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NEWS

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

Product / version / specification / keyword

https://support.industry.siemens.com/cs/ww/en/view/109749348

Siemens Industry Online Support



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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.

The SIMATIC application "Line Motion Control" is designed for controlling the machining of products while moving in a linear or feedthrough machine, e.g. edge banding machines. The application main functions include product position tracking and switching on/off tools based on the position of the conveyor and user' machining programs.

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.

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 linear, or feedthrough machines transported by a linear conveyor.
- 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

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.

The "Ready-to-Use" PLC application example project can be downloaded as a zip file from the Siemens online support portal called SIOS.

However, since this application is being tested in VLAB, there is no need to download anything. Simply log in to the VLAB cloud virtual environment and all the required components, including the application, manuals, etc., will be available for use.

Table	1-1:	Download	getting	started	project
-------	------	----------	---------	---------	---------

Component	Version Number	SIOS entry ID	Download Link
Example project S7-1500 with WinCC Unified HMI (V1.3.0) for TIA Portal V18	1.3.0	109775881	Download from SiePortal

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: <u>SiePortal</u>. Once you have registered, use your Siemens ID to login to the VLAB environment and start testing your PLC application.

Figure 2-1: Open Siemens VLAB page in the web browser.

0	S Virtual Lab	×	+								-	0	×
$\in C$	https://vlab.si	iemens.cl	oud/attend-workshop		A®	4	3	Ф	ζ'n	۲	-		•••
≡ s	IEMENS Virtual Lab									R			+
	With this platform you h	ave the j	possibility to put your knowledge	into practice.									
	Available Promos												
			-										
		Т											
	Internal_r2u_ PMA_Handlir	recording_Robo	ng ptics_TIA_V18										
	Configurations:	CPU: 8,	GPU: None, RAM: 32 GB										
	Current Usage:	Oh											
	Location of Data Center:	Frankfur	t am Main, Germany										
	Contact:	virtualla	b.industry@siemens.com										
	I agree with the following	Terms a	nd Conditions										
		► Sta	rt										
													63

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.

NOTE vlab.siemens.com

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.



4 WinCC Unified

Tahla	3-1.	Software	requirements
rable	3-1.	Sollware	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
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 cloud virtual environment or install the HMI and PLC simulations 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.

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

- 3. Open an internet browser and navigate to the VLAB portal.
- 4. Log in to VLAB using your credentials.
- 5. Once you are logged in, navigate to the PLC application, and click on its icon.

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 Advar

		<u></u>
Ľ	57-PLCSIM Advanced V5.0	4 Þ
	PLCSIM OD TCP/IP	
	Virtual Time Scaling	
	6.01 Off 100	
2	Strict Motion Timing	
	Start Virtual \$7-1500 PLC	
i.	Instance name CPUpkProject 2	1
	PLC family \$7-1500	
	Start	<u>, </u>
	Start 3	j .
	Start 3)
	Start 3	
	Start 3)
	Start 3	2
	Start 3 Start 3 No Active PLC Instance	2
	Start 3 Start 3 No Active PLC Instance Drop Instances Here	2
	Start 3 Start 3 No Active PLC Instance Drop Instances Here	2
	Start 3 Start BLC Instance Drop Instances Here	2
	Start	
	Start	,
	Start	
	Start	

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

Start		Open existing project
Devices &	Open existing project	Recently used Project
	Create new project	
programming	Migrate project	
Motion & 📫	Close project	
Online & Diagnostics	Welcome Tour	Activate basic integrity check
	First steps	Browse

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: File Location

- 🚽 👻 🛧 📙 > This PC > Documents > Automatic	n		~	đ
Vuick access Desktop Downloads Do Couments Pictures Y	2U_V_0_0_1_NEW			
│ 🕑 📙 ╤ │ LLnCtrl_GettingStarted_R2U_V_0_0_1_NEW				_
Image: Image	n → LLnCtrl_GettingStarte Date modified	td_R2U_V_0_0_1_NEW	↓ Size	0
Image: Image	n > LLnCtrl_GettingStarte Date modified 16/08/2023 9:38 am 16/08/2023 9:38 am	td_R2U_V_0_0_1_NEW Type File folder File folder	↓ Size	(
Image: Image	n > LLnCtrl_GettingStarte Date modified 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am	td_R2U_V_0_0_1_NEW Type File folder File folder File folder	∨ Size	3
Image: Share View Home Share View Home Share View Image: Share View Name Image: Share Addin Addin AdditionalFiles Image: Share Logs	n > LLnCtrl_GettingStarte Date modified 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am	td_R2U_V_0_0_1_NEW Type File folder File folder File folder File folder	∨ Size	¢
Image: Share View Home Share View Home Share View Name Addin Addin AdditionalFiles Image: Share Logs System System System	n > LLnCtrl_GettingStarte Date modified 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am	td_R2U_V_0_0_1_NEW Type File folder File folder File folder File folder File folder	∨ Size	6
Image: Share R2U_V_0_0_1_NEW Home Share View Ide Home Share View Ide Home Share View Ide Home Share View Ide Ide Addin Addin Ide AdditionalFiles IM Logs Ide System TMP System	n > LLnCtrl_GettingState Date modified 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am 16/08/2023 9:38 am	td R2U_V_0_0_1_NEW Type File folder File folder File folder File folder File folder File folder File folder	↓ Size	2
Image: Share View ite Home Share View Image: Share View Image: Share Automat Image: Share Name Image: Share Automat Image: Share Image: Share Image: Share Image: Share Image: Share Image: Share	 > LLnCtrl_GettingStarte Date modified 16/08/2023 9:38 am 	d_R2U_V_0_0_1_NEW Type File folder File folder File folder File folder File folder File folder File folder File folder	∨ Size	<

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.

Pr	roject Edit V 🖥 🎦 🔚 Save	/iew Insert Online project 🔒 🗶 🧾	Options To ⊡ ★ うき	ols Window @ ± 瞐	
	Project tree			بجعا	
	Devices	Plant objects]		
	19				
	► 🔄 LLnCtrl_(SettingStarted_R2U_V_	_0_0_1_NEW		
te	📑 Add r	new device			
S.	di Devic	es & networks			
	PLC_	S210Democase [CPU 1	1511T-1 PN]		

Figure 4-4: Compile the project to PLC

Figure 4-5: Download to device.

Figure 4-6: Simulate HMI

Project Edit View Insert Online Options T	ools Winde	w	Help ┨ 🖳 🞇 💋 Go online	🖉 Go offline 🛔 🖪 🖪 🧩 🖃 🛄 🔛 🔣 <earch in<="" th=""><th>n project></th></earch>	n project>
Project tree 🔲 🖣	Load pr	eviev	1		>
Devices Plant objects	. ?	Check	before loading		
	Status	!	Target	Message	Action
	+[]	0	PLC_S210Democase	Ready for loading.	Load 'PLC_S210Dem
LEnctri_Gettingstarted_k20_V_0_0_1_NEW					
Add new device Add new device		0	Simulated module	The loading will be performed from a simulated PLC.	
PIC S210Demorase [CPI 1511T-1 PN]					
MTP1900 [MTP1900 Unified Comfort]		0	 Different modules 	Differences between configured and target modules (online)	
S210Democase S210 Left [S210 PN]					
S210Democase S210 Right [S210 PN]		0	 Online is up-to-da 	The configuration will not be loaded, because the online status is	
▶ 1/Os ET200sp					
Ungrouped devices					
Security settings					
Cross-device functions					
🕨 🙀 Common data					
Documentation settings	<			W	>
Languages & resources					Defeat
Version control interface					Kettesn
Test Suite					
🕨 🔚 Online access				Finish	Load 2ncel
Card Reader/USB memory					

Since there are no changes to make, after pressing download to device, you may load the program directly (as shown in Figure 9) and then finish the download.

After downloading, make sure to set you PLC to "RUN" mode, to see the full behaviour 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.

Project tree	💷 🖣 Load pr	eview				
Devices Plant objects	3	Check	before loading			
1900M	Status	1	Target	Message	Action	
To UpCtd CettingStarted P2U V 0.0.1	NEW 4	2	▼ MTP1900	Ready for loading.	Load 'HMI_RT_4'	
Add new device						
Devices & networks		0	 Simulation mode 	Load Runtime in simulation mode		
Devices a networks	1 DNI					
MTP1900 [MTP1900 Unified Com	fort	0	Load Runtime	Full download to target system	Full download	
S210Democate S210 Left [S210	D PN1					
S210Democase S210_Een[521		0	 Runtime start 	Start Runtime after download to target system.	Start runtime	-
I/Os ET200sp						
		4	 Runtime values 	Keep current values in runtime or reset to start values from the en	Keep selected	
Security settings		-		Keep values of tags, active alarms and user management data.		
Cross-device functions		2				
Common data		~		Keep current values of tags and pending alarms in the runtime	i o	- 1
Documentation settings		-		Reep current user administration data in runtime	<u> </u>	- 1
Languages & resources		0	h Decetions	Parat all lass in the numbers	Newset	
Version control interface		•	 Reset logs 	Reset all logs in the fundime	Noreset	
Test Suite						>
Online access					Refre	esh
Card Reader/USB memory						

NOTE

The important 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 webserver

4.3.1 Opening HMI simulation in Browser

Once you are downloaded the application to the simulated HMI, the next thing to do is access the simulation which contains our HMI program. The Web HMI simulation uses your system name for the URL. This can be found in System Information, under "System Name."

Figure 4-7: Loca	ation of s	system	name
------------------	------------	--------	------

💐 System Information			×
File Edit View Help			
System Summary	Item 3	Value	^
Components	OS Name Version	Microsoft Windows Server 2019 Datacenter 10.0.17763 Ruild 17763	
⊞- Software Environment	Other OS Description	Not Available	
	System Name	UNIFIEDPCESRT	
	System Manufacturer System Model	Amazon EC2 m6i.2xlarge	
	System Type	x64-based PC	
	Processor	Intel(R) Xeon(R) Platinum 8375C CPU @ 2.90GHz, 2900 M	11 Y
Find what:		Fin <u>d</u> <u>C</u> lose Find	
Search selected category	only 🗌	Search category names only	

Figure 4-8: Enter the system name in the URL.

New Tab	× +	×	-	×
← → C (I ht)	tps://unifiedpcesrt			ł
S WinCC Unified				

Credentials - login and password

Once you've opened the webserver, simply click on "WinCC Unified RT" to be taken to the login page, for this project the Username and Password are:

User: admin Password: Siemens1

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: "Manual for S7-1500" 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 Line Motion 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 use the Line Motion Control using the HMI.

★ Line Motion Control	← 1		
One Call Application Disabled	Current Parameter set	Operator admin	Date and Time 16. 8. 2023 10:32:10
Enable Simulation Mode Axis	CAM 1	CAM 2	Machining program options Full Machining LE LE
Ome Call App Resist All Conveyor set speed 99.85 mm/s	On compensation Off compensation 1000.00 1000.00 Offset from infeed 1000.00 Machining programs Full	On compensation 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	TE Hole Machining LE
Conveyor position	Edge First edge (LE): Second edge (TE): 0.00 0.00 Hole When to start: When to end: 0.00 Cam type	Edge First edge (L5): Second edge (T5): 0.00 20.00 Hole When to start: When to and: 0.00 Can type	Where to and Where to start
Generate Product	Software	Software	LE Edge Machining LE Edge Length Mill
C Overview	Product Vi	sualization	

Figure 5-1: Start Screen of the LLnCtrl project HMI

To begin simulating the conveyor belt and output cams:

- 1. Open the HMI simulation on your local machine or VLAB.
- 2. On the "Overview" tab, you will see a screen with several buttons and indicators.
- 3. Press enable, and then "Simulation Mode", "Axis", and "One Call App".
- 4. If desired, use the "Speed" slider to adjust the speed of the axis movement.
- 5. Change the settings of the output cams to match your desired actions For more information on the settings available, please refer to the manual found on the SIOS entry
- 6. Once you are ready, either go to the visualization tab or stay in the overview tab, and press "Generate Product".
- 7. You can now see what the cams activation sequence would look like given your configuration. On the right hand side, you can find the 3 preset programs to switch between.



Figure 5-2: A look at the visualization tab from the HMI

Congratulations! You have successfully set up a conveyor belt simulation with multiple output cams. Feel free to play around with the various settings for product simulation, conveyor speed, cam configurations etc.

6 Appendix

6.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

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- Retrofitting and modernization services
- Service programs and contracts

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support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:

support.industry.siemens.com/cs/ww/en/sc/2067

6.2 Industry Mall



The Siemens Industry Mall is the platform on which the entire siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location: mall.industry.siemens.com

6.3 Application support

Siemens AG Digital Factory Division Factory Automation Production Machines DI FA PMA APC Frauenauracher Str. 80 91056 Erlangen, Germany

mailto: tech.team.motioncontrol@siemens.com

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/109749348

6.5 Change documentation

Table 6-2

Version	Date	Modifications
V1.0	07/2023	First version