SIEMENS

SIMATIC

Industrial PC
SIMATIC IPC647D

Operating Instructions

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Preface

These operating instructions contain all the information you need for commissioning and operation of the SIMATIC IPC647D .

It is intended both for programming and testing personnel who commission the device and connect it with other units (automation systems, programming devices), as well as for service and maintenance personnel who install add-ons or carry out fault/error analyses.

Basic knowledge required

A solid background in personal computers and Microsoft operating systems is required to understand this manual. General knowledge in the field automation control engineering is recommended.

Validity of the Operating Instructions

These operating instructions are valid for all supplied versions of the SIMATIC IPC647D.

Scope of this documentation

The documentation for the SIMATIC IPC647D includes:

- Product Information "Important notes on your device"
- Quick Install Guide SIMATIC IPC647D
- SIMATIC IPC647D operating instructions in English and German

The documentation is part of the "Documentation and Drivers" DVD supplied with the product.

Refer to the corresponding user documentation for information and instructions on using software.

Conventions

The terms "PC" or "device" are sometimes used in place of the product name SIMATIC IPC647D in these operating instructions.

History

Currently released versions of these operating instructions:

Version	Comments
01/2014	First edition
01/2015	Second edition, amendments: Windows Server 2012 R2, devices with RAID hardware

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Overview

1

1.1 Product description

The SIMATIC IPC647D is an industrial PC in 19" rack format design. The SIMATIC IPC647D has the following characteristic features:

- High-performance industrial functionality
- Highly compact
- Extremely rugged
- Extensive product continuity

1.1.1 Scope of application

The SIMATIC IPC offers system integrators, cabinet designers, system engineers and machine designers a 19" rack PC platform for high-performance applications and IT applications on the control and cell level for:

- Process and visualization applications
- Industrial image processing
- Quality assurance and monitoring tasks
- Measurement, control and rule-based tasks
- Data acquisition and management

The SIMATIC IPC 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, therefore, it can also be used in building automation or in public facilities.

1.1.2 Highlights

Highly compact

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

High degree of industrial capability

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

Ideal for industrial applications

- Integrated PROFIBUS DP / MPI interface (optional, compatible with CP5622)
- PROFINET interface CP 1616 onboard (optional)
- PCI, PCIe I/O, PEG slots

  PEG graphics and onboard graphics can be used simultaneously
- High flexibility and expansibility of components

High investment protection

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

High system availability

- SIMATIC IPC DiagMonitor – PC diagnostics and message software via OPC/SNMP/LAN
- SIMATIC PC/PG Image Creator – data imaging software
- Optional ECC memory module
- Redundant power supply with status message
- RAID configurations: RAID controller onboard or powerful hardware RAID controllers (PCIe x8) with Zero-Maintenance Cache Protection module
- RAID1 – redundant data storage on two hard drives, also "hot swap" in connection with removable drive bays
  (hot-spare equipment is supported)

1.1.3 Function

- Integral, configurable monitoring functions:
  - Program execution (watchdog)
  - Internal housing temperature
  - Fan speed
- Enhanced diagnostic/messaging via Ethernet, E-mail, SMS, and for direct input in SIMATIC software via OPC (optional using SIMATIC IPC DiagMonitor):
  - Operating hours counter
  - Hard disk status
  - System status (heartbeat)
  - Automatic logging of all messages to a log file
  - Option of remote monitoring of networked SIMATIC IPCs
- RAID1 (mirroring): For automatic data mirroring on two hard disks. Configurations with hot-spare drive available for order.
- Hardware RAID
  - Auto-Rebuild for change of hard disk
  - "Zero-Maintenance Cache Protection" protects the data in the hardware RAID controller cache in the event of a power failure
  - Reduced load on the main processor during the rebuild
  - Fast 1 TByte SAS hard disks for maximum speed when reading and writing data

1.1.4 Features

General features	
Design	• 19” rack, 2 HU • Rugged panel-mount housing, all metal • Prepared for mounting telescopic rails • Can be mounted horizontally • Lockable front cover as access protection
Enclosure	• Dust protection by means of overpressure ventilation using bearing seated front fan through 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	• 2 × removable drive bays, slimline or • 2 × 3.5" drive in vibration-damped drive cage and • 1 × slimline DVD format
Slots for expansion cards (long)	Max. 4 slots [1], equipment PCI/PCIe, depending on configuration
Graphics	• CRT (via DVI-I VGA adapter): Up to 2560x1600 at 120 Hz / 32-bit color depth • LCD via DVI-D: Up to 2048 x 1152 at 60 Hz, 32-bit color depth • LCD via DisplayPort: Up to 4096 x 1152 at 24 Hz, 32-bit color depth
Interfaces	
PROFIBUS/MPI	12 Mbps (isolated potential, compatible to CP -5622), optional
PROFINET	10/100 Mbps (CP 1616 onboard), three RJ45; optional
Ethernet	2 x 10/100/1000 Mbps (two RJ45) Wake on LAN, Remote Boot and teaming are supported
USB	2 x front panel, 4 x rear panel, 1 x internal; (high current)
Serial	COM1 (V.24), COM2 (V.24) optional, through slot plate adapter
Parallel	LPT optional, through slot plate adapter
Monitor	• 1 x DVI-I (for DVI-D or VGA using cable adapter) • 2 × DisplayPort • 2 × DVI-D/VGA with Dual Head graphics card (optional, via cable adapter)
Keyboard	PS/2

General features	
Mouse	PS/2
Audio	Microphone, Line out / Headset
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 optional hardware RAID controller occupies two slots

Monitoring functions	
Temperature	• Overshoot/undershoot of permissible operating temperature • Messages can be evaluated by an application program.
Fan	• Speed monitoring • Messages can be evaluated by an application program.
Watchdog	• Monitoring of the IPC • Monitoring time can be parameterized in software • Restart can be parameterized in the event of a fault • Messages can be evaluated by an application program.
Status LEDs	• POWER (internal power supply unit, PC switched On) • HDD (access to hard disk drive) • ETHERNET 1, ETHERNET 2 (Ethernet status, "heartbeat") • PROFIBUS/MPI (activation display of the PROFIBUS/MPI interface), optional product feature • SF PROFINET (status display of the CP 1616 onboard interface), optional product feature • WATCHDOG (Watchdog function/error display) • TEMP (temperature status) • FAN (speed monitoring) • HDD0 Alarm, HDD1 Alarm: RAID status message in conjunction with SIMATIC monitoring software (only with RAID option)

Basic variant	
Motherboard	Motherboard without fieldbus, Intel® DH82C226 Express Chipset
Bus board	PCI, PCIe x4, PCIe x16, 2 variants
Processor	• Intel® Xeon™ E3-1268L v3 2.3 (3.3) GHz, 4 cores, GT2, 8 MB SLC, HT • Intel® Core™ i5-4570TE 2.7 (3.3) GHz, 2 cores, GT2, 4 MB SLC, AMT • Intel® Core™ i3-4330TE 2.4 GHz, 2 cores, GT2, 3 MB SLC, AMT
RAM expansion	Up to 32 GB SDRAM DDR3 1600MT/s 4 DIMM base with or without ECC [1]
Drives	
Hard disks	3.5" SATA 6 Gbit/s or SAS, 500 GB / 1000 GB Maximum 4 × 3.5" SAS hard disks in the removable drive bay The quantity depends on the IPC type
Optical drive	Slimline SATA

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

Optional accessories	
PROFIBUS/MPI	12 Mbps (isolated potential, compatible to CP 5622)
PROFINET	10/100 Mbps (CP 1616 onboard, three RJ45)
Drives, RAID controller	
SAS Hardware RAID controller	• PCIe x8 expansion card The adjacent slot must remain free. • Intelligent PCIe x8 RAID controller type: PMC Sierra ASR-8405 for max. 4 SAS drives • With CPU, cache memory (thus, negligible effect on the system) • With battery backup for data reliability in the event of power failures
DVD burner	Read: DVD ROM: Single Layer8x, Dual Layer 6x DVD-R/+R: Single layer 8x, Dual layer 6x DVD-RW/+RW 8x, DVD-RAM 5x CD-ROM/CD-R Read 24x, CD-RW 24x Write: DVD+R 8x, DVD+RW 8x, DVD-R 8x, DVD-RW 6x DVD+R (DL) 6x, DVD-R DL 2x CD-R 24x, CD-RW 24x

Optional accessories	
Hard disks 3.5" (SATA or SAS)	Installation in drive cage (with vibration damping) • 500 / 1000 GB (SATA) • 2 × 1000 GB (SATA) RAID1: 1000 GB (2 × 1000 GB, SATA)
	Installation in the drive cage of the removable drive bay • 500 GB (SATA) • 1000 GB (SATA) • 2 × 1000 GB (SATA) • RAID1: 1000 GB (2 × 1000 GB, SATA or SAS)
Solid State Drive 2.5" (SATA)	• 240 GB MLC, internal or in removable drive bay
Graphics cards	PCIe x16 graphics card, dual head (2 x VGA or 2 x DVI-D)
DVI-I to VGA adapter	Used to connect a monitor with a VGA port to the PC (can be ordered by configurator).
Operating system	Preinstalled and activated, included on restore DVD • Windows Server 2008 R2, MUI [1], 64 bit • Windows Server 2012 R2, MUI [1], 64 bit • Windows 7, MUI [1], 32 bit / 64 bit
Power supplies	
Redundant AC power supply	Monitored AC-100/230 V power supply, 350 W

[1] MUI: German, English, French, Spanish and Italian

Operating system languages

The following languages for the operating system can be installed from the recovery DVD:

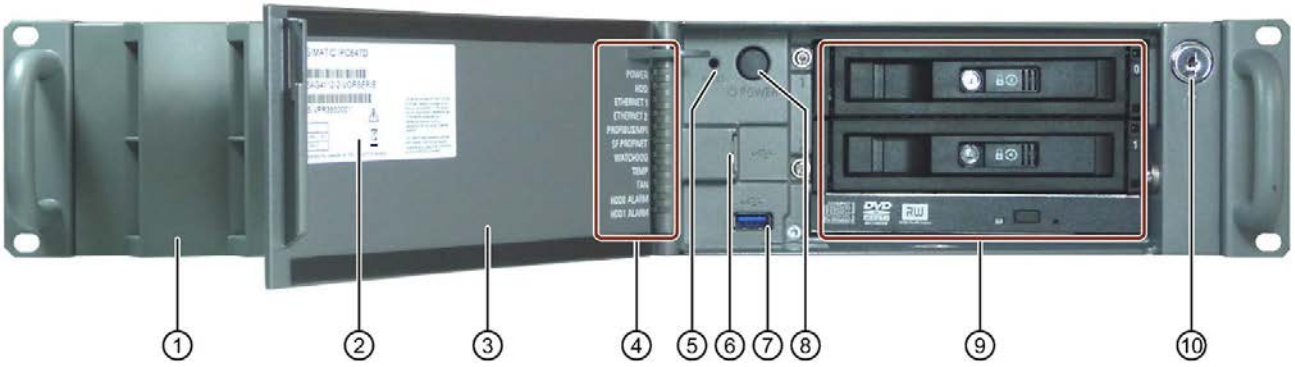
Language	Windows Server 2008 R2	Windows Server 2012 R2 UP1	Windows 7 32/64-bit
German (Germany)	X	X	X
English (United States)	X	X	X
French (France)	X	X	X
Italian (Italy)	X	X	X
Spanish (Spain)	X	X	X
Japanese (Japan)	X	X	X
Korean (Korea)	-	X	-
Russian (Russia)	X	X	X
Chinese (PRC)	X	X	X
Chinese (Hong Kong S.A.R.)	X	X	X
Chinese (Taiwan)	X	X	X

Optional software	
SIMATIC IPC DiagMonitor V4.4.3 or higher	Software for monitoring local and remote SIMATIC PCs: • Watchdog • Temperature • Fan speed • Hard disk monitoring (SMART, RAID status) • Monitoring modules of the redundant power supply • System / Ethernet monitoring (Heartbeat)
SIMATIC IPC Image & Partition Creator V3.3.3 or higher	Software tool for local data backup and setting up of the hard disks.

1.2 Design of the device

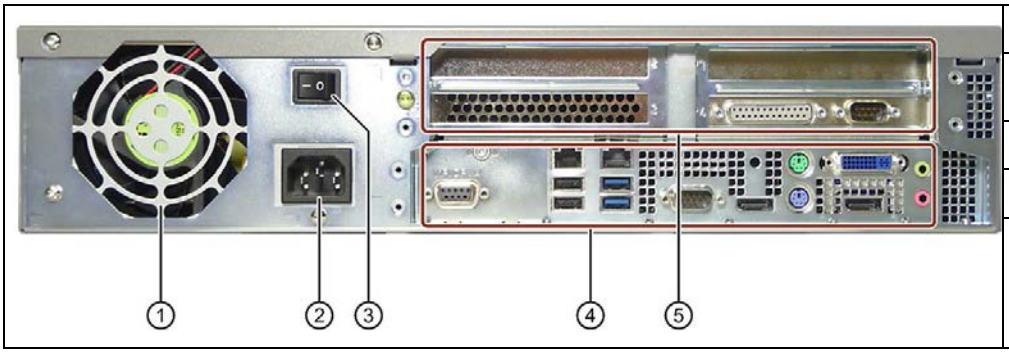
1.2.1 Device views

Front view



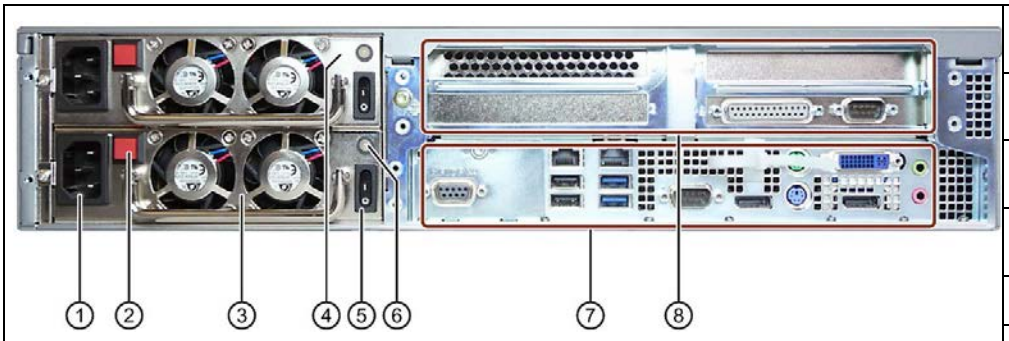
①	Front panel with openings for ventilation of the device	⑧	On/off button
②	Rating plate	⑨	Installation option for drives The following drives can be ordered optionally: • HDD or SSD in removable drive bay • DVD burner drive, Slimline • HDD in vibration-damped drive cage • SSD in internal drive cage
③	Front door		
④	Status displays		
⑤	Reset button	⑩	Lock for front door
⑥	USB 2.0 port		
⑦	USB 3.0 port		

Rear view with AC power supply



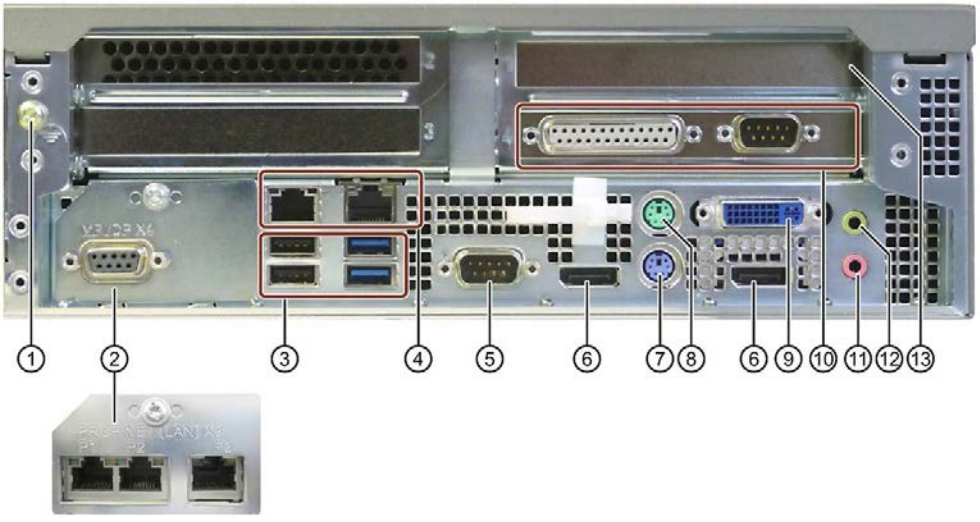
①	AC power supply
②	Power supply connection
③	On/off switch
④	Interfaces (Page 21)
⑤	Expansion card slots

Rear view with redundant power supply



①	Power supply connection
②	Acknowledgment button
③	Module 1 of the redundant power supply
④	Module 2 of the redundant power supply
⑤	On/off switch
⑥	Status LED module 1
⑦	Interfaces (Page 21)
⑧	Expansion card slots

1.2.2 Interfaces



Dual-head adapter

The adapter is necessary if you want to connect one of two monitors to the optional Dual Head graphics card.

①	Connection for equipotential bonding	⑨	DVI-I port
②	Fieldbus cover: No fieldbus, PROFIBUS or PROFINET [1]	⑩	Slot plate adapter with LPT and COM2 port, optional
③	USB ports Left sockets: Connection for USB 2.0 devices Right sockets: Connection for USB 3.0 / USB 2.0 devices USB 2.0 and USB 3.0 connections use different USB ports.	⑪	Audio input for analog audio source or microphone, 3.5 mm phono jack
④	ETHERNET interfaces 1 and 2 LAN interfaces are numbered on the enclosure to provide unique identification. The numbering by the operating system may deviate from this.	⑫	Audio output for active speakers or headset, 3.5 mm phono jack
⑤	COM interface	⑬	Slots for expansion cards (behind slot plate)
⑥	DisplayPort port	⑭	DMS59 connector
⑦	PS/2 interface for keyboard	⑮	DVI-I connector
⑧	PS/2 interface for mouse	⑯	VGA adapter

[1] Depending on the ordered device configuration

1.2.3 Status displays

Front panel

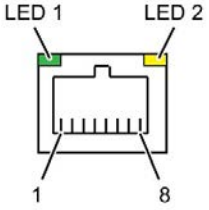
View with open front door

Operating display	Meaning	LED	Description
POWER	Operating mode of the PC	OFF	PC disconnected from power supply
		YELLOW	PC in standby
		GREEN	PC in operation
HDD	Access to hard disk	OFF	No access
		GREEN	Access of onboard SATA hard disk
ETHERNET 1 [1]	Status connection ETHERNET	OFF	• No connection
		GREEN	• Connection • No data traffic
ETHERNET 2 [1]		Flashes GREEN according to activity	• Connection • Data traffic
PROFIBUS/MPI (optional)	Status connection S7 or PROFIBUS	OFF	• No connection • No data traffic
		GREEN	Data traffic

Operating display	Meaning	LED	Description
SF PROFINET, optional	Status 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 RED	• Link status error • IO controller: IO device cannot be addressed • IO controller: Duplicate IP address
		Flashes rapidly RED	Exception error: diagnostics via Web or SNMP is no longer possible
		RED	• Diagnostics information available • No communication established.
WATCHDOG	WATCHDOG status	OFF	WATCHDOG not activated
		GREEN	WATCHDOG monitoring enabled
		RED	Monitoring time elapsed
TEMP	Temperature status	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
HDD0 ALARM HDD1 ALARM	HDD alarm in connection with RAID and monitoring software	OFF	RAID is OK
		RED, 1 ×	HDD0 or HDD1 not OK
		RED, 2 ×	RAID is not OK Localization of the hard disk see Section "Displaying a defective hard disk of a RAID system in the RAID software (Page 122)"
		Both flash	RAID synchronization in progress
All displays are lit	Error in early BIOS Post	All lit	CPU has not started up Error in early POST

[1] For unique labeling, the Ethernet ports are numbered on the enclosure. The numbering by the operating system may deviate from this.

Ethernet interface



Display	Meaning	LED	Description
Ethernet 1, 2 [1]	Green LED Link status display	Off	• No cable connected • Cable disabled • Interface disabled, 10 MBit cable active
		Green	100 Mbit cable active
		Orange	1000 Mbit cable active
	Yellow LED Activity status display	Off	• No cable connected • Cable disabled • Interface disabled
		Lit	• Connection • No activity
		Goes out briefly	Activity
PROFINET LAN X1 P1, P2, P3 [1]	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
		Lit	• Connection • No activity
		Goes out briefly	Activity

[1] For unique labeling, the LAN and PROFINET interface are numbered on the enclosure. The numbering by the operating system may deviate from this.

Drives in removable rack

① "Power" LED; power supply available

② "HDD" LED, access to hard disk drive

Virtual status display

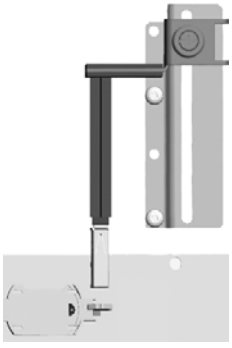
The two "virtual" CP -1616 LEDs are only visible in the SIMATIC user interface and can be read via SNMP.

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

1.3 Accessories

Accessories are available for your device. These are not included in the scope of delivery. Information on available accessories is listed in the table below and on the Internet at the following addresses:

- IPC expansion components (http://www.automation.siemens.com/mcms/pc-based-automation/en/industrial-pc/expansion_components_accessories)
- Industry Mall (https://mall.industry.siemens.com)

Name	Description	IPC647D	IPC847D	Article number and figure
Retainer for locking the internal USB interface	The retainer is a mechanical safety device for the internal USB interface. It optimizes the protection of an internal USB memory stick against loads caused by vibration and shock during transportation or operation. This increases the reliability and operational safety of the device.	x	x	6ES7648-1AA00-0XK0 
Tower Kit (not available in all countries)	You can use the Tower Kit to convert the device into an industrial Tower PC. This step expands the operating range beyond the control cabinet. Components of the Tower Kit: • Cover ① • Base ② • Accessories: Screws and rubber feet	-	x	6ES7648-1AA00-0XD0

Name	Description	IPC647D	IPC847D	Article number and figure
Tray for low-profile removable drive bay	The removable drive bay makes for quick and simple replacement of a 3.5" hard disk or 2.5" SSD without having to open the device or remove it from the control cabinet. The result is the following advantages for service and maintenance, data backup and data transfer: • Replacement of a failed hard disk in operation ("hot swap") in RAID configurations • Downloading different system states or operating systems from different hard drives during a short period of time. • Simplified data backup by copying, for example, to a backup hard drive. • Simple transportation of backup data • Separate data storage and archiving possible	x	x	6ES7648-0EG01-1BA0
VGA / DVI adapter	Graphics adapter cable DVI-I to VGA, 250 mm long	x	x	6ES7648-3AB00-0XA0
DP / DVI adapter	Graphics adapter cable, DisplayPort to DVI	x	x	6ES7648-3AF00-0XA0
DP / VGA adapter	Graphics adapter cable, DisplayPort to VGA	x	x	6ES7648-3AG00-0XA0

Safety Instructions

2

2.1 General safety instructions

Fully disconnecting the device from mains voltage

⚠ WARNING

Risk of fire and electric shock

The on/off button and on/off switch do not fully disconnect the device from the mains. If the device is switched off with the on/off switch, there remains a risk of electric shock and fire hazard, for example, if the device or connection cables are damaged or if the device is used improperly.

Always fully disconnect the device from the mains voltage as follows before performing work on the device or when the device will not be used over an extended period of time.

- If the device was not mounted in a control cabinet: Shut down the operating system and pull the power plug on the rear of the device.
- If the device was mounted in a control cabinet: Shut down the operating system and switch the AC circuit breaker to "Off".
- Properly connect the device to a protective conductor.

Devices in the control cabinet

⚠ WARNING

Life-threatening voltages are present with an open control cabinet

When you open the control cabinet, some areas or components may be carrying life-threatening voltages.

If you touch these areas or components, you may be killed by electric shock.

Switch off the power supply to the cabinet before opening it.

System expansions

NOTICE

Damage to the device, machine or plant due to device and system expansions

Device and system expansions may contain faults and affect the entire device, machine or plant.

Device and system expansions may violate safety rules and regulations regarding radio interference suppression. If you install or replace device or system expansions and damage your device, the warranty is voided.

Note the following:

- Only install device or system expansions designed for this device. Contact your technical support team or the point of sale to find out which device and system expansions are suitable for installation.
- Observe the information on electromagnetic compatibility provided in the technical specifications.

⚠ CAUTION

Fire hazard due to overheating of the device

Expansion cards generate additional heat. The device can overheat or cause a fire.

- Observe the safety and installation instructions for the expansion cards.
- If necessary, install the device in an enclosure that meets the requirements of paragraphs 4.6 and 4.7.3 of the standards EN 60950-1:2006 and IEC/UL/EN/DIN-EN 60950-1.

Battery

⚠ WARNING

Risk of explosion and release of harmful substances

Improper handling of lithium batteries can result in an explosion of the batteries.

Explosion of the lithium batteries and the resulting release of harmful substances can cause severe physical injury. Damaged batteries jeopardize the function of the device.

Note the following when handling lithium batteries:

- Replace used batteries in good time; see the section "Replacing the backup battery" in the section "Device maintenance and repair".
- Replace the lithium battery only with an identical battery or types recommended by the manufacturer (order no.: A5E00047601).
- Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

Strong high-frequency radiation

NOTICE
Observe immunity to RF radiation The device has an increased immunity to RF radiation according to the specifications on electromagnetic compatibility in the technical specifications. Radiation exposure in excees of the specified immunity limits can impair device functions, result in malfunctions and therefore injuries or damages. Observe the information on immunity to RF radiation in the technical specifications.

ESD directive

Electrostatic sensitive devices can be labeled with an appropriate symbol.

NOTICE
Electrostatic sensitive devices (ESD) When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold. If you work with components that can be destroyed by electrostatic discharge, observe the ESD directive in the technical specifications.

Industrial Security

Siemens offers products and solutions with Industrial Security functions that support the safe operation of equipment, solutions, machines, devices and/or networks. They are important components in a comprehensive Industrial Security concept. As a result the products and solutions from Siemens are constantly evolving. Siemens recommends obtaining regular information regarding product updates.

For safe operation of Siemens products and solutions appropriate protective measures (e.g., cell protection concept) must be taken and each component must be integrated in a comprehensive Industrial Security concept, which corresponds with the current state of technology. The products of other manufacturers need to be taken into consideration if they are also used. You can find addition information on Industrial Security under (http://www.siemens.com/industrialsecurity).

Sign up for our product-specific newsletter to receive the latest information on product updates. For more information, see under (http://www.siemens.de/automation/csi_en_WW).

Disclaimer for third-party software updates

This product includes third-party software. Siemens AG only provides a warranty for updates/patches of the third-party software, if these have been distributed as part of a Siemens software update service contract or officially released by Siemens AG. Otherwise, updates/patches are undertaken at your own risk. You can find more information about our Software Update Service offer on the Internet at Software Update Service (http://www.automation.siemens.com/mcms/automation-software/en/software-update-service/Pages/Default.aspx).

Notes on protecting administrator accounts

A user with administrator privileges has extensive access and manipulation options in the system.

Therefore, ensure there are adequate safeguards for protecting the administrator accounts to prevent unauthorized changes. To do this, use secure passwords and a standard user account for normal operation. Other measures, such as the use of security policies, should be applied as needed.

Access protection

CAUTION

Protection against access by unauthorized persons

An unauthorized user can operate the device incorrectly and bypass logon by restarting the device.

Operator actions by unauthorized persons jeopardize operational reliability.

Take the following safety precautions:

- Lock the front door and the removable drive bay.
- Do not use keyboards with an on/off button (Power button).
- If the device has a on/off button, assign the parameters of the function of the on/off button to meet your requirements under Windows. You can find the settings in the "Power Options" menu.

Headphones

CAUTION

Impaired hearing due to excessive sound pressure

The setting of the volume and the equalizer can increase the sound pressure in the headphones. Other factors not mentioned by the manufacturer can also influence the sound pressure, for example, the operating system, equalizer software, firmware and driver.

Excessive sound pressure from headphones can result in impaired hearing or even loss of hearing.

Set the volume control and equalizer to the lowest value before you put on the headphones. Keep checking the volume control setting. Only use headphones and software approved by the manufacturer.

2.2 Notes on use

NOTICE

Possible functional restrictions in case of non-validated plant operation

The device is tested and certified on the basis of the technical standards. In rare cases, functional restrictions can occur during plant operation.

Validate the correct functioning of the plant to avoid functional restrictions.

NOTICE

Rack-mount instructions

A) Elevated Operating Ambient - If installed in a closed or multi-unit rack, the operating ambient temperature of the rack environment may be greater than the room ambient. Therefore consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

B) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

C) Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

D) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

E) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e. g. use of power strips).

Note

Use in an industrial environment without additional protective measures

This device was designed for use in a normal industrial environment according to IEC 60721-3-3.

2.3 Ambient and environmental conditions

Ambient and environmental conditions

⚠WARNING

Voided approvals

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

NOTICE

Damage of device caused by ambient conditions

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

Note the following:

- Operate the device only in closed rooms. Failure to comply nullifies the warranty.
- Operate the device only in accordance with the ambient conditions.
- Observe the permitted mounting positions of the device.

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

- Climatic and mechanical environmental conditions defined in the "General technical data" chapter of the operating instructions.
- This device was designed for use in a normal industrial environment. SIMATIC Rack PCs may not be operated in severe environments which are subject to caustic vapors or gases without taking additional protective measures (such as the provision of clean air.)
- Avoid extreme ambient conditions as far as possible, for example, heat.
- Do not expose the device to direct sunlight or other powerful light sources.
- 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. There must be distance of at least 5 cm at the back of the device, depending on wiring.
- 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.

Installing and connecting the device

3

3.1 Preparing for installation

3.1.1 Checking the delivery package

Procedure

1. When accepting a delivery, please check the packaging for visible transport damage.
2. If any transport damage is present at the time of delivery, lodge a complaint at the shipping company in charge. Have the shipper confirm the transport damage immediately.
3. Unpack the device at its installation location.
4. Keep the original packaging in case you have to transport the unit again.

Note

Damage to the device during transport and storage

If a device is transported or stored without packaging, shocks, vibrations, pressure and moisture may impact the unprotected unit. Damaged packaging indicates that ambient conditions have already had a massive impact on the device and it may be damaged.

This may cause the device, machine or plant to malfunction.

- Keep the original packaging.
- Pack the device in the original packaging for transportation and storage.

---

5. Check the contents of the packaging and any accessories you may have ordered for completeness and damage.

6. Please inform the delivery service immediately if the package contents are incomplete or damaged or do not correspond with your order. Fax the enclosed form "SIMATIC IPC/PG Quality Control Report".

⚠ WARNING

Electric shock and fire hazard due to damaged device

A damaged device can be under hazardous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states.

Death or serious injury could occur.

Make sure that the damaged device is not inadvertently installed and put into operation. Label the damaged device and keep it locked away. Send off the device for immediate repair.

NOTICE

Damage from condensation

If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, as is the case in cold weather, for example, moisture can build up on or inside the device (condensation).

Moisture causes a short circuit in electrical circuits and damages the device.

In order to prevent damage to the device, proceed as follows:

- Store the device in a dry place.
- Bring the device to room temperature before starting it up.
- Do not expose the device to direct heat radiation from a heating device.
- If condensation develops, wait approximately 12 hours or until the device is completely dry before switching it on.

7. Please keep the enclosed documentation in a safe place. It belongs to the device. You need the documentation when you commission the device for the first time.
8. Write down the identification data of the device.

3.1.2 Identification data of the device

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

Noting down the device identification data

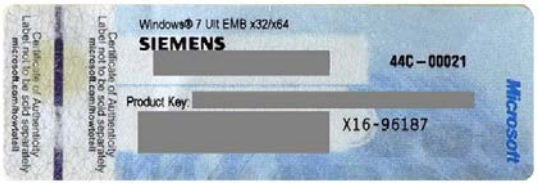
Enter the following data in the table below:

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

The data can be found as follows:

- Serial number: The serial number (S VP) is located on the rating plate either on the rear panel of the device or on the inside of the front door.

- Order number of the device
- Device Ethernet address: The Ethernet address is printed on the device and is stored in the BIOS Setup, "Advanced" menu, submenu "Peripheral Configuration".
- 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.



Information on the device equipment is available on the inside of the front door.

3.1.3 Permitted mounting positions

Optional installation locations

The device can be mounted horizontally in control desks, switchboards and 19" rack systems, and possibly vertically which is not permitted in all countries.

NOTICE
Operation in closed rooms The device is approved for operation in closed rooms only. Pay attention to the ambient and environmental conditions.

3.2 Mounting the device

3.2.1 Installation guidelines

⚠WARNING

Danger, high voltage

A high voltage may be present in the switchgear cabinet and could cause a dangerous electric shock.

It may result in death or serious physical injury.

Isolate the power supply to the switchgear cabinet before opening it. Ensure that the power to the switchgear cabinet cannot be turned on accidentally.

NOTICE

Fire hazard

If you install the device in an unapproved mounting position or if you do not observe the ambient conditions, the device can overheat. UL approval and conformity with the low-voltage directive (EN 60950-1:2006 and DIN EN 60950-1:2006-11) become void.

Overheating can cause a fire. Proper functioning of the device is no longer guaranteed.

Before you install the device, note the following general installation information.

Note

The device fulfills the requirements for a fire protection housing according to EN 60950-1. Therefore, it can be installed without additional fire protection.

- Install the device only in one of the described permitted mounting positions.
- Provide adequate volume in the switchgear cabinet for air circulation and heat transport.
- Do not cover the ventilation slots of the device. There must be distance of at least 5 cm at the back of the device, depending on wiring.
- Ensure that the maximum air intake temperature directly in front of the air intake opening does not exceed the permitted temperature according to the technical specifications of the device. The maximum air intake temperature must be accounted for especially when sizing closed switchgear cabinets.
- Install the device in such a way that it does not pose a danger, for example, by falling over.

Note

For more details, consult the "Technical Data" in the "Ambient conditions" chapter.

Mounting methods

You can mount the device as follows:

- Mounting with 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. You will find detailed information about the telescopic rails in sections Technical data of the telescopic rails (Page 177) and Dimension drawing of the telescopic rails (Page 168).

CAUTION

Risk of physical injury

The device is too heavy to be mounted exclusively with the 19 inch brackets of the front panel. The device may fall down, injure people and get damaged.

Secure the device using additional measures. The mounting screws of the telescopic rails may not protrude more than 5 mm into the device.

Position of the mounting holes for angle brackets or telescopic rails

The following figure highlights the mounting holes for the angle brackets and for the telescopic rails.

The dimensions for the mounting holes are listed in the chapter "Dimension drawing of the telescopic rails (Page 168)".

3.3 Connecting the device

3.3.1 Connection information

WARNING

Risk of fire and electric shock

The on/off button and on/off switch do not fully disconnect the device from the mains. If the device is switched off with the on/off switch, there remains a risk of electric shock and fire hazard, for example, if the device or connection cables are damaged or if the device is used improperly.

Always fully disconnect the device from the mains voltage as follows before performing work on the device or when the device will not be used over an extended period of time.

- If the device was not mounted in a control cabinet: Shut down the operating system and pull the power plug on the rear of the device.
- If the device was mounted in a control cabinet: Shut down the operating system and switch the AC circuit breaker to "Off".
- Properly connect the device to a protective conductor.

WARNING

Risk of lightning strikes

A lightning flash may enter the mains cables and data transmission cables and jump to a person.

Death, serious injury and burns can be caused by lightning.

Take the following precautions:

- Pull out the power plug in good time when a thunderstorm is approaching.
- Do not touch mains cables and data transmission cables during a thunderstorm.
- Keep sufficient distance from electric cables, distributors, systems, etc.

Note

Make sure that the shockproof power outlet of the building installation is freely accessible and as close as possible to the device, especially when the power plug is secured with a locking power plug latch.

WARNING

Operation only in TN networks

The device is designed for use on a grounded power supply grid (TN networks per VDE 0100 Part 100 or IEC 60364-1). Operation with non-grounded or impedance-grounded networks (IT networks) is not permitted.

Rated voltage

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

I/O devices

NOTICE

Fault caused by I/O devices

The connection of I/O devices can cause faults in the device. The result may be personal injury and damage to the machine or plant. Note the following:

- Connect only I/O devices which are approved for industrial applications in accordance with EN 61000-6-2/IEC 61000-6-2.
- Non-hot-plug capable I/O devices may only be connected when the power supply to the device is switched off.

Damage through regenerative feedback

Regenerative feedback of voltage to ground by a connected or installed component can damage the device.

Connected or built-in I/Os, for example, a USB drive, are not permitted to supply any voltage to the device. Regenerative feedback is generally not permitted.

3.3.2 Connection of equipotential bonding

A low-resistance ground connection ensures that interference signals generated by external power supply cables, signal cables or cables to the I/O modules are safely discharged to ground.

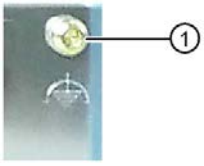
The equipotential bonding connection of the device is located on the side of the device and is identified by the following symbol:

Requirement

- TORX T20 screwdriver
- An equipotential bonding cable with a minimum cross-section of 2.5 mm^2

Procedure

1. Connecting the equipotential bonding connection ① of the device with the equipotential bonding cable. Ensure that the equipotential bonding cable has a large-area contact with the housing.
2. Connect the equipotential bonding cable with the central grounding point of the cabinet in which the device is installed. Ensure that the equipotential bonding cable has a large-area contact with the central grounding point.



3.3.3 Connecting peripheral equipment

Note

Observe suitability for industrial applications

Only connect I/O devices that are suitable for industrial applications in accordance with EN IEC 61000-6-2.

Note

I/O devices capable of hot-plugging (USB)

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

NOTICE

Non-hot-plug I/O devices

I/O devices that do not support hot-plugging may not be connected until the device is powered off. Strictly adhere to the specifications in the I/O manuals.

Note

Wait at least ten seconds before you reinsert USB devices.

Note that the EMC immunity of standard USB devices is designed only for office environments. These USB devices are appropriate for handling commissioning and service tasks. Only industrial grade USB devices are permitted for use in industrial environments. The USB devices are developed and marketed by the respective supplier. The respective product supplier provides support for the USB devices. The manufacturer's terms of liability shall apply.

Note

A monitor should be connected and switched on before device booting to ensure it is correctly detected and run by the BIOS and the operating system. The screen may otherwise remain dark.

Note

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

A counter e.m.f. greater than 0.5 V to ground on the + 3.3 V DC / + 5 V DC / + 12 V DC 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 must 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.

3.3.4 Connecting the power supply

3.3.4.1 Information about the power supply

Note

Note the following points:

- The wide-range power supplies are designed for 100 to 240 VAC power supply systems. The setting of the voltage range takes place automatically.
- The power supply contains a power factor correction circuit to conform with the EMC directive.
- Uninterruptible AC power systems 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

230 V supply voltage outside of the USA and Canada

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: Cable cross-section at least 0.82 mm^2 and 15 A / 250 V ground contact connector. The cable set must be compliant with the safety regulations of the country where the device is to be installed and carry the identification labels required by law.

Operation in 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 voltage

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

240 V voltage

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

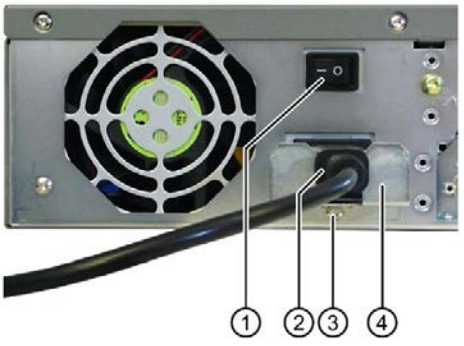
3.3.4.2 Connecting an AC power supply

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching on the device (Page 58)".
- 1 power cable
- 1 power plug latch from the accessory kit
- 1 T10 screwdriver

Procedure

Mounting



1. Set the on/off switch ① to position '0'.
   This prevents an automatic starting of the device when plugging in the power cable.
2. Remove the screws ③.
3. Plug the power cable plug ② into the power outlet.
4. Plug the power cable plug into the power outlet.
5. Slide the power plug latch ④ over the plug.
6. Secure the power plugs, if necessary, to prevent the power cables from becoming loose accidentally: Secure the power plug latch with the screw ③.
7. Set the on/off switch ① to position 'I'.
   The yellow power LED on the front panel of the device lights up.

Removal

For installation, follow the steps for removal in reverse order.

WARNING

Risk of fire

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.

3.3.4.3 Connecting a redundant power supply

Requirement

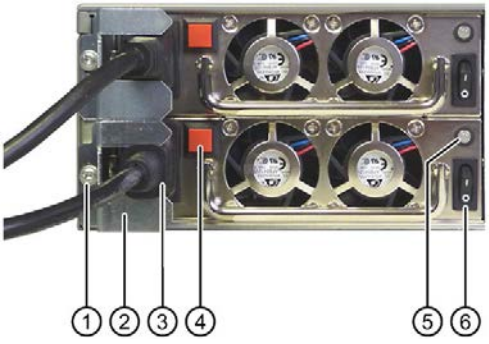
- The device is fully disconnected from the mains voltage, see chapter "Switching on the device (Page 58)".
- 2 power cables
- 2 power plug latches from the accessory kit
- 1 T10 screwdriver

Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Switch off both on/off switches ⑥.
   The LED ⑤ extinguishes.
2. Plug in both power plugs ③.
3. Switch on both on/off switches ⑥.
   The LED ⑤ lights up.
4. Secure the power plugs, if necessary, to prevent the power cables from becoming loose accidentally.
   Remove the screw ①.
5. Slide the power plug latch ② over the plug ③.
6. Fasten the power plug latch with the screw ①.



Note

If only one power supply module is switched on or connected, or a module is defective, a warning signal is emitted. You cancel the warning signal by pressing the acknowledgment button ④.

The status is also displayed and signaled by the SIMATIC monitoring software, if active. You can mute the acoustic alarm in the SIMATIC monitoring software.

WARNING

Risk of fire

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

Installation

Install the device in reverse order.

3.3.5 Connecting the device to networks

The following options are available for the integration in existing or planned system environments or networks:

Ethernet

The integrated Ethernet port (10/100/1000 Mbps) can also be used for communication and data exchange with automation devices 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

PROFINET can be operated via

- CP1616 IRT (Isochronous Real Time)
- Standard Ethernet interfaces (RT)

CP 1616 on-board allows you to connect IPCs to Industrial Ethernet. Only one CP 1616 can be installed in a PG/PC. You will find detailed information in sections "Connecting the device to networks (Page 51)" and "Hardware description (Page 178)".

Device driver CP 16xx.sys

The device driver allow integration of the Windows network protocol in the optional "CP 1616 onboard" Ethernet PROFINET controller on SIMATIC PCs. The PROFINET interface will act like a regular 100 Mbit Ethernet interface with a MAC address when you use this driver. The three RJ45 sockets are connected with each other via switch.

PROFINET IO application

You can create, operate and configure PROFINET IO applications using 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 are available free of charge at the following Internet address:
Development Kit DK-16xx PN IO
(http://www.automation.siemens.com/net/html_00/produkte/040_cp_1616_devlopkit.htm)

SIMATIC NET

Use this software package to configure network components and connections. You will find information on this on the SIMATIC NET DVD. This software package and the documentation are not part of the product package.

Additional information

Additional information is available in the catalog and the online ordering system Industry Mall (https://mall.industry.siemens.com).

See also

Technical Support (http://www.siemens.de/automation/csi_en_WW)

CP 1616 onboard

The basic characteristics of the PCS 1616 onboard are:

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

NOTICE
A maximum of one CP 1616/1604 is permitted A maximum of one CP 1616/1604 module can be installed in one PG/PC. If you want to use an additional CP 1616/1604 card, the CP 1616 onboard option must be disabled using the "Profinet" entry in the BIOS setup.

Additional documentation on PROFINET

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

Document name	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.

Document name	What is contained in this document?
Configuration Manual Commissioning PC Stations	This provides you will all the information necessary for commissioning and configuring a PC as a PROFINET IO controller or IO device.
Manual SIMATIC NET Industrial Communication with PG/PC: Volume 1 - Basics SIMATIC NET Industrial Communication with PG/PC: Volume 2 - Interfaces	This manual introduces you to industrial communication and explains the available communication protocols. It also describes the OPC interface as an alternative to the IO-based user programming interface.
S7 CPs for Industrial Ethernet Configuring and Commissioning	This provides the following support: - For commissioning S7 stations - For establishing effective communication
Manual SIMATIC NET - Twisted Pair and Fiber-Optic Networks	Configure and build your Industrial Ethernet networks based on this document.
This documentation is part of the supplied Documentation and Drivers CD:	
Operating instructions CP 1616/CP 1604/CP 1616 onboard	This provides you with all information required for operation.
Installation guide Device Driver CP16xx.sys	Read this guide if you want to install the NDIS device driver, CP16xx.sys.

Further information

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

3.3.6 Securing the lines

3.3.6.1 Network and fieldbus cables

The strain relief included in the scope of delivery is used to prevent that the plug does not connect from the device.

Mounting is carried out instead of the fieldbus cover.

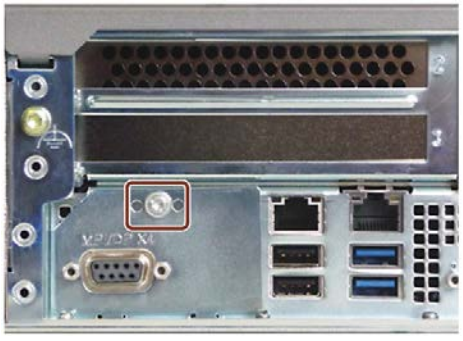
Requirement

- 1 strain relief
- 1 T10 screwdriver
- 1 side cutter
- Cable ties

Procedure

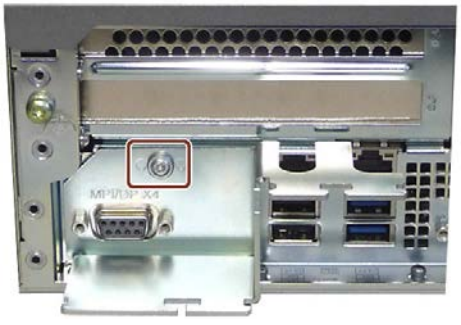
The following procedure describes the mounting of a strain relief for fieldbus and network cables. Mounting of other strain reliefs is carried out analog. The sheet metal part required for mounting is included in the accessory kit.

1. Remove the marked screw and the fieldbus cover fastened with it.

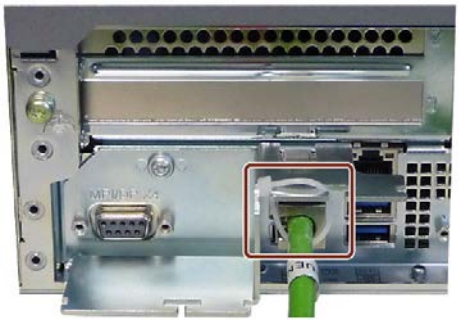


2. Mount the strain relief.

   Use the mounting screw of the fieldbus cover for this purpose.



3. Fasten the cables with cable ties to the cable strain relief.



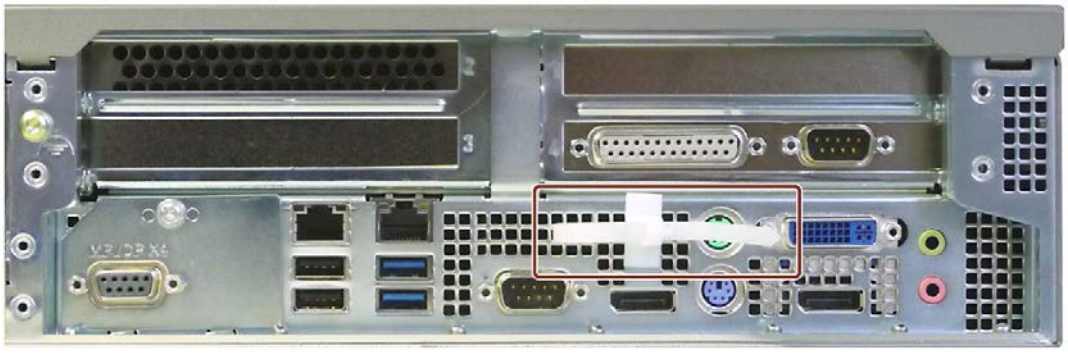
3.3.6.2 COM, DP, DVI/VGA, PS/2 and audio lines

Cable ties that can be loosened for strain relief at the interfaces are enclosed in the accessory kit. These cable ties can be installed on the rear panel, if necessary.

Procedure

1. Push a removable cable tie into the device rear panel at the marked point.

   The figure shows the correct cable tie mounting position.



2. Fasten the cables with the removable cable ties to the strain relief.

3.3.7 Multi-monitoring

You can operate up to five monitors simultaneously at the interfaces of the integrated graphics controller in combination with the optional graphics card. Parameter assignment is performed by means of the Control Panel in Windows.

The following monitors can be operated simultaneously on the motherboard:

- 2 × DisplayPort, 1 × DVI
- 2 × DisplayPort, 1 × VGA
- 1 × DisplayPort, 1 × DVI via DisplayPort-DVI adapter [1], 1 × DVI
- 1 × DisplayPort, 1 × VGA via DisplayPort-VGA adapter [1], 1 × VGA via DVI/VGA adapter [1]
- 1 × DVI via DisplayPort-DVI adapter, 1 × DVI via DisplayPort-DVI adapter [2], 1 × DVI
- 1 × VGA via DisplayPort-VGA adapter, 1 × VGA via DisplayPort-VGA adapter, 1 × VGA via DVI/VGA adapter

[1] available as accessories

[2] active DisplayPort-DVI adapter

Detailed information is available in section "Accessories".

Note

The motherboard supports up to one additional DVI monitor if it is connected by means of a passive DisplayPort-DVI adapter.

Commissioning the device

4

4.1 General information on commissioning

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

Note

Switching the device on

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

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

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

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

Requirements for commissioning

The following requirements have to be met before you can start commissioning:

- I/O devices, keyboard, mouse and monitor are connected.
- The power supply is connected.
- An operating system is installed.

  The device can be supplied without an operating system. Information on installation of the operating system is available in the section "Installing the software".

4.2 Switching on the device

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

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

Procedure

1. Set the on/off switch to position "1". Information on the position of the switch is available in the section "Device views (Page 19)".
2. Press the on/off button.

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

   ```
   Press <ESC> to go to the main BIOS menu
   ```
3. Wait for the message to disappear. Then Windows is started.
4. Follow the instructions on the screen.

   Note

   The following steps are only to be performed for initial startup of the device with factory settings.

5. Make the required region and language settings.

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

   Note

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

6. Type in the product key as required.

   The product key is located on the "Certificate of Authentication" in the "Product Key" line, see section "Identification data of the device (Page 39)".

Result

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

4.3 Automatic switching on of the device

In the BIOS setup, you can specify the behavior of the device when it is disconnected from the mains voltage. The following property is set as default:

- BIOS setup, "Advanced" menu, "Chipset Configuration" submenu, setup parameter "After G3 On" to "Last State".
- After a power loss during operation, the device will automatically restart when the power returns.
- If the device was not in operation, it remains switched off when the power returns.

The mains voltage must have failed for at least 20 s for the power failure to be detected and for this defined action to be executed.

NOTICE
Unintentional reactions at power loss restart Automatic startup, for example, after a power failure, can result in unintentional reactions of the machine or plant. This endangers the operation. Take the BIOS setup entry "After G3 On" into consideration in the plant planning.

4.4 Notes on different device configurations

4.4.1 Opening the front door

CAUTION

Electrostatic-sensitive devices

The device contains electronic components which may be destroyed by electrostatic charge.

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

4.4.2 DVD burner drive

The DVD burner drive is an optional device feature. Recording methods supported by the disk drive:

- Disc-At-Once
- Track-At-Once
- Session-At-Once
- Packet writing

For additional information, refer to the technical specifications.

Software

In order to use full functionality of the DVD burner you do not need to install additional software under Windows. The software for the DVD burner is part of the mentioned operating systems.

If you are using a different operating system, ensure that the software required for the DVD burner is installed.

Operation

Note

When first starting the burner software, no disks should be inserted in the drive. Faulty data storage media can interrupt the automatic drive recognition. This makes it impossible to correctly display the possible burner functions.

Burner operation is only permitted in an environment free of shock and vibration.

NOTICE

Data errors during burning

It cannot be ruled out that vibrations in the environment and varying quality of raw discs could result in data errors when burning data media, even when no error message occurs.

Data comparison is the only guarantee that data has been written correctly. Perform data comparison each time you burn a disc.

See also

Technical specifications (Page 169)

4.4.3 Hard disks in removable rack

The hard disks in the removable drive bay can be replaced during operation in connection with RAID (hot swap).

Requirement

- A hard disk of the same interface type

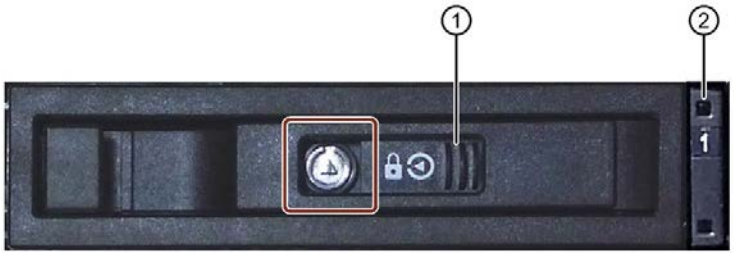
  The interface type of the hard disk is displayed on the front door. Always replace the defective hard disk with a new one of the same interface type and capacity.
- A key for the hard disk lock

Procedure

NOTICE
Damage to the hard disk and loss of data When you remove the hard disk while data is being written to the hard disk, you may damage the hard disk and destroy data. • Only remove the hard disk tray from the removable drive bay when the hard disk is inactive. Inactive means the hard disk status display of the removable drive bay is not flashing. • Observe the EGB guidelines.

1. Identify which hard disk the RAID controller has reported as being faulty (see status indicators).
2. Open the front panel.
3. Slide the cover ① of the removable drive bay lock to the right.

   The marked lock is exposed.



4. Open the lock with the appropriate key.
5. Fold out the tray bracket somewhat to the front and pull out the hard disk tray by the tray bracket.

   The procedure is described in more detail in the section "Removing and inserting the tray from the removable drive bays (Page 106)".
6. Insert the hard disk tray with the replaced hard disk into the removable drive bay and push it all the way in.

7. Fold back the tray bracket until it rests completely against the hard disk tray.

   The power supply LED ② must be on.

8. Slide the cover of the removable drive bay lock to the left.
9. Lock it with the appropriate key.

Note

Always lock the hard disk tray in the removable drive bay to ensure reliable operation of a device with removable drive bay.

4.4.4 System with two drives

The system with two drives is an optional feature for the device.

When the device ships, the second drive is connected to SATA port 1. This hard disk drive is not set up. This gives you the option of backing up your data to this hard disk drive. Refer to your order documentation for information on hard disk drive capacity.

Booting from the second hard disk drive

In order to allow booting from the second hard disk drive, you need to configure it as the primary boot device (Boot Option #1). To do this, make the following settings in your BIOS Setup:

1. Select the "Boot" tab.
2. Select the first entry from the list in the "Boot Option Properties": "Boot Option #1" and press the Return key.
3. Select the corresponding drive (slave drive) in the "Boot Option #1" window, e.g. STxxxxxxxxx, and press the Return key.

   The second hard disk drive (slave drive) becomes the primary boot device.

Note

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

4.4.5 RAID systems

4.4.5.1 Manage RAID system

RAID system management functions

The RAID system is fully set up ex works. The installed SIMATIC diagnostic software is used to display the status of the RAID system. Additional software is not required. Detailed information on hard disk replacement is available in section "Expansion and parameter assignment of device", "Replace defective hard disk in RAID system".

Note

A hard disk can be synchronized at operating system level if a fault is detected. It may take a very long time to synchronize a new hard disk in the background, depending on the size of the hard disk and on the system load. It may take several hours or even days in the case of extremely high hard disk load. Guide value for the duration: < 3 h with 90% HDD system load and RAID5 with HDD 1 TB.

The safe system states RAID Level, for example, 1 are only reached once synchronization has been successfully completed. In addition, system performance may be limited in the case of a manually started maintenance operation until completion of the maintenance phase.

Note

Password protection for RAID setup

To prevent access to the Option ROM, follow these steps:

- Set the supervisor password in the BIOS setup, "Security > Set Supervisor Password" menu.
- Disable the keyboard operation during the BIOS self test (POST) in the BIOS setup, "Security > Option ROM keyboard" menu.

Replacing a faulty drive in the RAID system

Replace the faulty drive with a new drive of the same type and capacity to return to the safe RAID1 or RAID5 state after a fault.

The diagnostic software indicates the following:

- A defective drive
- Details of the functioning hard disk

The defective hard disk is displayed with port number. You can find detailed information on drive replacement in the following sections:

- "Commissioning the device", "Hard disks in the removable drive bay"
- "Expansion and parameter assignment of device", "Replacing a defective hard disk in the RAID system".

Integrating a new hard disk

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

- The hard disk is brand new.
- The hard disk is set up as a global spare drive.
- The hard disk is set up as a specific dedicaded spare drive.

4.4.5.2 RAID1 system

This is a RAID1 system configuration (data mirroring with two drives). This means that if there is a defective hard disk or there are cable problems, the system can continue to operate in one channel and achieve a high degree of availability.

Note

You will find information about the RAID controller in the "Drivers\RAID-AHCI\Intel" or "Drivers\RAID-AHCI\Adaptec" directory on the "Documentation and Drivers" DVD that ships with the product.

Additional information on RAID1 systems can be found in the section "Manage onboard RAID system (Page 119)".

4.4.5.3 Hardware RAID system

SAS Hardware RAID adapter card with own CPU and cache memory:

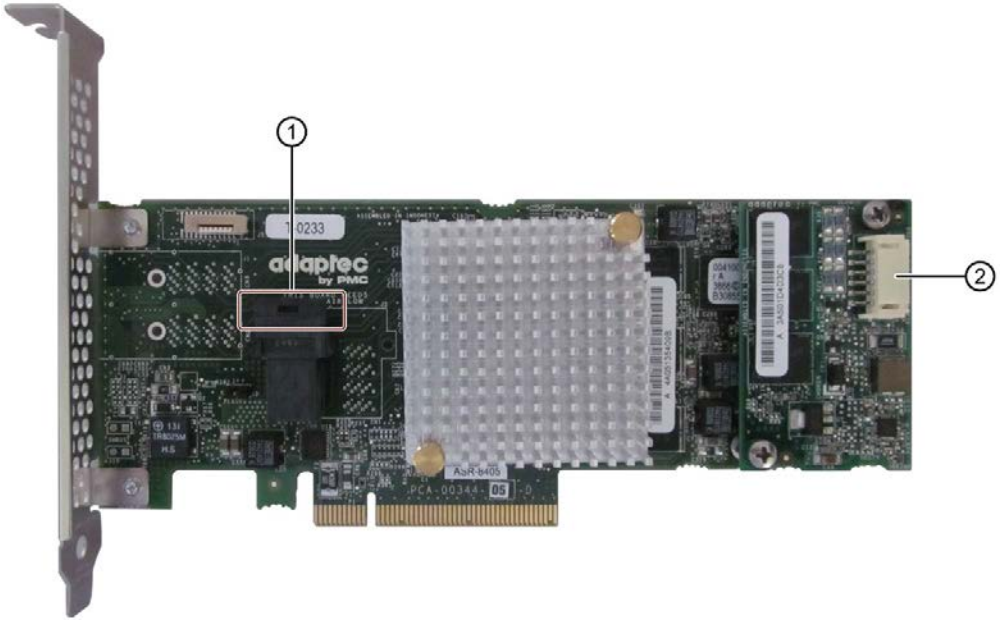
- For applications with stringent requirements regarding negligible system effects of the RAID system.
- With maintenance-free battery backup for high data reliability.
- The RAID controller with PCIe x8 interface occupies one PCIe x16 expansion slot of the device.
  The adjacent slot must remain free, and a perforated slot bracket must be mounted to ensure cooling.

Requirements for Adaptec Storage Manager software

The following requirements must be met before you use the software for the first time during commissioning:

- 4 GB main memory
- The operating system is restarted.
- The operating system is password-protected.
- Login and password of the operating system and Storage Manager software are the same.

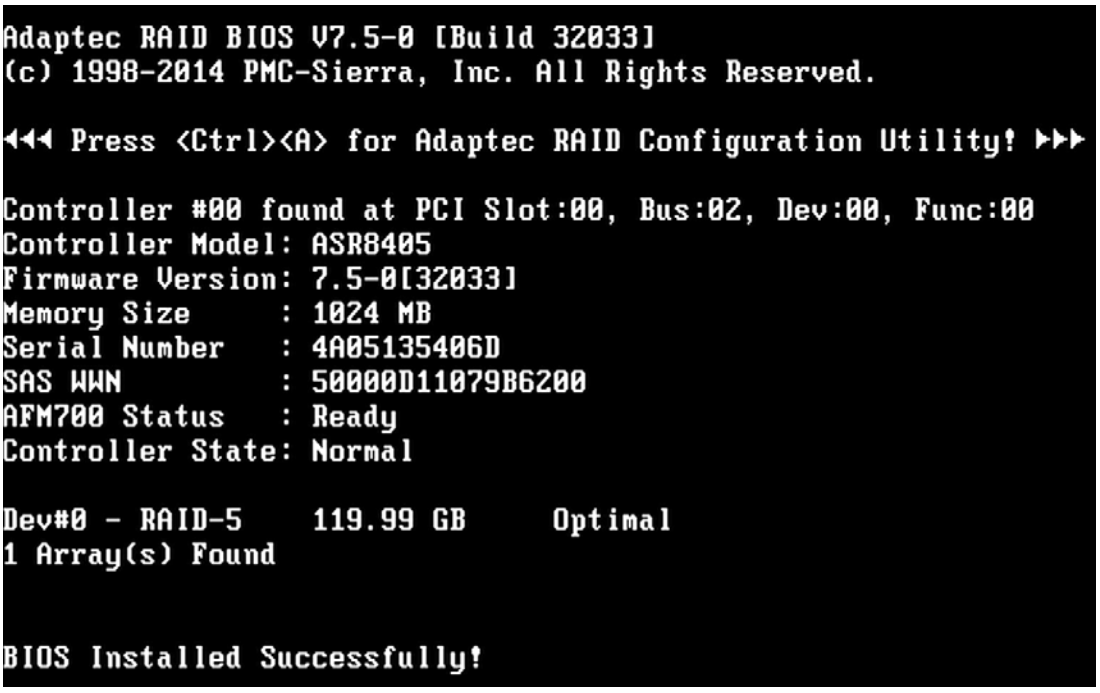
The data backup takes place on two or three SAS hard disks. As a result, the system is able to continue operation in the event of a defective hard disk or port connection problems, thereby achieving high availability. An optionally available hot-spare drive) can further increase the availability of the system.



① Connection for the SAS data cable

② Connection for Zero Maintenance Module (ZMM)

The installed RAID controller for the "Adaptec RAID ASR8405" module is displayed as follows in the BIOS:



Additional software and documentation

The following software documentation can be found in the "Drivers\RAID-AHCI\Adaptec" directory of the "Documentation and Drivers" DVD that ships with the product:

- Adaptec RAID Controller Quick Start Guide
  The PDF file describes how you install the RAID controller and create a bootable RAID1 or RAID5 array. It also describes how you install the operating system and the controller driver on the array.
- Adaptec RAID Controller Installation and User Manual
  The PDF file contains comprehensive information on installation and configuration of the RAID adapter card and the connected devices.
- Adaptec maxView Storage Manager User Manual
  The PDF file contains comprehensive information on installation and use of Adaptec maxView Storage Manager.
- Command Line Utility User Guide
  The PDF file contains the user manual for the command line utility program and comprehensive information on the use of ARCCONF.

All required software is pre-installed. However, if necessary, you can install additional software from the supplied Documentation and Drivers DVD, which also contains the associated software description. In order to use the software, the operating system must be password-protected. The password must be assigned before the software is installed. In a correct installation, the operating system password and RAID software password are the same.

4.5 Windows Action Center

Warning from the Windows Action Center

The Action Center checks the status of the device with regard to the important safety aspects listed below. If a problem is found, the Action Center provides 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. The firewall is enabled in the delivery state.
- Antivirus software: Antivirus programs add protection to the device by searching for and eliminating viruses and other security threats. No antivirus software is installed in the delivery 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 option is disabled in the delivery state for Windows Server 2008 R2 and Windows Server 2012 R2. You can enable or disable this option for Windows 7 during commissioning of Windows.
- User Account Control:User Account Control issues a warning when programs attempt to modify important Windows settings. You can then either acknowledge this warning or prevent the program from changing the Windows settings.

  This option is disabled in the delivery state for Windows Server 2008 R2 and Windows Server 2012 R2. This option is enabled in the delivery state for Windows 7.

4.6 Switching off the device

Shutting down the operating system

For Windows operating systems:

1. Right-click on the Windows desktop.
2. Press the key combination <Alt+F4>.
3. Select "Shutdown".

- Alternatively, briefly press the on/off button (unless otherwise configured in the power options). Information on the position of the button is available in the section "Device views (Page 19)".

For non-Windows operating systems:

- Briefly press the on/off button.

The operating system is shut down. The "POWER" LED goes out. The device is switched off but not fully disconnected from the mains voltage.

Fully disconnecting the device from mains voltage

⚠ WARNING

Risk of fire and electric shock

The on/off button and on/off switch do not fully disconnect the device from the mains. If the device is switched off with the on/off switch, there remains a risk of electric shock and fire hazard, for example, if the device or connection cables are damaged or if the device is used improperly.

Always fully disconnect the device from the mains voltage as described below before performing work on the device or when the device will not be used over an extended period of time.

If the device was not mounted in a control cabinet:

- Shut down the operating system and pull the power plug on the rear of the device.

If the device was mounted in a control cabinet:

- Shut down the operating system and switch the AC circuit breaker to "Off".

The device is switched off and fully disconnected from the mains voltage. No trickle current is flowing.

Hardware reset

You can perform a hardware reset to switch off the device when the operating system no longer responds to input from the keyboard or mouse. The operating system is not safely shut down in this case.

NOTICE
Risk of data loss The device is restarted in the case of a hardware reset. Data in the main memory can be deleted. Data on the drive may be lost. The device may be damaged. Perform a hardware reset only in the case of an emergency.

For all operating systems:

- Press the on/off button for more than 4 seconds.

  or:

- Press the Reset button. Information on the position of the button is available in the section "Device views (Page 19)".

See also

Device views (Page 19)

Extended device functions

5

5.1 Monitoring functions

5.1.1 Overview of the monitoring functions

The basic version of the device also provides monitoring functions. The following display, monitoring and control functions are available when the appropriate software is used:

- Temperature monitoring (overtemperature, low temperature, or cable break at a temperature sensor)
- Monitoring of drives with S.M.A.R.T. functionality
- Watchdog (hardware or software reset of the computer)
- Operating hours meter (information on total runtime)
- Hard disk status and status of the RAID system

SIMATIC IPC DiagBase software

Use the functions of the SIMATIC IPC DiagBase software included in the scope of delivery for local monitoring. Use the "DiagBase Management Explorer" application to obtain a clear overview of the controls. Use the DiagBase Alarm Manager to receive notifications about individual alarms.

Note

For more information on SIMATIC IPC DiagBase software functionality, please refer to the relevant Online Help.

SIMATIC IPC DiagMonitor software

SIMATIC IPC DiagMonitor is available on CD (not included in the scope of delivery). This monitoring software comprises:

- The software for the stations to be monitored.
- A library for creating user-specific applications.

Note

SIMATIC IPC DiagMonitor supports the device hardware as of version 4.4.3. Devices with Adaptec Hardware RAID adapter card are supported as of version 4.4.4.

Older versions do not support the device hardware.

5.1.2 Temperature monitoring/display

Three temperature sensors monitor the temperature of the device at several positions:

- Processor temperature
- Temperature close to the RAM ICs/chips
- Temperature of the basic module

A temperature error is triggered when one of the three temperature values exceeds the set temperature threshold and the following reaction is initiated:

Reaction	Option
"Temp" LED lit red.	None
Device fan at maximum speed. The power supply unit fan is controlled by the power supply unit.	None
The DiagBase or DiagMonitor software alerts the user.	None

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

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

5.1.3 Watchdog (WD) with LED

Function

The watchdog is able to monitor program runtime and informs the user about the different reactions that are triggered if the user program does not respond to the watchdog within the specified monitoring time.

The watchdog is in idle state during power on of the device, or after a HW-RESET (cold restart). A WD reaction is not triggered while it is in idle state. However, an active watchdog interrupt remains after a restart and its active state is still indicated by the LED.

Watchdog reactions

The following reactions may be triggered if the watchdog is not retriggered within the set time:

Reaction	Option
Switch watchdog LED to red	None
Trigger a PC reset	Configurable
Output of DiagBase alarm messages	None

Note

For more information on the watchdog functions, contact Customer Support.

WD monitoring times

Set the monitoring times in SIMATIC Diagnostics Management as integer values in the range from 4 to 255 seconds.

Note

The watchdog will be retriggered if you change the watchdog time after the WD has been activated.

5.1.4 Fan monitoring

The operation of the front, CPU and power supply fans is monitored.

If a fan fails, the following reactions are triggered:

- The "FAN" status display lights up red.
- If the SIMATIC monitoring software is installed, a fan alarm is output.

The fan error remains stored until the cause has been rectified. You can reset the error message with one of the following measures:

- Acknowledge error message with SIMATIC IPC DiagBase or SIMATIC IPC DiagMonitor
- Short-term disconnection of the device from the power supply
- Shut down device
- Restart the device

5.1.5 Battery monitoring

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

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

5.1.6 Drive monitoring

Default: SMART messages of the hard disks are reported.

RAID combination: The "Normal", "Degraded", "Rebuild" are displayed.

5.2 Active Management Technology (AMT)

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

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

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

SIMATIC IPC Remote Manager

The "SIMATIC IPC Remote Manager" software is available for utilization of the AMT functions with SIMATIC IPCs. The software can be ordered from the Siemens online ordering system. For detailed information about "SIMATIC IPC Remote Manager", refer to the corresponding product documentation: SIMATIC IPC Remote Manager (http://support.automation.siemens.com/WW/view/en/48707158)

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

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

Requirement

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

Configuration of the AMT PC

You configure AMT by means of the BIOS setup and MEBx (Management Engine BIOS Extension). MEBx is a BIOS extension for configuration of AMT (see BIOS description in chapter "Technical specifications").

5.3 Trusted Platform Module (TPM)

Depending on the ordered configuration of your device, a Trusted Platform Module according to Standard 1.2 may be available. The Trusted Platform Module is a chip that enhances your device with security functions. It provides an improved protection from manipulation of the PC. The current operating systems Windows 7 and Windows 8 support these security functions. You can enable the Trusted Platform Module in the "Security" menu in the BIOS Setup. Please note the respective import and export provisions for the Trusted Platform Module.

Using the Trusted Platform Module

The TPM can be used with the "BitLocker" drive encrypter, for example, in Windows operating systems. Please follow the instructions for this in the operating system.

Note

Risk of data loss

If you lose the password for the drive encryption, you will not be able to restore the data. You will then lose accesss to the encrypted drive.

The warranty does not cover a reset of the hardware in the event of a loss of a password.

Please store the password carefully and make sure it is protected against unauthorized access.

Expanding and assigning parameters to the device 6

6.1 Retrofitting instructions

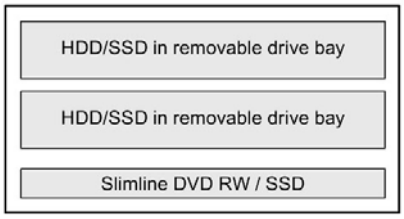
Temperature range 0 °C to 35 °C

The maximum permissible power loss of the expansion cards amounts to 75 W.

Distribution to the slots without exceeding the total power:

- 25 W for the expansion cards in Slot 1, 2, 3, 4 maximum

Maximum permitted configuration



Note

During operation, the HDDs installed in the removable drive bay must not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

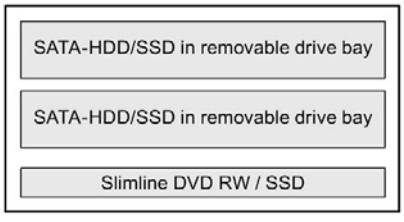
Temperature range 0 °C to 40 °C

The maximum permissible power loss of the expansion cards amounts to 55 W.

Distribution to the slots without exceeding the total power:

- 25 W for Slot 1 maximum
- 25 W each for Slot 2, 3 maximum
- 15 W for Slot 4 maximum

Maximum permitted configuration



An Slimline DVD RW drive can be installed optionally. This may only be operated under consideration of the following instructions.

CAUTION

Danger of data errors when burning data carriers (DVD RW)

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.

Note

During operation, the HDDs installed in the removable drive bay must not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

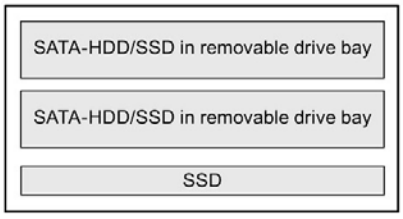
Temperature range 0 °C to 45 °C

The maximum permissible power loss of the expansion cards amounts to 55 W. An ODD drive slimline is not permitted.

Distribution to the slots without exceeding the total power:

- 25 W for Slot 1 maximum
- 25 W each for Slot 2, 3 maximum
- 15 W for Slot 4 maximum

Maximum permitted configuration



Note

During operation, the HDDs installed in the removable drive bay must not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

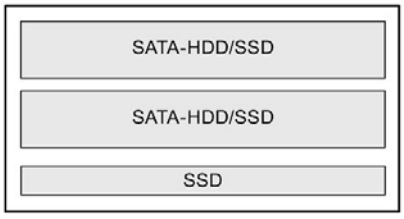
Temperature range 0°C to 50°C

The maximum permissible power loss of the expansion cards amounts to 30 W. An ODD drive slimline is not permitted and no HDD operation in the removable drive bay.

Distribution to the slots without exceeding the total power:

- 25 W for Slot 1 maximum
- 15 W for Slot 2 maximum
- 10 W for Slot 3 maximum
- 10 W for Slot 4 maximum

Maximum permitted configuration



Note

During operation, the HDDs installed in the removable drive bay must not be exposed to vibratory loads and may only be exposed to limited shock loads (see Technical specifications).

6.2 Removing the front panel

Requirement

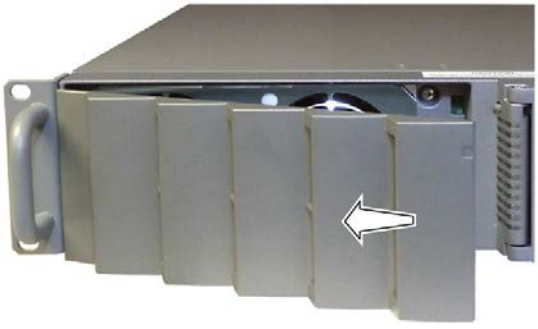
- The device is fully disconnected from the power supply, see chapter "Switching off the device (Page 69)".

Procedure

Observe the chapter "ESD guideline (Page 164)".

1. Open the front door at least 45°.
   The interlock marked in the figure then releases the front panel.

2. Remove the front panel.
   To do so reach into the fan slots.



6.3 Open the device.

NOTICE
Malfunctions and electric shock through repair
Improper repairs jeopardize operational reliability and damage the device.
The results are personal injuries and damage to the plant.
Take the following precautions: • Always disconnect the power plug before you open the device. • Close the device after every repair.

Disclaimer of liability

All technical specifications and approvals apply only to expansions which are approved by the Siemens AG. We are not liable for functional limitations 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 UL-approved components are used according to their "Conditions of Acceptability".

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- All connecting cables are unplugged
- The front panel is removed, see chapter "Removing the front panel (Page 80)".
- 1 T10 screwdriver

Procedure

Read the section "ESD guideline (Page 164)".

1. Loosen the marked screw and hit the screwdriver lightly with the ball of your hand to release the cover.
   The screw remains captive
   in the housing.

2. Push the housing cover back and remove it.

6.4 Removing and installing memory modules

Memory expansion options

The motherboard is equipped with 4 slots for memory modules. You can use DIMM DDR3 memory modules. Technology: Memory transaction rate 1333 MT/sec (PC3-10600), 1600MT/sec (PC3-12800), "unbuffered", "no ECC" or "with ECC". This allows you to expand Rack PC memory up to 32 GB, of which you can use approx. 3.2 GB for the operating system and applications in case of 32-bit operating systems. You can install one, two or four modules.

Combination	Channel A (external)		Channel B		Maximum expansion
	Slot X19 DIMM1-1	Slot X190 DIMM1-2	Slot X20 DIMM2-1	Slot X200 DIMM2-2	
1			2 GB/4 GB/ 8 G B		8 GB
2	2 GB/4 GB/ 8 G B		2 GB/4 GB/ 8 G B		16 GB
3	Combinations of three memory modules are not permitted				
4	2 GB/4 GB/ 8 G B	2 GB/4 GB/ 8 G B	2 GB/4 GB/ 8 G B	2 GB/4 GB/ 8 G B	32 GB

Note

- Memory modules with ECC and without ECC may not be used in mixed operation.
- Only modules of the same module organization 2Rx8 or 1Rx8 may be used per channel.
- Memory is operated in dual-channel mode if two modules are installed.
- If expansion cards with their own memory, for example, graphics cards with 256 MB or more are used, the memory available for the 32-bit operating system or applications may be less than 3.2 GB.

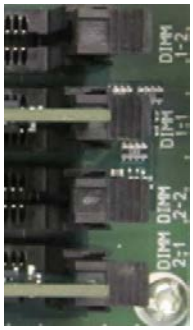
  In order to avoid operating faults you may have to remove one or two memory modules or use a memory module with a smaller capacity so that the real memory expansion on the motherboard and the reserved memory of the expansion card do not overlap.

Requirement

- The device is opened.
- Remove the bus board, if necessary, for easier access to the memory modules.

Procedure - installing a memory module

1. Install the memory modules in the following order:
   1. DIMM 2-1
   2. DIMM 1-1
   3. DIMM 2-2
   4. DIMM 1-2

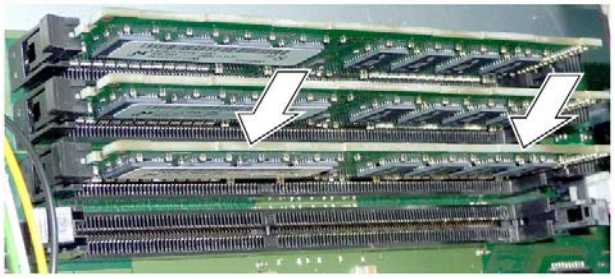


2. Remove the memory module from its packaging.

   Hold it by the upper edges only. Note the indicated notch during insertion.

3. Insert the memory module in the slot perpendicular to the mother-board.
4. Press both sides of the memory module evenly to avoid jamming. The memory module latches in audibly.

   The memory module is inserted correctly if less than 1 mm of the gold contacts is visible evenly across the entire length of the module.
5. Close the device.



Removing a memory module

1. Always remove the memory modules in the reverse order:
   1. DIMM 1-2
   2. DIMM 1-1
   3. DIMM 2-2
   4. DIMM 2-1

2. Open the two latches at the sides of the memory module evenly. Remove the memory module from the slot.
3. Close the device.

Display of the current memory configuration

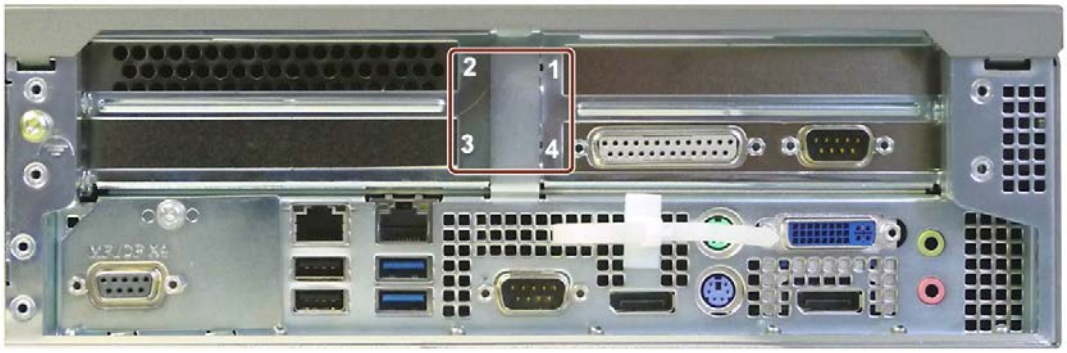
The new memory configuration is detected automatically. The allocation of the ”base memory and extended memory” is automatically displayed when you switch on the device.

6.5 Expansion cards

6.5.1 Notes on the expansion cards

Slot numbering

The 4 existing slots can be identified on the basis of the embossed numbers that are marked in the following figure.



Slot	4 x PCIe device version	2 x PCIe device version	2 x PCI/2 x PCIe device version
1	PCIe Gen3 8 Lane	-	PCIe Gen3 8 Lane
2	PCIe Gen3 4 Lane	PCIe Gen3 4 Lane	PCI
3	PCIe Gen2 4 Lane	PCIe Gen2 4 Lane	PCI
4	PCIe Gen3 4 Lane	-	PCIe Gen3 8 Lane

Note

All PCIe slots have PCIe x16 mechanics. For additional information, see Section Bus board models (Page 202).

Information about specifications

The device is designed for use with expansion cards to PCI specification 2.3 or PCIe specification 1.0a. PCI expansion cards with a 5 V and 3.3 V power supply can be operated. Compliance with the defined mechanical defaults is imperative. Failure to comply with these defaults can result in contact problems, malfunctions and assembly difficulties. The permitted expansion card contour dimensions are specified in the section Dimension drawing of the expansion cards (Page 168).

Note about long PCI / PCIe expansion cards

To insert long PCI / PCIe expansion cards into the guide rails, they must be equipped with a retainer.

Note on PCI-Express expansion cards

The expansion cards in the PCIe slot 1 can take up two slots.

Note on PROFINET expansion cards

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.

6.5.2 Removing and installing bus frame

The feet on the bus frame shown in the following figure serve as a mounting aid and allow vertical mounting. You may have to support the bus frame with your hand to prevent it from tipping.

Requirement

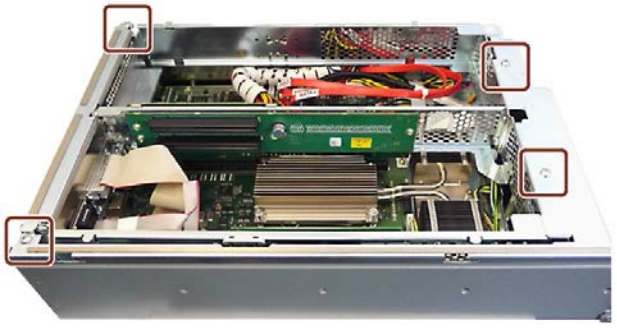
- The device is open in accordance with section "Open the device. (Page 81)".

Procedure

Read the section "ESD guideline (Page 164)".

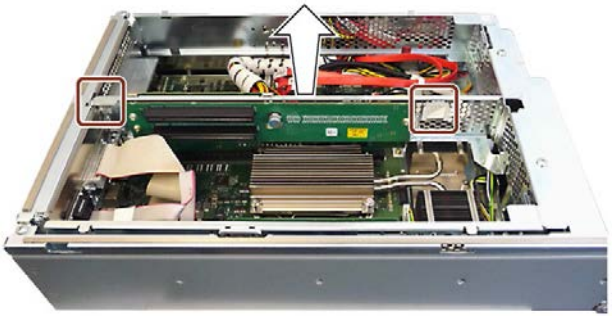
Removal

1. Remove the 4 marked screws.

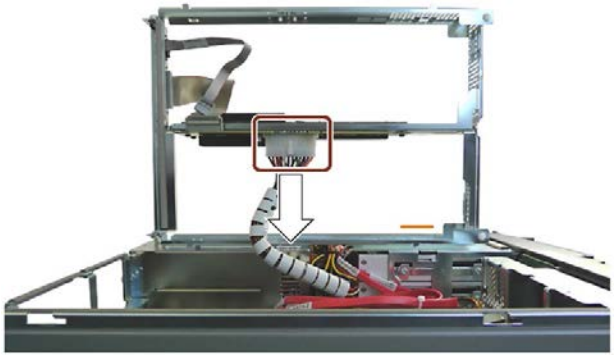


2. Pull the bus frame evenly from the unit at the marked points.

   Do not tilt the bus frame when removing it.



3. Place the bus frame upright. Support the bus frame with your hand to prevent it from tipping.
4. Unlock the marked plug and pull out the connector downwards.



Installation

To install the bus frame follow the steps for removing it in reverse order.

6.5.3 Removing and installing expansion cards

Requirement

- The bus frame has been removed in accordance with chapter "Removing and installing bus frame (Page 88)".
- 1 T10 screwdriver
- 1 side cutter
- 1 retainer from the accessory kit

  You may only use latching retainers of the same type.

  Latching retainers are available under the Order Number A5E02719654.
- 1 mounting bracket for low expansion cards included with the retainers in the accessory kit.

Note

Mounting bracket for low expansion cards

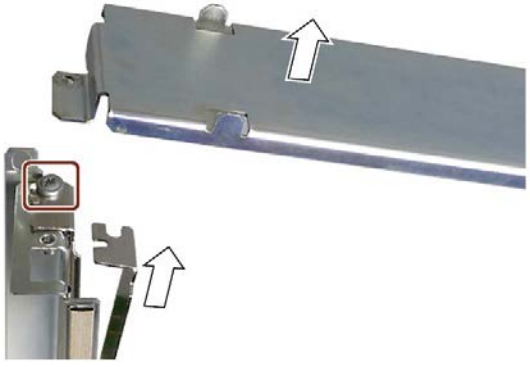
To guarantee the stable installation of a low expansion card, you need an additional mounting bracket for latching retainers. The mounting bracket may have to be removed when you replace the low expansion card with a high one.

Procedure

Installation

1. Remove the marked screw.

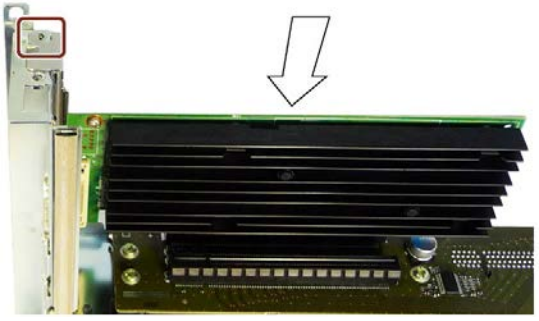
2. Swing the top edge of the bus frame towards the arrow direction and remove the front slot plate.
3. If you want to install the expansion card into the rear slot, remove the marked screw and then the rear slot plate.



4. Insert the expansion card into the slot in the arrow direction.

   Slide the expansion card into the slot until it stops without being skewed.

   Secure the expansion card at the marked point with the corresponding screw.

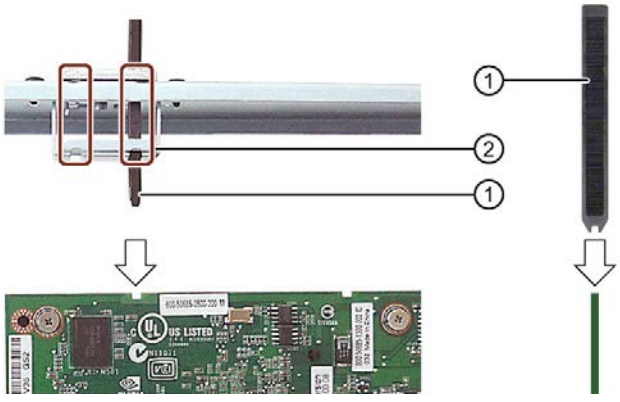


5. If required, fasten the shown support bracket with 2 expansion rivets to the bus frame, in particular at low-profile expansion cards.
6. Insert the retainer ① through one of the marked guide slots ②.

   If possible, use the guide slot closest to the edge-socket connector.

   The retainer can only be moved in the direction of the expansion card. The retainer latches into the selected position.

   If you want to change the position subsequently, you have to open the top edge of the bus frame.



7. Press the retainer onto the expansion card. But only so that the retainer touches the expansion card and does not damage it.

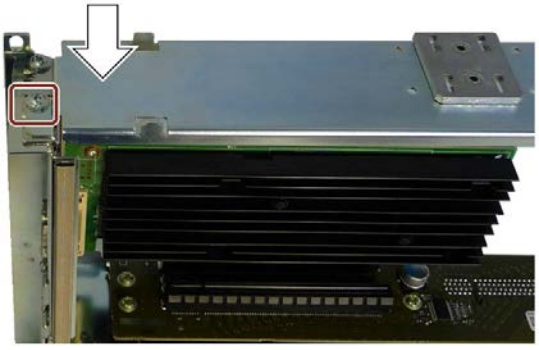
   While doing this, adjust the expansion card so that it fits into the slot of the retainer. Pay attention to the notch of the expansion card.

8. Cut off the protruding part of the retainer as shown.

   Do not leave any remnants jutting out.

9. Insert the front slot plate again.

   Swivel the top side of the bus frame back into the original position and secure the top side of the bus frame with the marked screw.



Removal

For installation, follow the steps for removal in reverse order.

The retainer can only be moved in the direction of the expansion card. To remove the retainer open the longitudinal side of the bus frame and pull out the retainer inwards.

Further procedure

1. Install the bus frame into the device in accordance with the chapter "Removing and installing bus frame (Page 88)".

See also

Bus board models (Page 202)

System resources (Page 208)

BIOS description (Page 222)

Bus board (Page 202)

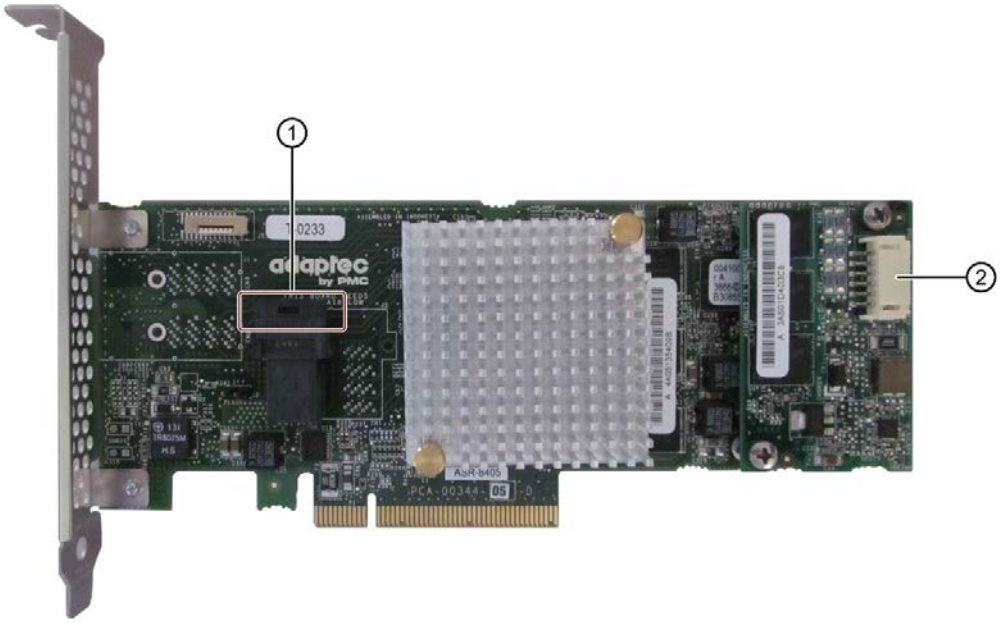
6.5.4 Removing and installing the Hardware RAID adapter card

6.5.4.1 Requirement

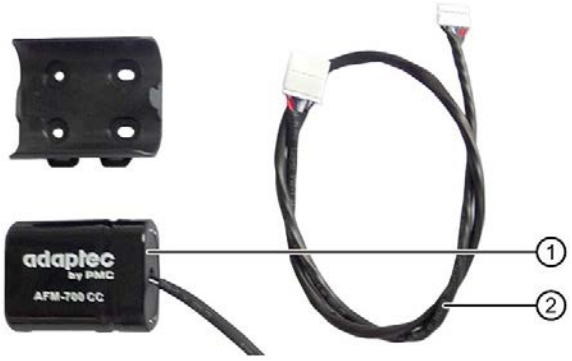
Requirement

For installation of the Hardware RAID adapter card, you require the following:

- A T10 screwdriver
- The Hardware RAID adapter card with connection for the SAS data cable ① and connection for the capacitor block of the ZMM ②

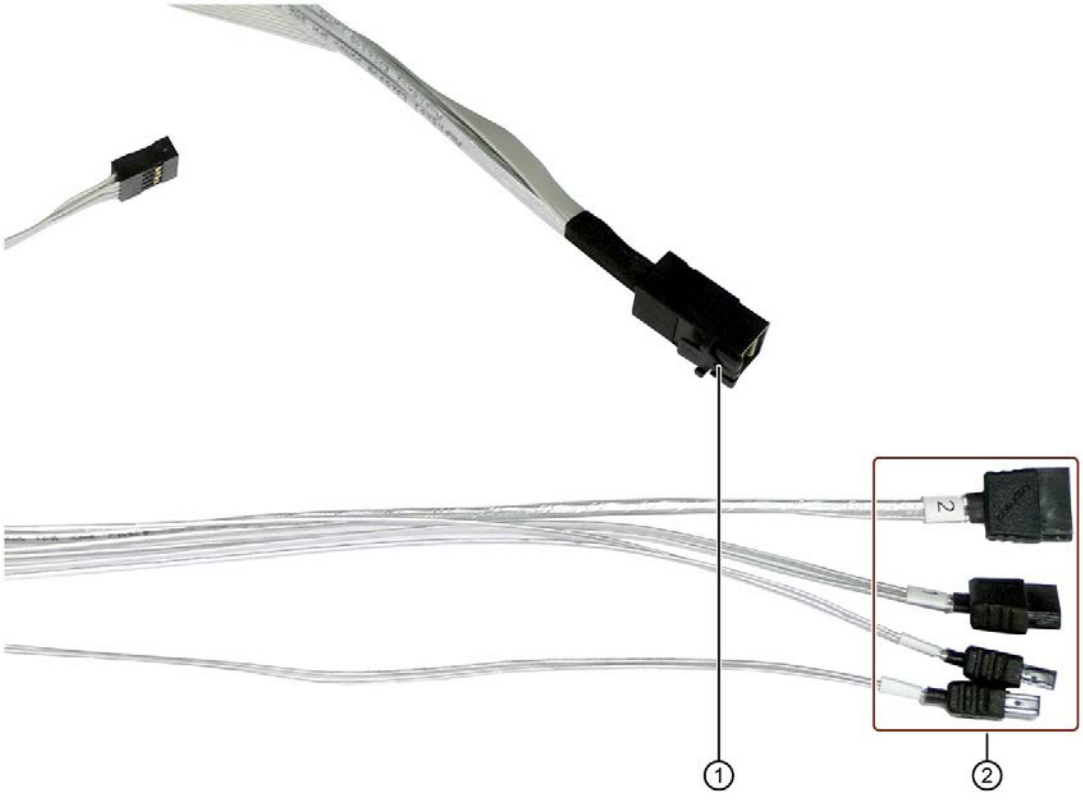


- A capacitor block of a maintenance-free battery backup module (ZMM)



① Capacitor block
② Extension, for IPC847D

- An adapter cable for connection of the hard disk drive ① to the RAID module



Observe the numbering of the connections ②.

NOTICE

Capacitor block must be discharged

When you remove or install a charged capacitor block, the components of the RAID adapter card may be damaged, resulting in data loss.

Remove or install a capacitor block only in completely discharged condition. The Siemens genuine spare part is supplied with discharged capacitor block.

Discharge an installed capacitor block as follows:

1. Shut down the operating system properly.
2. Disconnect the device from the supply system.
3. Wait at least 10 minutes.
   If the capacitor is not discharged, a yellow LED close to the connector lights up.
4. Only remove the connector when the yellow LED is extinguished.

6.5.4.2 Procedure

Procedure for IPC647D

This section describes the installation of the Hardware RAID adapter card with capacitor block for the SIMATIC IPC647D.

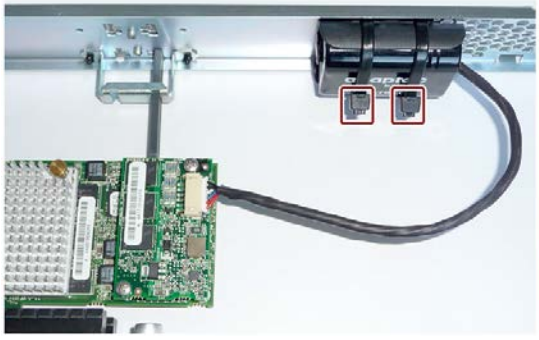
1. Disconnect the device from the supply system.
2. Remove the bus frame.
3. Connect the adapter cable to the appropriate existing drives. Loosen the screws for the power unit if necessary.
   - Plug in the adapter cable as follows:
     – Connector 0 in drive 0
     – Connector 1 in drive 1
   - Make sure that the connector latch engages.
   - Run the adapter cable S-shaped to the front and from there to the expansion card.

     The cable is laid in the front area under the bus frame in the final assembled state.
   - First plug the adapter cable into the RAID module, if the bus frame is mounted.

     The HDD cables are not attached to the drive rack in this case.
4. Secure the capacitor block to the bus frame with two cable ties.

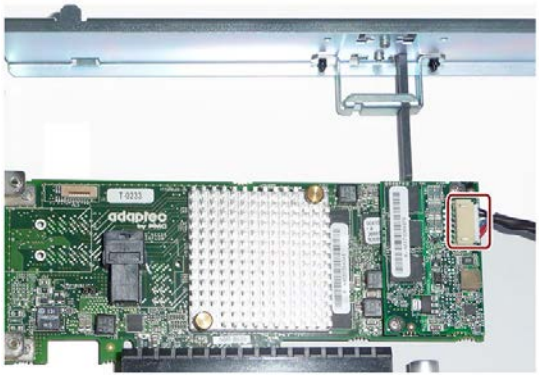
   Make sure that the locks of the cable tie, as indicated, are installed in the plug-in direction in relation to the motherboard.

   Ensure that the cable is not damaged during installation.



5. Install the RAID adapter card in slot 1. The adjacent slot must be free. The free slot is sealed with a perforated slot bracket to ensure cooling.
6. Secure the RAID adapter card with the holder.
7. Insert the capacitor block cable connector at the marked position.

   The connector snaps into place.

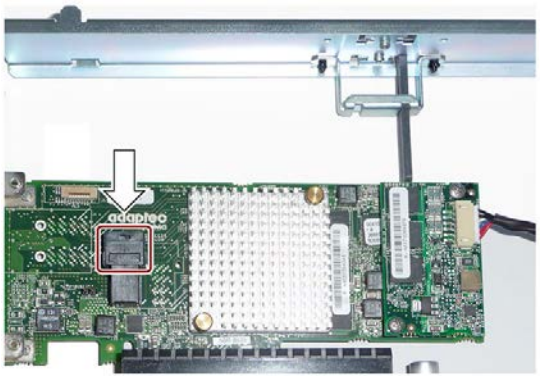


8. Install the bus frame in the housing. Ensure that no cables are crimped when inserting.

9. Make the connection between the RAID adapter card and adapter cable as follows:

   Insert the adapter cable at the marked position (viewed from below).

   Make sure that the connector latch audibly engages.



For removal, follow the steps in reverse order.

6.5.4.3 Configuring the Hardware RAID adapter card

Note

Management of the Hardware RAID system

When setting up the Hardware RAID system, set the write cache of the RAID controller as follows (see the additional documentation of Adaptec):

- Write Caching - Enable with Backup Unit
- create RAID via: Build/Verify

After replacement of the RAID adapter card, configure it in the BIOS setup as follows:

Note

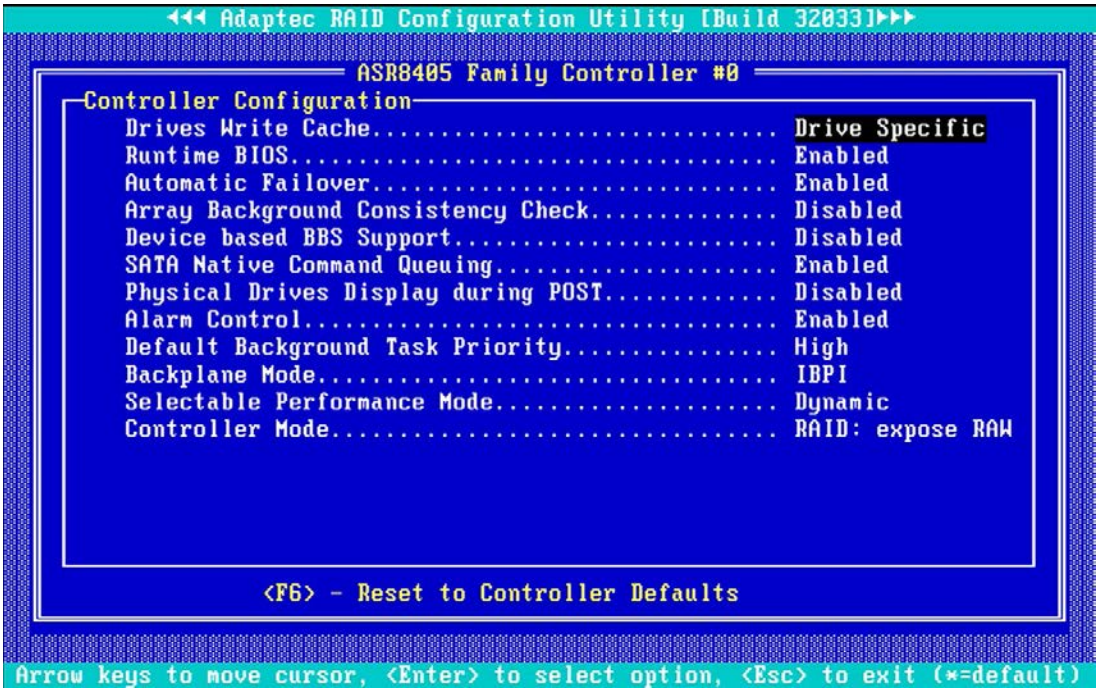
The key combination <CTRL+A> is only effective in "Legacy" mode. If the "Boot Type" parameter is set to "UEFI Boot Type in the "Boot" menu in the BIOS setup, the RAID hardware is configured by using the "Device Management" button in the BIOS selection menu.

1. Switch on the device.
2. During the boot phase, press the key combination <CTRL+A> when prompted to do so.

   If the "Boot Type" parameter is set to "Dual Boot Type" in the "Boot" menu in the BIOS setup and an EFI boot medium is available, you must press the <ENTER> key after having pressed the <CTRL+A> within 1 second.

   The system starts if you do not press the <ENTER> key in time.

3. Assign the parameters under "Controller Configuration" as follows:



Note

The settings shown correspond to the default setting in the delivery state of the device.

Difference in the parameters compared to the default setting of the Hardware RAID adapter card after replacement:

- "Drives Write Cache = Disabled", which means the write cache of the hard disk is switched off.
- "Alarm Control = Disabled", which means the acoustic alarm in case of a fault is switched off

6.6 Drives and storage media

6.6.1 Overview

You can mount the following drives and storage media in the device:

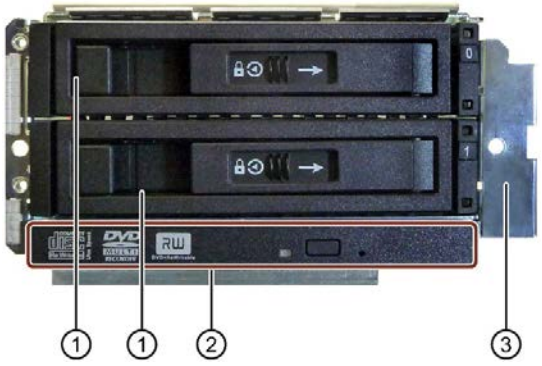
- Hard disk drive
- Solid State Drive
- DVD drive

There are two drive cages for alternative installation:

- Drive cage for removable drive bays
- Vibration-damped drive cage

Drive cage for removable drive bays

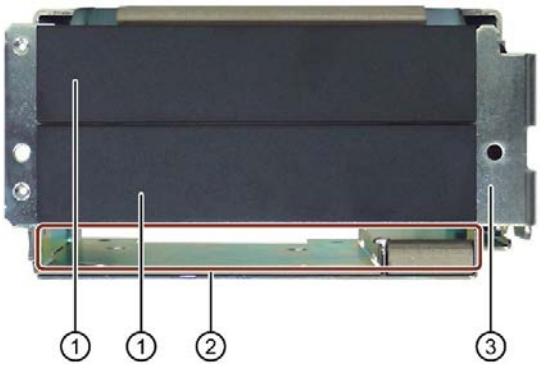
The drive cage is used to hold removable drive bays with inserts for drives, for example HDDs and SSDs. A Slimline DVD drive can be mounted in the lower drive bay.



① Removable drive bay with trays for drives
② Slimline mounting bay for DVD drive
③ Drive cage for removable drive bays

Vibration-damped drive cage

The drive cage contains shock and vibration-attenuating components for holding hard disk drives. A Slimline DVD drive can be mounted in the lower drive bay.



① Two drive bays
② Slimline mounting bay for DVD drive
③ Vibration-damped drive cage

6.6.2 Removing and installing drive cage

Requirement

- The device is open, see the section "Open the device. (Page 81)".
- Applies for vibration-damped drive cage:

  The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- 1 T10 screwdriver

Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Remove the marked screws.

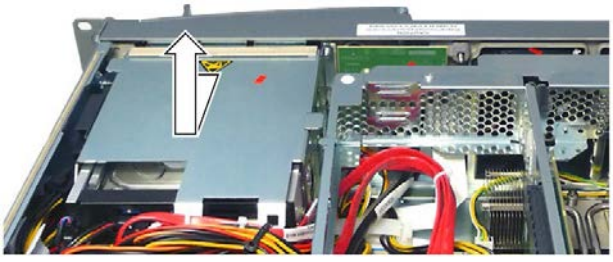
2. Remove the marked screws.

3. Note the positions of the marked SATA connector.

   Press the unlock mechanism of the connector shown on the right in the figure and pull off the connector.

   Pull off the power supply connector of the Slimline drive marked on the right, if a Slimline drive exists.

4. Slide the drive cage toward the power supply until it is released from the front frame and remove the drive cage from the device.



Installation

To install the fan, follow the steps for removing it in reverse order.

6.6.3 Removing and installing drive fans

Requirement

- The device is opened.

Note

Install only a fan of the same type. Information about the original spare parts for SIMATIC PCs is available in the Internet at After-sales information system for SIMATIC PC/PG (http://www.siemens.com/asis).

Install the drive fan as seen in the figure. The drive fan blows cooling air into the housing.

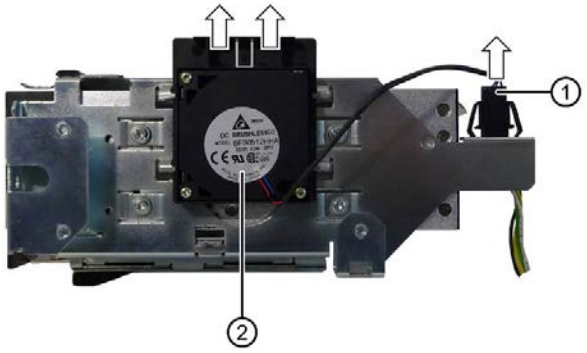
Procedure

Note

The drive cage has been removed so that the work steps can be more easily seen.

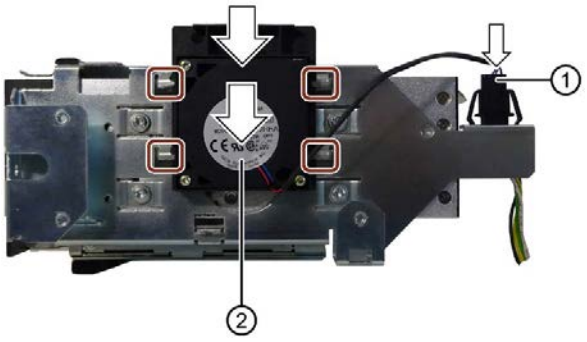
Removal

1. Press on the clip ① at the small power supply plug and pull the plug to the top from the larger adapter plug.
2. Put your hands into the indentations on the left and right of the fan retainer and slide the fan retainer together with the drive fan ② up and out of the guides.



Installation

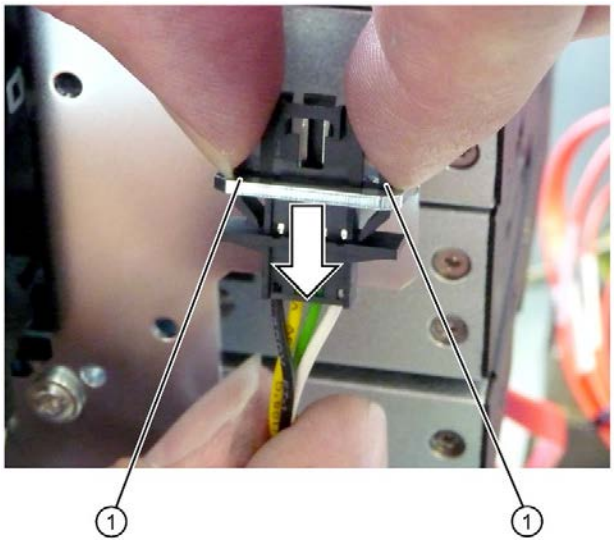
1. Slide the power supply plug ① into the adapter plug until it snaps into place.
2. Slide the fan retainer together with the drive fan ② first under the top two and then under the bottom two guides marked in red until the fan retainer is flush with the top edge of the drive cage. Make sure that you do not jam the fan retainer. The fan retainer is flush against the drive cage when installed.



Removing the adapter plug

If necessary, remove the adapter plug, for example, when removing the drive cage.

1. To do so, press on the clips ① on the side of the adapter plug and remove the plug by pulling it down.



6.6.4 Removing and inserting the tray from the removable drive bays

There are trays in the removable drive bays that are installed in the drive cages. Hard disks or SSDs can be installed in the tray.

Requirement

- The front door is open
- 1 key

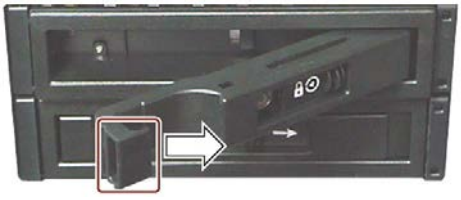
Procedure

Removal

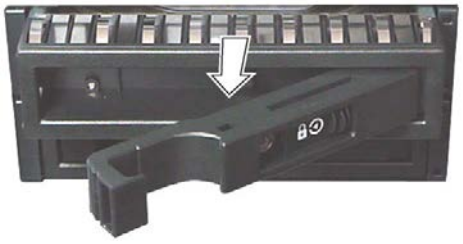
1. Slide the cover of the locking mechanism of the removable drive bay in the direction of the arrow.

2. Use the appropriate key to unlock the tray on the removable drive bay.

3. Open the handle on the removable drive bay and open it at the highlighted spot in direction of the arrow until you feel a slight resistance.



4. Now grasp the handle to the right of the notch you used to pull out the handle and pull the tray completely out of the removable drive bay.



Installation

To install the fan, follow the steps for removing it in reverse order.

Note

The tray must always be locked in the removable drive bay to ensure reliable operation of the devices with removable drive bays.

6.6.5 Removing and installing the hard disk drive from a tray

Requirement

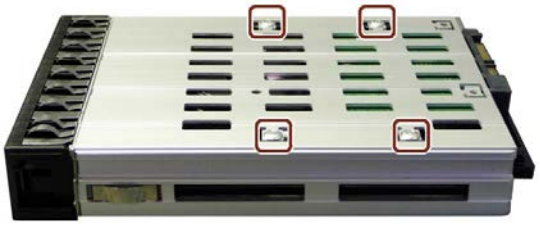
- The tray has been removed, see chapter "Removing and inserting the tray from the removable drive bays (Page 106)".
- 1 drive
- 1 soft mounting padding

Procedure

Observe the chapter "ESD guideline (Page 164)".

Removal

1. Place the tray as shown on the mounting padding.
2. Remove the marked screws.



Installation

Proceed in reverse order. Use only the original screws during installation. Position all screws first and do not tighten them until all screws are installed in the thread.

6.6.6 Removing and installing a drive from a drive cage

This chapter describes the removal and installation of the following drive types from the drive cage or the vibration-damped drive cage:

- Hard disk drive
- Removable drive bay
- DVD drive

Removal and installation of a Slimline DVD drive is carried out analog.

Requirement

- The drive cage has been removed, see chapter "Removing and installing drive cage (Page 102)".
- The drive fan has been removed, see chapter "Removing and installing drive fans (Page 104)".
- The connecting cables have been removed from the drive.

Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Position the drive cage as shown.
2. Remove the marked screws of the both sides of the drive cage.
4. Pull the removable drive bay out of the drive cage in the direction of the arrow.

Installation

To install the fan, follow the steps for removing it in reverse order. Use only the original screws during installation.

6.6.7 Replacing a defective hard disk drive in the RAID system

Hard disk drives can be replaced during operation in the removable drive bay in connection with a configured RAID system. This functionality is referred to as "Hot Swap".

Note

If you have configured a non-RAID system with several hard disk drives, you need to turn off the device before you replace a hard disk drive.

CAUTION

Damaging the drive

If you replace a drive while it is active, the drive and data are corrupted. The device can no longer be operated without problems.

Replace the drive in the removable drive bay when the "HDD" status display of the device is not lit.

Observe the EGB guidelines. Always replace the drive with a new drive of the same type and capacity.

Mounting locations for hard disk drives in the RAID1 system

Hard disk drives for a RAID system can be installed either in the device or on the front in the removable drive bay.

Note

The replacement of a hard disk drive with removable drive bays and in the RAID system can be performed without shutting down the device. An internal hard disk drive may only be replaced when the device is switched off.

The new hard disk drive can be integrated into the RAID1 system at operating system level with the RAID software. Synchronization may take several hours, depending on system load.

Status displays of the hard disk drives in a RAID1 system

The following table includes information on the alarms of the status displays. If the hard disk drive is defective and the SIMATIC monitoring software is installed, the LEDs of the status display light up individually or simultaneously.

Internal hard disk drive or hard disk drive in removable drive bay

Status display	RAID BIOS	RAID software	Data cable connection	Drive
HDD0 alarm	Port 0	Device port 0	0	0
HDD1 alarm	Port 1	Device port 1	1	1

Replacing a defective hard disk drive in the RAID system

1. Determine which hard disk was reported by the RAID software as defective.
2. Replace the defective hard disk.
3. Replace the defective hard disk with a hard disk of the same type and capacity.

6.6.8 Removing and installing an SSD

6.6.8.1 Removing and installing an SSD from a tray

Requirement

- The tray has been removed, see chapter "Removing and inserting the tray from the removable drive bays (Page 106)".
- The connecting cables have been removed from the SSD.
- 1 soft mounting padding

Procedure

Observe the chapter "ESD guideline (Page 164)".

Removal

1. Place the tray as shown on the mounting padding.
2. Remove the marked screws.

Installation

For installation, follow the steps for removal in reverse order. Use only the original screws during installation. Position all screws first and do not tighten them until all screws are installed in the thread.

6.6.8.2 Removing and installing an SSD with mounting plate from a drive cage

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The drive cage has been removed, see chapter "Removing and installing drive cage (Page 102)".
- The drive fan has been removed, see chapter "Removing and installing drive fans (Page 104)".
- 1 T10 screwdriver

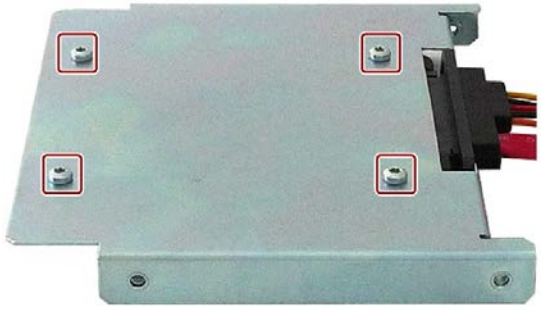
Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. On both sides of the drive cage, loosen the two screws that secure the mounting plate in the drive cage.
2. Pull out the mounting plate with the SSD from the drive cage in the direction of the cables.

   Do not pull on the cables.
3. Remove the marked screws.
4. Remove the mounting plate from the SSD.



5. Pull out the plug from the SSD.

Installation

To install the fan, follow the steps for removing it in reverse order. Use only the original screws during installation.

Device maintenance and repair 7

7.1 Repair information

Carrying out repairs

Only qualified personnel are permitted to repair the device.

⚠ WARNING

Unauthorized opening and improper repairs on the device may result in substantial damage to equipment or endanger the user.

- Always disconnect the power plug before you open the device.
- Only install system expansion devices designed for this device. If you install other expansion devices, you may damage the device or violate the safety requirements and regulations on RF suppression. Contact your technical support team or where you purchased your PC to find out which system expansion devices may be installed.

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

⚠ CAUTION

Electrostatic sensitive devices (ESD)

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

Make sure you take precautionary measures even when you open the device, for example, when opening device doors, device covers or the enclosure cover. For more information, please refer to the chapter "ESD directives".

Limitation of liability

All technical specifications and approvals of the device only apply if you use expansion components that have a valid CE approval (CE mark). The installation instructions for expansion components in the associated documentation must be observed.

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

We are not liable for functional limitations caused by the use of third-party devices or components.

Tools

You can make repairs on the device with the following tools:

- T20 screwdriver for protective conductor connection and enclosure
- T6 screwdriver for removing and installing the DVD drive
- T10 screwdriver for all of the remaining screws

See also

Spare parts and repairs (http://support.automation.siemens.com/WW/view/en/16611927)

7.2 Maintenance

7.2.1 Maintenance intervals

To maintain high system availability, we recommend the preventative replacement of those PC components that are subject to wear in accordance with the intervals for replacement indicated in the table below.

Component	Replacement interval
Drives	3 years
Backup battery	5 years
Device fan	3 years
Filter pad	Depending on the degree of soiling

7.2.2 Changing the filter pad

Requirement

- The device is disconnected from the power supply, see chapter "Switching off the device (Page 69)".
- The front panel is open, see chapter "Removing the front panel (Page 80)".
- A filter mat

  You may only use filter mats of the same type. Information about original spare parts for SIMATIC IPCs is available on the Internet at:
  SIMATIC IPC after-sales information system (http://www.siemens.com/asis).

  Order no.: A5E02396171; 10 pieces per package

Procedure

Removal

1. Remove the filter mat ① from the front panel.

Installation

Note

Note the following points:

- Use a new filter mat
- If you nevertheless use the removed filter mat, remember the direction in which the fans draw in air. Do not fit the outer side of the filter mat on the inside. Generally, the outer side is dirty after it has been in use for some time.

1. Insert the new filter mat in the front panel as shown.
2. Insert the front panel.
3. Close the front door.

7.3 Manage onboard RAID system

The RAID system is fully set up ex works. The installed SIMATIC diagnostic software is used to display the status of the RAID system. Additional software is not required. Additional information is available in the sections "RAID systems (Page 64)" and "Replacing a defective hard disk drive in the RAID system (Page 110)".

In "Legacy" mode, you can configure RAID hardware with <CTRL+I> in the boot phase. The associated description is available on the "Documentation and Drivers" DVD.

Note

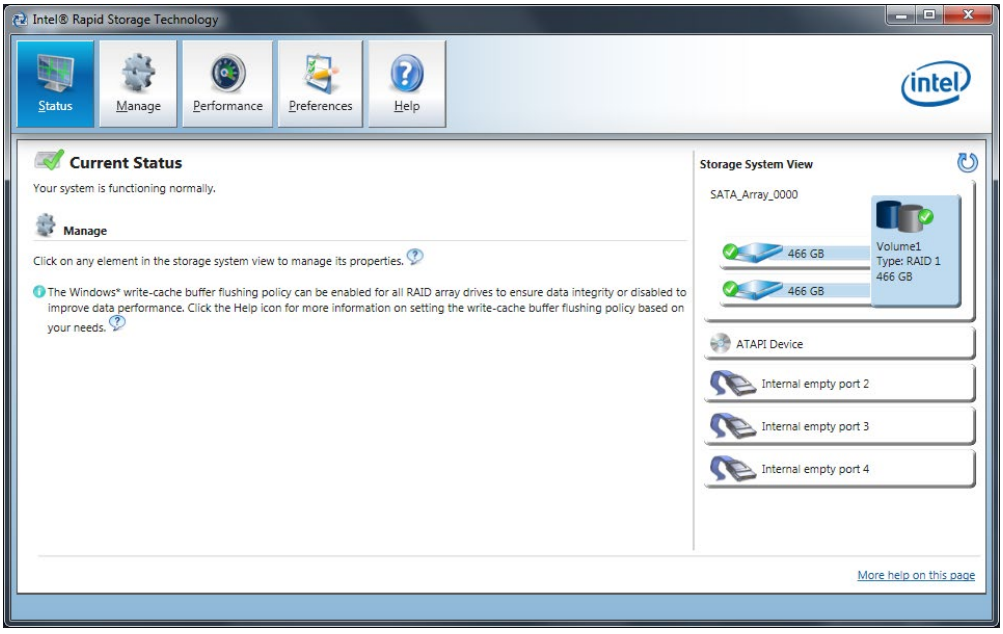
The key combination <CTRL+I> is only effective in "Legacy" mode. If the "Boot Type" parameter is set to "UEFI Boot Type in the "Boot" menu in the BIOS setup, the RAID hardware is configured by using the "Device Management" button in the BIOS selection menu.

7.3.1 Example for a RAID1 system during the boot phase of the system

7.3.2 RAID software

Die RAID software "Intel Rapid Storage Technology" offers advanced functions to use and manage the RAID system.

1. Select the RAID software via "Start > Programs > Intel Rapid Storage Technology".



2. Select "Manage" > "Advanced" to display details of the RAID system.
3. Select "Help" > "System Report" > "Save" to create a report with the details of the RAID system.

7.3.3 Checking the status of the RAID system

By default, the status of the RAID system is displayed in the Windows Event Viewer and in a log file of the program. If an error occurs, a hard disk can be synchronized at the operating system level.

Note

It may take a very long time (hours or even days in the case of a high drive load) to synchronize a new hard disk in the background, depending on its size and on the system load.

The redundant system state is reached again only after synchronization is completed.

NOTICE
Operator errors on the machine or plant Data is synchronized if a hard disk fails. Depending on the work load of the processor and hard disks, the system may react with some delay. Execution of keyboard, mouse or touch screen commands may be briefly delayed in extreme situations. This could result in operator errors on the machine or plant. Do not operate safety-critical functions when a hard disk has failed.

7.3.4 Displaying a defective hard disk of a RAID system in the RAID software

Note

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

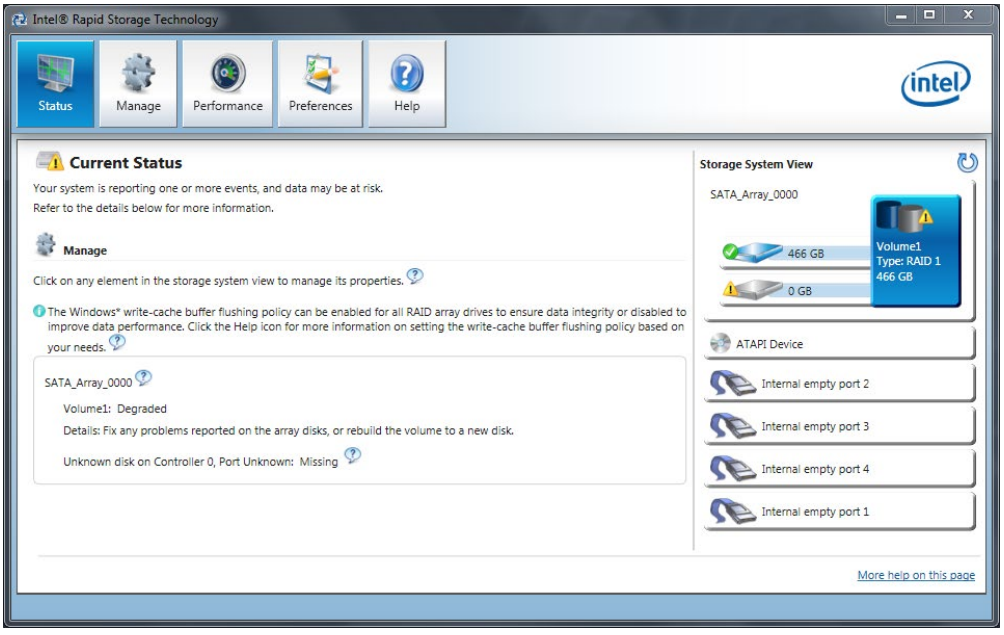
If an error is detected the defective hard disk must be replaced with a new hard disk to return to a secure RAID status after an error.

The RAID software indicates the following:

- A defective hard disk
- Details of the functioning hard disk:

  The functioning hard disk is indicated by BIOS with its port number or by the RAID software with its device port number.

  The following figure shows the corresponding window in the RAID software with a RAID1 system.



You can find information on how to detect and replace a defective hard disk in the RAID system in the section "Replacing a defective hard disk drive in the RAID system (Page 110)".

7.3.5 Special feature: Replacing hard disk in the RAID system when switched off

The RAID system does not automatically boot up when restarted if a defective hard disk was replaced while the RAID system is switched off. Therefore, place the RAID system in the first place of the bootable sources in the BIOS setup menu "Boot". Otherwise, the system will boot from the hard disk you have just installed and the message "Operating system not found" will be displayed.

7.3.6 Integrating a new hard disk drive in the RAID system

The RAID system is configured in the delivery state so that a new hard disk must be integrated manually in case of an error. To integrate the hard disk automatically, activate "Automatic rebuild" in the "Preferences" menu of the RAID software.

Automatic integration of a hard disk

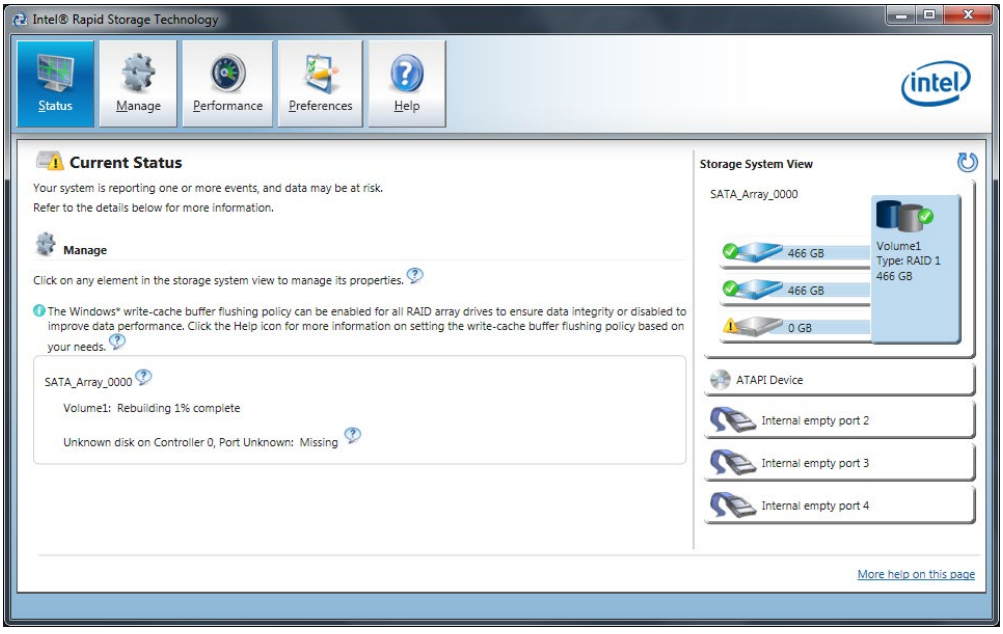
NOTICE
Data loss The hard disk to be integrated is not checked for partition information or existing data during automatic integration. All partitions and data on the hard disk are deleted without warning. Insert only a brand-new hard disk.

Requirement:

- "Automatic rebuild" is selected in the "Preferences" menu of the RAID software.
- The hard disk must be completely new or set up as spare drive for this purpose. Notes on creating spare drives are available in the controller documentation.

Sequence

The following figure is an example for the automatic rebuilding process.



A defective hard disk is still displayed during the rebuilding process. This display disappears when the rebuilding process is completed.

Procedure - integrating hard disk manually

When the "Automatic rebuild" option is deselected in the "Preferences" menu of the RAID software (default setting), you must integrate the hard disk manually:

1. Select "Start" > "Programs" > "Intel Rapid Storage Technology".
2. Click "Run Hardware Scan now".

   The new hard disk is found and displayed.

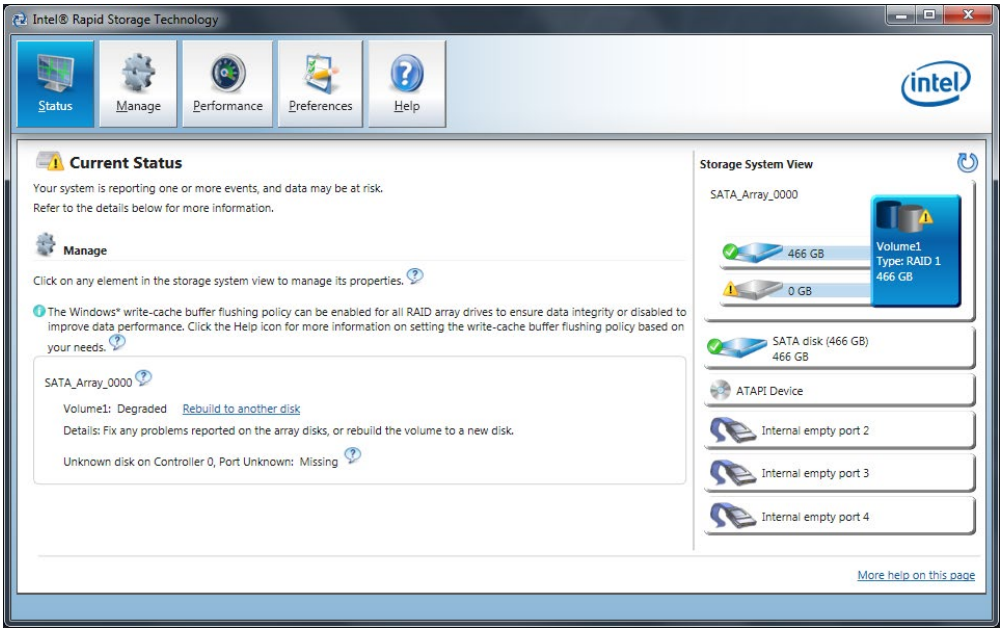
Or:

1. Reboot the device.

   The RAID software automatically integrates the hard disk.
2. Click the "Rebuild to another Disk" link.

   The RAID system is synchronized.

   The following figure shows the window when integrating a hard disk in a RAID1 system.



If you shut down and restart the system without installing a functioning new hard disk, "unused" is displayed for the corresponding SATA port. You can install the functioning hard disk while the system is running. The new hard disk is then assigned to a SATA port and is integrated into the RAID system.

A defective hard disk is still displayed during the rebuilding process. This display disappears when the rebuilding process is completed.

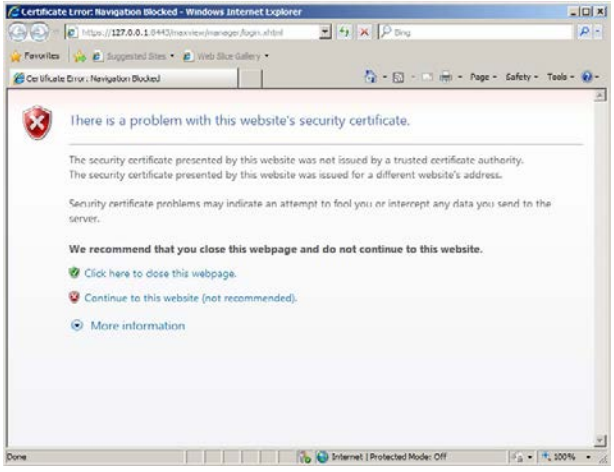
7.4 Managing the Hardware RAID system

The RAID system is fully set up ex works. The installed SIMATIC diagnostic software is used to display the status of the RAID system. Additional software is not required. Additional information is available in the sections "RAID systems (Page 64)" and "Removing and installing the Hardware RAID adapter card (Page 93)".

7.4.1 Calling Adaptec maxView Storage Manager

The Internet Explorer opens when you call the Adaptec maxView Storage Manager for the first time. The following message is displayed depending on the operating system:

- Windows 7 32-bit/64-bit, Windows Server 2008 R2, Windows Server 2012 R2: "There is a problem with this website's security certificate".



- Windows Server 2008 R2, Windows Server 2012 R2: "Content from the website listed below is being blocked by the Internet Explorer Enhanced Security Configuration. https://127.0.0.1"

You can find step-by-step instructions on installing the certificate and setting up the trusted sites on the Internet at the following address: Details: Instructions for calling the Adaptec maxView Storage Manager (http://support.automation.siemens.com/WW/view/en/102295361)

7.5 Removing and installing hardware

7.5.1 Replacing device fans

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The front panel is removed, see chapter "Removing the front panel (Page 80)".
- 1 or 2 fans

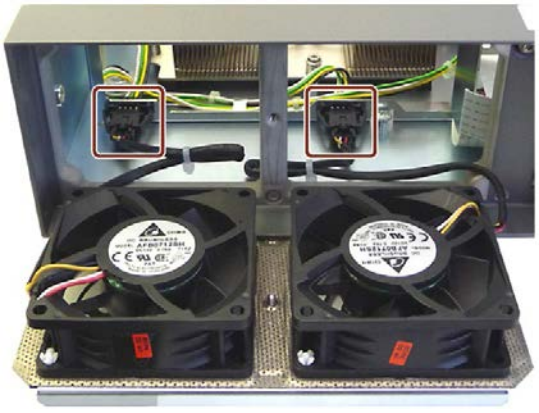
Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Release the knurled screw of the fan holder and remove the fan holder from the housing.

2. Press at the side of the clips of the fan connector to unlatch and pull the connector forward from the socket.



3. Loosen all the expanding rivets and remove the device fan from the fan holder.

Installation

Note

Install only fans of the same type. Information about original spare parts for SIMATIC PCs is available on the Internet at: SIMATIC IPC after-sales information system (http://www.siemens.com/asis)

Ensure that the arrow on the device fan points away from the fan bracket. The device fan blows air into the enclosure.

To install the fan, follow the steps for removing it in reverse order.

Ensure that position of the fans are the cable routing are correct, see the figure in the "Removal" section, Step 2. Make sure that the cables are not squashed or block the fan.

Furthermore take the positioning aids shown in the following figure into account. The fan holder must lie level on the front frame.

Further procedure

1. Install the front panel in accordance with chapter "Removing the front panel (Page 80)".
2. Test proper functioning of the fan using the DiagBase software.

7.5.2 Replacing the backup battery

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

Note

Note the following points:

- Check the maintenance interval.. You can find additional information in the section "Maintenance intervals (Page 117)".
- Replace the lithium battery only with an identical one or a type recommended by the manufacturer. Information about original spare parts for SIMATIC IPCs is available on the Internet at:
  SIMATIC IPC after-sales information system (http://www.siemens.com/asis)

Requirement

- The current BIOS Setup settings, see chapter "BIOS description (Page 222)".
- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed from the device, see chapter "Removing and installing bus frame (Page 88)".
- All connection cables are unplugged.
- 1 battery, Order Number A5E00047601

Procedure

Read the section "ESD guideline (Page 164)".

CAUTION

Risk of short circuit

Conductive materials cause a battery short-circuit or damage adjacent modules.

Do not use tools made of conductive materials to replace the battery.

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.

Removal

1. Remove the battery from the socket.
   To do so hold at the points marked with the arrows and lever the battery out.
2. Dispose of the battery properly.

Installation

1. Press the new battery centered into the socket applying slight pressure.
   Ensure that the battery is then held by the 4 brackets.

Further procedure

- Install the bus frame in accordance with chapter "Removing and installing bus frame (Page 88)".
- Connect all cables.
- Close the device as specified in chapter "Open the device. (Page 81)".
- Set the BIOS setup.
  The configuration data of the device may be deleted when you replace the backup battery, depending on BIOS setup settings.

7.5.3 Replace AC power supply

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The device is open, see the section "Open the device. (Page 81)".
- The power connector has been removed, see chapter "Connecting an AC power supply (Page 48)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- T10 screwdriver
- Cable ties

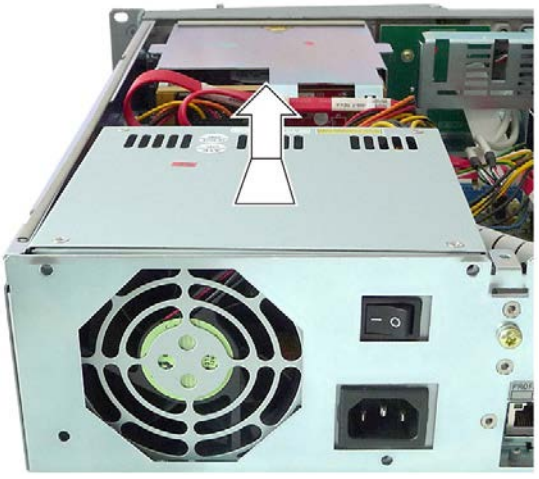
Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Remove the cable ties that secure the cables in the housing.
2. Remove the marked screws.

3. Push the power supply unit towards the drive cage and lift it out of the device.



Installation

Install the device in reverse order.

See also

Connection information (Page 43)
ESD guideline (Page 164)

7.5.4 Replacing the redundant power supply module

This work is required if a malfunction or a fault was reported for the redundant power supply. The LED of the defective module is not lit up then (see chapter "Device views (Page 19)").

Note

If a module of the redundant power supply is defective, the device continues to function with the second module that is not defective. To ensure the availability of your system by means of the redundant power supply, shut down the device as soon as possible correctly and replace the defective module.

Requirement

- The device is disconnected from the power supply, see chapter "Switching off the device (Page 69)".
- The power supply cables have been removed (see chapter "Connecting a redundant power supply (Page 49)")
- 1 crosstip screwdriver

Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Remove the marked screw at the defective module.
2. Pull out the defective module from the frame using the hinged handle.
3. Insert the new module and secure it with the screw.
4. Reconnect the power supply cables.

7.5.5 Replacing the redundant power supply completely

Requirement

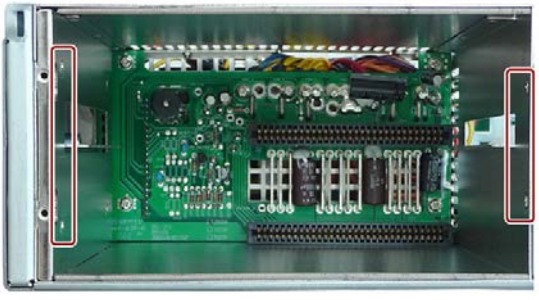
- The device is disconnected from the power supply, see chapter "Switching off the device (Page 69)".
- The power supply cables have been removed (see chapter "Connecting a redundant power supply (Page 49)")
- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- 1 spare part "Redundant power supply"
- 1 T10 screwdriver
- 1 crosstip screwdriver
- 2 cable ties

Procedure

Read the section "ESD guideline (Page 164)".

Removal

1. Remove the modules of the redundant power supply, see chapter "Replacing the redundant power supply module (Page 132)".
2. Remove the marked screws.



3. Loosen the two screws ① and ②.

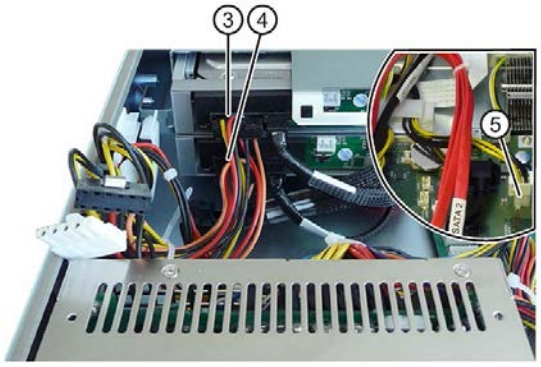
   Do not remove the screws completely. This facilitates subsequent reassembly. The power supply can still be pulled out.

3. Cut through the indicated cable ties.

   Ensure that no cable is damaged while doing this.

4. Loosen all connectors of the power supply lines that connect the redundant power supply with drives and the motherboard. This includes:
   - Power supply connectors of the drives ③ and ④
   - Power supply connector of the motherboard ⑤

6. When the connectors of all the cables have been removed from the redundant power supply, remove the redundant power supply with its housing from the device.



Installation

Install the device in reverse order. Secure the cables using the cable clips available in the device as well as with new cable ties.

7.5.6 Removing and installing the piggyback and bus board

This chapter describes the removal and installation of bus boards and piggybacks.

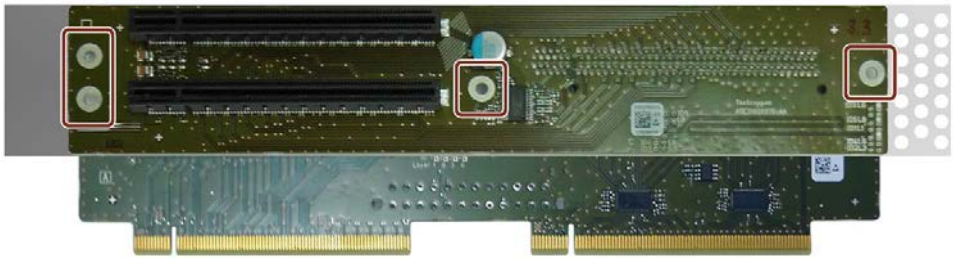
Information about the various variants of bus boards and piggybacks is available in chapter "Bus board models (Page 202)".

Requirement

- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- All expansion cards have been removed, see chapter "Removing and installing expansion cards (Page 90)".

Removing the piggyback

1. Remove the marked screws with which the piggyback is fastened to the middle rail of the bus frame.



2. On the other side of the middle rail of the bus frame remove the angle connector of the piggyback from the bus board as shown in the following figure.

3. Guide the angle connector of the piggyback through the middle rail of the bus frame and remove the piggyback as shown in the following figure.

Removing the bus board

1. Remove all 5 expanding rivets with which the bus board is fastened to the middle rack of the bus frame.

2. Use a screwdriver to press on the end of the expansion rivet until the expansion rivet can be freely moved.

Procedure

Installation

Install the device in reverse order. Use only new expansion rivets to mount a bus board.

7.5.7 Removing the OP

Requirement

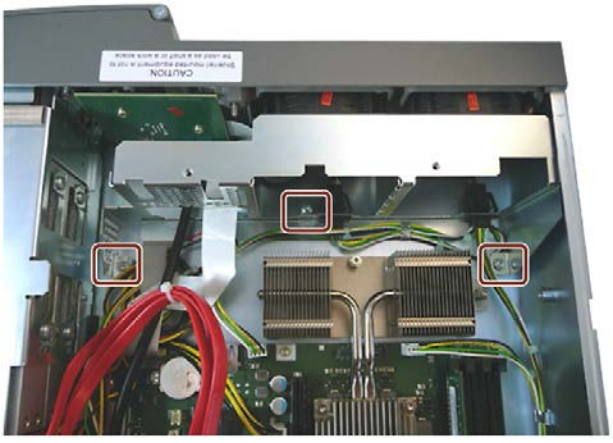
- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- 1 operator panel
- 1 crosstip screwdriver

Procedure

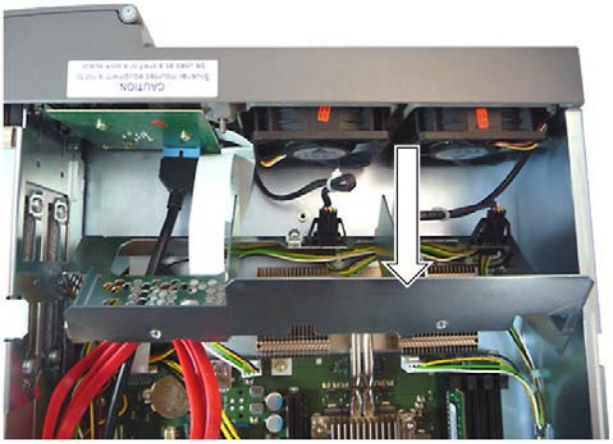
Read the section "ESD guideline (Page 164)".

Removal

1. Remove the marked screws.

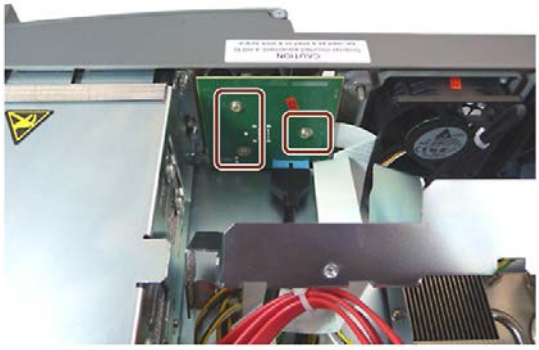


2. Fold the crossbar in the direction of the arrow.

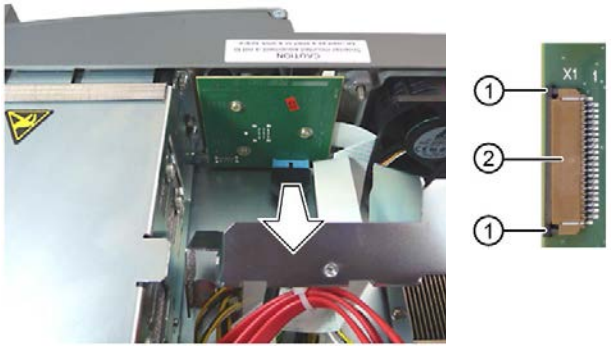


3. Remove the USB connector.

4. Remove the marked screws and then the operator panel.



5. Loosen the white flat cable at the plug connector ② by sliding the lock ① to the left.

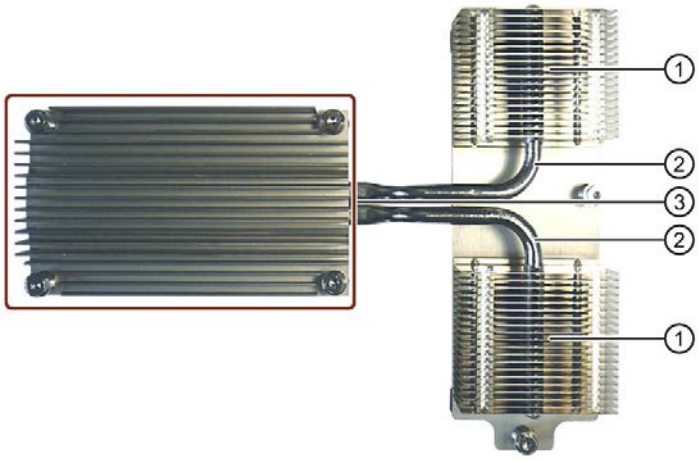


Installation

Install the device in reverse order.

7.5.8 Removing and installing the processor cooler

The processor cooler used in the device forms a unit together with heat pipes and further heat exchangers.



① Heat exchangers
② Heat pipe
③ Heat sink

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- 1 processor cooler

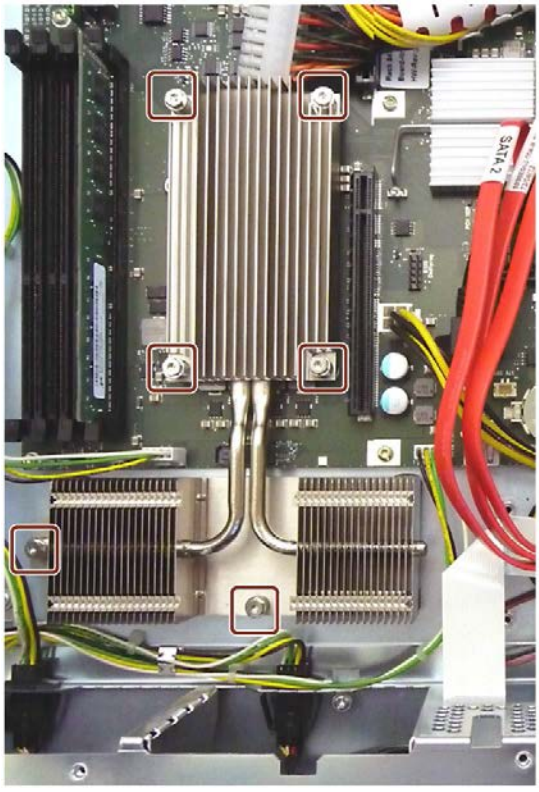
  Information about original spare parts for SIMATIC IPCs is available on the Internet at:

  SIMATIC IPC after-sales information system (http://www.siemens.com/asis)
- 1 T10 screwdriver

Procedure

Removal

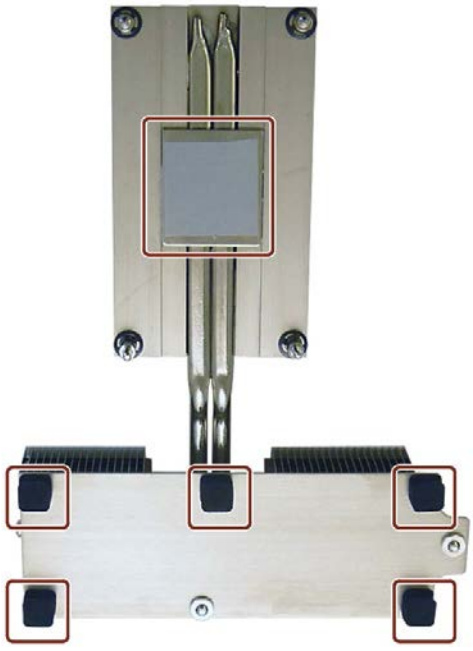
1. Remove the highlighted six screws.
2. Remove the processor cooler from of the device.



Installation

Make sure that the heat sink pad on the heat sink exists and is intact. The same applies for the rubber feet marked in the figure.

To install the fan, follow the steps for removing it in reverse order. Tighten the screws at the heat sink gradually crosswise. Avoid uneven tightening as this may result in a tensioning of the heat sink.



Further procedure

1. Install the bus frame.
2. Close the device.

7.5.9 Removing the motherboard

Requirement

- The device is fully disconnected from the mains voltage, see chapter "Switching off the device (Page 69)".
- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- The processor cooler has been removed, see chapter "Removing and installing the processor cooler (Page 139)".
- 1 motherboard

  Information about original spare parts for SIMATIC IPCs is available on the Internet at: SIMATIC IPC after-sales information system (http://www.siemens.com/asis).

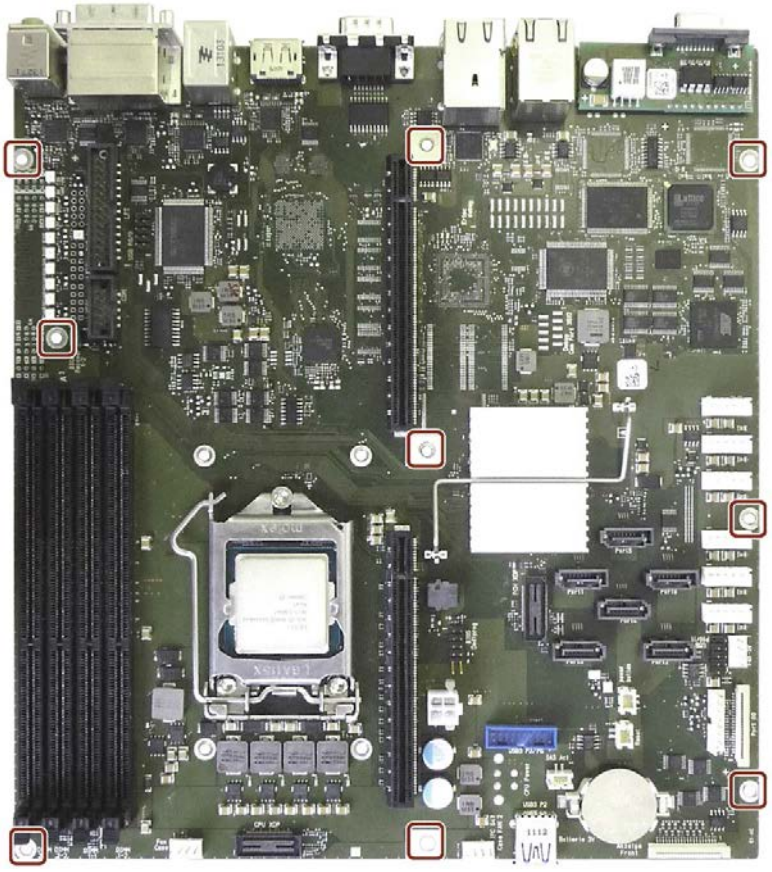
  The motherboard is supplied as a spare part with soldered-on processor - but without processor heat sink, memory modules and bus board.
- 1 hex key 4.5 mm
- T10 screwdriver

Procedure

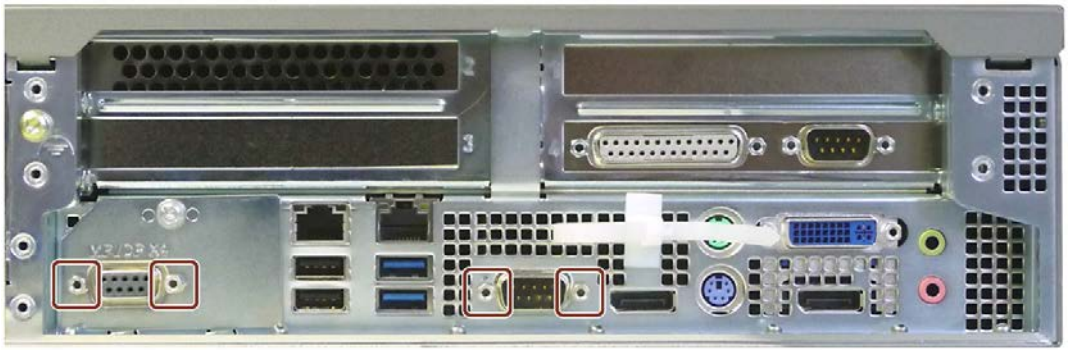
Observe the EGB guidelines.

Removal

1. Disconnect all cables from the motherboard, noting down their positions while doing so.
2. Remove the 9 screws from the positions indicated in the following figure.



3. Use a hex key to remove the hex bolts marked in the following figure.. The following figure shows the PROFIBUS device with MPI/DP interface. Only the two middle screws of the COM1 port have to be loosened at the other device variants.



4. Slide the motherboard carefully inwards until the D-sub sockets have loosened from the rear panel.

NOTICE
Damage to the motherboard Components can be damaged when removing the motherboard. • Proceed slowly and carefully when moving and removing the motherboard. • Ensure that the bottom of the motherboard does not contact projecting housing parts when sliding it.

5. Lift the motherboard carefully out of the housing.

Installation

To install the fan, follow the steps for removing it in reverse order.

Further procedure

1. Install the bus frame.
2. Close the device.

See also

Connection information (Page 43)

7.5.10 Replacing the processor

Requirement

- The device is open, see the section "Open the device. (Page 81)".
- The bus frame has been removed, see chapter "Removing and installing bus frame (Page 88)".
- The processor cooler has been removed, see chapter "Removing and installing the processor cooler (Page 139)".
- 1 approved processor

  Only an approved processor is permitted to be installed on the motherboard of the device. If the processor type is changed, the BIOS must be updated so that the suitable microcode is loaded. Information about original spare parts for SIMATIC IPCs is available on the Internet at:

  – SIMATIC IPC after-sales information system (http://www.siemens.com/asis)

  – Contacts (http://www.siemens.com/automation/partner)

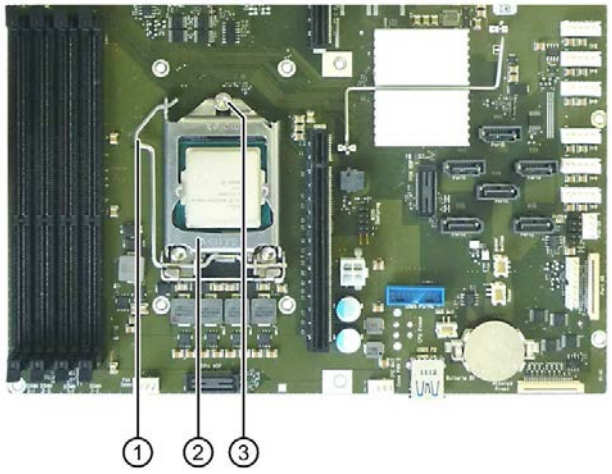
Procedure

Observe the EGB guidelines.

Removal

1. Unlock the lever ① and swivel it to the rear.

   The holding frame ② moves back and exposes the screw ③.



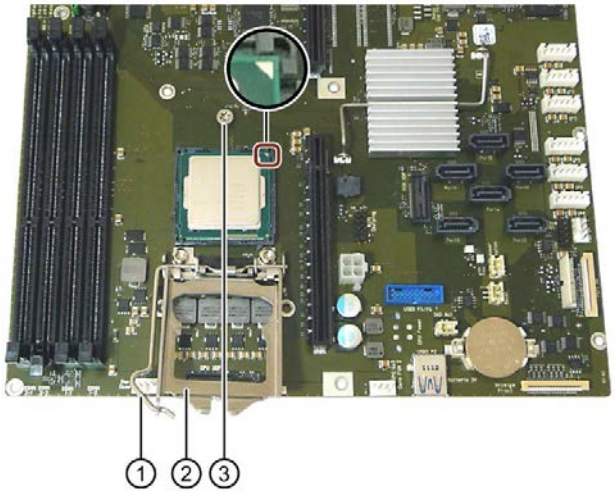
2. Fold up the holding frame ②.
3. Remove the processor.

   Do not touch the contacts of the processor in the process.

NOTICE
Damage to the motherboard Do not touch the contacts of the processor base when the processor is removed. Ensure that the base id free of soiling or foreign matter.

Installation

1. Place the processor on the base.



   Make sure when you insert the processor that the position identifier (metallic triangle) on the processor is in the right place.

2. Swivel the lever ① toward the processor.

   The holding frame moves as well and must then grip the screw ③.

3. Press the lever ① all the way down and lock it.

NOTICE
Damage to the processor If the locking mechanism jams, it can be damaged when it is pressed down completely. The processor is then not held correctly in place by the holding frame. The result may be malfunctions. Therefore use only a low level of force and if a fault occurs, swivel the lever back. Eliminate the cause of the fault.

Further procedure

1. Install the bus frame.
2. Close the device.
3. When a processor is replaced, perform a BIOS update.

   The microcode matching the processor is loaded in the process. The procedure is described "Technical manual of the motherboard" document on the "Documentation and Drivers" DVD.

NOTICE
Damage to the processor If the installed processor is operated with a higher clock frequency than permitted, it can be destroyed or cause loss of data. Operate the processor only at a clock frequency that is equal to or less than the permitted clock frequency.

7.6 Installing the software

7.6.1 Sources for installation of the operating system

If the operating system is faulty, you can reinstall it with one of these DVDs:

- With the recovery DVD and "Documentation and Drivers" DVD

  The recovery DVD is included in the scope of delivery when you have ordered a device with operating system. The recovery DVD includes:

  – The installation program for installing the operating system with the supported languages

  – The tools for setting up the drives

  The basic language of the installed operating system is English. If additional languages are required, install these from the recovery DVD.

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

- From the Restore DVD

  The Restore DVD is included in the scope of delivery when you have ordered a device with operating system. The DVD contains an image file with the following software:

  – Operating system with installed hardware drivers

  – Monitoring software, e.g., DiagBase.

7.6.2 Updating the operating system

Windows

The latest updates for the Windows operating system are available on the Internet at Microsoft (http://www.microsoft.com) and on the device in the Start menu "Start > All Programs > Windows Update > Check for updates".

Note

Before you install new drivers or operating system updates for Windows MUI versions, configure the regional menu and dialog settings and the default English (US) language.

other operating systems

Contact the corresponding manufacturer.

7.6.3 Installing drivers and software

Requirement

You need the "Documentation and Drivers" DVD included in the scope of delivery to install Windows drivers.

Procedure

Installing drivers

1. If your device has no DVD drive, connect an external USB DVD drive to a USB port.
2. Insert the supplied "Documentation and Drivers" DVD.
3. Start the "Start" program.
4. Accept the licensing conditions.
5. Select "Drivers" from the index.
6. Select the device and operating system.
7. Select the required driver.
8. Open the folder with the driver data. Click on the link next to "driver path".
9. Start the setup program in this folder.

Note

The driver for the chepset must be installed first with a new Windows installation. Then you can install the drivers of all other devices.

Installing the software

- You can find information about installing SIMATIC software packages in the corresponding documentation.
- You can obtain information about driver updates and installing application programs from the respective manufacturers.

7.6.4 Installing Windows

Note

Specific information on using the Windows operating systems is available on the Internet:

- Microsoft Technet Windows (http://technet.microsoft.com/windows)
- Microsoft Technet Windows Server (http://technet.microsoft.com/windowsserver)

The listed manuals are not included in the scope of delivery.

Requirement

You need the Recovery DVD for the operating system you want to install. The recovery DVD is included in the scope of delivery when you have configured a device with operating system.

If you use storage controllers that are unknown to the operating system, for example a RAID or AHCI controller, copy the respective controller driver to a USB stick and keep this USB stick to hand. The controller driver is required during installation.

Procedure

1. If your device has no DVD drive, connect an external USB DVD drive to a USB port.
2. Insert the Recovery DVD into the DVD drive.
3. Reboot the device.
4. Press the <Esc> key when the device boots and keep it pressed.

   The BIOS selection menu is displayed when initialization is completed.
5. Click the "Boot Manager" button.
6. Select the optical drive using the cursor keys.

   For your system to boot in "UEFI" mode after installation, you must also boot the recovery DVD using UEFI. You data storage medium will be set up with GPT partition management during installation of Windows.

   To boot the recovery DVD in "UEFI" mode, in the "Boot" menu in BIOS setup select the item for which the optical drive is identified with "UEFI" in front of the name. Example:

   UEFI: MATSHITADVD-RAM UJ8E0

   For your system to boot in "Legacy" mode after installation, you must also boot the recovery DVD using Legacy. You data storage medium will be set up with MBR partition management during installation of Windows.

   To boot the recovery DVD in "Legacy" mode, in the "Boot" menu in BIOS setup select the item for which the optical drive is identified with "P" in front of the SATA port number. Example:

   P5: MATSHITADVD-RAM UJ8E0
7. Confirm the selection by pressing ENTER.
8. **Immediately** press any key when you see the following prompt to install the operating system from the Recovery DVD.

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

   After a few seconds, you will see the "Install Windows" installation program.

9. Now follow the instructions in the installation program.

   You can find additional information on this in the next section.

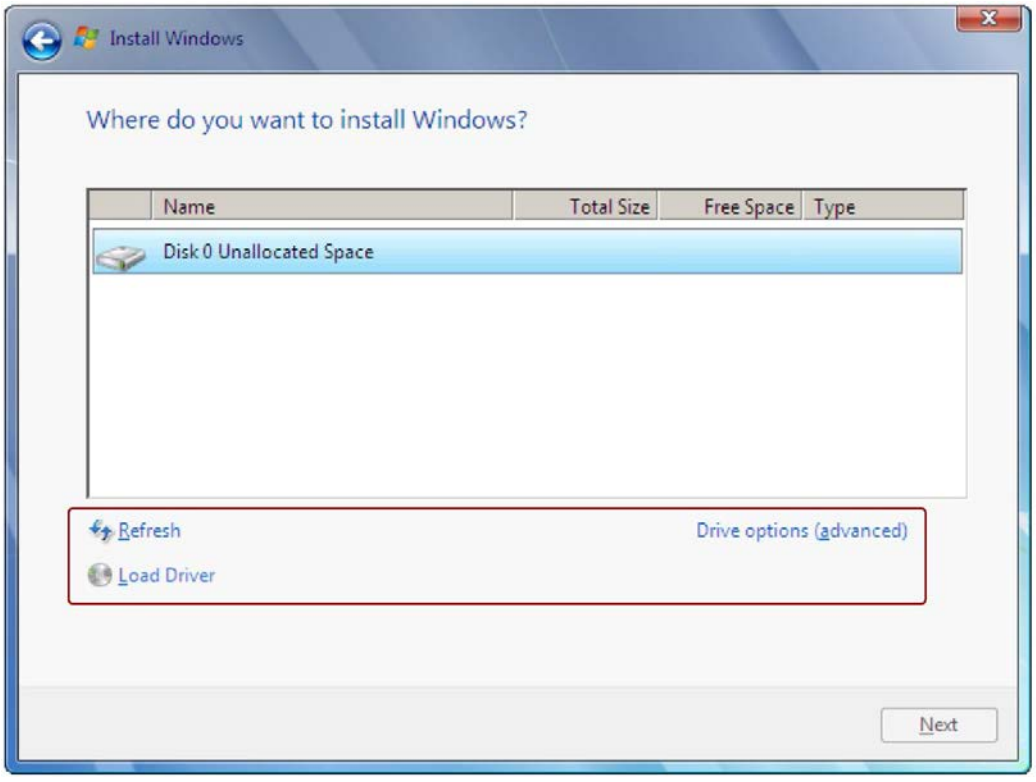
"Install Windows" installation program

The language of the installation program and the operating system is preset to English. You can change the language of the operating system after the installation. Information on this topic is available in the section "Setting up the language selection using the Multilanguage User Interface (MUI)".

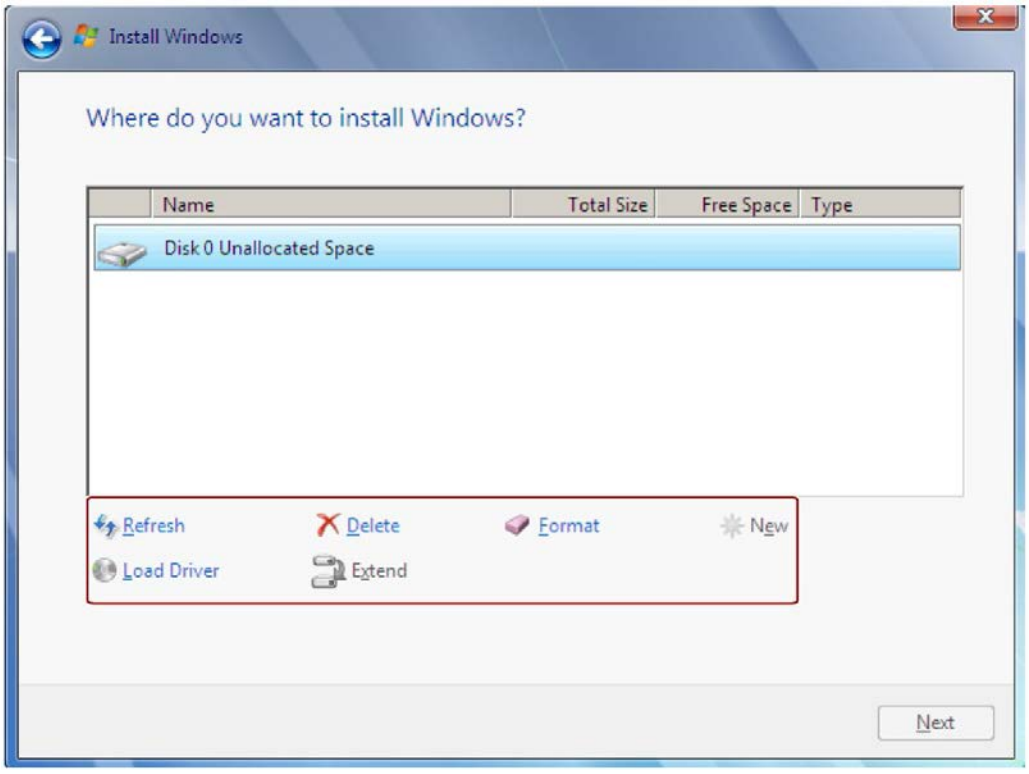
Setting up partitions and integrating storage controllers unknown to the operating system

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

The following dialog boxes are available:



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



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

Note

If you want to install the operating system on a data medium connected to a storage controller unknown to the operating system, you have to integrate the driver of the storage controller. Integrate this driver before you partition the data medium and before you install the operating system. For more information on integrating the storage controller, refer to the section "Information for systems with RAID or AHCI controller".

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

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

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

   Installation is started. The Windows operating system is installed on the data medium.

Partitions in delivery state for Windows 7 and Windows Server 2008 R2

The following information applies to data storage media ≥ 100 GB.

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

Windows Server 2012 R2 partitions in the factory state

The following information applies to data storage media ≥ 100 GB.

Partition	Name	Size	File system
First	WinRE	300 MB	NTFS
Second	Boot	260 MB	FAT32, automatically set up by installation program
Third	MSR	128 MB	FAT32, automatically set up by installation program
Fourth	System	100 GB	NTFS not compressed
Fifth	Data	Remainder	NTFS not compressed

Information for systems with RAID or AHCI controller

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

Requirement

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

Procedure

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

7.6.5 Setting up the language selection using the Multilanguage User Interface (MUI)

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

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

Procedure

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

Windows 7 and Windows Server 2008 R2:

1. Choose:

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

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

Windows Server 2012 R2:

1. Choose:

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

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

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

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

Windows 7 and Windows Server 2008 R2:

1. Choose:

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

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

Windows Server 2012 R2:

1. Choose:

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

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

Installing language package

The available language packages are described in the chapter "Design of the device". Some language packages are available on the Recovery DVD in the "Languagepacks" folder.

Windows 7 and Windows Server 2008 R2:

1. Choose:

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

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

Windows Server 2012 R2:

1. Right-click the start menu in the task bar and select "Command Promt (Admin)".
2. Enter the following command in the command line:

   ```
   Dism /online /Add-Package /PackagePath:#Path to the language pack#
   ```

   For "`#Path to language pack#`", enter the path to the language pack you want to install. Example:

   ```
   Dism /online /Add-Package /PackagePath:E:\Languagepacks\ja-jp\lp.cab
   ```

7.6.6 Restoring the delivery state

You can restore the original software using the Restore DVD. The DVD contains the necessary images and tools for transferring the software to the hard disk drive or SSD of your device.

The following options are available for restoring the delivery state:

- Restore the entire hard disk/SSD with drives C and D
- Restore drive C

  This means data stored on drive D are retained.

Back-up authorization or license key

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

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

Procedure

1. If your device has no DVD drive, connect an external USB DVD drive to a USB port.
2. Insert the Restore DVD into the DVD drive.
3. Reboot the device.
4. Press the <Esc> key when the device boots and keep it pressed.

   The BIOS selection menu is displayed when initialization is completed.
5. Click the "Boot Manager" button.

6. In the boot menu, select the optical drive using the cursor keys.

   To restore a system which boots in "UEFI" mode, you must also boot the restore DVD using UEFI.

   To boot the restore DVD in "UEFI" mode, in the "Boot" menu in BIOS setup select the item for which the optical drive is identified with "UEFI" in front of the name. Example:

   UEFI: MATSHITADVD-RAM UJ8E0

   To restore a system which boots in "Legacy" mode, you must also boot the restore DVD using Legacy.

   To boot the recovery DVD in "Legacy" mode, in the "Boot" menu in BIOS setup select the item for which the optical drive is identified with "P" in front of the SATA port number. Example:

   P5: MATSHITADVD-RAM UJ8E0

   Note

   Windows Server 2012 R2 boots in "UEFI" mode in the factory state.

   Windows 7 and Windows Server 2008 R2 boot in "Legacy" mode in the factory state.

7. Follow the instructions on the screen.

   Note

   All existing data, programs, user settings, authorizations and license keys on the drives are deleted.

7.6.7 Installing onboard RAID controller software

You install the software of the onboard RAID controller with its driver.

7.6.8 Installing Hardware RAID controller software

Note

Observe the "General information on commissioning (Page 57)" in section "Commissioning the device". Additional information is available in section "Installing drivers and software (Page 149)".

7.6.9 Backing up data and changing partitions at a later time

We recommend the software tool SIMATIC IPC Image & Partition Creator to back up data under Windows operating systems. This tool provides convenient and efficient functions for backing up and restoring the full content of memory cards, hard disks and individual partitions (images).

SIMATIC IPC Image & Partition Creator supports the burning of DVD media. You can order the tool using the Siemens online ordering system Industry Mall (https://mall.industry.siemens.com). For more information on SIMATIC IPC Image & Partition Creator, refer to the corresponding product documentation.

Note

SIMATIC IPC Image & Partition Creator supports the device hardware as of version 3.3.3. Data storage media set up with GPT partition management are supported as of version 3.4. Older versions do not support the device hardware.

For devices with a Hardware RAID adapter card, the device driver must be downloaded subsequently. A function is available for this in the SIMATIC IPC Image & Partition Creator. For information on SIMATIC IPC Image & Partition Creator, refer to the corresponding product documentation.

7.6.10 CP 1616 onboard

NDIS device driver

Read the information in the Device_driver_CP16xx.pdf document on the supplied "Documentation and Drivers" DVD.

PROFINET IO

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

Technical specifications

8

8.1 Certificates and approvals

ISO 9001 certificate

The Siemens quality management system for our entire product creation process (development, production and sales) meets the requirements of ISO 9001:2008.

This has been certified by DQS (the German society for the certification of quality management systems).

Certificate no.: 001323 QM08

Software license agreements

If the device is supplied with preinstalled software, you must observe the corresponding license agreements.

UL approval

The following approvals are available for the device:

- Underwriters Laboratories to Standard-UL 60950-1, File no. E11 5352
- Canadian National Standard CAN/CSA-C22.2 No. 60950-1-07 (I.T.E)

FCC and Canada

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 accept any interference received, including interference that may cause undesired operation.

CANADA	
Canadian Notice	This Class B digital apparatus complies with Canadian ICES-003.
Avis Canadien	Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

AUSTRALIA / NEW ZEALAND

This product meets the requirements of the standard EN 61000-6-3:2007 Generic standards - Emission standard for residential, commercial and light-industrial environments.

This product meets the requirements of the standard EN 61000-6-3:2007 Generic standards - Emission standard for residential, commercial and light-industrial environments.

Identification for Eurasion Customs Union

- EAC (Eurasian Conformity)
- Customs union of Russia, Belarus and Kazakhstan
- Declaration of conformity according to Technical Regulations of the Customs Union (TR CU)

KOREA

This product meets the requirements of Korean certification.

This product satisfies the requirement of the Korean Certification (KC Mark).

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

8.2 Directives and declarations

The device meets the guidelines listed in the following sections.

EC Declaration of Conformity

The associated declaration of conformity is available on the Internet at the following address: Rack PC certificates (http://support.automation.siemens.com/WW/view/en/10805674/134200).

Electromagnetic compatibility

This product meets the requirements of EC Directive 2004/108/EC "Electromagnetic Compatibility".

The device is designed for the following areas of application corresponding to the CE marking:

Scope of application	Requirements for	
	Interference emission	Immunity to interference
Industrial area	EN 61000-6-4 : 2007 +A1:2011	EN 61000-6-2 : 2005
Residential and commercial areas and small businesses	EN 61000-6-3 : 2007 +A1:2011	EN 61000-6-1 : 2007

The devices comply with the standards EN 61000-3-2:2006 +A1:2009 +A2:2009 (harmonic currents) and EN 61000-3-3:2008 (voltage fluctuations and flicker).

Low-voltage directive

The device with AC power supply complies with the requirements of the EC Directive 2006/95/EC "Low Voltage Directive". Compliance with this standard has been verified according to EN 60950-1:2006 + A11:2009 +A1:2010 +A12:2011.

8.2.1 ESD guideline

What does ESD mean?

An electronic module is equipped with highly integrated components. Due to their design, electronic components are highly sensitive to overvoltage and thus to the discharge of static electricity. Such electronic components or modules are labeled as electrostatic sensitive devices.

The following abbreviations are commonly used for electrostatic sensitive devices:

- ESD – Electrostatic sensitive device
- ESD – Electrostatic Sensitive Device as a common international designation

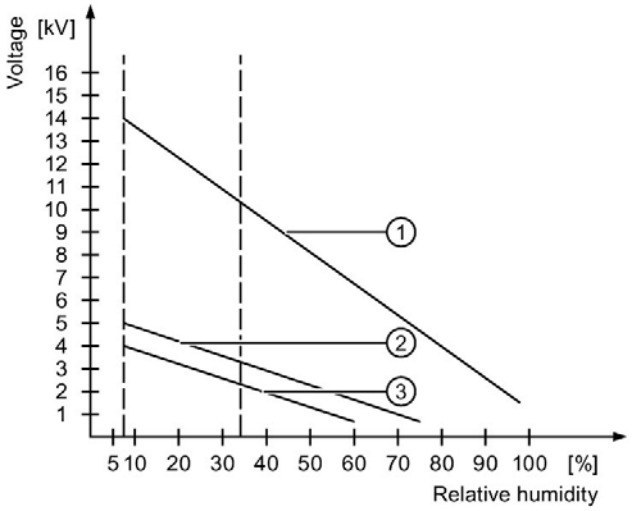
Electrostatic sensitive devices can be labeled with an appropriate symbol.

NOTICE
Damage to ESD from touch Electrostatic sensitive devices, ESD, can be destroyed by voltages which are far below the human perception limit. If you touch a component or electrical connections of a module without discharging any electrostatic energy, these voltages may arise. The damage to a module by an overvoltage can often not be immediately detected and only becomes evident after an extended period of operation. The consequences are incalculable and range from unforeseeable malfunctions to a total failure of the machine or system. Avoid touching components directly. Make sure that persons, the workstation and the packaging are properly grounded.

Charge

Every person without a conductive connection to the electrical potential of his/her surroundings can be electrostatically charged.

The material with which this person comes into contact is of particular significance. The figure shows the maximum electrostatic voltages with which a person is charged, depending on humidity and material. These values conform to the specifications of IEC 61000-4-2.



① Synthetic materials
② Wool
③ Antistatic materials such as wood or concrete

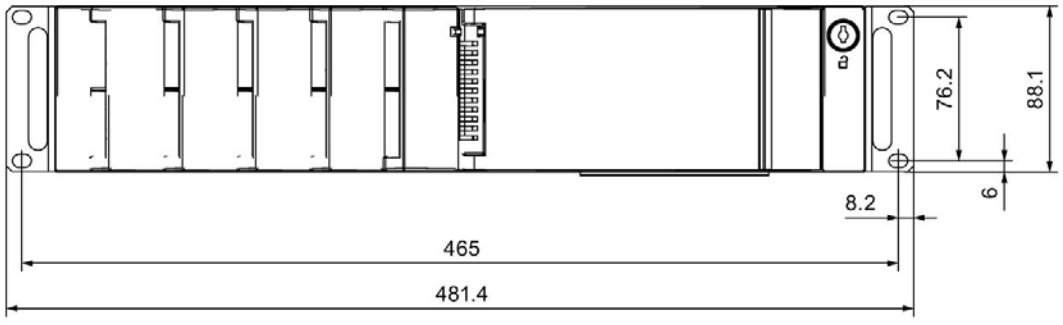
NOTICE
Grounding measures There is no equipotential bonding without grounding. An electrostatic charge is not discharged and may damage the ESD. Protect yourself against discharge of static electricity. When working with electrostatic sensitive devices, make sure that the person and the workplace are properly grounded.

Protective measures against discharge of static electricity

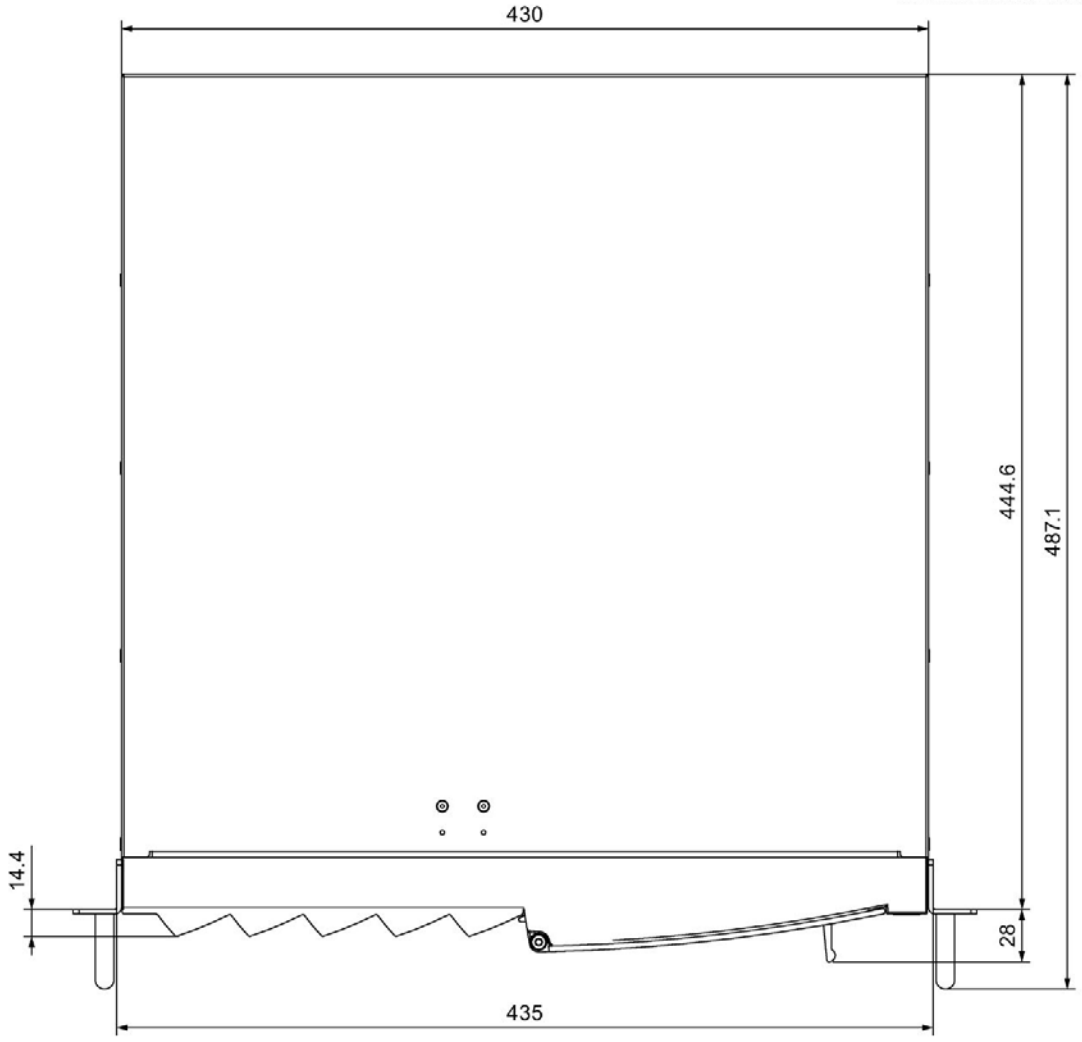
- Disconnect the power supply before you install or remove modules which are sensitive to ESD.
- Pay attention to good grounding:
  - When handling electrostatical sensitive devices, make sure that persons, the workstation and devices, tools and packaging used are properly grounded. This way you avoid static discharge.
- Avoid direct contact:
  - As a general rule, do not touch electrostatic sensitive devices, except in the case of unavoidable maintenance work.
  - Hold the modules at their edge so that you do not touch the connector pins or conductor paths. This way, the discharge energy does not reach and damage the sensitive components.
  - Discharge your body electrostatically before you take a measurement at a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

8.3 Dimension drawings

8.3.1 Dimensional drawing of the device

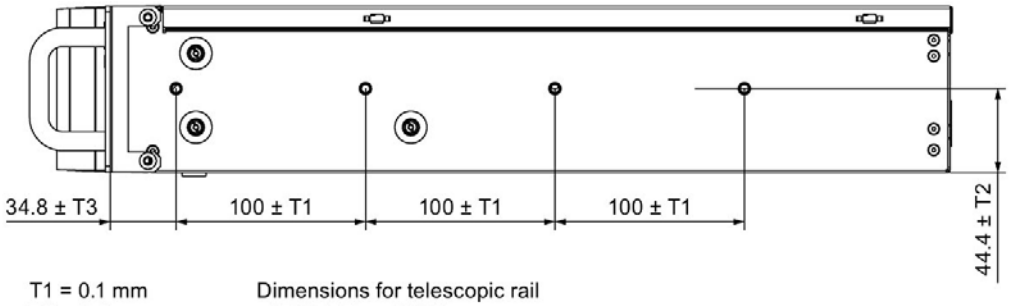


All dimensions in mm.



8.3.2 Dimension drawing of the telescopic rails

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



T1 = 0.1 mm
T2 = 0.3 mm
T3 = 0.5 mm

Dimensions for telescopic rail
of Rittal, Type 3659
Type RP 3659.180 for 600 mm cabinet
Type RP 3659.190 for 800 mm cabinet

All dimensions in mm.

8.3.3 Dimension drawing of the expansion cards

The following dimension drawing shows the main dimensions of the PCI and the PCI Express expansion card without slot bracket and retainer.

Alle Angaben in mm.

	PCI	PCIe
a	106.7 mm	111.2 mm

Note

Mounting of a retainer is required to ensure correct location of long expansion cards in the provided guide rails.

8.4 Technical specifications

8.4.1 General specifications

General specifications

Order number	6AG4112-2...(for details, refer to the ordering documentation)
Dimensions	430 × 88.1 × 444.6 (W × H × D in mm). Detailed dimensional specifications can be found in section Dimensional drawing of the device (Page 167).
Weight	Min. 10 kg, max. 14 kg
Supply voltage (V_N)	100 to 240 VAC (–15%, 10%), varying voltage; with transient power failure backup in accordance with NAMUR
Input current AC	Continuous current up to 6 A (up to 30 A for 5 ms at startup)
Line voltage frequency	50 to 60 Hz (min. 47 Hz to max. 63 Hz, sinusoidal)
Transient voltage interruption	Min. 20 ms at 93 V (max. 10 events per hour; recovery time at least 1 s)
Power consumption	AC power supply: Max. 240 W at 80% efficiency Redundant AC power supply: Max. 240 W at 80% efficiency
Power loss / heat emission	AC power supply: 240 W = 240 J/s = 0.23 BTU/s Redundant AC power supply: 240 W = 240 J/s = 0.23 BTU/s
Current delivery (DC)	+5 V/30 A + 3.3 V/28 A, max. aggregate power 160 W +12 V/15 A -12 V/0.5 A -5 V/0.5 A +5 Vaux/2 A Aggregate power of all voltages max. 190 W
Noise emission	< 45 dB(A) at 25 °C according to DIN EN ISO 7779 ODDs not in operation
Degree of protection	IP41 at the front and IP20 at the rear according to IEC 60529
Dust protection	With closed front panel Filter class G2 EN 779, 99% of particles > 0.5 mm are filtered

Safety

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

Electromagnetic compatibility (EMC)

Radiated interference	EN 61000-6-3, FCC Class A EN 61000-6-4; CISPR 22,EN 55022 class B EN 61000-3-2 class D, EN 61000-3-3
Noise immunity: Conducted disturbance variables on supply lines	± 2 kV, according to IEC 61000-4-4, burst ± 1 kV, according to IEC 61000-4-5, surge sym. ± 2 kV, according to IEC 61000-4-5, surge asym.
Noise immunity on signal lines	± 1 kV, according to IEC 61000-4-4; Burst; Length < 30 m ± 2 kV, according to IEC 61000-4-4; Burst; Length > 30 m ± 2 kV, according to IEC 61000-4-5; Length > 30 m
Immunity to discharge of static electricity	±6 kV contact discharge, according to IEC 61000-4-2 ± 8 kV air discharge, according to IEC 61000-4-2
Immunity to RF interference	• 10 V/m, 80...1000 MHz and 1.4...2 GHz, 80% AM 1 kHz, according to IEC 61000-4-3 • 3 V/m 2...2.7 GHz, 80% AM 1kHz, according to IEC 61000-4-3 • 10 V, 10 KHz...80 MHz, 80% AM 1 kHz, according to IEC 61000-4-6
Magnetic field	100 A/m, 50 Hz/60 Hz, nach IEC 61000-4-8

Climatic ambient conditions

Temperature	Tested in accordance with IEC 60068-2-2, IEC 60068-2-1, IEC 60068-2-14
During operation Gradient	0 °C … +35 °C, without restriction under the provided technical specifications 0 °C … +40 °C, ODD operation, no Hardware RAID, total power loss of expansion cards less than 55 W 0 °C … +45 °C, no ODD operation, no Hardware RAID, total power loss of expansion cards less than 55 W 0 °C … +50 °C * No ODD operation, no HDD operation in the removable drive bay, no Hardware RAID Max. 10 °C/h, no condensation * Power dissipation of the expansion cards in total less than 30 W
Storage/transport Gradient	–20 °C … +60 °C max. 20° C/h, no condensation
Relative humidity	Tested in accordance with IEC 60068-2-78, IEC 60068-2-30
In operation Gradient	5% to 80% at 25 °C (no condensation) Max. 10°C/h, no condensation
Storage/transport Gradient	5% to 95% at 25 °C (no condensation) Max. 20 °C/h, no condensation

Atmospheric pressure	
During operation	1080 to 795 hPa, corresponds to an elevation of -1000 to 2000 m
Storage/transport	1080 to 660 hPa, corresponds to an elevation of -1000 to 3500 m

Mechanical ambient conditions

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

[1] Mechanical interference must be safely excluded during the burning operation.

Motherboard

Chipset	Intel® DH82C226 Express Chipset (Platform Controller Hub)
Integrated RAID (on-board)	Intel® 8 Series SATA RAID Controller
Processor	• Intel® Xeon™ E3-1268L v3 2.3 (3.3) GHz, 4 cores, GT2, 8 MB SLC, HT • Intel® Core™ i5-4570TE 2.7 (3.3) GHz, 2 cores, GT2, 4 MB SLC, AMT • Intel® Core™ i3-4330TE 2.4 GHz, 2 cores, GT2, 3 MB SLC, AMT
RAM	4 DIMM base maximum 32 GB DDR3 with 1600 MT/s SDRAM Modules with and without ECC can be operated.
Memory expansion	2 GB to 32 GB DDR3, max. 3.5 GB can be used for 32-bit operating system and applications. Modules with and without ECC can be ordered (configuration see order documents). Module size maximum 8 GB, module organization 2 Gbits / 4 Gbits based x8 organized
Expansion slots	Max. 4 expansion cards simultaneously, grouped as follows: • 2 × PCI, 2 × PCIe mech. x16 (8 lanes) or • 4 × PCIe mech. x16 (4 lanes / 8 lanes depending on slot) • 2 × PCIe mech. x16 (4 lanes) All expansion cards up to 312 mm length can be inserted.

Maximum permissible current consumption per PCI slot	5 V/ 5 A or 3.3 V/ 7 A, 12 V/ 0.5 A, -12 V/ 0.05, 3.3 Vaux/ 0.4 A
Maximum permissible current consumption per PCIe slot	3.3 V / 3 A; 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.
Power consumption over all slots, maximum permissible	Total power consumption (all slots) may not exceed 75 W. Aggregate 3.3 Vaux current may not exceed 0.8 A.
Maximum bandwidth of PCI slots	133 MB/s bandwidth
Maximum bandwidth of the PCIe [1] slots	Gen 2, 5 GT/s (500 MB/s) bandwidth per lane Gen 3, 8 GT/s (985 MB/s) bandwidth per lane

[1] The total bandwidth results from the number of available lanes per slot.

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

Hard disks	3.5" SATA 6 Gbps, size: • 500 GB or 2 × 500 GB • 1000 GB or 2 × 1000 GB 3.5" SAS 6 Gbps, size: 1000 GB NCQ (Native Command Queuing) is supported.
Solid State Drive	2.5" SATA 240 GB (MLC)
DVD burner	Slimline SATA Read: • DVD ROM: Single layer 8x, dual layer 6x • DVD-R/+R: Single Layer 8×, Dual Layer 6×, DVD-RW/+RW 8×, • DVD-RAM; 5× CD-R 24×, CD-RW 24× Write: • DVD+R 8×, DVD+RW 8×, DVD-R 8×, DVD-RW 6× • DVD+R9 (DL) 6×, DVD-R DL 2× • CD-R 24×, CD-RW 24×

Hardware RAID controller

SAS Hardware RAID controller (optional)	• SAS RAID module PCIe x8, RAID 1, 5 • Type: Adaptec 8405 (independent processor, 1024 MB DDR3 cache)
Parameter	• 1 × Mini SAS HD adapter (SFF-8643 for 4 drives) • Maximum theoretical controller data rate 12 Gb/s per port • Maintenance-free buffer unit for onboard cache memory

Graphics

Graphics controller	Intel® HD Graphics Controller, P4600/P4700 GT1/GT2, 2-D and 3-D engine integrated in processor
Graphics memory	Dynamic Video Memory Technology,uses 32 MB to 1.7 GB RAM in main memory
Resolutions/frequencies/colors	• CRT (via DVI-I VGA adapter): Up to 2560 x 1600 at 120 Hz / 32-bit color depth • LCD via DVI-D: Up to 2048 x 1152 at 60 Hz / 32-bit color depth • LCD via DisplayPort: Up to 4096 x 1152 at 24 Hz / 32-bit color depth
Graphics card (optional)	• PCIe x16 graphics card, dual head (2 × DP, 2 × VGA or 2 × DVI-D) • Type: NVIDIA NVS-300, 512 MB graphics memory • Maximum resolution: – DisplayPort 2560 × 1600 at 60 Hz, 32 bit color depth – DVI 1920 × 1200 at 60 Hz, 32 bit color depth – VGA 2048 x 1536 at 60 Hz, 32-bit color depth

Interfaces

COM1; COM2 (optional)		Serial interface 1 (V.24), 9-pin D-sub connector
LPT (optional)		Parallel interface (Standard, EPP and ECP mode), connection for printer with parallel interface Double-row module connector (per ribbon cable at 25-pin sub D connector)
VGA (optional) (DVI-I)		Connection of an analog monitor via DVI-I / VGA adapter
1 × DVI-I		For connecting a digital monitor
2 × DisplayPort		For connecting a digital monitor
2 × DisplayPort / DVI-D/VGA with Dual Head graphics card (optional)		For connecting two digital or analog monitors DisplayPort, DVI-D or VGA via DMS59 cable adapter
Keyboard		PS/2 keyboard connection
Mouse		PS/2 mouse connection
USB	Rear of the device	2 × USB 3.0 high current 2 × USB 2.0 high current
	Front panel	1 × USB 3.0 high current 1 × USB 2.0 high current
	Internal	1 × USB 3.0 device high current
PROFIBUS (optional)		9-pin D-sub socket, CP5622-compatible, 9.6 Kbps to 12 Mbps, programmable with software: DP master: DP-V0, DP-V1 with SOFTNET-DP DP slave: DP-V0, DP-V1 with SOFTNET-DP slave RS 485 electrically isolated (SELV circuit)*

PROFINET [2]	3 × RJ45 interface, CP 1616 compatible onboard interface based on ERTEC 400, 10/100 Mbps electrically isolated *
Ethernet [2]	2 × Ethernet interface (RJ-45), Wake on LAN, Remote Boot and teaming are supported. 10/100/1000 Mbps, electrically isolated * Ethernet 1: WGI217LM, AMT-capable [1], supports jumbo frames up to 9014 bytes Ethernet 2: Intel WGI210IT, supports jumbo frames up to 9014 bytes
Audio - Microphone - Line out / Headset	IDT 92HD81HD 2 × 0.5 W / 8 Ohm

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

1 AMT and teaming cannot be used simultaneously on the Ethernet interface

2 For unique assignment, the LAN interfaces are numbered on the enclosure. The numbering by the operating system may deviate from this.

Status displays (LEDs)

Labeling on the front panel	LED color	Meaning
POWER	GREEN YELLOW	Device active standby
HDD	GREEN	HDD active
ETHERNET 1 [1] ETHERNET 2 [1]	GREEN GREEN	Active Active
PROFIBUS/MPI	GREEN	Active
SF PROFINET [2]	RED	No cable connected or fault
	RED flashing	Fault or node flash test function
WATCHDOG	GREEN RED	Active Alarm
TEMP	RED	Temperature alarm
FAN	RED	Fan alarm
HDD 0 HDD 1	RED or both RED, or RED flashing [3]	Hard disk alarm in conjunction with SIMATIC monitoring software

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

2 Interfaces supplied as optional.

3 See chapter "Status displays"

Note

Hardware RAID adapter card

The Hardware RAID adapter card may only be installed in slot 1.

8.4.2 Current and power requirements

Base system

Component	Voltage					
	+3.3 V	+5 V	+12 V	+12 V2	-12 V	5 Vaux
Motherboard core i processor with cooling	1.2 A	2.8 A	0.35 A	5.35 A	0.03 A	0.3 A
Front fan			1.0 A			
Fan inside			0.3 A			
Motherboard Xeon processor with cooling [1]	1.2 A	2.8 A	0.95 A	5.35A	0.03A	0.3 A
Hard disk drive [1] SATA and SAS (typical values)		0.5 A	0.7 A			
SSD SATA (typical)			0.25 A			
SAS Hardware Controller	0.4 A		1.2 A			
Base system (dual core) [1]	1.2 A	3.3 A	1.65 A	5.35 A	0.03 A	0.3 A
Slimline drive [1]	0.8 A					
Single currents ATX, max. permitted	20 A [2]	25 A [2]	11 A	14 A [3]	0.5 A	2.0 A [4]
Single currents ATX redundant, max. permissible	20 A [2]	20 A [2]	18 A	18 A	0.8 A	2.0 A [4]
Total power consumption, permissible	185 W					
Efficiency of the single and redundant power supply [1]	Approx. 80% (230 VAC), approx. 80% (120 VAC)					

[1] Depends on the selected device configuration

[2] The maximum total power of the voltage + 5 V and + 3.3 V amounts to 190 W at ATX power supply and 100 W at ATX redundant.

[3] 18 A for 20 seconds

[4] 2.5 A for 10 seconds

Typical power values

Component	Current consumption (AC-SV, U=230 V)	Power consumption
Base device	0.6 A	130 W
Hard disk drive 1 × 3.5"	0.06 A	13.6 W
Hard disk drives 2 × 3.5"	0.12 A	27.2 W
SSD 2.5" drive	0.02 A	3.3 W
DVD burner drive	0.05 A	12.7 W

8.4.3 Power supply (AC)

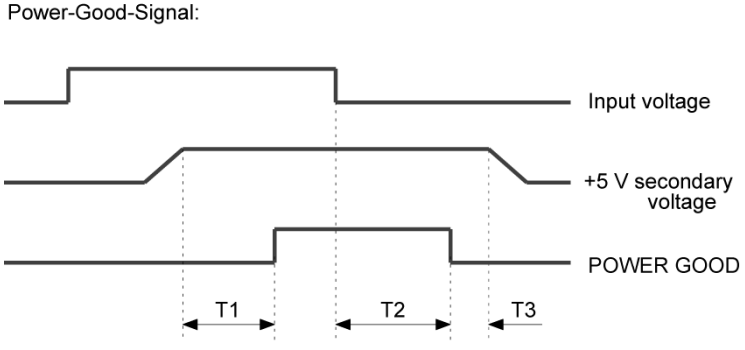
Output voltage

Voltage	Max. current	Voltage stability
+ 12 V_1	11 A	+/- 5 %
+ 12 V_2	14 A	+/- 5 %
- 12 V	0.3 A	+/- 10 %
+ 5 V	25 A [1]	+/- 5 %
+ 3.3 V	20 A [1]	+/- 5 %
+ 5 Vaux	2 A	+ 5 % / - 3 %

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

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

Power Good Signal



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

Figure 8-1 Timing profile of the Power Good Signal

Note

Operation at an uninterruptible power supply (UPS)

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

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

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

8.4.4 AC power supply, redundant

Output voltage

Voltage	Max. current	Voltage stability
+ 12 V	18 A [2]	+/- 5 %
+ 12 V	18 A [2]	+/- 5 %
+ 12 V	14 A [2]	+/- 5 %
- 12 V	0.8 A	+/- 10 %
+ 5 V	20 A [1]	+ 5 % / - 4 %
+ 3.3 V	20 A [1]	+ 5 % / - 4 %
+ 5 Vaux	2.0 A	+ 5 % / - 3 %

[1] The accumulated power of the +5 V and + 3.3 V supply may not exceed 100 W.

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

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

Note

Operation at an uninterruptible power supply (UPS)

The power supply contains an active PFC (Power Factor Correction) circuit to conform to the EMC guidelines. Uninterruptible AC power systems (UPS) must supply a sinusoidal output voltage in the normal and buffered mode when used with SIMATIC PCs with an active PFC. UPS characteristics are described and classified in the standards EN 50091-3 and IEC 62040-3. Devices with sinusoidal output voltage in the normal and buffered mode are identified with the classification "VFI-SS-...." or "VI-SS-....".

8.4.5 Technical data of the telescopic rails

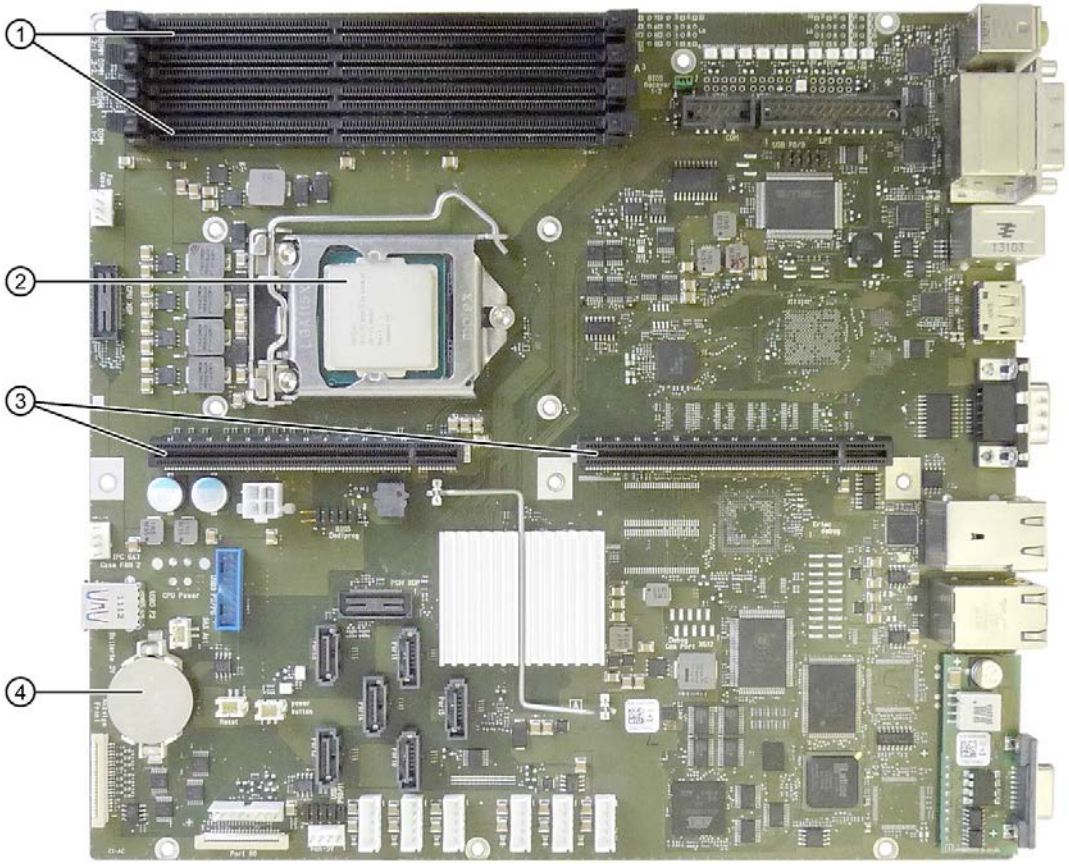
Ultimate load per pair	At least 14 kg
Full extraction length	At least 470 mm
Rail thickness	Maximum 9.7 mm
Mounting screws	M5 x 6 mm

8.5 Hardware description

8.5.1 Motherboard

8.5.1.1 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.



①	Slots for memory modules	③	Slot for the bus board
②	Processor	④	Backup battery

8.5.1.2 Technical features of the motherboard

Component / interface	Description	Parameters
Chipset	Single chipset	• Intel® 8 chipset DH82C226 Express (Platform Controller Hub)
BIOS	Update by means of software	• Insyde modified by Siemens
CPU	Intel® Core™ i	• VT and multimedia support • Turbo Boost and AMT, depending on CPU • Onboard cache with 3M/4M depending on CPU
Memory	4 DIMM module slots, max. 8 GB per module	• Data width of 64/72 bits (without ECC / with ECC) • 3.3 V • DDR3 1600-SDRAM in accordance with PC3-12800 specification • 2 to 4 Gbit chip size on the module • 1600 MT/sec transfer rate • Variable from 2 GB to 8 GB / DIMM • With and without ECC
Graphics	Integrated in the CPU	• Intel® HD Graphics Controller, P4600/P4700 GT1/GT2 Graphics Controller integrated in processor with three independent 2-D and 3-D Engines. • Intel® DH82C226 Express (Platform Controller Hub) – VGA: 2560 × 1600/32-bit color depth/120 Hz – DVI-D: 2048 × 1152/32-bit color depth/60 Hz DisplayPort: 4096 × 2160/32-bit color depth/24Hz • Graphics memory: Up to 1.7 GB, used in system memory, 32 MB reserved.
Expansion card slots	PCI, PCIe-Gen1, PCIe-Gen2	• 1 PCI 32-bit / PCIe-Gen2 4 Lanes. Type PCIe-x16 direct plug socket • 1 PCIe-Gen3 16 Lanes, type PCIe-x16 direct plug socket

Component / interface	Description	Parameters
SATA interface [4]	Various SATA modes, AHCI, RAID 0, etc. can be set	• 6 interfaces • Compatible to SATA-150/300/600 • Supports NCQ (Native Command Queuing) • 6 connectors
Keyboard	PS/2 keyboard interface	• Standard
Mouse	PS/2 mouse interface	• Standard
Serial	• COM1, 9-pin sub D • COM2, 9-pin	• V.24
Parallel	Standard, bi-directional, EPP and ECP mode	Module connector for ribbon cable, with 9-pin sub D at slot cover
PROFIBUS/MPI [2]	SIMATIC S7 communication interface	Electrically isolated [1] compatible to CP-5622, 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 Universal Serial Bus	USB 2.0	3 high-current (500 mA) USB -2.0 ports, of those: • 1 on the front • 2 on the back
	USB 3.0	4 high-current (500 mA) USB -3.0 ports, of those: • 1 on the front • 2 on the back • 1 inside
Ethernet (two interfaces)	10BaseT/100Base-TX/1000Base-TX Ethernet 1: Intel® Gigabit Network Connection (WGI210IT) Ethernet 2: Intel® Gigabit Network Connection (WGI217LM)	• 10/100/1000 Mbps, electrically isolated[1] • Wake on LAN, remote boot • AMT-capable [5], teaming-capable • Supports jumbo frames up to 9014 bytes • With teaming capability • Supports jumbo frames up to 9014 bytes

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

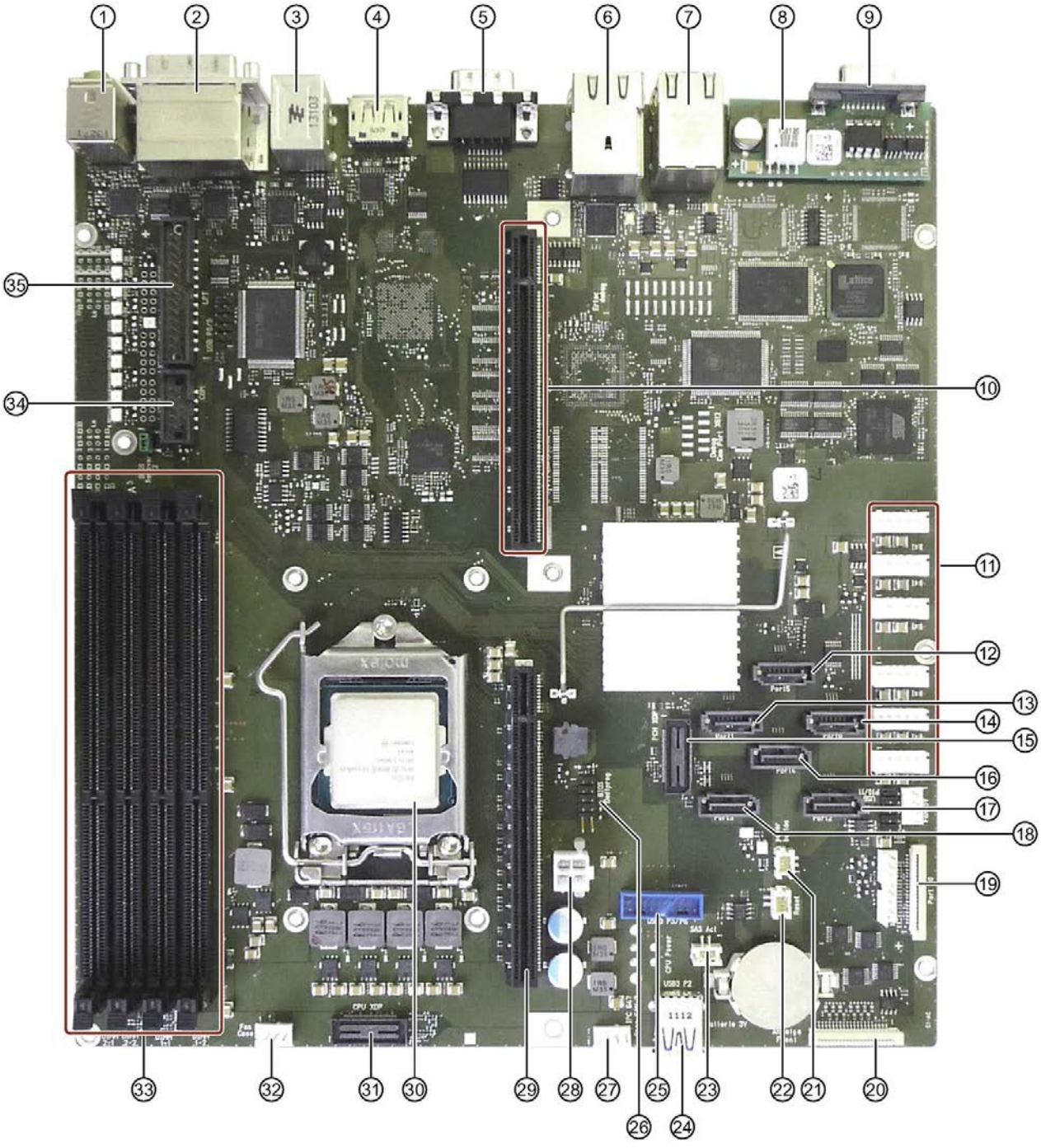
2 Optional product variant

3 Depends on the CPU type

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

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

8.5.1.3 Position of the interfaces on the motherboard



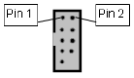
1	Audio input, audio output	10	PCIe Gen2/PCI	19	Port 80	28	2 × power supply ATX
2	DVI via DPP	11	SATA PS	20	Display and operator panel	29	PCIe Gen3
3	2 × PS/2	12	SATA 5	21	On/off button	30	Processor socket
4	DPP	13	SATA 1	22	Reset button	31	CPU XDP
5	COM 1, COM 2	14	SATA 0	23	SAS	32	Device fan

6	USB 2.0/LAN 1	15	SCSI LED	24	USB 3.0	33	Memory modules
7	USB 3.0/LAN 2	16	SATA 4	25	USB 3.0/USB 2.0	34	COM 1, COM 2
8	PROFINET	17	SATA 2	26	BIOS	35	LPT
9	PROFIBUS/MPI	18	SATA 3	27	Power supply fan		

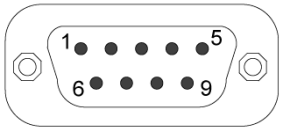
8.5.1.4 External interfaces

Interface	Position	Connector	Description
COM1	External	X30	9-pin standard plug
COM2	Internal	X504	10-pin module plug for ribbon cable connection
LPT1	Internal	X501	26-pin module plug for ribbon cable connection
PS/2 mouse	External	X25 P2 (7 to 12)	6-pin, miniature DIN socket (top socket)
PS/2 key-board	External	X25 P1 (1 to 6)	6-pin, miniature DIN socket (bottom socket)
USB 3.0	External	X2 A, B	USB3 Port 0, 1; USB2 Port 0, 1 interface side
	Internal	X563	USB3 Port 2; USB2 Port 2 (dongle interface)
	Internal	X502	USB3 Port 3; USB2 Port 3 (connection of display module)
USB 2.0	External	X4 A, B	USB2 Port 4, 5 interface side
PROFIBUS/ MPI	External	X600	9-pin, standard socket, electrically isolated interface
PROFINET	External	X3	Port 0, 1, 2 RJ45
Ethernet 1 and 2	External	X4, X2	RJ45
DVI-D	External	X70	24-pin DVI-D female connector
DPP	External	X71	20-pin DisplayPort connector
DPP	External	X72	20-pin DisplayPort connector
Microphone	External	X90 (bottom)	6-pin 3.5 mm jack
Line out	External	X90 (top)	6-pin 3.5 mm jack

Serial interfaces COM1, COM2 (V24), X30, X31, X504

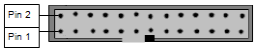


Pin no.	Short name	Meaning	Input / output
1	DCD (M5)	Receive signal (carrier)	Input
2	DSR (M1)	Ready for operation	Input
3	RxD (D2)	Receive data	Input
4	RTS (S2)	Request to send	Output
5	TxD (D1)	Send data	Output
6	CTS (M2)	Clear to send	Input
7	DTR (S1)	Data terminal ready	Output
8	RI (M3)	Incoming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



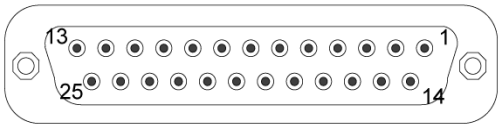
Pin no.	Short name	Meaning	Input / output
1	DCD (M5)	Receive signal (carrier)	Input
2	RxD (D2)	Receive data	Input
3	TxD (D1)	Send data	Output
4	DTR (S1)	Data terminal ready	Output
5	GND (E2)	Functional ground (reference potential)	–
6	DSR (M1)	Ready for operation	Input
7	RTS (S2)	Request to send	Output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

Parallel interface LPT1, X501 module plug



Pinno.	Short name	Meaning	Input / output
1	/ Strobe (CLK)	Data message	Output (open collector)
2	/ AUTO FEED	Automatically new line	Output (open collector)
3	Data - Bit 0	Data channel 0	Output (TTL level)
4	/ ERROR	Device error	Input (4.7 kΩ pull up)
5	Data - Bit 1	Data channel 1	Output (TTL level)
6	/ INIT	Reset / Initialization	Output (open collector)
7	Data - Bit 2	Data channel 2	Output (TTL level)
8	/ SELECT IN	Printer selection	Output (open collector)
9	Data - Bit 3	Data channel 3	Output (TTL level)
10, 12, 14, 16, 18, 20, 22, 24, 26	Data - Bit 7	Ground	-
11	Data - Bit 4	Data channel 4	Output (TTL level)
13	Data - Bit 5	Data channel 5	Output (TTL level)
15	Data - Bit 6	Data channel 6	Output (TTL level)
17	Data - Bit 7	Data channel 7	Output (TTL level)
19	/ACK	Data acknowledge	Input (4.7 kΩ pull up)
21	BUSY	Not ready	Input (4.7 kΩ pull up)
23	PE (PAPER END)	Paper end	Input (4.7 kΩ pull up)
25	SELECT	Device selection	Input (4.7 kΩ pull up)

Parallel interface LPT1



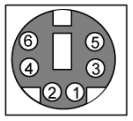
Pinno.	Short name	Meaning	Input / output
1	/ Strobe (CLK)	Data message	Output (open collector)
2	Data - Bit 0	Data channel 0	Output (TTL level)
3	Data - Bit 1	Data channel 1	Output (TTL level)
4	Data - Bit 2	Data channel 2	Output (TTL level)
5	Data - Bit 3	Data channel 3	Output (TTL level)
6	Data - Bit 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, X25 7 to 12

View onto the socket

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

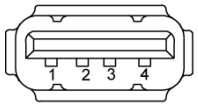
PS/2 keyboard interface, X21 1 to 6



View onto the socket

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

USB 2.0 ports, X4A, B; X561

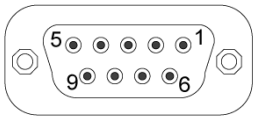


Pinno.	Short name	Meaning	Input / output
1	VCC	+ 5 V (fused)	Output
2	– Data	Data channel	Input / output
3	+ Data	Data channel	Input / output
4	GND	Ground	–

The connectors are of type A.

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

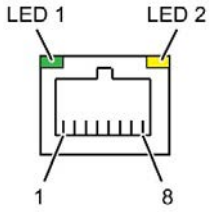
PROFIBUS/MPI interface X9 [1]



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

[1] Optional product variant

PROFINET LAN X3 Port P0, P1, P3

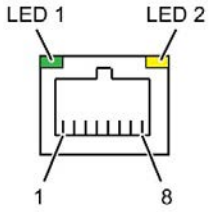


Pinno.	Short name	Meaning	Input / output
1	RD+	Receive data [2]	Input
2	RD-	Receive data [2]	Input
3	TD+	Send data [2]	Output
4, 5 [1]	SYMR	Internal 75 Ohm terminating resistor	_
6	TD-	Receive data [2]	Output
7, 8 [1]	SYMT-	Internal 75 Ohm terminating resistor	_
S		Shield	
	LED 1	Lit green: link	
	LED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

[1] Optional product variant

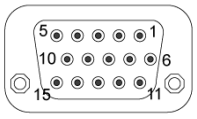
[2] Auto Negotiation and auto crossover are supported

Ethernet LAN connection, X2, X4



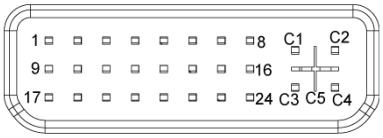
Pinno.	Short name	Meaning	Input / output
1	BI_DA+	Bi-directional data A+	Input / output
2	BI_DA-	Bi-directional data A-	Input / output
3	BI_DB+	Bi-directional data B+	Input / output
4	BI_DC+	Bi-directional data C+	Input / output
5	BI_DC-	Bi-directional data C-	Input / output
6	BI_DB-	Bi-directional data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

VGA interface of the DVI-I/VGA adapter



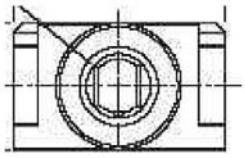
Pinno.	Short name	Meaning	Input / output
1	R	Red	Output
2	G	Green	Output
3	B	Blue	Output
4	–	Not used	–
5	GND	Ground	–
6	GND	Ground	–
7	GND	Ground	–
8	GND	Ground	–
9	+ 5 V	+ 5 V (fused)	Output
10	GND	Ground	–
11	–	Not used	–
12	DDC_DAT	Display data channel data	Input/output
13	EXT_H	Horizontal synchronizing pulse	Output
14	EXT_V	Vertical synchronizing pulse	Output
15	DDC_CLK	Display data channel clock	Input/output

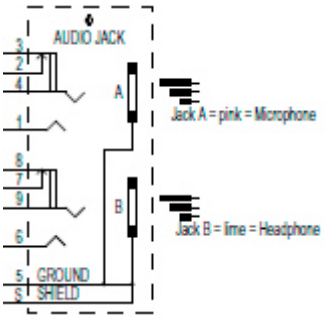
DVI-I interface, X70



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

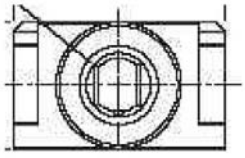
Microphone interface, X60 bottom

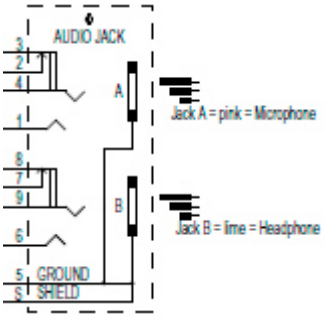




Pin no.	Short name	Meaning	Input / output
1	Right	Right channel	Input
2	7M	Analog ground	Output
3	Sense	Switch contact for device identification	Input
4	Left	Left channel	Input
5	M	Logic ground	Output

Line Out interface, headset, X60 top



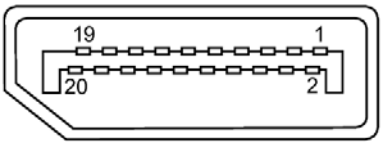


Pin no.	Short name	Meaning	Input / output
5	M	Logic ground	Output
6	Left	Left channel	Output
7	7M	Analog ground	Output
8	Sense	Switch contact for device identification	Input
9	Right	Right channel	Output

USB 3.0 port

Pin no.	Short name	Meaning	Input / output
1	VBUS	+ 5 V (fused)	Output
2	D-	Data channel USB2	Input / output
3	D+	Data channel USB2	Input / output
4	GND	Ground	–
5	RX-	Data channel USB3	Input
6	RX+	Data channel USB3	Input
7	GND	Ground	–
8	TX-	Data channel USB3	Output
9	TX+	Data channel USB3	Output

DisplayPort port



Pin no.	Short description	Meaning	Input / output
1	ML_Lane0+	DP data 0+	Output
2	GND	Ground	-
3	ML_Lane0-	DP data 0-	Output
4	ML_Lane1+	DP data 1+	Output
5	GND	Ground	-
6	ML_Lane1-	DP data 1-	Output
7	ML_Lane2+	DP data 2+	Output
8	GND	Ground	-
9	ML_Lane2-	DP data 2-	Output
10	ML_Lane3+	DP data 3+	Output
11	GND	Ground	-
12	ML_Lane3-	DP data 3-	Output
13	CONFIG1 CAD	Cable Adapter Detect	Input
14	CONFIG2	Ground (PullDown)	-
15	AUX_CH+	Auxiliary channel+	Bidirectional
16	GND	Ground	-
17	AUX_CH-	Auxiliary channel-	Bidirectional
18	HPD	Hot Plug Detect	Input
19	GND	Ground	-
20	DP_PWR	+3.3V (fused)	Output

8.5.1.5 Internal ports

Pin assignment of the internal interfaces

Interface	Position	Connector	Description
Memory	Internal	X19, X20, X190, X200	DIMM socket, 64-/ 72-bit
Bus expansion	Internal	X508	Bus expansion socket, used by PCI and PCIe bus signals
Power supply	Internal	X506, X507	4-pin 12 V ATX power connector (CPU-VRM supply)
BIOS Recovery	Internal	X593	Replace jumper on pins 3-4 to run BIOS Recovery
Unlock ME	Internal	X593	Replace jumper on pins 1-2 to change locked ME
Fan monitoring	Internal	X514	Monitoring of power supply fan, 8-pin, pin header
SATA	Internal, e.g., hard disk	X522, X523, X524, X525, X526, X527	7-pin SATA connector
Connection for PS serial ATA	Internal	X516, X517, X518, X519, X520, X521	Voltage supply for serial ATA
Connection for device fan	Internal	X512, X513, X515	Power supply, device fan monitoring (controlled), 4-pin, pin header
Connection for SCSI LED	Internal	X595	Input for SCSI drive activity display
Internal USB3/USB2 interface	Internal	X502	For connecting the USB cable to the front panel of the computer
Internal USB2 interface	Internal	X535, X536	Connection for USB interfaces on slot cover
Port 80 connector	Internal	X528	Connection for Port 80 / mode switch
COM2	Internal		Connection for COM2 on slot cover (see external interfaces)
LPT	Internal		Connection for LPT on slot cover (see external interfaces)

Assignment of the SCSI activity connector, X595 Type JST B2B-PH-SM3-TB

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

External Reset, X5, Type JST B2B-PH-SM3-TB

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

External Power button, X529, Type JST B2B-PH-SM3-TB

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

Pin assignment of the internal USB 2.0 interface connector, X535, X536

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

Pin assignment of the internal USB3/USB2 interface connector, X502

Pin no.	Short name	Meaning	Input / output
USB3 (USB3/USB 2.0 contacts)			
A1	VCC	+ 5 V (fused)	Output
A2	SSRX-	Data channel USB3	Input
A3	SSRX+	Data channel USB3	Input
A4	GND	Ground	-
A5	SSTX-	Data channel USB3	Output
A6	SSTX+	Data channel USB3	Output
A7	GND	Ground	–
A8	-Data	Data channel USB2	Input / output
A9	+Data	Data channel USB2	Input / output
A10	Reserved	+ 5 V (fused) or ground	Configurable

Pin no.	Short name	Meaning	Input / output
USB2 (USB 2.0 contacts)			
B1	-Data	Data channel USB2	Input / output
B2	+Data	Data channel USB2	Input / output
B3	GND	Ground	-
B4, 5	NC	Open	-
B6	GND	Ground	-
B7, 8	NC	Open	-
B9	VCC	+ 5 V (fused)	Output
B10	NC	Open	-

SATA data interface, X522, 523, 524, 525, 526, 527

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, X514

Pin no.	Short name	Meaning	Input / output
1	Reserved	-	-
2	Reserved	PWM, speed setting ATX AC-SV	Output
3	Reserved	-	Input
4	Tacho signal	Monitoring signal	Input
5	PS_Status	Status of redundant power supply	Input
6	Reserved	Reserved for fan error or redundant power supply	Input
7	Quittung_Status	Acknowledgment of acoustic alarm signal of redundant power supply (signal is open when module is switched on)	Output
8	Ground	-	-

Pin assignment of fan interface X512, X513, X515

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

Pin assignment of the supply for the serial ATA drives X516, 517, 518, 519, 520, 521

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

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

Signal	Pin no.	Pin no.	Signal
P12V	B1	A1	P12V
P12V	B2	A2	P12V
P12V	B3	A3	P12V
GND	B4	A4	GND
SMB_CLK2	B5	A5	n.c.
SMB_DATA2	B6	A6	n.c.
GND	B7	A7	n.c.
P3V3	B8	A8	n.c.
n.c.	B9	A9	P3V3
AUX_3V	B10	A10	P3V3
WAKE2	B11	A11	PCIE_RESET_L
n.c.	B12	A12	GND
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)
PCI_AD(27)	B21	O21	PCI_AD(26)

Signal	Pin no.	Pin no.	Signal
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
n.c.	B63	A63	GND

Signal	Pin no.	Pin no.	Signal
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

NOTICE

Note for bus modules with PCIe switch

As long as no modules are plugged into the PCIe slots behind a PCIe switch, the IRQs are not used by the PCIe switch, but the display only shows that these IRQs would be used if modules were plugged in.

The PCIe switch is displayed in Windows Device Management as "PCI standard PCI-to-PCI bridge".

8.5.2 Bus board

8.5.2.1 Bus board models

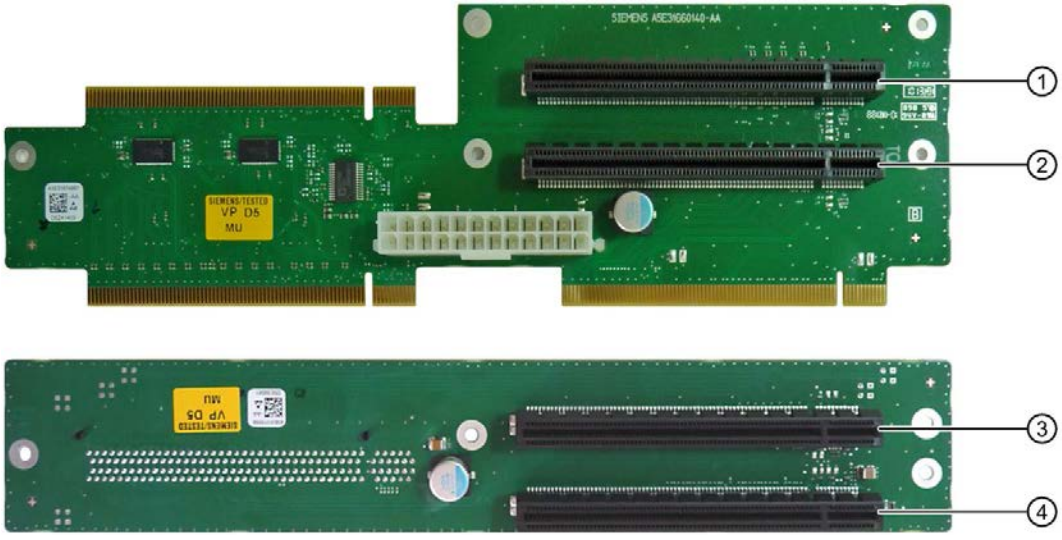
Riser cards are used as bus boards. These riser cards are used to a create spatial offset for connections between the motherboard and the expansion cards. This positions the bus board vertical and expansion cards parallel to the motherboard.

Depending on your device configuration, one of the following bus board models is mounted in your device.

When plugging the PCI/PCIe cards observe the slot specification. The same number of PCIe slots of the third generation (Gen. 3) are twice as powerful as slots of the second generation (Gen. 2).

Bus board 2 x PCIe with piggyback 2 x PCIe

The following figure shows the bus board at the top and the piggyback on the bottom.



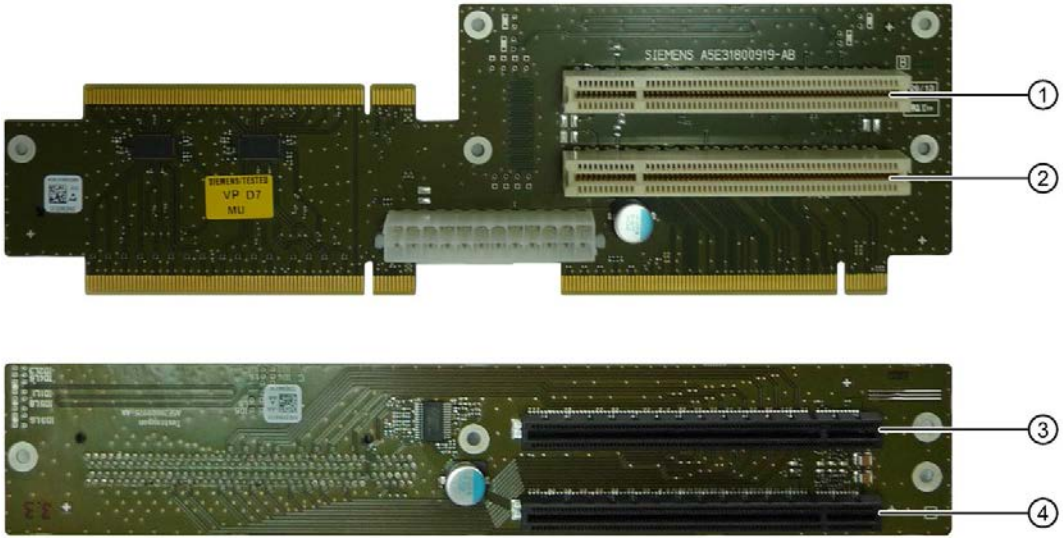
① Slot PCIe x4 Gen. 3	Corresponding designation on the device front: Slot 2
② Slot PCIe x4 Gen. 2	Corresponding designation on the device front: Slot 3
③ Slot PCIe x4 Gen. 3, piggyback	Corresponding designation on the device front: Slot 4
④ Slot PCIe x8 Gen. 3, piggyback	Corresponding designation on the device front: Slot 1

Bus board without piggyback 2 x PCIe

Corresponds to the model in the last figure, without piggyback. Only the slots in Slot 2 (Item ①) and Slot 3 (Item ②) can be equipped with PCIe cards.

Bus board 2 × PCI with piggyback 2 × PCIe

The following figure shows the bus board at the top and the piggyback on the bottom.



① Slot PCI	Corresponding designation on the device front: Slot 2
② Slot PCI	Corresponding designation on the device front: Slot 3
③ Slot PCIe x8 Gen. 3, piggyback	Corresponding designation on the device front: Slot 4
④ Slot PCIe x8 Gen. 3, piggyback	Corresponding designation on the device front: Slot 1

8.5.2.2 PCI hardware interrupts

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 with bus board 2 × PCI with piggyback 2 x PCIe at PCI slot 2 and PCI slot 3. Further exclusive interrupts for use at the slots are not available.

Assigning exclusive interrupts in BIOS Setup (PIC mode only)

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

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

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

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

The interface that causes the conflict is disabled automatically. Additional information is available in the section Interrupt assignments (Page 211).

Example

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

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

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

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

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

Interrupt assignment bus board 4 x PCIe

Rack PC 647D
Interrupt rooting of the slot connectors on the backplane
Y= Interrupt APIC-Mode, **Z=** BIOS Default Interrupt PIC-Mode (e.g. DOS)

	4xPCIe	IRQ Number																									Comment
	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	*	
Host PCI IRQ Line / Funktion																											E, F are exclusive Interrupts
Slot 1 (PCIe-X8)																											
	PCI IRQ Line A																	Y									
	PCI IRQ Line B																		Y								
	PCI IRQ Line C																			Y							
	PCI IRQ Line D																				Y						
Slot 2 (PCIe-X4)																											
	PCI IRQ Line A																			Y							
	PCI IRQ Line B																				Y						
	PCI IRQ Line C																	Y									
	PCI IRQ Line D																		Y								
Slot 3 (PCIe-X4)																											
	PCI IRQ Line A																	Y									
	PCI IRQ Line B																		Y								
	PCI IRQ Line C																			Y							
	PCI IRQ Line D																				Y						
Slot 4 (PCIe-X4)																											
	PCI IRQ Line A																		Y								
	PCI IRQ Line B																			Y							
	PCI IRQ Line C																				Y						
	PCI IRQ Line D																	Y									

* Host PCI-IRQ A to H rooting to ACPI IRQ 16 to 23 is fix, if ACPI mode is used.
Host PCI-IRQ A to H rooting to PIC IRQ 0 to 15 is handled from the BIOS, it is variable, it could not forced by the user.

Interrupt assignment bus board 2 x PCIe

Rack PC 647D
Interrupt rooting of the slot connectors on the backplane
Y= Interrupt APIC-Mode, **Z=** BIOS Default Interrupt PIC-Mode (e.g. DOS)

2xPCIe	IRQ Number																							Comment
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	
Host PCI IRQ Line / Funktion																									* E, F are exclusive interrupts
Slot 2 (PCIe-X4)																									
PCI IRQ Line A																			Y						
PCI IRQ Line B																				Y					
PCI IRQ Line C																	Y								
PCI IRQ Line D																		Y							
Slot 3 (PCIe-X4)																									
PCI IRQ Line A																	Y								
PCI IRQ Line B																		Y							
PCI IRQ Line C																			Y						
PCI IRQ Line D																				Y					

* Host PCI-IRQ A to H rooting to ACPI IRQ 16 to 23 is fix, if ACPI mode is used.
Host PCI-IRQ A to H rooting to PIC IRQ 0 to 15 is handled from the BIOS, it is variable, it could not forced by the user.

Interrupt assignment bus board 2 × PCI / 2 x PCIe

Rack PC 647D

Interrupt rooting of the slot connectors on the backplane

Y= Interrupt APIC-Mode, **Z=** BIOS Default Interrupt PIC-Mode (e.g. DOS)

2xPCI, 2xPCIe	IRQ Number																								Comment
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	*
Host PCI IRQ Line / Funktion																									**E, F** are exclusive Interrupts
Slot 1 (PCIe-X8 PEG A)																									
PCI IRQ Line A																	Y								
PCI IRQ Line B																		Y							
PCI IRQ Line C																			Y						
PCI IRQ Line D																				Y					
Slot 2 (PCI)																									
PCI IRQ Line A																					Y				
PCI IRQ Line B																						Y			
PCI IRQ Line C																							Y		
PCI IRQ Line D																								Y	
Slot 3 (PCI)																									
PCI IRQ Line A																						Y			
PCI IRQ Line B																							Y		
PCI IRQ Line C																								Y	
PCI IRQ Line D																					Y				
Slot 4 (PCIe-X8)																									
PCI IRQ Line A																		Y							
PCI IRQ Line B																			Y						
PCI IRQ Line C																				Y					
PCI IRQ Line D																	Y								

* Host PCI-IRQ A to H rooting to ACPI IRQ 16 to 23 is fix, if ACPI mode is used.
Host PCI-IRQ A to H rooting to PIC IRQ 0 to 15 is handled from the BIOS, it is variable, it could not forced by the user.

8.5.3 System resources

8.5.3.1 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 7	**Start >** Enter "msinfo32" in the search function

8.5.3.2 Allocation of the system resources used by BIOS/DOS

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

I/O address allocation

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

Static area

I/O address (hex)		Size [byte]	Description of the basic function	Alternative function
From	To			
0000	001F	32	DMA controller	
0020	0021	2	Programmable interrupt controller	
0022	0023	2	<Not used>	
0024	0025	2	Programmable interrupt controller	
0026	0027	2	<Not used>	
0028	0029	2	Programmable interrupt controller	
002A	002B	2	<Not used>	
002C	002D	2	Programmable interrupt controller	
002E	002F	2	Motherboard resources	
0030	0031	2	Programmable interrupt controller	
0032	0033	2	<Not used>	
0034	0035	2	Programmable interrupt controller	
0036	0037	2	<Not used>	
0038	0039	2	Programmable interrupt controller	
003A	003B	2	<Not used>	
003C	003D	2	Programmable interrupt controller	
003E	003F	2	<Not used>	
0040	0043	4	System timer	
0044	004D	10	<Not used>	
004E	004F	2	Motherboard resources	
0050	0053	4	System timer	

I/O address (hex)		Size [byte]	Description of the basic function	Alternative function
From	To			
0054	005F	12	<Not used>	
0060	0060	1	Keyboard controller	
0061	0061	1	Motherboard resources	
0062	0062	1	<Not used>	
0063	0063	1	Motherboard resources	
0064	0064	1	Keyboard controller	
0065	0065	1	Motherboard resources	
0066	0066	1	<Not used>	
0067	0067	1	Motherboard resources	
0068	006F	8	<Not used>	
0070	0070	1	Motherboard resources	Cascaded
0070	0077	8	System CMOS/real-time clock	
0078	007F	8	<Not used>	
0080	0080	1	Motherboard resources	
0081	0091	17	DMA controller	
0092	0092	1	Motherboard resources	
0093	009F	13	DMA controller	
00A0	00A1	2	Programmable interrupt controller	
00A2	00A3	2	<Not used>	
00A4	00A5	2	Programmable interrupt controller	
00A6	00A7	2	<Not used>	
00A8	00A9	2	Programmable interrupt controller	
00AA	00AB	2	<Not used>	
00AC	00AD	2	Programmable interrupt controller	
00AE	00AF	2	<Not used>	
00B0	00B1	2	Programmable interrupt controller	
00B2	00B3	2	Motherboard resources	
00B4	00B5	2	Programmable interrupt controller	
00B6	00B7	2	<Not used>	
00B8	00B9	2	Programmable interrupt controller	
00BA	00BB	2	<Not used>	
00BC	00BD	2	Programmable interrupt controller	
00BE	00BF	2	<Not used>	
00C0	00DF	32	DMA controller	
00E0	00EF	16	<Not used>	
00F0	00F0	1	Numeric data processor	
00F1	0277	391	<Not used>	
0278	027F	8	<Reserved>	Reserved for LPT1
0280	02E7	104	<Not used>	
02E8	02EF	8	<Reserved>	Reserved for COM1 or COM2

I/O address (hex)		Size [byte]	Description of the basic function	Alternative function
From	To			
02F0	02F7	8	<Not used>	
02F8	02FF	8	COM2	Can be deactivated in setup, then free Reserved for COM1 or COM2
0300	0377	120	<Not used>	
0378	037F	8	LPT1	Can be deactivated in setup, then free Reserved for LPT1
0380	03AF	48	<Not used>	
03B0	03BB	12	Graphics	
03BC	03BF	4	<Reserved>	
03C0	03DF	32	Graphics	
03E0	03E7	8	<Not used>	
03E8	03EF	8	<Reserved>	Reserved for COM1 or COM2
03F0	03F7	8	<Not used>	
03F8	03FF	8	COM1	Can be deactivated in setup, then free Reserved for COM1 or COM2

Dynamic range – resources are managed by means of Plug and Play functionality

I/O address (hex)		Size [byte]	Description of the basic function	Alternative function
From	To			
0400	0453	84	Motherboard resources	
04D0	04D1	2	Programmable interrupt controller	
0680	069F	32	Motherboard resources	
0800	087F	128	Motherboard resources	
164E	164F	2	Motherboard resources	
1800	18FE	255	Motherboard resources	
1854	1857	4	Motherboard resources	Cascaded
2004	2007	4	Motherboard resources	
FFFF	FFFF	1	Motherboard resources	

Interrupt assignments

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

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

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

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

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

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

Memory address assignments

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

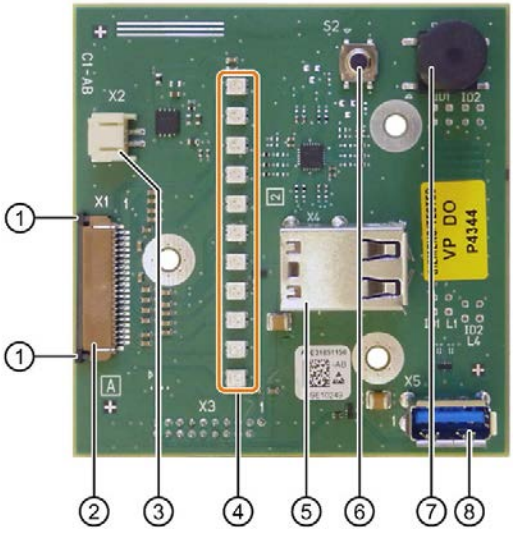
Address		Size	Description of the basic function	Possible alternative function
from	to			
0000 0000	0007 FFFF	512 K	Conventional system memory	
0008 0000	0009 F7FF	127 k	Conventional system memory extended	
0009 F800	0009 FFFF	2 K	XBDA, extended Bios Data Area	
000A 0000	000A FFFF	64 K	VGA graphics refresh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

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

8.5.4 Displays and operator panel

8.5.4.1 Design and function

The operator panel is interconnected with the motherboard via a 26-pin flat cable. The flat cable is plugged in at Position ② and secured by sliding the lock ① at the plug connector to the right.



① Lock plug connector
② Plug connector, connection to the motherboard
③ Connection for external reset
④ LEDs
⑤ USB socket, only the top USB contact is used
⑥ Reset button, 1-pin
⑦ On-Off button, 1-pin
⑧ USB 3.0 port

8.5.4.2 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.

8.5.5 Communication processor CP 1616 onboard

8.5.5.1 Introduction

Properties

CP 1616 on-board allows you to connect IPCs to Industrial Ethernet.

The basic characteristics of the PCS 1616 onboard are:

- Optimized for PROFINET IO
- Enhanced Real Time Ethernet Controller 400 = ERTEC 400
- 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).
- Autocrossing
- Automatic hardware detection
- Integrated 3-port real-time switch

3-port real-time switch

The switch function of the 3-port real-time switch is maintained in the following cases:

- Restart (Windows Restart)
- Reset (using the shortcut <Ctrl-Alt-Del)

The switch function can be activated permanently in the BIOS setup, "Power" menu with the "PROFINET always On" parameter. When switched off (Disabled), the switch function is interrupted in the following cases:

- Shutting down with Windows command
- Activating the on/off switch
- Shutting down with power switch (on/off switch).

Three RJ45 connectors

Terminal devices or other network components can be connected to the three RJ45 sockets that lead to the integrated real-time switch. The CP 1616 is connected to the LAN (Local Area Network) via one of the three RJ45 sockets of the device.

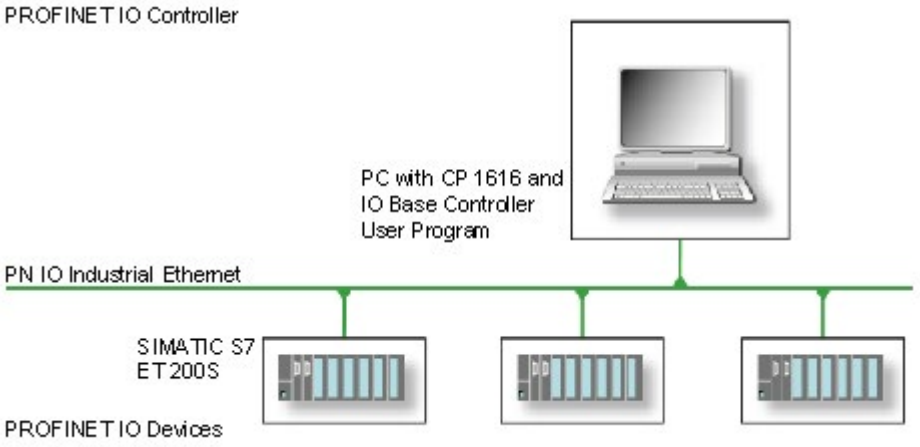
Typical Communication Partners

CP 1616 onboard as an IO controller

The following diagram shows a typical application: CP 1616 onboard as PROFINET IO controller on the IO controller layer.

The IO base controller user program runs on the PC. This program accesses the functions of the IO base user program interface.

Data traffic is routed via the communication processor to several SIMATIC S7 PROFINET IO devices, ET 200S over Industrial Ethernet.

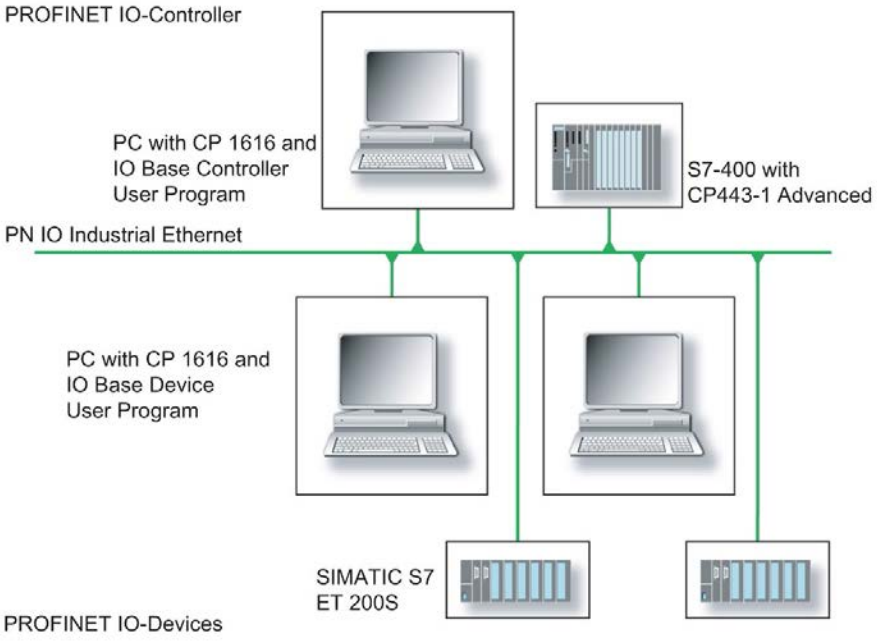


CP 1616 onboard as IO device

The following diagram shows a typical application: Two PCs each with a CP as a PROFINET IO device on the IO device layer.

A PC with a CP as PROFINET IO controller, a SIMATIC S7-400 with a CP 443-1 as PROFINET IO controller and two SIMATIC S7 ET 200S PROFINET IO devices are also connected in the network.

The IO base device user program runs on the IO device PC. This program accesses the functions of the IO base user program interface. Data traffic is routed via the CP 1616 onboard communication processor to a PC as PROFINET IO controller, or to an S7-400 automation system with CP 443-1 over Industrial Ethernet.



8.5.5.2 Firmware loader

Firmware loader

When to load firmware

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:

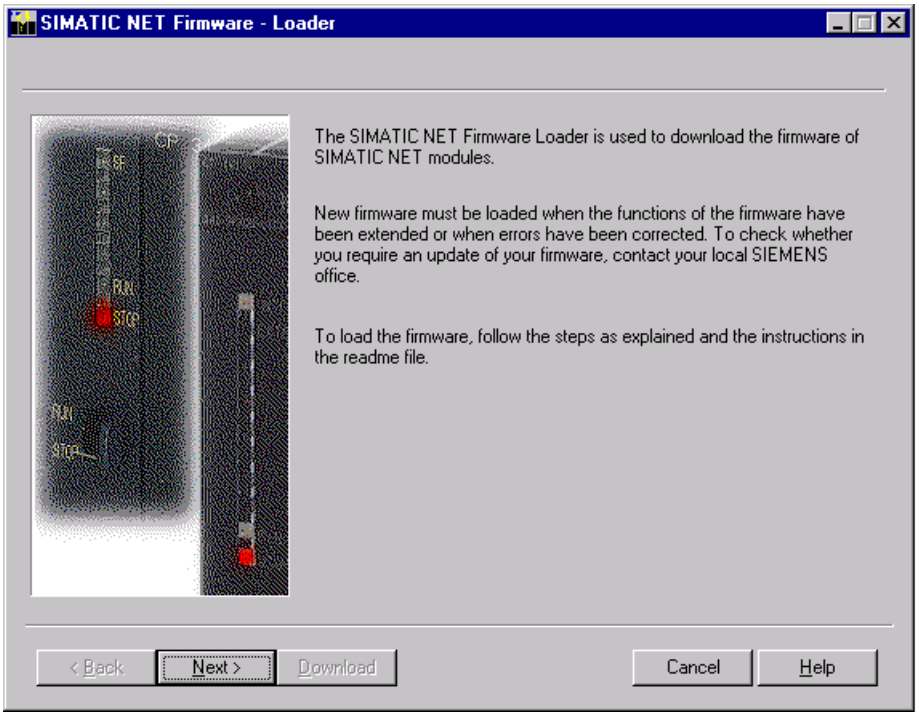
- <file>.FWL
  A file form that contains further information, which is displayed by the firmware loader. The firmware loader can use this information to check if the firmware is compatible to the device.

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.

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.

Note

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.

Note

Be aware that aborting the loading process may result in an inconsistent state in your module.

You can find additional, detailed information about the individual loader variants in the integrated help.

Note

When loading the firmware or commissioning the module, be aware that the CP 1616 onboard takes five MAC addresses (always in direct sequence). The first two addresses are displayed in the BIOS, in the "Peripheral Configuration" submenu of the "Advanced" menu.

Example

The lower MAC address at "Profinet" is provided for Layer 2 communication, while the second one is used for Ethernet/PROFINET communication.

8.5.5.3 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).

8.6 BIOS description

8.6.1 Overview

BIOS Setup program

The BIOS Setup program, or BIOS Setup for short, is located, together with the setup parameters, in a FLASH block on the motherboard.

You change the setup parameters of the device in the BIOS Setup. Examples: System time, hard disks or boot order.

Changing the device configuration

Your device configuration is preset for operating with the included software. You should only change the default setup parameters if you have made technical changes to your device, or if a fault occurs when the device is switched on.

NOTICE
Malfunctions can occur with running software CPU If a BIOS update of the PC is performed while SIMATIC software controller, a SIMATIC WinAC for example, is running, the software CPU can malfunction, resulting in communication interruptions or failures, for example. Other actions that put a heavy load on the PC hardware, for example, running hardware tests such as benchmarks, can result in malfunctions of the software CPU. Do not run a BIOS update or other actions that would put a heavy load on the hardware during operation of a software CPU. Switch the software CPU to "STOP" before you run a BIOS update or perform other critical actions.

Note

Documentation

BIOS Setup is described for all devices and device configurations. Some BIOS submenus or Setup parameters may not be included, depending on your order. The interface of your BIOS Setup can deviate from the figures in this document.

You can find a detailed description of the BIOS on the Support website under Entry ID 92189185 (http://support.automation.siemens.com/WW/view/en/92189185).

8.6.2 Opening the BIOS selection menu

Procedure

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

   Depending on the device version, the default settings can differ from the figures shown.

   The following message appears briefly on the display at the end of the self-test:

   ```
   Press ESC for boot options
   ```

2. Press <ESC> to open the BIOS selection menu:

The following keys are available in the BIOS selection menu:

Buttons	Function
Continue	Exit selection menu, continue start sequence
Boot Manager	Specify the boot media from which to boot: • Hard disk drive • CD-ROM drive • USB drive
Device Management	Start device manager for UEFI boot media
Boot From File	Boot Maintenance Manager: • Boot Options: Set boot order • Driver Options: Configure drivers • Console Options: Configure connected input device • Boot from File: Start from an ".EFI" file • Reset System: Restore factory settings
Secure Boot Option [1]	Configuration settings to start the device in Secure Boot mode. The only software modules loaded are those that are known to be safe for the BIOS or the operating system.

Buttons	Function
SCU	Start BIOS Setup via Setup Configuration Utility
BIOS Update	Update BIOS from USB memory stick
MEBx	Start Intel Management Engine BIOS Extension from Active Management Technology Support (AMT)

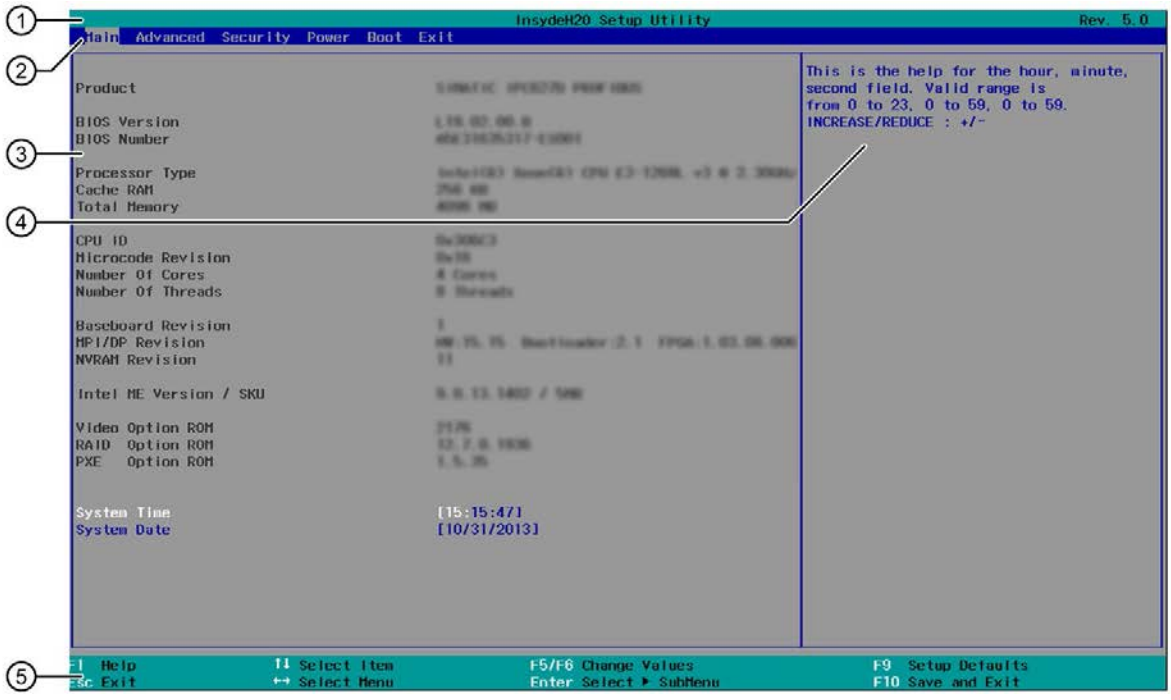
[1] Available as of Windows 8 or later

8.6.3 Configuration

The individual setup parameters are distributed between different menus and submenus. The menus always have the same layout.

Menu layout

The following figure is an example for the main menu. Device-specific information is shown as blurred.



① Header

② Menu bar

③ Settings, submenus and device-specific information

④ Help area

⑤ Key assignment

A menu is divided into four areas:

- In the menu bar ② on top, you select from the different menus "Main", "Advanced", etc.
- The center left area ③ includes information on your device and you can edit settings that are partly available in submenus.
- The center right area ④ displays short help texts for the currently selected setup parameters.
- The key assignment ⑤ at the bottom shows the function keys and control keys available in BIOS Setup.

  You can toggle between the menus with the "←" left and "→" right cursor keys.

The following table shows the standard menus. Not all menus are included in each supplied device configuration.

Menu	Meaning
Main	Display system information, for example, BIOS version, processor and memory
Advanced	Configure hardware using different submenus
Security	Security functions, e.g., setting a password
Power	Specify CPU settings and switch-on functions.
Boot	Determine boot options, e.g., boot order
Exit	Save and exit (see Exit menu)

8.6.4 Exit menu

You always exit BIOS Setup in this menu.

Exit Saving Changes	All changes are saved and the system is restarted with the new Setup parameters.
Save Change Without Exit	All changes are saved.
Exit Discarding Changes	All changes are discarded and the system is restarted with the old Setup parameters.
Load Optimal Defaults	All setup parameters are reset to the safe default values. **Notice**: The existing Setup parameters are overwritten by this.
Load Custom Defaults	The profile must be loaded with the custom Setup parameters. Requirement: The parameters are saved prior to this with "Save Custom Defaults".
Save Custom Defaults	The currently configured Setup parameters are saved as a custom profile (see also "Load Custom Defaults").
Discard Changes	All changes are discarded.

8.6.5 BIOS update

Check regularly if updates are available for download to your device.

Additional information can be found on the Internet at the following address:After Sales Information system (http://www.siemens.com/asis).

Noting down and restoring BIOS Setup settings

NOTICE
Irretrievable loss of data All BIOS Setup settings are deleted after the BIOS update. This can put the system in an undefined state. This may damage the device and the plant. 1. Print out the table in the next section "General BIOS Setup settings". 2. Enter your specific BIOS Setup setting in this table before you run a BIOS update. 3. Start BIOS Setup after the BIOS update. 4. Load the BIOS Setup default settings with <F9> "Setup Defaults". Or use the BIOS Setup command "Load Optimal Defaults" in the "Exit" menu. 5. Make your own Setup settings based on the table you have printed out. 6. Save the BIOS Setup settings with <F10> "Save and Exit".

Performing a BIOS update

NOTICE
Damage to the device If you switch off the device during the update, the BIOS will be incomplete and corrupt. This may result in malfunctions. Leave the device switched on during the update.

If you have purchased a new BIOS update for your device, follow these steps to install the update:

1. Copy the update to a USB memory stick.
2. Reset the device (warm or cold restart).

   The following message appears briefly on the display at the end of the self-test:

   ```
   Press ESC for boot options
   ```
3. Press <ESC> to open the BIOS selection menu.
4. Click the "BIOS Update" button.
5. Follow the instructions on the screen.

Reboots

There may be several reboots after a BIOS update. These reboots are initiated by the Management Engine (ME). The reboots are required by the ME to adapt itself to the changes of the BIOS update.

8.6.6 BIOS Setup settings

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

Note

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

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

BIOS Setup settings

Main

System parameters	Default settings	Local settings
System Time	00:00:00	
System Date	MM/DD/YYYY	

Advanced > Boot Configuration

System parameters	Default settings	Local settings
Numlock	On	
POST errors	All without keyboard	

Advanced > Peripheral Configuration

System parameters	Default settings	Local settings
Internal COM 1	Auto [1]	
Base I/O address [2]	3F8	
Interrupt [2]	IRQ4	
Internal COM 2	Auto [1]	
Base I/O address [2]	2F8	
Interrupt [2]	IRQ3	
Internal LPT	Auto [1]	
Base I/O address [3]	378	
Interrupt [3]	IRQ7	
Mode [3]	Bi-directional	
DMA Channel [3]	DMA 1	
Onboard PROFINET [1]	Enabled	
PCI – MPI / DP [1]	Enabled	
Audio	Auto	

System parameters	Default settings	Local settings
Onboard Ethernet 1 (LAN 1, X1 P1)	Enabled	
Onboard Ethernet 2 (LAN 2, X2 P1)	Enabled	

1 Depending on the ordered device configuration

2 Only visible if the associated parameter "Internal COM #" is enabled.

3 Only visible if "Internal LPT 1" is enabled.

Advanced > SATA Configuration

System parameters	Default settings	Local settings
SATA Controller	Enabled	
HDC Configure As	AHCI [1]	

1 Depending on the ordered device configuration

Advanced > Fan Control Configuration

System parameters	Default settings	Local settings
Fan Control Mode	Standard [1]	

1 Depending on the ordered device configuration

Advanced > Video Configuration

System parameters	Default settings	Local settings
Primary Display	Auto	
IGD - Aperture Size	128 MB	
IGD - DVMT Size	MAX	
IGD boot type	VBIOS default	
IGD boot type 2	Disabled	
PEG0 - Gen X	Auto	
PEG1 - Gen X	Auto	
PEG2 - Gen X	Auto	

Advanced > USB Configuration

System parameters	Default settings	Local settings
USB Precondition	Enabled	
XHCI	Auto	
Per-Port Control	Disabled	
The following parameters are only visible if "Per-Port Control" is enabled (Enabled).		
USB Port 0 (X61)	Enabled	
USB Port 1 (X60)	Enabled	
USB Port 2 (USB3 P2, internal)	Enabled	
USB Port 3 (USB3 P3, front)	Enabled	
USB Port 4 (X63)	Enabled	
USB Port 5 (X62)	Enabled	
USB Port 6 (USB2 P6, front)	Enabled	
USB Port 8 (USB2 P8, internal)	Enabled	
USB Port 9 (USB2 P9, internal)	Enabled	
USB Port 10 (USB2 P10, internal)	Enabled	
USB Port 11 (USB2 P11, internal)	Enabled	

Advanced > Chipset Configuration

System parameters	Default settings	Local settings
VT-d	Auto	
After G3 On	Last State	
DeepSx Power Policies	Disabled	
Max TOLUD	3 GB	
HPET Support	Enabled	

Advanced > Active Management Technology Support

System parameters	Default settings	Local settings
Intel AMT Support	Enabled	
Hide Un-Configure ME Confirmation	Disabled	
Un-Configure ME	Disabled	
Intel AMT Password Write	Enabled	
AMT CIRA Request Trig	Disabled	
USB Configure	Enabled	
AMT CIRA Timeout	0	

Advanced > PCI Express Configuration

System parameters	Default settings	Local settings
PCI Express Root Port 5	Enabled	
PCIe Speed [2]	Auto	
PCI Express Root Port 6 [1]	Enabled	
PCIe Speed [1] [2]	Auto	
PCI Express Root Port 7 [1]	Enabled	
PCIe Speed [1] [2]	Auto	
PCI Express Root Port 8 [1]	Enabled	
PCIe Speed [1] [2]	Auto	

[1] Visible depending on the ordered device configuration

[2] Only visible if the associated parameter "PCI Express Root Port #" is enabled.

Security

System parameters	Default settings	Local settings
TPM Status [1]	Depending on configuration	
TPM Operation [1]	No Operation	
TPM Force Clear [1]	Disabled	
Set Supervisor Password		
Set User Password		
Power-on Password [2]	Disabled	
User Access Level [2]	Full	
Option ROM keyboard [2]	Enabled	

[1] Visible depending on the ordered device configuration

[2] Only visible if "Supervisor Password" is set.

Power

System parameters	Default settings	Local settings
Wake on PME or LAN 2 (X2 P1)	Disabled	
Auto Wake on S5	Disabled	
Wake on S5 Time [1]	00:00:00	
Day of Month [1]	1	
Wake on LAN 1 (X1 P1)	Enabled	
PROFINET always On [2]	Disabled	
PROFINET Wake Capability [2] [3]	Disabled	
USB Ports 0/1 (X61/X60) powered	Enabled	
USB Ports 0/1 (X61/X60) Wake Capability [4]	Disabled	
USB Ports 4/5 (X63/X62) powered	Enabled	
USB Ports 4/5 (X63/X62) Wake Capability [4]	Disabled	
USB Ports 3/6/8/9 powered	Enabled	
USB Port 3/6/8/9 Wake Capability [4]	Disabled	

1 Only visible if the "Auto Wake on S5" is set accordingly.

2 Visible depending on the ordered device configuration

3 Only visible if the parameter "PROFINET always On" is enabled.

4 Only visible if the associated parameter "USB Ports # powered" is enabled.

Power > Advanced CPU Control

System parameters	Default settings	Local settings
P-States (ACTUAL)	Enabled	
Active Processor Cores	All Cores	
HT Support	Auto	
Execute Disable Bit	Enabled	
Intel (VMX) Virtualization Technology	Enabled	
C-States	Enabled	
Turbo Mode	Enabled	

Boot

System parameters	Default settings	Local settings
Boot Type	Dual Boot Type	
Quick Boot	Enabled	
Quiet Boot	Enabled	
Network Stack	Disabled	
PXE Boot capability	Disabled	
Add Boot Options	Auto	
USB Boot	Enabled	
EFI Device First	Enabled	
Boot Delay Time	3	

Boot > Legacy

System parameters	Default settings	Local settings
Normal Boot Menu	Standard	
Boot Type Order	In the order of the following Boot media types:	
Floppy drive	Depending on configuration	
Hard Disk Drive	Depending on configuration	
CD/DVD ROM Drive	Depending on configuration	
USB	Depending on configuration	
Others	Depending on configuration	

Exit

System parameters	Default settings	Local settings
Profile:		

8.6.7 Alarm, error and system messages

8.6.7.1 Power On Self Test

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

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

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

On-screen error messages

On-screen error message	Meaning / tip
Error - Keyboard error	Check whether the keyboard is properly connected.
Error - Keyboard controller error or no keyboard present	Check whether a functioning keyboard is properly connected. If this is the case, contact your technical support team.
Error - Keyboard controller error	Keyboard error Contact your Technical Support.
Error - System halted - harddisk drive (HDD) locked!	Turn off device, remove, HDD interlock and reboot once again.
Error - No MPI/DP interface detected	PROFIBUS interface defective Contact your Technical Support.
Error - PCH softstrap programming error: Riser card may not work correctly	Contact your Technical Support.
Error - PCH softstrap can't be programmed, descriptor locked: Riser card may not work correctly	Contact your Technical Support.
Error - SPI regions are not locked (ME unlocked)	Contact your Technical Support.
Error - Riser card Taufe does not match connected hardware configuration	Contact your Technical Support.
Error - Taufe configuration not present (Platform = Unknown)	Contact your Technical Support.
Warning - Manufacturer mode enabled	Contact your Technical Support.
System RAM Failed at offset	Memory error Contact your Technical Support.
Error - CMOS battery failed	Battery on the CPU module defective or empty Contact your Technical Support.
Error - SMART failure detected on HDD	Hard disk fault: A fault threshold specified by the manufacturer has been exceeded. Operation of the hard disk is unreliable. The hard disk has to be replaced. Contact your Technical Support.

On-screen error message	Meaning / tip
No bootable device -- Please restart system	Possible causes: • No operating system installed • Wrong drive addressed (disk in drive A/B) • Incorrect active boot partition • Incorrect drive entries in SETUP • HDD not connected / defective
Error - Realtime clock has lost power	Timer block error Contact your Technical Support.
Screen remains dark - cursor flashes at top left	A data carrier is inserted in the ODD drive. In this case it can take several minutes until the BIOS power up is continued.

8.6.7.2 BIOS beep codes

Below please find the customer-relevant POST codes. Contact Customer Support (http://www.siemens.de/automation/csi_en_WW) for information on all other POST codes.

Display (hex)	Meaning	Description		Remedy
01H	SEC_SYSTEM_POWER_ON	CPU power on and switch to Protected mode	Switch to Protected Mode	Service case
02H	SEC_BEFORE_MICROCODE _PATCH	Patching CPU microcode	Load CPU Microcode	Service case
03H	SEC_AFTER_MICROCODE _PATCH	Setup Cache as RAM	Set up cache as RAM	Service case
04H	SEC_ACCESS_CSR	PCIE MMIO Base Address initial	Initialize PCIE	Service case
05H	SEC_GENERIC_MSRINIT	CPU Generic MSR initial	Initialize CPU MS (Machine Status) Register	Service case
06H	SEC_CPU_SPEEDCFG	Setup CPU speed	Specify CPU speed	Service case
07H	SEC_SETUP_CAR_OK	Cache as RAM test	Carry out RAM Test on cache	Replacing a basic module
08H	SEC_FORCE_MAX_RATIO	Tune CPU frequency ratio to maximum level	Setting CPU frequency	Service case
09H	SEC_GO_TO_SECSTARTUP	Setup BIOS ROM cache	Set up BIOS ROM cache	Service case
0AH	SEC_GO_TO_PEICORE	Enter Boot Firmware Volume	Calling up the boot firmware memory area	Service case
70H	PEI_SIO_INIT	Super I/O initial	Initialization of the Super I/O	Service case
71H	PEI_CPU_REG_INIT	CPU Early Initial	Initialize CPU Register	Service case
72H	PEI_CPU_AP_INIT	Multi-processor Early initial	Multi processor initialization	Service case
73H	PEI_CPU_HT_RESET	HyperTransport initial	Initialize Hyper Transport functionality	Service case
74H	PEI_PCIE_MMIO_INIT	PCIE MMIO BAR Initial	Initialize PCIE Register	Service case
75H	PEI_NB_REG_INIT	North Bridge Early Initial	Initialization of the North bridge	Service case
76H	PEI_SB_REG_INIT	South Bridge Early Initial	Initialization of the South bridge	Service case
77H	PEI_PCIE_TRAINING	PCIE Training	Training phase of the PCIE device	Service case
78H	PEI_TPM_INIT	TPM initial	TPM initialization	Service case
79H	PEI_SMBUS_INIT	SMBUS Early Initial	Initialization of the SM Bus	Service case
7AH	PEI_PROGRAM_CLOCK_GEN	Clock Generator Initial	Initializations of the clock generator	Service case
7BH	PEI_IGD_EARLY_INITIAL	Internal Graphic device early initial, PEI_IGDOpRegion	First initialization of the graphic connection	Service case

Display (hex)	Meaning	Description		Remedy
7CH	PEI_HECI_INIT	HECI Initial	Initialization of the Host Embedded Controller Interface	Service case
7DH	PEI_WATCHDOG_INIT	Watchdog timer initial	Initialization of the watchdog timer	Service case
7EH	PEI_MEMORY_INIT	Memory Initial for Normal boot	Memory initialization during the PEI phase	Replace the memory modules
7FH	PEI_MEMORY_INIT_FOR_CRISIS	Memory Initial for Crisis Recovery	Memory initialization for BIOS recovery	Replace the memory modules
80H	PEI_MEMORY_INSTALL	Simple Memory test	Memory test	Replace the memory modules
81H	PEI_TXTPEI	TXT function early initial	Initialization of the Trusted Execution Technology	Service case
82H	PEI_SWITCH_STACK	Start to use Memory	Start the memory use	Service case
83H	PEI_MEMORY_CALLBACK	Set cache for physical memory	Use cache as a physical memory	Service case
84H	PEI_ENTER_RECOVERY_MODE	Recovery device initial	Initialize the device for BIOS recovery	Service case
85H	PEI_RECOVERY_MEDIA_FOUND	Found Recovery image	BIOS Recovery image found	Service case
86H	PEI_RECOVERY_MEDIA_NOT_FOUND	Recovery image not found	BIOS Recovery image not found	Check whether the BIOS Recovery image exists on the recovery medium (e.g. USB stick).
87H	PEI_RECOVERY_LOAD_FILE_DONE	Load Recovery Image complete	Loading of BIOS Recovery image completed	Service case
88H	PEI_RECOVERY_START_FLASH	Start Flash BIOS with Recovery image	Starting of flashing of BIOS Recovery image	Service case
89H	PEI_ENTER_DXEIPL	Loading BIOS image to RAM	Copy BIOS image to the RAM	Service case
8AH	PEI_FINDING_DXE_CORE	Loading DXE core	Loading DXE (Driver Execution Environment) program	Service case
8BH	PEI_GO_TO_DXE_CORE	Enter DXE core	Start DXE program	Service case
40H	DXE_TCGDXE	TPM initial in DXE	TPM initialization in DXE phase	Service case
41H	DXE_SB_SPI_INIT	South bridge SPI initial	Initialization of the Serial Peripheral Interface in the South Bridge	Service case
42H	DXE_CF9_RESET	Setup Reset service, DXE_CF9Reset	Setup Reset service	Service case

Display (hex)	Meaning	Description		Remedy
43H	DXE_SB_SERIAL_GPIO_INIT	South bridge Serial GPIO initial, DXE_SB_SerialGPIO_INIT	Initializations of the serial GPIO	Service case
44H	DXE_SMMACCESS	Setup SMM ACCESS service	Setup SMM access service	Service case
45H	DXE_NB_INIT	North bridge Middle initial	Initialization of the North Bridge	Service case
46H	DXE_SIO_INIT	Super I/O DXE initial	Initialization of the Super IO	Service case
47H	DXE_LEGACY_REGION	Setup Legacy Region service, DXE_LegacyRegion	Setup service Legacy region	Service case
48H	DXE_SB_INIT	South Bridge Middle Initial	Initialization of the South Bridge	Service case
49H	DXE_IDENTIFY_FLASH _DEVICE	Identify Flash device	Identify FLASH type	Service case
4AH	DXE_FTW_INIT	Fault Tolerant Write verification	Checking of the write fault tolerance	Service case
4BH	DXE_VARIABLE_INIT	Variable Service Initial	Initialization of the variable service	Service case
4CH	DXE_VARIABLE_INIT_FAIL	Fail to initial Variable Service	Failure to initialize the variable service	Service case
4DH	DXE_MTC_INIT	MTC Initial	MonoTonicCounter initialization	Service case
4EH	DXE_CPU_INIT	CPU Middle Initial	CPU initialization	Replacing a basic module
4FH	DXE_MP_CPU_INIT	Multi-processor Middle Initial	Multiprocessor initialization	Replacing a basic module
50H	DXE_SMBUS_INIT	SMBUS Driver Initial	SMBUS driver initialization	Service case
51H	DXE_SMART_TIMER_INIT	8259 Initial	SMART Timer initialization	Service case
52H	DXE_PCRTC_INIT	RTC Initial	RTC initialization	Service case
53H	DXE_SATA_INIT	SATA Controller early initial	Advance initialization of the SATA Controller	Service case
54H	DXE_SMM_CONTROLER_INIT	Setup SMM Control service, DXE_SMMControler_INIT	SSM Control service	Service case
55H	DXE_LEGACY_INTERRUPT	Setup Legacy Interrupt service, DXE_LegacyInterrupt	Setup Legacy Interrupt service	Service case
56H	DXE_RELOCATE_SMBASE	Relocate SMM BASE	Reassign SMM base	Service case
57H	DXE_FIRST_SMI	SMI test	SMI test	Service case
58H	DXE_VTD_INIT	VTD Initial	Initialize I/O virtualization (VTD)	Service case
59H	DXE_BEFORE_CSM16_INIT	Legacy BIOS initial	Legacy BIOS initialization	Service case
5AH	DXE_AFTER_CSM16_INIT	Legacy interrupt function initial	Legacy interrupts initialization	Service case
5BH	DXE_LOAD_ACPI_TABLE	ACPI Table Initial	ACPI table initialization	Service case
5CH	DXE_SB_DISPATCH	Setup SB SMM Dispatcher service, DXE_SB_Dispatch	SMM dispatcher service	Service case
5DH	DXE_SB_IOTRAP_INIT	Setup SB IOTRAP Service	SouthBridge IOTRAP service	Service case

Display (hex)	Meaning	Description		Remedy
5EH	DXE_SUBCLASS_DRIVER	Build AMT Table	Initialization of the AMT (Active Management Technology) table	Service case
5FH	DXE_PPM_INIT	PPM Initial	Initialization of the Processor Power Management	Service case
60H	DXE_HECIDRV_INIT	HECIDRV Initial	Initialization of the Host Embedded Controller Interface	Service case
61H	DXE_VARIABLE_RECLAIM	Variable store garbage collection and reclaim operation	Loading of the variable memory	Service case
10H	BDS_ENTER_BDS	Enter BDS entry	Phase Boot Device Selection	Service case
11H	BDS_INSTALL_HOTKEY	Install Hotkey service	Installation of the Hotkey service	Service case
12H	BDS_ASF_INIT	ASF Initial	Initialize Alert Standard Format	Service case
13H	BDS_PCI_ENUMERATION _START	PCI enumeration	Enumerate PCI bus	Service case
14H	BDS_BEFORE_PCIIO_INSTALL	PCI resource assign complete	Assign PCI resources	Run a test by disabling the hardware components in SETUP, or by removing the expansion cards installed on the bus board.
15H	BDS_PCI_ENUMERATION _END	PCI enumeration complete	PCI enumeration completed	Service case
16H	BDS_CONNECT_CONSOLE_IN	Keyboard Controller, Keyboard and Mouse initial	Initialization of keyboard and mouse	Run a test by replacing the keyboard/mouse
17H	BDS_CONNECT_CONSOLE _OUT	Video device initial	Initialize graphic connection	Service case
18H	BDS_CONNECT_STD_ERR	Error report device initial	Initialize default error output	Service case
19H	BDS_CONNECT_USB_HC	USB host controller initial	Initialize USB host controller	Service case
1AH	BDS_CONNECT_USB_BUS	USB BUS driver initial	Initialize USB bus driver	Service case
1BH	BDS_CONNECT_USB_DEVICE	USB device driver initial	Initialize USB device driver	Service case
1CH	BDS_NO_CONSOLE_ACTION	Console device initial fail	Initialization of the console faulty	Service case
1DH	BDS_DISPLAY_LOGO _SYSTEM_INFO	Display logo or system information	Display logo or system information	Service case
1EH	BDS_START_IDE _CONTROLLER	IDE controller initial	Initialization of the IDE controller	Service case
1FH	BDS_START_SATA _CONTROLLER	SATA controller initial	Initialization of the SATA controller	Service case

Display (hex)	Meaning	Description		Remedy
20H	BDS_START_ISA_ACPI_CONTROLLER	SIO controller initial	Initialization of the Super IO	Service case
21H	BDS_START_ISA_BUS	ISA BUS driver initial	Initialization of the ISA bus driver	Service case
22H	BDS_START_ISA_FDD	Floppy device initial	Initialization of the floppy connection	Service case
23H	BDS_START_ISA_SERIAL	Serial device initial	Initialization of the serial connection	Service case
24H	BDS_START_IDE_BUS	IDE device initial	Initialization of the IDE connection	Service case
25H	BDS_START_AHCI_BUS	AHCI device initial	Initialization of the AHCI connection	Service case
26H	BDS_CONNECT_LEGACY_ROM	Dispatch option ROMs	Callup of the Legacy Option ROMs	Service case
27H	BDS_ENUMERATE_ALL_BOOT_OPTION	Get boot device information	Determine the Boot Device information	Service case
28H	BDS_END_OF_BOOT_SELECTION	End of boot selection	Boot selection terminated	Service case
29H	BDS_ENTER_SETUP	Enter Setup Menu	Callup into SETUP	Service case
2AH	BDS_ENTER_BOOT_MANAGER	Enter Boot manager	Callup Boot Manager	Service case
2BH	BDS_BOOT_DEVICE_SELECT	Try to boot system to OS	Booting of the OS	Service case
2CH	BDS_EFI64_SHADOW_ALL_LEGACY_ROM	Shadow Misc Option ROM	Copying the Legacy Option ROMs into RAM	Service case
2DH	BDS_ACPI_S3SAVE	Save S3 resume required data in RAM	Make available for operating state S3 RAM	Service case
2EH	BDS_READY_TO_BOOT_EVENT	Last Chipset initial before boot to OS	Initialization of the last chipset before the OS Boot	Service case
2FH	BDS_GO_LEGACY_BOOT	Start to boot Legacy OS	Boot Legacy OS	Service case
30H	BDS_GO_UEFI_BOOT	Start to boot UEFI OS	Boot UEFI OS	Service case
31H	BDS_LEGACY16_PREPARE_TO_BOOT	Prepare to Boot to Legacy OS	Preparation for booting of Legacy OS	Service case
32H	BDS_EXIT_BOOT_SERVICES	Send END of POST Message to ME via HECI	Terminate Boot Service	Service case
33H	BDS_LEGACY_BOOT_EVENT	Last Chipset initial before boot to Legacy OS.	Initialization of the last chipset before the Legacy OS Boot	Service case
34H	BDS_ENTER_LEGACY_16_BOOT	Ready to Boot Legacy OS.	Callup to boot the Legacy OS	Service case
35H	BDS_RECOVERY_START_FLASH	Fast recovery start flash	Start the BIOS Recovery function	Service case
F9H	POST_BDS_NO_BOOT_DEVICE	No Boot Device, Post-BDS_NO_BOOT_DEVICE	No BOOT device found	Service case
FBH	POST_BDS_START_IMAGE	UEFI Boot Start Image, Post-BDS_START_IMAGE	Booting of an UEFI image	Service case
FDH	POST_BDS_ENTER_INT19	Legacy 16 boot entry	Start Legacy 16 boot	Service case

Display (hex)	Meaning	Description		Remedy
FEH	P0ST_BDS_JUMP_BOOT _SECTOR	Try to Boot with INT 19	Boot with INT 19	Service case
E4H	ASL_WAKEUP_S4	System wakeup from S4	Reboot from operating state S4	Service case
E5H	ASL_WAKEUP_S5	System wakeup from S5	Reboot from operating state S5	Service case

Note

If the boot process is interrupted with a BIOS POST message output on the screen, you will hear three long beeps. The parameter "POST Errors" must, for example, be set to "Halt on all errors" in the BIOS setup menu "Advanced > Boot Configuration" for this.

Special codes

Only the following BIOS post message is output as beep code:

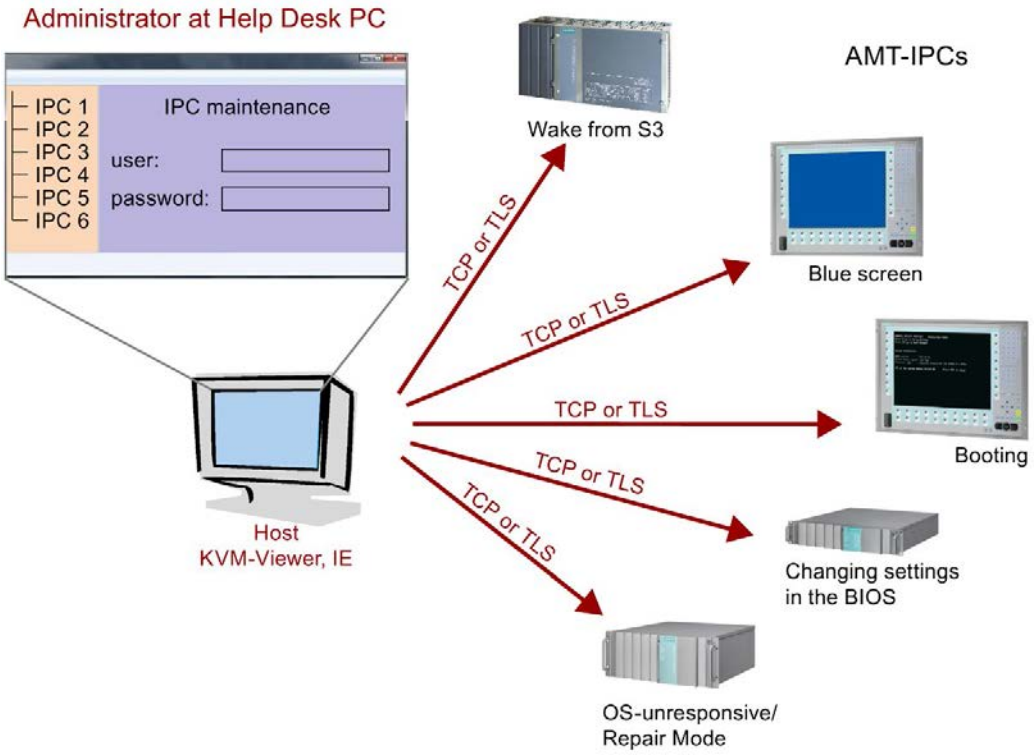
- No RAM: 3 long beeps followed by 2 short beeps, repeated for a total of three times.

8.7 Active Management Technology (AMT)

8.7.1 AMT basics

The Intel Core and Xeon processors support Intel® vPro™ and Intel Active Management Technology at the hardware end. An administrator at the Help Desk PC accesses the AMT PCs. Only the AMT PCs must have an integrated Intel AMT.

The following figure shows the possible structure of a network for remote management on the basis of SIMATIC AMT-PCs.



From a SIMATIC IPC which does not have Intel AMT functions, you can access networked SIMATIC IPCs with Intel AMT using the SIMATIC IPC Remote Manager and/or a web browser.

SIMATIC IPCs that support AMT feature two onboard Ethernet interfaces, each with a separate controller. The controller integrated in the chipset of the type: "xxxxxxLM" can be configured for the use of Intel AMT. Further details about the controller can be found in the technical specification.

For security reasons, AMT is disabled when you receive a SIMATIC IPC. Enable AMT in the BIOS setup. Afterwards the Intel® Management Engine (Intel® ME) has to be activated and set for AMT. You make additional settings in the Management Engine:

- Configuring the network for access via AMT
- Creating a password

8.7.2 Overview of AMT

This section describes the required measures and settings on the local IPC so that the IPC can be controlled and maintained remotely from a management station known below as the help desk PC.

The local IPC is known below as the "AMT PC".

The sections contain the following information:

- AMT settings in the MEBx and in the BIOS setup
- Basic configuration of AMT
- Further useful notes

8.7.3 Enabling AMT, basic configuration

Procedure

1. Connect the AMT PC with the LAN.
2. If necessary, first reset AMT to the default status (see section "Unconfigure").
3. Reboot the device.

   To open the BIOS selection menu, press the <ESC> key during the following BIOS message:

   Press Esc for Boot Options
4. Use the "SCU" (Setup Configuration Utility) button to open the BIOS setup.
5. In the "Advanced" menu, "Active Management Technology Support" submenu check to make sure that "Intel AMT Support" is enabled.
6. Exit the BIOS setup with <F10> key "Save and Exit". The AMT PC restarts.
7. To open the BIOS selection menu, press the <ESC> key.
8. Click the "MEBx" button.
9. In the login dialog, enter the standard password "admin".
10. Change the default password. The new password must include the following characters:
    - In total at least eight characters
    - One upper case letter
    - One lower case letter
    - One number
    - One of the special characters ! @ # $ % ^ & * @ # $ % ^ & *

    Note

    The underscore _ and the space characters are valid password characters, however they do not increase password complexity.
11. Enable "Intel (R) AMT Configuration > Manageability Feature Selection".
12. Enable "Intel (R) AMT Configuration > Activate Network Access".

8.7.4 Advanced settings

The BIOS and the MEBx contain the most important basic settings for AMT. Additional tools are necessary if you want to make more advanced settings. If required, these must be downloaded from the relevant manufacturer's site. For information on the options and use of these tools, refer to the relevant documentation of the manufacturer.

- Manageability Commander and other tools of the Intel DTK (Manageability Developer Tool Kit): Programs from the Intel DTK that you can download from the Internet at "http://software.intel.com/en-us/manageability".
- AMT Web interface: For encrypted connections, the URL of the Web interface is "https://<Fully qualified domain name>:16993" and for unencrypted connections "http://<IP address>:16992".
- WinRM: A command line program that is part of Windows as of Windows Vista. This tool can be downloaded for older Windows versions.

8.7.5 Resetting with Unconfigure

Note

If the AMT PC still has its factory settings, for example has just been purchased, you can skip this section.

If you have already configured AMT previously, it is best to discard all the previous AMT settings made in the MEBx.

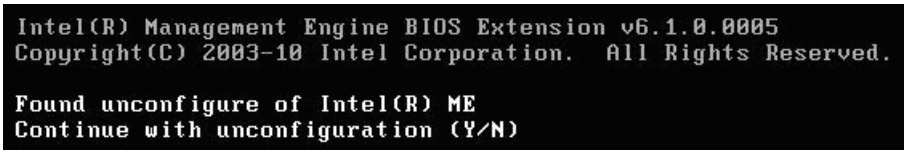
Note

All previous settings in the management engine are deleted.

Correct operation in the plant may be at risk.

Note down all the settings in the MEBx. Make the settings again as necessary following Unconfigure.

1. Enable the "Unconfigure ME" entry in "Advanced > Active Management Technology Support" in the BIOS.
2. Exit the BIOS with the <F10> key "Save and Exit". The AMT PC restarts.
3. After the restart, a user prompt appears asking whether you really want to discard all the settings in the management engine:



4. Confirm with "Y". On a German keyboard, this means pressing the <Z> key.

The device continues to boot with the factory settings of the management engine.

8.7.6 Determining the network address

To connect the AMT PC with the AMT server, the network address that uniquely localizes the AMT server on the AMT PC must be entered.

If DHCP is set for the automatic assignment of the network address in "Network Setup" in the MEBx of the AMT PC, the network address is not fixed.

Procedure

If the AMT server uses the same network address as the operating system of the AMT PC (most common situation):

1. You can obtain the address of the AMT server in the command line in Windows using "ipconfig" and in UNIX using "ifconfig".

If the AMT server and operating system do not use the same network address, ask your network administrator for the address you have been assigned.

8.7.7 Forcing user consent

When establishing a connection to the AMT PC, the KVM viewer may prompt the user to enter a six-figure code. This code is displayed on the screen of the AMT PC. The user of the AMT PC must inform the user of the KVM viewer of this code.

This code query needs to be set up on the KVM viewer.

Procedure

1. Select "Intel(R) AMT Configuration > User Consent" in the MEBx.
2. Select the value "KVM" for "User Consent".

To allow a user with administrator privileges to avoid this code query, follow these steps:

1. Select "Intel(R) AMT Configuration > User Consent" in the MEBx.
2. Enable "Opt-in configurable from remote IT".

8.8 Assignment of expansion interface to the software in the TIA Portal (CP assignment)

The table below shows the correlation between enclosure labeling of the IPC expansion slots and the labeling that is used during assignment of interfaces to the software in the TIA Portal.

Enclosure labeling	TIA Portal
1	X100
2	X101
3	X102
4	X103

IMPORTANT: Updated information for IPC647D 9

9.1 Validity

This product information applies to SIMATIC IPC647D with Article No. 6AG4112-2… and supplements the operating instructions of the SIMATIC IPC647D with the following topics:

- PCIe x16 dual head graphics card has been upgraded to a more powerful new version
- Operating system Windows Server 2016 Standard
- Operating system Windows 10 Enterprise 2016 LTSB
- Operating system Windows 10 Enterprise 2015 LTSB
- Update of the general safety instructions and approvals
- General information and clarifications

9.2 Features

Supplement to section 1.1.4 of the operating instructions.

Additional information about graphics cards and operating system:

Optional accessories	
Graphics cards	• The PCIe x16 dual head graphics card has been replaced with a more powerful graphics card of the latest generation for NVIDIA NVS315 multi-monitoring applications. • The operating system of the devices has been updated to work with the new NVS315 graphics card (see Technical specifications of the graphics interfaces (Page 259)).
Operating system	Pre-installed [3] / on the Restore DVD provided • Microsoft® Windows® Server 2016 Standard x64, MUI[1, 3, 4], including 5 clients • Microsoft® Windows® 10 Enterprise 2015 LTSB x64, MUI[1,2,3] • Microsoft® Windows® 10 Enterprise 2016 LTSB x64, MUI[1,3] [1] MUI: **M**ulti language **U**ser **I**nterface; 5 languages (English, German, French, Spanish, Italian) [2] Teaming is not possible in conjunction with Windows 10 Enterprise 2015 LTSB. [3] Activation is not absolutely necessary for full functionality of Windows. Activation occurs automatically as soon as the IPC has been connected to the Internet and was able to connect to the Microsoft activation servers. [4] The Microsoft Windows Server 2016 operating system no longer supports the Intel Advanced Network Services (Intel ANS) for the teaming configuration of the Intel Ethernet adapter. The teaming functionality can be configured with the Server Manager or the PowerShell of Windows Server 2016.

Note

Operation of Microsoft® Windows® 10 Enterprise 2016 LTSB x64 with SIMATIC DiagMonitor

- If the PC is operated in SATA AHCI mode, DiagMonitor can be used as of V5.0.0.0.
- If the PC is operated in SATA RAID mode, DiagMonitor must be used as of V5.0.2.1.

Operating system languages

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

Language	Windows Server 2008 R2 [1]	Windows Server 2012 R2 [1]	Windows Server 2016 [1]	Windows 7 (32-bit / 64-bit)[1] Windows 10 Enterprise 2015 LTSB [2] Windows 10 Enterprise 2016 LTSB [3]
German (Germany)	X	X	X	X
English (United States)	X	X	X	X
French (France)	X	X	X	X
Italian (Italy)	X	X	X	X
Spanish (Spain)	X	X	X	X
Japanese (Japan)	X	X	X	X
Korean (Korea)	-	X	X	X
Russian (Russia)	X	X	X	X
Chinese (PRC)	X	X	X	X
Chinese (Hong Kong S.A.R.)	X	X	-	X
Chinese (Taiwan)	X	X	X	X

[1] The languages can be installed at a later time from the Recovery DVD.

[2] The languages can be installed at a later time from the Restore DVD.

[3] The languages can be installed at a later time from the Add-ons DVD.

9.3 Windows Action Center

Supplement to section 4.5 of the operating instructions.

Take note of the special information pertaining to Windows 10 and Windows Server 2016 for the following functions.

Functions

- Automatic updates:

  Using automatic updates, Windows routinely searches for the latest critical updates for the device and installs them automatically.

  – You can enable or disable this option for Windows 10 during commissioning of Windows.

  – This option is enabled in the delivery state for Windows Server 2016.

- User Account Control:

  User Account Control issues a warning when programs attempt to modify important Windows settings. You can then either acknowledge this warning or prevent the program from changing the Windows settings. This option is enabled in the delivery state for Windows 10 and Windows Server 2016.

9.4 Calling Adaptec maxView Storage Manager

When Adaptec maxView Storage Manager is called for the first time, Internet Explorer opens.

Depending on the operating system, the following message is displayed:

- Windows 7 32-bit/64-bit, Windows Server 2008 R2, Windows Server 2012 R2, Windows Server 2016:
  "There is a problem with this website's security certificate".
- Windows Server 2008 R2, Windows Server 2012 R2, Windows Server 2016:
  "Content from the website listed below is being blocked by the Internet Explorer Enhanced Security Configuration.
  https://127.0.0.1".

9.5 Sources for installation of the operating system

Supplement to section 7.6.1 of the operating instructions.

If the operating system is faulty, you can reinstall it with the Restore DVD:

The Restore DVD is included in the scope of delivery if you have ordered a device with operating system. The DVD contains an image file with the following software:

- Operating system with installed hardware drivers
- Monitoring software, e.g. DiagBase

9.6 Installing Windows

Supplement to section 7.6.4 of the operating instructions.

Partitions in the delivery state for Windows 10 and Windows Server 2016

The following information applies to data storage media ≥ 200 GB. The partitions are fixed (GPT-formatted) and cannot be changed during initial installation.

Partition	Name	Size	File system
First	Boot	260 MB	FAT32
Second	MSR	128 MB	None
Third	System	160 GB	NTFS, not compressed
Fourth	WinRE	500 MB	NTFS, not compressed
Fifth	Data	Remainder	NTFS, not compressed

9.7 Setting up the language selection using the Multilanguage User Interface (MUI)

Supplement to section 7.6.5 of the operating instructions.

The procedure for Windows 10 and Windows Server 2016 corresponds to the procedure for Windows Server 2012 R2.

9.8 Restoring the delivery state

Supplement to sections 7.6.6 and 7.6.7 of the operating instructions.

Extended options of the Restore DVD of Windows 10 and Windows Server 2016

Note

Set the desired boot mode in BIOS Setup.
We recommend that you restore Windows 10 and Windows Server 2016 in UEFI mode.

Restoring boot modes

You can restore Windows 10 Enterprise 2016 LTSB and Windows Server 2016 in the following two boot modes.

- **UEFI mode (GPT volume):**

  To support new features, such as TPM 2.0, Secure Boot and volumes larger than 2 TB, the operating system must be restored in the way that it boots in UEFI mode. To do this, the Restore DVD must be booted in UEFI mode.
  The target system is then set up with a GPT volume and boots in UEFI mode.

- **Legacy mode (MBR volume):**

  To support extensions and functions, such as older PCI(e) cards and older software products, the operating system must be restored to boot in Legacy mode. To do this, the Restore DVD must be booted in Legacy mode.
  The target system is then set up with an MBR volume and boots in Legacy mode.

Selection of the restore scope

You can select the restore scope of Windows 10 Enterprise 2015 LTSB and Windows 10 Enterprise 2016 LTSB

- **"Factory settings" option:**

  Use this option if you want to restore the factory settings of the operating system with the installed device drivers and the SIEMENS software products.

- **"Administrator Basic" option:**

  Use this option if you only want to restore the operating system without additional device drivers and without SIEMENS software products.

Onboard SATA AHCI / RAID controller software

Windows operating systems as of Windows 10 Enterprise 2016 LTSB and Server operating systems as of Windows Server 2016 require the new RAID controller software Version RST V15 or higher.

Install the following RAID controller software from the "Documentation and Drivers" DVD supplied in line with the required operating mode:

- SATA RAID operation: RST version PV15.8.x.xxxx [1]
- SATA AHCI operation: RST version PV14.x.x.xxxx [2]

[1] RST PV15.8.0.1006 or later version

[2] RST PV14.8.6.1018 or later version

9.9 General safety instructions

Update of section 2.1 in the operating instructions on the topic of industrial security.

Security information

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

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

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

Additionally, Siemens' guidance on appropriate security measures should be taken into account. You can find more information about Industrial Security at (http://www.siemens.com/industrialsecurity).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at (https://support.industry.siemens.com).

9.10 Directives and declarations

Supplement to section 8.2. of the operating instructions.

Electromagnetic compatibility

This product meets the requirements of EU Directive 2014/30/EU "Electromagnetic Compatibility".

Low-voltage directive

The device with AC power supply complies with the requirements of the EU Directive 2014/35/EU "Low Voltage Directive".

Compliance with this standard has been verified according to EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC:2011 + A2:2013.

9.11 General technical specifications

Supplement and corrections to section 8.4.1 of the operating instructions

Mechanical ambient conditions

Correction of the Quick Install Guide and the following sections of the operating instructions:
Sec. 6.1 Retrofitting instructions
Sec. 8.4.1 General technical specifications

Note

The permissible lower operating temperature is dependent on the device configuration!

Lower operating temperature

Component	Lower operating temperature
SATA HDD	0 °C
SATA SSD	0 °C
SAS HDD	5 °C
DVD burner drive	5 °C

9.12 Current and power requirements (max. values)

Changes to section 8.4.2 of the operating instructions.

Component	Voltage					
	+3.3 V	+5 V	+12 V	+12 V2	-12 V	5 Vaux
Motherboard Core i processor with cooling	1.2 A	2.8 A	0.35 A	5.35 A	0.03 A	0.3 A
Front fan			0.5 A			
Internal fan			0.25 A			
Motherboard Xeon E3-1268L v3 processor with cooling [1]	1.2 A	2.8 A	0.95 A	5.35 A	0.03 A	0.3 A
Hard disk drive[1] SATA and SAS (typical values)		0.5 A	0.7 A			
SSD SATA (typical)			0.25 A			
SAS Hardware RAID Controller	0.4 A		1.2 A			
Slimline drive [1]		0.8 A				
Basic system (dual core) [1]	1.2 A	3.3 A	1.8 A	5.35 A	0.03 A	0.3 A
Single currents ATX, max. permitted	20 A [2]	25 A [2]	11 A	14 A [3]	0.5 A	2.0 A [4]
Single currents ATX, redundant, max. permitted	20 A [2]	25 A [2]	18 A	18 A	0.8 A	2.0 A [4]
Total power, permissible	185 W					
Efficiency of the simple and redundant power supply [1]	Approx. 80% (230 V AC), ca. 80% (120 V AC)					

[1] Depending on the selected device configuration

[2] The accumulated power of the +5 V and + 3.3 V voltage may not exceed 190 W with ATX power supply or 100 W with ATX redundant.

[3] 18 A for 20 seconds

[4] 2.5 A for 10 seconds

Typical power values

Component	Current consumption (AC-SV, U=230 V)	Power consumption
DVD burner drive	0.01 A	2.2 W

9.13 Technical specifications of the graphics interfaces

Changes to the following sections of the operating instructions:

Sec. 1.1.4 Characteristics

Sec. 8.4.1 General technical specifications

Sec. 8.5.1.2 Technical features of the motherboard

Resolution, frequency and color depth for the following processors:

- Intel® Core™ i3-4330TE, HD Graphics 4600 (GT2)
- Intel® Core™ i5-4570TE HD Graphics 4600 (GT2)
- Intel® Xeon™ E3-1268L v3 HD Graphics 4600 (GT2)

	Resolution	Frequency	Color depth
DisplayPort (DPP)	3840 x 2160 dpi	60 Hz	32-bit
DVI-D	1920 x 1200 dpi	60 Hz	32-bit
VGA	1920 x 1200 dpi	60 Hz	32-bit

- Comparison of NVIDIA NVS-315 and NVIDIA NVS-300

Specification	NVIDIA NVS315 graphics card (new)	NVIDIA NVS300 graphics card (old)
NVIDIA graphics processor	48 CUDA parallel computing cores	16 CUDA parallel computing cores
Total picture memory	1024 MB	512 MB
Bandwidth of the video interface	64-bit	
Memory bandwidth	14 Gbps	12.6 Gbps
Max. VGA resolution	2048 x 1536 @ 85 Hz; color depth 32-bit	
Max. DVI resolution	1920 x 1200 @ 60 Hz; color depth 32-bit	
Max. DP resolution	2560 x 1600 @ 60 Hz; color depth 32-bit	
Graphics slot	PCI Express 2.0 x16	
Form factor	69.37 mm x 167.64 mm (ATX bracket, 1 slot)	
Interfaces	2 x DVI-D or 2 x VGA	
Max. power rating	19.5 W	17 W
Cooling	Actively with fan	Without fan
Scope of delivery in the configurator	1 x DMS-59 to 2 x DVI-D adapter, 2 x DVI to VGA adapter	

Note

- The fan is monitored with SIMATIC IPC DiagBase as of version 1.5.2 or DiagMonitor software as of version 4.5.2 and 5.x.x (all).
- The new NVIDIA NVS315 graphics card is compatible with the old NVIDIA NVS300 graphics card regarding their interfaces.
- The operating system of the devices have been updated to work with the new NVS315 graphics card.

Customized configuration

- Users configuring new IPCs with their own Windows system images must update these images with the new drivers provided on the "Documentation and Drivers" DVD as of 04/2017, or they must use the operating system derivative as of 04/2017 as the new basis.
- Users using third-party systems (e.g. Linux, QNX, etc.) should check for compatibility with the new graphics card.

9.14 Interrupt assignment of the slot connectors on the bus board

Changes and supplements to section 8.5.3.1 of the operating instructions.

Note

All system resources (hardware addresses, memory allocation, interrupt assignment, DMA channels) are assigned dynamically by the BIOS or the Windows operating system, depending on the hardware equipment, drivers, installed expansion cards and connected external devices.

Assignment is automatic and depends on the demanded resources of the connected devices and the inserted modules. Due to this configuration dependency, clear statements can only be made by determining them in relation to the system in the final configuration. Resources may be viewed as follows under Windows:

1. Press the "Windows key" and "R" simultaneously.
   The "Run" dialog box opens.
2. Enter "msinfo32" in the "Open" field.
3. Confirm your entry with "OK".

9.15 BIOS Setup settings

Change to section 8.6.6 of the operating instructions.

The change is valid as of BIOS V19.01.07.

The default setting of the DisplayPort audio device has been changed from "Enabled" to "Disabled".

Note

You have to change the following BIOS setting to "Enabled" if you want to use the audio function of the DisplayPort monitor:

Advanced > Video Configuration > Internal Graphic Device > DPP Audio

9.16 Permitted mounting positions

Correction to section 3.1.3 of the operating instructions

Optional installation locations

The device can be mounted horizontally in control desks, switching cabinets and 19" rack systems.

Audio interfaces

Note

Figures in sections 1.2 and 3.3.6.2 of the operating instructions

The devices are supplied with monochrome black audio jacks as of May 2017.

9.17 Markings and symbols

9.17.1 Overview

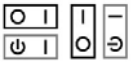
The following tables show all the symbols which may be found on your SIMATIC industrial PC, SIMATIC industrial monitor or SIMATIC Field PG in addition to the symbols which are explained in the operating instructions.

The symbols on your device may vary in some details from the symbols shown in the following tables.

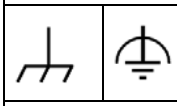
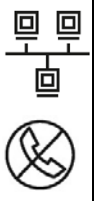
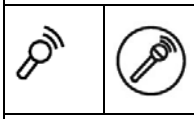
9.17.2 Safety

Symbol	Meaning		Symbol	Meaning
	Warning, observe the supplied documentation.			Lock is closed
	Attention, radio equipment			Lock is open
	Disconnect the power plug before opening			Opening for Kensington lock
	Attention ESD (Electrostatic sensitive device)			Warning of hot surface

9.17.3 Operator controls

Symbol	Meaning		Symbol	Meaning
	On/off switch, without electrical isolation			Eject CD/DVD
	On/off switch, without electrical isolation			

9.17.4 Interfaces

Symbol	Meaning		Symbol	Meaning
⎓	Connection to the power supply			PS/2 mouse interface
	Protective conductor terminal			PS/2 keyboard-interface
	Connection for functional earthing (equipotential bonding line)			Multimedia Card Reader
DPP	DisplayPort interface			Smart Card Reader
	DVI-D interface			Line In
LAN 	LAN interface, not approved for connecting WAN or telephone			Line Out
	Serial port			Microphone input
	USB port			Universal Audio Jack
	USB 2.0 high-speed port			Headphone output
	USB 3.0 super-speed port			

Technical support

A

A.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (http://www.siemens.de/automation/csi_en_WW)
- Support request form (http://www.siemens.com/automation/support-request)
- After Sales Information System SIMATIC IPC/PG (http://www.siemens.com/asis)
- SIMATIC Documentation Collection (http://www.siemens.com/simatic-tech-doku-portal)
- Your local representative (http://www.automation.siemens.com/mcms/aspa-db/en/Pages/default.aspx)
- Training center (http://sitrain.automation.siemens.com/sitrainworld/?AppLang=en)
- Industry Mall (https://mall.industry.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- MLFB of the device
- BIOS version for industrial PC or image version of the device
- Other installed hardware
- Other installed software

Tools & downloads

Please check regularly if updates and hotfixes are available for download to your device. The download area is available on the Internet at the following link:

After Sales Information System SIMATIC IPC/PG (http://www.siemens.com/asis)

A.2 Troubleshooting

This section provides you with tips on how to locate and/or troubleshoot problems which occur.

Problem	Possible cause	Possible remedy
The device is not operational	No power supply	• Check the power supply, the network cable and the power plug. • Check if the On/Off switch is in the correct position.
	Device is being operated outside the specified ambient conditions	• Check the ambient conditions. • After transport in cold weather, wait approximately 12 hours before switching on the device.
The 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.
	The brightness button has been set to dark	Increase brightness using the brightness button. For detailed information, refer to the monitor operating instructions.
	The power cord or the monitor cable is not connected.	• Check whether the power cord has been properly connected to the monitor and to the system unit or to the grounded shockproof 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 and measures, 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 available when you start the user 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 for the mouse cable, also check these connectors.
		If the mouse pointer still does not appear on the screen after you have performed these checks and actions, contact your technical support team.
Wrong time and/or date on the PC		1. Press <ESC> during the booting process to open the BIOS Setup. 2. Set the time and date in the setup menu.
Although the BIOS setting is OK, the time and data are still wrong.	The backup battery is dead.	Replace the backup battery.

Problem	Possible cause	Possible remedy
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.	• Turn on USB Legacy Support for mouse and keyboard. • For other devices, you need the USB device drivers for the required operating system.
DVD/CD drive door, if present, 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, for example, an opened paper clip, into the emergency extraction opening of the drive. Apply pressure carefully until the door opens. 3. Pull the door out further with your hand.
The screen flickers when the mouse moves or when programs are called	DDC information is not available. Possible causes: • Monitor does not supply DDC information • KVM switch does not forward DDC information • Y cable adapter with DVI-I for DVI-D/VGA connector is being used	• Use a monitor that supports DDC • Use a KVM switch that forwards DDC information • Use a simple cable adapter with only one interface
The startup of a Windows operating system on a GPT data carrier is aborted with the following error message: "Status: 0xc0000225 Info: The boot selection failed because a required device is inaccessible"	The boot parameters in the boot loader file "BCD" are incorrect or damaged.	Run "Startup and Repair" from Microsoft Windows: 1. Insert the Recovery DVD into the optical drive. 2. Start the boot manager using the <F12> key during booting 3. Select the line with "UEFI" in front of the name of the optical drive 4. Click "Next" in the language selection window 5. In the following "Install Windows" dialog, click on "Repair your computer" or press the <R> key. The "System Recovery Options" dialog appears. The system is checked for errors. 6. Next, click "Repair and restart"

Error displays on the front panel

Front LED	Possible cause	Details about the error display
Red WATCHDOG LED is lit	Watchdog has triggered	See section "Watchdog (WD)"
Red TEMP LED is lit	Excess temperature in the device	See section "Temperature monitoring/display"
Red FAN LED is lit	Fan failure	See section "Fan monitoring"
Red HDD0 ALARM LED is lit	RAID reports that hard disk 0 is defective	See section "Status displays"
Red HDD1 ALARM LED is lit	RAID reports that hard disk 1 is defective	See section "Status displays"
Red HDD2 ALARM LED is lit	RAID reports that hard disk 2 is defective	See section "Status displays"
HDD | HDD3 ALARM is lit in red or flashes green	RAID reports that hard disk 3 is defective	See section "Status displays"
HDD0, HDD1, HDD2 ALARM and HDD | HDD3 ALARM flash red	RAID is in the "rebuild" state	See section "Status displays"
HDD0, HDD1, HDD2 ALARM and HDD | HDD3 ALARM is lit in red	RAID system is not ready for operation:	Affected drive must be identified with the help of the RAID software. See section "Expanding and assigning parameters to the device", section "Drives" and section "Managing RAID systems".
PN I MPI/DP lights up red	A fault has occurred on the CPU 1616 onboard interface	See section "Status displays"
All front-panel LEDs are constantly lit	Error in early BIOS-POST	Contact Technical Support.

A.3 Troubleshooting status indicators

Error displays on the front panel

Front LED	Possible cause	Details about the error display
HDD0 ALARM LED lights up red	RAID signals that hard disk 0 is defective	See section "Maintaining and repairing the device" in the Operating Instructions for the IPC.
HDD1 ALARM LED lights up red	RAID signals that hard disk 1 is defective	
HDD2 ALARM LED lights up red	RAID signals that hard disk 2 is defective	
HDD3 ALARM lights up red	RAID signals that hard disk 3 is defective	
HDD0, HDD1, HDD2, and HDD3 ALARM LEDs flash red	RAID is in the "rebuild" state	
HDD0, HDD1, HDD2, and HDD3 ALARM LEDs light up red	RAID system is not ready for operation:	The affected drive must be identified using the RAID software. See section "Maintaining and repairing the device" in the Operating Instructions for the IPC.
PN I MPI/DP lights up red	A fault has occurred on the CPU 1616 onboard interface	See section "Communication Processor CP 1616 onboard" in the Operating Instructions for the IPC.
All front-panel LEDs are constantly lit	Error in early BIOS-POST	Contact Technical Support.

Redundant power supply

Problem	Possible cause	Possible remedy
Device failure despite redundant power supply in case of power failure	• One module is not switched on • Both modules are connected so the same AC circuit	• Switch on both modules • Connect modules to separate AC circuits

A.4 RAID system and device startup

Problem	Cause	Remedy
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	The messages have no negative effect on the operation of the device and can be ignored. Acknowledge the messages.
	RAID is activated	Install the software again from the supplied "Documentation and Drivers" DVD.
After changing the drive, the system does not boot from the RAID system	RAID system does not have highest boot priority	BIOS setup, Boot menu: • Permit RAID system in the boot priority • Set the RAID system to be first in the boot priority order.
After changing the drive, "unused" is indicated for the relevant SATA port	System was booted without functioning drive. The removable drive bay might not be switched on.	Reboot the system with a functioning drive.
Computer does not boot or "Boot device not found" is displayed	• The boot device is not permitted • The boot device is not in first place of the boot priority in the BIOS setup • The boot data carrier is set up with GPT and UEFI boot is deactivated in the BIOS setup	• In the BIOS setup "Boot" menu, permit the boot device in the boot priority • In the BIOS setup "Boot" menu, change the boot priority of the Boot device • Activate UEFI boot in the BIOS setup.

Problem	Cause	Remedy
The startup of a Windows operating system on a GPT data carrier is aborted with the following error message: "Status: 0xc0000225 Info: The boot selection faild because a required device is inaccessible"	The boot parameters in the boot loader file "BCD" are incorrect or damaged.	Execute "Startup and Repair" from Microsoft Windows: 1. Insert the Recovery DVD into the optical drive. 2. Select the line with "UEFI" in front of the name of the optical drive. 3. Click "Next" in the language selection window. 4. In the following "Install Windows" dialog, click on "Repair your computer" or press the <R> key. The "System Recovery Options" dialog appears. The system is checked for errors. 5. Next, click "Repair and restart".

Problem	Possible cause	Possible remedy
After changing the hard disk, the system does not boot from the RAID system	RAID system does not have highest boot priority	BIOS setup, boot menu: • Permit RAID system in the boot priority • Set the RAID system to be first in the boot priority order.
Computer does not boot or "Boot device not found" is displayed	• The boot device is not permitted • The boot device is not in first place of the boot priority in the BIOS setup • The boot data carrier is set up with GPT and UEFI boot is deactivated in the BIOS setup	• In the BIOS setup, "Boot" menu, permit the boot device in the boot priority • In the BIOS setup, "Boot" menu, change the boot priority of the boot device • Activate UEFI boot in the BIOS setup.
RAID software cannot be started	• No Windows password • The Windows password was set up subsequently • Main memory capacity < 4 GB	• Uninstall and then reinstall RAID software • Increase main memory capacity to at least 4 GB.
RAID software displays no details of the RAID system	• No Windows password • The Windows password was set up subsequently	• Uninstall and then reinstall RAID application
Monitoring software signals implausible states	Sampling rate of the SIMATIC monitoring software not reduced	Increase "RaidUpdateFactor" via registry key. For details see section "Installation of Hardware RAID Controller Software".
Adaptec Storage Manager software cannot be started	Certificate error	Change address in the link to the Adaptec Storage Manager software to "localhost". Requirement: The certificate is stored in the "Trusted Root Certification Authorities" certificate store and is not expired.

A.5 Notes on the use of third-party modules

Problem	Possible cause	Possible remedy
The PC crashes during startup.	• I/O addresses are assigned twice. • Hardware interrupts and/or DMA channels are assigned twice • Signal frequencies or signal levels are not adhered to • Different connector pin assignments	Check your computer configuration: • If the computer configuration corresponds with factory state, please contact your technical support team. • If the computer configuration has changed, restore the original factory settings. Remove all third-party expansion cards, then restart the PC. If the error no longer occurs, the third-party expansion card was the cause of the fault. Replace this expansion card with a Siemens card or contact the card supplier.
		If the PC still crashes, contact your technical support team.
	PCIe Gen1 expansion card does not behave according to specification.	1. Remove the expansion card. 2. Set the respective setup parameter "PCIe Speed" permanently to "Gen1" in the "Advanced > PCI Express Configuration" menu, submenu "PCI Express Root Port #" of the BIOS Setup. 3. Set the respective setup parameter "PEG# - Gen X" permanently to "Gen1" in the "Advanced > Video Configuration" menu, submenu "Pci Expess Graphic" of the BIOS Setup. 4. Install the expansion card again.

Abbreviations

B

Abbreviation	Term	Meaning
AC	Alternating current	Alternating current
ACPI	Advanced Configuration and Power Interface	
PLC	Programmable controller	
AGP	Accelerated Graphics Port	High speed bus system
AHCI	Advanced Host Controller Interface	Standardized controller interface for SATA devices. This is supported in Microsoft Windows XP as of SP1 and IAA driver.
AMT	Active Management Technology	Remote maintenance technology from Intel
APIC	Advanced Programmable Interrupt Controller	Extended programmable interrupt controller
APM	Advanced Power Management	Tool for monitoring and reducing power consumption of the PC
AS	Automation system	
ASIS	After Sales Information System	
AT	Advanced Technology	
ATA	Advanced Technology Attachment	
ATX	AT-Bus-Extended	
AWG	American Wire Gauge	US standard for the cable diameter
BIOS	Basic Input Output System	Basic Input Output System
CAN	Controller Area Network	
CD-ROM	Compact Disc – Read Only Memory	Removable storage medium for large data volumes
CD-RW	Compact Disc – Rewritable	Rewritable CD
CE	Communauté Européenne (CE symbol)	The product is in conformance with all applicable EC directives
CF	Compact Flash	
CGA	Color Graphics Adapter	Standard monitor interface
CIRA	Client Initiated Remote Access	Administration of AMT PCs not in the intranet
CLK	Clock pulse	Clock signal for controllers
CMOS	Complementary Metal Oxide Semiconductors	Complementary metal oxide semiconductors
COA	Certificate of authentication	Microsoft Windows Product Key
CoL	Certificate of License	License authorization
COM	Communications Port	Term for the serial interface
CP	Communication Processor	Communication computer
CPU	Central Processing Unit	CPU

Abbreviation	Term	Meaning
CRT	Cathode Ray Tube	
CSA	Canadian Standards Association	Canadian organization for tests and certifications according to own or binational standards (with UL / USA) standards
CTS	Clear To Send	Clear to send
DRAM	Dynamic Random Access Memory	
DC	Direct Current	DC current
DCD	Data Carrier Detect	Data carrier signal detection
DDRAM	Double Data Random Access Memory	Memory chip with high-speed interface
DHCP	Dynamic Host Configuration Protocol	Protocol for configuring IP networks
DMA	Direct Memory Access	Direct memory access
DOS	Disk Operating System	Operating system without GUI
DP	Display Port	New powerful digital monitor port
DQS	Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagement mBH	
DSR	Data Set Ready	Ready for operation
DTK	Developer Tool Kit	Tools for software development, testing, configuration etc.
DTR	Data Terminal Ready	Data terminal is ready
DVD	Digital Versatile Disk	Digital versatile disk
DVI	Digital Visual Interface	Digital display interface
DVI-I	Digital Visual Interface	Digital display interface with digital and VGA signals
ECC	Error checking and correction	Error correction code
ECP	Extended capability port	Extended parallel port
EFI	Extensible Firmware Interface	
EGA	Enhanced Graphics Adapter	PC to monitor interface
ESD	Components sensitive to electrostatic charge	
DM	Electronic Manual	
EIDE	Enhanced Integrated Drive Electronics	An enhancement of the IDE standard
EISA	Extended Industry Standard Architecture	Extended ISA standard
EMM	Expanded Memory Manager	Manages memory expansions
EM64T	Extended Memory 64 technology	
EN	European standard	
EPROM / EEPROM	Erasable Programmable Read-Only Memory / Electrically Erasable Programmable Read-Only Memory	Plug-in submodules with EPROM/EEPROM chips
EPP	Enhanced Parallel Port	Bi-directional Centronics interface
ESC	Escape character	Control character
EWF	Enhanced Write Filter	
FAQ	Frequently Asked Questions	FAQs
FAT 32	File Allocation Table 32-bit	32-bit file allocation table
FBWF	File-Based Write Filter	
FD	Floppy disk	Disk drive, 3.5"
FQDN	Fully qualified domain name	Full name of a domain

Abbreviation	Term	Meaning
FSB	Front Side Bus	
GND	Ground	Chassis ground
GPT	Globally Unique Identifier Partition Table	
HD	Hard disk	Hard disk
HDA	High Definition Audio	
HDD	Hard Disk Drive	Hard disk drive
HU	Height unit	
HMI	Human Machine Interface	User interface
HORM	Hibernate Once - Resume Many	
HT	Hyper-Threading	
HTML	Hyper Text Markup Language	Script language for creating Internet pages.
HTTP	Hypertext Transfer Protocol	Protocol for data transfer on the Internet
Hardware	Hardware	
I/O	Input/Output	Data input/output on computers
IAA	Intel Application Accelerator	
IAMT	Intel Active Management Technology	Diagnostics, management and remote control of PCs
IDE	Integrated Device Electronics	
IDER	IDE Redirection	Remotely mounting an ISO file as a drive
IEC	International Electronical Commission	
IGD	Integrated Graphics Device	
IP	Ingress Protection	Degree of protection
IR	Infrared	Infrared
IRDA	Infrared Data Association	Standard for data transfer via IR module
IRQ	Interrupt Request	Interrupt request
ISA	Industry Standard Architecture	Bus for expansion cards
ITE	Information Technology Equipment	
KVM	Keyboard, Video, Mouse	
L2C	Level 2 cache	
LAN	Local Area Network	Computer network that is limited to a local area.
LCD	Liquid Crystal Display	Liquid crystal display
LED	Light Emitting Diode	Light emitting diode
LPT	Line Printer	Printer port
LVDS	Low Voltage Differential Signaling	
LW	Drive	
MAC	Media access control	Media access control
MC	Memory card	Memory card in credit card format
ME	Management engine	Unit implemented by AMT
MEBx	Management Engine BIOS Extension	User interface for basic configuration of AMT
MLC	multi-level cell	Memory cells in which generally more than one bit per cell are saved
MLFB	Machine-readable product designation	
MMC	Micro Memory Card	Memory card of the format 32 mm x 24.5 mm

Abbreviation	Term	Meaning
MPI	Multipoint-capable interface for programming devices	
MPS	Manageability Presence Server	Proxy for AMT
MS-DOS	Microsoft Disc Operating System	
MTBF	Mean Time Between Failures	
MUI	Multilanguage User Interface	Language localization in Windows
NA	Not Applicable	
NAMUR	Normenarbeitsgemeinschaft for Mess- und Regelungstechnik in der chemischen Industrie (standardization body for instrumentation and control technology in the chemicals industry)	
NC	Not Connected	Not connected
NCQ	Native Command Queuing	Automatic re-sorting of the file and disk access, for increased performance
NEMA	National Electrical Manufacturers Association	Syndicate of manufacturers of electrical components in the USA
NMI	Non Maskable Interrupt	Interrupt the processor can not reject
NTFS	New Techniques File System	Secure file system for Windows versions (2000, XP, 7)
ODD	Optical Disk Drive	
OPC	OLE for Process Control	Standardized interface for industrial processes
PATA	Parallel ATA	
PC	Personal computer	
PCI	Peripheral Component Interconnect	High-speed expansion bus
PCIe	Peripheral Component Interconnect express	High-speed serial, differential full-duplex PtP interface with high data rate.
PCMCIA	Personal Computer Memory Card International Association	
PI	Protective Earth	Protective conductor
PEG	PCI Express Graphics	
PG	Programming device	
PIC	Programmable Interrupt Controller	Programmable interrupt controller
POST	Power On Self Test	
PRTC	Protected Real Time Clock	Clock in the management engine MEBx
PXE	Preboot Execution Environment	Software for running new PCs without hard disk data via the network
RAID	Redundant Array of Independent Disks	Redundant hard disk array
RAL	Restricted Access Location	Installation of device in operating facilities with restricted access - for example, a locked switchgear cabinet
RAM	Random Access Memory	
RI	Ring Input	Incoming call
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

Abbreviation	Term	Meaning
RxD	Receive Data	Data transfer signal
SAS	Serial attached SCSI	
SATA	Serial Advanced Technology Attachment	
SCSI	Small Computer System Interface	
SDRAM	Synchronous DRAM	
SELV	Safety Extra Low Voltage	Safety extra low voltage
SLC	Second Level Cache	
	single-level cell	Memory cells in which only one bit per cell is saved
SMART	Self Monitoring Analysis and Reporting Technology	Hard disk error diagnostics program
SMS	Short Message Service	Short message via telecommunication network
SNMP	Simple Network Management Protocol	Network protocol
SO-DIMM	Small Outline Dual Inline Memory Module	
SOL	Serial over LAN	Text-based remote control
SOM	SafeCard on Motherboard (SOM)	
SPP	Standard Parallel Port	Synonym for parallel port
SRAM	Static Random Access Memory	Static RAM
SSD	Solid State Drive	
SVGA	Super Video Graphics Array	Enhanced VGA standard with at least 256 colors
SVP	Serial number of the device	
SW	Software	
TCO	Total Cost of Ownership	
TFT	Thin-Film-Transistor	Type of LCD flat-screen
TTY	Tele Type	Asynchronous data transfer
TxD	Transmit Data	Data transfer signal
TXT	Trusted Execution Technology	Hardware implementation
TWD	Watchdog Time	Watchdog monitoring time
UEFI	Unified Extensible Firmware Interface	
UL	Underwriters Laboratories Inc.	US organization for tests and certifications according to own or binational standards (with CSA / Canada) standards.
UMA	Unified Memory Architecture	Video memory
URL	Uniform Resource Locator	Designation of the full address of an Internet page
USB	Universal Serial Bus	
UXGA	Ultra Extended Graphics Array	Graphic standard, maximum resolution 1600x1200 pixels.
V.24		ITU-T standardized recommendation for data transfer via serial ports.
VCC		Positive supply voltage of integrated circuits
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.

Abbreviation	Term	Meaning
VT-D	Virtualization Technology for Directed I/O	Enables the direct assignment of a device (e.g. network adapter) to a virtual device.
W2k	Windows 2000	
WAN	Wide Area Network	
WAV	Wave Length Encoding	Loss-free file format for audio data.
WD	Watchdog	Program monitoring with error detection and alarming.
WLAN	Wireless LAN	LWireless local area network
WoL	Wake on Local Area Network	
WWW	World Wide Web	
XD	Execute Disable Capability	Hardware implementation
XGA	Extended Graphics Array	Graphic standard, maximum resolution 1024x768 pixels.
ZMM	Zero Maintenance Cache Protection Module	Maintenance-free cache unit for saving cache contents

Glossary

AHCI mode

AHCI is a standardized method to address the SATA controller. AHCI describes a structure in the RAM, which contains a general area for control and status, as well as a command list.

APIC mode

Advanced peripheral interrupt controller. 24 interrupt lines are available.

ATAPI CD-ROM Drive

AT Bus **A**ttachment **P**acket **I**nterface (connected to AT bus) CD-ROM drive

Automation system (AS)

A programmable controller (PLC) of the SIMATIC S7 system consist of a central controller, one or several CPUs, and various I/O modules.

Backup

Duplicate of a program, data medium or database, used either for archiving purposes or for the protection of vital and non-replaceable data against loss when the working copy is corrupted. Certain applications automatically generate backup copies of data files, and manage both the current and the previous versions on the hard disk.

Baud

Physical unit for the step speed in signal transmission. Defines the number of transferred signal states per second. With only two states, one baud is equivalent to a transmission rate of 1 bps.

Boot disk

A boot disk is a disk with a "Boot" sector. This can be used to load the operating system from the disk.

Cache

High-speed access buffer for interim storage (buffering) of requested data.

CE marking

Communauté **E**uropéene The CE mark confirms compliance of the product with corresponding EC Directives, for example, with the EMC Directive.

Chipset

Located on the motherboard, connects the processor with the RAM, the graphics controller, the PCI bus, and the external interfaces.

Cold restart

A start sequence, starting when the computer is switched on. The system usually performs some basic hardware checks within the cold start sequence, and then loads the operating system from the hard disk to work memory -> boot

COM interface

The COM interface is a serial V.24 interface. The interface is suitable for asynchronous data transfer.

Compact Flash cards (CF)

Compact Flash is a digital storage medium in card format and without moving parts. The CF card contains the non-volatile memory and the controller. The interface of the CF card corresponds with the IDE interface. CF cards can be operated without additional electronics on PCMCIA or IDE hard disk controllers using a plug and socket adapter. There are two design forms: CF-I (42.6 x 36.4 x 3.3 mm) and CF-II (42.8 x 36.4 x 5 mm).

Configuration files

These are files containing data which define the configuration after restart. Examples of such files are CONFIG.SYS, AUTOEXEC.BAT and the registry files .

Configuration software

The configuration software updates the device configuration when new modules are installed . This is done either by copying the configuration files supplied with the module or by manual configuration using the configuration utility.

Controller

Integrated hardware and software controllers that control the functions of certain internal or I/O devices (for example, the keyboard controller).

Device configuration

The configuration of a PC or programming device contains information on hardware and device options, such as memory configuration, drive types, monitor, network address, etc. The data are stored in a configuration file and enable the operating system to load the correct device drivers and configure the correct device parameters. . If changes are made to the hardware configuration, the user can change entries in the configuration file using the SETUP program. .

Disc-At-Once

With this burning technique, data are written to a CD in a single session, and the CD is then closed. Further write access is then no longer possible.

DP

Display **P**ort: New digital monitor interface.

Drivers

Program parts of the operating system. They adapt user program data to the specific formats required by I/O devices such as hard disk, printers, and monitors.

Dual Core CPU

Dual-core processors significantly increase the speed of computing and program execution compared to the previous generation of single-core processors with hyper threading technology.

ECC

Error checking and correction is a method for detecting and correcting errors when saving and transferring data, frequently used in conjunction with RAM modules with and without ECC.

EMC directive

Directive concerning **E**lectro**m**agnetic **C**ompatibility. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

Energy management

The energy management functions of a modern PC allow individual control over the current consumption of vital computer components (e.g. of the monitor, hard disk and CPU), by restricting their activity based on the current system or component load. Energy management is of particular importance for mobile PCs.

Energy options

The energy options can be used to reduce energy consumption of the computer, while keeping it ready for immediate use. This can be configured in Windows by selecting Settings > Control Panel > Energy options.

Enhanced Write Filter (EWF)

Configurable write filter that allows you, for example, to boot Windows Embedded Standard from write-protected media (such as CD-ROM), to write protect individual partitions and adapt the performance of the file system to your needs (when using Compact Flash cards).

ESD directive

Directive for using electrostatic sensitive components.

Ethernet

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

Execute Disable Capability

Hardware implementation that prevents mutual memory accesses by programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Extensible Firmware Interface (EFI)

Refers to the central interface between the firmware, the individual components of a computer and the operating system. EFI is located logically beneath the operating system and represents the successor to PC BIOS, focusing on 64-bit systems.

File Based Write Filter (FBWF)

Configurable write filter to protect individual files from write access.

Formatting

Basic partitioning of memory space on a magnetic data medium into tracks and segments. Formatting deletes all data on a data medium. All data media must be formatted prior to their first use.

Gender changer

Using the gender changer (25-pin / 25-pin), the COM1/V24/AG interface of the SIMATIC PC family can be converted to the usual 25-pin male connector.

HORM

Hibernate once, resume many is a method for fast booting from a single Hibernate file that only needs to be created once. HORM ensures restoration of a uniform, saved system state when booting. This reduces the writing to a CompactFlash medium to a minimum, for example, when starting up and shutting down Windows Embedded Standard 2009.

Hot swap

The SATA interface gives the device's hard drive system hot swapping capability. Prerequisite for this configuration is a RAID1 system with SATA RAID controller (onboard, or slot module), and at least two SATA removable drive bays. Advantages of hot swap: defective hard drives can be replaced without reboot.

Hub

A term in network technology. In a network, a device joining communication lines at a central location, providing a common connection to all devices on the network.

Hyper Threading

HT technology (multi-threading) enables the parallel computing of processes. HT is only effective when all relevant system components, such as processors, operating systems and applications are supported.

IGD

Integrated Graphics Device. Graphics interface integrated in the chipset.

Image

This refers to the image, for example, of hard disk partitions saved to a file in order to restore them when necessary.

Intel Active Management Technology

This technology permits the diagnostics, management and remote control of PCs. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Intel VT

The Intel Virtualization Technology (IVT) is the implementation of a secure closed environment for applications. Special (visualization) software an a VT-capable processor is required for its use.

Interface

See Interface

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

Interface

See Interface

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

Interface, multi-point

MPI is the programming interface of SIMATIC S7/M7. Allows remote access to programmable modules, text-based displays and OPs from central locations. The MPI nodes can intercommunicate.

LAN

Local Area Network: LAN is a local network that consists of a group of computers and other devices that are distributed across a relatively restricted range and are linked with communication cables. The devices connected to a LAN are called nodes. The purpose of networks is the mutual use of files, printers or other resources.

Legacy Boot Device

Conventional drives can be used as USB devices.

Legacy USB support

Support of USB devices (e.g. mouse, keyboard) on the USB ports without driver.

License key

The license key represents the electronic license stamp of a license. Siemens provides the license keys for protected software.

License key disk

The license key disk contains the authorizations or license keys required to enable protected SIMATIC software.

Low-voltage directive

EC Product Safety Directive relating to the safety of products which are operated on low voltage (50 V AC to 1000 V AC, 70 V DC to 1500 V DC) and not specified in other directives. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

LPT interface

The LPT interface (Centronics interface) is a parallel interface that can be used to connect a printer.

Memory card

Memory cards in credit card format. Memory for user programs and parameters, for example, for programmable modules and CPs.

Module

Modules are plug-in units for PLCs, programming devices or PCs. They are available as central modules, interface modules, expansion cards or mass storage (mass storage module).

Motherboard

The motherboard is the core of the computer. Here, data are processed and stored, and interfaces and device I/Os are controlled and managed.

Operating system

Generic term which describes all functions for controlling and monitoring user program execution, distribution of system resources to the user programs and the operating mode in cooperation with the hardware (for example Windows XP Professional).

Packet writing

The CD-RW is used as a disk medium. The CD can then be read only by packet–writing compatible software or has to be finalized. Finalization of a CD closes the CD within an ISO9660 shell. You can still write to the CD-RW several times in spite of finalization. Not all CD drives can read packet-written CDs . There are restrictions to using this method in general data transfer.

PATA

Interface for hard disk drives and optical drives, with parallel data transmission rate up to 100 Mbps.

PC card

Trademark of the Personal Computer Memory Card International Association (PCMCIA). Designation for auxiliary cards that conform with PCMCIA specifications. A PC card that has roughly the size of a credit card can be plugged into a PCMCIA slot. Version 1 specifies cards of Type I with a thickness of 3.3 millimeters, which are designed mainly for use as external memory. Version 2 of the PCMCIA specification also defines cards of Type II with a thickness of 5 mm and cards of Type III with a thickness of 10.5 mm. Type II cards can realize devices such as modems, fax cards and network interface cards. Type III cards are equipped with devices that require more space, for example wireless communications modules, or rotary storage media such as hard disk drives, for example.

PC/104 / PC/104-Plus

Two bus architectures are especially fashionable today in the industrial world: PC/104 and PC/104-*Plus*. Both are standard in single-board computers of the PC class. The electrical and logical layout of the two bus systems is identical with ISA (PC/104) and PCI (PC/104-*Plus*). Software cannot usually detect a difference between them and normal desktop bus systems. Their advantage is the compact design and the resulting space they save.

PCMCIA

Association consisting of approx. 450 member companies of the computer industry whose focus is set on providing worldwide standards for miniaturization and flexible use of PC expansion cards in order to provide basic technologies to the market.

PEG interface

PCI Express for Graphics. Graphics interface with 16 PCIe lanes for expansions with graphics modules.

PIC mode

Peripheral interrupt controller. 15 interrupt lines are available.

Pixel

PixElement (picture point). The pixel represents the smallest element that can be reproduced on-screen or on a printer.

Plug&Play

Generally, a reference to the ability of a computer to automatically configure the system for communication with peripheral devices (for example monitors, modems or printers). The user can plug in a peripheral and "play" it at once without manually configuring the system. A Plug&Play PC requires both a BIOS that supports Plug&Play and a Plug&Play expansion card.

POST

Self-test performed by the BIOS after the computer is switched on. Performs a RAM test and a graphics controller test, for example. The system outputs audible signals (beep codes) if the BIOS detects any errors; the relevant message indicating cause of error is output on the screen.

PROFIBUS/MPI

Process **F**ield **Bus** (standard bus system for process applications)

PROFINET

PROFINET is the name of the standard for Industrial Ethernet developed and maintained by the PROFIBUS user organization. PROFINET unites protocols and specifications with which Industrial Ethernet meets the requirements of industrial automation technology.

Programmable controller (PLC)

The programmable controllers (PLC) of the SIMATIC S5 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

PXE server

A **P**reboot E**x**ecution **E**nvironment server is part of a network environment and can provide software to connected computers even before they boot. This can involve operating system installations or servicing tools, for example.

RAID

Redundant **A**rray of **I**ndependent **D**isks: Data storage system which is used to save data and the corresponding error correction codes (parity bits, for example) to at least two hard disk volumes in order to enhance reliability and performance. The hard disk array is controlled by management programs and a hard disk controller for error correction. The RAID system is usually implemented in network servers.

RAL

Restricted **A**ccess **L**ocation: Installation of the device in a production facility with restricted access, for example, a locked control cabinet.

Recovery CD

Contains the tools for configuring hard disks and the Windows operating system.

Reset

Hardware reset: Reset/restart of the PC using a button/switch.

Restart

Warm restart of a computer without switching the power off (Ctrl + Alt + Del)

Restore DVD

The Restore DVD is used to restore the system partition or the entire hard disk to factory state if the system has crashed. The bootable DVD contains all the necessary image files. You can also create a boot disk allowing restoration via the network.

ROM

Read-Only Memory ROM is a read-only memory in which every memory location can be addressed individually. The programs or data are permanently stored and are not lost in the event of a power failure.

S.M.A.R.T

The Self-Monitoring, Analysis and Reporting Technology (SMART or S.M.A.R.T.) is an industry standard integrated in storage media. It makes for permanent monitoring of important parameters and early detection of imminent problems.

SAS

Serial SCSI interface for connection of hard drives, for example, with serial data transmission

SATA

Serial ATA Interface for hard disk drives and optical drives with serial data transmission.

SCSI interface

Small Computer System Interface Interface for connecting SCSI devices such as hard disk drives or optical drives.

Session-At-Once

In session at once, the CD can be written to both with an audio session and a data session. The two sessions are written to at once (as in disc at once).

SETUP (BIOS Setup)

A program in which information about the device configuration (that is the configuration of the hardware on the PC/PG) is defined. The device configuration of the PC/PG is preset with defaults. Changes must therefore be entered in the SETUP if a memory expansion, new modules or a new drive are added to the hardware configuration.

SSD (Solid State Drive)

A Solid State Drive is a drive that can be installed like any other drive; it does not contain a rotating disk or other moving parts because only semiconductor memory chips of similar capacity will be used. This design makes SSDs more rugged, provides shorter access times, low energy consumption and rapid data transfer.

STEP 7

Programming software for the creation of user programs for SIMATIC S7 controllers.

Track-At-Once

In track-at-once recording, a CD can be written to in bits in several sessions if the CD was not closed.

Troubleshooting

Error cause, cause analysis, remedy

Trusted Execution Technology

Hardware implementation that allows secured execution of programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Turbo Mode

In this mode individual processor cores can be clocked higher in accordance with the load from the user programs and as required. It is only supported by Core i5 and Core i7 processors.

V.24 interface

V.24 is a standardized interface for data transfer. Printers, modems, and other hardware modules can be connected to a V.24 interface.

Wake on LAN (WoL)

Wake on Local area network. This function allows the PC to be started via the LAN interface.

Warm restart

The restart of a computer after a program was aborted. The operating system is loaded and restarted again. The CTRL+ ALT+ DEL hotkey can be used to initiate a warm restart.

WLAN

Wireless **LAN** is a local network that transmits data via radio waves, infrared light or another wireless technology. Wireless LAN is mainly used for mobile computer applications in office or factory environments.

ZMM

Zero **M**aintenance Cache Protection **M**odule is a functional unit of the SAS Raid controller that stores the data in the cache of the controller in the case of a voltage failure. This functional unit is maintenance-free.

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