



SIEMENS



Learn-/Training Document

Siemens Automation Cooperates with Education
(SCE) | From Version V14 SP1

TIA Portal Module 011-001
Firmware Update with SIMATIC S7-1200

[siemens.com/sce](https://www.siemens.com/sce)

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Matching SCE Trainer Packages for these Learn-/Training Document

- **SIMATIC S7-1200 AC/DC/RELAY (set of 6) "TIA Portal"**
Order no.: 6ES7214-1BE30-4AB3
- **SIMATIC S7-1200 DC/DC/DC (set of 6) "TIA Portal"**
Order no.: 6ES7214-1AE30-4AB3
- **Upgrade SIMATIC STEP 7 BASIC V14 SP1 (for S7-1200) (set of 6) "TIA Portal"**
Order no.: 6ES7822-0AA04-4YE5

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We wish to thank the TU Dresden, particularly Prof. Dr.-Ing. Leon Urbas and the Michael Dziallas Engineering Corporation and all other involved persons for their support during the preparation of this Learn-/Training Document.

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Firmware Update with SIMATIC S7-1200

1 Goal

This chapter will show how the **firmware version of the CPU** of **SIMATIC S7-1200** can be checked and upgraded using the TIA Portal.

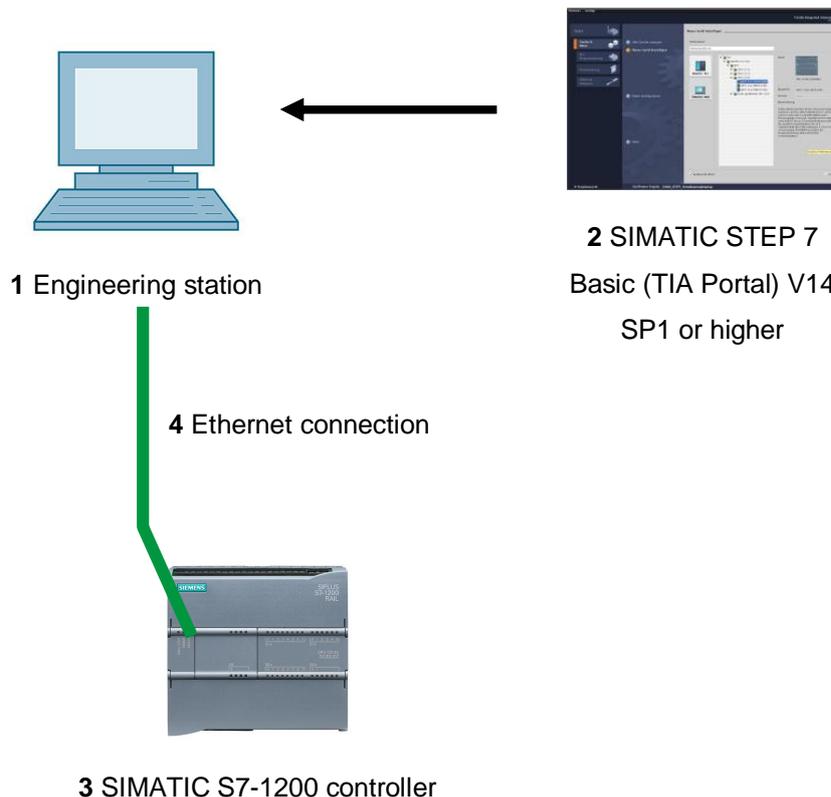
The SIMATIC S7 controllers listed in Chapter 3 can be used.

2 Requirement

No prerequisites have to be met for successful completion of this chapter.

3 Required hardware and software

- 1 Engineering station: requirements for hardware and operating system
(for additional information, see Readme on the TIA Portal Installation DVD)
- 2 SIMATIC STEP 7 Basic software in TIA Portal – V14 SP1 or higher
- 3 SIMATIC S7-1200 controller, e.g. CPU 1214C DC/DC/DC – Firmware V4.2.1 or higher
- 4 Ethernet connection between engineering station and controller



4 Theory

4.1 SIMATIC S7-1200 automation system

The SIMATIC S7-1200 automation system is a modular microcontroller system for the lower performance range.

A comprehensive range of modules is available to optimally adapt the system to the automation task.

The S7 controller consists of a power supply and a CPU with integrated inputs and outputs or additional input or output modules for digital and analog signals.

If necessary, communication processors and function modules for special tasks such as stepper motor control are also used.

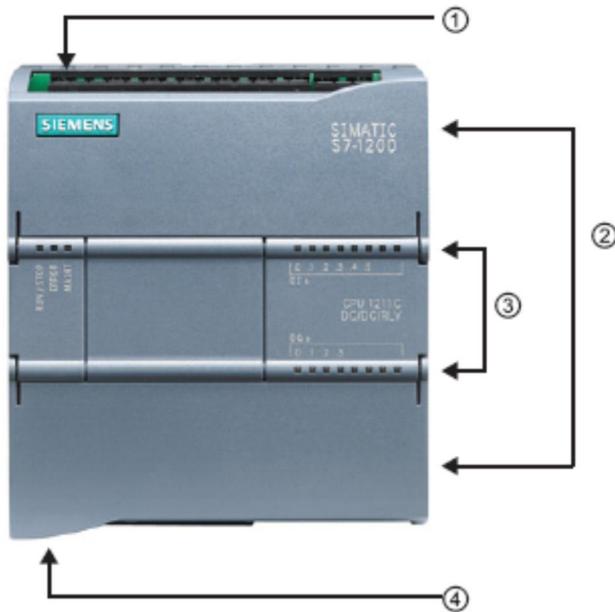
4.2 Operator controls and display elements of the CPU 1214C DC/DC/DC

4.2.1 Front view of the CPU 1214C DC/DC/DC

With an integrated power supply (24 V connection) and integrated inputs and outputs, the CPU 1214C DC/DC/DC is ready for immediate use without additional components.

For communication with a programming device, the CPU has an integrated TCP/IP connection.

The CPU can thus communicate with HMI devices or other CPUs over an Ethernet network.



- ① 24 V connection
- ② Plug-in terminal block for user wiring (behind the cover flaps)
- ③ Status LEDs for the integrated I/O and the operating mode of the CPU
- ④ TCP/IP connection (on the bottom of the CPU)

4.2.2 SIMATIC Memory Card (MC)

The optional **SIMATIC Memory Card (MC)** stores the program, data, system data, files and projects. It can be used for:

- Transfer of a program to multiple CPUs
- Firmware update of CPUs, signal modules (SM) and communication modules (CM)
- Simple CPU replacement



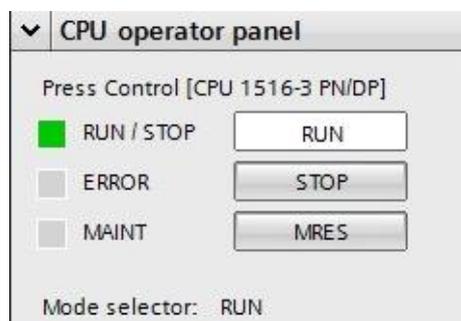
4.2.3 Operating modes of the CPU

The CPU can have the following three operating modes:

- In **STOP** mode, the CPU is not executing the program and you can download a project.
- In **STARTUP** mode, the CPU is starting up.
- In **RUN** mode, the program is being executed cyclically.

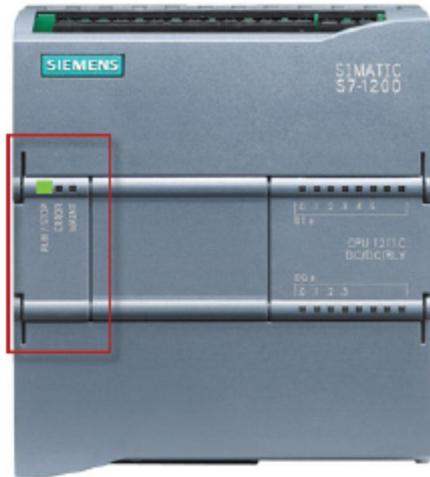
The CPU does not have a physical switch for changing the operating mode.

You use the button on the operator panel of the STEP 7 Basic software to change the operating mode (**STOP** or **RUN**). The operator panel also contains an **MRES** button for performing a memory reset and displays the status LEDs of the CPU.



4.2.4 Status and error displays

The **Status LED RUN/STOP** on the front of the CPU indicates the current operating mode of the CPU by the color indicated.



- **Yellow** light indicates **STOP** mode.
- **Green** light indicates **RUN** mode.
- A **flashing light** indicates **STARTUP** mode.

In addition, there is an **ERROR** LED for indicating errors and a **MAINT** LED for indicating a maintenance requirement.

4.3 STEP 7 Basic programming software (TIA Portal V14)

STEP 7 Basic V14 (TIA Portal V14) software is the programming tool for the following automation systems:

- SIMATIC S7-1200
- Basic Panels

STEP 7 Basic V14 provides the following functions for plant automation:

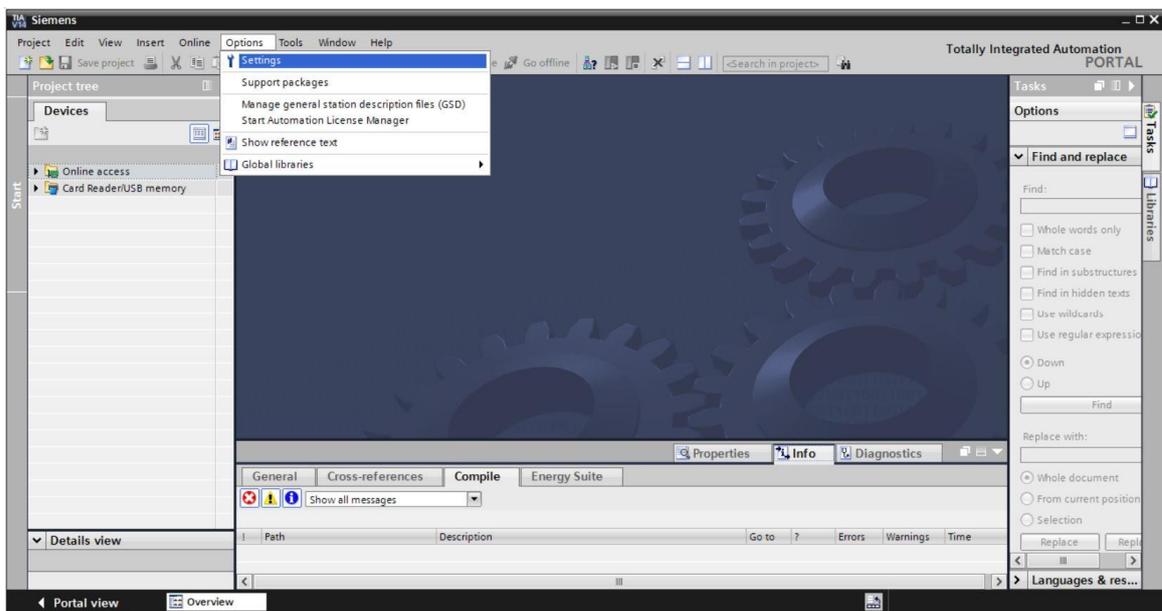
- Configuration and parameter assignment of the hardware
- Specification of the communication
- Firmware update
- Programming
- Testing, commissioning and service with operational/diagnostic functions
- Documentation
- Creation of visualizations for SIMATIC Basic Panels with the integrated WinCC Basic software

Support is provided for all functions through detailed online help.

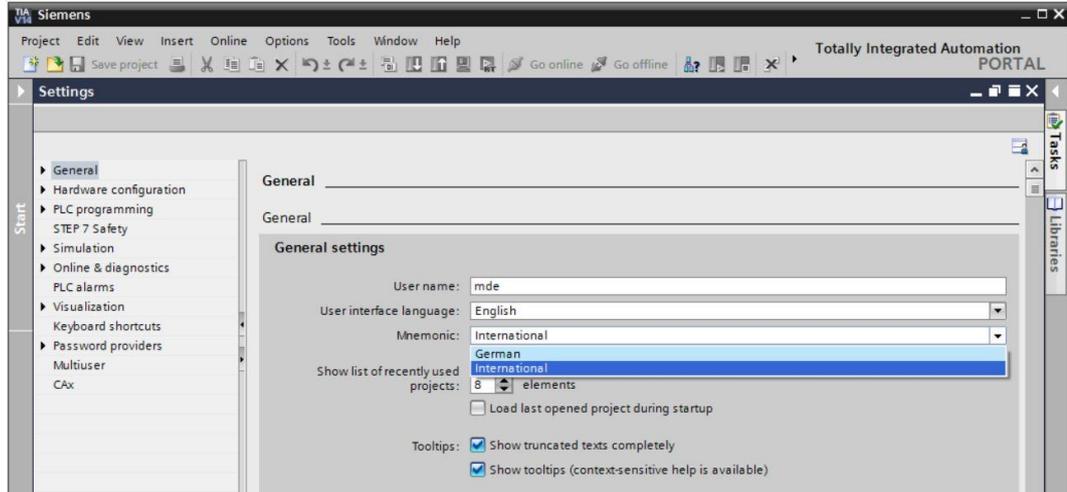
4.3.1 Basic settings for the TIA Portal

Ⓜ Users can specify their own default settings for certain settings in the TIA Portal. A few important settings are shown here.

Ⓜ In the project view, select the Ⓜ "Options" menu and then Ⓜ "Settings".



- ⑥ One basic setting is the selection of the user interface language and the language for the program display. In the curriculums to follow, "English" will be used for both settings.
- ⑥ Under ⑥ "General" in "Settings", select "User interface language ⑥ English" and "Mnemonic ⑥ International".
- ⑥ International".



Note: These settings can always be changed.

4.3.2 Setting the IP address on the programming device

You need a TCP/IP connection in order to upgrade the CPU of a SIMATIC S7-1200 controller from the PC, the programming device or a laptop.

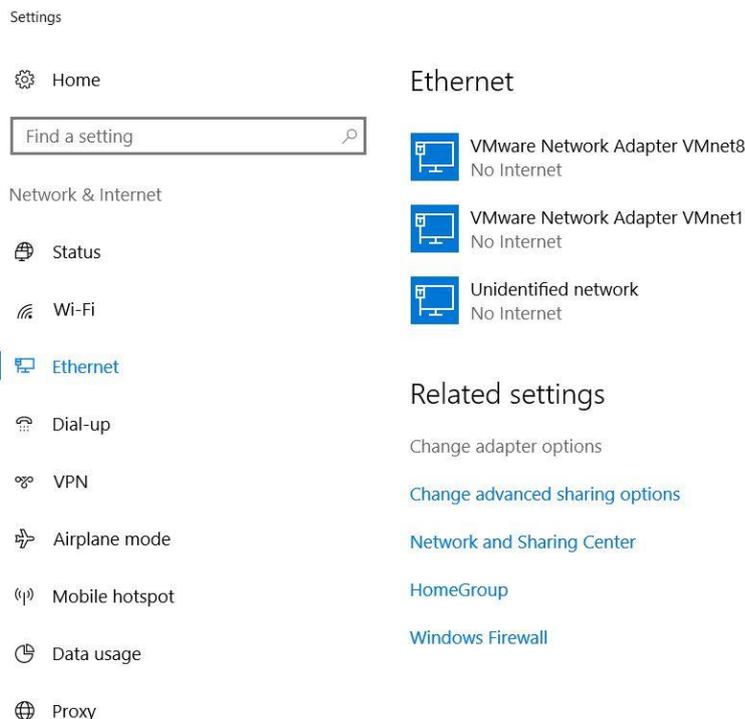
It is important that the IP addresses of both devices match for the computer and SIMATIC S7-1200 to communicate with each other via TCP/IP.

First, we will show you how to set the IP address of a computer with the Windows 10 operating system.

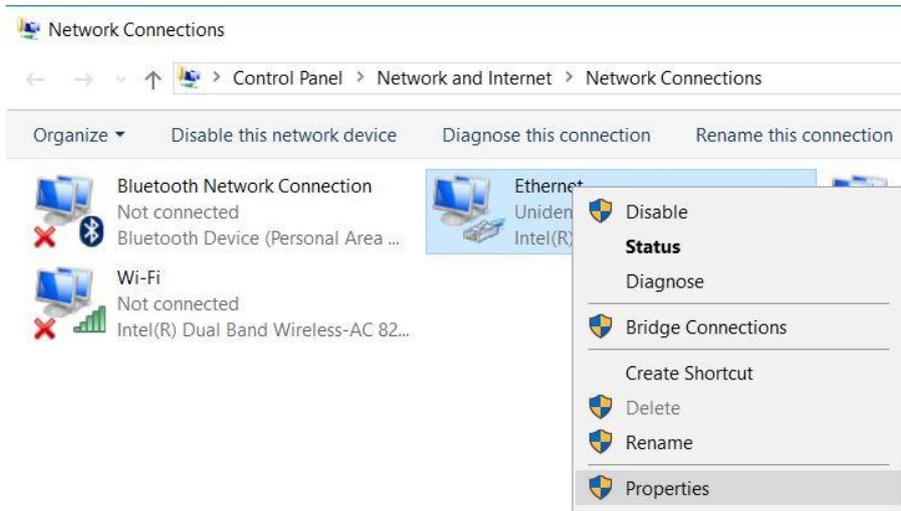
- ⑧ Select the network icon in the taskbar at the bottom  and click ⑧ "Network settings".



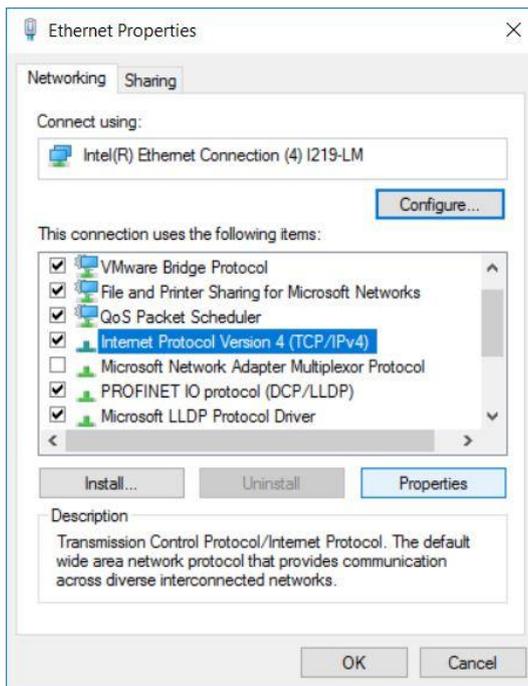
- ⑧ In the network settings window that opens, click ⑧ "Ethernet" and then on ⑧ "Change adapter options".



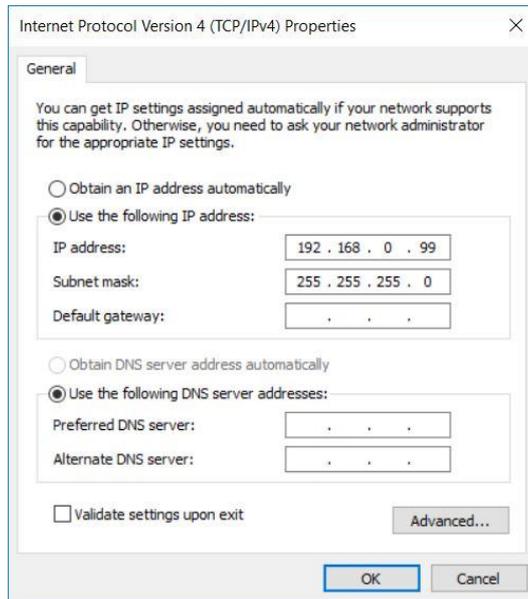
- ⑥ Select the desired ⑥ "LAN Connection" that you want to use to connect to the controller and click ⑥ "Properties".



- ⑥ Select ⑥ "Properties" for ⑥ "Internet Protocol Version 4 (TCP/IPv4)".



- ⑧ You can now use the following IP address, for example ⑧ IP address: 192.168.0.99 and enter the following ⑧ subnet mask 255.255.255.0. Accept the settings. (⑧ "OK")



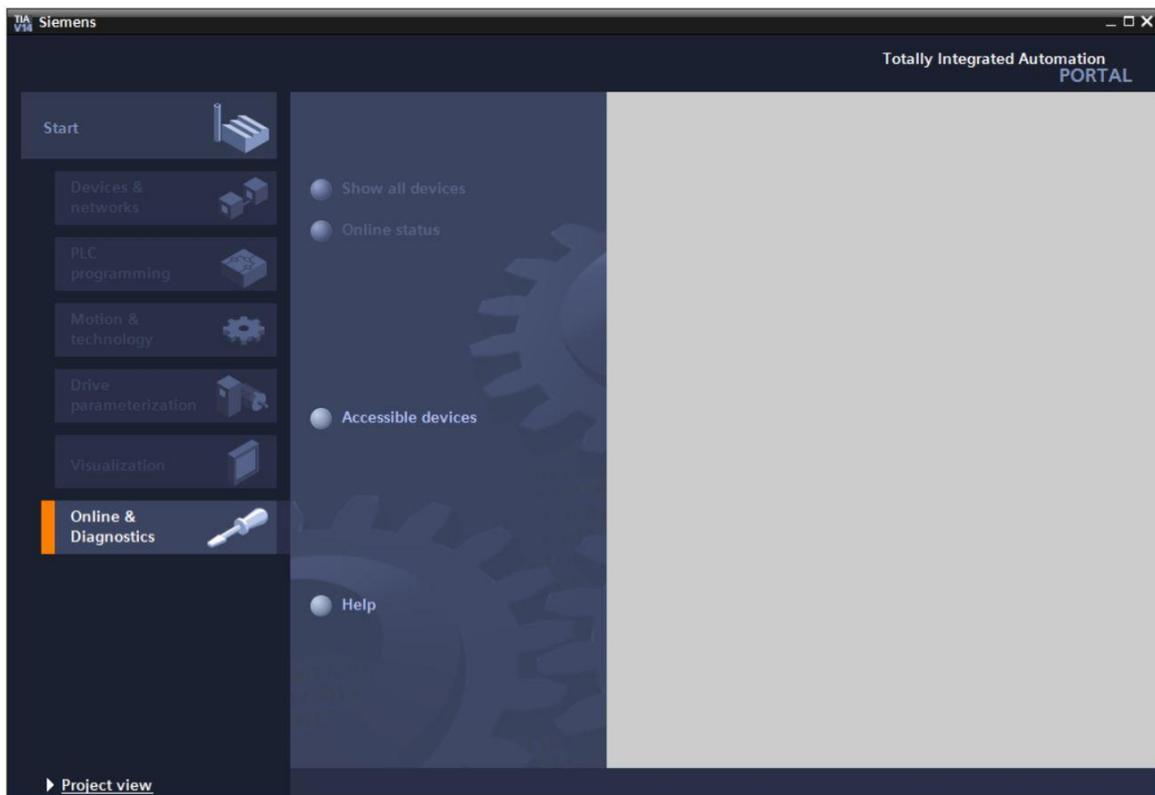
4.3.3 Setting the IP address in the CPU

Before a firmware update of the CPU can be performed, set the IP address of the SIMATIC S7-1200 correctly so that the programming device can reach the CPU via TCP (IP communication). The IP address of the SIMATIC S7-1200 is set as follows:

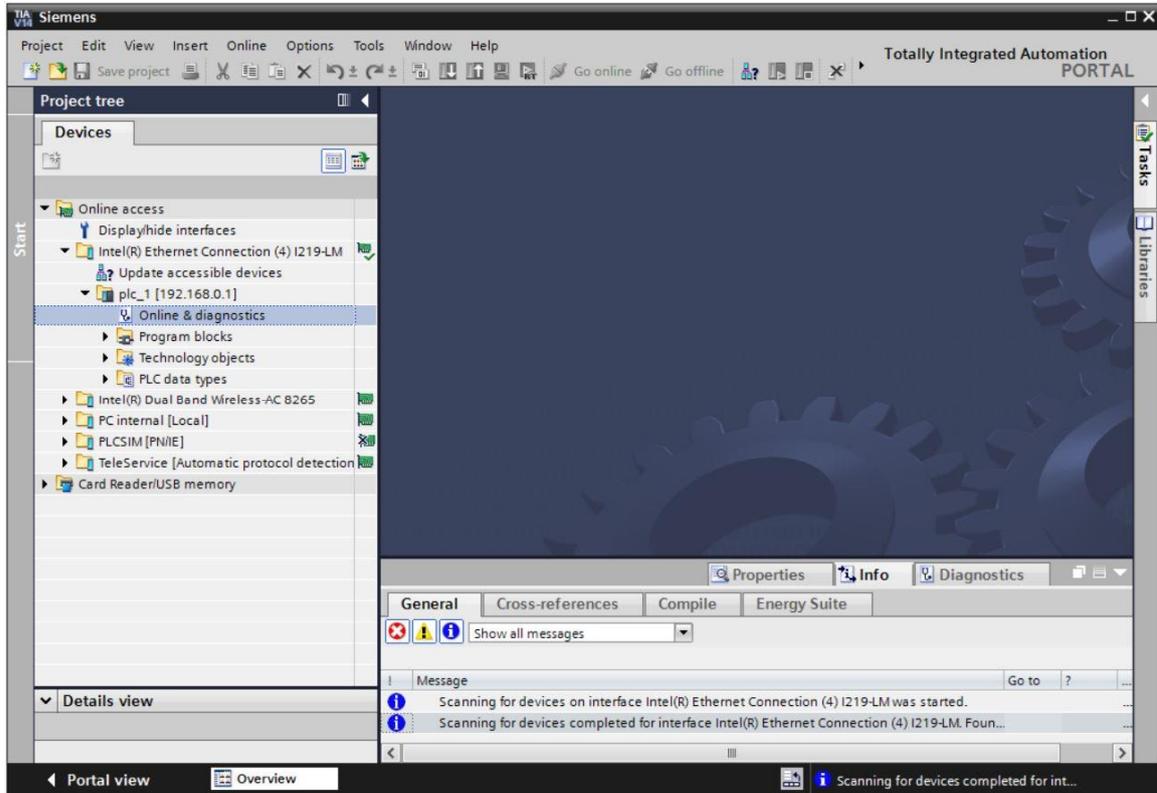
- ① Double-click the Totally Integrated Automation Portal to select it. (① TIA Portal V14)



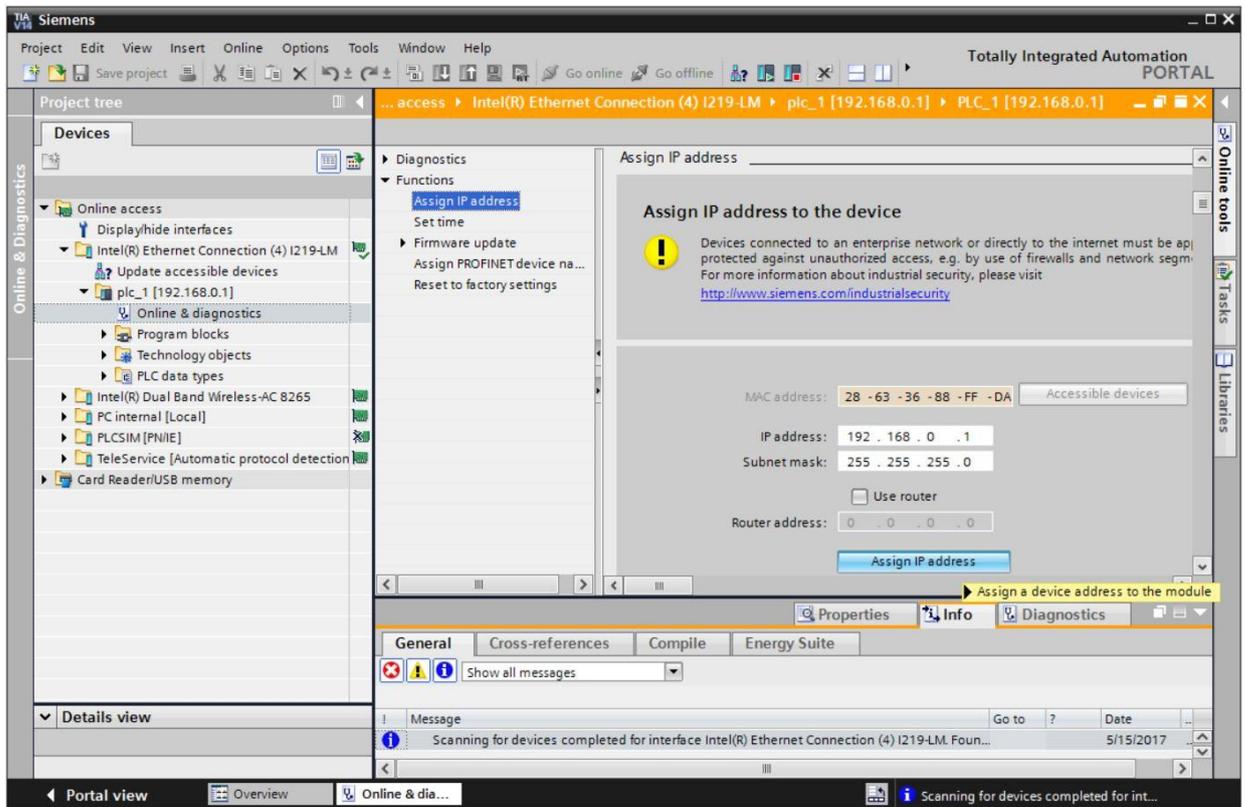
- ② Click ② "Online&Diagnostics" and open ② "Project view".



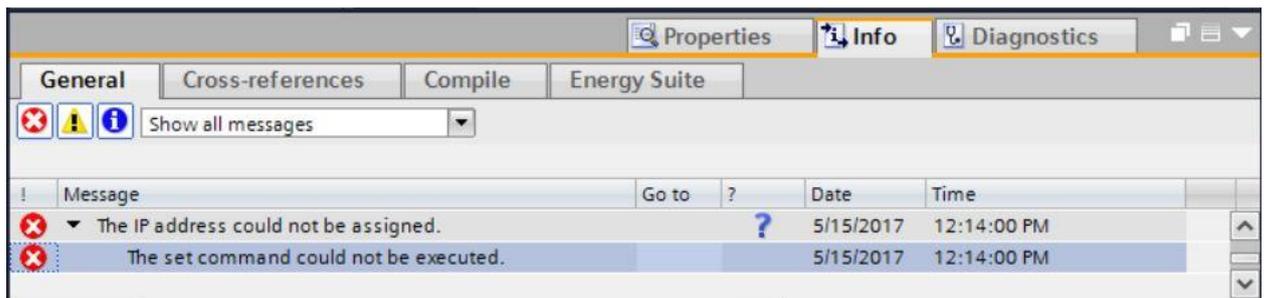
- Ⓜ In the project tree under Ⓜ "Online access", select the network adapter that was set previously. If you click Ⓜ "Update accessible devices", you will see the IP address (if previously set) or the MAC address (if IP address has not yet been assigned) of the connected SIMATIC S7-1200. Select Ⓜ "Online&Diagnostics".



- Under "Functions", you now find the "Assign IP address" item. Enter the following IP address here (example): IP address: 192.168.0.1 Subnet mask 255.255.255.0. Click "Assign IP address" and this new address will be assigned to your SIMATIC S7-1200.

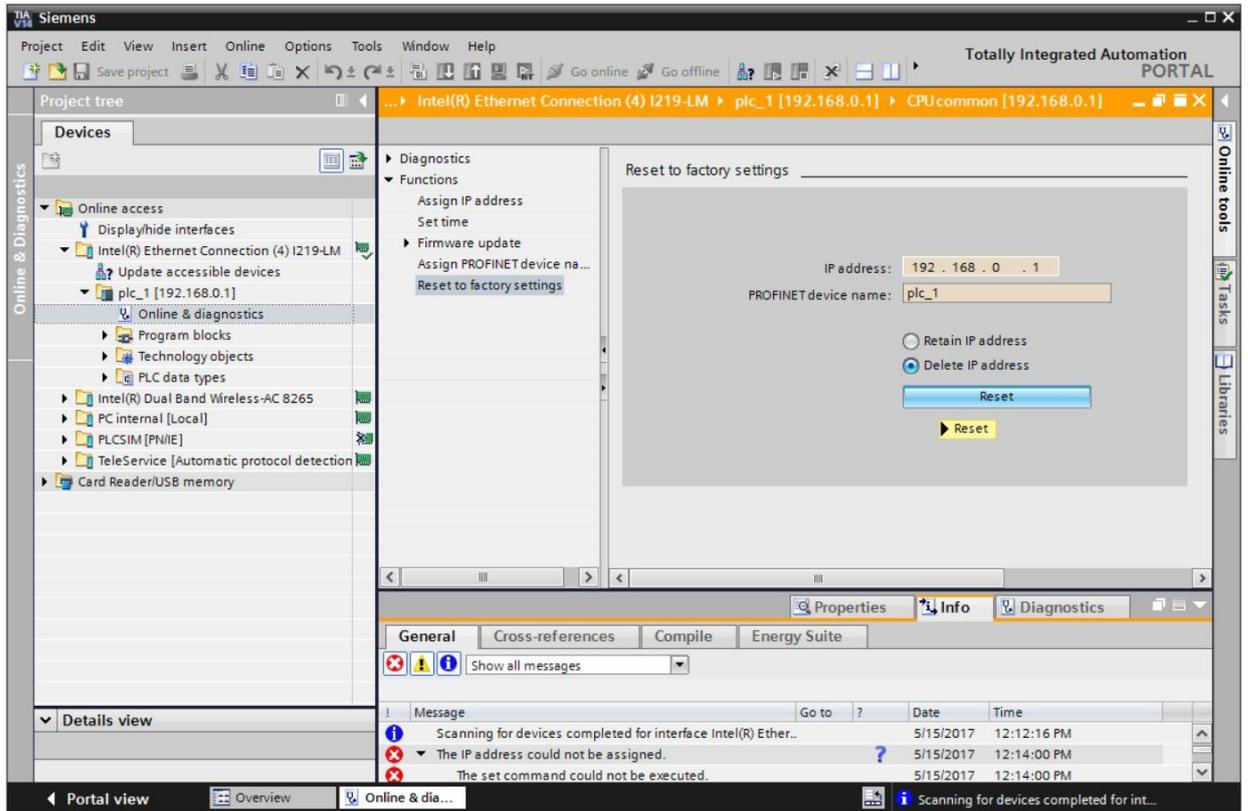


- If the IP address was not successfully assigned, you will receive a message in the "Info" window under "General".

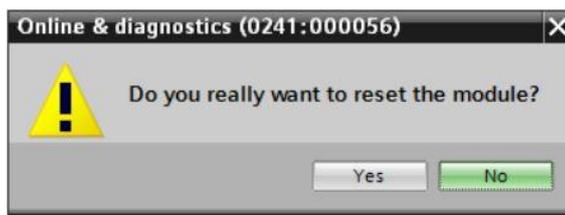


4.3.4 Restoring the factory settings of the CPU

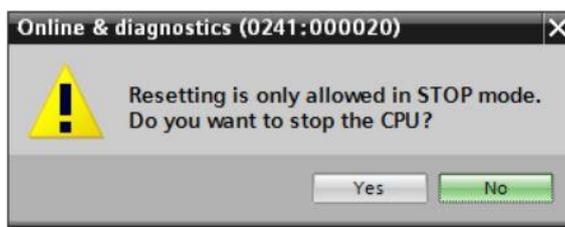
- Ⓜ If the IP address could not be assigned, the program data on the CPU must be deleted. This is done by resetting the CPU. To reset the controller, select the Ⓜ "Reset to factory settings" function and then Ⓜ "Delete IP address" and click Ⓜ "Reset".



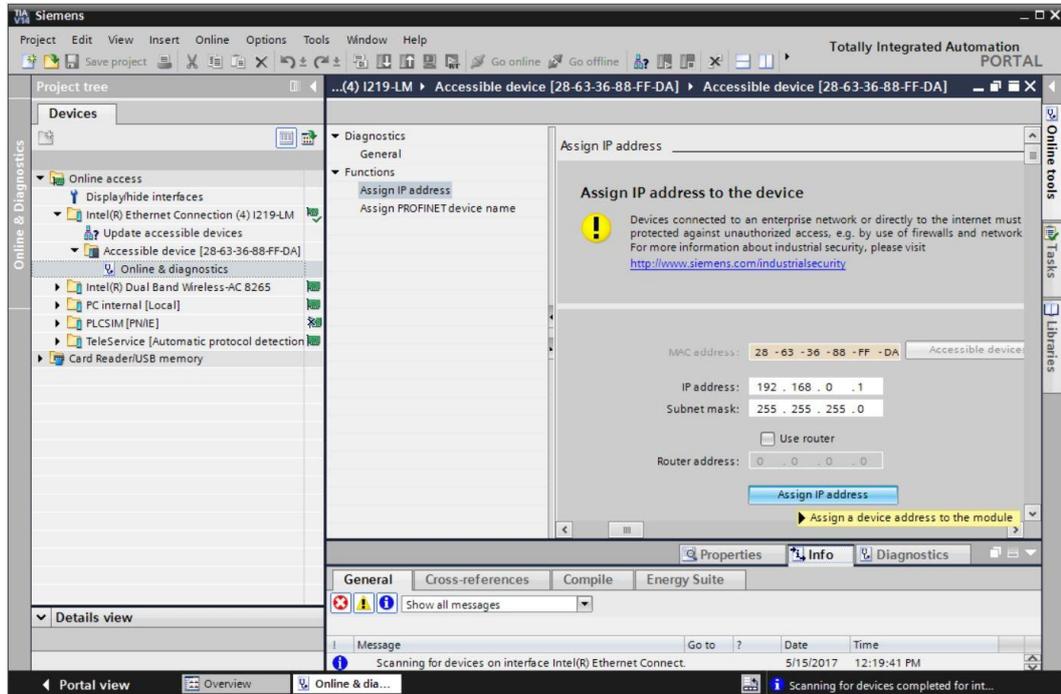
- Ⓜ Confirm the prompt asking if you really want to reset the module with Ⓜ "Yes".



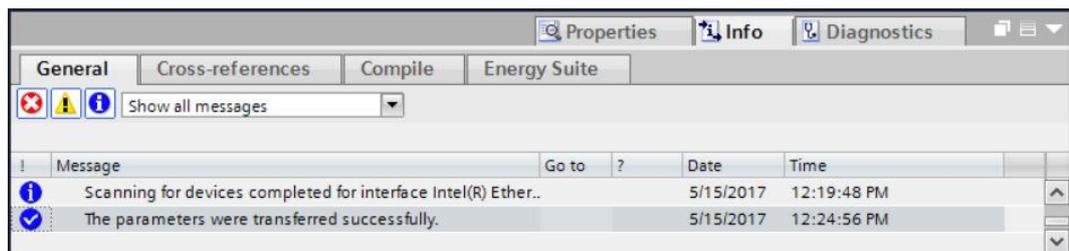
- Ⓜ If necessary, stop the CPU. (Ⓜ "Yes")



- Ⓜ Once the CPU has been reset, click Ⓜ "Update accessible devices" again. The MAC address of the connected SIMATIC S7-1200 can now be seen. Select Ⓜ "Online&Diagnostics" again. Select Ⓜ "Assign IP address" under Ⓜ "Functions". Enter the following IP address here (example): IP address: 192.168.0.1 Subnet mask 255.255.255.0. Click "Assign IP address" and this new address will be assigned to your SIMATIC S7-1200.



- Ⓜ You will receive a message regarding successful transfer of parameters in the Ⓜ "Info" Ⓜ "General" window.



4.3.5 Downloading a firmware update from the SIEMENS Support website

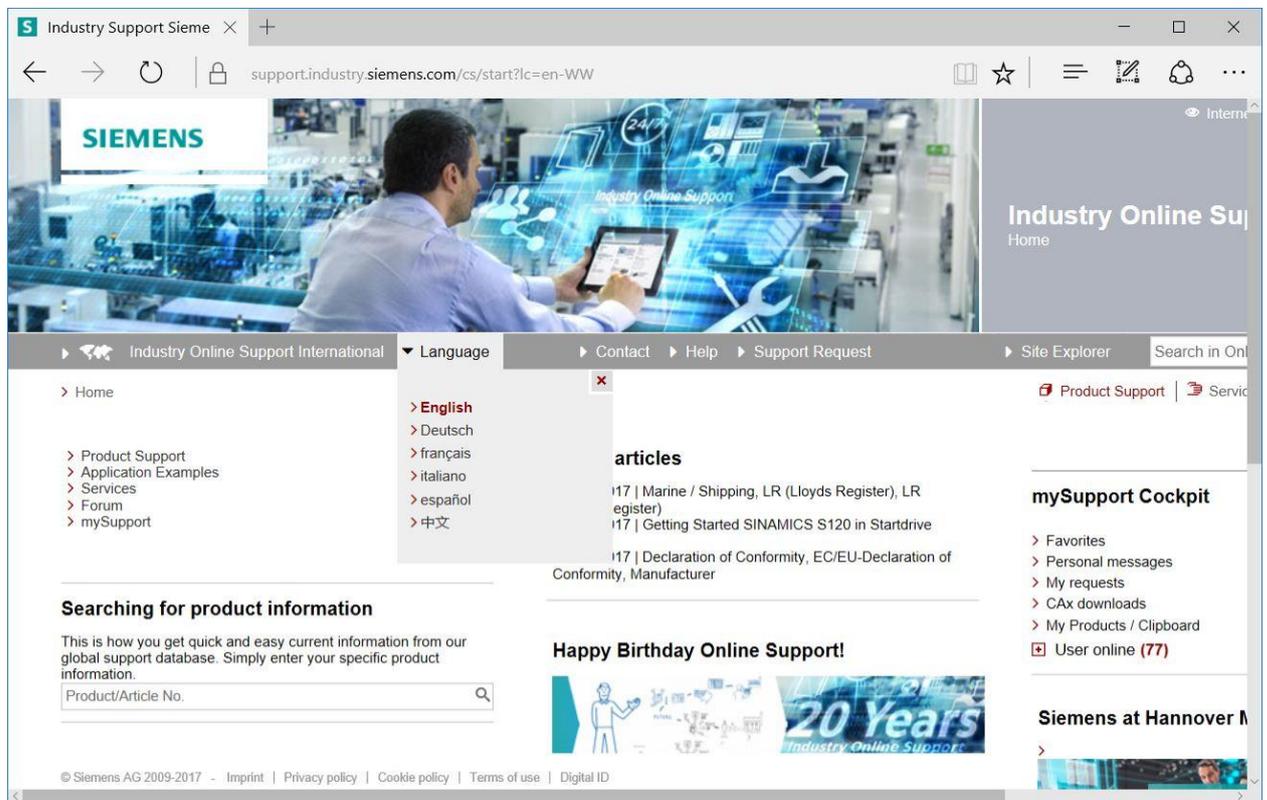
You can download current firmware updates free of charge from the Industry Online Support of SIEMENS AG.

® Open your choice of Internet browser and enter the address

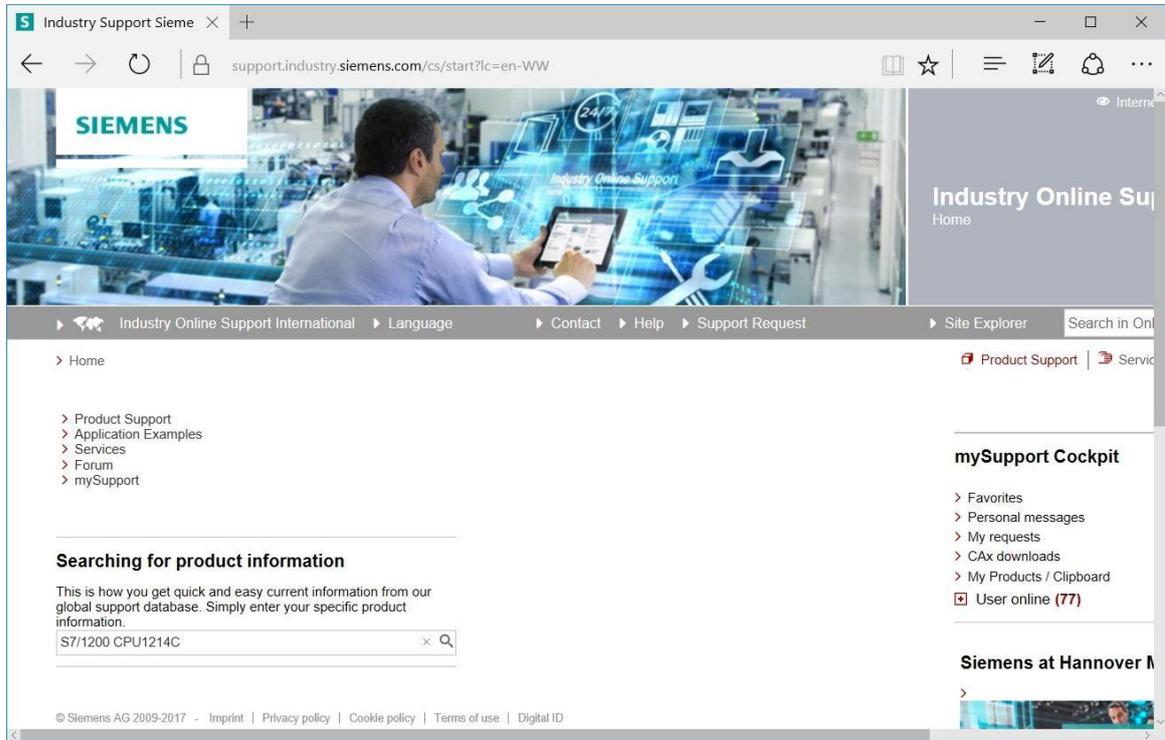
® support.automation.siemens.com



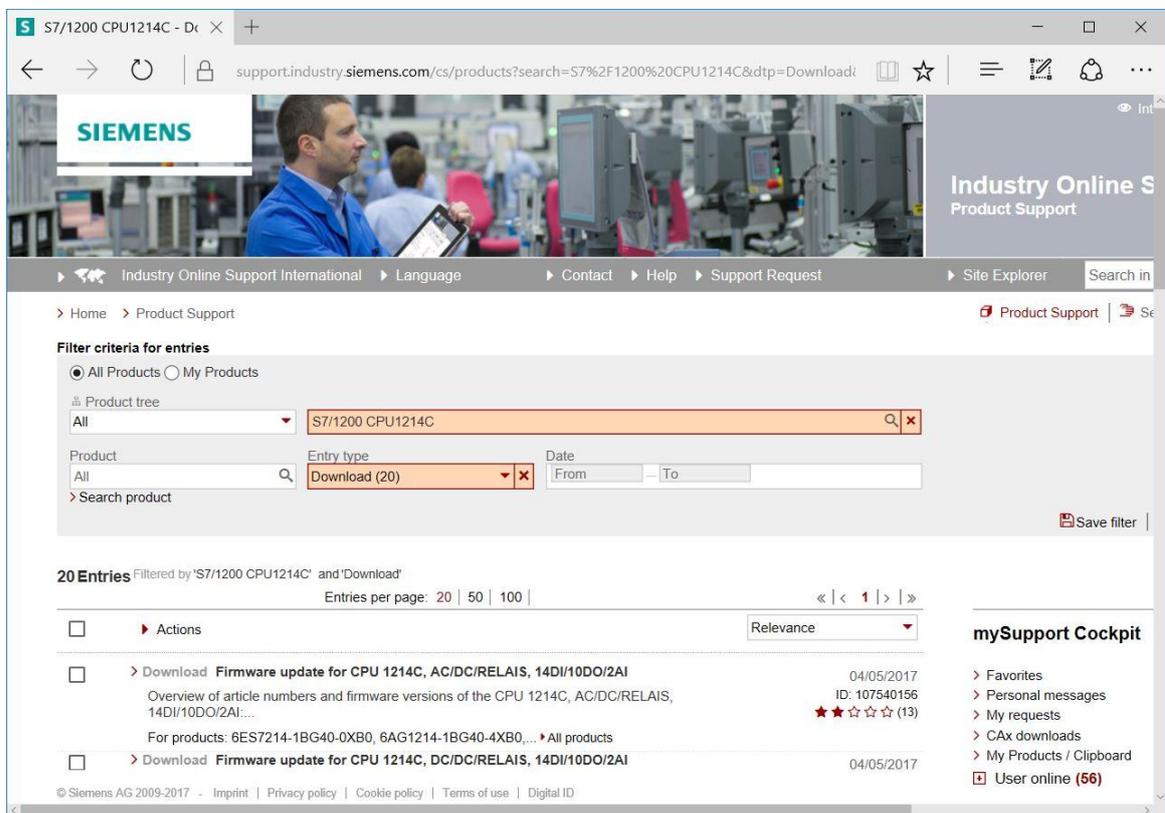
® Select your desired language ® "Language" ® "English".



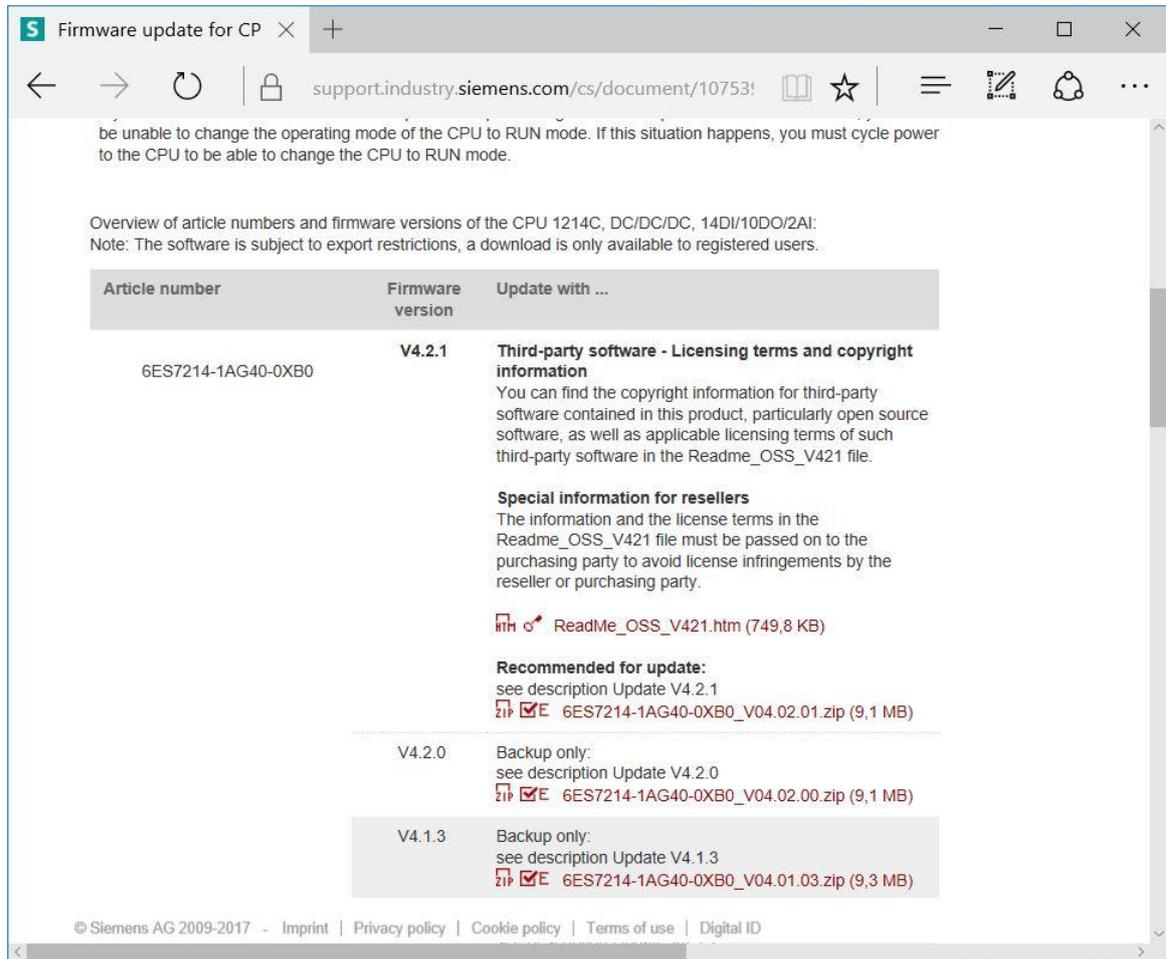
- ⑥ In "Searching for product information", enter the CPU for which you need a firmware update.
For example: ⑥ "S7-1200 CPU1214C"



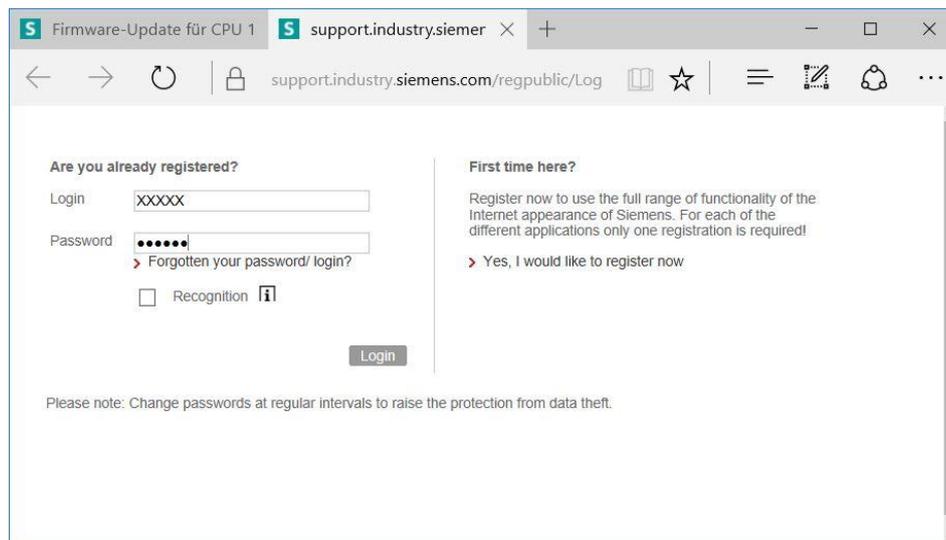
- ⑥ Under "Filter criteria for entries" select the "Entry type" ⑥ "Download" and click the entry with firmware updates for your CPU in the selection list.



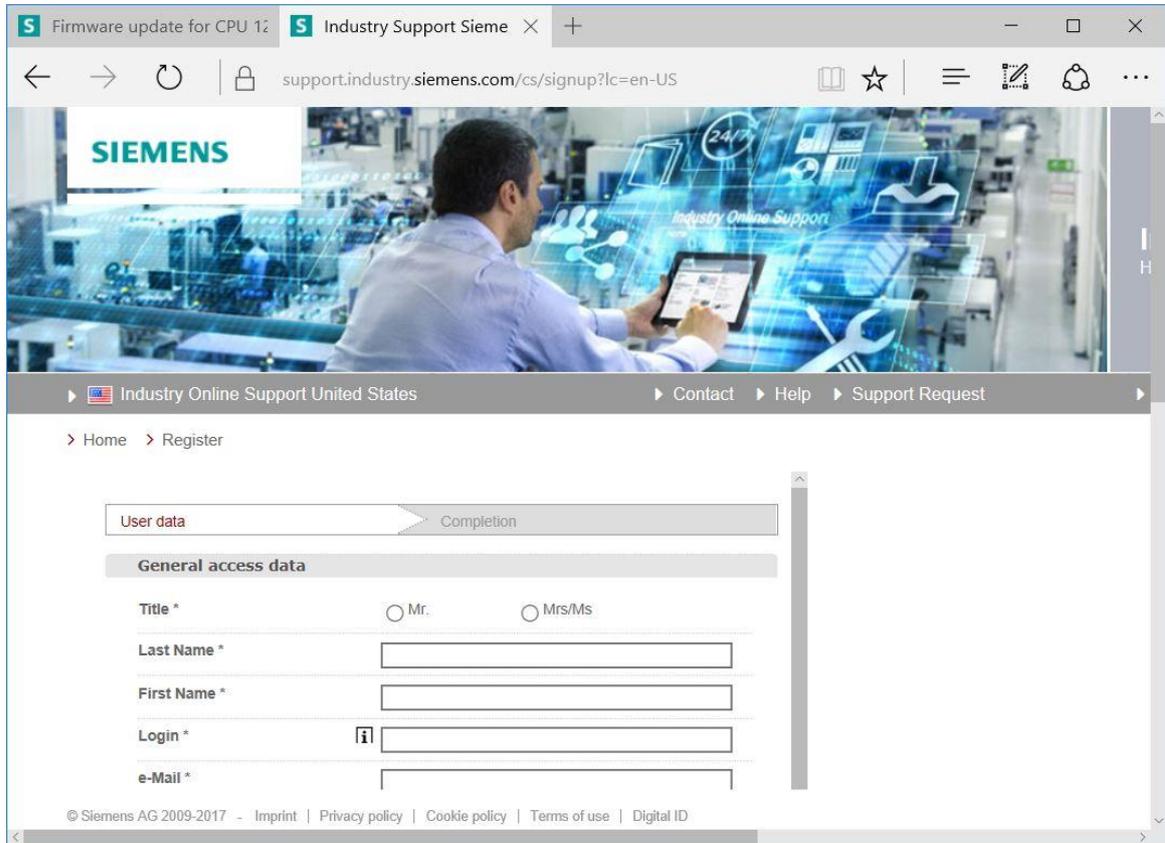
- Ⓜ Various updates are offered in the next window. Select the update recommended for the upgrade.



- Ⓜ If you have not already registered, do so in the next window. (Ⓜ "Yes I would like to register now"), or if already registered – log in with your "Login" and "Password". (Ⓜ "Login")



- Ⓜ Enter the requested data for the registration, select the option "Download of export restricted software" and then save the registration. (Ⓜ Ⓜ "Save")



Download of export restricted software

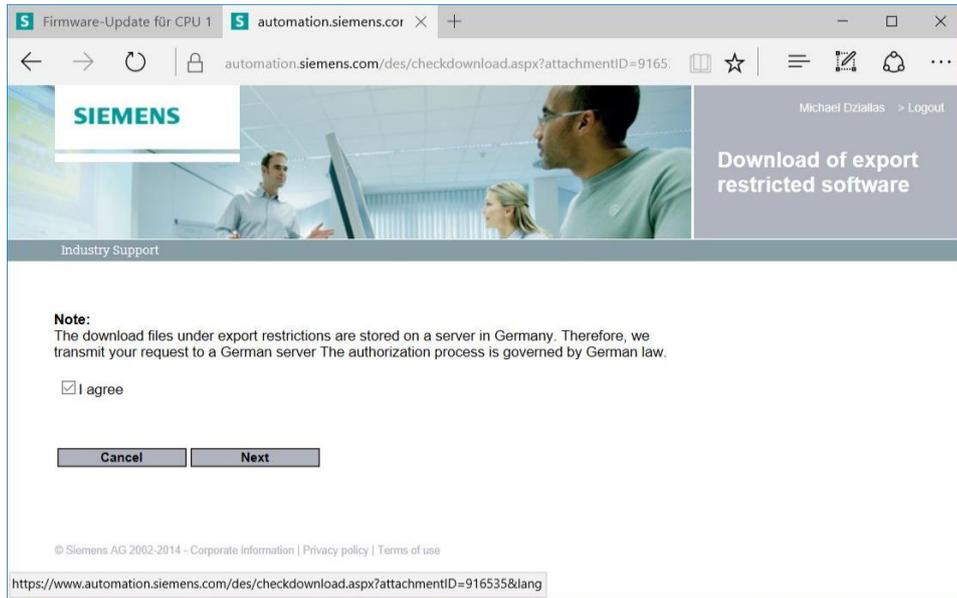
Access authorization for the download of export-restricted software
 Software that is subject to export restrictions may not be made generally accessible. Access authorization to export-restricted software may only be granted to selected, registered users.

Yes, I would like to register for access to export-restricted software

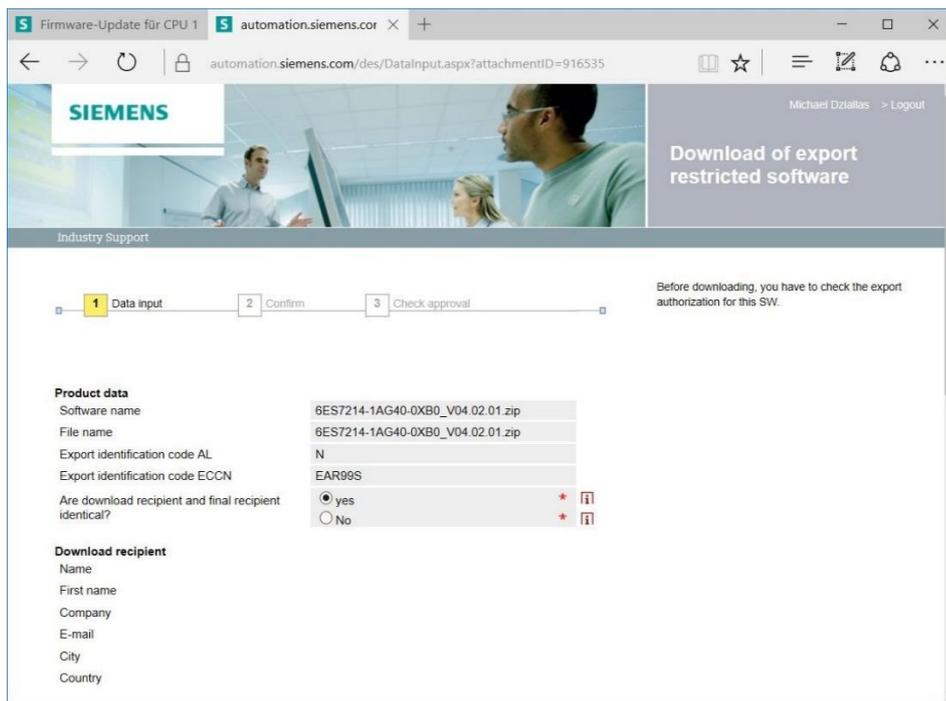
* Mandatory field Save

⑧ Go back to the Login. After login, consent to the procedure for export-restricted software.

(⑧ I agree ⑧ "Next")



⑧ Enter the requested data for "Download recipient" and "Final recipient".



Ⓜ Enter the requested data for use of the software. (Ⓜ "Next")

The screenshot shows a web browser window with the URL `automation.siemens.com/des/DataInput.aspx?attachmentID=916535`. The page contains a form with the following sections:

- Final recipient**
 - Name
 - First name
 - Company
 - Department
 - Street
 - ZIP code
 - City
 - Country
- Declaration for final user**
 - Do you or the end user of the download operate in a military or arms related area?
 yes No *
 - Do you or the end user of the download operate in a nuclear area?
 yes No *
 - Is the download associated with Nuclear, Biological or Chemical Weapons, launch vehicle technology or unmanned aerial vehicles?
 yes No *
 - Is your company located in a free zone or a free warehouse respectively is the download transferred to a free zone or a free warehouse?
 yes No *

* Mandatory fields

Buttons: **Cancel** and **Next**

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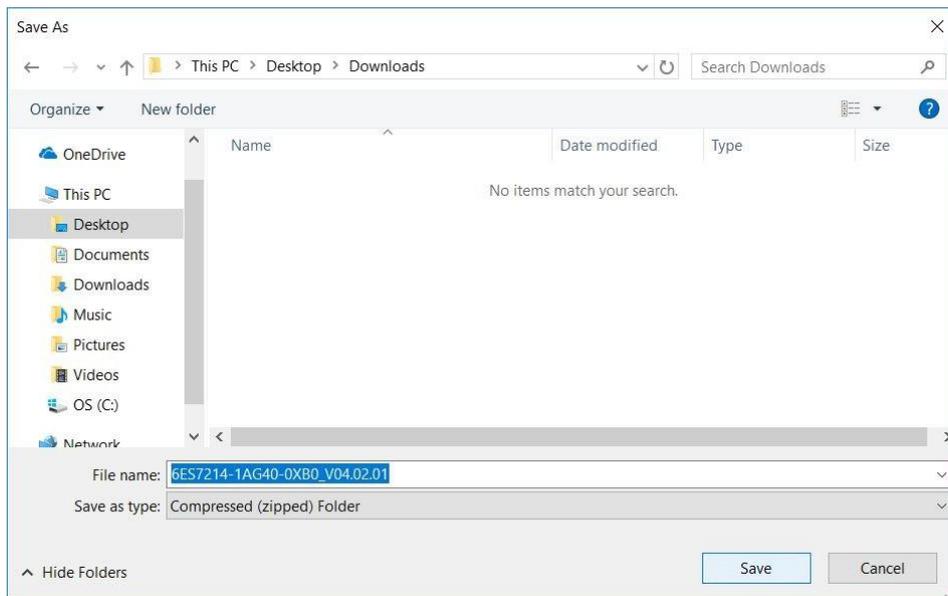
⑧ Confirm that your inputs are correct and accept the export regulations. (⑧ "Next")

The screenshot shows a web browser window with the URL `automation.siemens.com/des/DataConfirm.aspx`. The page contains a "Declaration for final user" section with four questions, each with "yes" and "No" radio button options. All "No" options are selected. Below the questions is a checked checkbox: "I hereby confirm that my data is correct and complete". A scrollable text box contains the "Download declaration" text. At the bottom, there is another checked checkbox: "I accept the above mentioned export control regulations and commit myself to strictly observe them". "Back" and "Next" buttons are located at the bottom of the form.

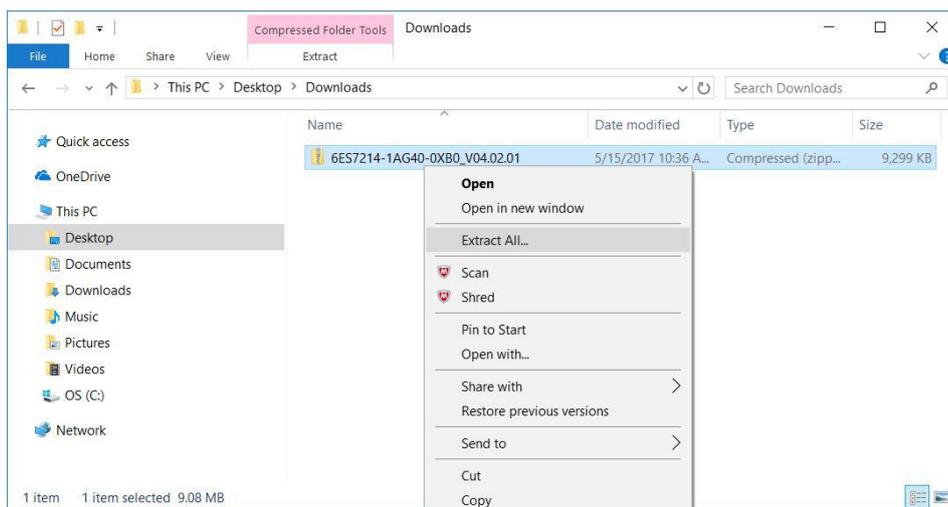
⑧ Once you have received confirmation of the export release, you can save the firmware update on your computer. (⑧ "Save as")

The screenshot shows a web browser window with the URL `automation.siemens.com/des/DataResult.aspx`. The page has a green background and displays a "Check result" section with the message "Export authorization exists". There are "Print" and "Continue to download" buttons. A file save dialog is open in the foreground, showing the filename "6ES7214-1AG40-0XB0_V04.02.01.zip (9.08 MB)" and the source "From: support.industry.siemens.com". The dialog has "Save", "Save as", and "Cancel" buttons.

- ⑧ Enter the desired memory location on your computer and click ⑧ "Save".



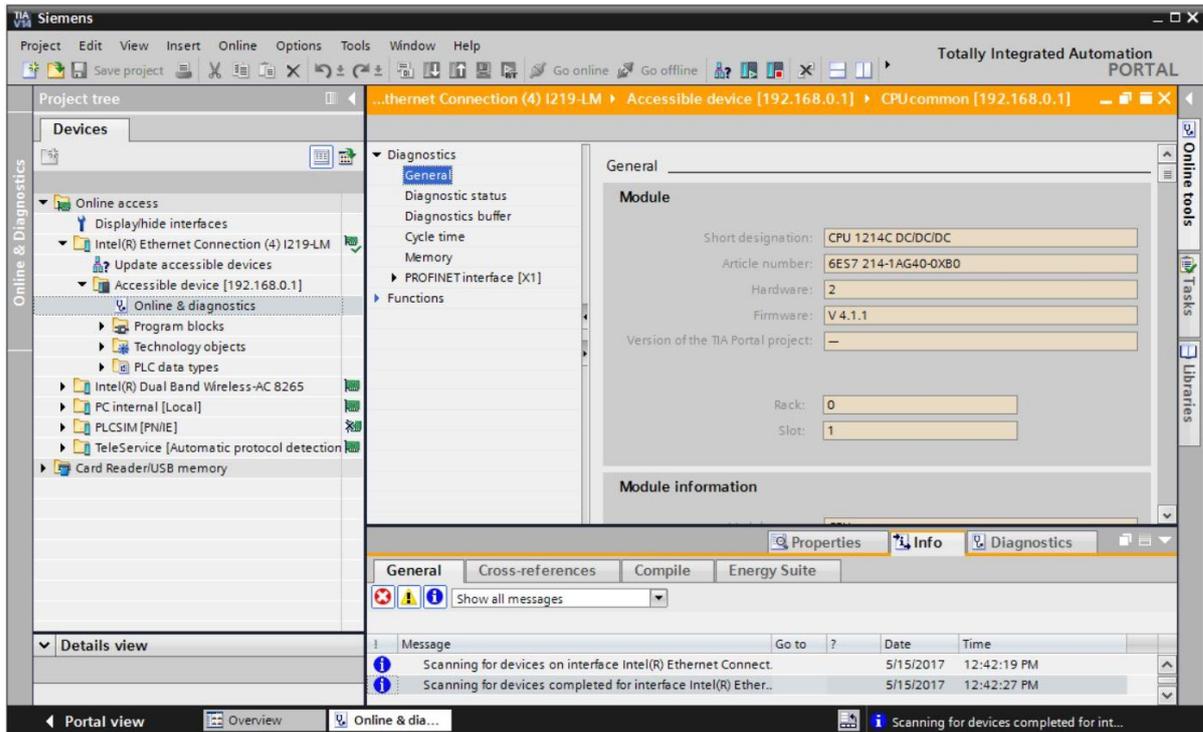
- ⑧ Click the downloaded compressed file in Windows Explorer and select ⑧ "Extract All".



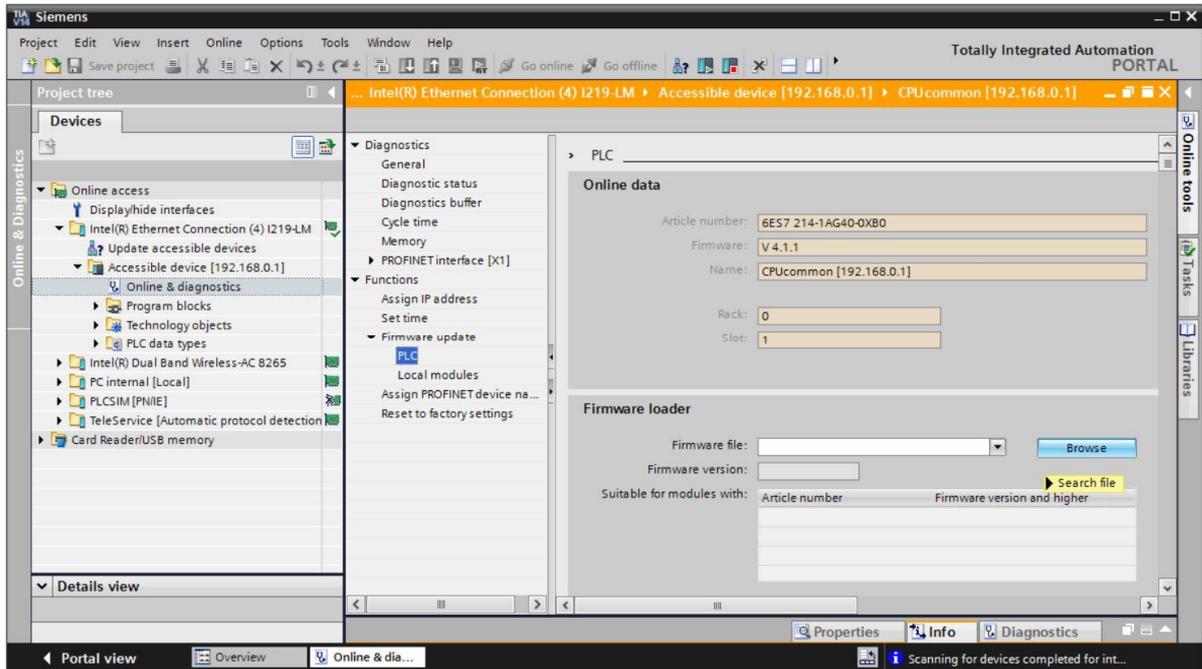
4.3.6 Firmware update of the CPU

The files with the firmware update can be imported into the "SIMATIC S7-1200" CPU as follows.

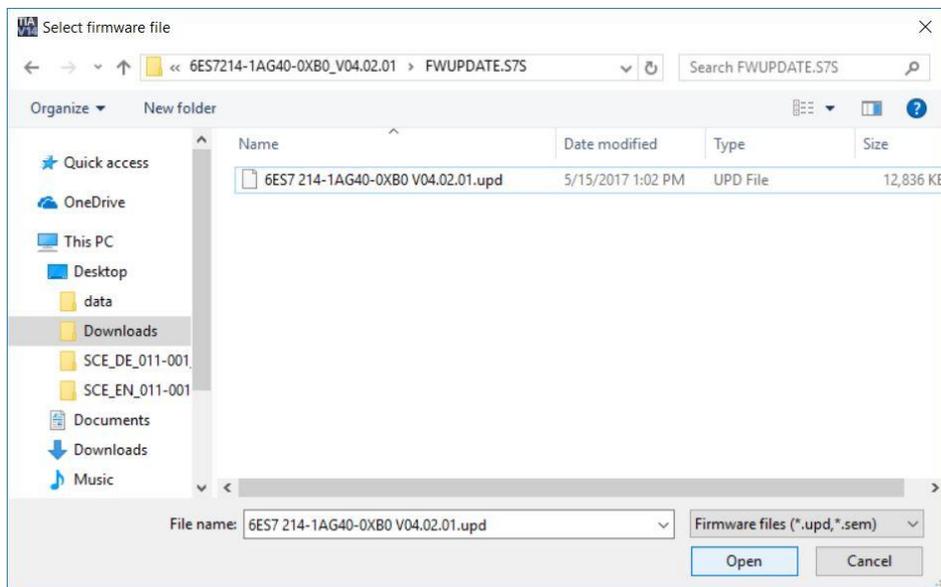
- Ⓜ In the project tree under Ⓜ "Online access", select the network adapter that was set previously. If you click Ⓜ "Update accessible devices", you will see the IP address of the connected SIMATIC S7-1200. Select Ⓜ "Online&Diagnostics". Under the "General" menu item, you can check the current firmware in your CPU in "Diagnostics".



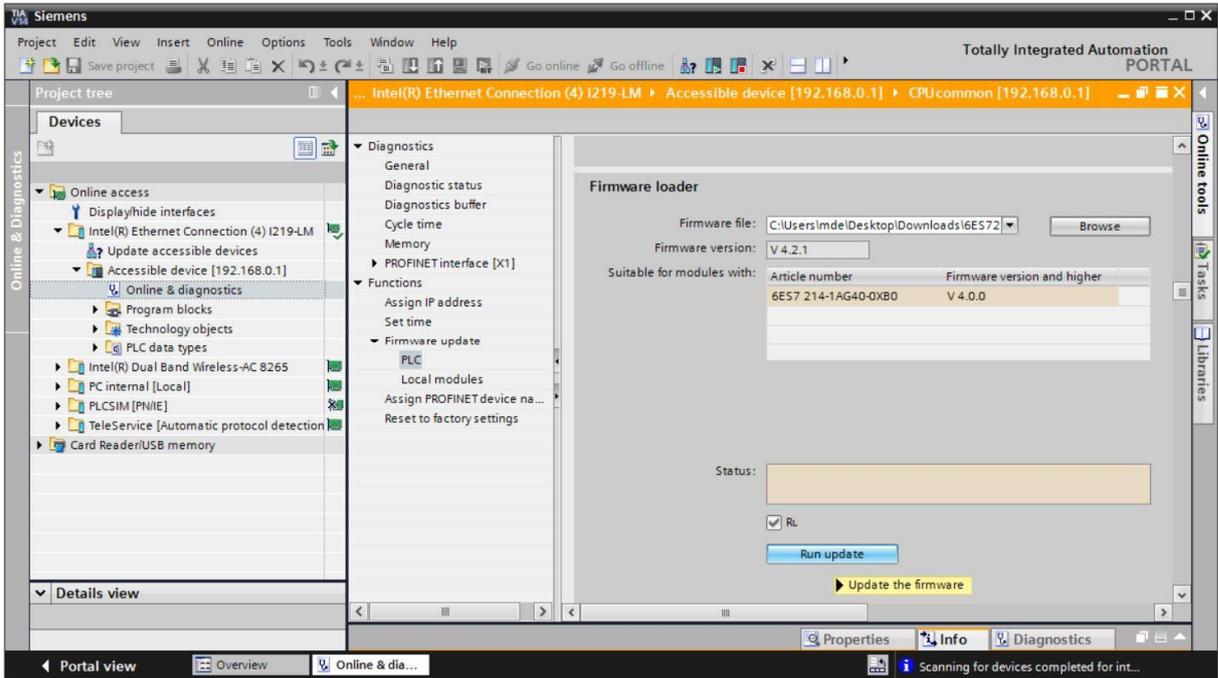
- Ⓜ In the Ⓜ "Functions" menu, change to Ⓜ "Firmware update" Ⓜ "PLC". In the Ⓜ "Firmware loader" sub-item, click Ⓜ "Browse".



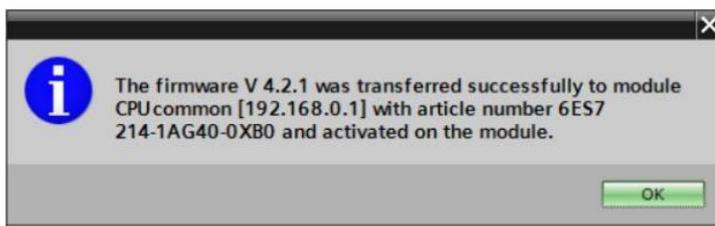
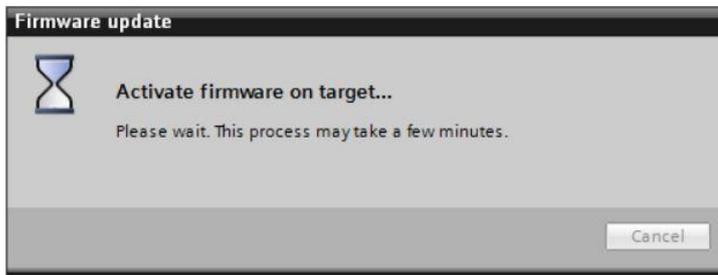
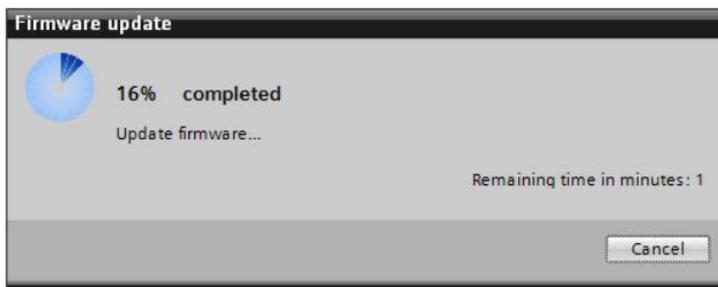
- Ⓜ Select the previously downloaded and extracted firmware file Ⓜ "6ES7 ***-****-****.upd" on your computer and click Ⓜ "Open".



- ⑥ The following dialog indicates whether your firmware file is compatible with your CPU. Now start the update. (⑥ "Run update")



- ⑥ The progress of the update and its successful completion are indicated with the following dialogs. Click ⑥ "OK" to confirm.



5 Additional information

You can find additional information as an orientation aid for initial and advanced training, for example, Getting Started, videos, tutorials, apps, manuals, programming guidelines and trial software/firmware, at the following link:

[siemens.com/sce/s7-1200](https://www.siemens.com/sce/s7-1200)

Preview "Additional information"

Getting Started, Videos, Tutorials, Apps, Manuals, Trial-SW/Firmware

- TIA Portal Videos
- TIA Portal Tutorial Center
- Getting Started
- Programming Guideline
- Easy Entry in SIMATIC S7-1200
- Download Trial Software/Firmware
- Technical Documentation SIMATIC Controller
- Industry Online Support App
- TIA Portal, SIMATIC S7-1200/1500 Overview
- TIA Portal Website
- SIMATIC S7-1200 Website
- SIMATIC S7-1500 Website

Further information

Siemens Automation Cooperates with Education
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SCE Training Curriculums
[siemens.com/sce/documents](https://www.siemens.com/sce/documents)

SCE Trainer Packages
[siemens.com/sce/tp](https://www.siemens.com/sce/tp)

SCE Contact Partners
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Digital Enterprise
[siemens.com/digital-enterprise](https://www.siemens.com/digital-enterprise)

Industrie 4.0
[siemens.com/future-of-manufacturing](https://www.siemens.com/future-of-manufacturing)

Totally Integrated Automation (TIA)
[siemens.com/tia](https://www.siemens.com/tia)

TIA Portal
[siemens.com/tia-portal](https://www.siemens.com/tia-portal)

SIMATIC Controller
[siemens.com/controller](https://www.siemens.com/controller)

SIMATIC Technical Documentation
[siemens.com/simatic-docu](https://www.siemens.com/simatic-docu)

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