SIEMENS

SIMATIC

Industrial PC SIMATIC IPC647C

Operating Instructions

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12/2012
A5E02669337-04

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:

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

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Disclaimer of Liability

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

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A5E02669337-04
℗ 12/2012 Technical data subject to change

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Introduction

1

Purpose of this documentation

These operating instructions contain all the information you need for commissioning and operation of the SIMATIC IPC647C .

It is aimed at both programmers and testers who are commissioning the device themselves and are combining the device with other units (automation systems, programming devices), as well as service and maintenance technicians installing expansions or undertaking fault analysis.

Scope of this documentation

The document is valid for all supplied variations of the SIMATIC IPC647C and describes the product status as of June 2010.

Conventions

The term "rack PC" or "device" is sometimes used to refer to the SIMATIC IPC647C product in this document. The abbreviation "CP" stands for CP 1616 onboard.

Basic knowledge required

Knowledge of personal computers and Microsoft operating systems is required. General knowledge in the field automation control engineering is recommended.

Position in the information landscape

These operating instructions are available on the "Documentation and Drivers" CD included with your product.

For supplementary instructions on how to handle the software, please refer to the corresponding manuals.

History

The following releases of the operating instructions have previously been published:

Edition	Comment
07/2010	First Edition
11/2010	Second Edition Changes: 64-bit operating systems, SAS hardware RAID controller, redundant power supply with monitoring, BIOS setup, AMT, technical specifications
07/2011	Third Edition Changes: BIOS setup, AMT, technical specifications, 64-bit operating systems, SAS hardware RAID controller, redundant power supply with monitoring
12/2012	Fourth Edition Climatic conditions: ODD operation/no ODD operation, retrofitting information: removable rack operation, slim DVD RW

1.1 Guideline to the operating instructions

Content structure	Contents
Table of contents	Detailed organization of the documentation, including the index of pages and chapters
Introduction	Purpose, layout and description of the important topics.
Safety instructions	Covers all general safety-related aspects of statutory regulations in terms of the installation, commissioning and operation of the product/system.
Description	Fields of application, features and installation of the product/system
Application planning	Aspects of storage, transport, environmental and EMC conditions to be considered in the preparatory stage
Installing	Product installation options and installation instructions
Connecting	Options of connecting the product and wiring instructions
Commissioning	Commissioning the product/system.
Integration	Options of integrating the product into existing or planned system environments/networks.
Functions	Monitoring and display functions
Expansions / Programming	Installation of expansion devices (memory, modules, drives)
Maintenance and service	Replacement of hardware components, restoring and setup of the operating system, installation of drivers and software
Troubleshooting	Problems, cause, remedy
Technical data	General specifications in compliance with relevant standards and current/voltage values
Dimensional drawings	Dimensions of the device and of modules
Detailed descriptions	Structure, function and features of vital components, distribution of system resources and use of the BIOS Setup routine
Appendix	Guidelines and certifications, service and support, notes on retrofitting
ESD directives	General ESD directives.

Safety notes

2

⚠ CAUTION
Please observe the safety instructions on the back of the cover sheet of this documentation. You should not expand your device unless you have read the relevant safety instructions.

This device is compliant with relevant safety directives to IEC, VDE, EN and UL. If you have questions about the validity of the installation in the planned environment, please contact your service representative.

Opening and repairing the device

Only authorized technical personnel are allowed to repair device components.

⚠ WARNING
Unauthorized opening and improper repairs can cause considerable damage to property or danger for the user.

System expansions

Only install system expansion devices designed for this device. Installation of other expansions may damage the system or violate safety requirements and RF interference suppression regulations. Contact your technical support team or where you purchased your PC to find out which system expansion devices may safely be installed.

NOTICE
If you install or exchange system expansions and damage your device, the warranty becomes void.

Use of earphones/headphones

Excessive sound pressure of earphones/headphones can result in hearing impairment / hearing loss.

Setting the volume and the equalizer to a setting other than the medium, will increase the output voltage of the earphones/headphones and therefore the sound pressure value.

The use of factors that influence the output power of the earphones/headphones (such as operating system, equalizer software, firmware, driver) and that are not approved by the manufacturer, may increase the output voltage of the earphones/headphones and therefore the sound pressure value.

Battery

This device is equipped with a Lithium battery. Batteries may only be replaced by qualified personnel.

⚠ CAUTION

There is the risk of an explosion if the battery is not replaced as directed. Replace only with the same type or with an equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local regulations.

⚠ WARNING

Risk of explosion and release of harmful substances!

Therefore, do not throw Lithium batteries into an open fire, do not solder or open the cell body, do not short-circuit or reverse polarity, do not heat up above 100° C, dispose of in accordance with regulations and protect against direct exposure to sunlight, moisture and condensation.

ESD Directive

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:

- Always discharge your body´s static electricity before handling modules that are sensitive to ESD (for example, 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 you install or remove modules which are sensitive to ESD.
- Handle modules fitted with ESDs by their edges only.
- Do not touch any wiring posts or conductors on modules containing ESDs.

Description

3

3.1 Overview

SIMATIC IPC647C is an industrial PC in 19" rack format with high-performance industrial functionality:

- Highly compact
- Extremely rugged
- Extensive product continuity



3.2 Areas of application

The SIMATIC IPC647C provides mechanical engineers, plant engineers and control cabinet manufacturers with a high-performance, extremely flexible 19" rack PC platform for machine-level industrial use:

- Measuring, open-loop control and closed-loop control of process data and machine data
- Visualization of production sequences and processes
- Image processing and evaluation in the context of quality inspection
- Data acquisition and management

The SIMATIC IPC647C is certified to CE for use in the following fields:

- Industrial area
- Domestic
- Business and commercial use

The device can therefore not only be used in industrial applications but also in building automation or in public facilities.

3.3 Highlights

Highly compact

- Compact housing design (2 HU)
- Flexibility for space-saving cabinet installation

High degree of industrial capability

- High operational vibration and shock resistance
- Wide operational temperature range
- High service friendliness
- Dust protection
- Distinct diagnostic features

Ideal for industrial applications

- Integrated PROFIBUS DP / MPI interface (optional)
- PROFINET interface CP 1616 onboard (optional)
- PCI, PCIe x4, PCIe x16 slots
- High flexibility and expansibility of components

High investment protection

- High continuity of the components/design
- Guaranteed spare parts availability for at least 5 years
- Simple integration in PC-based automation

High system availability

- SIMATIC IPC DiagMonitor – PC diagnostics and message software via OPC/SNMP/LAN
- SIMATIC PC/PG Image Creator – data imaging software
- RAID based on SAS hard disks through intelligent expansion module
- RAID based on SATA hard disks on-board
- RAID1 – redundant data storage on two hard drives, also "hot swap" in connection with removable racks
- Optional ECC memory module
- Redundant power supply with status message

3.4 Function

- Integral, configurable monitoring functions:
  - Program execution (watchdog)
  - Internal housing temperature
  - Fan speed
- Enhanced diagnostic/messaging via Ethernet, E-mail, SMS, and for direct input in SIMATIC software via OPC (optional using SIMATIC IPC DiagMonitor):
  - Operating hours counter
  - Hard disk status
  - System status (heartbeat)
  - Automatic logging of all messages to a log file
  - Option of remote monitoring of networked SIMATIC IPCs
- RAID1 for automatic data mirroring on two hard disk volumes

3.5 Features

General features	
Design	• 19” rack, 2 HU • Rugged panel-mount housing, all metal • Prepared for mounting telescopic rails • Can be mounted horizontally • Lockable front cover as access protection
Enclosure	• Dust protection by means of overpressure ventilation using bearing-seated front fan via filter • Enclosure cover fastened with a single screw • Front fan can be exchanged without tools • Card retainer for reliable operation of PC modules under vibration and shock conditions
Drive bays	• Front 2 x low profile removable rack or • 2 x 3.5" (in vibration-damped drive rack) • 1 x optical drive (slimline)

General features	
Slots for expansion cards long	• 2 x PCI or 1 x PCI, 1 x PCIe x4 • 1 x PCIe x16 [1)]
Graphics	• Onboard Intel® CPU with integrated HD Graphic Controller and Intel® QM57 Express Chipset Platform Controller Hub, 2-D and 3-D engine integrated on the processor Dynamic Video Memory Technology (uses up to 1.7 GB of RAM) Up to 1600x1200 at 120 Hz / 32-bit color depth Max. resolution: VGA 2560x1600 at 60 Hz / 32-bit color depth DVI 2048x1152 at 60 Hz / 32-bit color depth • in PCIe x16 slot (optional) PCIe x16 graphics card (dual head: 2x DP, 2x VGA or 2x DVI-D through DP adapter), 256 MB memory at 75 Hz / 32-bit color depth Maximum resolution: DP 2560x1600 at 60 Hz / 32-bit color depth DVI 1920x1200 at 60 Hz / 32-bit color depth VGA 2048x1536 at 60 Hz / 32-bit color depth

Interfaces	
PROFIBUS/MPI	12 Mbps (electrically isolated, compatible to CP-5611); optional
PROFINET	10/100 Mbps (CP 1616 onboard), three RJ-45; optional
Ethernet	2 x 10/100/1000 Mbps (two RJ-45) Wake on LAN and Remote Boot supported
USB	2 x front panel, 4 x rear panel, 1 x internal; (high current)
Serial	COM 1 (V.24), COM 2 (V.24); 9-pin
Parallel	LPT 1
Monitor	1 x DVI-I (for DVI-D or VGA using cable adapter)
Keyboard	PS/2
Mouse	PS/2
Audio	Microphone, Line out / Headset
Power supply	100 to 240 VAC, varying voltage; with transient power failure backup in accordance with NAMUR: Max. 20 ms at 93 V.

Monitoring functions	
Temperature	• Overshoot/undershoot of permissible operating temperature • Messages can be evaluated by an application program.
Fan	• Speed monitoring • Messages can be evaluated by an application program.
Watchdog	• Monitoring of program execution • Monitoring time can be parameterized in software • Restart can be parameterized in the event of a fault • Messages can be evaluated by an application program.
Status LEDs	• POWER (internal power supply unit, PC switched On) • HDD (access to hard disk drive) • ETHERNET 1, ETHERNET 2 (Ethernet status, "heartbeat") • PROFIBUS/MPI (activation display of the PROFIBUS/MPI interface), optional product feature • SF PROFINET (status display of the CP 1616 onboard interface), optional product feature • WATCHDOG (Watchdog function/error display) • TEMP (temperature status) • FAN (speed monitoring) • HDD1, HDD2 Alarm RAID status message in conjunction with SIMATIC monitoring software (only with RAID option)

Basic variant	
CPU motherboard	Motherboard without fieldbus
Bus module	3 slots (2 x PCI, 1 x PCIe x16)
Processor	Intel® Core™ i3-330E (2.13 GHz, 2 cores, 4 threads, 1066 MT/s FSB, 3 MB cache, EM64T, VT-x)
RAM expansion	1 GB SDRAM DDR3 1066 MT/sec (PC3-8500) Single Channel without ECC 2 DIMM base for maximum of 8 GB (without or with ECC) [1)]
Drives	
Hard disks	250 GB SATA, 3.5", internal installation
Operating system	without

1 Memory expansions ≥4 GB can only be used in combination with 64-bit operating systems

Optional accessories	
Processor	• Intel® Core™ i5-520E (2.4 GHz, 2 cores, 4 threads, 1066MT/s FSB, 3 MB cache, TB, EM64T, VT-x, VT-d, AMT) • Intel® Core™ i7-610E, (2.53 GHz 2 cores, 4 threads, 1066MT/s FSB, 4 MB cache, TB, EM64T, VT-x, VT-d, AMT)
RAM expansion	Up to 8 GB, Dual Channel (without or with ECC) [1)]
PROFIBUS/MPI	12 Mbps (electrically isolated, compatible to CP 5611)
PROFINET	10/100 Mbps (CP 1616 onboard, three RJ-45)
Drives	
CF drive	Slot for Compact Flash card, on front
DVD burner (Slimline, SATA)	Read: DVD ROM: Single Layer 8x, Dual Layer 6x DVD-R/+R: Single Layer 8x, Dual Layer 6x DVD-RW/+RW 8x, DVD-RAM; 5x CD-ROM: CD-R 24x, CD-RW 24x Write: DVD+R 8x, DVD+RW 8x, DVD-R 8x, DVD-RW 6x DVD+R9 (DL) 6x, DVD-R DL 2x CD-R 24x, CD-RW 24x
Hard disks 3.5" (SATA)	Hard disk in vibration-damped drive rack: • 250 GB; • 2 x 500 GB; • RAID1: 500 GB (2x 500 GB, SATA)
	Installation in the drive rack for the removable rack: • 250 GB • 500 GByte • 2 x 500 GB; • RAID1: 500 GB (2x 500 GB, SATA) 1000 GB (2x 1000 GB, SAS)
Solid State Drive 2.5" (SATA)	Fixed installation in the front drive rack • 50 GB SLC
	Installation in the front drive rack of the removable rack • 50 GB SLC
Expansion modules	
SAS hardware RAID controller [2)]	Intelligent PCIe-x8 RAID controller type: AD-5405Z • for max. 2 SAS drives • with CPU, cache memory (for little retroactive effect on system) • with buffer for data safety in the event of power failures

Optional accessories	
Optional accessories	
Graphics controllers	• PCIe x16 graphics card, Dual Head (2xDP or 2x VGA or 2x DVI-D)
DVI-I to VGA adapter	Used to connect a monitor with a VGA port to the PC (can be ordered by configurator).
DVI-I to VGA and DVI Y-adapter (dual display)	• Used to directly connect two monitors to the PC (without Dual Head graphics card). • Available as option (not per configurator).
Operating system	Preinstalled and activated / included on restore DVD • Windows XP Professional MUI*, 32-bit • Windows Server 2008 Standard Edition (incl. 5 clients), MUI *, 32-bit • Windows Server 2008 R2 Standard Edition (including 5 clients), MUI *, 64-bit • Windows 7 MUI**, 32-bit / 64-bit *MUI: **M**ulti language **U**ser **I**nterface; 5 languages (German, English, French, Spanish, Italian)

1 Memory expansions ≥4 GB can only be used in combination with 64-bit operating systems

2 SAS hardware RAID controller and graphic module cannot be used together.

Operating system languages

The following languages for the operating system can be installed at a later time from the recovery DVD:

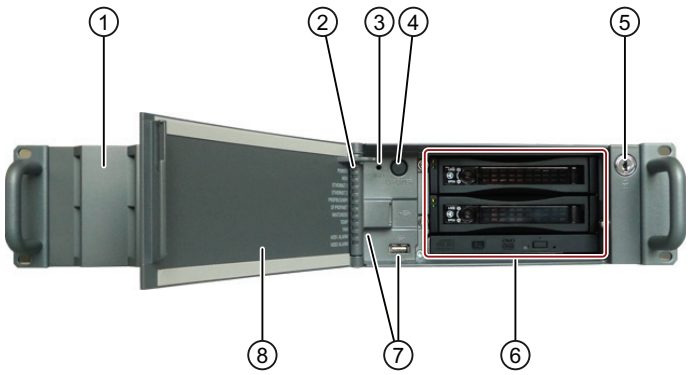
Language	Windows XP	Windows Server 2008	Windows Server 2008 R2	Windows 7 32-bit	Windows 7 64-bit
German	X	X	X	X	X
English		X	X	X	X
French	X	X	X	X	X
Italian	X	X	X	X	X
Spanish	X	X	X	X	X
Japanese	X	X	X	X	X
Chinese (Hong Kong)	X	X	X	X	X
Chinese (simplified)	X	X	X	X	X
Chinese (Taiwan)		X	X	X	X
Korean	X	X			
Russian	X	X	X	X	X

Optional expansions	
SIMATIC IPC DiagMonitor software	Tool for monitoring local and remote SIMATIC PCs: • Watchdog • Temperature • Fan speed • Hard disk monitoring (SMART, RAID status) • System and Ethernet monitoring (heart beat) • Monitoring modules of the redundant power supply
SIMATIC IPC Image and Partition Creator software	Tool for local data backup and management of hard disks.

3.6 Installation

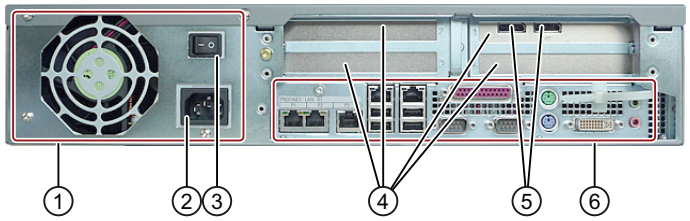
3.6.1 External design

Front view of the device (example)



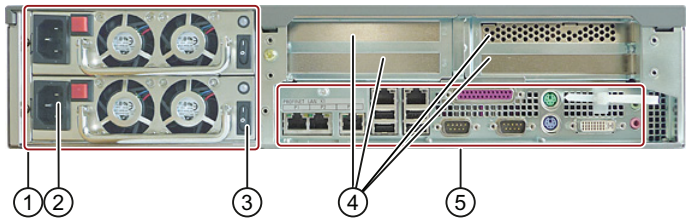
①	Front panel with vent openings (filter mat and fan behind the front panel). Check the filter mat regularly for soiling and, if appropriate, replace it.
②	Status displays
③	Reset button
④	On/off button
⑤	Lock
⑥	Option of installing: • DVD burner drive (slimline) • Hard disk removable rack • CF card adapter (slimline) • Hard disk in vibration-damped drive rack
⑦	2 USB ports
⑧	Lockable front door for access security. Keep the front door closed during normal operation. Note warning label underneath the drive bay when the front door is open.

Rear view of device with AC power supply



①	ATX power supply unit
②	Power supply connector
③	On/Off switch of AC power supply
④	Expansion slots
⑤	Connector for graphic card (display port, optional)
⑥	Connection elements

Rear view of device with redundant power supply (optional)



①	Power supply modules (2x)
②	Connector for redundant power supply module (2x)
③	On/Off switch of the redundant power supply (2x)
④	Expansion slots
⑤	Connection elements

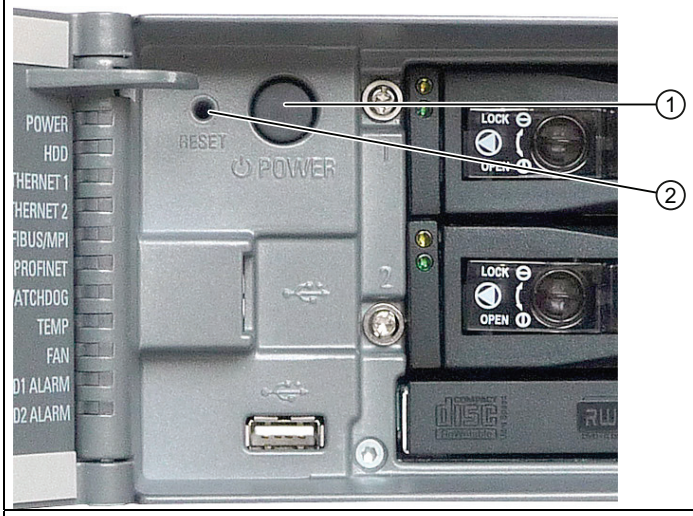
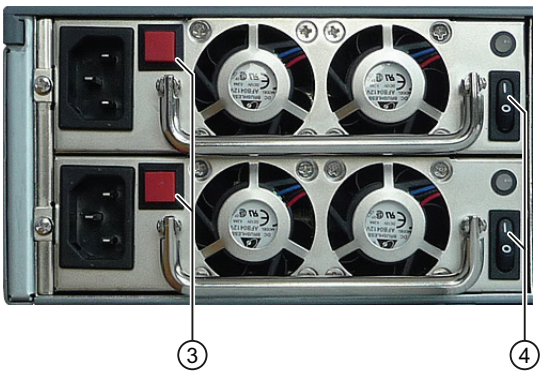
3.6.2 Control elements

⚠ WARNING
On/off buttons and on/off switches do not disconnect the device from the mains!

NOTICE
Data may be lost when the PC performs a hardware reset.

Note

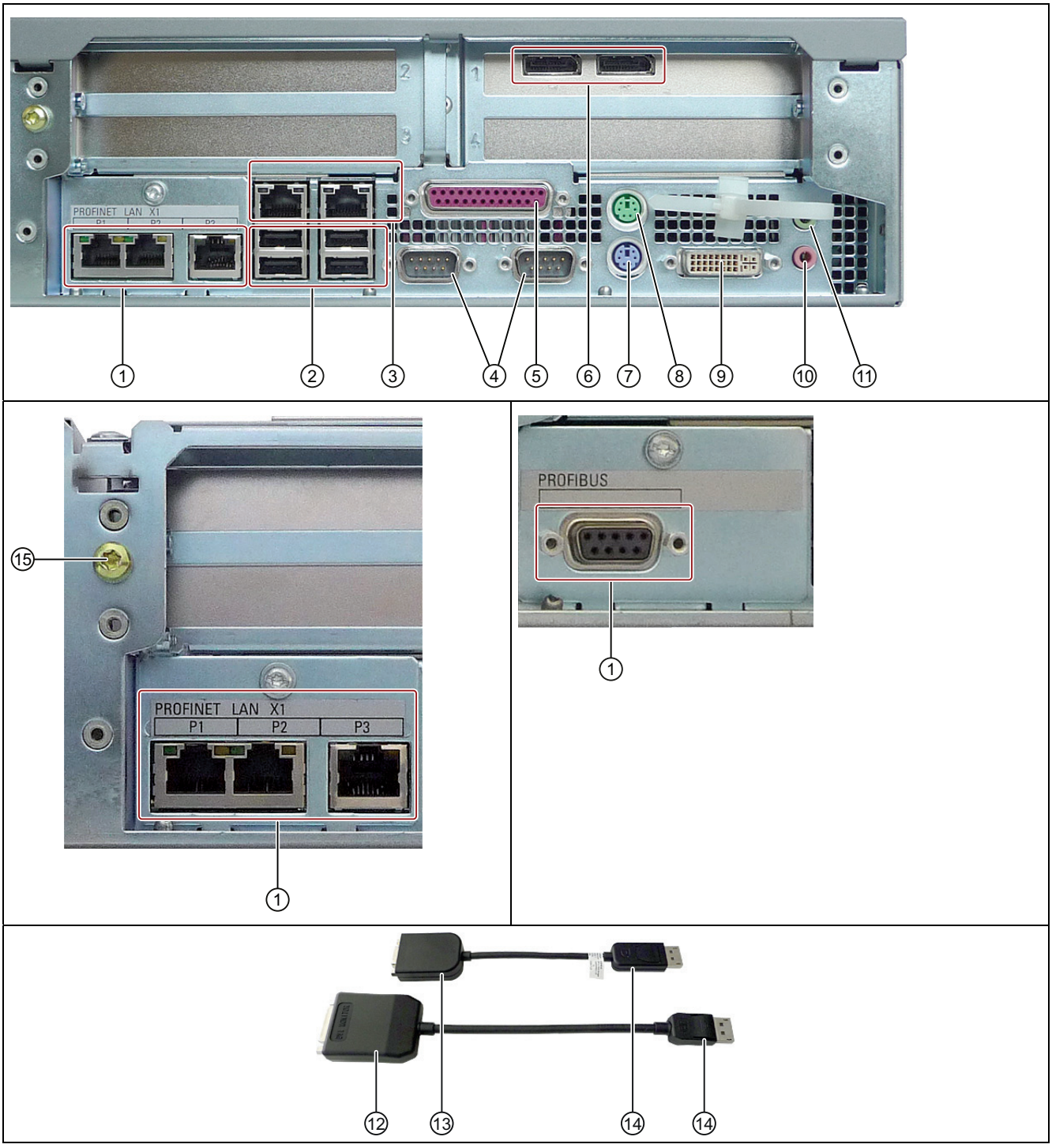
With a redundant power supply, both power switches must be set to "On" at the same time to ensure redundancy.

	①	On/off button For switching the device on or off Note: The device rear has one or 2 line side switches ③. These have to be switched on so that the on/off button at the front functions.
	②	Reset button The reset button can be operated using a pointed object (a bent paper clip, for example). The button signal triggers a hardware reset. The PC performs a restart (cold start).
	③	On/off switch Used to connect the device to the mains. Depending on the "After Power Failure" BIOS setting, the PC may turn on automatically. Otherwise, you may have to operate the on/off button ① on the front.
	③	Acknowledgement button of the redundant power supply The acoustic error signal is deactivated when the button is pressed.
	④	On/Off switch (redundant power supply) Used to connect the device to the mains. Depending on the "After Power Failure" BIOS setting, the PC may turn on automatically. Otherwise, you may have to operate the on/off button ① on the front.

See also

Connecting elements (Page 23)

3.6.3 Connecting elements

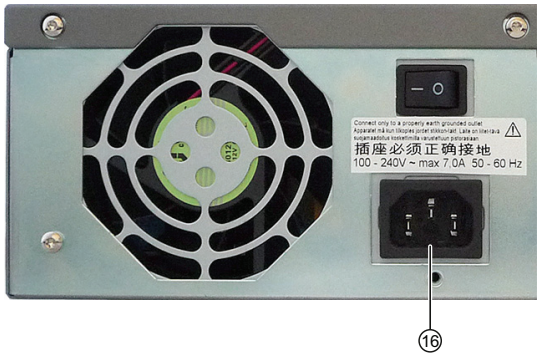


Item	Designation	Description
①	PROFIBUS/MPI	PROFIBUS interface (RS 485, electrically isolated), 9-pin D-sub socket (optional product characteristic)
	PROFINET	CP-1616 onboard interface, three RJ45 sockets (optional product version)
②	USB	Connection for USB devices, USB Port 1 to 4
③	ETHERNET 1, 2 *	2 x RJ45 connectors, Ethernet 10/100/1000 Mbps (ETHERNET 1 is AMT-capable)
④	COM	Serial interface (V.24), 9-pin sub D plug
⑤	LPT	Parallel interface, 25-pin
⑥	DP (Display Port)	2 x display port, DP connection of Dual Head graphics card (optional)
⑦	KEYBOARD	Connection for a PS/2 keyboard
⑧	MOUSE	Connection for a PS/2 mouse
⑨	DVI-I	DVI/VGA connection for CRT or LCD monitor with DVI interface, VGA via DVI/VGA adapter
⑩	Audio (input)	Connection for analog audio source, microphone, 3.5 mm phono jack
⑪	Audio (output)	Connection for active speakers or headset, 3.5 mm phono jack
⑫	DVI-D	DVI-D connection of the DP adapter
⑬	VGA	VGA connection of the DP adapter
⑭	DP	Display port connection of the DP adapter at Dual Head graphics card (optional)
⑮	Connecting potentials	Connection for equipotential bonding

* LAN interfaces are numbered on the enclosure to provide unique identification. The numbering by the operating system may deviate from this.

Power supply - position of the IEC connector

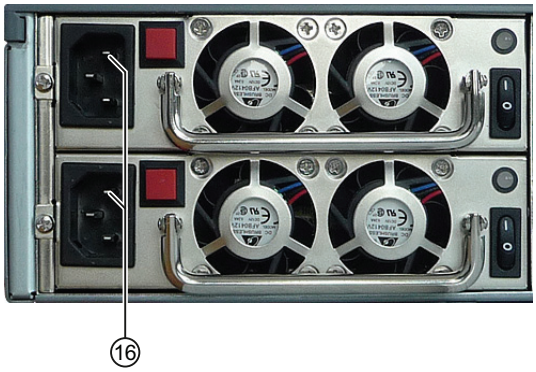
AC power supply



Power connection socket ⑯ for the power supply of the device.

The permitted voltage range is 100 V AC to 240 V AC.

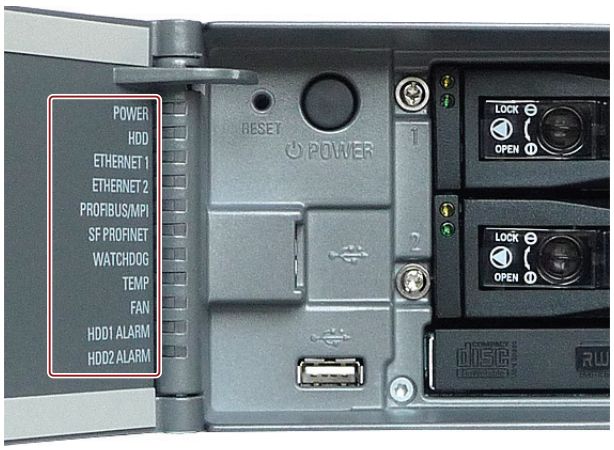
Redundant power supply



Power connection socket ⑯ for redundant power supply of the device.

The permitted voltage range is 100 V AC to 240 V AC.

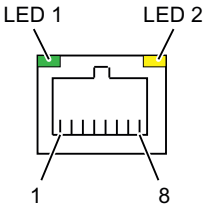
3.6.4 Status displays



Display	Meaning	LED	Description
POWER	PC status display	OFF	isolated from mains
		YELLOW	Standby (hibernating)
		GREEN	PC in operation
HDD	Display for hard disk access	OFF	no access
		GREEN	Access
ETHERNET 1 *	ETHERNET status display	OFF	• No connection • No data traffic
		GREEN	Data traffic
ETHERNET 2 *	ETHERNET status display	OFF	• No connection • No data traffic
		GREEN	Data traffic
PROFIBUS/MPI (optional)	Display of the communication status to S7 or PROFIBUS	OFF	• No connection • No data traffic
		GREEN	Data traffic

SF PROFINET (optional)	Status display for CP 1616 onboard	OFF	• CP not available • CP disabled • No error, communication established • Charging in progress • CP 1616 driver not installed • CP in NDIS mode
		Flashes slowly	• Link status error • IO controller: IO device cannot be addressed • IO controller: Duplicate IP address
		Flashes rapidly	Exception error: diagnostics via Web or SNMP is no longer possible
		AN	• Diagnostics information available • No communication established.
WATCHDOG	WATCHDOG status display	OFF	WATCHDOG not activated
		GREEN	WATCHDOG monitoring enabled
		RED	Monitoring time elapsed
TEMP	Internal temperature monitoring	OFF	Internal temperature OK
		RED	Internal temperature critical
FAN	Fan status (only with active SOM or DiagMonitor software)	OFF	Fan speed OK
		RED	Fan speed too low
HDD1 ALARM HDD2 ALARM	Hard disk alarm in conjunction with RAID and monitoring software	OFF	RAID is OK
		One RED	HDD1 or HDD2 not OK
		Both RED	RAID not OK (for information on locating the hard disk, refer to the RAID systems (Page 49) section)
		Both flash	RAID is synchronized
All displays are lit	Error in early BIOS Post	All lit	CPU startup failure Error in early POST
*	LAN interfaces are numbered on the enclosure to provide unique identification. The numbering by the operating system may deviate from this.		

Rear status displays



Display	Meaning	LED	Description
Ethernet LAN 1, 2 *	Green LED Link status display	OFF	• No cable connected • Cable disabled • Interface disabled, 10 MBit cable active
		GREEN	100 MBit cable active
		ORANGE	1000 MBit cable active
	Yellow LED Activity status display	OFF	• No cable connected • Cable disabled • Interface disabled • No activity
		YELLOW	Data transfer active
PROFINET LAN X1, P1, P2, P3 *	Green LED Link status display of CP 1616 channel	OFF	• No cable connected • Cable disabled • Interface disabled
		GREEN	Active cable connected
	Yellow LED Activity status display of CP 1616 channel	OFF	• No cable connected • Cable disabled • Interface disabled • No activity
		YELLOW	Data transfer active

* For unique labeling, the LAN and PROFINET interfaces are numbered on the enclosure. The numbering by the operating system may deviate from this.

Virtual status displays

The two "virtual" CP 1616 LEDs are only visible in the SIMATIC software and can be read via SNMP.

PROFINET	Virtual LEDs	RUN	CP is active
		STOP	CP is in the stop state
		Flashes	The states "flashes slowly" or "flashes rapidly" do not exist.

Application planning

4

4.1 Transport

Despite the device's rugged design, its internal components are sensitive to severe vibrations or shock. You must therefore protect the PC from severe mechanical stress when transporting it.

You should always use the **original packaging** for shipping and transporting the device.

NOTICE
Risk of damage to the device! When transporting the PC in cold weather, it may be submitted to extreme variations in temperature. In this situation, ensure that no moisture (condensation) develops on or inside the device. If condensation has developed on the device, wait at least 12 hours before you switch it on.

4.2 Unpacking and checking the delivery unit

Unpacking the device

Note the following points when you unpack the unit

- It is advisable not to dispose of the original packing material. Keep it in case you have to transport the unit again.
- Please keep the documentation in a safe place. It is required for initial commissioning and is part of the device.
- Check the delivery unit for any visible transport damage.
- Verify that the shipment contains the complete unit and your separately ordered accessories. Please inform your local dealer of any disagreements or transport damage.
- Please inform Siemens AG by means of the enclosed SIMATIC IPC/PG quality control report form.

Noting down the device identification data

The device can be clearly identified with the help of this identification data in case of repairs or theft.

Enter the following data in the table below:

- Serial number: The serial number (S VP) is located on the rating plate inside the front door.

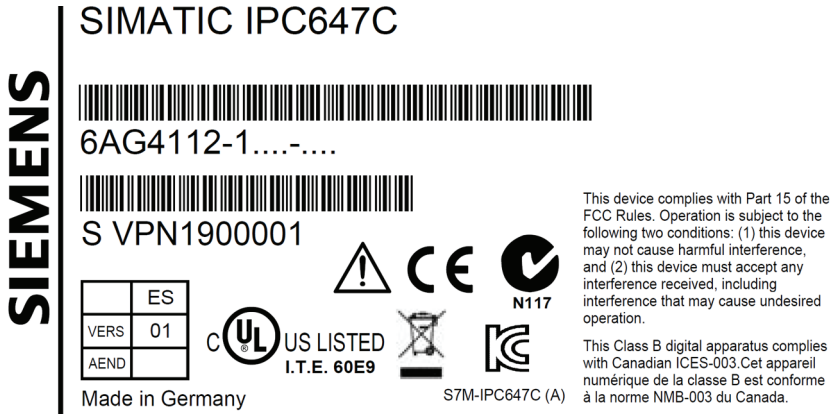


Figure 4-1 Example: Rating plate IPC647C

- Order number of the device
- Ethernet address: The Ethernet address of the device is printed on the device and is stored in the BIOS Setup (F2 key) under "Advanced > Peripheral Configuration".
- Microsoft Windows "Product Key" on the "Certificate of Authenticity" (COA). The COA label is located on the inner side of the front door. The product key is always required to reinstall the operating system. The Windows XP operating system is installed on the device shown here with the COA label.



Figure 4-2 COA label

Serial number	S VP ...
Order no.	6AG4112-1 ...
Microsoft Windows Product Key	
Ethernet 1 address	
Ethernet 2 address	
CP 1616 onboard layer 2	

Device equipment

The device equipment is listed on the inner side of the front door.

4.3 Ambient and environmental conditions

⚠ WARNING

If the following conditions for system installation are not observed, approvals in accordance with UL 60950-1 and EN 60950-1 are rendered void and there is a risk of overheating and personal injury.

When you plan your project, you should make allowances for:

- Climatic and mechanical environmental conditions defined in the "General technical data" chapter of the operating instructions.
- Avoid extreme ambient conditions as far as possible. Protect your device against dust, moisture and heat.
- This device was designed for use in a normal industrial environment. SIMATIC Rack PCs may not be operated in severe environments which are subject to caustic vapors or gases without taking additional protective measures (such as the provision of clean air.)
- Do not expose the device to direct sunlight.
- Install the device in such a way that it poses no danger, for example, by falling over.
- The device conforms to protection class IP41 at the front panel. Ensure that the installation opening for the device is splash-proof in areas which may be subject to splash water.
- Always maintain a minimum clearance of 50 mm to the area of the ventilation slots in order to ensure adequate ventilation of the PC.
- Do not cover the ventilation slots of the enclosure.
- The device meets requirements for fire protection housings to EN 60950-1 and can be installed without additional fire protection enclosure.
- The connected or built-in peripherals should not introduce a counter emf in excess of 0.5 V into the device.

4.4 Access protection

Note

Access protection

Unauthorized persons have direct access to the device.

Protect the device from unauthorized access with a front door that can be locked and is adequately secured.

⚠ CAUTION

Electrostatic sensitive devices

The device contains electronic components which are destroyed by electrostatic charges.

Before you open the front door, read the (ESD) guidelines for handling electrostatic-sensitive devices.

Installing

5

5.1 Installing the device

Optional installation locations

The device can be installed horizontally in control desks, in switch cabinets and in 19-inch rack systems.

Optional mounting methods

⚠ WARNING

Function test while installing the device in machines or systems

Following the results of a risk analysis, additional protection equipment on the machine or the system is necessary to avoid endangering persons. With this, especially the programming, configuration and wiring of the inserted peripherals have to be executed, in accordance with the safety performance (SIL, PL or Cat.) identified by the necessary risk analysis.

The intended use of the device has to be ensured.

The proper use of the device has to be verified with a function test on the system. This test can detect programming, configuration and wiring errors. The test results have to be documented and if necessary inserted into the relevant inputs.

You can mount the device as follows:

- Mounting on cabinet brackets
- Mounting on device bases
- Mounting on telescopic rails

  When telescopic rails are used for mounting, the device can be withdrawn fully from the cabinet or rack.

  For more detailed information on telescopic rails, refer to the sections "Technical data of the telescopic rails (Page 155)" and "Dimension drawing for telescopic rails (Page 158)".

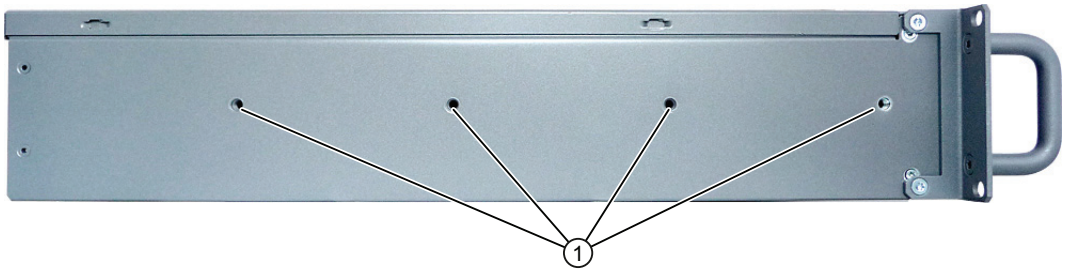


Figure 5-1 Position of the mounting holes ①

NOTICE

The mounting screws of the telescopic rails may not protrude more than 5 mm into the enclosure.

⚠ CAUTION

Risk of injury!

It is not permitted to install the device only on the 19-inch brackets of the front panel.

Connecting

6

6.1 Connecting peripherals

Note before connecting

Note

Connect only peripherals approved for industrial applications according to EN 61000-6-2. Shielded interface cables must be used for interfaces integrated ex factory.

Note

Hot-plug I/O modules (USB) may be connected while the PC is in operation.

NOTICE
I/O devices that are incapable of hot-plugging may only be connected after the device has been disconnected from the power supply.

⚠ WARNING
Strictly adhere to the specifications in the I/O manuals.

Note

The connected or built-in peripherals should not introduce a counter emf into the device.

A counter emf greater than 0.5 V to ground on the + 3.3 VDC / + 5 VDC / + 12 VDC power rail due to a connected or integrated component can prevent normal operation or even destroy the computer.

When measuring the counter emf, remember the following:

- The computer in question must be turned off and the power supply connector should be plugged in.
- During the measurement, all cables from the plant to the computer should be connected.
- All other components in the plant must be active.

6.2 Connecting the power supply

Note before connecting

WARNING

Do not connect or disconnect power and data cables during thunderstorms.

WARNING

The device may only be operated on grounded power supply networks (TN systems to VDE 0100, part 300, or IEC 60364-3).

Operation on ungrounded or impedance-grounded power networks (IT networks) is prohibited.

WARNING

The permitted nominal voltage of the device must conform with local mains voltage.

WARNING

The mains connector must be disconnected to fully isolate the device from mains. Ensure easy access to this area.

A master mains disconnect switch must be installed if the device is mounted in a switch cabinet. Always ensure free and easy access to the power inlet on the device or that the safety power outlet of the building installation is freely accessible and located close to the device.

Note

The varying-voltage power supply module is designed for operation on 100 VAC to 240 VAC mains. The setting of the voltage range takes place automatically.

Note

The power supply contains a PFC (Power Factor Correction) circuit to conform with the EMC directive.

Uninterruptible AC power systems (UPSs) must supply a sinusoidal output voltage in the normal and buffered mode when used with SIMATIC PCs with a PFC circuit.

UPS characteristics are described and classified in the standards EN 50091-3 and IEC 62040-3. Devices with sinusoidal output voltage in the normal and buffered mode are identified with the classification "VFI-SS-...." or "VI-SS-....".

Localized information

Outside of the USA and Canada, 230 V supply voltage:

This device is equipped with a safety-tested power cord which may only be connected to a grounded shockproof power outlet. If you choose not to use this cable, you must use a flexible cable of the following type: Min. 18 AWG conductor cross-section and 15-A / 250-V shock-proof connector. The cable set must be compliant with safety regulations and stipulated IDs of the country where the system is to be installed.

For the USA and Canada:

For the United States and Canada, a CSA or UL-listed power cord must be used.

The connector must be compliant with NEMA 5-15.

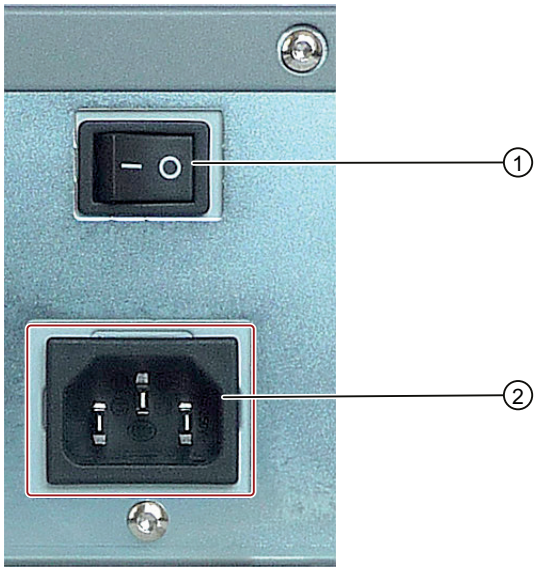
120 V supply voltage

Use a flexible power cord which is approved to UL and CSA with the following features: SJT model with three leads, min. 18 AWG conductor cross-section, max. 4.5 m in length and parallel ground contact connector 15 A, min. 125 V.

240 V supply voltage

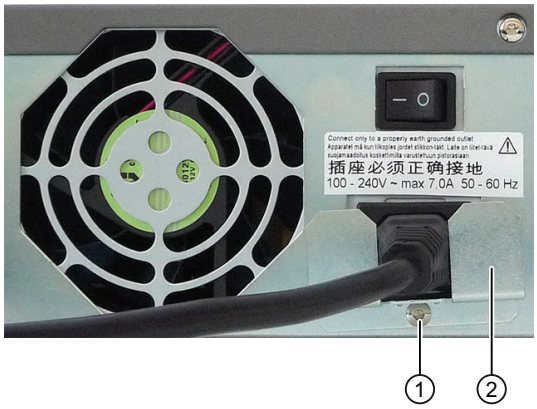
Use a flexible power cord which is approved to UL and CSA with the following features: SJT model with three conductors, min. 18 AWG conductor cross-section, max. length 4.5 m, and tandem grounded connector 15 A, min. 250 V.

Connecting an AC power supply

How to connect the device to mains		
1.	Make sure that the on/off switch ① is in the '0' (off) position. This prevents an unintentional starting of the device when plugging in the power cable.	
2.	Connect the power cable to the socket ②.	
3.	Plug the power cable plug into the power outlet.	
4.	Switch on the on/off switch ①. The yellow power LED (standby) on the front panel of the PC lights up.	

Secure the power plug

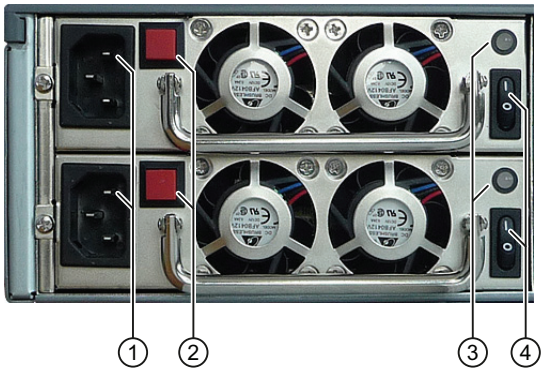
You can secure the power plug in order to avoid unintentional disconnection of the power cable.

How to secure the power plug		
1.	Screw out the lower left mounting screw ① on the power supply unit.	
2.	Screw on the power plug latch ② at the power supply unit.	

WARNING

If the power plug is secured with a clamp, the power outlet must be freely accessible to allow the device to be easily removed from the mains.

Connecting a redundant power supply

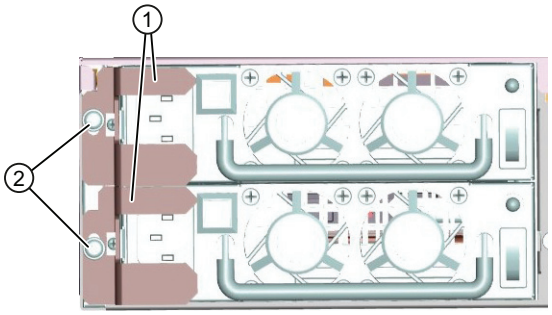
How to connect the device to mains		
1.	Plug in both IEC connectors ①.	
2.	Turn both on/off switches ④ on or off simultaneously. The green LED at the power supply ③ lights up. **Note:** If only one power supply module is switched on or connected, or a module is defective, a warning signal is emitted. Press the associated acknowledgment button ② to deactivate the warning signal. The status is also displayed and signaled by the SIMATIC monitoring software, if active. You can mute the acoustic alarm in the SIMATIC monitoring software.	

Securing the power plugs for the redundant power supply

The two power plugs for the redundant power supply are each secured separately.

1. Push the power plug latch ① over the inserted cable.

   A screw ② is on housing in preparation of the installation.
2. Fasten the standard power plug latch with screws ②.
3. Always use both power plug latches ①.

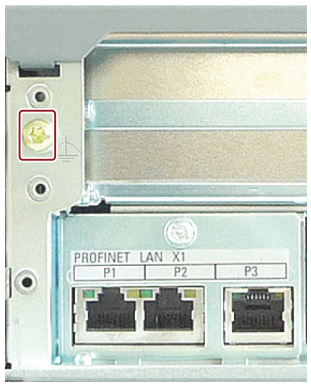


To replace a defective module, loosen only the relevant power plug latch on the screw ②. The intact module then remains secure.

⚠ WARNING
When the power plug is secured with a latch, the power outlet must be freely accessible to allow the device to be easily removed from the mains.

6.3 Equipotential bonding

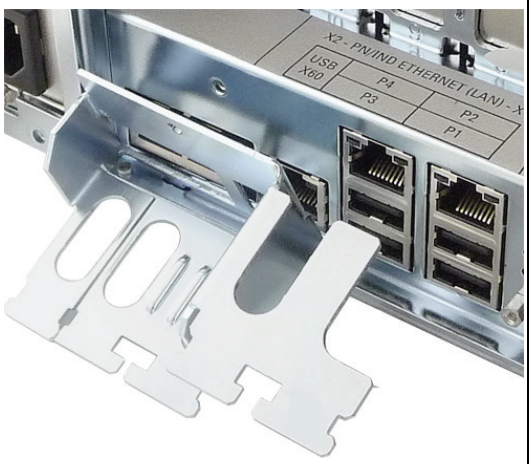
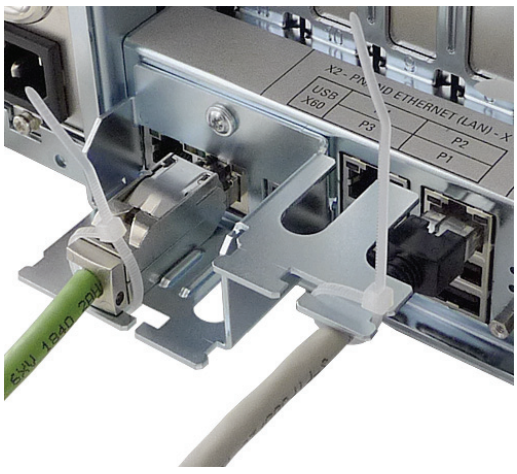
A low-impedance ground connection improves the discharge of interference generated by external power cables, signal cables or cables for I/O modules to ground.

The marked equipotential bonding terminal (large surface, large-area contact) must be connected with the central earthable point of the cabinet or plant in which the PC is to be installed. The minimum conductor cross-section may not be less than 5 mm^2.	

6.4 Connecting the strain relief for network cables

The strain relief provided in the scope of delivery is used to prevent accidental loosening of the network cable from the device. One cable tie (not included in the package) is required for each interface.

To fix the strain relief, you will need a TORX T10 screwdriver.

Steps for connecting the strain relief		
1.	Remove the PROFINET interface plate.	
2.	Install the plate for the Profinet and Ethernet connectors. Use the mounting screw of the PROFINET interface plate for this purpose.	
3.	Install the Profinet and Ethernet connectors at the respective positions and fasten the cables with cable ties.	

Commissioning

7

7.1 Requirements for commissioning

NOTICE
Risk of damage to the device! Make sufficient allowances for the device to acquire room temperature before you put it into use. If condensation has developed on the device wait at least 12 hours before you switch it on.

Note

Switching the device on

Depending on the device model, the power supply has either one or two on/off switches as a power switch.

If at least one of these on/off switches at the rear of the device is in position "1" (on), the device can be switched on using the on/off button at the front.

If all the on/off switches at the rear of the device are in position "0" (off), the device takes the least amount power from the AC mains. The device cannot then be switched on using the on/off button at the front.

Both on/off switches must therefore be in the "0" position, especially for the model with redundant power supply power. This is because the device is operational even with one active power supply module.

- Before you switch on the device, you should verify that all peripheral devices such the keyboard, mouse, monitor and the power supply are connected.
- The operating system of your device is preinstalled on the hard disk.

See also

Control elements (Page 21)

7.2 Initial commissioning

Following the initial switch on, the operating system is set up automatically on the device.

NOTICE
Faulty installation If you change the default values in the BIOS setup or if you turn off the device during installation, you disrupt the installation and the operating system is not installed correctly. The operating safety of the device and the plant is at risk. Do not switch off the device during the entire installation process. Do not change the default values in the BIOS setup.

Procedure

1. Press the on/off button.

   The green POWER LED lights up. The module carries out a self-test. During the self-test, the following message appears:

   ```
   Press <F2> to go to Setup Utility

   Press <F12> to go to Boot Manager
   ```

2. Wait for the message to disappear.
3. Follow the instructions on the screen.
4. Make the region and language settings.

   If you want your system language to be international, select English. Information on changing the regional and language settings at a later time is available in the section "Installing new software", "Setting up the language selection by means of the Multilanguage User Interface (MUI)" in the operating instructions.

   Note

   Once the operating system has been set up, the device may restart.

5. Type in the product key as required.

   The product key is located on the "Certificate of Authentication", in the "Product Key" line.

Result

The interface of the operating system is displayed every time you turn on the device and after the startup routine.

7.3 Windows Security Center

Warning from the Windows Security Center

A warning from the Windows Security Center is displayed the first time you switch on your device. The Security Center checks the status of the device in regard to the three important security aspects listed below. If a problem is detected (an outdated antivirus program, for example), the Security Center issues a warning and makes recommendations on how you can better protect the device.

- **Firewall**: The Windows Firewall adds protection to the device by blocking network or Internet access to the device by unauthorized users. Windows checks if the device is protected by a software firewall.
  The firewall is enabled by default in the factory state.
- **Antivirus software**: Antivirus programs add protection to the device by searching for and eliminating viruses and other security threats. Windows checks if a full-range, up-to-date antivirus program is running on the device.
  No antivirus software is installed in the factory state.
- **Automatic updates**: Using the Automatic Update feature allows Windows to regularly search for the latest critical updates for the device and to install them automatically. This feature is disabled in the factory state.
- **Real-time protection (Windows 7 only):** Windows Defender displays warnings if spyware or possibly unwanted software is installed or executed on the computer. You will also receive a warning if programs attempt to modify important Windows settings.

Configure the Security Center according to your requirements.

7.4 Notes on operation

7.4.1 Opening the front door

⚠ CAUTION
Electrostatic-sensitive devices The device contains electronic components which may be destroyed by electrostatic charge. Before you open the front door, read the (ESD) guidelines for handling electrostatic-sensitive devices.

7.4.2 Compact Flash card rack (optional)

Note

We highly recommend that use use approved SIMATIC Compact Flash cards. Siemens disclaims any liability for impairment of functions caused by the use of third-party cards.

Installation

It is possible to operate the optional CompactFlash card rack with a CompactFlash card as a flash drive. Additional information is available in the section Installation and removal of CF card rack (Page 93).

Features

The flash drive with CompactFlash card acts just like a standard hard disk. No special driver software is required to operate the Flash drive.

Although the Flash drive reacts like a hard disk superficially, there are restrictions due to the limited number of write cycles on Flash memory. The service life of a Compact Flash card depends on the number of write access to the medium - read accesses have no effect.

To maximize the service life of Compact Flash cards, take care that the writing to the cards is kept to a minimum.

For example, you can do this by ensuring that:

- Swap files of the operating system and application are not located on the Compact Flash card.
- Cyclic writing is avoided.

Operating systems such as MS-DOS and Windows XP Embedded allow this, for example. The Enhanced Write Filter (EWF) can be used with XP Embedded, for example. This minimized the number of write accesses to the Flash drive or avoids it entirely.

Flash drive functions

A Flash drive or a Compact Flash card consists of Flash memory chips.

An intelligent controller integrated in the flash drive manages the flash memory. This optimizes the use of the Flash memory to achieve a maximum service life.

The service life of a Flash drive depends in part on the following factors:

- Type of file
  Executable files (*.EXE) are usually only written once and stays at the same storage location.
- The number of writes within a given time (the less the better)

Comparison of Flash drive and hard disk drive service life

Examples of the service life for a Flash drive:

With a "Data logger function", a 4 KB file is written to a 1 GB Compact Flash card every 5 seconds. The cluster size is 4 KB in this case. Due to the file segmentation, the file is always written to another location on the Compact Flash card.

With this example, the Compact Flash card has a theoretical service of 79.3 years.

Example of the service life for a hard disk drive

The service life of a hard disk drive depends on the following factors:

- Temperature (operating & storage / transport)
- Shock (operating & storage / transport)
- Vibration (operating & storage / transport)
- Humidity (operating & storage / transport)
- Power supply
- Power on hours (POH)
- Duty cycle (% workload, i.e. write/read/positioning)

The service life for a hard disk is between 2.5 and 5 years, depending on the factors listed above.

Booting from the Flash drive

To be able to boot from the flash drive, you first need to install an operating system and set the boot priority. The procedure for installing an operating system is described in the section "Installing Windows". How to change the boot priority in the BIOS setup is described in the section "Boot Menu (Page 205)".

7.4.3 DVD burner (optional)

The DVD burner drive is an optional feature. Recording methods supported by the disk drive: Disc-at-once, Track-at-once, Session-at-once, Packet writing. You can write to CD-R, CD-RW, DVD+R, DVD-R, DVD-RW, DVD+RW, DVD-RAM and dual-layer media.

Burner software

You need to install additional software (burner software) to utilize full functionality of the DVD burner, depending on the operating system.

Example

The Windows XP operating system does not include burner functionality. This is why the burner software is included. This software is included on the CD supplied with the device. Insert the CD in the drive, run setup and follow the instructions on the screen.

The Windows 7 and Windows 2008 Server operating systems include burner functionality. No additional burner software is provided in this case. Refer to the operating system documentation for instructions on using the DVD burner.

Note

When starting the burner software the first time, no data medium should be inserted in the drive. This is because data media with errors can interrupt the automatic hard drive recognition. This makes it impossible to correctly display the possible burner functions.

NOTICE
Danger of data errors when burning disks Burning is permissible only in an undisturbed environment, i.e. shock and vibration stress must be avoided. Because of heavy fluctuation in the quality of CD-Rs, data may be corrupted in a burning session, even if no error message is initially displayed. The written data can only be verified by comparing these with the source. To be on the safe side, data should be verified after every burning session.

7.4.4 Removable hard disks

The removable racks support hot plugging in a RAID1 system. If, however, you have configured a non-RAID system, you will need to turn the device off before exchanging the rack.

Notes on operation

Note

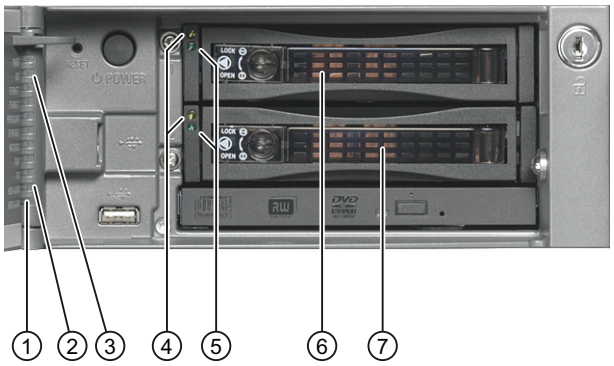
Always replace the defective drive with a new drive of the same type and capacity.

NOTICE
Removing the removable rack in order to replace the hard disk is only permissible when the hard disk is inactive, meaning when the hard disk status display of the removable rack is not flashing. Check the Integrated SATA RAID system (Page 49).

Identifying a defective hard drive

Note

The table and information below apply only to the delivery state of the device, that is if no changes or expansions were made.



① HDD 2 ALARM
② HDD 1 ALARM
③ HDD
④ HDD activity display
⑤ Power LED
⑥ Removable rack 1
⑦ Removable rack 2

See section "Status displays (Page 25)".

The table below shows the assignment of the removable rack positions in the device to the RAID system reports:

LED [1]	Installation location	Enclosure labeling
HDD1 ALARM	Removable rack ⑥	1
HDD2 ALARM	Removable rack ⑦	2

[1] If the disk is defective, LEDs ① and ② light individually or simultaneously when SIMATIC monitoring software is installed.

Replacing a hard disk

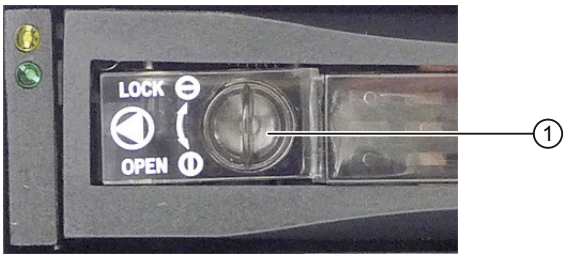
Determine which hard disk was reported as defective by the RAID controller (see sections Integrated SATA RAID system (Page 49)and Hardware SAS RAID system (Page 56)) and replace the hard disk as described in the section Removing and inserting the HDD carrier (Page 90).

Information about the recovery of the RAID system is available in the section RAID systems (Page 49).

Notes on operation

Note

Always interlock the hard disk cartridge with the removable rack in order to ensure reliable operation of the device.

	Turn the removable rack lock ① to open

7.4.5 2HDD system (optional)

When the device ships, the second hard disk is connected to SATA port 2. This hard disk drive is not set up. This gives you the option of backing up your data to this hard disk. For information on hard disk capacities, refer to your order documentation.

Booting from a slave hard disk

In order to allow booting from the second hard disk, you need to configure it as the primary boot device. Make the following settings in your BIOS Setup:

Select Boot > Hard Drive > <Disk name> e.g. STxxxxxxxxx- SATA2, then press the "+" key to move it up in the boot order.

Note

The drive letters for the partitions on both drives are assigned by the operating system used. You can change these in the Control Panel as required.

7.4.6 RAID systems

Two versions of RAID systems are available.

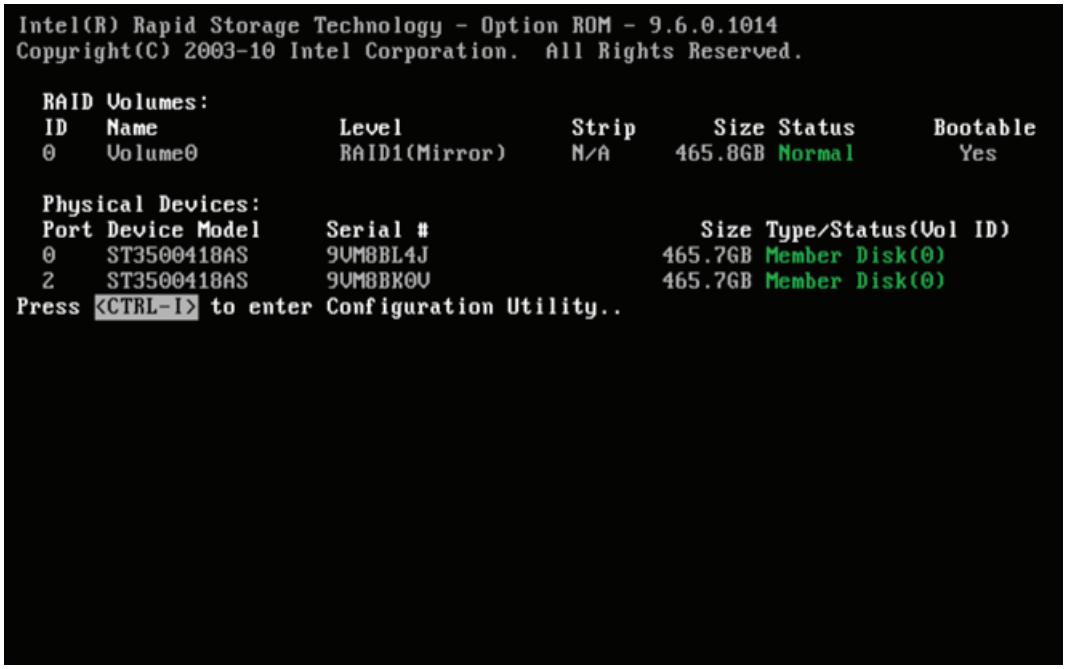
- Integrated SATA RAID based on the system CPU and chip sets:
  - For standard applications without high demands regarding system effects of the RAID.
  - No expansion slot is used.
- SAS hardware RAID controller with own CPU and cache memory:
  - For applications with high demands regarding system effects of the RAID.
  - With maintenance-free buffering for high data safety.
  - The RAID controller with PCIe-x8 interface uses the PCIe-x16 expansion slot of the device.

7.4.7 Integrated SATA RAID system

This is a RAID1 system configuration (data backup on two hard disks). This configuration enhances system availability as the system is able to continue operation if a hard drive fails, or if there is a cable problem at a channel.

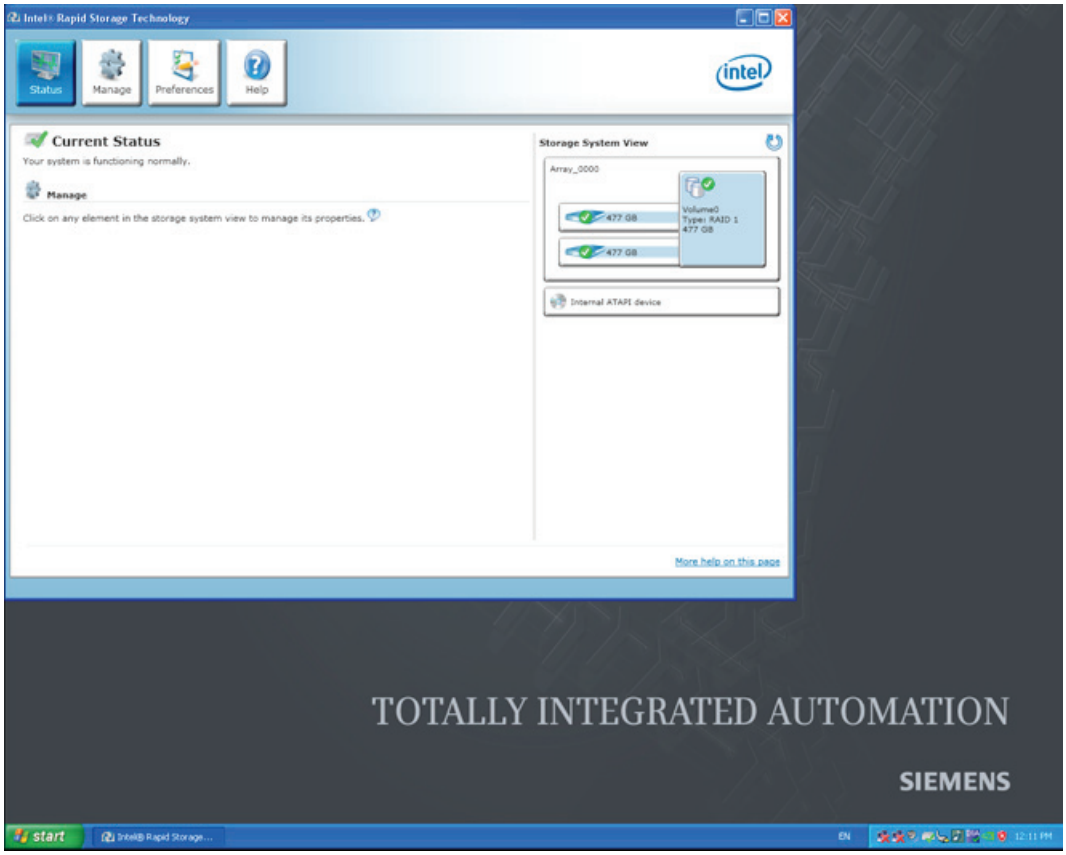
Note

You can find information about Intel RAID controllers in the RAID documentation on the "Documentation and Drivers" DVD that ships with the product in the Drivers\RAID-AHCI\Intel directory.



RAID system management functions

The pre-installed RAID system software offers enhanced functionality for RAID system operation and management. Start the SW
by selecting "Start > Programs > Intel Rapid Storage Technology.



The "Manage -> Advanced" command returns details of the RAID volumes.

Use the command "Help > System Report > Save" to create a report with details of the RAID volumes.

Note

The RAID status entries are returned by default in the Windows event view and in the log file of the program.

A hard drive can be synchronized at operating system level if a fault is detected. It may take a very long time (hours, in case of a high hard disk load even days) to synchronize a new hard disk in the background, depending on its size and on the system load.

The safe RAID Level 1 system state is achieved again only after synchronization is completed.

Comments about faults

Note

Input delay

The data is synchronized in the case of a hard disk failure. The system response may be delayed depending on the processor and hard disk loads. In extreme cases, the execution of keyboard, mouse or touch screen commands may be briefly delayed.

The result may be faulty operations of the machine or plant.

Do not operate any safety-critical functions during a hard disk failure.

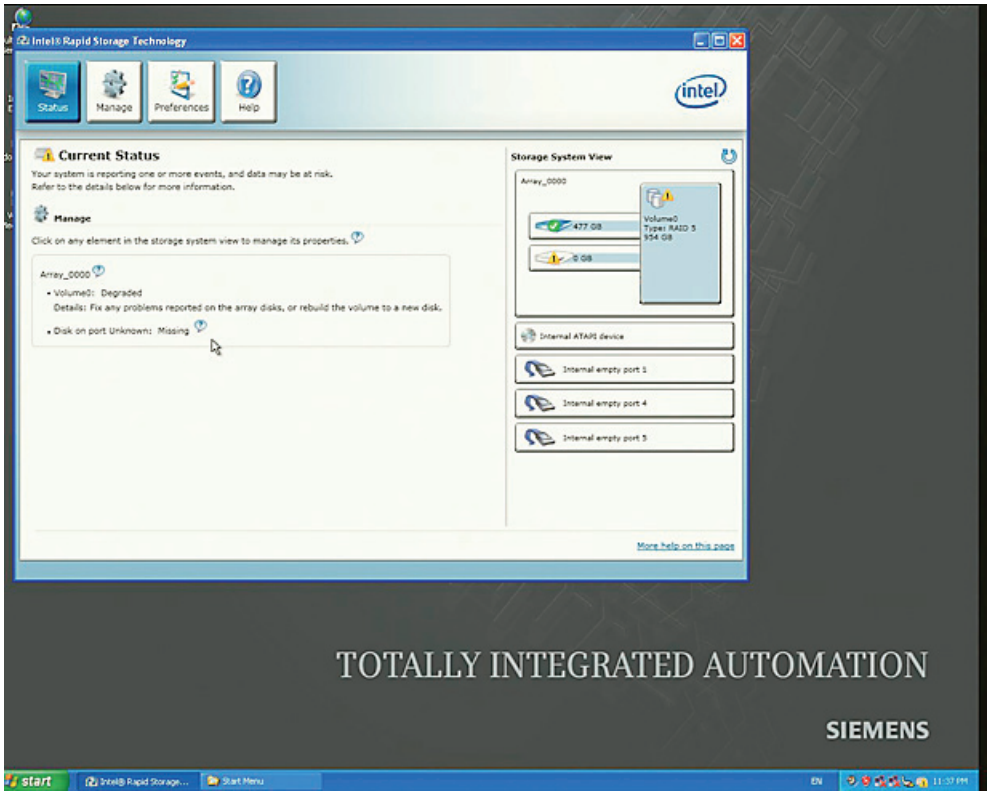
Replacing a defective RAID system drive

Replace the defective drive with a new drive of the same type and capacity to return to the secure RAID1 or RAID5 status after a fault.

The RAID software displays the following:

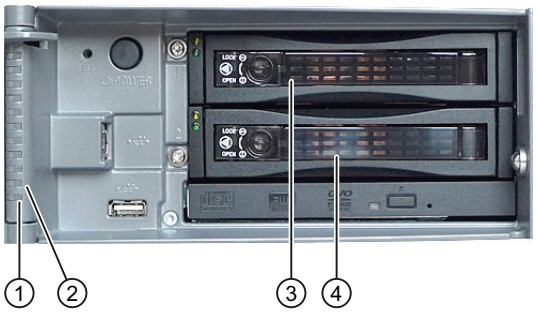
- A defective drive
- Details of the functioning hard drive

The working hard disk is displayed by the BIOS with a port number and by the RAID software with a device port number. To view details about each drive, move the mouse cursor over the drive and press the right mouse button. A pop-up window is then activated.



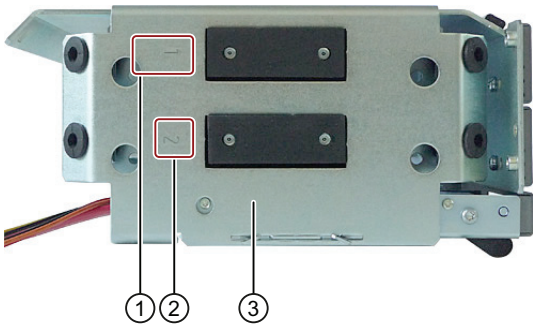
The functioning drive can be located using the following pictures and tables.
The table and information below apply only to the delivery state of the device, that is if no changes or expansions were made.

The following figure shows drives in the removable rack.



Assigned LED [1]	RAID BIOS	RAID software	SATA interface	Installation location	Enclosure labeling
HDD1 ALARM ②	Port 0	Device Port 0	SATA0	Removable rack ③	1
HDD2 ALARM ①	Port 2	Device Port 2	SATA2	Removable rack ④	2

The following figure shows drives in the removable rack.



Assigned LED [1]	RAID BIOS	RAID software	SATA interface	Installation location	Enclosure labeling
HDD1 ALARM	Port 0	Device Port 0	SATA0	Drive rack ③ Drive ①	1
HDD2 ALARM	Port 2	Device Port 2	SATA2	Drive rack ③ Drive ②	2

1 If the disk is defective and SIMATIC monitoring software is installed, LEDs ① and ② light individually or simultaneously.

Note

The table and information below apply only to the delivery state of the device, that is if no changes or expansions were made.

Always replace the defective drive with a new one of the same type and capacity.

Note

Drives in removable racks can be hot-swapped without shutting down the device.

Replacement in devices without a removable rack may only take place when the device is turned off.

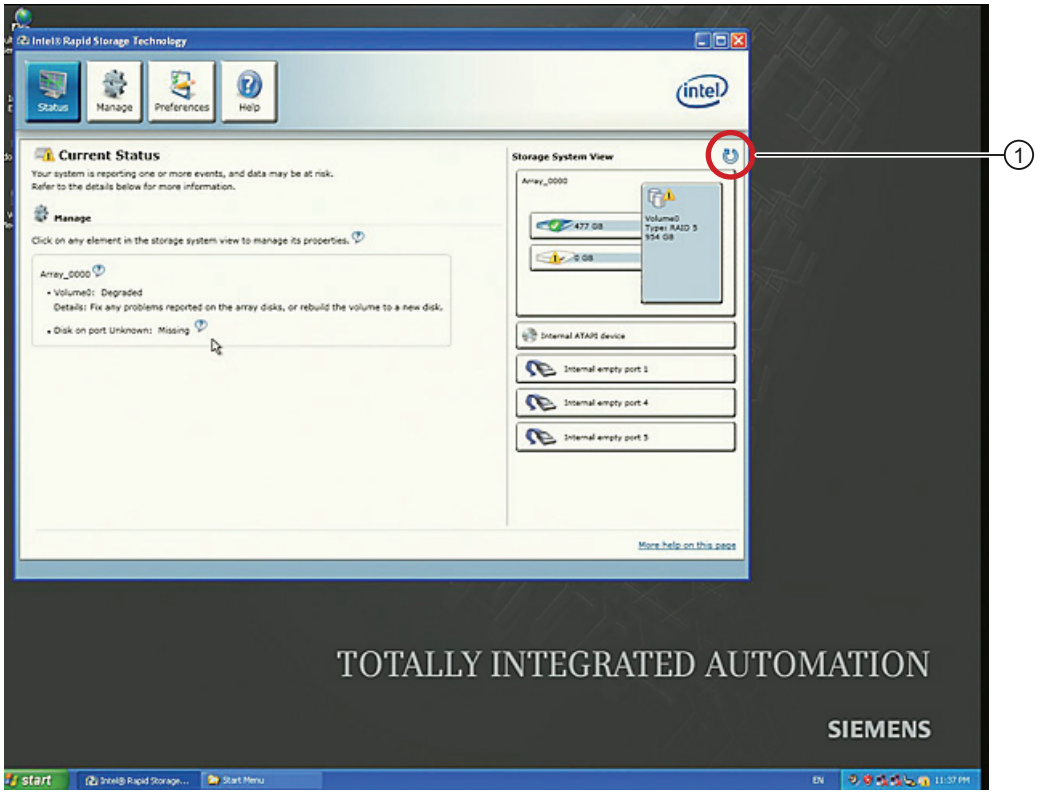
The new HDD can be integrated into the RAID system at operating system level by means of the RAID software. Synchronization may take several hours, depending on system load. The HDD alarm displays on the front will flash during this process. This is not possible at BIOS level.

Points to note if the hard disk is replaced when the computer is turned off

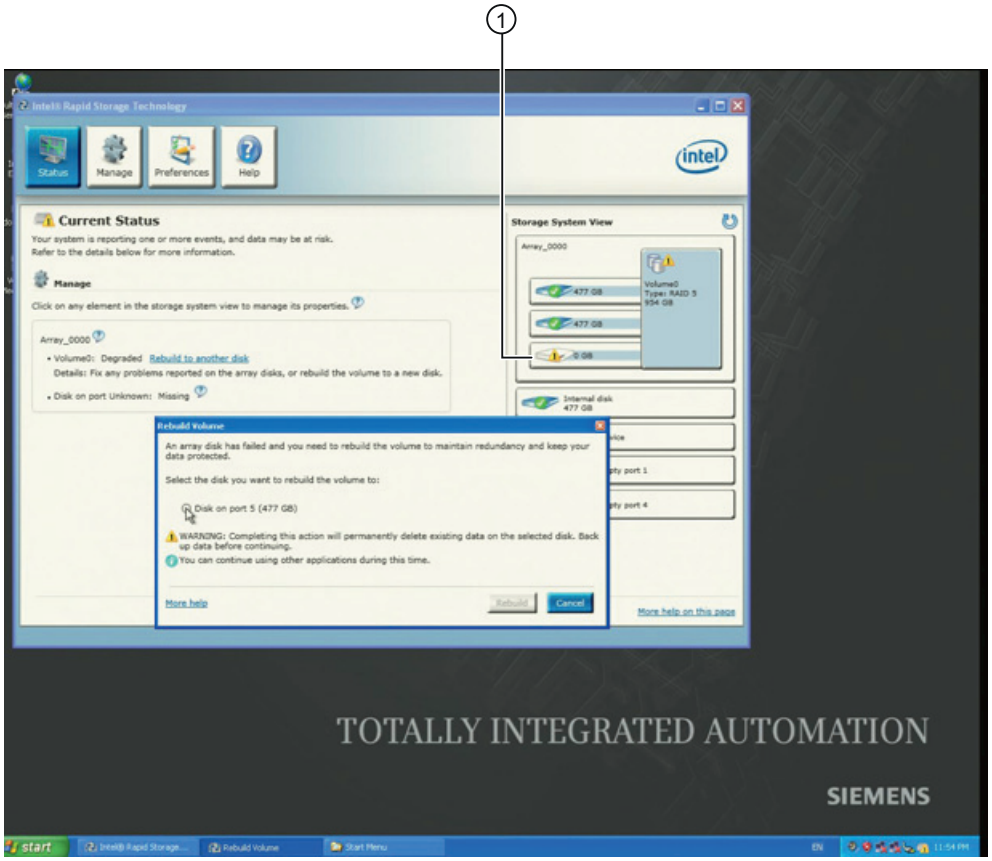
Only a hard disk that was active and functioning correctly when you booted can later be included in the RAID array.

To be able to boot from the RAID system, you must place this first in the list of bootable sources in the BIOS "Boot" setup menu. Otherwise the system will boot from the hard disk you have just installed and the message "Operating system not found" will be displayed.

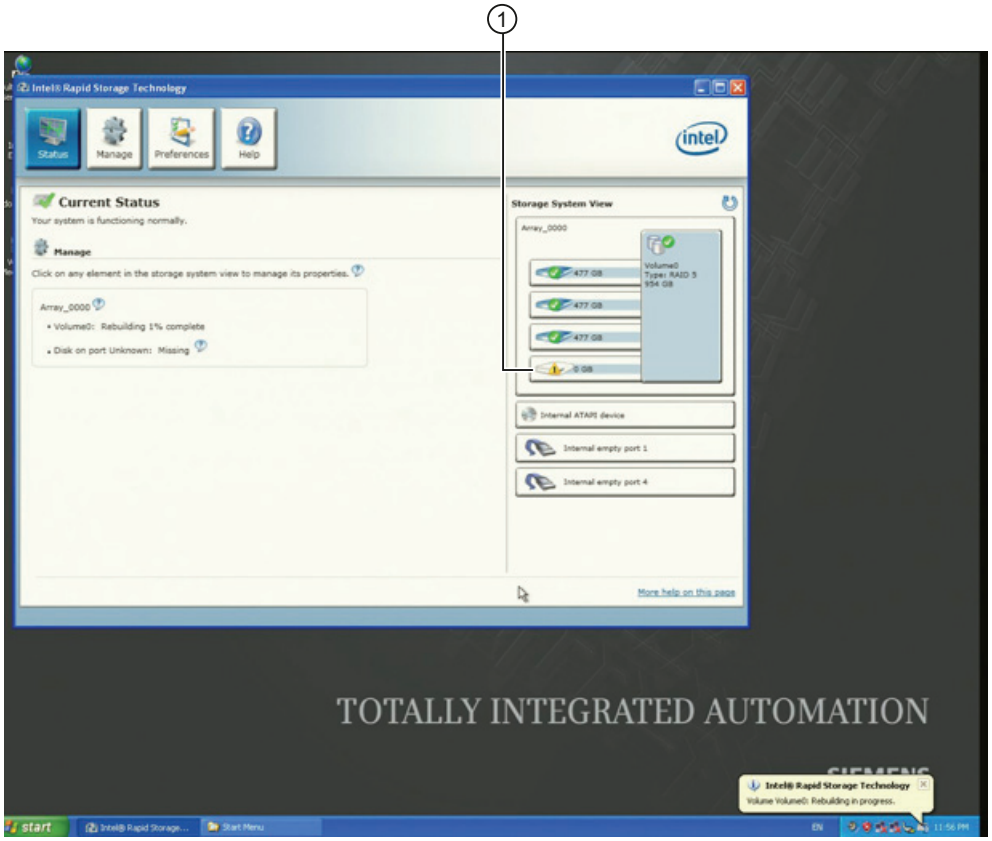
Integrating a new hard drive



Use the "Run Hardware Scan now " ① symbol to search for and display the new hard disk. You can also choose to reboot the device. In this case, the RAID software automatically integrates the new HDD. The "Rebuild to another Disk" command synchronizes the RAID volumes.



If you have shut down and restarted the system without installing a functioning new hard disk, "unused" will be displayed for the corresponding SATA port. In this case, you will need to shut down the system again and boot with the functioning hard disk. The new hard disk is then assigned to a SATA port and can be included in the RAID array. The "Rebuild to another Disk" command initiates synchronization of the RAID1 system.



A defective drive ① continues to be displayed during the rebuilding process. This drive disappears from the display when the rebuild process is complete.

See also

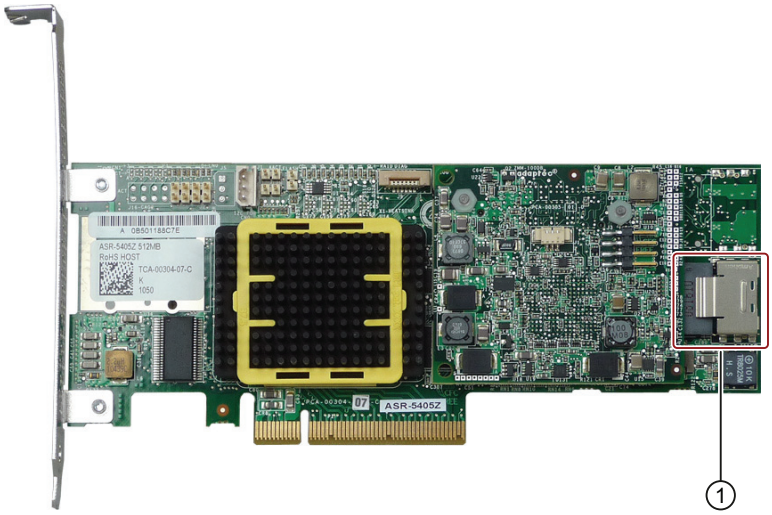
Removable hard disks (Page 46)

7.4.8 Hardware SAS RAID system

Introduction

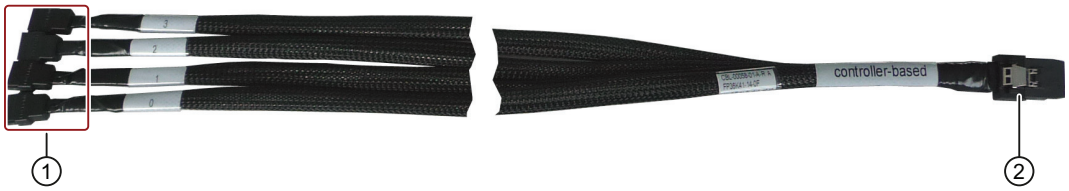
The system is configured as RAID1: data backup on two SAS hard disks. This configuration enhances system availability as the system is able to continue operation if a hard drive fails or if there is a cable problem at a channel. The RAID system is set up fully functioning. Operator controls are not necessary for operation.

Different RAID modules are described in the manufacturer documentation. The RAID module "Adaptec RAID 5405Z" is installed in your device:



① Connection for the adapter cable

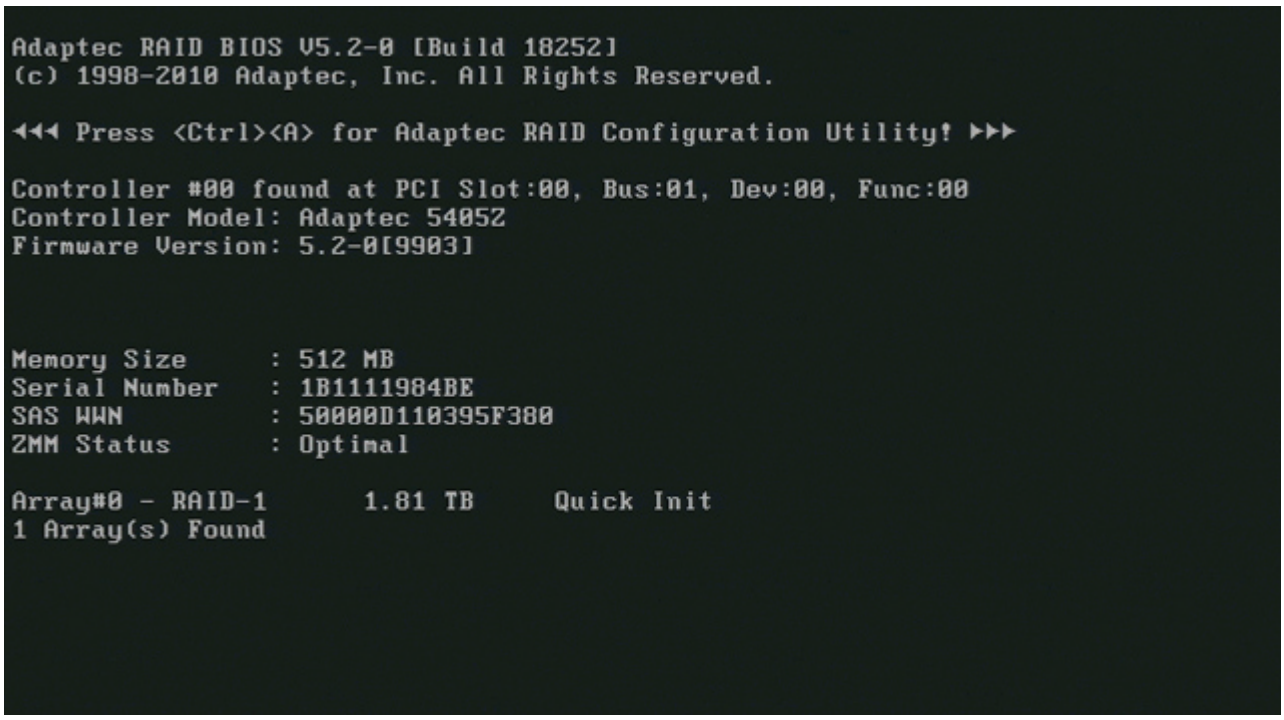
The figure below shows the adapter cable.



① Hard disk connections 0-3 (for the removable rack

② Connection for the RAID module

The installed RAID controller for the "Adaptec RAID 5405Z" module is displayed as follows in the BIOS:



The following documentation is available on the "Documentation and Drivers" DVD that ships with the product in the "Drivers\RAID\Adaptec" directory:

- Adaptec RAID Controller Quick Start Guide

  The PDF file contains information on how you install the RAID controller and create a bootable RAID1 array. It also describes how you install the operating system and the controller driver on the array.

- Adaptec RAID Controller Installation and User Manual

  The PDF file includes comprehensive information on installation and configuration of the RAID module and the connected devices.

- Adaptec Storage Manager User Manual

  The PDF file includes comprehensive information on installation and use of the Adaptec Storage Manager.

- Command Line Utility User’s Guide

  The PDF file includes the user manual for the command line utility program and comprehensive information on the use of ARCCONF.

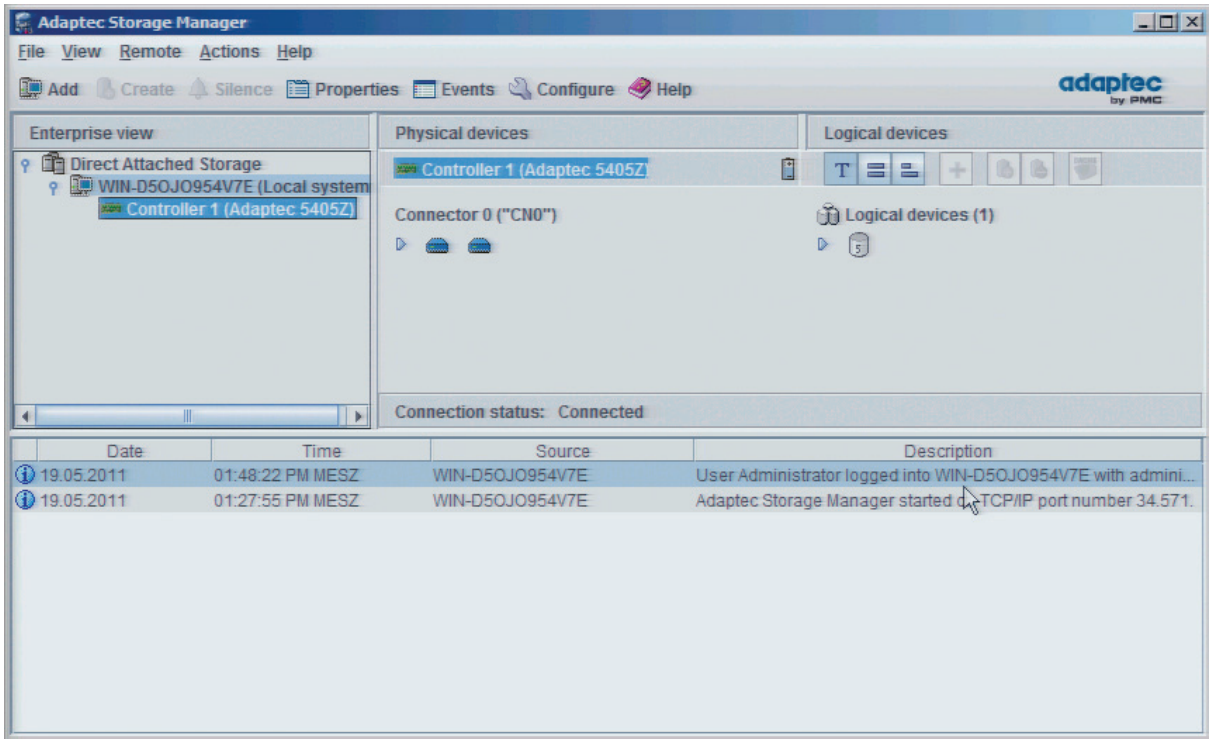
- Adaptec Storage Manager as integrated online help

  The online help includes details on the creation and management of arrays with the Adaptec Storage Manager.

RAID system management functions

The installed RAID system software offers enhanced functionality for RAID system operation and management. The software must be started for the detailed status displays to be displayed on the screen or for work to be carried out on the RAID.

You start the software with "Start > Program Files > Adaptec Storage Manager".



The symbols here have the following meaning:

Icon	Description
	Ready disk drive, not part of any logical drive
	Disk drive with no free space
	Failed disk drive
SSD	Ready Solid State Drive (SSD), not part of any logical drive or MaxIQ pool
	Controller

Note

The RAID system status is displayed in the Windows event view and in the event display of the Adaptec Storage Manager.

A hard drive can be synchronized at operating system level if a fault is detected. It may take a very long time to synchronize a new hard disk in the background, depending on the size of the hard disk and on the system load. It may take several hours or even days in the case of a high hard disk load.

The safe system state RAID 1 is reinstated only after synchronization is completed.

Comments about faults

Note

Input delay

The data is synchronized in the case of a hard disk failure. The system response may be delayed depending on the processor and hard disk loads. In extreme cases, the execution of keyboard, mouse or touch screen commands may be briefly delayed.

The result may be faulty operations of the machine or plant.

Do not operate any safety-critical functions during a hard disk failure.

Before you replace the defective hard disk, create a backup copy of the system. Always replace the defective drive with a new one of the same type and capacity.

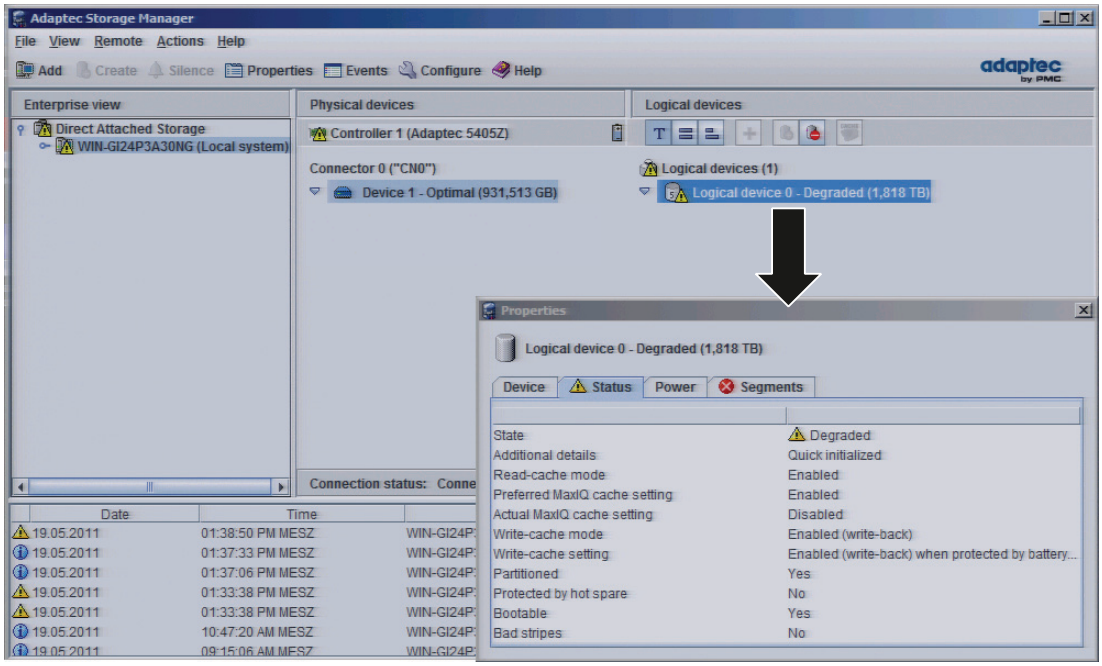
Replacing a defective drive the hardware RAID system

Replace the defective drive with a new drive of the same type and capacity to return to the safe RAID1 status after a fault.

The RAID software displays the following:

- A defective drive
- Details of the functioning hard drive

The defective hard drive is displayed by the BIOS with port number and by the RAID software with the warning symbol at the drive symbol. For details on the respective drive, double-click the drive symbol. The "Properties" dialog opens.

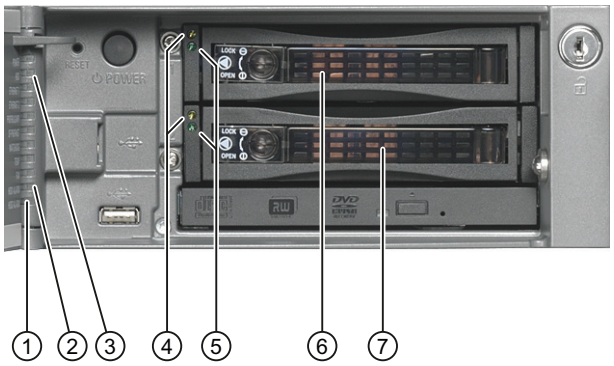


Note

Deviating figures

The following figures and notes apply only to the delivery state of the device without any changes or expansions.

The following figure shows the drives in the removable rack.



① HDD 2 ALARM
② HDD 1 ALARM
③ HDD
④ HDD activity display
⑤ Power LED
⑥ Removable rack 1
⑦ Removable rack 2

LED [1]	RAID BIOS	RAID software	Connection	Enclosure labeling
HDD 1 ALARM	Dev00	Device 0	0	1
HDD 2 ALARM	Dev01	Device 1	1	2

[1] If the disk is defective and SIMATIC monitoring software is installed, LEDs ① and ② light individually or simultaneously.

NOTICE

Data loss

Hot swap: For devices with removable racks, the drive can be replaced without turning off the device.

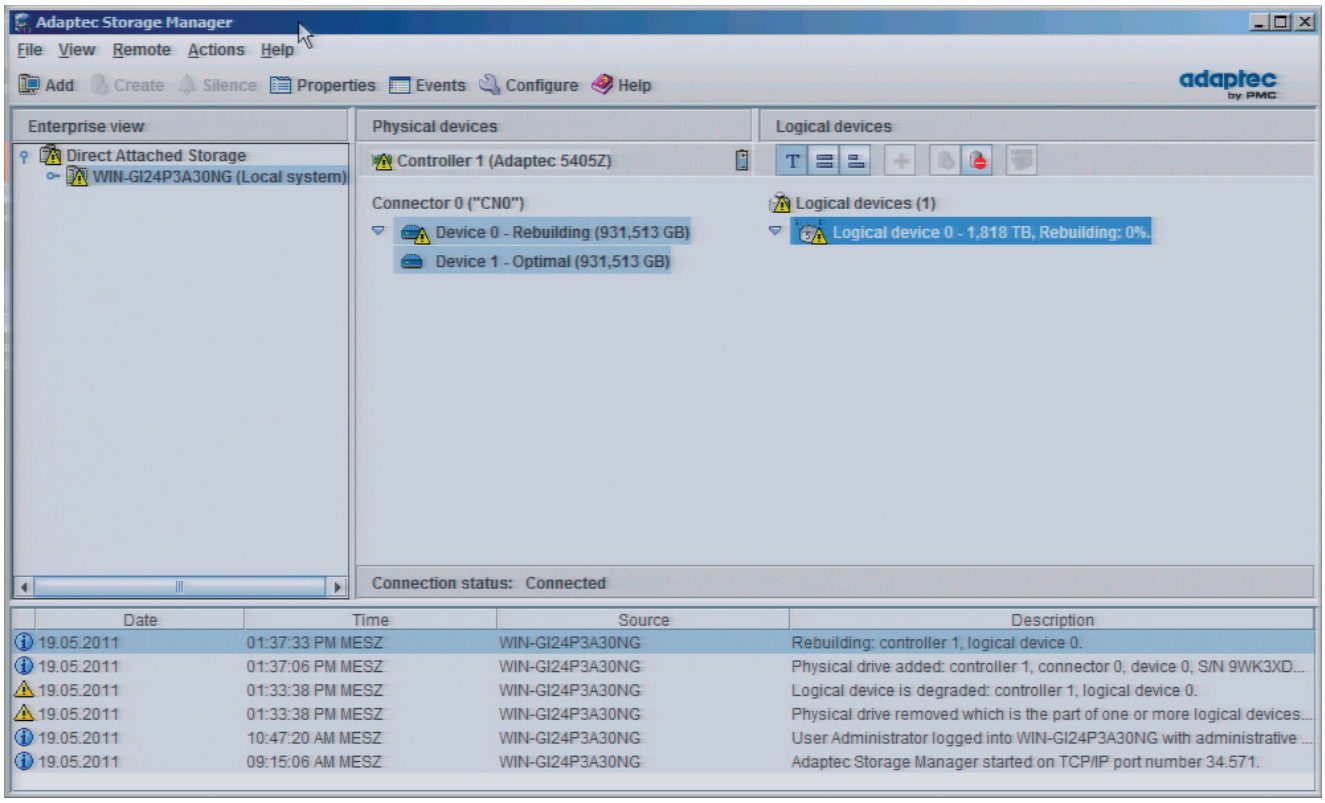
The new hard disk can be integrated into the RAID system at operating system level with the RAID software. Synchronization may take several hours, depending on system load.

Integrating a new hard drive

A hard drive is integrated automatically into the RAID if it fulfills one of the following requirements:

- Factory new
- It is set up as a replacement drive (global spare)
- It is set up as a specific replacement drive (dedicated spare).

Information about creating the spare drives is available in the controller documentation.



See also

Removable hard disks (Page 46)

Integration into an automation system

8

8.1 Integration

Options of integration in existing or planned system environments/networks:

Ethernet

Wake on LAN and Remote Boot are supported.

The integrated Ethernet interfaces (10/100/1000 Mbps) can also be used for communication and data exchange with programmable controllers such as SIMATIC S7.
This functionality requires the "SOFTNET S7" software package.

PROFIBUS/MPI

The optional electrically isolated PROFIBUS interface (12 Mbps) can be used to interconnect distributed field devices or for coupling to SIMATIC S7.

The "SOFTNET for PROFIBUS" software package is required for coupling to S7 automation systems.

PROFINET

CP 1616 onboard allows you to connect industrial PCs to Industrial Ethernet. Only one CP 1616 can be installed in a PG/PC. For detailed information, refer to the section " PROFINET (Page 64)".

Device driver CP 16xx.sys

The device driver allows you to use the Windows network protocol for the optionally available "CP 1616 onboard" Ethernet PROFINET controller on SIMATIC PCs. The PROFINET interface will act like a 100 MBit Ethernet interface with a MAC address when you use this driver. The three RJ45 sockets are connected to each other via switch.

The drivers and documentation can be found in the user manual on the supplied Documentation and Drivers CD.

PROFINET IO application

You can use the "Development Kit DK-16xx PN IO" to create, operate and configure PROFINET IO applications. It must be installed in addition to the CP 16xx.sys device driver. You can obtain information about this from your Siemens sales partner.

SIMATIC NET

You can create, operate and configure SIMATIC installations using this software package. You will find this information on the SIMATIC NET Manual Collection CD. The software package and the documentation are not parts of the development package.

Additional information

Additional information is available in the catalog and the online ordering system Industry Automation and Drive Technologies - Homepage (http://www.siemens.com/automation/service&support).

8.2 PROFINET

CP 1616 onboard

The basic characteristics of the PCS 1616 onboard are:

- Optimized for PROFINET IO
- With Ethernet realtime ASIC ERTEC 400
- Three RJ45 sockets for connecting terminal devices or addition network components
- Integrated 3-port real-time switch
- Automatic hardware detection

NOTICE
Only one CP 1616 can be installed in a PG/PC. If you want to use an additional CP 1616 module, the "CP 1616 onboard" option must be disabled in the BIOS Setup.

Additional documentation on PROFINET

Get an overview of the information available for PROFINET (http://support.automation.siemens.com/WW/view/en/18880715/133300).

Document designation	What is contained in this document?
This documentation is **not** included in the product package:	
Getting Started PROFINET IO Getting Started: Manual Collection	The documents use concrete examples to provide step-by-step instructions on how to commission a fully functional application.
Manual PROFINET System Description	This gives you the basic knowledge about the PROFINET IO topics: Network components, data exchange and communication, PROFINET IO, component-based automation, application example of PROFINET IO and component-based automation.
Manual From PROFIBUS DP to PROFINET IO	Read this document if you want to convert an installed PROFIBUS system to a PROFINET system.
Readme file for CP 1616/CP 1604 and DK-16xx PN IO	This provides the latest information about the SIMATIC NET products CP 1616/CP 1604, CP 1616 onboard, the developer kit.
Configuration Manual Commissioning PC Stations	This provides you will all the information necessary for commissioning and configuring a PC as a PROFINET IO controller or IO device.
Manual SIMATIC NET Industrial Communication with PG/PC: Volume 1 - Basics SIMATIC NET Industrial Communication with PG/PC: Volume 2 - Interfaces	This manual introduces you to industrial communication and explains the available communication protocols. It also describes the OPC interface as an alternative to the IO-based user programming interface.
S7 CPs for Industrial Ethernet Configuring and Commissioning	This provides the following support: - For commissioning S7 stations - For establishing effective communication
Manual SIMATIC NET - Twisted Pair and Fiber-Optic Networks	Configure and build your Industrial Ethernet networks based on this document.
This documentation is part of the supplied Documentation and Drivers CD:	
Operating instructions CP 1616/CP 1604/CP 1616 onboard	This provides you with all information required for operation.
Installation guide Device Driver CP16xx.sys	Read this guide if you want to install the NDIS device driver, CP16xx.sys.

Further information

You can find the information on specific products in the Internet at the address: Product-related Information SIMATIC NET (http://www.siemens.com/simatic-net)

Functions

9

9.1 Overview of the monitoring functions

Even in its basic version, the device comes with optional monitoring functions. When used in combination with the appropriate software, the following functions for displaying, monitoring and controlling are available:

- Temperature monitoring (overtemperature / undertemperature at the temperature sensor)
- Fan monitoring (fan speed too low, fan failure, or a break in a tachometer line)
- Monitoring of hard disks with S.M.A.R.T functionality even in a RAID system
- Watchdog (hardware or software reset of the computer)
- Operating hours meter (information on the cumulative run time)
- RAID alarm display
- Battery monitoring (charge status of the CMOS battery is displayed)
- Status of the redundant power supply (module errors are displayed)

  You can mute the acoustic alarm.
- AMT (Active Management Technology)

SIMATIC IPC DiagBase software

With the SIMATIC IPC DiagBase software (ships with the product), you can use these functions for local monitoring. You can use the DiagBase Management Explorer application for general monitoring or DiagBase Alarm Manager for notification of individual alarms.

The DMAPI programming interface and sample programs for the DiagBase software are located on the DVD "Documentation & Drivers" in the directory "\Drivers\DiagBase\program files\Siemens\DiagnosticManagement".

Additional information on the functionality of the SIMATIC IPC DiagBase software is available in the online help.

SIMATIC IPC DiagMonitor software

The SIMATIC IPC DiagMonitor software can be ordered on CD (does not ship with the product). It contains the networkable monitoring software, the software for the stations to be monitored and a library for creating custom applications.

AMT (Active Management Technology)

AMT is a technology from Intel for remote maintenance of computers. You turn an AMT PC on and off remotely and start the BIOS setup remotely. Different operating systems can be booted with ISO files.

9.2 Temperature monitoring and temperature display

The temperature is recorded using temperature sensors that are installed at critical locations of the device. A sensor monitors the process temperature, further sensors monitor critical points below the bus module.

The flashing Temp LED indicates that the device is being operated at its limits. The following fault reactions are triggered if one of the temperature values exceeds the set temperature threshold:

Reaction	Option
The Temp LED changes to red	None
Device cooling fan switches to maximum speed (the power unit controls its own fan)	None
SIMATIC monitoring software alarmed	Start user-defined programs, can be set

Temperature errors do not occur if the device is used as intended. If a temperature error does occur, check for the following possible causes:

- Are the fan apertures covered?
- Is the filter dirty?
- Is the fan functioning correctly?
- Is the ambient temperature within the specified range?
- Is the total output of the power supply within the specified limit?

The temperature error is retained in memory until temperatures have fallen below the thresholds and are reset by one of the following measures:

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

9.3 Watchdog (WD)

Function

The watchdog (WD) monitors the activities of the device and reports an overload or blockade of the device to the user by means of various reactions.

After POWER ON of the device or after a HW RESET (cold restart), the watchdog is in idle state, i.e. a reaction of the WD will not be triggered and the Watchdog LED is switched off. The Watchdog LED is lit green when the watchdog is enabled (by means of the monitoring software, e.g. DiagBase or DiagMonitor software).

WD reactions

If the watchdog is not triggered again within the set time (through monitoring software), the following reactions are triggered:

Reaction	Option
Watchdog LED changeover from green to red	None
Trigger a PC reset	can be set
SIMATIC monitoring software alarmed	None

WD monitoring times (TWD)

The monitoring times can be set in increments of one second within a range from 4 to 255 seconds.

Note

The watchdog is retriggered if the monitoring time is changed at the active watchdog (that is while the watchdog is running)!

9.4 Fan monitoring

Operation of the front / processor / power unit fans is monitored. The following reactions are triggered when a fan fails:

Reaction	Option
The fan LED switches to red	None
SIMATIC monitoring software alarmed	Startup of user-defined programs can be set

The fan fault is retained in memory until the cause of the fan failure has been rectified and the error is reset by taking one of the following measures:

- Acknowledgment of the error message through SIMATIC monitoring software, for example, Management Explorer of the SIMATIC IPC DiagBase software or the SIMATIC IPC DiagMonitor software.
- Restart of the device.

9.5 RAID monitoring

In conjunction with the SIMATIC monitoring software and in addition to the RAID software, the status of the RAID system is shown on the HDD1 alarm and HDD2 alarm front LEDs. You can more detailed information on the RAID system and on the operation of the RAID software in the section RAID systems (Page 49).

Reaction		Meaning	Option
HDD1 alarm HDD2 alarm	Off	RAID system is ready for operation. SIMATIC software is not active.	None
	One is red	Drive 1 or Drive 2 has failed.	
	Both are red	RAID system is not ready for operation. Affected drive must be determined with the help of the RAID software.	
	Both flash	RAID system is currently being synchronized.	

9.6 Battery monitoring

The installed backup battery has a service life of 5 years. The status can be checked with two-tier battery monitoring. The information can be read from an I/O register and evaluated.

When the first warning level is reached, the remaining service life of the battery for buffering CMOS data amounts to at least 1 month.

9.7 Status of the redundant power supply

The status of the modules is monitored. Any module is reported if its input voltage or fan fails. You can mute the acoustic alarm of the power supply using software:

Reaction	Option
SIMATIC monitoring software alarmed	Muting alarm Start user-defined programs, can be set

9.8 Active Management Technology (AMT)

AMT (Active Management Technology) is technology for the remote maintenance of computers (simply called AMT-PC in the remainder of the document) and it includes the following functions:

- Keyboard–Video–Mouse (KVM) redirection: Using KVM that is integrated in the AMT hardware you access the AMT PC remotely. With KVM, you can also control AMT PCs that have no or a defective operating system. A KVM remote session is always possible with the KVM server integrated in the firmware. This means you can restart the PC and change the BIOS setup remotely.
- Remote power management: AMT PCs can be turned on and off and restarted from another PC.
- SOL (Serial over LAN): Redirection of the data of a serial interface to the network. The main use of the function is text-based remote control of an AMT PC using a console.
- IDE redirection: An ISO file on the help desk PC can be mounted on the AMT PC and used as a DVD drive.

  An ISO file contains a memory image of the content of a CD or DVD structured in the ISO 9660 format.
- Remote reboot: An AMT PC can be booted from a bootable ISO file made available by another PC.

SIMATIC IPC Remote Manager

The "SIMATIC IPC Remote Manager" software is available for utilization of the AMT functions with SIMATIC IPCs. The software can be ordered from the Siemens online ordering system. For detailed information about "SIMATIC IPC Remote Manager", refer to the corresponding product documentation.

Typical areas of application and functions of the SIMATIC IPC Remote Manager:

- Remote maintenance of SIMATIC IPC with AMT, for example for service purposes in the case of a defective operating system or for adapting BIOS settings.
- Diagnostics without on-site use
- Convenient service: Access to AMT clients, such as headless systems, without additional hardware
- Resource management

Requirement

- A device with a Core i5 or Core i7 processor
- A functioning and configured management engine
- A functioning and configured Ethernet connection
- A help desk PC with a functioning and configured Ethernet connection for the full AMT functionality

Configuration of the AMT PC

You configure AMT using the BIOS setup and the MEBx (Management Engine BIOS Extension). MEBx is a BIOS extension for configuring AMT.

When the BIOS appears briefly during startup, press the <Ctrl+P> keyboard shortcut. The "MEBx" dialog opens.

Expansions and parameter assignment 10

10.1 Open the device.

NOTICE

Only qualified personnel are permitted to carry out any work on the open device. You may only install memory modules and expansion cards to expand the hardware within the warranty period.

⚠ CAUTION

Electrostatic sensitive devices

The device contains electronic components which are destroyed by electrostatic charges. The result is malfunctions and damage to the machine or plant.

Therefore, make sure you take precautionary measures even when opening the device, for example, when opening device doors, device covers or the housing cover. For additional information, refer to the guidelines for electrostatic sensitive devices (ESD guidelines).

Tools

You can mount all components using TORX T6, T10 and T20 screwdrivers and a 4.5-mm hex key (for the interface interlock on the rear panel.)

Requirement

- Device is disconnected from power supply.
- All cables are removed.
- All LEDs are off.

⚠ WARNING

Opening of device without previously disconnecting power may result in substantial damage to equipment and/or danger to the user.

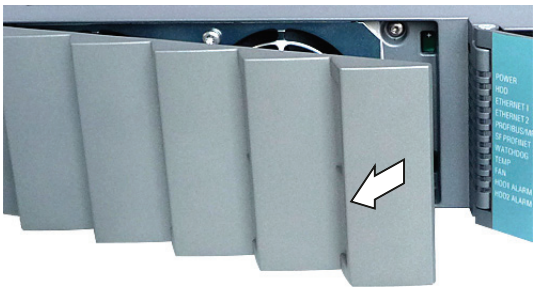
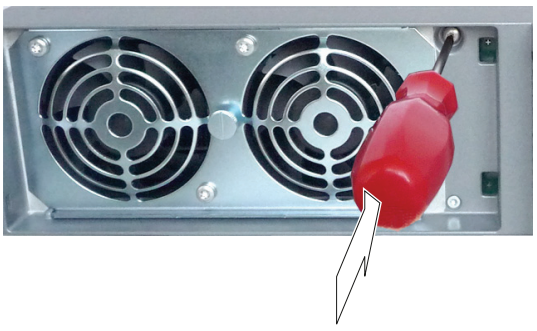
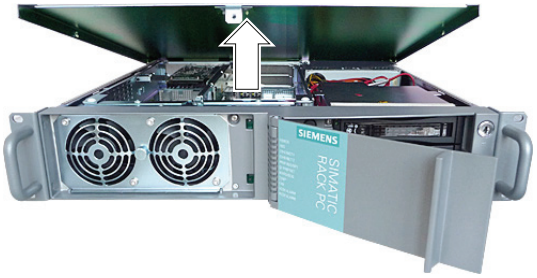
Disclaimer of liability

All technical data and approvals apply only to expansion units which are released by SIEMENS.

No liability can be accepted for impairment of functions caused by the use of third-party devices or components.

Observe the installation instructions for the components. UL approval of the device only applies when the UL-approved components are used according to their "Conditions of Acceptability".

Procedure

How to open the device		
1.	Open the front door to about 45° to release the latch of the front panel.	
2.	Remove the front panel.	
3.	Remove the cover screws ① (Torx T10).	
4.	Hit the screwdriver lightly with the ball of your hand to release the cover.	
5.	Push the cover back and remove it.	

10.2 Memory expansion

10.2.1 Installing memory modules

Memory expansion options

The motherboard is equipped with 2 slots for memory modules. DIMM DDR3 memory modules, storage frequency 1066 MT/sec, type PC3-8500, unbuffered, no ECC, or with ECC can be utilized. This allows you to expand Rack PC memory up to 8 GB, approximately 3.2 GB of which you can use for the operating system and applications for 32-bit operating systems. You can install one or two modules.

Combination	Slot X19 (outside)	Slot X20 (inside)	Maximum expansion
1	1 GB / 2 GB / 4 GB		4 GB
2	1 GB / 2 GB / 4 GB	1 GB / 2 GB / 4 GB	8 GB

Note

The modules can be inserted into any slot. Memory is operated in dual-channel mode if two modules are installed.

If expansion modules with their own memory (for example, graphics cards with 256 MB or more) are used on the module, the memory available for the 32-bit operating system or application can also be less than 3.2 GB.

In order to avoid operating faults you may have to extend a module so that the real memory expansion on the motherboard and the reserved memory of the expansion module do not overlap.

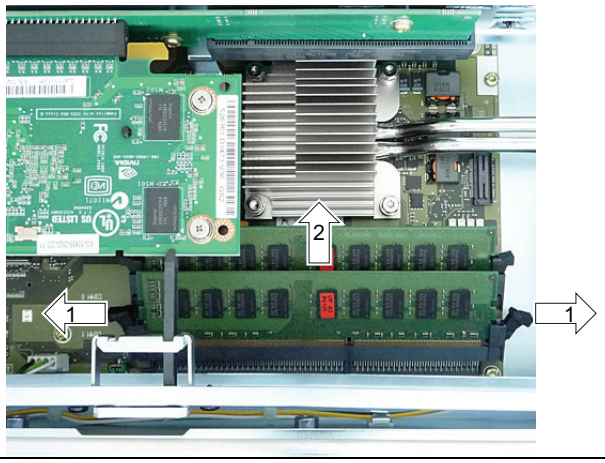
Requirement

- The device is opened.

NOTICE

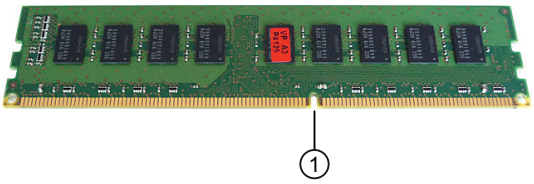
The electronic components on the PCBs are highly sensitive to electrostatic discharge. Always take appropriate precautionary measures when handling these components. Refer to the ESD directives on handling of electrostatically sensitive components: ESD Directive (Page 231) .

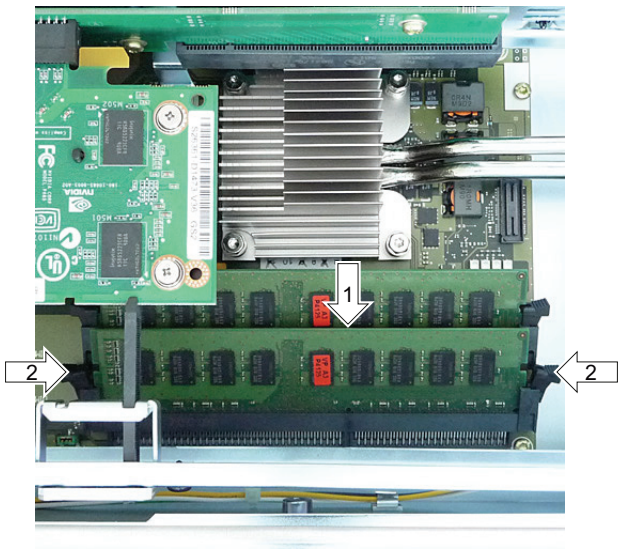
Removing a memory module

How to remove a memory module		
1.	Open the two latches (1) at the sides of the memory module. Remove the memory module (2) from the slot.	
2.	Close the device.	

Installing a memory module

The slots for the memory modules may be hidden by mounted expansion modules. Remove the bus frame if necessary, see Installation and removal of the bus frame (Page 79).

How to install a memory module		
1.	If you have more than one free slot, use the slot with the lowest number.	
2.	Remove the memory module from its packaging. Hold it by the upper edges only.	
3.	Note the recess ① on the connector side of the memory module. Hold the memory module at a flat angle to the surface of the motherboard and push it into the slot.	

How to install a memory module		
4.	Press both top sides (1) of the memory module evenly to avoid jamming. The memory module latches in audibly. Check that the latches (2) are correctly engaged. The memory module is inserted correctly if less than 1 mm of the gold contacts is visible evenly across the entire length of the module.	
5.	Close the device.	

Display of the current memory configuration

The new memory configuration is detected automatically. The allocation of the ”base memory and extended memory” is automatically displayed when you switch on the device.

See also

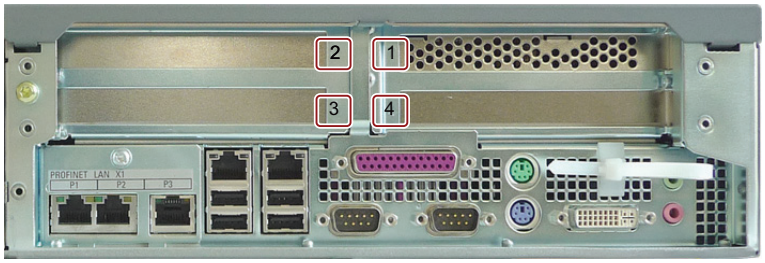
Open the device. (Page 73)

10.3 Installation and removal of expansion modules

10.3.1 Overview of the expansion modules

Slot numbering

Notes on orientation: The slots can be identified by the slot numbering. This is located on the rear panel, as depicted by the following figure.



The slots have the differing functions.

① PCIe x16

② PCI

③ PCI or PCIe x4, depending on features

④ Reserved

Notes on module specifications

The device is designed for use with modules to PCI specifications 2.3 or 1.0a. PCI modules with a 5 V and 3.3 V power supply can be operated. Compliance with the defined mechanical defaults is imperative. Failure to comply with these defaults can result in contact problems, malfunctions and assembly difficulties. The permitted module contour dimensions are specified in the Dimensional drawings for installation of expansion modules (Page 158) section.

Note about long PCI, PCIe modules

Long PCI / PCIe modules must be fitted with an extender for insertion into the guide rails (should be supplied with the long PCI PCIe board.)

Note on PCI-Express x16 modules

The modules in the PCIe x16 slot can take up two slots.

Note on PROFINET expansion modules

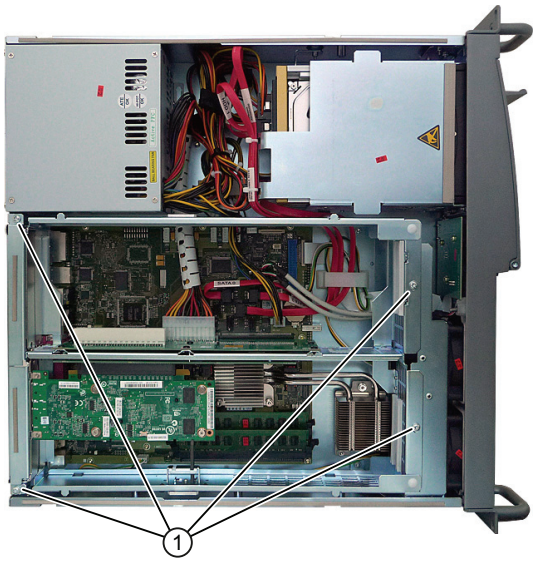
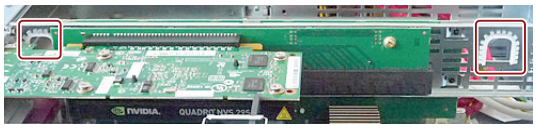
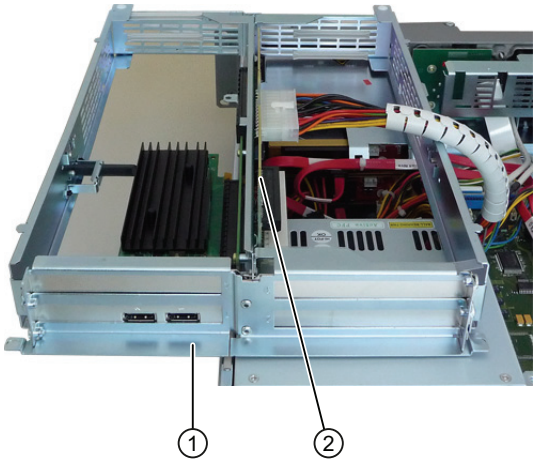
The "CP 1616 onboard" option must be disabled in the BIOS for devices with CP 1616 onboard, before a PROFINET module (such as a CP 1616) can be installed in the system.

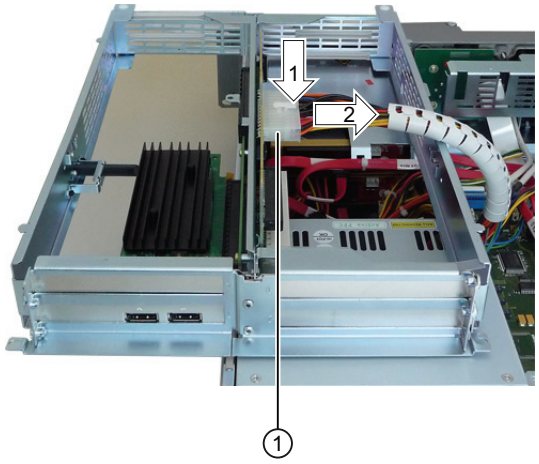
10.3.2 Installation and removal of the bus frame

Requirement

- All cables are removed.
- The device is open - see section "Open the device. (Page 73)".

Procedure - removal

How to remove the bus frame		
1.	Loosen the four screws ① on the bus frame.	
2.	Pull the bus frame evenly from the unit using the two gripping aids. Do not tilt the bus frame when removing it.	
3.	Turn the bus frame around. Grasp the bus frame only on the outside on the metal frame ① when turning it around. Do not touch the gold contacts ② of the bus module as this may lead to contact problems during operation of the device. Avoid contamination or damage to the gold contact pins for the edge-socket connector.	

How to remove the bus frame		
4.	Press release ① of the power plug ②.	
5.	Pull out the power plug from the bottom.	
6.	Place the bus frame on one of its sides on a level table surface. Set the bus frame on the table surface in such a way that the module which you want to install or remove is on the top.	
	The bus frame is removed. The four feet on the long side of the bus frame serve as mounting aid and make for lateral mounting. You may have to support the bus frame with your hand to prevent it from tipping.	

Procedure - installation

Perform the actions described above in reverse order to install the bus frame.

10.3.3 Installation and removal of expansion modules in the bus frame

Introduction

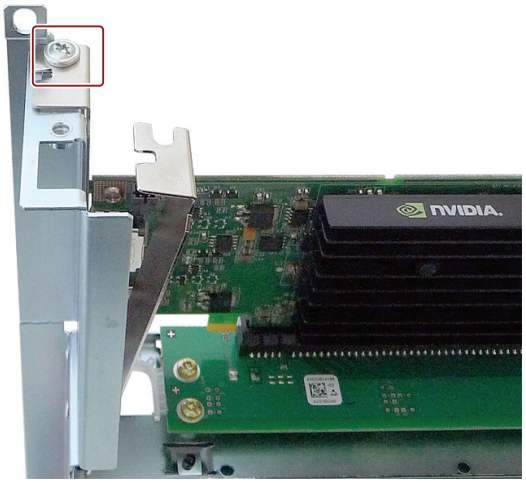
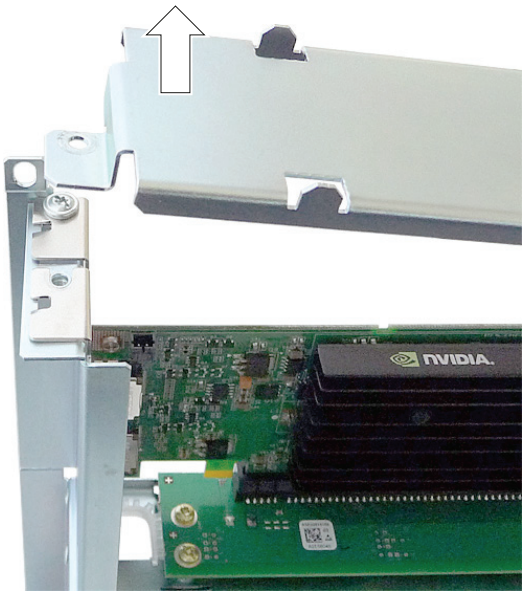
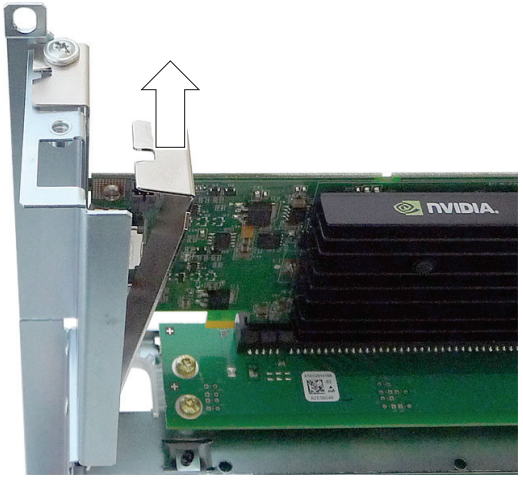
Three slots are available for installing an expansion module for the following bus systems:

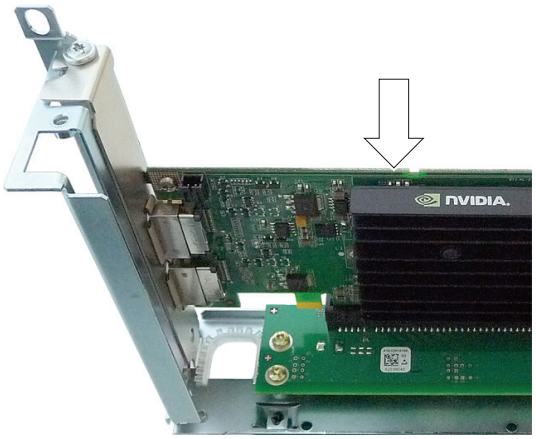
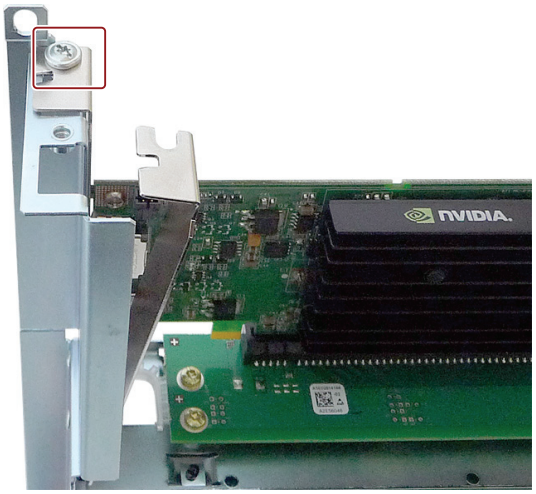
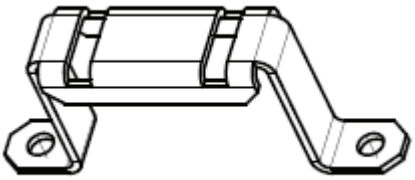
- PCI
- PCIe x8 (optional, for I/O expansion modules)
- PCIe x16 (for I/O expansion modules or graphics cards)

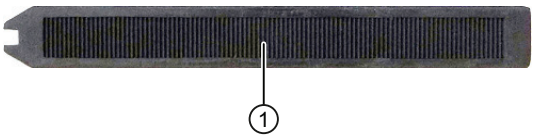
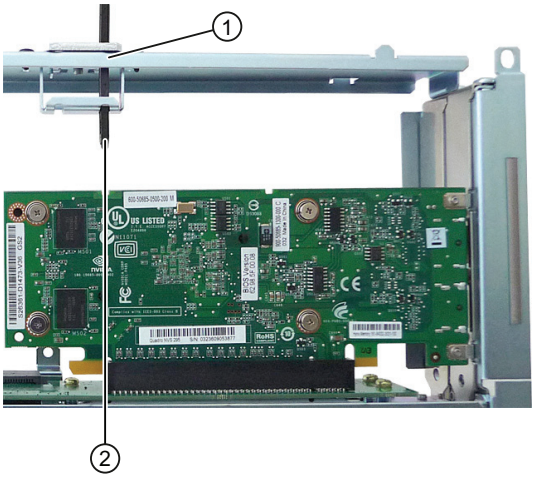
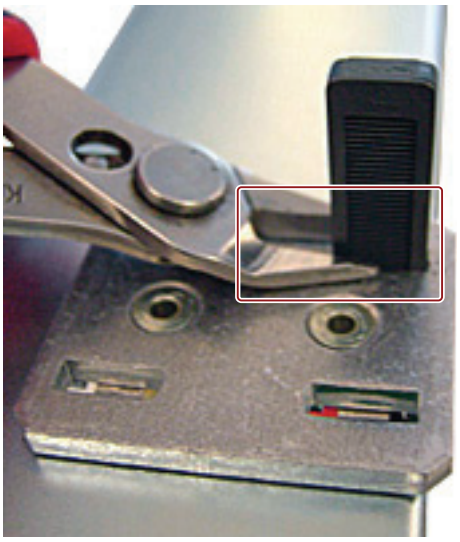
Preparation

You have removed the bus frame. For details of how to do this, see section Installation and removal of the bus frame (Page 79)

Installing expansion modules

How to install an expansion module (PCI / PCIe format):		
1.	Loosen the screws on the side of the bus frame. Loosening the screw releases the bracket on the side of the bus frame. The second bracket is attached to the bus frame by another screw.	
2.	Open the side of the bus frame by swinging it out.	
3.	Remove the released bracket. If necessary, loosen the screw of the second bracket and remove it.	

How to install an expansion module (PCI / PCIe format):		
4.	Place the expansion module in the provided slot and press the module until it engages in the edge-socket connector of this slot. Make sure that the module is seated correctly in the edge-socket connector. Do not tilt the module.	
5.	Screw down the bracket of the expansion and the other removed bracket if needed.	
6.	If necessary, fasten the support bracket to the side of the bus frame with the proper expansion rivets. You do not need a tool to do this. • Remove the support bracket from the accessories kit. • Place the support bracket inside the side of the bus frame and align the support bracket to the holes. • Insert the expansion rivets from the outside through the bus frame and support bracket and press the expansion rivets down.	
	Note: To ensure stable assembly, you need this support bracket to install a low-profile expansion module. When converting from a low-profile to a high-profile expansion module, the support bracket may need to be removed again.	

How to install an expansion module (PCI / PCIe format):		
7.	Take the latching retainer ① from the accessories kit. Note: You may only use latching retainers of the same type. Information about original spare parts for SIMATIC PCs is available on the Internet at: After-sales information system for SIMATIC PC / PG (http://www.siemens.de/asis). Latching retainers for the IPC647C are available under the following order number: A5E02719654.	
8.	Run the latching retainer ② through the guide slot ① on the long side of the bus frame and insert it firmly into the expansion module. Use the guide slot closes to the PCI edge-socket connector. You can also use a different guide slot if certain structural elements should be in your way when installing the latching retainer. While doing this, adjust the expansion module so that it fits into the slot of the latching retainer. Avoid using too much force. **Note**: The latching retainer can only move in the direction of the expansion module. To remove the retainer, open the side of the bus frame and pull it from the inside out.	
9.	Cut off the part of the latching retainer that protrudes from the guide slot with sharp wire cutters. Do not leave any remnants jutting out.	
	The expansion module is installed in the bus frame. Not insert the bus frame back into the device, as described in the section Installation and removal of the bus frame (Page 79).	

Notes on the allocation of resources

Only two exclusive interrupts are available for PCI /PCIe modules due to the large functional scope of the motherboard. If the new expansion modules require additional exclusive resources, you need to disable some functions on the motherboard. For information on allocated resources, refer to the section System resources (Page 184). Information on disabling motherboard functions is available in the BIOS Setup (Page 189). You can find information on the assignment of the PCI IRQ line to the PCI slot in the sections Advanced menu (Page 193) and Bus boards (Page 178).

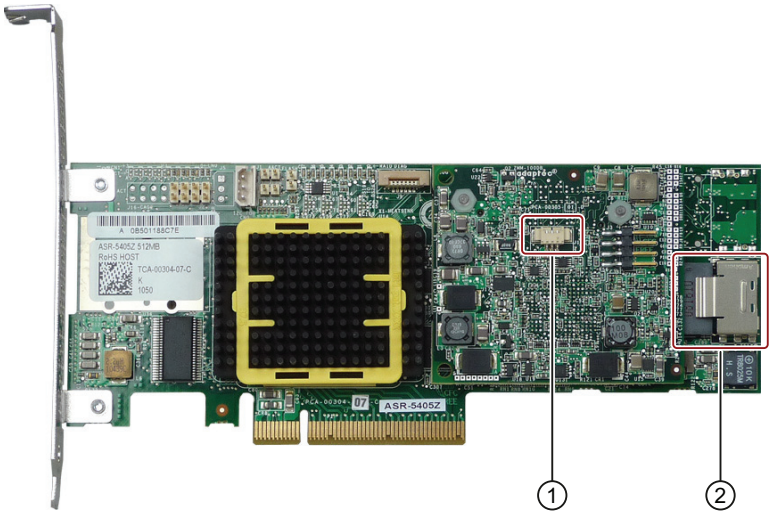
The device supports graphics modules with expansion ROM of up to 48 K.

10.3.4 Installing and removing a hardware RAID card

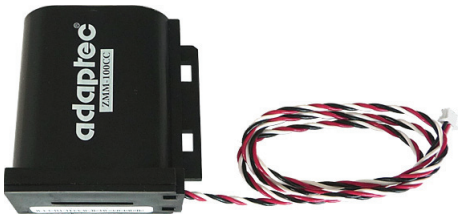
A RAID system is used to organize several physical hard disks of a computer into one logical drive, which permits higher data availability in the event of a single hard disk failure and/or a larger data throughput than with just one physical drive.

Requirement

- A RAID module with connections for the capacitor block ① and hard disk drive ②



- A capacitor block of a maintenance-free cache module (ZMM)



- An adapter cable for connection of the hard disk drive ② to the RAID module



Note the numbering of the connections ①.

- SAS-LED cable (connection to SCSI-LED connection on motherboard)



How to install RAID module

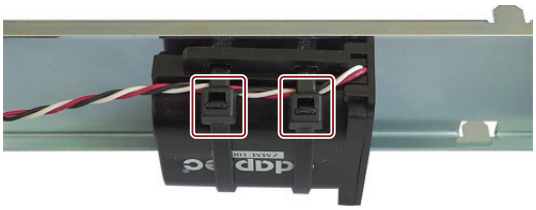
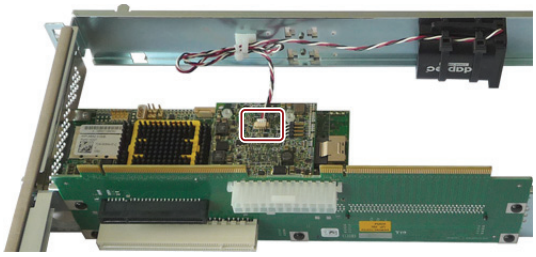
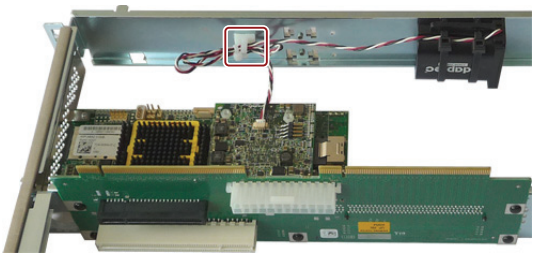
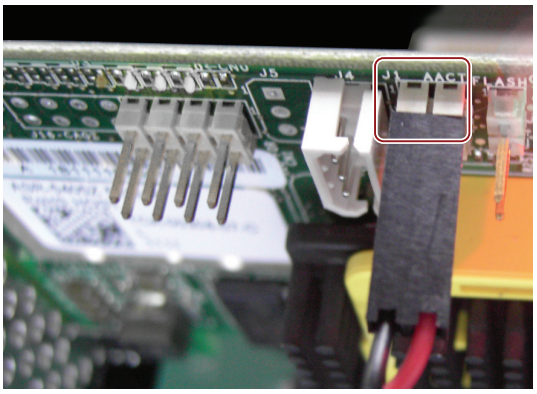
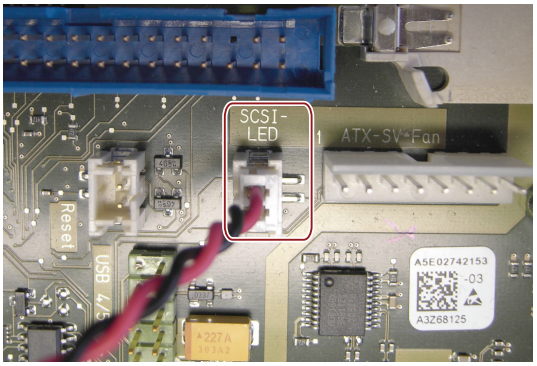
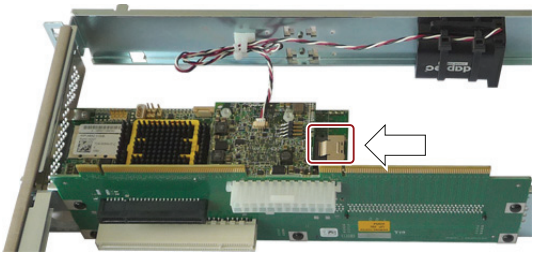
Diagram	Working step
–	Remove the bus frame.
–	Connect the adapter cables to the respective drives. Loosen the screws for the power unit if necessary. • Plug in the adapter cable as follows: – Plug 0 in drive 1 – Plug 1 in drive 2 • Make sure that the connector latch engages. • Run the adapter cable S-shaped to the front and from there to the expansion card. The cable is laid in the front area under the bus frame in the final assembled state. • First plug the adapter cable into the RAID module, if the bus frame is mounted. The HDD cables are not attached to the drive rack in this case.
	Secure the battery block to the bus frame with two cable ties. Make sure that the locks of the cable tie, as indicated, are installed in the plug-in direction in relation to the motherboard. The cable is laid below the cable ties for strain relief. Ensure that the cable is not damaged during installation.
–	Install the RAID module in slot 1. The arrangement of the slots is described in the section "Overview of the expansion modules (Page 78)".
–	Secure the RAID module with the retainer.
	Insert the battery block connector at the marked position. Ensure that the polarity is correct: The connector is coded against reverse polarity and can only be plugged in the correct position. The connector snaps into place.

Diagram	Working step
	Secure the battery block cable at the marked position in the cable routing.
	Install the black connector of the SAS-LED cable into the 2-pin header J1 (AACT) at the RAID module. You determine the polarity based on the cable colors: black left, red right.
–	Install the butterfly support. Install the bus frame in the housing. Ensure that no cables are crimped when closing the housing cover.
	Install the white connector onto the motherboard at the install position "SCSI-LED". The SAS-LED cable is coded and latched. For a function check monitor the HDD LED of the operation display. It flashes when the hard disk is accessed.
	Make the connection between the RAID module and adapter cable as follows: Insert the adapter cable at the marked position (viewed from below). • Make sure before the alignment of the contacts and the latch lever are correct. The latch lever points in the direction of the motherboard in the final assembled state. • Make sure that the connector latch audibly engages.

Removing the RAID module

1. Unlatch the adapter cable.
2. Loosen the plug on the RAID module.
3. Remove the SAS LED cable in reverse order.
4. Remove the bus frame.
5. Loosen the battery cable.
6. Remove the RAID module as you would an expansion card.

See also

Installation and removal of expansion modules in the bus frame (Page 80)

10.4 Drive racks and storage media

10.4.1 Overview

Drives and storage media

You can mount the following drives and media In the drive racks:

- Hard disk drive (HDD)
- Solid-State Drive (SSD)
- Card rack for Compact Flash Card (CF memory card)
- DVD drive

Drive rack

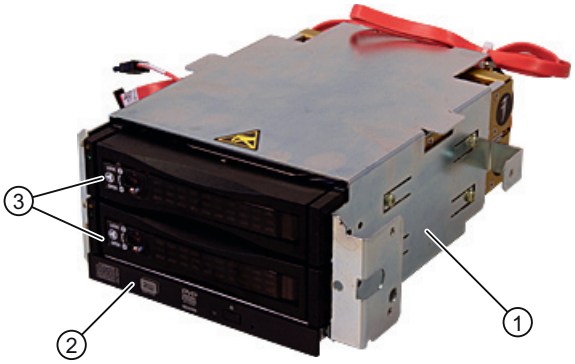
There are two drive racks for installation:

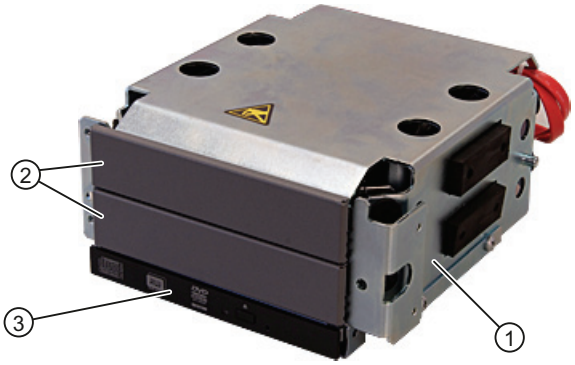
- Drive rack for a removable rack

  Drive rack with removable racks for carriers with storage media and drives, for example HDDs and SSDs. A DVD drive or, alternatively, a CF card rack can be mounted directly in the lower drive bay.

- Vibration-damped drive rack

  Drive rack containing shock and vibration-damped components for mounting HDDs. DVDs or CF card racks for CF memory cards are mounted in the lower bay.

Drive rack for a removable rack		
	①	Drive rack for a removable rack
	②	Slimline mounting bay for DVD drive for CF card rack.
	③	Removable rack with carriers for storage media

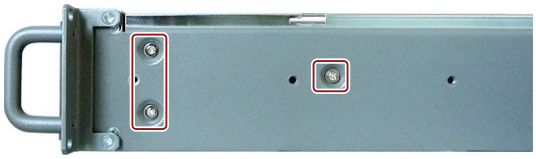
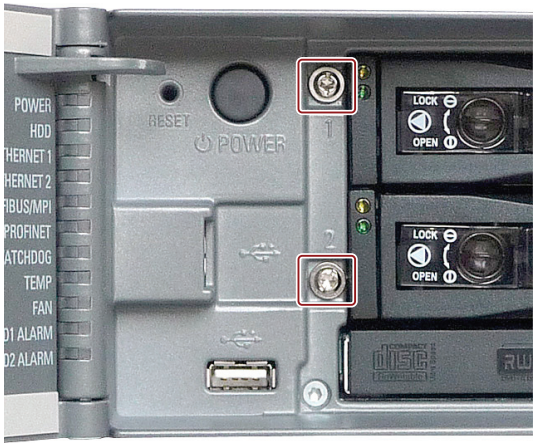
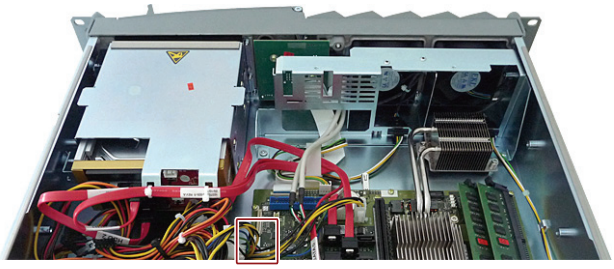
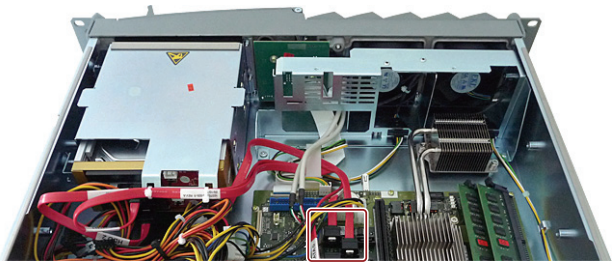
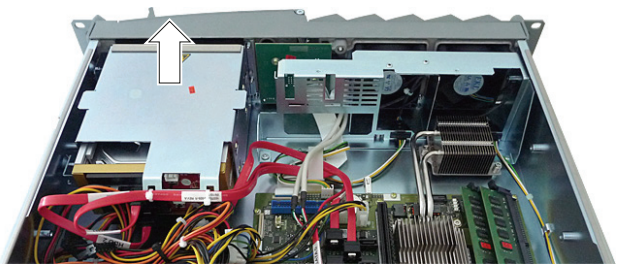
Vibration-damped drive rack		
	①	Vibration-damped drive rack
	②	Two slots for storage media (shock and vibration-damped)
	③	Slimline mounting bay for DVD drive for CF card rack

10.4.2 Installation and removal of drive racks

Preparations

1. Open the device as described in section Open the device. (Page 73).
2. Open the front panel of the device.
3. Remove the bus frame before removing the vibration damped drive rack as described in the section Installation and removal of the bus frame (Page 79). This is not necessary when removing the drive rack with a removable rack.

Removing drive racks

How to remove the drive rack		
1.	Loosen the identified screws with Torx T10 screwdriver.	
2.	Loosen the identified screws behind the front panel with a Torx T10 screwdriver.	
3.	Pull the power plugs for the Slimline drive rack and any mounted SSD drives on the motherboard.	
4.	Loosen the latch for the SATA connector by pressing the angled SATA connector lightly and pull it from the motherboard.	
5.	Remove the drive rack out of the device.	
	The drive rack is removed from the device.	

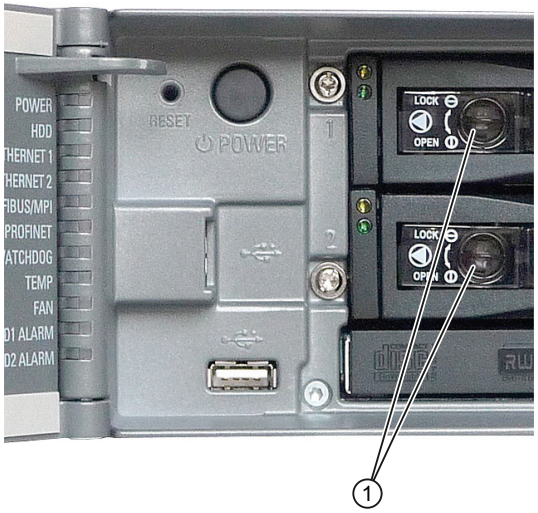
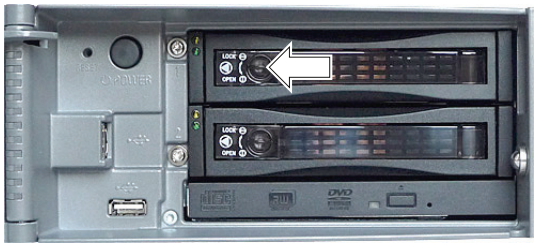
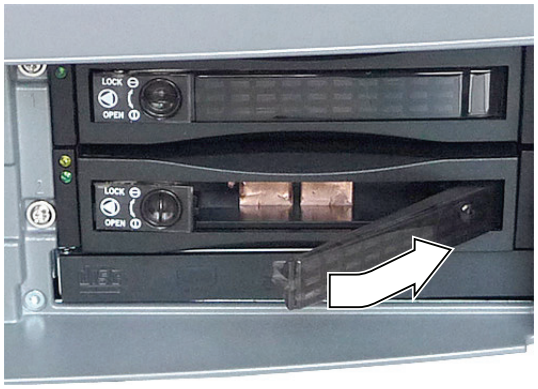
Installing the driver carrier

Perform the tasks describe above in reverse order.

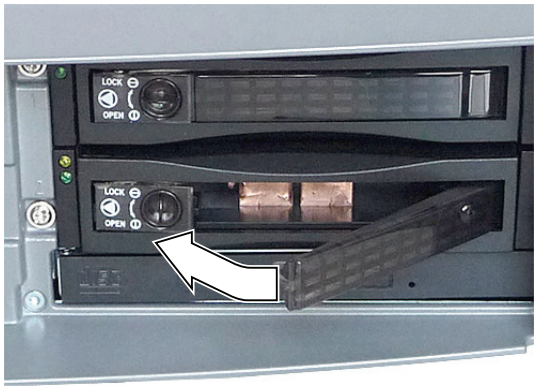
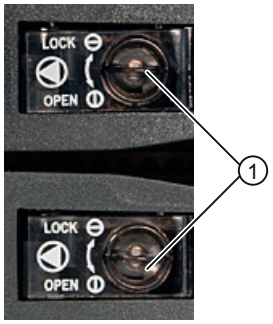
10.4.3 Removing and inserting the HDD carrier

A HDD carrier is located in the drive rack for removable racks. You can use the HDD carrier to insert and remove drives and storage media.

Removing the HDD carrier

How to remove the HDD carrier		
1.	Turn the locking switch ① to the "OPEN" position.	
2.	Press on the release next to the locking switch in the direction of the arrow to lower the lever on the HDD carrier.	
3.	Pull the lever out until you feel the HDD carrier release and pull it out completely.	

Insert the HDD carrier again.

How to insert the HDD carrier again		
1.	Insert the HDD carrier into the removable rack.	
2.	Close the lever of the HDD carrier again.	
3.	Return the locking switch ① to the "LOCK" position. You can hear clearly when the HDD carrier locks into position.	

10.4.4 Installation and removal of HDDs

HDDs in drive racks

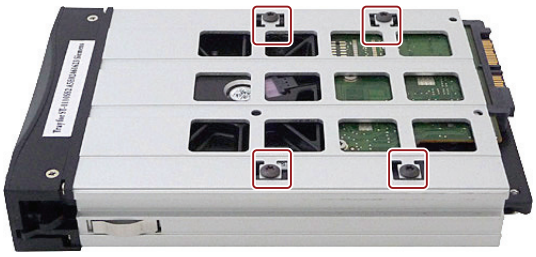
You can install and remove HDDs in the following drive racks:

- Drive rack for a removable rack Installation in the hard disk carrier
- Vibration damped drive rack: Direct mounting in the drive rack

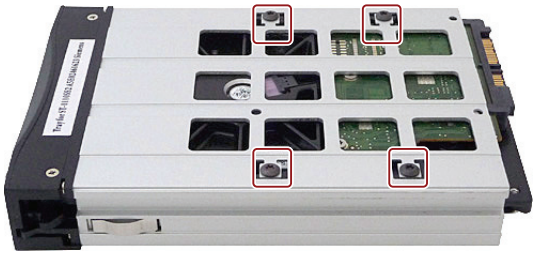
Requirement for the removing or installing the HDD

Remove the drive rack from the device as described in the section Installation and removal of drive racks (Page 88).

Drive rack for removable rack: Removing a HDD from the HDD carrier

How to remove the HDD from the motherboard		
1.	Remove the HDD carrier as described in section Removing and inserting the HDD carrier (Page 90).	
2.	Turn the HDD carrier upside down and loosen the four screws on the bottom of the HDD carrier with a PH No. 1 Philips screwdriver. Make sure that you do not drop the HDD on a hard surface. Place the hard disk rack on a suitable surface when you remove the HDD.	
3.	Remove the hard disk from the carrier.	
	The HDD is removed from the HDD carrier.	

Drive rack for removable rack: Installing a HDD in the HDD carrier

How to install the HDD		
1.	Always replace the defective hard disk with a new one of the same type and capacity. Take care not to touch the contacts.	
2.	Secure the hard disk with the four screws on the base of the carrier. Always use only the specified original screws for the installation.	
3.	Insert the HDD carrier again as described in section Removing and inserting the HDD carrier (Page 90).	

Vibration damped drive rack: Installing a HDD directly in the drive rack

Steps for mounting an HDD		
1.	Push the HDD into the drive rack.	
2.	Secure the HDD to the drive rack with two screws on the right and two on the left.	
3.	Connect the power and data cables to the HDD.	
4.	Install the drive bay again.	

Vibration damped drive rack: Removing the HDD for the drive rack

Perform the tasks describe above in reverse order.

10.4.5 Installation and removal of CF card rack

CF card rack in the drive rack

You can install and remove CF card racks in the following drive racks:

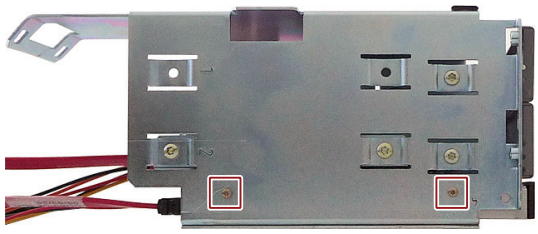
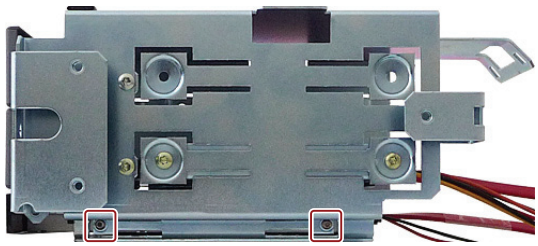
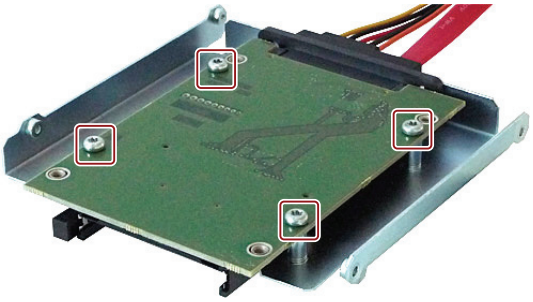
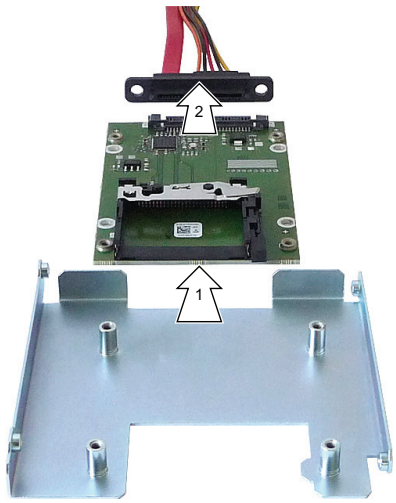
- Vibration-damped drive rack
- Drive rack for a removable rack

Preparations

1. If necessary, remove the CF card from the CF card rack.
2. Remove the drive rack from the device as described in the section Installation and removal of drive racks (Page 88).

Removing the CF card rack

The following figures show the removal of the CF card rack in the drive rack for removable racks. The removal of the CF card rack in the vibration-damped drive racks is performed the same way.

How to remove the Compact Flash card rack		
1.	Place the drive rack on its right side and loosen the two indicated screws with a Torx T6 screwdriver.	
2.	Place the drive rack on its left side and loosen the two indicated screws with a Torx T6 screwdriver.	
3.	Pull out the CF card rack out of the drive rack with the mounting plate in the direction of the cable. Do not pull on the cable.	
4.	Loosen the four screws on the CF card rack and remove the CF card rack from the mounting plate.	
5.	Pull the plug from the CF card rack (2).	
	The CF card rack is removed from the drive rack.	

Installing the CF card rack

Perform the tasks describe above in reverse order.

10.4.6 Installation and removal of DVD drive

DVD drive

You can install and remove the DVD drive in the following drive racks:

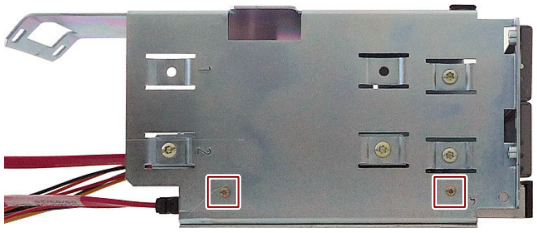
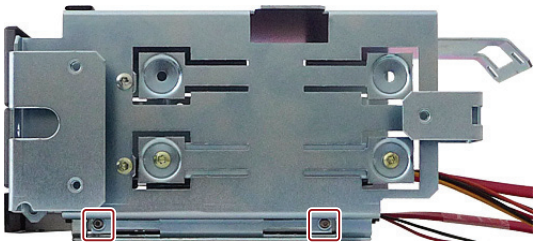
- Vibration-damped drive rack
- Drive rack for a removable rack

Requirement

1. Remove the drive rack from the device as described in the section Installation and removal of drive racks (Page 88).
2. Disconnect the connecting cable from the DVD drive.

Removing a DVD drive

The following figures show the removal of the DVD driver in the removable rack. The removal of the DVD drive in the vibration-damped drive racks is performed the same way.

How to remove a DVD drive		
1.	Lay the drive bay on its right side	
2.	Loosen the two indicated screws on the left with Torx T6 screwdriver.	
3.	Lay the drive rack on its left side and loosen the two indicated screws with a Torx T6 screwdriver.	
4.	Withdraw the DVD drive from the front of the drive rack.	–

The DVD drive is removed from the drive rack.

Installing a DVD drive

Perform the tasks describe above in reverse order. Only use the original screws to prevent damage to the DVD drive.

10.4.7 Installation and removal of SSDs

SSDs in drive racks

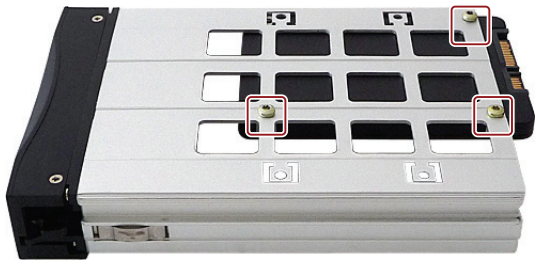
You can install SSDs in the drive rack with a removable rack as follows:

- In the HDD carrier
- With mounting plate in the drive rack

Requirement for the removing or installing the SSD

Remove the drive rack with the removable rack from the device as described in the section Installation and removal of drive racks (Page 88).

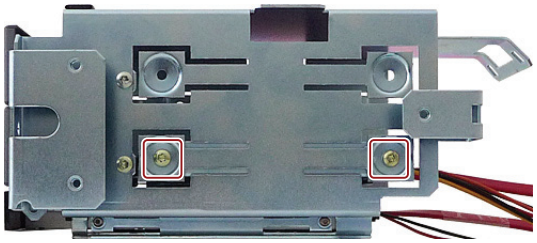
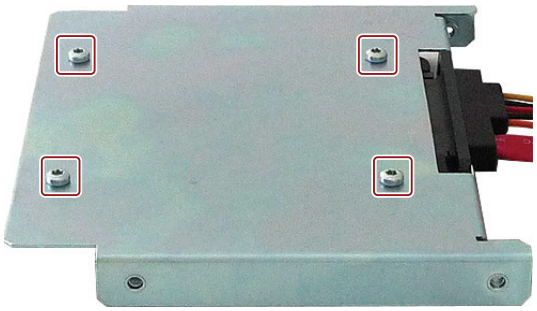
Removing an SSD from the HDD carrier

How to install the SSD		
1.	Remove the HDD carrier (1) as described in section Removing and inserting the HDD carrier (Page 90).	
2.	Turn the HDD carrier upside down and loosen the indicated screws on the bottom of the HDD carrier with a Torx T10 screwdriver.	
	The SSD is removed from the HDD carrier.	

Installing an SSD in the HDD carrier

Perform the tasks describe above in reverse order.

Removing an SSD with mounting plate

How to remove the SSD from the drive rack		
1.	On both sides of the drive rack, loosen the two screws that secure the mounting plate in the drive rack.	
2.	Pull out the mounting plate with the SSD from the drive rack in the direction of the cable. Do not pull on the cable.	
3.	Loosen the four screws that secure the SSD to the mounting plate.	
4.	Remove the SSD from the mounting plate.	
5.	Pull out the plug from the SSD.	

Installing an SSD with mounting plate

Perform the tasks describe above in reverse order.

Service and maintenance 11

11.1 Removing and installing hardware components

11.1.1 Repairs

Repairing the device

Only qualified personnel are permitted to repair the device.

⚠ WARNING

Unauthorized opening and improper repairs may lead to material damage and hazards to users.

⚠ WARNING

Always disconnect the power connector before you open the device.

Install only system expansions which are designed for this computer. Installation of other expansions may damage the system or violate safety requirements and RF interference suppression regulations. Contact Technical Support or your local sales department to find out which system expansions are suitable for installation.

Note

If you install or exchange system expansions and damage your device, the warranty becomes void.

Check the ESD Directive (Page 231).

Disclaimer of liability

All technical data and approvals apply only to expansion units which are released by SIEMENS.

No liability can be accepted for impairment of functions caused by the use of third-party devices or components.

Tools

You can perform all installation tasks on the device using Torx T6, T10, T20, crosshead PH no. 1 screwdrivers, a 4.5-mm hexagonal wrench (for the interface locking mechanism on the rear panel) and a side cutter.

11.1.2 Preventive maintenance

To maintain high system availability, we recommend the preventative exchange of those PC components that are subject to wear. The table below indicates the intervals for this exchange.

HDD	Fan	CMOS backup battery	Air filter mat
3 years	3 years	5 years	Depending on the degree of soiling

11.1.3 Replacing filters

Preparing for filter replacement

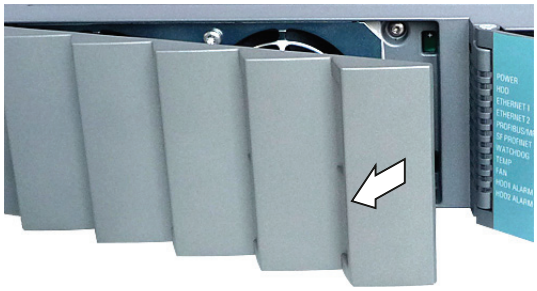
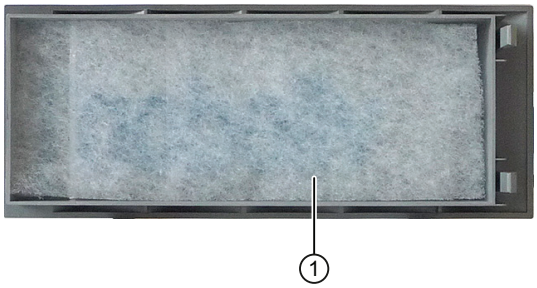
Note

You may only use filters of the same type. Information about original spare parts for SIMATIC PCs is available on the Internet at: After sales information system from SIMATIC IPC (http://www.siemens.com/asis)

Filter meshes are available under the following order number: A5E02396171 (10 pieces per package).

Replacing filters

How to replace the filter		
1.	Open the front door to about 45° to release the latch of the front panel.	

How to replace the filter		
2.	Remove the front panel.	
3.	Change the filter ① when necessary. This is inserted loosely in the fan cover. Place the filter evenly in the fan cover.	

Note

Used filters

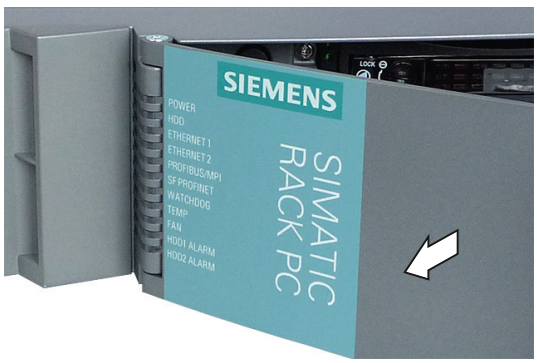
It is not advisable to fit filters again that have already been used. If you do want to refit a filter you have removed, remember the direction in which the fan draws air into the device. Make absolutely certain that you do not fit the outer side of the filter on the inside. Generally, the outer side is much more dirty than inner side if it has been in use for some time.

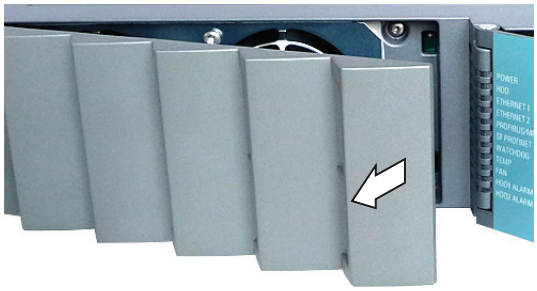
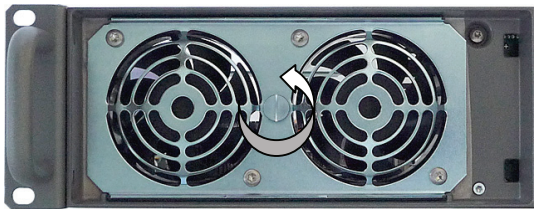
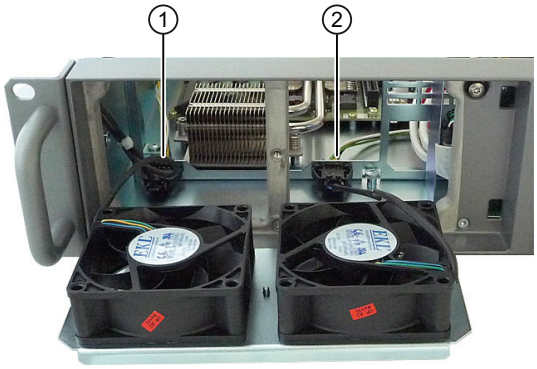
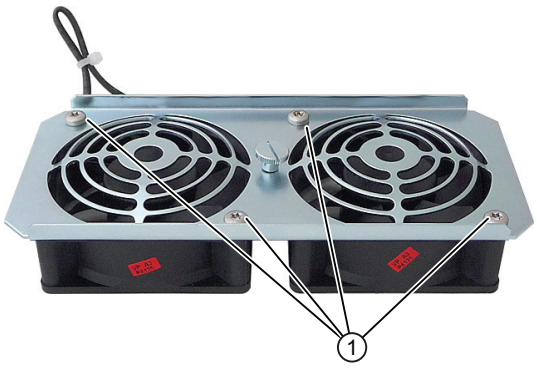
11.1.4 Replacing device fans

Preparing for removal of the device fan

Disconnect the device from the mains.

Removing the fan

How to remove the device fan		
1.	Open the front door to about 45° to release the lock of the front panel.	

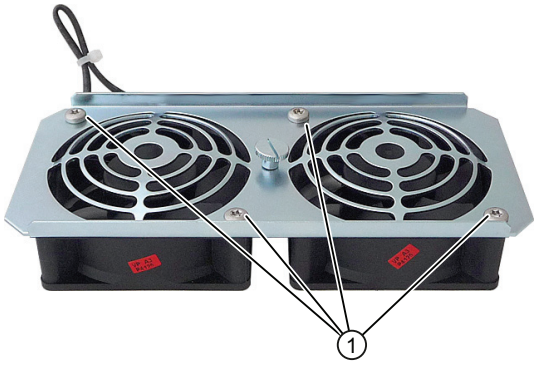
How to remove the device fan		
2.	Remove the front panel and, if necessary, replace the filter. See section Replacing filters (Page 100)	
3.	Release the knurled screws of the fan holder.	
4.	Take the fan holder out of the housing.	
5.	First, disconnect the left fan connector ① and then the right connector ② from the respective adapter connector. **Note:** The connectors are locked. To unlock them, press down the tongue on the connector of the fan cable.	
6.	Remove the two screws (Torx 20) for each fan ① and remove the fan from the fan holder.	

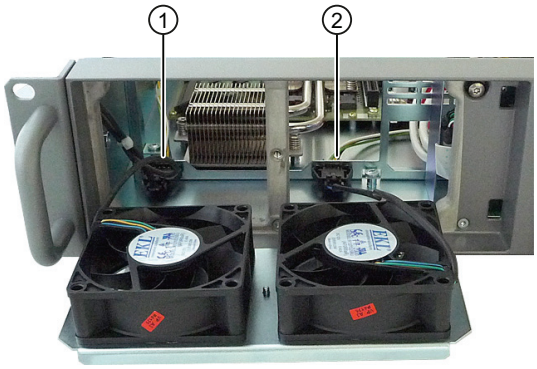
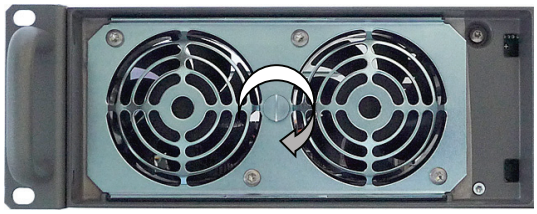
Installing the fan

Note

Always install a fan of the same type! Information about original spare parts for SIMATIC PCs is available on the Internet at: After sales information system from SIMATIC IPC (http://www.siemens.com/asis)

NOTICE
Ensure that the arrow on the fan points away from the fan bracket. The fan blows air into the interior of the housing.

How to install the device fan		
1.	Fasten the new fans with two screws (Torx 20) per fan to the fan holder.	
2.	Note the direction of the arrow on the fan. The picture shows the proper fan mounting position.	
3.	Arrange the cable to the right and left of the fan and feed them through the cutouts in the front panel.	

How to install the device fan		
4.	First, connect the right fan connector ② and then the left connector ① to the respective adapter connector.	
5.	Place the fan holder in the housing.	
6.	Note the positioning guides on the base of the front frame. The fan holder must lie level on the front frame.	
7.	Secure the fan holder with the knurled screw.	

11.1.5 Replacing the backup battery

The battery is used to back up the CMOS data for BIOS setup and the real-time clock.

Items to observe for replacement

Note

Batteries are wearing parts. Backup batteries should be replaced at intervals of 5 years in order to maintain PC functionality.

NOTICE
Risk of damage! The lithium battery may only be replaced with an identical battery or with a type recommended by the manufacturer (Order no.: A5E00047601). Information about original spare parts for SIMATIC PCs is available on the Internet at: After sales information system from SIMATIC IPC (http://www.siemens.com/asis)

Disposal

NOTICE
Used batteries must be disposed of in accordance with local regulations.

Preparation

Note

The configuration data of the device may be deleted when you replace the backup battery, depending on BIOS settings.

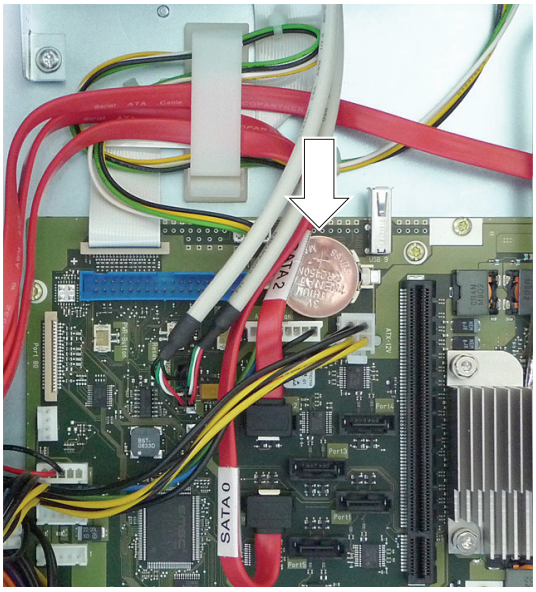
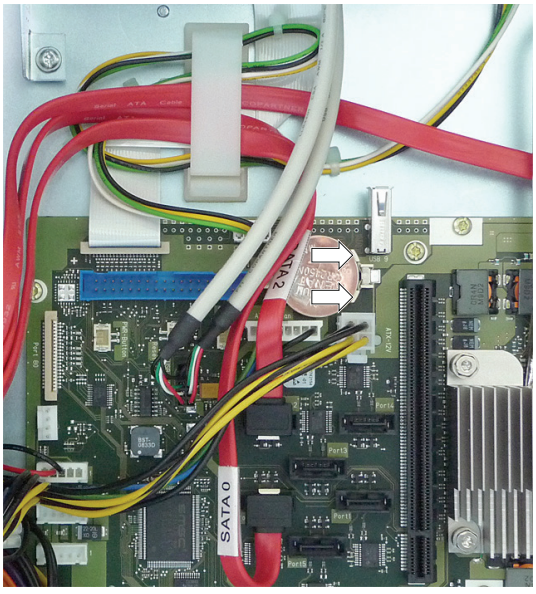
The configuration data are retained in the BIOS "Profile: User" setting; only the date and time must be set again.

A table in which you can log your settings is available in the section BIOS Setup default settings (Page 211).

1. Disconnect the device from the power supply and remove all connecting cables from the device.

Replacing the battery

Procedure:

How to replace the battery		
1.	Open the device and, if necessary, remove the bus frame. See Installation and removal of the bus frame (Page 79)	
2.	Remove the old battery from the socket. Make sure you do not use metal objects for this.	
3.	Applying a slight pressure, press the new battery into the socket. Make sure you do not use metal objects for this. Make sure not to short-circuit the battery during handling.	
4.	Close the device.	

New BIOS Setup

Device configuration data may be deleted when you replace the backup battery, depending on the settings in BIOS Setup, and must be configured again in BIOS Setup.

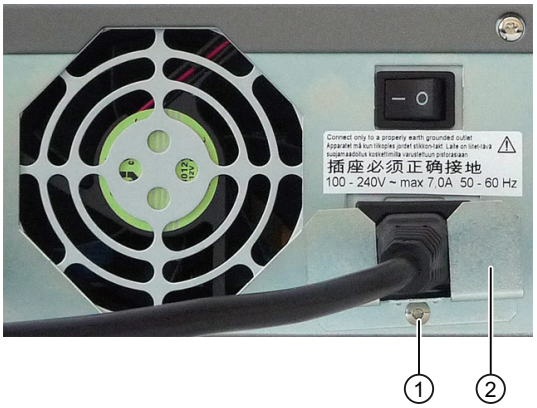
11.1.6 Removing the AC power supply

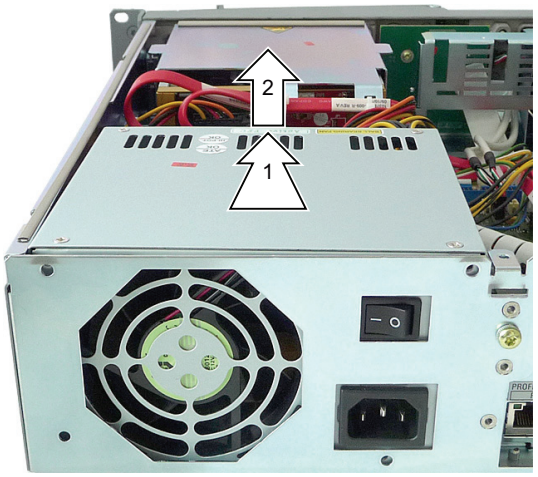
⚠ WARNING
Only qualified personnel are allowed to replace the power supply unit.

Requirement

- The device is opened.
- T10 screwdriver

Procedure

How to remove the power supply unit		
1.	Remove the power plug clamp (2), if installed, with the retaining screw (1).	
3.	Remove the bus frame, see Installation and removal of the bus frame (Page 79).	
4.	Disconnect all the cables coming out of the power supply unit.	
5.	Remove the cable ties securing the power cables in the housing.	

How to remove the power supply unit		
6.	Remove the identified retaining screws.	
7.	Pull the power supply unit towards the front (1) and lift it out of the device (2).	

See also

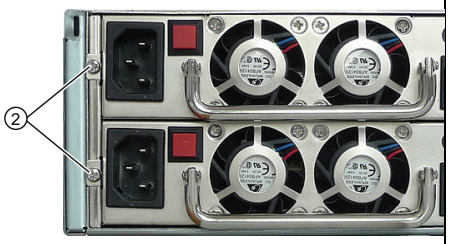
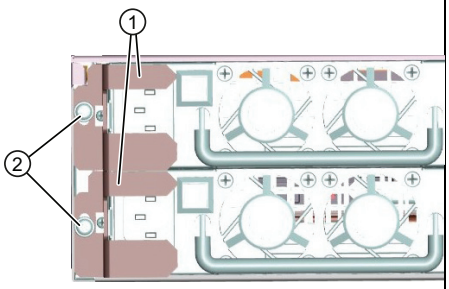
Open the device. (Page 73)

11.1.7 Removing the redundant AC power supply

⚠ WARNING
Only qualified personnel are permitted to replace the power supply.

Replacing the AC module

If a module of the redundant power supply is defective, you can continue to operate the system until it can be shut down in a controlled manner.

Steps for replacing the module		
1.	Use the LEDs ① to determine which module is defective (LED on the module is off).	
2.	Shut down the device so that the power supply is switched off. Disconnect the device from the mains.	
3.	Remove the power plug latch ①, if installed, with the retaining screw ②.	
4.	Remove the power cable of the defective module.	
5.	Remove the screws ② of the defective module.	
6.	Pull out the defective module from the frame using the hinged handle.	
7.	Insert the new module and secure it with the screw ②.	
8.	Connect the power cable once again and and install the power plug latch lock in the reverse order.	
9.	Start the device again.	

11.1.8 Replacing the redundant power supply completely

In rare cases replacing the module may not solve the problem. In this case, the redundant power supply has to be replaced.

NOTICE
Only qualified personnel are allowed to replace the power supply unit.

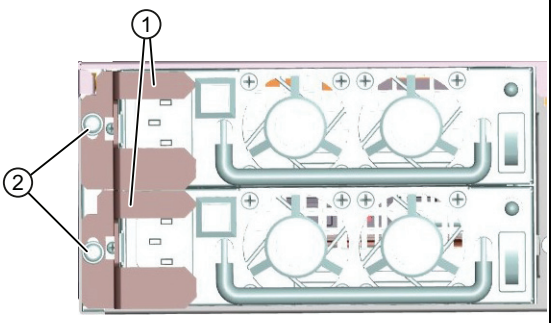
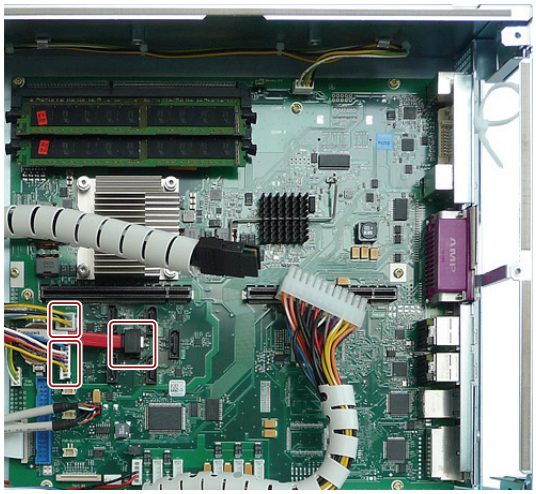
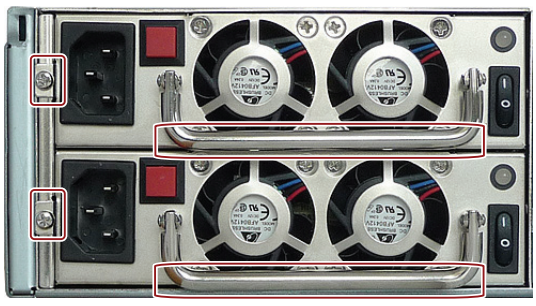
Note

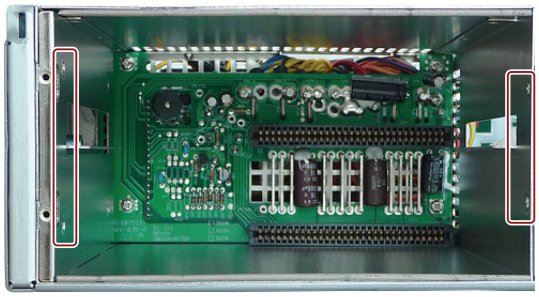
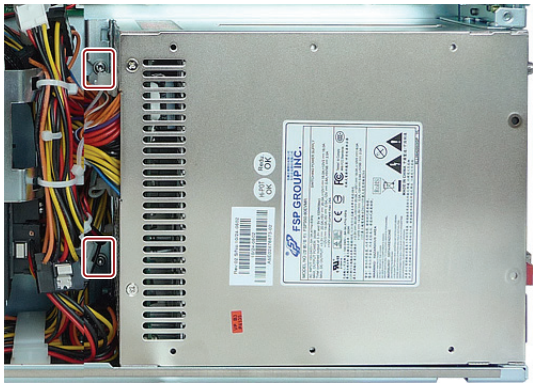
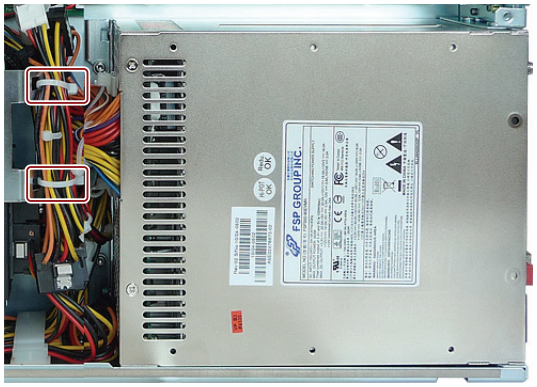
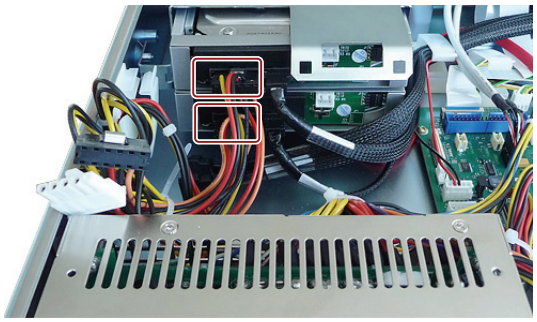
If the modules are defective, simply the exchange modules without disassembling the cabling or the mounting frame.

Requirement

- The device is opened.
- T10 screwdriver
- Phillips screw driver

Procedure

How to replace the redundant power supply		
1.	Remove the power plug latch ①, if installed, with the retaining screw ②.	
2.	Remove the bus frame.	–
3.	Pull out the indicated plug from the motherboard. Open cable clips for the cable routing at the bottom of the housing and remove the cable is secured there.	
4.	Remove the marked screws.	
5.	Pull out the two power supplies from the frame using the indicated folding handle.	

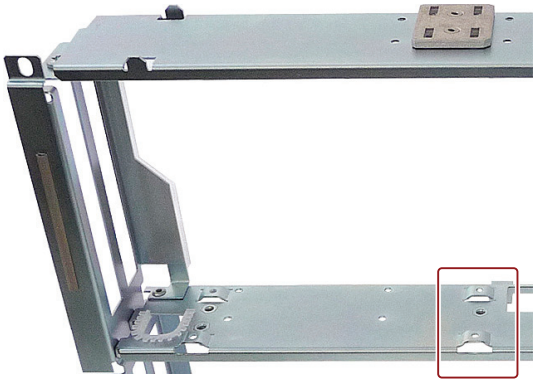
How to replace the redundant power supply		
6.	Remove the indicated screws from the side mounts.	
7.	Remove the indicated screws of the angle bracket. Do not remove the screws completely. This facilitates subsequent reassembly. The power supply can still be pulled out.	
8.	Lift the frame slightly and pull it out 5 cm.	–
9.	Cut through the indicated cable ties. Ensure that no cables are damaged when doing this.	
10.	Pull out the two indicated plugs from the power supply of the SATA drive. Open cable clips for the cable routing at the side of the housing and remove the cable is secured there.	
11.	Remove the frame from of the device.	–
12.	To install the new power supply, carry out the same steps in the reverse order. Re-establish the connections using cable ties.	–

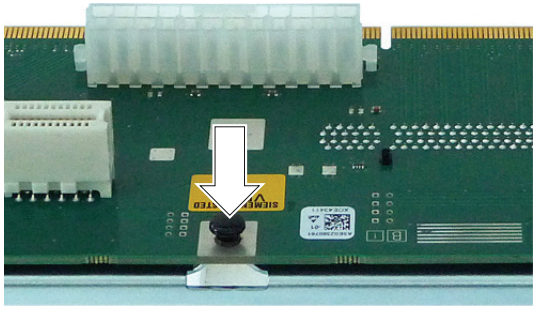
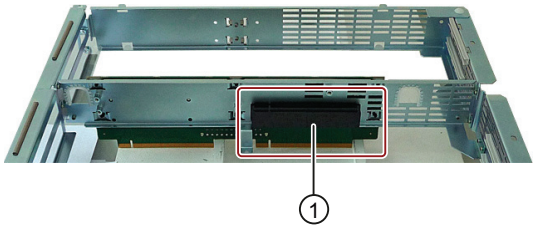
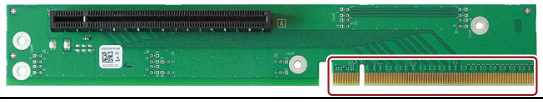
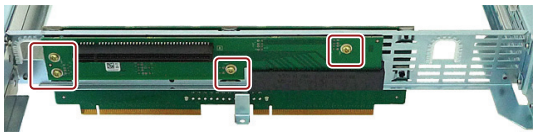
11.1.9 Installation and removal of bus boards in the bus frame

Preparation

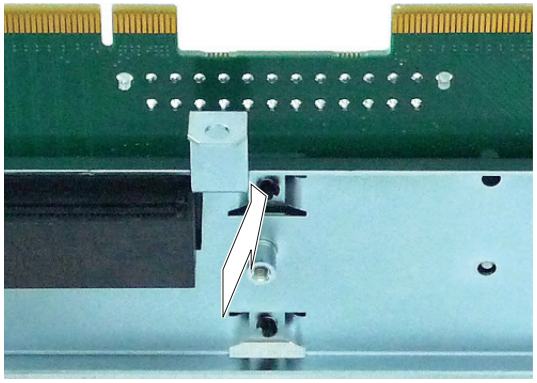
1. Disconnect the device from the power supply and remove all connecting cables from the device.
2. Open the device.

Installing a main bus board and piggybacks

How to install the bus board		
1.	Remove the bus frame as described in the section Installation and removal of the bus frame (Page 79).	
2.	Remove all installed expansion modules as described in the section Installation and removal of expansion modules (Page 78).	
3.	Align the bus frame in such a way that the imprints in the middle rack of the bus frame are pointing up.	
4.	Insert the desired main bus board into the middle rack of the bus frame and align the mounting holes to the holes there.	

How to install the bus board		
5.	Insert the six expansion rivets into the specified holes of main bus board and press the six expansion rivets down until they latch.	
6.	The angled PCIe x16 edge-socket connector (1) protrudes from the back of the middle rack for the piggyback. Align the piggyback for installation in the bus frame as shown in the illustration. Make sure that the gold plug-in contact is positioned correctly. Do not touch the plug-in contact.	
7.	Connect the piggyback with the plug-in contact into the angled PCIe x16 edge-socket connector.	
8.	Secure the piggyback with the four supplied screws at the identified places.	
	The main bus board and piggyback are mounted in the bus frame.	

Removing the bus board

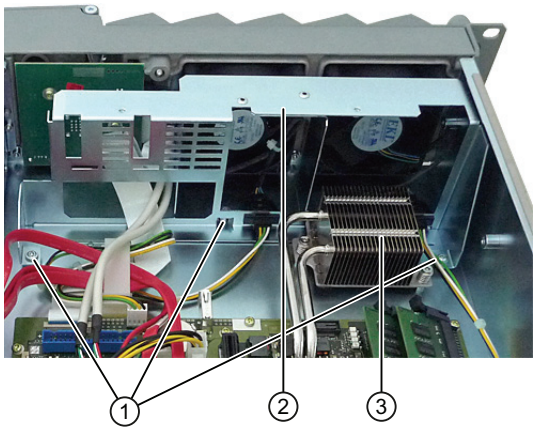
How to remove the bus board		
	Perform the tasks describe above in reverse order.	
	Use a screwdriver to press on the end of the expansion rivet until the expansion rivet can be freely moved. Use only new expansion rivets to re-install a bus board.	

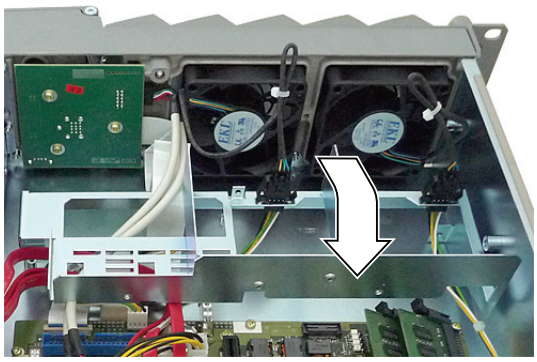
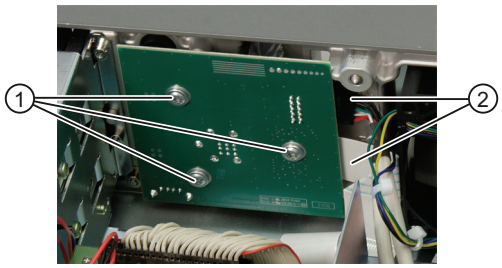
11.1.10 Removing the OP

Preparation

1. Disconnect the device from the power supply and remove all connecting cables from the device.
2. Open the device.

Removing the operator panel

How to remove the operator panel		
1.	Remove the bus frame as described in the section Installation and removal of the bus frame (Page 79).	–
2.	Remove the CPU cooler as described in the section Replacing the CPU cooler (Page 117) ③.	–
3.	Loosen the screws ① on the traverse ②.	

How to remove the operator panel		
4.	Tilt back the traverse.	
5.	Remove the three securing screws ① on the inside of the front panel of the device.	
6.	Release the cable ② from the operator panel.	

Installing an operator panel

How to install the operator panel		
1.	Perform the tasks describe above in reverse order.	

11.1.11 Removing the motherboard

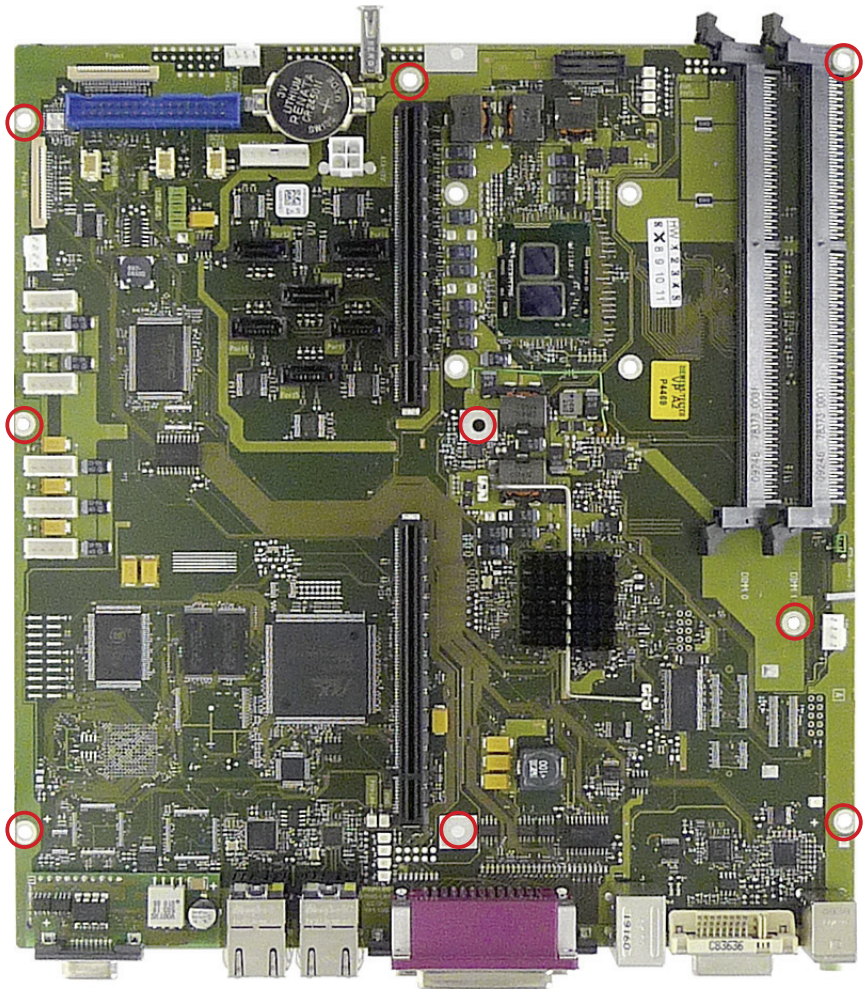
Preparation

NOTICE
The motherboard may only be removed by authorized technical personnel. Information about original spare parts for SIMATIC PCs is available on the Internet at: After sales information system from SIMATIC IPC (http://www.siemens.com/asis)

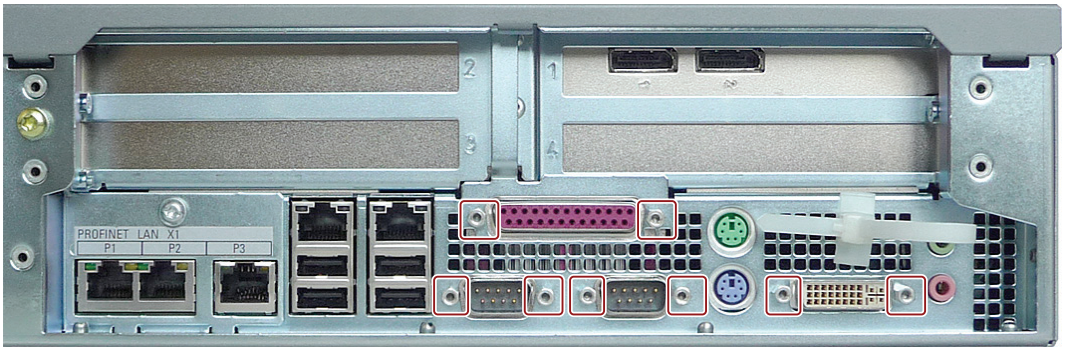
1. Disconnect the device from the power supply and remove all connecting cables from the device.
2. Open the device as described in section Open the device. (Page 73).

Removing the motherboard

How to remove the motherboard	
1.	Remove the bus frame. See section Installation and removal of the bus frame (Page 79).
2.	Disconnect all cables from the motherboard, noting down their positions while doing so.
3.	Remove the CPU cooler as described in the section Replacing the CPU cooler (Page 117).
4.	Remove all mounting screws on the motherboard. The locations of the screws are shown in the picture below.



How to remove the motherboard	
5.	Use 4.5-mm hex key to remove the indicated hex bolts.



The motherboard is supplied as spare part with processor (soldered to the motherboard), but without a CPU cooler, memory modules and bus board.

11.1.12 Replacing the CPU cooler

The CPU cooler installed in the SIMATIC IPC647C uses heat pipes and an additional heat exchanger.

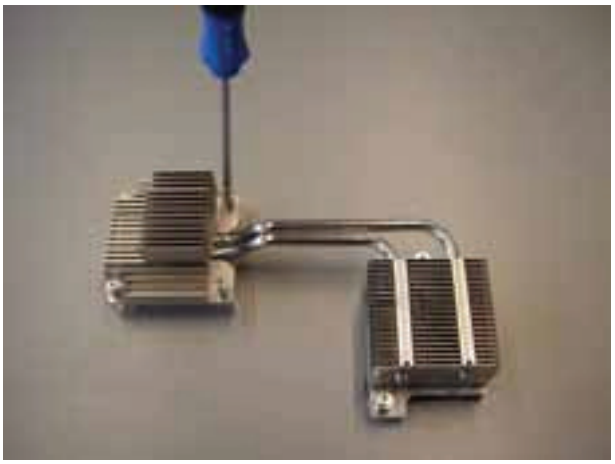


NOTICE
The CPU cooler may only be removed by authorized technical personnel. Information about original spare parts for SIMATIC PCs is available on the Internet at: After sales information system from SIMATIC IPC (http://www.siemens.com/asis)

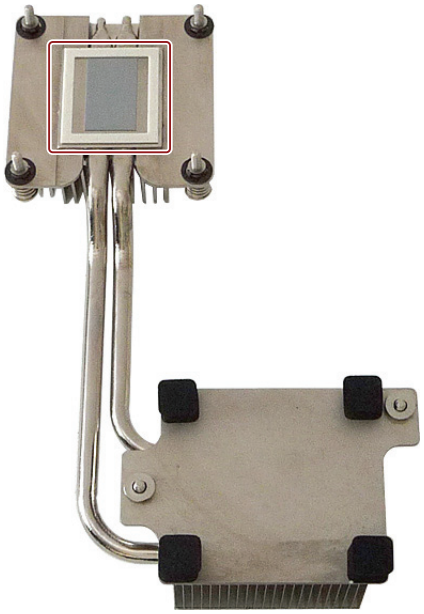
Preparation

1. Disconnect the device from the mains.
2. Open the device.

Removing the CPU cooler

How to replace the CPU cooler		
1.	Remove the bus frame. See section Installation and removal of the bus frame (Page 79).	
2.	Loosen the two screws on the heat exchanger.	
3.	Loosen the four screws on the CPU cooler.	
4.	Remove the CPU cooler with heat pipes and heat exchanger from the device.	
5.	Verify that there is no residue on the processor chip from the CPU cooler's heat sink pad. If there is, clean the processor surface and replace the CPU cooler.	

Installing a CPU cooler

How to install the CPU cooler		
1.	Make sure that the heat sink pad on the CPU cooler is intact.	
2.	Perform the tasks describe above in reverse order. Turn all the screws diagonally and tighten them uniformly, alternating to prevent skewing.	

11.1.13 Processor replacement

Removing the processor

Since the processor is soldered to the motherboard, it has to be replaced completely. Observe the information in the Chapter Removing the motherboard (Page 115).

11.2 Reinstalling the software

11.2.1 General installation procedure

If your software no longer functions correctly, you can reinstall it from either the Recovery DVD, the "Documentation and Drivers" DVD or the Restore DVD.

Recovery DVD:

The recovery DVD contains the installation program with tools for configuring the hard drives and installing the operating system and the languages supported by the operating system (MUI package).

The basic language of the installed operating system is English. To add other languages, install these languages from the Recovery DVD at a later time.

"Documentation and Drivers" DVD:

The "Documentation and Drivers" DVD contains the documentation and the hardware drivers.

Restore DVD:

The Restore DVD is included in the product package when you have ordered a device with operating system. The DVD contains a hard disk image file with the original software package: Operating system with installed hardware drivers and monitoring software, e.g. DiagBase.

Note

Place the data carrier from which the operating system is to be booted later at the first position in the boot folder. Carry out this setting in the BIOS Setup. You can find information on this in section Auto-Hotspot.

11.2.2 Restoring the delivery state

You can restore the original factory software using the Restore DVD. The DVD contains the necessary images and tools for transferring the factory software to the drive of your device. Restoration of the entire C drives: (system) and D: or only drive C: is possible. This allows you to retain any user data on drive D:.

Retrieving authorization or license

- Check whether you can retrieve your authorization or license key from the disk and perform this procedure if possible.
- If backup is not possible, please contact Customer Support. There you can obtain information necessary for software authorization.

NOTICE
If "Restore system partition only" is set all data on drive C: (system partition) will be deleted. All data, user settings and all authorizations or license keys on drive C: are lost! All data on drive C: will be completely deleted, reformatted and overwritten with the original factory software. If "Restore entire hard disk" is set ALL data, user settings, authorizations or license keys will be lost on the entire drive.

Procedure

1. Insert the Restore DVD into the DVD drive.
2. Restart the device with the on/off button.
3. Press the <F12> key when the following BIOS message appears.

   ```
   Press <F2> to go to Setup Utility

   Press <F12> to go to Boot Manager
   ```

   The "Boot Menu" is displayed when initialization is completed.
4. Select the optical drive with your cursor keys which is identified with a "P" in front of the SATA port number.

   Example:

   ```
   P3 - OPTIARC DVD-ROM DDU1681S.
   ```
5. Follow the on-screen instructions.

NOTICE
All existing data, programs, user settings, authorizations and license keys on the drives will be deleted and are thereby lost.

11.2.3 Installing Windows

11.2.3.1 Installing Windows XP

Note

Specific information on the use of the Windows XP Professional operating system is available in the following manual (not included in the product package):

Microsoft Windows XP Professional, Technical Reference (MSPress No. 934)

Requirement

You need the recovery DVD for the Windows XP operating system. It is included in the product package.

If you use a data carrier controller that is unknown to the operating system, for example, RAID, AHCI or SAS controller, copy the corresponding controller driver to a 3.5 inch floppy disk and keep this driver disk at hand. If your device does not have 3.5 inch floppy disk drive, connect a USB floppy disk drive. The controller driver is required during installation.

You can create a driver disk for the onboard RAID, the AHCI or the SAS RAID controller with the "Documentation and Drivers" DVD. Additional information is available in the section Installing drivers and software (Page 129).

Procedure

1. Insert the Recovery DVD into the DVD drive.
2. Restart the device with the on/off button.
3. Press the <F12> key when the following BIOS message appears.

   ```
   Press F2 to go to Setup Ulility

   Press F12 to go to Boot Manager
   ```

   After initialization, a boot menu is displayed.
4. In the boot menu, select the optical drive using the cursor keys. It is identified by a "P" in front of the SATA port number.

   Example:

   ```
   P3 - OPTIARC DVD-ROM DDU1681S
   ```
5. Confirm the selection by pressing ENTER.
6. **Immediately** press any key when you see the following prompt to install the operating system from the Recovery DVD.

   ```
   Press any key to boot from CD ..
   ```

   The Windows XP installation program (blue screen) appears after a few seconds.
7. Follow the instructions of the Windows XP installation program. You can find additional information on this in the section: Windows XP installation program

Windows XP installation program

The language of the installation program and the Windows XP Professional operating system is preset to English. You can change the language of Windows XP Professional once you have installed it. You can find information on this in section: Setting up the language selection by means of the Multilanguage User Interface (MUI) (Page 128).

Setting up partitions and integrating data carrier controllers unknown to the operating system

During the installation, you can create partitions and integrate data carrier controllers needed for the installation which are unknown to the operating system. Follow the instructions of the Windows XP installation program for this purpose. More information on integrating data carrier controllers is available in the section: Information for systems with RAID, AHCI or SAS controllers (optional).

The recommended minimum size of the partition on which you want to install Windows XP varies depending on how much work memory and which additional software you want to use. Information on partitioning of the data carrier in the delivery state is provided in the following table.

Partitions in the delivery state for Windows XP

Partition	Name	Size	File system
First	SYSTEM	25 GB	NTFS not compressed
Second	DATA	Remainder	NTFS not compressed

Procedure for systems with RAID, AHCI or SAS controllers (optional)

Data carrier controllers that are unknown to the operating system must be made known to the operating system during installation. Proceed as follows:

1. Insert the 3.5 inch floppy disk with the controller driver into the 3.5 inch floppy disk drive of the device.

   If the device does not have a 3.5 inch floppy disk drive, connect a USB floppy drive and insert the disk into this drive.

2. Start the Windows installation process as described above.
3. To start installation of the data carrier controller, press the <F6> key at the start of the Windows setup program (blue screen).

   After a few seconds, a dialog for installation of the data carrier controllers appears.

4. Select the corresponding driver on the driver disk.

Note

Select the following drivers for the onboard RAID or AHCI controller:

- For AHCI controller: "Intel(R) 5 Series 6 Port SATA AHCI Controller"
- For RAID controller: "Intel(R) ICH8M-E/ICH9M-E/5 Series SATA RAID Controller"

Note

Select the following drivers for the SAS controller:

- For AHCI controller: "Intel(R) 5 Series 6 Port SATA AHCI Controller"
  This driver is required for the Recovery DVD access.
- For SAS RAID controller: "Adaptec SAS/SATA-II RAID Controller"

11.2.3.2 Installation of Windows 7, Windows Server 2008 or Windows Server 2008 R2

Note

Specific information on using the Windows operating systems is available in the following manuals (not included in the product package):

- Windows 7 Technical Reference (MS Press No. 5913)
- Windows Server 2008 Technical Reference (MS Press No. 5919)

Requirement

You need the Recovery DVD for the operating system you want to install. It is included in the product package.

If you use data carrier controllers that are unknown to the operating system, e.g. a RAID, AHCI or SAS controller, copy the respective controller driver to a USB stick and have it ready. The controller driver is required during installation.

Procedure

1. Insert the Recovery DVD into the DVD drive.
2. Restart the device with the on/off button.
3. Press the <F12> key when the following BIOS message appears.

   ```
   Press F2 to go to Setup Ulility

   Press F12 to go to Boot Manager
   ```

   After initialization, a boot menu is displayed.
4. In the boot menu, select the optical drive using the cursor keys. It is identified by a "P" in front of the SATA port number.

   Example:

   ```
   P3 - OPTIARC DVD-ROM DDU1681S
   ```
5. Confirm the selection by pressing ENTER.
6. **Immediately** press any key when you see the following prompt to install the operating system from the Recovery DVD.

   ```
   Press any key to boot from CD or DVD ..
   ```

   After a few seconds, you will see the "Install Windows" installation program.
7. Now follow the instructions in the installation program. You can find additional information on this in the section: "Install Windows" installation program.

"Install Windows" installation program

The language of the installation program and the operating system you want to install has been preset to English. You can change the language of the operating system after the installation. You can find information on this in section: Setting up the language selection by means of the Multilanguage User Interface (MUI) (Page 128).

Setting up partitions and integrating unknown data carrier controllers into the operating system

You can set up partitions during the installation process and integrate data carrier controllers that are unknown to the operating system. To do so, select "Custom (advanced)" when prompted for the installation type in the "Install Windows" installation program.

The following dialog windows are then available:

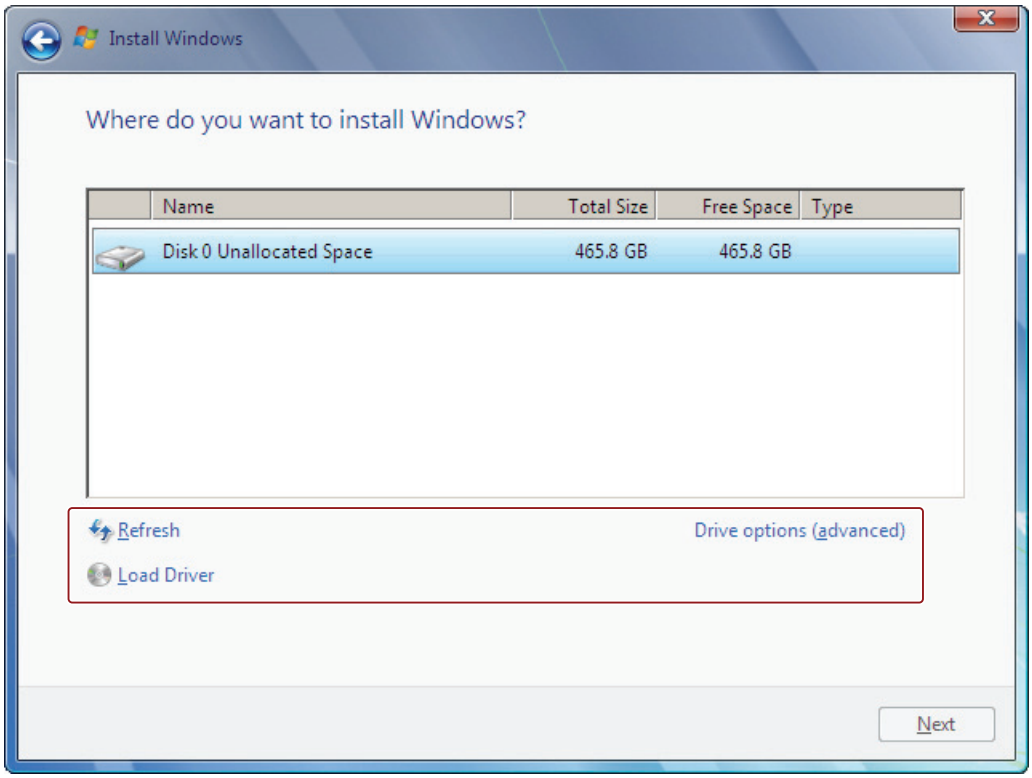


Figure 11-1 Example: Windows installation window

Refresh	Update
Load Driver	Integration of controller drivers unknown to the operating system and required for installation. Note the information in the section "Information for systems with RAID, AHCI or SAS controllers (optional)".
Drive options (advanced)	For display of additional functions that you can use to set up the data carriers, see figure "Windows installation window "Drive options (advanced)"".

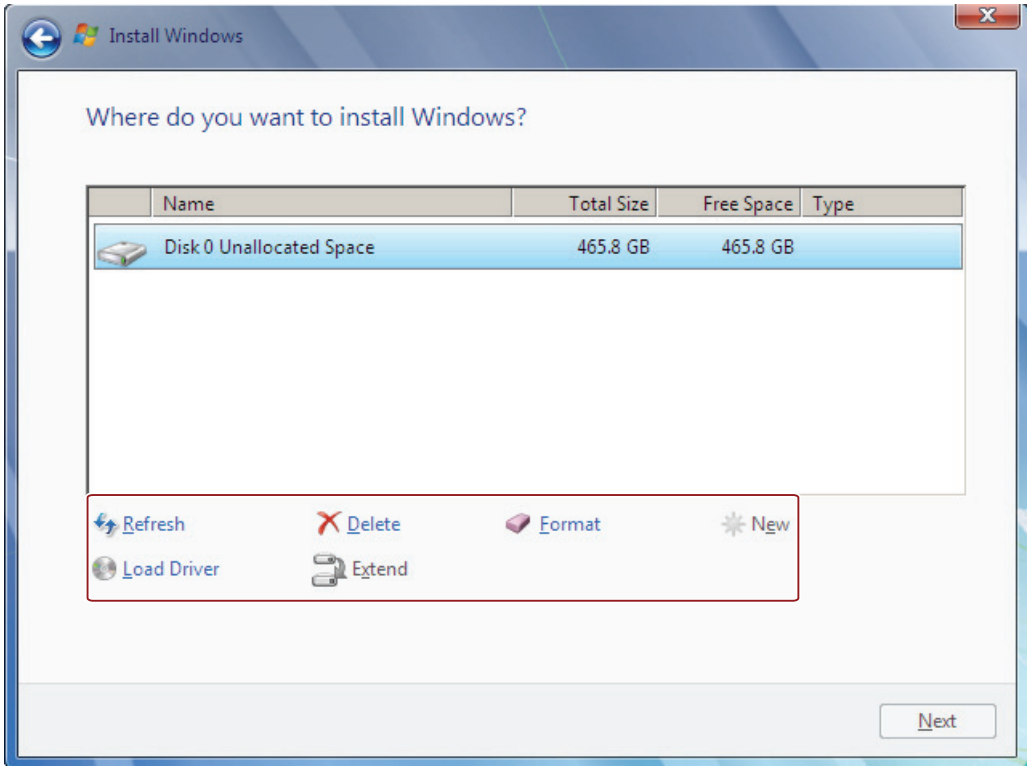


Figure 11-2 Example: Windows installation window "Drive options (advanced)"

Refresh	Update
Load Driver	Integration of controller drivers unknown to the operating system and required for installation. Note the information in the section "Information for systems with RAID, AHCI or SAS controllers (optional)".
Delete	Deleting a partition
Extend	Changing the partition size
Format	Formatting a partition
New	Creating new partitions
⚠	Identification for error messages, for example, if the data carrier was not formatted in the required "NTFS" format.

Note

If you want to install the operating system on a data carrier connected to a data carrier controller unknown to the operating system, you have to integrate the driver of the data carrier controller. Integrate this driver before you partition the data carrier and before you install the operating system. Additional information on the integration of data carrier controllers is available in the section: Information for systems with RAID, AHCI or SAS controllers (optional).

1. Make sure that the partition on which you want to install the operating system is large enough and is set up with a NTFS file system.

The recommended minimum size of this partition varies, depending on the operating system, how much RAM you have available and how much additional software you want to use. Information on how the data carrier is partitioned in its delivery state is available in the following tables.

2. Select the partition on which you want to install the operating system.
3. Click "Next".

Installation is started.

The Windows operating system is installed on the data carrier.

Partitions in delivery state for Windows 7 32-bit and Windows Server 2008 32-bit

Partition	Name	Size	File system
First	SYSTEM	25 GB	NTFS not compressed
Second	DATA	Remainder	NTFS not compressed

Partitions in delivery state for Windows 7 64-bit and Windows Server 2008 R2

Partition	Name	Size	File system
First	SYSTEM RESERVED	100 MB	Automatically set up by installation program
Second	SYSTEM	40 GB	NTFS not compressed
Third	DATA	Remainder	NTFS not compressed

Information for systems with RAID, AHCI or SAS controllers (optional)

Data carrier controllers unknown to the operating system must be made known to the operating system prior to installation in the "Install Windows" installation program. Proceed as follows:

Requirement

You have copied the relevant controller driver to a USB stick.

1. Connect the USB stick with the controller driver to the device.
2. Start the "Install Windows" installation program as described above.
3. Select "Load Drivers" in the Windows installation window.
4. Select the respective driver on the USB stick.

11.2.4 Setting up the language selection by means of the Multilanguage User Interface (MUI)

You can set the display of menus, dialogs or other information, such as date and time, to a different language. For this purpose, you can either select one of the preinstalled languages or install a new language package.

The following command sequences are described in English. Depending on the default setting, they can be displayed in another language.

Setting up the language selection for Windows XP Professional

Note

Specific information for setting up the language for Windows XP Professional is available in the following manual (not included in the product package):

- "Microsoft Windows XP Professional, Technical Reference" (MSPress No 934)

Changing the settings for language, region and formats of a registered user account

1. Choose:

   "Start > Control Panel > Regional and Language"

2. You can make the desired changes in the "Regional Settings", "Languages" and "Advanced" tabs.

Installing new language packages

1. Start the "MUISETUP.EXE" program in the "MUI" folder from the Recovery DVD.

   All languages that can be installed are displayed.

Setting up the language selection for Windows 7, Windows Server 2008 and Windows Server 2008 R2

Note

Specific information for setting up the language selection for Windows operating systems is available in the following manuals (not included in the product package):

- Windows 7 Technical Reference (MS Press No. 5913)
- Windows Server 2008 Technical Reference (MS Press No. 5919)

Changing the settings for language, region and formats of a registered user account

1. Choose:

   "Start > Control Panel > Clock, Language, and Region > Regional and Language Options"

2. You can make the desired changes in the "Formats" and "Location und Keyboards and Languages" tabs.

Changing the settings for language, region and formats of the system account and the standard user account

You can change the settings for language, region and formats of the system account (for example, the language in the user login dialog) and the settings of the standard user account (standard setting for new users). The settings of the registered user are copied to the system account and the standard user account for this purpose.

1. Choose:

   "Start > Control Panel > Clock, Language, and Region > Regional and Language Options"

2. You can make the required changes in the "Administrative" tab. You copy the settings by clicking the respective button.

Installing new language packages

Some language packages are available on the Recovery DVD in the "Languagepacks" folder.

1. Choose:

   "Start > Control Panel > Clock, Language, and Region > Regional and Language Options"

2. Select the "Keyboards and Languages" tab.
3. Click the "Install/uninstall languages" button and make the required changes.

11.2.5 Installing drivers and software

Note

In the case of multilingual operating systems (MUI versions), you have to set the regional settings for menus and dialogs and the default language to English (US) before you install new drivers or operating system updates.

Install the drivers and software from the included "Documentation and Drivers" DVD. Procedure:

1. Insert the DVD.
2. Run *START*.
3. Select *Drivers & Updates* from the index.
4. Select the device and operating system.
5. Select the desired driver.
6. Open the folder with the driver data by clicking on the link next to "Driverpath".
7. Start the setup program in this folder.

Note

During the installation of a new Windows operating system, the chipset driver, if required, must be installed before all other drivers.

11.2.6 Installing the Intel RAID controller software

The software installation of the onboard RAID controller takes place with its driver installation. Additional information on this is available in the section "Installation of drivers and software".

11.2.7 Installing the optional burner or DVD software

Information about installation of the burner / DVD software is available on the supplied CD.

11.2.8 Update installation

11.2.8.1 Updating the operating system

Windows

The latest updates for the Windows operating system are available in the Internet at Microsoft (http://www.microsoft.com).

Note

Before you install new drivers or operating system updates for Windows MUI versions, set the default language to US English in the regional settings for menus and dialogs.

Other operating systems

Contact the corresponding manufacturer.

11.2.8.2 Installing or updating application programs and drivers

Install and connect an appropriate drive in order to install software from a CD and / or floppy disk in Windows.

The USB floppy disk and CD-ROM drivers are included in Windows and do not have to be installed from other sources.

For information about installation of SIMATIC software packages, refer to the corresponding manufacturer documentation.

Contact the manufacturer to obtain updates of drivers and application programs you purchased from third-party vendors.

Note

Before you install new drivers or operating system updates for Windows versions, set the default language to US English in the regional settings for menus and dialogs.

11.2.9 Data backup / subsequent modification of partitions

11.2.9.1 Hardware supported

Note

Older versions of the SIMATIC IPC Image Creators do not support the hardware of the SIMATIC IPC847C.

Support is available as of SIMATIC IPC Image & Partition Creator Version 3.2.

In the case of device equipment with hardware RAID, the device driver has to be reloaded. A new function is available in the SIMATIC IPC Image & Partition Creator to this purpose.

For information on SIMATIC IPC Image & Partition Creator, refer to the corresponding product documentation.

11.2.9.2 Creating an image

To backup your data under Windows, we recommend that you use the "SIMATIC IPC Image & Partition Creator" software tool. This tool allow easy backup and fast restoration of the full contents of Compact Flash cards, hard disks and individual partitions (images).

"SIMATIC IPC Image & Partition Creator" supports burning to DVD media.

The software can be ordered from the SIEMENS online ordering system. For detailed information about "SIMATIC IPC Image & Partition Creator", please refer to the corresponding product documentation.

11.2.9.3 Modifying the partitions

In order to modify partitions, we recommend using the software tool "SIMATIC IPC Image & Partition Creator". The software can be ordered from the SIEMENS online ordering system.

Detailed information about using this tool is available in the manufacturer documentation of the "SIMATIC IPC Image & Partition Creator".

11.2.10 CP 1616 onboard

NDIS device driver

Read the information in description provided by Device_Driver_CP16xx.pdf on the supplied "Documentation and Drivers" CD.

PROFINET IO

Read the information regarding the SIMATIC devices and SIMATIC NET documentation listed in the "Integration" section.

11.3 BIOS update

Writing down the BIOS Setup settings

Before you update your BIOS Setup settings, you should write down the values so that you can restore them after the BIOS update, if necessary.

Updating the BIOS default values

It is imperative that you update the BIOS default values after a BIOS update:

1. Keep the F2 key pressed during the device start until the setup menu is displayed on the screen.
2. Open the defaults using the F9 key.
3. Adjust the BIOS setup settings once again, if necessary.

Reboots

Several reboots can be carried out after a BIOS update. These reboots are initiated by the Management Engine (ME). The reboots are required by the ME to adapt itself to the changes in the BIOS update.

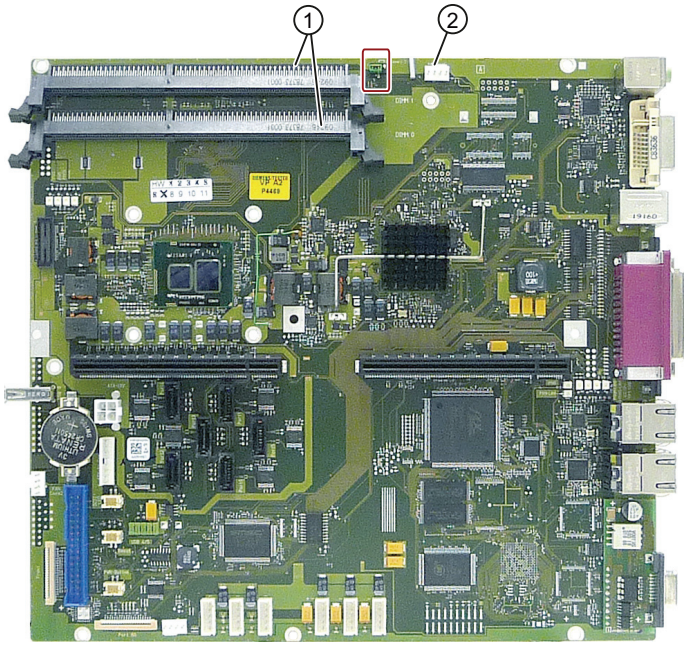
11.4 BIOS Recovery

The "BIOS-Recovery" function is used to reinstall the device when a BIOS is unusable.

All BIOS Setup settings will be lost in the recovery. You have to set these values again after a successful recovery.

Procedure

1. Switch off the device.
2. Remove the device cover and install the jumper on the main board as described in "Recovery". The jumper is located at the edge of the main board between the slots for memory modules ① and the fan connector ②.



3. Close the housing cover.
4. Place the Siemens BIOS Update USB stick into an USB slot of the device front.
5. Connect the device to the power supply.

   Recovery is executed automatically and cannot be interrupted or operated. The recovery progress will be displayed on the screen.
6. Turn off the device after recovery.
7. Install the jumper ① on "park position" and close the device.
8. Remove the BIOS Update USB stick.
9. Switch the device on.
10. Press <F2> to open the BIOS Setup.
11. Adjust the BIOS setup values once again, if necessary.

Alarm, error, and system messages 12

12.1 Boot error messages

BIOS first performs a **P**ower **O**n **S**elf **T**est (POST) within the boot routine to verify proper operation of certain functional units of the PC. The boot sequence is interrupted immediately if a fatal error is detected.

BIOS initializes and tests further functional units if the POST does not return any errors. In this startup phase, the graphics controller is initialized and any error messages are output to the screen.

The error messages output by system BIOS are listed below. For information on error messages output by the operating system or application programs, refer to the corresponding manuals.

On-screen error messages

On-screen error message	Meaning / tip
Address conflict	Plug-and-play problem. Contact your Technical Support.
Combination not supported	Plug-and-play problem. Contact your Technical Support.
IO device IRQ conflict	Plug-and-play problem. Contact your Technical Support.
Invalid System Configuration Data	Plug-and-play problem • Set the RESET CONFIGURATION DATA option in the "Advanced" menu of Setup. • Contact your Technical Support.
Allocation Error for ...	Plug and Play problem • Undo the last hardware change. • Contact your Technical Support.
System battery is dead. Replace and run SETUP	The battery on the CPU module is defective or dead. Contact your technical support team.
System CMOS checksum bad Run SETUP	Call SETUP, adjust and then save the settings. Contact Technical Support if this message persists in further retries to startup the system.
Failure Fixed Disk	HDD access error. Check the configuration in SETUP. Contact Technical Support.
Keyboard error	Check whether the keyboard is properly connected.
Key seizure	Check whether a key on the keyboard has seized.
System RAM Failed at offset:	Memory error. Contact Technical Support.

On-screen error message	Meaning / tip
Error - CMOS battery failed	The battery on the CPU module is defective or dead. Contact your technical support team.
Error - SMART failure detected on HDD	Hard disk fault: A fault threshold specified by the manufacturer has been exceeded. Operation of the hard disk is unreliable. The hard disk has to be replaced. Contact your Technical Support.
Error - Keyboard error	Check whether the keyboard is properly connected.
No bootable device -- Please restart system	Possible causes: • No operating system installed • Wrong drive addressed (disk in drive A/B) • Incorrect active boot partition • Incorrect drive entries in SETUP • HDD not connected / defective
Error - Realtime clock has lost power	Clock chip error. Contact Technical Support.
Error - Keyboard controller error	Keyboard error. Contact Technical Support.
Screen remains dark - cursor flashes at top left	A data carrier is inserted in the ODD drive. In this case it can take several minutes until the BIOS power up is continued.

12.2 BIOS beep codes

The following section lists the POST codes relevant to users in the sequence in which they occur: Contact Customer Support (http://www.siemens.de/automation/csi_en_WW) for information on all other POST codes.

Display (hex)	Meaning	Description		Remedy
4DH	DXE_MTC_INIT	MTC Initial	MonoTonicCounter initialization	Service case
4EH	DXE_CPU_INIT	CPU Middle Initial	CPU initialization	Replacing a basic module
4FH	DXE_MP_CPU_INIT	Multi-processor Middle Initial	Multiprocessor initialization	Replacing a basic module
50H	DXE_SMBUS_INIT	SMBUS Driver Initial	SMBUS driver initialization	Service case
51H	DXE_SMART_TIMER_INIT	8259 Initial	SMART Timer initialization	Service case
52H	DXE_PCRTC_INIT	RTC Initial	RTC initialization	Service case
53H	DXE_SATA_INIT	SATA Controller early initial	Advance initialization of the SATA Controller	Service case
54H	DXE_SMM_CONTROLER_INIT	Setup SMM Control service, DXE_SMMControler_INIT	SSM Control service	Service case

Display (hex)	Meaning	Description		Remedy
55H	DXE_LEGACY_INTERRUPT	Setup Legacy Interrupt service, DXE_LegacyInterrupt	Setup Legacy Interrupt service	Service case
01H	SEC_SYSTEM_POWER_ON	CPU power on and switch to Protected mode	Switch to Protected Mode	Service case
02H	SEC_BEFORE_MICROCODE_PATCH	Patching CPU microcode	Load CPU Microcode	Service case
03H	SEC_AFTER_MICROCODE_PATCH	Setup Cache as RAM	Set up cache as RAM	Service case
04H	SEC_ACCESS_CSR	PCIE MMIO Base Address initial	Initialize PCIE	Service case
05H	SEC_GENERIC_MSRINIT	CPU Generic MSR initial	Initialize CPU MS (Machine Status) Register	Service case
06H	SEC_CPU_SPEEDCFG	Setup CPU speed	Specify CPU speed	Service case
07H	SEC_SETUP_CAR_OK	Cache as RAM test	Carry out RAM Test on cache	Replacing a basic module
08H	SEC_FORCE_MAX_RATIO	Tune CPU frequency ratio to maximum level	Setting CPU frequency	Service case
09H	SEC_GO_TO_SECSTARTUP	Setup BIOS ROM cache	Set up BIOS ROM cache	Service case
0AH	SEC_GO_TO_PEICORE	Enter Boot Firmware Volume	Calling up the boot firmware memory area	Service case
70H	PEI_SIO_INIT	Super I/O initial	Initialization of the Super I/O	Service case
71H	PEI_CPU_REG_INIT	CPU Early Initial	Initialize CPU Register	Service case
72H	PEI_CPU_AP_INIT	Multi-processor Early initial	Multi processor initialization	Service case
73H	PEI_CPU_HT_RESET	HyperTransport initial	Initialize Hyper Transport functionality	Service case
74H	PEI_PCIE_MMIO_INIT	PCIE MMIO BAR Initial	Initialize PCIE Register	Service case
75H	PEI_NB_REG_INIT	North Bridge Early Initial	Initialization of the North bridge	Service case
76H	PEI_SB_REG_INIT	South Bridge Early Initial	Initialization of the South bridge	Service case
77H	PEI_PCIE_TRAINING	PCIE Training	Training phase of the PCIE device	Service case
79H	PEI_SMBUS_INIT	SMBUS Early Initial	Initialization of the SM Bus	Service case

Display (hex)	Meaning	Description		Remedy
41H	DXE_SB_SPI_INIT	South bridge SPI initial	Initialization of the Serial Peripheral Interface in the South Bridge	Service case
42H	DXE_CF9_RESET	Setup Reset service, DXE_CF9Reset	Setup Reset service	Service case
43H	DXE_SB_SERIAL_GPIO_INIT	South bridge Serial GPIO initial, DXE_SB_Serial GPIO_INIT	Initializations of the serial GPIO	Service case
44H	DXE_SMMACCESS	Setup SMM ACCESS service	Setup SMM access service	Service case
45H	DXE_NB_INIT	North bridge Middle initial	Initialization of the North Bridge	Service case
46H	DXE_SIO_INIT	Super I/O DXE initial	Initialization of the Super IO	Service case
47H	DXE_LEGACY_REGION	Setup Legacy Region service, DXE_LegacyRe gion	Setup service Legacy region	Service case
48H	DXE_SB_INIT	South Bridge Middle Initial	Initialization of the South Bridge	Service case
49H	DXE_IDENTIFY_FLASH_DEVICE	Identify Flash device	Identify FLASH type	Service case
4AH	DXE_FTW_INIT	Fault Tolerant Write verification	Checking of the write fault tolerance	Service case
4BH	DXE_VARIABLE_INIT	Variable Service Initial	Initialization of the variable service	Service case
4CH	DXE_VARIABLE_INIT_FAIL	Fail to initial Variable Service	Failure to initialize the variable service	Service case
26H	BDS_CONNECT_LEGACY_ROM	Dispatch option ROMs	Callup of the Legacy Option ROMs	Service case
27H	BDS_ENUMERATE_ALL_BOOT_OPTION	Get boot device information	Determine the Boot Device information	Service case
28H	BDS_END_OF_BOOT_SELECTION	End of boot selection	Boot selection terminated	Service case
29H	BDS_ENTER_SETUP	Enter Setup Menu	Callup into SETUP	Service case
2AH	BDS_ENTER_BOOT_MANAGER	Enter Boot manager	Callup Boot Manager	Service case
2BH	BDS_BOOT_DEVICE_SELECT	Try to boot system to OS	Booting of the OS	Service case
2CH	BDS_EFI64_SHADOW_ALL_LEGACY_ROM	Shadow Misc Option ROM	Copying the Legacy Option ROMs into RAM	Service case

Display (hex)	Meaning	Description		Remedy
2DH	BDS_ACPI_S3SAVE	Save S3 resume required data in RAM	Make available for operating state S3 RAM	Service case
2EH	BDS_READY_TO_BOOT_EVENT	Last Chipset initial before boot to OS	Initialization of the last chipset before the OS Boot	Service case
2FH	BDS_GO_LEGACY_BOOT	Start to boot Legacy OS	Boot Legacy OS	Service case
30H	BDS_GO_UEFI_BOOT	Start to boot UEFI OS	Boot UEFI OS	Service case
31H	BDS_LEGACY16_PREPARE_TO_BOOT	Prepare to Boot to Legacy OS	Preparation for booting of Legacy OS	Service case
32H	BDS_EXIT_BOOT_SERVICES	Send END of POST Message to ME via HECI	Terminate Boot Service	Service case
33H	BDS_LEGACY_BOOT_EVENT	Last Chipset initial before boot to Legacy OS.	Initialization of the last chipset before the Legacy OS Boot	Service case
34H	BDS_ENTER_LEGACY_16_BOOT	Ready to Boot Legacy OS.	Callup to boot the Legacy OS	Service case
35H	BDS_RECOVERY_START_FLASH	Fast recovery start flash	Start the BIOS Recovery function	Service case
F9H	POST_BDS_NO_BOOT_DEVICE	No Boot Device, PostBDS_NO_BOOT_DEVICE	No BOOT device found	Service case
FBH	POST_BDS_START_IMAGE	UEFI Boot Start Image, PostBDS_START_IMAGE	Booting of an UEFI image	Service case
FDH	POST_BDS_ENTER_INT19	Legacy 16 boot entry	Start Legacy 16 boot	Service case
FEH	P0ST_BDS_JUMP_BOOT_SECTOR	Try to Boot with INT 19	Boot with INT 19	Service case
E5H	ASL_WAKEUP_S5	System wakeup from S5	Reboot from operating state S5	Service case
10H	BDS_ENTER_BDS	Enter BDS entry	Phase Boot Device Selection	Service case
11H	BDS_INSTALL_HOTKEY	Install Hotkey service	Installation of the Hotkey service	Service case
12H	BDS_ASF_INIT	ASF Initial	Initialize Alert Standard Format	Service case
13H	BDS_PCI_ENUMERATION_START	PCI enumeration	Enumerate PCI bus	Service case

Display (hex)	Meaning	Description		Remedy
14H	BDS_BEFORE_PCIIO_INSTALL	PCI resource assign complete	Assign PCI resources	Run a test by disabling the hardware components in SETUP, or by removing the expansion modules installed on the bus module
15H	BDS_PCI_ENUMERATION_END	PCI enumeration complete	PCI enumeration completed	Service case
16H	BDS_CONNECT_CONSOLE_IN	Keyboard Controller, Keyboard and Mouse initial	Initialization of keyboard and mouse	Run a test by replacing the keyboard/mouse
17H	BDS_CONNECT_CONSOLE_OUT	Video device initial	Initialize graphic connection	Service case
18H	BDS_CONNECT_STD_ERR	Error report device initial	Initialize default error output	Service case
19H	BDS_CONNECT_USB_HC	USB host controller initial	Initialize USB host controller	Service case
1AH	BDS_CONNECT_USB_BUS	USB BUS driver initial	Initialize USB bus driver	Service case
1BH	BDS_CONNECT_USB_DEVICE	USB device driver initial	Initialize USB device driver	Service case
1CH	BDS_NO_CONSOLE_ACTION	Console device initial fail	Initialization of the console faulty	Service case
1DH	BDS_DISPLAY_LOGO_SYSTEM_INFO	Display logo or system information	Display logo or system information	Service case
1EH	BDS_START_IDE_CONTROLLER	IDE controller initial	Initialization of the IDE controller	Service case
1FH	BDS_START_SATA_CONTROLLER	SATA controller initial	Initialization of the SATA controller	Service case
20H	BDS_START_ISA_ACPI_CONTROLLER	SIO controller initial	Initialization of the Super IO	Service case
21H	BDS_START_ISA_BUS	ISA BUS driver initial	Initialization of the ISA bus driver	Service case
22H	BDS_START_ISA_FDD	Floppy device initial	Initialization of the floppy connection	Service case
23H	BDS_START_ISA_SERIAL	Serial device initial	Initialization of the serial connection	Service case
24H	BDS_START_IDE_BUS	IDE device initial	Initialization of the IDE connection	Service case
25H	BDS_START_AHCI_BUS	AHCI device initial	Initialization of the AHCI connection	Service case

Display (hex)	Meaning	Description		Remedy
56H	DXE_RELOCATE_SMBASE	Relocate SMM BASE	Reassign SMM base	Service case
57H	DXE_FIRST_SMI	SMI test	SMI test	Service case
58H	DXE_VTD_INIT	VTD Initial	Initialize I/O virtualization (VTD)	Service case
59H	DXE_BEFORE_CSM16_INIT	Legacy BIOS initial	Legacy BIOS initialization	Service case
5AH	DXE_AFTER_CSM16_INIT	Legacy interrupt function initial	Legacy interrupts initialization	Service case
5BH	DXE_LOAD_ACPI_TABLE	ACPI Table Initial	ACPI table initialization	Service case
5CH	DXE_SB_DISPATCH	Setup SB SMM Dispatcher service, DXE_SB_Dispatch	SMM dispatcher service	Service case
5DH	DXE_SB_IOTRAP_INIT	Setup SB IOTRAP Service	SouthBridge IOTRAP service	Service case
5EH	DXE_SUBCLASS_DRIVER	Build AMT Table	Initialization of the AMT (Active Management Technology) table	Service case
5FH	DXE_PPM_INIT	PPM Initial	Initialization of the Processor Power Management	Service case
60H	DXE_HECIDRV_INIT	HECIDRV Initial	Initialization of the Host Embedded Controller Interface	Service case
61H	DXE_VARIABLE_RECLAIM	Variable store garbage collection and reclaim operation	Loading of the variable memory	Service case
7AH	PEI_PROGRAM_CLOCK_GEN	Clock Generator Initial	Initializations of the clock generator	Service case
7BH	PEI_IGD_EARLY_INITIAL	Internal Graphic device early initial, PEI_IGDOpRegion	First initialization of the graphic connection	Service case
7CH	PEI_HECI_INIT	HECI Initial	Initialization of the Host Embedded Controller Interface	Service case
7DH	PEI_WATCHDOG_INIT	Watchdog timer initial	Initialization of the watchdog timer	Service case
7EH	PEI_MEMORY_INIT	Memory Initial for Normal boot	Memory initialization during the PEI phase	Replace the memory modules

Display (hex)	Meaning	Description		Remedy
7FH	PEI_MEMORY_INIT_FOR_CRISIS	Memory Initial for Crisis Recovery	Memory initialization for BIOS recovery	Replace the memory modules
80H	PEI_MEMORY_INSTALL	Simple Memory test	Memory test	Replace the memory modules
81H	PEI_TXTPEI	TXT function early initial	Initialization of the Trusted Execution Technology	Service case
82H	PEI_SWITCH_STACK	Start to use Memory	Start the memory use	Service case
83H	PEI_MEMORY_CALLBACK	Set cache for physical memory	Use cache as a physical memory	Service case
84H	PEI_ENTER_RECOVERY_MODE	Recovery device initial	Initialize the device for BIOS recovery	Service case
85H	PEI_RECOVERY_MEDIA_FOUND	Found Recovery image	BIOS Recovery image found	Service case
86H	PEI_RECOVERY_MEDIA_NOT_FOUND	Recovery image not found	BIOS Recovery image not found	Check whether the BIOS Recovery image exists on the recovery medium (e.g. USB stick).
87H	PEI_RECOVERY_LOAD_FILE_DONE	Load Recovery Image complete	Loading of BIOS Recovery image completed	Service case
88H	PEI_RECOVERY_START_FLASH	Start Flash BIOS with Recovery image	Starting of flashing of BIOS Recovery image	Service case
89H	PEI_ENTER_DXEIPL	Loading BIOS image to RAM	Copy BIOS image to the RAM	Service case
8AH	PEI_FINDING_DXE_CORE	Loading DXE core	Loading DXE (Driver Execution Environment) program	Service case
8BH	PEI_GO_TO_DXE_CORE	Enter DXE core	Start DXE program	Service case

Special codes

The BIOS does not generate any beep codes.

Troubleshooting/FAQs

13

13.1 General problems

This chapter provides you with tips on how to localize and troubleshoot frequently occurring problems.

Problem	Possible cause	To correct or avoid error
The device is not operational	No power supply	Check the power supply, and the power cord / connector
	Device operation is non-compliant with specified environment conditions	• Check the environment conditions • Wait approx. 12 hours before you switch on a device which was shipped in cold weather
The external monitor remains dark.	The monitor is switched off.	Switch on the monitor.
	The monitor is in "power save" mode.	Press any key on the keyboard.
	Luminance control is set to dark state	Increase brightness by means of luminance control. For detailed information, refer to the monitor operating instructions.
	Power cord or monitor cable not connected.	• Check whether the power cord has been properly connected to the monitor and to the system unit or to the grounded outlet. • Check whether the monitor cable has been properly connected to the system unit and to the monitor.
		If the monitor screen still remains dark after you have performed these checks, please contact your technical support team.
The mouse pointer does not appear on the screen.	The mouse driver is not loaded.	Check whether the mouse driver is properly installed and present when you start the application program. Detailed information about the mouse driver is available in the corresponding documentation.
	Mouse not connected.	Check whether the mouse cord is properly connected to the system unit. If you use an adapter or extension on the mouse cable, also check the connectors.
		Contact Technical Support if the mouse pointer still does not appear on the screen after you carried out these checks.
Incorrect time and/or date on the PC.		1. Press <F2> within the boot sequence to open BIOS Setup. 2. Adjust the time and date in BIOS Setup.
Although the BIOS setting is OK, the time and data are still incorrect.	The backup battery is low.	Contact Technical Support.

Problem	Possible cause	To correct or avoid error
USB device not responding.	The USB ports are disabled in BIOS.	Use a different USB port or enable the port.
	USB 2.0 device connected and USB 2.0 is disabled.	Enable USB 2.0.
	Operating system does not support the USB interfaces.	Enable USB Legacy Support for the mouse and keyboard. For other devices you need the USB drivers for your operating system.
DVD/CD: The front loader does not open.	The device is switched off or the open/close button is disabled by a software application.	Emergency removal of the data medium: 1. Switch off the device 2. Insert a pointed object, a pin for example, or an opened paper clip into the emergency extraction opening of the drive. Apply slight pressure to the contact until the front loader opens. 3. Pull the loader further out.
After changing the hard disk, the system does not boot from the RAID array	RAID array does not have highest boot priority	Set the RAID array to be first in the boot priority order
After changing the hard disk, "unused" is indicated for the relevant SATA port	The system was booted without a functioning hard disk (the removable rack was possibly not switched on)	Reboot the system with a functioning hard disk
Computer does not boot or "Boot device not found" is displayed	The boot device is not set to top boot priority in BIOS Setup, or is not approved as a boot device	Change the boot priority of the boot device in the Boot menu of BIOS Setup or include boot device in the boot priority
The screen flickers when the mouse moves or when programs are called	DDC information is not available. Possible causes: • Monitor does not supply DDC information • KVM switch does not pass through DDC information. • Y cable adapter with DVI-I for DVI-D/VGA connector is being used	• Use a monitor that supports DDC • Use a KVM switch that passes through DDC information • Use a basic cable adapter with DVI-I to VGA connector.
The startup of a Windows operating system on a GPT data medium is aborted with the following error message: "Status: 0xc0000225 Info: The boot selection failed because a required device is inaccessible"	The boot parameters in the boot loader file "BCD" are incorrect or damaged.	Run "Startup and Repair" from Microsoft Windows: 1. Insert the Recovery DVD into the optical drive. 2. Start the boot manager using the <F12> key during booting. 3. Select the line with "UEFI" in front of the name of the optical drive. 4. Click "Next" in the language selection window. 5. In the following "Install Windows" dialog, click on "Repair your computer" or press the <R> key. The "System Recovery Options" dialog appears. The system is checked for errors. 6. Then click "Repair and restart".

Error displays on the front panel

Front LED	Possible cause	Details about the error display
Red WATCHDOG LED is lit	Watchdog has triggered	See operating instructions, section "Watchdog (Page 68)".
Red TEMP LED is lit	Excess temperature in the device	See operating instructions, section "Temperature monitoring and temperature display (Page 68)".
Red FAN LED is lit	Fan failure	See operating instructions, section "Fan monitoring (Page 69)".
Red HDD1 ALARM LED is lit	RAID reports that hard disk 1 is defective	See operating instructions, section "RAID monitoring (Page 70)".
Red HDD2 ALARM LED is lit	RAID reports that hard disk 2 is defective	
Red HDD1 ALARM and HDD2 ALARM LEDs are flashing	RAID is in the "rebuild" state	
Red HDD1 ALARM and HDD2 ALARM LEDs are lit	RAID system is not ready for operation:	Affected drive must be identified with the help of the RAID software. See the operating instructions, section "RAID monitoring (Page 70)".
Red SF PROFINET LED is lit	A fault has occurred on the CPU 1616 onboard interface	See operating instructions, section "PROFINET (Page 64)".
All front-panel LEDs are constantly lit	Error in early BIOS-POST	In this case, contact Technical Support.

13.2 Troubleshooting RAID

Problem	Possible cause	Possible remedy
After changing the hard disk, the system does not boot from the RAID system	RAID system does not have highest boot priority	BIOS setup, boot menu: • Permit RAID system in the boot priority • Set the RAID system to be first in the boot priority order.
After changing the hard disk, "unused" is indicated for the relevant SATA port	The system was booted without a functioning hard disk (the removable cartridge was possibly not turned on)	Reboot the system with a functioning hard disk
Computer does not boot or "Boot device not found" is displayed	• The boot device is not permitted • The boot device is not in first place of the boot priority in the BIOS setup • The boot data carrier is set up with GPT and UEFI boot is deactivated in the BIOS setup	• In the BIOS setup, "Boot" menu, permit the boot device in the boot priority • In the BIOS setup, "Boot" menu, change the boot priority of the boot device • Activate UEFI boot in the BIOS setup.

13.3 Notes on the use of third-party modules

Problem	Possible cause	To correct or avoid error
The device crashes during startup	• I/O addresses are assigned twice • Hardware interrupts and/or DMA channels are assigned twice • Signal frequencies or signal levels are not adhered to • Different pin assignment	Check your computer configuration: • If the computer configuration corresponds to the delivery state, contact your technical support team. • In the case of a change in the configuration, restore the delivery state. To do this, remove the third-party modules and restart the device. If the error no longer occurs, the third-party module being used was the cause of the fault. Replace the third-party module with a Siemens module or contact the module supplier.
		If the device still crashes, contact your technical support team.
	• Insufficient output of an external power supply, e.g. UPS	• Use a higher capacity power supply
The device does not start up or switches off immediately	• A counter voltage is fed into the device by connected or installed third-party components	Clarify the following with the supplier of the component: • The component can be operated without an external power supply. • The component can be reconfigured so that it only uses the external power supply or that of the device. • so that only the PC voltage supply or external voltage supply is used"

Technical specifications

14

14.1 General specifications

General specifications

Order number	6AG4112-1...(for details, refer to the ordering documentation)
Dimensions	430.4 × 88.1 × 444.4 (W × H × D in mm). Detailed dimensional specifications can be found in section Dimensional drawing of the device (Page 157).
Weight	Min. 10 kg, max. 14 kg
Supply voltage (V_N)	100 to 240 VAC (–15%, 10%), varying voltage; with transient power failure backup in accordance with NAMUR
Input current AC	Continuous current up to 6 A (up to 30 A for 5 ms at startup)
Line voltage frequency	50 to 60 Hz (min. 47 Hz to max. 63 Hz, sinusoidal)
Transient voltage interruption	Min. 20 ms at 93 V (max. 10 events per hour; recovery time at least 1 s)
Power consumption	AC power supply: Max. 210 W at 80% efficiency Redundant AC power supply: Max. 240 W at 70% efficiency
Power loss / heat emission	AC power supply: 210 W = 210 J/s = 0.20 BTU/s Redundant AC power supply: 240 W = 240 J/s = 0.23 BTU/s
Current delivery (DC)	+5 V/30 A + 3.3 V/28 A, max. aggregate power 160 W +12 V/15 A -12 V/0.5 A -5 V/0.5 A +5 Vaux/2 A Aggregate power of all voltages max. 170 W
Noise emission	< 45 dB(A) at 25 °C according to DIN EN ISO 7779 ODDs not in operation
Degree of protection	IP41 at the front and IP20 at the rear according to IEC 60529
Dust protection	With closed front panel Filter class G2 EN 779, 99% of particles > 0.5 mm are filtered

Safety

Protection class	Protection class I according to IEC 61140
Safety regulations	• IEC 60950-1 • EN 60950-1 • UL 60950-1 • CSA C22.2 No 60950-1-07

Electromagnetic compatibility (EMC)

Radiated interference	EN 61000-6-3, FCC class A EN 61000-3-2 class D and EN 61000-3-3
Noise immunity: Mains borne disturbance variables on supply lines	± 2 kV, according to IEC 61000-4-4, burst ± 1 kV, according to IEC 61000-4-5, surge sym. ± 2 kV, according to IEC 61000-4-5, surge asym.
Noise immunity on signal lines	± 1 kV, according to IEC 61000-4-4; Burst; Length < 30 m ± 2 kV, according to IEC 61000-4-4; Burst; Length > 30 m ± 2 kV, according to IEC 61000-4-5; Length > 30 m
Immunity to discharge of static electricity	±6 kV contact discharge, according to IEC 61000-4-2 ± 8 kV air discharge, according to IEC 61000-4-2
Immunity to RF interference	• 10 V/m, 80...1000 MHz and 1.4...2 GHz, 80% AM 1 kHz, according to IEC 61000-4-3 • 1 V/m 2...2.7 GHz, 80% AM 1kHz, according to IEC 61000-4-3 • 10 V, 10 KHz...80 MHz, 80% AM 1 kHz, according to IEC 61000-4-6
Magnetic field	100 A/m, 50 Hz/60 Hz, nach IEC 61000-4-8

Climatic conditions

Temperature	Tested in accordance with IEC 60068-2-2, IEC 60068-2-1, IEC 60068-2-14
During operation	+5 to +35 °C, without restriction under the provided technical specifications +5 to +40 °C, ODD operation, no SAS HDD HW RAID operation, total power loss of expansion modules less than 55 W +5 to +45 °C, no ODD operation, no SAS HDD HW RAID operation, total power loss of expansion modules less than 55 W
Gradient	+5 to +50 °C +) No ODD operation, no HDD operation in the removable rack, no SAS HDD HW RAID operation Max. 10 °C/h, no condensation +) Power dissipation of the expansion modules in total less than 30 W
Storage/transport	–20 °C … +60 °C
Gradient	max. 20° C/h, no condensation
Relative humidity	Tested in accordance with IEC 60068-2-78, IEC 60068-2-30
In operation Gradient	5% to 80% at 25 °C (no condensation) Max. 10°C/h, no condensation
Storage/transport Gradient	5% to 95% at 25 °C (no condensation) Max. 20 °C/h, no condensation
Atmospheric pressure	
During operation	1080 to 795 hPa, corresponds to an elevation of -1000 to 2000 m
Storage/transport	1080 to 660 hPa, corresponds to an elevation of -1000 to 3500 m

Mechanical ambient conditions

Vibration	Tested in accordance with IEC 60068-2-6, 10 cycles
Operation [1, 2]	10 Hz to 58 Hz: 0.0375 mm, 58 Hz to 500 Hz: 4.9 m/s^2
Storage/transport	5 Hz to 9 Hz: 3.5 mm, 9 Hz to 500 Hz: 9.8 m/s^2
Resistance to shock	Tested in accordance with IEC 60068-2-27, IEC 60068-2-29
Operation [1, 2]	Half-sine: 50 m/s^2, 30 ms, 100 shocks per axis
Storage/transport	Half-sine: 250 m/s^2, 6 ms, 1000 shocks per axis
Special features	
Quality assurance	In accordance with ISO 9001

Motherboard

Chipset	Mobile Intel® QM57 Express Chipset
RAID (on-board)	Mobile Intel® QM57 Express (5 Series SATA RAID Controller)
Processor	• Intel® Core™ i3-330E (2.13 GHz, 1066 MT/sec FSB, 3 MB cache, EM64T, VT, 2 cores / 4 threads) • Intel® Core™ i5-520E (2.4 GHz Turbo Boost, 1066 MT/sec FSB, 3 MB cache, EM64T, VT, 2 cores / 4 threads), AMT • Intel® Core™ i7-610E, 2.53 GHz Turbo Boost, 1066MT/sec FSB, 4 MB cache, EM64T, VT, 2 cores / 4 threads), AMT
RAM	2 DIMM base maximum 8 GB DDR3 with 1066 MT/sec SDRAM (PC3-8500) Modules with and without ECC can be operated
Memory configuration	1 GB to 8 GB DDR3 (PC3-8500), max. 3.5 GB can be used for 32-bit operating system and applications. Modules with and without ECC can be ordered. (see ordering documents for features)
Free expansion slots	max. three modules simultaneously, grouped as follows: • 2 × PCI, 1 × PCIe x16 (PEG or PCIe x1/x4/x8/x16 IO possible) or • 1 × PCI, 1 × PCIe x4 (mech. PCIe x8), 1 × PCIe x16 (PEG or PCIe x1/x4/x8/16 IO possible) All modules up to 312 mm length are supported.
Power consumption per PCI slot, maximum permissible	5 V, 5 A or 3.3 V, 7 A; 12 V, 0.5 A; –12 V, 0.05 A
Power consumption per PCIe slot, maximum permissible	PCIe x4 module: 3.3 V, 3A; 12 V, 2.1 A; 3.3 Vaux, 0.4 A
Power consumption per PCIe slot, maximum permissible	PCIe x16 module: 3.3 V, 3 A; 12 V, 2.1 A; 3.3 Vaux, 0.4 A
Power consumption per slot, maximum permissible	Total power consumption (all voltages) may not exceed 25 W
Power consumption over all slots, maximum permissible	Total power consumption (all slots) may not exceed 75 W. Aggregate 3.3 Vaux current may not exceed 0.8 A.
Bandwidth of PCI slots, maximum	133 MB/s
Bandwidth of PCIe slots, maximum	2.5 GB/s per lane

Drives (for configuration details, refer to the order documentation)

Hard disk drive	3.5" SATA 300, 250 / 500 GB 3.5" SAS 3 Gbit/s, 1000 GB/s NCQ (Native Command Queuing) is supported.
Flash memory	2.5" SATA 3G 50 GB Solid State Disk (SLC)
DVD burner	Slimline SATA Read: • DVD ROM: Single layer 8x, dual layer 6x • DVD-R/+R: Single Layer 8×, Dual Layer 6×, DVD-RW/+RW 8×, • DVD-RAM; 5× CD-R 24×, CD-RW 24× Write: • DVD+R 8×, DVD+RW 8×, DVD-R 8×, DVD-RW 6× • DVD+R9 (DL) 6×, DVD-R DL 2× • CD-R 24×, CD-RW 24×
CompactFlash drive	Slot for CompactFlash card (behind the door, accessible from the front) Slot type II

Chipset

Main memory interface	Max. 8 GB SDRAM DDR3 (PC3-8500), unbuffered, ECC, no ECC Module types: 1 Gbit or 2 Gbit technology x8 and x16 organized
USB	Max. 7 USB 2.0 devices (500 mA high current, high speed up to 480 Mbps) Max. aggregate power consumption of all USB devices is 2.3 A.
PCI/PCIe	PCI V2.3, PCIe 2 data rate PCIe V1.0
SATA	6 × SATA 150/300, optional with RAID
SAS hardware RAID controller (optional)[7]	• SAS RAID module PCIe x8, RAID 1, (installed in PCIe x16 slot) • Type: Adaptec 5405Z (independent processor, 512 MB DDR2 cache) • Parameter: – 1x Mini SAS adapter (SFF-8087 for 4 SAS/SATA drives) – Maximum data rate 3 GB/s per port – Maintenance-free buffer unit for on-board cache memory

Graphics

Graphics controller	Intel® HD Graphics Controller, 2-D and 3-D engine integrated in chipset, Gen. 5.75
Graphics memory	Dynamic Video Memory Technology, uses 32 MB to 1.7 GB RAM
Resolutions/frequencies/colors	• CRT (via DVI-I VGA adapter): – Up to 1600x1200 at 120 Hz / 32-bit color depth – Up to 2560x1600 at 60 Hz / 32-bit color depth • LCD via DVI-D: – Up to 2048x1152 at 60 Hz/32-bit color depth
Graphics module (optional) [7]	• PCIe x16 graphics card, dual head (2 × DP, 2 × VGA or 2 × DVI-D) • Type: NVIDIA Quadro NVS 295 (256 MB graphics memory) • Maximum resolution: – DP 2560x1600 at 60 Hz / 32-bit color depth – DVI 1920x1200 at 60 Hz / 32-bit color depth – VGA 2048x1536 at 60 Hz / 32-bit color depth

Interfaces

COM1		Serial interface 1 (V.24), 9-pin D-sub connector
COM2		Serial interface 2 (V.24), 9-pin D-sub connector
LPT1		Parallel interface (Standard, EPP and ECP mode) Connection for printer with parallel interface
VGA (optional) (DVI-I)		Connection of an analog monitor via DVI-I / VGA adapter
1 × DVI-D		For connecting a digital monitor
2 × DP / DVI-D/VGA with Dual Head graphics card (optional)		For connecting two digital or analog monitors DVI-D or VGA via cable adapter
Keyboard		PS/2 keyboard connection
Mouse		PS/2 mouse connection
USB	Rear of the device	4 × USB 2.0 devices (500 mA high current, high speed up to 480 Mbps)
	Front panel	2 × USB 2.0 devices (500 mA high current, high speed up to 480 Mbps)
	Internal	1 × USB 2.0 devices (500 mA high current, high speed up to 480 Mbps)
PROFIBUS (optional)		9-pin D-sub socket, CP5611-compatible, 9.6 Kbps to 12 Mbps, programmable with software. Electrically isolated RS 485 (SELV circuit)*
PROFINET [4])		3 × RJ45 interface, CP 1616 compatible onboard interface based on ERTEC 400, 10/100 Mbps electrically isolated *
Ethernet [4]		2 × Ethernet interface (RJ-45), Wake on LAN, Remote Boot and teaming are supported. 10/100/1000 Mbps, electrically isolated * Ethernet 1: 82577 L, IAMT-capable [5], supports jumbo frames up to 4088 bytes Ethernet 2: Intel 82574 L, supports jumbo frames up to 9014 bytes
Audio - Microphone - Line out / Headset		IDT 92HD81HD 2 × 0.5 W / 8 Ohm

Status displays (LEDs)

Labeling on the front panel	LED color	Meaning
POWER	Green Yellow	Device active standby
HDD	Green	HDD active
ETHERNET 1 [4] ETHERNET 2 [4]	Green Green	Active Active
PROFIBUS/MPI	Green	Active
SF PROFINET [5]	Red	No cable connected or fault
	Flashing red	Fault or node flash test function
WATCHDOG	Green Red	Active Alarm
TEMP	Red	Temperature alarm
FAN	Red	Fan alarm
HDD 1 HDD 2	Red or both red, or red flashing [3]	Hard disk alarm in conjunction with SIMATIC monitoring software

Approvals / manufacturer's declarations

cULus	60950-1
CE	For details refer to Appendix A1 and manufacturer's declaration

* Electrical isolation within the safety extra-low voltage circuit (SELV)

1 Mechanical interference must be safely excluded within the burning operation.

2 Restrictions when HDDs are mounted in removable racks:
Shocks to 5G are permitted only for operation with SATA hard disk drives. Otherwise, mechanical stress must be safely excluded. SAS drives may not experience any shocks.

3 The two flashing red LEDs indicate that the RAID system is being synchronized.
Both red LEDs are lit if the monitoring software was unable to locate the defective HDD. It may be possible to locate this HDD using the RAID software. See section RAID monitoring (Page 70).

4 LAN interfaces are numbered on the enclosure to provide unique identification. The numbering by the operating system may deviate from this.

5 AMT and teaming cannot be used simultaneously on the Ethernet interface.

6 Interfaces supplied as optional.

7 SAS hardware RAID controller and the Dual Head graphics card occupy the same PCIe x16 expansion slot. The two cannot be operated together.

Note

Check the ESD Directive (Page 231).

The specifications apply only when:

- The device is in correct working order
- The fan cover and filter mat are installed
- The front door is closed

14.2 Power requirements of components (maximum values)

Base system

Component	Voltage					
	+5 V	+3.3 V	+12 V	-5 V	-12 V	5 Vaux
Motherboard core i processor with cooling	4 A	2.3 A	3.0 A		0.03 A	0.3 A
Front fan 1			0.4 A			
Front fan 2			0.4 A			
Base system (dual core)	**4 A**	**1 A**	**4 A**	**0 A**	**0.03 A**	**0.3 A**
Hard disk drive SATA and SAS (typical values) [1]	0.5 A		0.7 A			
DVD Burner [1]	0.8 A					
SAS hardware RAID controller		0.4 A	1.2 A			
Single currents (max. permissible)	30 A [2]	28 A [2]	15 A	0.5 A	0.5 A	2 A
Total power consumption, permissible	160 W					
Efficiency of the power supply [1]	Redundant AC power supply: Approx. 70% (230 VAC), approx. 65% (120 VAC) AC power supply: 80% (230 VAC), approx. 75% (120 VAC)					
1 Based on the selected device configuration 2 The accumulated power of the + +5 V and + +3.3 V voltage must not exceed 190 W with an AC power supply, or 100 W with AC redundant power supply.						

Typical power values

Component	Current input (AC-SV, U=230 V)	Power consumption
Base device	0.2 A	45 W
Hard disk drive 1 x 3.5"	0.04 A	9 W
Hard disk drives 2 x 3.5"	0.08 A	18 W
DVD burner drive (slimline)	0.02 A	4 W

14.3 Power supply (AC)

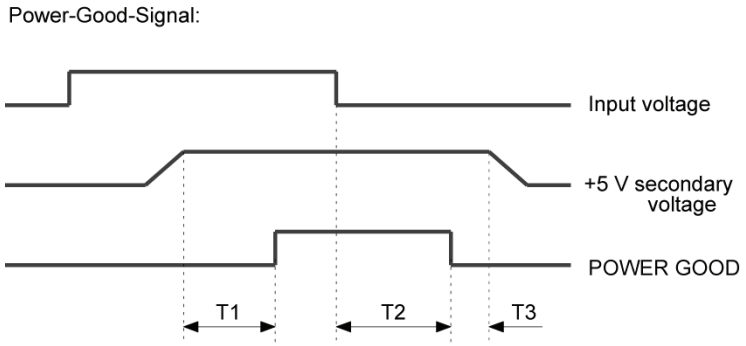
Output voltage

Voltage	Max. current	Voltage stability
+ 12 V_1	10 A	+/- 5 %
+ 12 V_2	13 A	+/- 5 %
- 12 V	0.3 A	+/- 10 %
+ 5 V	25 A [1]	+/- 5 %
+ 3.3 V	20 A1	+/- 5 %
+ 5 Vaux	2 A	+ 5 % / - 3 %

[1] The accumulated power of the +5 V and + 3.3 V supply may not exceed 190 W

Maximum inrush current at:
110 VAC = 25 A / 5 ms
230 VAC = 30 A / 5 ms

Power Good Signal



T1:	preset time	100 ... 500 ms
T2:	hold-up time	20 ms minimum
T3:	save time	1 ms mimimum

Figure 14-1 Timing profile of the Power Good Signal

Note

Operation at an uninterruptible power supply (UPS)

The power supply contains an active PFC (Power Factor Correction) circuit to conform to the EMC guidelines.

Uninterruptible AC power systems (UPS) must supply a sinusoidal output voltage in the normal and buffered mode when used with SIMATIC PCs with an active PFC.

UPS characteristics are described and classified in the standards EN 50091-3 and IEC 62040-3. Devices with sinusoidal output voltage in the normal and buffered mode are identified with the classification "VFI-SS-...." or "VI-SS-....".

14.4 AC power supply, redundant

Output voltage

Voltage	Max. current	Voltage stability
+ 12 V	18 A 2)	+/- 5 %
+ 12 V	18 A 2)	+/- 5 %
+ 12 V	14 A 2)	+/- 5 %
- 12 V	0.8 A	+/- 10 %
+ 5 V	20 A 1)	+ 5 %
+ 3.3 V	20 A 1)	+ 5 %
+ 5 Vaux	2.0 A	+ 5 % / - 3 %

1) The max. permitted accumulated power of the +5 V and + 3.3 V voltages is 100 W.

2) the maximum accumulated current of the +12 V voltage must not exceed 24 A.

The maximum inrush current is for:
110 V: AC 25 A, 5 ms
230 V: AC 30 A, 5 ms

14.5 Technical data of the telescopic rails

Ultimate load per pair	At least 14 kg
Full extraction length	At least 470 mm
Rail thickness	Maximum 9.7 mm
Mounting screws	M5 x 6 mm

Dimension drawings

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15.1 Dimensional drawing of the device

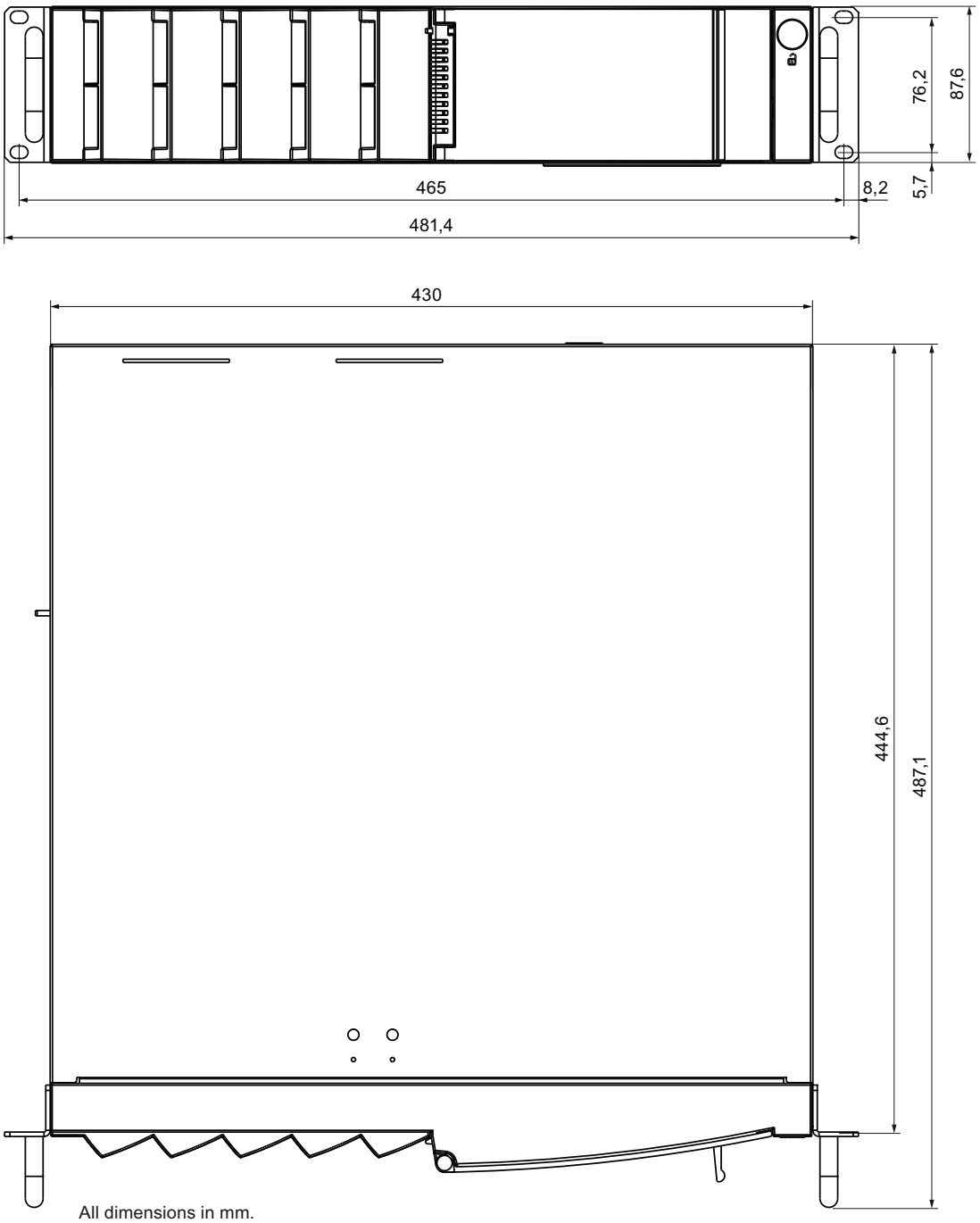
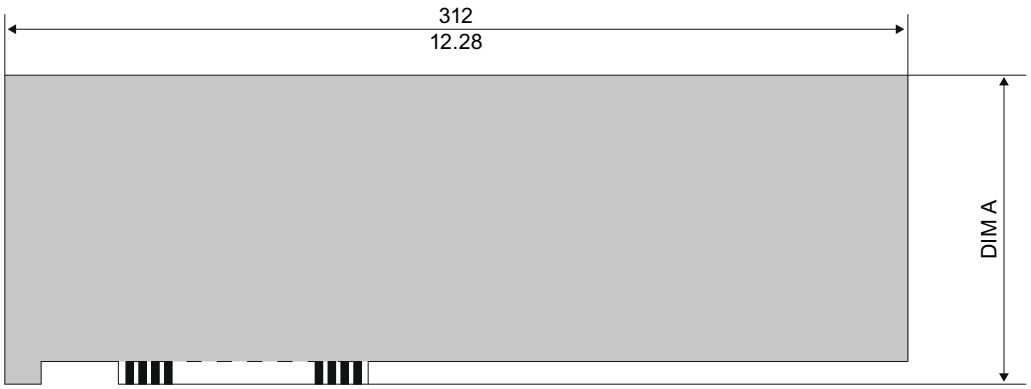


Figure 15-1 Dimensions IPC647C

15.2 Dimensional drawings for installation of expansion modules

The following dimension drawing shows the maximum dimensions of the PCI/PCI Express module without slot bracket and retainer.



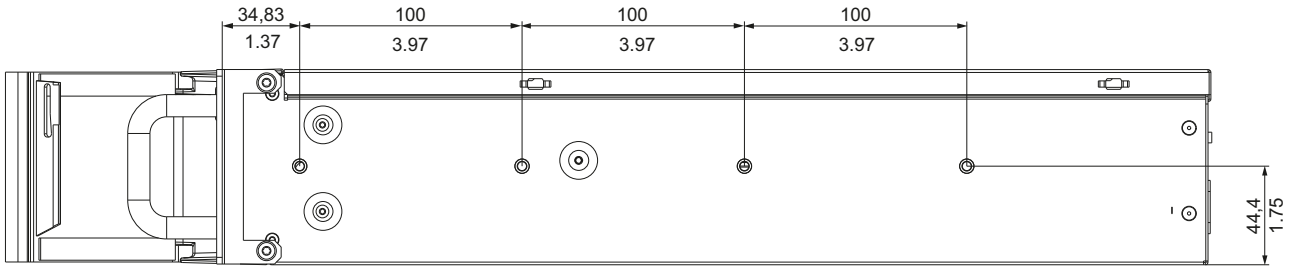
Dimensions: mm / inch

	PCI	PCIe	Meaning
DIM A (mm/inch)	106.68 mm 4.2	111.15 mm 4.38	Lower edge of module to upper edge of module

15.3 Dimension drawing for telescopic rails

The following dimension drawing shows the dimensions of the telescopic rails from the Rittal company.

- Type RP 3659.180 for 600 mm cabinet
- Type RP 3659.190 for 800 mm cabinet



Units of measurement: mm / Inch

Detailed descriptions

16

16.1 Motherboard

16.1.1 Structure and functions of the motherboard

Core components of the motherboard: processor and chipset, three slots for memory modules, internal and external interfaces, Flash BIOS and the backup battery.

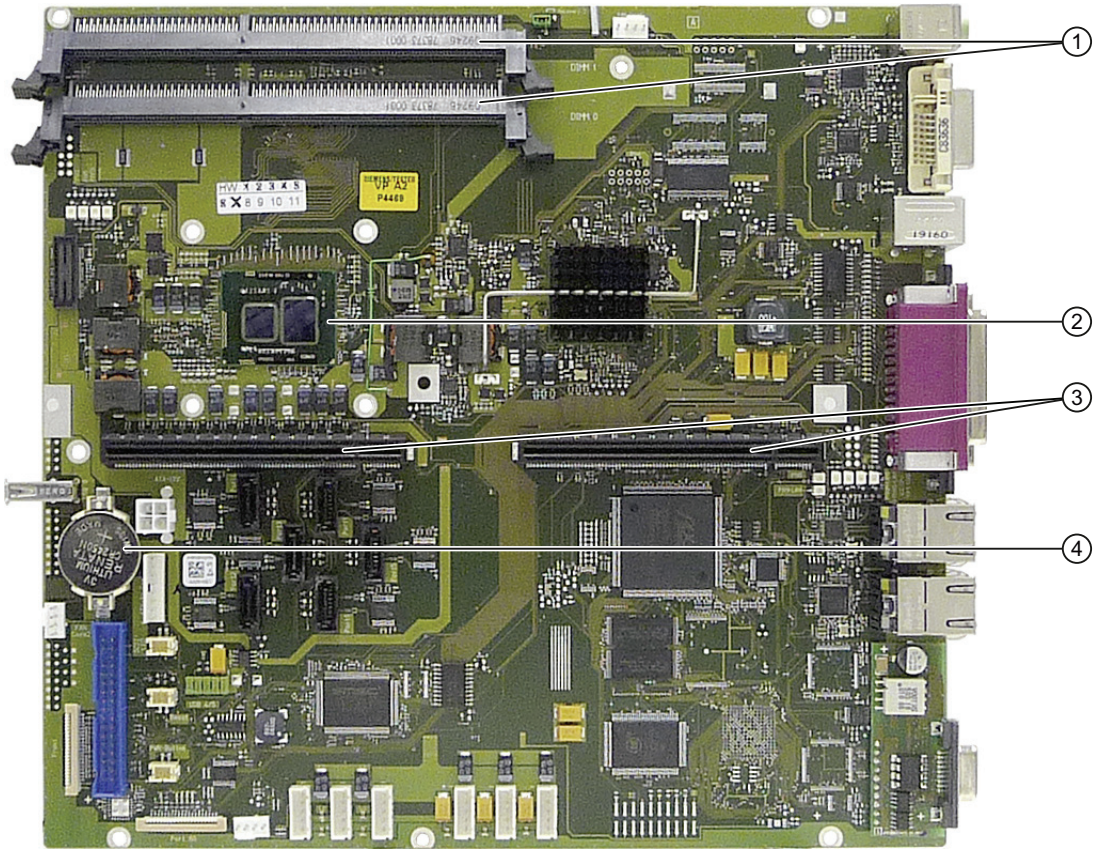


Figure 16-1 Layout of the motherboard

①	Two memory module slots	③	Slot for the bus board
②	Processor without fan	④	Backup battery

16.1.2 Technical features of the motherboard

Component / interface	Description	Parameters
Chipset	Single chipset	• Mobile Intel® 5 chipset QM57 Express (Platform Controller Hub)
BIOS	Update by means of software	• Insyde modified by Siemens
CPU	Intel® Core™ i	• VT and multimedia support • Turbo Boost and AMT, depending on CPU • Onboard cache with 3M/4M depending on CPU
Memory	2 DIMM module slots, max. 4 GB per module	• Data width of 64/72 bits (without ECC / with ECC) • 3.3 V • DDR3-SDRAM in accordance with PC3-8500 specification • 1 to 2 Gbit chip size on the module • 1066 MT/sec transfer rate • Variable from 1 GB to 8 GB / DIMM • With and without ECC
Graphics	Integrated in chip set	• Mobile CPU with integrated "Hi-K process Graphics" Graphics Controller and • Mobile Intel® QM57 Express (Platform Contro ller Hub) – VGA: 2560x1600/32-bit color depth/120 Hz to 2560x1600 at 60 Hz/32-bit color depth – DVI-I: 2048x1152/32-bit color depth/60 Hz • Graphics memory: Up to 1.7 GB, used in system memory, 32 MB reserved.
Hard disk [4]	Various SATA modes, AHCI, RAID 0, 1 and RAID 5 can be set	• Compatible to SATA -150 / 300 • Supports NCQ (Native Command Queuing)
DVD ROM [4] DVD ROM/CD RW[4]	SATA interface	• Compatible to SATA -150 / 300
Floppy [4]	FD drive interface	• 1.44 MB
Keyboard	PS/2 keyboard interface	• Standard
Mouse	PS/2 mouse interface	• Standard

Component / interface	Description	Parameters
Serial	COM1, 9-pin COM2, 9-pin	• V.24
Parallel	Standard, bi-directional, EPP and ECP mode	• SUB-D 25-pole
PROFIBUS/MPI [2]	SIMATIC S7 communication interface	• Electrically isolated [1] compatible to CP5611 - 12 Mbps
PROFINET [2]	Communication interface for PROFINET IO applications and SIMATIC installations	• 10/100 Mbps, electrically isolated[1] • CP -1616 compatible 3-port interface
USB 2.0	Universal Serial Bus	7 high-current (500 mA) USB -2.0 ports, of those: • 2 on the front • 4 on the back • 1 inside
Ethernet (two interfaces)	10BaseT/100Base-TX/1000Base-TX Ethernet 1: Intel® 82577LM Gigabit Network Connection (Hanksville) Ethernet 2: Intel® 82574L Gigabit Network Connection	• 10/100/1000 Mbps, electrically isolated[1] • Wake on LAN, remote boot • AMT-capable [5], teaming-capable • Supports jumbo frames up to 4088 bytes • With teaming capability • Supports jumbo frames up to 9014 bytes

1 Electrical isolation within the safety extra-low voltage circuit (SELV)

2 Optional product variant

3 Depends on the CPU type

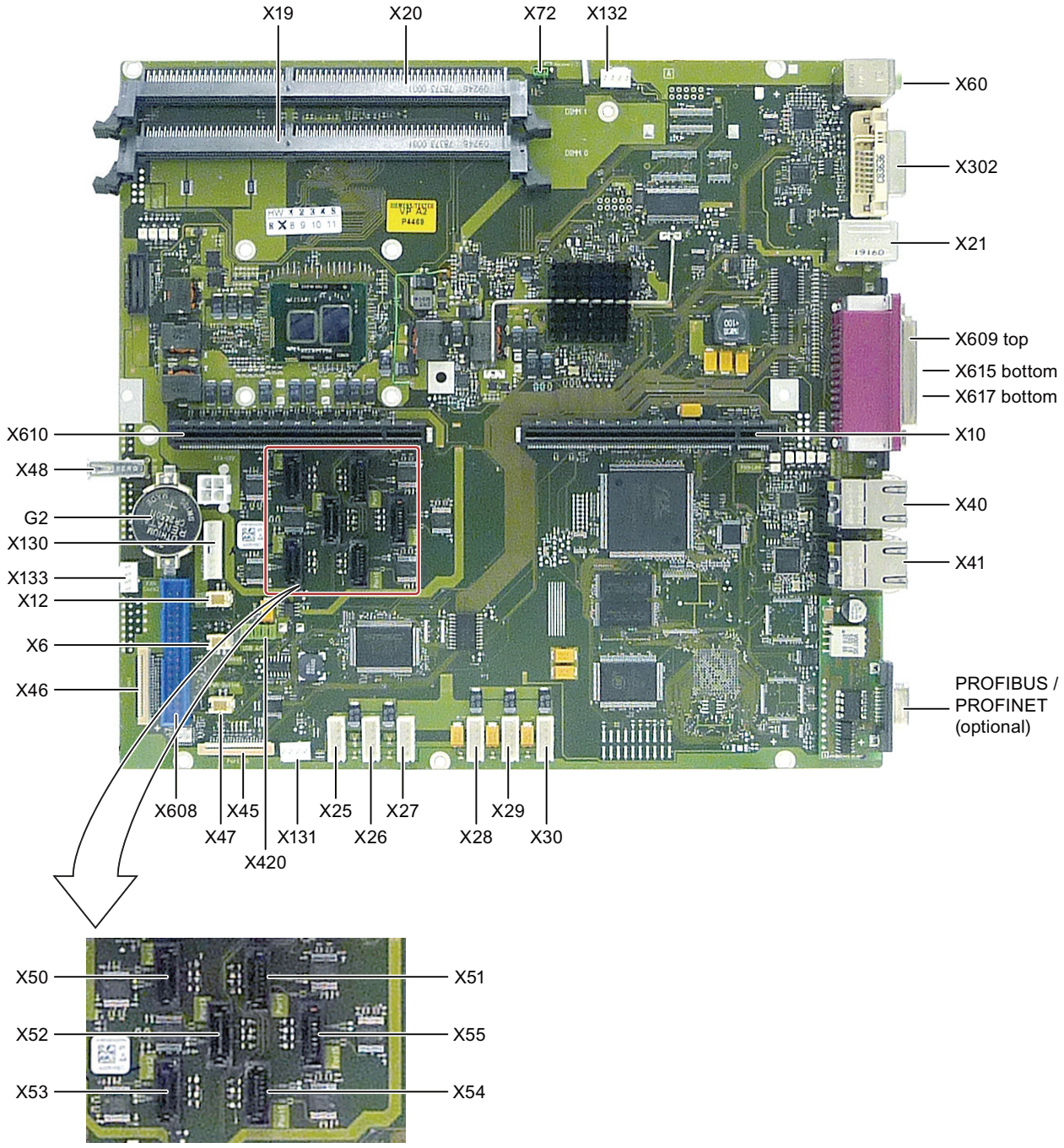
4 Depends on the selected device configuration
A floppy disk drive cannot be ordered using the configurator

5 AMT and teaming cannot be used simultaneously on the Ethernet interface.

16.1.3 Position of the interfaces on the motherboard

The Rack PC motherboard contains the following interfaces:

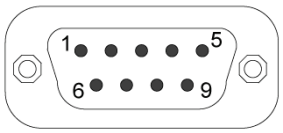
- Interfaces for the connection of external devices
- Interfaces for internal components (drives, bus boards etc.)



16.1.4 External interfaces

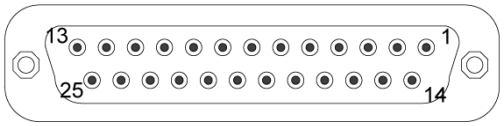
Interface	Position	Connector	Description
COM1	External	X617	9-pin, standard connector
COM2	External	X615	9-pin, standard connector
LPT1	External	X609	25-pin, standard socket
PS/2 mouse	External	X21 (7 to 12)	6-pin, miniature DIN socket (top socket)
PS/2 keyboard	External	X21 (1 to 6)	6-pin, miniature DIN socket (bottom socket)
USB 2.0	External	X40A, B; X41A, B; X420	Port 0, 2; 4, 5; USB ports 1, 3 at the front
PROFIBUS/MPI	External	X600	9-pin, standard socket, electrically isolated interface
PROFINET	External		RJ45
Ethernet 1 and 2	External	X40, 41	RJ45
DVI-I	External	X302	Combined socket: 24-pin DVI-D plus 5-pin VGA
Microphone	External	X60 (top)	6-pin 3.5-mm phono jack
Line out	External	X60 (bottom)	6-pin 3.5-mm phono jack

Serial interfaces COM1, COM2 (V24), X617, X615



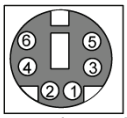
Pin no.	Short name	Meaning	Input / output
1	DCD (M5)	Receive signal (carrier)	Input
2	RxD (D2)	Receive data	Input
3	TxD (D1)	Send data	Output
4	DTR (S1)	Data terminal ready	Output
5	GND (E2)	Functional ground (reference potential)	–
6	DSR (M1)	Ready for operation	Input
7	RTS (S2)	Request to send	Output
8	CTS (M2)	Clear to send	Input
9	RI (M3)	Incoming call	Input

Parallel interface LPT1, X609



Pinno.	Short name	Meaning	Input / output
1	/ Strobe (CLK)	Data message	Output (open collector)
2	Data - Bit 0	Data channel 0	Output (TTL level)
3	Data - Bit 1	Data channel 1	Output (TTL level)
4	Data - Bit 2	Data channel 2	Output (TTL level)
5	Data - Bit 3	Data channel 3	Output (TTL level)
6	Data - Bit 4	Data channel 4	Output (TTL level)
7	Data - Bit 5	Data channel 5	Output (TTL level)
8	Data - Bit 6	Data channel 6	Output (TTL level)
9	Data - Bit 7	Data channel 7	Output (TTL level)
10	/ACK	Data acknowledge	Input (4.7 kΩ pull up)
11	BUSY	Not ready	Input (4.7 kΩ pull up)
12	PE (PAPER END)	Paper end	Input (4.7 kΩ pull up)
13	SELECT	Device selection	Input (4.7 kΩ pull up)
14	/ AUTO FEED	Automatically new line	Output (open collector)
15	/ ERROR	Device error	Input (4.7 kΩ pull up)
16	/ INIT	Reset / Initialization	Output (open collector)
17	/ SELECT IN	Printer selection	Output (open collector)
18…25	GND	Ground	–

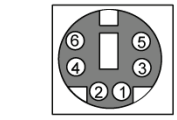
PS/2 mouse interface, X21 7 to 12



View onto the socket

Pin no.	Short name	Meaning	Input output
1	DAT	Data channel, mouse	Input/output
2	–	Not used	–
3	GND	Ground	–
4	P5VFK	+ 5 V (fused)	Output
5	CLK	Clock channel, mouse	Input/output
6	–	Not used	–

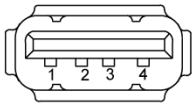
PS/2 keyboard interface, X21 1 to 6



View onto the socket

Pin no.	Short name	Meaning	Input output
1	DAT	Data channel, keyboard	Input/output
2	–	Not used	–
3	GND	Ground	–
4	P5VFK	+ 5 V (fused)	Output
5	CLK	Clock channel, keyboard	Input/output
6	–	Not used	–

USB 2.0 ports, X40A, B; X41A, B

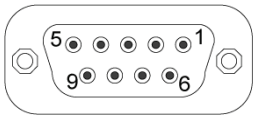


Pinno.	Short name	Meaning	Input / output
1	VCC	+ 5 V (fused)	Output
2	– Data	Data channel	Input / output
3	+ Data	Data channel	Input / output
4	GND	Ground	–

The connectors are of type A.

The ports are rated as high-current USB 2.0 (500 mA).

PROFIBUS/MPI interface X600 [1]

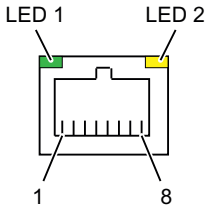


Pinno.	Short name	Meaning	Input / output
1	–	Not used	–
2	–	Not used	–
3	LTG_B	Signal line B of MPI module	Input/output

4	RTS_AS	RTSAS, control signal for received data stream. The signal is "1" when the directly connected AS is sending.	Input
5	M5EXT	M5EXT return line (GND) of 5 V power supply. The current load of an external consumer connected between P5EXT and M5EXT may not exceed the 90 mA.	Output
6	P5 EXT	P5EXT power supply (+5 V) of the 5 V power supply. The current load of an external consumer connected between P5EXT and M5EXT may not exceed the 90 mA.	Output
7	–	Not used	–
8	LTG_A	Signal line A of the MPI module	Input/output
9	RTS_PG	RTS output signal of the MPI module. The control signal is "1" when the programming device is sending.	Output
Shield		on connector casing	

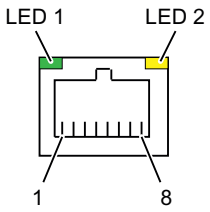
1 Optional product variant

PROFINET LAN X1 Port P1, P2, P3



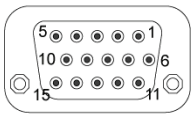
Pinno.	Short name	Meaning	Input / output
1	RD+	Receive data *	Input
2	RD-	Receive data *	Input
3	TD+	Send data *	Output
4, 5 1)	SYMR	Internal 75 Ohm terminating resistor	_
6	TD-	Receive data *	Output
7, 8 1)	SYMT-	Internal 75 Ohm terminating resistor	_
S		Shield	
	LED 1	Lit green: link	
	LED 2	Lights up yellow: activity	
* Auto negotiation and auto crossover supported			

Ethernet LAN connection, X40, X41



Pinno.	Short name	Meaning	Input / output
1	BI_DA+	Bi-directional data A+	Input / output
2	BI_DA-	Bi-directional data A-	Input / output
3	BI_DB+	Bi-directional data B+	Input / output
4	BI_DC+	Bi-directional data C+	Input / output
5	BI_DC-	Bi-directional data C-	Input / output
6	BI_DB-	Bi-directional data B-	Input / output
7	BI_DD+	Bi-directional data D+	Input / output
8	BI_DD-	Bi-directional data D-	Input / output
S		Shield	–
	LED 1	Off: 10 Mbps Lit in green color: 100 Mbps Lit in orange color: 1000 Mbit/s	–
	LED 2	Lit: Active connection (to a hub, for example) Flashing: actvity	–

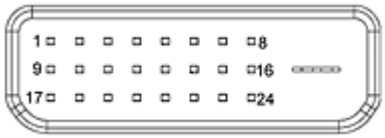
VGA interface of the DVI-I/VGA adapter or of the DP/VGA adapter



Pinno.	Short name	Meaning	Input / output
1	R	Red	Output
2	G	Green	Output
3	B	Blue	Output
4	–	Not used	–
5	GND	Ground	–
6	GND	Ground	–
7	GND	Ground	–
8	GND	Ground	–
9	+ 5 V	+ 5 V (fused)	Output
10	GND	Ground	–

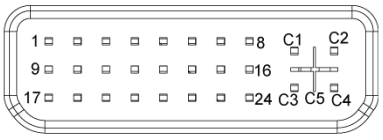
11	–	Not used	–
12	DDC_DAT	Display data channel data	Input/output
13	EXT_H	Horizontal synchronizing pulse	Output
14	EXT_V	Vertical synchronizing pulse	Output
15	DDC_CLK	Display data channel clock	Input/output

DVI-D interface of the DVI-I/DVI-D adapter or of the DP/DVI-D adapter



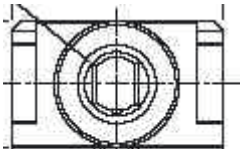
Pinno.	Short name	Meaning	Input / output
S	GND	Ground	–
S1	GND	Ground	–
1	TX2N	TDMS data 2-	Output
2	TX2P	TDMS data 2+	Output
3	GND	Ground	–
4	NC	Not used	–
5	NC	Not used	–
6	DDC CLK	DDC clock	Input / output
7	DDC CLK	DDC data	Input / output
8	VSYNC	Vertical synchronizing pulse	Output
9	TX1N	TDMS data 1-	Output
10	TX1P	TDMS data 1+	Output
11	GND	Ground	–
12	NC	Not used	–
13	NC	Not used	–
14	+5 V	+5 V	Output
15	GND	Ground	–
16	MONDET	Hotplug detect	Input
17	TX0N	TDMS data 0-	Output
18	TX0P	TDMS data 0+	Output
19	GND	Ground	–
20	NC	Not used	–
21	NC	Not used	–
22	GND	Ground	–
23	TXCP	TDMS clock +	Output
24	TXCN	TDMS clock -	Output

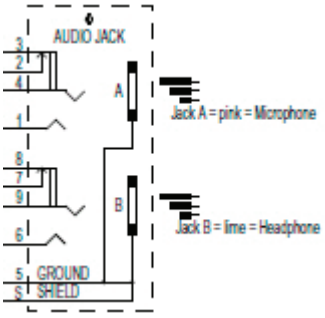
DVI-I interface



Pinno.	Short name	Meaning	Input / output
S	GND	Ground	–
S1	GND	Ground	–
C1	R	Red	Output
C2	G	Green	Output
C3	B	Blue	Output
C4	HSYNC	Horizontal synchronizing pulse	Output
C5	GND	Ground	–
CSA	GND	Ground	–
1	TX2N	TDMS data 2-	Output
2	TX2P	TDMS data 2+	Output
3	GND	Ground	–
4	NC	Not used	–
5	NC	Not used	–
6	DDC CLK	DDC clock	Input / output
7	DDC CLK	DDC data	Input / output
8	VSYNC	Vertical synchronizing pulse	Output
9	TX1N	TDMS data 1-	Output
10	TX1P	TDMS data 1+	Output
11	GND	Ground	–
12	NC	Not used	–
13	NC	Not used	–
14	+5 V	+5 V	Output
15	GND	Ground	–
16	MONDET	Hotplug detect	Input
17	TX0N	TDMS data 0-	Output
18	TX0P	TDMS data 0+	Output
19	GND	Ground	–
20	NC	Not used	–
21	NC	Not used	–
22	GND	Ground	–
23	TXCP	TDMS clock +	Output
24	TXCN	TDMS clock -	Output

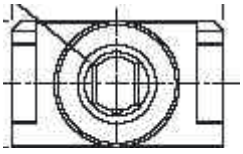
Microphone interface, X60 top

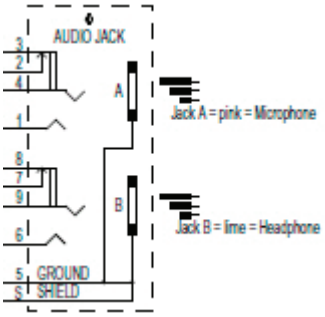




Pin no.	Short name	Meaning	Input / output
1	Right	Right channel	Input
2	7M	Analog ground	Output
3	Sense	Switch contact for device identification	Input
4	Left	Left channel	Input
5	M	Logic ground	Output

Line Out interface, X60 bottom





Pin no.	Short name	Meaning	Input / output
5	M	Logic ground	Output
6	Left	Left channel	Output
7	7M	Analog ground	Output
8	Sense	Switch contact for device identification	Input
9	Right	Right channel	Output

16.1.5 Internal ports

Pin assignment of the internal interfaces

Interface	Position	Connector	Description
Memory	Internal	X19, X20	2 DIMM sockets, 64-/ 72-bit
Bus expansion	Internal	X10	Bus expansion socket, used by PCI and PCIe bus signals
Power supply	Internal	X9	4-pin 12 V ATX power connector (CPU-VRM supply)
Fan monitoring	Internal	X130	Power supply fan monitoring 8-pin pin header
Floppy	Internal	X608	Two drives can be installed (82078 compatible) 360 KB, 720 KB, 1.2 MB, 1.44 MB 3F0h–3F7h, 370h–377h, IRQ 6 can be disabled, edge triggered 34-pin, socket for standard floppy disk drive
SATA	Internal (hard disk drive, for example)	X50, 51, 52, 53, 54, 55	SATA connector, 7-pin
Connection for device fan	Internal	X132, X131	Power supply, device fan monitoring (controlled), 4-pin, pin header
Connection for SCSI LED	Internal	X12	Input for SCSI drive activity display
Internal USB interface	Internal	X420	For connecting the USB cable to the front panel of the computer
Front panel interface	Internal	X46	OP connection
RAID HDD Alarm	Internal	X11	2-pin plug, LED interface for hard disk or removable racks 1 and 2
Port 80 connector	Internal	X45	Connection for Port 80 / mode switch

Assignment of the SCSI activity connector, X12 Type JST B2B-PH-SM3-TB

Pin no.	Short name	Meaning	Input / output
1	NC	-	-
2	SCSI HD_N	0-V level means that the SCSI interface is active	Input

External Reset, X6, Type JST B2B-PH-SM3-TB

Pin no.	Short name	Meaning	Input / Output
1	GND	Ground	-
2	Reset	0 V level means reset	Input

External Power button, X47, Type JST B2B-PH-SM3-TB

Pin no.	Short name	Meaning	Input / Output
1	EXT_PWRBTN	OV level means Power button pressed	Input
2	GND	Ground	-

Pin assignment of the internal USB connector, X420

Pin no.	Short name	Meaning	Input / output
1	VCC	+ 5 V (fused)	Output
2	VCC	+ 5 V (fused)	Output
3	-Data USB1	Data channel	Input / output
4	-Data USB3	Data channel	Input / output
5	+Data USB1	Data channel	Input / output
6	+Data USB3	Data channel	Input / output
7	GND	Ground	–
8	GND	Ground	-
9	GND	Ground	–
10	Key	–	–

Note

Contact Customer Support or the Repair Center for detailed information on pin assignments of the interfaces.

SATA data interface, X50, 51, 52, 53, 54, 55

Pin no.	Short name	Meaning	Input / output
1	GND	Ground	-
2	TX-P	Transmitter positive	Output
3	TX-N	Transmitter negative	Output
4	GND	Ground	-
5	RX-N	Receiver negative	Input
6	RX-P	Receiver positive	Input
7	GND	Ground	-

Pin assignment of the power supply fan monitoring interface, X130

Pin no.	Short name	Meaning	Input / output
1 to 3	Reserved	-	-
4	Tacho signal	Monitoring signal	Input
5 - 7	Reserved	-	-
8	Ground	-	-

Pin assignment of the front fan interface, X131, X132

Pin no.	Short name	Meaning	Input / output
1	GND	Ground	-
2	VCC	+12 V fused	Output
3	Tacho signal	Monitoring signal	Input
4	PWM	Speed setting	Output

Pin assignment of the supply for the serial ATA drives X25, X26, X27, X28, X29, X30

Pin no.	Short name	Meaning	Input / output
1	+12 V	Power supply	Output
2	GND	Ground	–
3	GND	Ground	–
4	+5 V	Power supply	Output
5	+3.3 V	Power supply	Output

Pin assignment of the PEG interface (PCIe X16 socket), X610

Signal	Pin no.	Pin no.	Signal
P12V	B1	A1	P12V
P12V	B2	A2	P12V
P12V	B3	A3	P12V
GND	B4	A4	GND
SMB_CLK2	B5	A5	n.c.
SMB_DATA2	B6	A6	n.c.
GND	B7	A7	n.c.
P3V3	B8	A8	n.c.
n.c.	B9	A9	P3V3
AUX_3V	B10	A10	P3V3
WAKE2	B11	A11	PCIE_RESET_L
n.c.	B12	A12	GND

Signal	Pin no.	Pin no.	Signal
GND	B13	A13	PCIE0_ECLK
PCIEX16_TX_P(15)	B14	A14	PCIE0_ECLK_N
PCIEX16_TX_N(15)	B15	A15	GND
GND	B16	A16	PCIEX16_RX_P(15)
SDVO_CTRLCLK	B17	A17	PCIEX16_RX_N(15)
GND	B18	A18	GND
PCIEX16_TX_P(14)	B19	A19	n.c.
PCIEX16_TX_N(14)	B20	A20	GND
GND	B21	O21	PCIEX16_RX_P(14)
GND	B22	A22	PCIEX16_RX_N(14)
PCIEX16_TX_P(13)	B23	A23	GND
PCIEX16_TX_N(13)	B24	A24	GND
GND	B25	A25	PCIEX16_RX_P(13)
GND	B26	A26	PCIEX16_RX_N(13)
PCIEX16_TX_P(12)	B27	A27	GND
PCIEX16_TX_N(12)	B28	A28	GND
GND	B29	A29	PCIEX16_RX_P(12)
n.c.	B30	A30	PCIEX16_RX_N(12)
SDVO_CTRLDATA	B31	A31	GND
GND	B32	A32	n.c.
PCIEX16_TX_P(11)	B33	A33	n.c.
PCIEX16_TX_N(11)	B34	A34	GND
GND	B35	A35	PCIEX16_RX_P(11)
GND	B36	A36	PCIEX16_RX_N(11)
PCIEX16_TX_P(10)	B37	A37	GND
PCIEX16_TX_N(10)	B38	A38	GND
GND	B39	A39	PCIEX16_RX_P(10)
GND	B40	A40	PCIEX16_RX_N(10)
PCIEX16_TX_P(9)	B41	A41	GND
PCIEX16_TX_N(9)	B42	A42	GND
GND	B43	A43	PCIEX16_RX_P(9)
GND	B44	A44	PCIEX16_RX_N(9)
PCIEX16_TX_P(8)	B45	A45	GND
PCIEX16_TX_N(8)	B46	A46	GND
GND	B47	A47	PCIEX16_RX_P(8)
MCH_CFG_20	B48	A48	PCIEX16_RX_N(8)
GND	B49	A49	GND
PCIEX16_TX_P(7)	B50	A50	n.c.
PCIEX16_TX_N(7)	B51	A51	GND
GND	B52	A52	PCIEX16_RX_P(7)
GND	B53	A53	PCIEX16_RX_N(7)
PCIEX16_TX_P(6)	B54	A54	GND

Signal	Pin no.	Pin no.	Signal
PCIEX16_TX_N(6)	B55	A55	GND
GND	B56	A56	PCIEX16_RX_P(6)
GND	B57	A57	PCIEX16_RX_N(6)
PCIEX16_TX_P(5)	B58	A58	GND
PCIEX16_TX_N(5)	B59	A59	GND
GND	B60	A60	PCIEX16_RX_P(5)
GND	B61	A61	PCIEX16_RX_N(5)
PCIEX16_TX_P(4)	B62	A62	GND
PCIEX16_TX_N(4)	B63	A63	GND
GND	B64	A64	PCIEX16_RX_P(4)
GND	B65	A65	PCIEX16_RX_N(4)
PCIEX16_TX_P(3)	B66	A66	GND
PCIEX16_TX_N(3)	B67	A67	GND
GND	B68	A68	PCIEX16_RX_P(3)
GND	B69	A69	PCIEX16_RX_N(3)
PCIEX16_TX_P(2)	B70	A70	GND
PCIEX16_TX_N(2)	B71	A71	GND
GND	B72	A72	PCIEX16_RX_P(2)
GND	B73	A73	PCIEX16_RX_N(2)
PCIEX16_TX_P(1)	B74	A74	GND
PCIEX16_TX_N(1)	B75	A75	GND
GND	B76	A76	PCIEX16_RX_P(1)
GND	B77	A77	PCIEX16_RX_N(1)
PCIEX16_TX_P(0)	B78	A78	GND
PCIEX16_TX_N(0)	B79	A79	GND
GND	B80	A80	PCIEX16_RX_P(0)
n.c.	B81	A81	PCIEX16_RX_N(0)
n.c.	B82	A82	GND

Pin assignment of the PCI-PCIe interface (PCIe X16 socket), X10

Signal	Pin no.	Pin no.	Signal
N12V	B1	A1	AUX_5V
P12V	B2	A2	P12V
P12V	B3	A3	P12V
GND	B4	A4	GND
PCI_INT_N(7)	B5	A5	PCI_INT_N(6)
PCI_INT_N(5)	B6	A6	PCI_INT_N(8)
P5V	B7	A7	P5V
PCI_REQ_N(4)	B8	A8	P5V
PCI_REQ_N(3)	B9	A9	PCI_GNT_N(4)

Signal	Pin no.	Pin no.	Signal
GND	B10	A10	PCI_GNT_N(3)
PCI0_PCLK	B11	A11	AUX_3V
GND	B12	A12	PLT_RST_N_BUFF
PCI1_PCLK	B13	A13	GND
GND	B14	A14	PCI_GNT_N(1)
PCI_REQ_N(1)	B15	A15	PCI_GNT_N(2)
PCI_REQ_N(2)	B16	A16	GND
P5V	B17	A17	PME
PCI_AD(31)	B18	A18	PCI_AD(30)
PCI_AD(29)	B19	A19	P3V3
GND	B20	A20	PCI_AD(28)
PCI_AD(27)	B21	O21	PCI_AD(26)
PCI_AD(25)	B22	A22	GND
P3V3	B23	A23	PCI_AD(24)
PCI_CBE_N(3)	B24	A24	n.c.
PCI_AD(23)	B25	A25	P3V3
GND	B26	A26	PCI_AD(22)
PCI_AD(21)	B27	A27	PCI_AD(20)
PCI_AD(19)	B28	A28	GND
P3V3	B29	A29	PCI_AD(18)
PCI_AD(17)	B30	A30	PCI_AD(16)
PCI_CBE_N(2)	B31	A31	P3V3
GND	B32	A32	FRAME
IRDY	B33	A33	GND
P3V3	B34	A34	TRDY
DEVSEL	B35	A35	GND
GND	B36	A36	STOP
PLOCK	B37	A37	P3V3
PERR	B38	A38	SMB_CLK1
P3V3	B39	A39	SMB_DAT1
SERR	B40	A40	GND
P3V3	B41	A41	PAR
PCI_CBE_N(1)	B42	A42	PCI_AD(15)
PCI_AD(14)	B43	A43	P3V3
GND	B44	A44	PCI_AD(13)
PCI_AD(12)	B45	A45	PCI_AD(11)
PCI_AD(10)	B46	A46	GND
GND	B47	A47	PCI_AD(9)
PCI_AD(8)	B48	A48	PCI_CBE_N(0)
PCI_AD(7)	B49	A49	P3V3
P3V3	B50	A50	PCI_AD(6)
PCI_AD(5)	B51	A51	PCI_AD(4)

Signal	Pin no.	Pin no.	Signal
PCI_AD(3)	B52	A52	GND
GND	B53	A53	PCI_AD(2)
PCI_AD(1)	B54	A54	PCI_AD(0)
P5V	B55	A55	P5V
P5V	B56	A56	P5V
P5V	B57	A57	PCIE_1X4X
AUX_5V	B58	A58	GND
WAKE1	B59	A59	PLT_RST_N_PCIE4X
GND	B60	A60	PS_ON
GND	B61	A61	PS_PWRGD
n.c.	B62	A62	GND
n.c.	B63	A63	GND
GND	B64	A64	PCIE_TX_P(1)
GND	B65	A65	PCIE_TX_N(1)
PCIE_RX_P(1)	B66	A66	GND
PCIE_RX_N(1)	B67	A67	GND
GND	B68	A68	PCIE1_ECLK
GND	B69	A69	PCIE1_ECLK_N
PCIE_TX_P(2)	B70	A70	GND
PCIE_TX_N(2)	B71	A71	GND
GND	B72	A72	PCIE_RX_P(2)
GND	B73	A73	PCIE_RX_N(2)
PCIE_TX_P(3)	B74	A74	GND
PCIE_TX_N(3)	B75	A75	GND
GND	B76	A76	PCIE_RX_P(3)
GND	B77	A77	PCIE_RX_N(3)
PCIE_TX_P(4)	B78	A78	GND
PCIE_TX_N(4)	B79	A79	GND
GND	B80	A80	PCIE_RX_P(4)
RESERVE1 *)	B81	A81	PCIE_RX_N(4)
RESERVE2 *)	B82	A82	GND

16.2 Bus boards

16.2.1 Bus board models

Riser cards are used as bus boards for SIMATIC IPC647C. These riser cards are used to a create spatial offset for connections between the motherboard and the expansion modules. The riser card is used as an elbow. This positions the bus board vertical and expansion modules parallel to the motherboard. The edge-socket connectors for expansion modules are located on the bus board. The riser card also provides power to the motherboard.

There are two types of bus boards for SIMATIC IPC647C:

1. Bus boards

   The following bus boards are optionally used.

   – 2 × PCI and 1 × PCI x16 (angled)

     Bus board with edge-socket connectors for two PCI expansion modules and an angled edge-socket connector for the PCI x16 Piggyback.

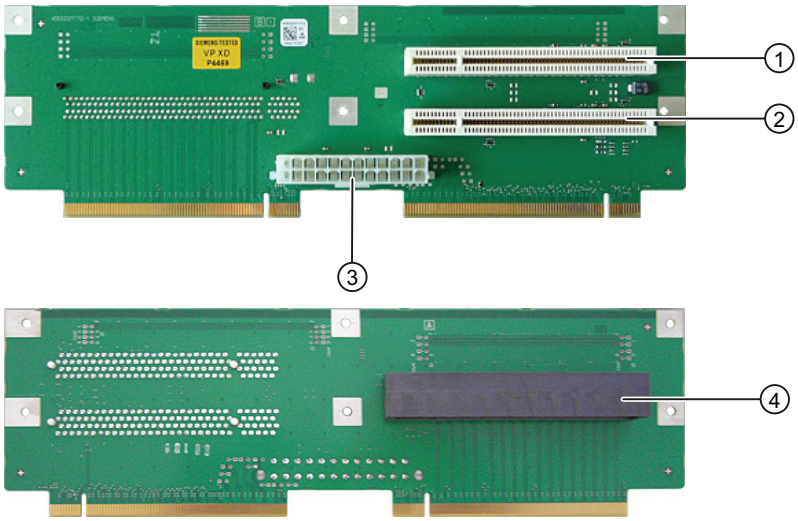
   – 1 × PCI and 1 × PCI x4 and 1 × PCI x16, angled

     Bus board with edge-socket connectors for one PCI expansion module, one PCI x4 expansion module and an angled edge-socket connector for the PCI x16 Piggyback.

2. Piggyback

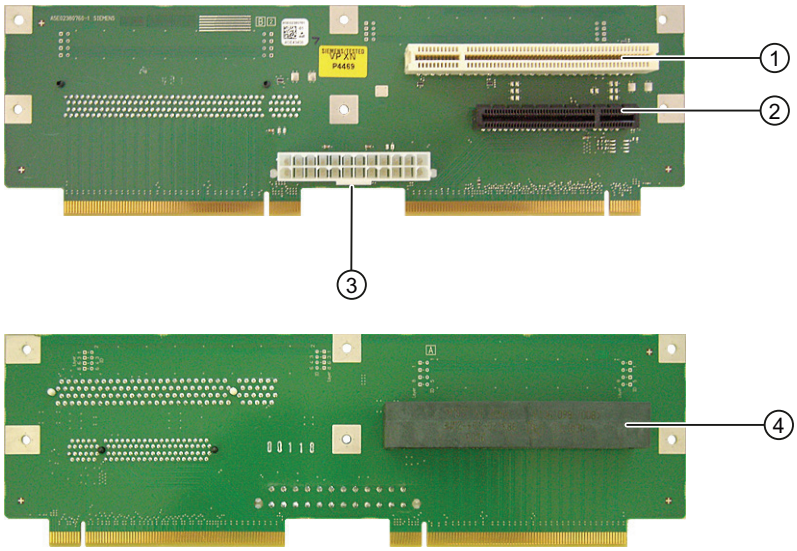
   Bus board with diverted connection for a PCIe x16 expansion module.

Motherboard 2 × PCI and 1 × PCIe x16, angled



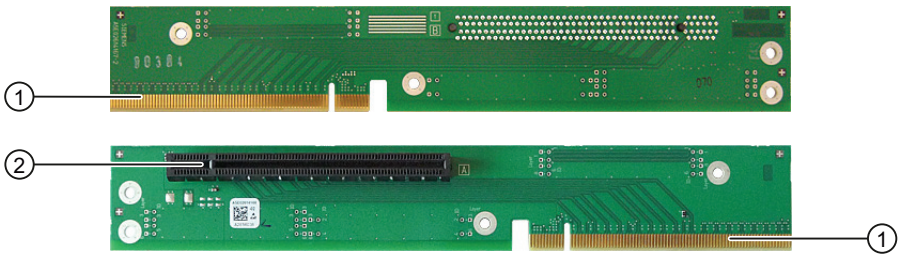
①	PCI edge-socket connector
②	PCI edge-socket connector
③	BTX power connector
④	PCIe x16 edge-socket connector, angled for piggyback

Motherboard 1 × PCI and 1 × PCIe x4 and 1 × PCIe x16, angled



①	PCI edge-socket connector
②	PCIe x4 edge-socket connector
③	BTX power connector
④	PCIe x16 edge-socket connector, angled for piggyback

Piggyback



①	PCIe x16 plug-in contact for edge-socket connector
②	PCIe x16 edge-socket connector

Can host expansion modules conforming to PCI specification (Rev. 2.3) or PCI specification 1.0a. All PCI/PCIe x16 edge-socket connectors are master-capable. Power is directly supplied to the expansion modules via the bus board connection.

16.2.2 Exclusive PCI hardware interrupt

Applications demanding high-performance interrupt handling require high-speed hardware interrupt reaction. The PCI hardware interrupt should only be used by one resource in order to ensure high-speed reaction of the hardware.

Setting up an exclusive interrupt on the device (only APIC mode)

An exclusive interrupt can only be used for PCI slot 2 and slot 3. Further exclusive interrupts for use at the slots are not available.

Assigning exclusive interrupts in BIOS Setup (PIC mode only)

The interrupts are automatically assigned to the slots at system startup due to the default settings in system BIOS.

Several slots may share the same interrupt, depending on the system configuration. This functionality is known as interrupt sharing. Exclusive interrupts are not available in PIC mode. Disable specific system resources in order to obtain exclusive interrupts. The resulting free interrupt is then assigned to the slots. The lower free IRQ is assigned to the lower Slot No.

If a conflict arises through the assignment, a message will be displayed and has to be acknowledged.

```
Message: "Resources Conflict. Please re-select [ok]"
```

The interface that causes the conflict is disabled automatically. Additional information is available in the section Interrupt assignments (Page 187).

Example

If you want to use "IRQ 3" for a slot, you have to disable the "Internal COM 2" by using Advanced > Peripheral Configuration. IRQ 3 is then assigned automatically to the slot that has the lowest slot number.

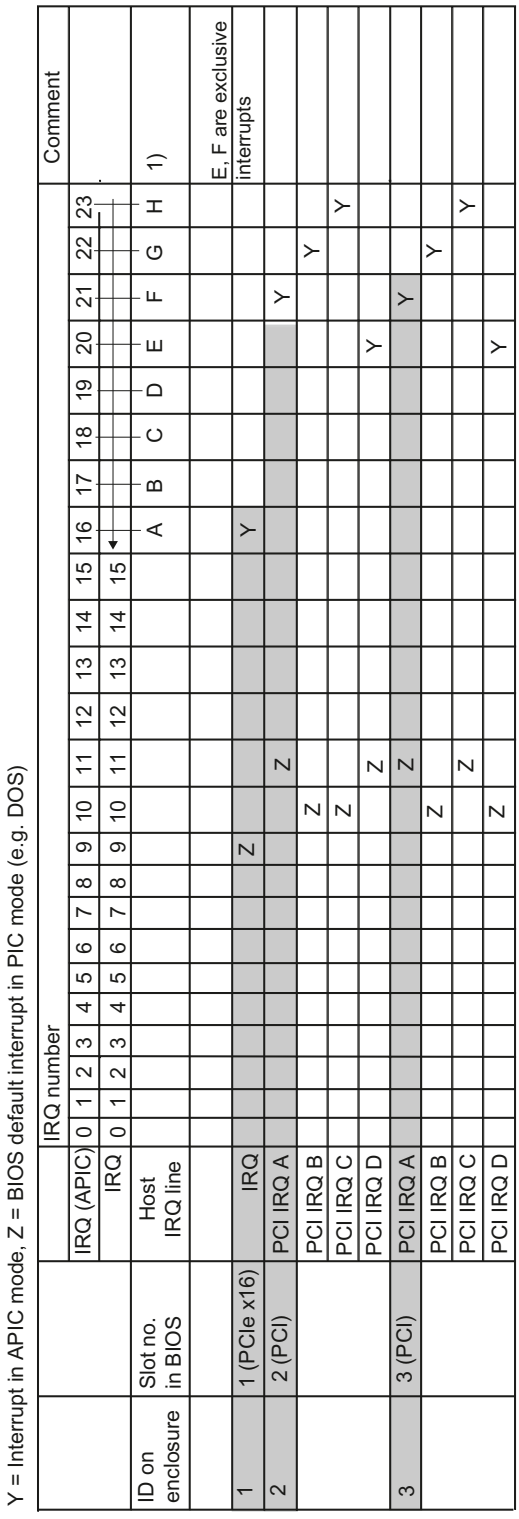
	IRQ assignments for Windows (APIC mode)
Ethernet 1	16 1) 2)
Ethernet 2	17 1)
PROFIBUS/MPI	19 1)
PCI slot 1	20 1)
PCI slot 2	21 1)
PCI Express slot	16 1) 3)

1 Requirement: The modules in the PCI slots each require only one interrupt

2 Requirement: VGA and PCI Express do not require an interrupt

3 Requirement: VGA does not require an interrupt and Ethernet1 is disabled

Interrupt assignment of the edge-socket connector on the bus board with 2 x PCI

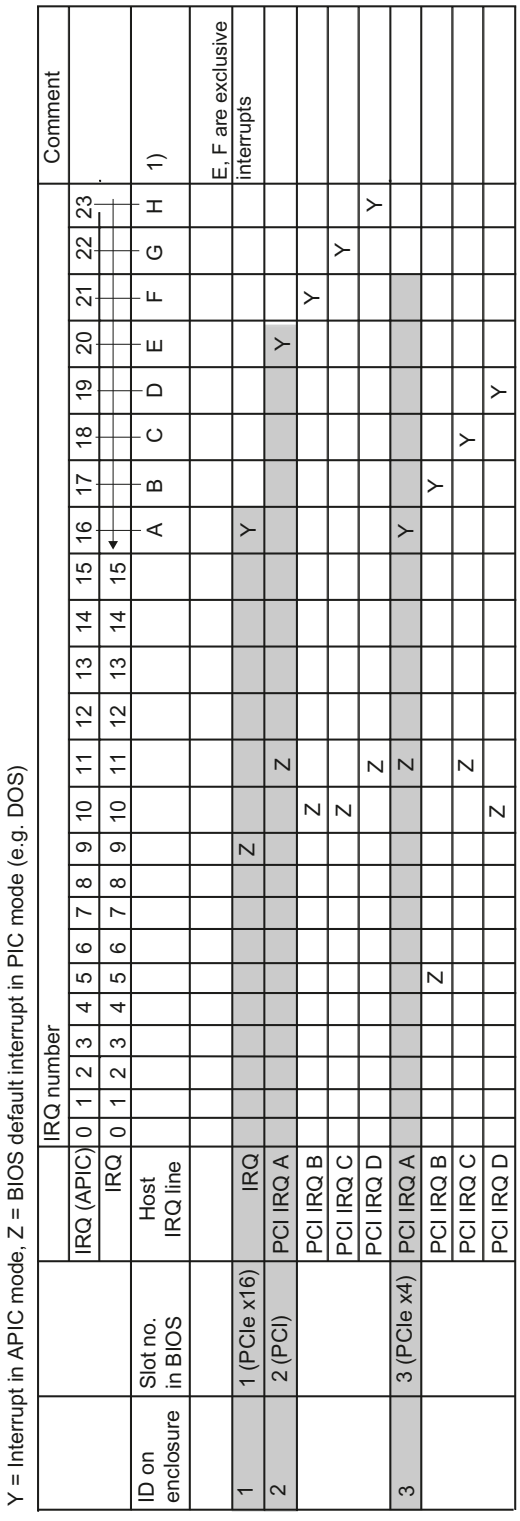


Y = Interrupt in APIC mode, Z = BIOS default interrupt in PIC mode (e.g. DOS)

ID on enclosure	Slot no. in BIOS		IRQ (APIC)	IRQ number 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Comment
		Host IRQ line	IRQ	0															A	B	C	D	E	F	G	H	1)
																											E, F are exclusive interrupts
1	1 (PCIe x16)	IRQ											Z						Y								
2	2 (PCI)	PCI IRQ A													Z									Y			
		PCI IRQ B												Z											Y		
		PCI IRQ C												Z												Y	
		PCI IRQ D													Z								Y				
3	3 (PCI)	PCI IRQ A													Z									Y			
		PCI IRQ B												Z											Y		
		PCI IRQ C													Z											Y	
		PCI IRQ D												Z									Y				

1) Host PCI-IRQ A to H is permanently assigned to IRQ 16 to 23 in APIC mode.
Host PCI-IRQ A to H is assigned to IRQ 0 to 15 automatically in PIC mode by the BIOS.

Interrupt assignment of the edge-socket connector on the bus board with 1x PCI and 1xPCI x4



Y = Interrupt in APIC mode, Z = BIOS default interrupt in PIC mode (e.g. DOS)

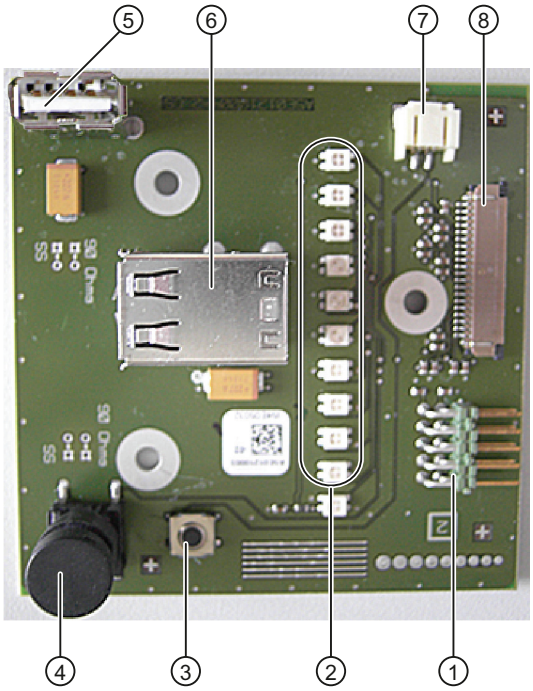
ID on enclosure	Slot no. in BIOS		IRQ (APIC)	IRQ number																					Comment
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
			IRQ	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A	B	C	D	E	F	G	H	
		Host IRQ line																										1)
																												E, F are exclusive interrupts
1	1 (PCIe x16)	IRQ											Z							Y								
2	2 (PCI)	PCI IRQ A													Z								Y					
		PCI IRQ B												Z										Y				
		PCI IRQ C												Z												Y		
		PCI IRQ D													Z												Y	
3	3 (PCIe x4)	PCI IRQ A													Z					Y								
		PCI IRQ B							Z												Y							
		PCI IRQ C													Z							Y						
		PCI IRQ D												Z									Y					

1) Host PCI-IRQ A to H is permanently assigned to IRQ 16 to 23 in APIC mode.
Host PCI-IRQ A to H is automatically assigned to IRQ 0 to 15 in PIC mode by the BIOS.

16.3 Displays and operator panel

16.3.1 Design and function

The operator panel is interconnected with the motherboard via a 26-pin connecting cable.

Operator panel	Item	Description
	①	9-pin plug connector Connection to the motherboard (x420)
	②	LEDs
	③	Reset button Single-pin pushbutton
	④	On/off pushbutton Single-pin pushbutton
	⑤	USB port
	⑥	USB port (only the top USB contact is used)
	⑦	External reset connector
	⑧	Connection to the motherboard (x46)

16.3.2 Pin assignment of the OP connectors

External Reset ⑦ type: JST B2B-PH-SM3-TB

Pin no.	Short name	Meaning	Input / output
1	PWR Good	External reset, (IO low max. 30 mA)	
2	GND	Ground	

The device is reset when pins 1 and 2 (for example, by means of a pushbutton) are short-circuited. It remains in this state until the short-circuit is cleared.

Note

Contact Customer Support or the Repair Center for detailed information on pin assignments of the interfaces.

16.4 System resources

16.4.1 Currently allocated system resources

All system resources (hardware addresses, memory configuration, allocation of interrupts, DMA channels) are assigned dynamically by the Windows OS, depending on the hardware configuration, drivers and connected external devices. You can view the current configuration of system resources or possible conflicts with the following operating systems:

Windows XP Professional	**Start > Run** Enter "msinfo32" under **Open** Confirm with **OK**
Windows 7	**Start >** Enter "msinfo32" in the search function

16.4.2 Allocation of the system resources used by BIOS/DOS

The following tables describe the system resources for the factory state of the device.

16.4.2.1 I/O address allocation

Allocation of system resources

I/O address (hex)		Size (bytes)	Description of the basic function	Possible alternative function
from	to			
0000	000F	16	DMA controller	
0010	001F	16	Motherboard resources	
0020	0021	2	Programmable interrupt controller	
0022	003F	30	Motherboard resources	
0040	0043	4	System timer	
0044	005F	28	Motherboard resources	
0060	0060	1	Keyboard controller	
0061	0061	1	System loudspeaker	
0062	0063	2	Motherboard resources	
0064	0064	1	Keyboard controller	
0067	006F	9	Motherboard resources	
0070	0075	6	System CMOS/real-time clock	
0076	0080	11	Motherboard resources	
0081	008F	15	DMA controller	
0090	009F	16	Motherboard resources	
00A0	00A1	2	Programmable interrupt controller	
00A2	00BF	30	Motherboard resources	

I/O address (hex)				
00C0	00DF	32	DMA controller	
00E0	00EF	16	Motherboard resources	
00F0	00FE	15	Numeric data processor	
0110	016F	96	Not used	
0170	0177	8	Secondary EIDE channel	
0178	01EF	120	Not used	
01F0	01F7	8	Primary EIDE channel	Switchable in Setup, then free
01F8	01FF	8	Not used	
0200	0207	8	Reserved for game port	
0208	02E7	224	Not used	
02E8	02EF	8	Reserved	
02F8	02FF	8	COM2	Switchable in Setup, then free
0300	031F	32	Not used	
0320	032F	16	Not used	
0330	033F	16	Not used	
0340	035F	32	Not used	
0360	0367	8	Not used	
0370	0371	2	SOM	
0372	0375	4	Not used	
0376	0376	1	Secondary EIDE channel	
0378	037F	8	LPT 1	Switchable in Setup, then free
0380	03AF	48	Not used	
03B0	03BB	12	Graphics	
03BC	03BF	4	Reserved	
03C0	03DF	16	Graphics	
03E0	03E7	8	Not used	
03E8	03EF	6	Reserved	
03F0	03F5	6	Standard floppy disk controller	Disabled in the BIOS
03F6	03F6	1	Primary EIDE channel	
03F7	03F7	1	Standard floppy disk controller	Disabled in the BIOS
03F8	03FF	8	COM1	Switchable in Setup, then free

Dynamic range

The resources are managed using Plug and Play functionality,

0400	0777	888	Not used	
0778	077F	8	ECP LPT 1	
0780	07FF	128	Not used	
0800	080F	16	ACPI communications range	Fixed
0810	0CFB	1260	PCI configuration index	Fixed
0CFC	0CFF	4	PCI configuration data	Fixed
0D00	0EFF	512	Not used	
0F00	0F4F	80	Super IO	
0F50	0FFF	176	Not used	
1000	10FF	256	Used internally	
1180	11FF	128	Used internally	
1800	187F	128	Used internally	
8800	8BFF	1023	SATA RAID Controller	
8C00	FEFF	29288	Not used for SATA RAID	
8870	8897	39	PATA RAID Controller	
8898	FEFF	30311	Not used for PATA RAID	
1880	886F	28655	Not used	
FF00	FF0F	16	EIDE bus master register	

16.4.2.2 Interrupt assignments

The functions are assigned different interrupts, depending on the operating system. A distinction is made between the PIC and APIC modes.

The functions are assigned different interrupts, depending on the operating system. A distinction is made between the PIC and APIC modes.
X = Interrupt in PIC and APIC mode, Y = Interrupt in APIC mode, Z = BIOS default interrupt in PIC mode (e.g. DOS)

IRQ number																									Comment
IRQ (ACPI mode)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
IRQ (PIC mode)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A	B	C	D	E	F	G	H	
Host PCI IRQ line																									1)
Function																									
Timer 0	X																								Fixed
PS/2 keyboard		X																							Fixed
Cascaded (IRQ9)			X																						Fixed
Serial port 2				X																					Can be switched off
Serial port 1					X																				Can be switched off
FD controller						X																			Free
Parallel interface 1							X																		Can be switched off
Real-time clock (RTC)								X																	Fixed
PS/2 mouse									X				X												Fixed, can be switched off
Numeric co-processor														X											Fixed
HD controller 1 (prim.)															X										Cannot be switched off
HD controller 2 (sec.)																X									Cannot be switched off
SATA												Z							Y						Cannot be switched off
USB ports 0 to 7											Z													Y	Can be switched off
USB ports 8 to 13											Z												Y		Can be switched off
Ethernet 1 (phy.)											Z						Y								Can be switched off
Ethernet 2 (controller)						Z												Y							Can be switched off
VGA											Z						Y								Can be switched off
Profibus or Profinet											Z									Y					Can be switched off
Audio																							Y		Can be switched off
Thermal controller												Z											Y		Fixed

1) Host PCI-IRQ A to H is permanently assigned to IRQ 16 to 23 in APIC mode.
Host PCI-IRQ A to H is automatically assigned to IRQ 0 to 15 in PIC mode by the BIOS.

PCI / PCIe cards and the on-board PCI / PCIe devices require PCI interrupt channels. These interrupt channels can be shared and are plug-and-play compatible, that is, several devices can share the same interrupt. The IRQ is assigned automatically.
PCI interrupt channels must be derived from the PIC interrupt pool, that is PCI modules also use PIC resources. These IRQ channels are assigned automatically.
The Host PCI IRQ channels A to H are permanently assigned in APIC mode. These default settings cannot be modified.

The host PCI IRQ channels A to H in PIC mode are assigned automatically by the BIOS. The assignment can be changed by disabling functions. You can also assign free IRQs to the host PCI IRQ line in the BIOS menu "PCI Configuration".

16.4.2.3 Memory address assignments

PCI VGA modules can be operated with expansion ROM up to 48K.

Address		Size	Description of the basic function	Possible alternative function
from	to			
0000 0000	0007 FFFF	512K	Conventional system memory	
0008 0000	0009 F7FF	127K	Conventional system memory extended	
0009 F800	0009 FFFF	2K	XBDA, extended Bios Data Area	
000A 0000	000A FFFF	64K	VGA graphics refresh memory	Shared SMM for power management
000B 0000	000B 7FFF	32K	SW graphics / text refresh memory	Not used
000B 8000	000B FFFF	32K	VGA graphics/text refresh memory	
000C 0000	000C BFFF	48K	VGA BIOS expansion	
000C 0000	000C E9FF	59K [1)]	VGA BIOS	Always occupied
000C F000	000D FFFF	68K [1)]	Not used (no RAID, no PXE)	via EMM High DOS Memory
000C F000	000C FFFF	4K [1)]	PXE	
000D 0000	000D FFFF	64K [1)]	Not used (no RAID, with PXE)	via EMM High DOS Memory
000C F000	000D 37FF	18K [1)]	RAID	
000D 3800	000D FFFF	50K [1)]	Not used (RAID, no PXE)	via EMM High DOS Memory
000C F000	000D 47FF	22K [1)]	RAID and PXE	
000D 4800	000D FFFF	46K [1)]	Not used	
000E 0000	000E 1FFF	8K	USB	
000E 2000	000E 3FFF	8K	DMI data	
000E 4000	000F FFFF	112K	System BIOS	
0010 0000	CFFF FFFF	3.25 GB	System memory 4 GB memory configuration	Depends on memory configuration
E000 0000	FFEF FFFF	511 MB	PCIe Configuration Space	
FFF0 0000	FFFF FFFF	1 MB	Firmware HUB	

[1)] Optional memory allocation, depending on settings in BIOS Setup

16.5 BIOS Setup

16.5.1 Overview

BIOS Setup program

BIOS SETUP allows you to set the hardware configuration, and system properties. SETUP is also used to set the time and date of the realtime clock.

Changing the device configuration

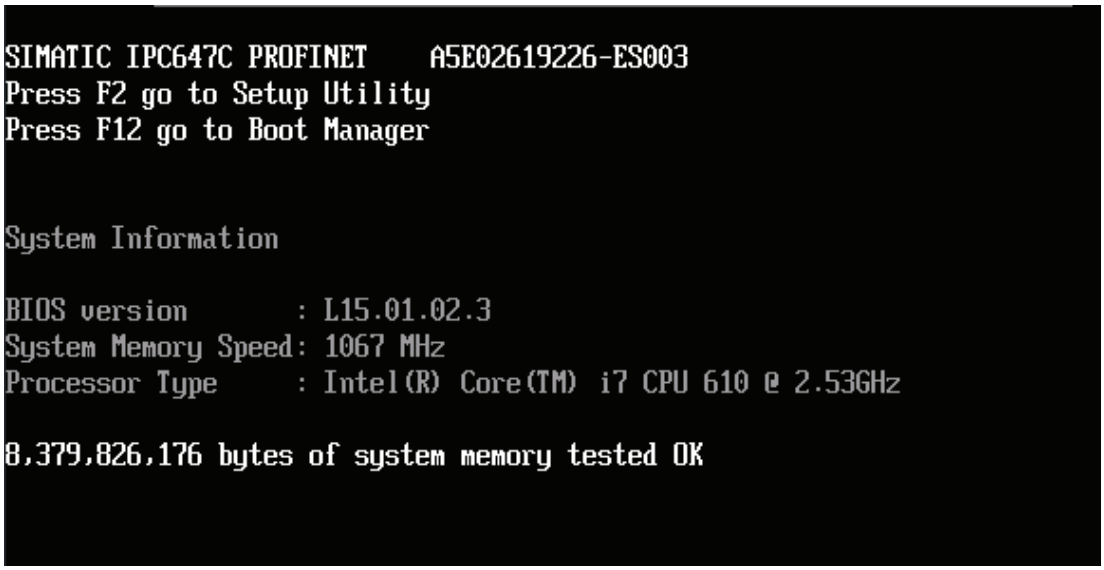
Your device configuration is preset for operating with the included software. You should only change the default values if you have modified the technical configuration your device, or if a fault occurs when the unit is powered up.

16.5.2 Starting BIOS Setup

Start the setup program as follows:

1. Reset the device (warm or cold restart).

   In the figures shown, the default settings differ based on the device versions. With the default setting of the Box PC, the display shown below appears following power-on, for example:



   On completion of the POST, the BIOS gives you the opportunity of starting the SETUP program. The following message appears on the screen:

   - `Press F2 go to Setup Utility`
   - `Press F12 go to Boot Manager`

2. Press the F2 key while the BIOS prompt appears on the screen.

16.5.3 BIOS Setup menus

The various menus and submenus are listed on the next pages. You can obtain information on the selected SETUP item from the "item-specific help" part of the respective menu.

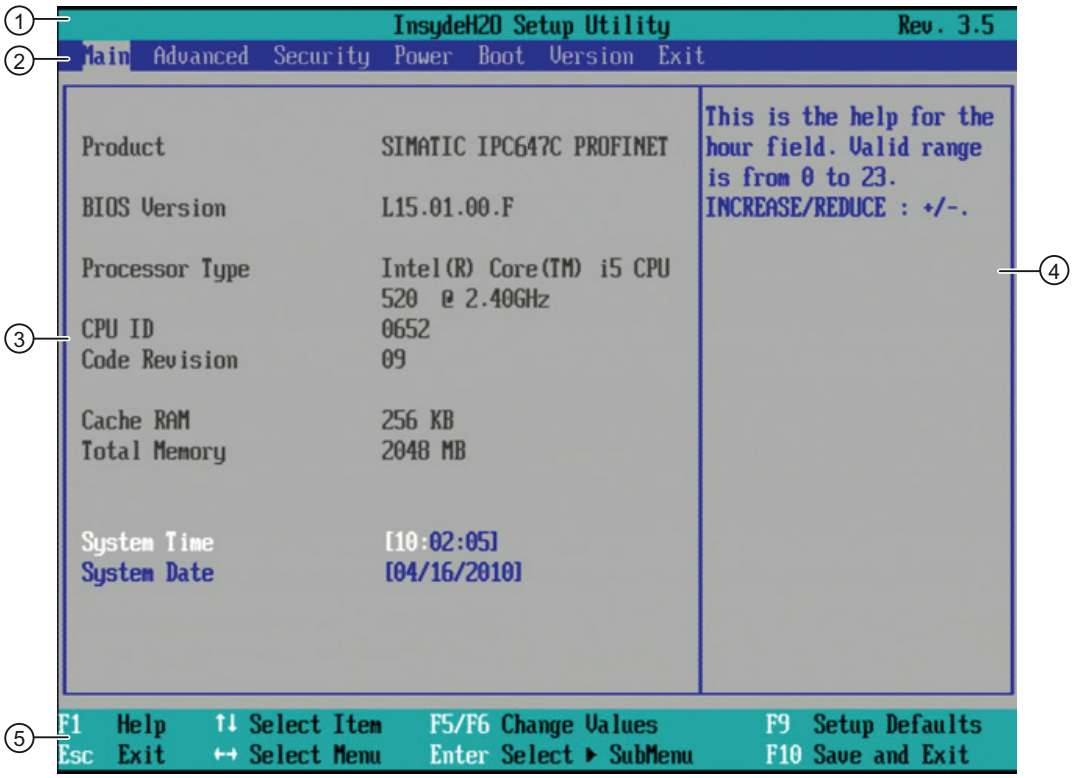


Figure 16-2 SETUP Main menu (example)

① Header	④ Command line
② Menu bar	⑤ Help window
③ System information	

Menu layout

The screen is divided into four sections below the title ①. In the top section ②, you can select the submenus [Main], [Advanced], [Security], [Power], [Boot], [Version], [Exit]. You can select various settings or submenus in the left middle section ③. Brief help text is displayed on the right ④ for currently selected menu command; the bottom section ⑤ contains information for operator control.

The following figures represent examples of specific device configurations. The screen content may deviate slightly depending on the equipment actually supplied.

You can move between the menu forms using the cursor keys [←] left and [→] right.

Menu	Meaning
Main	System functions are set here
Advanced	An extended system configuration can be set here
Security	This is where setting security functions such as the password are set.
Power	The behavior of the device after a power failure and after wake events is specified here.
Boot	This is where the boot priority is specified.
Version	This shows device-specific information (such as the release version).
Exit	Used for terminating and saving.

16.5.4 Main menu

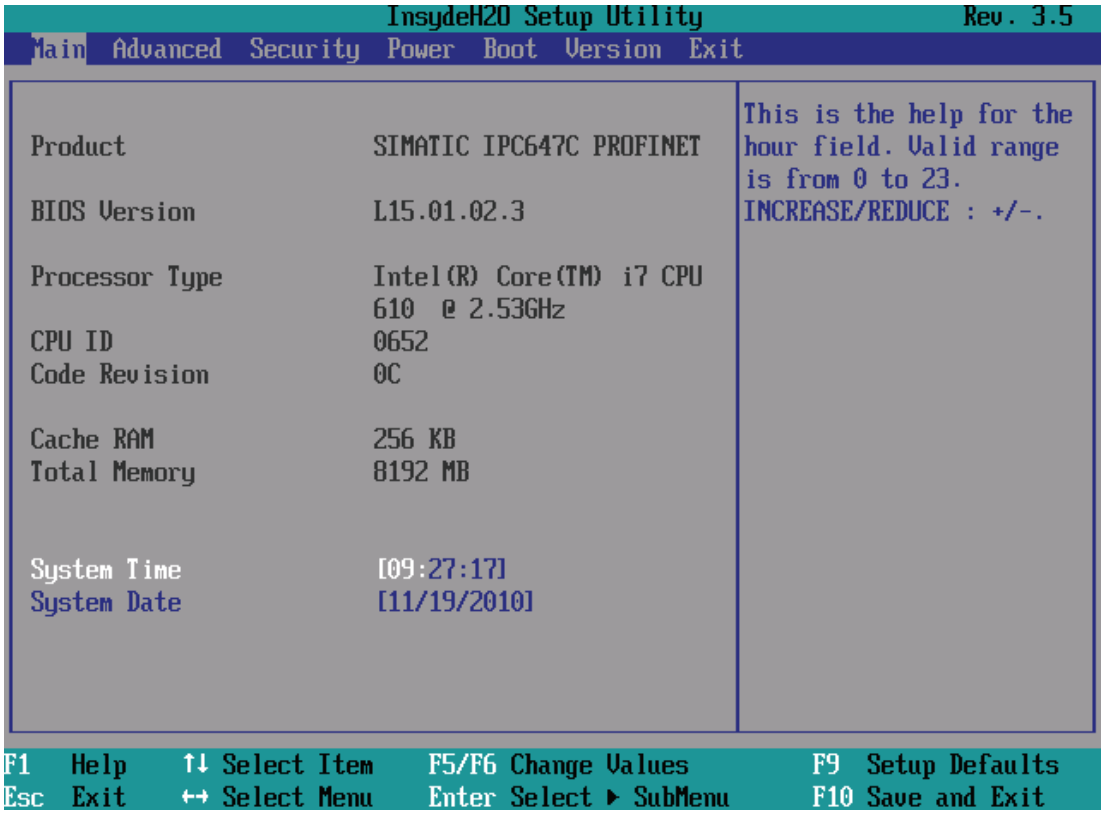


Figure 16-3 Main menu (example)

Settings in the main menu

In the main menu, you can move up and down to select the following system configuration boxes by means of the [↑] up and [↓] down cursor keys:

Field	Meaning
System Time	For viewing and setting the current time
System Date	For viewing and setting the current date

System time and date

System Time and System Date indicate the current values. Once you have selected the appropriate option, you can use the [+] and [-] keys to modify the time setting

Hour: Minute: Second

and for the date

Month/Day/Year

.

You can navigate between the entries in the date and time fields (for example, from hour to minute) using the ENTER key.

16.5.5 Advanced menu

Menu layout

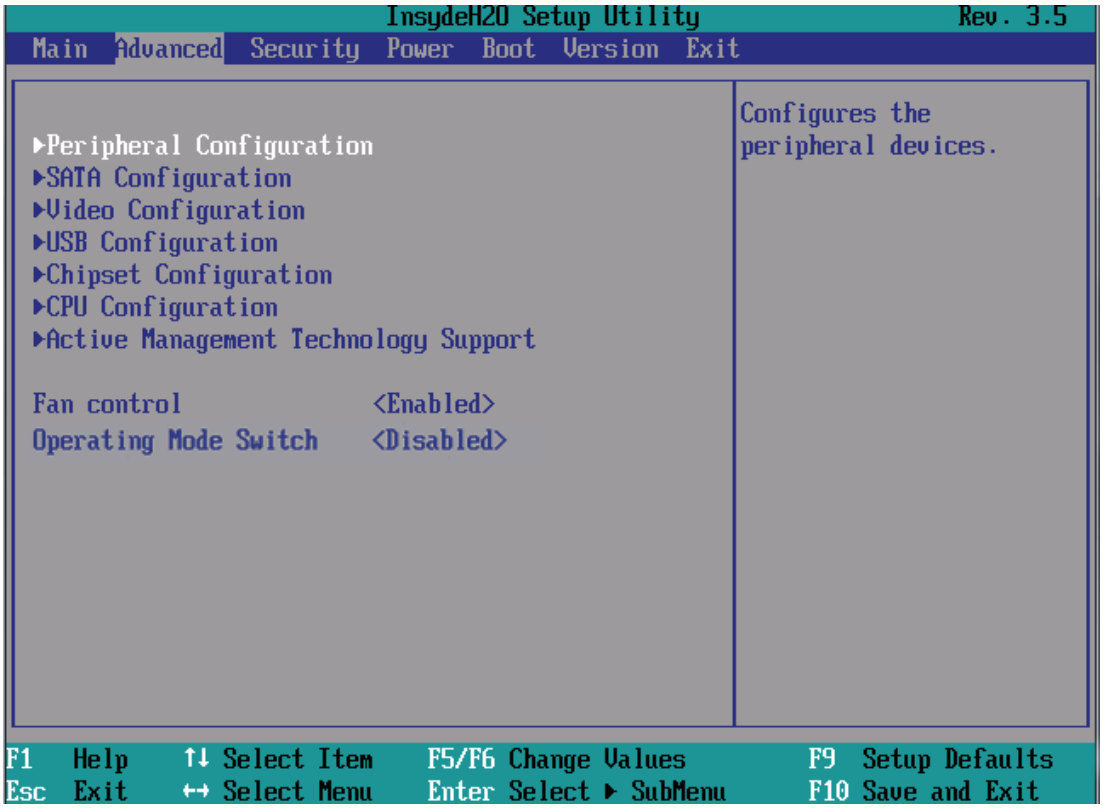


Figure 16-4 "Advanced" menu (example)

Settings in the Advanced Menu

Entry	Meaning
Peripheral Configuration	Configuration of components on the motherboard.
SATA Configuration	Configuration of the SATA interface.
Video Configuration	Configuration of the graphics interface
USB Configuration	Configuration of the USB ports
Chipset Configuration	Extended chipset configuration.
CPU Configuration	Configuration of CPU parameters
Active Management Technology Support	Configuration of the AMT functionality
Fan control	Activate/deactivate fan control. If deactivated, the fans always run at full speed.
Operating Mode Switch	Select operating mode switch

Advanced menu > "Peripheral Configuration"

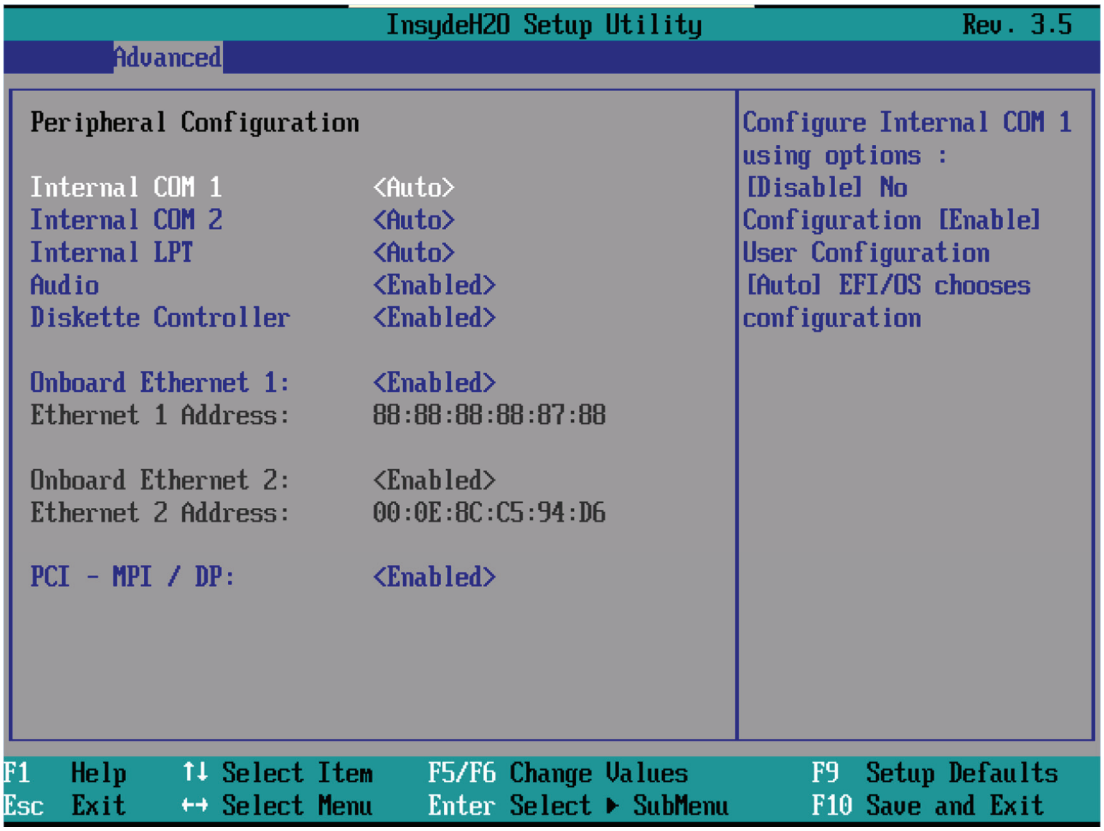


Figure 16-5 "Peripheral Configuration" submenu example

Entry	Meaning
Internal COM 1, Internal COM 2	Enable (Enabled) or disable (Disabled) the serial port or configure it automatically (Auto) With Enabled, it is possible to specify the I/O base address and the interrupt. AUTO: BIOS switches on the COM. Resources are assigned in the OS per reconfiguration.
Internal LPT	Enable (Enabled) or disable (Disabled) the parallel interface or configure it automatically (Auto). With Enabled, it is possible to specify the I/O base address, the interrupt, mode and the DMA channel. AUTO: BIOS switches on the LPT. Resources are assigned and the mode set in the OS per reconfiguration.
Audio	Enable or disable the audio interface
Onboard Ethernet 1:	Enable or disable the onboard Ethernet 1 interface.
Ethernet 1 Address:	Display the MAC address of Ethernet 1
Onboard Ethernet 1:	Enable or disable the onboard Ethernet 2 interface.
Ethernet 1 Address:	Display the MAC address of Ethernet 2
PCI – MPI / DP or PROFINET	Enable or disable the onboard MPI/DP or PROFINET interface.

Advanced menu > SATA/PATA Configuration

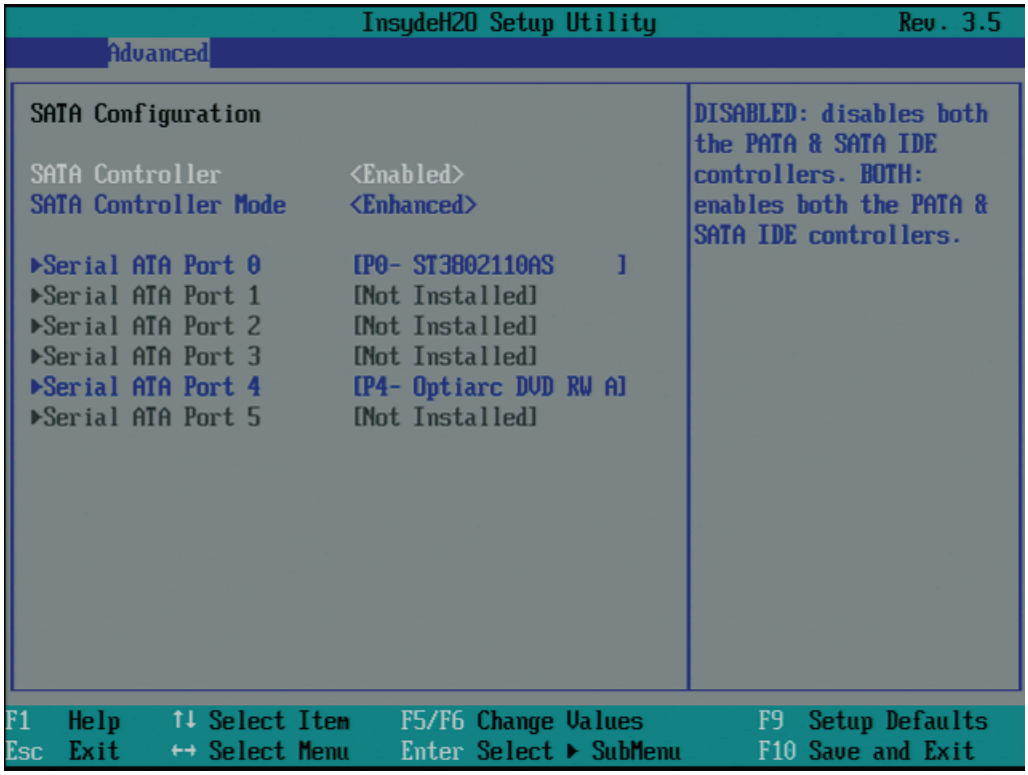


Figure 16-6 "SATA/PATA Configuration" submenu example

Entry	Meaning
SATA Controller	Enable or disable the SATA and PATA controllers.
SATA Controller mode	Set operating mode of the SATA controller: • Enhanced: SATA Ports 0-3 operate in Legacy mode, SATA Ports 4-5 in native IDE mode • AHCI : Disable or enable the AHCI support • RAID: Disables or enables RAID support
Serial ATA Port 0	Submenu for SATA Port 0 configuration
Serial ATA Port 1	Submenu for SATA Port 1 configuration
Serial ATA Port 2	Submenu for SATA Port 2 configuration
Serial ATA Port 3	Submenu for SATA Port 3 configuration
Serial ATA Port 4	Submenu for SATA Port 4 configuration
Serial ATA Port 5	Submenu for SATA Port 5 configuration

NOTICE
Data loss The RAID array information on the data media may be deleted when you switch from RAID to "AHCI" or "Enhanced". which leads to malfunctions of the device.

Note

RAID must be disabled in connection with the SAS hardware RAID controller.

Advanced menu > Video Configuration

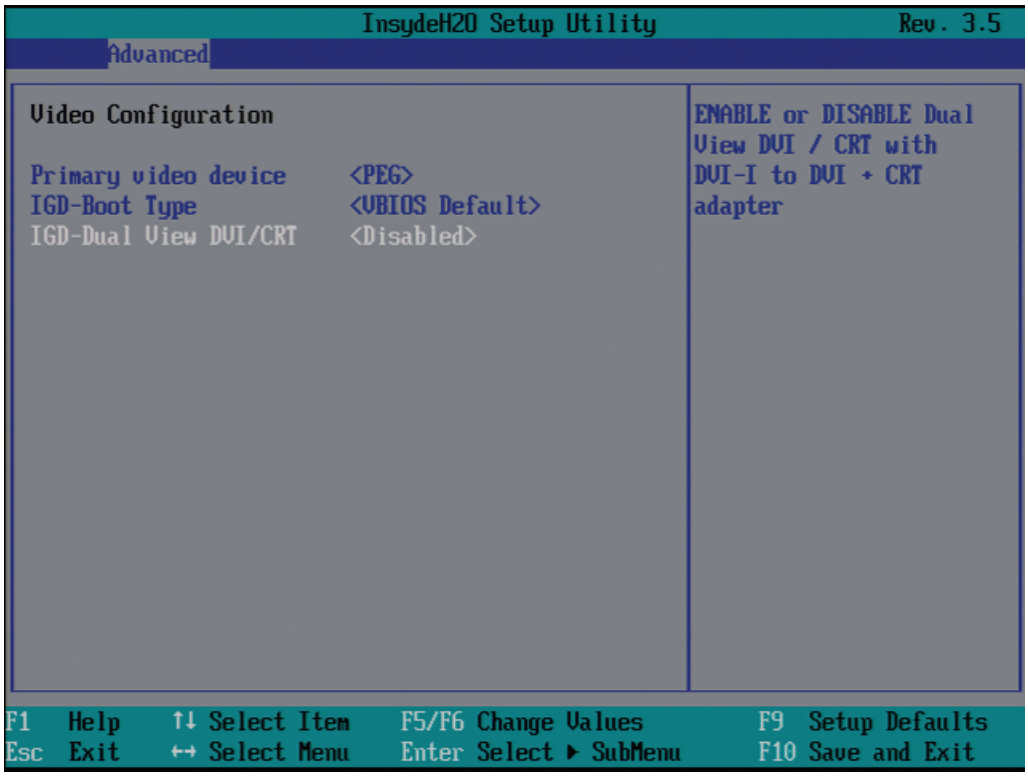


Figure 16-7 Submenu Advanced menu > Video Configuration example

Entry	Meaning
Primary video device	Selection of the primary video interface to which the boot messages are to be output: • IGD: Internal onboard graphics • PEG: PCIExpress graphics (internal graphics is deactivated) • PCI: PCI graphics (internal graphics is deactivated)
IGD boot type	Selection of the video device that is used during booting. • VBIOS default: The graphics specified by the VIDEO BIOS is used. • CRT: VGA screen • EFP: External Flat Panel (DVI) • CRT+EFP: VGA and DVI screen
IGD Dual View DVI/CRT	Activate/deactivate the dual view mode: Simultaneous operation of 2 monitors (CRT and DVI) by means of adapter (splitter) at the DVI output of the device.

Advanced menu > USB Configuration

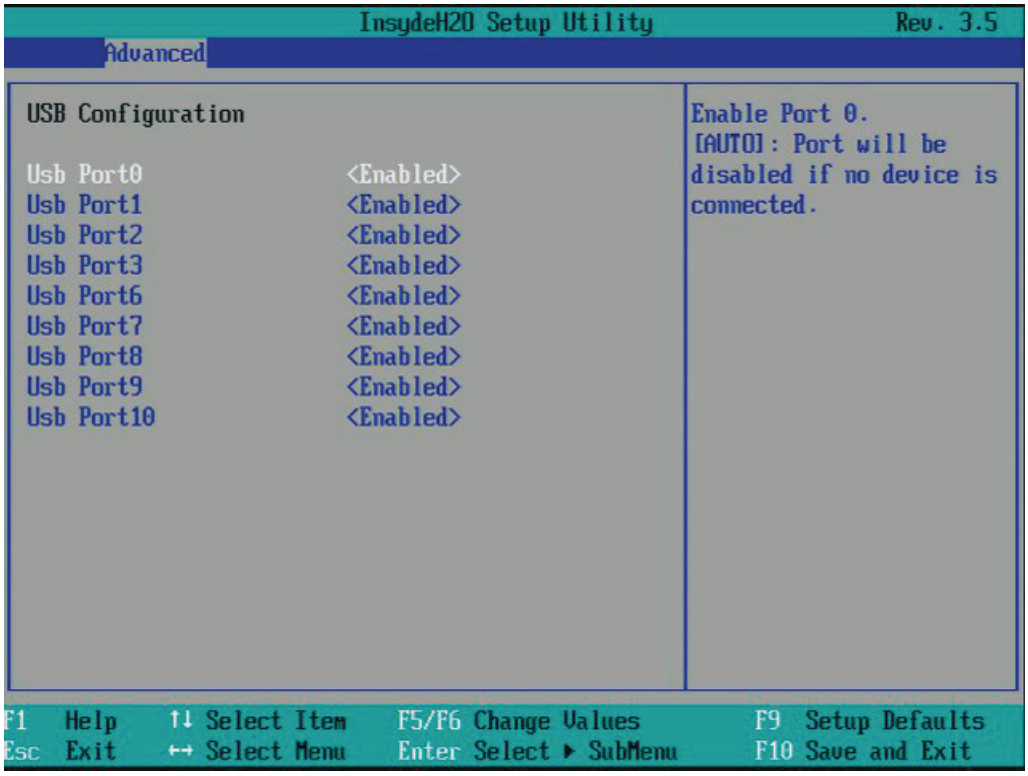


Figure 16-8 Submenu Advanced menu > USB Configuration

Entry	Meaning
USB Port0 -10	• Enable: USB port is activated. • Auto: USB port is deactivated when no device is plugged. • Disable: USB port is deactivated.

The following table lists the assignment of the USB ports to the USB ports:

USB port	USB port
0	Ext. interface X60 P1
1	Ext. interface X60 P2
2	Ext. interface X60 P3
3	Ext. interface X60 P4
6	Int. interface X43 Pin 1 - 5
7	Int. interface X43 Pin 6 - 10
8	Front-end interface of the panel fronts X42
9	Int. interface X38
10	Keyboard / Touch controller interface of the panel fronts X44

Advanced menu > Chipset Configuration

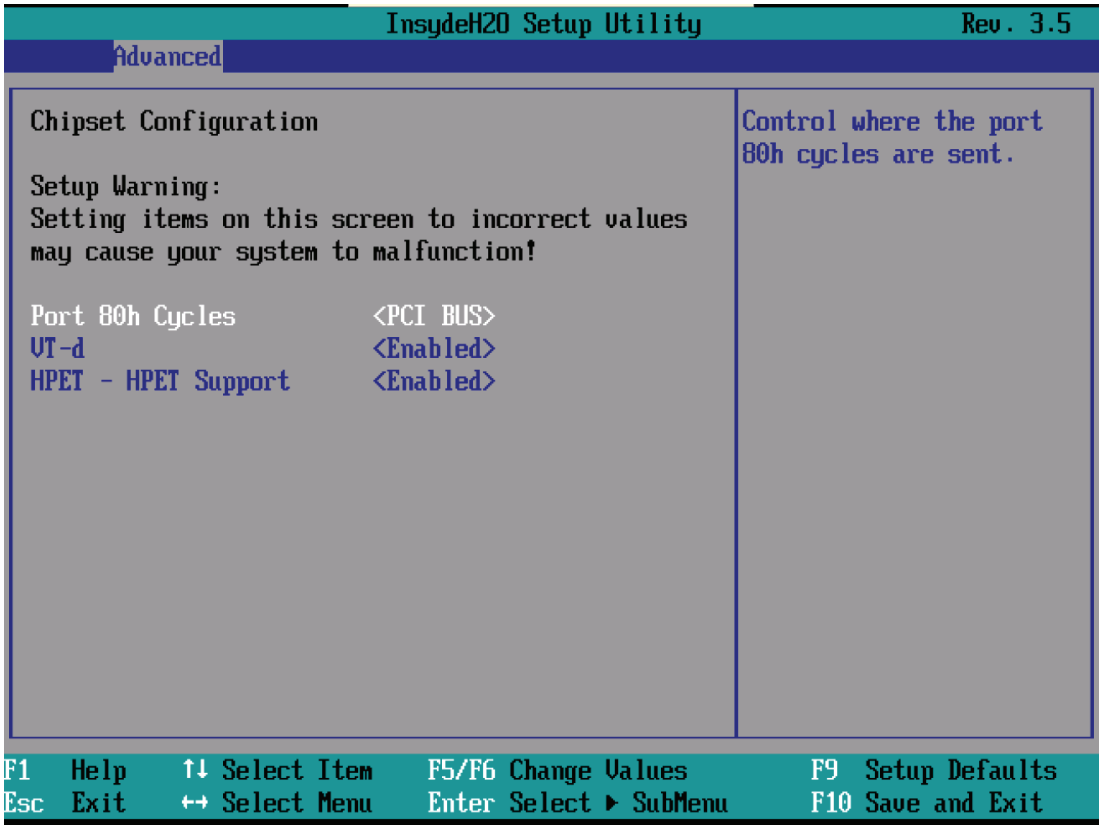


Figure 16-9 Submenu Advanced menu > Chipset Configuration

Entry	Meaning
Port 80h Cycles	Output Port 80 status display to PCI bus or LPC BUS (status display at the device).
VT-d	Enable or disable advanced support for virtualization technology "DIRECT I/O"
HPET	Enable High Precision Event Timer

Advanced menu > CPU Configuration

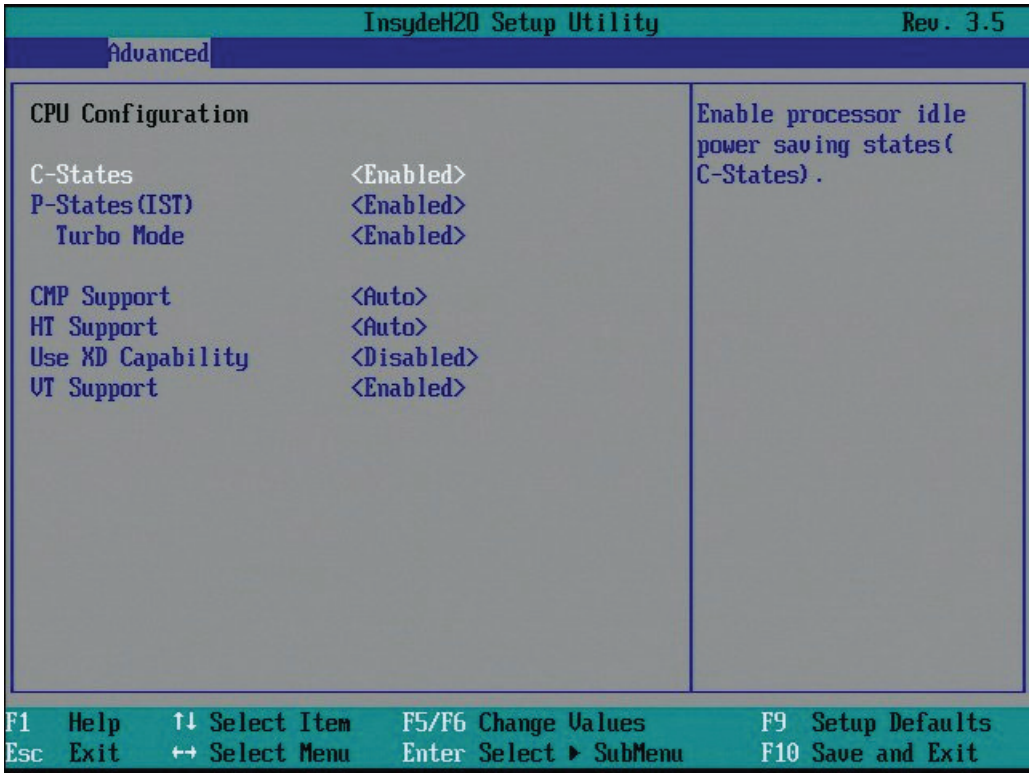


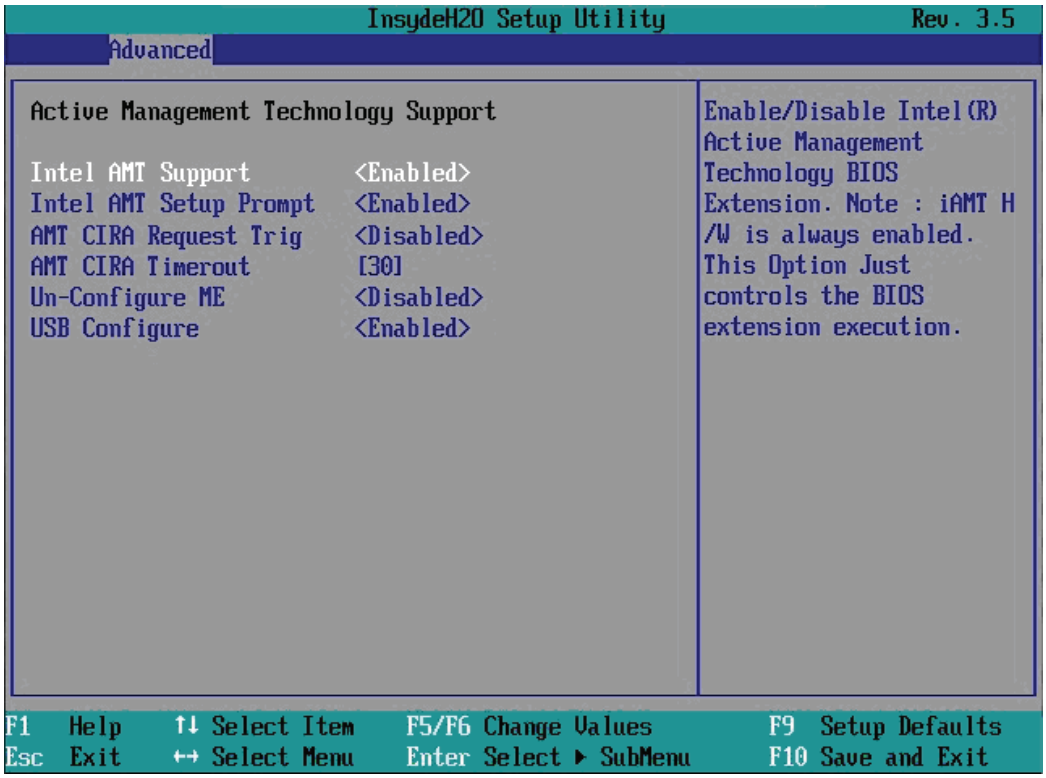
Figure 16-10 Submenu Advanced menu > CPU Configuration

Entry	Meaning
C-States	Enable the power saving modes of the processor.
P-States (IST)	Enable the performance modes of the processor.
Turbo Mode	Enable or disable Turbo Modes.
CMP support	• Auto: Multi Core operation, if available • Disabled: Single Core operation
HT Support	• Auto: Use hyperthreading, if available. • Disabled: Hyperthreading disabled.
Use XD Capability	Enable or disable XD (Execute Disable) Capability.
VT Support	Enable or disable virtualization functionality "Vanderpool Technology".

16.5.6 "Advanced, Active Management Technology Support" menu

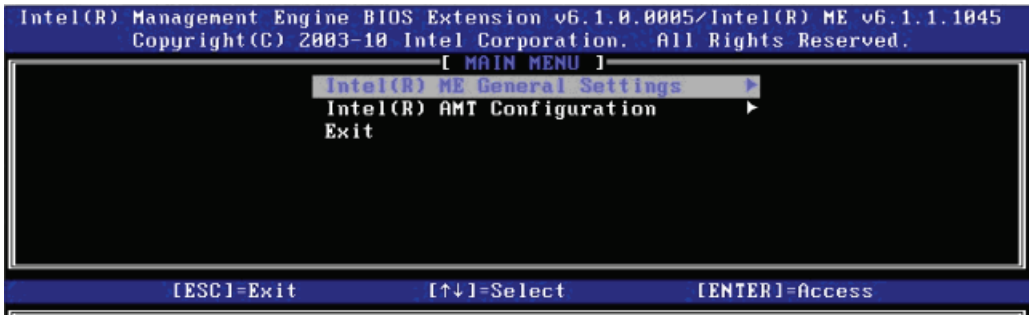
Settings in the BIOS

The following figure shows the BIOS submenu "Advanced Menu > Active Management Technology Support", in which you configure part of AMT in the BIOS. You will find further configuration options for AMT in the MEBx (see "Settings in the MEBx").



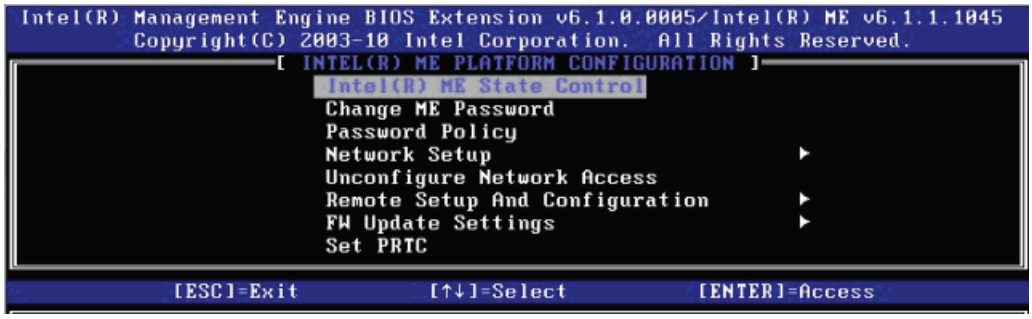
Entry	Meaning
Intel AMT Support	Enable and disable BIOS support for Intel Active Management Technology (AMT)
Intel AMT Setup Prompt	Enable and disable the boot interruption <Ctrl+P> to call up the MEBx configuration page.
AMT CIRA Request Trig	Enable CIRA (Client Initiated Remote Access, "Fast Call For Help"). CIRA allows AMT maintenance event if the AMT PC is not in the intranet.
AMT CIRA Timeout	CIRA timeout for connection establishment with MPS (Manageability Presence Server / "vPro Enabled Gateway").
Un-Configure ME	Resets all the values of the MEBx to their defaults (see section "Reset with Un-Configure").
USB Configure	Enable and disable the USB configuration (provisioning).

Settings in the MEBx



Entry	Meaning
Intel(R) ME General Settings	Opens the submenu with the general ME settings (see "ME General Settings").
Intel(R) AMT Configuration	Opens the submenu for the AMT settings (see "ME General Settings").
Exit	Exits the MEBx.

ME general settings

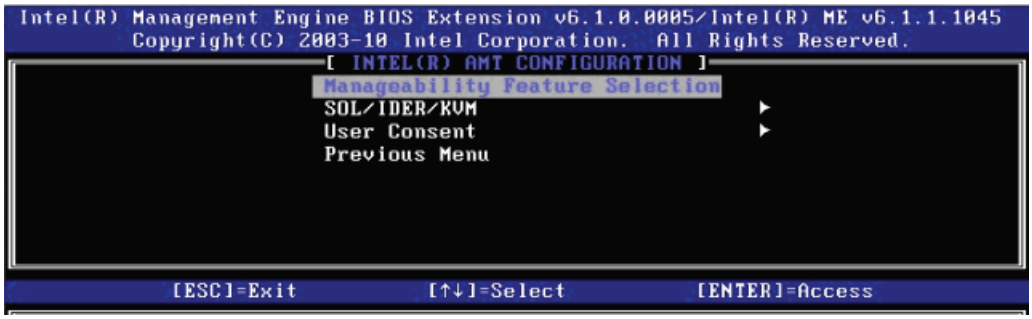


You cannot see all the switches in the menu at the same time. Use the arrow buttons to display the hidden switches.

Entry	Meaning
Intel(R) ME State Control	Enable ME: Normal operation Disable ME: Stops ME at a very early boot stage to search for errors. • When searching for errors, ME can then be excluded as a possible source of error. • No ME activities on a BUS.
Change ME Password	Used to change the password
Password Policy	Password policy that specifies the conditions under which the password can be modified remotely.
Network Setup	Network settings, for example DHCP, IP address, host name, domain name.

Entry	Meaning
Activate Network Access	Activates the network interface. This menu entry only exists if the network is not activated.
Unconfigure Network Access	Deactivates the network interface and resets the network settings to their default values.
Remote Setup And Configuration	Displays the current provisioning settings.
FW Update Settings	Sets the user rights and the conditions under which ME firmware updates can be transferred.
Set PRTC	PRTC (protected real time clock) is an internal ME clock, that is required in the ME, for example for comparing times with TLS & Kerberos, time stamps of events. Period of validity: 1.1.2004 – 4.1.2021.
Power Control	Specifies the power states S0, S3, S4 of the computer in which the ME is activated.
Previous Menu	Return to the main menu.

AMT configuration



Entry	Meaning
Manageability Feature Selection	Enable and disable all AMT features.
SOL/IDER/KVM	Enable and disable the features SOL, IDE redirection, KVM.
User Consent	User consent settings. Forces the following additional security behavior: When a user attempts to establish a KVM connection remotely, a six-figure number is displayed on the AMT PC. The remote user must enter this number on the help desk PC before the KVM connection can be opened.
Previous Menu	Return to the main menu.

16.5.7 Security menu

In this menu access to the IPC can be limited or prevented by assigning passwords (Supervisor / User password).

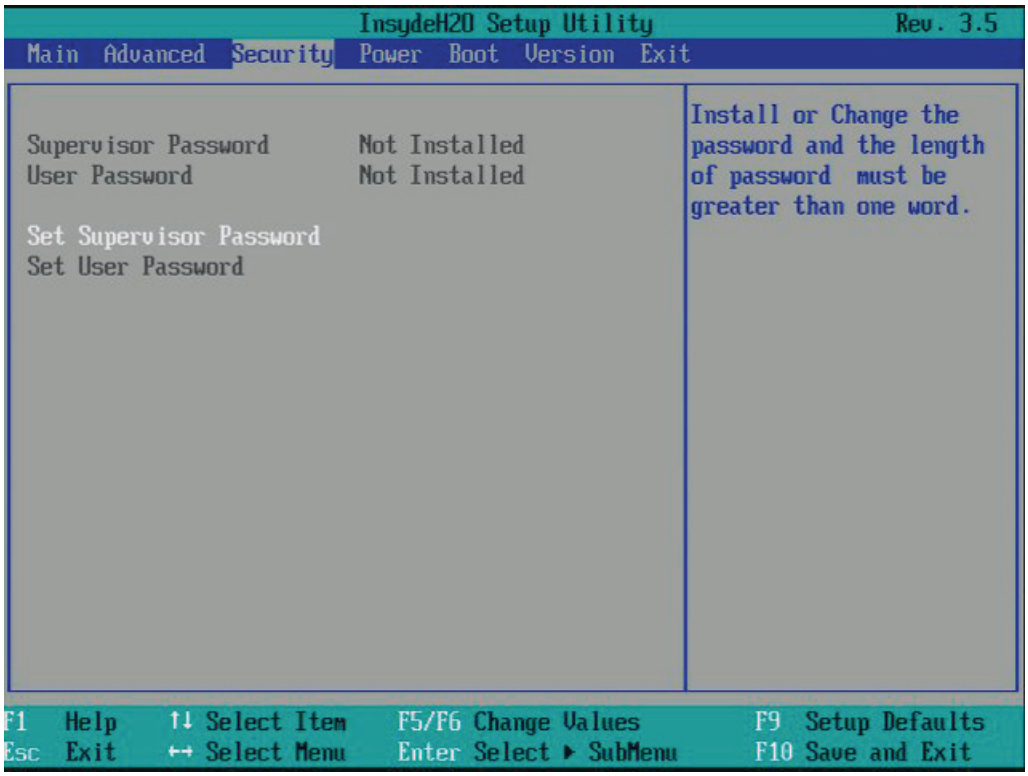


Figure 16-11 Security menu

Entry	Meaning
Supervisor Password	• Installed: A Supervisor password is set up • Not installed: No Supervisor password is set up
User password	• Installed: A User password is set up • Not installed: No User password is set up
Set Supervisor Password	Set a Supervisor password for full access to the SETUP. This field opens the password input dialog. After entering the Supervisor password correctly, the user can change the password, or clear and thus deactivate it by pressing "ENTER".
Set User Password	Set a User password for limited access to the SETUP. This field opens the password input dialog. Logged on users can change the password, or clear and thus deactivate it by pressing "RETURN."

16.5.8 Power menu

The behavior of the device after a power failure and after wake events is specified in this menu.

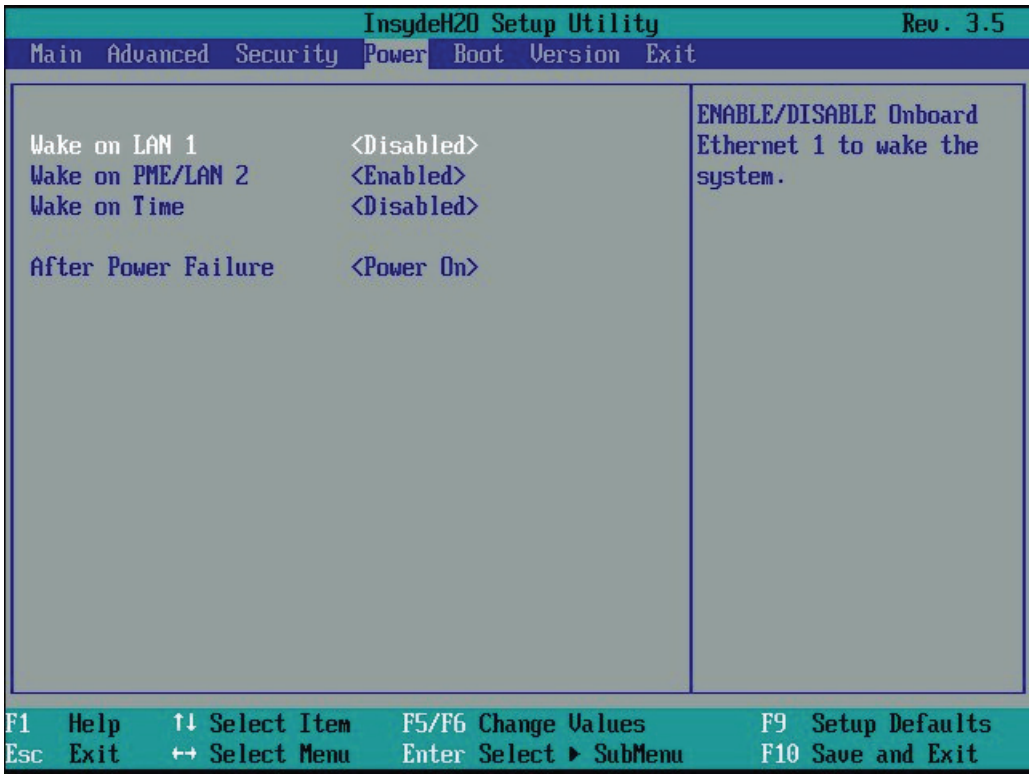


Figure 16-12 Power menu

Entry	Meaning
Wake on LAN 1	Device can be activated by an event via LAN.
Wake on PME/LAN 2	The device switches on when a Power Management Event occurs.
Wake on Time	The device switches on at a moment to be specified when it is in the operating state S5.
After Power Failure	Specification of the device behavior after a voltage failure and voltage recovery. • [Power On]: After voltage failure and subsequent voltage restoration, the device switches on automatically. • [Stay Off]: After voltage failure and subsequent voltage restoration, the device remains switched off. • [Last State]: If the device was switched on when the power failure occurred, the device switches on when the voltage is restored. Otherwise, the device remains switched off when the voltage is restored.

16.5.9 Boot Menu

In this menu this booting behavior of the device is specified and the boot medium or sequence of the boot media is determined.

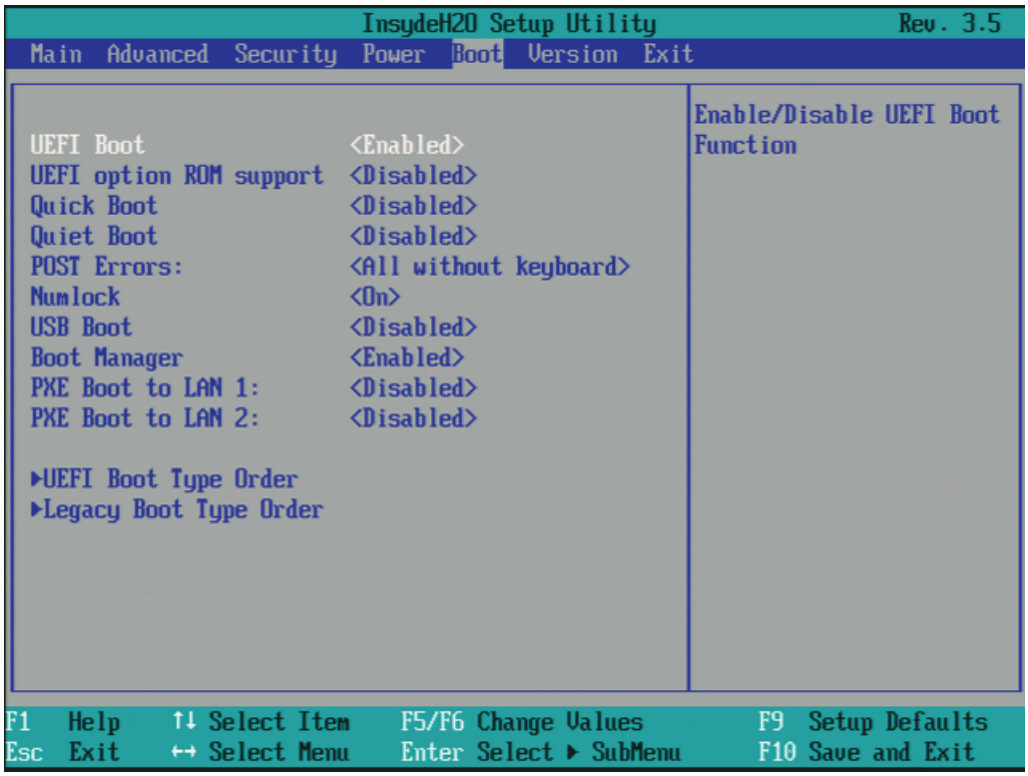


Figure 16-13 Boot Menu

Entry	Meaning
UEFI Boot	Enable (Enabled) or disable (Disabled, default) the UEFI Boot functionality
UEFI option ROM support	Enable (Enabled) or disable (Disabled, default) the UEFI Boot option from bootable expansion modules.
Quick Boot	Enable or disable If enabled, the programming device starts faster because various hardware function tests are skipped.
Quiet Boot	Booting is carried out in text mode.

Entry	Meaning
POST errors	Specification of the booting behavior if errors are recognized. • Never halt on errors: Continue the booting process when errors occur. • Halt on all errors: Interrupt the booting process when errors occur. • All Without keyboard: Interrupt the booting process when errors occur, except for keyboard errors. • All without kb/smart: Interrupt the booting process when errors occur, except for keyboard and S.M.A.R.T errors. (SMART: Self-Monitoring, Analysis and Reporting Technology)
NumLOCK	On = Enable numeric keypad on right Off = Disable numeric keypad on right (= navigation)
USB Boot	Allow/Do not allow booting of inserted USB devices.
Boot manager	Enable (Enabled, Default) or disable (Disabled) of the Boot manager accessible through <F12> button.
Ethernet 1 Remote Boot	Enable or disable booting of the LAN1.
Ethernet 2 Remote Boot	Enable or disable booting of the LAN2.
UEFI Boot Type Order	Set order of the EFI boot media
Legacy Boot Type Order	Set traditional boot order (Normal, Advanced, Advanced Placeholder)

Boot Menu > Legacy Boot Type Order: Standard

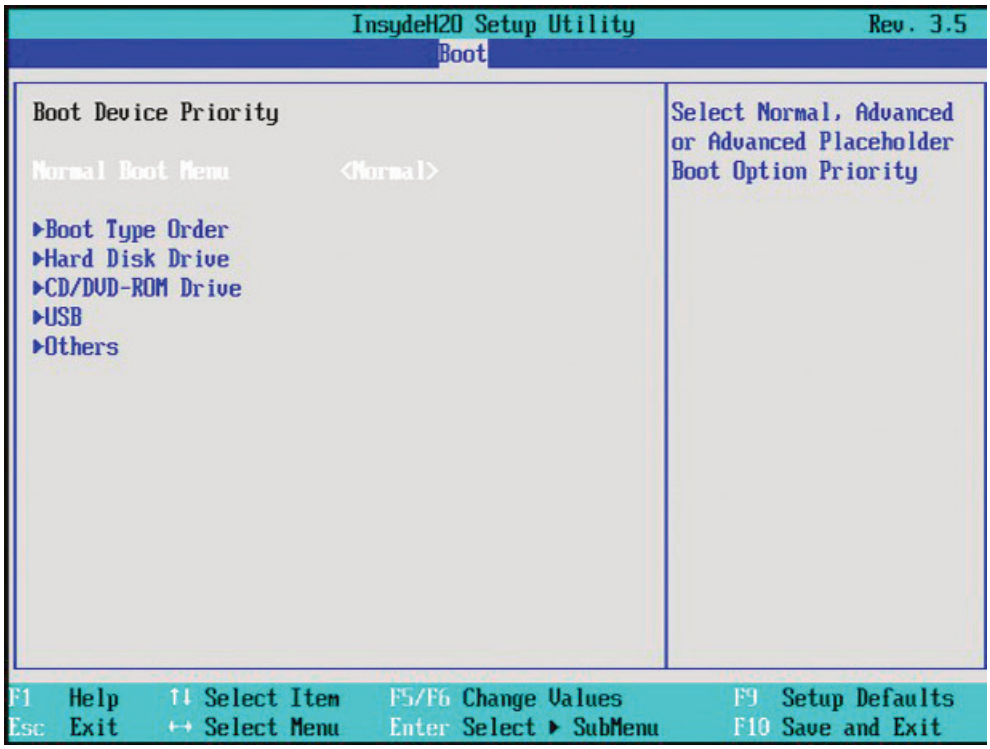


Figure 16-14 Submenu "Boot / Legacy / Normal Boot Menu <Normal>" example

Entry	Meaning
Entry	Meaning
Normal Boot Menu	• Normal = Boot order based on component type • Advanced = Customized boot order of all components • Advanced Placeholder = Individual, fixed booting sequence that is not changed automatically
Boot Type Order	Submenu for setting the boot order of component groups relative to one another
Hard disk drive [1)]	Submenu for setting the boot order within the hard disk group
CD/DVD ROM Drive [1)]	Submenu for setting the boot order within the group of optical drives.
USB [1)]	Submenu for setting the boot order within the group of USB drives.
Others [1)]	Submenu for setting the boot order within the group of Others (for example Remote Boot Device).

[1)] The groups are only displayed if a device of this group exists.

Boot menu / Legacy / Normal Boot Menu (Advanced)

In this menu all the connected bootable components and their booting position are displayed. The booting position of the component can be moved freely.

During booting the component at the first position (highest booting priority) is used. If the component is not available, booting is carried out from the next component in the list.

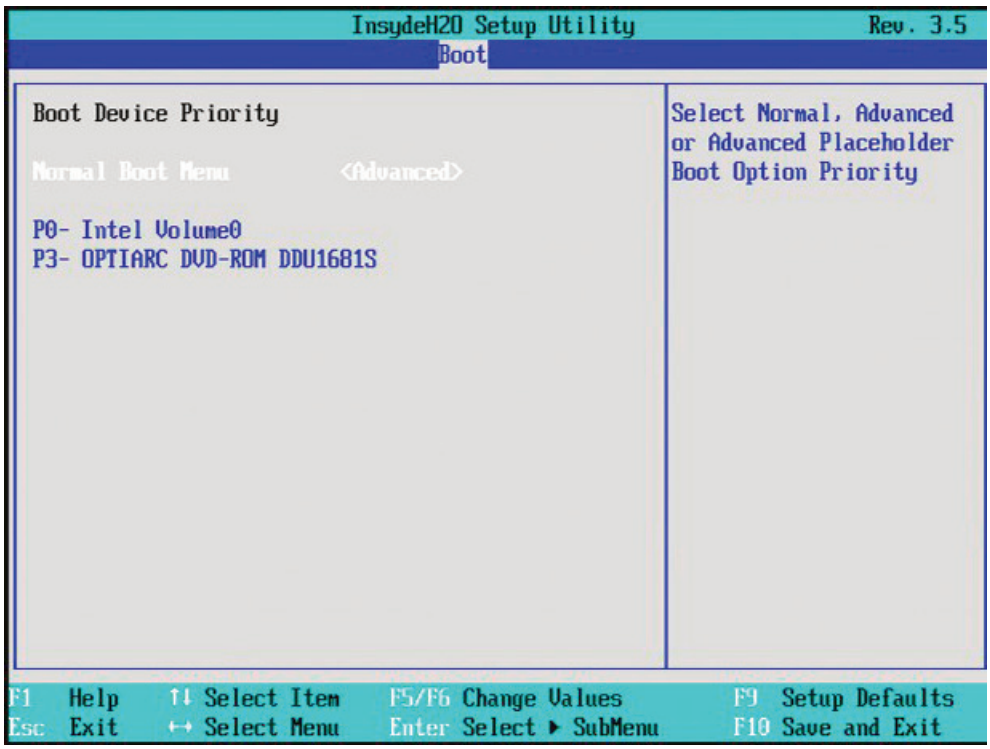


Figure 16-15 Submenu "Boot / Legacy / Normal Boot Menu <Advanced>" example

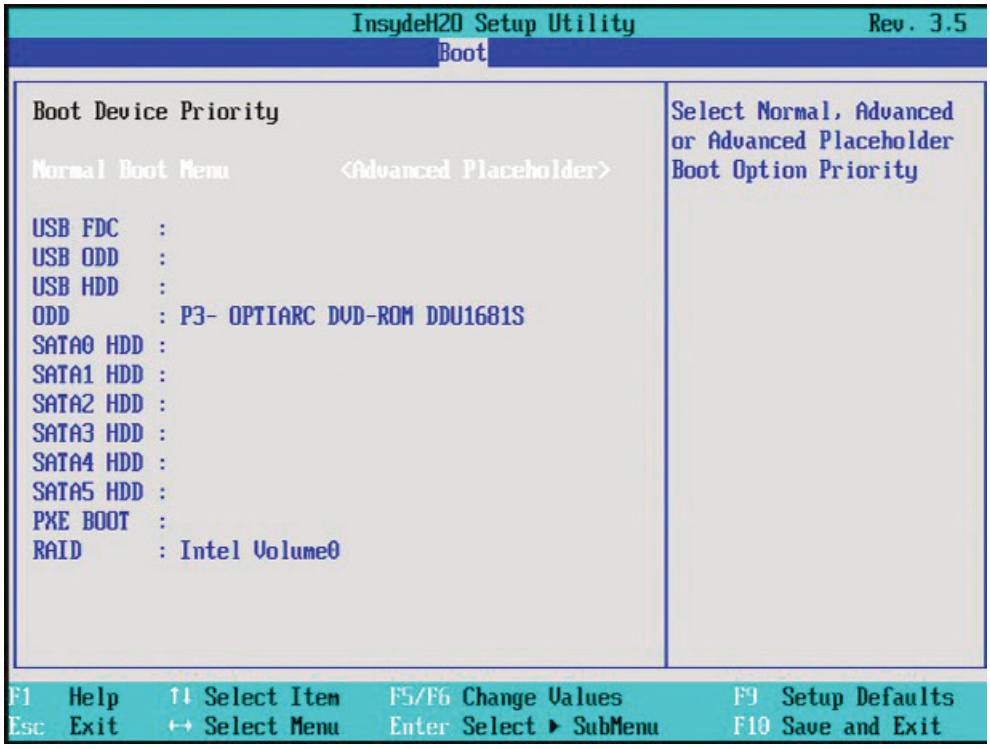


Figure 16-16 Advanced Placeholder example

Bootable components that are disconnected from and then reconnected to the PC between booting processes are set by the BIOS to the first position in the case of the "Advanced" setting, and relocated back to their original booting position (Advanced Placeholder Boot) in the case of the "Advanced Placeholder" setting.

The boot sequence is changed as follows:

Select the boot component with the ↑ ↓ keys, move to the desired position with + or -.

Note

During the booting process the boot manager can be started by using the F12 key. The boot manager displays all the available boot components and boots the device selected by the user.

16.5.10 Version Menu

This menu contains system information which should be made available to Technical Support.

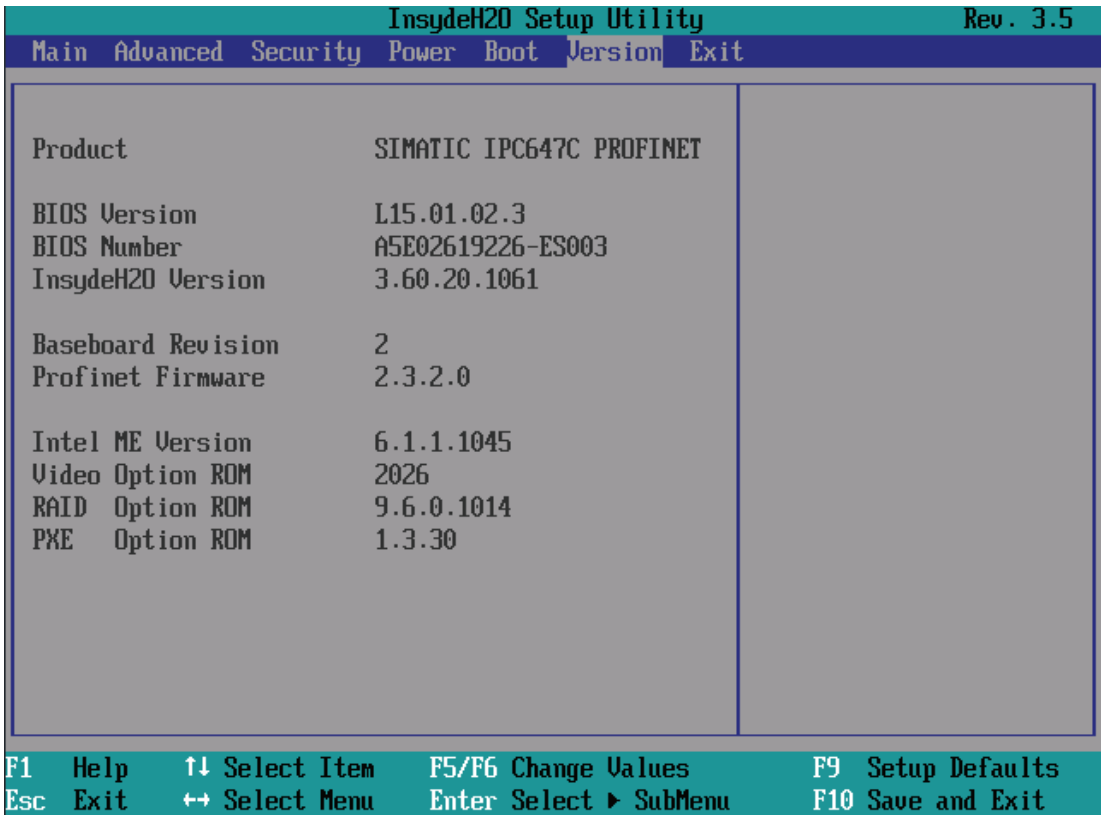


Figure 16-17 Version menu example

16.5.11 Exit menu

You always exit BIOS Setup in this menu.

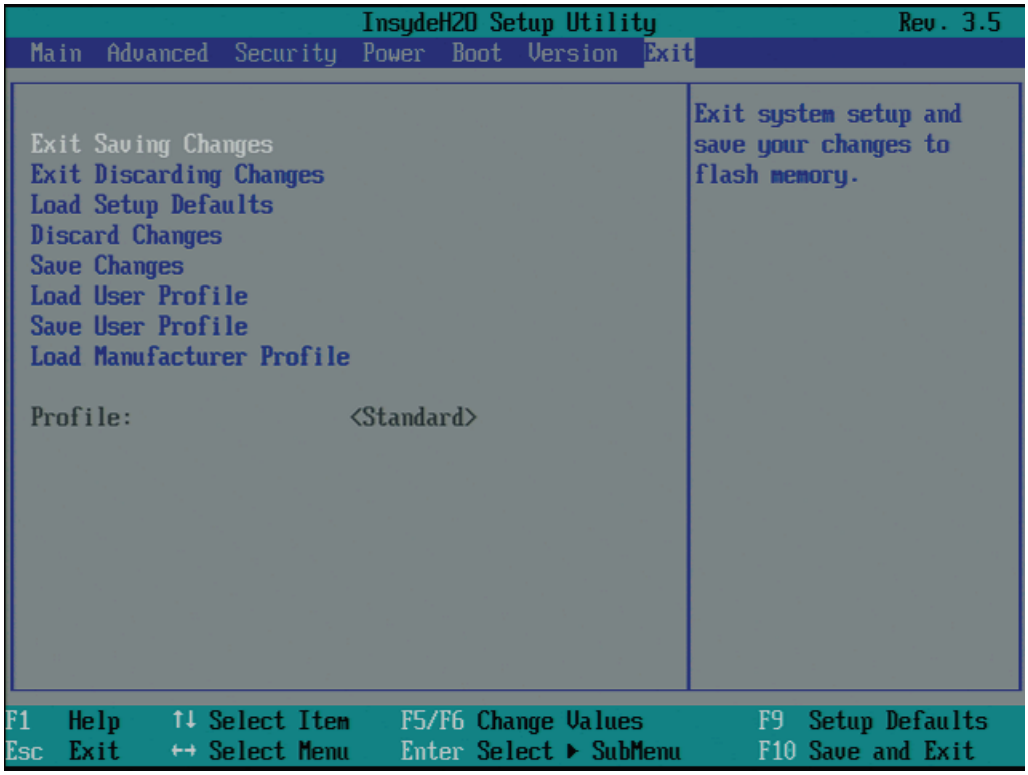


Figure 16-18 The "Exit" menu (example)

Entry	Meaning
Exit Saving Changes	All the parameter changes are saved. Afterwards a system restart is carried out with the new parameters.
Exit Discarding Changes	All the parameter changes are discarded and the system is restarted with the old parameters.
Load Setup Defaults	All parameters are set to safe values.
Discard Changes	All the parameter changes are rejected.
Save Changes	All the parameter changes are saved.
Load User Profile	All the user-defined settings are loaded. (The user settings must have been saved beforehand with the Save User Profile function.)
Save User Profile	The set parameters are saved as a USER profile.
Load Manufacturer Profile	The manufacturer parameters are downloaded to the SETUP device.
Profiles	Display field: Displays the active profile (Standard, User, Manufacturer) with which the device is currently operating ...

16.5.12 BIOS Setup default settings

Documenting the device configuration

If you have changed any default settings in Setup, you can enter them in the following table. You can then refer to these entries for any future hardware modifications.

Note

Print out the table below and keep the pages in a safe place once you made your entries.

The default setup settings vary depending on the ordered device configuration.

If you have changed any default settings in Setup, you can enter them in the following table. You can then refer to these entries for any future hardware modifications.

BIOS Setup default settings

System parameters	Default settings	Local settings
Main		
System Time	hh:mm:ss	
System Date	MM/DD/YYYY	

System parameters	Default settings	Local settings
Advanced>Peripheral Configuration		
Internal COM 1	Auto	
Internal COM 2	Auto	
Internal LPT	Auto	
Audio	Enabled	
Onboard Ethernet 1	Enabled	
Onboard Ethernet 2	Enabled	
PCI – MPI / DP	Enabled	
Profinet		

System parameters	Default settings	Local settings
Advanced>SATA Configuration		
SATA Controller	Enabled	
SATA Controller mode	AHCI	

System parameters	Default settings	Local settings
Advanced>SATA Configuration		

System parameters	Default settings	Local settings
Advanced>Video Configuration		
Primary video device	PEG	
IGD boot type	VBIOS default	
IGD Dual View DVI/CRT	Disabled	

System parameters	Default settings	Local settings
Advanced > USB Configuration		
USB Port0	Enabled	
USB Port1	Enabled	
USB Port2	Enabled	
USB Port3	Enabled	
USB Port6	Enabled	
USB Port7	Enabled	
USB Port8	Enabled	
USB Port9	Enabled	
USB Port10	Enabled	

System parameters	Default settings	Local settings
Advanced>Chipset Configuration		
Port 80h Cycles	LPC Bus	
VT-d	Enabled	
HPET	Enabled	

System parameters	Default settings	Local settings
Advanced>CPU Configuration		
C-States	Enabled	
P-States (ACTUAL)	Enabled	
Turbo mode	Enabled	
CMP support	Auto	
HT Support	Auto	
Use XD Capability	Disabled	
VT Support	Enabled	

System parameters	Default settings	Local settings
Advanced>Active Management Technology Support		
Intel AMT Support	Disabled	
Intel AMT Setup Prompt	Disabled	
AMT CIRA Request Trig	Disabled	
AMT CIRA Timerout	30	
Un-Configure ME	Disabled	
USB Configure	Enabled	

System parameters	Default settings	Local settings
Advanced		
Fan control	Enabled	
Operating Mode Switch	Disabled	

System parameters	Default settings	Local settings
Security		
Supervisor Password	Not installed	
User password	Not installed	
Set Supervisor Password	Inactive (no password assigned)	
Set User Password	Inactive (no password assigned)	

System parameters	Default settings	Local settings
Power		
Wake on LAN 1	Enabled	
Wake on PME/LAN 2	Disabled	
Wake on Time	Disabled	
After Power Failure	Power On	

System parameters	Default settings	Local settings
Boot		
UEFI Boot	Disabled	
UEFI option ROM support	Disabled	
Quick Boot	Disabled	
Quiet Boot	Disabled	
POST errors	All without keyboard	
NumLOCK	On	
USB Boot	Enabled	
Boot manager	Enabled	
PXE Boot to LAN 1	Disabled	
PXE Boot to LAN 2	Disabled	

System parameters	Default settings	Local settings
Boot > UEFI Boot Type Order		

System parameters	Default settings	Local settings
Boot > Legacy Boot Type Order		
Normal Boot Menu	Advanced Placeholder	

System parameters	Default settings	
Version		
Product	SIMATIC IPC	
BIOS Version	V15.01.	
BIOS Number		
InsydeH2O Version		
MPI / DP Firmware ID		

System parameters	Default settings	
Version		
FPGA Revision ID		
Intel ME Version		
Video Option ROM		
RAID Option ROM		
PXE Option ROM		

1 Deviating default settings are possible. These depend on the manufactured device configuration.

System parameters	Default settings	Local settings
Exit		
Profile:		

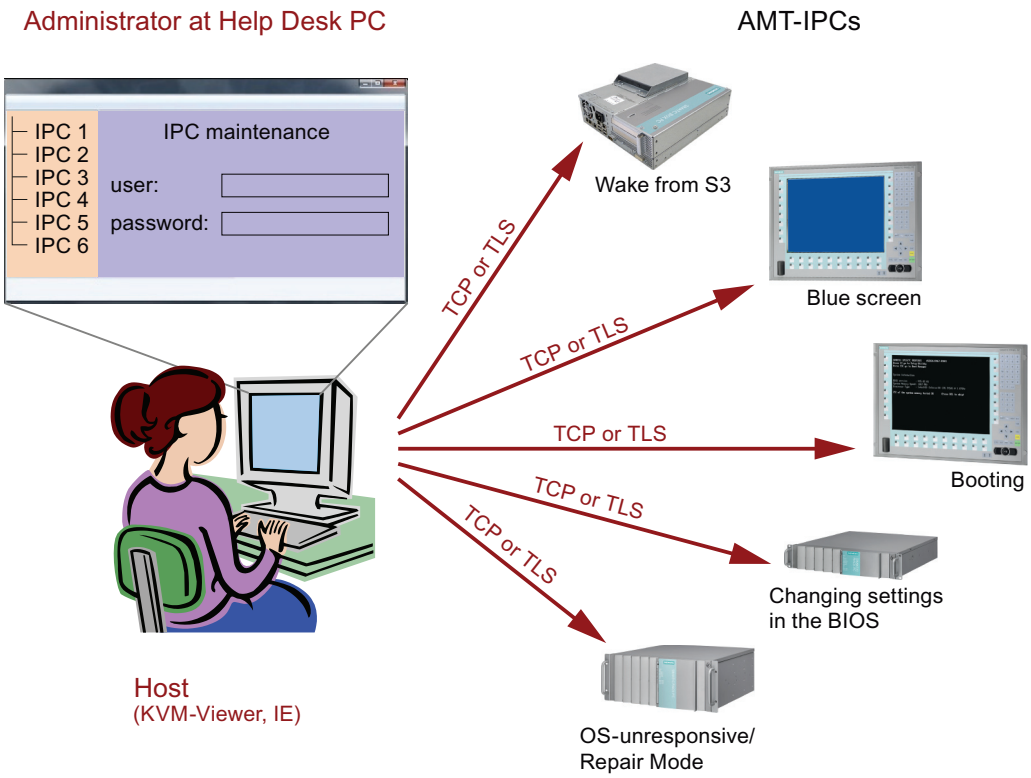
16.6 Active Management Technology (AMT)

16.6.1 AMT basics

The processors Intel Core i5 and Core i7 support Intel® vPro™ and Intel Active Management Technology at the hardware end.

An administrator at the Help Desk PC accesses the AMT PCs. Only the AMT PCs must have an integrated Intel AMT.

The following figure shows the possible structure of a network for remote management on the basis of SIMATIC AMT-PCs.



From a SIMATIC IPC which does not have Intel AMT functions, you can access networked SIMATIC IPCs with Intel AMT using the SIMATIC IPC Remote Manager and/or a web browser.

SIMATIC IPCs that support AMT feature two onboard Ethernet interfaces, each with a separate controller. You can configure the controller integrated in the chipset for use with Intel AMT. Further details about the controller can be found in the technical specification.

For security reasons, AMT is disabled when you receive a SIMATIC IPC. Enable AMT in the BIOS setup. Afterwards the Intel® Management Engine (Intel® ME) has to be activated and set for AMT. You make additional settings in the Management Engine:

- Configuring the network for access via AMT
- Creating a password

This section describes the required measures and settings on the local IPC so that the IPC can be controlled and maintained remotely from a management station known below as the help desk PC.

The local IPC is known below as the "AMT PC".

The sections contain the following information:

- AMT settings in the MEBx and in the BIOS setup
- Basic configuration of AMT
- Further useful notes

16.6.2 Enabling AMT, basic configuration

Procedure

For security reasons, AMT is not enabled on new devices.

To enable AMT, follow these steps:

1. Connect the AMT PC with the LAN.
2. If necessary, first reset AMT to the default status (see section "Unconfigure").
3. To access the BIOS, press the <F2> key while the device is booting.
4. In the Advanced menu, enable "Intel AMT Support", and "Intel AMT Setup Prompt".
5. Exit the BIOS with the <F10> key "Save and Exit". The AMT PC restarts.
6. To access the MEBx, press the <Ctrl+P> keyboard shortcut
7. In the login dialog, enter the standard password "admin".
8. Change the default password. The new password must include the following characters:
   - In total at least eight characters
   - One upper case letter
   - One lower case letter
   - One number
   - One of the special characters ! @ # $ % ^ & * @ # $ % ^ & *

   Note

   The underscore _ and the space characters are valid password characters, however they do not increase password complexity.

9. Enable "Intel (R) AMT Configuration > Manageability Feature Selection".
10. Enable "Intel (R) ME General Settings > Activate Network Access".

16.6.3 Advanced settings

The BIOS and the MEBx contain the most important basic settings for AMT. Additional tools are necessary if you want to make more advanced settings. If required, these must be downloaded from the relevant manufacturer's site. For information on the options and use of these tools, refer to the relevant documentation of the manufacturer.

- Manageability Commander and other tools of the Intel DTK (Manageability Developer Tool Kit): Programs from the Intel DTK that you can download from the Internet at "http://software.intel.com/en-us/manageability".
- AMT Web interface: For encrypted connections, the URL of the Web interface is "https://<Fully qualified domain name>:16993" and for unencrypted connections "http://<IP address>:16992".
- WinRM: A command line program that is part of Windows as of Windows Vista. This tool can be downloaded for older Windows versions.

16.6.4 Resetting with Un-configure

Note

If the AMT PC still has its factory settings, for example has just been purchased, you can skip this section.

If you have already configured AMT previously, it is best to discard all the previous AMT settings made in the MEBx.

Note

All previous settings in the management engine are deleted.

Correct operation in the plant may be at risk.

Note down all the settings in the MEBx. Make the settings again as necessary following Unconfigure.

To reset the AMT settings, follow these steps:

1. Enable the "Un-configure ME" entry in "Advanced > Active Management Technology Support" in the BIOS.
2. Exit the BIOS with the <F10> key "Save and Exit". The AMT PC restarts.
3. After the restart, a user prompt appears asking whether you really want to discard all the settings in the management engine:



4. Confirm with "Y". On a German keyboard, this means pressing the <Z> key.

The device continues to boot with the factory settings of the management engine.

16.6.5 Determining the network address

To connect the AMT PC with the AMT server, the network address that uniquely localizes the AMT server on the AMT PC must be entered.

If DHCP is set for the automatic assignment of the network address in "Network Setup" in the MEBx of the AMT PC, the network address is not fixed.

Procedure

If the AMT server uses the same network address as the operating system of the AMT PC (most common situation):

1. You can obtain the address of the AMT server in the command line in Windows using "ipconfig" and in UNIX using "ifconfig".

If the AMT server and operating system do not use the same network address, ask your network administrator for the address you have been assigned.

16.6.6 Forcing user consent

When establishing a connection to the AMT PC, the KVM viewer may prompt the user to enter a six-figure code. This code is displayed on the screen of the AMT PC. The user of the AMT PC must inform the user of the KVM viewer of this code.

Procedure

To set up this code query on the KVM viewer, follow these steps:

1. Select "Intel(R) AMT Configuration > User Consent" in the MEBx.
2. Select the value "KVM" for "User Consent".

To allow a user with administrator privileges to avoid this code query, follow these steps:

1. Select "Intel(R) AMT Configuration > User Consent" in the MEBx.
2. Enable "Opt-in configurable from remote IT".

16.7 CP 1616 onboard communications processor

16.7.1 Introduction

The CP 1616 on-board allows the connection of industrial PCs to Industrial Ethernet.

The basic characteristics of the PCS 1616 onboard are:

- Optimized for PROFINET IO
- With Ethernet realtime ASIC ERTEC 400
- Three RJ45 sockets for connecting terminal devices or addition network components
- Integrated 3-port real-time switch
- Automatic hardware detection

16.7.1.1 Network connections

Ethernet

The CP 1616 is designed for operation in Ethernet networks. Additional features are:

- The connectors are designed for 10BaseT and 100BaseTX.
- Data transfer rates of 10 and 100 Mbps in full/half duplex mode are supported.
- The handshake is performed automatically (auto negotiation).
- A 3-port realtime switch is located in the module.
- Autocrossing

Three RJ45 connectors

The CP 1616 is connected to the LAN (Local Area Network) via one of the three RJ45 sockets of the PC.

These three sockets lead to the integrated realtime switch.

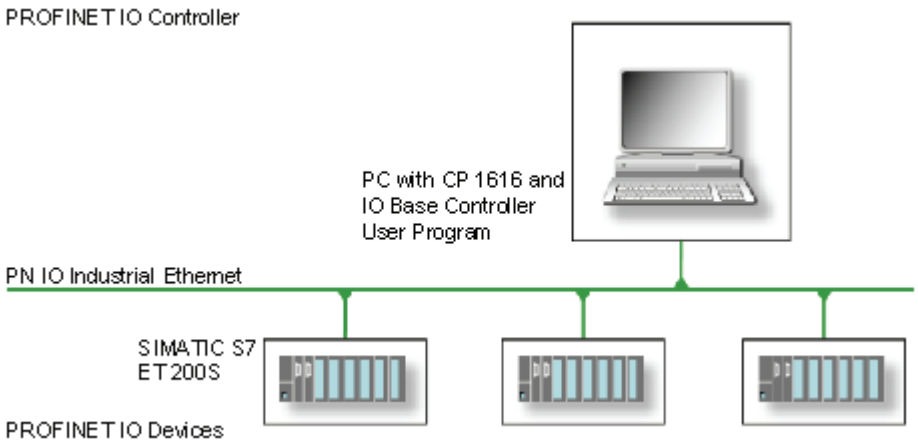
16.7.1.2 Typical Communication Partners

CP 1616 onboard as an IO controller

The following diagram shows a typical application: CP 1616 onboard as PROFINET IO controller on the IO controller layer.

The IO base controller user program runs on the PC. This program accesses the functions of the IO base user program interface.

Data traffic is routed via the communication processor to several SIMATIC S7 PROFINET IO devices, ET 200S over Industrial Ethernet.

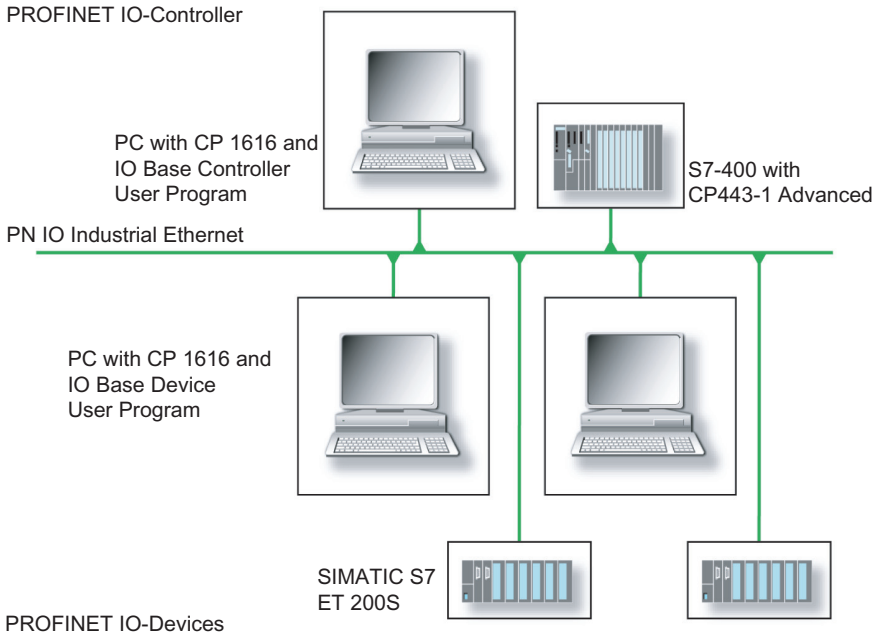


CP 1616 onboard as IO device

The following diagram shows a typical application: Two PCs each with a CP as a PROFINET IO device on the IO device layer.

A PC with a CP as PROFINET IO controller, a SIMATIC S7-400 with a CP 443-1 as PROFINET IO controller and two SIMATIC S7 ET 200S PROFINET IO devices are also connected in the network.

The IO base device user program runs on the IO device PC. This program accesses the functions of the IO base user program interface. Data traffic is routed via the CP 1616 onboard communication processor to a PC as PROFINET IO controller, or to an S7-400 automation system with CP 443-1 over Industrial Ethernet.



16.7.2 Firmware Loader

This section will familiarize you with the application area and use of the firmware loader. You can find additional, detailed information about the individual loader variants in the integrated help of the program.

"Firmware" refers to the system programs in the SIMATIC NET modules.

Scenario for using the firmware loader

The CP 1616 onboard is supplied with the latest version of the firmware. If new functions become available due to product development, you can make them available by performing a firmware download.

Application area for the firmware loader

The firmware loader enables you to reload new firmware releases to SIMATIC NET modules. It is used for:

- PROFIBUS modules
- Industrial Ethernet modules
- Modules for gateways, for example IE/PB link

Installation

The firmware loader is available on your PG/PC under Windows following the installation of STEP 7/NCM PC.

Loader files

The firmware loader supports the following file types:

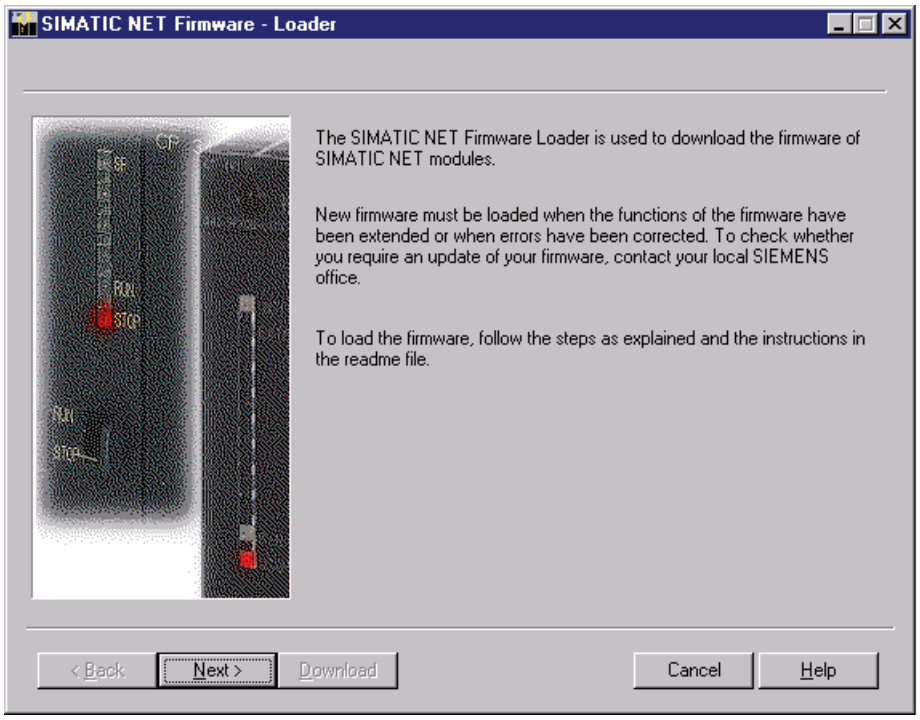
- <File>.FWL
  A file form that contains information in addition to the LAD file format, which is displayed by the firmware loader. The firmware loader can use this information to check if the firmware is compatible to the device.
- <File>.LAD
  A file format that only contains the system program to be loaded into the module.

Read the information provided along with the loader file, for example, in the readme file. This information is also displayed in the firmware loader when the FWL file is loaded.

16.7.2.1 Loading firmware

Start downloading procedure

1. In the Windows Start menu, select the menu command SIMATIC > STEP 7 > NCM S7 > Firmware Loader.



2. Click "Next" and follow the instructions in the dialog fields that follow. A help function is integrated in the software as support.

NOTICE
Ensure that the loader file you are using for the update is suitable for the version of firmware on your module. If you have any doubts, contact your local Siemens consultant.

NOTICE
Be aware that aborting the loading process may result in an inconsistent state in your module.

You can find additional, detailed information about the individual loader variants in the integrated help.

Note

When loading the firmware or commissioning the module, be aware that the CP 1616 onboard takes five MAC addresses (always in direct sequence). The first two are shown in the BIOS.

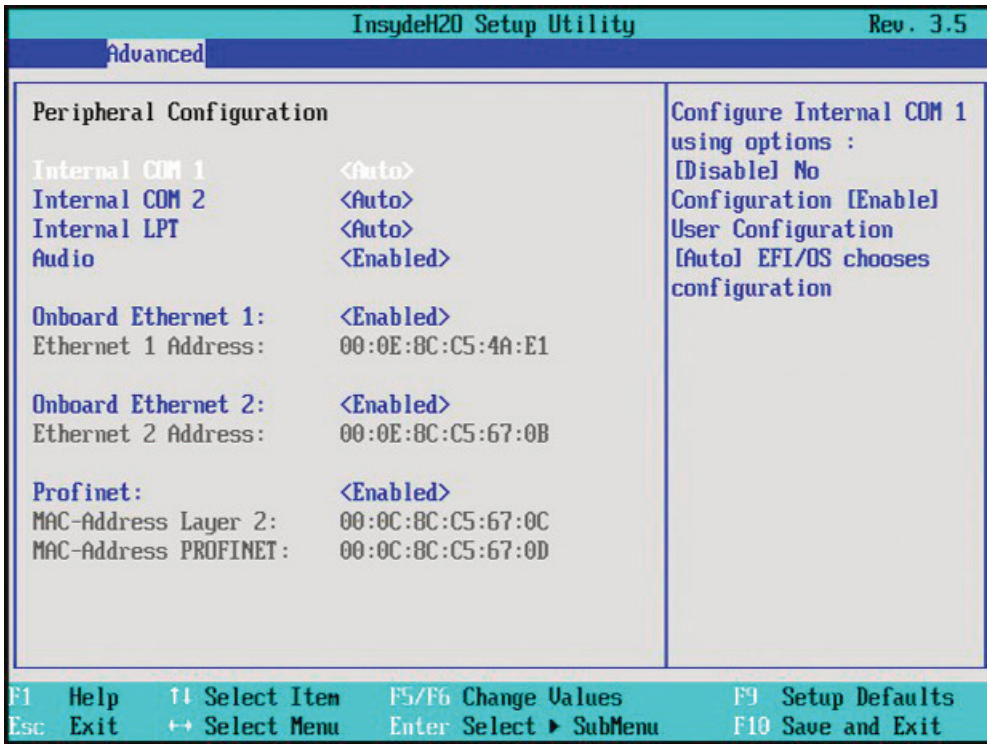


Figure 16-19 Advanced menu > "Peripheral Configuration"

Example

The lower MAC address under "Profinet" is intended for Layer 2 communication, while the second one is for Ethernet/PROFINET communication.

16.7.3 Further actions in STEP 7/NCM PC

Configuring

Your PC is now ready, although you still have to configure the SIMATIC NET communication software. The rest of the procedure is described in the "Commissioning PC Stations" manual (on the Windows PC that also contains STEP 7/NCM PC: Start > Simatic > Documentation > English > Commissioning PC Stations).

Appendix A

A.1 Guidelines and declarations

The following applies to the SIMATIC product described in this document:

Notes on CE marking



The following applies to the SIMATIC product described in this document:

EMC directive

This product meets the requirements of EC directive 2004/108/EEC "Electromagnetic Compatibility", and is designed for operation in the following fields of application in accordance with this CE marking:

Fields of application	Requirement for	
	Emitted interference	Immunity to interferences
Residential, business and commercial operations, and small businesses	EN 61000-6-3: 2007	EN 61000-6-1: 2007
Industry	EN 61000-6-4: 2007	EN 61000-6-2: 2005

The product complies with EN 61000-3-2:2006 (harmonic currents) and EN 61000-3-3:2008 (voltage fluctuations and flicker.)

Low-voltage directive

The product fulfills the requirements of EC Directive 2006/95/EC "Low Voltage Directive". Conformance with this directive has been verified according to EN 60950-1: 2006.

Declaration of conformity

The EC declaration of conformity and the corresponding documentation are made available to authorities in accordance with the EC directives stated above. Your sales representative can provide these on request.

Note the installation guidelines

The installation guidelines and safety instructions given in this documentation have to be noted during commissioning and operation.

Connecting I/Os

Noise immunity requirements to EN 61000-6-2 are met if connected I/Os are suitable for industrial applications. Peripheral devices are only be connected via shielded cables.

A.2 Certificates and Approvals

ISO 9001 certificate

The Siemens quality management system for all production processes (development, production and sales) meets ISO 9001:2000 requirements.

This has been certified by DQS (the German society for the certification of quality management systems).

Q-Net certificate no.: DE-001108 QM

Software License Agreement

The device can be supplied with or without preinstalled software. For devices with preinstalled software, please note the relevant license agreements.

Approvals for the USA, Canada and Australia

- Product safety

  The following approval is available for the device:

c UL us	Underwriters Laboratories (UL) to Standard UL 60950-1, Report E11 5352 and Canadian Standard C22.2 No. 60950-1 (I.T.E).

- EMC

USA	
Federal Communications Commission Radio Frequency Interference Statement	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of operations	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must tolerate any interference received, including interference that may cause undesired operation.

CANADA	
Canadian Notice	This Class B digital apparatus complies with Canadian ICES-003.
Avis Canadian	Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

AUSTRALIA	
	This product meets the requirements of the standard EN 61000-6-3:2007 Generic standards - Emission standard for residential, commercial and light-industrial environments.

A.3 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (http://www.siemens.de/automation/csi_en_WW)
- Support request form (http://www.siemens.com/automation/support-request)
- After-sales information system for SIMATIC PC / PG (http://www.siemens.com/asis)
- SIMATIC Documentation Collection (http://www.siemens.com/simatic-tech-doku-portal)
- Your local representative (http://www.siemens.com/automation/partner)
- Training center (http://www.sitrain.com)
- Industry Mall (http://mall.automation.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- Order number of the device (MLFB)
- BIOS version (industry PC) or image version (HMI device)
- Installed additional hardware
- Installed additional software

Tools & downloads

Please check regularly if updates and hotfixes are available for download to your device. The downloads are available on the Internet under "After Sales Information System SIMATIC PC/PG" (see above).

A.4 Retrofitting instructions

A.4.1 Configurations

Temperature range 5 °C to 50 °C

The maximum permissible power loss of expansion modules is 30 W. Distribution over the slots:

- 25 W maximum for the PCIe x16 slot
- 25 W maximum for the upper module in slot 2
- 10 W maximum for the lower module in slot 3

Maximum permitted configuration

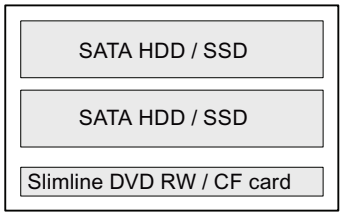


Figure A-1 Approved configuration versions for the temperature range 5 °C to 50 °C

NOTICE
Restrictions Slimline DVD RW can be installed, but may only be operated up to a temperature of 40°C. Removable rack operation is not permitted in a temperature range up to 50°C.

Temperature range 5 °C to 45 °C

Maximum power loss of expansion modules is 55 W. Arrangement of the slots:

- 25 W maximum for the PCIe x16 slot
- 2 × 25 W maximum for the modules in slot 2 and slot 3

Maximum permitted configuration

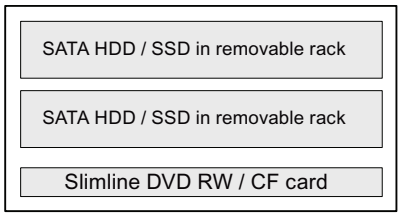


Figure A-2 Approved configuration versions for the temperature range 5 °C to 45°C

NOTICE
Restrictions Slimline DVD RW can be installed, but may only be operated up to a temperature of 40°C. During operation, the HDDs installed in the removable rack may not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

Temperature range 5 °C to 35 °C

Maximum power loss of expansion modules is 75 W. Arrangement of the slots:

- 25 W maximum for the PCIe x16 slot
- 2 × 25 W maximum for the modules in slot 2 and slot 3

Maximum permitted configuration

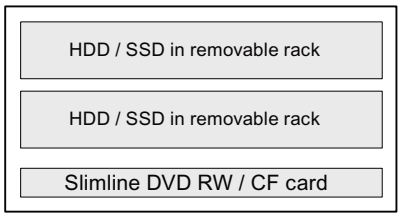


Figure A-3 Approved configuration versions for the temperature range 5 °C to 35°C

NOTICE
Restrictions During operation, the HDDs installed in the removable rack may not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

ESD Directive

B

Meaning



An electronic module is equipped with highly integrated electronic components. Due to their design, electronic components are highly sensitive to overvoltage and thus to the discharge of static electricity. Such electronic components are labeled as electrostatic sensitive devices (ESD).

The following abbreviations are commonly used for electrostatic sensitive devices:

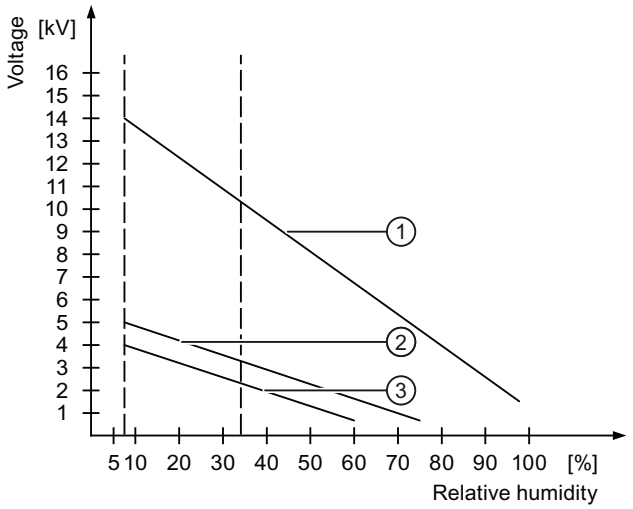
- ESD – Electrostatic Sensitive Device
- ESD – Electrostatic Sensitive Device (internationally recognized term)

Electrostatic charge

NOTICE
Electrostatic charge ESDs may be destroyed by voltages far below the level perceived by human beings. If you are not discharged electrostatically, the voltage that you transfer when touching a component or the contact points of a module can already cause damage. The damage to an ESD caused by overvoltage is usually not recognized immediately. The damage only becomes apparent after a long period of operation. Discharge any electrostatic charge of your body before you touch the ESD.

Anyone who is not connected conductively to their surroundings is subject to electrostatic charge.

The following diagram shows the maximum voltage values to which a person can be charged electrostatically. The values depend on the material and humidity. The shown values are in conformity with the specifications of EN 61000-4-2.



① Synthetic materials
② Wool
③ Antistatic materials such as wood or concrete

Protective measures against discharge of static electricity

NOTICE
Grounding measures There is no equipotential bonding without grounding. An electrostatic charge is not discharged and may damage the ESD. When working with electrostatic sensitive devices, make sure that the person and the workplace are properly grounded.

Note the following:

- Only touch the ESD if it is absolutely necessary.
- When you touch ESD modules, avoid touching the pins or the PCB tracks.

  This precaution reduces the risk of damaging an ESD.
- Discharge electrostatic electricity from your body if you are performing measurements on an ESD.

  To do so, touch a grounded metal object before you carry out the measurement.
- Always use grounded measuring instruments.

List of abbreviations

C

Abbreviation	Term	Meaning
AC	Alternating current	Alternating current
ACPI	Advanced Configuration and Power Interface	
PLC	Programmable controller	
AGP	Accelerated Graphics Port	High speed bus system
AHCI	Advanced Host Controller Interface	Standardized controller interface for SATA devices. This is supported in Microsoft Windows XP as of SP1 and IAA driver.
AMT	Active Management Technology	Remote maintenance technology from Intel
APIC	Advanced Programmable Interrupt Controller	Extended programmable interrupt controller
APM	Advanced Power Management	Tool for monitoring and reducing power consumption of the PC
AS	Automation system	
ASIS	After Sales Information System	
AT	Advanced Technology	
ATA	Advanced Technology Attachment	
ATX	AT-Bus-Extended	
AWG	American Wire Gauge	US standard for the cable diameter
BIOS	Basic Input Output System	Basic Input Output System
CAN	Controller Area Network	
CD-ROM	Compact Disc – Read Only Memory	Removable storage medium for large data volumes
CD-RW	Compact Disc – Rewritable	Rewritable CD
CE	Communauté Européenne (CE symbol)	The product is in conformance with all applicable EC directives
CF	Compact Flash	
CGA	Color Graphics Adapter	Standard monitor interface
CIRA	Client Initiated Remote Access	Administration of AMT PCs not in the intranet
CLK	Clock pulse	Clock signal for controllers
CMOS	Complementary Metal Oxide Semiconductors	Complementary metal oxide semiconductors
COA	Certificate of authentication	Microsoft Windows Product Key
CoL	Certificate of License	License authorization
COM	Communications Port	Term for the serial interface
CP	Communication Processor	Communication computer

Abbreviation	Term	Meaning
CPU	Central Processing Unit	CPU
CRT	Cathode Ray Tube	
CSA	Canadian Standards Association	Canadian organization for tests and certifications according to own or binational standards (with UL / USA) standards
CTS	Clear To Send	Clear to send
DRAM	Dynamic Random Access Memory	
DC	Direct Current	DC current
DCD	Data Carrier Detect	Data carrier signal detection
DDRAM	Double Data Random Access Memory	Memory chip with high-speed interface
DHCP	Dynamic Host Configuration Protocol	Protocol for configuring IP networks
DMA	Direct Memory Access	Direct memory access
DOS	Disk Operating System	Operating system without GUI
DP	Display Port	New powerful digital monitor port
DQS	Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagement mBH	
DSR	Data Set Ready	Ready for operation
DTK	Developer Tool Kit	Tools for software development, testing, configuration etc.
DTR	Data Terminal Ready	Data terminal is ready
DVD	Digital Versatile Disk	Digital versatile disk
DVI	Digital Visual Interface	Digital display interface
DVI-I	Digital Visual Interface	Digital display interface with digital and VGA signals
ECC	Error checking and correction	Error correction code
ECP	Extended capability port	Extended parallel port
EFI	Extensible Firmware Interface	
EGA	Enhanced Graphics Adapter	PC to monitor interface
ESD	Components sensitive to electrostatic charge	
DM	Electronic Manual	
EIDE	Enhanced Integrated Drive Electronics	An enhancement of the IDE standard
EISA	Extended Industry Standard Architecture	Extended ISA standard
EMM	Expanded Memory Manager	Manages memory expansions
EM64T	Extended Memory 64 technology	
EN	European standard	
EPROM / EEPROM	Erasable Programmable Read-Only Memory / Electrically Erasable Programmable Read-Only Memory	Plug-in submodules with EPROM/EEPROM chips
EPP	Enhanced Parallel Port	Bi-directional Centronics interface
ESC	Escape character	Control character
EWF	Enhanced Write Filter	
FAQ	Frequently Asked Questions	FAQs
FAT 32	File Allocation Table 32-bit	32-bit file allocation table

Abbreviation	Term	Meaning
FBWF	File-Based Write Filter	
FD	Floppy disk	Disk drive, 3.5"
FQDN	Fully qualified domain name	Full name of a domain
FSB	Front Side Bus	
GND	Ground	Chassis ground
GPT	Globally Unique Identifier Partition Table	
HD	Hard disk	Hard disk
HDA	High Definition Audio	
HDD	Hard Disk Drive	Hard disk drive
HU	Height unit	
HMI	Human Machine Interface	User interface
HORM	Hibernate Once - Resume Many	
HT	Hyper-Threading	
HTML	Hyper Text Markup Language	Script language for creating Internet pages.
HTTP	Hypertext Transfer Protocol	Protocol for data transfer on the Internet
Hardware	Hardware	
I/O	Input/Output	Data input/output on computers
IAA	Intel Application Accelerator	
IAMT	Intel Active Management Technology	Diagnostics, management and remote control of PCs
IDE	Integrated Device Electronics	
IDER	IDE Redirection	Remotely mounting an ISO file as a drive
IEC	International Electronical Commission	
IGD	Integrated Graphics Device	
IP	Ingress Protection	Degree of protection
IR	Infrared	Infrared
IRDA	Infrared Data Association	Standard for data transfer via IR module
IRQ	Interrupt Request	Interrupt request
ISA	Industry Standard Architecture	Bus for expansion modules
ITE	Information Technology Equipment	
KVM	Keyboard, Video, Mouse	
L2C	Level 2 cache	
LAN	Local Area Network	Computer network that is limited to a local area.
LCD	Liquid Crystal Display	Liquid crystal display
LEDs	Light Emitting Diode	Light emitting diode
LPT	Line Printer	Printer port
LVDS	Low Voltage Differential Signaling	
LW	Drive	
MAC	Media access control	Media access control
MC	Memory Card	Memory card in credit card format
ME	Management engine	Unit implemented by AMT
MEBx	Management Engine BIOS Extension	User interface for basic configuration of AMT

Abbreviation	Term	Meaning
MLFB	Machine-readable product designation	
MMC	Micro Memory Card	Memory card of the format 32 mm x 24.5 mm
MPI	Multipoint-capable interface for programming devices	
MPS	Manageability Presence Server	Proxy for AMT
MS-DOS	Microsoft Disc Operating System	
MTBF	Mean Time Between Failures	
MUI	Multilanguage User Interface	Language localization in Windows
NA	Not Applicable	
NAMUR	Normenarbeitsgemeinschaft for Mess- und Regelungstechnik in der chemischen Industrie (standardization body for instrumentation and control technology in the chemicals industry)	
NC	Not Connected	Not connected
NCQ	Native Command Queuing	Automatic re-sorting of the file and disk access, for increased performance
NEMA	National Electrical Manufacturers Association	Syndicate of manufacturers of electrical components in the USA
NMI	Non Maskable Interrupt	Interrupt the processor can not reject
NTFS	New Techniques File System	Secure file system for Windows versions (2000, XP, 7)
ODD	Optical Disk Drive	
OPC	OLE for Process Control	Standardized interface for industrial processes
PATA	Parallel ATA	
PC	Personal computer	
PCI	Peripheral Component Interconnect	High-speed expansion bus
PCIe	Peripheral Component Interconnect express	High-speed serial, differential full-duplex PtP interface with high data rate.
PCMCIA	Personal Computer Memory Card International Association	
PI	Protective Earth	Protective conductor
PEG	PCI Express Graphics	
PG	Programming device	
PIC	Programmable Interrupt Controller	Programmable interrupt controller
POST	Power On Self Test	
PRTC	Protected Real Time Clock	Clock in the management engine MEBx
PXE	Preboot Execution Environment	Software for running new PCs without hard disk data via the network
RAID	Redundant Array of Independent Disks	Redundant hard disk array
RAL	Restricted Access Location	Installation of device in operating facilities with restricted access - for example, a locked switchgear cabinet
RAM	Random Access Memory	
RI	Ring Input	Incoming call

Abbreviation	Term	Meaning
ROM	Read-Only Memory	
RS 485	Reconciliation Sublayer 485	Bi-directional bus system designed for up to 32 nodes.
RTC	Real Time Clock	Real-time clock
RTS	Reliable Transfer Service	Request to send
RxD	Receive Data	Data transfer signal
SAS	Serial attached SCSI	
SATA	Serial Advanced Technology Attachment	
SCSI	Small Computer System Interface	
SDRAM	Synchronous DRAM	
SELV	Safety Extra Low Voltage	Safety extra low voltage
SLC	Second Level Cache	
SMART	Self Monitoring Analysis and Reporting Technology	Hard disk error diagnostics program
SMS	Short Message Service	Short message via telecommunication network
SNMP	Simple Network Management Protocol	Network protocol
SO-DIMM	Small Outline Dual Inline Memory Module	
SOL	Serial over LAN	Text-based remote control
SOM	SafeCard on Motherboard (SOM)	
SPP	Standard Parallel Port	Synonym for parallel port
SRAM	Static Random Access Memory	Static RAM
SSD	Solid State Drive	
SVGA	Super Video Graphics Array	Enhanced VGA standard with at least 256 colors
SVP	Serial number of the device	
SW	Software	
TCO	**T**otal **C**ost of **O**wnership	
TFT	Thin-Film-Transistor	Type of LCD flat-screen
TTY	Tele Type	Asynchronous data transfer
TxD	Transmit Data	Data transfer signal
TXT	Trusted Execution Technology	Hardware implementation
TWD	Watchdog Time	Watchdog monitoring time
UEFI	Unified Extensible Firmware Interface	
UL	Underwriters Laboratories Inc.	US organization for tests and certifications according to own or binational standards (with CSA / Canada) standards.
UMA	Unified Memory Architecture	Video memory
URL	Uniform Resource Locator	Designation of the full address of an Internet page
USB	Universal Serial Bus	
UXGA	Ultra Extended Graphics Array	Graphic standard, maximum resolution 1600x1200 pixels.
V.24		ITU-T standardized recommendation for data transfer via serial ports.
VCC		Positive supply voltage of integrated circuits

Abbreviation	Term	Meaning
VDE	Verein deutscher Elektrotechniker (Union of German Electrical Engineers)	
VGA	Video Graphics Array	Video adapter which meets industrial standard
VRM	Voltage Regulator Module	
VT	Virtualization Technology	Intel technology with which a virtually closed environment can be made available.
VT-D	Virtualization Technology for Directed I/O	Enables the direct assignment of a device (e.g. network adapter) to a virtual device.
W2k	Windows 2000	
WAN	Wide Area Network	
WAV	Wave Length Encoding	Loss-free file format for audio data.
WD	Watchdog	Program monitoring with error detection and alarming.
WLAN	Wireless LAN	LWireless local area network
WoL	Wake on Local Area Network	
WWW	World Wide Web	
XD	Execute Disable Capability	Hardware implementation
XGA	Extended Graphics Array	Graphic standard, maximum resolution 1024x768 pixels.
ZMM	Zero Maintenance Cache Protection Module	Maintenance-free cache unit for saving cache contents

Glossary

AHCI mode

AHCI is a standardized method to address the SATA controller. AHCI describes a structure in the RAM, which contains a general area for control and status, as well as a command list.

APIC mode

Advanced peripheral interrupt controller. 24 interrupt lines are available.

ATAPI CD-ROM Drive

AT Bus **A**ttachment **P**acket **I**nterface (connected to AT bus) CD-ROM drive

Automation system (AS)

A programmable controller (PLC) of the SIMATIC S7 system consist of a central controller, one or several CPUs, and various I/O modules.

Backup

Duplicate of a program, data medium or database, used either for archiving purposes or for the protection of vital and non-replaceable data against loss when the working copy is corrupted. Certain applications automatically generate backup copies of data files, and manage both the current and the previous versions on the hard disk.

Baud

Physical unit for the step speed in signal transmission. Defines the number of transferred signal states per second. With only two states, one baud is equivalent to a transmission rate of 1 bps.

Boot disk

A boot disk is a disk with a "Boot" sector. This can be used to load the operating system from the disk.

Cache

High-speed access buffer for interim storage (buffering) of requested data.

CE marking

Communauté **E**uropéene The CE mark confirms compliance of the product with corresponding EC Directives, for example, with the EMC Directive.

Chipset

Located on the motherboard, connects the processor with the RAM, the graphics controller, the PCI bus, and the external interfaces.

Cold restart

A start sequence, starting when the computer is switched on. The system usually performs some basic hardware checks within the cold start sequence, and then loads the operating system from the hard disk to work memory -> boot

COM interface

The COM interface is a serial V.24 interface. The interface is suitable for asynchronous data transfer.

Compact Flash cards (CF)

Compact Flash is a digital storage medium in card format and without moving parts. The CF card contains the non-volatile memory and the controller. The interface of the CF card corresponds with the IDE interface. CF cards can be operated without additional electronics on PCMCIA or IDE hard disk controllers using a plug and socket adapter. There are two design forms: CF-I (42.6 x 36.4 x 3.3 mm) and CF-II (42.8 x 36.4 x 5 mm).

Configuration files

These are files containing data which define the configuration after restart. Examples of such files are CONFIG.SYS, AUTOEXEC.BAT and the registry files .

Configuration software

The configuration software updates the device configuration when new modules are installed . This is done either by copying the configuration files supplied with the module or by manual configuration using the configuration utility.

Controller

Integrated hardware and software controllers that control the functions of certain internal or I/O devices (for example, the keyboard controller).

Device configuration

The configuration of a PC or programming device contains information on hardware and device options, such as memory configuration, drive types, monitor, network address, etc. The data are stored in a configuration file and enable the operating system to load the correct device drivers and configure the correct device parameters. . If changes are made to the hardware configuration, the user can change entries in the configuration file using the SETUP program. .

Disc-at-once

With this burning technique, data are written to a CD in a single session, and the CD is then closed. Further write access is then no longer possible.

DP

Display **P**ort: New digital monitor interface.

Drivers

Program parts of the operating system. They adapt user program data to the specific formats required by I/O devices such as hard disk, printers, and monitors.

Dual Core CPU

Dual-core processors significantly increase the speed of computing and program execution compared to the previous generation of single-core processors with hyperthreading technology.

ECC

Error checking and correction is a method for detecting and correcting errors when saving and transferring data, frequently used in conjunction with RAM modules with and without ECC.

EMC directive

Directive concerning **E**lectro**m**agnetic **C**ompatibility. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

Energy management

The energy management functions of a modern PC allow individual control over the current consumption of vital computer components (e.g. of the monitor, hard disk and CPU), by restricting their activity based on the current system or component load. Energy management is of particular importance for mobile PCs.

Energy options

The energy options can be used to reduce energy consumption of the computer, while keeping it ready for immediate use. This can be configured in Windows by selecting Settings > Control Panel > Energy options.

Enhanced Write Filter (EWF)

Configurable write filter that allows you, for example, to boot Windows Embedded Standard from write-protected media (such as CD-ROM), to write protect individual partitions and adapt the performance of the file system to your needs (when using Compact Flash cards).

ESD directive

Directive for using electrostatic sensitive components.

Ethernet

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

Execute Disable Capability

Hardware implementation that prevents mutual memory accesses by programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Extensible Firmware Interface (EFI)

Refers to the central interface between the firmware, the individual components of a computer and the operating system. EFI is located logically beneath the operating system and represents the successor to PC BIOS, focusing on 64-bit systems.

File Based Write Filter (FBWF)

Configurable write filter to protect individual files from write access.

Formatting

Basic partitioning of memory space on a magnetic data medium into tracks and segments. Formatting deletes all data on a data medium. All data media must be formatted prior to their first use.

Gender changer

Using the gender changer (25-pin / 25-pin), the COM1/V24/AG interface of the SIMATIC PC family can be converted to the usual 25-pin male connector.

HORM

Hibernate once, resume many is a method for fast booting from a single Hibernate file that only needs to be created once. HORM ensures restoration of a uniform, saved system state when booting. This reduces the writing to a CompactFlash medium to a minimum, for example, when starting up and shutting down Windows Embedded Standard 2009.

Hot plug

The SATA interface gives the device's hard drive system hot plugging capability. Prerequisite for this configuration is a RAID1 system with SATA RAID controller (onboard, or slot module), and at least two SATA removable cartridges. The advantage of hot plugging is that defective hard disks can be replaced without having to reboot the computer.

Hub

A term in network technology. In a network, a device joining communication lines at a central location, providing a common connection to all devices on the network.

Hyper Threading

HT technology (multi-threading) enables the parallel computing of processes. HT is only effective when all relevant system components, such as processors, operating systems and applications are supported.

IGD

Integrated Graphics Device. Graphics interface integrated in the chipset.

Image

This refers to the image, for example, of hard disk partitions saved to a file in order to restore them when necessary.

Intel Active Management Technology

This technology permits the diagnostics, management and remote control of PCs. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Intel VT

The Intel Virtualization Technology (IVT) is the implementation of a secure closed environment for applications. Special (visualization) software an a VT-capable processor is required for its use.

Interface

See Interface

- Physical interconnection (cable) of hardware elements such as PLCs, PCs, programming devices, printers or monitors.
- Interface for interactive software applications.

Interface

See Interface

- Physical interconnection (cable) of hardware elements such as PLCs, PCs, programming devices, printers or monitors.
- Interface for interactive software applications.

Interface, multi-point

MPI is the programming interface of SIMATIC S7/M7. Allows remote access to programmable modules, text-based displays and OPs from central locations. The MPI nodes can intercommunicate.

LAN

Local Area Network: LAN is a local network that consists of a group of computers and other devices that are distributed across a relatively restricted range and are linked with communication cables. The devices connected to a LAN are called nodes. The purpose of networks is the mutual use of files, printers or other resources.

Legacy Boot Device

Conventional drives can be used as USB devices.

Legacy USB support

Support of USB devices (e.g. mouse, keyboard) on the USB ports without driver.

License key

The license key represents the electronic license stamp of a license. Siemens provides the license keys for protected software.

License key disk

The license key disk contains the authorizations or license keys required to enable protected SIMATIC software.

Low-voltage directive

EC Product Safety Directive relating to the safety of products which are operated on low voltage (50 V AC to 1000 V AC, 70 V DC to 1500 V DC) and not specified in other directives. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

LPT interface

The LPT interface (Centronics interface) is a parallel interface that can be used to connect a printer.

Memory card

Memory cards in credit card format. Memory for user programs and parameters, for example, for programmable modules and CPs.

Module

Modules are plug-in units for PLCs, programming devices or PCs. They are available as local modules, expansion modules, interfaces or mass storage (Mass storage module).

Motherboard

The motherboard is the core of the computer. Here, data are processed and stored, and interfaces and device I/Os are controlled and managed.

Operating system

Generic term which describes all functions for controlling and monitoring user program execution, distribution of system resources to the user programs and the operating mode in cooperation with the hardware (for example Windows XP Professional).

Packet writing

The CD-RW is used as a disk medium. The CD can then be read only by packet–writing compatible software or has to be finalized. Finalization of a CD closes the CD within an ISO9660 shell. You can still write to the CD-RW several times in spite of finalization. Not all CD drives can read packet-written CDs . There are restrictions to using this method in general data transfer.

PATA

Interface for hard disk drives and optical drives, with parallel data transmission rate up to 100 Mbps.

PC card

Trademark of the Personal Computer Memory Card International Association (PCMCIA). Designation for auxiliary cards that conform with PCMCIA specifications. A PC card that has roughly the size of a credit card can be plugged into a PCMCIA slot. Version 1 specifies cards of Type I with a thickness of 3.3 millimeters, which are designed mainly for use as external memory. Version 2 of the PCMCIA specification also defines cards of Type II with a thickness of 5 mm and cards of Type III with a thickness of 10.5 mm. Type II cards can realize devices such as modems, fax cards and network interface cards. Type III cards are equipped with devices that require more space, for example wireless communications modules, or rotary storage media such as hard disk drives, for example.

PC/104 / PC/104-Plus

Two bus architectures are especially fashionable today in the industrial world. PC/104 and PC/104-*Plus*. Both are standard in single-board computers of the PC class. The electrical and logical layout of the two bus systems is identical with ISA (PC/104) and PCI (PC/104-*Plus*). Software cannot usually detect a difference between them and normal desktop bus systems. Their advantage is the compact design and the resulting space they save.

PCMCIA

Association consisting of approx. 450 member companies of the computer industry whose focus is set on providing worldwide standards for miniaturization and flexible use of PC expansion cards in order to provide basic technologies to the market.

PEG interface

PCI Express for Graphics. Graphics interface with 16 PCIe lanes for expansions with graphics modules.

PIC mode

Peripheral interrupt controller. 15 interrupt lines are available.

Pixel

PixElement (picture point). The pixel represents the smallest element that can be reproduced on-screen or on a printer.

Plug&Play

Generally, a reference to the ability of a computer to automatically configure the system for communication with peripheral devices (for example monitors, modems or printers). The user can plug in a peripheral and "play" it at once without manually configuring the system. A Plug&Play PC requires both a BIOS that supports Plug&Play and a Plug&Play expansion card.

POST

Self-test performed by the BIOS after the computer is switched on. Performs a RAM test and a graphics controller test, for example. The system outputs audible signals (beep codes) if the BIOS detects any errors; the relevant message indicating cause of error is output on the screen.

PROFIBUS/MPI

Process **F**ield **Bus** (standard bus system for process applications)

PROFINET

PROFINET is the name of the standard for Industrial Ethernet developed and maintained by the PROFIBUS user organization. PROFINET unites protocols and specifications with which Industrial Ethernet meets the requirements of industrial automation technology.

Programmable controller (PLC)

The programmable controllers (PLC) of the SIMATIC S5 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

PXE server

A **P**reboot E**x**ecution **E**nvironment server is part of a network environment and can provide software to connected computers even before they boot. This can involve operating system installations or servicing tools, for example.

RAID

Redundant **A**rray of **I**ndependent **D**isks: Data storage system which is used to save data and the corresponding error correction codes (parity bits, for example) to at least two hard disk volumes in order to enhance reliability and performance. The hard disk array is controlled by management programs and a hard disk controller for error correction. The RAID system is usually implemented in network servers.

RAL

Restricted **A**ccess **L**ocation: Installation of the device in a production facility with restricted access, for example, a locked control cabinet.

Recovery CD

Contains the tools for configuring hard disks and the Windows operating system.

Reset

Hardware reset: Reset/restart of the PC using a button/switch.

Restart

Warm restart of a computer without switching the power off (Ctrl + Alt + Del)

Restore DVD

The Restore DVD is used to restore the system partition or the entire hard disk to factory state if the system has crashed. The bootable DVD contains all the necessary image files. You can also create a boot disk allowing restoration via the network.

ROM

Read-Only Memory ROM is a read-only memory in which every memory location can be addressed individually. The programs or data are permanently stored and are not lost in the event of a power failure.

S.M.A.R.T

The Self-Monitoring, Analysis and Reporting Technology (SMART or S.M.A.R.T.) is an industry standard integrated in storage media. It makes for permanent monitoring of important parameters and early detection of imminent problems.

SAS

Serial SCSI interface for connection of hard drives, for example, with serial data transmission

SATA

Serial ATA Interface for hard disk drives and optical drives with serial data transmission.

SCSI interface

Small Computer System Interface Interface for connecting SCSI devices such as hard disk drives or optical drives.

Session at once

In session at once, the CD can be written to both with an audio session and a data session. The two sessions are written to at once (as in disc at once).

SETUP (BIOS Setup)

A program in which information about the device configuration (that is the configuration of the hardware on the PC/PG) is defined. The device configuration of the PC/PG is preset with defaults. Changes must therefore be entered in the SETUP if a memory expansion, new modules or a new drive are added to the hardware configuration.

SSD (Solid State Drive)

A Solid State Drive is a drive that can be installed like any other drive; it does not contain a rotating disk or other moving parts because only semiconductor memory chips of similar capacity will be used. This design makes SSDs more rugged, provides shorter access times, low energy consumption and rapid data transfer.

STEP 7

Programming software for the creation of user programs for SIMATIC S7 controllers.

Track-at-once

In track-at-once recording, a CD can be written to in bits in several sessions if the CD was not closed.

Troubleshooting

Error cause, cause analysis, remedy

Trusted Execution Technology

Hardware implementation that allows secured execution of programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Turbo Mode

In this mode individual processor cores can be clocked higher in accordance with the load from the user programs and as required. It is only supported by Core i5 and Core i7 processors.

V.24 interface

V.24 is a standardized interface for data transfer. Printers, modems, and other hardware modules can be connected to a V.24 interface.

Wake on LAN (WoL)

Wake on Local area network. This function allows the PC to be started via the LAN interface.

Warm restart

The restart of a computer after a program was aborted. The operating system is loaded and restarted again. The CTRL+ ALT+ DEL hotkey can be used to initiate a warm restart.

WLAN

Wireless **LAN** is a local network that transmits data via radio waves, infrared light or another wireless technology. Wireless LAN is mainly used for mobile computer applications in office or factory environments.

ZMM

Zero **M**aintenance Cache Protection **M**odule is a functional unit of the SAS Raid controller that stores the data in the cache of the controller in the case of a voltage failure. This functional unit is maintenance-free.

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