

Global library "Sample Library for Instructions"

Installation Manual

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Disclaimer

Note

The examples are non-binding and do not claim to be complete in terms of configuration and equipment or any other eventualities. The examples do not represent customer-specific solutions but are merely intended as an aid to better understand the functions of the instructions in the TIA Portal.

You are solely responsible for proper operation of the described products. These examples do not relieve you of your obligation for safe handling during application, installation, operation and maintenance.

By using these examples, you acknowledge that we cannot be held liable for any damages in excess of the described liability regulation. We reserve the right to make changes to these examples at any time without notice. In case of deviations between the recommendations in the examples and other Siemens publications, such as catalogs, the content of the other documentation takes precedence.

We do not guarantee the contents of this document.

Use of the examples

We assume no liability, irrespective of the legal basis, for any damage arising from the use of the instructions, programs, configuring and performance data, etc., in this application example, except when liability is mandatory, for example, according to the German Product Liability Act in cases of willful damage, gross negligence, endangerment to life, body or health, breach of guarantee for the condition of an item, due to fraudulent concealment of a defect or breach of a substantial contractual obligation. The damages for a breach of a substantial contractual obligation are, however, limited to the foreseeable damage, typical for the type of contract, except in the event of intent or gross negligence or injury to life, body or health. This does not entail a change in the burden of proof to your disadvantage.

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates. For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. You can find more information about industrial security under <http://www.siemens.com/industrialsecurity> (<http://www.siemens.com/industrialsecurity>). To stay informed about product updates as they occur, sign up for a product-specific newsletter. You can find more information at <http://support.automation.siemens.com> (<http://support.automation.siemens.com>).

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Basic information on the library

This installation manual supports you in the use of the global library "Sample Library for Instructions".

Requirement

- Hardware:
 - S7-1500 CPU with firmware version V1.7 or later
 - or S7-1200 CPU with firmware version V4.1 or later
- Software:
 - SIMATIC STEP 7 Professional V13 SP1 Update 4 (TIA Portal) or higher

Note

The supported CPU is specified in the folder names of the instructions in the library.

Introduction to the library

The global library "Sample Library for Instructions" includes program examples for the instructions in the TIA Portal. All program examples were created in the programming language LAD. In the folder names of the library, the programming language is designated in English with "LAD".

Use the program examples to gain a better understanding of the functionality of the instructions in the TIA Portal. The TIA Portal information system offers you additional information on the utilized instructions at any time.

The library is expanded further with each consecutive version.

Easy-to-use program examples

You can copy all program examples from the library to your CPU. To do so, download the library "Sample Library for Instructions" in the TIA Portal. Using the program examples, you can try out the instructions in the TIA Portal. The program examples can be easily modified and extended.

You always use the program examples in the library in the same order:

The first screenshot shows the 'Libraries' pane with the 'Sample Library for Instructions' expanded to '02_Extended_instructions (LAD)'. A blue arrow points to the '1_T_COMP' block. The second screenshot shows the 'Project tree' with the '1_T_COMP' block copied into the 'Main [OB1]' folder. A blue arrow points to the 'T_COMP [FB50003]' block. The third screenshot shows the 'Main Program' network with the 'T_COMP' block called, and a callout window showing the block's internal logic.

1 Sample Library for Instructions Open

2 copy example

3 Call block and Compile project

Same structure/same name

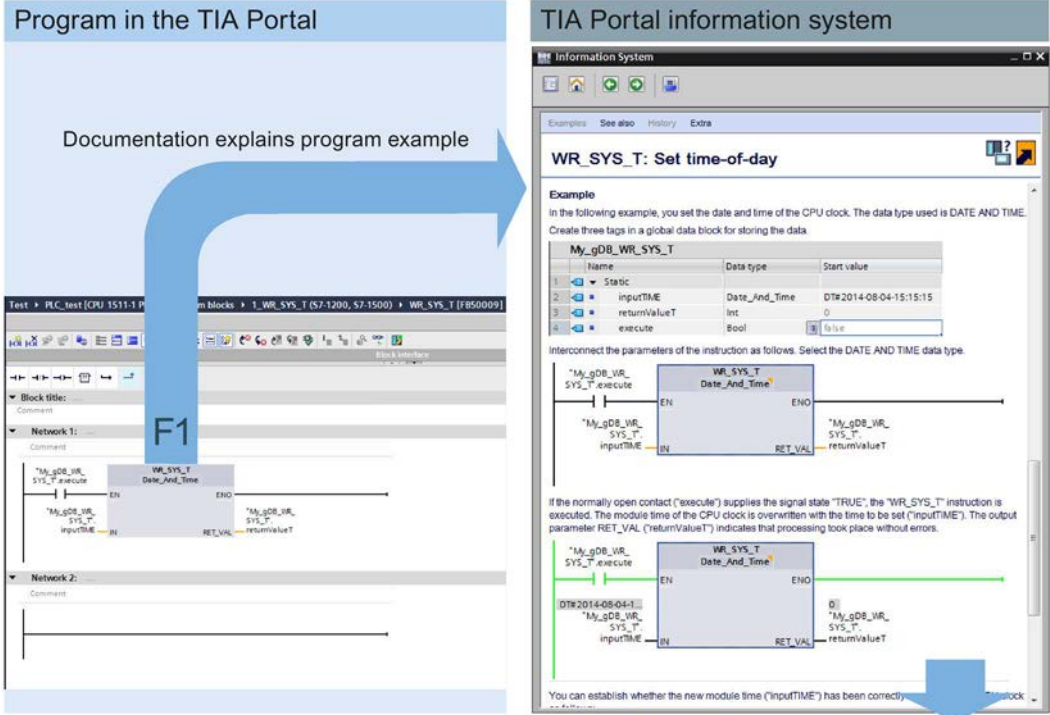
The list of the instructions in the TIA Portal, the view in the TIA Portal information system and the structure in the "Sample Library for Instructions" are the same.

The names of the folders are in English.

Sample Library for Instructions	Instructions in the TIA Portal	Information system of the TIA Portal
<ul style="list-style-type: none"> Sample Library for Instructions <ul style="list-style-type: none"> Types Master copies <ul style="list-style-type: none"> 01_Basic_instructions (LAD) 02_Extended_instructions (LAD) <ul style="list-style-type: none"> 01_Date_and_time-of-day 02_String+Char 03_Process_image 04_Distributed_I/O 05_PROFenergy 06_Module_parameter_assignment 07_Interrupts 08_Alarms 09_Diagnostics 10_Pulse 11_Recipes_and_data_logging 12_Data_block_functions 13_Addressing 03_Technology 04_Communication Common data 	<ul style="list-style-type: none"> Basic instructions Extended instructions <ul style="list-style-type: none"> Date and time-of-day String + Char Process image Distributed I/O PROFenergy Module parameter assignment Interrupts Alarming Diagnostics Recipe and data logging Data block control Addressing Technology Communication 	<ul style="list-style-type: none"> Basic instructions (S7-1200, S7-1500) Extended instructions (S7-1200, S7-1500) <ul style="list-style-type: none"> Date and time-of-day (S7-1200, S7-1500) String + Char (S7-1200, S7-1500) Process image (S7-1500) Distributed I/O (S7-1200, S7-1500) PROFenergy (S7-1500) Module parameter assignment (S7-1500) Interrupts (S7-1200, S7-1500) Alarms (S7-1500) Diagnostics (S7-1200, S7-1500) Pulse (S7-1200, S7-1500) Recipes and data logging (S7-1200, S7-1500) Data block functions (S7-1200, S7-1500) Addressing (S7-1200, S7-1500) Technology (S7-1200, S7-1500) Communication (S7-1200, S7-1500) Add-on packages (S7-1200, S7-1500)

Interaction of information system and "Sample Library for Instructions"

Use the help (<F1>) in the TIA Portal to call up the documentation of the instruction as well as the description of the program example. The program examples for an instruction from the TIA Portal information system and the "Sample Library for Instructions" are identical.



Library includes program example from the documentation

Additional information

Additional information on the scope of the library can be found in the section "Library version (Page 17)".

Using a library

2.1 Downloading the library

Introduction

Below you will find the procedure for opening the "Sample Library for Instructions" library.

Requirement

The TIA Portal is open in the project view.

Procedure

To open the library, follow these steps:

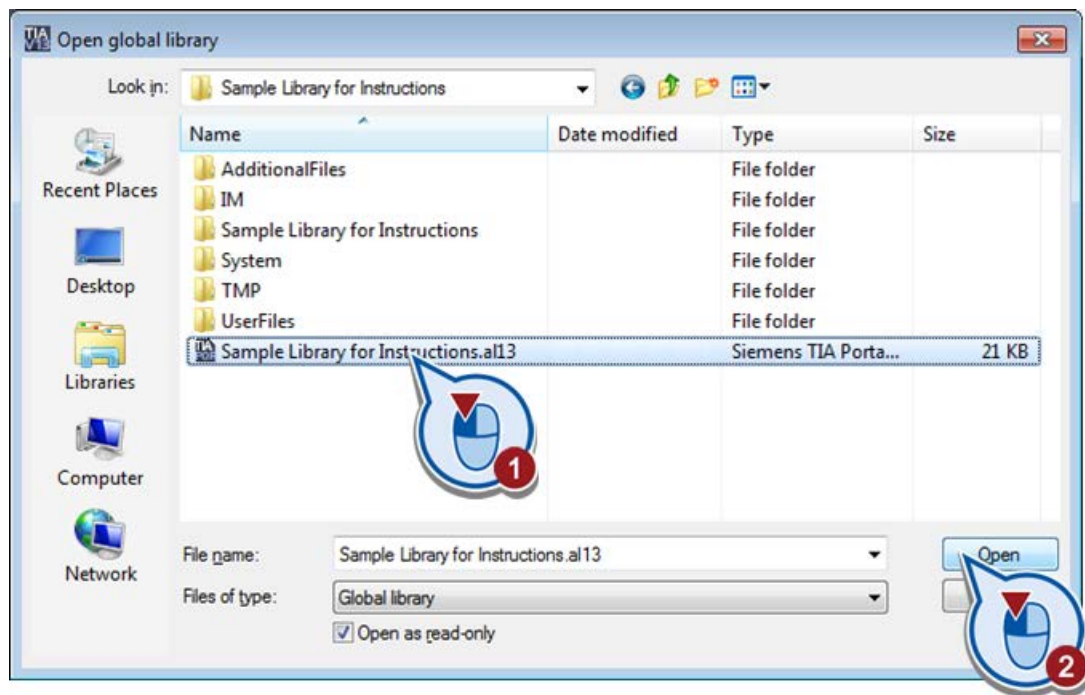
1. Open the "Libraries" task card.
2. Click "Open global library".

The "Open global library" dialog box is displayed.

3. Select the library you want to open and click "Open".

Note

The "Open as read-only" option is selected by default.



2.2 Switching the project language to English

Introduction

Below, you will find the procedure for switching the project language in the TIA Portal.

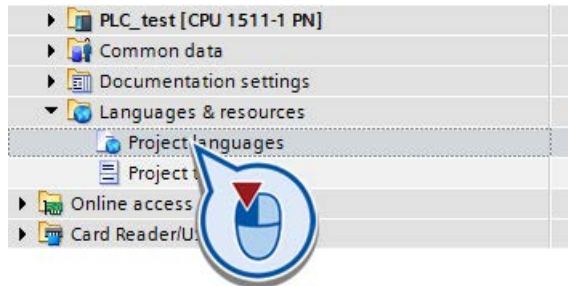
Requirement

A project as well as an S7-1500 or S7-1200 CPU has been created in the TIA Portal.

Procedure

To switch the project language to English, follow these steps:

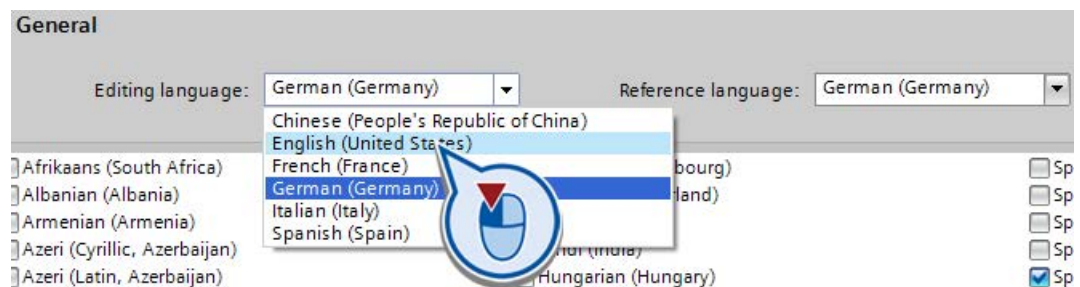
1. In the project tree, click "Languages & Resources > Project languages".



2. The desktop shows a list of all supported project languages.

Make sure that the language "English (United States)" is enabled for use.

3. Click the drop-down list of the editing language and select "English (United States)".



2.3 Using the examples

Introduction

Below you will find the procedure for using the program examples of the "Sample Library for Instructions" library.

Note

Possible red interconnection in the network

After the insertion of certain program examples in the project folder, the following can occur: A red interconnection is shown in the network of a block (FB, FC or OB). This is normal, because system blocks (FBs, IDBs etc.) required for the program example are not supplied in addition.

To create the missing system blocks automatically, compile the program example (see step 5). If you then open the affected block again, the interconnection is no longer marked red.

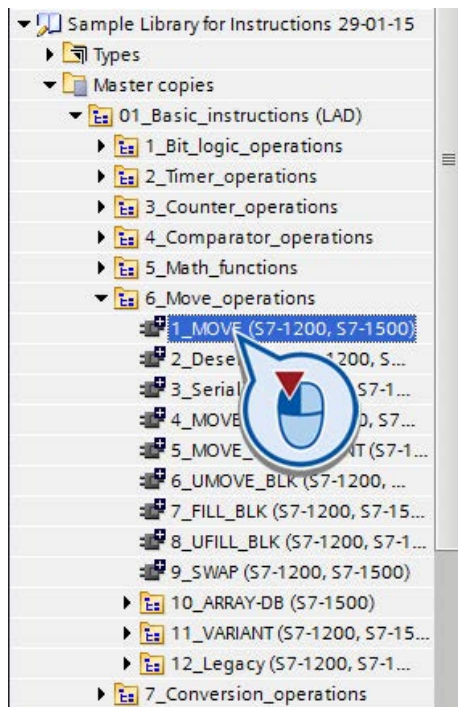
Requirement

- The "Sample Library for Instructions" library is opened in the TIA Portal.
- A project as well as an S7-1500 or S7-1200 CPU has been created in the TIA Portal.
- The project language "English (United States)" has been set.

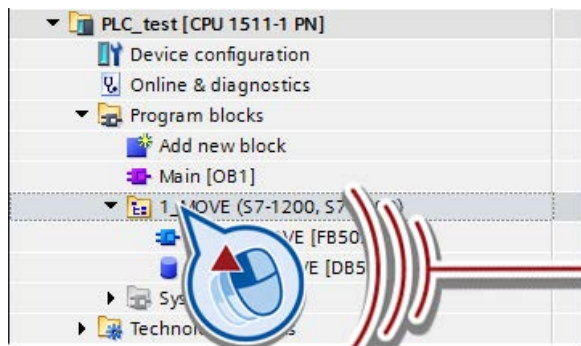
Procedure

To use the program examples, follow these steps:

1. Go to the required example in the folder hierarchy of the library.



2. Use drag-and-drop to drag the folder object of the required example to your "Program blocks" project folder.

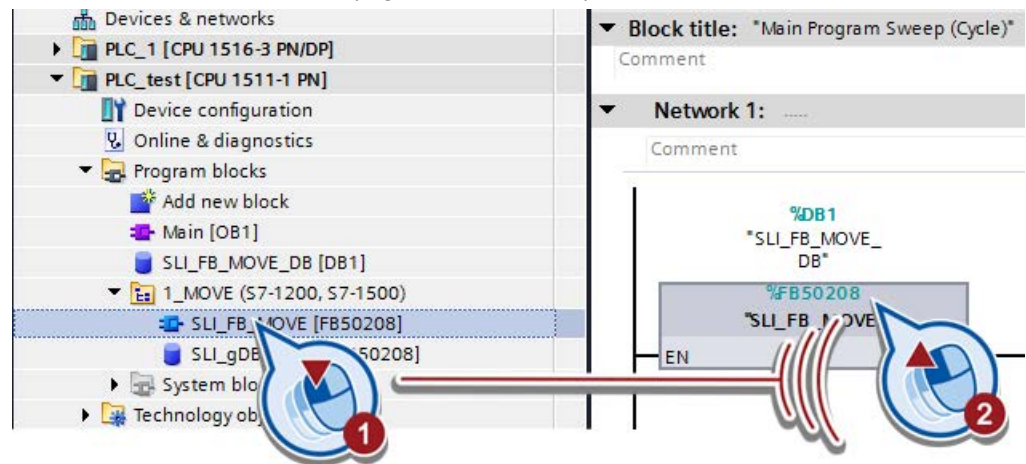


3. If the example includes additional objects:

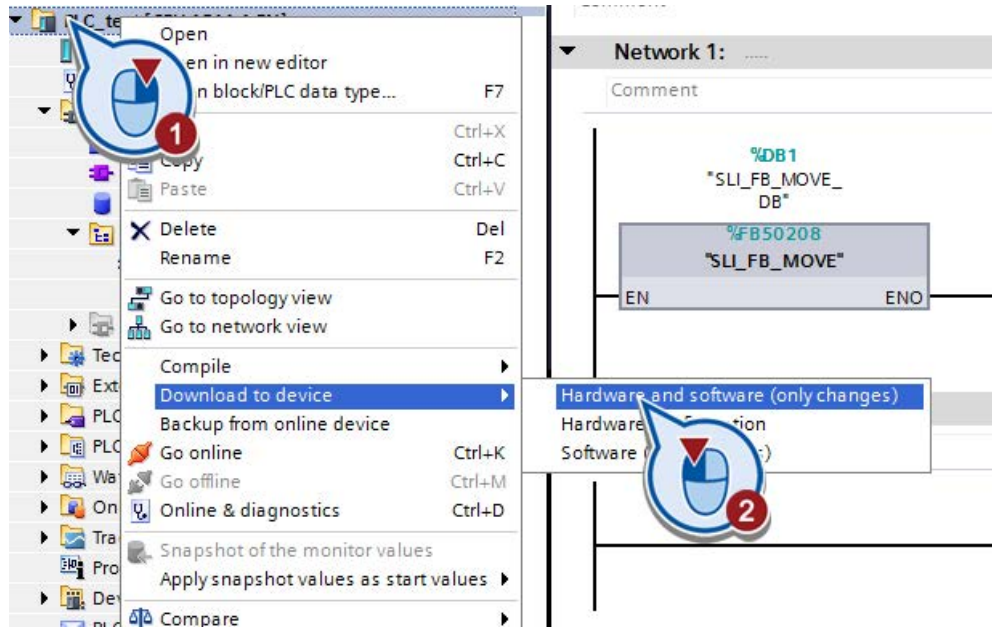
Use drag-and-drop to drag the additional objects according to their type to the matching folder of your project.

4. Call up the function block of the example in your user program.

If there is more than one function block in the program example, call the function block with the abbreviation "Call_" (e.g. "_FB_FBCall_")



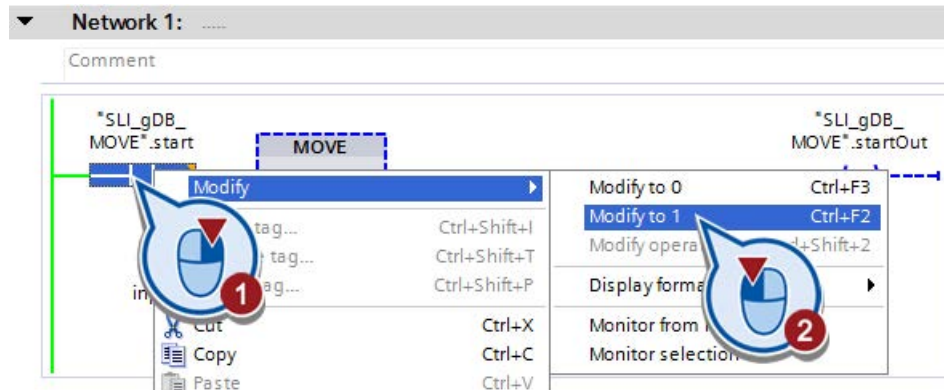
5. Compile the project and download it to the CPU.



6. Test the example in online mode.

Note

The examples usually include an NO contact so that they do not start up automatically after download to the CPU. The NO contact must be set to TRUE for the program example to be processed.



Library version

Below you will find the versions and the scope of the version of the "Sample Library for Instructions" library.

Note

You will find the version in the properties of the "Sample Library for Instructions" library.

Versions

Version	Description		
	Change	Instruction category (*)	Program example (*)
1.0.1	Modified	Extended instructions	Diagnostics (GET_DIAG)
	New	Extended instructions	Process Image (UPDAT_PI, UPDAT_PO), Distributed IO (RDREC), Interrupts (ATTACH, DETACH, SET_CINT, QRY_CINT, SET_TINT, CAN_TINT, ACT_TINT, QRY_TINT, SRT_DINT, CAN_DINT, QRY_DINT), Diagnostics (second example on GET_DIAG; RT_INFO, Get_IM_Data, GET_NAME, GetStationInfo), Data block control (CREATE_DB, DELETE_DB, WRIT_DBL, ATTR_DB), Addressing (GEO2LOG, LOG2GEO, IO2MOD, RD_ADDR), Useful tools (HexIntBools_Converter, CMYK_TO_RGB_Converter)
		Technology	PID control (PID_Compact)
		Communication	S7 communication (GET, PUT), Open user communication (TSEND_C, TRCV_C)

Version	Description		
	Change	Instruction category (*)	Program example (*)
1.0.0	New	Basic instructions	Bit logic operations (complete), Timer operations (complete), Counter operations (complete), Comparator operations (complete), Math functions (complete), Move operations (complete), Conversion operations (complete), Program control operations (complete), Word logic operations (complete), Shift and rotate (complete)
	New	Extended instructions	Date and time-of-day (complete), String and Char (complete), Alarms (Program_Alarm, Get_AlarmState, Gen_UsrMsg), Diagnostics (LED, DeviceStates, ModuleStates, GET_DIAG), Recipe and data logging (complete), Data block functions (READ_DBL)

* The name corresponds to that specified in the library and is in English.