SIEMENS

SIMATIC

Industrial PC
SIMATIC Rack PC 647B

Operating Instructions

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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
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Proper use of Siemens products

Note the following:

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

1

1.1 Preface

Purpose of this documentation

These operating instructions contain all the information you need to commission and use the SIMATIC Panel PC 647B.

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

This documentation is valid for all variations of SIMATIC Rack PC 647B and describes delivery conditions as of April 2009.

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.

Conventions

The term Rack PC or device is also used within this documentation as abbreviation of the product name SIMATIC Rack PC 647B. The abbreviations CP will be used for CP 1616 onboard and Vista for Windows Vista Ultimate.

History

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

Edition	Comment
12/2008	First Edition
04/2009	Alternative PCI/ PCIe x4 bus module

1.2 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 information

2

2.1 General safety instructions

⚠ 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 the device / repairs

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.

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

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 directives

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 Rack PC 647B is an industrial PC in 19" rack format (2 HU) with high-performance industrial functionality:

- Highly compact
- Extremely rugged
- Extensive product continuity



Figure 3-1 SIMATIC Rack PC 647B

3.2 Areas of application

The SIMATIC Rack PC 647B provides machine, systems and control cabinet engineering companies with a high-performance and highly flexible 19" rack PC platform for machine-oriented industrial applications:

- Automatic measurement and control systems for controlling process and machine data
- Visualization of production sequences and processes
- Computing and processing of images for QC
- Data acquisition and management

The SIMATIC Rack PC 647B has CE certification for use in the industrial sector as well as in residential and commercial areas, and small businesses. In addition to the industrial applications, it can also be used in building services automation or in facilities open to the public.

3.3 Highlights

Highly compact:

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

Highly compatible with industrial standards:

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

High-performance industrial functionality:

- 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 security:

- 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 PC DiagMonitor – PC diagnostics/message software by way of OPC/SNMP/LAN
- SIMATIC PC/PG Image Creator – data imaging software
- RAID1 – redundant data storage to two hard disk volumes protects against data loss

3.4 Function

- Integrated programmable monitoring functions (program execution (watchdog), internal housing temperature, fan speed)
- Enhanced diagnostic/messaging by way of Ethernet, E-mail, SMS, and for direct input in SIMATIC software by way of OPC (optional using SIMATIC PC 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 PCs
- 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 • Horizontal installation is possible • 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 damping drive bay) • 1 x optical drive (slimline)
Slots for expansion cards	• Alternative 2x PCI long or 1x PCI long, 1x PCIe x4 long • 1 x PCI Express x16 long
Graphics	• Onboard Intel® GMA950 graphics controller 2-D and 3-D engine integrated in chipset, Dynamic Video Memory Technology (uses up to 128 MB of RAM) Max. 1280x1024 at 100 Hz / 32-bit color depth Max. resolution: 2038x1536 at 75 Hz / 16-bit color depth • in PCIe x16 slot (optional) PCIe x16 graphics card (dual head: 2 x VGA or 2 x DVI) [1)] 128 MB RAM Up to 2048 x 1536 pixels at 75 Hz / 32-bit color depth
Interfaces	
PROFIBUS/MPI	12 Mbps (isolated potential, compatible to CP 5611); optional
PROFINET	10/100 Mbps (CP 1616 onboard), three RJ-45; optional
Ethernet	2x 10/100/1000 Mbps (two RJ-5) Wake on LAN and Remote Boot supported
USB	2 x front panel, 4 x rear panel; (high current)
Serial	COM1 (V.24), COM2 (V.24) 9-pin
Parallel	LPT1
VGA	1 x
Keyboard	PS/2
Mouse	PS/2
Audio	Microphone, Line out / Headset

General features	
Power supply	100 VAC to 240 VAC, wide range; with short-term power failure backup in accordance with NAMUR: Max. 20 ms at 0.85 rated voltage
1)	The modules should not occupy more than one slot

Monitoring functions	
Temperature	• Overshoot/undershoot of permissible operating temperature • Messages can be evaluated by the application program
Fan	• Speed monitoring • Messages can be evaluated by the 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 the 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™2 Duo T7400 (2.16 GHz, 667 MHz FSB, 4 MB Second Level Cache, EM64T, VT)
RAM expansion	512 MB SDRAM DDR2 667 (PC 5300) Single Channel 2 x SO DIMM slots for max. 4 GB
Drives	
Hard disks	80 GB SATA, 3.5", internal installation
Operating system	without

Optional accessories	
Processor	• Intel® Core™2 Duo T5500 (1.66 GHz, 667 MHz FSB, 2 MB Second Level Cache, EM64T) • Intel® Celeron® M 440 (1.86 GHz, 533 MHz FSB, 1 MB Second Level Cache)
RAM expansion	Up to 4 GB, dual-channel
PROFIBUS/MPI	12 Mbps (isolated potential, compatible to CP 5611)
PROFINET	10/100 Mbps (CP 1616 onboard, three RJ-45)
Bus module	3 slots (1x PCI, 1x PCIe x16, 1x PCIe x4)
Drives	
CF drive	Slot for Compact Flash card
DVD burner slimline	Read: DVD ROM: Single Layer 8x, Dual Layer 6x DVD-R/+R: Single Layer 9x, Dual Layer 6x DVD-RW/+RW 8x, DVD-RA; 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)	Installation in removable rack or vibration damped • 80 GB • 160 GB • 2 x 160 GB; • RAID1, 2 x 160 GB (mirror disks)
Graphics controllers	• Add2 card (1x DVI-D) • PCIe x16 graphics card, dual head (2x VGA or 2x DVI-D)
Operating system	Preinstalled / supplied on Restore DVD • Windows XP Professional MUI* • Windows Server 2003 MUI • Windows Vista Ultimate *MUI: **M**ulti language **U**ser **I**nterface; 5 languages (German, English, French, Spanish, Italian)

Languages that can be installed from operating system recovery CD / DVD			
Language	**Windows XP**	**Windows Server 2003**	**Windows Vista**
German	X	X	X
English	X	X	X
French	X	X	X
Italian	X	X	X
Spanish	X	X	X
Japanese	X	X	X
Chinese (Hong Kong)	X		X
Chinese (simplified)	X	X	
Chinese (Taiwan)			X
Korean	X		

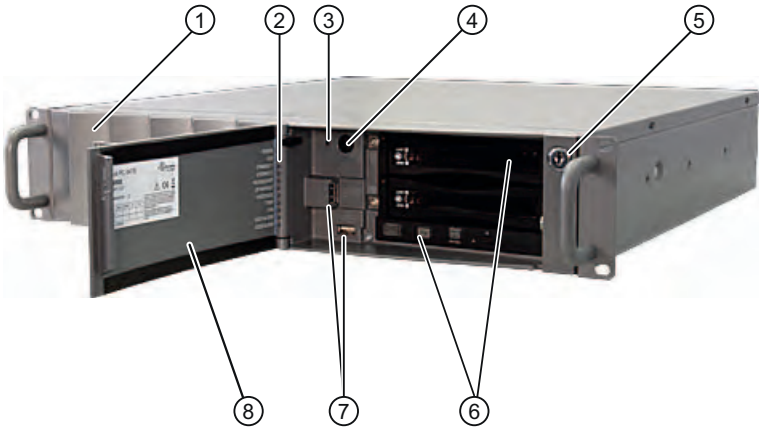
Languages that can be installed from the service pack CD / DVD		
Language	**Windows XP**	**Windows Vista**
Russian		X
Korean		X
Chinese (simplified)		X

Optional expansions	
SIMATIC PC DiagMonitor SW	Software tool for monitoring local and remote SIMATIC PCs: • Watchdog • Temperature • Fan speed • Hard disk monitoring (SMART, RAID status) • System / Ethernet monitoring (Heartbeat)
SIMATIC PC Image Creator SW	Software tool for saving data locally

3.6 Setup

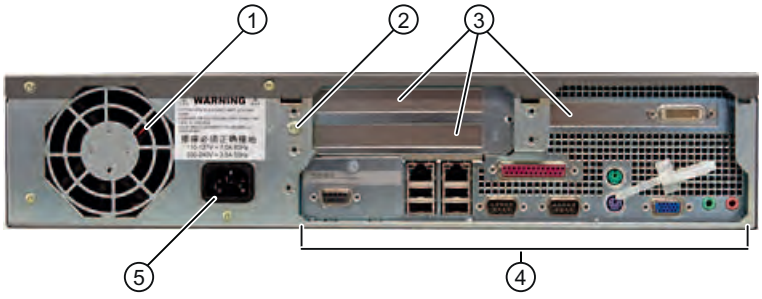
3.6.1 External design

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 • Hard disk in vibration damping drive bay
⑦	USB ports
⑧	Lockable front door for access security. Keep the front door closed during normal operation.

Rear view of the device (example)



①	Fan / power supply unit
②	Equipotential bonding connection
③	Expansion slots
④	Connection elements
⑤	Power supply connector

3.6.2 Operator Controls

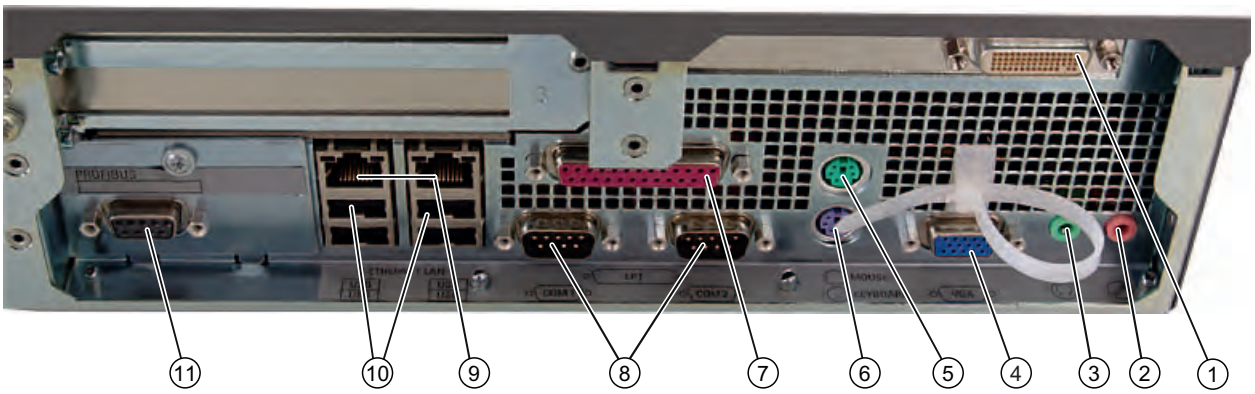
Control elements, On/Off and Reset buttons		
	①	On/off button For switching the device on or off
	②	Reset button The reset button can be operated using a pointed object or a paper clip, for example. The button signal triggers a hardware reset. The PC performs a restart (cold start).

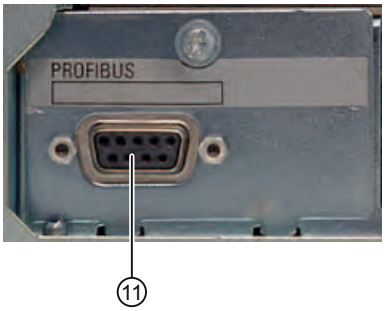
CAUTION
Data may be lost when the PC performs a hardware reset.

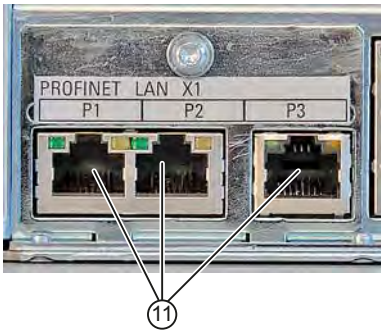
⚠ WARNING
The on/off button signal does not cut off power to the PC!

3.6.3 Connecting elements

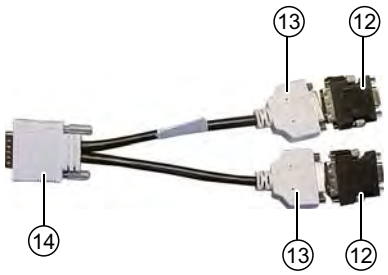
Layout of the interfaces on the rear of the device







Item	Designation	Description
①	DVI or DMS59	DVI-D connector of the ADD2 card for digital monitors (optional) or DMS59 connector for Dual Head graphics card (optional).
②	Audio (input)	Connectors for analog audio source, microphone, 3.5 mm phono jack
③	Audio (output)	Connector for active speakers or headset, 3.5 mm phono jack
④	VGA	Connection for VGA monitor
⑤	MOUSE	Connection for a PS/2 mouse
⑥	KEYBOARD	Connection for a PS/2 keyboard
⑦	LPT	Parallel interface, 25-pin
⑧	COM	Serial interface(V.24), 9-pin sub D plug
⑨	ETHERNET 1, 2 *	2 x RJ-45 connectors, Ethernet 10/100/1000 Mbps
⑩	USB	USB device connectors. USB ports 1 to 4
⑪	Blanking plate	Optional product variant
	PROFIBUS/MPI	PROFIBUS interface (RS 485, electrically isolated), 9-pin D-sub socket (optional product characteristic)
	PROFINET	CP 1616 onboard interface, three RJ-45 jacks (optional product version)
*	For unique labeling, the LAN interfaces are numbered on the enclosure. The operating system numbering may deviate from this.	



Item	Designation	Description
⑫	VGA (via the graphics card)	VGA connection (adapter plugged in)
⑬	DVI-I (via the graphics card)	DVI-I connection
⑭	Dual-head adapter (via the graphics card)	DMS59 connector on dual-head graphics card (optional)

Power supply

Position of the IEC connector	Description
	IEC connector for the AC power supply to the device. The permitted power range is 100 VAC to 240 VAC.

3.6.4 Status displays

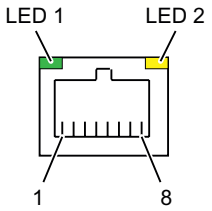
Front status displays



Display	Meaning	LEDs	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

Front status displays			
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 faulty HDD, refer to the RAID system (Page 50) section)
		Both flash	RAID is synchronized
All displays are lit	Error in early BIOS Post	All lit	CPU startup failure Error in early POST
*	For unique labeling, the LAN interfaces are numbered on the enclosure. The operating system numbering 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
		GREEN	Active cable connected
	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 housing. 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.

CAUTION
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.

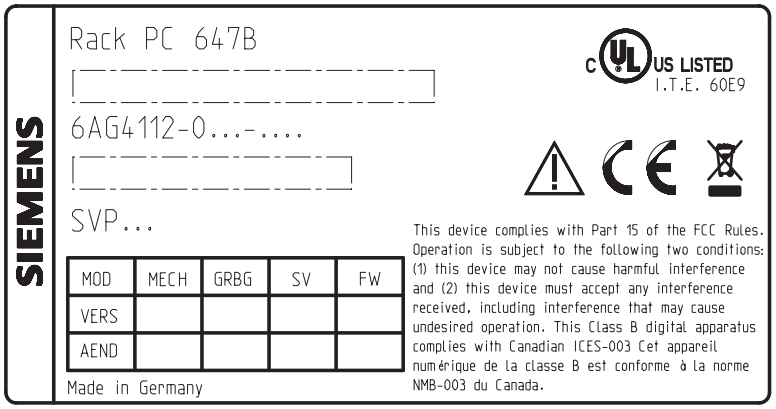


Figure 4-1 Rating plate

- Order number of the device

- Ethernet address: The Ethernet address of the device is available in BIOS Setup **(F2 function key)** , at **Info > (F1 function key) > LAN Address**.
- Microsoft Windows "Product Key" on the "Certificate of Authenticity" (COA). The COA label is attached to the inside of the front door.
  You may need the Product Key in case you reinstall the operating system.



Figure 4-2 COA label

Serial number	S VP ...
Order no.	6AG4112-0 ...
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

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

- Observe the climatic and mechanical environmental conditions in the technical data in your operating instructions.
- Avoid extreme ambient conditions as far as possible. Protect your device against dust, moisture and heat.
- The device is designed for use in normal industrial environments to IEC 60721-3-3 (pollutant class 3C2 for chemical influence, 3S2 for sand and dust.) 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.

⚠ WARNING
Failure to comply with these requirements for system installation shall render approvals to UL 60950-1, EN 60950-1 void and leads to the risk of overheating and injury!

4.4 Access protection

The access protection of the rack PC is only enabled if the front door is locked.

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

Options of mounting the device

- 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 148) and Dimensional drawing for the use of telescopic rails (Page 150).

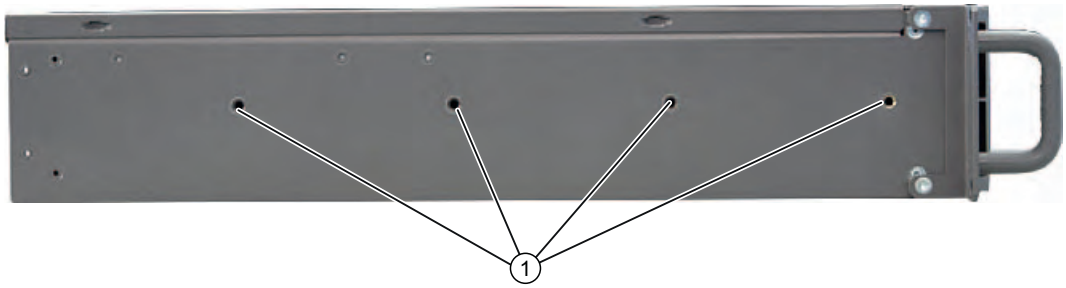


Figure 5-1 Position of the mounting holes ①

CAUTION
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

NOTICE
Connect only peripherals approved for industrial applications according to EN 61000-6-2.

Note

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

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

CAUTION
Strictly adhere to the specifications in the I/O manuals.

NOTICE
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 device to power

Note before connecting

Note

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

⚠ 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.

⚠ CAUTION

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 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, operation on a 230 V power supply:

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 AC power supply
To be used is a flexible power cord approved to UL and with CSA label, and which has the following features: Type SJT with three leads, min. 18 AWG conductor cross-section, max. length 4.5 m, parallel grounding plug 15 A, min. 125 V.

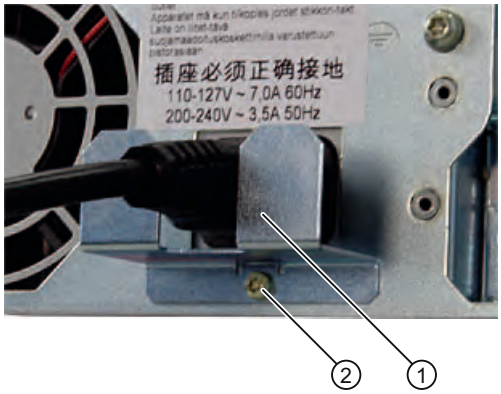
240 VAC power supply
Use a flexible power cord which is approved to UL and CSA, and which has the following features: Type SJT with three conductors, min. 18 AWG conductor cross-section, max. length 4.5 m, and tandem grounded connector 15 A, min. 250 V.

Connecting

Steps for connecting the device to mains		
1.	Connect the power plug.	
2.	Connect the power cable to the socket and turn on the power switch (if present) 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 cord.

Steps for securing the power plug		
1.	Loosen the screw ② on the power supply unit.	
2.	Screw the power plug locking mechanism ① to the power supply unit with this screw.	

⚠ 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.

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.

Equipotential bonding terminal	
The equipotential bonding terminal ① on the device (large surface, large-area contact) must be connected with the central grounding busbar 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 PROFINET strain relief

The PROFINET strain relief provided in the package is used to prevent accidental loosening of the cable from the device. A cable tie (not included in the package) is needed for each interface.

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

Steps for connecting the PROFINET strain relief		
1.	Remove the PROFINET interface plate.	

Steps for connecting the PROFINET strain relief		
2.	Attach the PROFINET strain relief.	
3.	Attach the cable using the cable tie.	

Commissioning

7

7.1 Requirements for commissioning

- 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.

CAUTION
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.

7.2 Initial Commissioning - Initial Startup

The Rack PC operating system is automatically set up the **first** time you switch on the device. Procedure:

1. Press the on/off button. The green power LED lights up. The PC performs a POST. During the self-test, this message appears:
   `Press <F2> to enter SETUP`
2. Wait until this message is cleared, then follow the instructions on the screen.
3. Type in the Product Key as required. You find this key on the "Certificate of Authentication", in the "Product Key" line.

NOTICE
The PC may not be switched off when you run setup. Do **not** change the default BIOS settings, otherwise the operating system setup may become corrupted.

4. Automatic restart

After you have entered all necessary information and after the operating system setup is completed, the PC is automatically restarted and displays the user interface of the relevant operating system.

From now on, after you switch on the PC, the user interface of the operating system is automatically opened when the startup routine is completed.

Switching off the device

Note

On a Windows platform, always shut down the PC by clicking **Start > Close**.

Press the on/off button behind the front panel door. The green power LED is switched off. Disconnect the mains connector to isolate the device from mains.

7.3 Windows XP, Vista Security Center

Warning from the Windows Security Center

A warning from the Windows Security Center appears the first time you switch on your device. The Security Center checks the status of the device with 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 (Vista 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 Compact Flash card (optional)

NOTICE
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 adapter with a CompactFlash card as a flash drive.

Features

The flash drive with Contract card acts just like a standard IDE 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)
- Voltage 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. You will find the procedure for installing an operating system described in the section Installing Microsoft Windows operating systems (Page 123). How to change the boot priority in the BIOS setup is described in the section Boot menu (Page 210).

7.4.2 DVD burner

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

In order to utilize full functionality of the DVD burner you need to install additional software (burning software). 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.

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

Notes on burning optical data carriers

CAUTION
Danger of data errors when burning data carriers! 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.

7.4.3 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 faulty drive with a new drive of the same type and capacity.

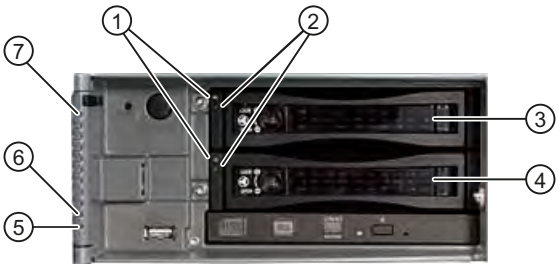
NOTICE
Always lock the hard disk cartridge in the removable rack to ensure reliable operation of the device.

⚠ CAUTION
Hard drives may only be replaced in a removable rack if the hard drive is inactive and the HDD activity display of the device is off. Check the ESD Guidelines (Page 231).

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.

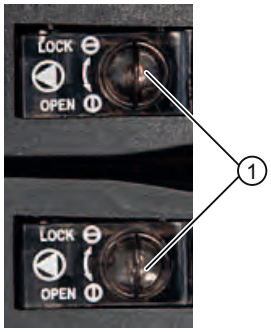
	Power LED ① power applied
	HDD activity display ② You should also check the HDD access display ⑦, HDD 1 ALARM ⑥ or HDD 2 ALARM ⑤. See also the section Status displays (Page 22) .

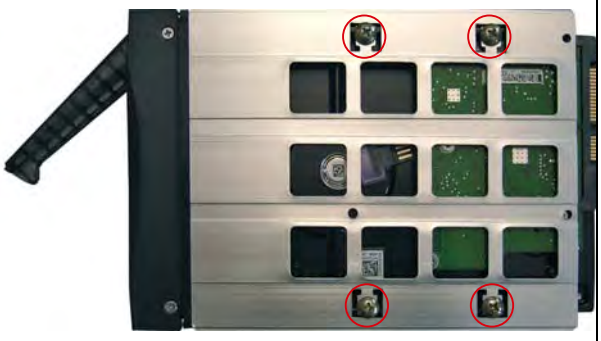
The table below shows the assignment of the exchangeable rack positions in the device to the RAID system reports:

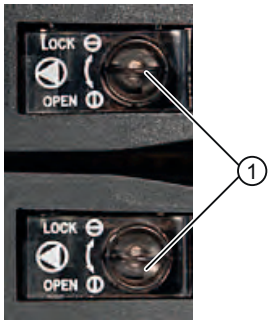
Assigned LED [1]	RAID BIOS	RAID software	SATA interface	Installation location	Enclosure labeling
HDD1 ALARM	Port 0	Device Port 0	SATA0	③ Removable rack	1
HDD2 ALARM	Port 2	Device Port 2	SATA2	④ Removable rack	2

[1] If the SIMATIC monitoring software is installed, the status LED ⑤ or ⑥ on the front panel is lit if the hard disk has failed.

Replacing a hard disk

Steps for replacing the hard disk		
1.	Check which hard disk the RAID controller has reported being faulty (hard disk on channel 1 or 2).	
2.	Turn the locking switch ① to the "OPEN" position.	
3.	Press on the marking ◀ or press the release in the direction of the arrow, so that the lever on the hard disk cartridge comes out.	

Steps for replacing the hard disk		
4.	Pull the lever out until you feel the hard disk cartridge release and pull it out completely.	
5.	Loosen the four screws on the base of the cartridge.	
6.	Remove the hard disk from the cartridge.	
7.	Always replace the defective disk with a new one of the same type and capacity. Take care not to touch the contacts.	
8.	Secure the hard disk with the four screws on the base of the cartridge. Only use the original screws.	

Steps for replacing the hard disk		
9.	Close the lever ① of the hard disk cartridge again.	
10.	Return the locking switch ① to the "LOCK" position. You can hear clearly when the removable rack is locks into position.	

Information about the recovery of the RAID system is available in the section RAID system (Page 50).

7.4.4 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 the 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.

NOTICE
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.

7.4.5 RAID system

This is a RAID1 system configuration (mirroring with 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 regarding Intel RAID controllers in the RAID documentation on the included "Documentation and Drivers" CD in the Drivers\RAID\Intel directory.

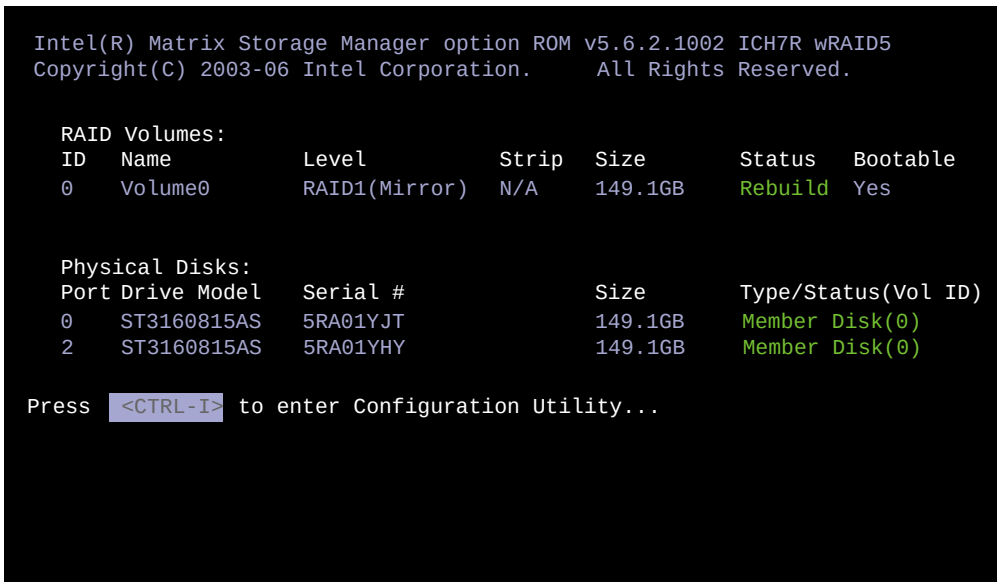


Figure 7-1 Example

RAID system management functions

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

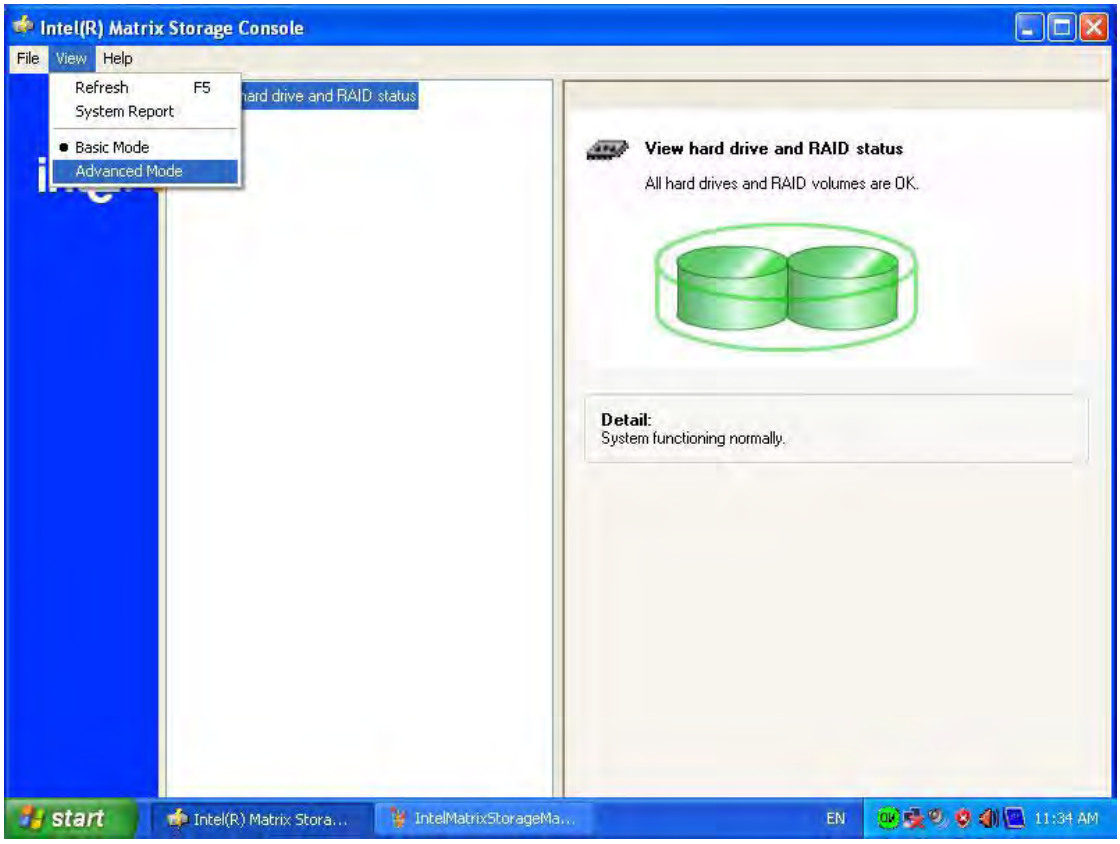


Figure 7-2 Example

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

The command "View -> System Report" can be used to create a report with details of the RAID volumes.

NOTICE
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 up to several hours to synchronize a new hard disk in the background, depending on the its size and on system load. The redundant system state RAID Level 1 is only recovered if synchronization has been successfully completed.

Comments about faults

NOTICE
Input delay System load may briefly increase due to synchronization when a hard disk has failed, depending on processor load and current hard disk activity. Execution of keyboard and touch screen commands may be briefly delayed in extreme situations. Before you replace the defective hard disk, create a backup copy of the system.

Replacing a faulty drive in a RAID array

Replace faulty RAID drives with a new drive in order to recover secure RAID1 state. The RAID software reports the faulty drive and returns details of the operable hard drive.

The functioning hard drive is indicated in BIOS by its port number, or by the RAID software by its device port number.

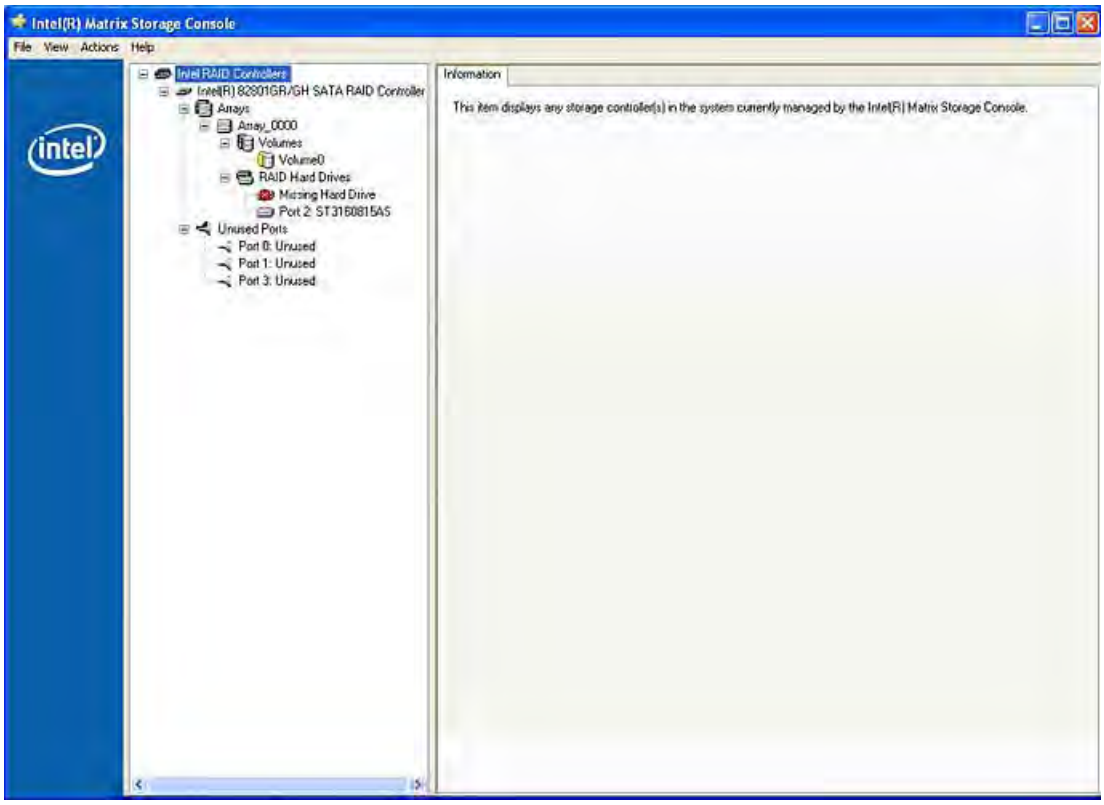


Figure 7-3 Example

Note

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

The functioning drive can be located using the following pictures and tables.



Figure 7-4 Drives in the exchangeable rack

Assigned LED [1]	RAID BIOS	RAID software	SATA interface	Installation location	Enclosure labeling
HDD1 ALARM ⑥	Port 0	Device Port 0	SATA0	Removable rack ①	1
HDD2 ALARM ⑤	Port 2	Device Port 2	SATA2	Removable rack ②	2

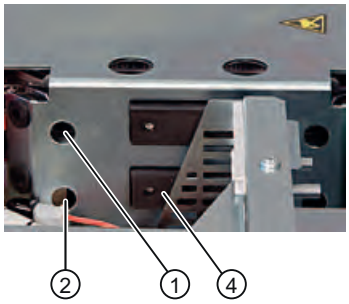


Figure 7-5 Drives in vibration damping drive bay

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

[1)] If the SIMATIC monitoring software is installed, the LED ⑤ or ⑥ of the status displays on the front panel is lit if the hard disk is defective.

Note

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

NOTICE
Drives in removable racks can be hot-plugged without shutting down the device. Devices without exchangeable rack may only be replaced in shutdown state. 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. Both HDD alarm displays of the front panel flash during synchronization. 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

Select the "Rescan for Plug and Play Devices" command to find and indicate the new HDD. You can also choose to reboot the device. In this case, the RAID software automatically integrates the new HDD and synchronizes the RAID system.

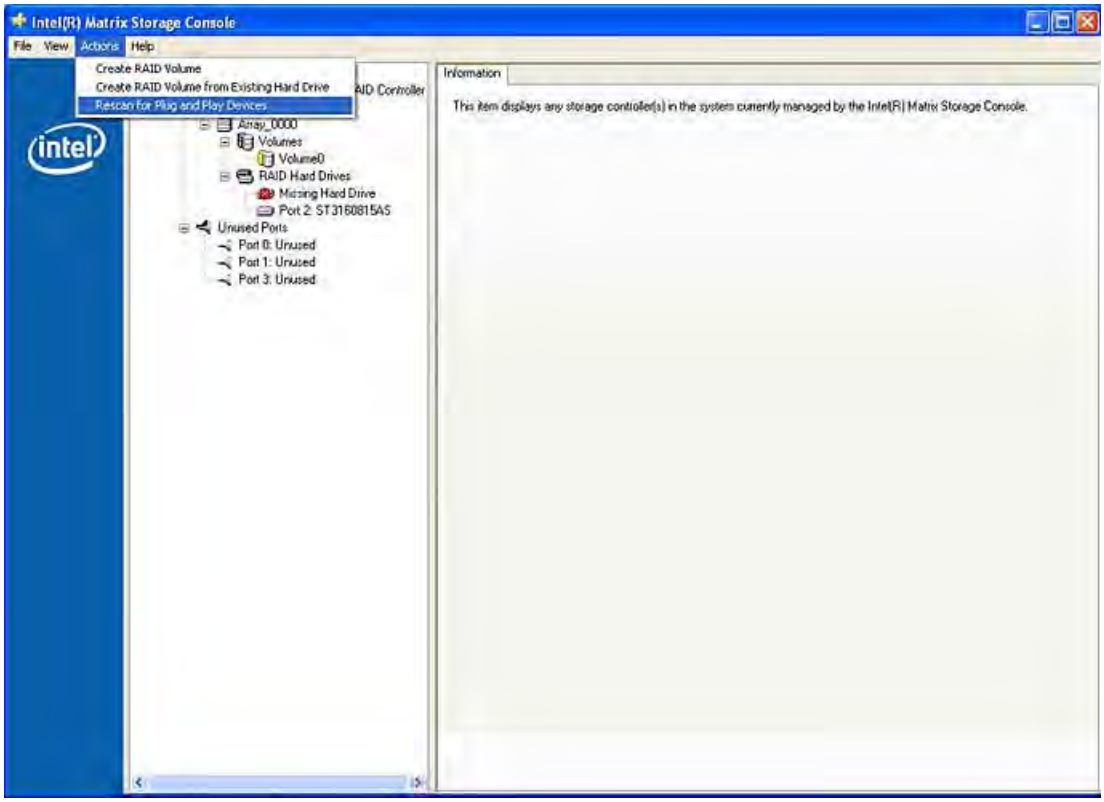


Figure 7-6 Example

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 this Hard drive" command initiates synchronization of the RAID1 system.

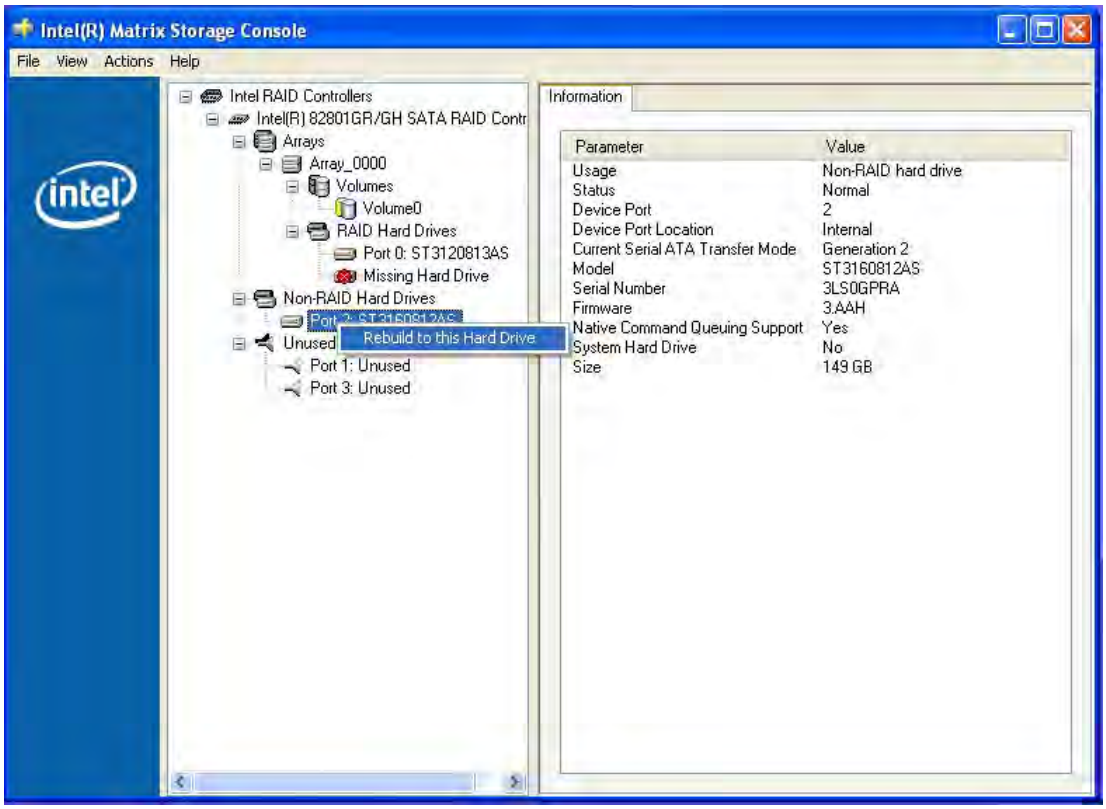
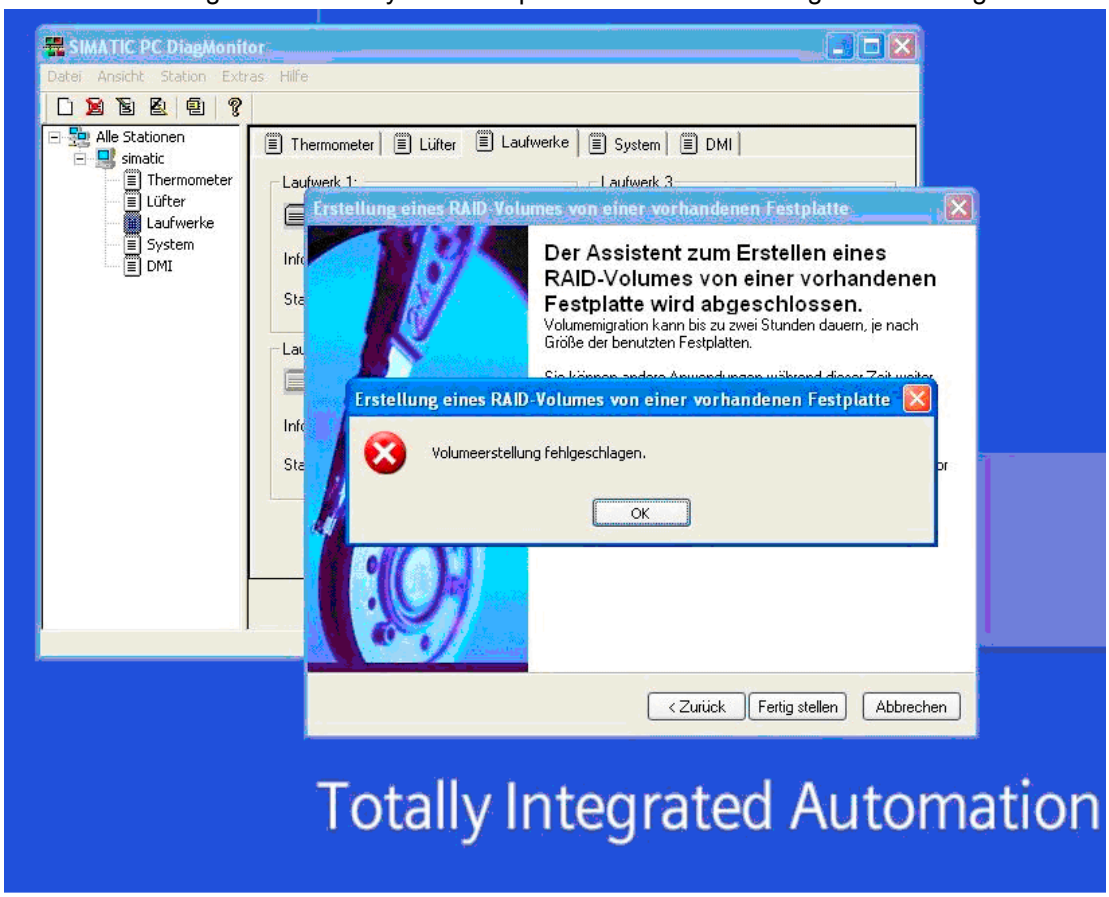


Figure 7-7 Example

Notes on RAID configuration with installed SIMATIC PC DiagMonitor software

When creating a RAID-system where SIMATIC PC DiagMonitor software is being used, the Intel Matrix Storage Console may abort the process with the following error message:



Solution:

Before performing a RAID commissioning, the SIMATIC PC DiagMonitor should be deactivated. Subsequently, it can be reactivated.

Measures:

If the DiagMonitor Management Station is in operation on your device:

- Close all applications, including the Management Station.
- Afterwards, stop the DiagMonitor SNMP Agent (SOL Agent). In order to do so, select **Start > Run** and enter `cmd` in the Open field.
- Then enter `Net stop snmp` and confirm with the Enter key.

If your device is remotely monitored with SIMATIC PC DiagMonitor:

In this case you need **only** stop the DiagMonitor SNMP Agent (SOL Agent).

- In order to do so, select **Start > Run** and enter `cmd` in the Open field.
- Then enter `Net stop snmp` and confirm with the Enter key.

NOTICE
If you do not adhere to the procedure described above, a correct RAID configuration cannot be guaranteed.

8 Integration into an Automation System

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 module can be installed in a PG/PC. You will find detailed information in the next section PROFINET (Page 61) or in the detailed descriptions > CP 1616 onboard communications processor (Page 218).

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. In Windows, the PROFINET interface will act like a 100 Mbps Ethernet interface with a MAC address when you use this driver. The three RJ-45 jacks 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 create, run or configure PROFINET IO applications with the Development Kit DK-16xx PN IO. It must be installed in addition to the CP 16xx.sys device driver. This kit and the documentation is available free of charge at the following Internet address: DK-16xx PN IO development kit
(http://www.automation.siemens.com/net/html_00/produkte/040_cp_1616_devlopkit.htm)

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

You will find additional information in the catalog and the Siemens online ordering system Industrial Automation and Drive Technologies (http://mall.automation.siemens.com)
.

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 RJ-45 jacks for connecting terminal devices or addition network components
- Integrated 3-port real-time switch
- Automatic hardware detection

CAUTION
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 on the topic of PROFINET.

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

Document designation	What is contained in this document?
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 will find product-related information on the Internet at: SIMATIC NET products and related topics (http://www.automation.siemens.com/net)

Functions

9

9.1 Overview of the monitoring functions

Functions implemented:

- Temperature monitoring and over/under-temperature display
- Watchdog
- Fan monitoring
- RAID alarm display

Messages of the monitoring modules can be transferred to applications.

The SOM software (Safecard On Motherboard) and DiagMonitor software on CD (optional) can be used to handle this functionality.

The DiagMonitor software CD contains the monitoring software, the software for the stations to be monitored, and a library for creating user-specific applications.

The descriptions of drivers and of the SOM program are available on the CD "Documentation and Drivers" under **Drivers & Updates\<device>\...**

9.2 Temperature monitoring/display

Temperature monitoring

The temperature is recorded using temperature sensors that are installed at critical locations of the device. The processor temperature, the temperature in the area of the memory modules and the temperature below the bus module are monitored.

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 is activated	None

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

- Check whether the ambient temperature limit has been exceeded, or whether the filter is soiled.
- Acknowledgment of the error message by the monitoring software
- Restart of the device

9.3 Watchdog (WD)

Function

The watchdog monitors program execution and reports a program crash to the user by means of various reactions.

After POWER ON of the PC, or after a HW RESET (cold restart), the watchdog is in idle state, that is, a reaction of the WD is not triggered and the Watchdog LED is switched off. The Watchdog LED is lit green when the watchdog is enabled (by means of the driver, SOM program or DiagMonitor software.)

WD reactions

If the WD is not triggered again within the set time (by the driver or SOM program), the following reactions are initiated:

Reaction	Option
Watchdog LED changeover from green to red	None
Trigger a PC reset	Configurable
SIMATIC monitoring software is activated	None

WD monitoring times (TWD)

The monitoring times can be set in increments of one second within a range from 3 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

The front fan and processor fan are monitored. The following reactions are triggered when a fan fails:

Reaction	Option
The fan LED switches to red	None
SIMATIC monitoring software is activated	None

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 by the SOM program or 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. For detailed information on the RAID system and on the operation of the RAID software, refer to the section RAID system (Page 50).

Reaction		Description	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 Safecard on Motherboard (SOM)

This application is used to monitor PC hardware (temperature, watchdog and fans) and to display the current measured values. You can also configure the temperature and fan monitoring functions, and the watchdog function.

Your device is equipped with three temperature sensors which are automatically detected by the application.

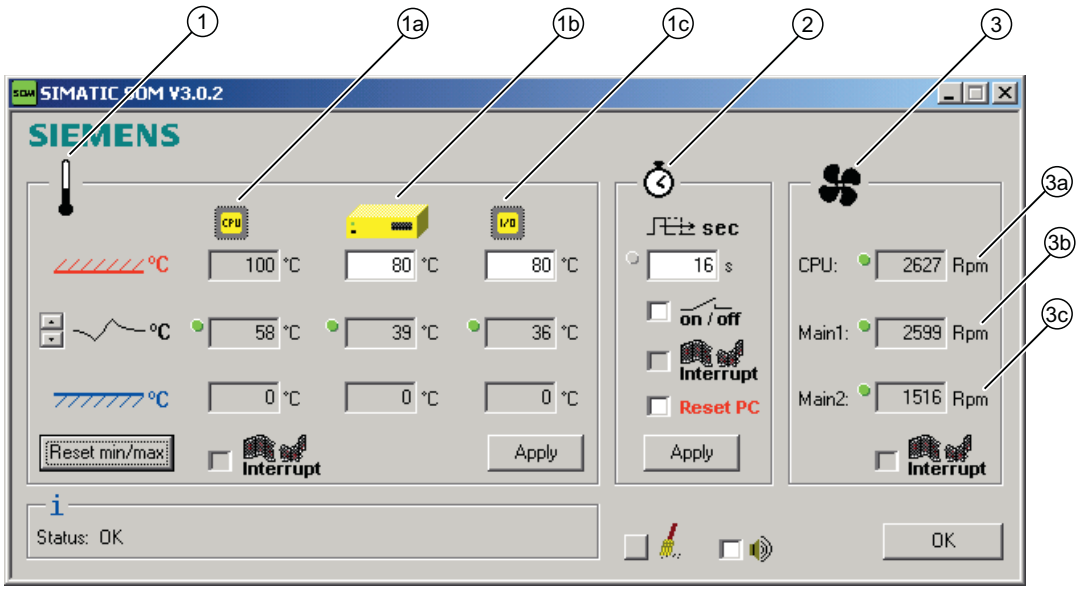


Figure 9-1 Safecard On Motherboard

(1)	Temperature range	Displays the current temperature and limit values. You can toggle the temperature display mode to indicate either the current temperature, or the min./max. values measured since the start of the application.	
		(1a)	Internal processor temperature
		(1b)	Internal device temperature beneath the power supply: high threshold can be set from 30°C to 80°C
		(1c)	Internal device temperature beneath the bus module: high threshold can be set from 30°C to 80°C
(2)	Watchdog range	Here, you can configure the watchdog function in your monitoring application. You can specify the watchdog time, activate a PC reset and activate / deactivate the watchdog.	
(3)	Fan area	You can read the current fan speed in this area.	
		(3a)	Speed of the left front fan
		(3b)	Speed of the right front fan
		(3c)	Speed of the power unit fan

The description of the SOM software and the drivers for Windows are available on the "Documentation and Drivers" DVD in **Drivers & Updates\<device>\...**

From the CD, run **Install.bat** and follow the instructions on your screen.

Expansions and parameter assignment

10

10.1 Open the device

CAUTION
Only authorized technical personnel are allowed 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
The device contains electronic components which may be destroyed by electrostatic charge. Take appropriate precautionary measures before you open the device. Refer to the ESD guidelines on handling electrostatically sensitive components (ESD Guidelines (Page 231)).

Tools

You can install all device components using TORX T10 and T20 drivers and a 4.5-mm hexagonal wrench (for the interface interlock on the rear panel.)

Preparation

Disconnect the device from the mains.

⚠ WARNING
Unauthorized 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".

Open the device

How to open the device		
1.	Open the front door ① to about 45° to release the lock ② of the front panel.	
2.	Remove the front panel.	

How to open the device		
3.	Remove the cover screws (Torx T10).	

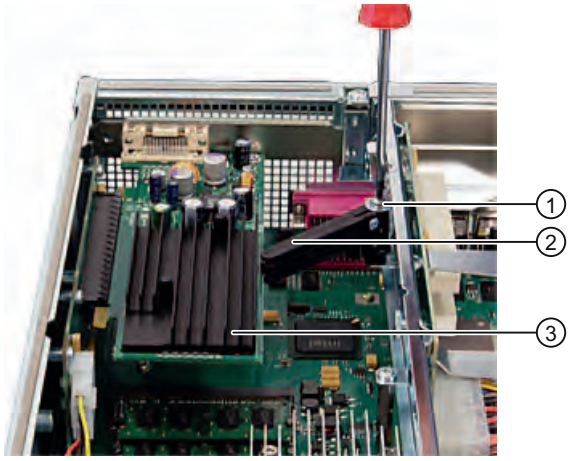
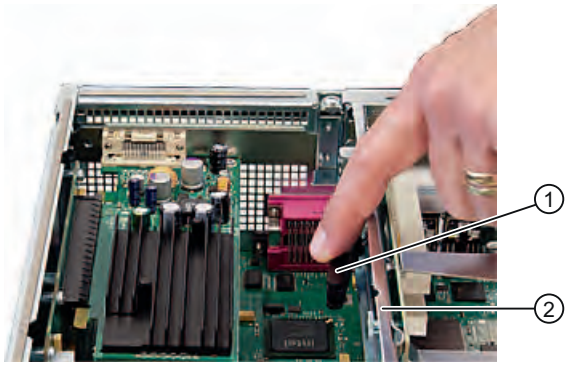
How to open the device		
4.	Hit the screwdriver lightly to release the cover.	
5.	Push the cover back and remove it.	

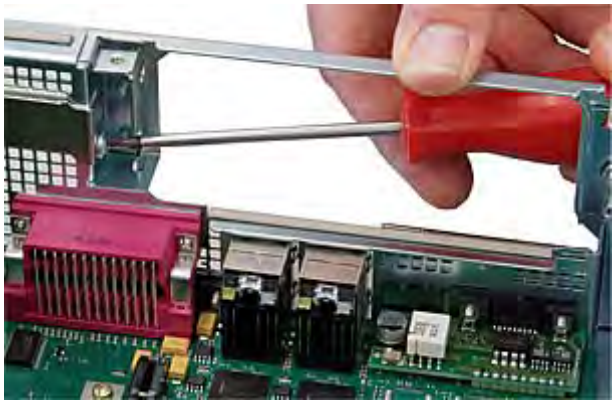
10.2 Installing / removing the graphics module

Preparation

Disconnect the device from mains and unplug all cables.

Removing / installing the graphics module

Steps for removing the graphics module		
1.	Open the device.	
2.	Open the screw ① to release the retainer ② of the graphics module ③.	
3.	Turn the retainer ① in the direction of the bus frame ②.	
4.	Remove the bus frame as described in the section Removing and installing the bus frame (Page 79).	

Steps for removing the graphics module		
5.	Loosen the screw in the slot cover of the graphics module.	
6.	Pull out the graphics module.	
7.	To install a module, follow the same steps in the reverse order.	

10.3 Memory expansion

10.3.1 Installing memory modules

Memory expansion options

The motherboard features two memory slots under the bus module. You can install 667 MHz SO-DIMM DDR2 memory modules, type PC2-5300, unbuffered, no ECC. This allows you to expand Rack PC memory up to 4 GB, of which you can use approx. 3.2 GB for the operating system and applications. You can install one or two modules.

Combination	Slot X19 (bottom)	Slot X20 (top)	Maximum expansion
1	256/512 MB / 1 GB / 2 GB		2 GB
2	256/512 MB / 1 GB / 2 GB	256/512 MB / 1 GB / 2 GB	4 GB

Note

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

If you have expansion modules with their own memory on the module (for example, graphics cards with 256 MB or more), the memory available for the operating system or application can also be less than 3.2 GB. In this case, you can set the usable memory in the BIOS menu Main > Hardware Options > Current Memory Limit".

Preparation

Disconnect the device from mains and unplug all cables.

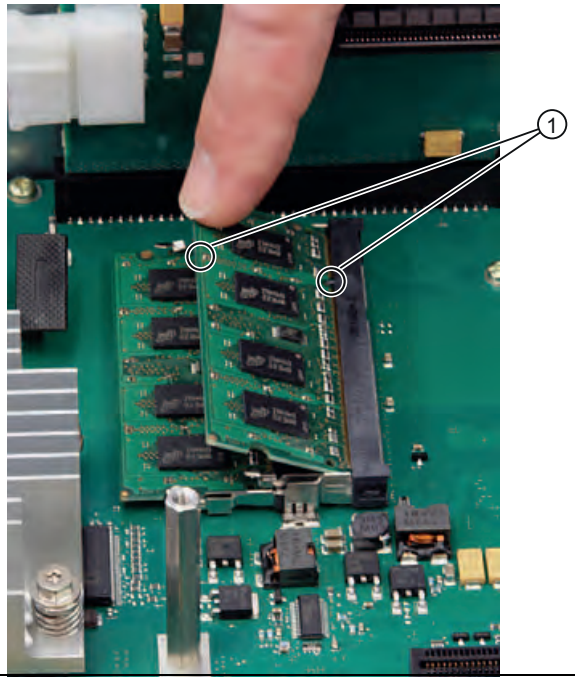
CAUTION

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 guidelines on handling electrostatically sensitive components (ESD Guidelines (Page 231)).

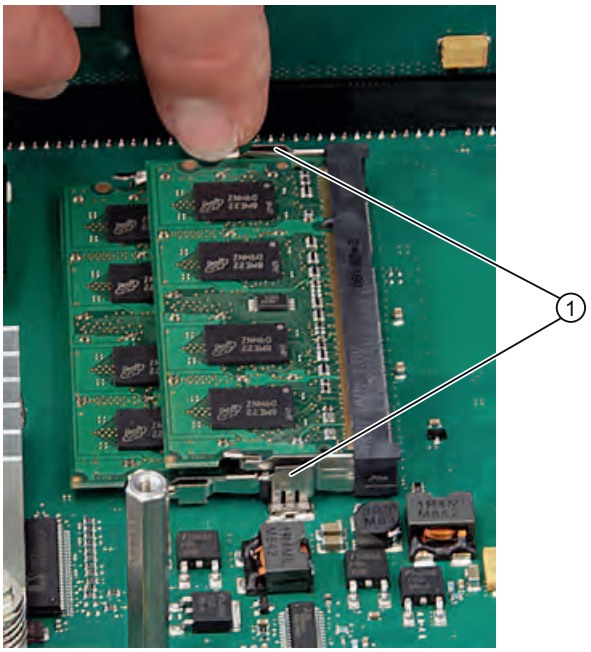
This applies in particular when handling memory modules. Do no touch the exposed contacts of the module - hold it by the sides. This avoids contaminating the contacts.

Installing a memory module

The slots for the memory modules may be hidden by the installed graphics module. If this is the case, this must first be removed.

How to install a memory module		
1.	Open the device.	
2.	If it is installed, remove the graphics module as described in the section Installing / removing the graphics module (Page 73).	
3.	Remove the bus frame as described in the section Removing and installing the bus frame (Page 79).	
4.	Note where the orientation notch ① is located on the pin side of the RAM module before inserting it.	
5.	Insert the module in the free slot you have selected.	
6.	Press the module downwards, applying slight pressure until it locks into place.	
7.	Close the device.	

Removing a memory module

How to remove a memory module		
1.	Open the device.	
2.	If the slots for the memory modules are hidden by a graphics module, remove this first. For details, see Section Installing / removing the graphics module (Page 73).	
3.	Release the locking mechanisms ① on the left and right. Start by opening the latches of the top memory module.	
4.	Pull the memory module out of the slot.	
5.	Remove the bottom memory module.	
6.	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.

10.4 Installing expansion modules

10.4.1 Notes on the modules

Notes on module specifications

The device is designed for use with modules to PCI specifications 2.3 or 1.0a. The module supports operation of 5 V and 3.3 V PCI modules. 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 Dimension drawings (Page 149) 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 should not occupy more than one slot.

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.

10.4.2 Removing and installing the bus frame

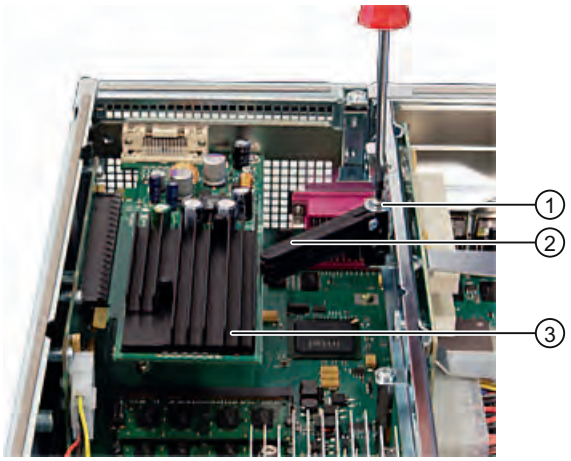
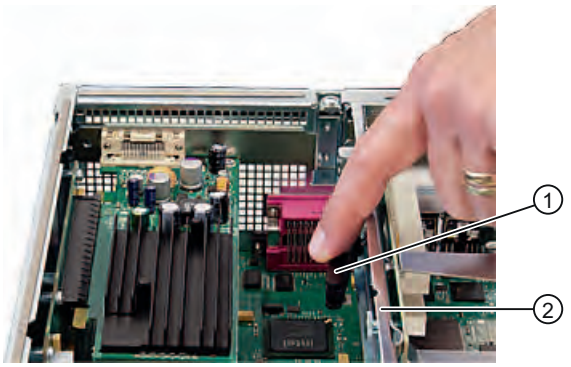
Preparation

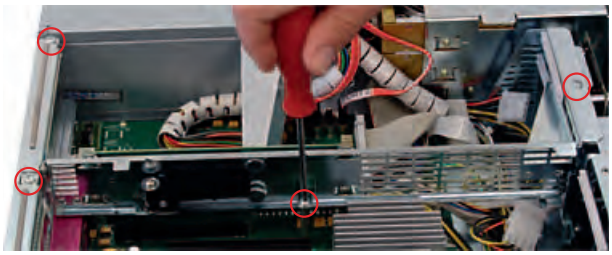
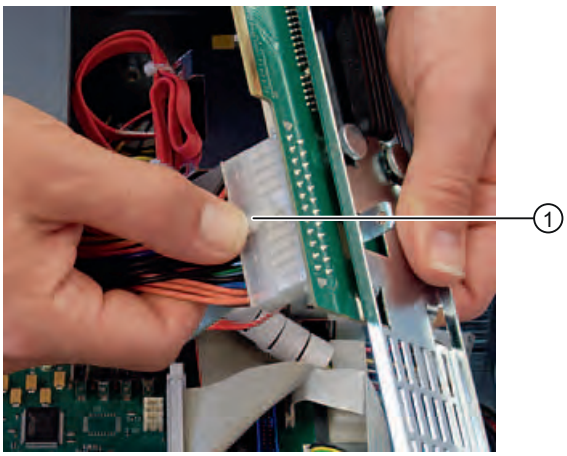
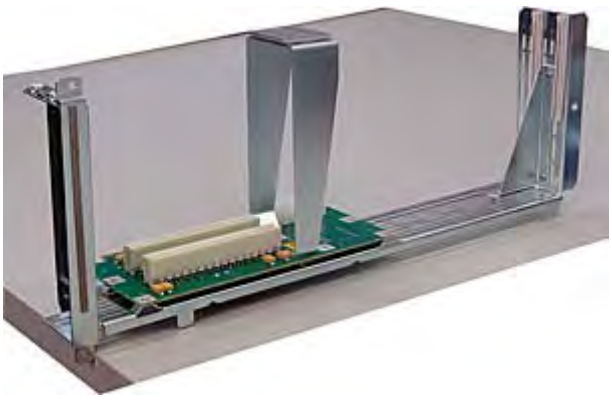
Disconnect the device from the mains.

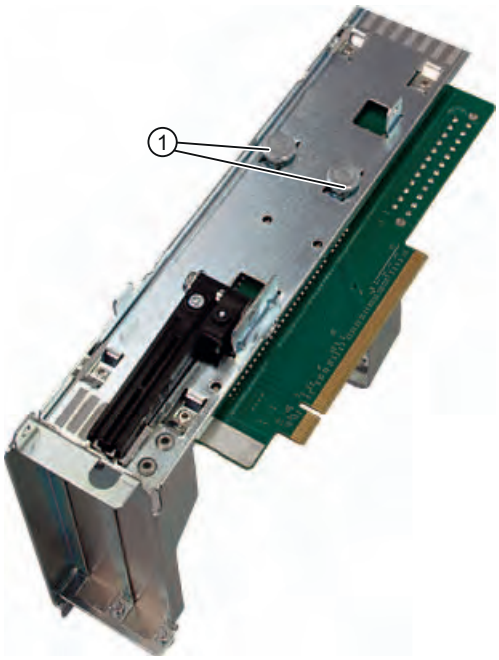
Removing the bus frame

Note

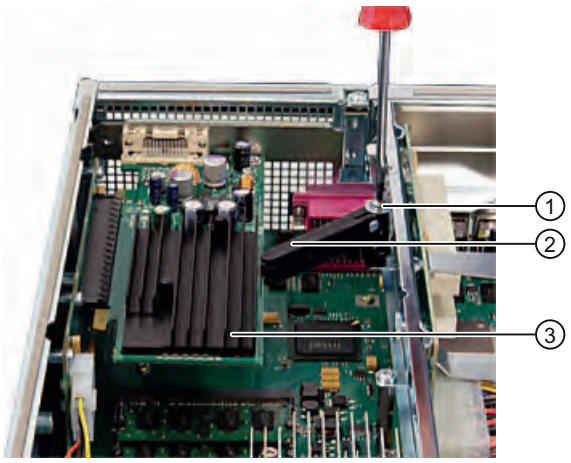
Steps 2 and 3 are only required if a graphics module is installed.

Steps for removing the bus frame		
1.	Open the device.	
2.	Open the screw ① to release the retainer ② of the graphics module ③.	
3.	Turn the retainer ① in the direction of the bus frame ②.	

Steps for removing the bus frame		
4.	Loosen the four screws on the bus frame. Note that the middle screw is seated somewhat deeper.	
5.	Take the bus frame ① out of the device.	
6.	Press down the latch ① on the power connector and remove it.	
7.	Position the bus frame with its back on a level table surface. This provides a stable base for the four feet on the bus frame. The edge of the slot cover must extend beyond the edge of the table.	

Steps for removing the bus frame		
8.	Loosen the four screws ① on the card retainer.	
9.	Remove the slot cover ① of the slot you have selected.	

Installing the bus frame

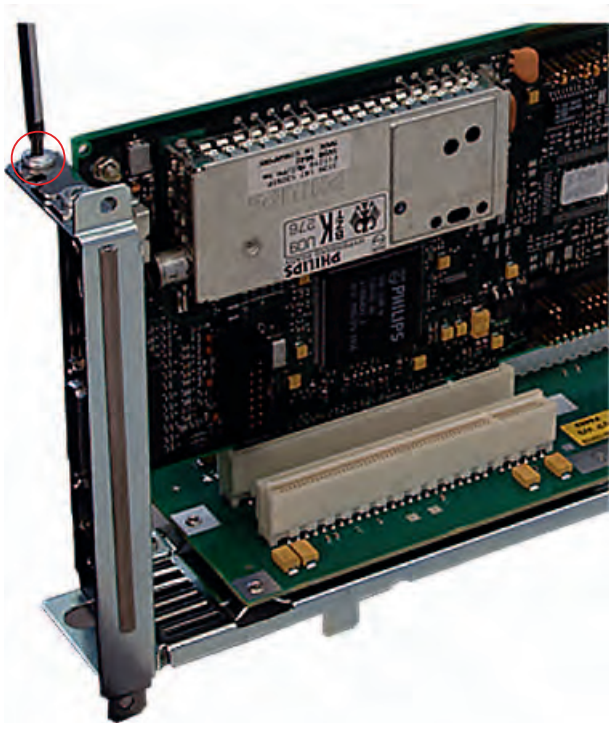
How to install the bus frame		
1.	When installing the bus frame, make sure it is aligned in the housing.	
2.	Insert the direct connector into the slot in the motherboard.	
3.	If necessary, return the retainer ② to its position on the graphics module ③ and tighten the screw ① to secure it.	

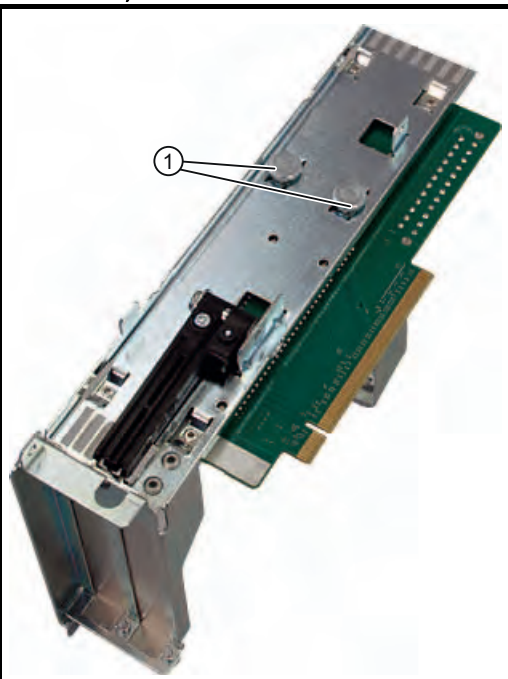
10.4.3 Installing an expansion module

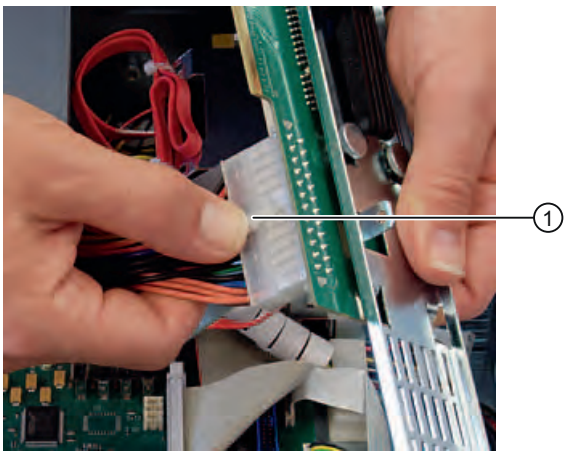
Preparation

You have removed the bus frame and, if applicable, the graphics module.

Installing expansion modules

How to install an expansion module (PCI / PCIe format):		
1.	Press the expansion module into the selected slot. Make sure that the module is seated correctly in the connector.	
2.	Screw down the slot cover for the expansion module.	

How to install an expansion module (PCI / PCIe format):		
3.	Secure the card retainer with the knurled screws ①.	
4.	Push the slider through the guide slot until it is seated firmly on the module. **Note**: The securing mechanism is designed so that the slider element can only move in the direction of the module. If you want to remove the slider element, release the card retainer and pull out the slider element towards the inside.	

How to install an expansion module (PCI / PCIe format):		
5.	Remove the excess part of the slider element by cutting the slider element on the upper edge of the holder with sharp side cutter. Do not leave any remnants jutting out.	
6.	Push the power connector firmly into the socket again. Make sure that the latch ① engages:	
7.	Install the bus frame again. For details of how to do this see section Removing and installing 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 must disable certain motherboard functions. For information on allocated resources, refer to the section System resources (Page 177). Information on disabling motherboard functions is available in the BIOS Setup (Page 183). You will find information on the assignment of the PCI IRQ line to the PCI slot in the section Advanced Menu (Page 199)" or section Bus boards (Page 171).

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

10.5 Installing drives

10.5.1 Options of installing disk drives

There are two alternative drive bays that you can install:

- The drive bay for a removable rack
- The vibration damping drive bay

Drive bay for a removable rack



①	Drive bay
②	Slimline DVD
③	Two bays for hard disk removable rack

Vibration damping drive bay



①	Vibration damping drive bay
②	Two bays for hard disk drives (with shock and vibration damping)

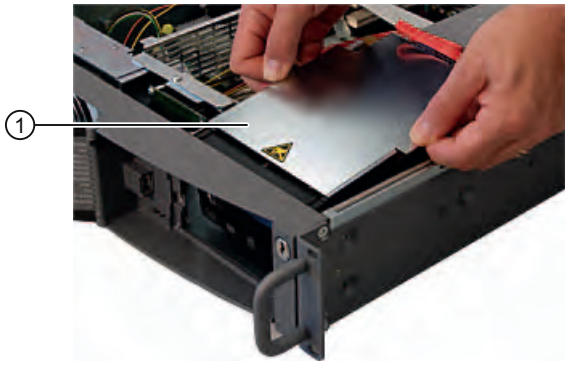
10.5.2 Installing and removing drives in the drive bay for a removable rack

Preparations

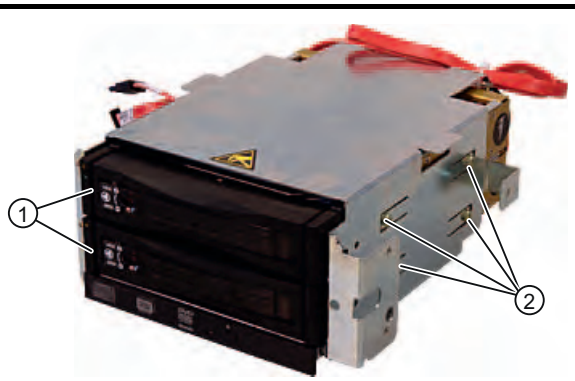
1. Disconnect the device from the power supply and remove all connecting cables from the device.
2. Open the device.

NOTICE
Check the ESD Guidelines (Page 231).

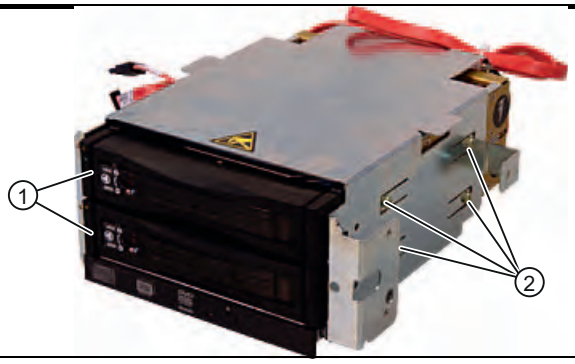
Removing a drive bay for a removable rack

Steps for removing the drive bay for a removable rack		
1.	Remove the three screws ① on the side.	
2.	Remove the two screws ② to the left of the drive bay.	
3.	Lift the drive bay ① slightly, push it towards the power supply and then lift it completely out of the device.	
4.	Detach all cables from the drives. When removing cables, hold the connector and not the cable.	

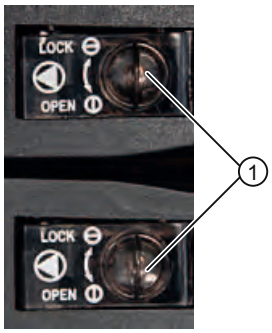
Removing the removable rack

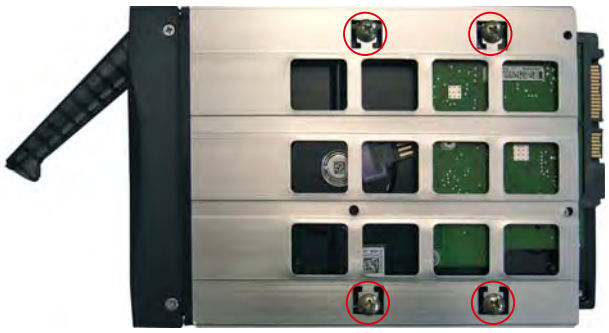
How to remove a removable rack		
1.	Remove the four screws ② (two on each side) with which the removable rack is secured to the drive bay.	
2.	Remove the removable rack ① from the drive bay.	

Installing the removable rack

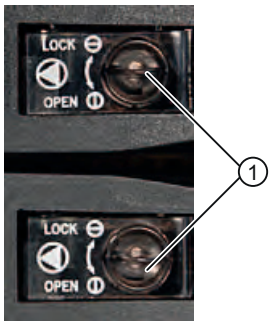
How to install a removable rack		
1.	Push the removable rack ① into the drive bay from the front.	
2.	Secure the removable rack with the four screws ② (two on each side) to the drive bay.	
3.	Connect the cables again.	
4.	Install the drive bay again.	

Removing a drive from the removable rack

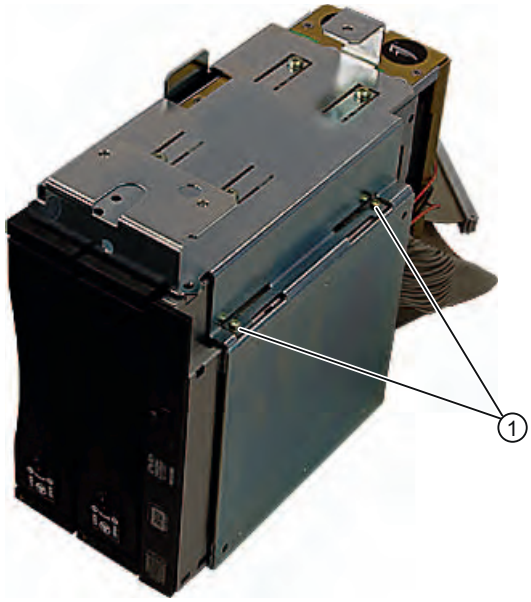
How to remove a drive		
1.	Turn the locking switch ① to the "OPEN" position.	
2.	Press on the marking ◀ or press the release in the direction of the arrow, so that the lever on the hard disk cartridge comes out.	
3.	Pull the lever out until you feel the hard disk cartridge release and pull it out completely.	

How to remove a drive		
4.	Loosen the four screws on the base of the cartridge. Use a crosshead screwdriver PH no. 1.	
5.	Pull the drive out of the cartridge.	

Installing a drive in the removable rack

How to install the hard disk		
1.	Push the drive out into the cartridge. Take care not to touch the contacts.	
2.	Secure the drive with the four screws on the base of the cartridge. Only use the original screws.	
3.	Close the lever of the hard disk cartridge again.	
4.	Return the locking switch ① to the "LOCK" position. You can hear clearly when the removable rack is locks into position.	

Removing a DVD drive

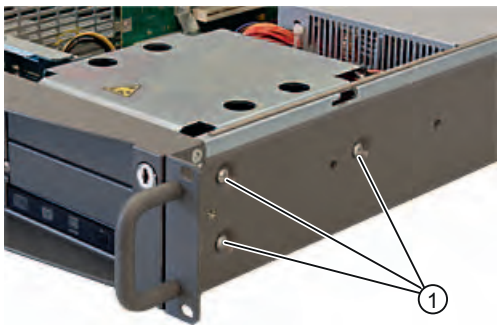
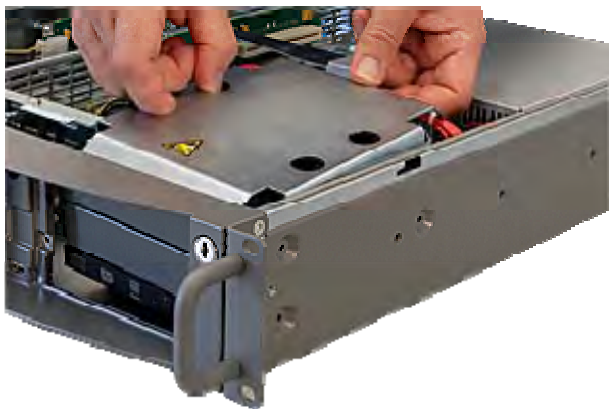
How to remove a DVD drive		
1.	Remove the four securing screws (two on each side). Use a Torx T6 screwdriver.	
2.	Pull the DVD drive out of the bay.	

10.5.3 Installing and removing drives in the vibration damping drive bay

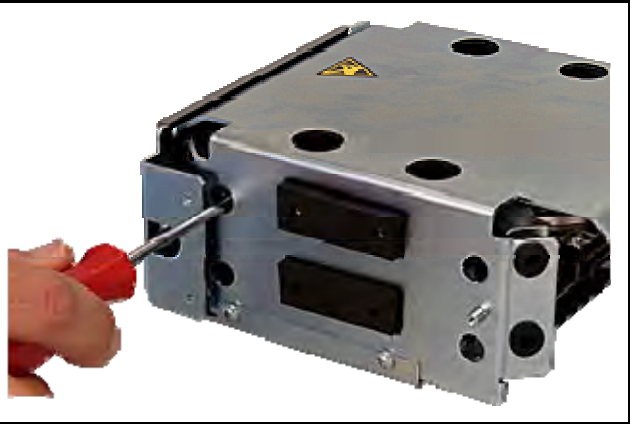
Preparations

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

Removing the vibration damping drive bay

How to remove the drive bay		
1.	Remove the three screws ① on the side.	
2.	Remove the two screws ② to the left of the drive bay.	
3.	Disconnect the connector for the DVD drive from the motherboard and lift the drive bay out of the housing.	
4.	Then disconnect the power supply and the data cable from the installed drives.	

Installing a drive

How to install a drive		
1.	Push the drive out into the drive bay.	
2.	Secure the drive to the drive bay with two screws on the right and two on the left.	
3.	Connect the power and data cables to the drive.	
4.	Install the drive bay again.	

11 Service and maintenance

11.1 Removing and installing hardware components

11.1.1 Repairs

Repairing components

Only authorized technical personnel are allowed to repair device components.

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

- 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.

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

NOTICE
Check the ESD guidelines (Page 231).

Disclaimer of liability

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

Siemens disclaims any liability 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 for SIMATIC PC/PG (http://www.siemens.com/asis)

Filter meshes are available under the following order number: A5E02318854.

Replacing filters

How to replace the filter		
1.	Open the front door ① to about 45° to release the lock ② of the front panel.	

How to replace the filter		
2.	Remove the front panel.	
3.	Change the filter when necessary. This is inserted loosely in the fan cover. When you insert the filter, make sure it lies uniformly in the fan cover.	

NOTICE

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 clearly dirty after it has been in use for some time.

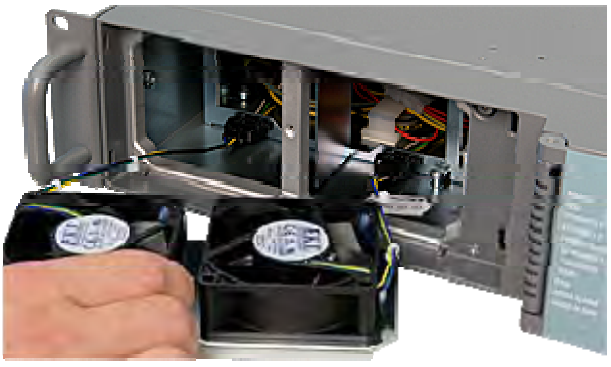
11.1.4 Replacing device fans

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 ① to about 45° to release the lock ② of the front panel.	
2.	Remove the front panel and, if necessary, replace the filter. See section Replacing filters (Page 97)	

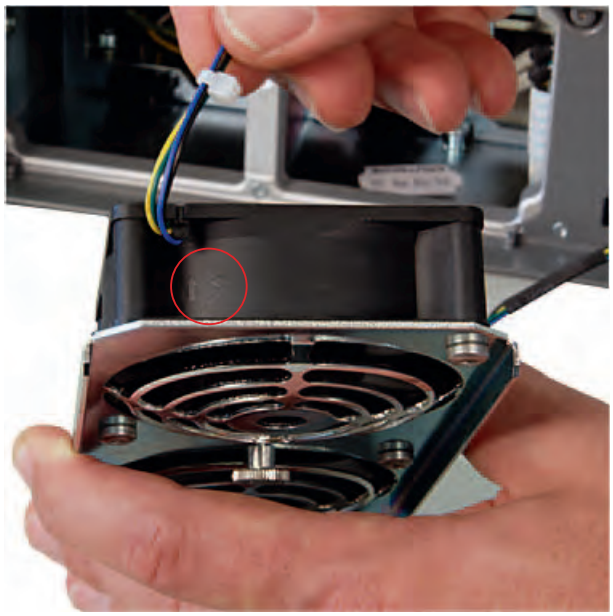
How to remove the device fan		
3.	Release the knurled screws of the fan holder.	
4.	Take the fan holder out of the housing.	
5.	First disconnect the left-hand fan connector and then the right-hand connector from the adapter connector. **Note:** The connectors are locked. To unlock them, press down the tongue on the connector of the fan cable.	

How to remove the device fan		
6.	Remove the two screws (Torx 20) per fan and remove the fan from the fan holder.	

Installing the fan

NOTICE
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 for SIMATIC PC/PG (http://www.siemens.com/asis)

CAUTION
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.	Secure the new fan to the fan holder.	
2.	Note the direction of the arrow on the fan. The picture shows the proper fan mounting position.	

How to install the device fan		
3.	Arrange the cable to the right and left of the fan and feed them through the cutouts in the front panel.	
4.	First connect the left-hand fan connector and then the right-hand connector to the adapter connector.	
5.	Place the fan holder in the housing.	

How to install the device fan		
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.

CAUTION
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 for SIMATIC PC/PG (http://www.siemens.com/asis)

Disposal

CAUTION
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.

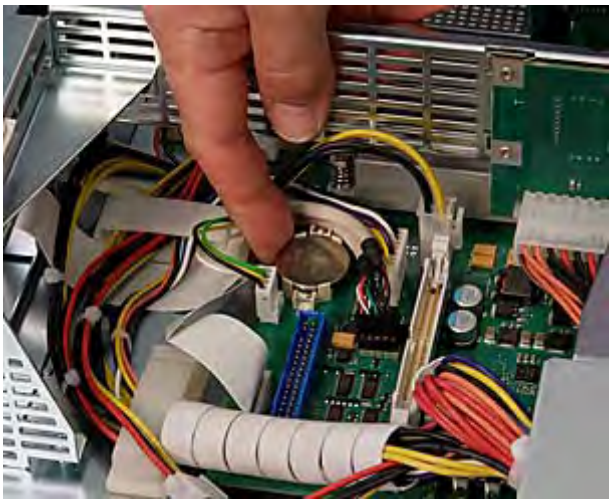
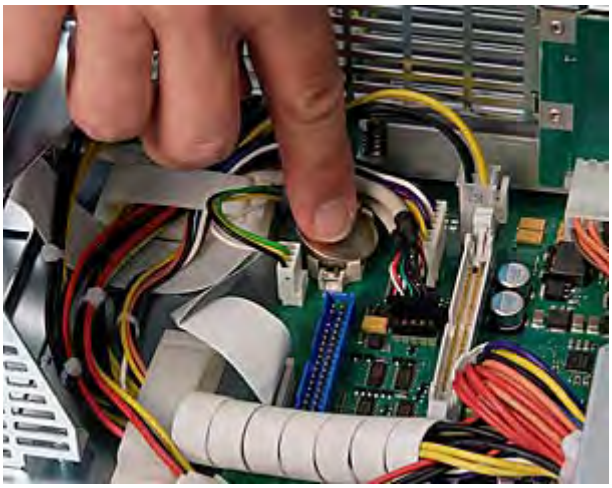
The configuration data are retained in the BIOS "Profile: User" setting; only the date and time must be set again.

A table in which you can log your settings is available in the section Default BIOS Setup entries (Page 214).

1. Disconnect the device from the power 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 Removing and installing the bus frame (Page 79)	
2.	Remove the battery from socket.	
3.	Press the new battery into the socket applying slight pressure.	
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.

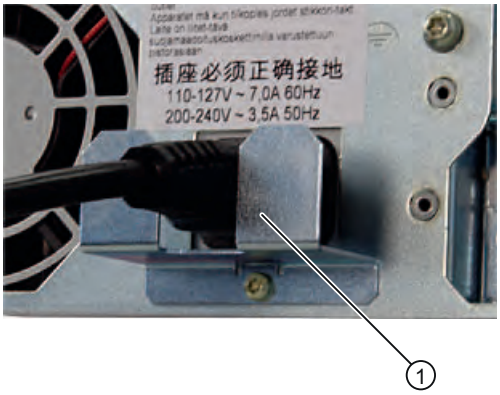
11.1.6 Removing the power supply module

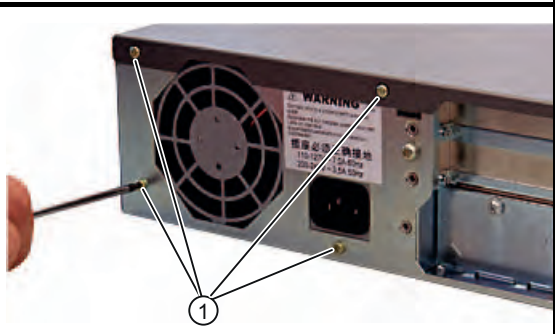
⚠ WARNING
Only qualified personnel are allowed to replace the power supply unit.

Preparations

1. Isolate the device from mains and disconnect all connecting cables.

Removing the power supply unit

How to remove the power supply unit		
1.	If necessary, remove the power connector fuse.	
2.	Open the device	
3.	Remove the bus frame. See Removing and installing 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.	Loosen the securing screws ② on the mounting plate of the power supply unit.	
7.	Pull the power supply unit towards the front and lift it out of the device.	

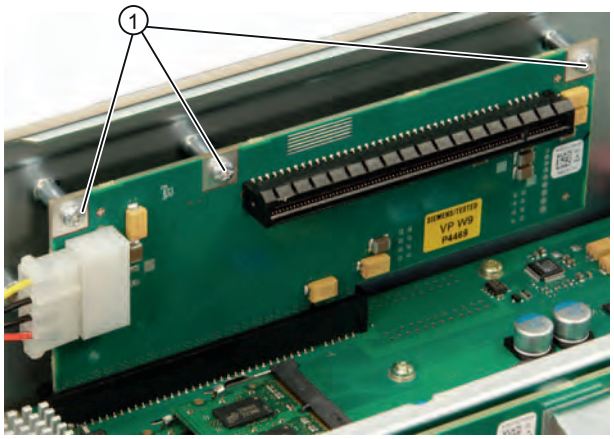
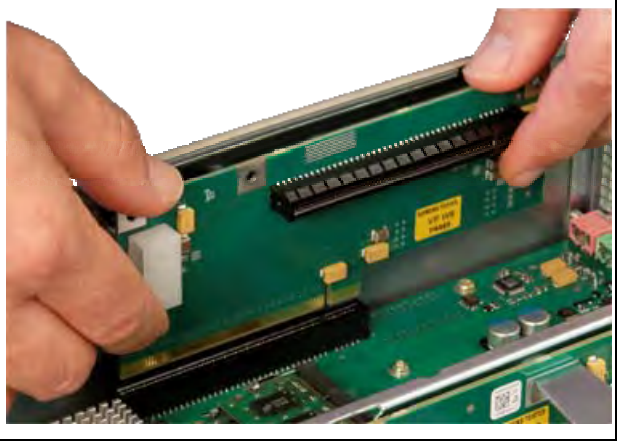
11.1.7 Removing the PCIe graphics expansion card (PEG riser)

Preparation

1. Isolate the device from mains and disconnect all connecting cables.
2. Open the device.

Removing a PEG riser card

How to remove the PEG riser card		
1.	If it is installed, remove the graphics module as described in the section Installing / removing the graphics module (Page 73).	
2.	Remove the bus frame as described in the section Removing and installing the bus frame (Page 79).	
3.	Disconnect the power connector ①.	

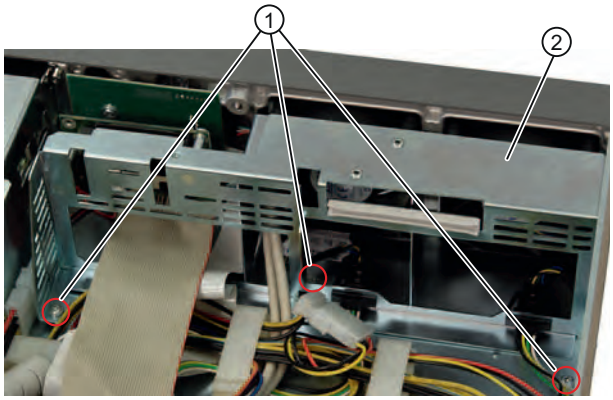
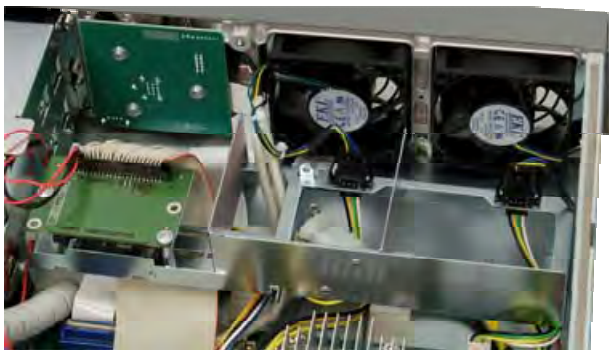
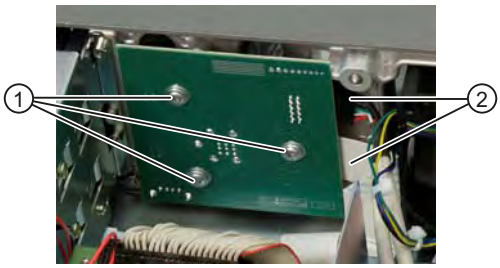
How to remove the PEG riser card		
7.	Remove the three securing screws ①.	
8.	Remove the PEG riser card from the motherboard.	

11.1.8 Removing the OP

Preparation

1. Isolate the device from mains and disconnect all connecting cables.
2. Open the device.

Removing the operator panel

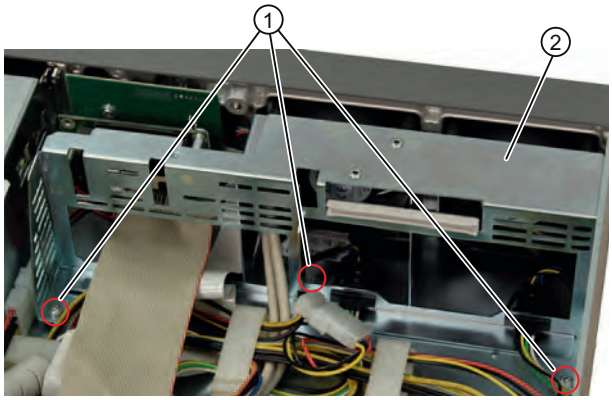
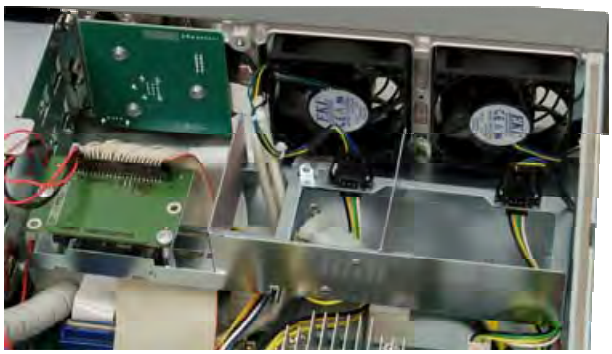
How to remove the operator panel		
1.	Remove the bus frame as described in the section Removing and installing the bus frame (Page 79).	
2.	Loosen the screws ① on the traverse ②.	
3.	Tilt back the traverse.	
4.	Remove the three securing screws ① on the inside of the front panel of the device.	
5.	Release the cable ② from the operator panel.	

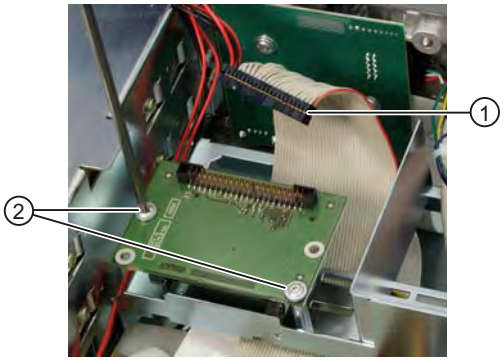
11.1.9 Removing the CompactFlash slot

Preparation

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

Removing the CompactFlash slot

How to remove the CF slot		
1.	Remove the bus frame as described in the section Removing and installing the bus frame (Page 79).	
2.	Loosen the screws ① on the traverse ②.	
3.	Tilt back the traverse.	

How to remove the CF slot		
4.	Detach the data cable ①.	
5.	Remove the two securing screws ①.	

11.1.10 Removing the motherboard

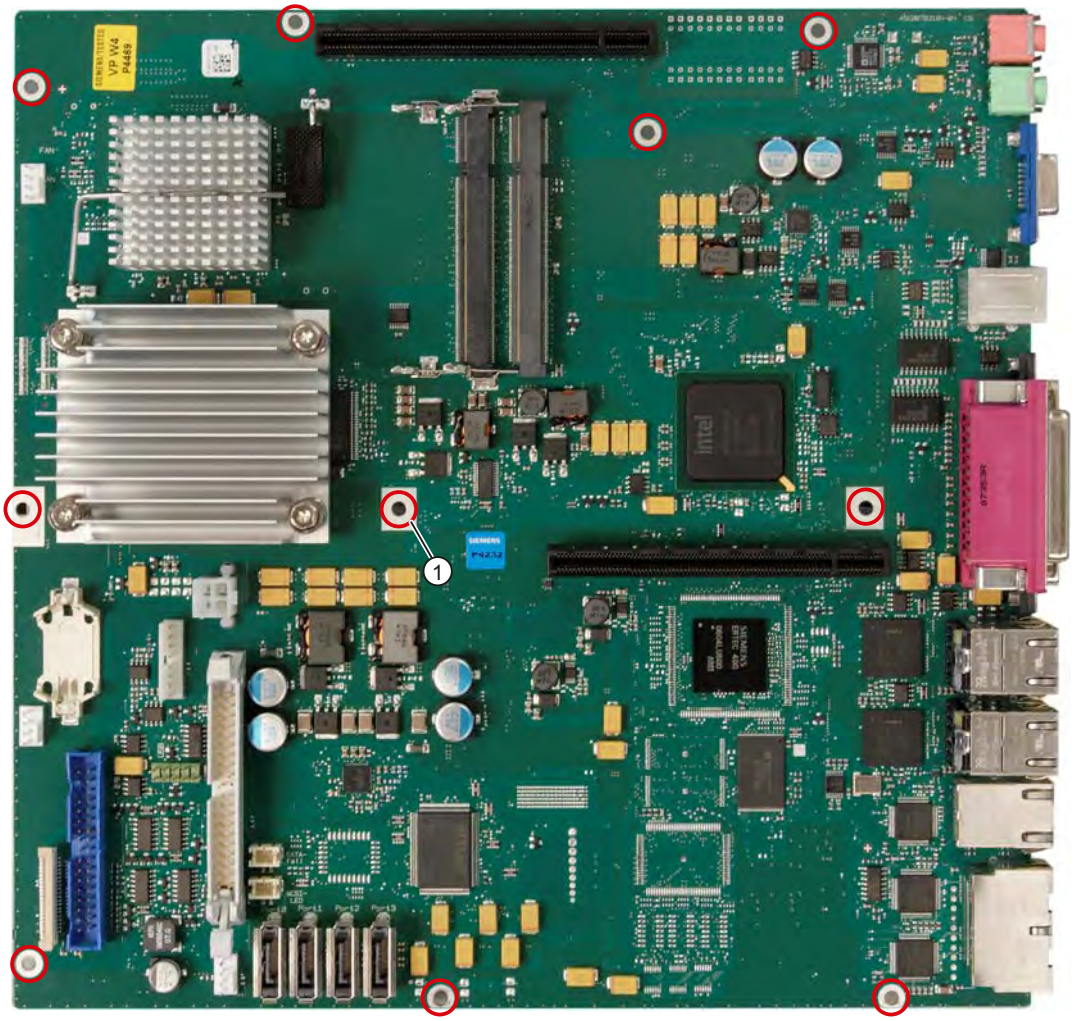
Preparation

1. Isolate the device from mains and disconnect all connecting cables.
2. Open the device.

Removing the motherboard

How to remove the motherboard	
1.	Remove the bus frame. See section Removing and installing the bus frame (Page 79).
2.	Remove the modules from the slots. (PEG)
3.	Disconnect all cables from the motherboard, noting down their positions while doing so.
4.	Remove the four screws on the CPU heat sink.
5.	Remove the nine screws on the motherboard.
6.	Remove the hexagon head distancing bolts ① of the bus frame using a 5.5 mm key.

How to remove the motherboard



7.	Remove the hexagon head bolts of the interfaces with a 4.5 mm key.



The motherboard is supplied as spare part without processor, memory modules and bus board.

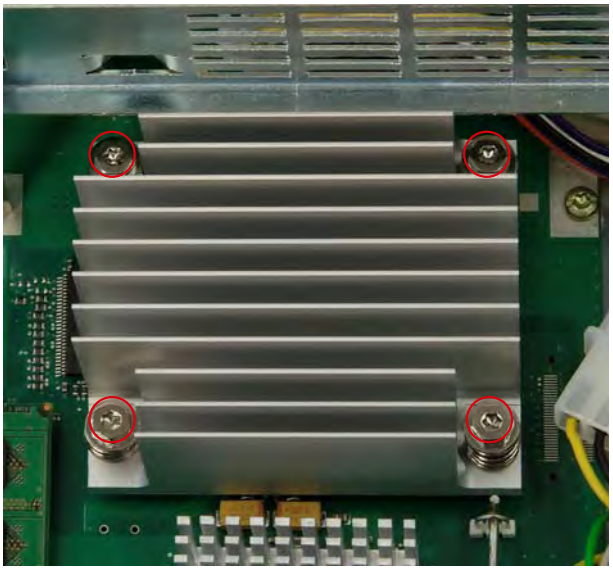
11.1.11 Processor replacement

CAUTION
The processor may only be replaced by authorized technical personnel. 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.com/asis)

Preparation

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

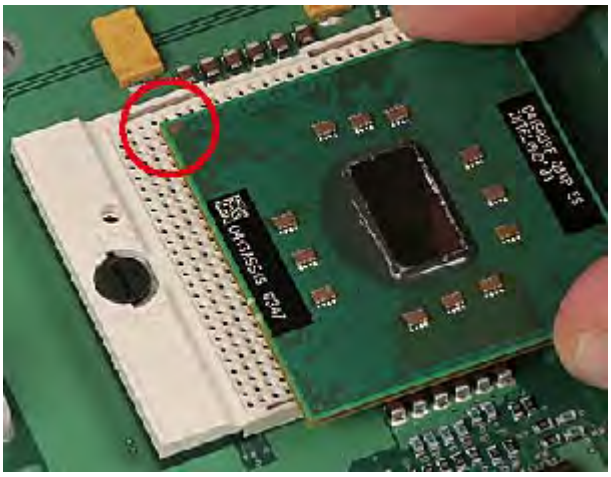
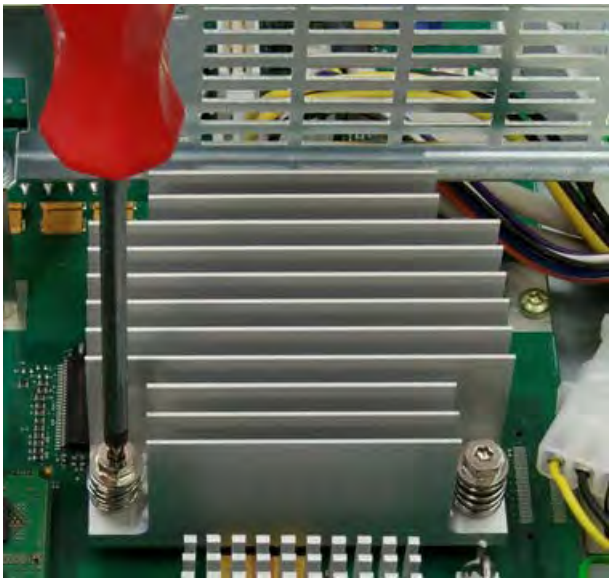
Removing the processor

How to remove the processor		
1.	Remove the bus frame. See section Removing and installing the bus frame (Page 79).	
2.	Remove the four screws from the processor heat sink and remove the heat sink.	

How to remove the processor		
3.	Loosen the processor latch.	
4.	Remove the processor.	

Installing the processor

NOTICE
Make sure that the processor and socket coding match when inserting the processor.

How to install the processor		
1.	Insert the processor.	
2.	Insert the new heat sink.	
3.	Secure the heat sink with the four screws: Fit the screws diagonally, and tighten them uniformly alternating to prevent skewing.	

11.2 Reinstalling the software

11.2.1 General installation procedure

If your software is corrupt, you can reinstall it using the recovery CD or DVD, the Documentation and Drivers CD and the Restore DVD.

Recovery CD or DVD:

The recovery CD/DVD contains the Windows user interface with tools for configuring the hard drives, and for installation of the operating system and the languages supported by the operating system (MUI).

The basic language of the operating system to be installed is English. If you want to integrate additional languages, you will need to subsequently install them from Recovery CD2 or DVD.

Documentation and Drivers CD:

Contains the documentation and the hardware drivers.

Restore DVD:

Contains a hard disk image file with the original factory software (operating system with installed hardware drivers).

11.2.2 Restoring the Factory State of the Software Using the Restore DVD

You can restore the software to the original factory state using the Restore CD (not included in all package variants). The DVD contains the necessary images and tools for transferring the factory software to the hard disk of your PC. You can restore the entire hard disk with drive C: (system) and drive D: or only drive C:. This allows you to retain any user data on drive D:.

Retrieving authorizations or license keys from the hard disk

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

CAUTION
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: of the hard disk will be deleted. Setup formats the hard disk and installs the original factory software. If "Restore entire hard disk" is set ALL data, user settings, authorizations or license keys will be lost on the hard disk.

Restoring factory state

To restore the delivery state:

- Place the Restore DVD into the drive and restart the device using the on/off switch.
- When BIOS outputs the message

  `Press <F2> to enter Setup or <ESC> to show the Boot menu`

  to boot from the Recovery CD or DVD. The "Boot Menu" is displayed when initialization is completed.
- Select the optical drive using the cursor keys.
- Follow the on-screen instructions.

CAUTION
All existing **data, programs, user settings** and **authorizations or license keys will be deleted** from the hard disk and are therefore lost.

For information on the functions, refer to the README.TXT file on the Restore DVD.

11.2.3 Installing Windows

Use the Recovery CD/DVD to install Windows to suit your particular requirements. You also need the "Documentation and Drivers" CD supplied. Additional controllers unknown to the operating system must be made known to the recovery system and to the Windows operating system.

1. Press the F6 or the "Load Driver" icon key while booting and follow the on-screen instructions. During the rest of the installation, you will be asked several times for the missing driver of the controller.

Booting from recovery CD or DVD

1. Press <ESC> when BIOS outputs the message

   ```
   Press <F2> to enter Setup or <ESC> to show the Boot menu
   ```

   to boot from the Recovery CD or DVD. The boot menu displayed after initialization indicates all boot devices.

2. Select the CD/DVD drive.
   Follow the instructions on the screen until the "Siemens SIMATIC Recovery" window is displayed.

   When using the recovery function with Windows Vista, confirm that you want to boot from CD or DVD as soon as you restart. Otherwise the system boots from hard disk if you have a bootable hard disk installed.

The following sections describe older Windows operating systems. The recovery of Vista is described in the section Recovery of Windows Vista (Page 126).

11.2.3.1 Setting up partitions for Windows XP and Server 2003 operating systems

The hard disk needs to be partitioned after installation of a new hard disk, if partitions are faulty, of if the user wants to change the partition sizes.

CAUTION
All data on the hard disk are lost if you delete / setup partitions or logical DOS volumes. All partitions on the hard disk are deleted.

Microsoft recommends setup of the NTFS file system on hard disk partitions in Windows operating systems. Procedure:

Setting up partitions

When shipped, the partitions are set up as follows:

Partition	Operating system	Name	Size	File system
First	Windows XP, Server 2003	SYSTEM	20 GB	NTFS not compressed
Second	Windows XP, Server 2003	DATA	Remainder	NTFS not compressed

1. Boot from the Recovery CD and then follow the on-screen instructions until the Recovery functions window is displayed.
2. Start the DiskPart tool in the "Siemens SIMATIC Recovery" window. Enter the following commands in the displayed command interface:

list disk	Displays all available hard disks.
select disk 0	For selecting the disk to be reconfigured. 0 selects the first hard disk drive.
list partition	Displays all partitions on the selected hard disk.
clean	Deletes the entire selected hard disk. All information stored is lost.
create partition primary size=n	Creates a primary partition with a size of n MB on the selected HDD. Default values: n = 20000 for Windows XP, Windows Server 2003
select partition 1	Select the primary partition
active	Activates the selected partition
exit	Closes the DiskPart tool.

Additional DiskPart functions:

Help	Shows all DiskPart commands. Additional command parameters entered are described in the help extension. Example: create partition help

Note

After having modified the HDD configuration using DiskPart, restart the PC for the changes to go into effect.

Boot again from the Recovery CD to format the partitions.

Formatting the primary partition

1. Boot from the Recovery CD to format the partitions. Follow the on-screen instructions until the Recovery functions window is displayed.
2. Select "Start command prompt" in the Recovery functions window. Enter the following command in the command interface:

   `format drive:/FS:file system`

   drive = drive letter of the partition to be formatted. Valid values: C, D, E, F etc.
   File system = specifies the type of file system. Valid values: FAT, FAT32, NTFS.

NTFS is the factory setting for all Windows operating systems.

Example of a master IDE HDD

`format C:/FS:NTFS`

format /? Shows all command parameters.

11.2.3.2 Installing Microsoft Windows operating systems

This CD contains encrypted data that can only be transferred to this system.

1. Boot from the Recovery CD and then follow the on-screen instructions until the Recovery functions window is displayed.
2. Select "Recovery Windows ..." in the "Siemens SIMATIC Recovery" window.
3. Follow the on-screen instructions.

Note

Make sure that sufficient free space is left on the drive after the transfer of selected recovery data:
1500 MB for Windows XP
1500 MB for Windows Server 2003

4. Select "Start command prompt" in the Recovery functions window.
5. Enter the following commands in the command interface:

   Drive:

   cd \I386

   Winnt32.bat

   Drive: Drive letter of the folder which contains the I386 directory.
6. The preparation of the Windows installation is displayed.

7. When this operation completed, close the command prompt by entering the `exit` command.
8. Close the Siemens SIMATIC Recovery window by clicking the "Finish" button.
9. Setup automatically restarts the system and completes the installation of Windows.
10. Follow the on-screen instructions.

Note

If you use Microsoft Windows professionally, you should have the following manuals available (not included in the scope of delivery):
Microsoft Windows XP Professional, Technical Reference (MSPress No 934) or
Microsoft Windows Server 2003, Planning Server Deployment for Windows Server 2003, Technical Reference (MSPress No. 420)

These manuals contain specific information for administrators who install, manage and integrate Windows in networks or multi-user environments.

Information for systems with RAID controllers (optional)

Unknown additional controllers must be made known to the Windows operating system.

1. Press F6 key within the startup sequence and follow the on-screen instructions. In the next installation phases you are prompted several times to insert a floppy disk which contains the missing RAID driver. The driver is available on the included "Documentation and Drivers" CD in the Drivers\RAID\Intel directory.
2. Copy the corresponding driver to a blank, formatted floppy disk. Connect a USB FD drive to the device.
3. After the message to press the F6 key, select the driver "Intel(R) 82801GR/GH SATA RAID" on the screen in a selection window. To display the proposed list completely, you may need to scroll down with the arrow keys.

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

Preinstalled languages such as German, French, Spanish or Italian can be set up directly. Run MUISETUP.EXE from Recovery CD 2 to install additional languages. The program displays all available languages.

Language selection in Windows XP Professional and Windows Server 2003

The **M**ultilanguage **U**ser **I**nterface (MUI) in Windows XP allows you to change the menu and dialog language.

The default language setting of your Windows installation is English with US keyboard layout. You can change the language in the Control Panel. Select:

Start > Control Panel > Regional and Language, Languages tab **Language used in menus and dialogs** field.

For the **Date**, **Time**, **Language**, and **Regional Options**, set the default as **non-Unicode programs** under **Advanced** in addition to the language for menus and dialogs.

11.2.5 Recovery of Windows Vista

To recover Windows Vista, there is a full graphical user interface available. It may take several minutes before the first input window appears. In this window, you can set the time and currency formats and select the keyboard language.

English is the basic language and other languages can be installed later with the MUI. The MUI is on the recovery DVD.
Now follow the on-screen instructions. It may take several minutes before the next prompt for the product key is displayed.

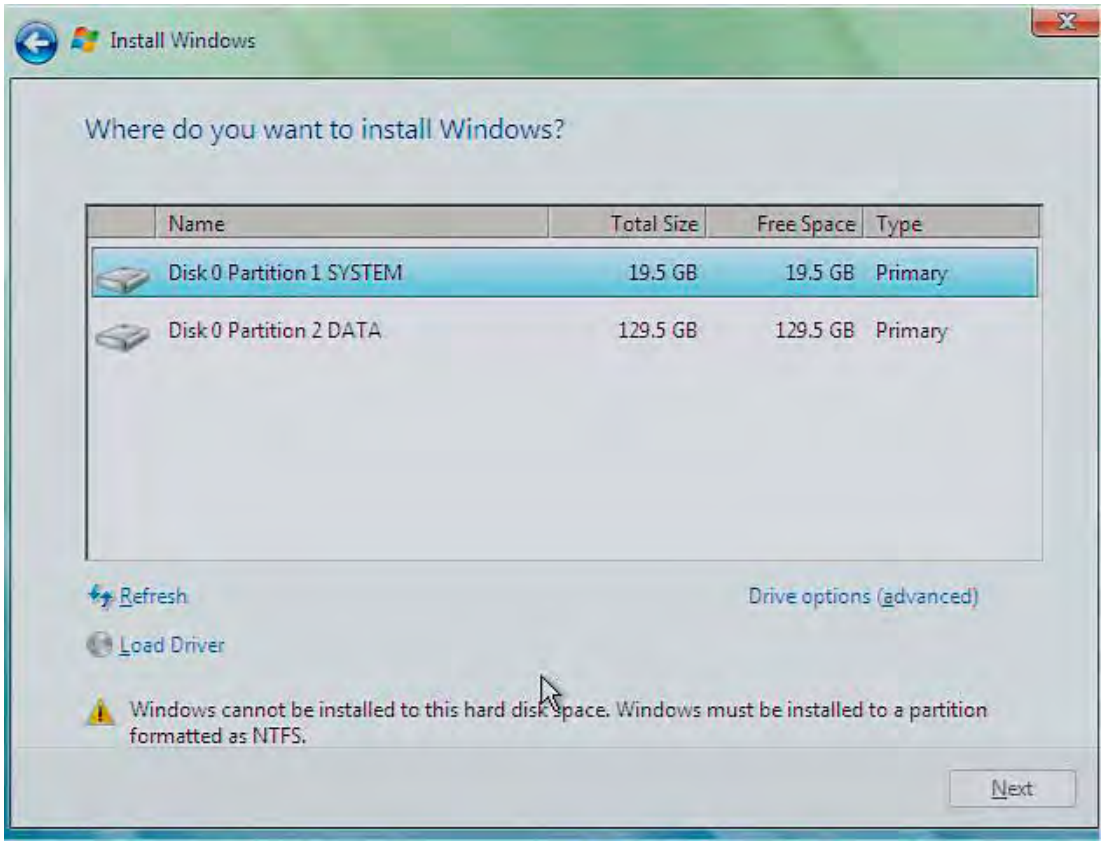
Note

Due to the previous activation, you do not need to enter the product key (COA number). This is entered automatically during the installation.

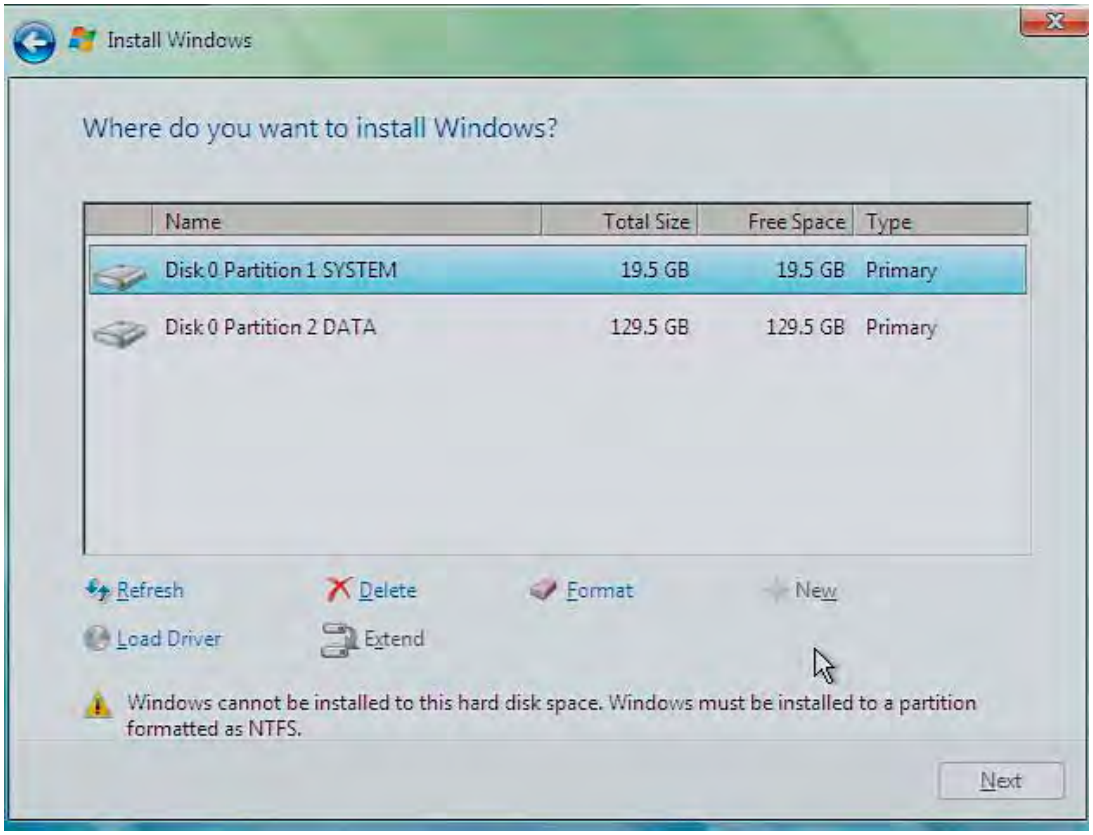
Setting up and formatting partitions

After you have installed a new hard disk, or if partitions are faulty, or when you wish to change the partitioning on your hard disk, you need to create or reconfigure partitions on the hard disk.

In the next dialog box, you can set up the hard disk according to your requirements and add controllers that are not yet known to the system.



Options	Meaning
Drive options (advanced)	Further functions are displayed with which you can set up the hard disk.
Load Driver	To add new drivers, for example the driver for RAID.



Options	Meaning
Refresh	Updating
Delete	Deleting a partition
Format	Formatting a partition
New	Creating new partitions
Load Driver	To add new drivers, for example the driver for RAID
Extend	Changing the partition size
⚠	Any error messages that occur are displayed behind this icon, for example if the hard disk was not formatted in the required "NTFS" format.

The first partition should be at least 25 GB. The operating system must be installed on this partition. You can use the rest of the hard disk as a data partition. Both partitions must be installed as the NTFS file system.

When shipped, the partitions are set up as follows:

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

Following a reboot, Windows Vista is installed on the hard disk. This process takes at least 20 minutes.

Now follow the instructions on the screen.

Note

If you want to reinstall drivers from a USB floppy disk drive, select Floppy Drive (A:) .

Note

If you want to use Microsoft Windows as a professional user, you will need the following manual (not supplied):
Windows Vista Inside Out (MS Press no. 5913)

This manual contains information specifically for administrators involved in installing, managing and integrating Windows in networks or multi-user environments.

Setting up language options in Windows Vista

With the Multilanguage User Interface (MUI), you can set up the Windows menus and dialogs for additional languages. When shipped, Windows Vista is installed with English menus and dialogs. You can change this in the Control Panel with the "Regional and Language options" or "Time and Date" dialogs.

Here, you can change all system formats:
Start > Control Panel > Clock, Language, and Region > Change display language > Regional and Language options

Here, you can only change the date and time formats:
Start > Control Panel > Clock, Language, and Region > Change display language > Time and Date

If you want to install additional languages, you can install these later in the Control Panel, as follows. You will find the necessary files on the recovery DVD and on the Service Pack Cd (optional) in the "Languagepacks" folder.

Start > Control Panel > Clock, Language, and Region > Change display language > Regional and Language options > Keyboards and Languages.

Further languages can be integrated via Windows Update.

11.2.6 Installing drivers and software

NOTICE
Before you install new drivers or updates for multilingual operating systems, (MUI versions), reset the regional settings for menus and dialogs and the default language to US English.

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

1. Place the CD into the drive.
2. Run *START*.
3. Select *Drivers & Updates* from the index.
4. Select the operating system in *Drivers & Updates*.
5. Install the required driver.

NOTICE
If you require the driver for the chipset after reinstalling Windows XP / Server 2003 / Vista, this must always be installed first before all other drivers.

11.2.7 Installing the RAID Controller software

The procedure for installing the RAID controller software is described on the included "Documentation and Drivers" CD.

Note on Windows XP Professional / Windows Server 2003 / Windows Vista

Select the Intel(R) 82801GR/GH SATA RAID Controller from the proposed list when you install a Windows operating system. To display the list completely, you may need to scroll down with the arrow keys.

11.2.8 Installing burner/DVD software

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

11.2.9 Installing updates

11.2.9.1 Updating the operating system

Windows

The latest updates for Windows operating systems are available on the Internet at:
Microsoft Side Guide (http://www.microsoft.com)

NOTICE
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.

11.2.9.2 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 XP Professional.

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.

NOTICE
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.

11.2.10 Data backup

11.2.10.1 Creating an image

Data backup in Windows

Siemens recommends using **SIMATIC PC/PG Image Creator** to generate backup copies of your data. This tool provides comfortable and efficient functions for backup and restoring the full content of Compact Flash cards, of HDDs and of individual partitions (images.)

The software can be ordered from the catalog and from Siemens online ordering system Industrial Automation and Drive Technologies (http://mall.automation.siemens.com). For detailed information about SIMATIC PC/PG Image Creator, refer to the corresponding product documentation.

11.2.11 CP 1616 onboard

NDIS device driver

Read the information in the description Installation_CP16xx.pdf document on the supplied Documentation and Drivers CD.

PROFINET IO

Please note the information on the SIMATIC devices and SIMATIC NET documentation listed in Integration into an Automation System (Page 59).

Interrupts, error and system alarms

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. If an error is detected within this phase, BIOS outputs a beep code based on the current test result. 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
Shadow RAM Failed at offset:	Memory error. Contact Technical Support.
Extended RAM Failed at offset:	Memory error. Contact Technical Support.
Failing Bits:	Memory error. Contact Technical Support.
Operating system not found	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
Previous boot incomplete Default configuration used	Previous BOOT sequence was canceled, for example, due to power failure. Correct the entries in SETUP.
System cache error Cache disabled	Error in the CPU's cache module. Contact your technical support team.
Monitor type does not match CMOS Run SETUP	The monitor does not match SETUP entries. Adapt the SETUP entries to suit the monitor.
System timer error	Hardware error. Contact Technical Support
Real-time clock error	Clock chip error. Contact Technical Support.
Keyboard controller error	Keyboard error. Contact Technical Support.
A PCI or PCIe add-on card needs extra memory area within the 4 GB address space	A PCI or PCI Express card requires more space in the 4 GB address space than is available for expansions. You can expand the area for cards in the BIOS setup. Follow the onscreen instructions and notes in the "Item Specific Help" of the BIOS menu.

12.2 BIOS POST codes

The section below lists the POST codes relevant to users in chronological order of occurrence: Contact Customer Support for information on all other POST codes.

Display (hex)	Meaning	Description	To correct or avoid errors
16H	TP_CHECKSUM	BIOS checksum test	Service event
28H	TP_SIZE_RAM	Determine DRAM size	Replace the memory modules
2AH	TP_ZERO_BASE	Set base RAM 64KB to 0	Replace the memory modules
2CH	TP_ADDR_TEST	Check address busses	Replace the memory modules
2EH	TP_BASERAML	BaseRam Low	Replace the memory modules
30H	TP_BASERAMH	BaseRam High	Replace the memory modules
38H	TP_SYS_SHADOW	BIOS is copied to DRAM	Replace the memory modules
3AH	TP_CACHE_AUTO	Determine processor cache	Replace the processor
22H	TP_8742-TEST	Test the keyboard controller	Check whether the keyboard is connected or defective
3CH	TP_ADV_CS_CONFIG	Configure the advanced chipset	Run a test by disabling the hardware components in Setup
49H	TP_PCI_INIT	Initialize the PCI interface	Run a test by disabling the hardware components in Setup, or by removing the expansion modules installed on the bus module
55H	TP_USB_INIT	Activation of the USB hardware	Removal of USB devices
4AH	TP_VIDEO	Initialize the video interface	
5CH	TP_MEMORY_TEST	System memory test	Replace the memory modules
60H	TP_EXT_MEMORY	System memory test	Replace the memory modules
62H	TP_EXT_ADDR	Address bus test	Replace the memory modules
90H	TP_FDISK	Initialization and test of the hard disk hardware	Disconnect the HDD, replace it if necessary
95H	TP_CD	Initialization and test of the CD hardware	Disconnect the CD-ROM drive, replace it if necessary
98H	TP_ROM_SCAN	Search for BIOS expansions	Run a test by disabling the hardware components in Setup, or by removing the expansion modules installed on the bus module
BCH	TP_PARITY	Test of memory modules	Replace the memory modules
00H		BIOS POST completed. Loading operating system	

Special codes

The following Beep Codes are available in addition to the POST Codes listed:

- **3 x short** INSERT key is pressed at system startup:
  If an external graphics card on the bus board is not detected, you can try to activate it by pressing the INSERT key.
  The "INSERT" key activates special enumerations for activating PCI VGA cards.
- **1 x long 8 x short** Error when reading MPI system information:
  Contact Customer Support
- **4 x short** MPI firmware has been updated:
  This may occur once after BIOS update.
- **2x short** BIOS returns a checksum error:
  This error may be generated if you replaced the backup battery, or if this battery is low.

Conversion table of the beep codes in hex notation:

Beep tones		Hex code
B	B	0
B	BB	1
B	BBB	2
B	BBBB	3
BB	B	4
BB	BB	5
BB	BBB	6
BB	BBBB	7
BBB	B	8
BBB	BB	9
BBB	BBB	O
BBB	BBBB	B
BBBB	B	C
BBBB	BB	D
BBBB	BBB	E
BBBB	BBBB	F

Example of FF code:

Beep Beep Beep Beep - Pause - Beep Beep Beep Beep - Pause - Beep Beep Beep Beep - Pause - Beep Beep Beep Beep

Example

B	BBBB	BB	BBB	Beep sequence
3		6		Hex code
Check the shutdown code				Meaning

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.	Time is not set.	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.
	The operating system does not support the USB ports.	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.
The RAID software reports the following errors: • The RAID plug-in failed to load, because the drive is not installed. • The Serial ATA plug-in failed to load, because the driver is not installed correctly. • The Intel® Matrix Storage Console was unable to load a page for the following reason: – A plug-in did not provide a page for the selected device – A plug-in failed to load	RAID is not activated	In this case, the messages have no negative influence on the device function and can be ignored. Acknowledge the messages.
	RAID is activated	Re-install the software from the supplied Documentation and Drivers DVD.
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 exchangeable 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 first in the boot priority in the BIOS setup or is excluded as a boot device	Change the boot priority of the boot device in the Boot menu of the BIOS setup or include boot device in the boot priority

Error displays on the front panel

Front LED	Possible cause	Details about the error display
Red WATCHDOG LED is lit	Watchdog has triggered	See section Watchdog (WD) (Page 65)
Red TEMP LED is lit	Excess temperature in the device	See section Temperature monitoring/display (Page 64)
Red FAN LED is lit	Fan failure	See section Fan monitoring (Page 66)
Red HDD1 ALARM LED is lit	RAID reports that hard disk 1 is defective	See section RAID monitoring (Page 66)
Red HDD2 ALARM LED is lit	RAID reports that hard disk 2 is defective	See section RAID monitoring (Page 66)
Red HDD1 ALARM and HDD2 ALARM LEDs are flashing	RAID is in the "rebuild" state	See section RAID monitoring (Page 66)
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 section RAID monitoring (Page 66)
Red SF PROFINET LED is lit	A fault has occurred on the CPU 1616 onboard interface	See section CP 1616 onboard communications processor (Page 218)
All front-panel LEDs are constantly lit	Error in early BIOS-POS	In this case, contact Technical Support.

13.2 Problems when Using Modules of Third-party Manufacturers

Problem	Possible cause	To correct or avoid error
The PC crashes during startup	• Redundant I/O addresses • Redundant hardware interrupts and/or DMA channels • Fluctuation of signal frequencies or levels • Connector pin assignments deviate • No "Reset Configuration" in BIOS SETUP	Check your computer configuration: • Contact Technical Support if the computer configuration corresponds with the delivery state. • If the computer configuration has changed, restore the original factory settings. Remove all third-party modules, then restart the computer. If the error no longer occurs, the third-party module was the cause of the fault. Replace the thrid-party module with a Siemens module or contact the module supplier. • Force a "Reset Configuration" using the BIOS Setup. • Some PCI or PCI Express cards require a lot of memory and this must be deducted from the actual SDRAM. The "Currently used DRAM size" must always be the "Maximum allowed DRAM size" to ensure that the inserted card functions correctly.
		If the PC still crashes, contact your technical support team.
	• Insufficient output of an external power supply (UPS, for example)	• Use a higher capacity power supply
	• A resource conflict between expansion modules and basic modules was set in the BIOS • A resource conflict between expansion modules was set in the BIOS	Unplug the power connector and then remove the CMOS backup battery. Short the battery contact in the battery socket or on the connector of the basic module. Reinsert the battery and plug in the power connector. You will then need to make your BIOS settings again, set the time and resolve the resource conflict. Do not save the BIOS settings if a resource conflict is reported. This is indicated by a yellow * in front of the function involved.
PC does not restart or turns off immediately	• A voltage > 0.5 V is fed into the PC due to connected or installed third-party components	Check with the supplier of the component • whether this can be operated without an external power supply, • whether the settings for the component can be changed so that only the PC power supply is used or only the external power supply.
Onscreen error message: A PCI or PCIe add-on card needs extra memory area within the 4 GB address space	• A PCI or PCI Express card requires more space in the 4 GB address space than is available for expansions.	You can expand the area for cards in the BIOS setup. Follow the onscreen instructions and notes in the "Item Specific Help" of the BIOS menu.

Specifications

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14.1 General specifications

General specifications	
Order number	6AG4112-0...(for details, refer to the ordering documentation)
Dimensions	430.4 x 88.1 x 444.4 (WxHxD in mm) Detailed dimensional specifications can be found in the Dimensional drawing of the device (Page 149) section.
Weight	min. 10 kg, max. 14 kg
Supply voltage (V_N)	100 -240 V AC (-15%, 10%), wide range; with short-term power failure backup in accordance with NAMUR:
Input current AC	Continuous current up to 7 A (during startup up to 30 A for the duration of 5 ms)
Line voltage frequency	50 to 60 Hz (min. 47 Hz to max. 63 Hz, sinusoidal)
Transient voltage interruption	min. 20 ms at 0.85 U_N (max. 10 events per hour; min. recovery time 1 s)
Power consumption	Approx. 240 W maximum at 70% efficiency
Current delivery (DC)	+5 V/30 A +3.3 V/28 A, max. accumulated power 160 W +12 V/15 A -12 V/0.5 A -5 V/0.5 A +5 Vaux/2 A Maximum accumulated power of all voltages = 170 W
Noise emission	< 45 dB(A) at 25°C to DIN 45635 ODDs are not in operation
Degree of protection	IP41 at the front and IP20 at the rear to IEC 60529
Dust protection	With the front door closed according to IEC 60529 Filter class G2 EN 779, 99 % of particles > 0.5 mm are filtered
Pollution gas	EN 60721-3-3:1995 class 3C2 Sulfur dioxide and hydrogen sulfide class 3C3
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 60950-00
Electromagnetic compatibility (EMC)	
Radiated interference	EN 55022 Class A, FCC class A EN 61000-3-2 Class D and EN 61000-3-3
Noise immunity: Mains borne disturbance 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 < 3 m) ± 2 kV; (according to IEC 61000-4-4; burst; length > 3 m) ± 2 kV; (according to IEC 61000-4-5; surge asym. length > 30 m)

General specifications	
Immunity to discharge of static electricity	± 6 kV contact discharge; (to IEC 61000-4-2) ± 8 kV air discharge; (to IEC 61000-4-2)
Immunity to RF interference	10 V/m, 80 MHz to 1000 MHz and 1.4 GHz to 2 GHz, 80% AM; (to IEC 61000-4-3) 1 V/m 2 to 2.7 GHz, 80% AM 1 kHz (to IEC 61000-4-3) 10 V, 10 KHz to 80 MHz; 80% AM 1 kHz (to IEC 61000-4-6)
Magnetic field	100 A/m, 50 Hz / 60 Hz; (to IEC 61000-4-8)
Climatic conditions	
Temperature	Tested to DIN EN 60068-2-2, DIN EN 60068-2-1, DIN EN 60068-2-14
- in operation - Gradient	+ 5 °C to + 35 °C without restrictions + 5 °C to + 45 °C no burner operation + 5 °C to + 50 °C [1] no ODD operation, no HDD operation in removable rack Max. 10° C/h no condensation [1] Power dissipation of the expansion modules in total less than 30 W
- Storage / transport - Gradient	20 °C to +60 °C max. 20°C/h, no condensation
Relative humidity	Tested to DIN EN 60068-2-78, DIN EN 60068-2-30
- Operation - Gradient	5 to 85% at 30° C (no condensation) Max. 10° C/h no condensation
-Storage/transport - Gradient	5 to 95% at 55° C (no condensation) max. 20° C/h, no condensation
Atmospheric pressure	
- Operation [6]	1080 to 795 hPa (corresponds to an altitude of -1000 to 2000 m)
- Storage / transport	1080 to 660 hPa (corresponds to an altitude of -1000 to 3500 m)
Mech. ambient conditions	
Vibration	Tested to DIN EN 60068-2-6, 10 cycles
- Operation [1, 2]	10 to 58 Hz 0.0375 mm, 58 Hz to 500 Hz: 4.9 m/s^2
-Storage/transport	5 to 9 Hz: 3.5 mm, 9 to 500 Hz: 9.8 m/s^2
Resistance to shock	Tested to DIN EN 60068-2-27, DIN EN 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	to ISO 9001

General specifications	
Motherboard	
Chipset	Intel 945GM
RAID (on-board)	Intel ICH7R with Intel Storage Manager software
Processor	• Intel Celeron M 440 1.86 GHz, 533 MHz FSB' 1024 KB Second Level Cache • Intel Core 2 Duo T5500 1.66 GHz, 667 MHz Front Side Bus 2048 KB Second Level Cache, EM64T • Intel Core 2 Duo T7400 2.16 GHz, 667 MHz Front Side Bus 4096 KB Second Level Cache, EM64T, VT
RAM	2 SODIMM sockets, max. 4 GB DDR2 (PC 5300)
Memory expansion	512 MB to 4 GB DDR2 (PC 5300), max. 3.25 GB can be used for operating system and applications. (see ordering documents for features)
Free expansion slots	Max. 3 modules simultaneously: 2x PCI or 1x PCI, 1x PCIe x4 1x PCIe x16 graphic (PEG) All modules up to 312 mm length are supported
Max. permissible power consumption per PCI slot	5 V/ 5 A or 3.3 V/ 7 A, 12 V/ 0.5 A, -12 V/ 0.05 A
Max. permissible power consumption per PCIe slot	PCIe x4 module: 3.3 V/ 3A; 12 V/ 2.1 A, 3.3 Vaux/ 0.4 A
Max. permissible power consumption per PCIe slot (PEG)	PCIe x16 module: 3.3 V/3A; 12 V/2.1 A, 3.3 Vaux/0.4 A
Max. permissible power loss per PCI slot	Accumulated power loss (all voltages) may not exceed 25 W.
Max. permissible power loss at all slots	Accumulated power loss (all slots) may not exceed 55 W. Accumulated 3.3 Vuax current may not exceed 0.8 A.
Maximum bandwidth of PCI slots	133 MB/s bandwidth
Maximum bandwidth of PCIe slots	2.5 GB/s bandwidth per lane
Drives (for configuration details, refer to the order documentation)	
HDD	3.5" SATA 300, 80 / 160 GB
DVD burner	Slimline ATA33 Read: DVD ROM: Single Layer 8x, Dual Layer 6x DVD-R/+R: Single Layer 8x, Dual Layer 6x DVD-RW/+RW 8x, DVD-RA; 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
CompactFlash drive	ATA33, slot for CompactFlash card (internal) slot type II

General specifications	
Chipset	
Main memory interface	Max. 4 GB SDRAM DDR2 (PC 5300), unbuffered, no ECC
USB	Max. 6 USB 2.0 devices (500 mA high current, high speed up to 480 Mbps) Max. accumulated power consumption of all USB devices: 2.3 A.
PCI/PCIe	PCI V2.3, PCIe V1.0a
SATA	4x SATA 150/300, with optional RAID
ATA	Max. 2 ATA 100 drives
Graphics	
Graphics controller	Intel® GMA950 Graphics Controller, 2-D and 3-D engine integrated in chipset
Graphics memory	Dynamic Video Memory Technology (uses up to 128 MB of RAM)
Resolutions/frequencies/colors	CRT: up to 1280x1024 at 100 Hz / 32-bit color depth up to 1600x1200 at 10 Hz / 32-bit color depth Maximum resolution: 2048x1536 at 75 Hz LCD via DVI: expansion module (Add2 card) in the PCIe x16 Slot (optional) up to 1600x1200 at 60 Hz / 32-bit color depth
Graphics module (optional)	PCIe x16 graphics card, dual head (2x VGA or 2x DVI-D) Type: NVIDIA Quadro NVS 285 (128 MB graphics memory) up to 2048 x 1536 at 75 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 parallel interface printer
VGA	Connection for analog monitor, 15-pin D-sub socket
1x DVI-D with ADD card (optional)	For connecting a digital monitor
2x DVI-D/VGA with Dual-Head graphics controller (optional)	For connecting two digital or analog monitors
Keyboard	PS/2 keyboard connection
Mouse	PS/2 mouse connection
USB (on rear panel) USB on front panel	4x USB 2.0 devices (500 mA high current, high speed up to 480 Mbps) 2 x USB 2.0 devices (500 mA high current)
PROFIBUS (optional)	9-pin D–sub socket, CP5611-compatible, 9.6 Kbps to 12 Mbps, programmable with software Electrically isolated RS485 (SELV circuit)*
PROFINET [4])	3x RJ-45 interface, CP 1616 compatible onboard interface based on ERTEC 400, 10/100 Mbps electrically isolated *
Ethernet [4]	2x Ethernet interface (RJ-45) Intel Tekoa 82573L 10/100/1000 Kbps, electrically isolated * Wake on LAN and Remote Boot supported

General specifications			
Audio - Microphone - Line out / headset	Analog Device AD1986 2 x 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		
CE	CE residential area: EN 61000-6-3:2007 emission, CE industrial area: EN 61000-6-2:2005 immunity:		

*	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 exchangeable racks: mechanical stress must be safely excluded.
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 faulty HDD. It may be possible to locate this HDD using the RAID software. See section RAID system (Page 50).
4	For unique labeling, the LAN interfaces are numbered on the housing. The numbering by the operating system may deviate from this.
5	Interfaces supplied as optional.
6	For operation at higher altitudes, derating is required according to the altitude compensation factors specified in EN 60664-1 table A.2 or the maximum permissible ambient temperature must be reduced by 3.5 K / 500 m.

Note

Check the ESD Guidelines (Page 231).

The specifications apply only when:

- The devices 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	4 A	1 A	0.8 A		0.03 A	0.3 A
Dual-Core processor with heat sink	0 A	0 A	2.3 A			
Core 2 Duo processor with heat sink	0 A	0 A	2.6 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**
HDD [1]	0.5 A		0.7 A			
DVD Burner [1]	0.8 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	165 W					
Efficiency of the power supply	Approx. 70% (230 V AC) / approx. 65% (120 V AC)					

[1] based on the selected device configuration
[2] The accumulated power of the + 5 V and + 3.3 V may not exceed 170 W.

14.3 Power supply (AC)

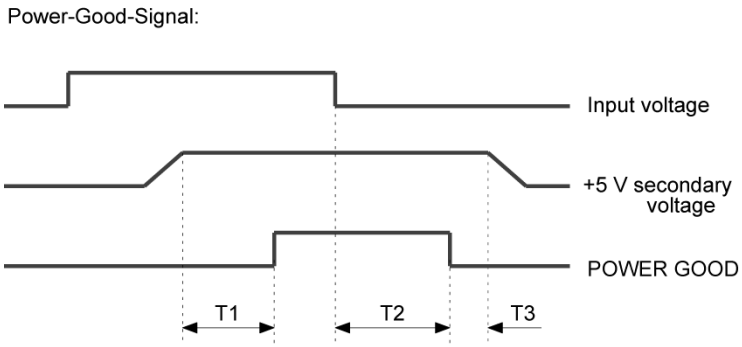
Output voltage

Voltage	Max. current	Voltage stability
+ 12 V	15 A	+/- 5 %
+ 12 V	15 A	+/- 5 %
- 12 V	0.2 A	+/- 10 %
+ 5 V	26 A [1]	+ 5 % / - 4 %
+ 3.3 V	24 A [1]	+ 5 % / - 4 %
+ 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

14.4 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

15

15.1 Dimensional drawing of the device

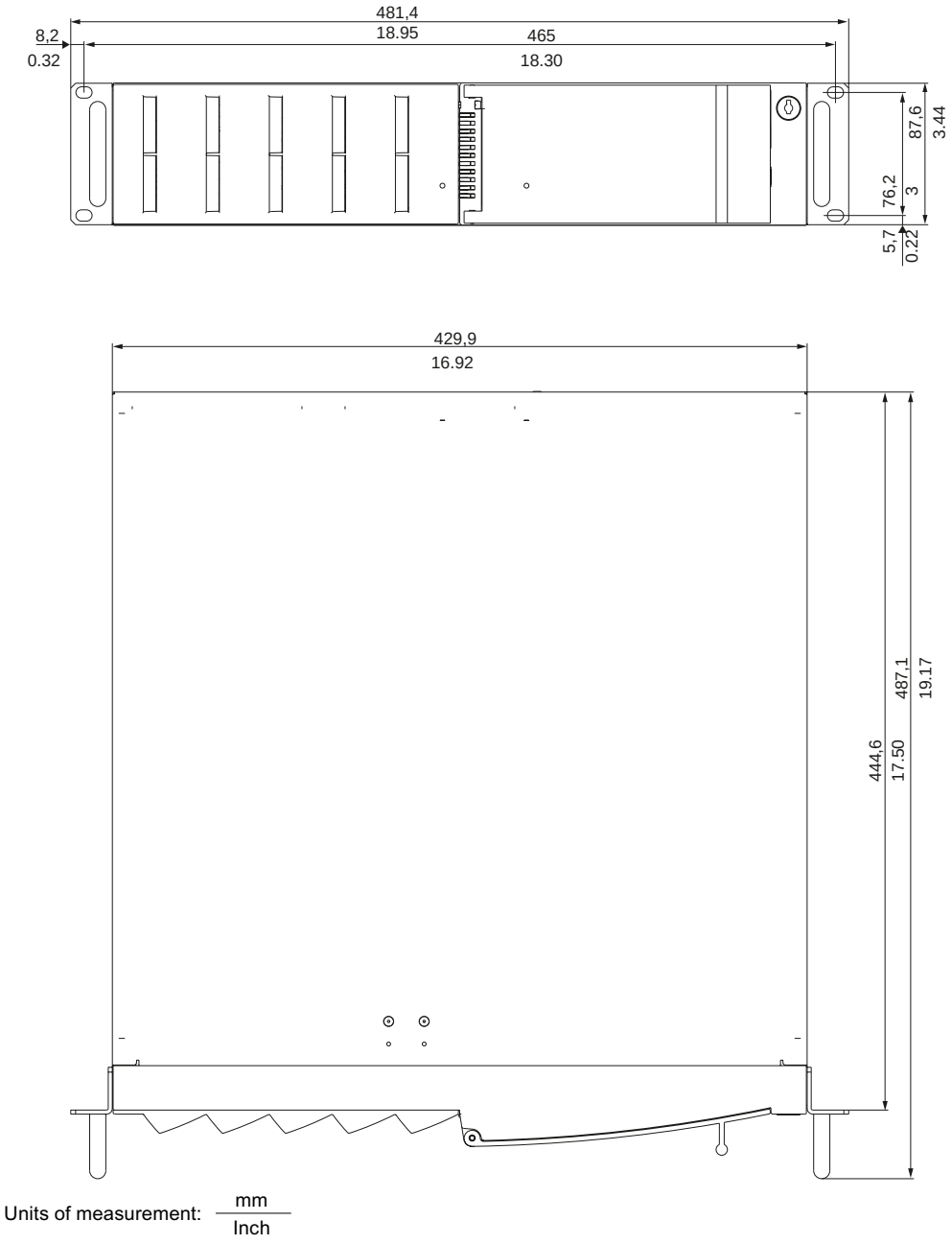


Figure 15-1 Dimension drawing of the SIMATIC Rack PC 647B

15.2 Dimensional drawing for the use of telescopic rails

Below you will find 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

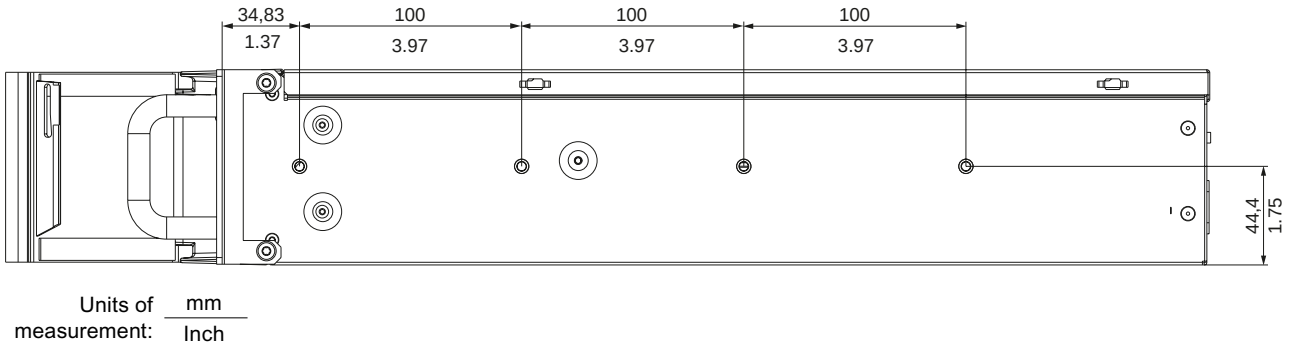


Figure 15-2 Dimensional drawing for the use of telescopic rails

15.3 Dimensional drawings for installation of expansion modules

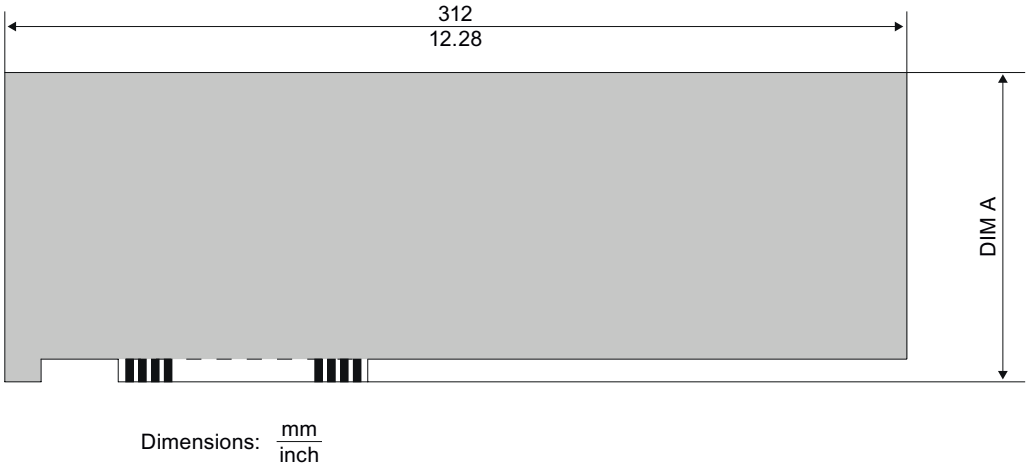


Figure 15-3 Maximum mountable PCI/PCIe module (shown without slot bracket and retainer)

	PCI	PCIe	Meaning
DIM A (mm/inch)	106,68 / 4,2	111,15 / 4,38	Lower edge of module to upper edge of module

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.

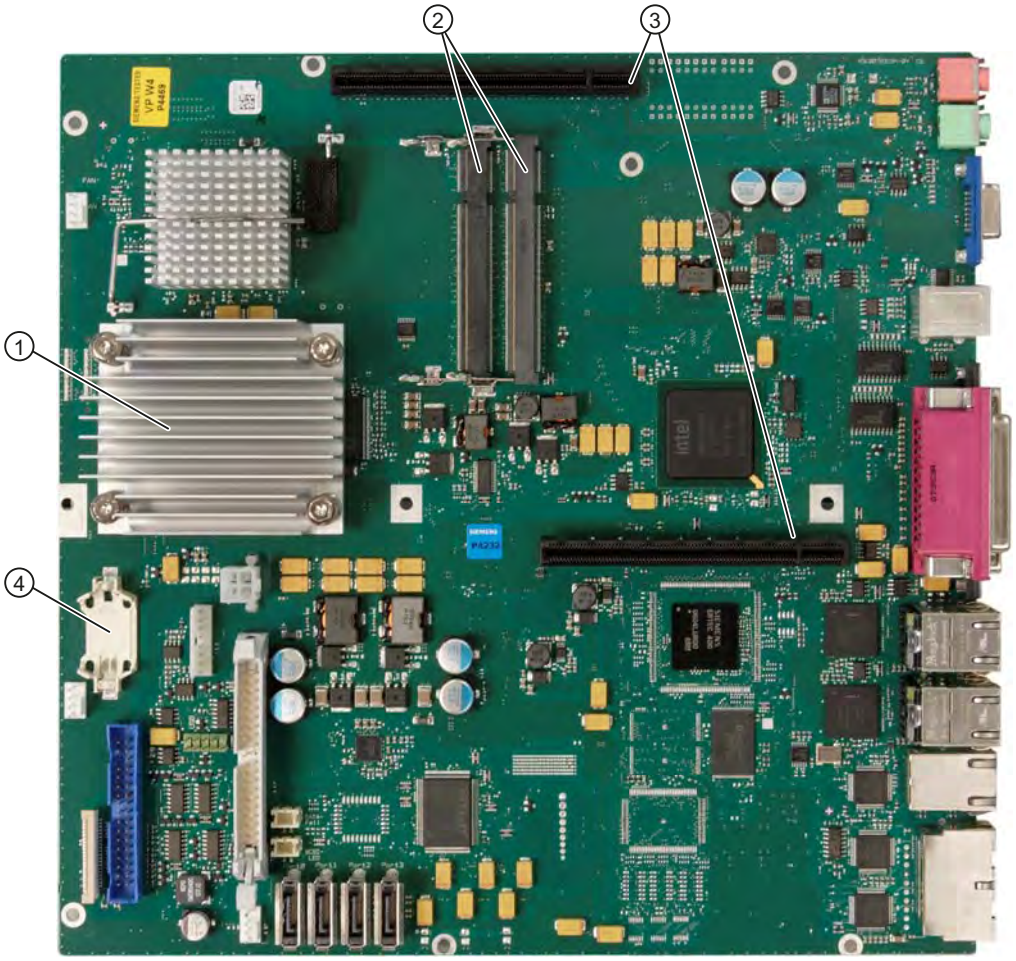


Figure 16-1 Layout of the motherboard

①	Processor with fan	③	Slot for the bus board
②	Two memory module slots	④	Backup battery

16.1.2 Technical features of the motherboard

Component / interface	Description	Parameters
Chipset	Single chipset	945GM and ICH7/ICH7R
BIOS	Update by means of software	Phoenix First BIOS, modified by Siemens
CPU	Intel Core 2 Duo / Celeron M (design FC PGA479)	- Upgradeable - Multimedia support - On-board L2-Cache with 1M/2M/4M, CPU dependent
Memory	2 x SODIMM module slots, max. 4 GB	- Data length = 64 bit - 3.3 V - DDR2 SDRAM to PC5300 specification - Chip size up to 1 GBit on the module - 100/133 MHz bus clock [3] - 256 MB to 2 GB / SODIMM, variable
Graphics	Integrated in chipset	Mobile Intel 945GM Express Chipset Family, compatible to Graphics Media Accelerator 950 - VGA: 1600x1200 / 32-bit color depth / 85 Hz DVI-I: 1600x1200/32-bit color depth/60 Hz Graphics memory: 8 MB to 128 MB, used in system memory, 8 MB reserved. 256 MB to 2 GB in system memory: additional dynamic use of up to 256 MB
HDD [4] [4 x SATA]	Compatible, Enhanced, AHCI, RAID 0 and RAID 1 supported	- Compatible to SATA 150 / 300
DVD ROM/CD RW[4]	Master on secondary EIDE interface	- DMA capable
Keyboard	PS/2 keyboard interface	- Standard
Mouse	PS/2 mouse interface	- Standard
Serial	COM1/9-pin COM2/9-pin	- V.24
Parallel	Standard, bi-directional, EPP and ECP mode	- 25-pin D-sub
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	- 6 x three high-current (500 mA) USB 2.0 ports, of those two at the front

Component / interface	Description	Parameters
Ethernet (two interfaces)	10BaseT/100Base-TX/1000Base-TX (Intel Tekoa 82573L)	- 10/100/1000 Mbps, electrically isolated [1]

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

[2] Optional product feature

[3] Depends on the CPU type

[4] Depends on the selected device configuration

16.1.3 Position of the interfaces on the motherboard

Interfaces

The Rack PC motherboard contains the following interfaces:

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

The diagram below shows the position of the internal and external interfaces on the motherboard.

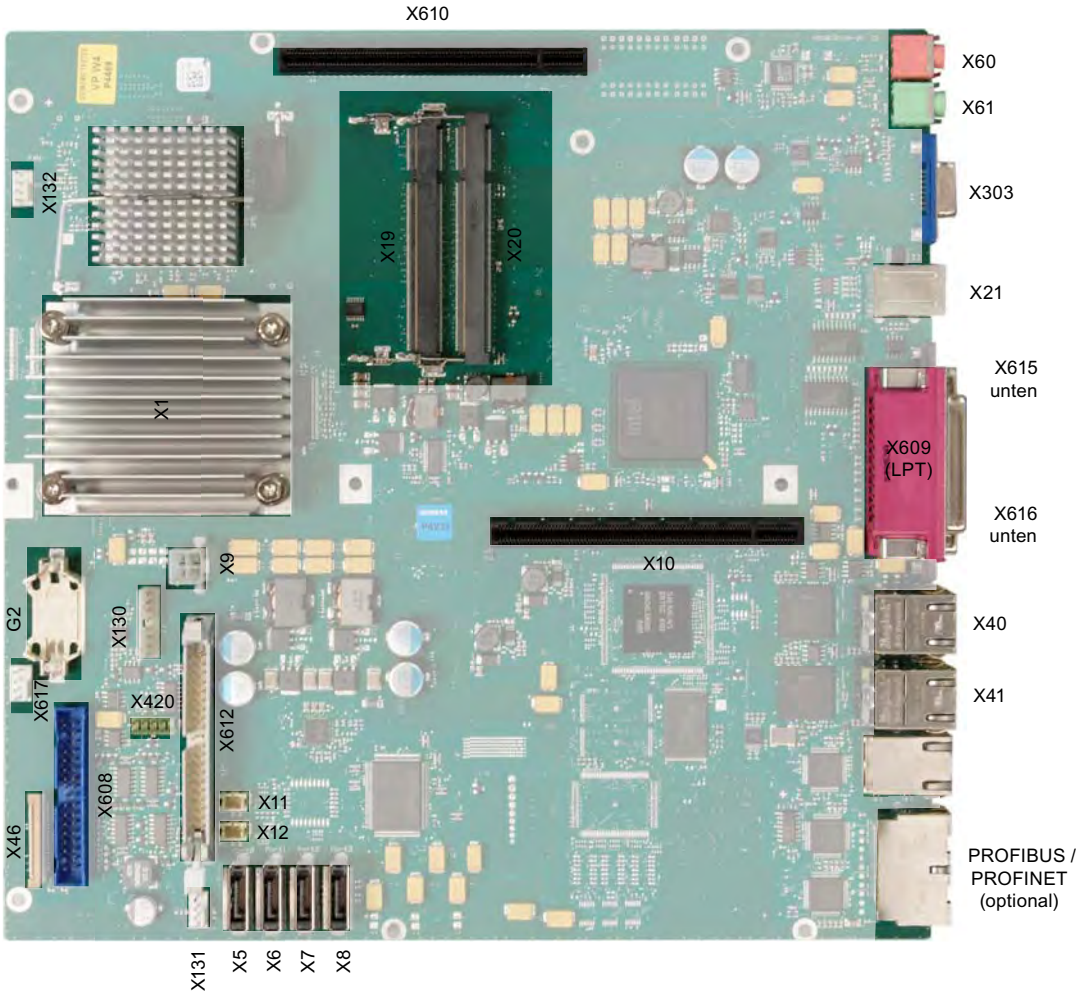


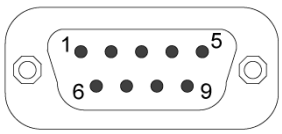
Figure 16-2 Position of the interfaces on the motherboard

16.1.4 External interfaces

Interface	Position	Connector	Description
COM1	External	X616	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 and 3 at the front
PROFIBUS/MPI	External	X600	9-pin, standard socket, electrically isolated interface
PROFINET	External		RJ-45
Ethernet 1 and 2	External	X40, 41	RJ-45
VGA	External	X303	15-pin socket
DVI-D	External		26-pin, female (optional product model in conjunction with ADD card)
Microphone	External	X60	6-pin 3.5-mm phono jack
Line out	External	X61	6-pin 3.5-mm phono jack

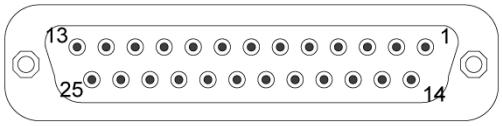
Serial interfaces COM1, COM2 (V24), X616, X615

Serial interface

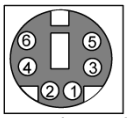


Pin no.	Short name	Meaning	Input / output
1	DCD (M5)	Receive signal (carrier)	Input
2	RxD (D2)	Receive data	Input
3	TxD (D1)	Send data	Output
4	DTR (S1)	Data terminal ready	Output
5	GND (E2)	Functional ground (reference potential)	–
6	DSR (M1)	Ready for operation	Input
7	RTS (S2)	Request to send	Output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

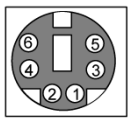
Parallel interface LPT1, X609

Parallel interface			
			
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	–

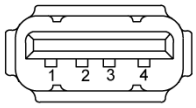
PS/2 mouse interface, X21 7 to 12

PS/2	Pin no.	Short name	Meaning	Input / output
 View onto the socket	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

PS/2	Pin no.	Short name	Meaning	Input / output
 View onto the socket	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 interfaces, X40A, B; X41A, B

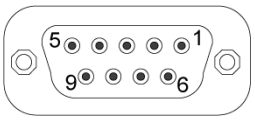
USB 2.0 interface			
			
Pinno.	**Short name**	**Meaning**	**Input / output**
1	VCC	+ 5 V (fused)	Output
2	– Data	Data channel	Input / output
3	+ Data	Data channel	Input / output
4	GND	Ground	–

The connectors are of type A.

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

PROFIBUS/MPI interface, X600

PROFIBUS/MPI interface [1]

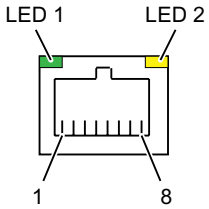


Pinno.	Short name	Meaning	Input / output
1	–	Not used	–
2	–	Not used	–
3	LTG_B	Signal line B of MPI module	Input/output
4	RTS_AS	RTSAS, control signal for received data stream. The signal is "1" when the directly connected AS is sending.	Input
5	M5EXT	M5EXT return line (GND) of 5 V power supply. The 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 feature

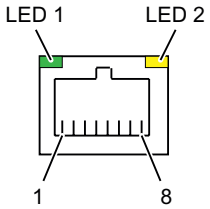
PROFINET LAN X1 Port P1, P2, P3

PROFINET interface

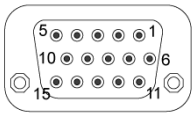


Pinno.	Short name	Meaning	Input / output
1	RD+	Receive data *	Input
2	RD-	Receive data *	Input
3	TD+	Send data *	Output
4, 5 1)	SYMR	Internal 75 Ohm terminating resistor	_
6	TD-	Receive data *	Output
7, 8 1)	SYMT-	Internal 75 Ohm terminating resistor	_
S		Shield	
	LED 1	Lit green: link	
	LED 2	Lights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

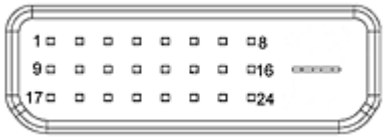
Ethernet LAN connection, X40, X41

Ethernet LAN connection			
			
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 Mbps	–
	LED 2	Lit: Active connection (to a hub, for example) Flashing: actvity	–

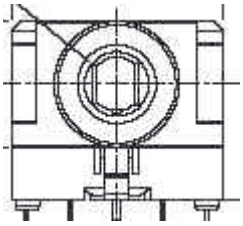
VGA interface, X303

VGA interface			
			
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

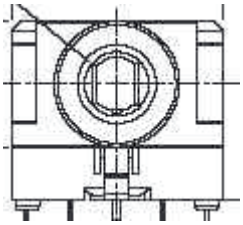
DVI-D interface (via ADD card)

DVI interface			
			
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

Microphone interface, X60

Microphone interface			
			
Pin no.	**Short name**	**Meaning**	**Input / output**
1	right	Right channel	Input
P	sense	Switch contact for device identification	Input
Q	GND	Ground for identification	Output
4	left	Left channel	Input
5A	M7	Analog ground	Output
5D	M	Logic ground	Output

Line Out interface, X61

Line Out interface			
			
Pin no.	**Short name**	**Meaning**	**Input / output**
1	right	Right channel	Output
P	sense	Switch contact for device identification	Input
Q	GND	Ground for identification	Output
4	left	Left channel	Output
5A	M7	Analog ground	Output
5D	M	Logic ground	Output

16.1.5 Internal ports

Pin assignment of the internal interfaces

Interface	Position	Connector	Description
Memory	Internal	X19, X20	2 SODIMM sockets, 64-bit
Processor	Internal	X1	Socket for FCPGA processor
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	Interface is disabled. Socket for standard floppy disk drive
SATA	Internal (hard disk drive, for example)	X5, 6, 7, 8	7-pin SATA connector, shielded
secondary EIDE (DVD ROM, for example)	Internal	X612	170h–177h, 1F0h–1F7h, switchable IRQ14, IRQ15, edge triggered 40-pin, 2.54 mm pin header, operation of up to two disk drives
Connection for device fan	Internal	X132, X617	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-pole pin header, LED interface for exchangeable rack 1 and 2

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

Pin assignment of the internal USB connector, X420

Pin no.	Short name	Meaning	Input / output
1	VCC	+ 5 V (fused)	Output
2	Key	–	–
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, X5, 6, 7, 8 (shielded connector)

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 HDD fan interface, X131

Pin no.	Short name	Meaning	Input / output
1	GND	Ground	-
2	VCC	5 V to +12 V, regulated	Output
3	Tacho signal	Monitoring signal	Input
4	-	Reserved	-

Pin assignment of the front fan interface, X132, X 617

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 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
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

Signal	Pin no.	Pin no.	Signal
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
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)

Signal	Pin no.	Pin no.	Signal
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)
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)

Signal	Pin no.	Pin no.	Signal
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)
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

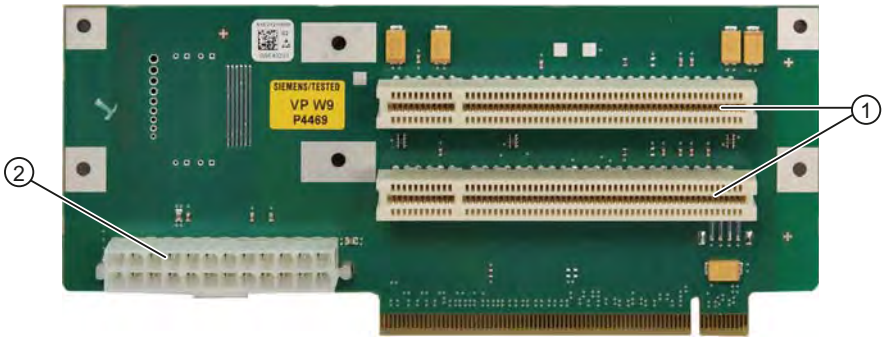
Signal	Pin no.	Pin no.	Signal
n.c.	B63	A63	GND
GND	B64	A64	PCIE_TX_P(1)
GND	B65	A65	PCIE_TX_N(1)
PCIE_RX_P(1)	B66	A66	GND
PCIE_RX_N(1)	B67	A67	GND
GND	B68	A68	PCIE1_ECLK
GND	B69	A69	PCIE1_ECLK_N
PCIE_TX_P(2)	B70	A70	GND
PCIE_TX_N(2)	B71	A71	GND
GND	B72	A72	PCIE_RX_P(2)
GND	B73	A73	PCIE_RX_N(2)
PCIE_TX_P(3)	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 Design and functions of the bus boards (riser cards)

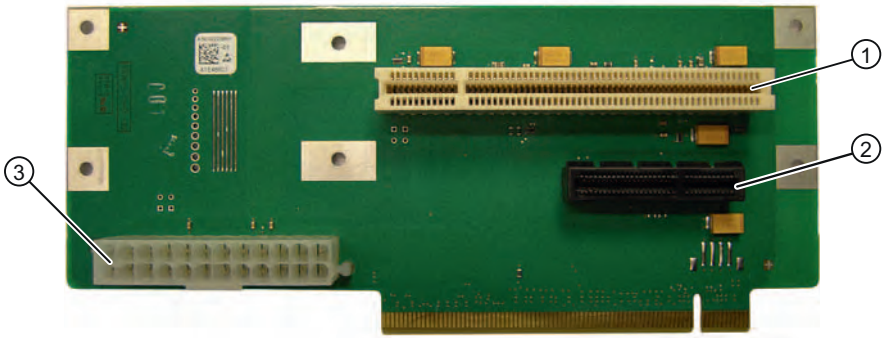
The bus board is designed as a link between the motherboard and the expansion modules. There are two different bus modules for the slots of PCI or PCIe x4 expansion plug-in cards. In addition, there is a separate bus module for the expansion with a PCIe x16 plug-in card (PEG).

- The PCI bus module (PCI riser card) has two slots for PCI cards. This is riveted into the bus frame (a mounting frame).



①	2x PCI
②	BTX power connector

- The other PCI/ PCIe x4 bus module carries one slot each for PCI and PCIe x4 modules.



①	1x PCI
②	1x PCIe x4
③	BTX power connector

- The PCIe module (PEG riser card) has one slot for a PCIe x16 module. This is screwed to the housing wall.



①	PCIe-x16 (PEG slot)
②	Expanded power supply

Can host expansion modules conforming to PCI specification (Rev. 2.3) or PCI specification 1.0a. All PCI slots support master mode. Power is directly supplied to the expansion modules via the bus board connection.

Interrupt assignment of the slot connectors on the bus board

Y = Interrupt in APIC mode, Z = BIOS default interrupt in PIC mode (for example DOS)

Labeling on housing	Slot no. in the BIOS	Host IRQ line	IRQ number																								Comments
		ACPI IRQ	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	1)
																											E, F are exclusive interrupts.
1	Slot 1 (PEG)	IRQ										Z							Y								
2	Slot 5 PCI	PCI IRQ A												Z									Y				
		PCI IRQ B											Z											Y			
		PCI IRQ C											Z												Y		
		PCI IRQ D												Z												Y	
3	Slot 6 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 assigned permanently to IRQ 16-23 in APIC mode.
Host PCI IRQ A to H is assigned automatically to IRQ 0-15 by the BIOS in PIC mode.

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. You can assign a specific IRQ for the modules in the BIOS menu "PCI Configuration". Select the host IRQ line E or F belonging to the slot and assign it to an IRQ number.

If the "PCI IRQ line" is marked with an asterisk due to the assignment, the selected IRQ is being used by another device. You will then need to disable this. The assignment of the interrupts can be found in the section Interrupt assignments (Page 180).

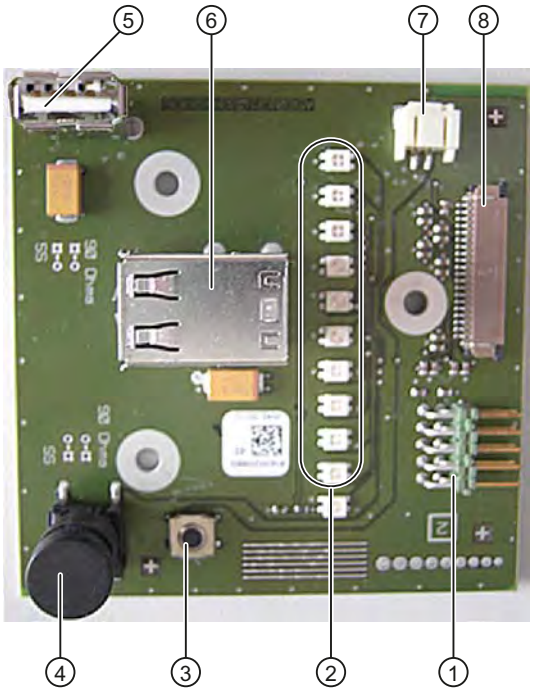
CAUTION
If you save the settings although a resource conflict is indicated, this will cause problems when you boot. In this case, you must remove the CMOS battery.

Example:
If you have assigned "IRQ 3" of the "PCI IRQ line E", you will need to disable "Serial port 2" in **Advanced > I/O Device Configuration**. In this menu, the "Serial port 2" entry is marked by an asterisk. If you set this entry to "Disabled", the IRQ is free and the asterisk disappears.

16.3 Operator panel

16.3.1 Operating panel - Layout and function

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

Operator panel	Item	Description
	①	9-pole pin header Connection to the motherboard (x420)
	②	LEDs
	③	Reset button Single-pole pushbutton
	④	On/off pushbutton Single-pole 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**, then enter "msinfo32" in **Open** field and confirm with **OK**
Windows Vista	**Start >** Enter "msinfo32" in the search function

16.4.2 System resources used by the BIOS/DOS

The following table describes the system resources for the factory state of the device.

16.4.2.1 I/O address allocation

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	
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	

I/O address (hex)				
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; resources are managed by means of 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 here 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 (for example DOS)

IRQ number																									Comments
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 output 0	X																								Fixed
Keyboard		X																							Fixed
Cascaded (IRQ9)			X																						Fixed
Serial port 2				X																					Can be disabled
Serial port 1					X																				Can be disabled
FD controller							X																		free
Parallel port 1								X																	Can be disabled
Real-time clock (RTC)									X																
PS/2 mouse													X												fixed, can be disabled
Numeric processor														X											Fixed
HD controller 1 (prim.)															X										Cannot be disabled
HD controller 2 (sec.)																X									Cannot be disabled
SATA												Z												Y	Can be disabled
USB port 0/1												Z												Y	Cannot be disabled
USB port 2/3												Z												Y	Cannot be disabled
USB port 4/5											Z												Y		Cannot be disabled
USB 2.0 controller											Z												Y		Can be disabled
Ethernet 1											Z						Y								Can be disabled
Ethernet 2											Z							Y							Can be disabled
VGA											Z						Y								Can be disabled
Profibus or Profinet						Z														Y					Option, can be disabled
Audio											Z						Y								Can be disabled

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

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 program is stored in ROM BIOS. System configuration data are stored in battery-backed RAM of the device.

SETUP can be used to define the hardware configuration (for example, the hard disk type) 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

Starting BIOS SETUP

Run SETUP as follows:

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

   With the default setting of your device, the display shown below appears following power-on, **for example**:

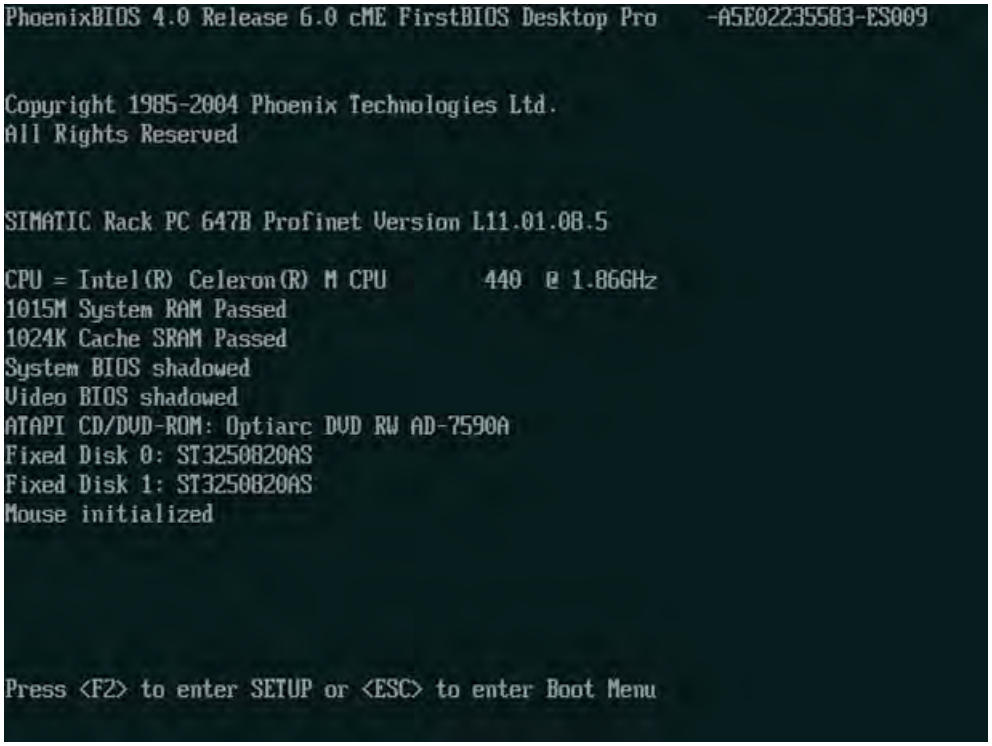


   Figure 16-3 Starting BIOS Setup

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

   `PRESS < F2 > to enter SETUP or <ESC> to show the Boot menu`

3. Press the F2 key as long as 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.

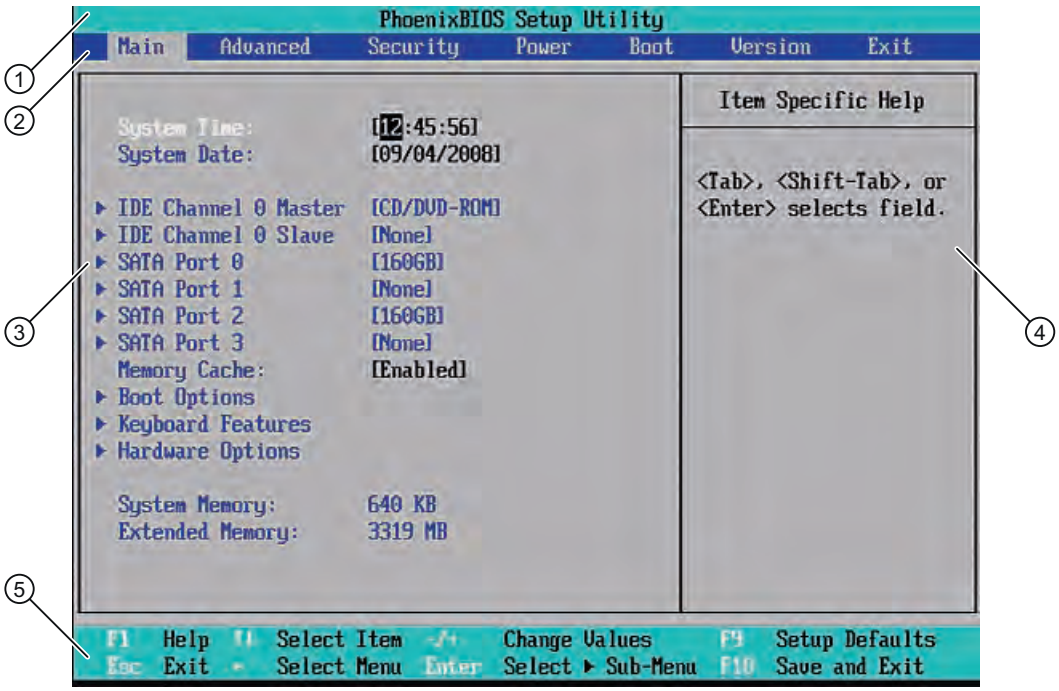


Figure 16-4 BIOS SETUP Menu (example)

① Header	④ Help window
② Menu bar	⑤ Operator input row
③ Selectable submenu	

Menu layout

The screen is divided into four sections. 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. Short help texts are output on the right ④ for currently selected menu entries. The bottom section contains information for operator input.

The diagrams below represent examples of specific device configurations. The screen content changes based on the delivered equipment configuration.

Yellow stars to the left of the interface name (for example, Internal COM1) indicate resource conflicts at interfaces managed in BIOS. In this case you should set the defaults (F9) or eliminate the conflict.

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

Menu	Meaning
Main	Set the system functions in this mask
Advanced	Set advanced system configurations in this dialog
Security	Dialog for setting security functions such as the password.
Power	Power-saving functions can be selected here
Boot	Define boot priorities in this dialog.
Version	Returns device-specific information such as the release version.
Exit	Used to exit the program and save the settings.

16.5.4 Main menu

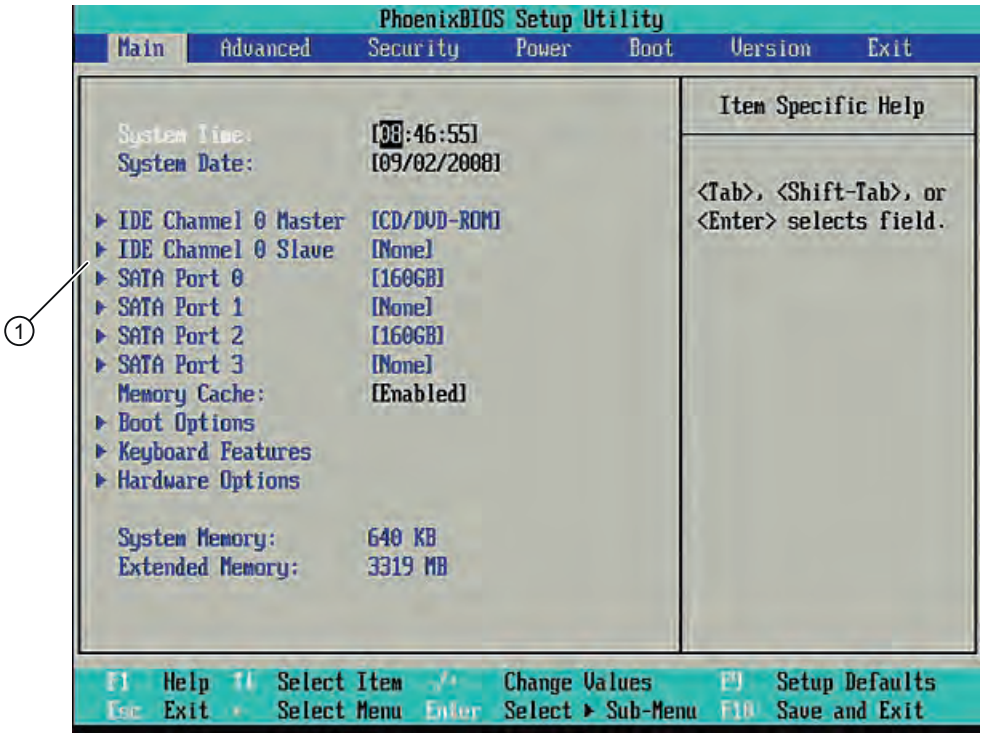


Figure 16-5 SETUP main menu (example)

① Selectable submenu

Settings in the main menu

In the main menu, you can navigate up and down to select the following system configuration fields using 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
Memory Cache	Used to set the cache options
via submenus	
IDE Channel 0 Master	Type of installed disk drives
IDE Channel 0 Slave	Type of installed disk drives
SATA Port 0	Type of installed disk drives
SATA Port 1	Type of installed disk drives
SATA Port 2	Type of installed disk drives
SATA Port 3	Type of installed disk drives
Boot options	Used to setup the boot options
Keyboard Features	Used to setup the keyboard interface (for example, NUM lock, Typematic Rate)
Hardware Options	Used to setup hardware options

System Time and System Date

System Time and System Date indicate the current values. You can change the values using the [+] and [–] keys after having selected the corresponding field

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 tab key.

IDE Channel 0 Master, IDE Channel 0 Slave

The system jumps to the following submenu when you select this type of menu field:

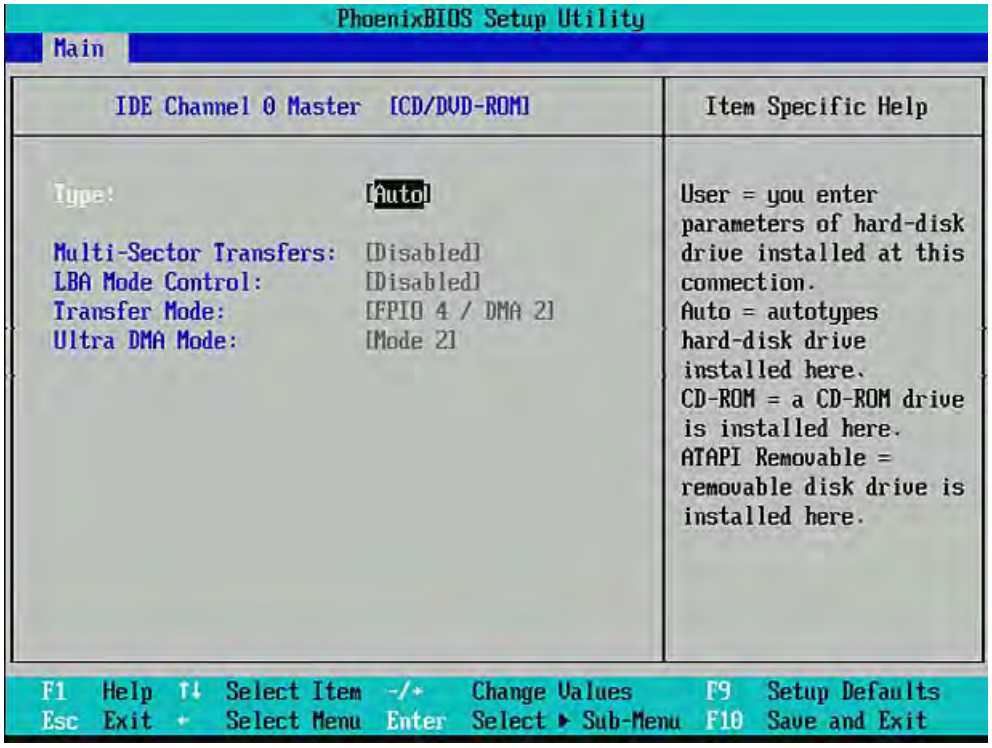


Figure 16-6 IDE Channel 0 Master (example)

Type	[User]	Select "User" to enter a user-specific definition of the hard disk type. Configure all the other options, for example, Cylinder, Heads, Sectors/Track, or other properties of the hard disk drive.
	[Auto]	The parameters which you can select in this dialog are usually saved to the respective IDE drive. The "Auto" setting in the "Type" field means that these values are automatically read from the drive and written to memory.
	[CD/DVD-ROM]	CD/DVD-ROM is connected
	ATAPI Removable	A removable data volume is connected
	None	Select "None" if you have not connected a disk drive. This setting reduces system waiting time.
Multi-Sector Transfer	The number of blocks (sectors) transferred per interrupt are defined at the "Multi-Sector Transfer" option. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field.	
	Disabled	2, 4, 8, 16 sectors
LBA Mode Control	The "Enabled" setting at the "LBA Mode Control" (enabled, disabled) option means that hard disk capacities greater than 528 MB are supported. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field.	
32-bit I/O	The type of access to the drive is determined in the 32-bit I/O field	
	Disabled	16-bit access
	Enabled	32-bit access (default)
Transfer Mode or Ultra DMA Mode	Define the data transmission rate of the interface in these fields. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field. Exit the submenu by pressing ESC.	

SATA Port 0, SATA Port 1, SATA Port 2, SATA Port 3

The system jumps to the following submenu when you select this type of menu field:

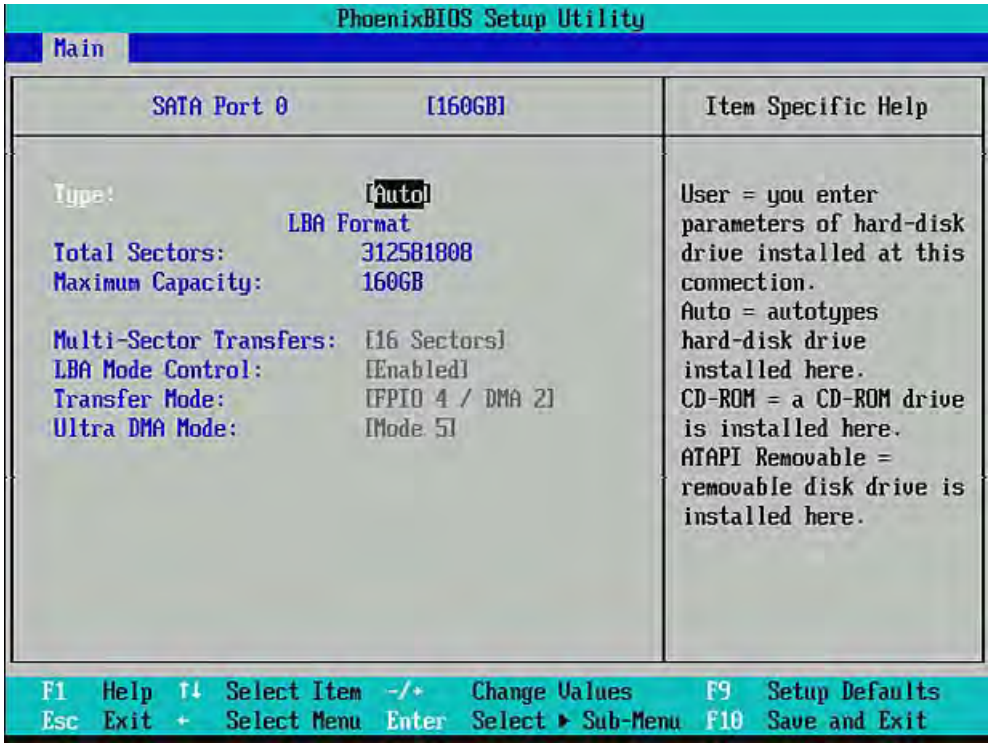


Figure 16-7 SATA Port 0 (example)

Type	[User]	Select "User" to enter a user-specific definition of the hard disk type. Configure all the other options, for example, Cylinder, Heads, Sectors/Track, or other properties of the hard disk drive.
	[Auto]	The parameters which you can select in this dialog are usually saved to the respective IDE drive. The "Auto" setting in the "Type" field means that these values are automatically read from the drive and written to memory.
	[CD/DVD-ROM]	CD/DVD-ROM is connected
	ATAPI Removable	A removable data volume is connected
	None	Select "None" if you have not connected a disk drive. This setting reduces system waiting time.
Multi-Sector Transfer	The number of blocks (sectors) transferred per interrupt are defined at the "Multi-Sector Transfer" option. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field.	
	Disabled	2, 4, 8, 16 sectors
LBA Mode Control	The "Enabled" setting at the "LBA Mode Control" (enabled, disabled) option means that hard disk capacities greater than 528 MB are supported. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field.	

32-bit I/O	The type of access to the drive is determined in the 32-bit I/O field	
	Disabled	16-bit access
	Enabled	32-bit access (default)
Transfer Mode or Ultra DMA Mode	Define the data transmission rate of the interface in these fields. The value depends on the drive and should only be set by way of "Auto" setting at the "Type" field. Exit the submenu by pressing ESC.	

"Memory Cache" field

The following shortcut menu appears when you select the "Memory cache" option in the main menu:

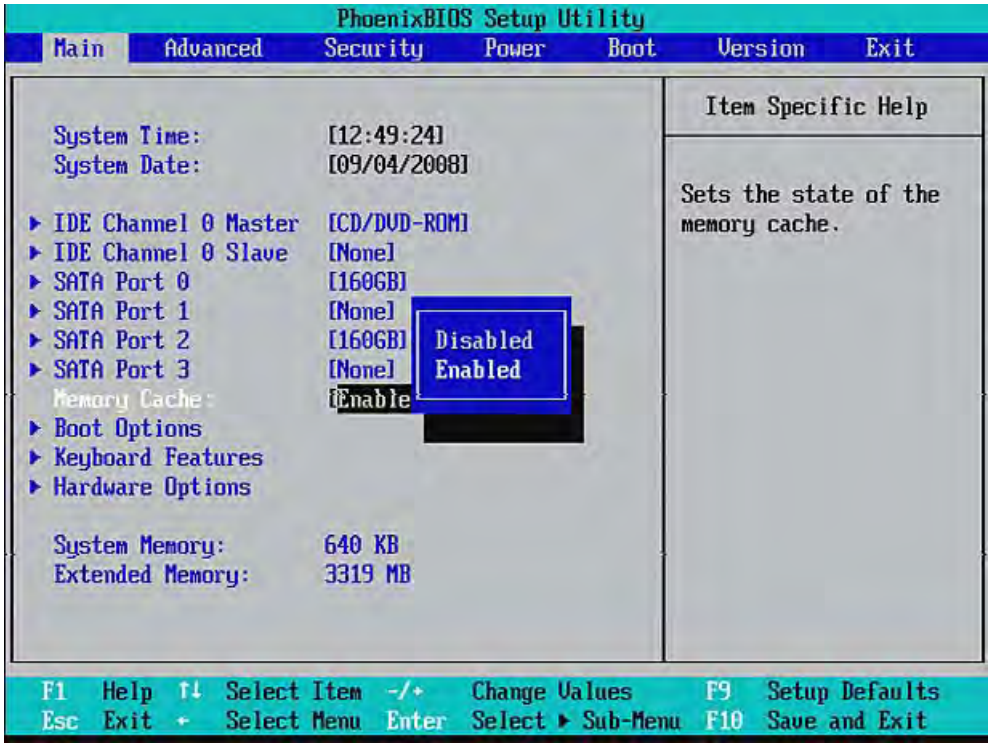


Figure 16-8 "Memory Cache" field

The term cache is used to denote a high-speed memory buffer between the CPU and memory (DRAM). Instead of using the slower RAM the system deploys high-speed cache memory for repetitive memory access, provided this function is enabled. In rare cases it may be necessary to disable cache memory for certain hardware and software, as program runtimes or waiting times can be reduced by using high-speed cache memory.

[Disabled]	Cache is disabled
[Enabled]	Cache is enabled

"Boot Options" field

The following submenu appears when you select the "Boot Options" from the main menu:

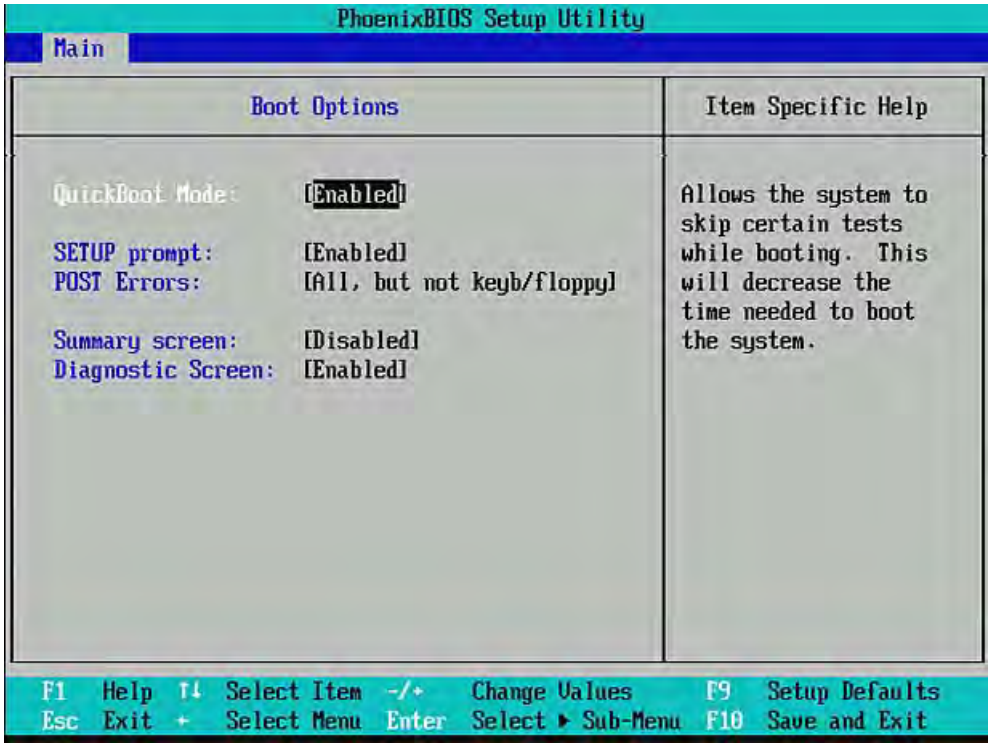


Figure 16-9 "Boot Options" field (example)

Quick Boot Mode	Certain hardware tests are skipped in order to accelerate the boot sequence.	
SETUP prompt	The message "Press <F2> to enter Setup or <Esc> to show the Boot menu" is output on the bottom of the screen within the system startup phase.	
POST errors	If the boot sequence is interrupted due to an error detected within the system startup phase, press F1 to acknowledge this error.	
	[Disabled]	Error acknowledgment is not required, for example, if a keyboard is not found.
	[All, but not keyboard/floppy]	Show all errors except for keyboard and floppy-drive errors.
Summary screen	The most important system parameters are displayed when the system startup phase is completed.	
Diagnostic screen	Outputs diagnostics messages within the boot sequence.	

"Enabled" means that the relevant feature is active. "Disabled" means that the feature is inactive.

Example of a Summary Screen:

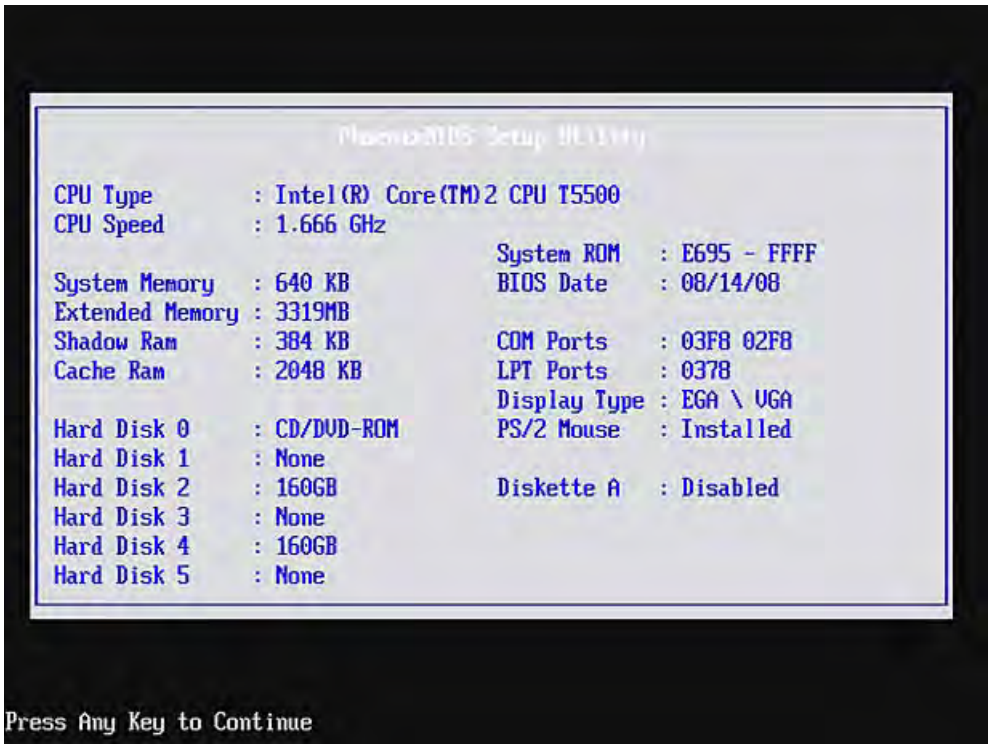


Figure 16-10 Summary screen (example)

The summary screen appears when system startup is completed.

"Keyboard Features" field

The following submenu appears when you select the "Keyboard Features" field from the main menu:

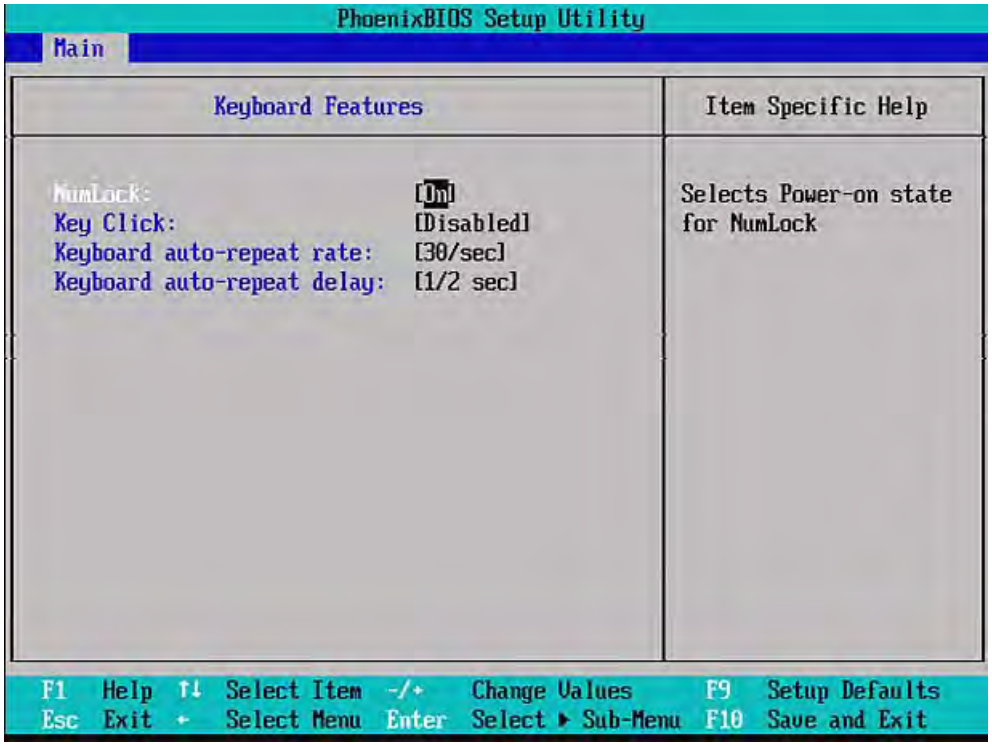


Figure 16-11 "Keyboard Features" submenu (example)

Numlock	Switches Numlock on or off after Power On.
Key Click	The program outputs an audible "CLICK" for keystrokes.
Keyboard auto-repeat rate	Increase of the automatic key repeat rate
Keyboard auto-repeat delay	On-delay of automatic keyboard repeat

"Hardware Options" field

One of the following submenus appears when you select the "Hardware Options" field from the main menu:

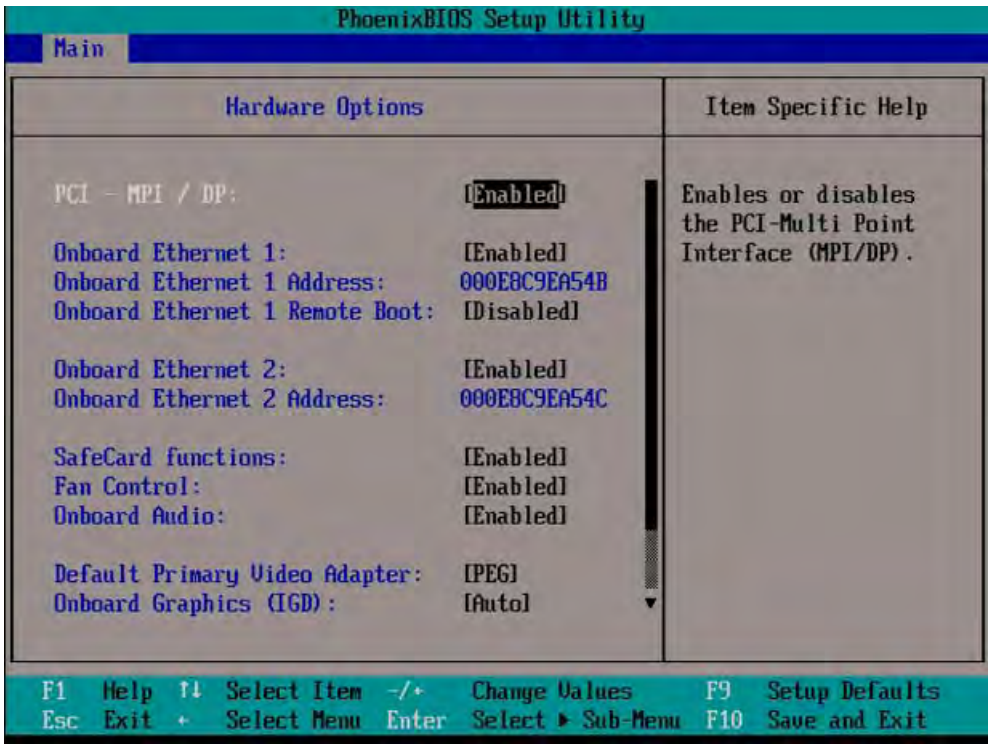


Figure 16-12 "Hardware Options" field (example for PROFIBUS)

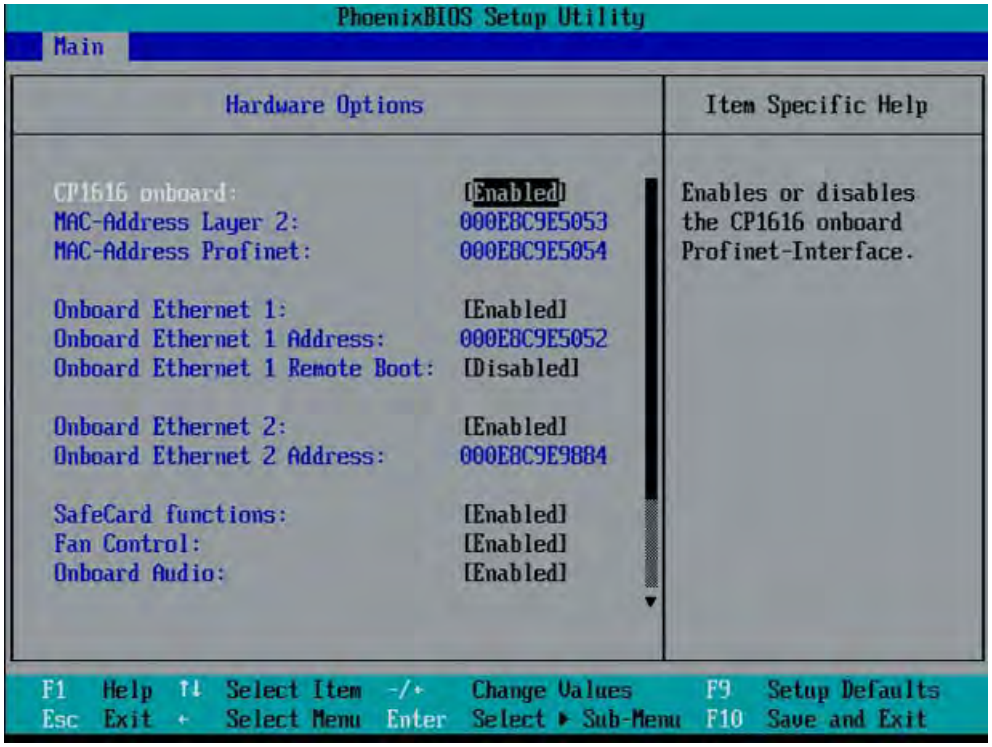


Figure 16-13 "Hardware Options" box (example for CP 1616)

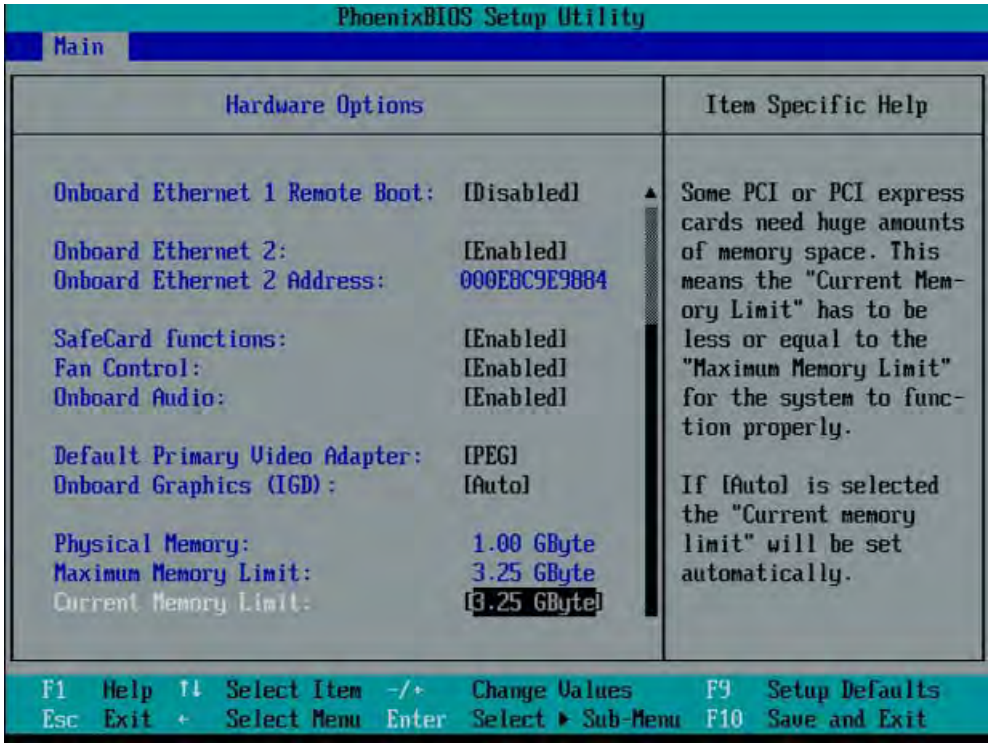


Figure 16-14 "Hardware Options" Part 2 box (example for PROFIBUS and CP 1616 onboard)

Set the parameters of interfaces installed on the motherboard at this field.

Entry	Meaning	
PCI-MPI/DP *	[Enabled]	PROFIBUS onboard is enabled.
	[Disabled]	PROFIBUS onboard is disabled.
CP 1616 onboard *	[Enabled]	CP 1616 onboard is enabled.
	[Disabled]	CP 1616 onboard is disabled.
MAC Address Layer 2 *		This address is for NDIS applications. Example: 000E8C8E8C0A
MAC Address Profinet *		This is the main address for PROFINET applications Example: 000E8C8E8C0B. The MAC addresses of the individual ports are derived from the "MAC Address Profinet". They are not shown in the BIOS setup. Example: P1=000E8C8E8C0B+1, P2=000E8C8E8C0B+2, P3=000E8C8E8C0B+3
On-board Ethernet	[Enabled]	The Ethernet interface on the motherboard is enabled.
	[Disabled]	The Ethernet interface on the motherboard is disabled.
Ethernet Address	Shows the individual Ethernet address.	
On-board Ethernet 1 Remote Boot	[Enabled]	Booting via Ethernet interface 1 is enabled.
	[Disabled]	Booting via Ethernet interface 1 is disabled.
SafeCard functions	[Enabled]	On-board monitoring functions are enabled.
	[Disabled]	No monitoring functions.
	The relevant driver and application must be started for operation of the monitoring functions.	
Fan Control	[Enabled]	The fan speed is temperature-controlled
	[Disabled]	The fan always runs at full speed.
Onboard audio	[Enabled]	Audio interface is enabled.
	[Disabled]	Audio interface is disabled.
Default primary video adapter	IGD/PCI	A graphics integrated in the chipset or a graphics card in a PCI slot is active in the boot phase.
	PEG	A graphics card inserted in the PEG slot is active in the boot phase.
Onboard Graphics (IGD)	Auto	BIOS detects whether another graphics module is inserted and switches over depending on the "Default Primary Video Adapter" setting.
	Disabled	The integrated graphics is disabled in the chipset. This setting should only be selected if another graphics card is installed.

* This menu command depends on the device configuration

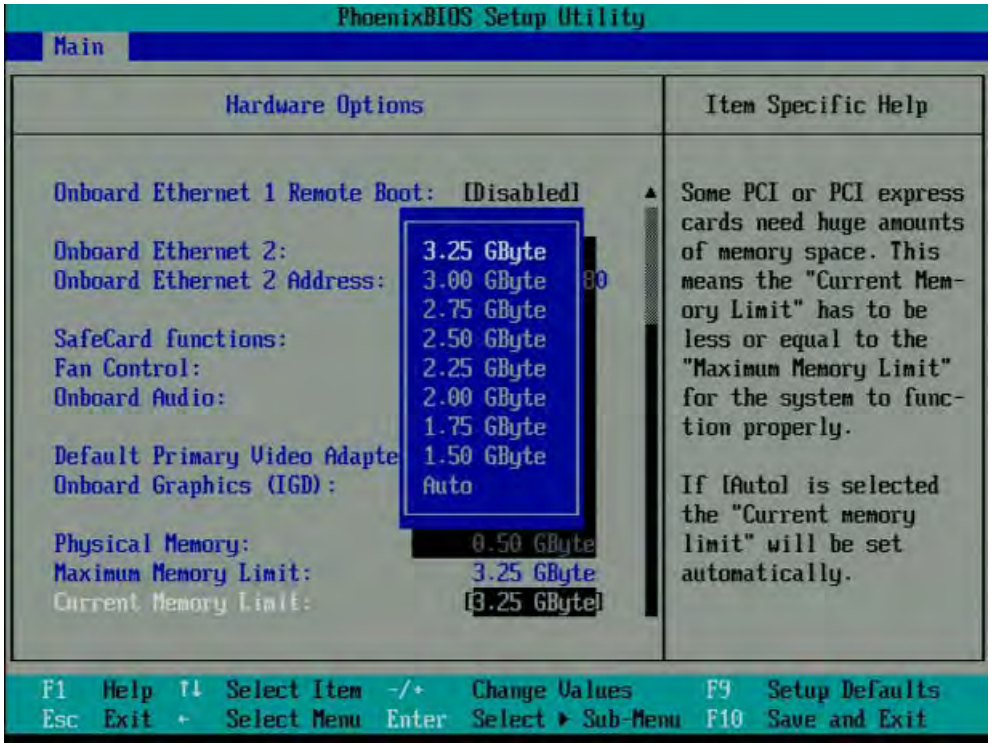


Figure 16-15 "Hardware Options" box (example Current Memory Limit)

Entry	Meaning	
Physical Memory	2 GB *	This entry shows the size of the installed memory.
Maximum Memory Limit	[3.25 GB]	Here, you will see the value calculated by the system that you should enter in the "Current Memory Limit" menu item if you have problems with the inserted modules.
Current Memory Limit	[3.25 GB] [3.00 GB] .... [1.50 GB]	With this setting, the memory available for the operating system can be reduced from 3.25 GB to 1.5 GB (in steps of: 0.25 GB). You will find the value proposed by the system in the "Maximum Memory Limit" menu.
	[Auto]	If Auto is set, the setting is made by the BIOS.

* This menu command depends on the device configuration

16.5.5 Advanced Menu

Menu layout

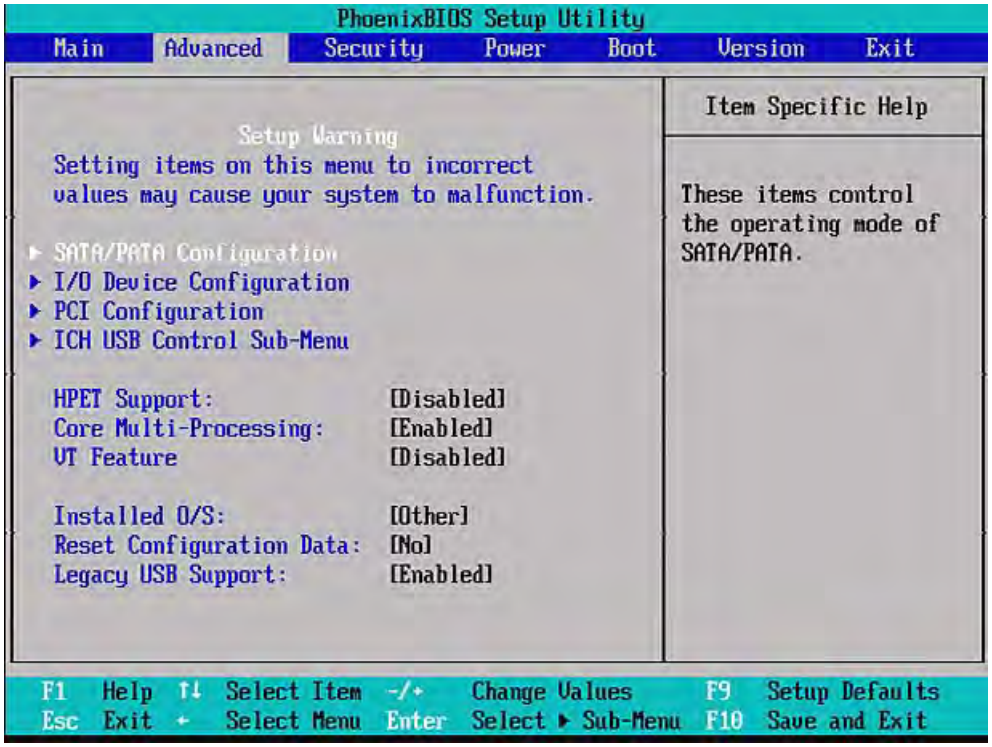


Figure 16-16 "Advanced" menu (example)

Settings in the Advanced menu

HPET Support	[Disabled]	High-resolution timer for multimedia disabled.
	[Enabled]	High-resolution timer for multimedia enabled.
Core Multi-Processing *	[Disabled]	Core Multi-Processor disabled
	[Enabled]	Core Multi-Processor enabled
VT Feature *	[Enabled]	VT support of the CPU can be used.
	[Disabled]	VT support of the CPU is disabled.
Installed O/S	Plug-and-Play means that all modules are automatically detected and installed, provided the modules support this functionality.	
	[Other]	BIOS handles the entire Plug-and-Play compatibility, default setting.
	[Win2000]	The operating system handles the Plug-and-Play functions.
	[WinXP]	The operating system handles the Plug-and-Play functions.
Reset Configuration Data	[Yes]	All Plug-and-Play data are deleted and the configuration is initialized at the next system restart. The entry is then reset to [No]. System components which do not support Plug-and-Play have to be entered manually.
	[No]	The Plug-and-Play system components are initialized after the next system start.
Legacy USB support	[Disabled]	The USB devices can be used in BIOS Setup and operating systems which support USB. DOS is not supported.
	[Enabled]	DOS can be controlled using the USB keyboard, that is, tools such as Image Creator for DOS are supported.

"SATA/PATA Configuration" submenu

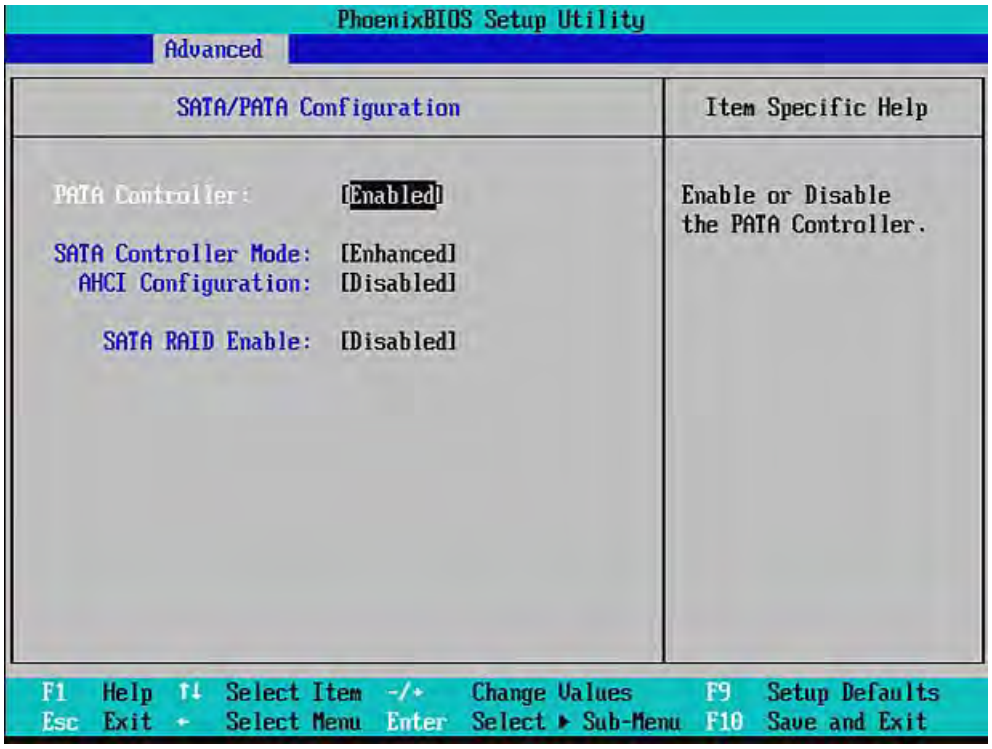


Figure 16-17 SATA/PATA Configuration

PATA Controller	[Enabled] [Disabled]	Disables or enables the PATA controller
SATA Controller mode	[Enhanced]	4 SATA ports are available in Native Mode
	[Compatible]	Drives on SATA Port 0, 2 => SATA drives are emulated as primary PATA master/slave. PATA drives are emulated as secondary PATA master/slave. Drives on SATA Port 1, 3 => SATA drives are emulated as secondary PATA master/slave. PATA drives are emulated as primary PATA master/slave.
AHCI Configuration	[Disabled] [Enabled]	Enhanced AHCI: WinXP-SP1 + IAA driver supports AHCI mode
SATA RAID Enable	[Disabled] [Enabled]	Disables or enables RAID support

"I/O Device Configuration" submenu

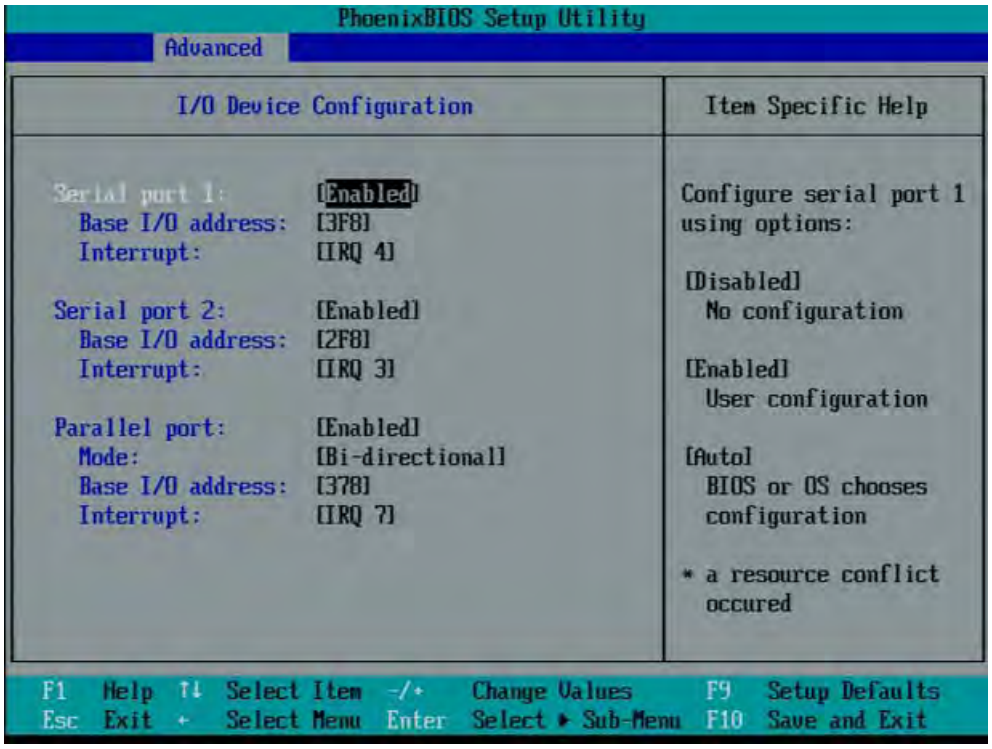


Figure 16-18 "I/O Device Configuration" submenu

The resources used by an interface are released by disabling this interface. It is advisable not to change the default I/O addresses and interrupts.

CAUTION
*** a resource conflict occurred** If you save the settings although a resource conflict is indicated, this will cause problems when you boot. In this case, you must remove the CMOS battery. An IRQ resource conflict between COM1 and COM2 is not indicated.

Internal printer port LPT1

Mode	Use this setting to set the operating mode of the printer port. This setting must match the terminal device you connected as described below.

Configurable mode	Features
Output Only Standard Parallel Port - unidirectional (SSP)	-Standard setting for 8-bit parallel data transfer to the IEEE1284 specification -Feedback of the output device is only possible via the control channels
Bi-directional Standard Parallel Port - bi-directional	Same as SPP - unidirectional, but: - Feedback of the output device is also possible via 8-bit data channels.
EPP Enhanced Parallel	- High-speed parallel port (data transmission rates between 500 kbps and 2 Mbbps are possible) -Hardware handshake -different devices can be addressed
ECP Extended Capability Port	Same as EPP, but: -separate DMA channel -FIFO buffer -Data compression

CAUTION
*** a resource conflict occurred** If you save the settings although a resource conflict is indicated, this will cause problems when you boot. In this case, you must remove the CMOS battery.

"PCI Configuration" submenu

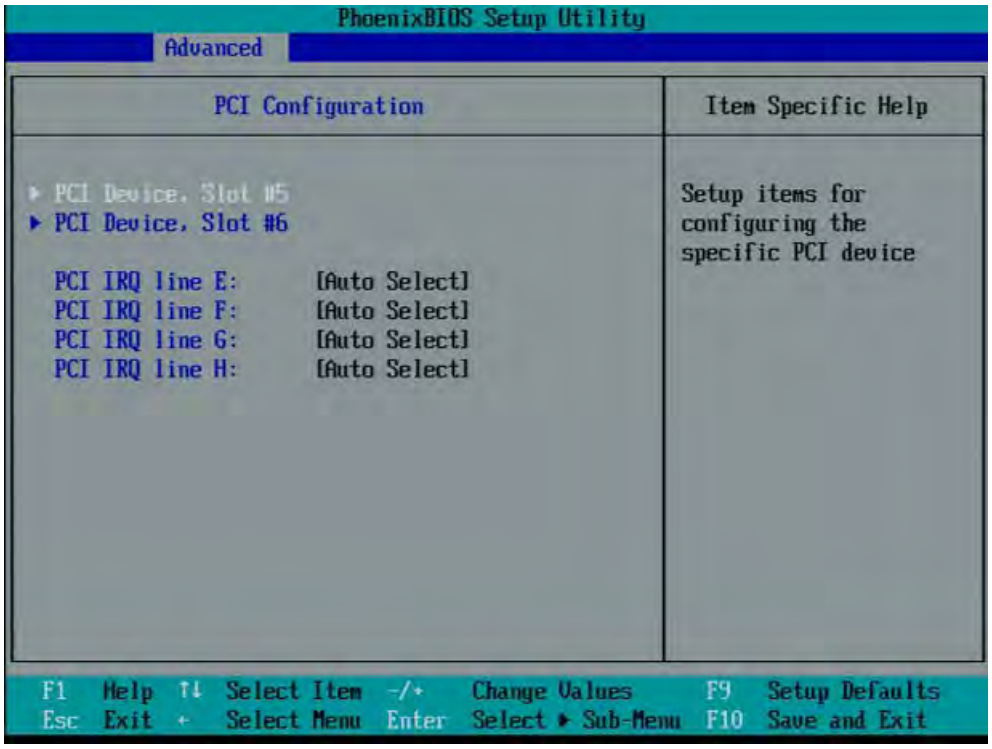


Figure 16-19 "PCI Configuration" submenu

The labeling of the slots in the BIOS menu differs from the labeling on the housing.

BIOS labeling	Housing labeling
PCI Device, Slot #5	2
PCI Device, Slot #6	3

"PCI Devices" field

If the PCI devices field is selected, the following submenu appears:

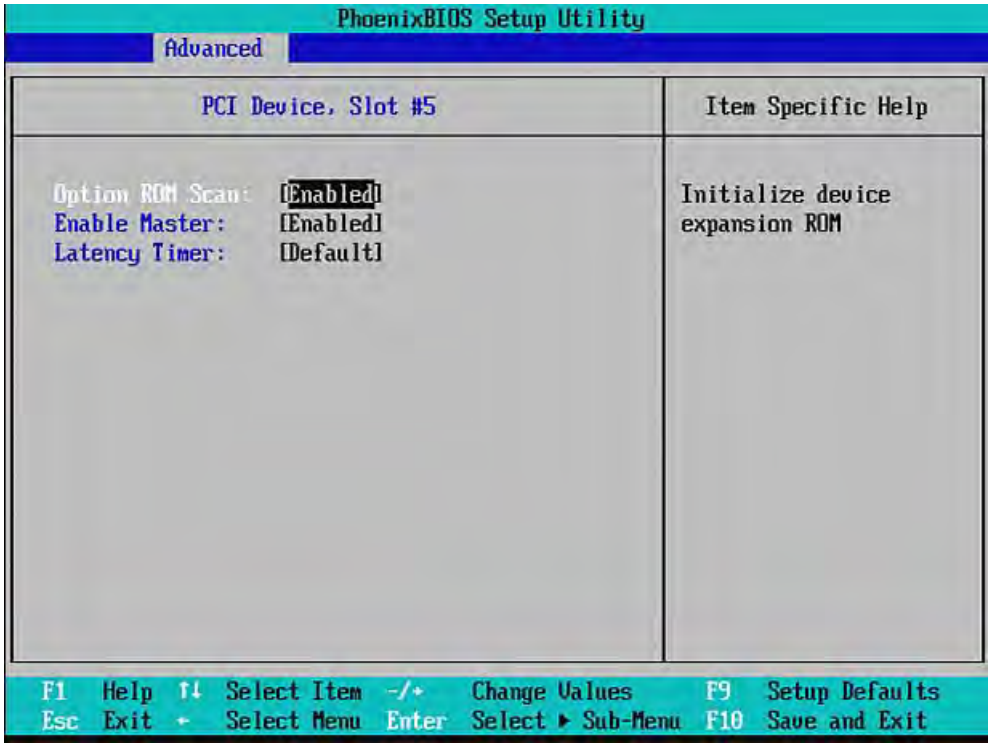


Figure 16-20 "PCI Devices" field

ROM Scan Option	[Enabled]	The ROM option of the PCI module (if present) is enabled
	[Disabled]	The ROM option of a PCI module is disabled.
Enable Master	[Enabled]	This slot can be assigned PCI master functions
	[Disabled]	This slot can only operate as a PCI slave.
Latency Timer	[Default]	The number of active PCI clock cycles of the master modules is determined by this module
	[0020H to 00E0H]	These settings define the maximum number of active PCI clock cycles according to the set value.
	You should only use a value different from the default if required by the module or its application.	

BIOS labeling	Housing labeling
PCI Device, Slot #5	2
PCI Device, Slot #6	3

"PCI IRQ line" field

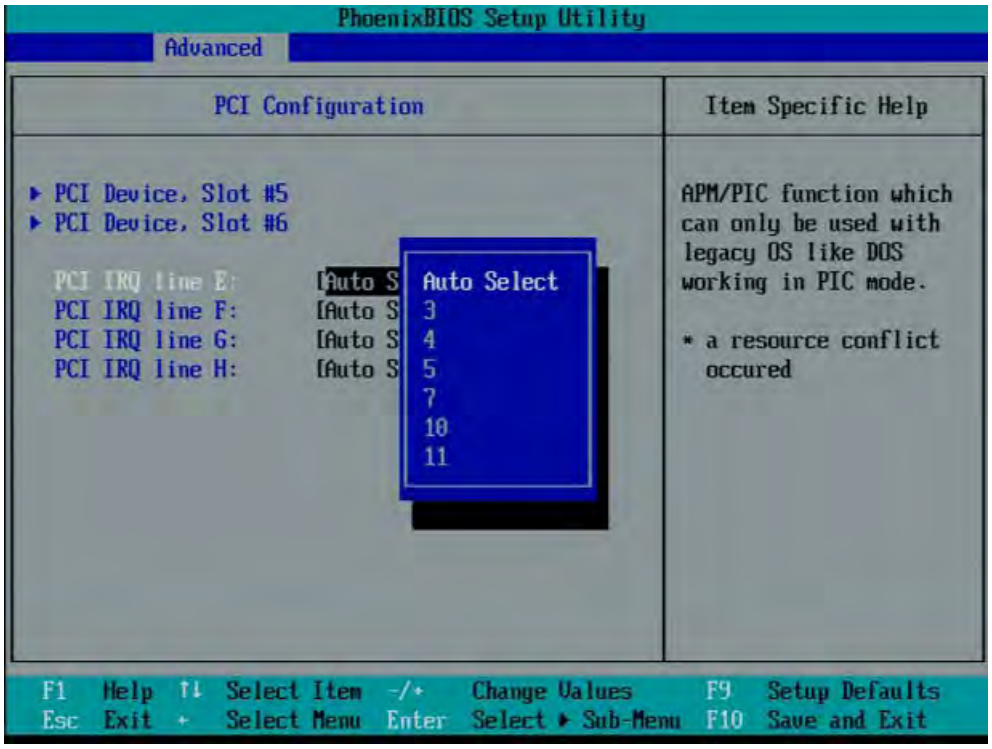


Figure 16-21 "PCI IRQ line" field

Auto select	Plug and Play mechanism in BIOS selects unassigned interrupts and allocates them to the PCI devices. This function only affects APM systems in PIC mode (for example RMOS, DOS).
3, 4, 5, 7, 10, 11	The selected PCI IRQ channel is assigned permanently to the selected interrupt. You should only select this setting if it is required in the documentation of your application.

If the "PCI IRQ line" is marked with an asterisk due to the assignment, the selected IRQ is being used by another device. You will then need to disable this. The assignment of the interrupts can be found in the section Interrupt assignments (Page 180).

CAUTION
*** a resource conflict occurred** If you save the settings although a resource conflict is indicated, this will cause problems when you boot. In this case, you must remove the CMOS battery.

Example:
If you have assigned "IRQ 3" of the "PCI IRQ line E", you will need to disable "Serial port 2" in **Advanced > I/O Device Configuration**. In this menu, the "Serial port 2" entry is marked by an asterisk. If you set the entry to "Disabled", the IRQ is free and the asterisk disappears.

"ICH USB Control Sub-Menu"

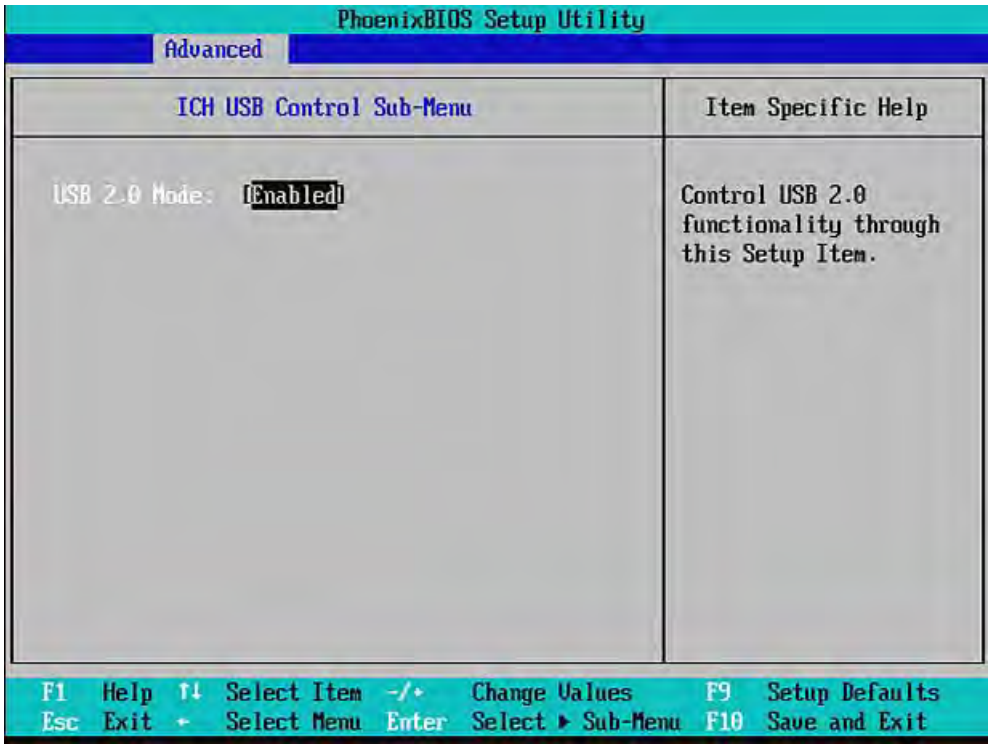


Figure 16-22 "ICH USB Control Submenu"

USB 2.0 Mode	Enabled	USB 2.0 devices are supported.
	Disabled	USB 2.0 devices are not supported

16.5.6 Security menu

You can only edit the fields enclosed in square brackets. Two passwords can be assigned to protect your PC from unauthorized use. The Supervisor password can be used to restrict access to the hard disks.

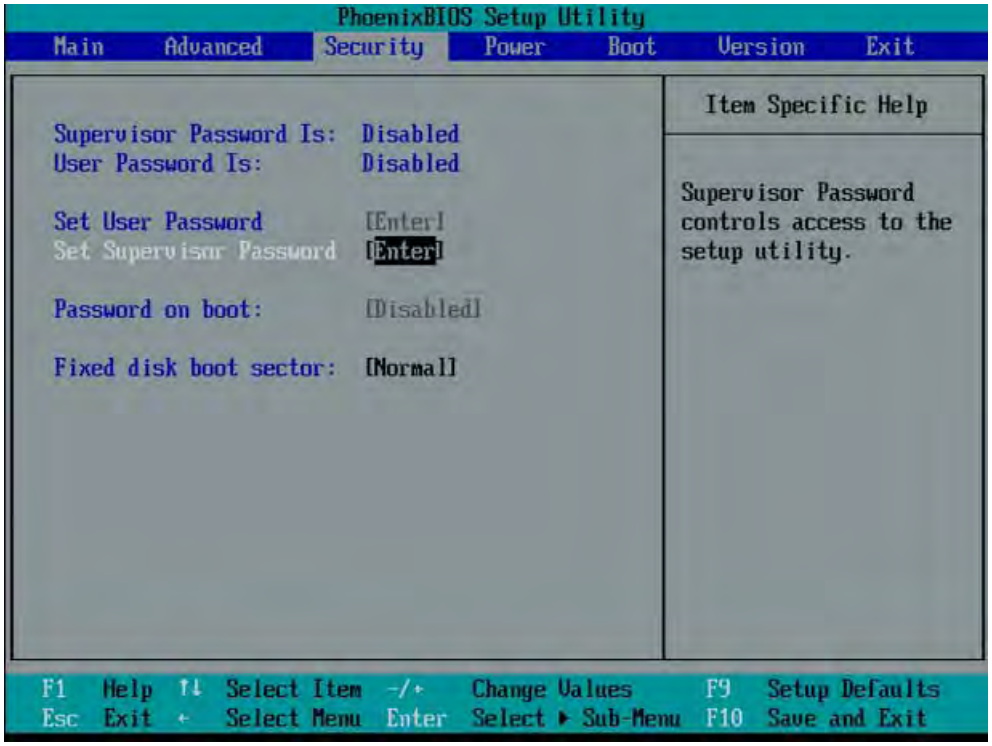


Figure 16-23 Security menu (example)

User password is	Disabled	The password is disabled.
	Enabled	Certain Setup fields are configurable by the user, including the user password.
	The field resets automatically from [Disabled] to [Enabled] when the password is entered.	
Set User Password	This field opens the password input dialog. Logged on users can change the password, or clear and deactivate it by pressing "Return."	
Set Supervisor Password	This field opens the password input dialog. Authorized logged on users can change the supervisor password, or delete and deactivate it by pressing "Return."	
Password on boot	[Disabled]	No password required for system boot.
	[Enabled]	Supervisor or user password must be entered for system boot.
Fixed disk boot sector	[Normal]	All types of hard disk access are permitted.
	[Write protect]	The user cannot install an operating system. This is a way of protecting against boot viruses.

16.5.7 Power menu

This menu has the following layout:

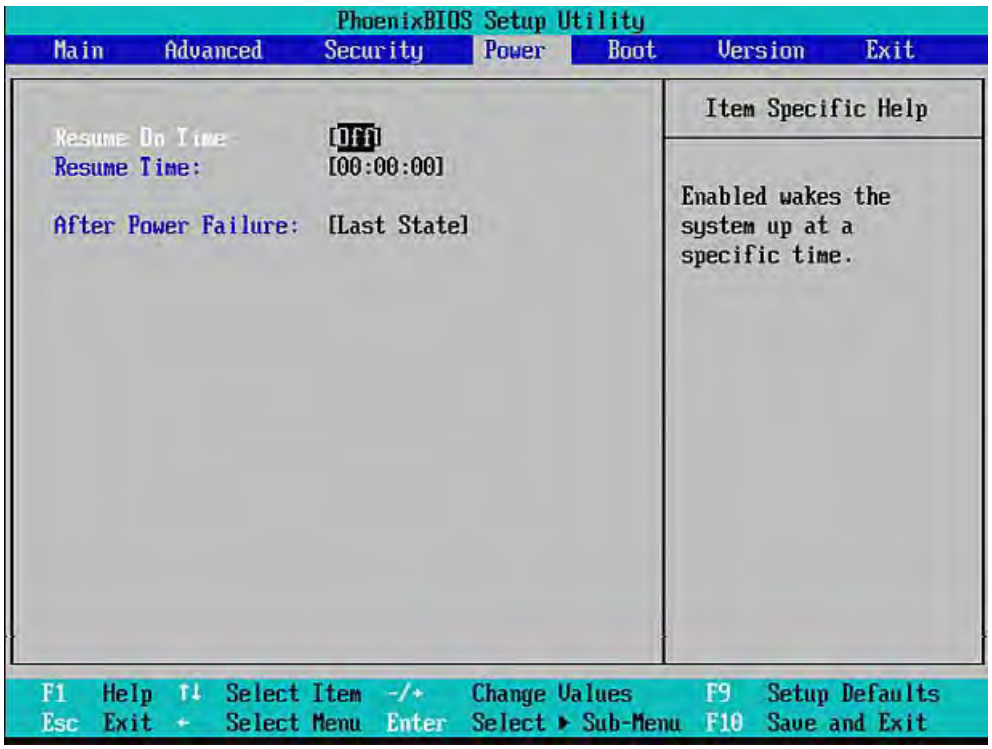


Figure 16-24 Power menu (example)

You can use the Power menu to set various (environment-friendly) power-saving modes:

Resume On Time	[On]	This function is used to switch the device on automatically at the time specified at the bottom.
	[Off]	Off disables this function.
After Power Failure	[Last State]	Device reverts to last state it was in prior to power failure.
	[Power On]	Devices restarts automatically after a power failure.
	[Stay Off]	Device does not restart automatically after a power failure.

16.5.8 Boot menu

This menu allows you to define the boot priority of the devices.

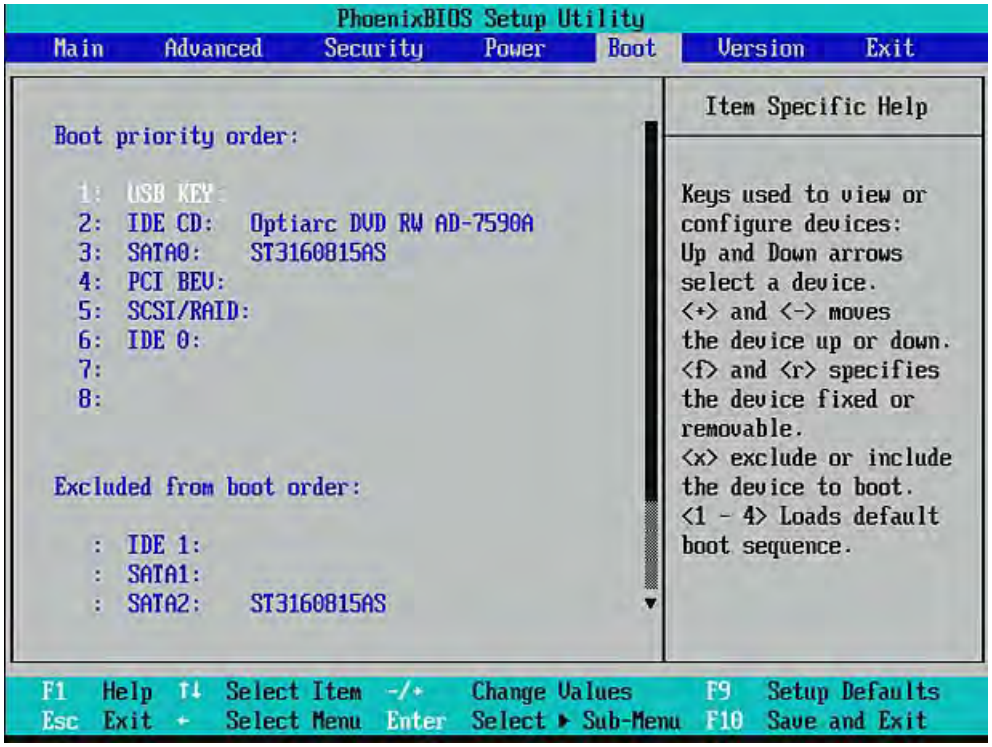


Figure 16-25 Boot menu (example)

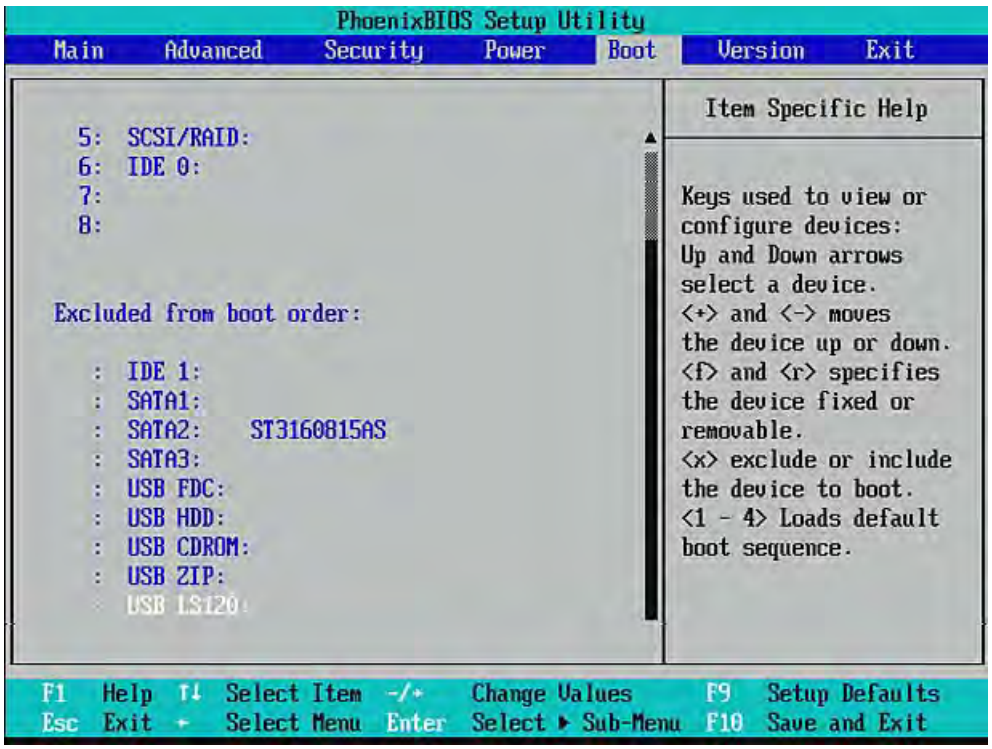


Figure 16-26 Boot menu (example)

This screen shows all available boot sources. The boot source with highest boot priority shown at the top. To change the boot sequence:

Select the group using the ↑ ↓ keys, move to device the desired position using the + or - keys.

Note

You can select the boot volume by pressing the ESC key during system startup.

If a boot source is not available the system automatically tries to boot from the next device of the sequence.

16.5.9 Version menu

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

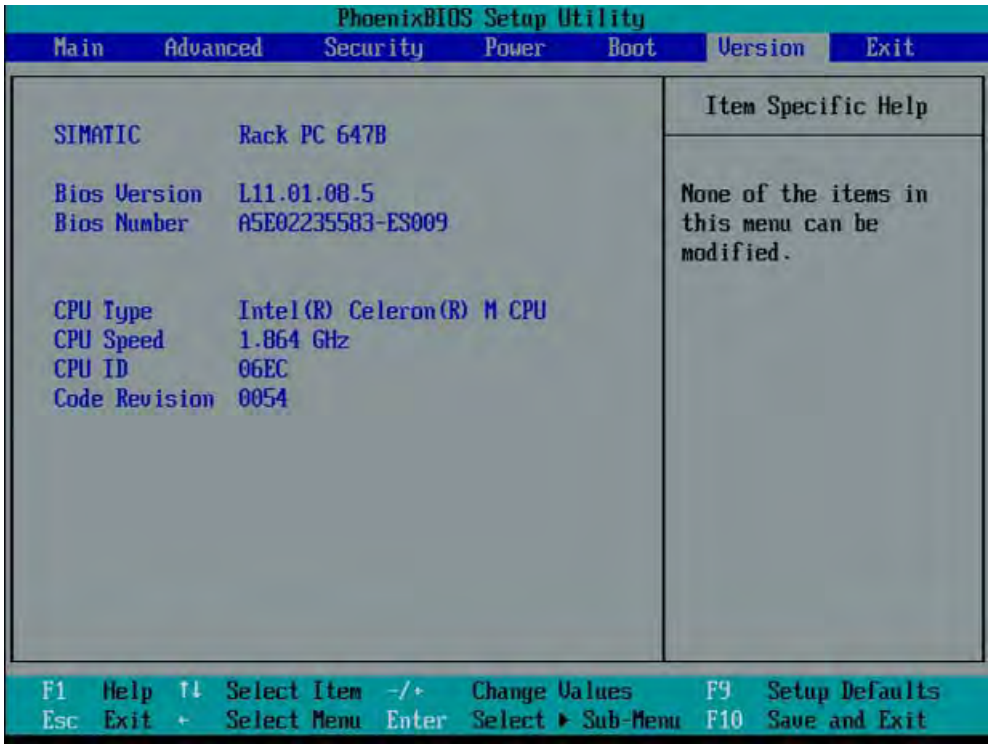


Figure 16-27 Version menu (example)

16.5.10 Exit menu

You always exit BIOS Setup in this menu.

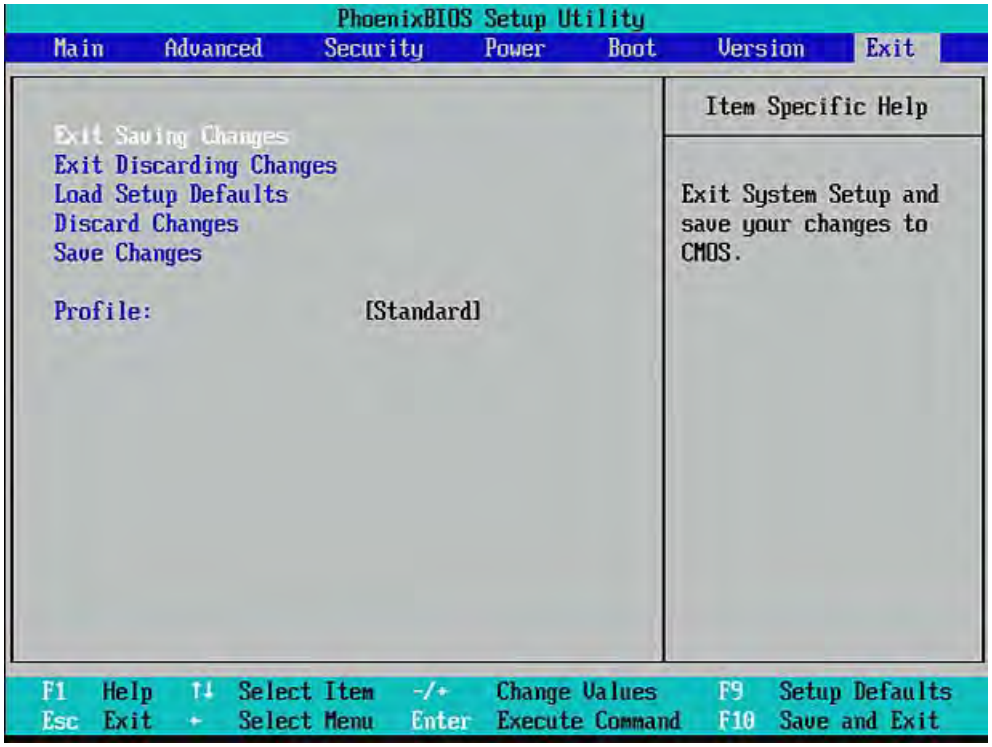


Figure 16-28 Exit menu

Exit Saving Changes	All changes are saved and the system is restarted with the new parameters.	
Exit Discarding Changes	All changes are discarded and the system is restarted with the old parameters.	
Load Setup Defaults	Loads the default settings	
Discard Changes	All changes are discarded.	
Save Changes	All changes are saved	
Profile	Standard	The BIOS settings are backed up to buffered CMOS
	User	The BIOS settings are saved to BIOS NV-RAM which is backed up by battery.
	Manufacturer	This setting is only used for production purposes. Do not use.

16.5.11 Default BIOS Setup entries

Documenting your 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 have made your entries.

BIOS Setup defaults

System parameters	Defaults	Custom entries
Main		
System Time	hh:mm:ss	
System Date	MM/DD/YYYY	
IDE Channel 0 Master	CD-ROM	
IDE Channel 0 Slave	None	
SATA Port 0	80026MB	
SATA Port 1	None	
SATA Port 2	None	
SATA Port 3	None	
Memory Cache	Enabled	

Boot options		
Quick Boot Mode	Enabled	
SETUP prompt	Enabled	
POST errors	Enabled	
Summary screen	Disabled	
Diagnostic screen	Enabled	

Keyboard Features		
Num Lock	On	
Key Click	Disabled	
Keyboard auto–repeat rate	30/sec	
Keyboard auto–repeat delay	½ sec	

Hardware Options		
PCI - MPI / DP [1]	Enabled	
PROFINET [1]	Enabled	
MAC Address Layer1	000E8C80A63E (example)	
MAC Address Profinet	000E8C80A63F (example)	
On-board Ethernet 1	Enabled	
On-board Ethernet 1 Address	000E8C80A63D (example)	
On-board Ethernet 1 Remote Boot	Disabled	
On-board Ethernet 2	Enabled	
On-board Ethernet 2 Address	000E8C8E0971 (example)	
SafeCard functions	Enabled	
Fan Control	Enabled	
Onboard audio	Enabled	
Default primary video adapter	PEG	
Onboard Graphics (IGD)	PEG	
Physical Memory	[1]	
Maximum Memory Limit	[2]	
Current Memory Limit	3.25 GB	
[1] Depends on the device or CPU features		
[2] depending on the resource requirements of the inserted expansion modules		

Advanced		
HPET Support	Disabled	
Core Multi-Processing [2]	Enabled [3]	
VT [1]	Disabled	
Installed O/S	Other	
Reset Configuration Data	No	
Legacy USB support	Disabled	
[1] Depends on the device or CPU features [2] Depends on the CPU and operating system features [3] Disabled when device is supplied "without an operating system" or Windows 2000		

SATA/PATA Configuration		
PATA Controller	Enabled	
SATA Controller mode	Enhanced	
AHCI Configuration	Disabled	
SATA RAID Enable	Disabled	

I/O Device Configuration		
Serial Port 1	Enabled	
Serial Port 2	Enabled	
Parallel Port	Enabled	

ICH USB Control Sub-Menu		
USB 2.0 Support	Enabled	

PCI Configuration		
PCI Device Slot 5 (housing labeling: 2)		
ROM scan option	Enabled	
Enable Master	Enabled	
Latency timer	Default	
PCI Device Slot 6 (housing labeling: 3)		
ROM Scan Option	Enabled	
Enable Master	Enabled	
Latency timer	Default	

PCI IRQ lines		
PCI IRQ line E	Auto Select	
PCI IRQ line F	Auto Select	
PCI IRQ line G	Auto Select	
PCI IRQ line H	Auto Select	

Security		
Supervisor Password Is	Disabled	
User Password is	Disabled	
Set User Password	Enter	
Set Supervisor Password	Enter	
Password on boot	Disabled	
Fixed disk boot sector	Standard	

Power		
Resume On Time	Off	
Resume Time	00:00:00	
After Power Failure	Last State	

Boot		
Boot priority order		
Excluded from boot order		

Version		
SIMATIC	SIMATIC Rack PC 647B	
BIOS Version		
BIOS Number		
MPI/DP Firmware		
CPU Type	Intel® Core 2 CPU	
CPU Speed		
CPU ID		
Code Revision		

16.6 CP 1616 onboard communications processor

16.6.1 Introduction

The CP 1616 onboard 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 RJ-45 jacks for connecting terminal devices or addition network components
- Integrated 3-port real-time switch
- Automatic hardware detection

16.6.1.1 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.

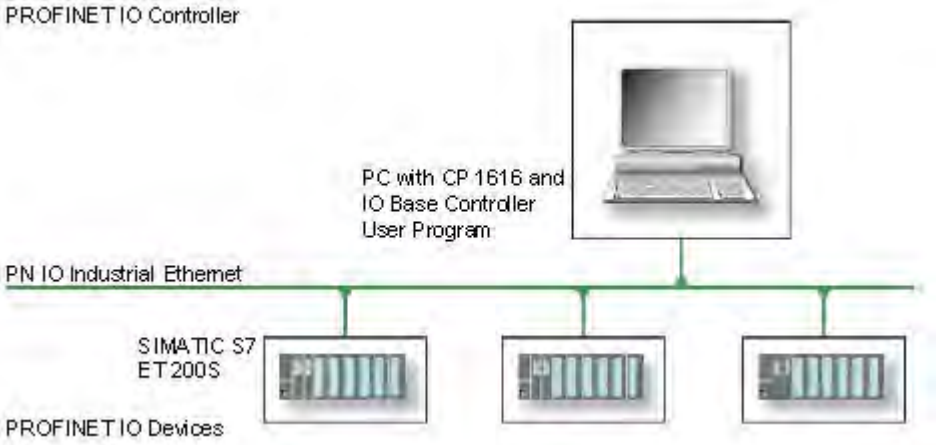
16.6.1.2 Typical Communication Partners

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.

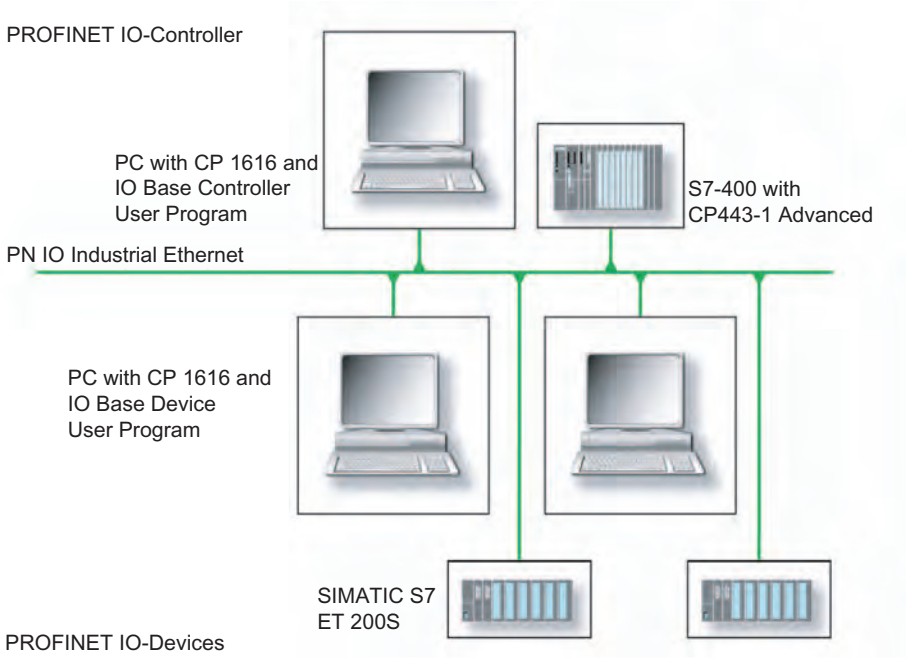


CP 1616 onboard as IO device

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 an S7-400 automation system with CP 443-1 over Industrial Ethernet.



16.6.2 Firmware loader

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.

Description

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

This refers to the system program in the SIMATIC NET modules.

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:

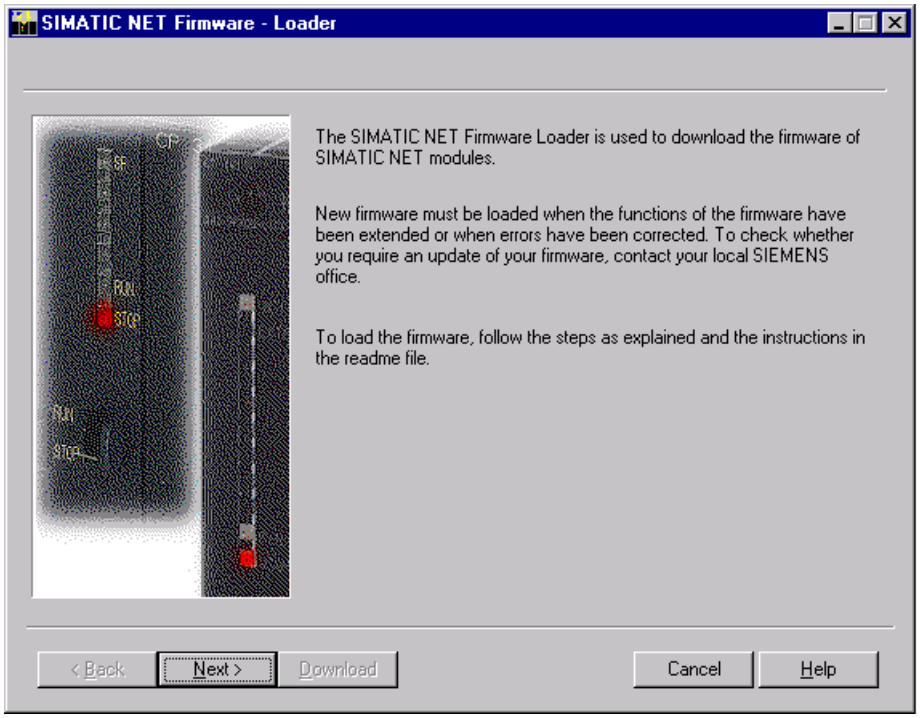
- <File>.FWL
  A file form that contains information in addition to the LAD file format, which is displayed by the firmware loader. The firmware loader can use this information to check if the firmware is compatible to the device.
- <File>.LAD
  A file format that only contains the system program to 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.

16.6.2.1 Loading firmware

Start downloading procedure

1. In the Windows Start menu, select the menu command SIMATIC > STEP 7 > NCM S7 > Firmware Loader.



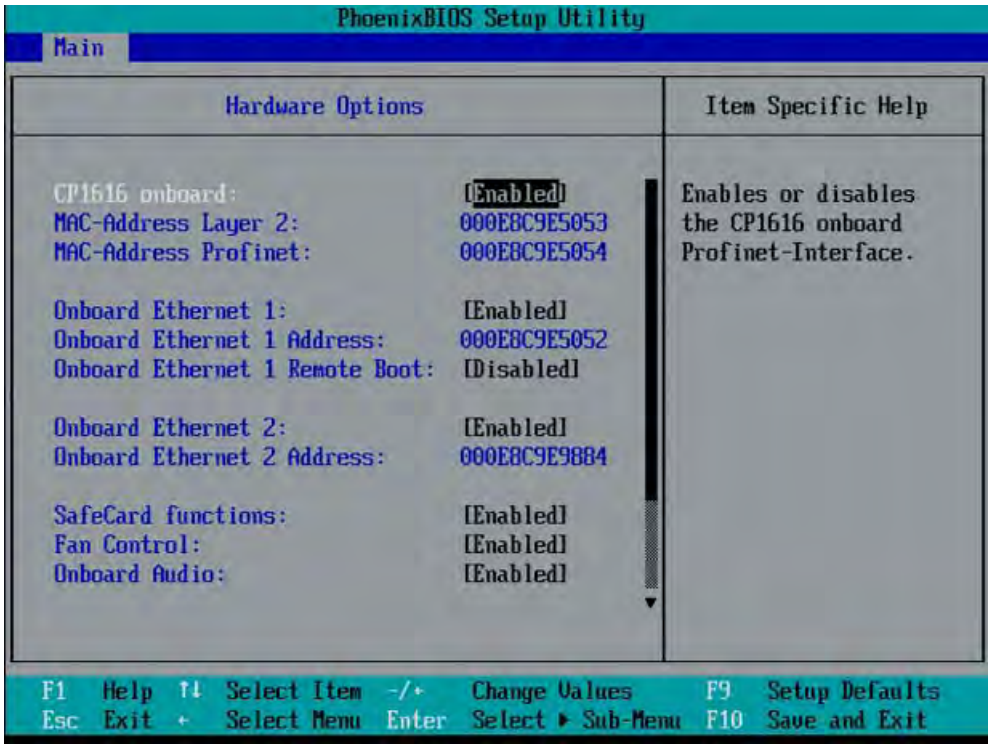
2. Click "Next" and follow the instructions in the dialog fields that follow. A help function is integrated in the software as support.

CAUTION
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.

CAUTION
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.

NOTICE
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.



Example

The lowest address is for the layer 2 communication. The second is for Ethernet/PROFINET communication.

16.6.3 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

Notes on CE marking

The following applies to the SIMATIC product described in this documentation:

EMC directive

This product fulfills 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	Requirements for	
	Radiated interference	Noise immunity
Domestic area, commercial and light industrial environments	EN 61000-6-3: 2007	EN 61000-6-1: 2007
Industrial area	EN 61000-6-4: 2007	EN 61000-6-2: 2005

The devices conform with EN 61000-3-2:2006 (harmonics) and EN 61000-3-3:1995 +A1:2001 +A2:2005 (voltage fluctuations and flicker).

Low voltage directive

The devices comply with the requirements of the EC Directive 2006/95/EC "Low Voltage Directive". Compliance with this directive has been verified according to EN 60950-1:2001 +A11:2004.

Declaration of conformity

The EC declaration of conformity and corresponding documentation are available to responsible authorities in accordance with EC directives stated above. Your sales representative can provide these on request.

Observe the installation guidelines

The installation guidelines and safety instructions specified in this documentation must be observed for commissioning and operation.

Connecting peripherals

Noise immunity requirements to EN 61000-6-2 are met if connected peripherals are suitable for industrial applications. Peripheral devices may 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.

A.3 Service and support

Local information

Contain your Siemens representative (http://www.siemens.com/automation/partner) if you have questions about the products described here.

Technical documentation for SIMATIC products

You can find additional documentation for SIMATIC products and systems in the Internet: SIMATIC Guide manuals (http://www.siemens.com/simatic-tech-doku-portal)

Easy shopping at the mall

You can find the online catalog and order system under:
Industrial Automation and Drive Technologies (http://mall.automation.siemens.com)

Training center

All the training options are listed at:
SITRAIN homepage (http://www.sitrain.com)
Find a contact at: Tel. + 49 911 895 3200

Technical support

You can contact technical support for all Industry Automation and Drive Technologies products by:

- Phone: +49 180 5050 222
- Fax: +49 180 5050 223
- Internet: Online support request form: (http://www.siemens.com/automation/support-request)

When you contact the customer support, please have the following information for the technician on hand:

- BIOS version
- Order No. (MLFB) of the device
- Installed additional software
- Installed additional hardware

Online Service & Support

Information about the product, Support and Service, right through to the Technical Forum, can be found at: Industry Automation and Drive Technologies - Homepage (http://www.siemens.com/automation/service&support)

After-sales information system for SIMATIC PC / PG

Information about contacts, drivers, and BIOS updates, FAQs and Customer Support can be found at: After-sales information system for SIMATIC PC/PG (http://www.siemens.com/asis)

A.4 Retrofitting instructions

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 PEG slot
- 25 W maximum for the upper module in slot 2
- 10 W maximum for the lower module in slot 3

Maximum permitted configuration

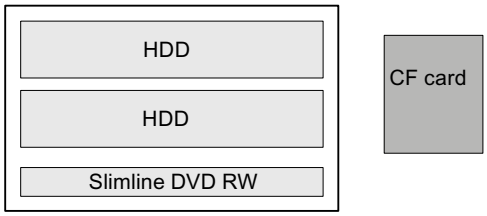


Figure A-1 Approved configuration versions for the temperature range 5 °C to 50 °C

Slimline DVD RW can be installed, but may only be operated as described below.

Note

Devices equipped with exchangeable racks may not to be exposed to shock or vibration during operation.

Temperature range 5 °C to 45°C

The maximum permissible power loss of expansion modules is 55 W. Distribution over the slots:

- 25 W maximum for the PEG slot
- 2 x 25 W maximum for the modules in slot 2 and slot 3

Maximum permitted configuration

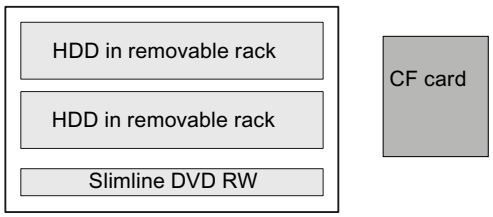


Figure A-2 Approved configuration versions for the temperature range 5 °C to 45°C

Note

Devices equipped with exchangeable racks may not to be exposed to shock or vibration during operation.

ESD guidelines

B

B.1 ESD Guidelines

Definition of ESD

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:



CAUTION
ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction.

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

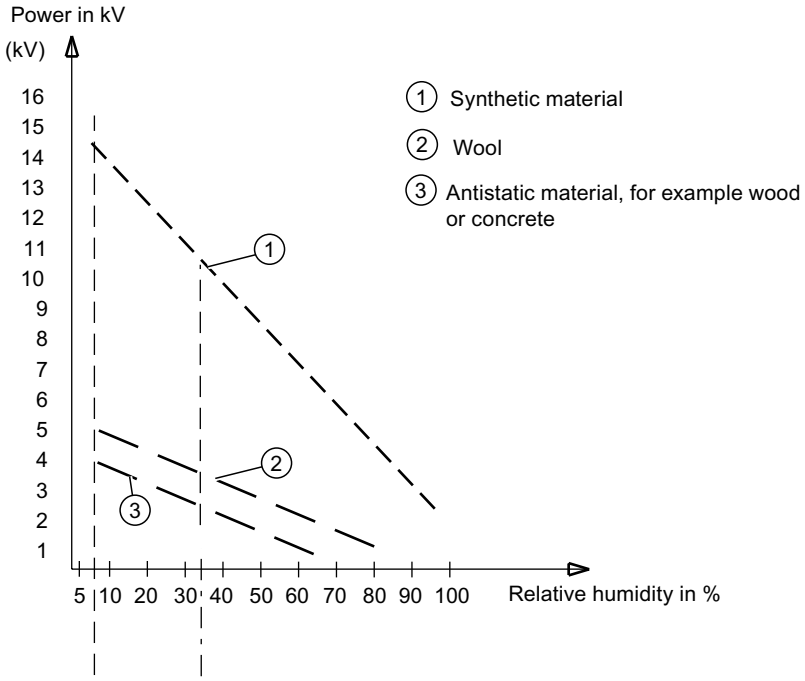


Figure B-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

- Ensure good equipotential bonding:
  When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.
- Avoid direct contact:
  As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices.

  Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

List of abbreviations

C

C.1 Abbreviations

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.
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
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
DMA	Direct Memory Access	Direct memory access
DOS	Disk Operating System	Operating system without GUI
DP	Distributed I/Os	
DQS	Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagement mBH	
DDRAM	Double Data Random Access Memory	Memory chip with high-speed interface
DSR	Data Set Ready	Ready for operation
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 Correction Code	Error correction code
ECP	Extended capability port	Extended parallel port
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
FBWF	File-Based Write Filter	
FD	Floppy disk	Disk drive, 3.5"
FSB	Front Side Bus	
GND	Ground	Chassis ground

Abbreviation	Term	Meaning
HD	Hard disk	Hard disk
HDA	High Definition Audio	
HDD	Hard Disk Drive	HDD
HU	Height unit	
HMI	Human Machine Interface	User interface
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	
IDE	Integrated Device Electronics	
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	
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
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	
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

Abbreviation	Term	Meaning
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, Vista)
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	
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
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
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	

Abbreviation	Term	Meaning
SOM	SafeCard on Motherboard (SOM)	
SPP	Standard Parallel Port	Synonym for parallel port
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
TWD	Watchdog Time	Watchdog monitoring time
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
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.
W2k	Windows 2000	
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	
XGA	Extended Graphics Array	Graphic standard, maximum resolution 1024x768 pixels.

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.

BEEP code

If the BIOS detects a boot error, it outputs an audible warning based on the current test result.

Boot disk

A boot disk is a bootstrap disk with "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 peripheral 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.

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.

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.

File Based Write Filter (EWF)

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.

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 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.

InterfaceInterface

See Interface

- Physical interconnection (cable) of hardware elements such as PLCs, PCs, programming devices, printers or monitors.
- Interface for interactive software applications.

InterfaceInterface

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 **A**rea **N**etwork: 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 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 VAC to 1000 VAC, 70 VDC to 1500 VDC) 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).

Module retainer

The module retainer is used to fasten modules and ensure safe contact and transport. Shocks and vibrations especially affect large, heavy modules. It is therefore recommended to use the module retainer for this type of module. There are also short, compact and light modules on the market. The module retainer was not designed for these modules because the standard fastening is sufficient for them.

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.

NEC Class 2

The "NEC", National Electrical Code, is the USA collection of regulations that generally correspond to German VDE 0100 standards. All USA standards governing the safety of electrical equipment and corresponding "deviations" in IEC standards are based on NEC in terms of their country-specific requirements.

NEC Class 2 specifies higher safety requirements for protection against electric shock and National Fire Protection Association (NFPA) requirements for fire protection. Power supplies operating within the range from 20 VDC to 30 VDC must be equipped with an internal current limiting circuit which safely prevents output power higher than 100 VA.

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 **Fi**eld **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.

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.

SATA

Serial ATA Interface for hard disk drives and optical drives with serial data transmission rates of up to 300 Mbps.

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 and low energy consumption.

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

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.

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