and test it using the PLC and HMI simulations.

With VLAB, the demo projects will be found on the desktop as under "Siemens Application Examples and libraries".

4.1 Starting the PLC simulation

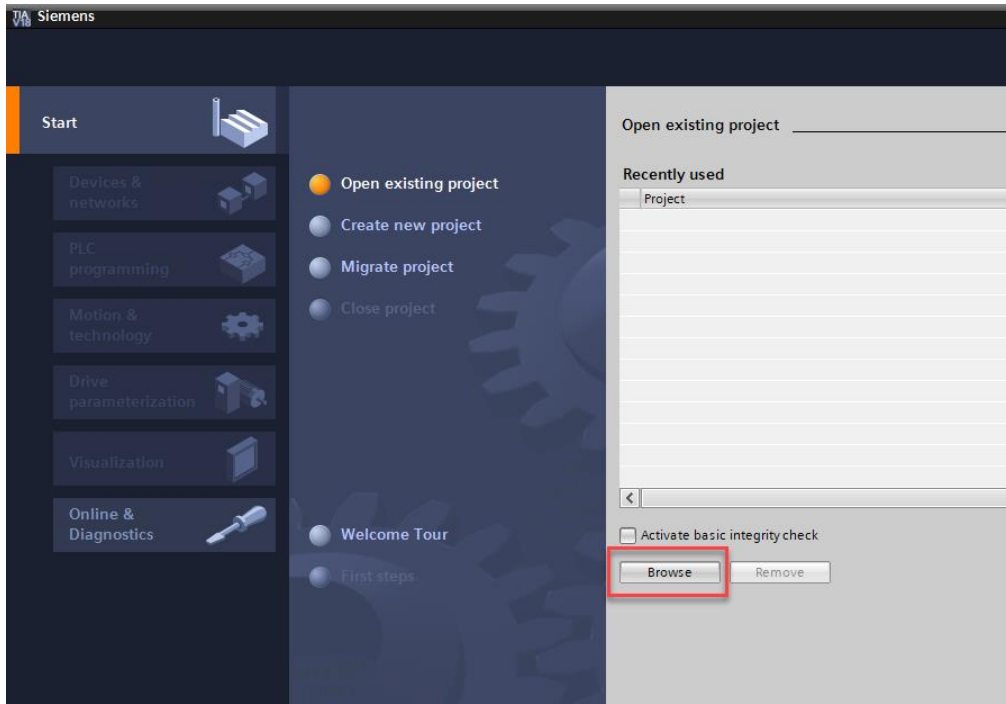
After installing everything, we can begin to setup the project. We can begin by starting an instance of PLCSIM Advanced.

Figure 4-1: PLCSIM Advanced



To start an instance of the PLC, you should specify the online access method, name your PLC instance, and press start.

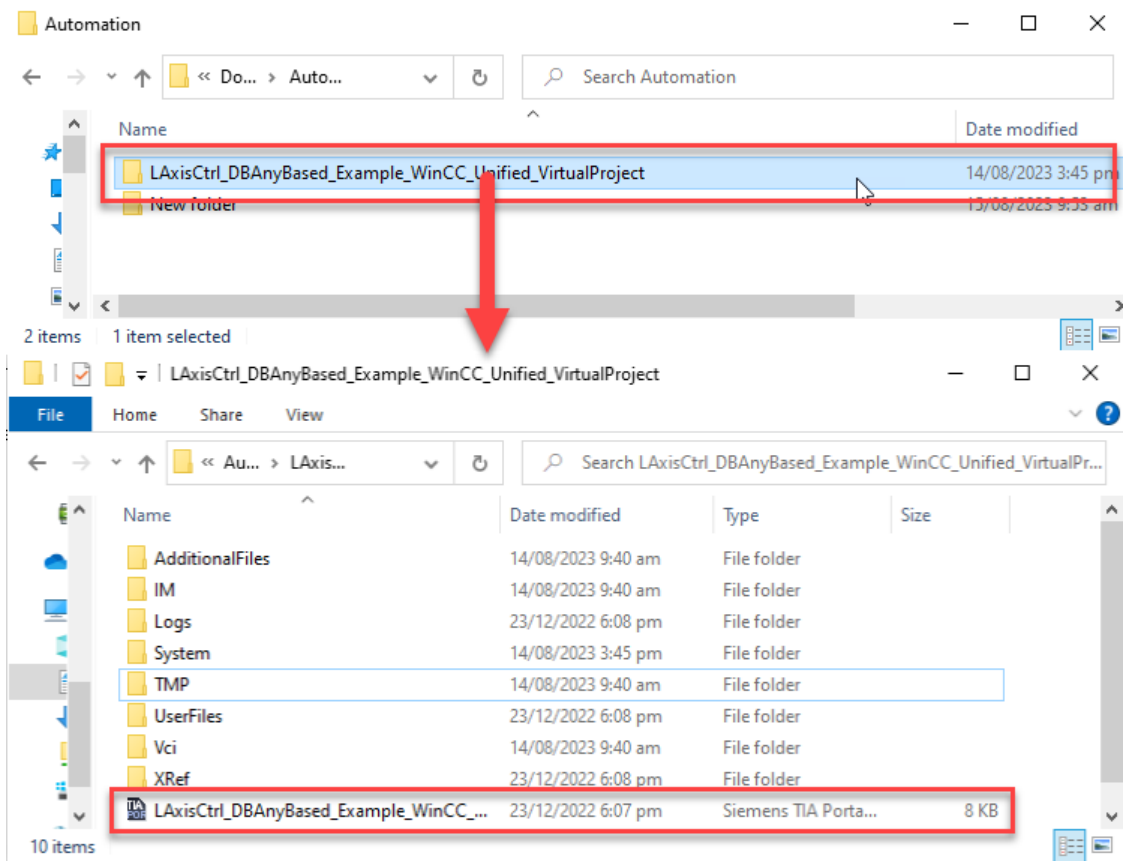
Figure 4-2: Browse button in TIA start screen



As shown in red, press the browse button to see a list of available projects, look for your project in the same place as you saved it before. The file you are looking for is found inside your project folder (Shown in red).

4 Downloading and Running the Getting Started Project for PLC and HMI

Figure 4-3: File location



4.2 Downloading the Application Example Project to PLC

After setting up the PLC simulation, the next step is to download the PLC application example project to this PLC. Follow these steps to complete the process:

Since the project is already finished, the next steps will just be a matter of downloading and running it.

To begin, we must compile the PLC program and download it to device. You must first click on the PLC_1 tab so that TIA knows to compile the project.

Figure 4-4: Compile the project.

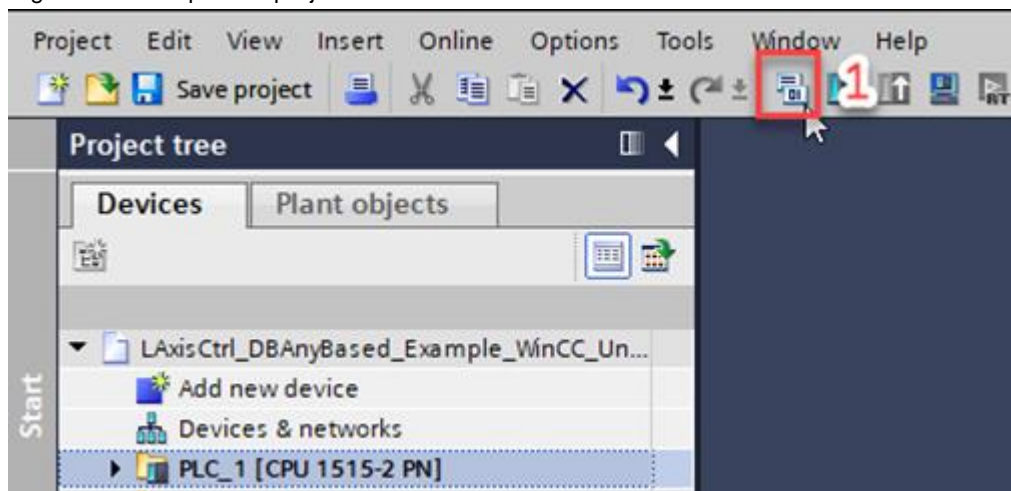
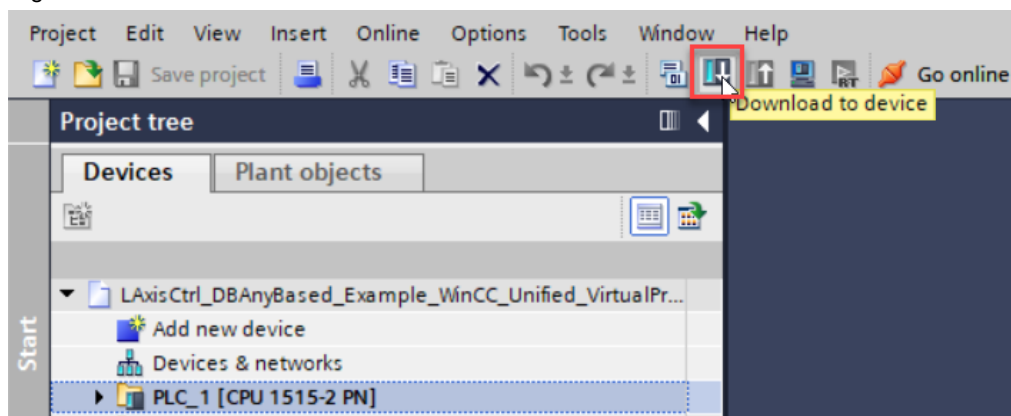
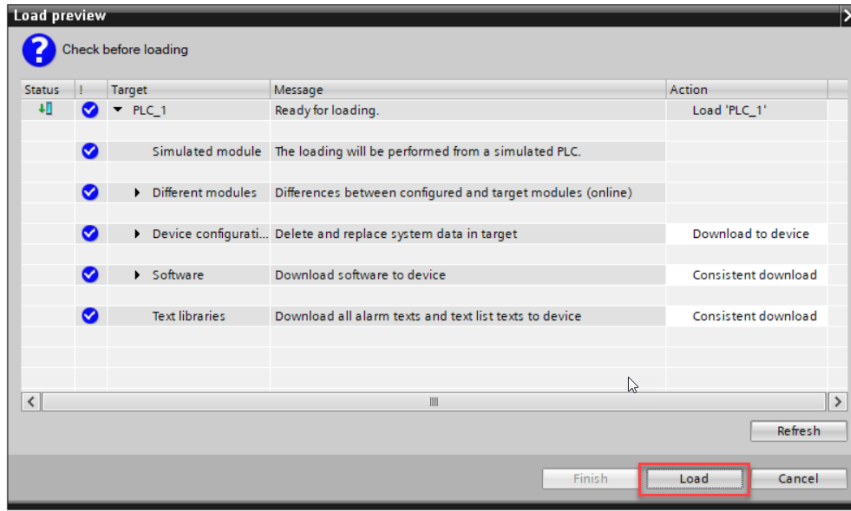


Figure 4-5: Download to device.



Since there are no changes to make, after pressing download to device, you may load the program directly and then finish the download.

Figure 4-6: Load screen

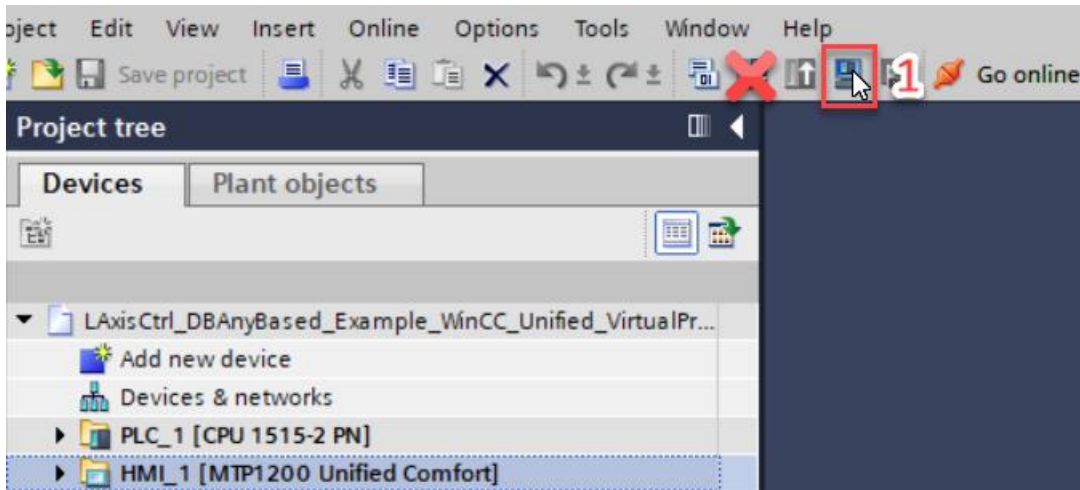


NOTE After downloading, make sure to set you PLC to “RUN” mode, to see the full behavior from the HMI later.

4.3 Starting Web HMI simulation - “WinCC Unified RT”

Next, we must compile and simulate the HMI. Similarly, to the PLC, we must compile and load the configuration to the HMI.

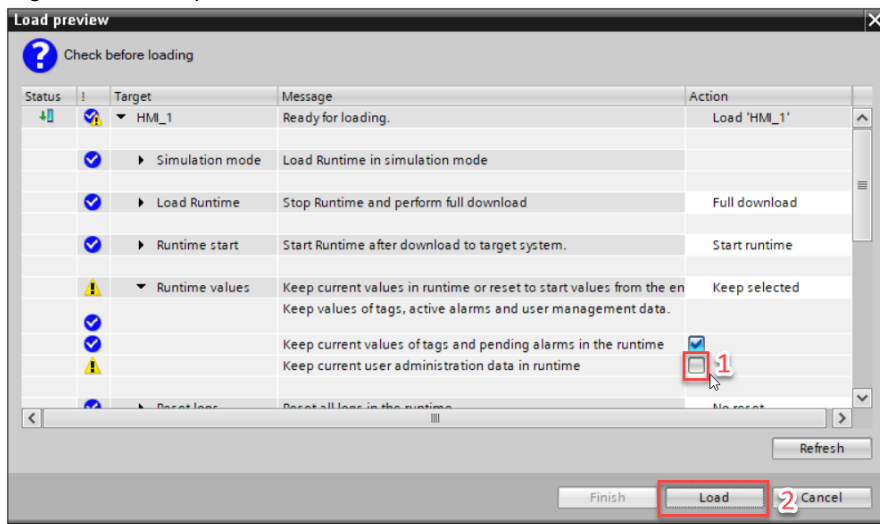
Figure 4-7: The “Start simulation” button.



NOTE

The difference here is that you must UNCHECK the box marked “Keep current user administration data in runtime”. This prevents us from getting an error in the HMI Simulation

Figure 4-8: Load preview for HMI



4.3.1 Opening HMI simulation in Browser

Once you have downloaded the application to the simulated HMI, the next thing to do is access the simulation which contains our HMI program.

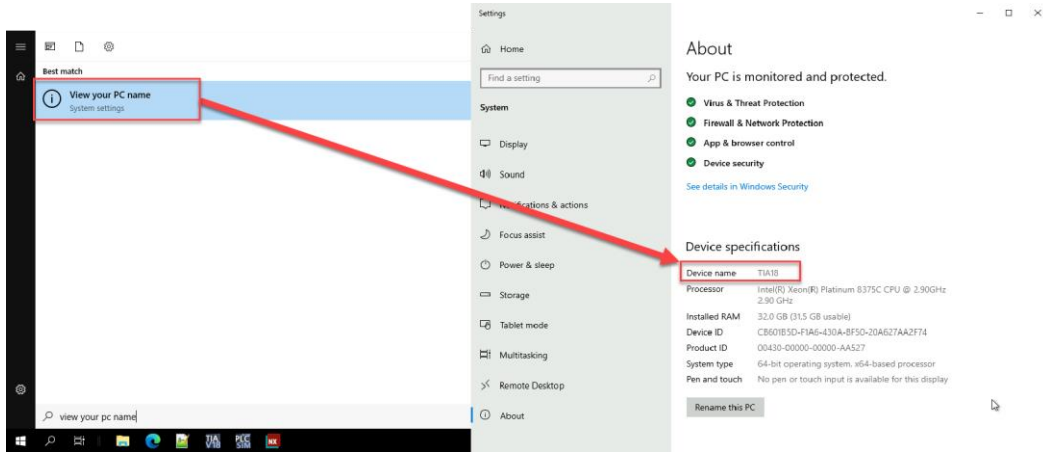
NOTE

The Web HMI simulation uses **your** system name for the URL. This can be found in System Information, under “System Name.”

The figures below guide you to finding your device's name, the URL will be written as:

`https://[SystemName]`

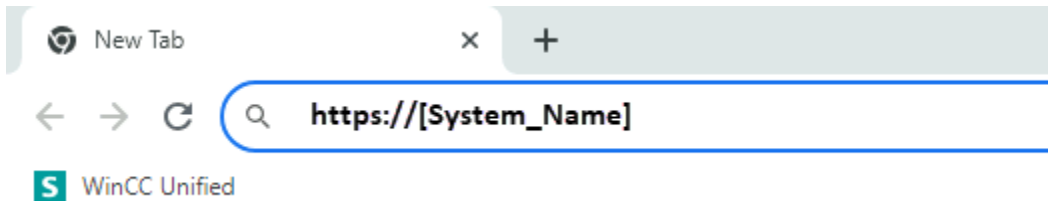
Figure 4-9: Finding your PC Name



NOTE

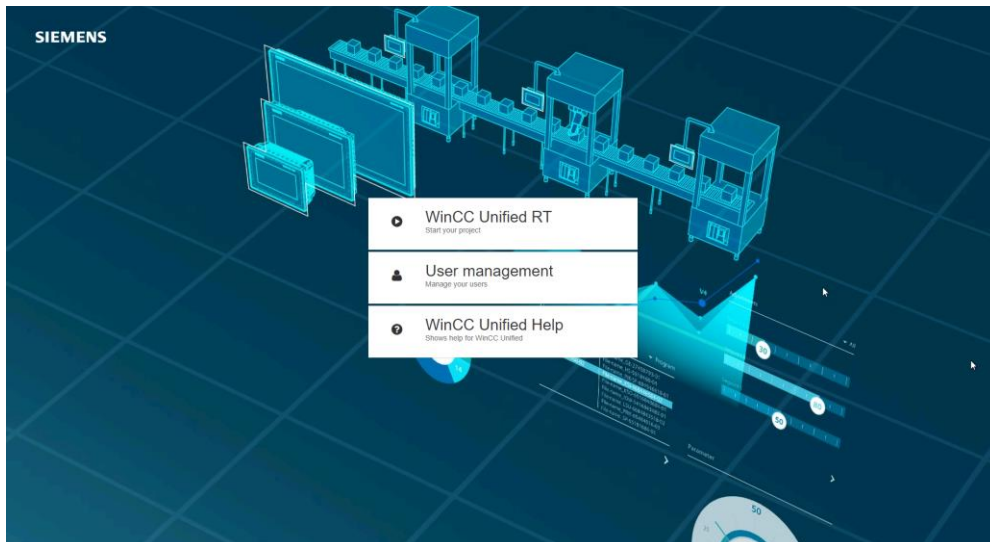
The name of your system might be different than the one shown here, even if you are using the Virtual Lab environment

Figure 4-10: URL to access the HMI simulation



Credentials – login and password

Figure 4-11: WinCC RT opening page



4 Downloading and Running the Getting Started Project for PLC and HMI

Once you've opened the HMI simulation, you will be on the page shown in the figure above, simply click on the first option "WinCC Unified RT" to be taken to the login page, for this project the Username and Password are:

```
User: Admin  
Password: Siemens123
```

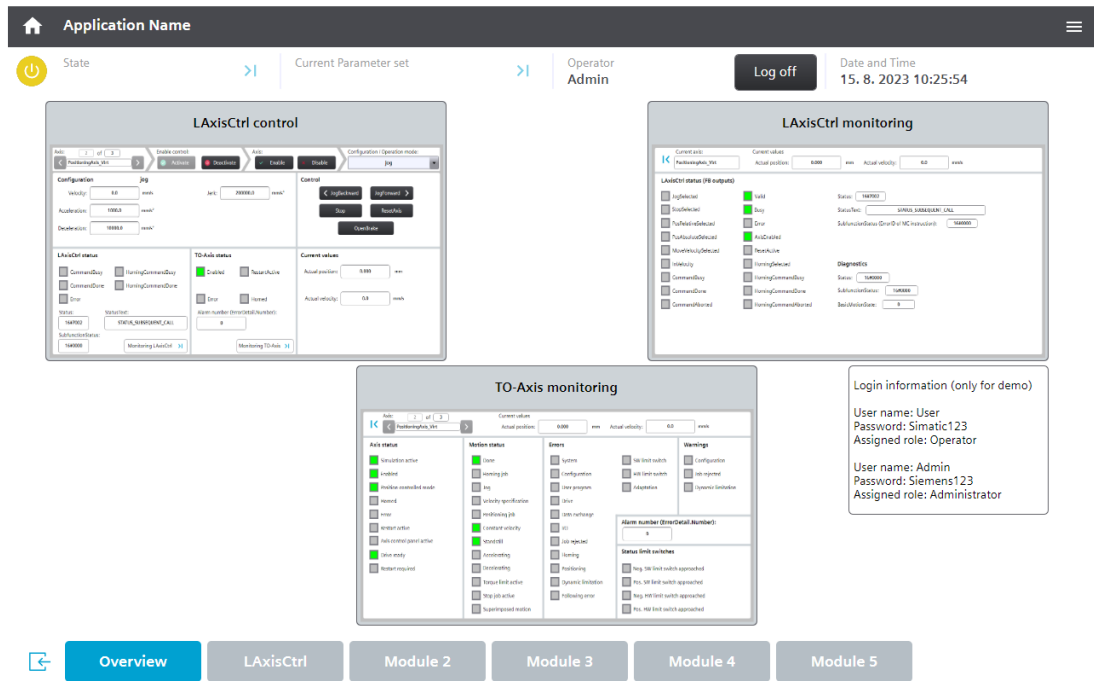
Inside the project you can find 3 simulated axes for speed, position, and synchronization. For more information about the program, you can refer to the manual of the library, titled: "LAxisCtrl_DBAAnyBased" manual (12/2022) for TIA Portal V18".

The project is available as a ZIP file containing the TIA project and can be downloaded from Siemens SIOS. You can find the project using the same entry ID (109749348) as in the example project. Once downloaded, you can extract the files and open the project in the TIA Portal software.

5 Using the HMI with Axis Control

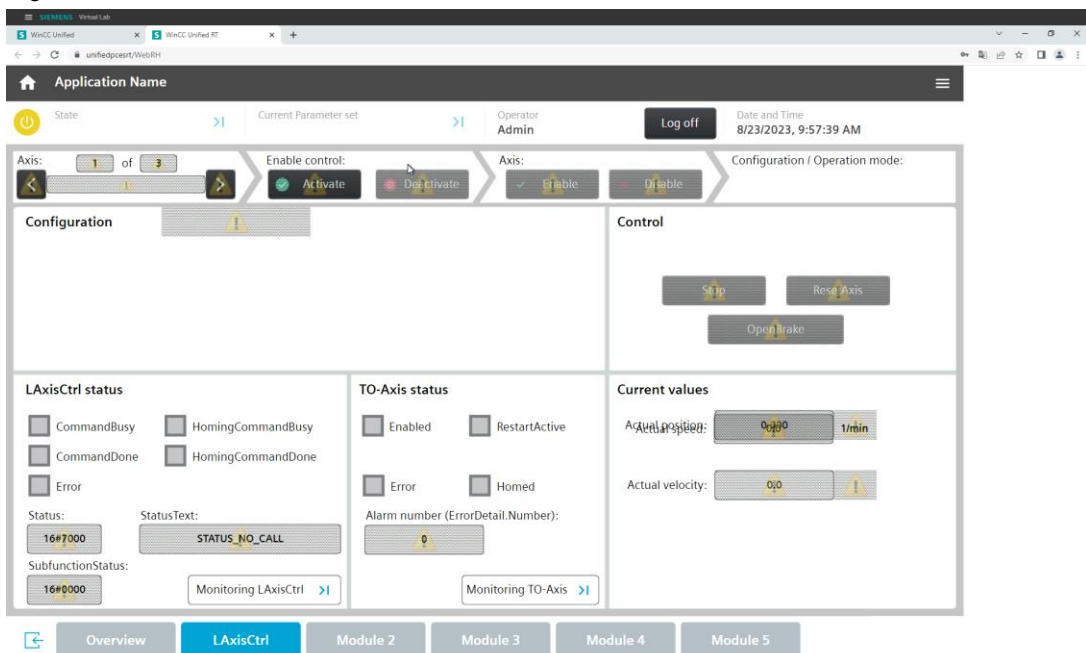
Now that you have downloaded and started the PLC application example project and verified that it is working correctly with the PLC simulation advanced and HMI, it's time to learn how to control the axis using the HMI.

Figure 5-1: Start Screen of the LAxisCtrl



When opening the HMI, you might be met with a screen like shown in figure 5-1, this indicates that the PLC is not in run mode. You can always change the state of the PLC as shown through TIA Portal, or through the PLCSIM Advanced window.

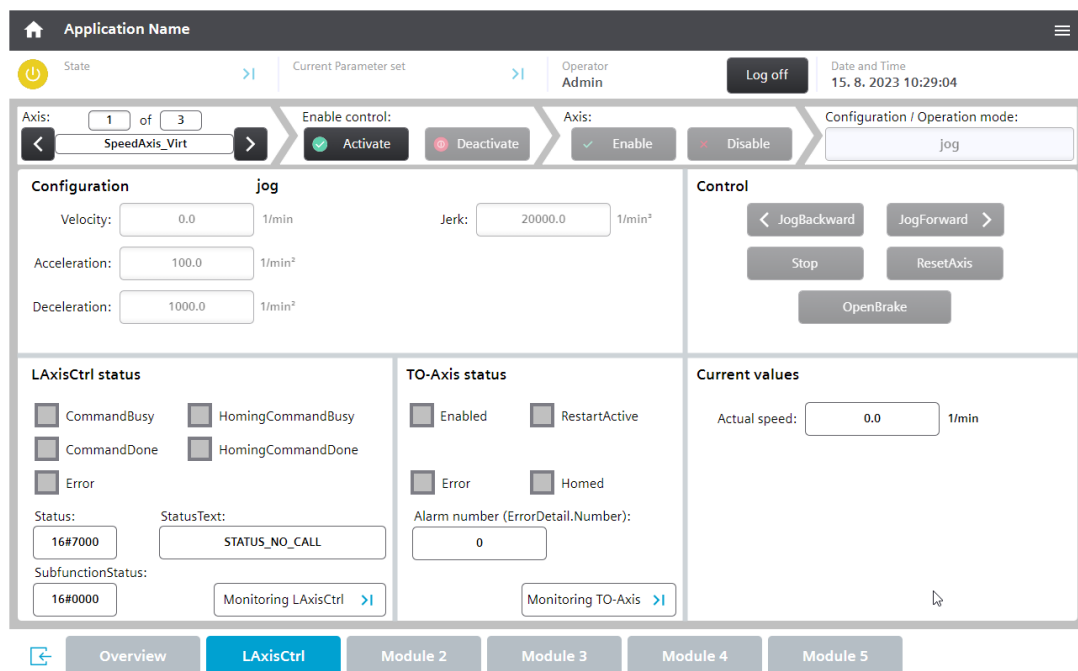
Figure 5-2: LAxisCtrl screen when the PLC is in STOP mode.



To jog/control the axis using the HMI, follow these steps:

3. Open the HMI simulation on your local machine or VLAB.
4. Open the "Axis Control" application.
5. Once the application is open, you will see a screen with several buttons and indicators.
6. Use the "Direction" button to select the desired direction of the axis movement. The button will light up to indicate the selected direction.
7. Use the "Speed" slider to adjust the speed of the axis movement.
8. Press the "Jog" button to start the axis movement in the selected direction and at the selected speed.
9. To stop the axis movement, press the "Stop" button.
10. If necessary, use the "Fine/Coarse" switch to adjust the axis movement resolution.

Figure 5-3: AxisCtrl control page



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Congratulations! You have successfully jogged/controlled the axis using the HMI. Different axes and operation modes can have additional buttons and features available in the HMI. Take some time to explore the interface and familiarize yourself with the various controls and options available.

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

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6.3 Application support

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6.4 Links and literature

Table 6-1

Nr.	Thema
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109823103

6.5 Change documentation

Table 6-2

Version	Date	Modifications
V1.0.0	08/2023	First version
V1.12.0	01/2024	Updated footer/header