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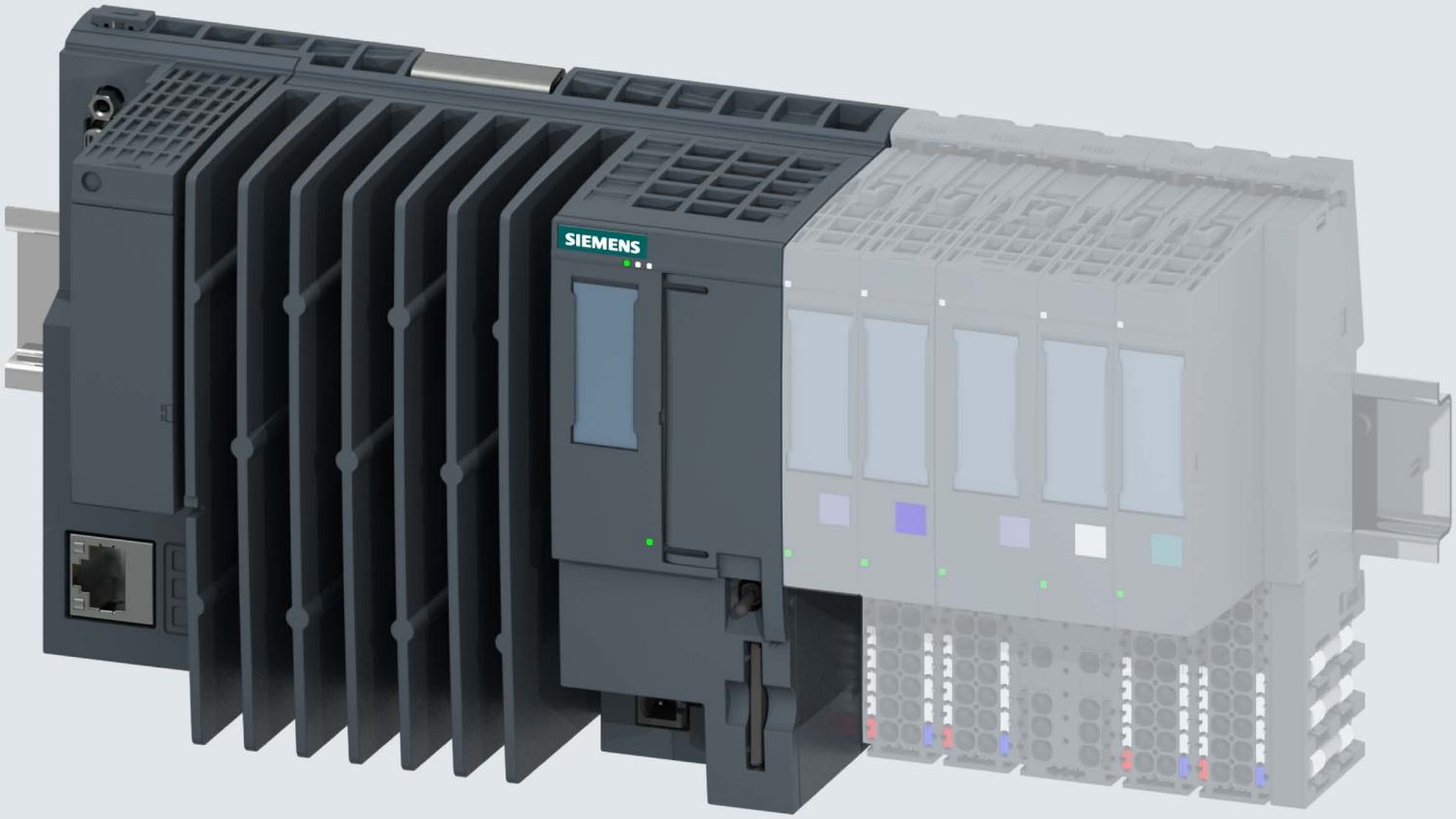

Manual

SIMATIC

ET 200SP Open Controller

CPU 1515SP PC (F) (6ES7677-2xAxx-0xx0)

Edition 05/2017

support.industry.siemens.com

SIEMENS

SIMATIC

ET 200SP Open Controller CPU 1515SP PC (F)

Manual

05/2017

A5E32701806-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

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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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Preface

Purpose of the documentation

This manual supplements the system manual for the ET 200SP distributed I/O system. Functions that generally relate to the system are described in this manual.

The information contained in this product manual and the system / function manuals enable you put the CPU 1515SP PC (F) into operation.

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
- Programming with STEP 7
- PC based automation with an S7-1500 software controller and with WinCC Runtime Advanced
- Basic knowledge of PC technology
- Windows Embedded Standard 7 operating system

Scope of validity of the documentation

This documentation is valid for the following devices:

ET 200SP Open Controller	Article number	
	System version WES7 E 32Bit 4GB RAM	System version WES7 P 64Bit 4GB RAM
CPU 1515SP PC	6ES7677-2AA31-0EB0	6ES7677-2AA41-0FB0
CPU 1515SP PC + HMI 128PT	--	6ES7677-2AA41-0FK0
CPU 1515SP PC + HMI 512PT	--	6ES7677-2AA41-0FL0
CPU 1515SP PC + HMI 2048PT	--	6ES7677-2AA41-0FM0
CPU 1515SP PC F	6ES7677-2FA31-0EB0	6ES7677-2FA41-0FB0
CPU 1515SP PC F + HMI 128PT	--	6ES7677-2FA41-0FK0
CPU 1515SP PC F + HMI 512PT	--	6ES7677-2FA41-0FL0
CPU 1515SP PC F + HMI 2048PT	--	6ES7677-2FA41-0FM0
CPU 1515SP PC, spare part, without CFast card, without software	6ES7677-2AA40-0AA0	

Conventions

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)".

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.

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 only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit (http://www.siemens.com/industrialsecurity).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (http://www.siemens.com/industrialsecurity).

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 (http://www.siemens.com/automation/service&support).

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).

Catalogs for all the products in automation and drives are available on the Internet (https://mall.industry.siemens.com).

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 installed at the user's own risk. You can find more information about our software update service offer under (http://w3.siemens.com/mcms/topics/en/simatic/licenses/software-update-service/Pages/Default.aspx).

Notes on protecting administrator accounts

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

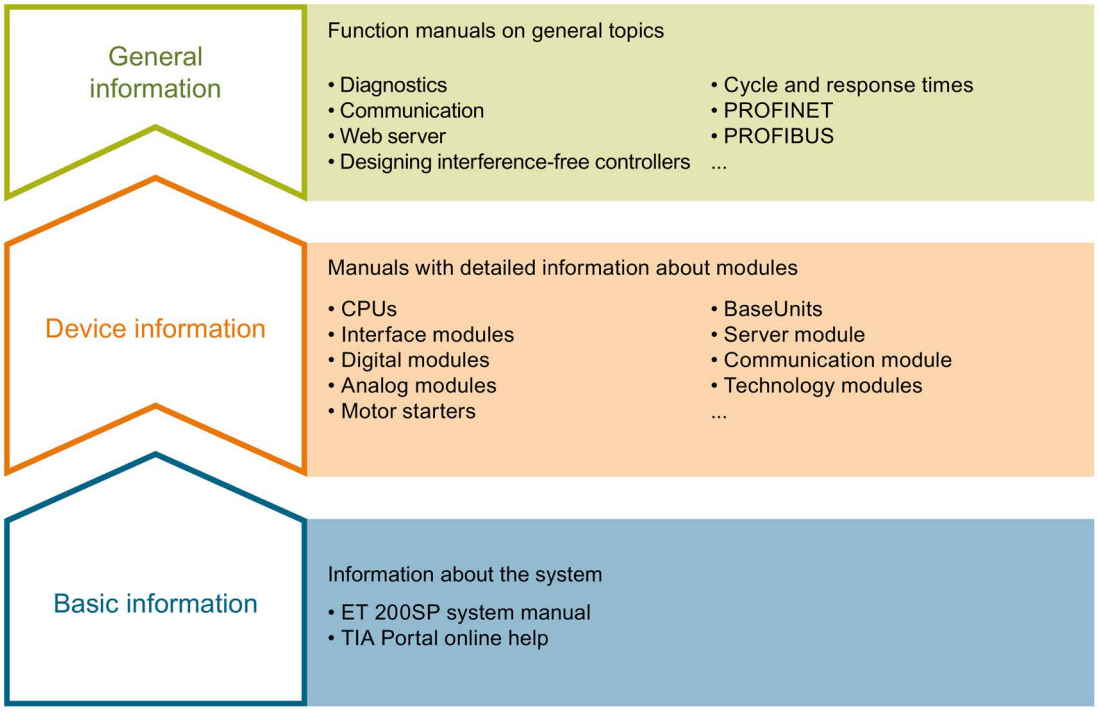
Therefore, make sure that the administrator account is adequately protected to prevent unauthorized changes. To do this, set secure passwords and use a standard user account for regular operation. Other measures, such as the use of security policies, should be applied as required.

Table of contents

Documentation guide

1

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.



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.

Device information

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

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, motion control and OPC UA.

You can download the documentation free of charge from the Internet (http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-et200/Pages/Default.aspx).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (https://support.industry.siemens.com/cs/us/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 (http://support.automation.siemens.com/WW/view/en/84133942).

"mySupport"

With "mySupport", your personal workspace, you make the most of your Industry Online Support.

In "mySupport" you can store filters, favorites and tags, request CAx data and put together your personal library in the Documentation area. Furthermore, your data is automatically filled into support requests and you always have an overview of your current requests.

You need to register once to use the full functionality of "mySupport".

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

"mySupport" - Documentation

In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.
You can export the manual in PDF format or in an editable format.

You can find "mySupport" - Documentation in the Internet (http://support.industry.siemens.com/My/ww/en/documentation).

"mySupport" - CAx Data

In the CAx Data area of "mySupport", you can have access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- 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" - CAx Data in the Internet (http://support.industry.siemens.com/my/ww/en/CAxOnline).

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 in individual products.

You can find the application examples on the Internet (https://support.industry.siemens.com/sc/ww/en/sc/2054).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).
This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one 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 (http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the data and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- Operating mode switchover RUN/STOP
- Localization of the CPU by means of LED flashing
- Reading out CPU error information
- Reading the CPU diagnostic buffer
- Reset to factory settings
- Updating the firmware 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

With SIEMENS PRONETA (PROFINET network analysis), you analyze the plant network during commissioning. PRONETA features two core functions:

- The topology overview independently scans PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a system.

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

1.1 Documentation on CPU 1515SP PC (F)

The following additional documentation is required for using the CPU 1515SP PC (F):

- Operating manual S7-1500 software controller (http://support.automation.siemens.com/WW/view/en/109249299)
- System manual WinCC Advanced V14 (http://support.automation.siemens.com/WW/view/en/109742297)
- System manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293)
- Manual Server module (http://support.automation.siemens.com/WW/view/en/63257531)

Safety notes

2

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

WARNING

Risk of fire

The device is classified for use in the area of Industrial Control Equipment as "Open Type" according to UL508. If overheating occurs, burning material may leak and cause a fire.

For this reason, observe the following information:

- For approval and operation in accordance with UL508, the device must be installed in a housing complying with UL508.
- Install the device in an enclosure that meets the requirements of sections 4.6 and 4.7.3 of the standards EN 60950-1:2006 and IEC/UL/EN/DIN-EN 60950-1.

If you have questions about the validity of installation in the planned environment, please contact our service representatives.

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 with lead to protect the CFast card with the operating system of the CPU 1515SP PC (F) against unauthorized access.

For more information on Industrial Security, refer to the Internet (http://www.siemens.com/industrialsecurity).

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.

For additional information on repairs, see section Sending the device to customer service (Page 99).

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.

See also

Electromagnetic compatibility (Page 105)

2.1 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.

Product overview

3

3.1 Fail-safe option

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 (http://support.automation.siemens.com/WW/view/en/54110126).

You can find information on using the CPU 1505SP (F) software controller in the corresponding product manual (https://support.industry.siemens.com/cs/ww/en/view/109740725) and in the F product information (https://support.industry.siemens.com/cs/ww/en/view/109478599).

3.2 Properties

Article number

6ES7677-2xAxx-0xx0

The complete article number depends on the system version and the ordering option.

View of the module

The figure below shows the CPU 1515SP PC.

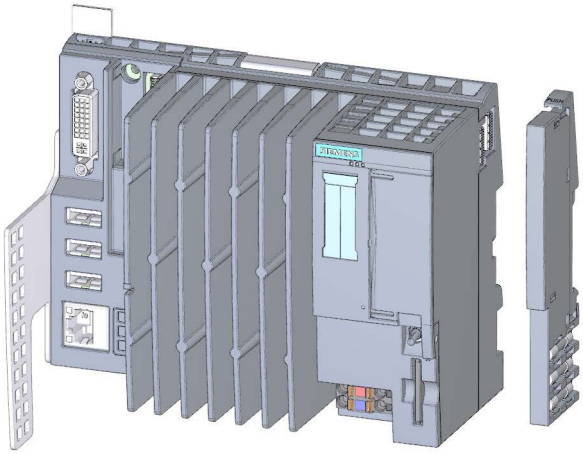


Figure 3-1 CPU 1515SP PC with supplied accessories

Properties

CPU 1515SP PC (F) 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.

CPU 1515SP PC (F) has the following technical properties:

- A removable CFast card with the following pre-installations is used as storage medium:
  - Windows Embedded Standard 7 operating system
  - S7-1500 Software Controller CPU 1505SP (F)
  - Optionally with HMI: WinCC Runtime Advanced as of V14 SP1
- Interfaces
  - An interface for the exchangeable ET 200SP BusAdapters for connection of PROFINET IO (2 ports)
  - An interface for connecting devices using Industrial Ethernet (Gigabit Ethernet)
  - 3 interfaces for USB devices
  - One DVI-I interface 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.
- CPU 1515SP PC (F) is designed for use in industrial environment:
  - Compact design
  - Fan-less operation
  - High robustness
- The CPU 1515SP PC (F) is approved for the degree of protection IP20 and for the installation in a control cabinet.

System versions and ordering options

System version	SIMATIC software	CFast card	Article number
WES7 E 32Bit	CPU 1505SP V2.1	30 GB	6ES7677-2AA31-0EB0
WES7 P 64Bit (multitouch functionality)	CPU 1505SP V2.1	30 GB	6ES7677-2AA41-0FB0
	CPU 1505SP V2.1 & WinCC Runtime Adv. V14 SP1 128PT	30 GB	6ES7677-2AA41-0FK0
	CPU 1505SP V2.1 & WinCC Runtime Adv. V14 SP1 512PT	30 GB	6ES7677-2AA41-0FL0
	CPU 1505SP V2.1 & WinCC Runtime Adv. V14 SP1 2048PT	30 GB	6ES7677-2AA41-0FM0
WES7 E 32Bit	CPU 1505SP F V2.1	30 GB	6ES7677-2FA31-0EB0
WES7 P 64Bit (multitouch functionality)	CPU 1505SP F V2.1	30 GB	6ES7677-2FA41-0FB0
	CPU 1505SP F V2.1 & WinCC Runtime Adv. V14 SP1 128PT	30 GB	6ES7677-2FA41-0FK0
	CPU 1505SP F V2.1 & WinCC Runtime Adv. V14 SP1 512PT	30 GB	6ES7677-2FA41-0FL0
	CPU 1505SP F V2.1 & WinCC Runtime Adv. V14 SP1 2048PT	30 GB	6ES7677-2FA41-0FM0
CPU 1515SP PC, spare part, without CFast card, without software			6ES7677-2AA40-0AA0

3.3 Sample configuration

Configuration

CPU 1515SP PC (F) is mounted on the mounting rail according to EN 60715. A modular system is formed with ET 200SP modules in the central rack.

You can use the CPU 1515SP PC (F) as PROFINET IO controller. The PROFINET IO devices are connected with the SIMATIC BusAdapter BA 2xRJ45 via the ports of the interface X1 PN (LAN).

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 figure below shows an example configuration with CPU 1515SP PC (F).

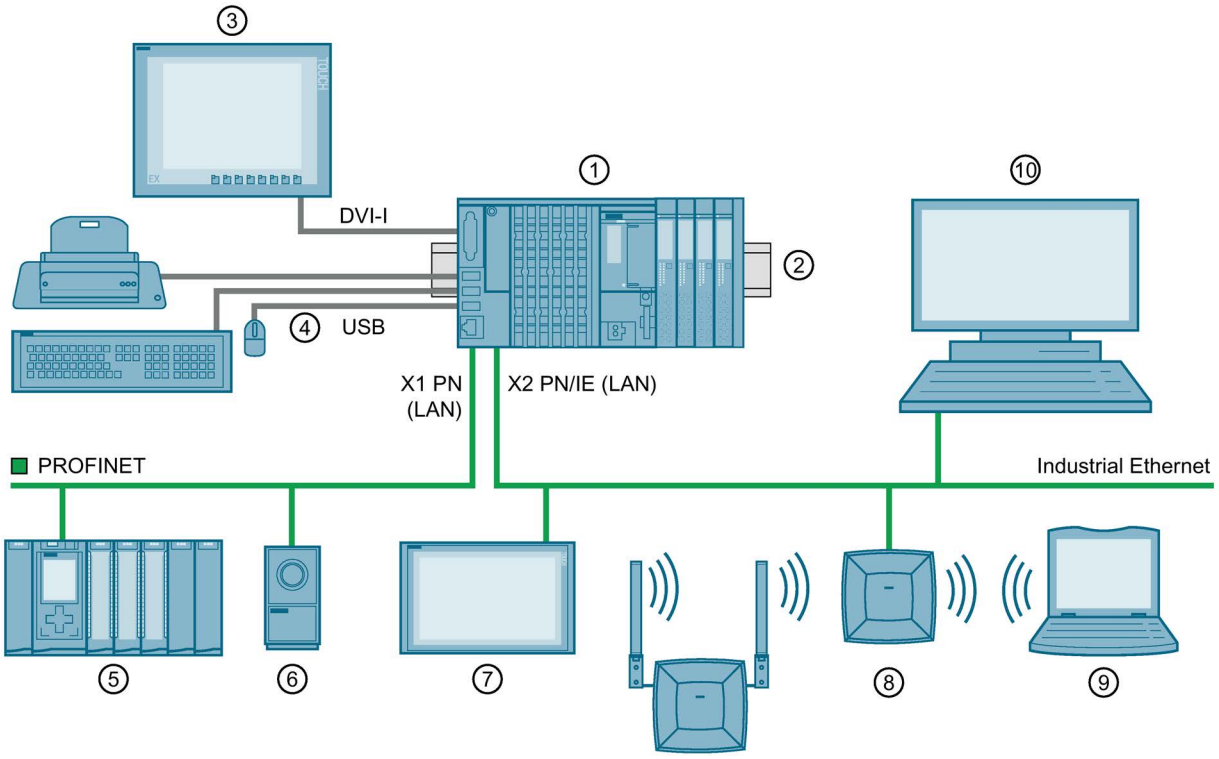


Figure 3-2 Example configuration with the CPU 1515SP PC (F)

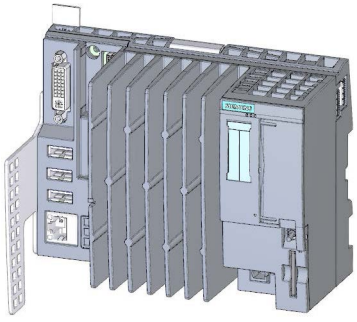
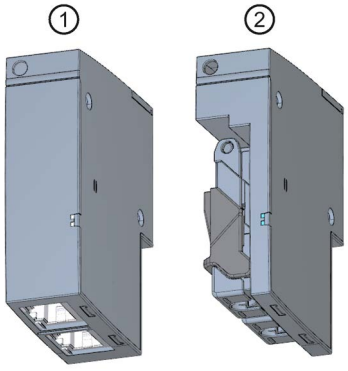
① CPU 1515SP PC (F), I/O module, server module
② Mounting rail
③ Flat Panel - Wide Screen Display
④ USB devices: Keyboard, mouse, printer ...
⑤ PROFINET IO device
⑥ Camera
⑦ Industrial Thin Client ITC
⑧ SCALANCE W786
⑨ Field programming device
⑩ PC/Programming device

3.4 Components

Components of the CPU 1515SP PC (F)

The table below contains an overview of the components of the CPU 1515SP PC (F):

Table 3- 1 Components of the CPU 1515SP PC

Component	Function	Figure
Mounting rail in accordance with EN 60715	The mounting rail is the module carrier for the CPU 1515SP PC (F).	
CPU 1515SP PC (F)	CPU with strain relief and white reference labels	
BusAdapter	The BusAdapter allows free selection of the connection technology for PROFINET IO. The following versions are available for CPU 1515SP PC (F): • For standard RJ45 plug (BA 2×RJ45) ① • For direct connection of the bus cable (BA 2×FC) ②	
Server module	The server module completes the configuration of the CPU 1515SP PC (F) with I/O modules. The server module is included in the CPU's scope of delivery.	

3.5 Configuration of the devices

Front view

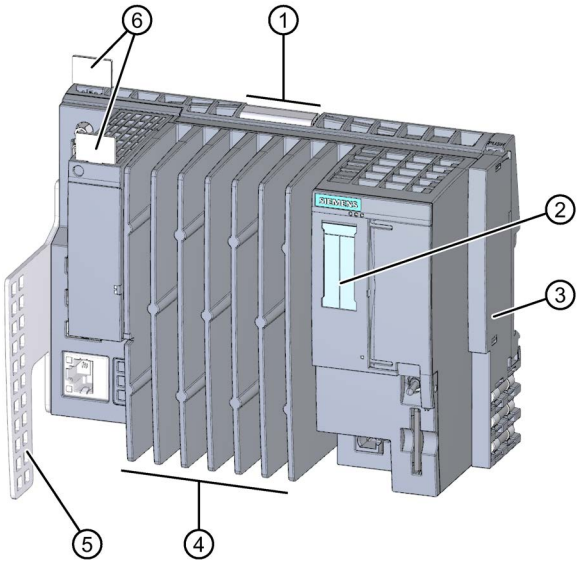


Figure 3-3 Front view CPU 1515SP PC (F)

① Mounting rail release mechanism
② Labeling strips
③ Server module
④ Cooling fins
⑤ Strain relief
⑥ Reference labels

3.6 Operator controls and display elements

Front view of the module

The figure below shows the operator control and connection elements of the CPU 1515SP PC (F).

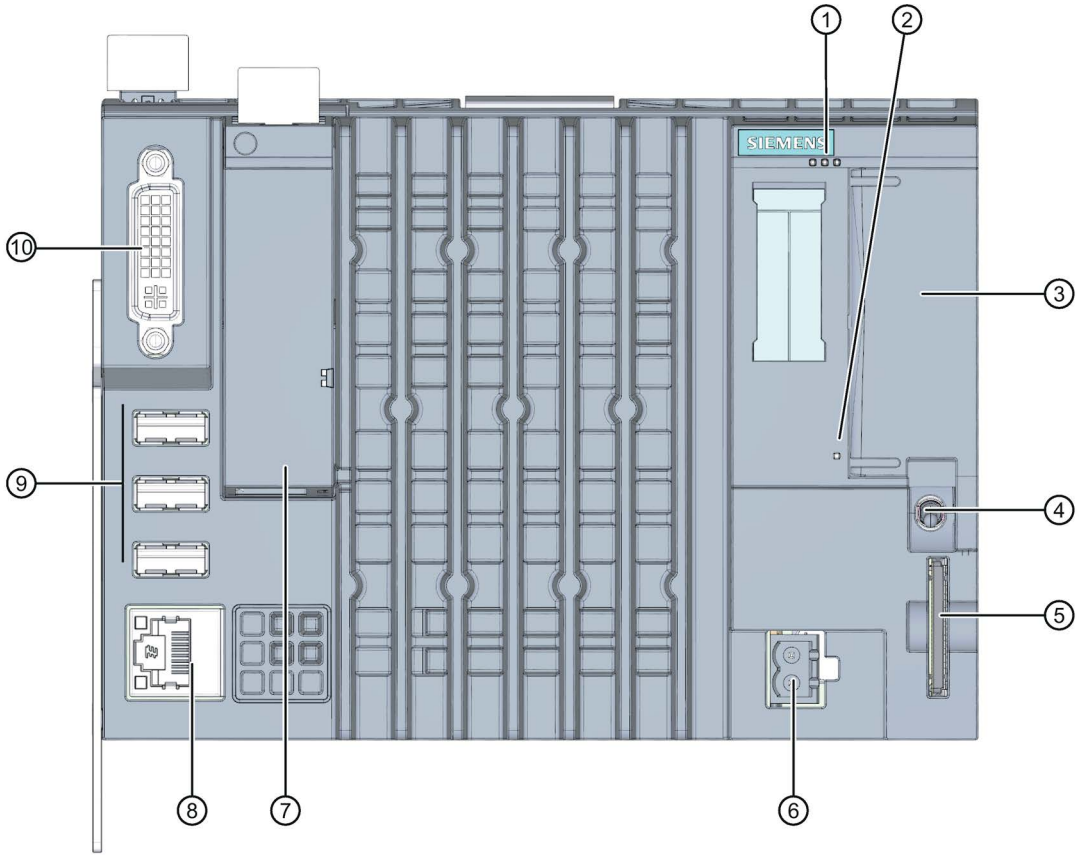


Figure 3-4 View of the CPU 1515SP PC (F)

① LED displays for the current operating mode and diagnostic status of the CPU
② Power LED
③ **X50:** Slot for the CFast card (flash memory), sealable
④ Mode selector
⑤ **X51:** Slot for an optional SD/MMC card
⑥ **X80:** Connector for 24 V DC supply voltage
⑦ **X1 PROFINET (LAN):** Slot for BusAdapter for connection of PROFINET IO; status display for PROFINET
⑧ **X2 PN/IE (LAN):** GbE Ethernet connection with integrated display
⑨ **X60, X61, X62:** 3 USB connections
⑩ **X70 DVI-I:** Connection for monitor

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 PC (F).

Note

Unauthorized access

Seal the cover of the shaft with lead to protect the CFast card with the operating system of the CPU 1515SP PC (F) against 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

Two USB high-current (500 mA) interfaces and one low-current (100 mA) interface can be used at the same time.

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 PC (F) is lasered with the MAC addresses 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 3- 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

CPU 1515SP PC (F) has a 2-pole 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 3- 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 LED displays RUN and STOP display the **actual** operating state of the CPU 1515SP PC (F).

[2] See the S7-1500 software controller manual

3.7 Scope of delivery

3.7.1 Unpacking the device

When unpacking

When unpacking, make sure to check the following:

- Check packaging and contents for visible damage from transport.
- Check the delivery for completeness.
  Please inform your Siemens contact partner should you determine damages from transport or 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.

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). 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 for approximately 12 hours or 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.

Identification data

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

Make a note of the following data for your devices:

- The article number of the CPU 1515SP PC (F) is located on the order form.
- Depending on the scope of delivery, the "Certificate-of-License" is included in the license verification for the S7-1500 software controller and for WinCC Runtime Advanced V14 SP1.
- The "Microsoft Windows Product Key" can be found on the "Certificate of Authenticity" label.
- The first and the last MAC addresses are located on the device.

3.7.2 Scope of delivery - System version WES7 E 32Bit 4GB RAM

Note

The designation **CPU 1515SP PC** with the article number 6ES7677-**2AA40-0AA0** is always on the device regardless of the order option.

The following components are included in the scope of delivery of the CPU 1515SP PC:

Order option	**CPU 1515SP PC**	**CPU 1515SP PC (spare part)**
Article number	6ES7677-2AA31-0EB0	6ES7677-2AA40-0AA0
CPU	X	X
Strain relief with fixing screws	X	X
Server module	X	X
30 GB CFast card with the following pre-installations:		
• Windows Embedded Standard 7 E operating system	X	–
• S7-1500 Software Controller CPU 1505SP	X	–
• WinCC RT Advanced as of V14 SP1	–	–
Restore DVD for image restore	X	–
"Documentation and Drivers" DVD	X	–
Windows-Certificate of Authenticity (CoA)	X	–
Certificate of License (COL)	X	–
USB stick with SIMATIC license keys	X	–
Product information	X	–

The following components are contained in the scope of delivery of the CPU 1515SP PC F:

Order option	**CPU 1515SP PC F**
Article number	6ES7677-2FA31-0EB0
CPU	X
Strain relief with fixing screws	X
Server module	X
30 GB CFast card with the following pre-installations:	
• Windows Embedded Standard 7 E operating system	X
• S7-1500 Software Controller CPU 1505SP F	X
• WinCC RT Advanced as of V14 SP1	–
Restore DVD for image restore	X
"Documentation and Drivers" DVD	X
Windows-Certificate of Authenticity (CoA)	X
Certificate of License (COL)	X
USB stick with SIMATIC license keys	X
Product information	X

3.7.3 Scope of delivery - System version WES7 P 64Bit 4GB RAM

Note

The designation **CPU 1515SP PC** with the article number 6ES7677-**2AA40-0AA0** is always on the device regardless of the order option.

The following components are included in the scope of delivery of the CPU 1515SP PC:

Order option	**CPU 1515SP PC**	**CPU 1515SP PC + HMI**	**CPU 1515SP PC (spare part)**
Article number	6ES7677-2AA41-0FB0	6ES7677-2AA41-0FK0 HMI 128PT 6ES7677-2AA41-0FL0 HMI 512PT 6ES7677-2AA41-0FM0 HMI 2048PT	6ES7677-2AA40-0AA0
CPU	X	X	X
Strain relief with fixing screws	X	X	X
Server module	X	X	X
30 GB CFast card with the following pre-installations:			
• Windows Embedded Standard 7 P operating system	X	X	–
• S7-1500 Software Controller CPU 1505SP	X	X	–
• WinCC RT Advanced as of V14 SP1	–	X	–
Restore DVD for image restore	X	X	–
"Documentation and Drivers" DVD	X	X	–
Windows Certificate of Authenticity (CoA)	X	X	–
Certificate of License (CoL)	X	X	–
USB stick with SIMATIC license keys	X	X	–
Product information	X	X	–

The following components are contained in the scope of delivery of the CPU 1515SP PC F:

Order option	CPU 1515SP PC F	CPU 1515SP PC F + HMI
Article number	6ES7677-2FA41-0FB0	6ES7677-2FA41- • 0FK0 HMI 128PT • 0FL0 HMI 512PT • 0FM0 HMI 2048PT
CPU	X	X
Strain relief with fixing screws	X	X
Server module	X	X
30 GB CFast card with the following pre-installations:		
• Windows Embedded Standard 7 P operating system	X	X
• S7-1500 Software Controller CPU 1505SP F	X	X
• WinCC RT Advanced as of V14 SP1	–	X
Restore DVD for image restore	X	X
"Documentation and Drivers" DVD	X	X
Windows Certificate of Authenticity (CoA)	X	X
Certificate of License (CoL)	X	X
USB stick with SIMATIC license keys	X	X
Product Information	X	X

Installing

4

4.1 Basics

Introduction

The CPU 1515SP PC (F) is an open operation resource. This means that you may only install it in enclosures, cabinets or electrical operating areas. These housings, cabinets or electrical operating areas must only be accessible with a key or tool. Access may only be possible for instructed or authorized personnel.

Installation location

CPU 1515SP PC (F) must be installed in a suitable enclosure or suitable control cabinet with at least IP54 degree of protection according to EN 60529 and the ambient conditions for the operation of the equipment must be taken into consideration.

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.

The restrictions regarding ambient temperature and maximum configuration apply to the CPU 1515SP PC (F) depending on the mounting position.

NOTICE
Damage to the modules Modules can be damaged if exposed to ambient temperatures higher than permitted. The following ambient temperatures must not be exceeded during operation: • Horizontal mounting – 60 °C for an installation with up to 32 I/O modules. – 55 °C for an installation with up to 64 I/O modules. • Vertical mounting – 50 °C for an installation with up to 32 I/O modules.

For more detailed information, refer to section Mechanical and climatic ambient conditions (Page 108)

Mounting rail

CPU 1515SP PC (F) is mounted on a mounting rail according to EN 60715 (35 × 7.5 mm and/or 35 × 15 mm).

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 Accessories/spare parts (Page 133).

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.

Check whether the mounting rails meet the requirements for a protective conductor.

Minimum clearances

Maintain the following minimum clearances when installing or dismantling the CPU 1515SP PC (F).

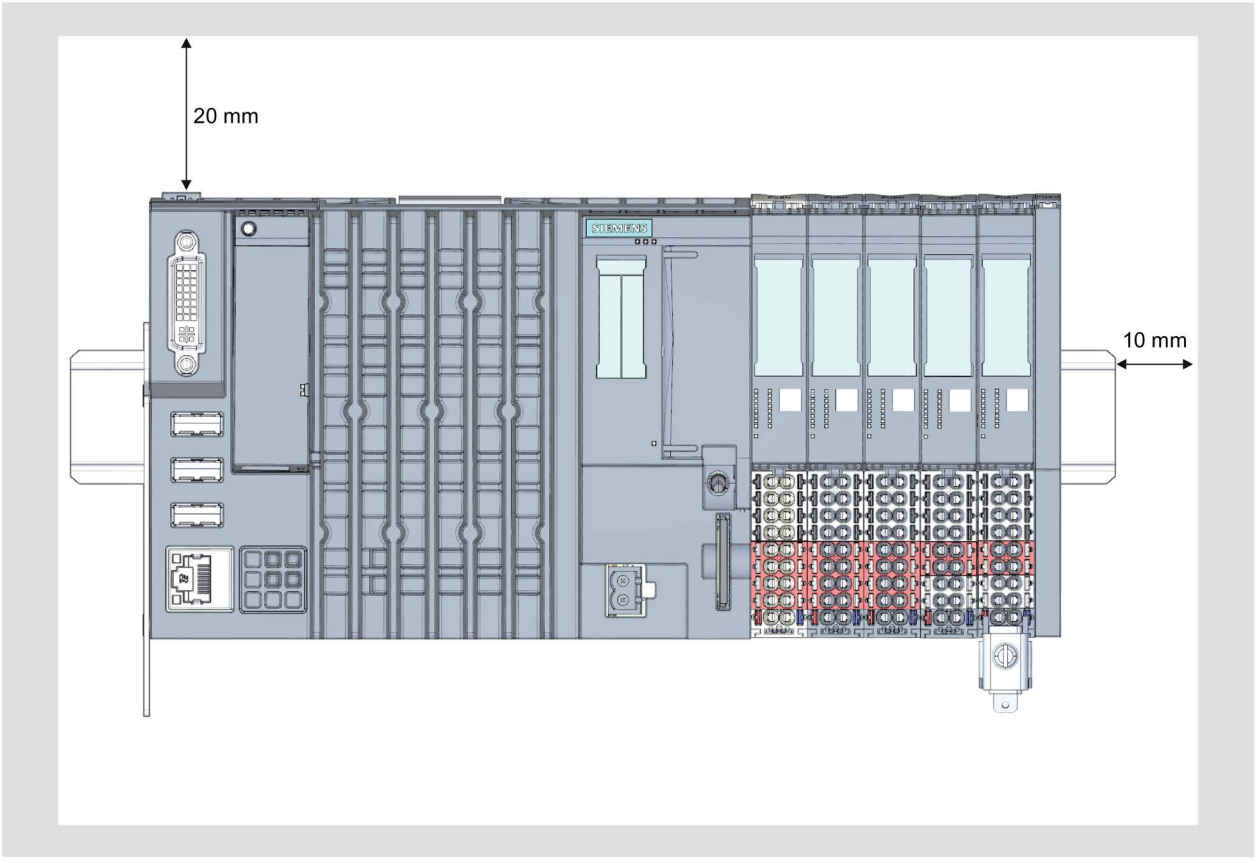


Figure 4-1 Minimum clearances

Installation rules

- After the CPU 1515SP PC (F) there is a BaseUnit BU..D with incoming supply voltage L+ (light 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 (http://support.automation.siemens.com/WW/view/en/84133942).
- The server module completes the installation.

Note

Only install the CPU 1515SP PC (F) when the power supply is switched off.

4.2 Hardware configuration

Maximum mechanical configuration

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

Table 4- 1 Maximum mechanical configuration

Properties	Rule
Number of modules	• Horizontal mounting – 0 to 60 °C ambient temperature: a maximum of 32 I/O modules **and** USB load – 0 to 55 °C ambient temperature: a maximum of 64 I/O modules **and** USB load • Vertical mounting – 0 to 50 °C ambient temperature: a maximum of 32 I/O modules **and** USB load
Backplane bus length	Maximum 1 m mounting width (without CPU 1515SP PC (F), 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

In case of maximum configuration with the CPU 1515SP PC (F), the USB load must also be taken into consideration:

- Horizontal mounting
  - Ambient temperature of 0 to 60 °C with maximum 32 I/O modules **and** 3 x 100 mA USB load
  - Ambient temperature of 0 to 55 °C with maximum 64 I/O modules **and** 2 x 500 mA + 1 x 100 mA USB load
- Vertical mounting
  - Ambient temperature of 0 to 50 °C with maximum 32 I/O modules **and** 3 x 100 mA USB load

Address space

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

4.3 Installing CPU 1515SP PC (F)

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

Fasten the strain relief at the upper and lower left side of the CPU 1515SP PC (F) with the supplied screws.

Installing CPU 1515SP PC (F)

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.

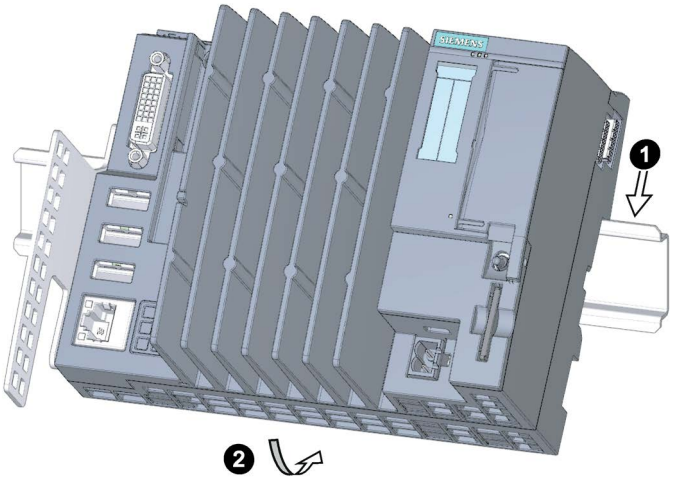


Figure 4-2 Installing CPU 1515SP PC (F)

Disassemble CPU 1515SP PC (F)

The BaseUnits with the I/O modules are located to the left of the CPU 1515SP PC (F):

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 in parallel to the left until it comes off the remaining 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 PC (F).

Connection

5

5.1 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 (http://support.automation.siemens.com/WW/view/en/58649293) and in the function manual Designing interference-free controllers (http://support.automation.siemens.com/WW/view/en/59193566).

NOTICE

Fault caused by I/O devices

The connection of I/O devices can lead to faults on the device.

Injury to persons and damage to the machine or plant could result.

Note the following when connecting I/O devices:

- Read the documentation related to the I/O devices. Follow all instructions given in the documentation.
- Only connect I/O devices which are suitable for use in industrial environments according to EN 61000-6-2/EC 61000-6-2.
- You may only connect hot-plug capable I/O devices when the power supply is switched off.

Note

Feedback through USB devices

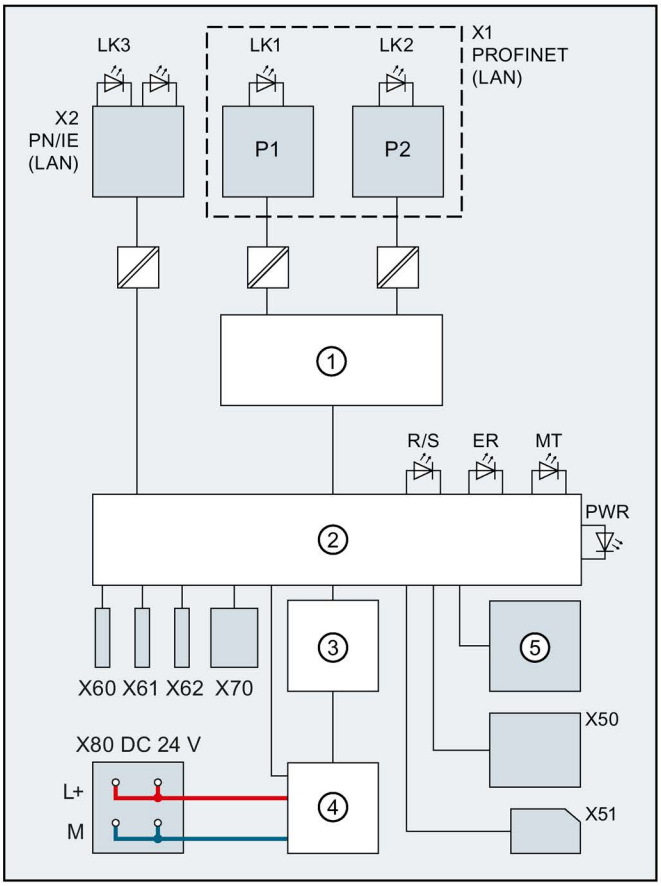
If USB devices are connected which - contrary to the USB 2.0 specification - feed voltage back to the host interface, the startup of the CPU 1515SP PC (F) is not ensured upon power-up.

Regenerative feedback is generally not permitted.

5.2 Terminal and block diagram

Block diagram

The figure below shows the block diagram of the CPU 1515SP PC (F).



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	USB interface 2.0, 0.5 A	R/S	RUN/STOP LED (yellow/green)
X61, X62	USB interface 2.0, 0.5 A	ER	ERROR LED (red)
X70	DVI-I 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 5-1 Block diagram for CPU 1515SP PC (F)

5.3 Electrical configuration

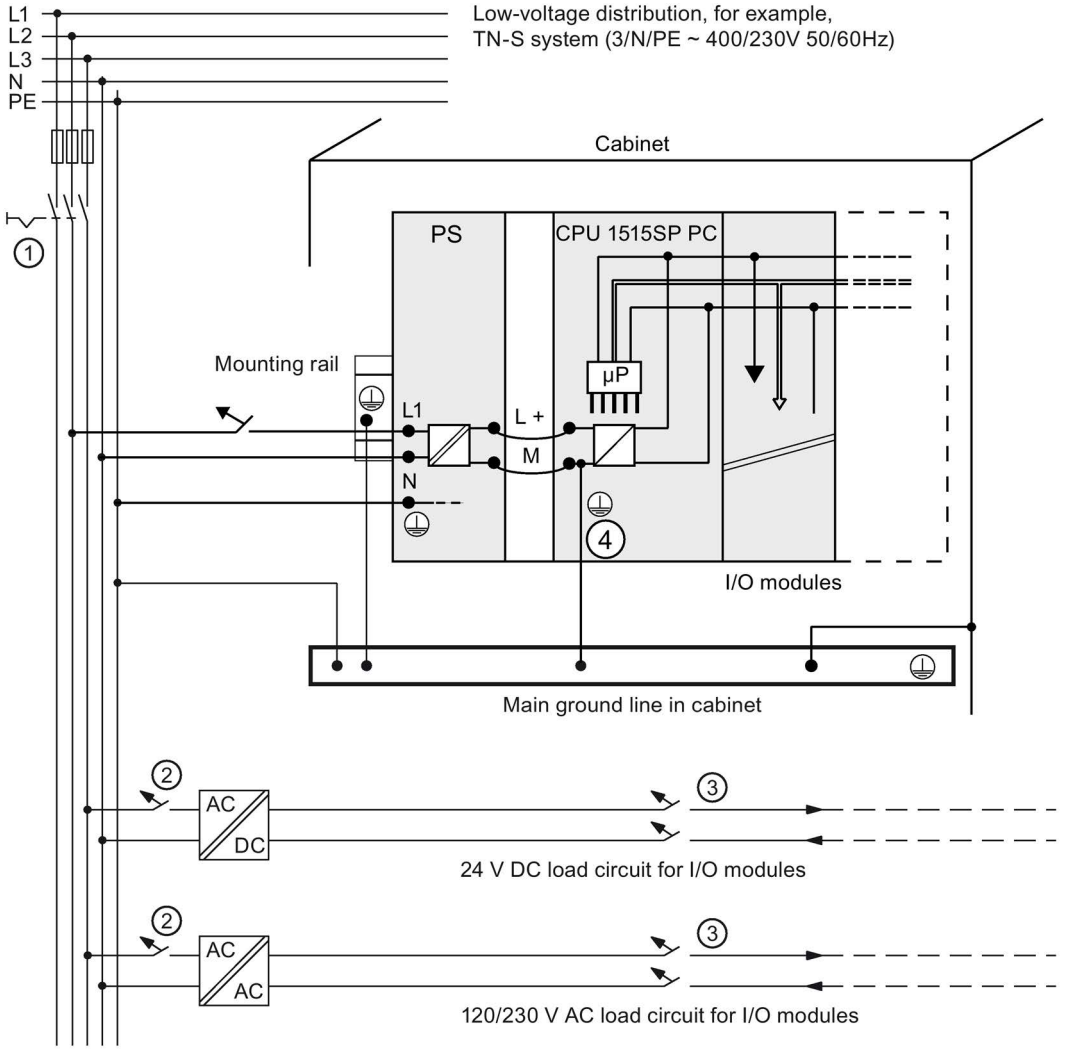
Non-isolated configuration

Note

Unlike the distribution I/O system ET 200SP, only a non-isolated configuration is possible the CPU 1515SP PC (F).

The figure below shows a CPU 1515SP PC (F) in the overall configuration with infeed from a TN-S system. The power supply supplies the CPU 1515SP PC (F) and the load circuits for the 24 V DC modules.

With the CPU 1515SP PC (F) 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 In the CPU 1515SP PC (F), this connection is automatically established.
The represented layout of the power connections does not correspond to the actual layout; it was chosen for demonstration purposes only.

Figure 5-2 Connecting the load voltage reference potential

5.4 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 interface X2 PN/IE (LAN) 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.

5.5 Securing cables

The strain relief for connection lines prevents the USB and the PROFINET connector coming loose from the CPU 1515SP PC (F). 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.

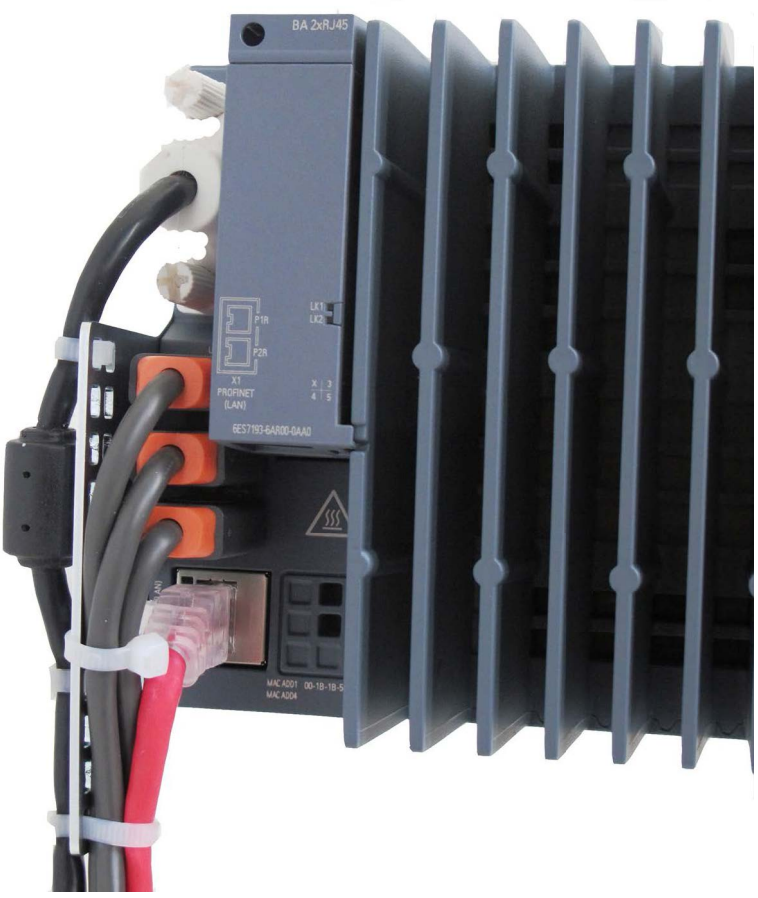


Figure 5-3 Secured cables

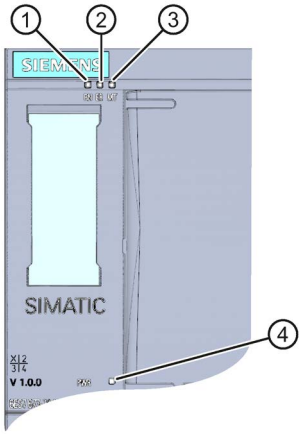
Diagnostics, error and system alarm

6

6.1 Status and error display

LED display

The figure below shows the LED displays of the CPU 1515SP PC (F).



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

Figure 6-1 LED displays of the CPU 1515SP PC (F).

Meaning of the LED displays with active software controller

CPU 1515SP PC (F) has a display of the current operating state and of the diagnostics status (three LEDs).

The following table shows the meaning of the color combinations of the LED displays in connection with the software controller.

Table 6- 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 1515SP PC (F) in the "Windows only" mode No power supply. The software controller of the CPU 1515SP PC (F) has not been downloaded or the software controller of the CPU 1515SP PC (F) is in the operating state Power OFF.
LED off	LED flashes red	LED off	An error has occurred.
LED green	LED off	LED off	Software controller of the CPU 1515SP PC (F) 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.
			CPU defective
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 RUN → STOP)

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

POWER LED

Table 6- 2 POWER LED

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

Commissioning 7

7.1 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 Enhanced Write Filter (EWF) (Page 78).
- Before commissioning, please consider the effects on other devices in the plant.

⚠ CAUTION

Hot surfaces

Risk of burns due to hot surfaces.

During operation, only touch the device with appropriate protective gloves.

NOTICE

Condensation in the device

Damage to the device due to condensation if the temperature between transport or storage and the installation site differs by more than 20 °C (36 °F).

Before commissioning the device, leave it to stand for several hours in the new environment.

NOTICE

Data loss

Data loss may occur if write filters are used incorrectly.

Therefore, note the information on write filters.

Two write filters are available for configuration under Windows Embedded:

- Enhanced Write Filter (Page 78)
- File Based Write Filter (Page 82)

7.2 Initial commissioning

Requirements

The following conditions must be met before you commission the open controller for the first time.

- CPU 1515SP PC (F) is mounted.
- The CFast card is inserted.
- No data carriers are connected via USB.
- The following hardware is available: A monitor, a USB keyboard, a USB mouse

Procedure

1. Connect a monitor via a DVI-I cable.
2. Connect a keyboard and a mouse to the CPU via USB.
3. Connect the power supply.

   → The PWR LED lights up yellow first, then green.

   → The device carries out the hardware initialization.
4. Wait until the Siemens logo disappears from the screen.
5. Follow the instructions on the screen to configure the device

NOTICE
Faulty installation If you change the default values in the BIOS Setup or switch off the device during the installation, the installation will be disrupted and the operating system will not be installed correctly. The operational reliability of the device and the plant is endangered. Do not switch of the device during the entire installation process. Do not change the default values in the BIOS Setup.

Result

- The WES7 operating system is installed.
- WES7 P: The Multitouch functions are available.
- The operating system's start screen is displayed after each startup.
- A login window appears if a password was entered during the initial commissioning.

Initial commissioning an open controller

The basic settings, user name, administrator password and IP address are prompted for during initial power-up of your CPU 1515SP PC (F). 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.

User name, computer name, password

When you enter a "User name", this is suffixed with "-PC" under "Computer name". The computer name must not exceed 15 characters.

Note

This user has administrator rights!

For security reasons, enter a password for this user (administrator).

IP address

The IP address (192.168.1.1) and the subnet mask (255.255.255.0) for the X2 interface are pre-set in the logon dialog.

You use the buttons to make your changes or to retain the pre-set values.

Note

The initial TIA Portal download must be performed using set IP address via the GB Ethernet interface X2 in order that the PROFINET interface X1 and the hardware configuration are correctly assigned.

User "Operator"

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 be able to use the CPU 1515SP PC (F) directly, the Windows "Autologon" is activated for the user "Operator". No password is preset.

Note

When you assign a password, change the entry for the Windows "Autologon" function accordingly in order that the function remains activated.

Administrator rights

You need administrator rights for the following actions:

- Back up the data in the root directory of the C partition.
- Installing the language pack

Screen resolution

In Windows Embedded Standard 7, the values that are determined for the monitor via the DVI-I interface are set for the screen resolution.

7.3 Initial configuration of an Open Controller

Creating the configuration

You have created a new project in the TIA Portal.

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

1. Double-click "Add new device" in the project tree.
2. In "PC-Systeme > SIMATIC S7 Open Controller > ET 200SP Open Controller >", select the "CPU 1515SP PC (F) (+HMI)".
3. Select the appropriate version.

   The configured Open Controller is displayed in the device view.
4. The following components can be seen in the Open Controller:
   - Onboard interface X2 (GB Ethernet Windows interface) that is assigned directly to the PC station (1 port)
   - Replaceable BusAdapter X1, which is directly assigned to the software controller (2 ports)
   - On the right side (behind the plugged modules in the rack): the configured software controller CPU 1505SP (F) and WinCC Runtime Advanced.
5. Insert the server module.
   The server module at the right end of the configuration forms the termination of the CPU with the I/O modules.

Setting the IP addresses:

In the Inspector window under "Properties":

- Onboard interface X2: the configured, specified IP address is identical with the Windows IP address that is set during the first commissioning on the open controller.
- BusAdapter X1: the configured, specified IP address is identical with the IP address that is set during the first commissioning in the panel of the software controller (display application).

Important properties of the Software Controller

Change the properties in the Inspector window under "Properties" if required:

- Selecting startup type
- System diagnostics
- Setting the storage location for retentive data
- Setting up copy protection
- Using the LEDs of the hardware
- Configuring the Web server
- Assigning interfaces for the communication

Establish HMI connection

1. Right-click the WinCC RT Advanced in the device view.
2. Start the HMI device wizard.
3. Apply all default settings.
   The wizard creates system images for you with the corresponding navigation.
4. Switch to the connection view in the network view.
5. Click on WinCC RT Advanced.
6. Drag (with mouse button pressed) from the WinCC RT Advanced software to the S7-1500 software controller (for example, CPU 1505SP).
   A network connection is established between the two devices.

Downloading the project to the target system

The complete PC station is downloaded the first time you download the configuration.

1. Select the complete PC system in the device view.
2. Click the "Download to device" button.
3. Make the following settings:
   - Type of connection
   - Specify the interface of the programming device
   - Specify the X2 interface on the Open Controller

Note

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

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

Download and compile the project. The hardware configuration and the first download are now completed.

WinCC RT Advanced

WinCC Runtime Advanced contains all the essential functions for operator control and monitoring of machinery or plants.

Reference

For more information on WinCC RT Advanced, refer to the WinCC Advanced V14 (http://support.automation.siemens.com/WW/view/en/109742297) system manual.

7.4 Installing license keys

Licensing the software

A license key is not required to operate the S7-1500 software controller CPU 1505SP (F) V2.x. The software controller is permanently coupled to your CPU 1515SP PC (F). It is not necessary to input the key via the Automation License Manager!

WinCC RT Advanced requires a product-specific license key. This is located on the supplied USB stick.

Prior to commissioning, you must install the license key for the HMI powertags using the *Automation License Manager (ALM)*.

Perform the licensing directly via the CPU 1515SP PC (F).

Requirements

- Initial commissioning was successfully completed.
- Windows Embedded Standard 7 has started.
- The enhanced write filter **EWF** must be disabled on the CPU 1515SP PC (F).

Installing License keys with local configuration

The *Automation License Manager* is preinstalled on the CPU 1515SP PC (F).

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

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

Using a programming device/PC to install the license keys

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

1. Connect the CPU 1515SP PC (F) to a programming device / PC.
2. Connect the supplied USB stick to the programming device/PC.
3. Select the menu command **Start >SIMATIC >License Management > Automation License Manager**.
4. Select the menu command **Bearbeiten > Rechner verbinden** and enter the IP address of the CPU 1515SP PC (F) (default 192.168.1.1).
5. Drag the license keys from the USB stick to the system partition C: of the CPU 1515SP PC (F).

Saving and securing license keys in the case of restore and repair

Note

Loss of license keys

A SIMATIC license key cannot be copied or duplicated. If you drag the license keys from your USB-Stick to your CPU 1515SP PC (F), no copies are then left on the USB stick.

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 a fault occurs with your license keys on the CPU 1515SP PC (F), contact your local Siemens representative. Make sure to have the "Certificate of License" (CoL) to hand.

Note

The EWF (Page 78) write filter serves to protect your license keys and your configuration.

Reference

For additional information on licenses, refer to the *Automation License Manager* manual. You can find the manual for the CPU 1515SP PC (F) under **Start > All Programs > Siemens Automation > Documentation** and in the Internet (http://support.automation.siemens.com/WW/view/en/56956174).

7.5 Windows Security Center

Warning from the Windows Security Center

A warning from the Windows Security Center appears when you first switch on your device. The Security Center check the status of the device with regard to the main security aspects listed below. If the Security Center finds a problem during this check, it gives recommendations on how to better protect the device.

- Firewall: The Windows firewall contributes to protecting the device by preventing the access of unauthorized users via a network or the Internet. Windows checks whether the device is protected by a software firewall.
  As delivered, the firewall is enabled.
- Antivirus software: Antivirus programs contribute to protecting the device against viruses and other security threats. Windows checks whether a comprehensive up-to-date program is used on the device.
  No antivirus software is installed as delivered.
- Automatic updates: With the help of automatic updates, Windows can routinely check for the latest major updates for the device and install these automatically. In the delivery state, this option is disabled.

Note

To keep Windows up-to-date, enable either the automatic update function of Windows or install updates manually. Before the installation, check the size of the package to be installed and decide if you need the update and if there is sufficient storage space available.

Some updates may make it necessary to use a larger CFast card or to change the partitioning. You can find information on changing the partition size in the Change partitioning (Page 85) chapter.

Configure the Security Center to suit your requirements.

7.6 Switching CPU 1515SP PC (F) on/off

Requirements

Initial commissioning was successfully completed.

Switching on the CPU 1515SP PC

1. Switch on the power supply of the CPU.

   The Boot Manager GRUB4DOS opens.

2. Select the mode in which the CPU 1515SP PC (F) should start:
   - Only with the Windows operating system.
   - With the Windows operating system and the S7-1500 software controller (default).

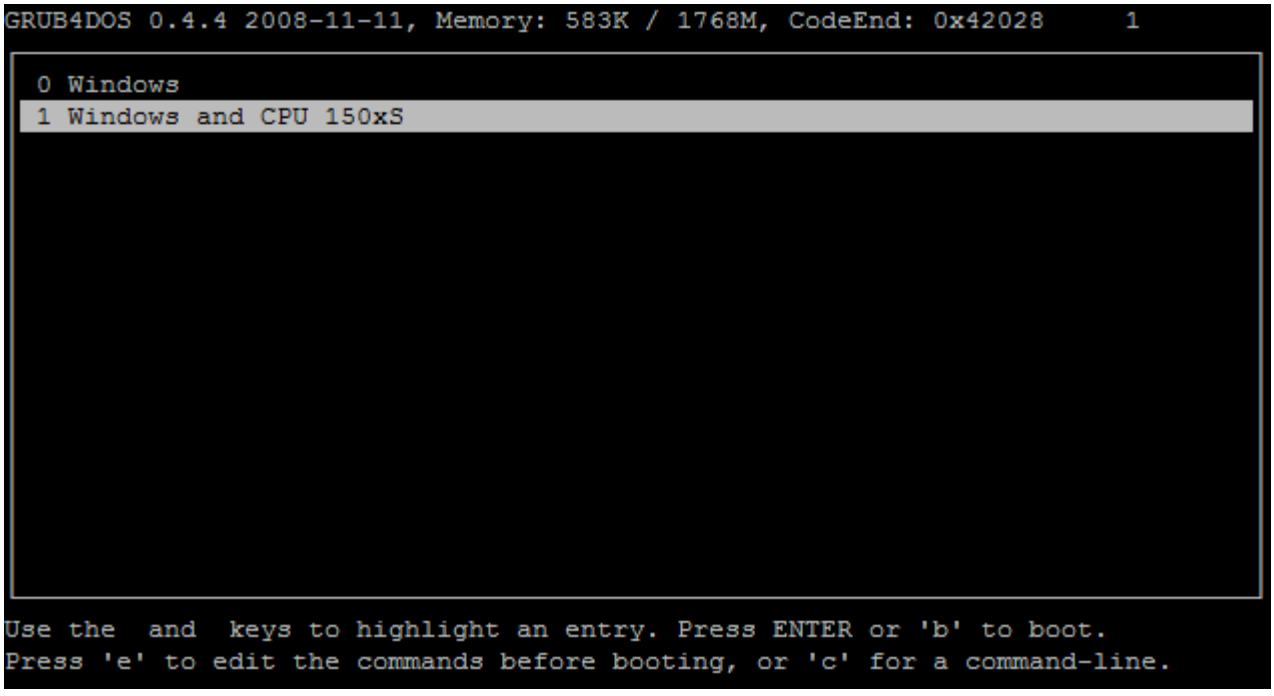


Figure 7-1 Boot Manager GRUB4DOS

Switch off CPU 1515SP PC (F)

1. To switch off the Windows function, use **StartShut down**.

   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.

Functions

8

8.1 Monitoring functions

Introduction

CPU 1515SP PC (F) has monitoring functions that you can use with the corresponding software. The following display, monitoring and control functions are available.

- Temperature monitoring
- Monitoring of drives with SMART functionality
- Operating hours counter (information on the total runtime)

SIMATIC IPC DiagBase

The SIMATIC IPC DiagBase software is contained in the scope of delivery of the CPU 1515SP PC (F).

With the SIMATIC IPC DiagBase software, you use the functions for local monitoring. 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 IPC DiagMonitor software is provided on a CD.

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

Temperature monitoring

Three thermistors monitor the temperature at multiple locations of the CPU 1515SP PC (F):

- 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

8.2 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. Up to 410 KB of data is backed up to non-volatile data memeory by this in the event of power failure. This function can be set on the engineering station in the TIA Portal.

8.3 BIOS description

8.3.1 Introduction

BIOS setup

The BIOS setup is located in the BIOS ROM. The information is stored to the memory of the CPU 1515SP PC (F) via the system configuration.

You can set the following using the Setup:

- The hardware configuration, for example, drive type
- The system properties
- time and date

Note

The American keyboard layout applies in the BIOS.

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.

8.3.2 Starting BIOS setup

Start the setup program as follows:

1. Disconnect the device from the power supply and switch it on again (cold restart).

   The following screen appears in the default setting of the CPU 1515SP PC (F) after it is switched on:

Figure 8-1 BIOS setup

After completion of the startup test, you have the option of starting the SETUP program.

The following BIOS message appears:

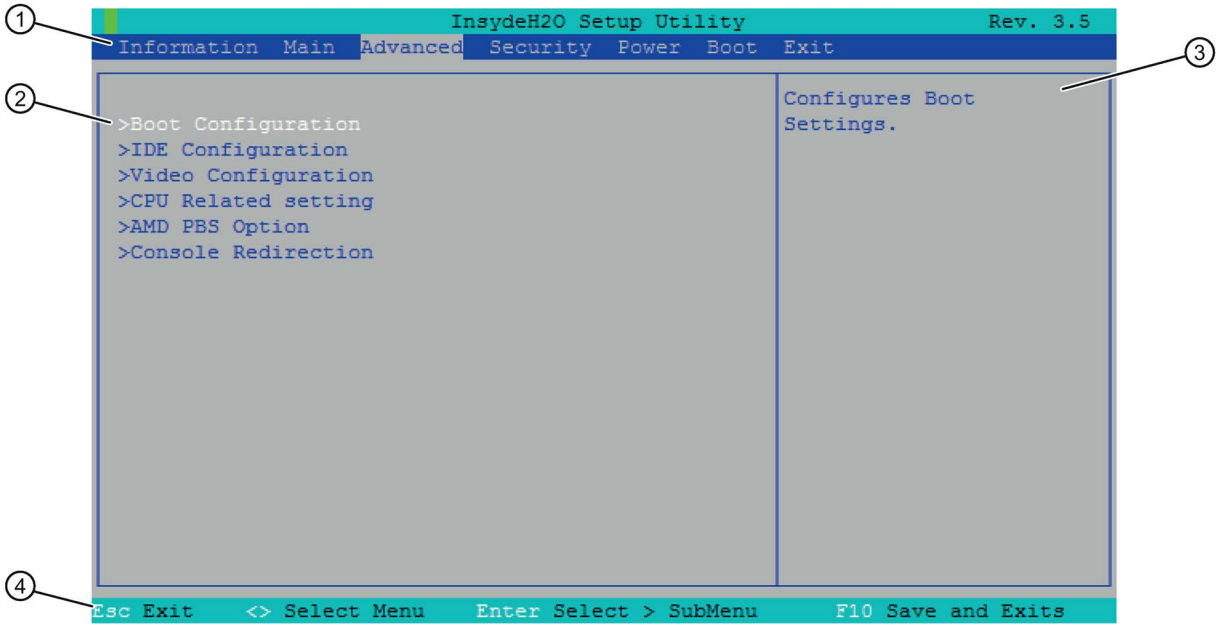
```
Press F2 go to Setup Utility

Press F12 go to Boot Manager
```

2. Press the <F2> button while the message is on the screen.

8.3.3 BIOS setup menus

Overview of BIOS setup

The menus and submenus are shown on the following pages.



① Menu bar
② Selectable submenu
③ Help window
④ Operating line

Figure 8-2 Structure of the BIOS setup menus

Menu structure

In the menu bar ①, you can select between the following menu forms:
[Information] [Main] [Advanced] [Security] [Power] [Boot] [Exit].

In the main window ②, various settings are displayed or submenus selected.

In the Help window ③ of the respective menu, you can find information on the selected setup entry.

The operating line ④ contains notes on operation.

You can use the cursor keys [←] left and [→] right to switch between the menu forms.

Menu	Meaning
Information	Device-specific information, for example, product version
Main	Setting system functions
Advanced	Advanced system configuration
Security	Safety functions, for example, setting a password
Power	Determining the switch-on behavior of the device
Boot	Determining boot options, such as boot priority
Exit	Exiting and saving

8.3.3.1 Information menu

This menu shows the versions of the device-specific functions.

Keep this information at hand for Customer Support when you have technical questions regarding your system.

Example

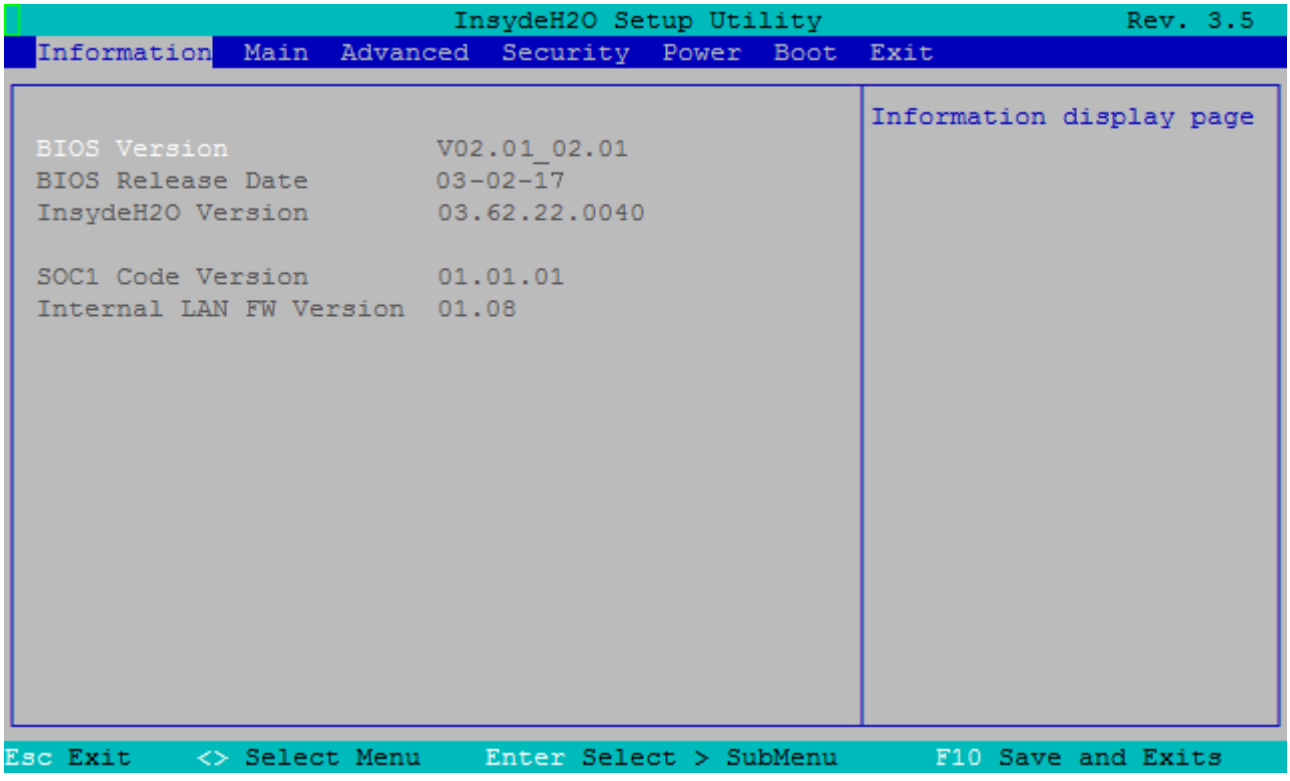


Figure 8-3 Information menu

8.3.3.2 Main menu

Settings in the Main menu

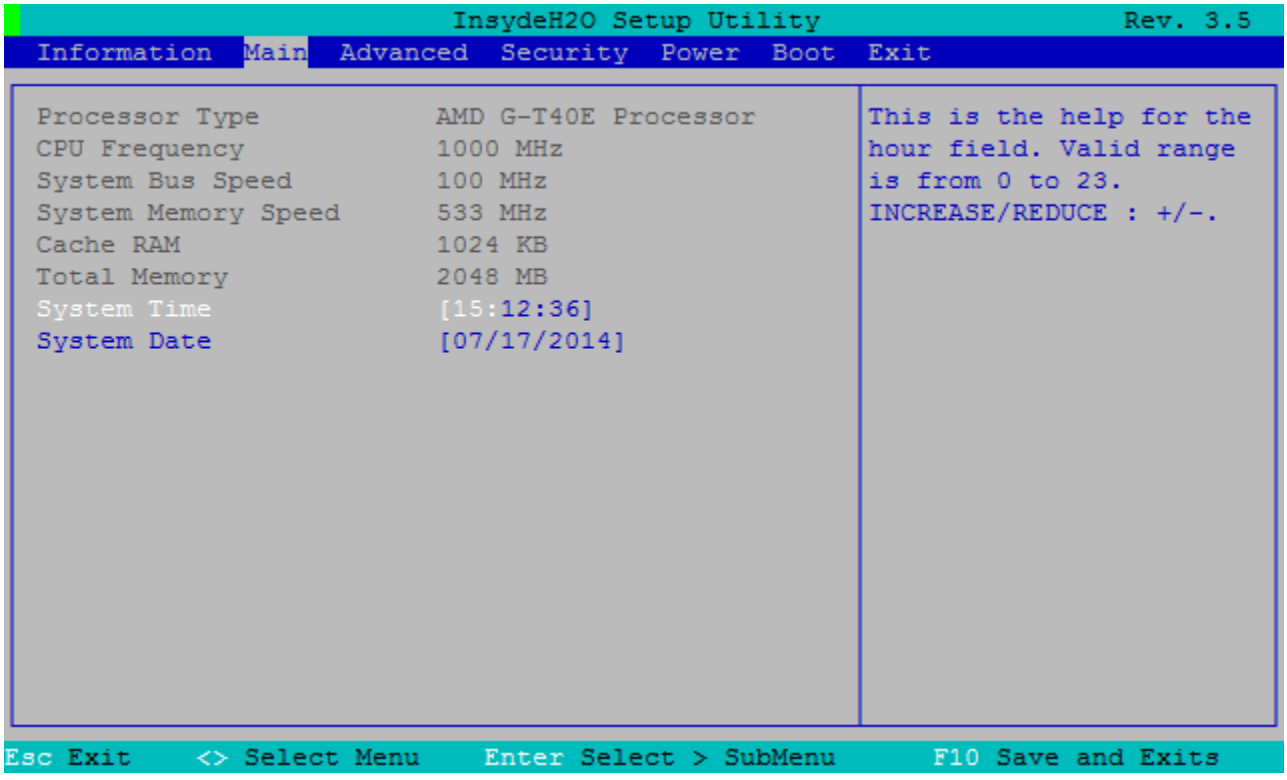


Figure 8-4 Main menu

In the Main menu, you can use the [↑] up and [↓] down arrow keys to select between the following system setting fields:

Array	Meaning
System Time	Displaying and setting the current time
System Date	Displaying and setting the current calendar date

System Time and System Date

System Time and System Date show the current values. After you have selected the corresponding field, you can change the following settings, one after the other, using the [+] and [–] keys:

- For the time of day: Hour: Minute: Second
- For the date: Month/day/year.

You can use the <ENTER> key to switch between the entries within the Date and Time fields (e.g., from hour to minute).

8.3.3.3 Advanced menu

Settings in the Advanced menu

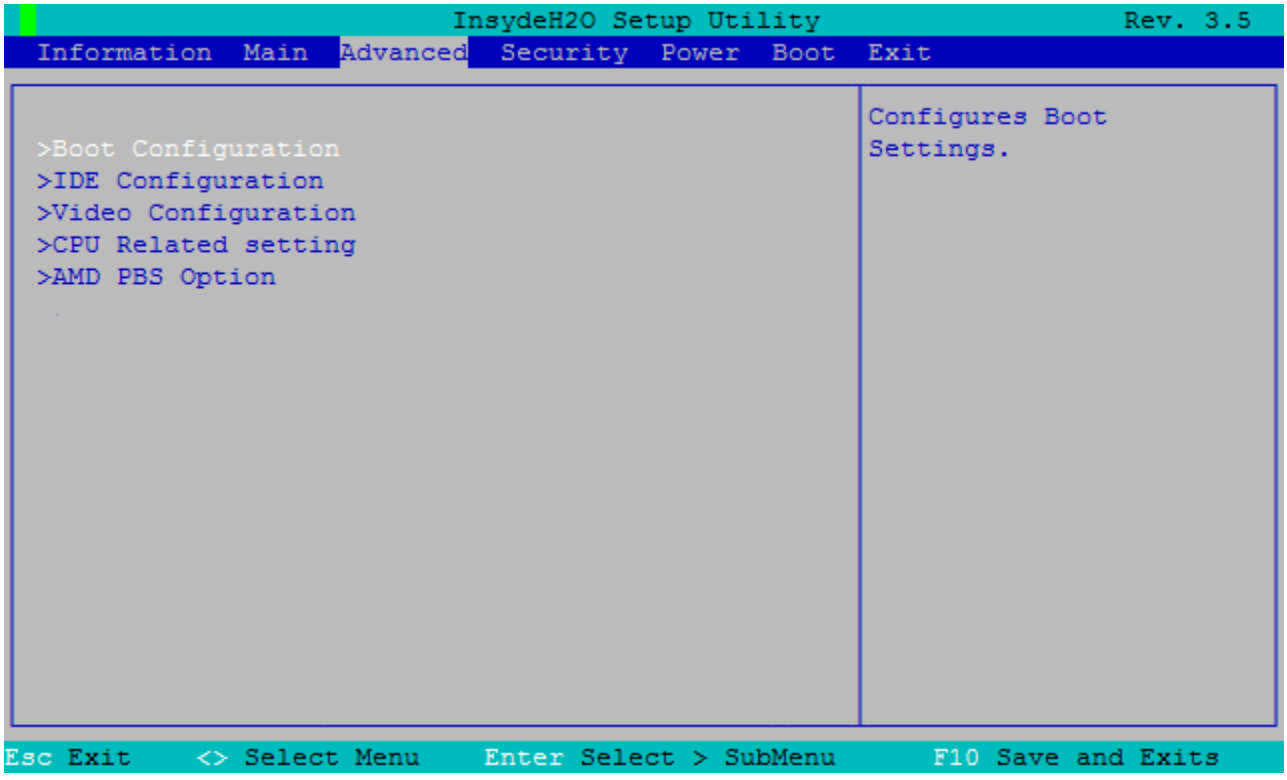


Figure 8-5 Advanced menu

Entry	Meaning
Boot Configuration	Configuring the boot settings
IDE Configuration	Configuring the devices
Video Configuration	Configuring the graphics parameters
CPU Related setting	Configuring CPU parameters
AMD PBS Option	Configuring interfaces

"IDE Configuration" submenu

Entry	Meaning
SATA configure as	Setting the SATA configuration type: IDE, LEGACY IDE, AHCI
Serial ATA Port 0	Serial ATA Port 0 device configuration

"Video Configuration" submenu

Entry	Meaning
UMA Sharing Memory Size (256 MB)	Setting the size of the work memory for the graphics processor. (Unified Memory Architecture; also Shared Memory)

"CPU Related setting" submenu

Entry	Meaning
SVM support	Enabling (Enabled) or disabling (Disabled) Secure Virtual Machine functionality .

"AMD PBS Option" submenu

Entry	Meaning
Internal LAN Controller	Integrated Ethernet interface (10/100/1000 Mbps) X2 PN/IE (LAN)
PXE Boot to INT_LAN	Enabling (Enabled) or disabling (Disabled) internal Southbridge Network Controller.

8.3.3.4 Security menu

Settings in the Security menu

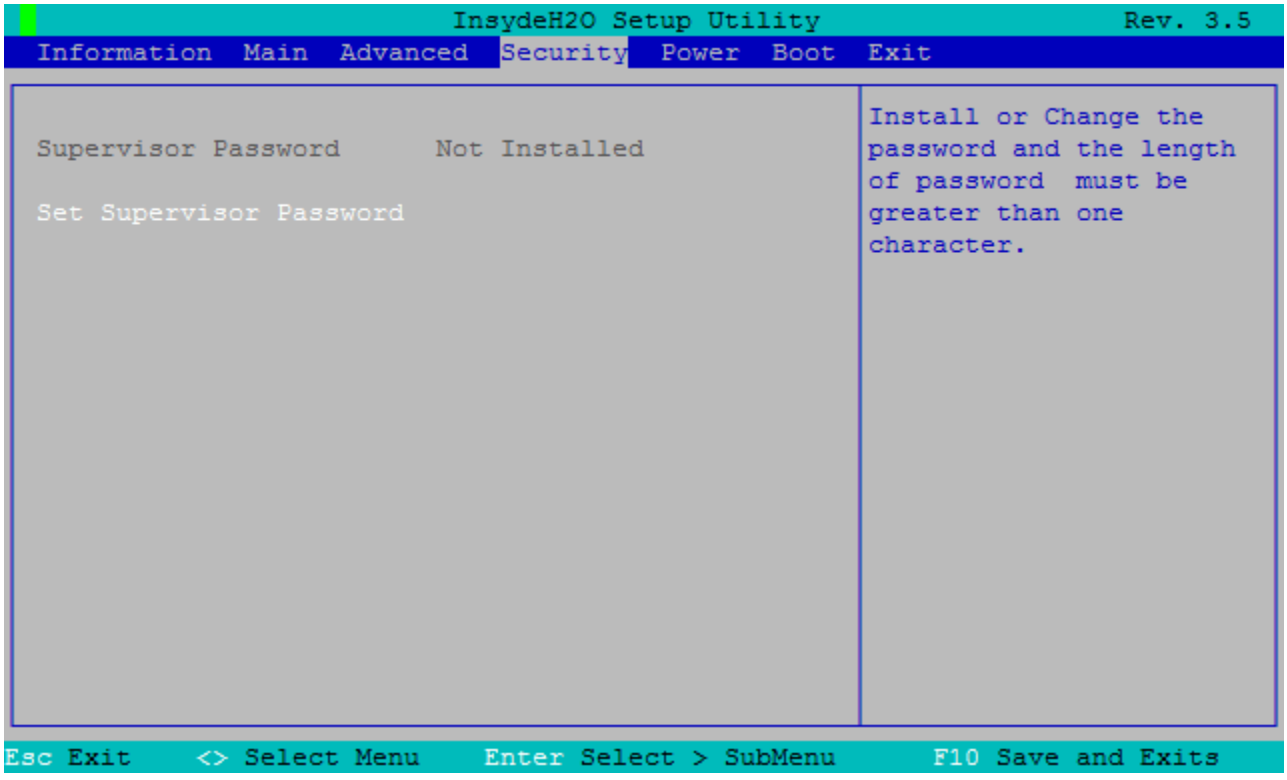


Figure 8-6 Security menu

To protect the CPU 1515SP PC (F) against unauthorized access, assign a password.

Supervisor Password	Installed	Specific setup fields, including the Supervisor password, can be modified by the user.
	Not installed	Password is disabled.
Set Supervisor Password	This field opens a dialog for assigning or changing the password.	

Note

Overwriting of the Supervisor password during a BIOS update

A BIOS update overwrites the password.

After a BIOS update, set up the password again.

8.3.3.5 Power menu

Settings in the Power menu

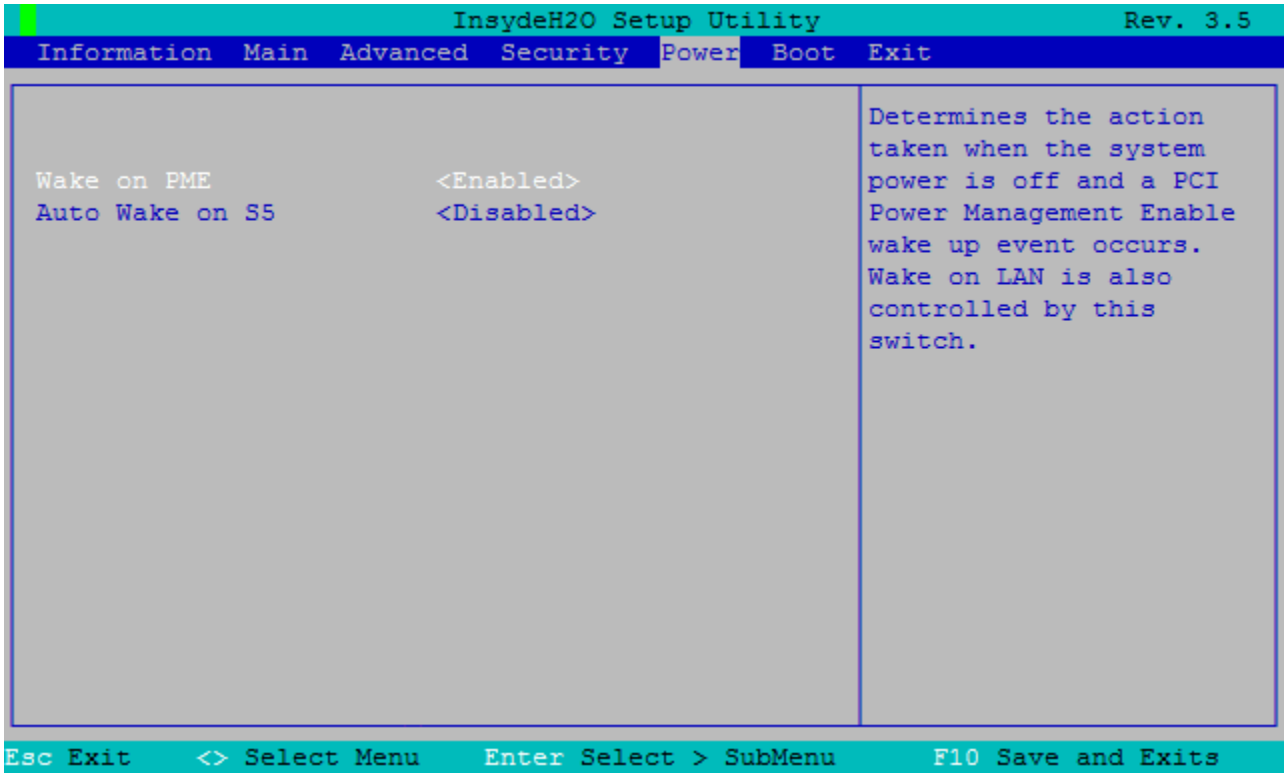


Figure 8-7 Power menu

In the Power menu, you specify the device reaction to a power failure and a Wake Event.

Entry	Meaning
Wake on PME	When activated (Enabled), the device switches itself on when a Power Management Event occurs. Otherwise, the device remains switched off.
Auto Wake on S5	When activated (Enabled), the device switches itself on when a Wake Event occurs. Otherwise, the device remains switched off.

8.3.3.6 Boot menu

Entries in the Boot menu

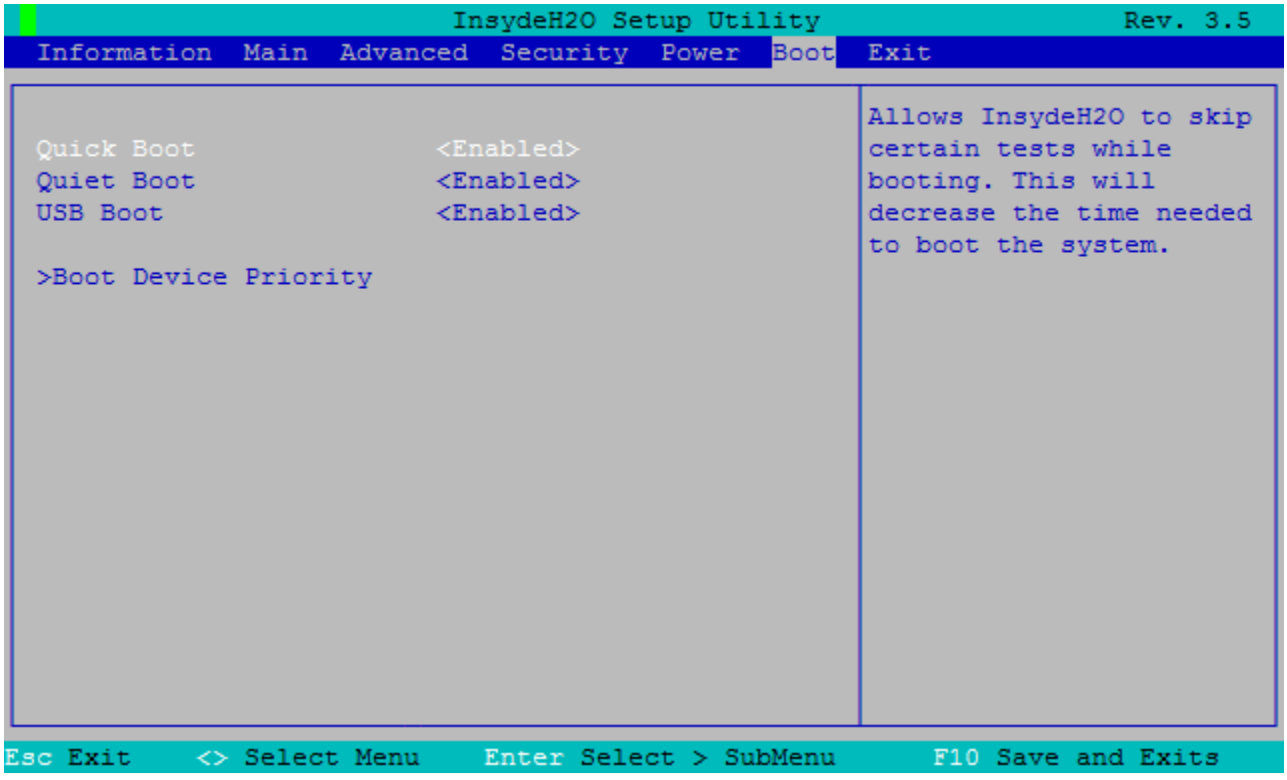


Figure 8-8 Boot menu

In this menu, you define the boot behavior of the device.

Entry	Meaning
Quick Boot	Enabling (Enabled) or disabling (Disabled). The device starts up faster when this option is enabled, because various hardware function tests are skipped.
Quiet Boot	When this option is disabled, the device boots in text mode. When it is enabled, a start screen with logo appears.
USB Boot	Booting from connected USB devices permitted/not permitted.

Boot menu > submenu "Boot Device Priority"

In this menu, you define the sequence of the boot media.

Entry	Meaning
Normal Boot Menu	Normal = boot sequence by component type Advance = individual boot sequence of all components

Boot Device Priority > submenu "Boot Type Order"

Entry	Meaning
Hard Disk Drive	Setting the boot sequence of the group of drives
USB	Setting the boot sequence of the group of USB drives
Others	Setting the boot sequence of the group Others,, e.g. Remote Boot Device

All connected boot-capable components and their boot position are displayed in this menu. The boot position of the components can be moved freely.

The component at the top (highest boot priority) is used for booting. If the component is not available, the system boots from the next component in the list.

You change the boot sequence as follows:

- Select the boot components using the keys <↑>, <↓>
- Move to the required position using the keys <+>, <–>

Note

You can start the Boot Manager by pressing the <F12> key during the boot process.
The Boot Manager shows all available boot components and boots from the device selected by the user.

"Normal Boot Menu > Advance" setting

Boot capable components which were disconnected and reconnected to the CPU 1515SP PC (F) during the boot processes, appear in first place in the BIOS in the "Advance" setting.

Boot Device Priority > submenu "Hard Disk Drive"

The size of the CFast card is displayed in this menu.

8.3.3.7 Exit menu

Settings in the Exit menu

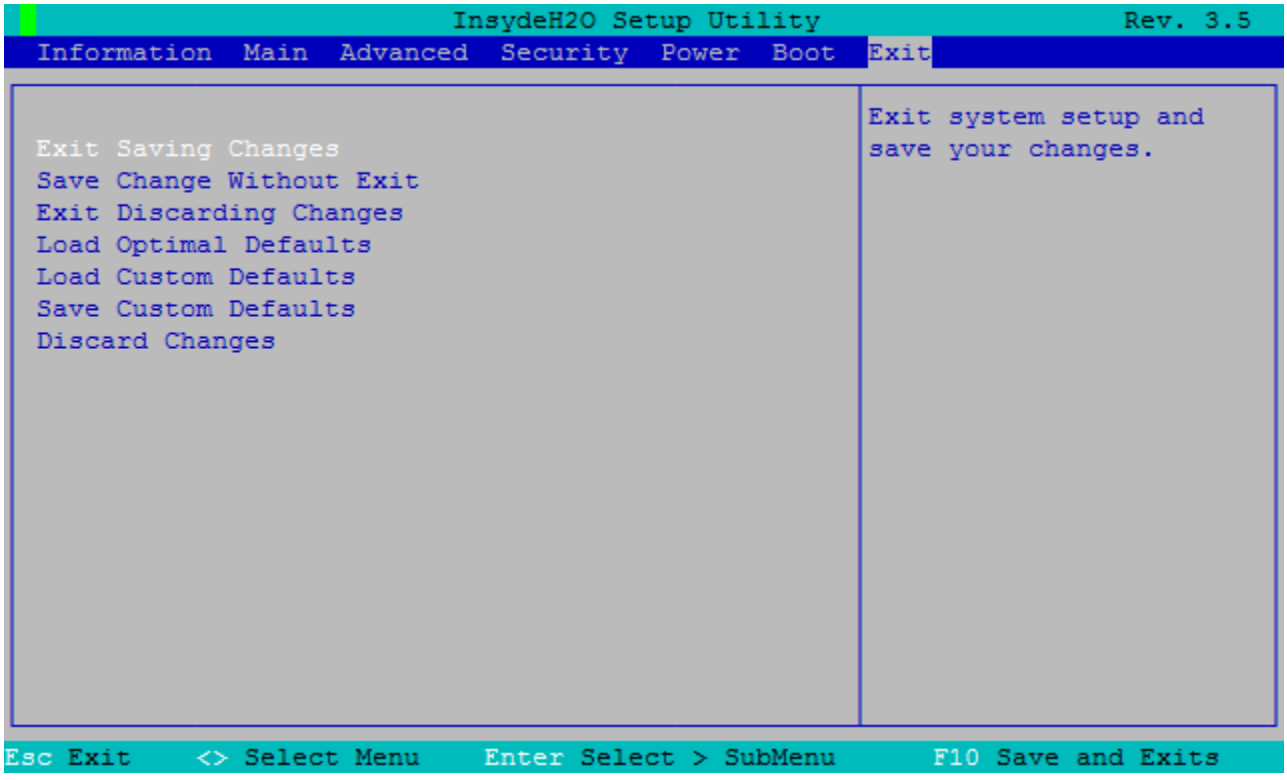


Figure 8-9 Exit menu

The setup program is always terminated via the Exit menu.

The menu is used to save or discard the changes made.

Entry	Meaning
Exit Saving Changes	Saves all changes and then starts the system with the new parameters.
Save Change Without Exit	Saves all changes
Exit Discarding Changes	Discards all changes and then restarts the system with the old parameters.
Load Optimal Defaults	Loads the optimum default values
Load Custom Defaults	Loads the default values
Safe Custom Defaults	Saves the default values
Discard Changes	Discards all changes

8.3.4 BIOS setup default settings

Documenting the device configuration

If you change the default setting of the BIOS Setup, then enter this in the following table. This will ensure that values you set will be readily available if hardware changes are made later.

We recommend that you print out the table below and keep it in a safe place after you have made your entries.

Note

The default settings in the BIOS setup depend on the ordered device configuration.

BIOS setup default settings

Menu	System parameters	Default settings	User settings
Main	System Time	hh:mm:ss	
	System Date	MM/TT/JJJJ	
Advanced > IDE Configuration	SATA configure as	LEGACY IDE	
	Serial ATA Port 0	SIMATIC IPC CFast 30	
Advanced > Video Configuration	UMA Sharing Memory Size	256 MB	
Advanced > CPU Related setting	SVM Support	Enabled	
Advanced > AMD PBS Option	Internal LAN Controller	Auto	
	PXE Boot to INT_LAN	Disabled	
Security	Supervisor Password	Not installed	
	Set Supervisor Password	Inactive (no password assigned)	
Power	Wake on PME	Enabled	
	Auto Wake on S5	Disabled	
Boot	Quick Boot	Enabled	
	Quiet Boot	Disabled	
	USB Boot	Disabled	
Boot > Boot Device Priority > Normal Boot Menu	Normal Advance	Normal	
Boot > Boot Device Priority	Boot Type Order	Hard Disk Drive	
		USB	
		Others	
	Hard Disk Drive	SIMATIC IPC CFast 8/16/30 GByte	

Menu	System parameters	Default settings	User settings
Exit	Exit Saving Change	Standard	
	Save Change Without Exit		
	Exit Discarding Changes		
	Load Optimal Defaults		
	Load Custom Defaults		
	Safe Custom Defaults		
	Discard Changes		

8.3.5 BIOS update

With the SIMATIC IPC DiagBase software (included in scope of delivery), you can perform the following actions:

- Perform a BIOS update.
- Saving and updating the current BIOS version.
- Saving the BIOS settings or loading them from another backup.

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

Requirements

- The S7-1500 software controller CPU 1505SP (F) must be in STOP mode.
- CPU 1515SP PC (F) must be started in Windows mode.

NOTICE
Malfunctions in the software controllers due to critical actions If you perform a BIOS update during the operation of the S7-1500 software controller CPU 1505SP (F), software controller malfunctions can occur that lead to interruptions in communications and downtimes. Do not perform BIOS updates or other actions that strongly utilize the hardware resources during the operation of the CPU 1505SP (F). **Prior** to a BIOS update, switch the CPU 1505SP (F) to STOP.

Performing a BIOS update

1. Start the CPU 1515SP PC (F) in the GRUB menu in **Windows mode** (see figure (Page 58)).

   → The PWR LED lights up yellow first, then green.

   → The device carries out the hardware initialization.

2. Follow the BIOS update steps described in the help for SIMATIC IPC DiagBase.

   → The update is performed.

   → You are prompted to restart the device.

3. Us thee Windows function **Start > Shut down** to shut down the CPU 1515SP PC (F).

   → The PWR LED lights up green first, then yellow.

   → The Windows function closes the Windows operating system and the software controller.

4. Switch off the power supply at the CPU 1515SP PC (F).
5. Connect the power supply.
6. Wait until the Siemens logo disappears.

   → The CPU 1515SP PC (F) restarts.

NOTICE
Overwriting of the Supervisor password during a BIOS update
A BIOS update overwrites the password.
After a BIOS update, set up the password again in the Security menu under "Set Supervisor Password".

8.4 Power options

An energy diagram with the name SIMATIC on the CPU 1515SP PC (F). 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.

8.5 Protective functions for data carriers

NOTICE
Data loss The number of write cycles on CFast cards is limited due to technical reasons. To prevent data loss, the CFast card must therefore be provided with special protection. Use a write filter to lengthen of service life of the CFast card and avoid the CPU 1515SP PC (F).

Write filters

Two write filters are available for Windows Embedded:

- To protect an entire partition of the CFast card, use the Enhanced Write Filter EWF (Page 78).
  Unlike FBWF, you can also use EWF with compressed NTFS data systems.
- Use the File-Based Write Filter FBWF (Page 82), to update specific files dynamically. The FBWF can be configured more flexibly and enables direct write access without restart.

NOTICE
Data loss If both write filters are activated, the EWF blocks direct write access of the FBWF. Data get lost after a restart of CPU 1515SP PC (F). Activate **only one** of the two write filters per partition.

8.5.1 Enhanced Write Filter (EWF)

Purpose and function

The Enhanced Write Filter (EWF) allows you to write-protect individual partitions.

EWF is disabled by default on the CPU 1515SP PC (F).

The EWF is activated by means of the pre-installed SIMATIC IPC EWF Manager or the Windows console application ewfmgr.exe.

SIMATIC IPC EWF Manager

Start the software via **Start > All Programs > Siemens Automation > SIMATIC > EWF Manager**.

In the status bar, you can use the SIMATIC IPC EWF Manager icon to check whether the EWF is active.

Table 8- 1 Meaning of the icons

Icons	Meaning
	The partition is protected by the EWF.
	EWF is disabled for this partition.
	The EWF is currently switched off, but is activated after the restart.
	The EWF is currently active, but will be deactivated after the restart.
	The filter is active. A Commit command is executed before the next reboot.
	The filter is currently active, but is deactivated after the restart. A Commit command will also be executed before the next reboot.

The operating instructions for the SIMATIC Industrial PC: IPC EWF Manager (http://support.automation.siemens.com/WW/view/en/50867677) is available on the CPU 1515SP PC (F) under **Start > All Programs > Siemens Automation > Documents > Manuals.**

Console application ewfmgr.exe

The application is called via the Windows command line (Command Prompt).

The following functions are available, among others, for setting, switching on and switching off the EWF:

Table 8- 2 Enhanced Write Filter functions

Function	Command
Write-protect drive C: Switching on	`ewfmgr c: -enable`
Write-protect drive C: disable (modified data is accepted)	`ewfmgr c: -commitanddisable`
Modified files on drive C: Accept	`ewfmgr c: -commit`
Display information about the EWF drive	`ewfmgr c:`
Display help	`ewfmgr /h`

Note

The EWF commands for write protection become effective only after a restart.

Note

The EWF command `ewfmgr c: -commitanddisable` must not be used with the option `-Live`.

Special features when using the EWF

NOTICE

Data loss upon power failure and upon shutdown/restart

If the EWF is active, all changes made on the C drive are lost after power failure and on shutdown/restart.

Use an UPS to prevent data losses after power failure.

Back up the data in the EWF-RAM overlay to the CFast card before shutting down the CPU 1515SP PC (F). In the command line, enter the following commands:

```
ewfmgr c: -commit
```

Restart the device

Or

```
ewfmgr c: -commitanddisable
```

Restart the device

```
ewfmgr c: -enable
```

Restart the device

Note

Data loss

If EWF is active and you decline a restart after having set the `-commitanddisable` or `-commit` option, your data is lost after a power failure!

Note

Disabling automatic daylight saving changes

In systems without central time management and with activated EWF, the time is advanced or set back by one hour in the daylight saving time or standard time period each time the system performs a cold or warm restart, due to the system-specific function for automatic daylight saving changes.

Reason for this behavior: Windows Embedded Standard 7 sets a flag in a registry entry that indicates completion of the conversion to daylight saving time. Since this file is also protected against modification by the EWF, the marker is lost during the boot sequence and the adjustment is made again.

We therefore recommend that you deactivate the automatic adjustment and change the clock manually.

Proceed as follows:

1. Disable the EWF filter (`ewfmgr c: -commitanddisable`) and reboot the system.
2. Deactivate the automatic switchover in the Control Panel:
   Start > Control Panel > Date and Time > in the tab "Time Zone" clear the check mark for "Automatically adjust clock for daylight saving changes".
3. Save the change (`ewfmgr c: -commit`).
4. Switch on the EWF again (`ewfmgr c: -commitanddisable`) and reboot the system.

8.5.2 File-Based Write Filter (FBWF)

Purpose and function

The FBWF allows you to write-protect specific files and folders of a partition.

FBWF is enabled by default on the CPU 1515SP PC (F).

The FBWF is activated by means of the Windows console application fbwfmgr.exe.

NOTICE
Data loss If both write filters are activated, the EWF blocks direct write access of the FBWF. Data get lost after a restart of CPU 1515SP PC (F). Activate **only one** of the two write filters.

Console application fbwfmgr.exe

The application is called via the Windows command line (Command Prompt).

The following functions, among others, are available for setting, switching on and switching off the FBWF:

Table 8- 3 File-Based Write Filter

Function	Command
Show FBWF status	`fbwfmgr /displayconfig`
Activate FBWF after the next restart	`fbwfmgr /enable`
Write to protected files	`fbwfmgr /commit c: \<Path>\<File Name>`
Display help	`fbwfmgr /?`
Defining exclusions:	
• Add file	`fbwfmgr /addexclusion c: \<Path>\<FileName.ext>`
• Add folder	`fbwfmgr /addexclusion c: \<Path>`
• Remove file	`fbwfmgr /removeexclusion c: \<Path>\<FileName.ext>`
• Remove folder	`fbwfmgr /removeexclusion c: \<Path>`

Note

Note:

- The correct notation is as follows:
  Drive letter: space character "\" relative file path
- The write protection commands become effective only after a restart.

Rule for exclusion list

The following sequence applies if you define exclusions for files and folders that do not yet exist:

- Defining exclusions
- Restart CPU 1515SP PC (F)
- Create file/folder

Display of the partition size with activated FBWF

The partition size displayed in the Explorer does not correspond with the actual size when the FBWF is active. The size displayed is derived from the amount of memory occupied on the partition and from memory released by the FBWF. After the maximum size of the overlay was reached, a message is output warning of insufficient space on the partition.

Reference

Additional information on FBWF is available on the Internet (http://msdn.microsoft.com/en-us/library/ff794219(v=winembedded.60).aspx).
Additional information on the topic of partitions is available in the Change partitioning (Page 85) chapter.

Maintenance 9

9.1 Backing up and restoring data

Introduction

The operating system and the Runtime software are located on the supplied Restore DVD. You can use this to restore the original software of the CPU 1515SP PC (F).

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 no completed within this period, the CPU 1515SP PC (F) is automatically restarted.

Save your project to partition D: 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.

To back up data in Windows Embedded Standard 7, we recommend the software tool SIMATIC IPC Image & Partition Creator (V3.3 or later). It provides for easy backup and fast restore of the contents of the CFAST card and of individual partitions (images).

Note

The SIMATIC Image & Partition Creator supports the X2 PN/IE (LAN) interface.

You can procure the SIMATIC IPC Image & Partition Creator:

- via the Siemens online ordering system (http://www.siemens.com/automation/mall).
- 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 (http://www.siemens.com/automation/mall).

9.2 Change partitioning

9.2.1 Partitions in the delivery state

Partitioning the CFast card

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

Partition	Name	30 GB CFast card (WES7 E 32Bit/WES7 P 64Bit)	File system
C:	SYSTEM	19.5 GB	NTFS
D:	DATA	8 GB	NTFS
-	-	0.4 GB	RAW
-	WinCCMB	0.04 GB	NTFS

Note

Partitions in Windows Embedded Standard 7

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

NOTICE
CPU volume for 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.

9.2.2 Change partitioning

If the capacities of the partitions are insufficient, you have the option with Windows 7 to change the size of the partitions (for example, drive C: extend and drive D: reduce).

Free space must be available in order to extend the partition. You can recognize free space by the designation "Unallocated". You may have the reduce or delete other partitions to create space.

Note

Deleting partitions

When partitions are deleted on the data on them are destroyed.

Possible reasons for an expansion of the partition size to drive C:

- Loading security updates for Windows drive C:
- Option of installing large software packages on C, if their size exceeds the available storage space.

Expand/shrink partition

To expand, for example, Partition C: at the cost of Partition D: follow these steps:

In the Windows start bar, select **Start > Control Panel > System and Security > Administrative Tools > Computer Management > Disk Management**. The "Computer Management" window opens.

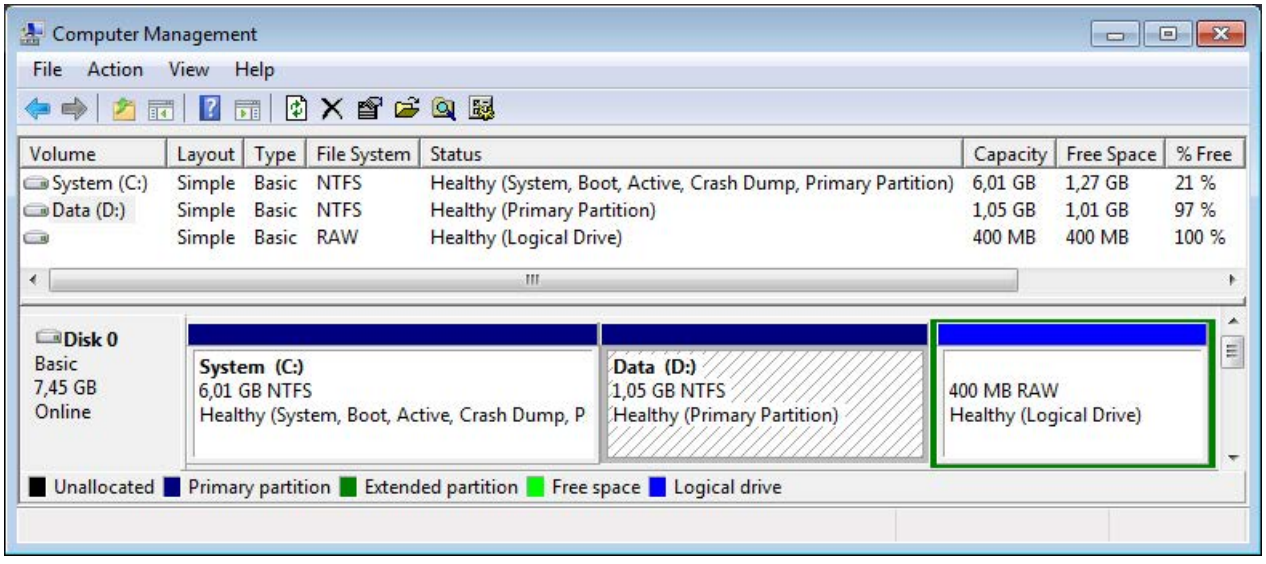


Figure 9-1 Computer Management

To expand Partition C: you must delete Partition D: first. Right-click on Partition D: and select "Delete Volume..."

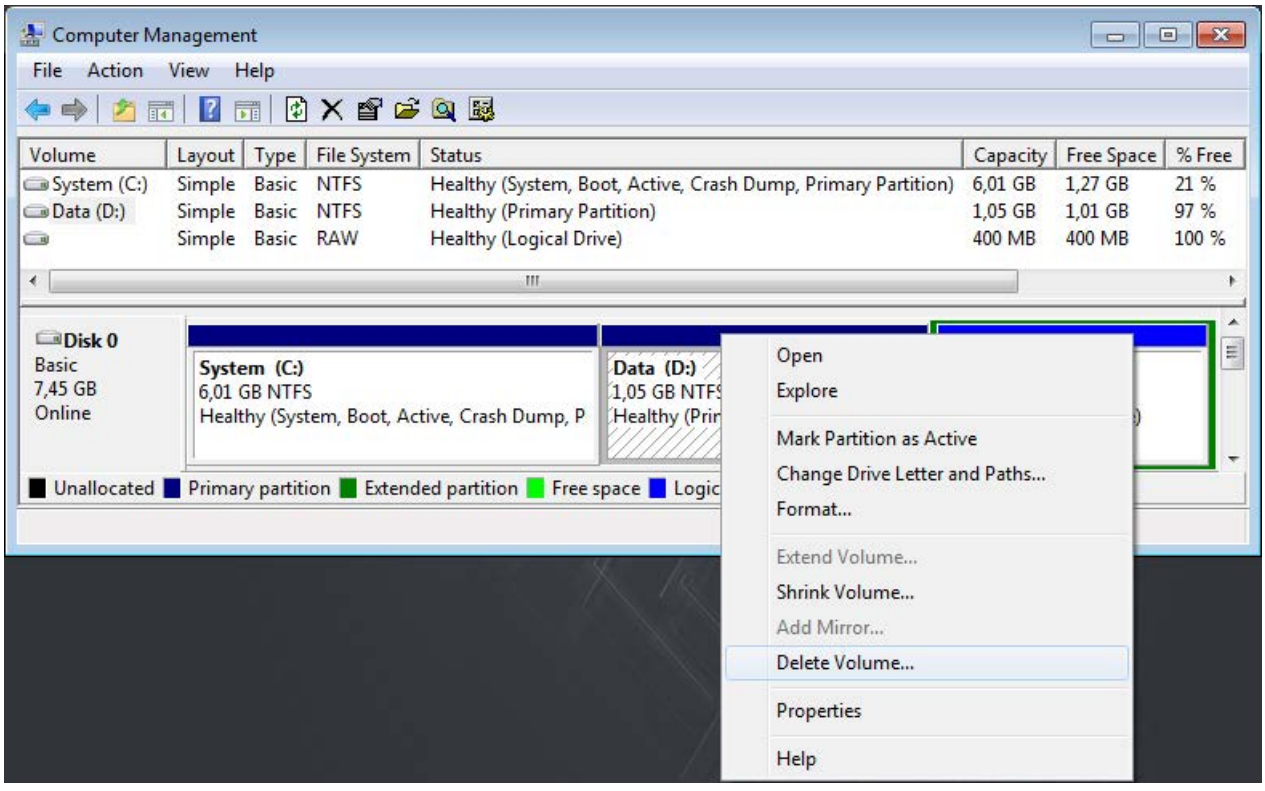


Figure 9-2 Partition D: Delete

The space which was occupied by Partition D: is now available for Partition C: .

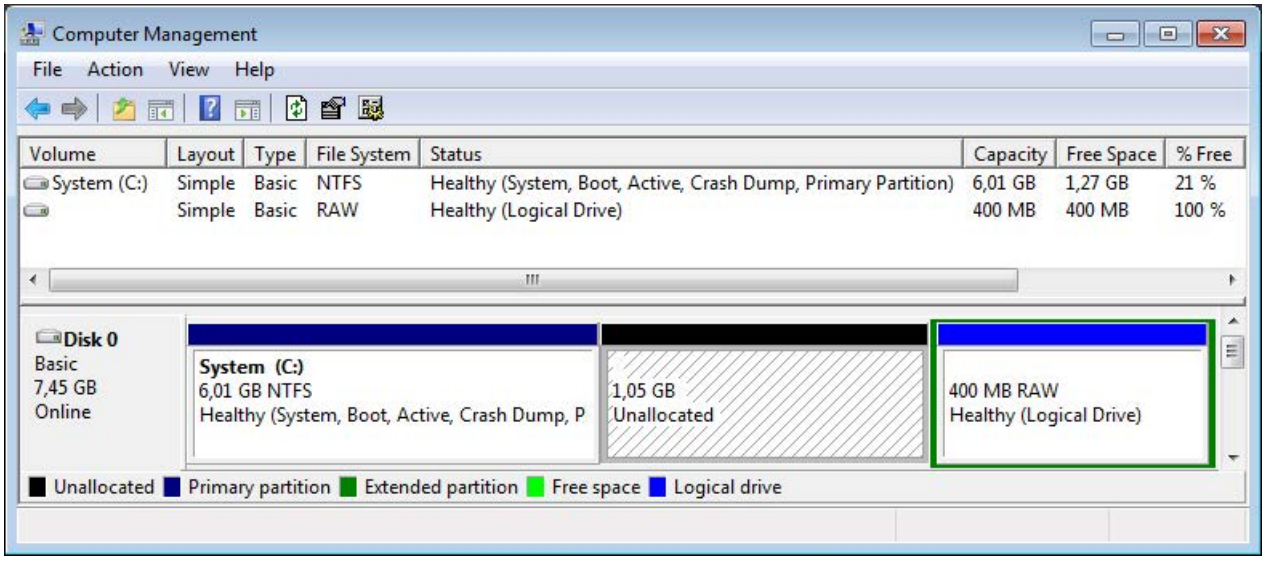


Figure 9-3 Partition D: cleared

Now right-click on Partition C: and select "Extend Volume...".

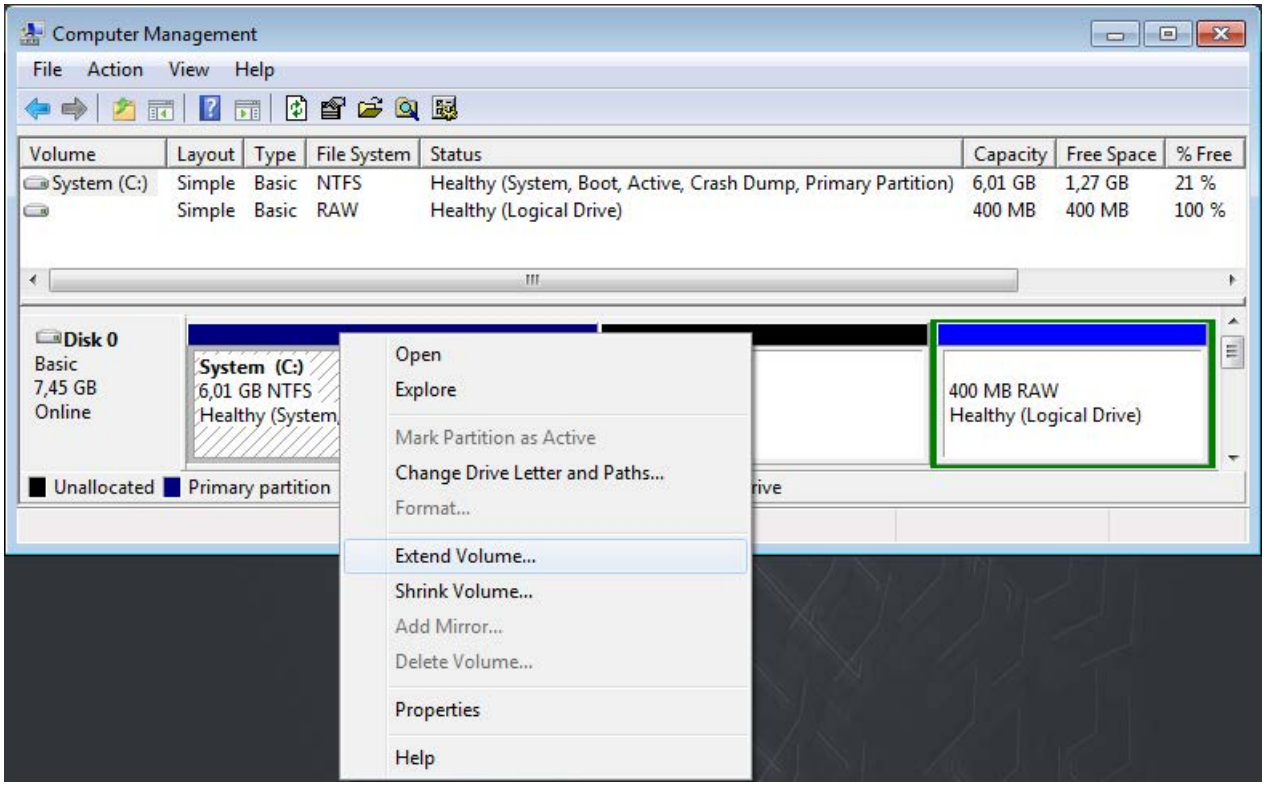


Figure 9-4 Partition C: expand

After selecting the option "Extend Volume...", the "Extend Volume Wizard" appears.

Figure 9-5 Extend Volume Wizard

In the following window you have the option to expand Partition C: by all or part of the available memory. In our example we expand Partition C: by 500 MB.

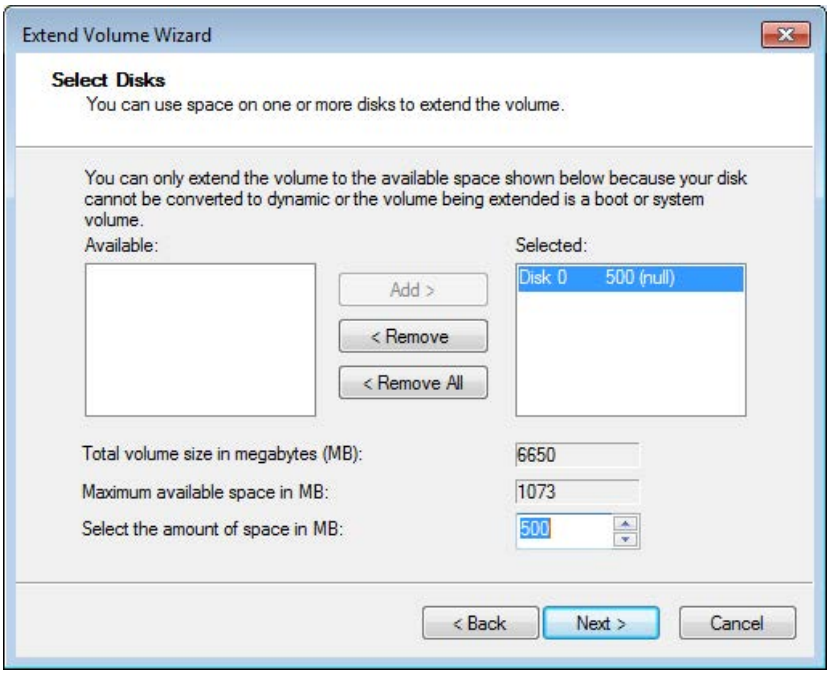


Figure 9-6 Select memory size

When you have completed the steps of the wizard, the Computer Management window shows you the new division of the partition sizes.

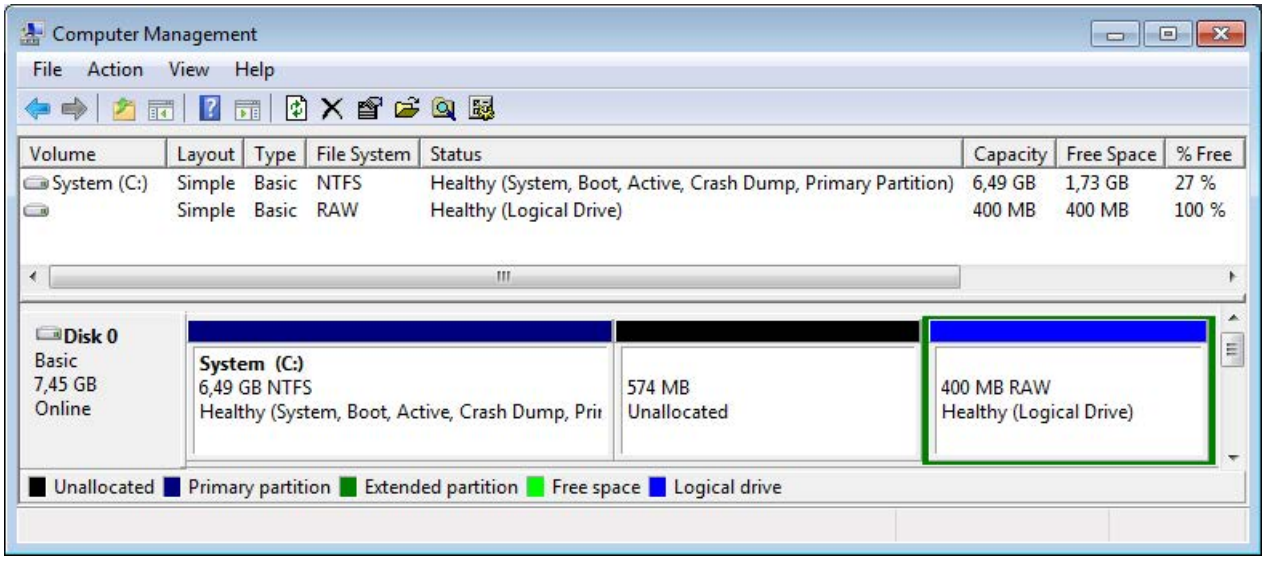


Figure 9-7 Result of the repartitioning

To reassign the unassigned memory to Partition D: right-click on the unassigned memory and select "New Simple Volume..."

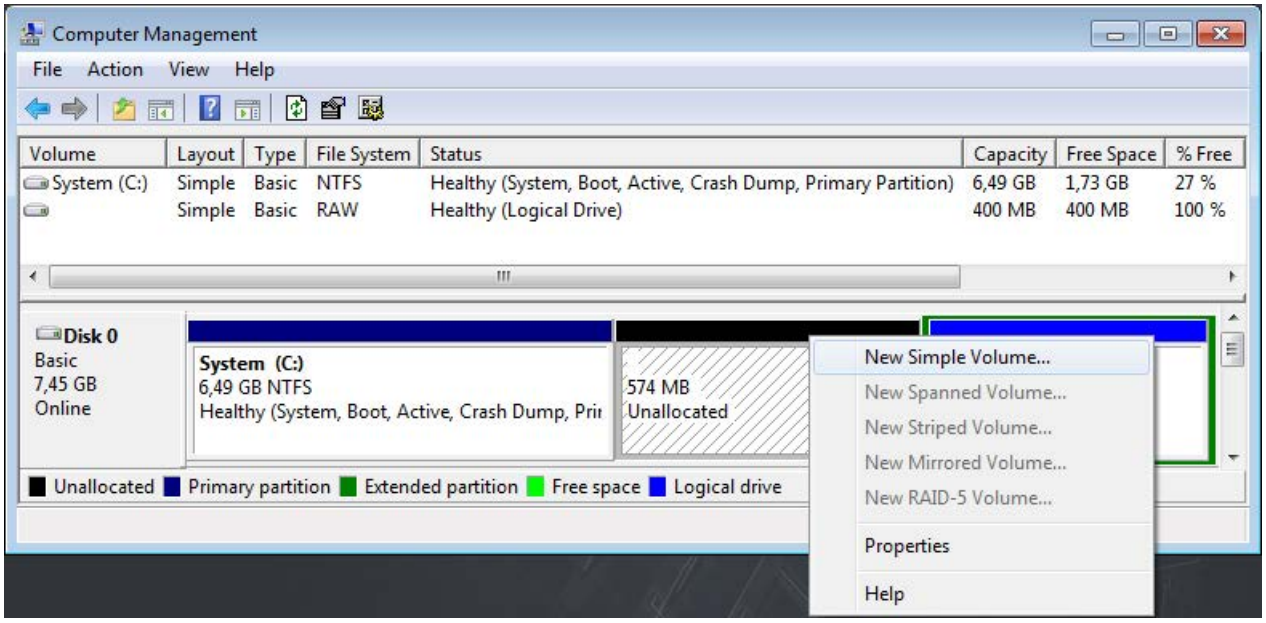


Figure 9-8 Recreate partition

After selecting the option "New Simple Volume...", the "New Simple Volume Wizard" appears. Set the required memory size there.

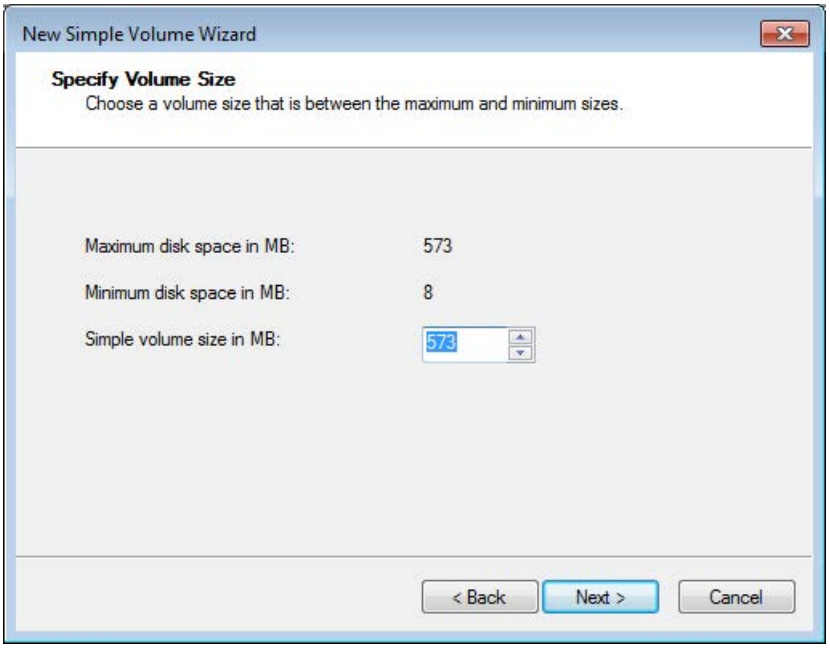


Figure 9-9 Select memory size

In the following window, select Drive D:

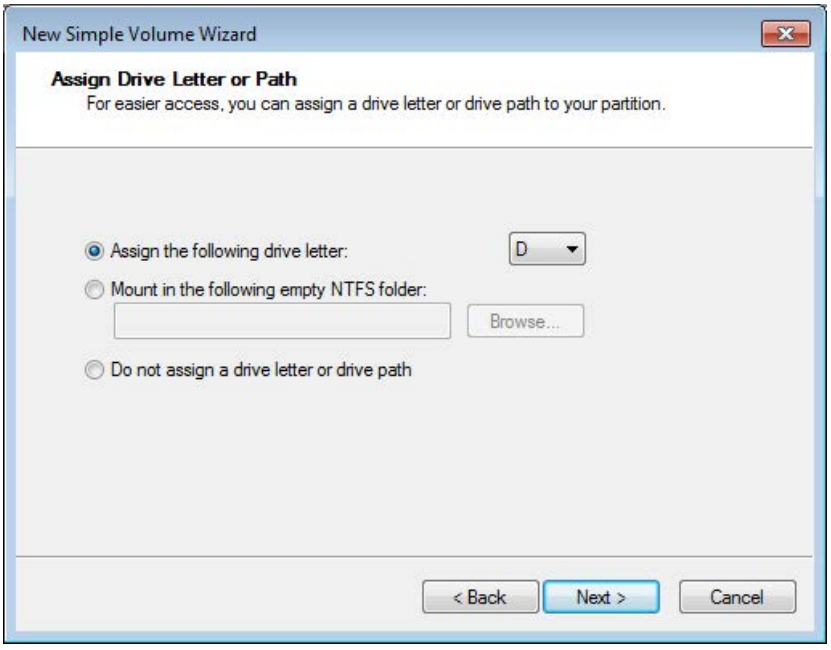


Figure 9-10 Assign drive letter

Specify the formatting for storing data on the partition.

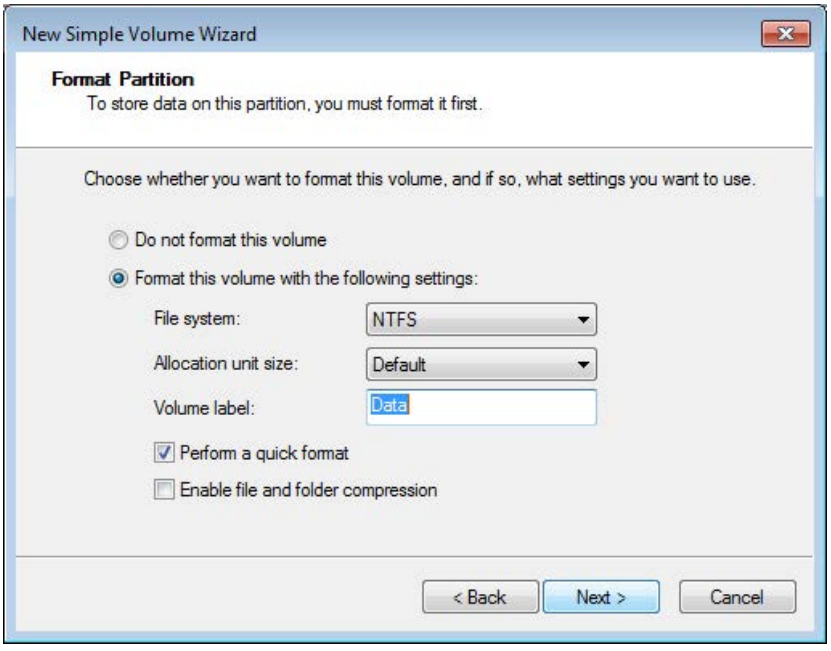
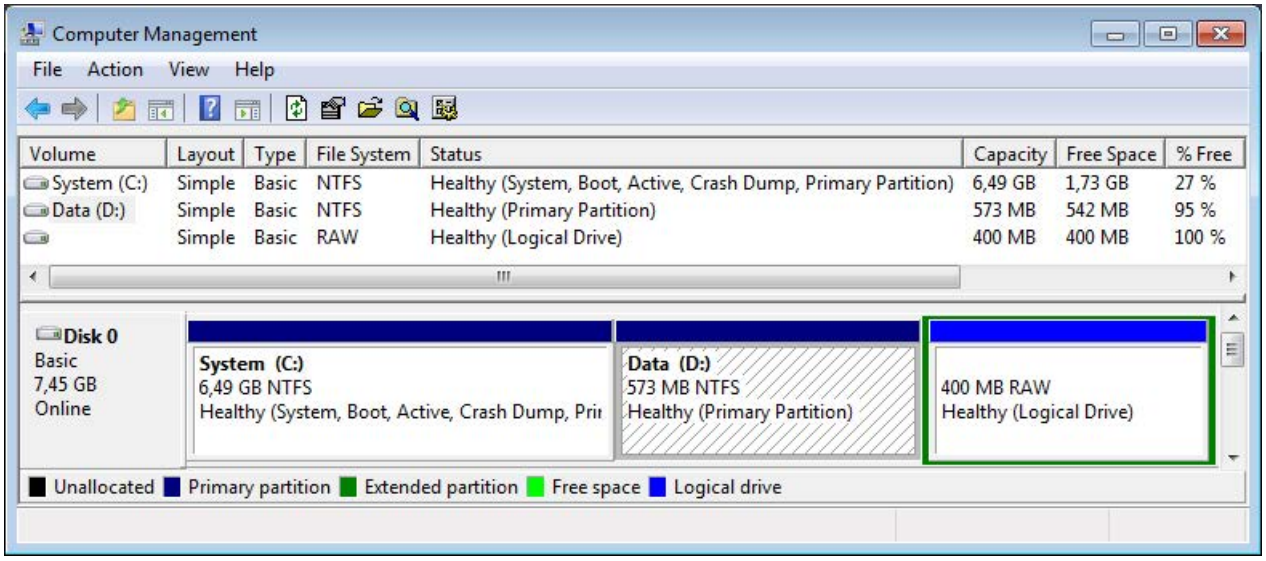


Figure 9-11 Specify formatting

Once you have defined the formatting, an overview of your selected settings appears. Then click "Finish" to complete the process.

The "Computer Management" window now shows the new partition sizes.



9.3 Restoring the delivery state

Introduction

The entire image of your operating system and your Runtime software are located on the supplied Restore DVD. You can use the SIMATIC Restore menu to restore the original CPU 1515SP PC (F) software.

Alternatively, you can use the Restore menu to create a boot-capable USB stick to restore the original software without a DVD-ROM drive (see chapter Restoring delivery state using USB stick (Page 95)).

Note

Restoring existing system partition

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

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.

Requirements

To restore the original software of the CPU 1515SP PC (F), the following is required:

- A CFast card. Minimum size of the CFast card for the CPU 1515SP PC (F):
  - WES7 E 32Bit 4GB RAM: 8 GB
  - WES7 P 64Bit 4GB RAM: 16 GB
- A DVD drive with external power supply
- The supplied Restore DVD. Alternatively, a bootable USB stick
- A data backup

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 PC (F), 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 stick via *Automation License Manager*.
After the restart of the CPU 1515SP PC (F), re-install the license keys on the device via the *Automation License Manager*.

Restore delivery state of the CPU 1515SP PC (F) with the Restore DVD

Before the restore

1. Switch off the power supply of the CPU.
2. Remove all USB devices from the CPU.
3. Connect a DVD drive with restore DVD to a USB interface of the CPU.
4. Switch on the power supply of the CPU.
   → The CPU is started.
5. Press <F12> to start the Boot Manager.
6. Select the list entry for the DVD drive in the Boot Manager.
7. After the prompt, confirm the start by pressing any key.
   → The loading process is displayed (Windows logo).
   → The SIMATIC Restore menu opens.
   – Select a language.
   – Select "CPU1515SP PC (F)" or "CPU1515SP PC (F) + HMI".
   – Select the option "Completely restore system drive".
     → The original software is restored on Partition C:, Partition D: is deleted.

After the restore

1. Exit the Restore menu.
2. Remove all USB devices.
3. Proceed as described in Initial commissioning (Page 50).

Further procedure

- Reconnect the USB devices.
- Install the license keys.

9.4 Restoring delivery state using USB stick

Introduction

You can use the Restore menu to create a bootable USB stick in order to restore the original software of the CPU 1515SP PC (F).

Use the SIMATIC IPC Service USB FlashDrive (6AV7672-8JD02-0AA0) for the creation.

Preparing bootable USB stick using PC

NOTICE
Data loss If you transfer the data from the Restore-DVD to the USB stick, all existing data on the USB stick is deleted. You should back up the data on the USB stick before you create the Restore USB stick.

Transferring Restore DVD data to the USB stick

1. Place the Restore DVD into the DVD drive of a PC.
2. Double-click the CD_Menu.exe file in the root directory of the DVD.
3. Select the option " Create USB flash drive".
4. When all the data has been transferred, remove the Restore USB stick safely from the PC.

Note

If you disturb the User-Interface window during the process (for example, by a mouse click in the window), the process continues unchanged even if no reaction is recognizable within the tool interface.

Restoring delivery state using USB stick

Before the restore

1. Switch off the power supply of the CPU.
2. Remove all USB devices from the CPU.
3. Connect the Restore USB stick directly to the CPU.
4. Switch on the power supply of the CPU.

   The CPU is started.

   The restore process starts.
5. Press <F12> to start the Boot Manager.
6. Select the list entry for the USB stick as boot medium in the Boot Manager.
7. After the prompt, confirm the start by pressing any key.

   The loading process is displayed (Windows logo).

   The SIMATIC Restore menu opens.
8. Select a language.
9. Select "CPU 1515SP PC (F)" or "CPU 1515SP PC (F) + HMI".
10. Select the option "Restore delivery state".

    The original software is restored.

After the restore

1. Exit the Restore menu.
2. Remove all USB devices.
3. Proceed as described in Initial commissioning.

9.5 Updating software

Note

If you update the software, then always start the CPU 1515SP PC (F) in the GRUB menu in Windows mode (see Figure (Page 58)).

Information on updating software 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.

9.6 Windows Embedded Standard 7

The Windows Embedded Standard 7 operating system is pre-installed on the CPU 1515SP PC (F). WES7 E 32Bit or WES7 P 64Bit are available depending on the order option.

The WES7 P version supports multi-touch functionality (gesture control).

Windows language packs

English is available as the basic language for the installation of the Windows operating system.

With the system version **WES7 P 64Bit 4GB RAM** of the CPU 1515SP PC (F), other operating system languages can be installed after the first commissioning. Note that you need administrator rights to install language packages.

The following language packages are contained on the Restore DVD in \Packages\x64\LanguagePack:

- Traditional Chinese
- Simplified Chinese
- German
- English
- French
- Italian
- Japanese
- Korean
- Russian
- Spanish

Installing languages

Use the Windows function "Start > Control Panel > Region and Language" to install a language pack. The installation takes around 45 minutes.

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).

9.7 Sending the device to customer service

Before sending

Note

Back up data and remove memory cards

Before you send in the CPU 1515SP PC (F) 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**.

9.8 Removing and inserting the CFast card

Introduction

CPU 1515SP PC (F) has one slot for a CFast card. On this card, you will find the operating system, your Runtime software 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

- CPU 1515SP PC (F) is de-energized.

Procedure – Removing the CFast card

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.

   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 with lead to protect the CFast card with the operating system of the CPU 1515SP PC (F) against unauthorized access.

Technical data

10

10.1 Standards and approvals

Introduction

The general technical specifications cover the following:

- The standards and test values which the CPU 1515SP PC (F) complies with and fulfils.
- The test criteria according to which the CPU 1515SP PC (F) was tested.

Currently valid markings and approvals

Note

The currently valid markings and approvals are printed on the CPU 1515SP PC (F).

Safety information

WARNING

Risk of personal injury and damage to property.

In potentially explosive atmospheres, injury to persons and material damage may occur if you disconnect plug-in connections during operation of an ET 200SP.

Always switch off the power to the ET 200SP when disconnecting plug-in connections in potentially explosive atmospheres.

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 PC (F) meets the requirements and protection targets of the following EC guidelines and complies with the harmonized European standards (EN) for programmable logic controllers published in the official gazettes of the European Community:

- 2006/95/EC "Electrical equipment designed for use within certain voltage limits" (Low-Voltage Directive)
- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)
- 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)

The EC declarations of conformity are available for the responsible authorities at:

Siemens AG
Digital Factory

Factory Automation
DF FA AS DH AMB
Postfach 1963
D-92209 Amberg

These are also available for download on the Customer Support Internet 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 RELAYS.

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

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

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)

IECEx Ex nA IIC Tx Gc
IECEx DEK 13.0011X

Marking for Australia and New Zealand

or

The ET 200SP distributed I/O system meets the requirements of the standard AS/NZS CISPR 16.

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 PC (F) with the S7-1500 software controller CPU 1505SP (F) meets the requirements and criteria of the standard IEC 61131-2 (programmable logic controllers, part 2: Equipment requirements and tests).

PROFINET standard

The ET 200SP distributed I/O system is based on the standard IEC 61158 Type 10.

PROFIBUS standard

The ET 200SP distributed I/O system is based on the standard IEC 61158 Type 3.

IO-Link standard

The ET 200SP distributed I/O system is based on the standard IEC 61131-9.

Use in industrial environments

SIMATIC products are designed for use in industry.

Table 10- 1 Use in industrial environments

Area of application	Interference emission requirements	Interference immunity requirements
Industry	EN 61000-6-4: 2011	EN 61000-6-2: 2005

Use in residential areas

Note

The ET 200SP is intended for use in industrial areas; use in residential areas may have an impact on radio/TV reception.

If you want to use the ET 200SP in residential areas, you must ensure that its radio frequency interference emission complies with limit class B in accordance with EN 55011.

Suitable measures for achieving RF interference level Class B include, for example:

- Installation of the CPU 1515SP PC (F). in grounded control/switch cabinets
- Use of filters in the supply lines

Reference

The certificates for the markings and approvals can be found on the Internet under Service&Support (http://www.siemens.com/automation/service&support).

10.2 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.

Among other things, CPU 1515SP PC (F) also meets the requirements of the EMC legislation for the European single market. The prerequisite for this is that the CPU 1515SP PC (F) complies with the requirements and guidelines relating to electrical equipment.

EMC according to NE 21

The CPU 1515SP PC does not meet the EMC specifications of the NAMUR guideline NE21.

The CPU 1515SP PC meets the EMC specifications according to IEC 61131-2 and IEC 61000-6-2.

Pulse-shaped disturbance

The following table shows the electromagnetic compatibility of the CPU 1515SP PC (F) with regard to pulse-shaped interference.

Table 10- 2 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 cable) 2 kV (signal cable > 30 m) 1 kV (signal cable < 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 (http://support.automation.siemens.com/WW/view/en/59193566))		3
• asymmetric coupling	2 kV (power supply cable) DC with protective elements 2 kV (signal cable/data cable only > 30 m), possibly with protective elements	
• symmetric coupling	1 kV (power supply cables) DC with protective elements 1 kV (signal cable/data cable only > 30 m), possibly with protective elements	

Sinusoidal disturbance

The following table shows the electromagnetic compatibility of the CPU 1515SP PC (F) with regard to sinusoidal interference.

- RF radiation

Table 10- 3 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 2.7 GHz	3
10 V/m	3 V/m	
80% AM (1 kHz)		

- RF coupling

Table 10- 4 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 according to EN 55016: Limit class A, group 1 (measured at a distance of 10 m).

Table 10- 5 Interference emission of electromagnetic fields according to EN 55016

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

Interference emission via the AC power supply according to EN 55016: Limit value class A, Group 1.

Table 10- 6 Interference emission via the AC power supply according to EN 55016

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

10.3 Shipping and storage conditions

Introduction

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

Table 10- 7 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	1080 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

10.4 Mechanical and climatic ambient conditions

Note

Restrictions

Deviating from the ambient conditions for the ET 200SP distributed I/O system, the following restrictions apply to the CPU 1515SP PC (F):

- Mechanical ambient conditions:
  - 2 g constant acceleration when using the BusAdapter BA 2×FC
- Ambient temperature:
  - 0 to 60 °C for horizontal installation with maximum 32 I/O modules
  - 0 to 55 °C for horizontal installation with maximum 64 I/O modules
  - 0 to 50 °C for vertical installation with maximum 32 I/O modules

Operating conditions

CPU 1515SP PC (F) is designed for stationary use in weather-proof locations. The operating conditions exceed the requirements according to 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 10- 8 Mechanical ambient conditions

Frequency band	CPU 1515SP PC (F)
5 ≤ f ≤ 8.4 Hz	3.5 mm amplitude
8.4 ≤ f ≤ 150 Hz	1 g constant acceleration
10 ≤ f ≤ 60 Hz	0.35 mm amplitude
60 ≤ f ≤ 1000 Hz	• 1 g constant acceleration (with BusAdapter BA 2×RJ45) • 2 g constant acceleration (with BusAdapter BA 2×FC)

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 10- 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 • 10 Hz ≤ f ≤ 60 Hz, 0.35 mm constant amplitude • 60 Hz ≤ f ≤ 1000 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 may use the CPU 1515SP PC (F) under the following climatic, ambient conditions.

Table 10- 10 Climatic ambient conditions

Ambient conditions	Permissible range	Comments
Temperature: Horizontal mounting position:	• from 0 to 60 °C	For configuration with 32 I/O modules and 3 x 100 mA USB load
	• from 0 to 55 °C	For configuration with 64 I/O modules and 2 x 500 mA + 1 x 100 mA USB load
Vertical installation:	• 0 to 50 °C	For configuration with 32 I/O modules and 3 x 100 mA USB load
Permitted temperature change	10 K/h	-
Relative humidity	from 10 to 95%	Without condensation, corresponds to relative humidity (RH) class 2 according to IEC 61131 part 2
Barometric pressure	1080 hPa to 795 hPa	Corresponds to an altitude of -1000 m to 2000 m
Concentration of pollutants	SO_2: <0.5 ppm; RH <60 %, no condensation H_2S: <0.1 ppm; RH <60 %, no condensation	-
	ISA-S71.04 severity level G1; G2; G3	-

10.5 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

For modules with 24 V DC supply voltage, the electrical isolation is designed for max. 60 V AC / 75 V DC and basic insulation is designed according to EN 61131-2: 2007.

Pollution degree/overvoltage category according to IEC 61131

- Pollution degree 2
- Overvoltage category: II

Protection class according to IEC 61131-2:2007

CPU 1515SP PC (F) fulfils the protection class I and contains parts of protection class II and 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

CPU 1515SP PC (F) works with the rated voltage and corresponding tolerances listed in the following table.

Table 10- 11 Rated voltage for operation

Rated voltage	Tolerance range
24 V	19.2 to 28.8 V DC [1]
	18.5 to 30.2 V DC [2]

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

[2] Dynamic value: including ripple, for example, with three-phase bridge rectification

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

See product information Use of subassemblies/modules in a Zone 2 Hazardous Area (http://support.automation.siemens.com/WW/view/en/19692172).

10.7 Module data

10.7.1 CPU 1515SP PC, system version WES7 E 32Bit 4GB RAM

CPU 1515SP PC, system version WES7 E 32Bit 4GB RAM

	6ES7677-2AA31-0EB0
General information	
Product type designation	CPU 1515SP PC
HW release number	FS06
Firmware version	V2.1
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V14 SP1
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Flash disk	30 GB
Operating systems	Windows Embedded Standard 7 E 32 bit
Installed SW	
Visualization	No
Controller	S7-1500 Software Controller CPU 1505SP V2.1
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use

	6ES7677-2AA31-0EB0
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
Work memory	
Integrated (for program)	1 MB
Integrated (for data)	5 MB
Integrated (for ODK application)	10 MB
Load memory	
Integrated (on PC mass storage medium)	320 MB
Buffering	
with UPS	Yes; all retentive declared memory areas
with non-volatile memory	Yes
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU 1515SP PC + 64 module + server module
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
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 interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously
Number of SD card slots	1
Video interfaces	
Graphic interface	1x DVI-I
1st interface	
Interface hardware	
Number of ports	2
Integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes

	6ES7677-2AA31-0EB0
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Interrupts/diagnostics/status information	
LED diagnostics display	
RUN/STOP LED	Yes
ERROR LED	Yes
MAINT LED	Yes
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C
I/O / Options	
I/O	
• SD card	Optional for additional mass storage

	6ES7677-2AA31-0EB0
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.2 CPU 1515SP PC F, system version WES7 E 32Bit 4GB RAM

CPU 1515SP PC F, system version WES7 E 32Bit 4GB RAM

	6ES7677-2FA31-0EB0
General information	
Product type designation	CPU 1515SP PC F
Firmware version	V2.1
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V14 SP1
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Flash disk	30 GB
Operating systems	Windows Embedded Standard 7 E 32 bit
Installed SW	
Visualization	No
Controller	S7-1500 Software Controller CPU 1505SP F
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value

	6ES7677-2FA31-0EB0
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
Work memory	
Integrated (for program)	1.5 MB
Integrated (for data)	5 MB
Integrated (for ODK application)	10 MB
Load memory	
Integrated (on PC mass storage medium)	320 MB
Buffering	
with UPS	Yes; all retentive declared memory areas
with non-volatile memory	Yes
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU 1515SP PC + 64 module + server module
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
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 interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously
Number of SD card slots	1
Video interfaces	
Graphics interface	1x DVI-I

	6ES7677-2FA31-0EB0
1st interface	
Interface hardware	
Number of ports	2
integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Interrupts/diagnostics/status information	
LED diagnostics display	
RUN/STOP LED	Yes
ERROR LED	Yes
MAINT LED	Yes
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load

	6ES7677-2FA31-0EB0
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C
I/O / Options	
I/O	
• SD card	optional for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.3 CPU 1515SP PC, system version WES7 E 32Bit 4GB RAM - spare part

CPU 1515SP PC, system version WES7 E 32Bit 4GB RAM - spare part

	6ES7677-2AA40-0AA0
General information	
Product type designation	CPU 1515SP PC
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	as of STEP 7 V14
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Installed SW	
Visualization	No
Controller	No
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms

	6ES7677-2AA40-0AA0
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	No
Work memory	
Integrated	4 GB
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU + 64 Module + server module (mounting width max. 1 m)
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
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; via CM DP module
Number of interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously
Number of SD card slots	1
Video interfaces	
Graphics interface	1x DVI-I

	6ES7677-2AA40-0AA0
1st interface	
Interface hardware	
Number of ports	2
integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes; via CM DP module
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C

	6ES7677-2AA40-0AA0
I/O / Options	
I/O	
• SD card	optional for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.4 CPU 1515SP PC, system version WES7 P 64Bit 4GB RAM

CPU 1515SP PC, system version WES7 P 64Bit 4GB RAM

	6ES7677-2AA41-0FB0
General information	
Product type designation	CPU 1515SP PC
HW release number	FS05
Firmware version	V2.1
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V14 SP1
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Flash disk	30 GB
Operating systems	Windows Embedded Standard 7 P 64 bit
Installed SW	
Visualization	No
Controller	S7-1500 Software Controller CPU 1505SP V2.1
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms

	6ES7677-2AA41-0FB0
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
Work memory	
Integrated (for program)	1 MB
Integrated (for data)	5 MB
Integrated (for ODK application)	10 MB
Load memory	
Integrated (on PC mass storage medium)	320 MB
Buffering	
with UPS	Yes; all retentive declared memory areas
with non-volatile memory	Yes
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU 1515SP PC + 64 module + server module
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
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 interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously
Number of SD card slots	1

	6ES7677-2AA41-0FB0
Video interfaces	
Graphics interface	1x DVI-I
1st interface	
Interface hardware	
Number of ports	2
integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Interrupts/diagnostics/status information	
LED diagnostics display	
RUN/STOP LED	Yes
ERROR LED	Yes
MAINT LED	Yes
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load

	6ES7677-2AA41-0FB0
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C
I/O / Options	
I/O	
• SD card	optional for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.5 CPU 1515SP PC F, system version WES7 P 64Bit 4GB RAM

CPU 1515SP PC F, system version WES7 P 64Bit 4GB RAM

	6ES7677-2FA41-0FB0
General information	
Product type designation	CPU 1515SP PC
HW release number	FS02
Firmware version	V2.1
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	V14 SP1
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Flash disk	30 GB
Operating systems	Windows Embedded Standard 7 P 64 bit
Installed SW	
Visualization	No
Controller	S7-1500 Software Controller CPU 1505SP F
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes

	6ES7677-2FA41-0FB0
Power and voltage failure backup	
Power/voltage failure backup time	5 ms
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	Yes; 30 GB flash memory
SIMATIC memory card required	No
Work memory	
Integrated (for program)	1.5 MB
Integrated (for data)	5 MB
Integrated (for ODK application)	10 MB
Load memory	
Integrated (on PC mass storage medium)	320 MB
Buffering	
with UPS	Yes; all retentive declared memory areas
with non-volatile memory	Yes
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU 1515SP PC + 64 module + server module
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
Deviation per day, max.	10 s; typ.: 2 s

	6ES7677-2FA41-0FB0
Interfaces	
Number of Industrial Ethernet interfaces	2
Number of PROFINET interfaces	1
Number of PROFIBUS interfaces	1
Number of interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously
Number of SD card slots	1
Video interfaces	
Graphics interface	1x DVI-I
1st interface	
Interface hardware	
Number of ports	2
integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Interrupts/diagnostics/status information	
LED diagnostics display	
RUN/STOP LED	Yes
ERROR LED	Yes
MAINT LED	Yes

	6ES7677-2FA41-0FB0
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C
I/O / Options	
I/O	
• SD card	optional for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.6 CPU 1515SP PC, system version WES7 E 64Bit 4GB RAM - spare part

CPU 1515SP PC, system version WES7 E 64Bit 4GB RAM - spare part

	6ES7677-2AA40-0AA0
General information	
Product type designation	CPU 1515SP PC
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	as of STEP 7 V14
PC configuration	
Processor	Dual-Core 1 GHz, AMD G Series APU T40E
Main memory	4 GB RAM
Installed SW	
Visualization	No
Controller	No

	6ES7677-2AA40-0AA0
Operator controls	
Mode selector	1
Supply voltage	
Type of supply voltage	24 V DC
Low limit of permitted range (DC)	19.2 V
High limit of permitted range (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms
Input current	
Current consumption (rated value)	1.5 A; full processor load, incl. ET 200SP modules and USB use
Current consumption (in no-load operation), typ.	0.6 A
Inrush current, max.	4.7 A; rated value
Power	
Power consumption, max.	36 W; incl. ET 200SP modules and USB use
Incoming power to the backplane bus	8.75 W
Power loss	
Power loss, typ.	15 W; without ET 200SP modules and without USB use
Memory	
Type of memory	DDR3-SDRAM
CFast memory card	No
Work memory	
Integrated	4 GB
Hardware configuration	
integrated power supply	Yes
Number of DP masters	
Via CM	1
Racks	
Modules per rack, max.	64; CPU + 64 Module + server module (mounting width max. 1 m)
Number of rows, max.	1
Time-of-day	
Clock	
Type	Hardware clock
Buffering time	6 wk; at 40 °C ambient temperature, typ.
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; via CM DP module
Number of interfaces RS 485	1; via CM DP module
Number of USB interfaces	3; 3x USB 2.0 front, 500 mA each – of which 2 x 500 mA and 1 x 100 mA simultaneously

	6ES7677-2AA40-0AA0
Number of SD card slots	1
Video interfaces	
Graphics interface	1x DVI-I
1st interface	
Interface hardware	
Number of ports	2
integrated switch	Yes
RJ 45 (Ethernet)	Yes; via BusAdapter BA 2x RJ45
• Transmission rate, max.	100 Mbps
• Industrial Ethernet status LED	Yes
2nd interface	
Interface hardware	
Number of ports	1
RJ 45 (Ethernet)	Yes; integrated
• Transmission rate, max.	1000 Mbps
• Industrial Ethernet status LED	No
3rd interface	
Interface hardware	
RS 485	Yes; via CM DP module
Interface hardware	
RJ 45 (Ethernet)	
100 Mbps	Yes; for 1st Interface X1
1000 Mbps	Yes; for 2nd Interface X2
Autonegotiation	Yes
Autocrossing	Yes
RS 485	
Transmission rate, max.	12 Mbps
Ambient conditions	
Ambient temperature in operation	
Min.	0 °C
Max.	Up to 60 °C with max. 32 ET 200SP modules and 3x 100 mA USB load; up to 55 °C with max 64 ET 200SP modules and 2x max. 500 mA and 1x max. 100 mA USB load
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C; with max. 32 ET 200SP modules and 3x 100 mA USB load
Ambient temperature during storage / transport	
Min.	-40 °C
Max.	70 °C

	6ES7677-2AA40-0AA0
I/O / Options	
I/O	
• SD card	optional for additional mass storage
Dimensions	
Width	160 mm
Height	117 mm
Depth	75 mm
Weights	
Weight, approx.	0.83 kg

10.7.7 CPU 1515SP PC (F) + HMI

The technical specifications of the following devices modules can be found in the product information under (http://support.automation.siemens.com/WW/view/en/104117388).

ET 200SP Open Controller System version WES7 P 64Bit 4GB RAM	Article number
CPU 1515SP PC	
CPU 1515SP PC + HMI 128PT	6ES7677-2AA41-0FK0
CPU 1515SP PC + HMI 512PT	6ES7677-2AA41-0FL0
CPU 1515SP PC + HMI 2048PT	6ES7677-2AA41-0FM0
CPU 1515SP PC F	
CPU 1515SP PC F + HMI 128PT	6ES7677-2FA41-0FK0
CPU 1515SP PC F + HMI 512PT	6ES7677-2FA41-0FL0
CPU 1515SP PC F + HMI 2048PT	6ES7677-2FA41-0FM0

10.7.8 S7-1500 Software Controller CPU 1505SP (F)

CPU 1505SP (F) is a PC-based controller of the SIMATIC S7-1500 Software Controller family. For more information about the CPU 1505SP (F), refer to the corresponding manual at (https://support.industry.siemens.com/cs/ww/en/view/109740725). For the CPU 1505SP F, also note the information in the F product information at (https://support.industry.siemens.com/cs/ww/en/view/109478599).

Technical specifications

You can find all technical specifications on CPU 1505SP with the article number 6ES7672-5DC01-0YA0 under (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5DC01-0YA0/td). You can find all technical specifications on CPU 1505SP F with the article number 6ES7672-5SC01-0YA0 under (https://support.industry.siemens.com/cs/ww/en/pv/6ES7672-5SC01-0YA0/td).

10.8 Dimension drawings

10.8.1 CPU 1515SP PC (F)

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 PC (F).

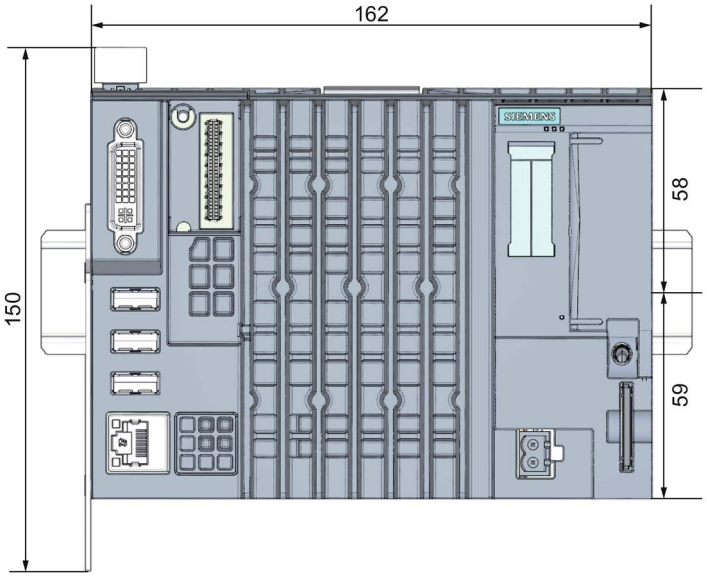


Figure 10-1 Dimension drawing of CPU 1515SP PC, front view

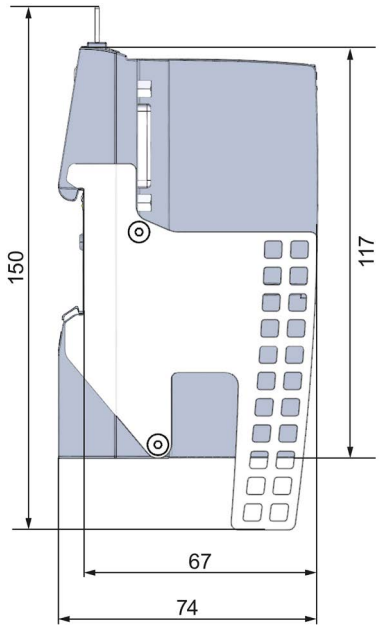


Figure 10-2 Dimension drawing of CPU 1515SP PC, side view

Accessories/spare parts

A

Ordering options and accessories for CPU 1515SP PC (F)

Table A- 1 Order options for CPU 1515SP PC

Description	Article number
System version **WES7 E 32Bit 4GB RAM** [1]	
CPU 1515SP PC, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP	6ES7677-2AA31-0EB0
CPU 1515SP PC, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP F	6ES7677-2FA31-0EB0
CPU 1515SP PC 4 GB, spare part (without CFast card, without software)	6ES7677-2AA40-0AA0
System version **WES7 P 64Bit 4GB RAM** [1]	
CPU 1515SP PC, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP	6ES7677-2AA41-0FB0
CPU 1515SP PC, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP and WinCC Runtime Advanced as of V14	
• CPU 1515SP PC + HMI 128PT	6ES7677-2AA41-0FK0
• CPU 1515SP PC + HMI 512PT	6ES7677-2AA41-0FL0
• CPU 1515SP PC + HMI 2048PT	6ES7677-2AA41-0FM0
CPU 1515SP PC F, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP	6ES7677-2FA41-0FB0
CPU 1515SP PC, 30 GB CFast card with pre-installed S7-1500 Software Controller CPU 1505SP F and WinCC Runtime Advanced as of V14	
• CPU 1515SP PC F + HMI 128PT	6ES7677-2FA41-0FK0
• CPU 1515SP PC F + HMI 512PT	6ES7677-2FA41-0FL0
• CPU 1515SP PC F + HMI 2048PT	6ES7677-2FA41-0FM0

[1] Windows Embedded Standard 7

Table A- 2 Accessories for CPU 1515SP PC (F)

Description	Article number
BusAdapter, 1 unit	
• BA 2×RJ45 (PROFINET BusAdapter with standard Ethernet socket)	6ES7193-6AR00-0AA0
• BA 2×FC (PROFINET BusAdapter with Fast Connect Ethernet connection)	6ES7193-6AF00-0AA0
Server module; 1 unit	6ES7193-6PA00-0AA0
Strain relief for CPU 1515SP PC (F)	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 Flashdrive 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 V4.4	6ES7648-6CA04-4YX0
SIMATIC PC, adapter cable, DVI-I compliant with VGA, 250 mm long	6ES7648-3AB00-0XA0
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
• Length: 830 mm	6ES5710-8MA31
• Length: 2000 mm	6ES5710-8MA41
SIMATIC IPC CFast cards	
• CFast 4 GB Industrial Grade	6ES7648-2BF10-0XG10
• CFast 8 GB Industrial Grade	6ES7648-2BF10-0XH10
• CFast 16 GB Industrial Grade	6ES7648-2BF10-0XJ10
• CFast 30 GB Industrial Grade	6ES7648-2BF10-0XK10

Online catalog

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

Abbreviations

B

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
DVD	Digital Versatile Disc	Digital storage medium with high memory capacity.
DVI-I	Digital Visual Interface	Interface for transfer of image and video data for DVI-I monitors.
ESD	Components sensitive to electrostatic charge	
EN	European standard	
EWF	Enhanced Write Filter	Enhanced write filter
FBWF	File Based Write Filter	File based write filter
GbE	Gigabit Ethernet	
GRUB / GRUB4DOS	GRand Unified Bootloader	Boot Manager
HMI	Human Machine Interface	User interface
IEC	International Electronical 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	

Abbreviation	Term	Meaning
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.
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; protective measure in which circuits with a rated voltage of up to 50 V AC or 120 V DC are operated ungrounded and feeds from circuits with a higher voltage are separated from these by, for example, a safety transformer.
UL	Underwriters Laboratories Inc.	
USB	Universal Serial Bus	Serial bus system for connecting a computer to external devices.

Troubleshooting

C

Problem	Possible cause	Remedy
CPU 1515SP PC (F) is not working.	CPU 1515SP PC (F) is not supplied with current.	Check the power supply.
CPU 1515SP PC (F) does not start.	Feedback through USB devices.	Use USB devices that comply with the USB 2.0 specification.
Windows no longer boots.	Settings in the BIOS setup are not correct. Windows clock is set incorrectly.	Check the settings in the BIOS setup menu Boot.
Time and/or date of the CPU 1515SP PC (F) do not match.	CPU 1515SP PC (F) was not connected for more than 6 weeks.	Correct the settings in the BIOS setup menu Main or 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 37).

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).

Enhanced Write Filter (EWF)

Configurable write filter making it possible to boot Windows Embedded Standard from write-protected media (e.g. from CD-ROM), to write-protect individual partitions and to adapt file system performance to the user's requirements (e.g. when using CFast cards).

Ethernet

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

File-Based Write Filter (FBWF)

Configurable write filter making it possible to write-protect individual files.

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.

Restore DVD

You use the Restore DVD to reset your system partition or the entire hard disk to the delivery state in the event of an error. The DVD contains all the image files required and is bootable.

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 PC (F) is pre-set. Changes must be made whenever a memory expansion, new modules or drives are to be activated.