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Getting started manual – SIMATIC Kinematics Integrator Library for S7-1500(T)

SIMATIC / PLC / S7-1500(T)

https://support.industry.siemens.com/cs/ww/en/view/109823537

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Table of contents

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.

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.

Purpose of the manual

The SIMATIC Kinematics Integrator (SKI) is a software solution for kinematics control. It consists of a pre-built PLC project with an HMI application. The operating concept allows the user to create, edit and execute kinematics programs entirely on the HMI without an engineering system.

The standard application SIMATIC Kinematics Integrator enables the user to program all supported kinematics types of the technology object kinematics (also Motion Control KinPlus up to 6D). Controlling multiple kinematics in different channels on one SIMATIC S7-1500T CPU is supported.

Core content

- This manual is designed for entry-level users with little or no experience in motion control or Siemens PLC/HMI.
- No hardware, license or software installation is needed to try the "Ready-to-Use" PLC application example project.
- The project is designed to control an "axis" in the context of motion control.
- VLAB, a cloud virtual environment, enables users to quickly start PLC programming and experiment with the application.
- This manual provides step-by-step guidance, allowing anyone to have a solid understanding of the basics of PLC application testing in a short amount of time.

1.2 Library advantages

SIMATIC Kinematics Integrator offers the following HMI configuration and programming features:

- Configuration of single axes and kinematics
- Configuration and control of inputs, outputs, and variables
- Jogging of the kinematics and single axes
- Teaching of Cartesian positions
- Diagnostics functions of program, kinematics, and axes
- Save and load programs to / from HMI or USB drive.
- Create new programs and edit existing machine programs via HMI.
- Flexible program structures, e.g., labels, branches, loops, subroutines, and parallel sequences

- Programming of kinematics movement commands (single command and complete path motion)
- Usage of independent single axis commands
- Support of synchronous operation (gearing) functionality
- Access and usage of inputs, outputs, and variables in program logic

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	Download Link
LSKI Library V2.1.1 (89,6 MB) for TIA Portal	109802248	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.
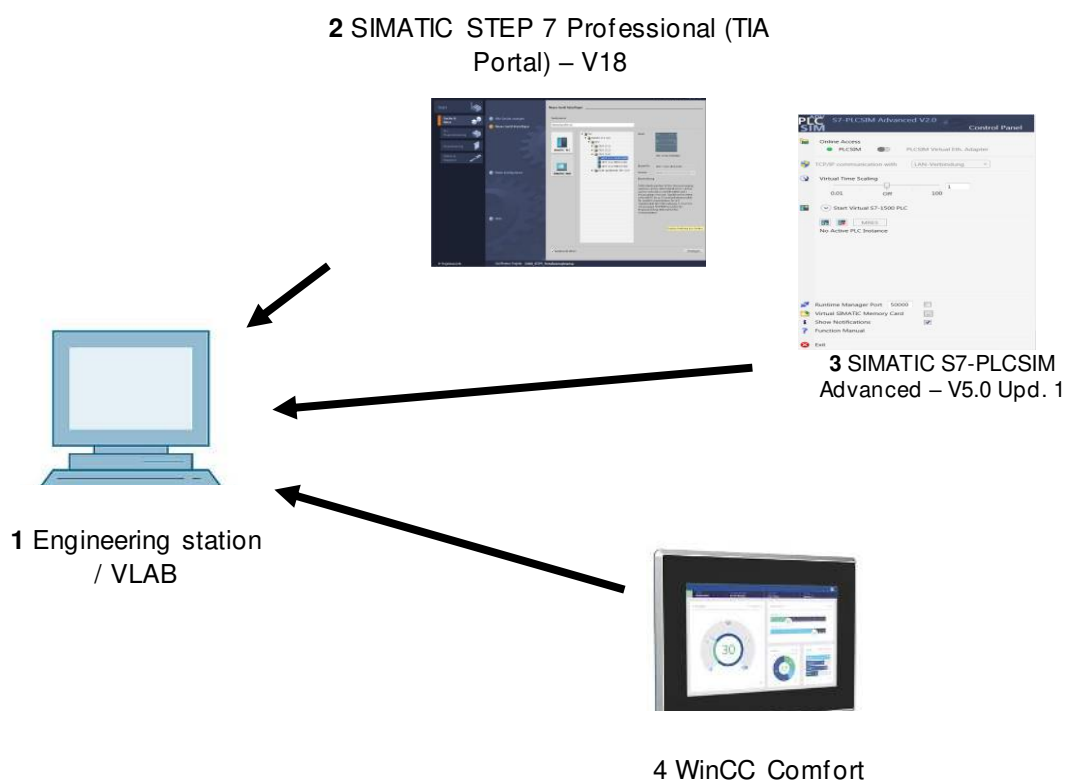
2 SIMATIC STEP 7 Professional (TIA Portal) – V18

3 SIMATIC S7-PLCSIM Advanced – V5.0 Upd. 1

1 Engineering station / VLAB

4 WinCC Comfort

Table 3-1: Software requirements

Component	Version Number	SIOS entry ID	Download Link
STEP 7 Basic/Professional, WinCC Basic/Comfort/Advanced	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

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
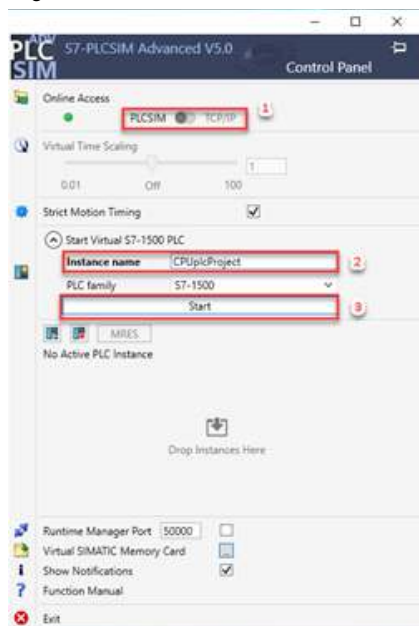
To start an instance of the PLC, you should specify the online access method, name your PLC instance, and press start.
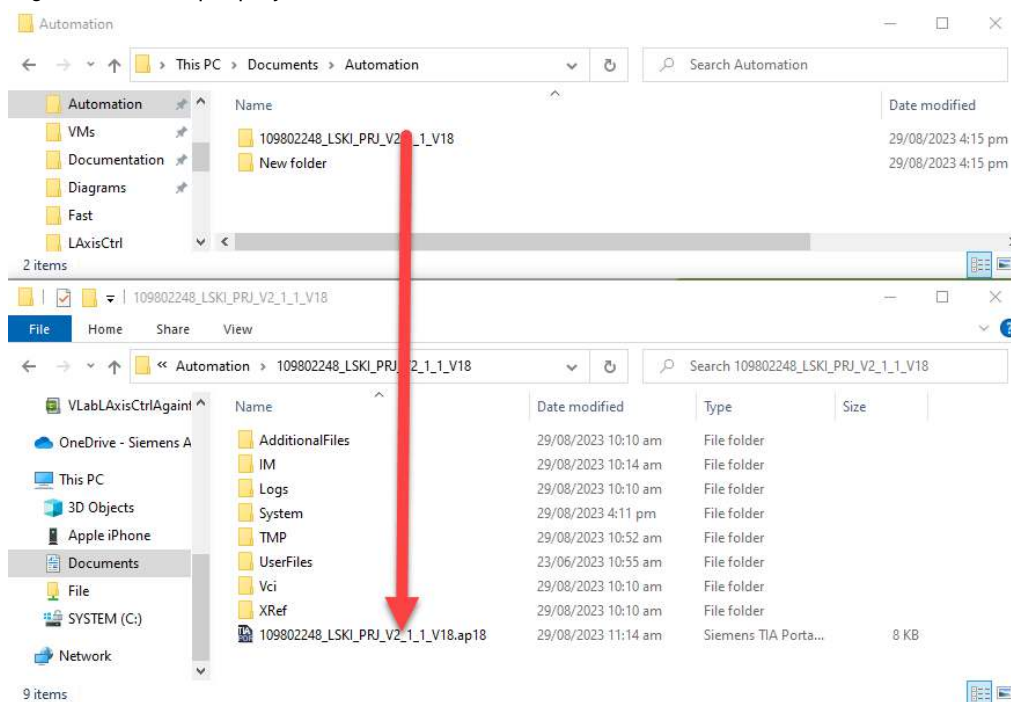
Figure 4-2: Browse button in TIA start screen
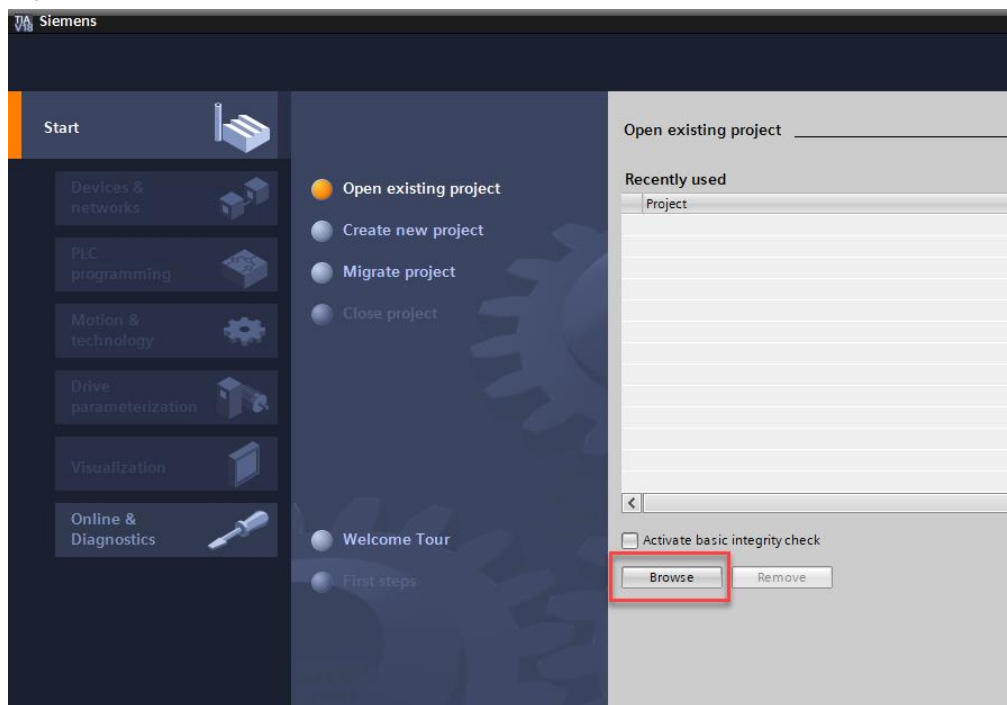
As shown in red, press the browse button to see a list of available projects, look for your project in the same place as you saved it before. The file you are looking for is found inside your project folder (Shown in red).

Figure 4-3: Example project 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 1500 tab so that TIA knows to compile the project.
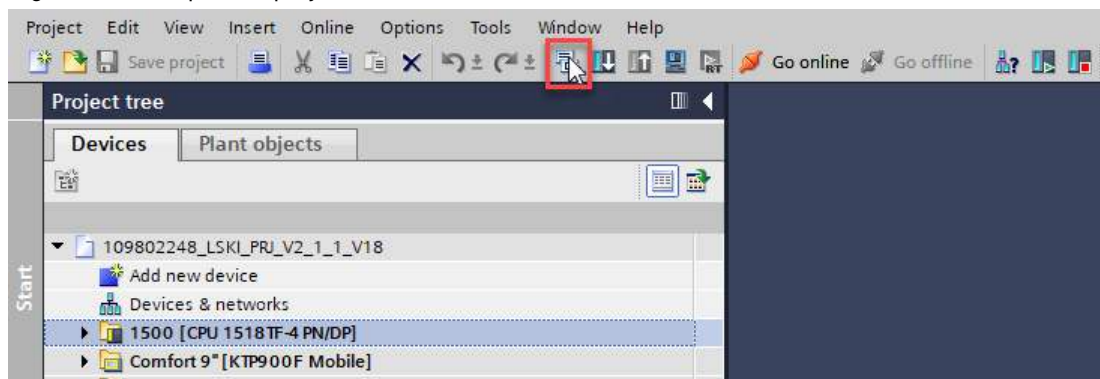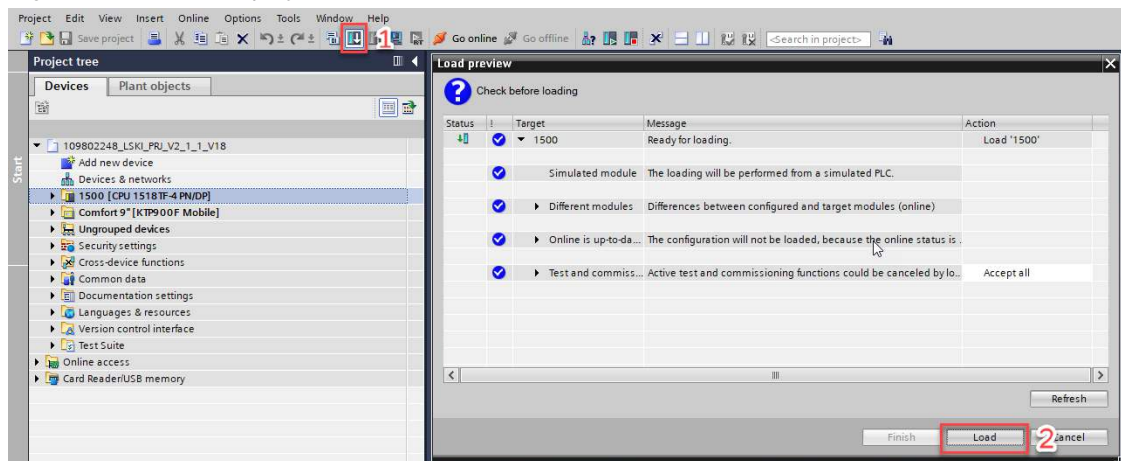
Figure 4-4: Compile the project.

Figure 4-5: Download project 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.

<table>
<tr><td>NOTE</td><td>After downloading, make sure to set you PLC to "RUN" mode, to see the full behaviour from the HMI later.</td></tr>
</table>

4.3 Kinematics Objects

The example project includes many different technology objects, which subsequently are used in the kinematics objects. The example this manual explains will be a "pick and place" program that has already been created for the **"Cartesian Picker" Kinematics object.**

This step may not be necessary for you if the visualization is not required, skip to chapter 4.4 in that case.

The kinematics object, along with it's kinematics trace, can be found in the PLC's "Technology Objects" device tree. In this project it is called CH2_CartesianPortal. Once opened, press the monitor icon in the top left of the Trace window.

Figure 4-6: Opening the kinematics trace.
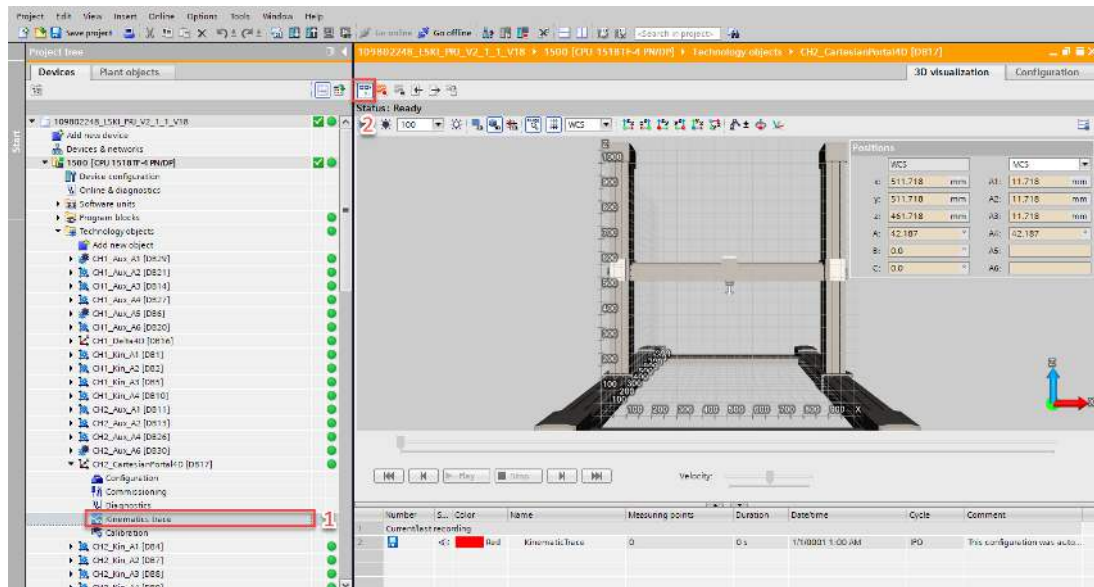
Now that you have shown the kinematics object, we will be able to see what the program looks like while running, to operate the program we want to simulate our HMI

4.4   Starting HMI simulation - WinCC

Next, we must compile and simulate the HMI. Similarly, to the PLC, we must compile and load the configuration to the HMI. This will show a new window with the simulated HMI.

Figure 4-7: Simulating the HMI
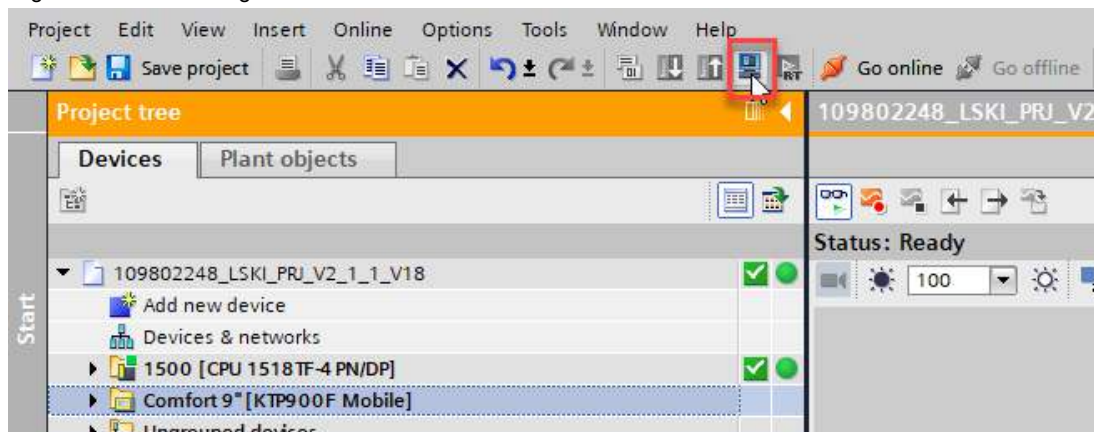
After waiting for some time, the SIMATIC WinCC Runtime Advanced window will open, and you can begin operating the simulation.
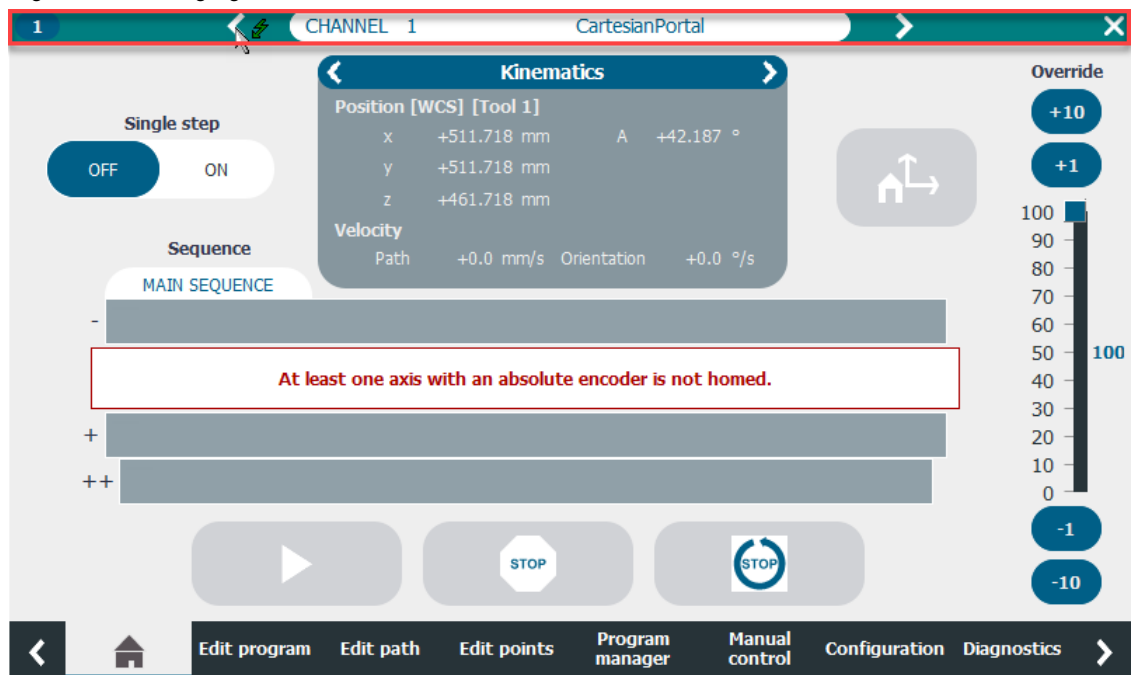
Figure 4-8: HMI window

4.4.1 Operating the HMI

After opening the HMI, you will be on the home page, first you should check the top bar to see which channel you are operating in, this example should be run on Channel 1 – CartesianPortal
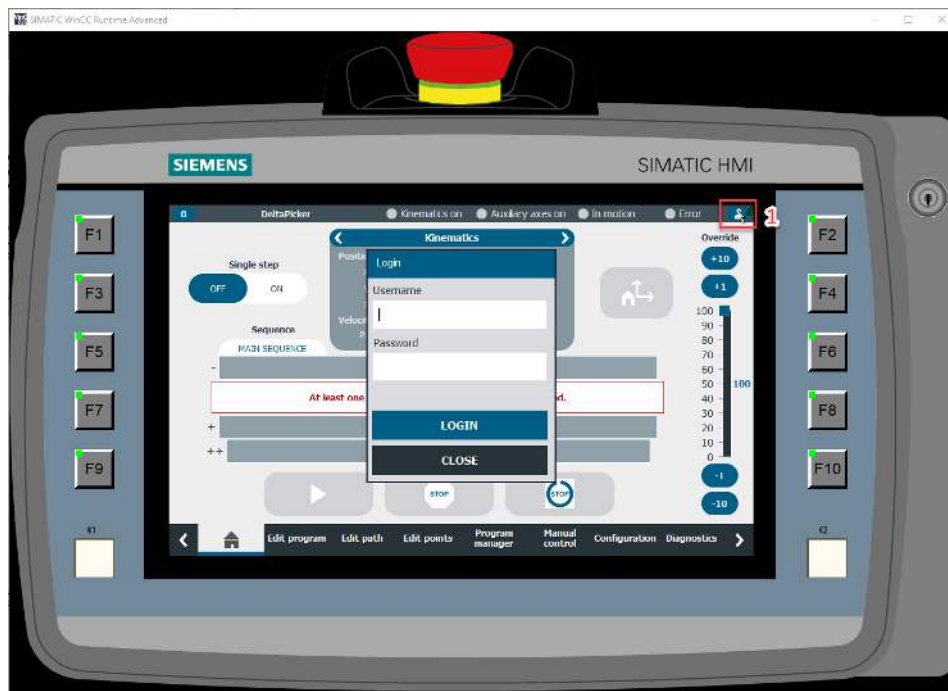
Figure 4-9: Changing the channel in the HMI.

Operating the HMI requires a user login, press the user login icon in the top right and enter the user credentials (case sensitive) as follows:

Figure 4-10: HMI Login

```
User: admin
Password: Admin
```

After logging in, you will be able to make changes to the points, path, and program of the HMI. You can make your own program completely through using the intuitive editor, but for the purpose of this example that is not relevant, since we are using the example project's preset program.

As is shown in the home page, the axes are not yet homed and the program cannot be run. You can manually home the axes, as well give each individual axis commands such as jogging. To do so, head on over to the "Manual control".

Figure 4-11: Homing the axes.
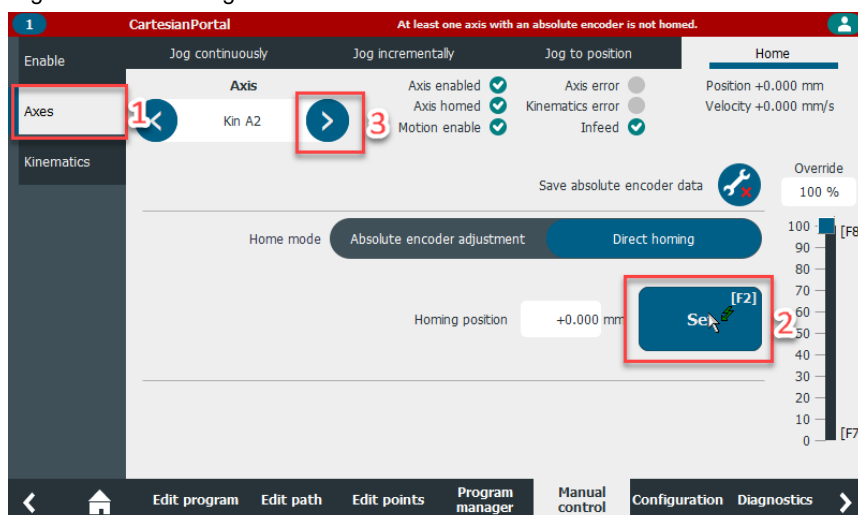
After heading on over to the manual control tab, you will have 3 buttons on the left side, press the axes button. This will take you to a screen that allows you to give basic commands to the selected axis.

Select an axis that is not homed and press the set button, it should show a checkmark near "Axis homed". Do this for all the available axes, when you are done the red bar warning you of an axis not being homed should disappear as shown below.

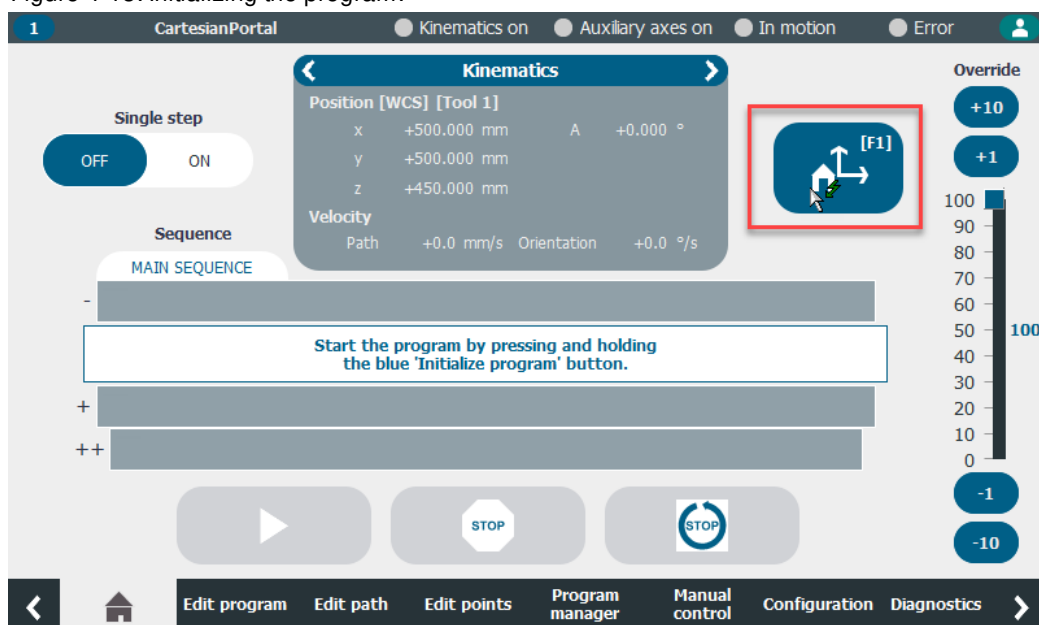Figure 4-12: Manual Control screen after homing all the axes.
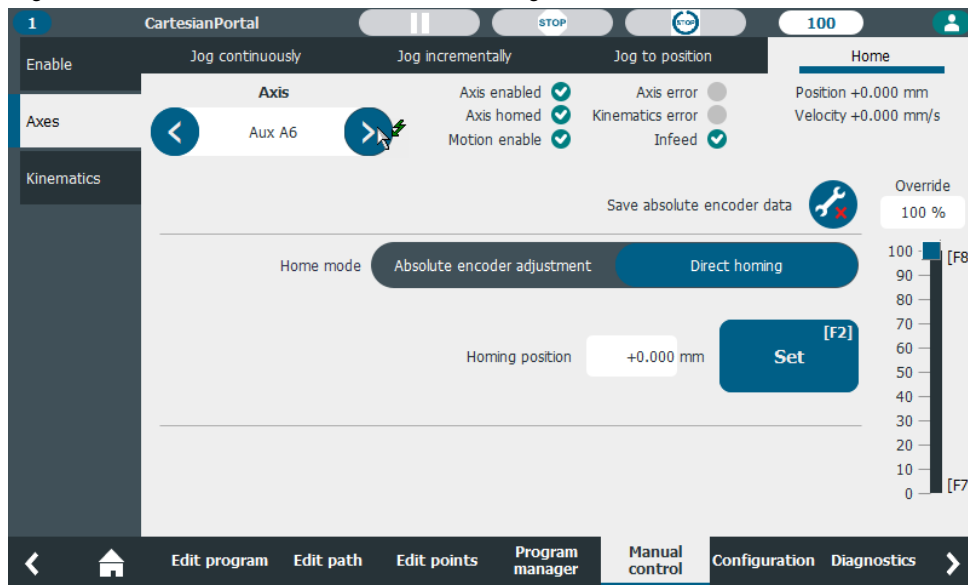
Now that everything is homed, back to the home page to begin the program.

| NOTE | If you intend on showing the visualization through kinematics trace, you can begin a recording before starting the program to show the movement with a red line. |

Figure 4-13: Initializing the program.

Following the instructions on the home page, press and hold the home button or f1 key. After that it will unblock the grey play button. As soon as you press the button the program will start, so if you intend on visualizing, press the record button on the kinematics 3d trace.

Figure 4-14: Record the kinematics trace.
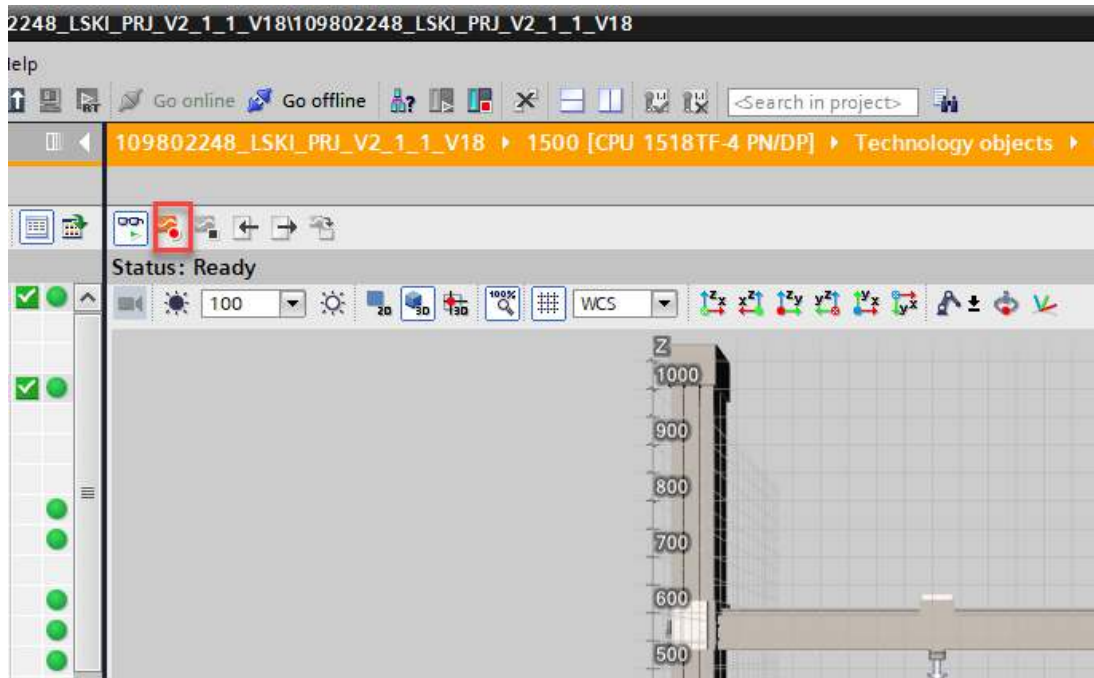
Now that everything is ready, press the play button or f3.
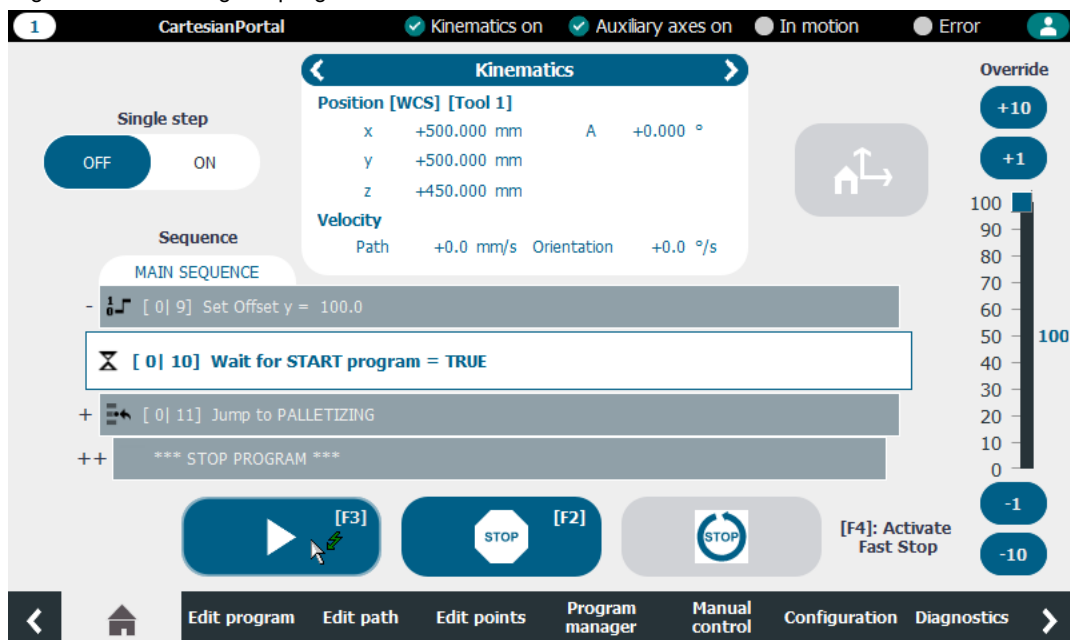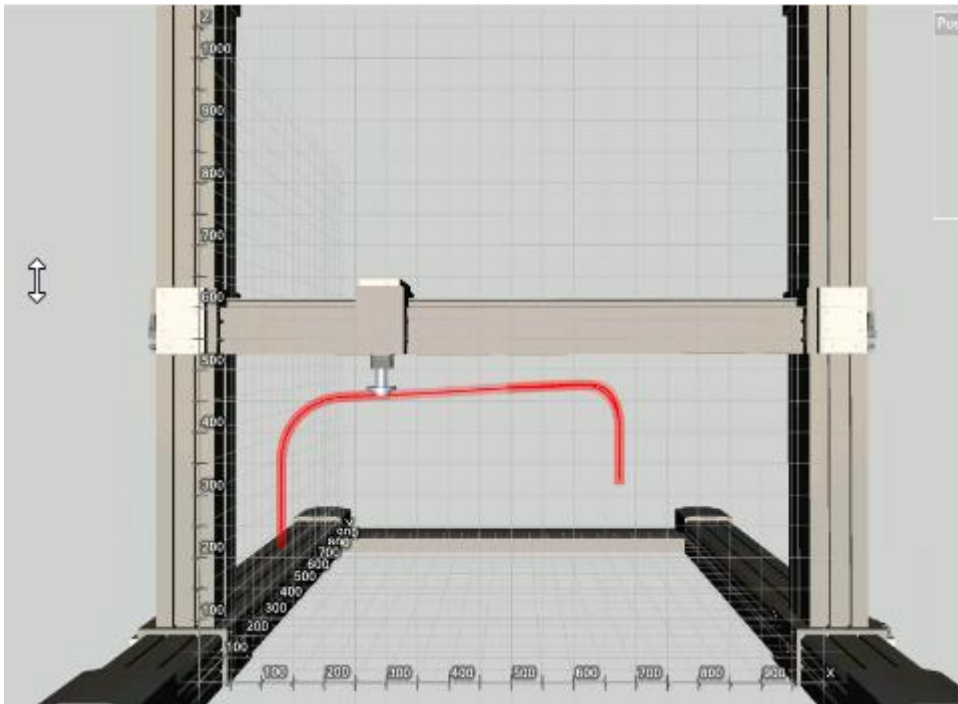
Figure 4-15: Starting the program.

Figure 4-16: The kinematics trace

This was a basic application example for the SIMATIC Kinematics Integrator library, the program itself is a pick and place program, try out your own commands and see all the capabilities.

5 Appendix

5.1 Service and support

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5.3 Application support

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5.4 Links and literature

Table 5-1

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/109823537
\3\	

5.5 Change documentation

Table 5-2

Version	Date	Modifications
V1.0	07/2023	First version