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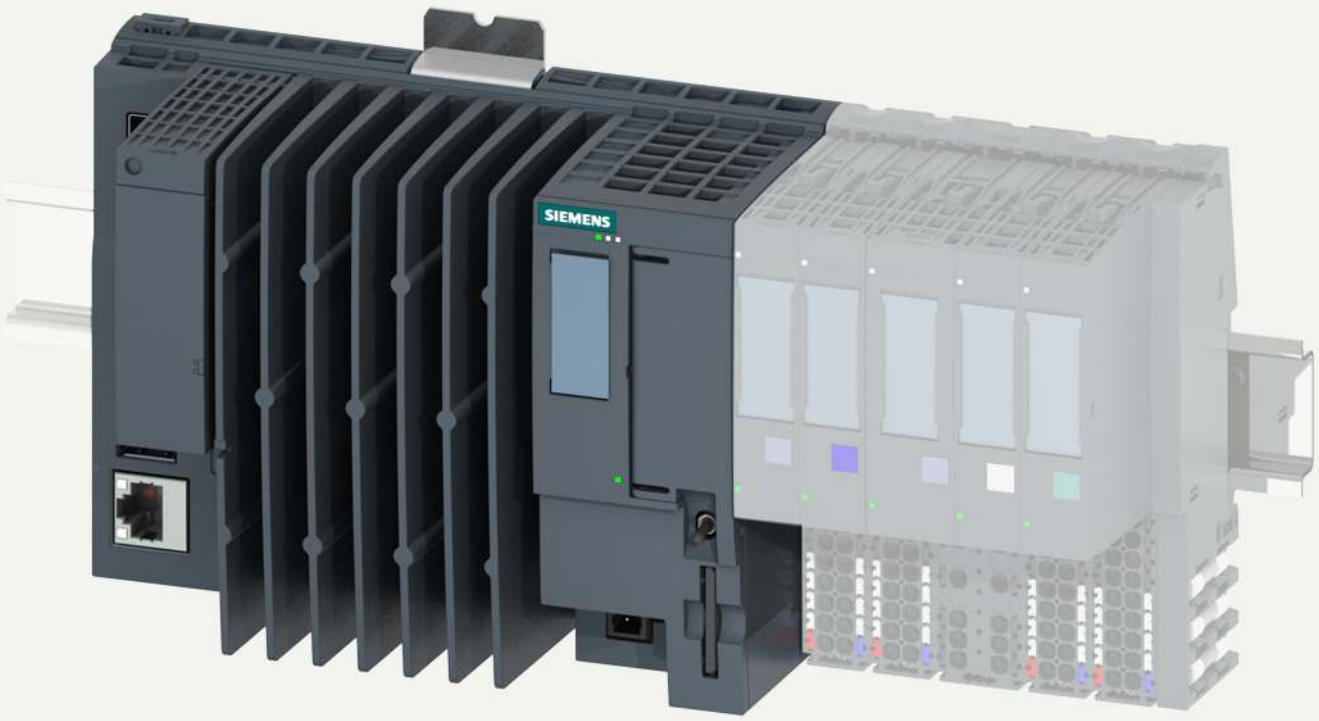

Output

03/2023

OPERATING INSTRUCTIONS

SIMATIC

ET 200SP Open Controller

CPU 1515SP PC2 (F/T/TF)

support.industry.siemens.com

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SIMATIC

ET 200SP Open Controller CPU 1515SP PC2 (F/T/TF)

Operating Instructions

03/2023
A5E42603425-AC

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.

Trademarks

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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.

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Ⓟ 05/2023 Subject to change

Table of contents

Introduction

1

Purpose of the documentation

These operating instructions supplement the system manual ET 200SP distributed I/O system. Functions that generally relate to the system are described in this manual.

The information provided in these operating instructions and in the system/function manuals supports you in commissioning the CPU 1515SP PC2.

Basic knowledge required

The system must be operated and used by qualified staff only.
The following knowledge is required:

- Installation guideline for SIMATIC ET 200SP
- Totally Integrated Automation Portal, in particular:
  - Hardware configuration with *hardware and network editor*
  - Communication between CPUs
- PC-based automation with an S7-1500 Software Controller
- Basic knowledge of fail-safe automation systems
- Basic knowledge of PC technology
- Windows 10 IoT Enterprise operating system (64-bit LTSC 2021)

Conventions

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

"CPU 1515SP PC2 T" means that the respective section applies **only** to the "CPU 1515SP PC2 T".

"CPU 1515SP PC2 F" means that the respective section applies **only** to the "CPU 1515SP PC2 F".

"CPU 1515SP PC2 TF" means that the respective section applies **only** to the "CPU 1515SP PC2 TF".

"CPU 1515SP PC2" also includes "CPU 1515SP PC2 F", "CPU 1515SP PC2 T" and "CPU 1515SP PC2 TF".

Please also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product or on the section of the documentation to which particular attention should be paid.

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)	6ES7677-2DB43-0GB0
Fail-safe CPUs	
• CPU 1515SP PC2 F (Win 10)	6ES7677-2SB42-0GB1
• CPU 1515SP PC2 F (IndOS)	6ES7677-2SB43-0GB0
Technology CPUs	
• CPU 1515SP PC2 T	6ES7677-2VB42-0GB1
Fail-safe technology CPUs	
• CPU 1515SP PC2 TF	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) Version V30.0 (http://support.automation.siemens.com/WW/view/en/109799686)
- System Manual STEP 7 Basic/Professional V17 and SIMATIC WinCC V18 (https://support.industry.siemens.com/cs/ww/en/view/109798671)
- 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)

1.2 ET 200SP Documentation Guide

1.2.1 ET 200SP Documentation Guide

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.

This arrangement enables you to access the specific content you require.

You can download the documentation free of charge from the Internet (https://support.industry.siemens.com/cs/ww/en/view/109742709).

Basic information

The System Manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP distributed I/O system.

The STEP 7 online help supports you in the configuration and programming.

Examples:

- ET 200SP System Manual
- System Manual ET 200SP HA/ET 200SP modules for devices used in a hazardous area
- Online help TIA Portal

Device information

Equipment manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

Examples:

- Equipment Manuals CPUs
- Equipment Manuals Interface Modules
- Equipment Manuals Digital Modules
- Equipment Manuals Analog Modules
- Equipment Manuals Motor Starter
- BaseUnits Equipment Manuals
- Equipment Manual Server Module
- Equipment Manuals Communications Modules
- Equipment Manuals Technology Modules

General information

The function manuals contain detailed descriptions on general topics relating to the SIMATIC ET 200SP distributed I/O system.

Examples:

- Function Manual ET 200AL/ET 200SP Mixed Configuration
- Function Manual Diagnostics
- Function Manual Communication
- PROFINET Function Manual
- PROFIBUS Function Manual
- Function Manual Designing Interference-free Controllers
- MultiFieldbus Function Manual

Product Information

Changes and supplements to the manuals are documented in a Product Information. The Product Information takes precedence over the device and system manuals.

You can find the latest Product Information on the ET 200SP distributed I/O system on the Internet. (https://support.industry.siemens.com/cs/de/en/view/73021864)

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet. (https://support.industry.siemens.com/cs/ww/en/view/84133942)

1.2.2 SIMATIC Technical Documentation

Additional SIMATIC documents will complete your information. You can find these documents and their use at the following links and QR codes.

The Industry Online Support gives you the option to get information on all topics. Application examples support you in solving your automation tasks.

Overview of the SIMATIC Technical Documentation

Here you will find an overview of the SIMATIC documentation available in SIOS:

Industry Online Support International (https://support.industry.siemens.com/cs/ww/en/view/109742705)

Watch this short video to find out where you can find the overview directly in SIOS and how to use SIOS on your mobile device:

Quick introduction to the technical documentation of automation products per video (https://support.industry.siemens.com/cs/us/en/view/109780491)

YouTube video: Siemens Automation Products - Technical Documentation at a Glance (https://youtu.be/TwLSxxRQQsA)

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Favorites	You can use the "Add to mySupport favorites" to flag especially interesting or frequently needed content. Under "Favorites", you will find a list of your flagged entries.
Recently viewed articles	The most recently viewed pages in mySupport are available under "Recently viewed articles".
CAx data	The CAx data area gives you access to the latest product data for your CAx or CAe system. You configure your own download package with a few clicks: • Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files • Manuals, characteristics, operating manuals, certificates • Product master data

You can find "mySupport" on the Internet. (https://support.industry.siemens.com/My/ww/en)

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus on individual products.

You can find the application examples on the Internet. (https://support.industry.siemens.com/cs/ww/en/ps/ae)

1.2.3 Tool support

The tools described below support you in all steps: from planning, over commissioning, all the way to analysis of your system.

TIA Selection Tool

The TIA Selection Tool tool supports you in the selection, configuration, and ordering of devices for Totally Integrated Automation (TIA).

As successor of the SIMATIC Selection Tools , it assembles the configuration editors for automation technology already familiar into a single tool.

With the TIA Selection Tool , you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet. (https://support.industry.siemens.com/cs/ww/en/view/109767888)

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to perform commissioning and maintenance activities on various SIMATIC S7 stations as bulk operations independent of TIA Portal.

The SIMATIC Automation Tool offers a wide range of functions:

- Scanning of a PROFINET/Ethernet system network and identification of all connected CPUs
- Assignment of addresses (IP, subnet, Gateway) and device name (PROFINET device) to a CPU
- Transfer of the date and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- RUN/STOP mode switchover
- CPU localization through LED flashing
- Reading out of CPU error information
- Reading the CPU diagnostic buffer
- Reset to factory settings
- Firmware update of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet. (https://support.industry.siemens.com/cs/ww/en/view/98161300)

PRONETA

SIEMENS PRONETA (PROFINET network analysis) is a commissioning and diagnostic tool for PROFINET networks. PRONETA Basic has two core functions:

- The "Network analysis" offers a quick overview of the PROFINET topology. It is possible to make simple parameter changes (for example, to the names and IP addresses of the devices). In addition, a quick and convenient comparison of the real configuration with a reference system is also possible.
- The "IO test" is a simple and rapid test of the wiring and the module configuration of a plant, including documentation of the test results.

You can find SIEMENS PRONETA Basic on the Internet: (https://support.industry.siemens.com/cs/ww/en/view/67460624)

SIEMENS PRONETA Professional is a licensed product that offers you additional functions. It offers you simple asset management in PROFINET networks and supports operators of automation systems in automatic data collection/acquisition of the components used through various functions:

- The user interface (API) offers an access point to the automation cell to automate the scan functions using MQTT or a command line.
- With PROFIenergy diagnostics, you can quickly detect the current pause mode or the readiness for operation of devices that support PROFIenergy and change these as needed.
- The data record wizard supports PROFINET developers in reading and writing acyclic PROFINET data records quickly and easily without PLC and engineering.

You can find SIEMENS PRONETA Professional on the Internet: (https://www.siemens.com/proneta-professional)

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load
- Increased production availability thanks to online scan and verification of existing systems
- Transparency before commissioning through importing and simulation of existing STEP 7 projects
- Efficiency through securing existing investments in the long term and the optimal use of resources

You can find SINETPLAN on the Internet (https://new.siemens.com/global/en/products/automation/industrial-communication/profinet/sinetplan.html).

1.3 Information about third-party software updates

This product contains third-party software. Siemens accepts liability with respect to updates/patches for the third-party software only when these are distributed by Siemens in the context of a Software Update Service contract or officially approved by Siemens. Otherwise, updates/patches are performed at your own risk. You can find more information about our software update service offer on the Internet (https://www.siemens.com/sus).

1.4 Notes on protecting administrator accounts

A user with administrator rights has extensive access and manipulation possibilities.

Therefore, make sure that the administrator account is adequately protected to prevent unauthorized changes. To do this, set secure passwords and use a standard user account for regular operation. Other measures, such as the use of security policies, should be applied as required.

Safety information 2

2.1 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (https://www.siemens.com/cert).

2.2 General safety instructions

⚠ WARNING
Life-endangering voltage when control cabinet is open
If the device is installed in a control cabinet, areas or components can be under life-endangering voltage when the control cabinet is open.
Contact with these areas or components may lead to death through electric shock.
Switch off the power before opening the control cabinet.

If the device is operated in a machine in accordance with the machinery directive, the provisions of the guideline 2006/42/EC apply.

Safe operation of a plant

NOTICE
Protective measures To ensure safe operation of a plant, you have to take suitable IT security measures, for example, network segmentation. Seal the cover to protect the CFast card with the operating system of the CPU 1515SP PC2 from unauthorized access. For more information on Industrial Security, refer to the Internet (https://new.siemens.com/global/en/products/automation/topic-areas/industrial-security.html).

If you have questions about whether it is permissible to install the device in the planned environment, please contact your service representative.

Repairs

⚠ WARNING
Damage caused by opening the device Unauthorized opening of and improper repairs to the device may result in substantial damage to equipment or endanger the user. Only authorized personnel are permitted to repair the device.

You can find more information on the repair in the section Sending device in for repair (Page 73).

ESD guidelines

Modules containing electrostatic sensitive devices (ESDs) can be identified by the following label:

Strictly follow the guidelines mentioned below when handling modules which are sensitive to ESD:

- Before working with modules with ESD, you need to ensure that you are free of electrostatic charge (e.g. by touching a grounded object).
- All devices and tools must be free of static charge.

- Always pull the mains connector and disconnect the battery before installing or removing modules which are sensitive to ESD.
- Handle modules fitted with ESDs only by their edges.
- Do not touch any connector pins or conductors on modules containing ESDs.

2.3 Notes on use

⚠ WARNING

Hazards at an unprotected machine or plant

According to the results of a risk analysis, hazards can occur at an unprotected machine. The hazards may lead to personal injury.

According to the risk analysis, the risk of injury to persons can be countered with the following measures:

- Additional protective equipment at the machine or plant. In this case, the programming, parameter assignment and wiring of the I/O used, in particular, must be performed in accordance with the safety criteria (SIL, PL or Cat.) ascertained by means of an appropriate risk analysis.
- Use of the device for its intended purpose, which can be established by performing a functional test on the plant. This allows errors in programming, parameter assignment and wiring to be detected.
- Documentation of the test results which can be entered, if required, into the relevant safety certificates.

NOTICE

Ambient conditions

Ambient conditions for which the device is not suitable can lead to faults or damage the device.

Note the following:

- Only operate the device in enclosed areas. If you do not comply with this instruction, the warranty becomes void.
- Only operate the device in accordance with the ambient conditions given in the technical specifications.
- Protect the device from dust, moisture and heat.
- Do not expose the device to direct sunlight or other strong sources of light.
- The device must not be used in places with more difficult operating conditions through corrosive vapors or gases without taking additional protective measures, for example, supply of clean air.

Areas of application 3

3.1 Areas of application of fail-safe CPUs

Areas of application

F-CPUs are mainly designed for personal and machine protection. In addition to the safety program, you can also program standard applications. You can operate the F-CPUs in safety mode or in standard mode.

Reference

Information on the use of F-CPUs in safety mode is available in the programming and operating manual SIMATIC Safety - Configuring and Programming (https://support.industry.siemens.com/cs/ww/en/view/54110126).

You can find information on using the CPU 1505SP (F) Software Controller in the associated manual (https://support.industry.siemens.com/cs/ww/en/view/109762855) and in the F-product information (https://support.industry.siemens.com/cs/ww/en/view/109478599).

3.2 Areas of application of technology CPUs

Areas of application

Areas of application of T-CPUs are motion control applications such as gearing and camming as well as control of kinematics. Due to the supported technology functions, the S7-1500T CPUs are suitable for controlling packaging machines, converting applications, assembly automation, etc.

You can operate the TF-CPUs in safety mode or in standard mode.

Reference

You can find information on using the T-CPUs in the function manual SIMATIC S7-1500T Motion Control (https://support.industry.siemens.com/cs/ww/en/view/109781849).

You can find information on using the T-CPUs in the function manual SIMATIC S7-1500T kinematics functions (https://support.industry.siemens.com/cs/ww/en/view/109781850).

You can find information on using the F-CPUs and TF-CPUs in safety mode in the product information for SIMATIC S7-1200/S7-1500 F-CPUs (https://support.industry.siemens.com/cs/ww/en/view/109478599).

Product overview

4

4.1 Field of application

Article number

The article number depends on the pre-installed S7-1500 Software Controller and HMI Runtime.

You can find an overview of the article numbers in the section Scope of validity of the documentation (Page 7).

View of the module

The following figure shows the CPU 1515SP PC2:

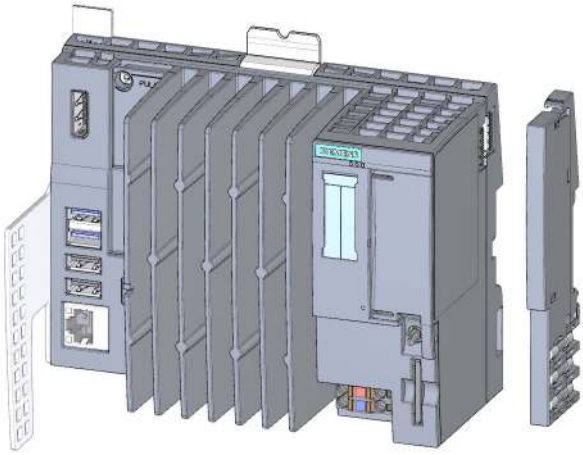


Figure 4-1 CPU 1515SP PC2 with supplied accessories

4.2 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:
  - Windows 10 IoT Enterprise operating system (64-bit LTSC 2021) or IndOS
  - 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 113)
  - 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)
  - 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 7).

4.3 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.

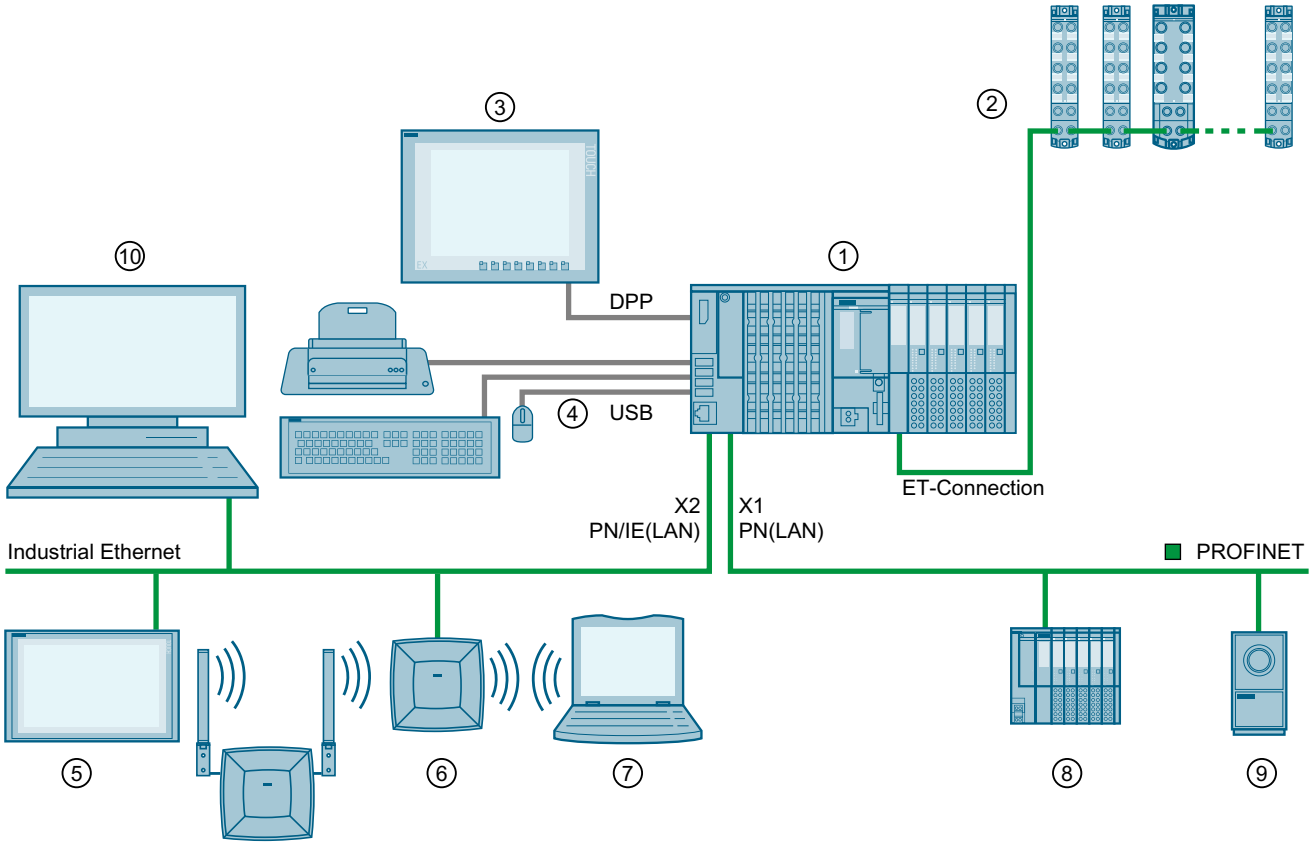
You can use the CPU 1515SP PC2 as PROFINET IO controller. The PROFINET IO devices are connected via the ports of the X1 PN(LAN) interface using a SIMATIC BusAdapter.

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
⑦ Field PG
⑧ PROFINET IO device
⑨ Camera
⑩ PC/Programming device

Figure 4-2 Configuration example with the CPU 1515SP PC2

Reference

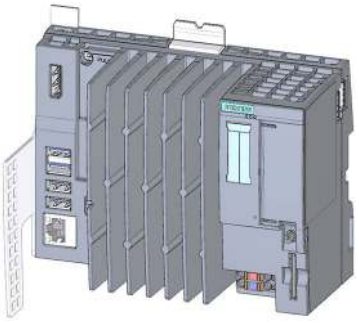
You can find more information about configuring the ET 200AL modules in the system manual ET 200AL distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/89254965).

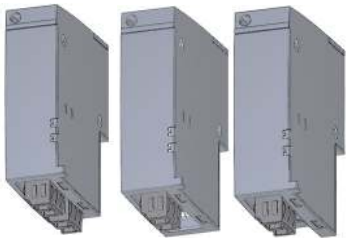
4.4 Components

Components of the CPU 1515SP PC2

The following table provides an overview of the components of the CPU 1515SP PC2:

Table 4-1 Components of the CPU 1515SP PC2

Component	Function	Figure
Mounting rail in accordance with EN 60715	The mounting rail is the rack for the CPU 1515SP PC2.	
CPU 1515SP PC2	CPU with strain relief and white reference labels	

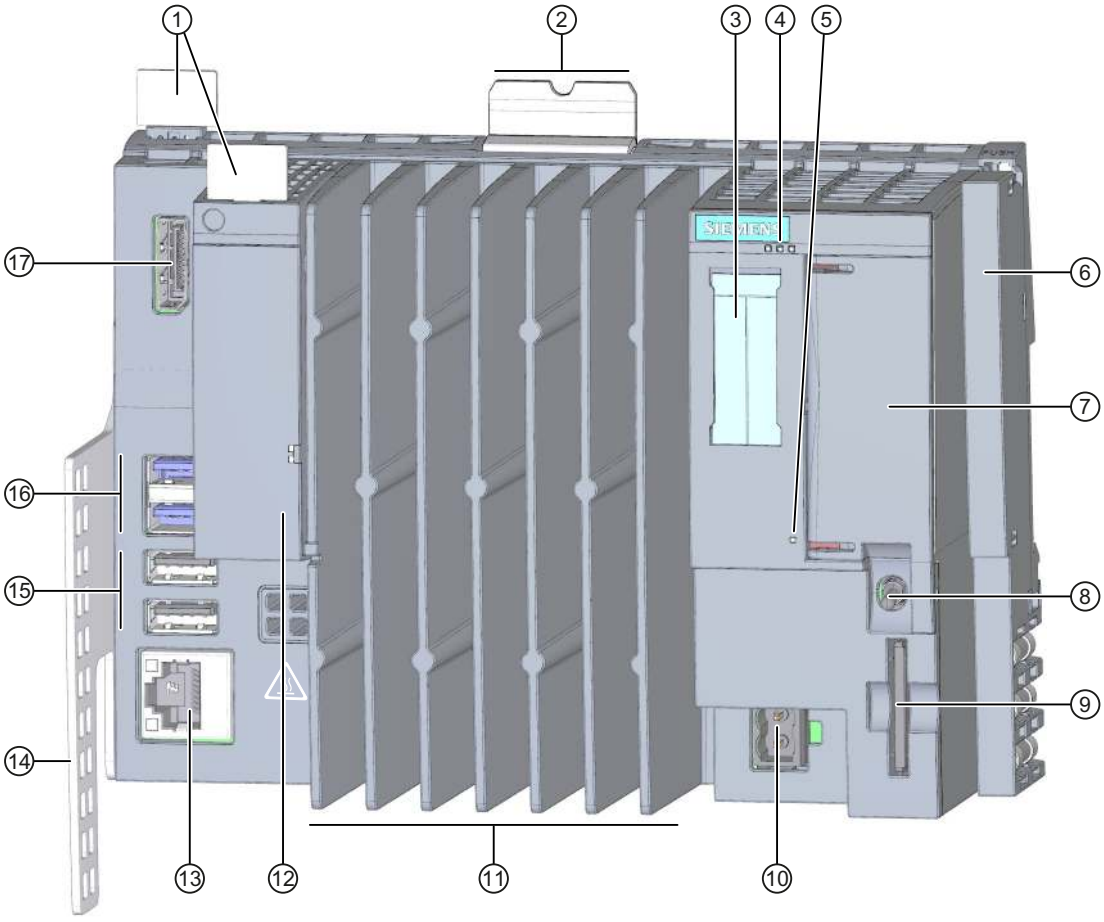
Component	Function	Figure
BusAdapter	The BusAdapter allows free selection of the connection technology for PROFINET IO. The following versions are available for CPU 1515SP PC2: • For standard RJ45 connector (BA 2×RJ45) ① • For direct connection of the bus cable (BA 2×FC) ② • For standard M12 connector (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	① ② ③  ④ ⑤ ⑥  ⑦ ⑧ 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.	① 

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.	

4.5 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

⑬	**X2 PN/ IE(LAN):**	GbE Ethernet connection with integrated display
⑭	Strain relief	
⑮	**X62, X63:**	2 x USB 2.0 ports
⑯	**X60, X61:**	2 x USB 3.0 ports
⑰	**X70:**	DisplayPort interface (DPP)

Figure 4-3 View of the CPU 1515SP PC2

Slot for CFast card

The operating system, Runtime software and project are installed on the supplied SIMATIC CFast card. The CFast card is the only mass storage device of the CPU 1515SP PC2.

Note

Unauthorized access

Seal the cover of the slot to protect the CFast card with the operating system of the CPU 1515SP PC2 from unauthorized access and manipulation.

Slot for SD/MMC card

You can use a SIMATIC SD or MMC card as additional storage drive. This drive can be used to store data via Windows, for example a backup, but not the operating system, the Runtime software or the project.

Permitted SD cards: SDHC up to 32 GB, SDXC up to 2 TB.

USB connections

- 2 x USB 3.0 with I_{max} = 1 A per interface
- 2 x USB 2.0 with I_{max} = 0.5 A per interface

MAC addresses

The MAC address consists of a 3-byte manufacturer ID and a 3-byte device ID (consecutive number).

Each device is already assigned four MAC addresses in the factory. The front of the CPU 1515SP PC2 is lasered with the MAC address 1 and 4. With the MAC addresses 2 and

3, the consecutive numbers are incremented. If, for example, the first MAC address is 08-00-06-6B-80-C0, the second MAC address is 08-00-06-6B-80-C1.

Table 4-2 Assignment of the MAC addresses

	Assignment
MAC address 1	X2 PN/IE(LAN) • Visible in STEP 7 for accessible devices • Lasered on the front of the CPU (start of the number range)
MAC address 2	X1 PROFINET (LAN) • Visible in STEP 7 for accessible devices
MAC address 3	Port X1 P1 (required for LLDP, for example)
MAC address 4	Port X1 P2 R (required for LLDP, for example) • Lasered on the front of the CPU (end of the number range)

Connector for supply voltage

The CPU 1515SP PC2 is equipped with a 2-pin connection terminal for the power supply.

The connection plug for the supply voltage is plugged in when the CPU is shipped from the factory.

Mode selector

Use the mode selector to set the CPU operating mode.

Table 4-3 Mode selector positions

Position	Meaning	Description
RUN	Operating mode RUN[1]	The CPU is processing the user program.
STOP	Operating mode STOP[1]	The CPU is not processing the user program. The outputs are set to a "safe" state.
MRES	Memory reset	**For active S7-1500 Software Controller**[2] only: CPU memory reset

[1] RUN and STOP indicate the **selected** operating state. The RUN and STOP LEDs indicate the **actual** operating mode of the CPU 1515SP PC2.

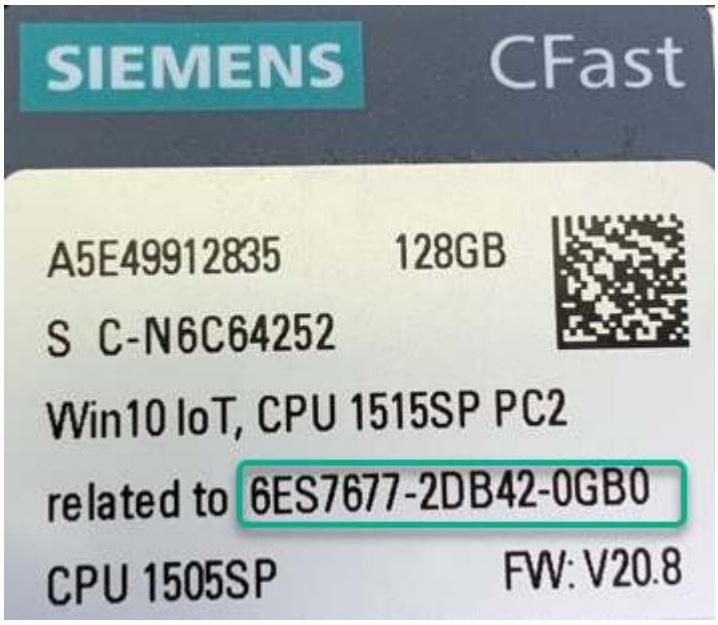
[2] See Operating instructions CPU 1505SP (F/T/TF), CPU 1507S (F), CPU 1508S (F) Version 21.9

4.6 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 various bundles, please use the article number found on the following Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/109760163) page, in the" **Ordering information**" table.

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 unit
- Larger CFast card with 128 GB memory
- Server module; 6ES7193-6PA00-0AA0
- Strain relief with fixing screws
- Plug, 24 V DC, 2x2-pin
- CFast card with the following pre-installations:
  - Operating system Windows 10 IoT Enterprise 64Bit LTSC 2021
  - 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 68) before using the CPU 1515SP PC2 Open Controller.

Application planning

5

5.1 Basics

Introduction

The CPU 1515SP PC2 is open equipment. This means you may only set up the CPU in enclosures, cabinets or electrical equipment rooms and in a dry environment (IP20 degree of protection). The housings, cabinets and electrical operating rooms must guarantee protection against electric shock and spread of fire. The requirements regarding mechanical strength must also be observed. The housings, cabinets, and electrical operating rooms must not be accessible without a key or tool. Access may only be possible for instructed or authorized personnel.

Installation location

Install the CPU 1515SP PC2 in a suitable enclosure/control cabinet with at least IP54 degree of protection according to EN 60529 and take into consideration the ambient conditions for operating the devices.

Installation position

You can install the ET 200SP distributed I/O system in any position. The preferred mounting position is horizontal mounting on a vertical wall.

Depending on the mounting position, restrictions on ambient temperature and maximum configuration apply to the CPU 1515SP PC2.

NOTICE
Damage to the modules Modules can be damaged if exposed to ambient temperatures higher than permitted. Additional **important information** on the permissible ambient temperatures can be found in section Mechanical and climatic ambient conditions (Page 86).

5.2 Unpacking the device

When unpacking

When unpacking, make sure to check the following:

- Check packaging and contents for visible damage from transport. Damaged or incomplete devices should never be commissioned.
- Check the delivery for correctness and completeness.
  Please inform your Siemens contact partner should you notice any irregularities.
- Keep the supplied documentation and licenses. They belong to the device and are the proof that you have purchased the software preinstalled on the CFast card. Documentation and licenses are required for initial commissioning and for any questions that arise.
- Keep the original packaging in case the device needs to be transported again.
- Note the identification data (Page 35) of the device.

NOTICE
Damage to the device during transport and storage If a device is transported or stored without packaging, it is unprotected from shocks, vibrations, pressure and moisture. Damaged packaging indicates that environmental conditions have already had a significant impact on the device. The device might be damaged. Do not dispose of the original packaging. Pack the device for transport and storage.

NOTICE
Damage to the device caused by condensation If the device was exposed to low temperatures or extreme variations in temperature during transport, this may cause moisture to build up on or in the device (condensation). Please note the specified mechanical and climatic ambient conditions (Page 86). Moisture can cause short-circuits in the electrical circuits and damage the device. Proceed as follows to avoid damage: • Store the device in dry conditions. • Make sure it adapts to room temperature before commissioning. • Do not expose the device to direct heat radiation from a heater. • If condensation has developed, wait until the device is completely dry before you switch it on.

⚠ WARNING

Electric shock and fire hazard from damaged device

A damaged device can carry dangerous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states.

Death or severe injury could occur.

Make sure that the damaged device is not installed and commissioned accidentally. Label the damaged device correspondingly and keep it locked up. Have the device repaired without delay.

5.3 Identification data

The identification data can be used to clearly identify the device when a repair is necessary.

The activation code for Windows is already integrated in the supplied image.

Note the following data:

- Printed on the nameplate of the device, please find the following information:
  - Article number
  - Serial number
  - The first and the last MAC address
- Depending on the scope of delivery, the "Certificate-of-License" is provided as proof of license.
  Valid for the following products:
  - S7-1500 Software Controller CPU 1505SP
  - S7-1500 Software Controller CPU 1505SP F/T/TF
- The "Microsoft Windows Product Key" can be found on the "Certificate of Authenticity" label.

5.4 Installation location

Introduction

Install the CPU 1515SP PC2 in a suitable housing/control cabinet with sufficient mechanical strength, fire protection and at least IP54 degree of protection according to EN 60529, and take into consideration the ambient conditions for operating the devices.

Mounting rail

You must ground the mounting rail separately in the control cabinet. Exception: If you install the rail on grounded, zinc-plated mounting plates, there is no need to ground the rail separately.

Note

If the ET 200SP distributed I/O system is exposed to vibration and shock loads, both ends of the ET 200SP system assembly must be mechanically fixed to the mounting rail (e.g using 8WA1010-1PH01 ground terminals). This measure prevents the ET 200SP from shifting to the side.

Note

If the ET 200SP distributed I/O system is exposed to high vibration and shock load, we recommend that you screw the mounting rail to the mounting surface at intervals of approx. 200 mm.

Suitable surface finishes are:

- Steel strip in accordance with Appendix A of EN 60715 or
- Tinned steel strip. We recommend the use of the mounting rails in section (Page 113).

Note

Mounting rails of other manufacturers

If you use mounting rails from other manufacturers, ensure that they have the properties required for your climatic and mechanical ambient conditions.

Minimum clearances

Make sure to maintain the following minimum clearances when installing the CPU 1515SP PC2.

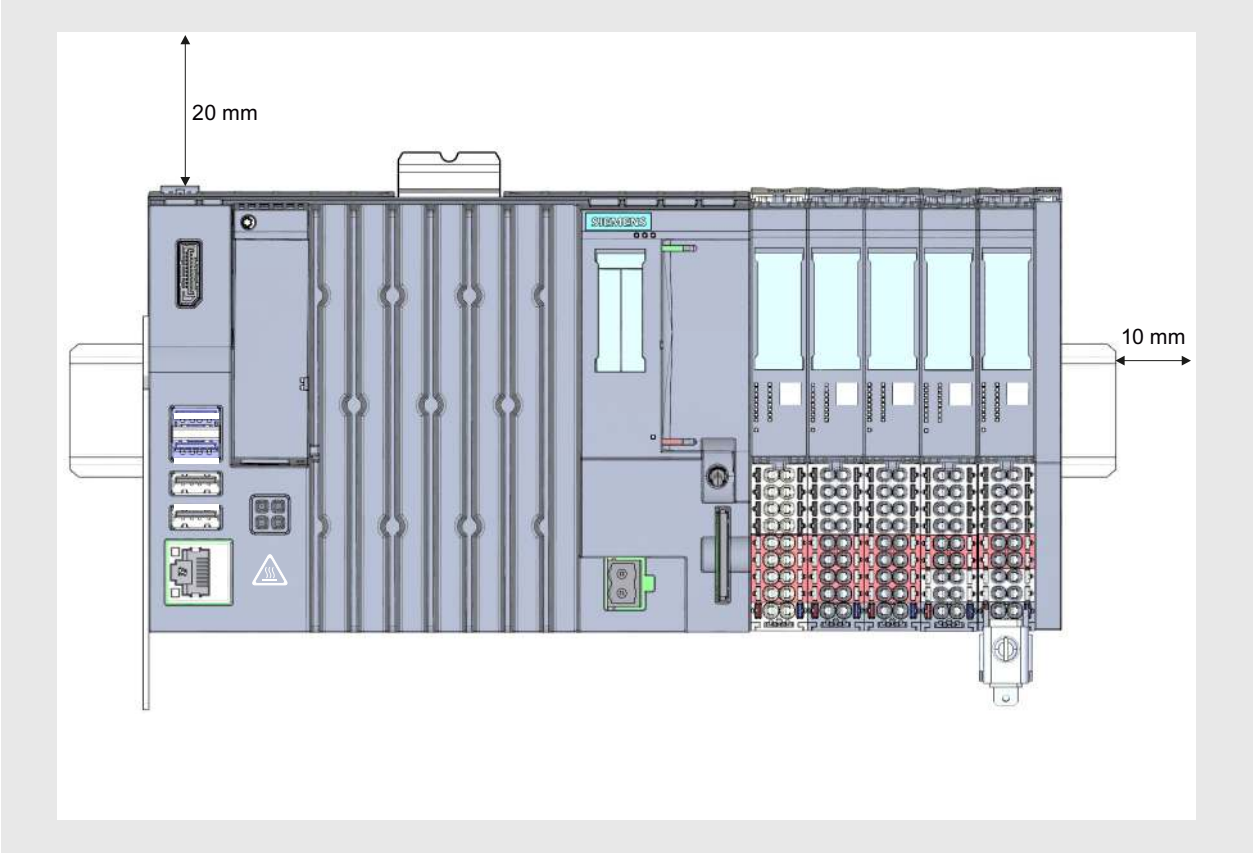


Figure 5-1 Minimum clearances

Installation rules

- After the CPU 1515SP PC2, there is a BaseUnit BU..D with incoming supply voltage L+ (light-colored terminal box).
- This is followed by BaseUnits BU..B (with dark-colored terminal box).
- The respective corresponding I/O modules can be connected to the BaseUnits.
  Suitable combinations of BaseUnits and I/O modules can be found in the ET 200SP System Manual (https://support.industry.siemens.com/cs/ww/en/view/84133942).
- The server module completes the installation.

Note

Install the CPU 1515SP PC2 only with disconnected supply voltage.

5.5 Hardware configuration

As soon as one of the following rules applies, the maximum configuration has been reached.

Maximum mechanical configuration

Backplane bus length: Maximum 1 m mounting width (without CPU 1515SP PC2, including server module)

Electrical maximum configuration

The number of operable I/O modules of a potential group is limited by the

- Power consumption of the I/O modules
- Power consumption of the components supplied via these I/O modules

The maximum current-carrying capability of the terminals on the BaseUnit L+/ground is 10 A.

USB load

When using the CPU 1515SP PC2 with the maximum configuration, the USB load must also be considered:

- **Horizontal mounting:**
  - Ambient temperature of 55 °C or higher with max. 32 ET 200SP modules: 4 x 0.3 A USB load; CFAST memory card max. 10% load; SD card not used
- **Vertical mounting:**
  - Ambient temperature of 45 °C or higher with max. 32 ET 200SP modules: 4x 0.3 A USB load; CFAST memory card and SD card max. 10% load

Address space

The address space is predefined. However, you can adjust the address space in the user program.

Installation

6

6.1 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.

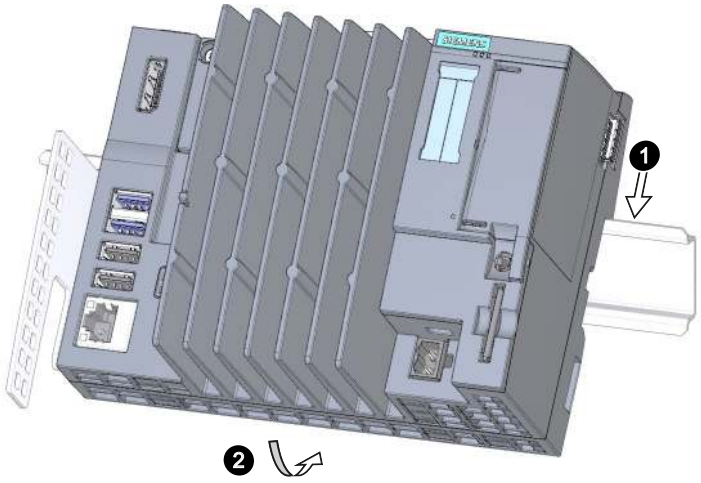


Figure 6-1 Installing the CPU 1515SP PC2

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.

Wiring

7

7.1 Notes on connection

Note

Rules and regulations for operation

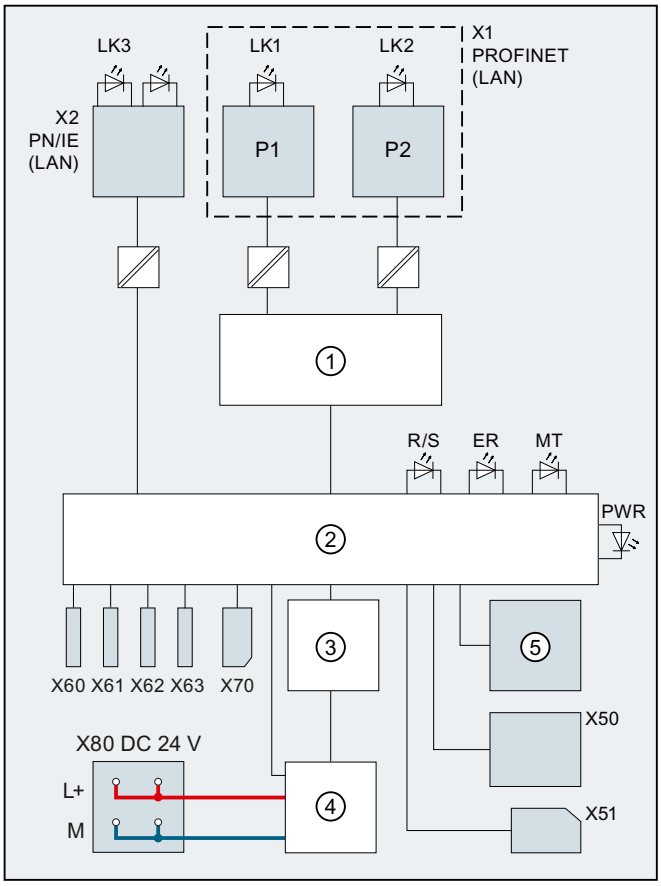
Observe the information contained in the *Wiring* section in the system manual ET 200SP distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/84133942) and in the function manual Designing interference-free controllers function manual (https://support.industry.siemens.com/cs/ww/en/view/59193566).

NOTICE
Risk of hazardous system states If you remove and insert I/O devices with the supply voltage switched on, this can result in hazardous system states. Injury to persons and damage to the machine or plant could result. Therefore, I/O devices can only be inserted and removed when the supply voltage is switched off. Only connect I/O devices which are suitable for use in industrial environments according to EN 61000-6-2 / IEC 61000-6-2.

7.2 Terminal and block diagram

Block diagram

The following figure shows the block diagram for the CPU 1515SP PC2.



①	Switch	X1 PN(LAN)	PROFINET interface X1
②	Electronics	P1	PROFINET interface X1 Port 1
③	Backplane bus interface	P2	PROFINET interface X1 Port 2
④	Internal supply voltage	L+	24 V DC supply voltage
⑤	Mode selector	M	Ground
X50	CFast card	LK1, LK2	LED Link TX/RX
X51	SD/MMC card	LK3	LED Link
X60, X61	USB 3.0 interfaces, max. 0.9 A	R/S	RUN/STOP LED (yellow/green)
X62, X63	USB 2.0 interfaces, max. 0.5 A	ER	ERROR LED (red)
X70	DPP interface	MT	MAINT LED (yellow)
X80 24 V DC	Infeed of supply voltage	PWR	POWER LED (yellow/green)
X2 PN/IE(LAN)	Ethernet interface X2		

Figure 7-1 Block diagram for the CPU 1515SP PC2

7.3 Electrical configuration

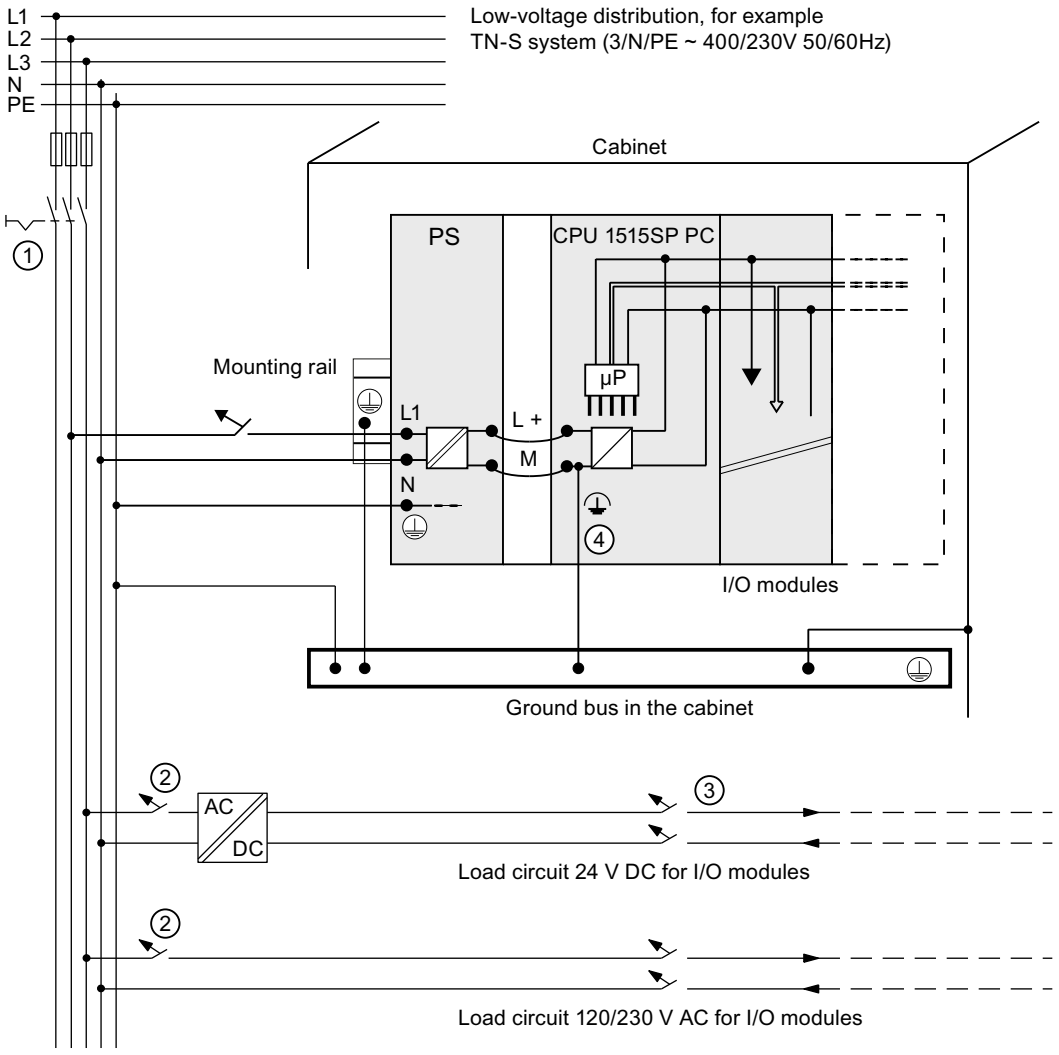
Non-isolated configuration

Note

Unlike the ET 200SP distributed I/O system, the CPU 1515SP PC2 can only be operated with a non-isolated configuration.

The following figure shows the overall configuration of a CPU 1515SP PC2 with power supply from a TN-S system. The power supply supplies the CPU 1515SP PC2 and the load circuit for the 24 V DC modules.

For the CPU 1515SP PC2, there is a fixed connection between the ground infeed terminal and the contact springs to the mounting rail. You must ground the mounting rail separately in the control cabinet.



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 7-2 Connecting the load voltage reference potential

7.4 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.

7.5 Securing cables

The strain relief for connecting cables prevents the USB cables and PROFINET connectors detaching from the CPU 1515SP PC2. The strain relief is included in the scope of delivery.

⚠ WARNING

Flying sparks due to loose cables

Risk of explosion in hazardous areas.

USB cables and PROFINET connectors may detach from the device in the case of strong oscillation and high vibrating loads.

Attach these cables to the strain relief of the device using cable ties.

Requirements

- The strain relief is fixed to the CPU.
- The CPU is installed.

Procedure

Secure the USB and PROFINET cables to the strain relief using cable ties.

Figure 7-3 Secured cables

Commissioning 8

8.1 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 41).
- 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)

8.2 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 48)

8.2.1 Requirements

The following requirements must be met before you commission the Open Controller for the first time:

- The CPU 1515SP PC2 is mounted.
- The supplied CFast card is inserted.
- No data carriers are connected via USB.

8.2.2 Preparing commissioning

Procedure

When the requirements are met, proceed as follows with the commissioning:

1. Connect a monitor using a DisplayPort cable.
2. Connect a keyboard and a mouse to the CPU via USB.

Result

The Open Controller is prepared for commissioning.

8.2.3 Commissioning procedure

When you start up your CPU 1515SP PC2 for the first time, basic settings and the administrator password are queried. The device is then automatically set up for the operating system that is installed on the CFast card. Restart the device after the operating system has been set up.

Note

The initial commissioning is not possible with a Multitouch panel, as the Multitouch driver is only available after the installation of the operating system.

Procedure

When the requirements (Page 48) are met and the preparations for commissioning (Page 48) are complete, proceed as follows with the commissioning:

1. Connect the power supply.
   → The PWR LED lights up yellow first, then green.
   → The device carries out the hardware initialization.
2. Wait until the Siemens logo disappears from the screen.

3. Follow the instructions on the screen to configure the device:
   - Set <Language>, <Country/region>, <App language>, <Keyboard layout>, <Time zone for>
   - Accept license conditions
   - Setting the account
4. Finally, you will be prompted to restart the device.

NOTICE
Faulty installation when shutting down the CPU If you shut down the CPU during installation, the installation is disrupted, and the operating system is not installed correctly. The operational reliability of the device and the plant is endangered. Do **not** shut down the CPU during the entire installation process.

Information on users/user groups in Windows

A user "Operator" with standard user rights is already created on the Windows system.

The user is in a user group "SIEMENS TIA Engineer". This grants the user the rights to use the installed SIMATIC software products.

To use the CPU 1515SP PC2 directly, the Windows "Autologon" function is enabled for the "Operator" user. No password is preset.

Note

When you assign a password, change the entry for the "Autologon" function accordingly using the Windows user administration.

For security reasons, some functions of the CPU 1505SP (F/T/TF) Software Controller installed on the CPU 1515SP PC2 are not enabled under Windows without additional user groups. For example, these are: Controlling the Software Controller CPU 1505SP (F/T/TF) via command line tool, or loading a PC station using a configuration file import.

The user groups "Software Controller Operators" and/or "Failsafe Operators" (only applies to fail-safe CPUs) are not available as standard and must be created by the user.

With standard versions of the CPU 1515SP PC2, users of the user group "Software Controller Operators" have the right to control the CPU 1505SP (T) Software Controller with the command line tool and to load a PC station using the configuration file import.

With fail-safe versions of the CPU 1515SP PC2, users of the user group "Failsafe Operators" have the right to control the CPU 1505SP (F/TF) Software Controller with the command line tool and to load a PC station using the configuration file import.

Result

- The Windows 10 IoT Enterprise operating system (64-bit LTSC) is installed.
- The "Operator" user is logged on automatically.
- The Software Controller is ready to use.
- For administrative purposes, the "Operator" user can be logged off and the administrator created during commissioning can be logged on.
- The operating system's start screen is displayed after each startup.

8.3 Initial commissioning an open controller

The following sections provide an overview of the first commissioning of an Open Controller.

Step 1: Creating the configuration of the Open Controller (Page 50)

Step 2: Setting the IP address (Page 51)

Step 3: Changing the properties of the Software Controller (Page 51)

Step 4: Establishing the HMI connection

Step 5: Downloading a project to the target system (Page 51)

Step 6: Transferring the license key (Page 52)

Step 7: Switching the Open Controller on/off (Page 54)

8.3.1 Creating the configuration of the Open Controller

Requirements

The following requirements must be met before you can create the configuration of the Open Controller:

- TIA Portal ≥ V18 must be installed.
- You have started the TIA Portal and created a new project.

Creating the configuration

To create the configuration in the TIA Portal, follow these steps:

1. Double-click "Add new device" in the project tree.
2. Select "PC systems > SIMATIC S7 Open Controller > ET 200SP Open Controller >".
3. Select the required device.
4. Select the desired version and click "OK".
   The configured Open Controller is displayed in the device view.

5. The following interfaces can be seen in the Open Controller:
   – Onboard interface X2 (GB Ethernet Windows interface) that is assigned directly to the PC station (1 port)
   – Exchangeable BusAdapter that is assigned directly to the Software Controller (2 ports)
6. The following preconfigured components can be seen in the device view:
   – **CPU 1515SP PC2 / CPU 1515SP PC2 F/T/TF:** CPU 1505SP (F/T/TF) Software Controller
7. Insert the server module from the hardware catalog.
   The server module forms the termination of the CPU with the I/O modules. If no server module is configured, the server module is added automatically during compiling.

8.3.2 Setting the IP address

Set the IP address as follows:

- BusAdapter [X1]: The configured IP address becomes effective on the Open Controller after a download. To go online via the [X1] interface, the configured address must match the [X1] address entered in the panel of the software controller.
- Onboard interface [X2]: The configured IP address should be identical to the Windows IP address of the Open Controller.

8.3.3 Changing the properties of the S7-1500 Software Controller

Information on the property of the CPU is available in the Inspector window under "Properties". You can change these properties if required.

8.3.4 Downloading a project to the target system

Key statement

To set up your automation system, you need to download the project data you generated offline to the connected devices. This project data is generated, for example when configuring hardware, networks, and connections or when programming the user program or when creating recipes. The first time you download, the entire project data is downloaded. During later download operations, only changes are downloaded.

Proceed as follows to download the configuration:

1. Select the complete PC system in the device view.
2. Right-click on the PC system.
3. Select the option you require in the "Download to device" menu command.

Note

Note that the options available to you always depend on the selected device.

4. Select the interfaces with which you want to establish the online connection to the device. You have the option of showing all compatible devices by selecting the corresponding option and clicking the "Start search" command.

   Note

   The first TIA Portal download **must** be via the "X2" interface.

   Only ASCII characters are permitted in the name of the X2 PN/IE(LAN) interface in the TIA Portal, e.g. PROFINET_2.

5. Download and compile the project.

The hardware configuration and the first download are now completed.

Reference

Additional information on the possible options for downloading is available in the online help of the TIA Portal.

8.3.5 Transferring license keys

Licensing the software

For the following products, you need to transfer the product-specific license key with the *Automation License Manager (ALM)* before commissioning:

- WinCC RT Advanced incl. PowerTag
- CPU 1505SP T/TF

Note

No license key is required to operate the S7-1500 Software Controller CPU 1505SP (F) V2.x.

Requirements

- Initial commissioning was successfully completed.
- Windows 10 IoT Enterprise (64-bit LTSC 2021) is started.
- The extended write filter **UWF must be deactivated** on the CPU 1515SP PC2.

Transferring license keys with local configuration

The *Automation License Manager* is pre-installed on the CPU 1515SP PC2.

Open the software using the icon on the desktop or a menu command.

1. In the Windows start bar, select **Start > Siemens Automation > Automation License Manager**.
2. Follow the instructions of the *Automation License Manager*.

Transferring license keys via programming device/PC

The *Automation License Manager* is pre-installed on a programming device/PC with STEP 7 and the CPU 1515SP PC2.

1. Connect the CPU 1515SP PC2 to a programming device/PC.
2. Connect the supplied USB stick to the programming device/PC.
3. Select the menu command **Start > Siemens Automation > Automation License Manager**.
4. Select the menu command **Edit > Connect computer** and enter the IP address of the CPU 1515SP PC2.
5. if the option "Forbid license keys transfer from local computer" is disabled on the source computer, drag the license keys from the USB stick to the system partition C: of the CPU 1515SP PC2.

Backing up license keys for restore and repair

Note

Loss of license keys

A SIMATIC license key cannot be copied or duplicated. No more license key copies exist on the USB stick once you have dragged the license keys from the USB stick to your CPU 1515SP PC2.

Secure your purchased license keys **before** restoring the delivery state (Restore) or in the case of repair. To do this, move the license keys to a USB stick and keep this stick in a safe place.

If an error occurs on your license keys on the CPU 1515SP PC2, please contact your Siemens representative. Make sure to have the "Certificate of License" (CoL) to hand.

Reference

For additional information on licenses, refer to the *Automation License Manager* manual. You can find the manual on the CPU 1515SP PC2 under **Start > All Programs > Siemens Automation > Documentation** and on the Internet (https://support.industry.siemens.com/cs/ww/en/view/56956174).

You can find more information on the UWF write filter in the section: Protective function for data carriers (Page 62).

8.3.6 Switching the Open Controller on/off

Requirements

Initial commissioning was successfully completed.

Switching on the CPU 1515SP PC2

Proceed as follows to switch on the CPU 1515SP PC2:

1. Switch on the power supply of the CPU.
   The Boot Manager GRUB2DOS starts.
2. Select the mode in which the CPU 1515SP PC2 should start:
   - Default: with the Windows operating system and the S7-1500 Software Controller
   - Only with the Windows operating system (e.g. with updates)

Switching off the CPU 1515SP PC2

Proceed as follows to switch off the CPU 1515SP PC2:

1. Use the Windows function **Start > Power > Shut down** to switch off.
   The PWR LED changes from green to yellow.
   The Windows function shuts down the Windows operating system and the S7-1500 Software Controller.

If the device will not be used for a longer period after the shutdown, de-energize the device.

Backing up the data of the Open Controller

Note

You can create a backup image of your CFast card. This contains the operating system, the Runtime software and the complete project loaded from the TIA Portal. To back up data under Windows, we recommend the SIMATIC IPC Image & Partition Creator software tool (≥ V3.5). For more information on the Image & Partition Creator, refer to section: Backing up and restoring data (Page 68).

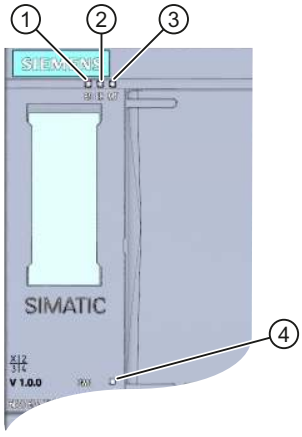
Interrupt, error and system messages

9

9.1 Status and error display

LED display

The following figure shows the LED displays of the CPU 1515SP PC2.



① RUN/STOP LED (yellow/green LED)
② ERROR LED (red LED)
③ MAINT LED (yellow LED)
④ POWER LED (yellow/green LED)

Figure 9-1 LEDs of the CPU 1515SP PC2

Meaning of the LED displays with active S7-1500 Software Controller

The CPU 1515SP PC2 has three LEDs to indicate the current operating state and diagnostics status.

The following table shows the meaning of the color combinations of the LED displays in connection with the S7-1500 Software Controller.

Table 9-1 Meaning of the LED displays

RUN/STOP LED	ERROR LED	MAINT LED	Meaning
LED off	LED off	LED off	POWER OFF Starting of the CPU 1515 SP PC2 in "Windows only" mode No power supply. Software Controller of the CPU 1515SP PC2: • is not downloaded • is in the operating state Power OFF Use of the hardware LEDs was disabled (configuration via TIA Portal).
LED off	LED flashes red	LED off	An error has occurred.
LED green	LED off	LED off	Software Controller of the CPU 1515SP PC2 is in RUN mode.
LED green	LED flashes red	LED off	A diagnostics event is pending.
LED green	LED off	LED lights up yellow	Maintenance demanded for the plant. The affected hardware must be exchanged within a short period.
LED green	LED off	LED flashes yellow	Maintenance required for the plant. You must exchange the affected hardware within a foreseeable period.
			Firmware update successfully completed
LED lights up yellow	LED off	LED off	Software Controller of the CPU is in the operating state STOP.
LED lights up yellow	LED flashes red	LED flashes yellow	The user program is causing an error.
LED flashes yellow	LED off	LED off	CPU is performing internal activities during STOP, e.g. ramp-up after STOP.
			Loading the user program
LED flashes yellow/green	LED off	LED off	Startup (transition from STOP → RUN)

RUN/STOP LED	ERROR LED	MAINT LED	Meaning
LED flashes yellow/green	LED flashes red	LED flashes yellow	Startup (CPU booting)
			Test of LEDs during startup, inserting a module.
			LED flashing test
LED flashes green	LED flashes red	LED flashes red	CPU defective

POWER LED

Table 9-2 POWER LED

POWER LED	Meaning
LED off	No supply voltage or supply voltage too low; operating system is shut down
LED lights up yellow	Supply voltage present; running through BIOS phase
LED green	Supply voltage present; Booting or operation of the operating system

Functions

10

10.1 Monitoring functions

10.1.1 Requirements

Introduction

The CPU 1515SP PC2 has monitoring functions that you can use with the corresponding monitoring software.
The following display, monitoring and control functions are available:

- Temperature monitoring
- Monitoring the CFast card with the S.M.A.R.T. function
- Operating hours counter (information on the total runtime)
- HW LED status display (RUN/STOP, ERROR, MAINT)

Monitoring software

- **SIMATIC IPC DiagBase**
  The SIMATIC DiagBase software is included in the scope of delivery of the CPU 1515SP PC2. Use the DiagBase Management Explorer application to obtain a clearer overview for monitoring. The DiagBase Alarm Manager notifies you of individual alarms.

  Note

  For additional information, refer to the online help for the SIMATIC IPC DiagBase software.

- **SIMATIC IPC DiagMonitor**
  The SIMATIC DiagMonitor software is provided on a CD. You can find the order number of the license in the section Accessories/Spare parts (Page 113).
  Potential system failures are detected and reported in good time with the diagnostics and alerting software. The software is also used for remote diagnostics.
  The software contains:
  - The software for the stations to be monitored
  - A library for creating your own applications

10.1.2 Temperature monitoring

Three temperature sensors monitor the temperature at different locations of the CPU 1515SP PC2:

- Processor temperature
- Temperature in the vicinity of the RAM ICs/blocks
- Temperature of the basic module

If one of the temperature values exceeds the set temperature threshold, the temperature monitoring triggers a temperature error. The temperature error activates the IPC DiagBase and/or IPC DiagMonitor software.

The temperature error remains stored until the temperatures fall below the temperature threshold again and it is reset using one of the following measures:

- Acknowledgment of the error message by the monitoring software
- Restart of the device

10.1.3 Monitoring the CFast card with the S.M.A.R.T function

The CFast card supports the **S.M.A.R.T function** (**S**elf-**M**onitoring, **A**nalysis and **R**eporting Technology). This function helps avoid data loss.

Using special routines, SIMATIC IPC DiagBase requests a status report for the hard drive. The SMART hard drive keeps a list of errors that occurred while reading or writing sectors. When the number of errors exceeds a certain threshold, this is often an early warning of an impending defect of the drive.

At the latest, this is also the time when you should create a backup of the drive and replace the hard drive.

In this case, SMART would notice the rapid increase in the error rate and trigger an alarm.

Errors that originate, for example, in the electronics and lead to an immediate failure of the hard drive, but cannot be recognized by SMART.

10.1.4 Operating hours counter

You can use an operating hours counter for a variety of applications:

- For calculating the operating time of the CPU
- For calculating the operating time of controlled equipment

You can find more information about the operating hours counter in the "Operating hours counter" group in the "Diagnostics" folder of the Online and Diagnostics view in the TIA Portal.

10.2 Retentive memory NVRAM

Retentive memory is non-volatile memory for saving a limited quantity of data in the event of power failure.

The data defined as retentive is stored in retentive memory. This data is retained beyond a power-off or power failure.

A corresponding function is implemented in the S7-1500 software controller to allow NVRAM to be used there. This saves up to 410 KB of data in non-volatile data memory in the case of power failure. This function can be set on the engineering station in the TIA Portal.

10.3 BIOS setup

BIOS setup

The boot order can be set using the BIOS Setup.

Changing the device configuration

The device configuration is preset for working with the supplied software.

Only change the set values if you have made technical changes to your device.

10.4 Power options

A power plan with the name SIMATIC S7 is set as default on the CPU 1515SP PC2. This ensures that the CPU does not deviate from its maximum clock rate in order not to endanger the real-time capability of the software controller.

10.5 Benefits of the function: Sleep mode

Under Windows 10, sleep mode reduces the power consumption of PCs and laptops during ongoing operation. By default, Windows 10 puts the computer into standby mode after 15 or 30 minutes of inactivity.

To change the default settings of the mode, follow these steps:

1. Open the Control Panel on your PC.
2. Select the "Hardware and Sounds" category.
3. Click "Power options".
   A new window opens.
4. On the left side, click on "Change when the PC sleeps".
   A new window opens with two columns for On battery (for notebooks) and Plugged in (for notebooks and PCs).

5. To specify switching to sleep mode after a specific period of time, select "Put the computer to sleep:" Your desired time.
6. Save your new settings with "Apply changes".

Note

The Software Controller does **not** work when power save mode is **enabled**.

10.6 "Unified Write Filter (UWF)" write filter

General information on the write filter

The "Unified Write Filter" is a feature that helps you protect your drives.

The standard abbreviation for the Unified Write Filter is "UWF". Enabling the filter ensures that data is no longer saved retentively on the system. All write access operations are swapped out to the work memory (RAM) and are available until system restart. As soon as the computer is restarted, it loses its memory and goes back to the state that it was in before the filter was enabled.

NOTICE
Risk of data loss with enabled "UWF" When the device is shut down, all changes made after the boot process may be lost due to the write-protected data storage medium. To prevent this from happening, make changes to data storage media only with **disabled** write protection.

The "UWF" is disabled in the delivery state.

The filter does not support external removable data storage media, such as USB sticks and other flash drives, that are recognized as removable data storage media by the operating system.

Enable write protection

To enable the "Unified Write Filter = UWF" under Windows, follow these steps:

Control Panel > Programs > Programs and Features > Turn Windows features on or off > Device Lockdown > Uniform Write Filter

Note

Note that the work memory is reduced when "UWF" is enabled.

Loss of data due to frequent write cycles

NOTICE
Loss of data due to frequent write cycles The number of write cycles on CFast cards is limited due to technical reasons. To prevent data loss, the CFast card must be provided with special protection. To protect the CFast card, enable the "UWF". This feature extends the service life of the CFast card and prevents a possible failure of the CPU 1515SP PC2.

Reference

You can find additional information on the "UWF" write filter on the Internet in the online help for Microsoft® Windows® 10.

Maintenance 11

11.1 Display resolution

The table below shows the resolutions available with the DisplayPort V1.2 standard:

DisplayPort V1.2 standard	Resolution	Refresh rate
720p	1280 x 720	30 Hz
720p	1280 x 720	60 Hz
1080p	1920 x 1280	30 Hz
1080p	1920 x1280	60 Hz
1440p (2K)	2560 x 1440	30 Hz
1440p (2K)	2560 x 1440	60 Hz
4K	3840 x 2160	30 Hz / 60 Hz

11.2 Partitions in the delivery state

Partitioning the CFast card

The following partitions are set up on the CFast card by default:

Partition	Name	128 GB CFast card	File system
C:	SYSTEM	60 GB	NTFS
D:	DATA	44 GB	NTFS
E:	Restore	16 GB	NTFS
-	-	0.4 GB	RAW

Note

Partitions under Windows 10 IoT Enterprise (64-bit LTSC 2021)

The partitions need to be set again if they are faulty or if the partitioning is to be changed.

Note

Restoring existing system partition

If your projects are stored on partition D: you can use the "Restore existing system partition" option to restore partition C: with the operating system and the Runtime software, without your project data being affected.

NOTICE
CPU volume for S7-1500 Software Controller (0.4 GB RAW) Do not change the CPU volume for Software Controllers. This is the only way to ensure that the Software Controller continues to operate without error.

11.3 BIOS update

With the SIMATIC IPC DiagBase software (included in scope of delivery of the CPU 1515SP PC2), you can perform a BIOS update.

NOTICE
Irreparable damage to the BIOS If the BIOS update is not performed correctly, the BIOS can be irreparably damaged so that the device can no longer be operated and must be sent in for repair. You may only start a BIOS update when it is absolutely necessary. The following applies here: • Never interrupt the power supply during an update. • The update process must be completed before you shut down the device. • The BIOS update can **only** be performed in "Windows Only" mode. • Do **not** perform a BIOS "downgrade".

Note

BIOS update with running Software Controller

If a BIOS update is performed while the Software Controller is running, the DiagBase BiosManager issues the following error message: Error loading the BIOS file.

Procedure

To perform a BIOS update, follow these steps:

1. Check whether an up-to-date BIOS is available for the CPU 1515 SP PC2. You can find additional information on the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/109743969) page, in the "BIOS version" table.

   NOTICE

   Using BIOS versions for the CPU 1515 SP PC2 Open Controller

   When you accidentally use a BIOS version for the CPU 1515 SP PC Open Controller, it may happen that the device can no longer be operated and needs to be sent in for repair.

   When selecting the BIOS version, make sure that you use files that are intended for the CPU 1515 SP PC2 Open Controller. You will recognize these files by the name of the zip file: CPU_1515SP_**PC2**_xxxx_xxxx.zip

2. Start the DiagBase Management Explorer.
3. In the "Tools" menu bar, select "Local BIOS...".
4. Select the "Update" tab.
5. Click the "Load" button in the "BIOS Image" field.
6. Select the desired file for the update.
7. Start the update.
8. After a successful update, you will see the note "Needs reboot".
9. Restart the Open Controller.

Starting may take a bit longer after the update. Moreover, the PWR LED provides you with information about which phase the Open Controller is in:
Yellow = BIOS phase
Green = Operational

NOTICE

BIOS downgrade

Do not downgrade to an earlier version, for example, from BIOS V02.08_01.00 to BIOS V02.05_16.02.

After a downgrade, the Open Controller is **unusable**!

Please send the device in its original packaging to your Siemens representative.

Reference

You can find additional information in the SIMATIC IPC DiagBase Operating Manual (https://support.industry.siemens.com/cs/ww/en/view/109749690).

11.4 Backing up and restoring data

Introduction

The CFast card (included in the scope of delivery) contains the operating system, the runtime software and the restore area.

To prevent loss of data and be able to restore the contents of the CFast card at any time, create a USB restore stick (Page 68).

If you use functions from the Restore menu, you must acknowledge a security message. For the functions, 72 hours are available in each case. If the functions are not completed within this time period, CPU 1515SP PC2 is automatically restarted without a further prompt.

If you want to back up your projects, save them to the D: partition of the CFast card.

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.

11.5 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.

Creating a bootable Restore USB stick

The Restore USB stick is used to restore the delivery state of the CFast card:

- Restoring the delivery state is only possible on the Open Controller CPU 1515SP PC2.
  When creating on a Windows PC, the user must use a CFast card reader and insert the supplied CFast card.
  If the "System" partition on the CFast card is error-free, use the Open Controller CPU 1515SP PC2 directly.
- If the "System" partition on the CFast card is damaged, use a Windows 10 PC with Windows 10 Build 1607 or later for restoring.

Use the following steps to ensure that you can restore the system if an error occurs:

NOTICE
Data loss All existing data on the USB stick is deleted when you create the USB restore stick. Back up the data on the USB stick before you create the USB restore stick.

1. The "Restore" partition of the CFast card contains the file "E:\Create-RestoreUsb.lnk". Open this file.

   Note

   When you create the USB restore stick on a different Windows 10 PC, the drive name might be different from "E".

2. To obtain the full administrator access token, confirm the UAC (User Account Control) through administrator logon information. Enter an administrator password. The script in the Powershell is started.
3. Insert the USB restore stick into the PC.
   Please note that the script will be ended if a USB stick is not inserted within 60 seconds after the prompt.
4. Confirm the deletion of all data on the USB stick by entering "Y" (without quotation marks).

5. Confirm by entering "Y" to copy the restoration data from the restore partition to the USB stick.
6. When the copy is complete, press the "Enter" key to exit the script.

The USB restore stick for restoring the delivery state is ready. The process is logged in a log file in the directory "E:\TOOLS\CreateRestoreUsb\Logs".

Check bootable Restore USB stick

Check whether the restore process can be started with the Restore USB stick.

1. Switch off the power supply of the CPU 1515SP PC2.
2. Remove all USB drives from the CPU 1515SP PC2.
3. Connect the Restore USB stick directly to the CPU 1515SP PC2.
4. Switch on the power supply of the CPU 1515SP PC2.
5. Press <ESC> to start the Boot Manager.
6. Select the list entry for the USB stick in the Boot Manager.
7. When the loading process is indicated (Windows logo) and the "SIMATIC Restore" menu can be opened, a check is made to determine if the "Restore" USB stick is bootable and was created properly.

Note

To check the functionality it is sufficient to test the start of the SIMATIC IPC Restore application. The application can be aborted before the recovery process starts.

11.6 Restoring the delivery state

Note

Using Multitouch Panels

The restoration of the original software is not possible with a Multitouch panel, because the Multitouch driver is not available until after the installation of the operating system.

NOTICE
Data loss
During restoration of the system to delivery state, the CFast card is completely erased and re-formatted, and is then loaded with the original software. All subsequently modified or added data, programs, license keys and partitions on the CFast card will be lost.
Back up the data of the CPU 1515SP PC2 after you have assigned parameters to the module and if you have made changes to the configuration.

NOTICE
Loss of license keys Back up the license keys before the restore by dragging these to your USB restore stick via the *Automation License Manager*. After the restart of the CPU 1515SP PC2, transfer the license keys back to the device via the *Automation License Manager*.

Procedure to restore the delivery state

To restore the state saved on the CFast card using the USB restore stick, follow these steps.

1. Switch off the power supply to the CPU 1515SP PC2.
2. Remove all USB drives from the CPU 1515SP PC2.
3. Connect the USB restore stick directly to the CPU 1515SP PC2.
4. Insert the CFast card into the designated slot of the CPU 1515SP PC2.
5. Switch on the power supply to the CPU 1515SP PC2.
   The CPU is started.
6. To start the Boot Manager, press <Esc> while the Siemens logo is being displayed.
7. Select the list entry for the USB stick as boot medium in the Boot Manager.
8. Follow the instructions of the SIMATIC IPC Restore application.
   The original software is restored.
9. Copy the restore data from the USB flash drive to the restore partition. To do this, select the "Fill restore partition" option in the SIMATIC IPC Restore application.

Note

The restore process writes **all** the data stored on the USB stick to the restore partition.

In case you skip step 9 from the above instruction, the restore partition will remain empty.

11.7 Updating software

Note

When you update software (such as Windows, drivers, BIOS, etc.), always start the CPU 1515SP PC2 in the GRUB menu in Windows mode.

Information on updating software for the respective product can be found on the Internet (https://support.industry.siemens.com/cs/ww/en).

HMI devices

During the installation, make sure that you always use the latest drivers for the HMI devices used (SIMATIC Flat Panels).
Before you install a new driver version, you must uninstall the old driver version in order to ensure proper operation.

You can download the current driver software from SIMATIC Product Support.

11.8 Windows 10 IoT Enterprise (64-bit LTSC 2021)

The Windows 10 IoT Enterprise operating system (64-bit LTSC 2021) is pre-installed on the CPU 1515SP PC2.

Windows language packs

After first commissioning of the CPU 1515SP PC2, you can install additional operating system languages. Note that you need administrator rights to install language packages.

The following language packages are available on the restore partition E: under \LanguagesPackages\.

- Simplified Chinese
- German
- English
- French
- Italian
- Spanish

Installing the Windows language packages

To install the Windows language packages, follow these steps:

1. To start a console session, open the "Run" dialog, for example, with the keyboard shortcut: <Windows key+R>.
2. Enter the following command: pksetup.exe
3. Click "OK" to confirm.
4. The "Install or uninstall display languages" window opens.
5. Click on "Install display languages".
6. Select the display language to be installed by clicking on "Browse".
7. Navigate to the folder containing the display languages and confirm with "OK".
8. The selected language package is displayed in the "Install or uninstall display languages" window.
9. Click on "Next" and follow the instructions of the installation wizard.

Updates

You can install additional updates at a later time. You can find current information on the operating system at Widows (http://www.windows.com).

Note

In the delivery state, partitions are set up on drive C: and D: on the CFast card with free memory. See section Partitions in the delivery state (Page 65).

Make sure that sufficient free memory space is available on your CFast card for the installation of updates.

11.9 Sending the device to customer service

Before sending

Before you send in the CPU 1515SP PC2 for repair:

- Create a backup of your data.
- Back up your SIMATIC license keys on a USB stick.
- Remove your SD/MMC cards.
- Remove your **CFast card**.

Sending in the device

- Pack the device in its original packaging.
- Enclose identification data (Page 35).
- Send to your Siemens contact partner.

11.10 Removing and inserting the CFast card

Introduction

The CPU 1515SP PC2 has a slot for a CFast card. On this card, you will find the operating system, your runtime software, the restore area and, after configuration, the project.

Seal the cover for the CFast card to protect the system against unauthorized access.

You must remove the CFast card before you send in the CPU, for example, for repair.

Requirements

- The CPU 1515SP PC2 is disconnected from the power supply.

Procedure – Removing the CFast card

NOTICE
Removing the CFast card during operation Do **not** remove the CFast card while the CPU 1515SP PC2 Open Controller is running.

1. Remove the seal.
2. Open the cover, using a screwdriver if necessary.
3. Press onto the CFast card.
   The card is pressed out of the slot.
4. Pull the card out of the slot.
   To do this, grip the rib on the underside of the memory card.

Procedure – Inserting the CFast card

1. Open the cover of the slot, using a screwdriver if necessary.
2. Insert the CFast card into the slot.
3. Press the CFast card into the slot until it clicks into place.
   The CFast card is properly inserted if the cover can be closed without any resistance.
4. Close the cover.

NOTICE
Unauthorized access Seal the cover to protect the CFast card with the operating system of the CPU 1515SP PC2 from unauthorized access.

11.11 Recycling and disposal

For ecologically sustainable recycling and disposal of your old device, contact a certificated disposal service for electronic scrap or dispose of the device in accordance with the regulations in your country.

Industrial OS

12

The functions described in the following chapter apply **only** to the Open Controller CPU 1515SP PC2 (F) V30.0 SIMATIC Industrial OS.

12.1 Updating BIOS

A physical access to the CPU 1515SP PC2 is not required. An SSH connection is sufficient.

Procedure

Proceed as follows to update the BIOS:

1. Download the BIOS update file from Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/109743969).
2. Transfer the BIOS update file to the CPU 1515SP PC2.
3. Run the following command as root: *bios-update <FILE>*
4. The CPU 1515SP PC2 is automatically restarted twice.
   A log file is created in the home directory of root. The file contains complete information about the BIOS update process. If an error is detected, a service data dump is added to this log file.
5. After the required number of restarts, check the log file.
   If it says *"All done"* at the end, then the BIOS update was successful.
   Otherwise check the error message and contact Siemens Industry Online Support if necessary. Provide the log file to the Siemens Industry Online Support.

Note

It is recommended to run the BIOS update in native Linux mode.

12.2 Commissioning procedure

When you start the Open Controller CPU 1515SP PC2 for the first time, the installations of SIMATIC Industrial OS and Software Controller are started automatically.

The detailed description of the configuration of Simatic Industrial OS can be found in Industrial OS - Getting Started, section 2.4. (https://support.industry.siemens.com/cs/de/en/view/109795683)

Before installing the Software Controller, the customer must accept the license terms, security information, and OSS and third party licenses. The system performs several restarts during the installation process.

More information about installation and operation of the software controller can be found in the Operating Instructions Software Controller CPU 1505SP (F), CPU 1507S (F) and

CPU 1508S (F) SIMATIC Industrial OS. (https://support.industry.siemens.com/cs/de/en/view/109808199)

12.3 System backup and restoring to factory state

For system backups and restoring to factory state, we recommend the open-source tool "Clonezilla".

The recovery image to be used with "Clonezilla" can be found for download on the Industry Online Support page.

12.4 Changing system time and date

To change the system time and date, use the following Linux command: "date -s"

Synchronization via NTP server is described in Industrial OS - Getting Started, chapter 2.4.7 (https://support.industry.siemens.com/cs/de/en/view/109795683).

12.5 Time and date synchronization

Note

When changing the time in SIMATIC Industrial OS, it is necessary to manually synchronize the system time and date with the real-time clock. To do this, use the following Linux command: "hwclock --systohc".

12.6 Security updates

For updates of the software packages available in the Industrial OS, we recommend setting a regular interval for installing security updates in the "Apt Update" dialog.

The "Apt Update" function is described in Industrial OS - Getting Started, Section 2.4.12 (https://support.industry.siemens.com/cs/de/en/view/109795683). The call of the setup settings with the "mel-setup" command is described in section 2.6.

Current security instructions for the installed packages can be found at https://www.debian.org/security/

Current security instructions for the Linux kernel and BIOS used can be found at https://new.siemens.com/global/en/products/services/cert.

NOTICE
Only install kernel updates provided by Siemens For updates of the Linux kernel, **only** use SIMATIC Industrial OS versions provided by SIEMENS. Updates that are not provided by Siemens can result in security, stability and compatibility problems. Ensure the consistency and integrity of the downloaded files.

Technical specifications

13

13.1 Standards and approvals

Introduction

The general technical specifications cover the following:

- The standards and test values that the CPU 1515SP PC2 complies with and fulfills.
- The test criteria according to which the CPU 1515SP PC2 was tested.

Currently valid markings and approvals

Note

Information for CPU 1515SP PC2

The currently valid markings and approvals are printed on the CPU 1515SP PC2.

Safety information

⚠ WARNING

Risk of personal injury and damage to property.

In hazardous areas, there is a risk of injury or damage if you disconnect any connectors while the CPU 1515SP PC2 is in operation.

Always de-energize the CPU 1515SP PC2 operated in such areas before you disconnect the connectors.

⚠ WARNING

Flying sparks due to loose cables

Risk of explosion in hazardous areas.

USB cables and PROFINET connectors may detach from the device in the case of strong oscillation and high vibrating loads.

Attach these cables to the strain relief of the device using cable ties.

⚠ 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

cULus HAZ. LOC. approval

Underwriters Laboratories Inc., complying with

- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 142 (Process Control Equipment)
- ANSI/ISA 12.12.01
- CSA C22.2 No. 213 (Hazardous Location)

APPROVED for use in
Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

Installation Instructions for cULus haz.loc.

- WARNING - Explosion Hazard - Do not disconnect while circuit is live unless area is known to be non-hazardous.
- WARNING - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2 or Zone 2.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC; or non-hazardous locations.

WARNING: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE RELAY.

FM approval

Factory Mutual Research (FM) according to
Approval Standard Class Number 3611, 3600, 3810

(ANSI/ISA 82.02.01)
CSA C22.2 No. 213
CSA C22.2 No. 61010-1
APPROVED for use in Class I, Division 2, Group A, B, C, D Tx;
Class I, Zone 2, Group IIC Tx

Installation Instructions for FM

- WARNING - Explosion Hazard - Do not disconnect while circuit is live unless area is known to be non-hazardous.
- WARNING - Explosion Hazard - Substitution of components may impair suitability for Class I, Division 2 or Zone 2.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC; or non-hazardous locations.

WARNING: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF MATERIALS USED IN THE RELAYS.

OR

ATEX approval

In accordance with EN 60079-15 (Electrical apparatus for potentially explosive atmospheres; Type of protection "n") and EN 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General Requirements)

II 3 G Ex nA IIC Tx Gc
DEKRA 12ATEX0038X

OR

IECEx approval

According to IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n") and IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

Ex nA IIC Tx Gc
IECEx DEK 13.0011X

RCM (C-Tick) Declaration of conformity for Australia/New Zealand

CPU 1515SP PC2 meets the requirements of the standard EN 61000-6-4:2007 + A1:2011.

Korea Certificate KCC-REM-S49-ET200SP

Note that this device corresponds to limit class A in terms of the emission of radio frequency interference. This device can be used in all areas, except residential areas.

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

IEC 61131

The CPU 1515SP PC2 with the S7-1500 Software Controller CPU 1505SP (F/T/TF) fulfills the requirements and criteria of the IEC 61131-2 standard (programmable logic controllers, Part 2: Equipment requirements and tests).

PROFINET standard

CPU 1515SP PC2 is based on standard IEC 61158 Type 10.

PROFIBUS standard

CPU 1515SP PC2 is based on standard IEC 61158 Type 3.

IO-Link standard

CPU 1515SP PC2 is based on standard IEC 61131-9.

Use in industrial environments

CPU 1515SP PC2 is designed for use in industrial environments. It meets the following standards for this type of use:

- Requirements on interference emission EN 61000-6-4: 2007 + A1: 2011
- Requirements on immunity EN 61000-6-2: 2005

Use in mixed areas

Under certain circumstances, you can use the CPU 1515SP PC2 in a mixed area. A mixed area is used for residential purposes and for commercial operations that do not significantly impact on residents.

If you want to use the CPU 1515SP PC2 in mixed areas, you must ensure that its radio frequency interference emission complies with the limit classes of the EN 61000-6-3 generic standard. Suitable measures for observing these limits for use in a mixed area are, for example:

- Installation of the CPU 1515SP PC2 in grounded control cabinets
- Use of noise filters in the supply cables

An individual acceptance test is also required.

Use in residential areas

Note

CPU 1515SP PC2 not intended for use in residential areas

CPU 1515SP PC2 is not intended for use in residential areas. Using the CPU 1515SP PC2 in residential areas can affect radio and television reception.

Reference

The certificates for the markings and approvals can be found on the Internet under Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en/).

13.2 Electromagnetic compatibility

Definition

Electromagnetic compatibility (EMC) is the ability of an electrical installation to function satisfactorily in its electromagnetic environment without interfering with that environment.

The CPU 1515SP PC2 meets the requirements of the EMC legislation for the European single market, among other requirements. The prerequisite for this is that the CPU 1515SP PC2 complies with the specifications and guidelines relating to electrical configuration.

EMC according to NE 21

The CPU 1515SP PC2 meets the EMC specifications of NAMUR guideline NE 21.

Pulse-shaped disturbance

The following table shows the electromagnetic compatibility of the CPU 1515SP PC2 with regard to pulse-shaped disturbances.

Table 13-1 Pulse-shaped disturbance

Pulse-shaped disturbance	**Test voltage**	**corresponds to degree of severity**
Electrostatic discharge according to IEC 61000-4-2.	Air discharge: ±8 kV Contact discharge ± 4 kV	3 3
Burst pulses (high-speed transient disturbance) according to IEC 61000-4-4.	±2 kV (power supply lines) ±2 kV (signal lines > 30 m) ±1 kV (signal lines < 30 m)	3 3
High-energy single pulse (surge) according to IEC 61000-4-5 External protective circuit required (see function manual Designing interference-free controllers (https://support.industry.siemens.com/cs/ww/en/view/59193566))		3
• asymmetric coupling	±2 kV (power supply lines) DC with protective elements ±2 kV (signal/data line only > 30 m), with protective elements	
• symmetric coupling	±1 kV (power supply lines) DC with protective elements ±1 kV (signal/data line only > 30 m), with protective elements	

Sinusoidal disturbance

The following table shows the electromagnetic compatibility of the CPU 1515SP PC2 with regard to sinusoidal disturbances.

- RF radiation

Table 13-2 Sinusoidal disturbance variables with RF radiation

RF radiation according to IEC 61000-4-3/NAMUR 21 Electromagnetic RF field, amplitude-modulated		**corresponds to degree of severity**
80 to 1000 MHz; 1.0 to 2.0 GHz	2.0 GHz to 6.0 GHz	3
10 V/m	3 V/m	
80% AM (1 kHz)		

- RF coupling

Table 13-3 Sinusoidal disturbance variables with RF coupling

RF coupling according to IEC 61000-4-6	**corresponds to degree of severity**
(10 kHz) 150 kHz to 80 MHz	3
10 V_{rms} unmodulated	
80% AM (1 kHz)	
150 Ω source impedance	

Emission of radio interference

Interference emission of electromagnetic fields in accordance with IEC61000-6-4 (measured at a distance of 10 m).

Table 13-4 Interference emission of electromagnetic fields

Frequency	**Emitted interference**
30 MHz to 230 MHz	< 40 dB (µV/m)Q
230 MHz to 1000 MHz	< 47 dB (µV/m)Q

Emission of interference via AC supply voltage in accordance with EN 55016.

Table 13-5 Interference emission via the AC power supply

Frequency	**Emitted interference**
0.15 to 0.5 MHz	<79 dB (µV) Q <66 dB (µV) M
0.5 to 30 MHz	<73 dB (µV) Q <60 dB (µV) M

13.3 Shipping and storage conditions

Introduction

The CPU 1515SP PC2 exceeds the requirements of IEC 61131-2 in terms of shipping and storage conditions. The following information applies to modules that are shipped and/or stored in their original packaging.

Table 13-6 Shipping and storage conditions for modules

Type of condition	Permissible range
Free fall (in shipping package)	≤1 m
Temperature	From -40 °C to +70 °C
Barometric pressure	from 1140 hPa to 660 hPa (corresponds to an altitude of -1000 m to 3500 m)
Relative humidity	5% to 95%, without condensation
Sinusoidal vibrations according to IEC 60068-2-6	5 - 8.4 Hz: 3.5 mm 8.4 - 500 Hz: 9.8 m/s^2
Shock according to IEC 60068-2-27	250 m/s^2, 6 ms, 1000 shocks

13.4 Mechanical and climatic ambient conditions

Operating conditions

The CPU 1515SP PC2 is suitable for use in weather-proof, fixed locations. The operating conditions are based on the requirements of DIN IEC 60721-3-3:

- Class 3M3 (mechanical requirements)
- Class 3K3 (climatic requirements)

Mechanical ambient conditions

The table below shows the mechanical ambient conditions in the form of sinusoidal oscillations.

Table 13-7 Mechanical environmental conditions for BA 2×RJ45

Frequency band	
5 Hz ≤ f ≤ 8.4 Hz	3.5 mm amplitude
8.4 Hz ≤ f ≤ 150 Hz	1 g constant acceleration

Table 13-8 Mechanical environmental conditions for BA 2×FC

Frequency band	CPU 1515SP PC2
5 Hz ≤ f ≤ 8.2 Hz	7.5 mm amplitude
8.2 Hz ≤ f ≤ 500 Hz	2 g constant acceleration

Test of mechanical ambient conditions

The table below provides important information with respect to the type and scope of the test of ambient mechanical conditions.

Table 13-9 Test of mechanical ambient conditions

Condition tested	Test Standard	Comment
Vibration	Vibration test according to IEC 60068-2-6 (sine)	Type of oscillation: Frequency sweeps with a rate of change of 1 octave/minute. BA 2×RJ45 • 5 Hz ≤ f ≤ 8.4 Hz, 3.5 mm constant amplitude • 8.4 Hz ≤ f ≤ 150 Hz, 1 g constant acceleration BA 2×FC • 5 Hz ≤ f ≤ 8.2 Hz, 7.5 mm constant amplitude • 8.2 Hz ≤ f ≤ 500 Hz, 2 g constant acceleration Duration of vibration: 10 frequency sweeps per axis in each of 3 vertically aligned axes
Shock	Shock, tested according to IEC 60068-2-27	Type of shock: Half-sine Shock intensity: 150 m/s^2 peak value, 11 ms duration Direction of shock: 3 shocks in each direction (+/-) at each of 3 vertically aligned axes

Climatic ambient conditions

You can use the CPU 1515SP PC2 under the following climatic ambient conditions:

Table 13-10 Climatic ambient conditions

Ambient conditions	Permissible range	Comments
Temperature: Horizontal mounting position	• 55 °C or higher	When expanding with 32 ET 200SP modules: 4 x 0.3 A USB load; CFAST memory card max. 10% load; SD card not used
Temperature: Vertical mounting position	• 45 °C or higher	When expanding with 32 ET 200SP modules: 4x 0.3 A USB load; CFast memory card and SD card max. 10% load
Permitted temperature change	10 K/h	-
Relative humidity	from 10 to 95%	Without condensation
Barometric pressure	From 1140 to 795 hPa	Corresponds to an altitude of -1000 m to 2000 m
Concentration of pollutants	ANSI/ISA-71.04 severity level G1; G2; G3	-

13.5 Information on insulation, protection class, degree of protection and rated voltage

Insulation

The insulation is designed according to the requirements of EN 61131-2: 2007.

Note

In the case of modules with 24 V DC (SELV/PELV) supply voltage, galvanic isolations are tested with 707 V DC (type test).

Note

The ground/minus pole of the 24 V DC power supply is connected via the device with functional ground (FE).

Pollution degree / overvoltage category according to IEC 61131

- Pollution degree 2
- Overvoltage category: II

Protection class in accordance with IEC 61131-2:2007

The distributed I/O system ET 200SP fulfills protection class I and includes parts of protection class II and III. The CPU 1515SP PC2 is a part of protection class III.

The grounding of the mounting rail must meet the requirements for functional earth FE.

The installation location (e.g. enclosure, control cabinet) must have a protective conductor connection that meets the standard to maintain protection class I.

Degree of protection IP20

Degree of protection IP20 according to IEC 60529, i.e.:

- Protection against contact with standard probe
- Protection against foreign objects with diameters in excess of 12.5 mm
- No protection against water

Rated voltage for operation

The CPU 1515SP PC2 works with the rated voltage and corresponding tolerances listed in the following table.

Table 13-11 Rated voltage for operation

Rated voltage	Tolerance range
24 V DC	19.2 to 28.8 V DC [1]

[1] Static value: Creation as functional extra-low voltage with safe electrical isolation in accordance with IEC 60364-4-41

13.6 Use of the ET 200SP in zone 2 potentially explosive atmospheres

See product information Use of subassemblies/modules in a Zone 2 Hazardous Area (https://support.industry.siemens.com/cs/ww/en/view/19692172).

13.7 Module data

13.7.1 Technical specifications CPU 1515SP PC2

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7677-2DB42-0GB0/td).

Article number	6ES7677-2DB42-0GB1
General information	
Product type designation	CPU 1515SP PC2
HW functional status	from FS04
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V18
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP
Control elements	
Mode selector switch	1
Supply voltage	
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L

Article number	**6ES7677-2DB42-0GB1**
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory
SIMATIC memory card required	No
Work memory	
• integrated (for program)	2 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s

Article number	6ES7677-2DB42-0GB1
– Industrial Ethernet status LED	Yes
• Number of ports	2
• integrated switch	Yes
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2021 LTSC
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm

Article number	**6ES7677-2DB42-0GB1**
Weights	
Weight, approx.	0.83 kg

13.7.2 Technical specifications of CPU 1515SP PC2 F

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7677-2SB42-0GB0/td).

Article number	6ES7677-2SB42-0GB1
General information	
Product type designation	CPU 1515SP PC2 F
HW functional status	from FS04
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V17
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP F
Control elements	
Mode selector switch	1
Supply voltage	
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory
SIMATIC memory card required	No

Article number	**6ES7677-2SB42-0GB1**
Work memory	
• integrated (for program)	3 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s
– Industrial Ethernet status LED	Yes
• Number of ports	2
• integrated switch	Yes
2. Interface	
Interface types	

Article number	**6ES7677-2SB42-0GB1**
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2021 LTSC
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

13.7.3 Technical specifications of CPU 1515SP PC2 T

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7677-2VB42-0GB0/td).

Article number	6ES7677-2VB42-0GB1
General information	
Product type designation	CPU 1515SP PC2 T
HW functional status	From FS05
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	STEP 7 V18 or higher
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP T
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory

Article number	**6ES7677-2VB42-0GB1**
SIMATIC memory card required	No
Work memory	
• integrated (for program)	3 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s
– Industrial Ethernet status LED	Yes
• Number of ports	2

Article number	**6ES7677-2VB42-0GB1**
• integrated switch	Yes
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2019 LTSC, 64 bit, MUI
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

13.7.4 Technical specifications of CPU 1515SP PC2 TF

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/ww/en/pv/6ES7677-2WB42-0GB0/td).

Article number	6ES7677-2WB42-0GB1
General information	
Product type designation	CPU 1515SP PC2 TF
HW functional status	From FS05
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	STEP 7 V18 or higher
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP TF
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.5 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory

Article number	**6ES7677-2WB42-0GB1**
SIMATIC memory card required	No
Work memory	
• integrated (for program)	3 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s
– Industrial Ethernet status LED	Yes
• Number of ports	2

Article number	**6ES7677-2WB42-0GB1**
• integrated switch	Yes
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	Windows 10 IoT Enterprise 2019 LTSC, 64 bit, MUI
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

13.7.5 Technical specifications CPU 1515SP PC2 - IndOS

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet.

Article number	6ES7677-2DB43-0GB1
General information	
Product type designation	CPU 1515SP PC2
HW functional status	from FS04
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V18
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory
SIMATIC memory card required	No

Article number	**6ES7677-2DB43-0GB1**
Work memory	
• integrated (for program)	2 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s
– Industrial Ethernet status LED	Yes
• Number of ports	2
• integrated switch	Yes

Article number	**6ES7677-2DB43-0GB1**
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	SIMATIC Industrial OS
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

13.7.6 Technical specifications of CPU 1515SP PC2 F -IndOS

Technical specifications

The following table shows the technical specifications as of 05/2023. You will find a data sheet including daily updated technical specifications on the Internet.

Article number	6ES7677-2SB43-0GB1
General information	
Product type designation	CPU 1515SP PC2 F
HW functional status	from FS04
Firmware version	V30.0
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V18
Installed software	
• Visualization	No
• Control	S7-1500 Software Controller CPU 1505SP F
Control elements	
Mode selector switch	1
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms
Input current	
Current consumption (rated value)	1.8 A; Full processor load, incl. ET 200SP modules and using USB
Current consumption (in no-load operation), typ.	0.5 A
Current consumption, max.	2.9 A
I^2t	0.426 $A^2 \cdot s$; with starting current inrush
Power	
Active power input, max.	43 W; incl. ET 200SP modules and using USB
Infeed power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	16 W
Processor	
Processor type	Intel Atom E3940, 1.6 GHz, 4 cores
Memory	
Type of memory	DDR3L
Main memory	8 GB RAM
CFast memory card	Yes; 128 GB flash memory
SIMATIC memory card required	No

Article number	6ES7677-2SB43-0GB1
Work memory	
• integrated (for program)	3 Mbyte
• integrated (for data)	7.5 Mbyte
• integrated (for CPU function library of CPU Runtime)	20 Mbyte
Load memory	
• integrated (on PC mass storage)	320 Mbyte
Backup	
• with UPS	Yes; all memory areas declared retentive
• with non-volatile memory	Yes
Hardware configuration	
Integrated power supply	Yes
Number of DP masters	
• Via CM	1
Number of IO Controllers	
• via PC interfaces	1
Rack	
• Modules per rack, max.	64; CPU 1515SP PC + 64 modules + server module
• Quantity of operable ET 200SP modules, max.	64
• Quantity of operable ET 200AL modules, max.	16
• Number of lines, max.	1
Time of day	
Clock	
• Type	Hardware clock
• Backup time	6 wk; At 40 °C ambient temperature, typically
• Deviation per day, max.	10 s; Typ.: 2 s
Interfaces	
Number of industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of RS 485 interfaces	1; Via CM DP module
Number of USB interfaces	4; 2x USB 2.0, 2x USB 3.0 on front side
Number of SD card slots	1
Video interfaces	
• Graphics interface	1x DisplayPort
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Via BusAdapter BA 2x RJ45
– Transmission rate, max.	100 Mbit/s
– Industrial Ethernet status LED	Yes
• Number of ports	2
• integrated switch	Yes

Article number	**6ES7677-2SB43-0GB1**
2. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; Integrated
– Transmission rate, max.	1 000 Mbit/s
– Industrial Ethernet status LED	No
• Number of ports	1
3. Interface	
Interface types	
• RS 485	Yes
Interface types	
RS 485	
• Transmission rate, max.	12 Mbit/s
Interrupts/diagnostics/status information	
Diagnostics indication LED	
• RUN/STOP LED	Yes
• ERROR LED	Yes
• MAINT LED	Yes
Ambient conditions	
Ambient temperature during operation	
• min.	-20 °C
• horizontal installation, min.	-20 °C
• horizontal installation, max.	60 °C; from 55°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card max. 10% load; SD card not used
• vertical installation, min.	-20 °C
• vertical installation, max.	50 °C; from 45°C: with max. 32 ET 200SP modules; 4x 0.3 A USB load; CFast memory card and SD card; max. 10% load
Ambient temperature during storage/transportation	
• min.	-40 °C
• max.	70 °C
Operating systems	
pre-installed operating system	SIMATIC Industrial OS
Peripherals/Options	
SD card	Optionally for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

13.7.7 S7-1500 Software Controller CPU 1505SP (F/T/TF)

The CPU 1505SP (F/T/TF) is a PC-based controller of the SIMATIC S7-1500 Software Controller family. You can find additional information about the CPU 1505SP (F/T/TF) in the relevant manual (https://support.industry.siemens.com/cs/ww/en/view/109762855). For the CPU 1505SP (F/T/TF), please also note the information in the F product information (https://support.industry.siemens.com/cs/ww/en/view/109478599).

Technical specifications

You can find technical specifications of CPU 1505SP with the article number 6ES7672-5DC11-0YA0 on the Internet under the following link (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5DC11-0YA0/td).

You can find technical specifications of CPU 1505SP F with the article number 6ES7672-5SC11-0YA0 on the Internet under the following link (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5SC11-0YA0/td).

You can find technical specifications of CPU 1505SP T with the article number 6ES7672-5VC11-0YA0 on the Internet under the following link (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5VC11-0YA0/td).

You can find all technical specifications of CPU 1505SP TF with the article number 6ES7672-5W11-0YA0 on the Internet under the following link (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5WC11-0YA0/td).

Dimension drawings

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14.1 CPU 1515SP PC2

This section contains a dimension drawing of the module mounted on a mounting rail. Always observe the specified dimensions for installation in cabinets.

Dimension drawings of the CPU 1515SP PC2

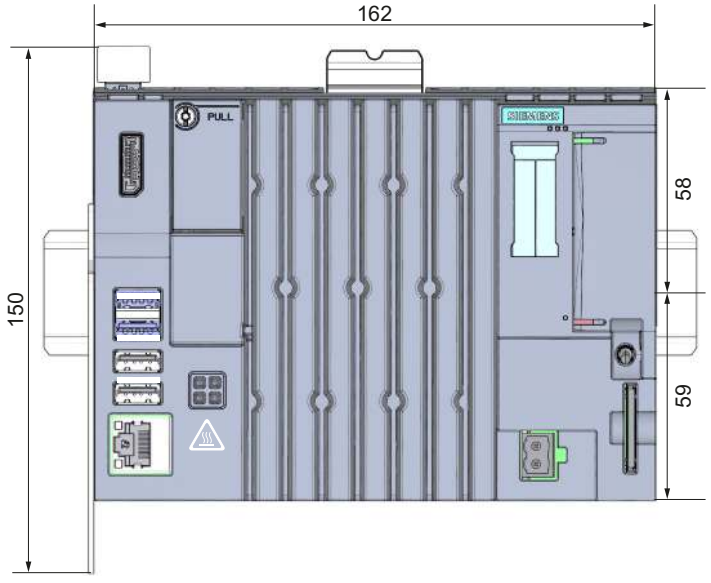

Figure 14-1 Dimension drawing CPU 1515SP PC2, front view

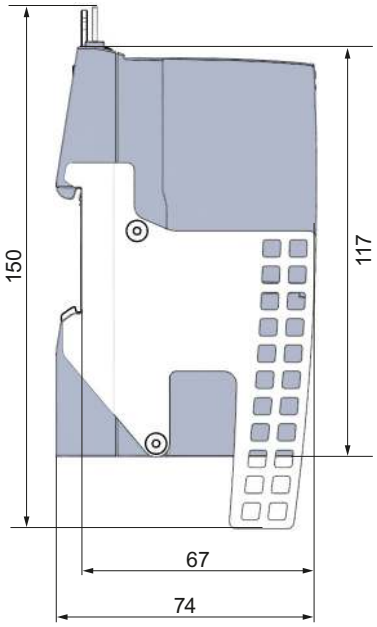

Figure 14-2 Dimension drawing CPU 1515SP PC2, side view

Spare parts/accessories

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15.1 Accessories/spare parts

Accessories for CPU 1515SP PC2

Table 15-1 Accessories for CPU 1515SP PC2

Description	Article number
BusAdapter/media converter; 1 unit	
• BA 2×FC (PROFINET BusAdapter with FastConnect Ethernet connection)	6ES7193-6AF00-0AA0
• BA 2xLC (BusAdapter 2x LC glass fiber-optic connectors, for PROFINET)	6ES7193-6AG00-0AA0
• BA LC/RJ45 (media converter glass fiber-optic/CU 1x LC FO connector 1x RJ45 connector for PROFINET)	6ES7193-6AG20-0AA0
• BA LC/FC (media converter glass fiber-optic/CU 1x LC FO connector and 1x FastConnect (FC) connector for PROFINET)	6ES7193-6AG40-0AA0
• BA 2xSCRJ (BusAdapter 2 SCRJ FO connectors, for PROFINET)	6ES7193-6AP00-0AA0
• BA SCRJ/RJ45 (media converter fiber-optic CU 1x SCRJ FO connector and 1x RJ45 connector for PROFINET)	6ES7193-6AP20-0AA0
• BA SCRJ/FC (media converter fiber-optic CU 1x SCRJ FO connector and 1x FastConnect (FC) connector for PROFINET)	6ES7193-6AP40-0AA0
• BA 2×RJ45 (PROFINET BusAdapter with standard Ethernet socket)	6ES7193-6AR00-0AA0
• BA-Send 1xFC (1x FastConnect connector for ET-Connection)	6ES7193-6AS00-0AA0
• BA 2xM12 (2 x M12 push-pull sockets, D coding, also suitable for M12 standard, for PROFINET)	6ES7193-6AM00-0AA0
Server module; 1 unit	6ES7193-6PA00-0AA0
Strain relief for CPU 1515SP PC2	A5E32291462
SIMATIC IPC Service USB flash drive 8 GB (SLC), pre-installed BIOS-MANAGER V3.3, Image/Partition Creator V3.3 and installation CD	6AV7672-8JD01-0AA0
SIMATIC IPC Service USB flash drive 16 GB, USB3.0, pre-installed BIOS-MANAGER V3.3, Image/Partition Creator V3.4 and installation CD	6AV7672-8JD02-0AA0
SIMATIC IPC DiagMonitor software	6ES7648-6CA05-0YX0
SIMATIC IPC accessories DisplayPort cable, length: 3 m	6AV7860-0DH30-0AA0
SIMATIC IPC accessories DisplayPort cable, length: 5 m	6AV7860-0DH50-0AA0
DisplayPort cable, length: 5 m, E74020-C AWM Style 20276, 80°C, 30 V, VW-1 (with integrated ferrite cores at both ends)	-
SIMATIC PC, DisplayPort according to DVI-I for onboard graphics	6ES7648-3AF00-0XA0
Reference identification label, sheet with 16 labels, 10 units	6ES7193-6LF30-0AW0
Mounting rails, tin-plated steel strip	
• Length: 483 mm	6ES5710-8MA11
• Length: 430 mm	6ES5710-8MA21

Description	Article number
• Length: 830 mm	6ES5710-8MA31
• Length: 2000 mm	6ES5710-8MA41

Online catalog

Additional article numbers can be found on the Internet in the online catalog and online ordering system (https://mall.industry.siemens.com).

Appendix

A

A.1 Siemens Industry Online Support

You can find current information on the following topics quickly and easily here:

- **Product support**
  All the information and extensive know-how on your product, technical specifications, FAQs, certificates, downloads, and manuals.
- **Application examples**
  Tools and examples to solve your automation tasks – as well as function blocks, performance information and videos.
- **Services**
  Information about Industry Services, Field Services, Technical Support, spare parts and training offers.
- **Forums**
  For answers and solutions concerning automation technology.
- **mySupport**
  Your personal working area in Industry Online Support for messages, support queries, and configurable documents.

This information is provided by the Siemens Industry Online Support in the Internet (https://support.industry.siemens.com/cs/de/en/).

A.2 Industry Mall

The Industry Mall is the catalog and order system of Siemens AG for automation and drive solutions on the basis of Totally Integrated Automation (TIA) and Totally Integrated Power (TIP).

You can find catalogs for all automation and drive products on the Internet.

See also

Industry Mall (https://mall.industry.siemens.com)

A.3 Troubleshooting

Problem	Possible cause	Remedy
CPU 1515SP PC2 does not work.	CPU 1515SP PC2 is not supplied with power.	Check the power supply.
Time and/or date of the CPU 1515SP PC2 not correct.	CPU 1515SP PC2 was not connected for more than 6 weeks.	Check the settings in Windows.
USB device is not working.	USB power supply is overloaded.	Use an external power supply for the USB device (see section Application planning (Page 38)).

List of abbreviations

B

B.1 Abbreviations

Abbreviation	Term	Meaning
AC	Alternating current	Alternating current
ALM	Automation License Manager	Tool for managing license keys in STEP 7
BIOS	Basic Input Output System	Basic Input Output System. A set of important software routines used after the startup of the CPU to load the operating system and to provide the routines for data exchange between hardware components.
CE	Communauté Européenne	CE label
CFast	CompactFlash ATA Serial Transfer	Memory card
CoA	Certificate of Authenticity	Certificate of Authenticity, label with Microsoft Windows "Product Key"
CoL	Certificate of License	Certificate of License for the SIMATIC software loaded
DC	Direct current	DC current
DPP	Dual-mode DisplayPort	Interface for transfer of image and video data for monitors
ESD	Components sensitive to electrostatic charge	
EN	European standard	
GbE	Gigabit Ethernet	
GRUB / GRUB2DOS	GRand Unified Bootloader	Boot Manager
HMI	Human Machine Interface	User interface
IEC	International Electrotechnical Commission	
IM	Interface module	The interface module connects the ET 200SP distributed I/O system with the IO controller and exchanges data with the I/O modules via the backplane bus.
LAN	Local Area Network	Computer network that is limited to a local area.
LED	Light Emitting Diode	Light emitting diode
LLDP	Link Layer Discovery Protocol	Protocol that enables the exchange of information between adjacent devices.
MMC	Multi Media Card	Memory card
NTFS	New Technology File System	File system that offers targeted access protection at the file level.
NVRAM	Non-Volatile Random-Access Memory	Non-volatile data memory that is RAM-based, the data content of which is retained without external power supply.
PC	Personal computer	
PELV	Protective Extra Low Voltage	PELV, previously called "extra low voltage with safe isolation", is a protective measure against electrical shock. See EN 50178.
PN	PROFINET	
PG	Programming device	Compact programming device which meets the special requirements of industry. The PG is fully equipped for programming SIMATIC PLCs.

Abbreviation	Term	Meaning
PS	Power supply	Power supply
PT	Power Tags	Process tags; tags enable data exchange between the components of an automation process, for example, between the HMI device and the controller.
RAM	Random Access Memory	Main or work memory of a computer with direct access, allowing read access to data and editing.
RT	Runtime	
SD	Secure Digital card	Memory card
SELV	Safety Extra Low Voltage	Safety Extra Low Voltage; electrical circuit in which the voltage cannot exceed 30 V AC (RMS), 42.4 V AC peak or 60 V DC under NORMAL CONDITIONS and CONDITIONS OF A SINGLE FAULT, including ground faults in other circuits.
UL	Underwriters Laboratories Inc.	
UWF	Unified Write Filter	Configurable write protection under Windows 10, for protection of data carriers (for example, CFast card, internal USB drives, etc.)"Unified Write Filter (UWF)" write filter (Page 62)
USB	Universal Serial Bus	Serial bus system for connecting a computer to external devices.

Glossary

Cold restart

A startup procedure commencing when the CPU is switched on. Upon a cold restart, the system typically performs some basic hardware checks and then loads the operating system from the hard disk into the work memory.

Controller

Integrated hardware and software controlling the operation of a specific internal or I/O device (e.g. keyboard controller).

Device configuration

The device configuration of a PC/programming device includes information on the features and options of the PC/programming device such as memory configuration, drive types, monitor, network address etc. The data is stored in a configuration file and is used by the operating system to load the corresponding device drivers or assign device parameters.

Drivers

Program sections of the operating system. They convert data from the user programs to the specific formats required by the I/O devices (e.g. hard disks, monitors, printers).

Ethernet

Local network (bus structure) for text and data communication with a data transmission rate of 10/100/1000 Mbps.

Image

An image is a copy of hard-disk partitions, for example, which is stored as backup in a file so that it can be restored if necessary.

Interface

- Connection between individual hardware elements such as PCs, programming device, printer or screen by means of physical plug-in connections (cables).
- Connection between different programs to allow them to be used together.

LAN

Local Area Network: LAN refers to a local network consisting of a group of computers and other devices which are distributed over a relatively restricted area and connected through communication lines. The devices connected to a LAN are referred to as nodes. The purpose of networks is the shared use of files, printers or other resources.

License key

The license key is the electronic license stamp of a license. Siemens AG provides a license key for software that is protected by licensing laws.

Operating system

Generic term which describes all functions for controlling and monitoring user program execution and distribution of system resources to the user programs as well as maintenance of the operating mode in cooperation with the hardware.

Power options

The power options can be used to reduce the power consumption of the computer while still keeping it ready for immediate use. In Windows via **Start** > **Control Panel** > **Hardware and Sound** > **Power Options**.

Restart

The restart of the company that is already in operation using, for example, the <Ctrl+Alt+Del> shortcut without switching off the power supply.

ROM

Read Only Memory. ROM refers to a read-only memory where each memory location can be addressed individually. The stored programs or data are hard-coded and are preserved even in the event of a power failure.

S.M.A.R.T

Self-Monitoring, Analysis and Reporting Technology (SMART or S.M.A.R.T.) is an industry standard for storage media. It provides for permanent monitoring of relevant parameters and thus early recognition of pending defects.

SATA

Serial ATA. An interface for hard disk drives and optical drives with serial data transfer.

SETUP (BIOS setup)

A program used to determine information on the device configuration. The device configuration of the CPU 1515SP PC2 is preset. Changes must be made whenever a memory expansion, new modules or drives are to be activated.

USB restore stick

The USB restore stick is a USB stick you create yourself to reset your system partition or the entire hard disk to the delivery state in the event of an error. The USB stick contains all the necessary image files and is bootable.

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