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Getting started manual – Drive safe Library for PLCs

<https://support.industry.siemens.com/cs/ww/en/view/109485794>

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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.

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

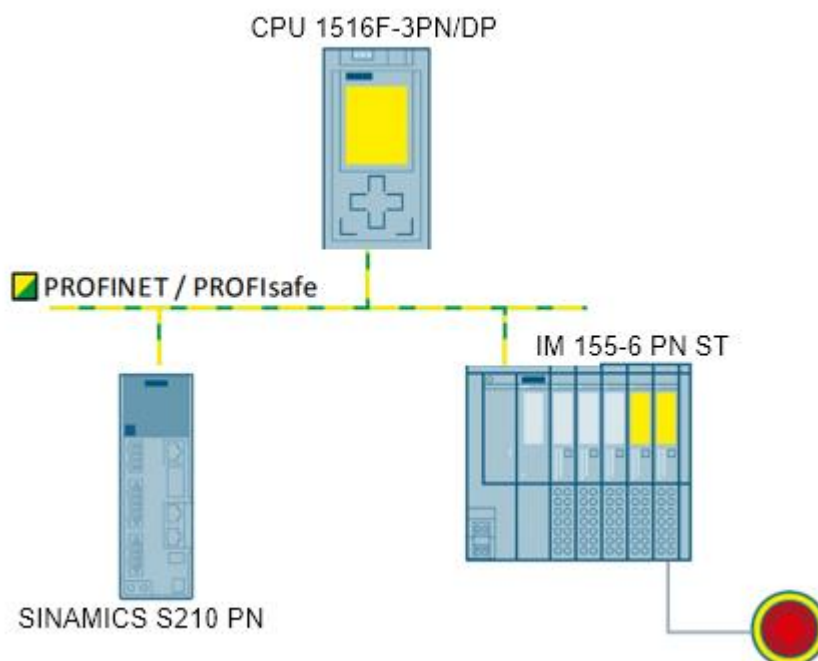
Emergency stop buttons are one of the most used safety parts of machines. Old approach used special hardware (safety relays and contactors) wired directly to cut the power from moving parts of the machine or using special wiring to bring the electrical signal to the safety inputs of actuators. Using PROFIsafe communication is possible to use already present cabling for PROFINet and reduce the cost of the machine.

In this example show, how to implement STO (Safe Torque Off) function of the S210 servo controller using PROFIsafe and LDrvSafe library.

LDrvSafe library includes fail-safe S7 blocks implement various applications in conjunction with S7-1200F, S7-1500F, S7-1500F Software controller, SINUMERIK ONE and SINAMICS or SIMATIC Micro Drive coupled via PROFIsafe.

The figure below provides an overview of the basic design.

Figure 1-1: Overview of the basic design



If you're not familiar with Siemens PLC or safety functions of Siemens PLCs, don't worry. This manual provides step-by-step guidance to make it easy for anyone to get started.

In this application example we have conveyor belt controlled by SINAMICS S210 PN and Safety PLC with CPU 1516F. All inputs and outputs for user interaction – like start/stop button, emergency stop, etc. - are wired to the peripheral module IM155-6 PN ST.

For the communication between PLC S71500 and SINAMICS is used standard telegram 3 (speed control) and PROFIsafe telegram 30.

Core content

- This manual is designed for entry-level users with little or no experience in motion control, Siemens PLC or SIMIT simulations.
- No hardware, license or software installation is needed to try the "Ready-to-Use" PLC application example project.
- The project is designed to control a simulated "speed axis" and safely stop it using Emergency Stop button.
- 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 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

Component	Number	SIOS entry ID	Note
LDrvSafe Example project for TIA Portal V18 and example project for SIMIT V11	4.2.0	109485794	Download from SiePortal

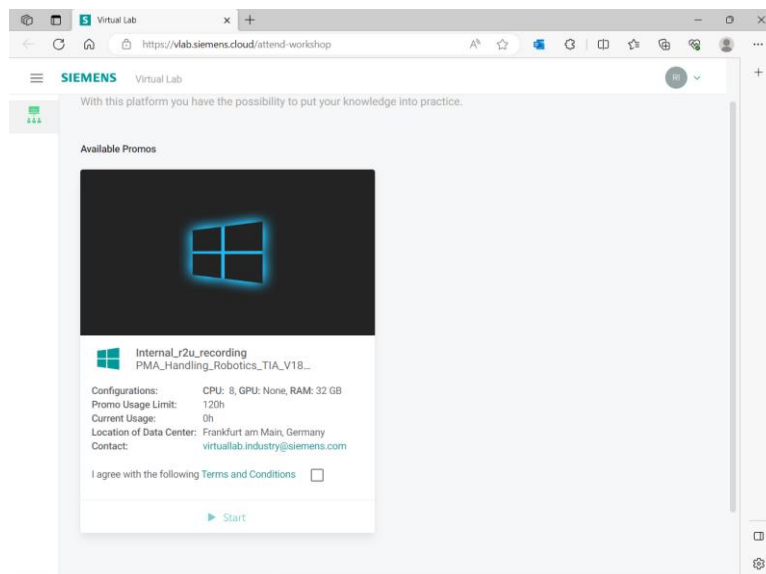
2 VLAB

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: [insert link]. 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.



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

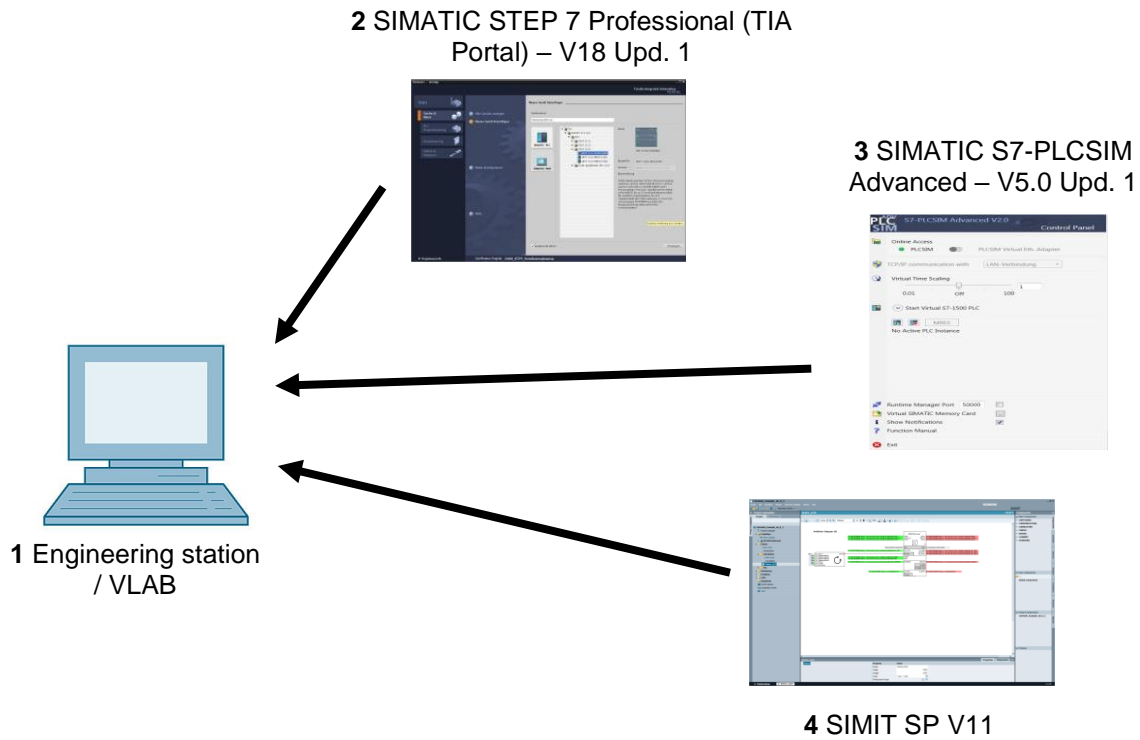
Wait for the VLAB virtual environment to be prepared (approx. 5 min)

After the virtual environment preparation process is complete, 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.

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.



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Table 3-1

Component	Version Number	SIOS entry ID	Download Link
STEP 7 Basic/Professional, WinCC Basic/Comfort/Advanced and WinCC Unified	V18 Update 2	109817218	Download from SiePortal
SIMATIC S7-PLCSIM Advanced	V5.0 Update 2	109809300	Download PLCSIM Advanced Here
SIMIT	V11 SP1	109810223	Download SIMIT 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 simulators 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 simulators.

VLAB vs Local Installation:

The steps for launching the PLC and HMI simulators 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 portal.
2. Log in to VLAB using your credentials.
3. Once you are logged in, navigate to the PLC application, and click on its icon.

5 Starting the project

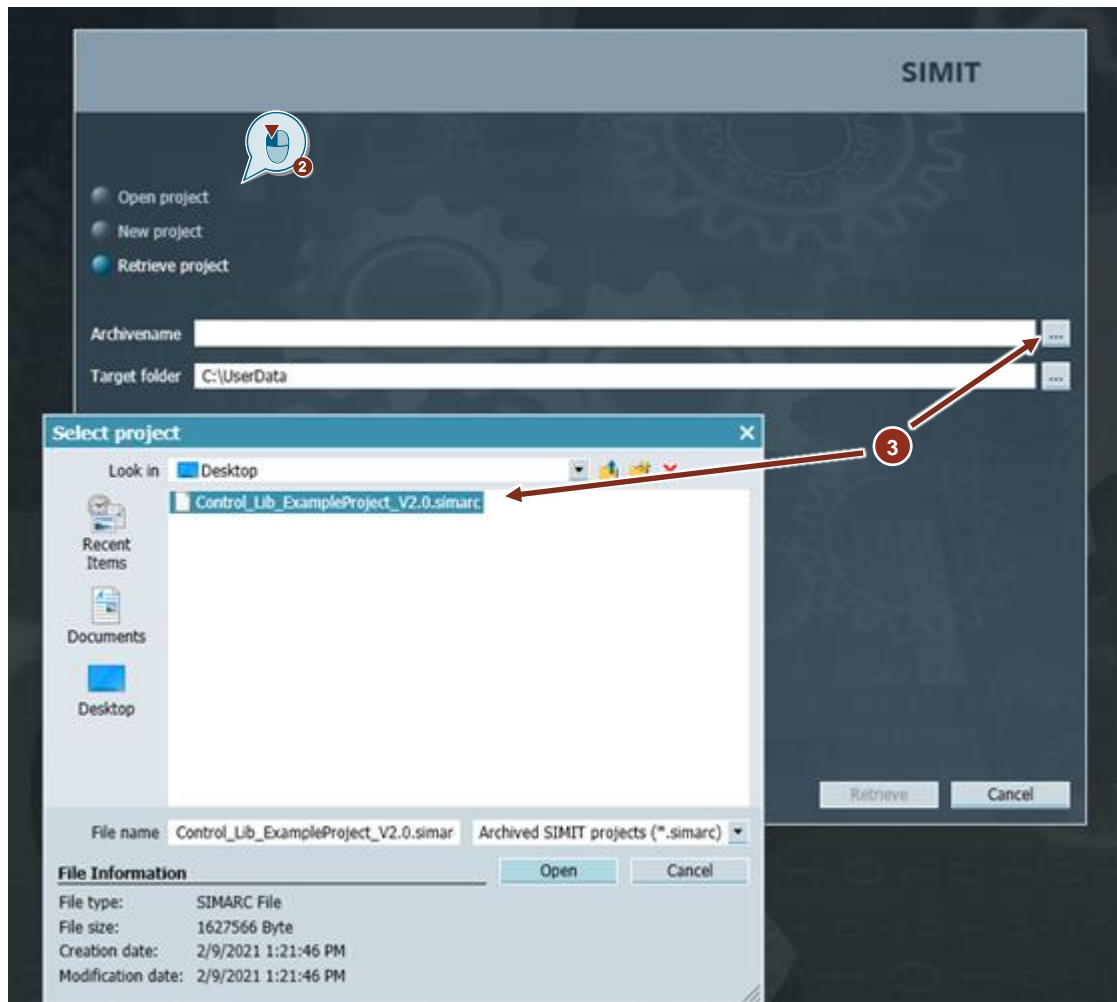
LDvSafe Example contains two files – Tia Portal archive (*.zap17) and SIMIT SP archive (*.simarc). Necessary steps to retrieve and run whole simulation are:

5.1 Retrieving SIMIT SP project

To retrieve archived SIMIT project (*.simarc)

1. Open SIMIT SP
2. Click on “Retrieve project”
3. Navigate to simarc archive and pres “Open”.
4. Fill the target folder and press “Retrieve” button

Figure 5-1

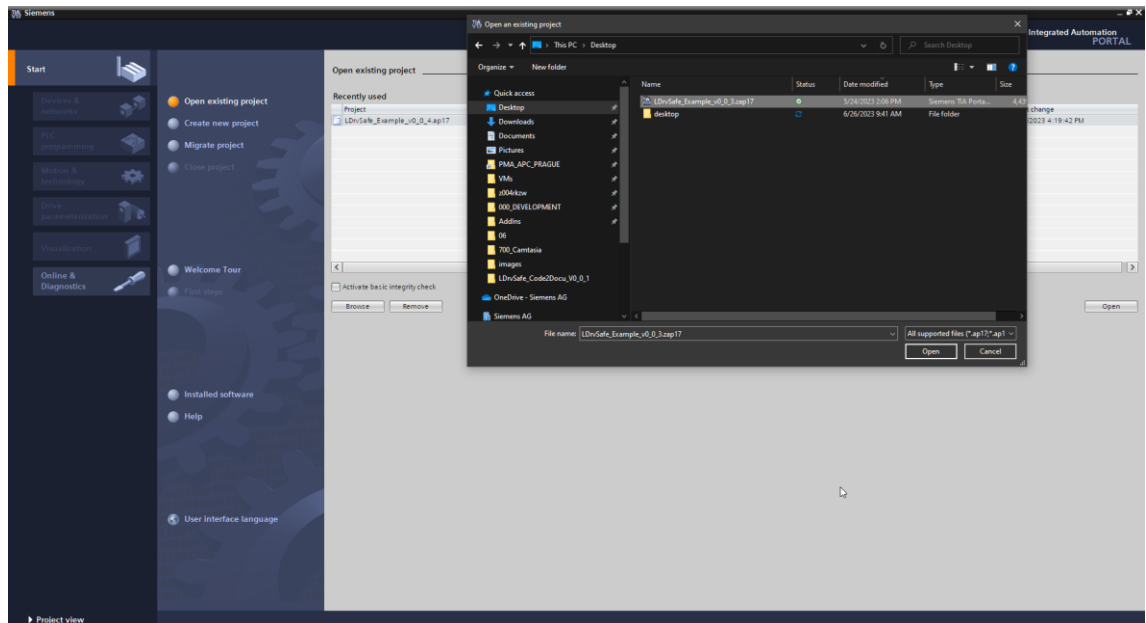


5.2 Retrieving TIA Portal project

TIA Portal archive file has extension *.zap17. To retrieve it, please follow these steps:

4. Open TIA Portal v17
5. Browse the downloaded *.zap17 file and press Open

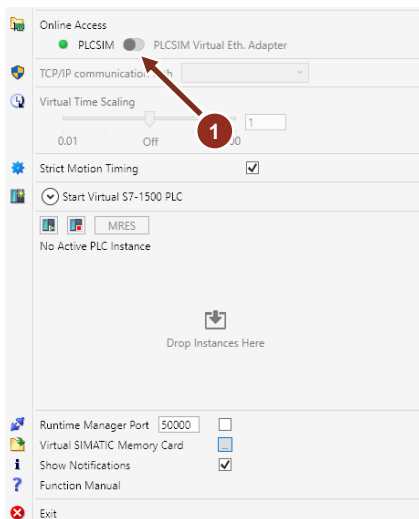
Figure 5-2



6. Next opened window will prompt you to select directory, where project will be retrieved. Select directory and press “Select Folder” button.

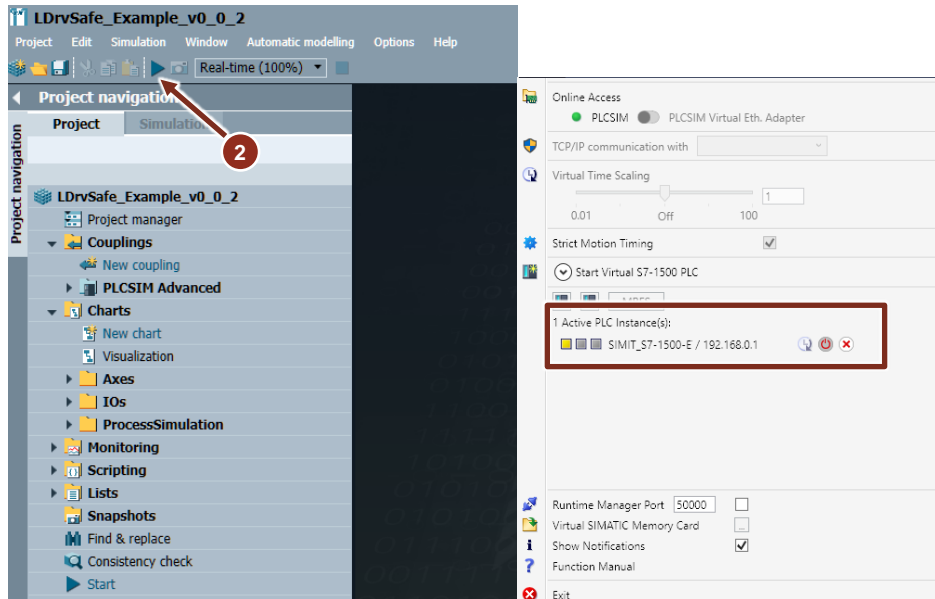
5.3 Starting the simulation

1. Start the S7-PLCSIM Advanced V4 SP1 app. As a communication interface choose PLCSIM.

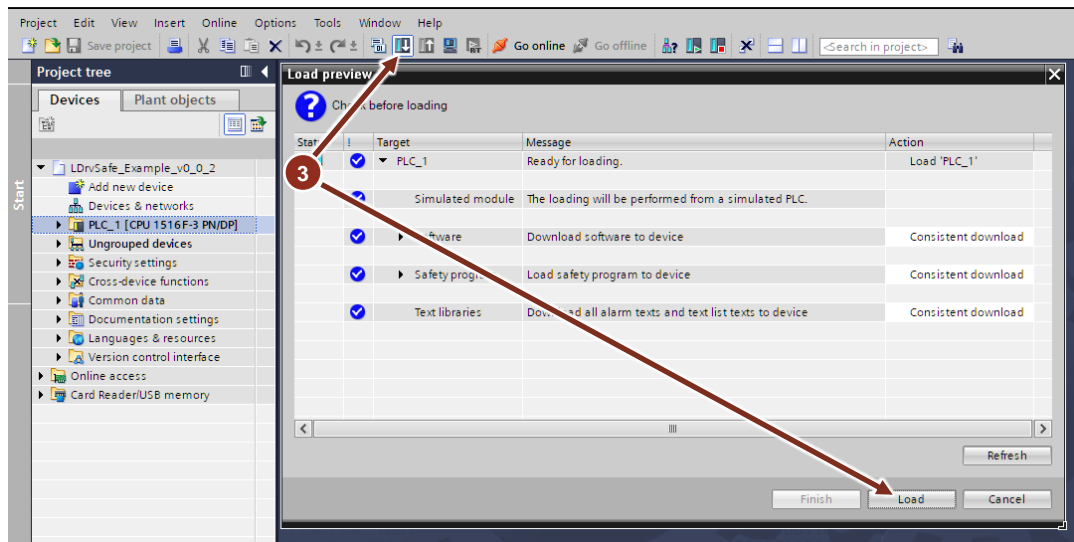


2. In SIMATIC press the “Start Simulation” button. Simit will create new PLC instance in the S7-PLCSIM Advanced.

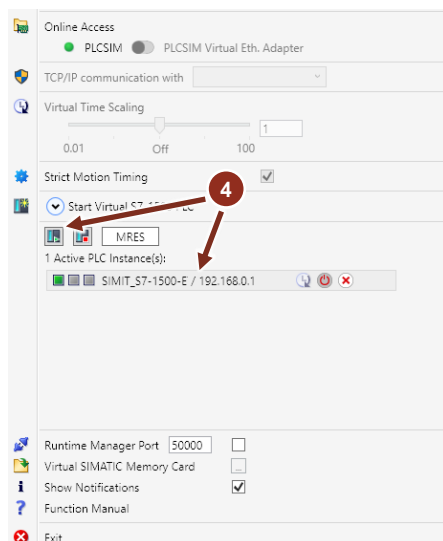
5 Starting the project



- From TIA Portal download your project to the running S7-PLCSIM Advanced instance.



- In PLCSIM Advanced start the simulated PLC

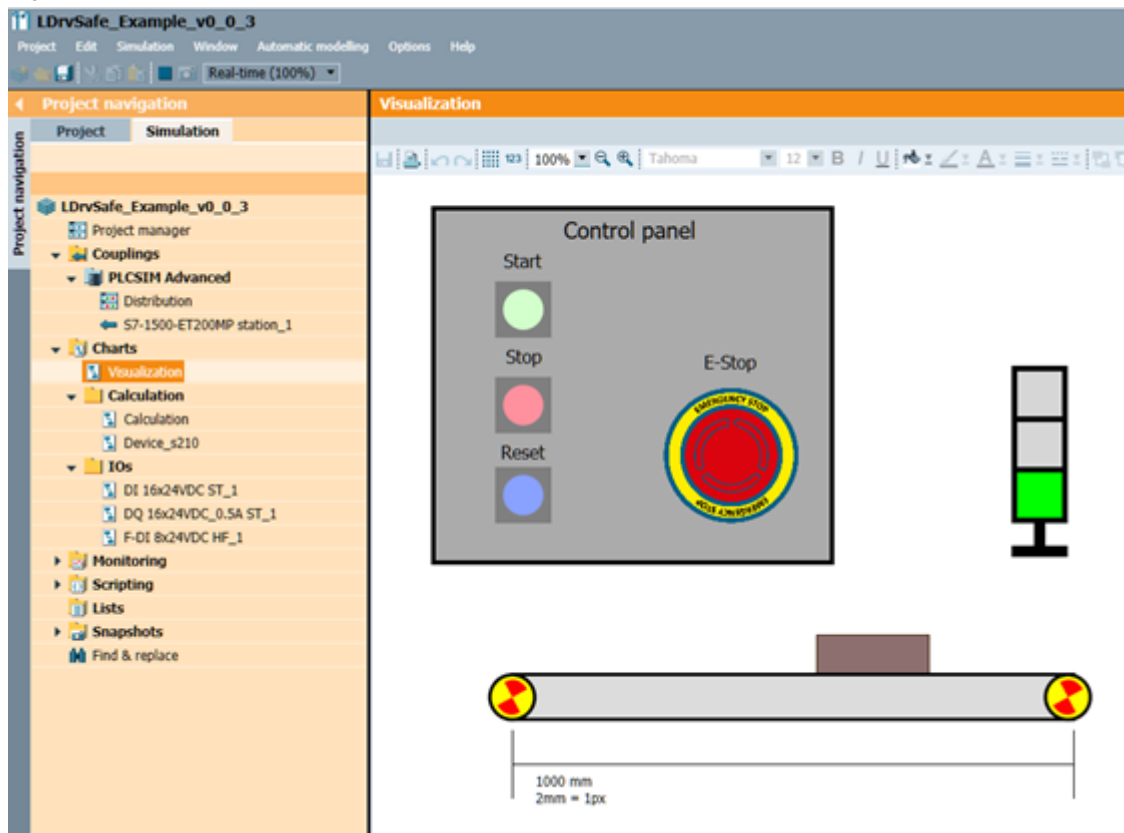


NOTE

After downloading the project from TIA Portal, don't start the PLC (keep option "No action" in Start modules combo box). Instead change this mode in PLCSIM Advanced by selecting the PLC instance and pressing "RUN" button.

Simulation is now running. You can open the "Visualization" chart in SIMIT. After starting the simulation is necessary acknowledge the safety faults by pressing "Reset" button. Then you can start and stop the Conveyor by pressing buttons "Start" and "Stop". After pressing the "E-Stop" button conveyor safely stops. Then you must unlock the "E-stop" button with second press (as a real emergency stop) and acknowledge the safety circuit by pressing "Reset".

Figure 5-3



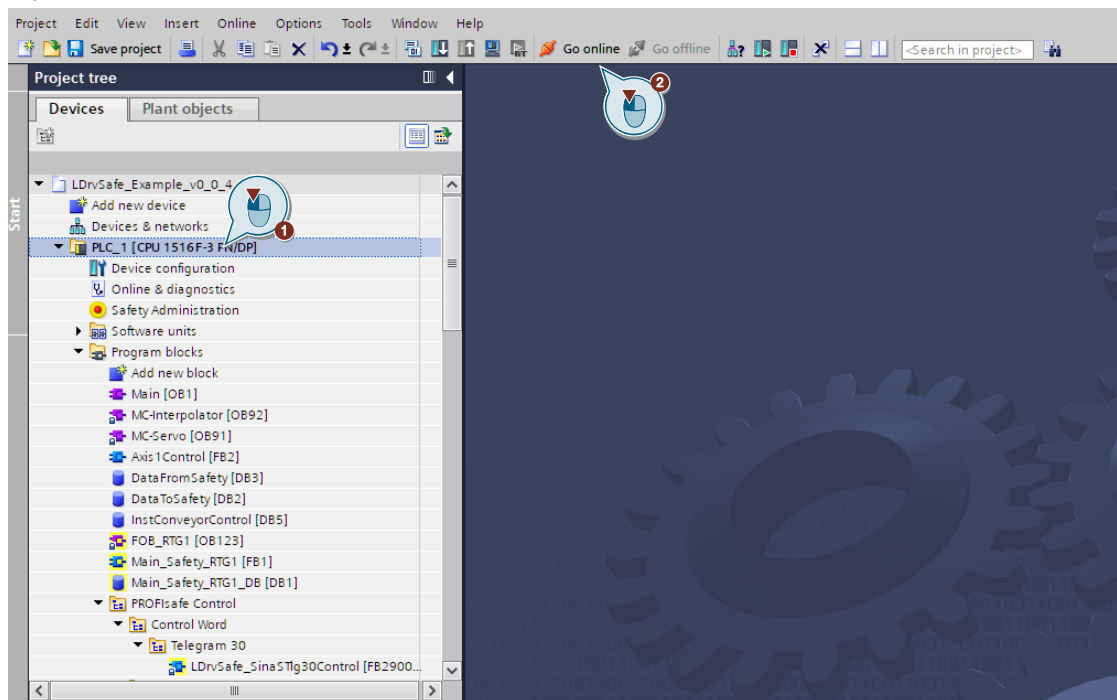
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In TIA portal you can trace used signals, check the communication telegrams etc

1. Select PLC and press "Go online" button:

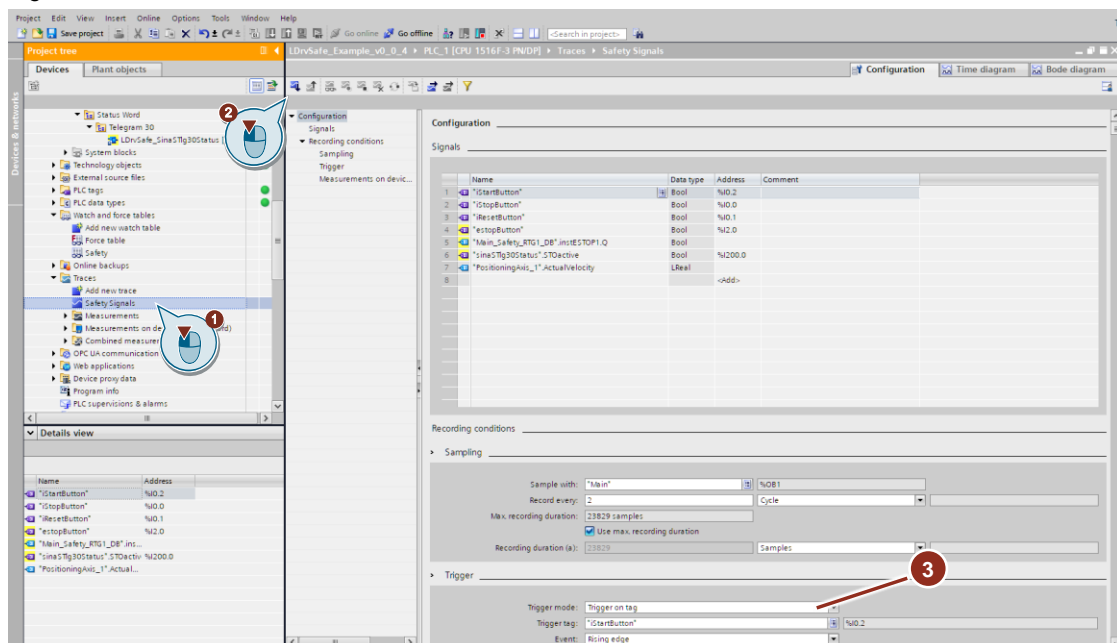
5 Starting the project

Figure 5-4



2. In Traces folder open the Safety Signals trace and press “Transfer trace configuration to device” button. Trigger mode is Trigger on tag “iStartButton” – that means, recording will start when Start button is pressed.

Figure 5-5



3. Activate the recording. Trace will start in the moment, when you press the start button in SIMIT control panel.

5 Starting the project

Figure 5-6

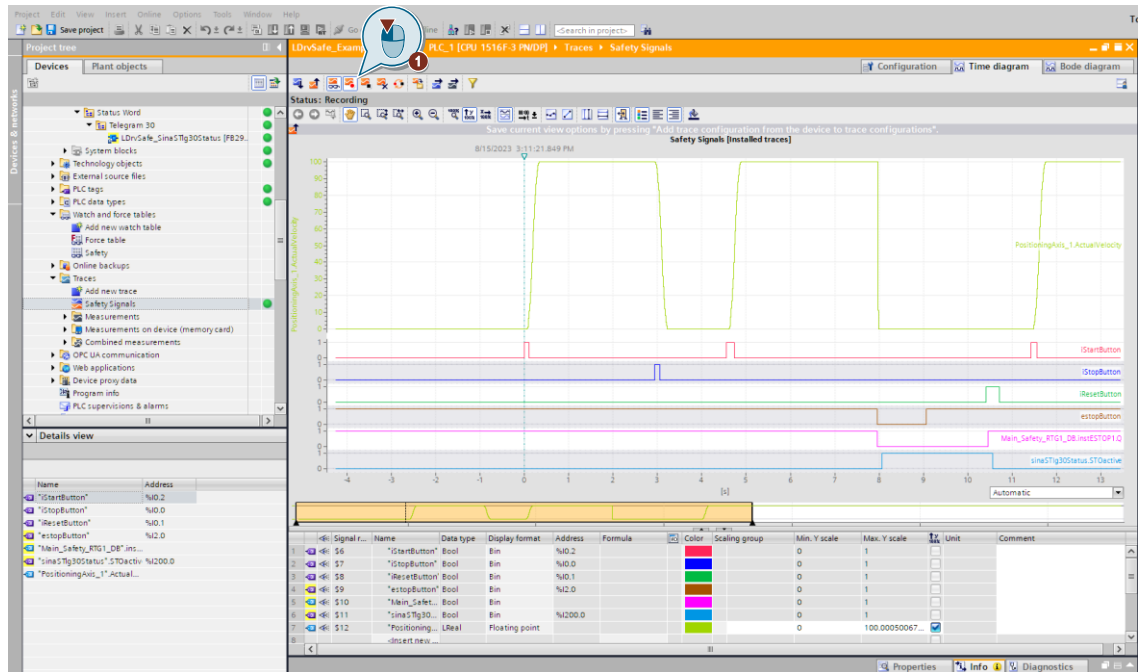
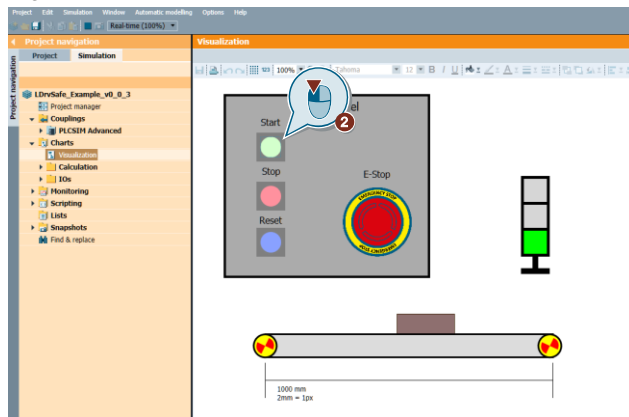


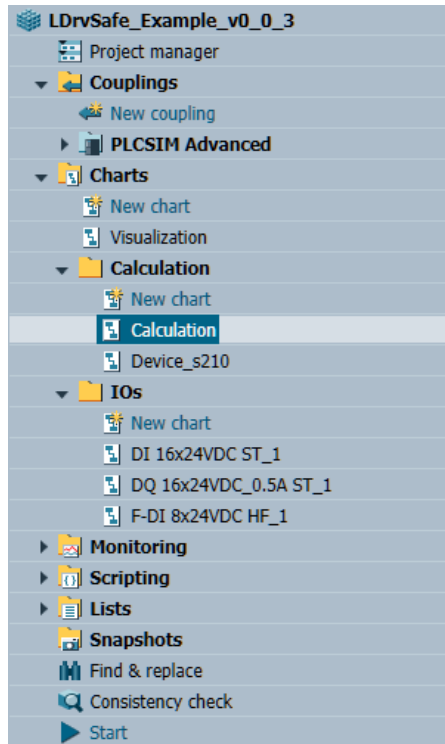
Figure 5-7



6 Example project

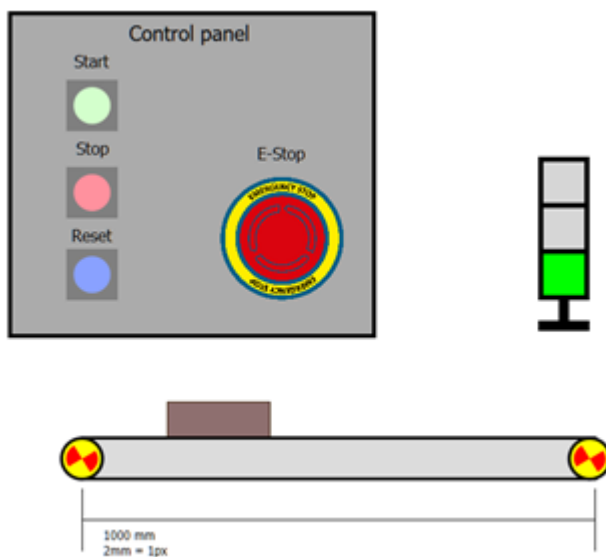
Example SIMIT project contains several charts.

Figure 6-1: SIMIT Project structure



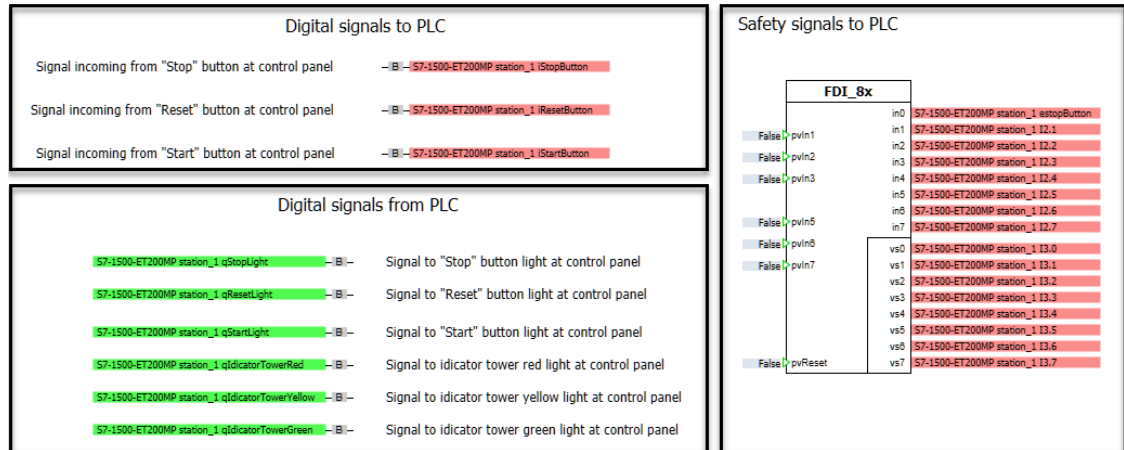
On visualization chart are buttons and signalization for operator interaction together with visualization of the conveyor. With Start/stop button operator can control the conveyor. With Reset button operator can reset the safety faults. By pressing the E-Stop button, STO signal is send to the conveyor servo controller S210, which safely stops the movement of the conveyor.

Figure 6-2: Control pane on Visualization chart



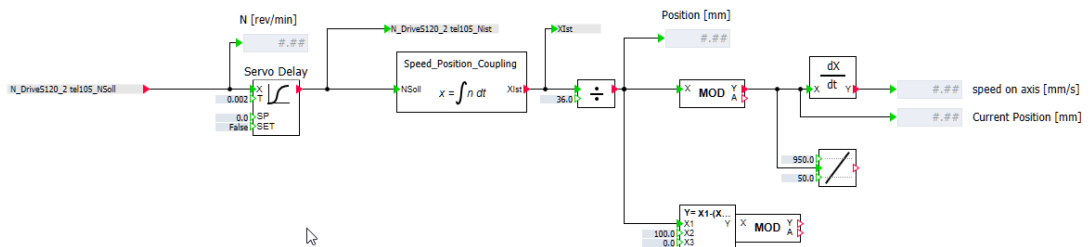
For better maintainability (in case of changing the IO is necessary) inputs and outputs of this chart are interconnected to the BConnectors placed in IO charts. With this approach user doesn't need to change the variables on more different places.

Figure 6-3: IO's charts



Rotation animation is using value "ConveyorPosition.XIst", which is calculated on the ConveyorAxis chart using the "Speed_Position_Coupling" function. Because we are using only speed axis without encoder, for simulation purposes this function counting integral from speed, which is used also for the box movement.

Figure 6-4: Calculation chart



7 Additional information

7.1 Alternative solutions

For more information about solutions using STARTDRIVE, configuration of SINAMICS S210 using webserver or STARTDRIVE, acceptance tests or LDrvSafe library, please check out the links in chapter [Links and literature](#)

8 Appendix

8.1 Service and support

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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

8.2 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 process – directly and independently of time and location:

mall.industry.siemens.com

8.3 Application support

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DF FA PMA APC
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mailto: tech.team.motioncontrol@siemens.com

8.4 Links and literature

Table 8-1

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/109485794
\3\	SINAMICS/SIMOTICS servo drive system SINAMICS S210 operating instructions https://support.industry.siemens.com/cs/ww/en/view/109753800
\4\	SIMATIC – Failsafe library LDrvSafe to control the Safety Integrated functions of the SINAMICS drive family. https://support.industry.siemens.com/cs/ww/en/view/109485794
\5\	Controlling SINAMICS S210 Safety Integrated Functions using SIMATIC S7-1500TF via PROFIsafe https://support.industry.siemens.com/cs/cz/en/view/109760341
\6\	Configuring Technology Objects with SIMATIC S7-1500 and SINAMICS S210 in TIA-Portal https://support.industry.siemens.com/cs/cz/en/view/109749795
\7\	SIMIT Control Library https://support.industry.siemens.com/cs/cz/en/view/109775634
\8\	SIMIT components for the simulation of fail-safe modules of the S7-1500 / ET 200MP / ET 200SP https://support.industry.siemens.com/cs/cz/en/view/109775634

8.5 Change documentation

Table 8-2

Version	Date	Modifications
V1.0	04/2023	First version