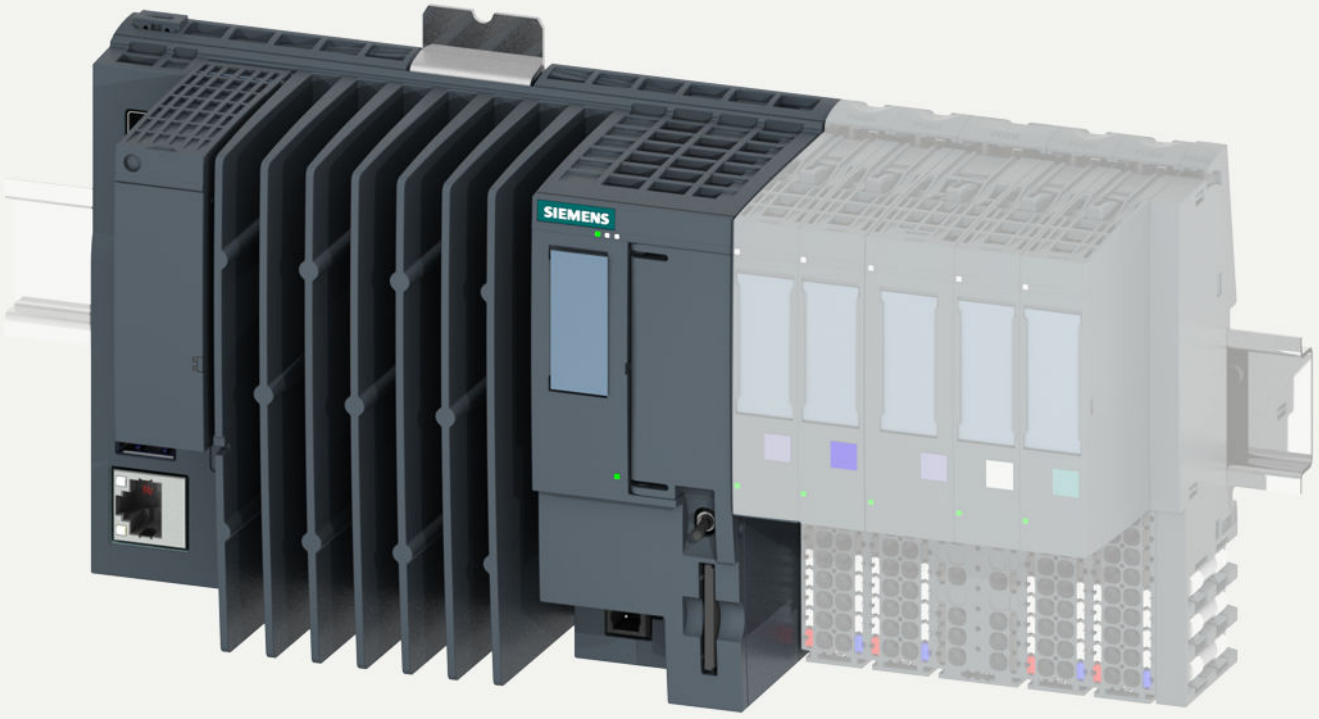
SIEMENS



Edition 02/2024

OPERATING INSTRUCTIONS

SIMATIC

ET 200SP Open Controller

CPU 1515SP PC2 (F/T/TF)

support.industry.siemens.com

Scope of validity of the documentation

This documentation is valid for the following products:

ET 200SP Open Controller	Article number
Standard CPU	
• CPU 1515SP PC2 basic device	6ES7677-2DB40-0AA0
• CPU 1515SP PC2 (Win 10)	6ES7677-2DB42-0GB1
• CPU 1515SP PC2 (IndOS)	6ES7677-2DB43-0GB1
Fail-safe CPUs	
• CPU 1515SP PC2 F (Win 10)	6ES7677-2SB42-0GB1
• CPU 1515SP PC2 F (IndOS)	6ES7677-2SB43-0GB1
Technology CPUs	
• CPU 1515SP PC2 T (Win 10)	6ES7677-2VB42-0GB1
Fail-safe technology CPUs	
• CPU 1515SP PC2 TF (Win 10)	6ES7677-2WB42-0GB1

1.1 Documentation on CPU 1515SP PC2

The following additional documentation is required to use the CPU 1515SP PC2:

- Operating Instructions CPU 1505SP (F/T/TF), CPU 1507S (F), CPU 1508S (F/T/TF) (https://support.industry.siemens.com/cs/ww/en/view/109825803)
- Operating Instructions CPU1505SP (F), CPU 1507S (F), CPU 1508S (F) SIMATIC Industrial OS (https://support.industry.siemens.com/cs/ww/en/view/109808199)
- STEP 7 online help (TIA Portal)
- ET 200SP distributed I/O system manual (https://support.industry.siemens.com/cs/ww/en/view/58649293)
- ET 200SP server module manual (https://support.industry.siemens.com/cs/ww/en/view/63257531)
- Programming and Operating Manual SIMATIC Safety - Configuring and Programming (https://support.industry.siemens.com/cs/ww/en/view/54110126)
- Product Information SIMATIC S7-1200/S7-1500 F-CPUs (https://support.industry.siemens.com/cs/ww/en/view/109478599)

5.2 Characteristics

The CPU 1515SP PC2 is a PC-based automation device in the design of the ET 200SP. It is used for control and visualization purposes. The supplied IPC DiagBase software provides basic diagnostics functions and supports you in handling the BIOS.

General characteristics

- A removable CFast card with the following pre-installations is used as storage medium:
  - Operating system Windows 10 IoT Enterprise (64-bit LTSC 2021) or SIMATIC Industrial OS V3.4.2 (based on Debian 11)
  - S7-1500 Software Controller: CPU 1505SP, CPU 1505SP F, CPU 1505SP T, CPU 1505SP TF
- Interfaces:
  - An interface for the exchangeable ET 200SP BusAdapters for connection of PROFINET IO (2 ports) Accessories/spare parts (Page 117)
  - An interface for connecting devices using Industrial Ethernet (Gigabit Ethernet)
  - 4 interfaces for USB devices (2 x USB 3.0 and 2 x USB 2.0)

    NOTE
    USB 2.0 support
    Note that the wireless HID devices are not supported in BIOS for USB 2.0. Some wireless devices do not work during setup.

  - A DisplayPort interface (DPP) for a monitor
  - A sealable slot for the CFast card
  - A slot for an SD/MMC card as additional optional drive
- Supply voltage 1L+ 24 V DC (SELV/PELV). The connection plug is included in the scope of delivery.
- The CPU 1515SP PC2 is suitable for use in industrial environments:
  - Compact design
  - Fan-less operation
  - High robustness
- The CPU 1515SP PC2 complies with IP 20 degree of protection and is intended for installation in a control cabinet.

Additional information

You can find more information on the system versions and ordering options in the section Scope of validity of the documentation (Page 9).

5.3 Sample configuration

Configuration

The CPU 1515SP PC2 is mounted on a mounting rail according to EN 60715. A modular system is formed with ET 200SP modules in the central rack. You can also expand the CPU 1515SP PC2 with fail-safe I/O modules.

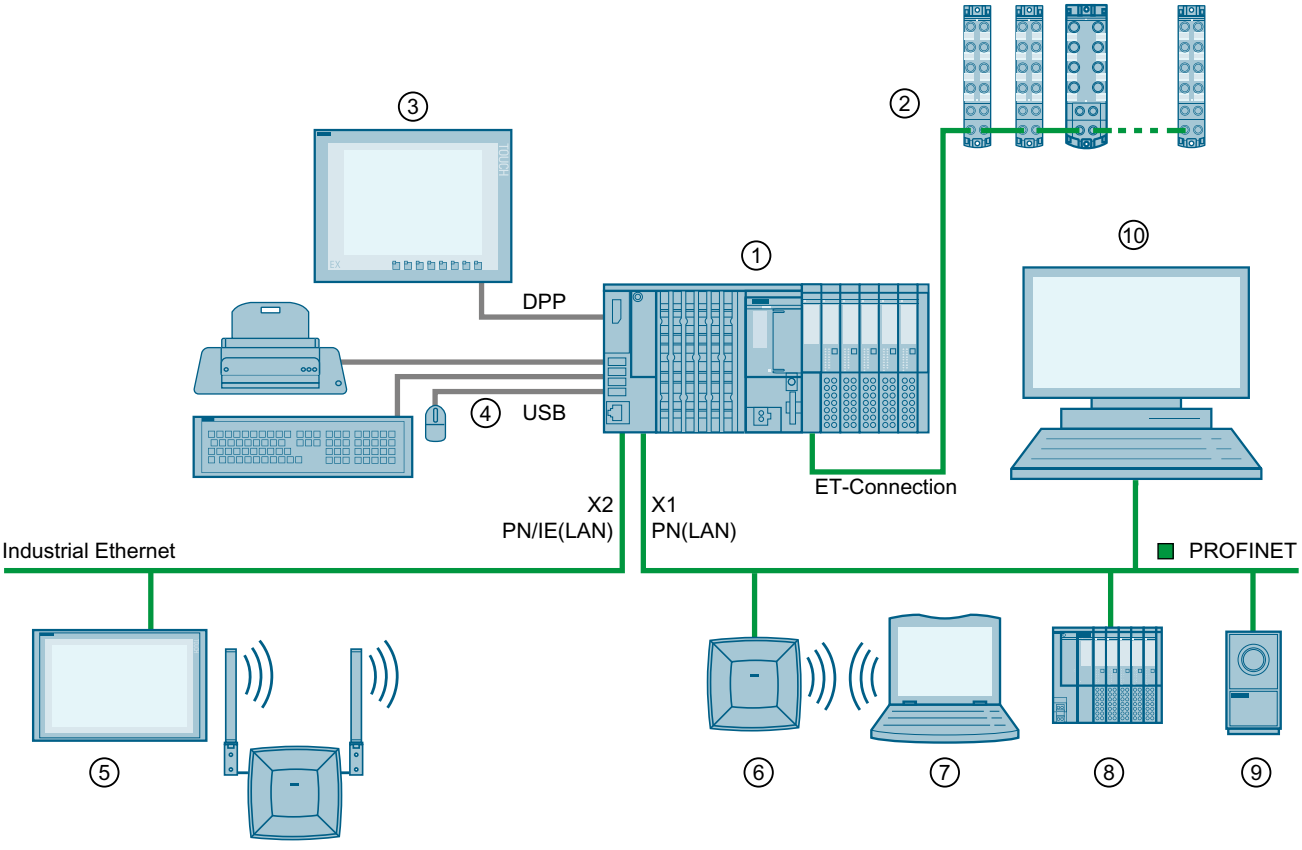
You can use the CPU 1515SP PC2 as PROFINET IO controller. The PROFINET IO devices are connected via the ports of the X1 PN(LAN) interface using a SIMATIC BusAdapter.

Devices can be connected via Industrial Ethernet using the integrated interface X2 PN/IE(LAN).

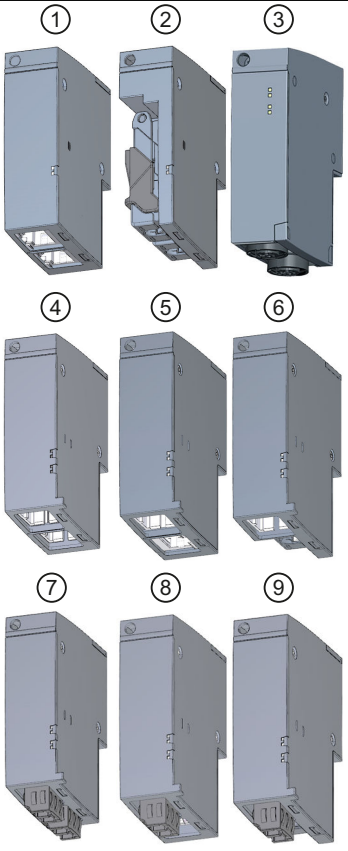
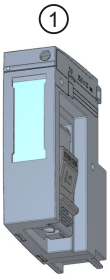
The connection to PROFIBUS can be made using the DP master module.

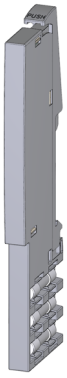
Sample configuration

The following figure shows a sample configuration with the CPU 1515SP PC2:



① CPU 1515SP PC2, I/O modules, server module, BusAdapter
② ET 200AL modules with ET-Connection
③ Flat Panel - Wide Screen Display
④ USB devices: Keyboard, mouse, printer ...
⑤ Industrial Thin Client ITC
⑥ SCALANCE W786

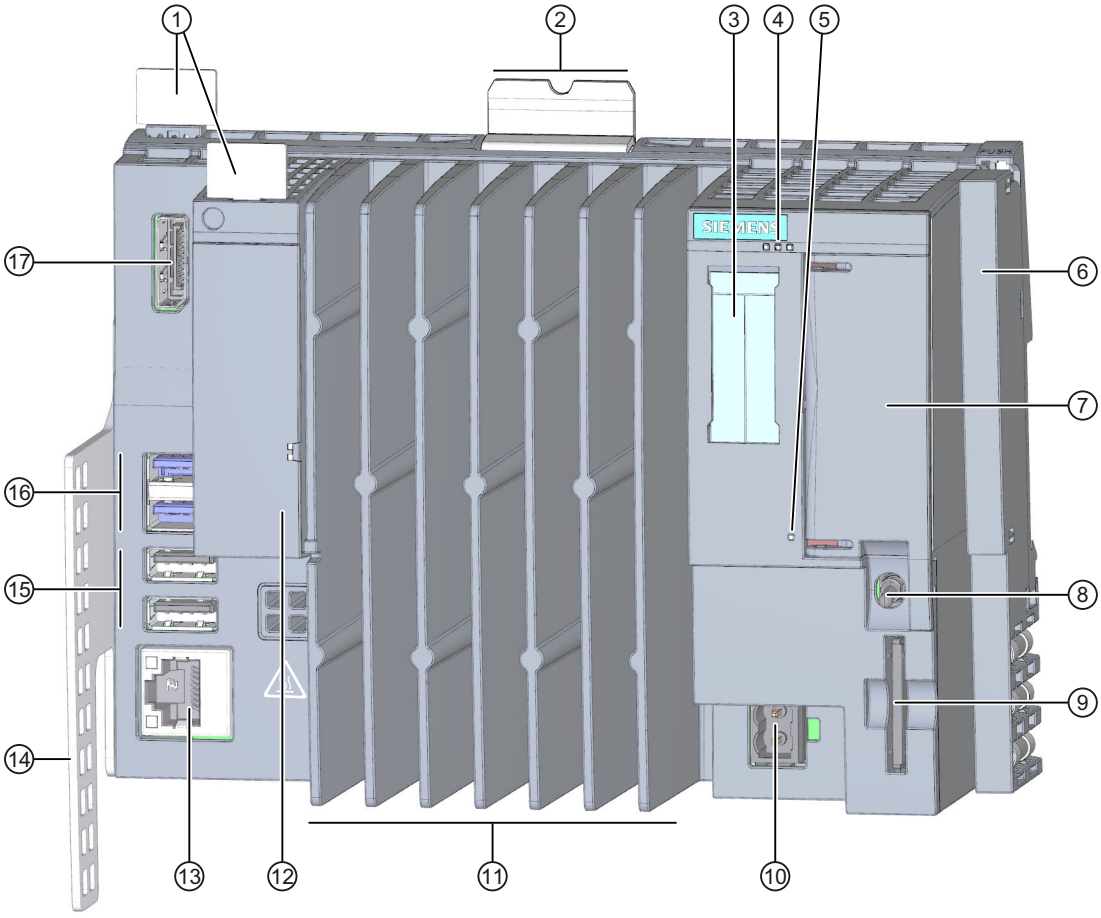
Component	Function	Figure
BusAdapter	The BusAdapter allows free selection of the connection technology for PROFINET IO. The following versions are available for CPU 1515SP PC2: • For standard RJ45 connector (BA 2×RJ45) ① • For direct connection of the bus cable (BA 2×FC) ② • For standard M12 connector (D-coded) with screw-type terminal or plug-in push-pull version (BA 2xM12) ③ • For POF/PCF fiber-optic cable (BA 2xSCRJ) ④ • As media converter for POF/PCF fiber-optic cable ⇔ standard RJ45 plug (BA SCRJ/RJ45) ⑤ • As media converter for POF/PCF fiber-optic cable ⇔ direct connection of the bus cable (BA SCRJ/FC) ⑥ • For glass fiber-optic cable (BA 2xLC) ⑦ • As media converter for glass fiber-optic cable ⇔ standard RJ45 plug (BA LC/RJ45) ⑧ • As media converter for glass fiber-optic cable ⇔ direct connection of the bus cable (BA LC/FC) ⑨	
	For mixed configuration with an ET 200AL , you require the BusAdapter BA-Send 1xFC ① (plugged into the BaseUnit BU-Send). Connect the bus cable for ET-Connection to the BusAdapter BA-Send 1xFC.	 Figure

Component	Function	Figure
Server module	The server module completes the configuration of the CPU 1515SP PC2 with I/O modules. The server module is included in the CPU's scope of delivery.	

5.5 Operator controls and connection elements

View of the module

The following figure shows the operator controls and connection elements of the CPU 1515SP PC2:



① Reference identification labels
② Mounting rail release
③ Labeling strips
④ LEDs for the current operating state and diagnostic status of the CPU 1505SP
⑤ Power LED
⑥ Server module
⑦ **X50:** Slot for the CFast card (flash memory), sealable
⑧ Mode selector
⑨ **X51:** Slot for an optional SD/MMC card
⑩ **X80:** Connector for 24 V DC supply voltage
⑪ Cooling fins
⑫ **X1 PROFINET (LAN):** Slot for BusAdapter for connection of PROFINET IO; Status display for PROFINET

5.6 Scope of delivery

When ordering the hardware with the article number "6ES7677-2DB40-0AA0", you will only receive the basic unit = hardware of the CPU 1515SP PC2 Open Controller, **without** any software.

The hardware **always** has the article number "6ES7677-2DB40-0AA0" and **always** has the designation "CPU 1515SP PC2".

The bundles that can be ordered have their own article numbers. You can find this article number on the CFast card. The following figure shows, based on an example, where to find the article number on the CFast card:



NOTE

To order the different bundles, please use the article number provided in the Introduction (Page 9) and Spare parts/accessories (Page 117) sections.

The hardware is always the CPU 1515SP PC2 basic unit. The bundles differ with respect to the software contained on the CFast card.

The scope of delivery of the CPU 1515SP PC2 Open Controller does not include a BusAdapter; you must order it separately.

The ET 200SP Open Controller is delivered with the following accessories:

- CPU 1515SP PC2 basic device
- Server module; 6ES7193-6PA00-0AA0
- Strain relief with fixing screws
- Plug, 24 V DC, 2x2-pin
- CFast card with 128 GB memory and with the following pre-installations:
  - Operating system Windows 10 IoT Enterprise (64-bit LTSC 2021) or SIMATIC Industrial OS (IndOS)
  - S7-1500 Software Controller CPU 1505SP (F/T/TF)
- "Certificate of Authenticity" label

- "Certificate of License" (CoL)
- Product information

NOTE

The scope of delivery no longer includes a USB restore stick

We therefore highly recommend that you create your own USB restore stick (Page 71) before using the CPU 1515SP PC2 Open Controller.

See also

Product announcement for ET 200SP PC2
(https://support.industry.siemens.com/cs/ww/en/view/109760163)

Installation

7

7.1 Installing the device

Requirements

The mounting rail is fitted.

Required tools

3 to 3.5 mm screwdriver (only to fix the strain relief and dismantle the BusAdapter)

Fixing strain relief

Fix the strain relief to the top and bottom of the left-hand side of the CPU 1515SP PC2 with the supplied screws.

Installing the CPU 1515SP PC2

1. Install the CPU on the mounting rail.
2. Swivel the CPU back until you hear the mounting rail release click into place
3. To check that the CPU has correctly clicked into place, pull on the underside of the enclosure.

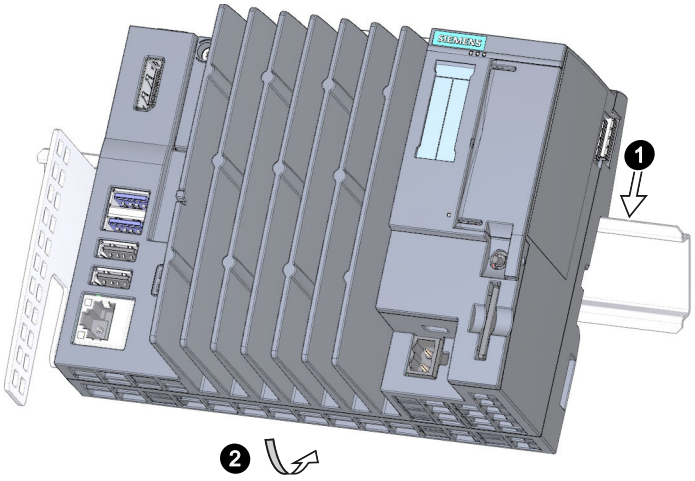


Figure 7-1 Installing the CPU 1515SP PC2

Uninstalling the CPU 1515SP PC2

The BaseUnits with the I/O modules are located to the right of the CPU 1515SP PC2:

1. Switch off the supply voltage on the CPU.
2. Press the mounting rail release button on the first BaseUnit and, at the same time, move the CPU parallel to the left until it comes off the rest of the module group.
   Note: The mounting rail release button is located above the CPU.
3. While pressing the mounting rail release button on the CPU, swivel the CPU out of the mounting rail.

NOTE

It is not necessary to remove the BusAdapter from the CPU 1515SP PC2.

① Master switch
② Short-circuit and overload protection
③ Load current supply (galvanic isolation)
④ This connection is established automatically with the CPU 1515SP PC2.

The represented layout of the power connections does not correspond to the actual layout; it was chosen for demonstration purposes only.

Figure 8-2 Connecting the load voltage reference potential

8.4 Connecting devices to networks

The following options are available for integrating devices into existing or planned system environments and networks.

Ethernet

You can use the integrated Ethernet interface X2 PN/IE(LAN) (10/100/1000 Mbps) for communication and data exchange with automation devices, for example, SIMATIC S7. Only ASCII characters are permitted in the name of the X2 PN/IE(LAN) interface in the TIA Portal, e.g. PROFINET_2.
You need suitable software to do this: STEP 7, WinCC, SIMATIC NET.

NOTE

Use a Category 5e Ethernet cable (Cat-5e cable) for operation with 1000 Mbps.

PROFINET

PROFINET operation is possible via the X1 PN(LAN) interface and the approved BusAdapter.

PROFIBUS

The connection to PROFIBUS can be made using the DP master module.

Commissioning

9

9.1 Notes on commissioning

⚠ WARNING

Improper commissioning in hazardous areas

Device failure or risk of explosion in hazardous areas.

- Do not commission the device unless it is fully mounted and connected according to the specifications in the section Wiring (Page 42).
- Before commissioning, please consider the effects on other devices in the plant.

NOTICE

Condensation in the device

Damage to the device due to condensation if the temperature between transport or storage and the installation point differs.

Before commissioning the device, leave it to stand until it is dry.

NOTICE

Data loss

Data loss may occur if write filters are used incorrectly.

Therefore, note the information on write filters.

The following configurable write filter is available under Windows 10:

- Unified Write Filter (UWF) (Page 62)

9.2 Basic commissioning procedure

The following sections provide an overview of the general commissioning procedure.

Step 1: Commissioning requirements (Page 48)

Step 2: Preparing commissioning (Page 48)

Step 3: Commissioning procedure (Page 49)

SIMATIC IPC Image & Partition Creator

You can also create your own image of your CFast card. This contains the operating system, the Runtime software and the complete project loaded from the TIA Portal.
We recommend the SIMATIC IPC Image & Partition Creator (≥ V3.5) software tool to back up data under Windows. It provides for easy backup and fast restore of the contents of the CFAST card and of individual partitions (images).

NOTE

Data can only be backed up to a network drive with the SIMATIC IPC Image & Partition Creator software using the X2 PN/IE(LAN) interface.

You can procure the SIMATIC IPC Image & Partition Creator:

- Via the Siemens online ordering system.
- Pre-installed on the SIMATIC IPC Service USB flash drives.

For additional information, please refer to the corresponding product documentation.

SIMATIC IPC Service USB flash drive

You can use the SIMATIC IPC Service USB flash drives for data backup and restore.
You obtain these through the Siemens online ordering system.

12.5 Creating a bootable Restore USB stick

As **no** restore USB stick is included in the scope of delivery, we recommend creating a USB restore stick to restore the CFast card after commissioning the Open Controller.
You will also find the restore image on the CFast card in partition E:.

Business logic for the creation of the Restore USB stick

The following requirements must be met:

- You need a USB stick with at least 16 GB free memory.
  To create the USB stick use, for example, the SIMATIC IPC Service USB FlashDrive (6ES7648-6XA11-0YA0). Alternatively, you can also use other bootable USB sticks with a minimum size of 16 GB.
- Make sure that PowerShell (version number 3.0 - 5.1) is installed in Windows.
- To create the stick you need administrator rights under Windows.
- If you create the USB stick on another Windows 10 PC, connect a CFast card reader to record the 128 GB CFast card.

⚠ WARNING
Explosion hazard If you replace components, compliance with Class I, DIV. 2 can become invalid.

⚠ WARNING
Area of application This device is only suitable for use in Class I, Div. 2, Group A, B, C, D, or in non-hazardous areas.

CE marking

The CPU 1515SP PC2 meets the requirements and safety objectives of the following guidelines and complies with the harmonized European standards (EN) for programmable logic controllers published in the official journals of the European Community:

- 2014/30/EU "Electromagnetic Compatibility" (EMC Directive)
- 2014/34/EU "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)
- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS Directive)
- 2006/42/EC "Machinery Directive" for fail-safe modules

The conformity declaration certificates are available for the responsible authorities and are kept at the following address:
Siemens AG
Digital Factory
Factory Automation
DF FA TI COS TT
Postfach 1963
D-92209 Amberg
They are also available for download on the Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en/) web pages, keyword "Declaration of Conformity".

cULus approval

Underwriters Laboratories Inc., complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)

OR