SIEMENS

SIMATIC

**Industrial PC
SIMATIC IPC647E**

Operating Instructions

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> ⚠ **DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> ⚠ **WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> ⚠ **CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

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

Trademarks

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

Disclaimer of Liability

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

Preface

Technical knowledge required for the use of these operating instructions

These operating instructions contain all the information you need for the installation, electrical connection, commissioning and expansion of the SIMATIC IPC647E and to maintain and repair the device.

The information in these operating instructions is intended for personnel with qualified expertise in the following areas:

- Mounting of industrial PCs and accessories
- Electrical installation
- Commissioning of industrial PCs
- Microsoft operating systems
- IT administration and network engineering
- Service and maintenance of industrial PCs

General knowledge in the field automation control engineering is recommended.

Range of validity of these operating instructions

These operating instructions are valid for all order versions of the SIMATIC IPC647E.

History

Currently released versions of these operating instructions:

Version	Comments
10/2018	First edition
08/2022	General update Addition: Information about SIMATIC IPC647E with AI Unit NVIDIA A2

Security information

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

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

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

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

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

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

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 OSD: Software Update Service (SUS) (https://support.industry.siemens.com/cs/ww/en/view/109759444).

Table of contents

Product description

<div style="text-align: right; font-size: 3em;">1</div>

1.1 Important instructions and manuals for operating the device

Documentation	Contents	Source
Operating instructions	• Product description • Technical specifications • Installation of the device • Operation of the device • Installing and removing hardware • Dimension drawings	• Supplied data storage medium • Online in the "Rack PC" section under: Documentation for SIMATIC Industrial PC (http://www.siemens.com/simatic-ipc-doku-portal)
Quick Install Guide	Information on: • Link and QR code to the online form for the quality control notification in the SIEMENS After Sales Information System (ASIS) • Operating Instructions of the device • Installation of the device • Steps for connecting the device to the power supply • Connecting I/O devices • Switching the device on	• Supplied in printed form with the device • Supplied data storage medium
Firmware/BIOS description	Information on: • Important firmware settings • Firmware settings in the delivery state • Boot modes	• Supplied data storage medium • Online at: Firmware/BIOS description (https://support.industry.siemens.com/cs/ww/en/view/109760621)

Documentation	Contents	Source
Windows® operating system	Information on: • Commissioning the operating system • Restoring the operating system • Configuration of the operating system	• Supplied data storage medium • Online at: Microsoft® Windows® 10 (https://support.industry.siemens.com/cs/ww/en/view/109749498) Microsoft® Windows® Server 2016 (https://support.industry.siemens.com/cs/ww/en/view/109760563) Microsoft® Windows® Server 2019 (https://support.industry.siemens.com/cs/ww/en/view/109773882)
SIMATIC IPC DiagBase	Information on: • Temperature monitoring • Fan monitoring • Monitoring drives • Watchdog • Operating hours counter • Battery monitoring	• Supplied data storage medium • Online at: SIMATIC IPC DiagBase (https://support.industry.siemens.com/cs/ww/de/view/109749690/en)
SIMATIC IPC DiagMonitor	Monitoring functions such as with SIMATIC IPC DiagBase with additional extended functions	• Online at: SIMATIC IPC DiagMonitor (https://support.industry.siemens.com/cs/ww/en/view/39129913)
SIMATIC IPC Image & Partition Creator	Information on: • Backup and recovery of files, directories, drive partitions	• Online at: SIMATIC IPC Image & Partition Creator (https://support.industry.siemens.com/cs/de/de/view/109780775)
SIMATIC NET	Industrial communication	• Online at: SIMATIC NET (http://w3.siemens.com/mcms/automation/en/industrielle-kommunikation/Seiten/Default.aspx)

See also

SIMATIC IPC Image & Partition Creator (https://support.industry.siemens.com/cs/de/en/view/109780775)

1.2   Product highlights

The SIMATIC IPC647E is a high-performance industrial PC in 19" installation format (2 U). It is perfectly suited for PC applications with high-level industry functionality.

Device view

Note

Depending on the configuration ordered the features and illustrations described in this manual may differ from the features of your device.

Maximum industrial compatiblity for 24-hour continuous use in industrial environments

- Maximum processor performance (in full version) without loss of performance (throttling) at up to 50° C ambient temperature

- Fully coated surfaces that repel dirt and corrosion

- Rugged all-metal enclosure, fully coated (blue-chromed) and painted on the outside to protect from corrosion and dirt with high EMC

- Suitable for installation in space-saving switchgear cabinet measuring only 500 m in depth

- Dust protection through overpressure venting concept with front-side fan and dust filter

- Protection against vibration and shock through corresponding hard drive retainer and card hold-down mechanism

High productivity through fast data processing

- 8th and 9th generation Intel® processors: Xeon, Core i7, Core i5 or Core i3 with up to 8 cores / 16 threads

- Graphics controller (630/P630) integrated in the processor up to 4 K Ultra HD resolution

- Maximum performance, e.g. through Intel C246 chipset, DDR4 memory with support of dual channel technology

- High data transfer rates, e.g. via PCI Express Technology Gen 3, USB 3.1 Gen 2 SuperSpeed + (10 Gbps), M.2 NVME SSD

- Optional: AI Unit with NVIDIA A2 Tensor Core GPU for versatile inference acceleration in industrial AI applications

- Low noise impact thanks to closed-loop fan

High system availability thanks to minimization of standstill times (availability depending on configuration)

- High data security through RAID systems: Onboard RAID system or hardware RAID system

- RAID1 system: Data mirroring on two SATA or SAS drives, including in removable racks, and optionally with additional SSD (for operating system)

- Hot swap (swapping of drive during operation) in removable drive bays in RAID systems

- Fast identification and swapping of drives under error conditions through alarm LEDs for RAID systems

- Efficient event diagnostics through the SIMATIC IPC DiagBase or DiagMonitor monitoring software (optional)

- Remote control and remote maintenance of the device through iAMT (Intel® Active Management Technology)

- SSD as 2.5" SATA or M.2 NVMe and ECC memory (optional)

- Replacement of power supply module for redundant power supply in runtime

Differentiated safety concepts

- Lockable front door for component protection against unauthorized access, e.g.

  – Software dongle in USB connection behind the front door

  – Front fan can only be replaced when front door is open

  – All components inside the device can only be accessed when front door is open

- Device monitoring through operating displays on the front for Ethernet; alarms for fans, temperature, Watchdog and drives in RAID1 systems

High investment protection

- Platform with embedded Intel components for long-term stability
- Availability: 3 to 6 years
- Assured spare parts availability: 5 years after product phase-out
- Certified for worldwide marketing (cULus)
- Support of legacy interfaces (COM)
- Compatible installation across device generations
- Worldwide service and support

User-friendly application scenarios for commissioning, use and service

- High flexibility and expandability thanks to integrated interfaces and up to 4 slots (PCI and PCI Express)
- Pre-installed and activated operating system
- Fast restoration of delivery state of the operating system (with supplied data storage medium)
- Universal use as industrial workstation or industrial server
- Gbit LAN with teaming capability (3 x LAN 10/100/1000 Mbps connections)
- Service-friendly device configuration (modifications, service), e.g. replacement of filter or front fan without tools
- Flexible usage options with telescopic rails

1.3 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 and AI applications
- 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.

1.4 External design of the device

1.4.1 Front panel

Front: Front door is closed

① Fan cover of front fan with openings for ventilation of the device (locked by front door)
② System status displays (Page 27)
③ Front door: lockable, protection against unauthorized access
④ Lock
  • Key vertical: open
  • Key horizontal: closed
⑤ 19" mounting bracket with handle

Front: Front door is open
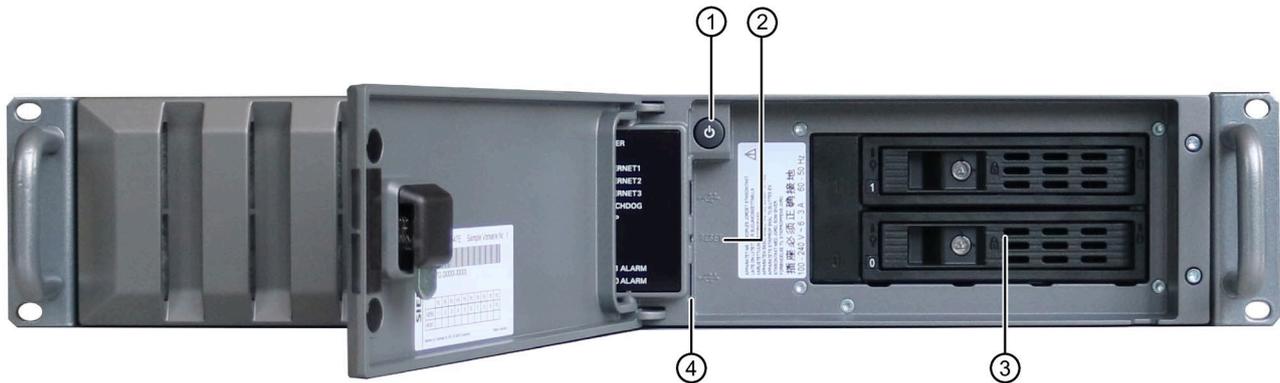
① On-off button, see Operator controls (Page 25)
② Reset button, see Operator controls (Page 25)
③ Drive cage (in this case type A); depending on the expansion variant, see:
  • Drive cage type A (Page 18)
  • Drive cage type B (Page 20)
④ Interfaces on the front of the device, see Device ports (Page 22)

1.4.2 Drive cage type A

Drives and mounting locations in the drive cage type B

The drive cage type A is located behind the front door.

You can install drives in removable trays, in which the drives are easily accessible from the outside without opening the device.

The removable trays can be locked, thus protecting the drives from unauthorized access.

(0)	Mounting location 0 for: • 2.5" drive in removable tray • 3.5" drive in removable tray
(1)	Mounting location 1 for: • 2.5" drive in removable tray • 3.5" drive in removable tray
(2)	Mounting location 2 (internal) for: • 2.5" drive internal via drive cage
(3)	Mounting location 3 (internal) for: • 2.5" drive internal via drive cage
(A)	Cover
(B)	Removable tray or blanking panel (if no removable tray present)

Components of the removable tray
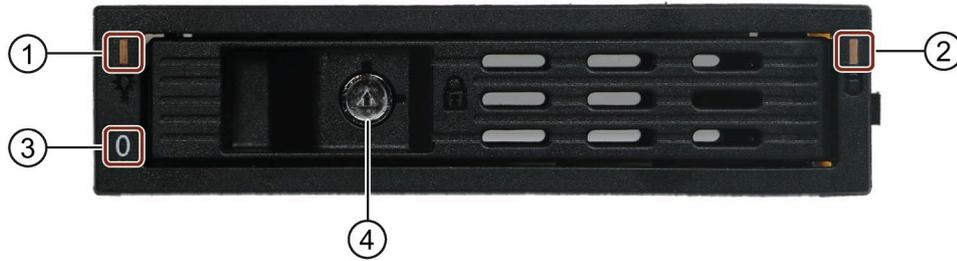
(1)	Status display (Page 29)
(2)	Status display (Page 29)
(3)	Number of the mounting location (here: Mounting location 0)
(4)	Lock

See also

Installation options for drives with drive cage type A (Page 114)

1.4.3 Drive cage type B

Drives and mounting locations in the drive cage type B

The drive cage type B is located behind the front door.

In the drive cage type B, drives are permanently installed internally and are provided with a drive bezel from the outside and are therefore not accessible.

The drives are particularly well protected against vibration and oscillation ("vibration-dampened drive cage").

In addition, up to 2 drives can be installed internally with mounting brackets above the drive cage type B.
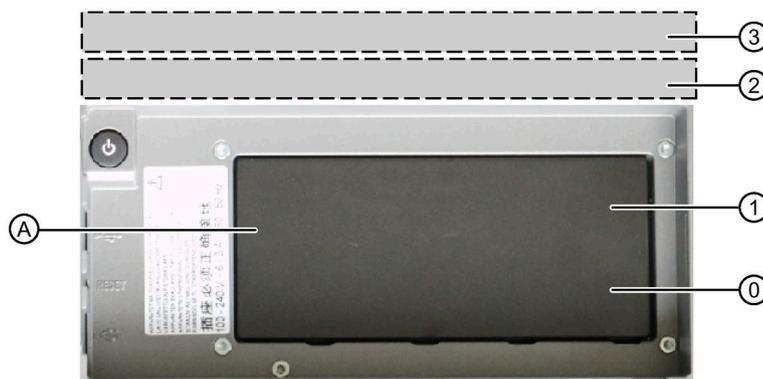
(0)	Mounting location 0 for:
	• 3.5" drive in the drive bay of the drive cage
(1)	Mounting location 1 for:
	• 3.5" drive in the drive bay of the drive cage
(2)	Mounting location 2 (internal) for:
	• 2.5" drive internal via drive cage
(3)	Mounting location 3 (internal) for:
	• 2.5" drive internal via drive cage
(A)	Cover

See also

Installation options for drives with drive cage type B (Page 123)

1.4.4 Rear of the device

①	Connection for functional earthing, see "Connection of equipotential bonding line (Page 57)"
②	Area for connections of plug-in expansion cards with numbers of the slots, see "Technical specifications of the expansion card slots (Page 162)".
③	Connections of the optional graphics card (here: NVIDIA Quadro P400 graphics card)
④	Fixing screws for strain relief (Page 64)
⑤	Range: Device ports (Page 22)
⑥	Power supply (here: redundant power supply)

1.4.5 Connections

1.4.5.1 Device ports

Connections on the front of the device

There are two USB connection sockets on the front of the device behind the front panel.

Observe the technical specifications of the connections on the device (Page 171).
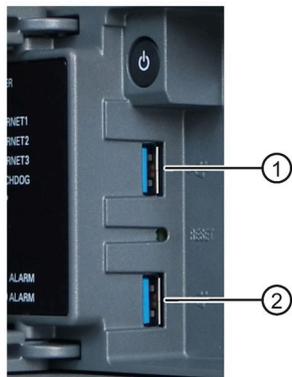
No.	Connection socket
①	USB 3.1 Gen 1; Type A (X66)
	SuperSpeed backwards compatible to USB 3.0 / 2.0 / 1.1; each 900 mA / high current[1]
②	USB 3.1 Gen 1; Type A (X67)
	SuperSpeed backwards compatible to USB 3.0 / 2.0 / 1.1; each 900 mA / high current[1]

[1] Sum of the currents on the USB interfaces of the device (including the internal USB interfaces) ≤ 3 A

Connections on the rear of the device

Observe the technical specifications of the connections on the device. (Page 171)

No.	Connection socket
①	COM2, optional (X31)
②	Audio (X90)
③	COM1 (X30)
④	DVI-D (X70), for connecting monitors to internal graphics card
⑤	DisplayPort (labeling on the device: DPP), for connecting monitors to internal graphics card
	• DPP 2 (X72)
	• DPP 1 (X71)
⑥	LAN 1 (X1 P1)
	Intel® Jacksonville i219-LM; AMT-capable
	iAMT and teaming cannot be used simultaneously on the LAN interface.
	The following teaming modes are supported:
	• Adapter Fault Tolerance (AFT)
	• Adaptive Load Balancing (ALB)
	• IEEE 802.3ad Dynamic Link Aggregation (DLA)
	• Static Link Aggregation (SLA)
	• Switch Fault Tolerance (SFT)
	LAN 2 (X2 P1) Intel® Springville i210-AT
	LAN 3 (X3 P1) Intel® Springville i210-AT
⑦	USB 3.1 Gen 2; Type C[2]
	backwards compatible to USB 3.0 / 2.0 / 1.1; each 1500 mA / high current[1]
	• (X61)
	• (X63)
⑧	USB 3.1 Gen 2; Type A SuperSpeed; backward compatible with USB 3.0 / 2.0 / 1.1; 900 mA each / high current[1]
	• (X60)
	• (X62)
⑨	2 x USB 3.1 Gen 2; Type A SuperSpeed; backward compatible with USB 3.0 / 2.0 / 1.1; 900 mA each / high current[1]
	• (X64)
	• (X65)

[1] Sum of the currents on the USB interfaces of the device (including the internal USB interfaces) ≤ 3 A

[2] Maximum cable length: max. 3 m; depending on attenuation of the cable and maximum data rate of the connection.

Use the original connection technology of the I/O devices to be connected without adapters and without extensions.

Connections of optional graphics cards

Optional graphics cards are expansion cards. After installing an optional graphics card, the following connections are available on the back of the device (Page 21) in the vicinity of the expansion cards for connecting monitors.

- NVIDIA Quadro P400 graphics card: 3 x Mini Display Port

For information on how to connect monitors with adapters to these ports, see "Hardware accessories (Page 31)".

You can find information on the optional graphics cards under "Technical specifications of graphic (Page 168)".

1.4.5.2 Power supply connections

Sockets for power plugs with single and redundant power supply
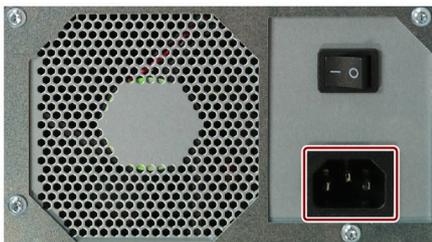
Single power supply (400 W)   **Redundant power supply (350 W)**

1.4.6   Operator controls

⚠ WARNING
Risk of electric shock
The buttons and switches described in the following do not fully disconnect the device from the line voltage.
You also need to the notes and information under "Switching off the device (Page 66)".

On-off switch with single and redundant power supply

The following figures show the location of the on/off switch on the rear of the device for devices with simple or redundant power supply.

Single power supply (400 W)

Redundant power supply (350 W)

On-off button and Reset button for single and redundant power supply

The on-off button ① and the reset button ② are located on the front of the device behind the front door.

①	On/off button
②	Reset button

- The On/off button starts and shuts down the operating system.

    You can find information on switching the device on and off under "Switching on the device (Page 65)" and "Switching off the device (Page 66)".

- The reset button is for the emergency when the device can no longer be operated.

    You can find information on the hardware reset under "Switching off the device (Page 66)".

Alarm reset button with redundant power supply

The alarm reset button is only available for devices with redundant power supply and it is simultaneously the status display of the redundant power supply (Page 29).

Use the alarm reset button to switch off the signal tone of the redundant power supply in the event of an error.

1.4.7 Status displays

1.4.7.1 System status displays

The status displays for the system are located on the front of the device. They provide information on the status of the device components.
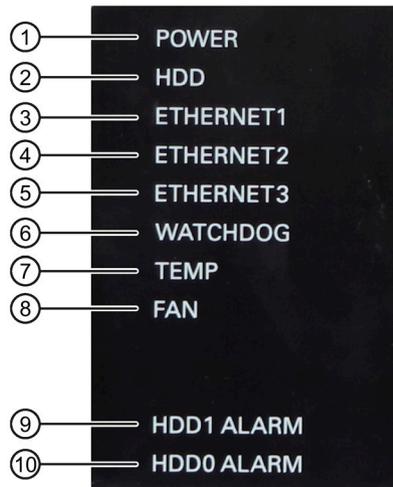
No.	Status display	Meaning	Status	Description of the status
①	POWER	Operating mode of the PC	OFF	Switched off or disconnected from the mains
			YELLOW	Idle state or shut down
			GREEN	PC in operation
②	HDD	Access to drive	OFF	No access
			GREEN	Access
③ ④ ⑤	ETHERNET 1 ETHERNET 2 ETHERNET 3	Ethernet status display	OFF	• No connection • No data traffic
			GREEN	Data traffic
⑥	WATCHDOG	Watchdog status	OFF	Not activated
			GREEN	Activated
			RED	Expired
⑦	TEMP	Temperature status	OFF	No error
			RED	Possible causes: • CPU temperature is critical • Device temperature is critical

No.	Status display	Meaning	Status	Description of the status
⑧	FAN	Fan status	OFF	No error
			RED	Possible causes: • Front fan faulty • The fan on the processor heat sink is faulty • Fan on drive cage type A faulty • Fault in fan of the single power supply (400 W)
⑨ ⑩	HDD1 ALARM HDD0 ALARM	HDD alarm in combination with RAID and monitoring software. The number of the HDD alarm corresponds to the number of mounting locations of drives, see "Drive cage type A (Page 18)" and "Drive cage type B (Page 20)".	OFF	RAID is OK
			A RED LED is lit up	Associated drive is not OK
			All RED LEDs are flashing	RAID synchronization running, RAID is not OK In case of error, the newly mounted drive is synchronized with an existing drive.
			All RED LEDs are lit up	RAID is not OK The faulty drive could not be located by the monitoring software. It may be possible to determine the defective drive with the RAID software. You can find information under "RAID1 system (Page 69)".

1.4.7.2 Status display of the Ethernet interface

The Ethernet interfaces are numbered on the housing for a unique description.
The numbering by the operating system may deviate from this.
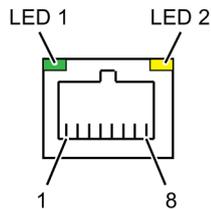
Status display	Status	Meaning of the status
LED 1	Off	10 Mbps
	Lit green	100 Mbps
	Lit orange	1000 Mbps
LED 2	Lit	Connection exists
	Flashes	Activity

1.4.7.3 Status display of redundant power supply

Status display	Meaning	Status	Meaning of the status
Power supply module	Status of the power supply module	OFF	• Module is out of service, no redundancy in effect.
		GREEN	• The module is in operation and functioning. • Redundancy is in effect when both modules are operating.
		RED	• Module failed, no redundancy in effect.

1.4.7.4 Status displays on removable tray for drives

No.	Status display	Meaning	Status	Meaning of the status
①	Power	Status of the removable tray	OFF	• Device switched off • Power supply not connected • No drive installed
			GREEN	• Device is switched on and a drive is installed
②	Activity	Status of the drive	ORANGE	• Drive is active
			OFF	• Drive is not active

1.5 Internal construction of the device
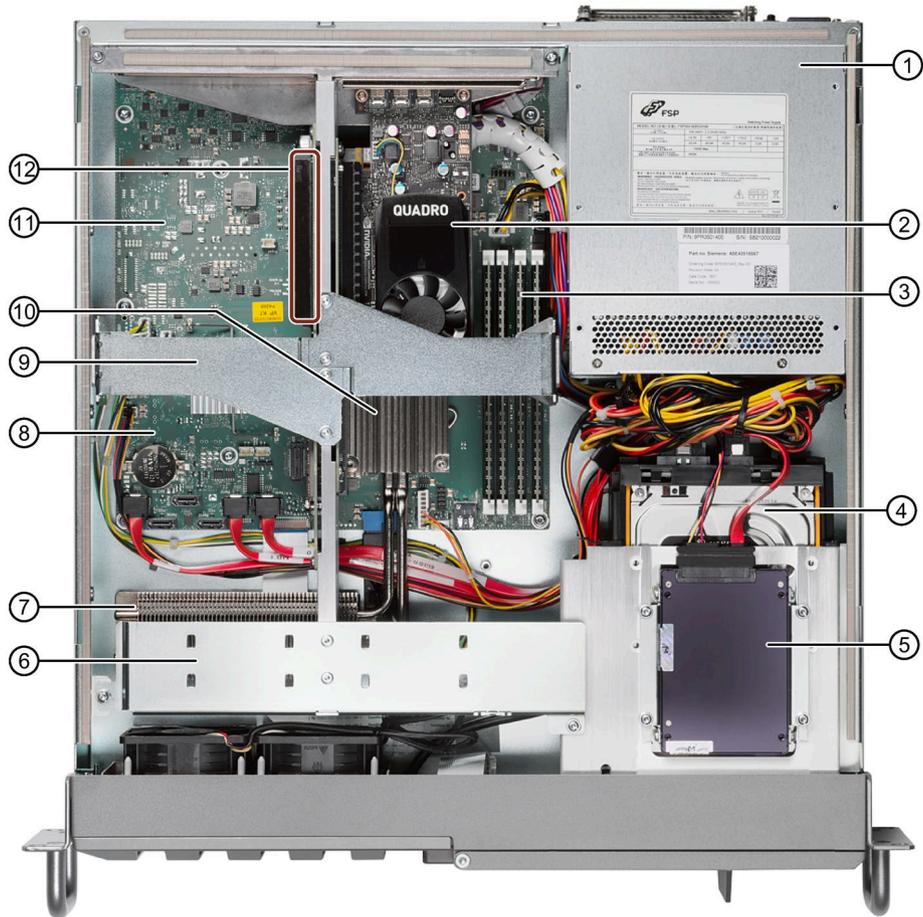
①   Power supply, single or redundant (here in the example: redundant power supply)

②   Optional graphics card (here: NVIDIA Quadro P400 graphics card)

③   Slots for memory modules

④   Removable tray for drive cage type A

⑤   Internal drive above the drive cage (here 2.5" SSD)

⑥   Guide rail of the bus frame,
         for stabilization of long expansion cards

⑦   Heat exchanger of the processor

⑧   Motherboard

⑨   Middle beam of the bus frame,
         consists of 2 parts mounted on the connecting rail

⑩   Heat sink of the processor, connected by 2 heat pipes with heat exchanger of the processor

⑪   Bus board

⑫   Slot for expansion cards on the bus board

1.6 Accessories and replacement parts

1.6.1 Hardware accessories

Accessories from Siemens are available for your device. These are not included in the scope of delivery.

Obtaining accessories from the SIEMENS Industry Mall

You can find additional information in the online ordering system Industry Mall (https://mall.industry.siemens.com).

Accessories available for order

Name	Description	Article number
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.	6ES7648-1AA00-0XK0
DisplayPort adapter Connection of monitors with the following adapters possible to: • integrated graphics interfaces	• DP to DVI-D adapter DisplayPort to DVI-D	6ES7648-3AF00-0XA0
	• DP to VGA adapter DisplayPort to VGA	6ES7648-3AG00-0XA0

Name	Description	Article number
Mini-DisplayPort adapter Connection of monitors with the following adapters possible to: • optional graphics card P400	• mDP to VGA adapter Mini DisplayPort to VGA	6ES7648-3AL00-0XA0
	• mDP to DVI-D adapter Mini DisplayPort to DVI-D available as single-pack or 3-pack	1 unit 6ES7648-3AK00-0XA0 3 units 6ES7648-3AK00-1XA0
	• mDP-DP adapter* Mini DisplayPort to DisplayPort available as single-pack or 3-pack	1 unit 6ES7648-3AJ00-0XA0 3 units 6ES7648-3AJ00-1XA0*

* Part of the optional graphics card P400

SIEMENS spare parts services

You can find information on ordering, the provision and delivery of spare parts under "Industry Online Support: Spare parts services (http://support.automation.siemens.com/WW/view/en/16611927)".

Name	Description	Article number
Filter set Rack PC 2HM	Filter mat for fan cover on front of device, pack of 10 filter mats	A5E47229003
Removable tray 3.5" drive (SATA/SAS) or 2.5" SSD (SATA), (without drive)	The removable tray makes for quick and simple replacement of a 2.5" or 3.5" drive 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 during operation ("hot-swap") • 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	6ES7648-0EH00-1BA0
Removable drive bay kit HDD / SSD for drive cage type A	Removable tray with backplane, key, data cable, screws, numbers for drive numbering on the front	A5E37754868
Mounting kit for 1x 2.5" SSD internal		A5E44987395
Mounting kit for 2x 2.5" SSD internal		A5E49063933
Mounting kit for 1x 3.5" HDD internal		A5E44987338
Spare Part Kit A2 without Card	Replacement part kit for AI Unit NVIDIA A2 with enclosure, fan, screws (for replacement of the fan)	A5E52109581/RS-AA/001
Spare Part Kit A2 with Card	Replacement part kit for AI Unit NVIDIA A2 with enclosure, fan, screws (with NVIDIA A2 Tensor Core GPU) (for exchange of the NVIDIA A2 Tensor Core GPU)	A5E52109594/RS-AA/001

1.6.2   Software accessories

The following software products, among others, can be additionally ordered for your device:

Software	Description
SIMATIC IPC Image & Partition Creator	SIMATIC IPC Image & Partition Creator enables easy backup and quick recovery of individual data and files, complete hard disks and other data storage media.
	The intuitive user interface provides disk and partition management functions.
SIMATIC IPC DiagMonitor	In addition to the local monitoring options, SIMATIC IPC DiagMonitor offers options for remote monitoring of IPCs, communication with other systems, worldwide alerts and creation of custom monitoring applications.

More detailed information on software products for SIMATIC IPCs

- Catalog and ordering system for Automation and Drives: Industry Mall
  (https://mall.industry.siemens.com)

- Industrial automation technology portfolio: Products & Services
  (https://new.siemens.com/global/en/products/automation.html)

Safety instructions

2

2.1 General safety instructions

Danger if work is performed incorrectly

⚠ **WARNING**

The installer of the system is responsible for the safety of a system in which the device is integrated.

There is a risk of malfunction if work on the device is carried out incorrectly, if the device is faulty, or if it is integrated incorrectly into a system.

Death or serious bodily injury can result.

* Make sure that only appropriately qualified personnel work on the device or on a system.

Danger to life when the control cabinet is open

⚠ **WARNING**

Electrocution risk when control cabinet is open

When you open the control cabinet, there may be a dangerous voltage at certain areas or components.

Touching these areas or components can cause death or serious physical injury.

* Always disconnect the cabinet from the mains before opening it.
* Ensure that the power to the control cabinet cannot be turned on accidentally.

Risk of electric shock when working on the device

⚠️ WARNING
Risk of electric shock from supply voltage
The on/off button and on/off switch do not fully disconnect the device from the mains.
There is also a risk of fire if the device or connecting lines are damaged.
• Always fully disconnect the device from the supply voltage before performing work on the device or when the device will not be used over an extended period of time. Shut down the operating system. Then pull out the mains plug or operate the central AC circuit breaker when installing in a control cabinet. Therefore, when installing the device in a control cabinet, ensure that the AC circuit breaker is easily accessible.

Risk due to strong high-frequency radiation

NOTICE
Observe immunity to RF radiation
The device has increased immunity to high-frequency radiation in accordance with the information on electromagnetic compatibility (Page 159).
Radiation exposure exceeding the specified immunity limits can impair device functions, result in malfunctions and therefore injuries or damages.
• Note the information on immunity to high-frequency radiation.

Danger in case of lightning strike

⚠️ DANGER
Danger in case of lightning strike
A lightning flash may enter the mains cables and data transmission cables and jump to a person.
Death, serious injury and burns may result.
• In the event of an approaching thunderstorm, completely disconnect the device from the supply voltage in good time, see "Switching off the device (Page 66)".
• Do not touch power cables and data transmission cables during a thunderstorm.
• Keep sufficient distance from electric cables, distributors, systems, etc.

Danger when working on electrostatically sensitive components (ESD)

Electrostatic sensitive devices can be labeled with an appropriate symbol.

> **NOTICE**
>
> **Electrostatic sensitive devices (ESD)**
>
> The device contains electrostatically sensitive components that can be destroyed by voltages that are far below human perception.
>
> This can result in malfunctions and damage to the machine or plant.
> - If you are working with electrostatically sensitive components, take appropriate precautions when opening the device and observe the ESD guidelines.

Risk due to device overheating

When setting up and installing the device, observe the important information in section:

- "Safety instructions on ambient and environmental conditions (Page 42)

Danger when changing the battery

When changing the battery, note the important information in the section:

- "Changing the backup battery (Page 136)"

Avoiding functional restrictions

> **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.

Use in industrial environments

> **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.

2.2 Safety instructions on transport and storage

Danger when carrying and lifting the device

⚠ CAUTION
Risk of physical injury
The device is heavy and may injure persons and be damaged if it falls.
• Use the handles on the front panel of the device to carry and lift the device.

Risk during transport and storage

NOTICE
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.

Danger due to damage to the device

⚠ 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.
• Avoid installing and commissioning a damaged device.
• Label the damaged device and keep it locked away. Send off the device for immediate repair.

Risk due to condensation

NOTICE
Damage from condensation
If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, moisture could occur on or inside the HMI device (condensation).
Moisture can cause a short-circuit in electrical circuits and damage the device.
• Store the device in a dry place.
• Allow the device to warm up to room temperature before commissioning.
• 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.

2.3 Safety instructions for assembly

Fire protection enclosure

Note

The device meets the requirements for fire protection enclosures in accordance with IEC/EN/UL/CAN/CSA-C22.2 No. 61010-2-201. It can therefore be installed without an additional fire protection cover.

Approvals expire if the instructions are not observed

⚠ WARNING
Approvals expire if the instructions are not observed
If the ambient and environmental conditions are not complied with during installation and operation of the device or system, the approvals according to IEC/EN/UL/CAN/CSA-C22.2 No. 61010-2-201 are voided.
There is a risk of overheating and personal injury.
Note the following instructions and information under:
• "Climatic and mechanical and ambient conditions (Page 159)"
• "Safety instructions on ambient and environmental conditions (Page 42)"

Important notes on rack assembly

Note

- **Higher operating temperature**

  If installed in a closed unit or a multi-unit rack, the ambient operating temperature may be greater than the room temperature. Install the device in an environment recommended by the manufacturer, see notes under "Climatic and mechanical and ambient conditions (Page 159)"

- **Reduced air flow**

  When installing the device in a rack, ensure that the air flow required for safe operation of the device is guaranteed, see instructions under "Climatic and mechanical and ambient conditions (Page 159)".

- **Mechanical load**

  Mounting of the equipment in the rack should be such that a hazardous condition is not caused due to an uneven mechanical load, see notes under "Climatic and mechanical and ambient conditions (Page 159)"

- **Circuit overload**

  When connecting the device, observe the information on the power supply on the information label on the rear of the device.

- **Reliable grounding**

  Ensure that the equipment installed in the rack is safely grounded, see the notes under "Connection of equipotential bonding line (Page 57)"

Danger to life when the control cabinet is open

⚠ WARNING
Electrocution risk when control cabinet is open
When you open the control cabinet, there may be a dangerous voltage at certain areas or components.
Touching these areas or components can cause death or serious physical injury. • Always disconnect the cabinet from the mains before opening it. • Ensure that the power to the control cabinet cannot be turned on accidentally.

2.4 Safety instructions on ambient and environmental conditions

Approvals expire if the instructions are not observed

⚠ WARNING
Approvals expire if the instructions are not observed
If the ambient and environmental conditions are not complied with during installation and operation of the device or system, the approvals according to IEC/EN/UL/CAN/CSA-C22.2 61010-2-201 are voided.
There is a risk of overheating and personal injury.

Danger if ambient conditions are unsuitable

NOTICE
Ambient conditions and chemical resistance
Unsuitable ambient conditions may cause faults or damage the device. Failure to comply will void the warranty and approval in accordance with IEC/EN/UL/CAN/CSA-C22.2 No. 61010-2-201
• When the device is operated in severe environments which are subject to caustic vapors or gases, ensure sufficient clean air is provided. • Clean the enclosure surface with a damp cloth. • Make sure that no water gets inside the device.

Notes on the suitable location of the device

Note

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

- Operate the device only in closed rooms.
- Install the device in such a way that it poses no danger, e.g. by falling over.
- Only operate the device in a suitable environment, see information under "Climatic and mechanical and ambient conditions (Page 159)".
  - Avoid extreme ambient conditions, such as heat.
  - Do not expose the device to direct sunlight or powerful light sources.
- Observe the permitted mounting positions of the device.
- This device was designed for use in a normal industrial environment.
- When using the device in locations with difficult operating conditions due to corrosive vapors or gases, special additional protective measures are necessary, such as the supply of clean air.
- Ensure adequate ventilation of the device:
  - Do not obstruct the venting slots of the device.
  - Always maintain a minimum clearance of 50 mm to the area of the ventilation slots.
- The device meets the requirements for fire protection enclosures in accordance with IEC/EN/UL/CAN/CSA-C22.2 No. 61010-2-201. You can therefore install it without an 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.

High frequency radiation

⚠ **CAUTION**

Immunity to RF interference

The device has increased immunity to high-frequency radiation, see information under "Electromagnetic compatibility (Page 159)".

High frequency radiation above the specified immunity limits can result in malfunctioning of the device.

Persons are injured and the plant is damaged.

- Avoid high-frequency radiation.
- Remove radiation sources from the environment of the device.
- Switch off radiating devices.
- Reduce the radio output of radiating devices.
- Read the information on electromagnetic compatibility.
- Read the information in the technical specifications.

2.5 Safety instructions for I/O devices

Risk of damage to the device from connecting I/O devices

⚠ CAUTION
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. • Only connect I/O devices which are approved for industrial applications in accordance with EN 61000-6-2 and IEC 61000-6-2. • I/O devices that are not hotplug-capable may only be connected after the device has been disconnected from the power supply.

Danger due to regenerative feedback

NOTICE
Damage to the device due to regenerative feedback
A connected or installed component can cause voltage to be fed back to ground in the device.
This can damage the device. • Do not apply voltage to the device through connected or installed I/O devices that are operated with their own power supply (e.g. a USB drive with an external power supply).

Note on measuring the counter voltage

Note
Note the following when measuring the counter voltage: • Switch off the affected device and then insert the power plug. • Connect all cables from the system to the device and switch all components of the system to active before starting the measurement.

Risk of electric shock from supply voltage

⚠ WARNING
Risk of electric shock
The on/off button and on/off switch do not fully disconnect the device from the mains.
There is also a risk of fire if the device or connecting lines are damaged.
• Always fully disconnect the device from the supply voltage before performing work on the device or when the device will not be used over an extended period of time.
• For control cabinet mounting: Use a central, easily accessible AC circuit breaker, especially when close to the device.
• When you install the device, make sure that the power supply connector is easily accessible.

2.6 Safety instructions on device and system extensions

Contact your technical support team or the point of sale to find out which device and system expansions are suitable for installation.

Risk due to device and system expansions

NOTICE
Damage caused by 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.   - Disconnect the device completely from the line voltage before opening the device. (Page 66)   - Only install device or system expansions designed for this device. Contact your technical support team (Page 192) or the point of sale to find out which device and system expansions are suitable for installation.   - Note the Information on electromagnetic compatibility (Page 159).

Risk of electric shock when working on the device

⚠ WARNING
Risk of electric shock from supply voltage
The on/off button and on/off switch do not fully disconnect the device from the mains.
There is also a risk of fire if the device or connecting lines are damaged.   - Always fully disconnect the device from the supply voltage before performing work on the device or when the device will not be used over an extended period, see information under "Switching off the device (Page 66)"   - For control cabinet mounting: Use a central, easily accessible AC circuit breaker, especially when close to the device.   - When you install the device, make sure that the power supply connector is easily accessible.

Risk when opening the device

⚠ WARNING
Risk of malfunctions and electric shock
Improper intervention in the device endangers operational reliability and may damage the device.
The results are personal injuries and damage to the plant.
Take the following precautions:
• Disconnect the power plug before you open the device.
• Close the device after every intervention.

NOTICE
Electrostatic sensitive devices (ESD)
The device contains electronic components which may be destroyed by electrostatic charge.
Malfunctions and damage to the machine or system can result.
Take corresponding precautionary measures when you open the device.

⚠ WARNING
Risk due to unauthorized opening and improper repairs or expansions
Improper procedures when carrying out expansions may result in damage to equipment or endanger the users.
If you install or exchange system expansions and damage your device, the warranty becomes void.
It is therefore essential that you observe the information under "Open the device (Page 97)".

Danger from unauthorized or improperly performed repairs

⚠ WARNING
Danger due to unauthorized opening or improperly carried out repairs or extensions
Improperly carried out repairs or extensions to the device can lead to property damage or danger to the users.
If you install or exchange system expansions and damage your device, the warranty becomes void.

Risk of overheating when using expansion cards

⚠️ 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.
• Note the maximum power consumption permitted for the device, see "General technical specifications (Page 153)".

⚠️ CAUTION
Danger of burns from the hot blanking plates on the rear of the device
If expansion cards that generate a lot of heat are fitted, high temperatures can be present on the rear of the device in the vicinity of the perforated blanking plates.
Observe the danger symbol "Warning of hot surface" (Page 197)on the rear of the device.
Observe the Notes on the suitable location of the device (Page 42).

Limitation of liability

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

Installing and connecting the device

<div style="text-align: right; font-size: 3em;">3</div>

3.1 Preparing for installation

3.1.1 Scope of delivery

Device and hardware for the device

- Rack PC SIMATIC IPC647E
- Power cable (country-specific): 1 power cable*

  For redundant power supply: 2 power cable*
- Strain reliefs: 1 strain relief for USB and LAN interfaces, 2 removable cable ties
- Power plug latch:

  1 strain-relief, if single power supply was ordered

  2 strain reliefs if redundant power supply was ordered
- Keys for front door: 2 keys
- For device with drive cage type A:

  2 keys for removable trays
- Self-adhesive enclosure feet: 4 units

(* if ordered with power supply cable)

Supplied data storage medium

On the supplied data storage medium (read only) you will find:

- Software and tools to recover your ordered Microsoft® Windows® operating system
- Device drivers for installation in operating systems
- Quick Install Guide for SIMATIC IPC647E
- Operating instructions for SIMATIC IPC647E
- Product information
- Firmware/BIOS description
- Operating instructions for your ordered Microsoft® Windows® operating system on this device

Operating system

Depending on the ordered device configuration, the device is equipped **with** or **without** an installed operating system.

You can find information on ordered Microsoft® Windows® operating systems under: Important instructions and manuals for operating the device (Page 11) or Technical specifications of the operating systems (Page 173).

Installed software

- Monitoring software SIMATIC IPC DiagBase (only with installed Microsoft® Windows® operating system)

You will find the latest information on additional software for your device under: Software accessories (Page 34)

Printed documents

- Quick Install Guide SIMATIC IPC647E with link and QR code to the online form for quality control (quality control notification) in the SIEMENS After Sales Information System (ASIS)
- Product Information "Important notes on your device"

3.1.2 Checking the delivery package

> ⚠️ **WARNING**
>
> **Electric shock and fire hazard due to damaged device**
>
> Improper storage or shipping can damage equipment. This may result in personal injury and/or property damage.
>
> You must follow the instructions under "Safety instructions on transport and storage (Page 38)".

Procedure

1. Check the delivery unit for any signs of visible transport damage.

   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.

2. Unpack the device at its installation location.

3. Keep the original packaging in case you have to transport the unit again.

4. Check the scope of delivery (Page 49) and any accessories (Page 31) you may have ordered for completeness and damage.

   If the contents of the package are incomplete, damaged or do not correspond to your order, you can use the After Sales Information System (ASIS) (http://siemens.com/asis) to provide feedback on product deliveries and repairs.

   Complete the online form for quality control (quality control notification).

5. Please keep the documentation in a safe place. It is required for initial commissioning and is part of the device.

6. Note down the Device identification data (Page 52).

3.1.3 Device identification data

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

The following illustrations are examples. The data of your device may differ from the data in these examples.

Rating plate

The rating plate is located inside the front door.
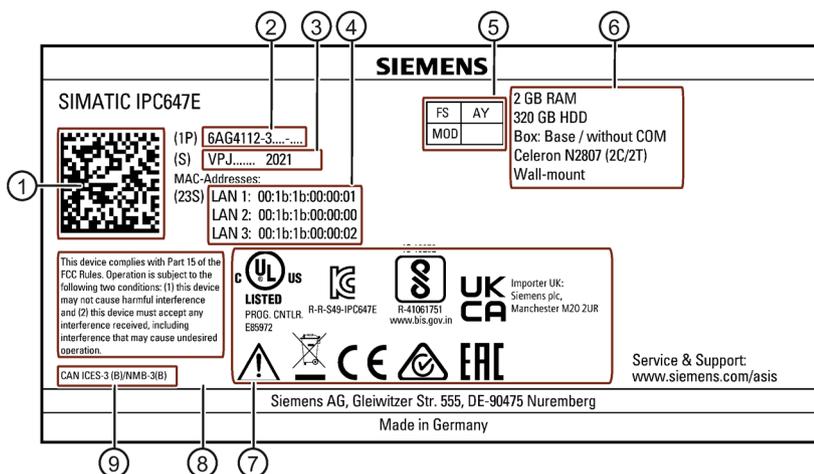
Example: SIMATIC IPC647E nameplate (the information on the nameplate is device-specific)

Identification data of the device

①	QR code for information about the device
②	Item number of the device (device-specific)
③	Serial number of the device (device-specific)
④	MAC-Addresses (Media Access Control Addresses):
	Addresses of the Ethernet ports of the device (device-specific)
⑤	FS (Functional State): Functional state of the device
⑥	Information on the device equipment (device-specific)
⑦	Symbols of certificates and approvals (Page 198)
	Symbols for safe use and disposal (Page 197)
⑧	FCC Rules (USA) (Page 178)
⑨	ICES Compliance (Canada) (Page 178)

COA label

The COA label (Certificate of Authenticity) is located inside the front door.

Note

The COA label is only available for devices delivered with Microsoft® Windows® operating system installed.

Example: COA label for the Microsoft® Windows® 10 operating system

(the data of the product key are grayed out in the figure)

3.2 Mounting the device

3.2.1 Mounting types

Note

If the device is permanently installed or mounted on telescopic rails, it must not be subjected to vibration stress during operation. In these cases, use only SSDs and not HDDs as drives.

Horizontal: Mounting with cabinet brackets

The device can be installed horizontally in control cabinets and 19" rack systems.

This installation type meets the requirements in accordance with IEC60297-3-100.

Horizontal: Mounting on telescopic rails

The device can be installed horizontally in control cabinets and 19" rack systems.

When telescopic rails are used for mounting, the device can be withdrawn fully from the cabinet or rack. Note the information in "Technical specifications of the telescopic rails (Page 172)".

Installation in the control cabinet

When mounting the device in a cabinet, use a central and easily accessible mains disconnector (if possible, near the device).

Horizontal: Mounting on device base

This installation type meets the requirements in accordance with IEC60297-3-100.

Additional information

You can find additional information in the Quick Installation Guide (QIG) that is enclosed with the device.

3.2.2 Securing device

⚠ WARNING
Dangerous voltage and fire hazard
Improper actions during installation and assembly may lead to personal injury and/or substantial damage to equipment.
It is essential that you follow the installation and assembly instructions under: • Safety instructions for assembly (Page 40) • Safety instructions on ambient and environmental conditions (Page 42)

⚠ DANGER
Electrocution risk when control cabinet is open
When you open the control cabinet, there may be a dangerous voltage at certain areas or components.
Touching these areas or components can cause death or serious bodily injury. • Always disconnect the cabinet from the mains before opening it. • Ensure that the power to the control cabinet cannot be turned on accidentally.

⚠ 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. • Use handles attached to the front to carry and lift the device.

Bore holes for telescopic rails

You can find the dimensions for the holes under: "Dimension drawing for drill holes for telescopic rails (Page 176)".

You can find detailed information on the drives under: "Technical specifications of the telescopic rails (Page 172)".

3.3 Connecting the device

3.3.1 Country-specific information on supply voltage

Country-specific information on supply voltage in USA and Canada

Supply voltage 120 V / 230 V / 240 V

Ensure that the power cords used are rated for the maximum current input and ambient temperature of the device and meet the requirements of the following standards:

- ANSI/UL 817
- CSA C22.2 No. 21

Ensure that the device connectors, connector sockets and connection materials are rated for the maximum current input and ambient temperature of the device and meet the requirements of the following standards:

- ANSI/UL 498 and CSA C22.2 No. 42
- CSA C22.2 No. 182.1
- CSA C22.2 No. 182.2
- CSA C22.2 No. 182.3

Country-specific information on supply voltage outside of USA and Canada

Supply voltage 230 V AC

This device is supplied with a safety-tested power cord and may only be connected to a grounded SCHUKO socket outlet.

If you do not use the power cord, use a flexible cable that is rated for the maximum current input and ambient temperature of the device and complies with the safety regulations of the country in which the device is installed.

The power supply cord and the plug connector must bear the prescribed markings.

3.3.2 Connection of equipotential bonding line

A low-impedance earth connection ensures that interference signals generated by external power supply cables, signal cables or other cables to the I/O devices are safely discharged to earth.

The connection for functional earthing on a device has a large surface, makes contact over a large area and is marked with the following symbol.

You can find information on the position of the functional earthing connection under "Rear of the device (Page 21)".

Requirement

- T20 screwdriver

- Equipotential bonding conductor with a minimum cross section of 2.5 mm^2

Procedure

1. Make the connection for functional ground via an equipotential bonding line to the equipotential bonding rail or grounding bar of the control cabinet in which the device is installed.

3.3.3 Connecting the power supply

3.3.3.1 Connect single power supply (AC)

> ⚠ **WARNING**
>
> **Injury to persons or damage to property when operated on an incorrect power supply system**
>
> If you connect the device to an unsuitable power supply, the device receives voltages and currents that are too high or too low.
>
> Injuries to persons, malfunctions or a damage to the device can result.
> - The permissible rated voltage of the device must match the local supply voltage.
> - Operate the device only in grounded power supply networks (TN networks in accordance with VDE 0100 Part 100 or IEC 60364-1).
> - Operation via non-grounded or impedance-earthed networks is prohibited.

> **⚠ WARNING**
>
> **Risk of electric shock**
>
> The on/off button and on/off switch do not fully disconnect the device from the mains.
>
> There is also a risk of fire if the device or connecting lines are damaged.
> - Always fully disconnect the device from the supply voltage before performing work on the device or when the device will not be used over an extended period of time.
> - For control cabinet mounting: Use a central and easily accessible AC circuit breaker near the device.

Requirement

- You have observed the information under "Country-specific information on supply voltage (Page 56)".
- T10 screwdriver

Procedure

1. Ensure that the on-off switch is in position '0' (off). Information on the position of the on/off switch is available in "Operator controls (Page 25)".

2. Connect the power plug to the corresponding socket. Information on the position of the socket is available in "Power supply connections (Page 24)".

3. Insert the power cable in the electrical socket.

4. Switch the device on using the on/off switch (position |).

5. To prevent unintentional removal of the power plug, secure the power plug on the device.

   To do this, screw on the power plug interlock ② with the fixing screw ①.
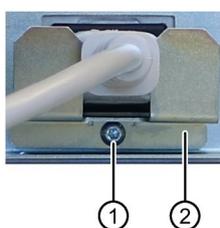
3.3.3.2 Connecting a redundant power supply (AC)

> ⚠️ **WARNING**
>
> **Injury to persons or damage to property when operated on an incorrect power supply system**
>
> If you connect the device to an unsuitable power supply, the device receives voltages and currents that are too high or too low.
>
> Injuries to persons, malfunctions or a damage to the device can result.
>
> * The permissible rated voltage of the device must match the local supply voltage.
> * Operate the device only in grounded power supply networks (TN networks in accordance with VDE 0100 Part 100 or IEC 60364-1).
> * Operation in non-grounded or impedance-grounded networks is not permitted.

> ⚠️ **WARNING**
>
> **Risk of electric shock**
>
> The on/off button and on/off switch do not fully disconnect the device from the mains.
>
> There is also a risk of fire if the device or connecting lines are damaged.
>
> * Always fully disconnect the device from the supply voltage before performing work on the device or when the device will not be used over an extended period of time.
> * For control cabinet mounting: Use a central, easily accessible AC circuit breaker close to the device, if possible.

Requirement

* You have observed the information under "Country-specific information on supply voltage (Page 56)".
* T10 screwdriver

Procedure

1. Ensure that both on-off switches are in the 0 position. Information on the position of the on-off switch is available under "Operator controls (Page 25)".

2. Connect the power plug to both sockets. Information on the position of the sockets is available in "Power supply connections (Page 24)".

3. Connect the power cable to the sockets.

4. Switch the device on using the on/off switch (position |).

   The status display on the power supply modules light up green.

   Note

   If only one of the power supply modules works, a warning signal sounds. You turn off the warning signal by pressing the alarm reset button on the working power supply module. You can find information on the position of the alarm reset button under "Operator controls (Page 25)".

5. To prevent unintentional disconnection of the power plug, secure the power plug on the device.

   To do this, screw on the two power plug interlocks ② with the fixing screws ①.
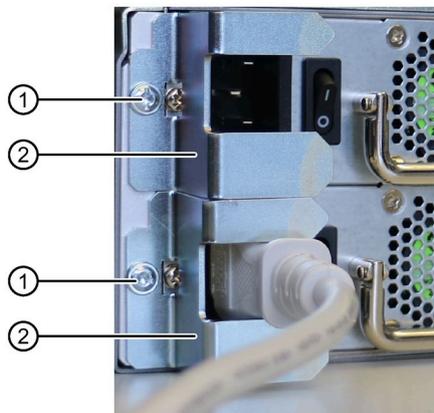
3.3.4 Connecting I/O devices

3.3.4.1 Connecting external devices

⚠ CAUTION
Fault caused by I/O devices
The improper connection of I/O devices can cause faults in the device.
The result may be personal injury and damage to the machine or plant.
Be sure to follow the Instructions for connecting I/O devices (Page 44).

Procedure

> **Note**
>
> Use the original connections of the I/O to be connected without adapters or extensions.

1. Connect the I/O devices to the respective interfaces. Information on the position of the interfaces is available in "Device ports (Page 22)".
2. Secure the cables (Page 64) with a strain relief.

3.3.4.2 Connecting audio devices

Requirement

- You have observed the information under "Safety instructions for I/O devices (Page 44)" and under "Technical specifications of the connections on the device (Page 171)"

> **Note**
>
> **Simultaneous use of UAJ connection socket (for audio devices) and DVI connection socket (for monitors)**
>
> Note the following when connecting monitors to the DVI connection socket (Page 22) or using a DVI adapter (Page 31):
>
> If you are using the UAJ connection socket for audio equipment, attach a ferrite to the outlet point of the connection socket (type: 742 716 33, manufacturer: Würth) with one winding.

Procedure

> **Note**
>
> Use the original connection technology of the audio devices to be connected without adapters and extensions.

1. Connect the I/O devices to the respective interfaces. You can find information on the position of the interfaces in "Device ports (Page 22)".
2. Secure the cables (Page 64) with a strain relief.

3.3.4.3 Connecting several monitors (multi-monitoring)

Connection of monitors for devices with optional NVIDIA Quadro P400 graphics card

You will find three connection sockets on the rear of the device for connecting monitors at the integrated graphics interfaces.

- 2 x DP (DisplayPort; labeling on the device: DPP1, DPP2)

- DVI-D

You will find three additional connection sockets on the rear of the device for connecting monitors to the optional NVIDIA Quadro P400 graphics card.

- 3 x mDP

  At these connection sockets, you can use adapters to connect monitors to other graphics ports.

You can find information on the connection sockets on the rear of the device under: "Device ports (Page 22)".

You can find information on the adapters under "Hardware accessories (Page 31)".

Connection socket on monitor		Connection socket on the internal graphics interfaces			Connection socket on optional graphics card NVIDIA Quadro P400		
		DP (DPP1; X71)²	DP (DPP2; X72)²	DVI-D (X70)²	mDPP1	mDPP2	mDPP3
Monitor 1	DP (DisplayPort)	X					
	DVI	X ¹⁾					
	VGA	X ¹⁾					
Monitor 2	DP (DisplayPort)		X				
	DVI		X ¹⁾				
	VGA		X ¹⁾				
Monitor 3	DP (DisplayPort)						
	DVI			X			
	VGA						
Monitor 4	DP (DisplayPort)				X ¹⁾		
	DVI				X ¹⁾		
	VGA				X ¹⁾		
Monitor 5	DP (DisplayPort)					X ¹⁾	
	DVI					X ¹⁾	
	VGA					X ¹⁾	
Monitor 6	DP (DisplayPort)						X ¹⁾
	DVI						X ¹⁾
	VGA						X ¹⁾

¹⁾ via adapter, see "Hardware accessories"

²⁾ Labeling on the device

Requirement

- You have observed the information in the following sections:

  "Connecting external devices (Page 61)"

Procedure

1. Connect the monitors to the rear of the device (Page 22).

   You can find information on connecting monitors with adapters in "Hardware accessories (Page 31)".

2. On delivery the device is set for multi-monitoring.

   If the delivery state settings have been changed, configure the multi-monitoring function in the firmware settings, see "Installing the optional graphics card (Page 112)".

See also

Technical specifications of graphic (Page 168)

Technical specifications of the connections on the device (Page 171)

3.3.5 Connecting the device to networks

The following options are available for integrating the device into existing or planned system environments and networks.

Ethernet

Wake on LAN and Remote Boot are supported.

You can use the integrated Ethernet interfaces (10/100/1000 Mbps) for communication and data exchange with automation devices, such as SIMATIC S7.

You need the "SOFTNET S7" software package for this.

PROFINET

PROFINET can be operated via:

- Standard Ethernet interfaces (RT)

SIMATIC NET

Use this software package to create, operate and configure an innovative network for Field & Control level. Additional information is available under SIMATIC NET (http://w3.siemens.com/mcms/automation/en/industrial-communications/Pages/Default.aspx).

The software package and the documentation are not included in the scope of delivery

Additional information

You can find additional information on the Internet at: Technical support (https://support.industry.siemens.com/cs/us/en/)

3.3.6 Securing the cables

The strain relief is used to prevent accidental loosening of cables.

Requirement

- I/O devices are connected to the respective connections.
- T10 screwdriver

Procedure

1. Connect I/O devices to the corresponding sockets on the rear of the device.

   Information on the position of the sockets is available in "Device ports (Page 22)".

2. Screw the strain relief ① to the device using the fastening screws ②.

3. Insert detachable cable ties into corresponding holes of the strain relief and secure the cable with the cable ties.

Commissioning the device

<div style="text-align: right; font-size: 3em;">4</div>

4.1 Switching on the device

Requirement

- The power supply is connected. (Page 57)

Procedure

1. Switch the on/off switch (in case of redundant power supply: both on/off switches) on the rear of the device (position |).
2. Press the on/off button at the front of the device behind the front panel door.

   Information on the position of the switch and the button is available under "Operator controls (Page 25)".

Commissioning the installed Windows® operating system

You can find information on the first switch on of the device and on commissioning the installed Windows® operating system in the documentation of your operating system, see "Important instructions and manuals for operating the device (Page 11)".

4.2 Configuring automatic switch-on of device

In the firmware settings you can define that the device automatically switches on again after a disconnection from the supply voltage as soon as the supply voltage is available again.

The minimum downtime required for the supply voltage depends on the configuration of the device.

Configure this function with the firmware setting:

- State After G3

You can find information on this in the firmware/BIOS description, see "Important instructions and manuals for operating the device (Page 11)".

4.3 Switching off the device

Shutting down the operating system

For active operating system:

- Shut down the operating system properly.

For inactive operating system

- Briefly press the on/off button. Information on the position of the button is available under "Operator controls (Page 25)".

Result

The "POWER" status indicator on the front (Page 27) indicates the corresponding energy-saving mode ("Shut down") of the device.

The device is switched off but not fully disconnected from the line voltage.

Fully disconnecting the device from the line voltage

⚠ WARNING
Risk of electric shock from mains voltage
The on/off button and on/off switch do not fully disconnect the device from the mains.
There is also a risk of fire if the device or connecting lines are damaged.
Always fully disconnect the device from the mains voltage before performing work on the device or when the device will not be used over an extended period of time.
• Shut down the operating system.
The "POWER" status indicator on the front (Page 27) indicates the corresponding energy-saving mode ("Shut down").
• Then pull out the mains plug or operate the central AC circuit breaker when installing in a control cabinet.
Therefore, when installing the device in a control cabinet, ensure that the AC circuit breaker is easily accessible.

Hardware reset

If the device does not respond to input from the keyboard or mouse, restart it with the hardware reset. A started operating system will not hereby shut down safely.

NOTICE
Data loss
With a hardware reset, the device is switched off and restarted. • Data in the main memory is deleted. • Data on the data storage media may be lost. • The device may be damaged. Perform a hardware reset only in the case of an emergency.

Hardware reset with on-off button:

- Press the on/off button for more than 4 seconds.
  - The unit switches off.
  - To switch the device on again, press the on/off button again.

Hardware reset with reset button:

- Press the reset button.
  - The device switches off and on again.

Information on the position of the buttons is available under "Operator controls (Page 25)".

Operating the device

5

5.1 Opening the front door

Procedure

1. Open the front door with the key.
2. Pull the front door to the side.

5.2 Multi-monitoring

In its delivery state, the device is equipped with integrated graphics interfaces.

You will find the following connection sockets on the rear of the device for connecting monitors at these graphics interfaces.

- 2 x DP (DisplayPort: labeling on the device: DPP)

- DVI-D

You can find information on the position of the connection sockets and the labeling on the device in section "Device ports (Page 22)".

To connect several monitors to the device at the same time (Page 62)(multi-monitoring), you can install a so-called "optional graphics card" (Page 112).

5.3 Drive configurations

5.3.1 RAID1 system

You can operate two drives of the same capacity and type independently of each other as a RAID1 system or as a "System with 2 drives" (see "System with 2 drives (Page 70)").

An RAID1 system works on the principle of "data mirroring on two drives". In the event of a defective drive the RAID1 system can continue to work on the remaining drive and thus achieves a high level of availability.

RAID1 system with associated software

If you have ordered a RAID1 system with pre-installed operating system, your device is monitored with the installed SIMATIC IPC DiagBase or DiagMonitor diagnostics software.

The following software is available to monitor the RAID1 system:

- For an onboard RAID system:

  Intel® Optane™ Memory and Storage Management (Page 73)

- For a hardware RAID system:

  maxView Storage Manager (Page 81)

Mounting locations for drives in the onboard RAID system

The 2 hard disks required for an onboard RAID system may be installed at the following locations:

- Drive cage type A (Page 18)
- Drive cage type B (Page 20)

Mounting locations for drives in the hardware RAID system

The 2 hard disks required for a hardware RAID system can be installed in the following locations:

- Drive cage type A (Page 18)

Display of a faulty drive in a RAID1 system

A faulty drive is displayed in connection with a RAID1 system at the following locations:

- System status displays (Page 27) on the front of the device

- SIMATIC IPC DiagBase or SIMATIC IPC DiagMonitor monitoring software
- For an onboard RAID system:

  "Intel® Optane™ Memory and Storage Management (Page 73)"

- For a hardware RAID system:

  "maxView Storage Manager (Page 81)"

5.3.2 System with 2 drives

You can operate two drives of the same capacity and type independently of each other as a "System with 2 drives" or as a RAID1 system (see "RAID1 system (Page 69)").

You can find information on the capacity of the drives in the ordering documents.

In a system with 2 independently operated drives, the second drive is connected to SATA port 1 when the device is delivered and has not yet been set up. The drive setup can be performed with the pre-installed operating system.

You have the option of backing up your data to this drive.

You can find information on how to boot the device from the second drive in the detailed firmware/BIOS description, see "Important instructions and manuals for operating the device (Page 11)".

5.4 RAID systems

5.4.1 Onboard RAID system

5.4.1.1 Setting up the onboard RAID system in the firmware (Create Volume)

If you ordered a device with an onboard RAID system, the onboard RAID system is pre-configured by default.

The subsequent setup of an onboard RAID system is carried out in the firmware under "Create Volume".

After setting up the onboard RAID system, it can be configured using the "Intel® Optane™ Memory and Storage Management" software.

Requirement

- The drives required for the onboard RAID system are built into the device, see information under: "RAID1 system (Page 69)".

Procedure

1. Switch on the device or restart it.

2. To access the user interface of the firmware, press <Esc> and hold it down immediately after switching on the device when the message "`Press ESC for boot options`" appears.

   The firmware user interface opens. Here you have the following keys available for navigation:

Navigation in the firmware	
Action	**Key**
• Select entry (then confirm selection)	• Arrow keys on the keyboard
• Confirm selection **Exception:** Confirm selection when integrating drives:	• <Enter> key **Exception:** – <Space> keyboard
• Back to previous window	• <Esc> key

3. Use the arrow keys of the keyboard to select "Device Management" from the firmware selection menu and confirm your selection.

   To select and save settings, refer to the information on navigating in the firmware, see above.

4. From the "Device List", select the entry "Intel <R> Rapid Storage Technology".

5. Select "Create RAID Volume".

6. In the next window, enter a name for the RAID system.

7. Select "RAID Level" and select the entry "RAID1" in the following selection window.

   A list of available drives is displayed.

8. Select "Select Disks".

   A list of available drives is displayed.

9. Select the drives ① from the list that you want to integrate into your RAID system and press the **Space** key.

   You can find information on the mounting locations of the drives in the device under "RAID1 system (Page 69)".

   – In the list, the mounted drive is marked with an "X" ②.

   – You can find the assignment of the drive to the mounting location in the device ③ in front of the drive model designation.
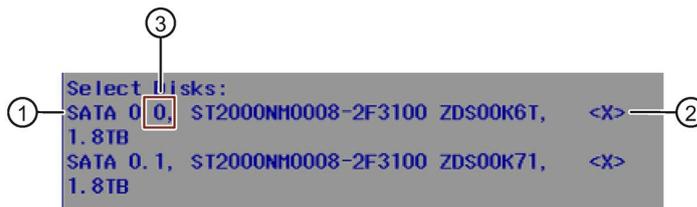
10. Select "Create Volume".

    The following window now displays the details of the RAID system (RAID Volume) that has just been set up.

    The onboard RAID system is set up.

11. To exit the firmware settings, press the <F10> key (Save & Exit) and confirm the subsequent dialog with <Y>.

Configuring onboard RAID system with "Intel® Optane™ Memory and Storage Management"

1. Select Start > Intel® Optane™ Memory and Storage Management.

2. Select the "Manage" tab.

You can find information on configuring a RAID system with "Intel® Optane™ Memory and Storage Management" in the documentation or help for the software.

5.4.1.2 Monitoring the onboard RAID system with "Intel® Optane™ Memory and Storage Management"

Use the Intel® Optane™ Memory and Storage Management software to monitor the onboard RAID system.

You can find information on monitoring a RAID system with "Intel® Optane™ Memory and Storage Management" in the documentation or help for the software.

Open "Intel® Optane™ Memory and Storage Management"

1. Select Start > Intel® Optane™ Memory and Storage Management.

Display status of the onboard RAID system (faulty drive)

1. Select the "Manage" tab.

   In the right area of the window, a list of the drives mounted in the onboard RAID is displayed under "Storage System View".

2. Right-click on a drive from the list or on "Volume".

   Status displays are shown for functions and components of the drives or the onboard RAID system.

5.4.1.3 Integrating a new drive into an onboard RAID system

The onboard RAID system is configured in the delivery state so that a new drive must be integrated manually when a defective drive was replaced.

You can also configure the onboard RAID system in such a way that the new drive is automatically mounted when the defective drive is replaced.

Onboard RAID systems with a hot-spare drive are configured so that the hot-spare drive is automatically integrated in the event of an error.

Configure "Automatic integration of a new drive" (before replacing a defective drive)

NOTICE
Risk of data loss
If a new drive is automatically integrated, the new drive is not checked for partition information or existing data.
All partitions and data of the new drive are deleted without warning. • Insert only a brand new drive or a drive that is configured as a replacement drive. • Refer to the controller documentation for instructions on setting up replacement drives.

1. Select "Start" > "Intel® Optane™ Memory and Storage Management".

2. Select the "Manage" menu.

3. Select "Settings".

4. Set the "Auto-rebuild on hot plug" option to "Enabled".

Configure the mounted drive under "Create Raid Volume".

Configure "Manual integration of a new drive" (before replacing a defective drive)

The onboard RAID system is configured in the delivery state so that a new drive must be integrated manually when a defective drive was replaced.

You can configure the manual integration of the drive or check the settings yourself.

To do this, disable the function to automatically mount a new drive.

1. Select "Start" > "Intel® Optane™ Memory and Storage Management".

2. Select the "Manage" menu.

3. Select "Settings".

4. Set the "Auto-rebuild on hot plug" option to "Disabled".

Configure the mounted drive under "Create Raid Volume".

Mount new drive during operation in the onboard RAID system (after an error has occurred)

Requirements

The system is configured to mount new drives manually (not automatically), see above.

Procedure

1. Select "Start" > "Intel® Optane™ Memory and Storage Management".

2. Select the "Manage" menu.

   You will find the following components in the "Storage System View" area:

   ① The drives mounted in the onboard RAID system with the information that a drive is not yet mounted (Unknown hard disk).

   ② List of available drives and systems. The new drive is placed at the top of this list.

Storage System View

Click on any component below to manage its properties.

SATA_Array_0003

SATA hard disk (932 GB)	**volume_0000** Type: RAID 1 932 GB
Unknown hard disk (0 Bytes)	

①

SATA hard disk (932 GB)

PCIe SSD (894 GB) (System)

②

Internal empty port 1

Internal empty port 3

Internal empty port 4

Internal empty port 5

Rescan

SATA (932 GB)
Controller 0, Port 2
Port Location: **Internal**
Status: **Normal**
Type: **SATA hard disk**
Mark as spare ——— ③
Usage: **Available**
Size: **932 GB**
Serial number: ZFA08P6Z
Model: **ST1000NM0008-2F2100**
Firmware: **SN02**
System disk: **No**
Password protected: **No**
Data disk cache: **Enabled**
Native command queuing: **Yes**
SATA transfer rate: **6 Gb/s**
Physical sector size: **512 Bytes**
Logical sector size: **512 Bytes**

3. Right-click on the new drive.

4. From the drive information, select the "Mark as spare" function ③.

   The drive is mounted to the onboard RAID system and appears in the mounted drives area.

See also

5.4.2 Hardware RAID system

5.4.2.1 Software and documentation for the hardware RAID system

When ordering a device with hardware RAID system, all required software is already installed on your device when it is delivered.

You can find the following in the "Drivers\RAID-AHCI\Adaptec" directory of the supplied data storage medium:

- "Microsemi Smart Storage Controllers User Guide / maxView Storage Manager" with comprehensive information on installing and configuring the hardware RAID adapter card

- "maxView Storage Manager" software and the corresponding User's Guide

- in the "cmdline" folder a readme file "README.TXT" with information about the command line tool "arcconf.exe", with which you can configure the hardware RAID adapter card

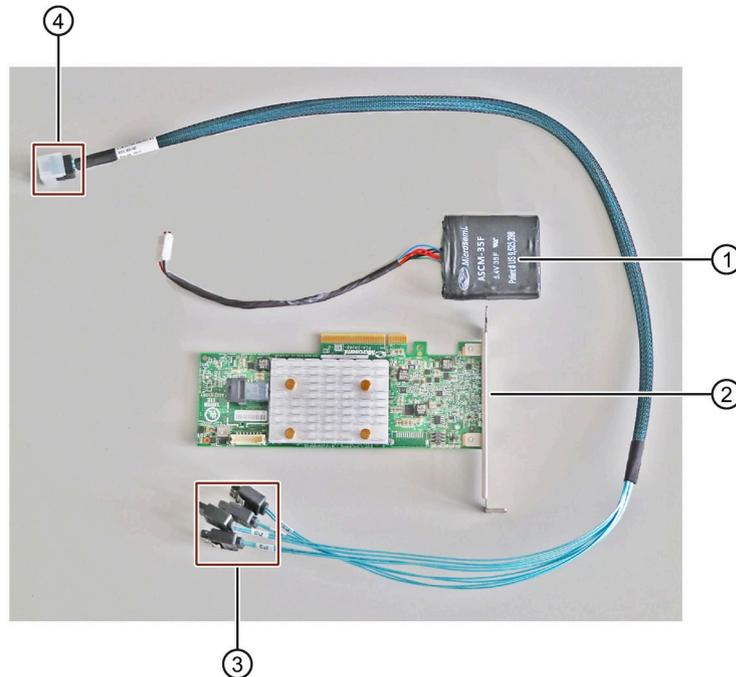### 5.4.2.2 Installing the hardware RAID adapter card

If you ordered a device with a RAID system, the hardware RAID adapter card is already built in on delivery.

If you want to operate your device as a hardware RAID system afterwards, install a hardware RAID adapter card.

Requirement

- Device with drive cage type A

- 4 GB main memory

- T10 screwdriver
- Components for installing the hardware RAID adapter card. Your local SIEMENS contact person will provide you with information on these components.

①   Capacitor block with capacitor block line
②   Hardware RAID adapter card, see "Technical specifications of the hardware RAID adapter card (Page 168)"
③   Adapter cable: numbered connections to drives
④   Adapter cable: Connection to the hardware RAID adapter card

---

NOTICE

Capacitor block must be discharged

The original SIEMENS replacement part is supplied with a discharged capacitor block.

When you remove or install a charged capacitor block, the Hardware RAID adapter card may be damaged. Data loss may result.

Remove or install a capacitor block only in completely discharged condition.

Discharge an installed capacitor block as follows:

1. Shut down the operating system properly.
2. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".
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.

Procedure

1. Open the device, see important information on this in "Open the device (Page 97)".

2. Install the hardware RAID adapter card in the corresponding slot in the device.

   Do not leave the slot in front of the hardware RAID adapter card empty.

   For instructions on installing the hardware RAID adapter card, refer to: "Installing expansion cards (Page 100)".

   You can find information on the hardware RAID adapter card under "Technical specifications of the expansion card slots (Page 162)".

3. Connect the numbered terminals of the adapter cable ③ to the backplanes of the removable trays.

   The number of the connections here correspond to the number of the drive slots, see "Drive cage type A (Page 18)".

4. Route the connection of the adapter cable ④ to the front of the device and from there to the hardware RAID adapter card.

5. Plug the connector of the adapter cable ④ into the hardware RAID adapter card and make sure that it audibly clicks into place.

6. Attach the capacitor block ① to the guide rail for long expansion cards ⑥ using a cable tie, see "Internal construction of the device (Page 30)".

7. Plug the connector of the capacitor block line ⑤ into the hardware RAID adapter card.
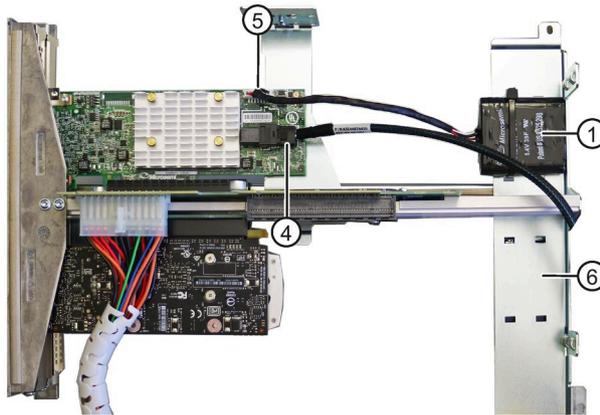
8. Connect the power supply of the drives (SATA power, 15-pin) to the backplane of the corresponding removable tray, see "Installing a backplane for removable tray (Page 118)".

9. Close the device.

10. Configure the installed hardware RAID adapter card.

5.4.2.3 Configuring the hardware RAID system

If you ordered a device with hardware RAID system, the hardware RAID adapter card is already installed and configured in the delivery state.

If you subsequently install a hardware RAID adapter card, you then need to configure the hardware RAID system. Proceed as follows for this:

- First set up a RAID system in the firmware of the hardware RAID adapter card (Array Configuration).
- Then configure the settings of the hardware RAID adapter card (Configure Controller Settings)

Requirement

Note

For a hardware RAID system, integrate only drives of the type A drive bay.

- The drives required for the RAID system are installed in the device, see:
  - RAID1 system (Page 69)
- A hardware RAID adapter card is installed, see "Installing the hardware RAID adapter card (Page 76)".

Setting up the hardware RAID system (Array Configuration)

1. Switch on the device or restart it.
2. To access the firmware user interface, press and hold down the <Esc> key immediately after switching on the device, as soon as the SIEMENS logo and the message "`Press ESC for boot options`" appear.

   The firmware user interface opens. Here you have the following keys available for navigation:

Navigation in the firmware	
Action	**Key**
• Select entry (then confirm selection)	• Arrow keys on the keyboard
• Confirm selection **Exception:** – Confirm selection when integrating drives:	• <Return> key **Exception:** – <Space> keyboard
• Back to previous window	• <Esc> key

3. Use the arrow keys of the keyboard to select "Device Management" from the firmware selection menu and confirm your selection.

4. Select the hardware RAID adapter card "Devices List" from the "Adaptec Smart RAID 3151-4i".

   The firmware of the hardware RAID adapter card is open.

   To select and save settings, refer to the information on navigating in the firmware, see above.

5. Select "Array Configuration".

6. Select "Create Array".

   A list of available drives is displayed.

7. Select the drives ① from the list that you want to integrate into your RAID system and press the **Space** key.

   You can find information on the mounting locations of the drives in the device under "RAID1 system (Page 69)".

   – In the list, the mounted drive is marked with an "X" ②.

   – You can find the assignment of the drive to the mounting location in the device ③ in the entry "Bay:...".
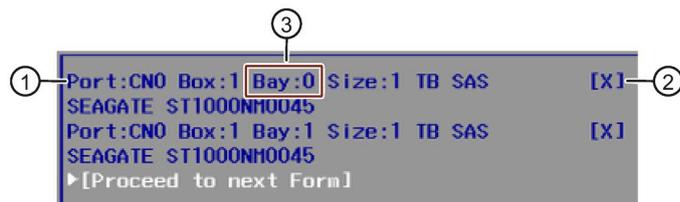
8. Select [Proceed to next Form].

9. Select "RAID Level" and select the entry "RAID1" in the following selection window.

10. Select [Proceed to next Form].

11. Under "Logical Drive Label", enter a name for your RAID system.

12. Select [Submit Changes] to save your settings.

    The message "Logical Drive Creation Successful" is displayed in the next window.

13. Select [Back to Main Menu].

Configuring hardware RAID adapter card settings (Configure Controller Settings)

1. After setting up the RAID system, select "Configure Controller Settings" from the main menu.

2. Select "Modify Controller Settings".

   Check or change the value of the following firmware entry:

Firmware entry	Value
Configured Physical Drive Write Cache State	<Disabled>

3. Press the </Esc> key twice.

4. Select "Array Configuration".

5. Select "Manage Arrays" and then select the desired Array.

6. Select "List Logical Drives" and then select the desired Logical Drive.

7. Select "Edit Logical Drive".

   Select "Modify Controller Settings".

   Check or change the value of the following firmware entry:

Firmware entry	Value
Acceleration method	<Controller Cache>

8. Select [Submit Changes] to save your settings.

9. Select [Back to Main Menu].

10. Finish the process by pressing the <ESC> key repeatedly.

5.4.2.4   Monitor hardware RAID system with "maxView Storage Manager".

With the " maxView Storage Manager" software, you can monitor your hardware RAID system and display important information to diagnose the system.

The first time you call "maxView Storage Manager", Microsoft Edge opens and displays a warning message.

Then install the website security certificate.

Requirement

- 4 GB main memory
- The operating system is restarted.
- The operating system is protected with a user name and password
- You have administrator rights

Operating system

- Microsoft® Windows® Server 2019
- Microsoft® Windows®10

Warning message during the first launch of "maxView storage manager"

1. Open Microsoft Edge.

2. Open "maxView Storage Manager" with the link on your desktop.

   A warning message about the security certificate of the website appears.

   - First, export and save the security certificate.
   - Then install the security certificate with the previously exported file.

Export and save the security certificate from Microsoft Edge

1. Open Microsoft Edge.

2. At the top of the Microsoft Edge address bar, click the icon to the left of the "https// address".

3. From the list, select the entry "The connection to this website (is not secure)".

4. In the following window, click the "Display certificate" icon in the top right.

5. Select the "Details" tab.

6. Select "Copy to file ..."
   The Certificate Export wizard opens.

7. Select "Next".

8. In the following window, the desired format is "DER-coded...".

   Do not change this setting.

9. Select "Next".

10. Assign a name and save the security certificate.

Installing the security certificate

1. Open the previously exported security certificate.

2. Select "Install certificate...".

3. Select "Local Computer" as storage location and confirm your selection with "Next".

4. Confirm the subsequent warning.

5. Select the option "Save all certificates in the following storage location" and define the storage location for the certificate.

6. Select the "Trusted master certification bodies" option and click "OK"; then click "Next" and "Finish".

7. Close Microsoft Edge and then open Microsoft Edge again.

   The security certificate is installed and "maxView Storage Manager" is set up.
   The user interface of "maxView Storage Manager" is now available in Microsoft Edge.

Monitor hardware RAID system with "maxView Storage Manager"

You can find detailed information on the use of "maxView Storage Manager" in the user guide to the software, see "Software and documentation for the hardware RAID system (Page 76)".

5.4.3 Data synchronization in the RAID system

NOTICE
Danger of incorrect operations on machine and plant: delayed system reaction during data synchronization
Data is synchronized if a drive fails.
The system can respond with a delay depending on the size of the drive and system load. In extreme cases, the execution of keyboard, mouse or touch screen commands may be briefly delayed.
The result may be faulty operations of the machine or plant.
• Do not operate safety-critical functions during synchronization of a drive. Stable system statuses are only achieved after successful completion of synchronization.

Duration of data synchronization

The synchronization process may take quite some time, e.g. several hours, with extremely high drive load even days.

Guide value for the duration of data synchronization:

• < 3h at 90% HDD system load

In addition, system performance may be limited in the case of a manually started maintenance operation until completion of the maintenance phase.

5.5 Monitoring of the device

5.5.1 Monitoring functions

You can monitor the following device functions with the SIMATIC DiagBase or SIMATIC DiagMonitor software:

Monitoring	Description	Status display and actions
Temperature monitoring	• Monitoring of high and low temperature limits and cable break of the temperature sensors • For this, temperature sensors record the temperature at critical points of the device, e.g. at the processor. • The temperature thresholds are defined for the individual temperature sensors. • With SIMATIC IPC DiagBase or SIMATIC IPC DiagMonitor, actions are triggered when the temperature thresholds are exceeded.	• Status display "TEMP (Page 27)" • Closed-loop speed control of the device fans, the power supply fan and the fan of the optional graphics card • Temperature alarm is output.
Fan monitoring	• Monitoring of underspeed and failure of a fan as well as cable break of the tachometer cable The operation of the fan is monitored at the following positions: • Front panel • Optional graphics card • Optional AI Unit NVIDIA A2 • Single power supply (400 W)	• Status display "FAN (Page 27)" • Fan alarm is output.
Watchdog	• Monitoring of the system status and message as to whether a station is still operational. • If the watchdog is not operated within a configured monitoring time, a watchdog alarm is output. • A change to the monitoring time is effective immediately.	• Status display "WATCHDOG (Page 27)" Depending on the setting, the following actions are initiated: • Reset on: A hardware reset is carried out
Monitoring of the voltages	• Monitoring of the charge status of the buffer battery (CMOS) • When the first warning threshold is reached, the backup battery will run for at least 1 more month.	• If a critical or error status occurs, an alarm is output.
Drive monitoring	• Determination of the status of the drives (HDD and SSD) with SMART functionality (SMART: Self-Monitoring, Analysis and Reporting Technology) also in RAID systems (RAID state) • The status of an inactive hot swap drive is not displayed.	• Status display "HDDx ALARM (Page 27)" • SMART status of the hard drives • The following statuses, for example, are displayed in a RAID system: "Normal", "OK", "Degraded", "Error Rebuild", "Rebuilding"

Note

Fan monitoring restricted

The redundant power supply (350 W) does not report a fan error.

If the fan fails or is defective, there is no fan alarm.

The device switches off automatically to protect against overheating.

Software for device monitoring

You can find information on the monitoring software and its documentation under:

- SIMATIC IPC DiagBase (Page 87) for monitoring and alarm output locally on the device

- SIMATIC IPC DiagMonitor (Page 87) for monitoring and alarm output via the network

SIMATIC DiagBase or SIMATIC DiagMonitor also controls the status displays of the IPC, see: System status displays (Page 27).

5.5.2 SIMATIC IPC DiagBase

If you have ordered your device with a Microsoft® Windows® operating system, the SIMATIC IPC DiagBase monitoring software is installed.

Information on the software and documentation of SIMATIC IPC DiagBase can be found under:

• Important instructions and manuals for operating the device (Page 11)

5.5.3 SIMATIC IPC DiagMonitor

The SIMATIC IPC DiagMonitor monitoring software can be ordered optionally.

If a device is ordered with SIMATIC IPC DiagMonitor, the software is included with the device in the delivery state.

Information on the software and documentation of SIMATIC IPC DiagMonitor can be found under:

• Important instructions and manuals for operating the device (Page 11)

Note

SIMATIC IPC DiagMonitor only supports the device hardware as of version 5.1.5.

Older versions do not support the device hardware.

5.6 Remote maintenance of the device

5.6.1 Remote maintenance functions and device requirements for remote maintenance

Remote maintenance of the devices is performed using Intel® Active Management Technology (iAMT), which is integrated into the hardware and firmware of the computer.

Through remote access to SIMATIC IPCs, system or program errors can be eliminated, program updates can be performed and firmware/BIOS settings can be made from a control room (without on-site presence). Access is possible even if the operating system no longer starts.

Several remote maintenance functions of iAMT are listed as examples below:

Function	Description
Remote operation (keyboard video mouse redirection)	With KVM Redirection, you can control SIMATIC IPCs remotely even if they 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 allows you to restart the IPC and change firmware/BIOS settings remotely.
Remote power management	SIMATIC IPCs can be turned on and off and restarted from another PC.
IDE redirection	An ISO file on the Help Desk PC can be integrated and used on the SIMATIC IPC 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 booting	A SIMATIC IPC can be booted remotely from a bootable ISO file made available by another PC.

Device requirements for remote maintenance

The following requirements must be fulfilled in order to use the remote maintenance:

- Processor that supports iAMT technology
- Connection to the network

5.6.2 Remote maintenance with Intel® AMT

5.6.2.1 Enable Intel® AMT control on the device

To make use of "Intel® Active Management Technology ", proceed as follows:

- Note the information on the device requirements for Intel® AMT. (Page 88)

- First, enable the Intel® AMT functions (Page 89).

- Then configure the Intel® AMT functions. (Page 90)

Note

For information on the firmware settings, refer to the firmware/BIOS description of the device, see "Important instructions and manuals for operating the device (Page 11)".

5.6.2.2 Activate Intel® AMT

1. Switch on the device or restart it.

2. To access the firmware user interface, press the <Esc> button several times in succession immediately after switching on the device.

   The firmware user interface opens. Here you have the following keys available for navigation:

Action	Key
• Select entry (then confirm selection)	• Arrow keys on the keyboard
• Confirm selection	• <Enter> key
• Back to previous window	• <Esc> key

3. Select "Advanced" > "AMT Configuration".

4. Assign the "Enabled" value to the firmware setting "AMT BIOS Features".

5. Press the button <F10> (Save & Exit) and confirm the subsequent dialogue with <Y>.

6. Switch off the device and then configure the Intel® AMT functions (Page 90).

5.6.2.3 Configuring Intel® AMT

Requirements and procedure for using Intel® AMT

Requirement

- The Intel® AMT functions are enabled. (Page 89)
- The device was switched off or restarted after activating the Intel® AMT functions.

Procedure

1. Immediately after switching on the device, press the keyboard shortcut <Ctrl + P> as soon as the message "Press <Ctrl + P > to enter MEBx" appears.

   MEBx ("Intel® Management Engine BIOS Extension") is open.

2. Log in to MEBx and assign a password. (Page 90)

3. Configure the Intel® AMT functions in the Options of the MEBx (Page 91).

Logging onto MEBx (assigning password)

1. Select the "Intel(R) Management Engine BIOS Extension" option on the "Main Page" with the arrow keys.

2. Select the "MEBx Login" option.

3. Confirm your selection with the <Return> key.

4. Enter the following "**Intel(R) ME Password**" when logging on the first time:

   admin

5. Afterwards, change the password immediately.

   The new password must contain the following characters:

   – A total of at least eight characters

   – An upper case letter

   – A lower case letter

   – Eine Zahl

   – A special character . ! @ # $ % ^ & *

   Note

   The underscore and blank space are valid password characters but do not increase password complexity.

Options of the MEBx

Use "Intel® Management Engine BIOS Extension" (MEBx) to configure important firmware settings of your device to use Intel® AMT functions and the Intel® Management Engine (ME). The following options are available for Intel® AMT-enabled devices:

- Intel(R) ME General Settings
- Intel(R) AMT
- Intel(R) AMT Configuration
- MEBx Exit

Requirement for the use of "Intel® Management Engine BIOS Extension" (MEBx)

- Intel® AMT functions are enabled, i.e. the firmware setting "AMT BIOS" is assigned the value "Enabled". You can find information on this under "Activate Intel® AMT (Page 89)".
- A device with the SMS-W480 motherboard.

Note

The MEBx setting options depend on whether or not your device supports Intel® AMT.

Intel(R) ME General Settings

MEBx setting	Meaning
Change ME Passwort	Here, you can change the current password for logging onto MEBx.
FW Update	Firmware updates of the "Intel® Management Engine" (ME) can be installed, not installed or only installed after entering the password.

Intel(R) AMT

MEBx setting	Meaning
Intel(R) AMT	When Intel® Active Management Technology (iAMT) is disabled, all network settings are reset to the settings in the delivery state.

Intel(R) AMT Configuration

MEBx setting	Meaning
Manageability Feature Selection	Intel® AMT functions are enabled or disabled. In the delivery state, "Manageability Feature Selection" = Disabled.
SOL/Storage Redirection/KVM (only if "Manageability Feature Selection" = Enabled)	Enabling and disabling of the Intel® AMT functions: • SOL • Storage Redirection • KVM Feature Selection
User Consent (only if "Manageability Feature Selection" = Enabled)	User Consent settings. Forces the following additional security behavior: When a user attempts to establish a KVM connection remotely, a six-digit number is displayed on the AMT PC. The remote user must enter this number on the help desk PC before the KVM connection can be opened.

MEBx setting	Meaning
Password Policy (only if "Manageability Feature Selection" = Enabled)	Password policy that specifies the conditions under which the password is permitted to be changed remotely. The following options can be selected: • Default Password Only • During Setup And Configuration • Anytime
Network Setup (only if "Manageability Feature Selection" = Enabled)	The following network settings can be configured: Intel(R) ME Network Name Settings • Host Name • Domain Name • Shared/Dedicated FQDN • Dynamic DNS Update TCP/IP Settings > Wired LAN IPV4 Configuration • DHCP mode
Activate Network Access (only if "Manageability Feature Selection" = Enabled)	Enables the network interface. This MEBx setting is only available when the network is not enabled.
Unconfigure Network Access (only if "Manageability Feature Selection" = Enabled)	Disables the network interface and resets the network settings to their default values.
Remote Setup And Configuration (only if "Manageability Feature Selection" = Enabled)	Displays the current provisioning settings.
Power Control (only if "Manageability Feature Selection" = Enabled)	Specifies the power states (S0, S3, S4, S5) of the computer in which MEBx is enabled.

MEBx Exit

Exiting MEBx. The changes are saved.

Further information

More information about MEBx can be found here: Intel® website (https://www.intel.com).

5.6.2.4   Reset Intel® AMT functions to default settings and disabling iAMT

One effect of resetting to the default settings is that Intel® AMT is disabled.

1. Switch on the device or restart it.

2. To access the firmware user interface, press the <Esc> button several times in succession immediately after switching on the device.

The firmware user interface opens. Here you have the following keys available for navigation:

Action	Key
• Select entry (then confirm selection)	• Arrow keys on the keyboard
• Confirm selection	• <Enter> key
• Back to previous window	• <Esc> key

3. Select "Advanced" > "AMT Configuration".

4. Assign the "Enabled" value to the firmware setting "Unconfigure ME".

5. Press the button <F10> (Save & Exit) and confirm the subsequent dialogue with <Y>.

6. Switch off the device or restart the device.

7. At the next start-up, a confirmation message appears to perform the "Unconfigure ME" operation.

   If you perform this action, all values of the Intel® Management Engine BIOS Extension (MEBx) including the MEBx password are reset to default values.

5.6.2.5 Disabling Intel® AMT access to the firmware/BIOS settings

You can prevent access to firmware/BIOS settings with Intel® AMT

This may be necessary, for example, in the following cases:

• When you are no longer using Intel® AMT.

• You want to ensure that Intel® AMT is not used without authorization.

All Intel® AMT functions are thereby reset to default settings.

Procedure

1. Switch on the device or restart it.

2. To access the firmware user interface, press the <Esc> button several times in succession immediately after switching on the device.

   The firmware user interface opens. Here you have the following keys available for navigation:

Action	Key
• Select entry (then confirm selection)	• Arrow keys on the keyboard
• Confirm selection	• <Enter> key
• Back to previous window	• <Esc> key

3. Select "Advanced" > "AMT Configuration".

4. Assign the "Disabled" value to the firmware setting "AMT BIOS Features".

5. Press the button <F10> (Save & Exit) and confirm the subsequent dialog with <Yes>.

6. Switch off the device and then configure the Intel® AMT functions.

5.7 Trusted Platform Module (TPM)

Depending on the ordered configuration of your device, a Trusted Platform Module according to Standard TPM V2.0 may be available. The Trusted Platform Module is a chip that enhances your device with security functions. This provides an improved protection from manipulation of the device.

NOTICE
Import restrictions for the Trusted Platform Module
Use of the Trusted Platform Module is subject to legal restrictions in some countries and is not permitted there.
• Always observe the respective import restrictions of the country in which the device will be used.

Activating the Trusted Platform Module

You can find information on activating the Trusted Platform Module in the detailed firmware/BIOS description in "Important instructions and manuals for operating the device (Page 11)".

5.8   AI Unit NVIDIA A2

The **AI Unit NVIDIA A2** offers inference with high performance at low power consumption for intelligent video analyses (IVA) and can be used for AI applications.

Components of the AI Unit NVIDIA A2

The **AI Unit NVIDIA A2** consists of the **NVIDIA A2 Tensor Core GPU**① and a **fan**② that are installed in an **enclosure**③.
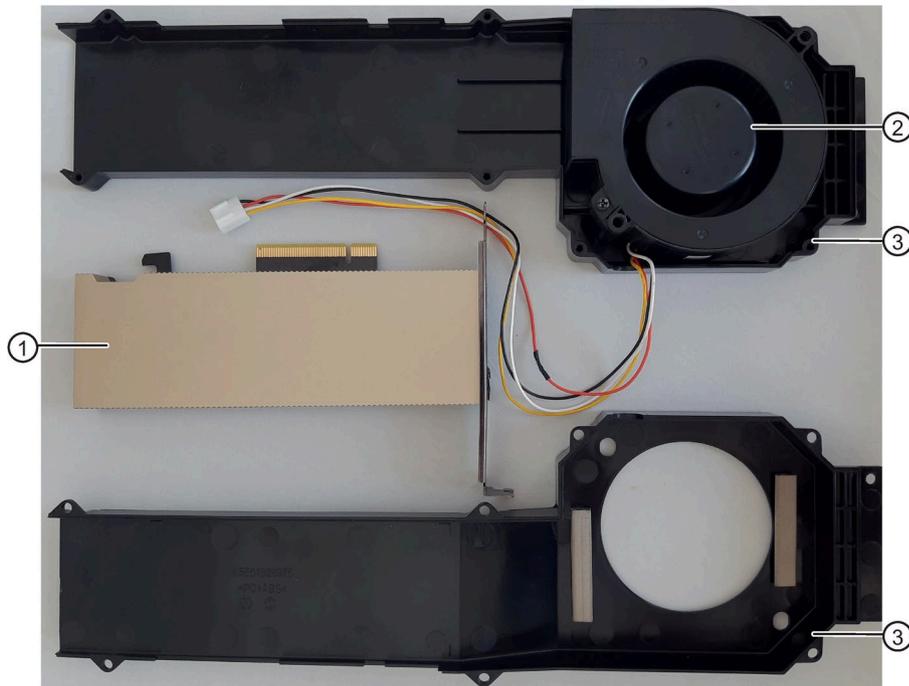
Requirements

> **Note**
>
> When a SIMATIC IPC647E with AI Unit NVIDIA A2 is delivered, the device is configured according to the system requirements.

- Operating system:
  - Microsoft® Windows® 10 Enterprise 2019 LTSC, 64-bit
  - Windows® Server 2019 Standard Edition, including 5 clients, 64-bit, Multi-Language
- Drive cage type A
- Bus board variant 1 or variant 2. You can find information on the variants of the bus boards under "Technical specifications of the expansion card slots (Page 162)".
- You know the climatic ambient conditions for operating the device with AI Unit NVIDIA, see "Climatic and mechanical and ambient conditions (Page 159)".

Firmware setting when using the AI Unit NVIDIA A2

For SIMATIC IPC647E devices with AI Unit NVIDIA A2, the firmware setting "Fan Control Mode" is assigned the value "Enhanced" at the time of delivery. This value must not be changed.

If necessary, check this value before using the AI Unit in AI applications.

"You can find more detailed information on this in the firmware/BIOS description for the SIMATIC IPC647E standard device under Firmware/BIOS description (https://support.industry.siemens.com/cs/ww/en/view/109760621)".

Expanding and assigning parameters to the device 6

6.1 Open the device

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- T10 screwdriver

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".
2. Unplug all connecting cables.
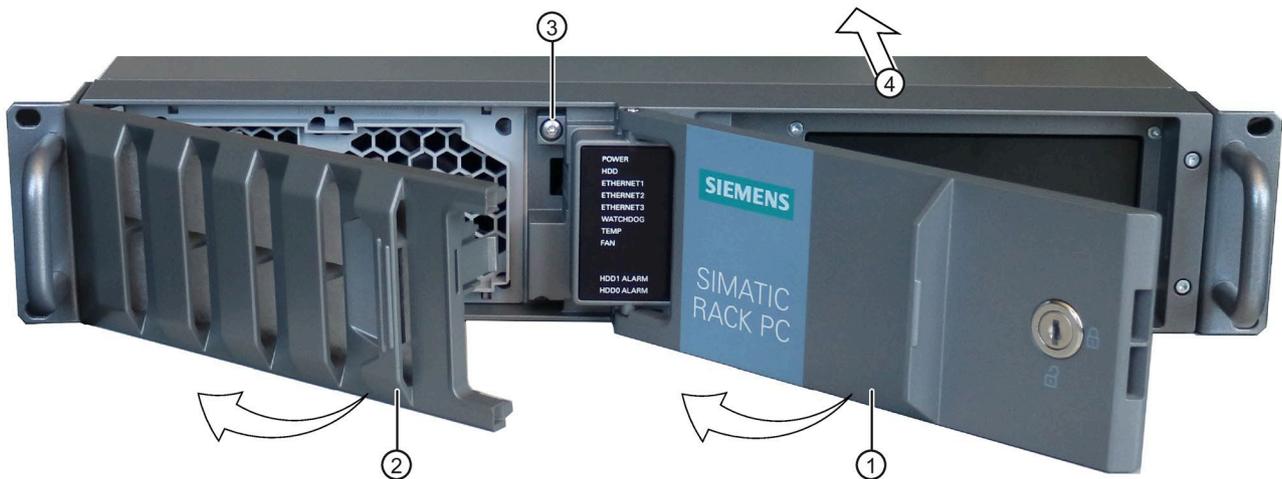
3. Open the front door (Page 68)①.
4. Open the fan cover ②.
5. Unscrew the locking screw of the enclosure cover ③.
6. Slide the enclosure cover back ④.
7. Lift up and remove the enclosure cover.

6.2 Installing and removing expansion cards

6.2.1 Remove the bus frame

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- Screwdriver T10

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".
2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".
3. Remove the 4 screws ① with which the bus frame is mounted in the device.
4. Pull the bus frame carefully and evenly upwards out of the device at the marked points ②.

   When doing this, do not tilt the bus frame.
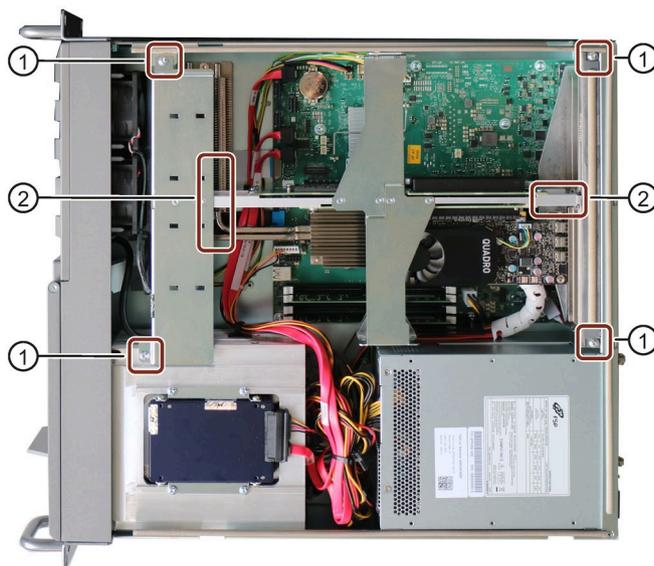
5. Turn the bus frame over and place it on the device with the bottom side facing up.

6. Unlock the power supply plug and disconnect it.
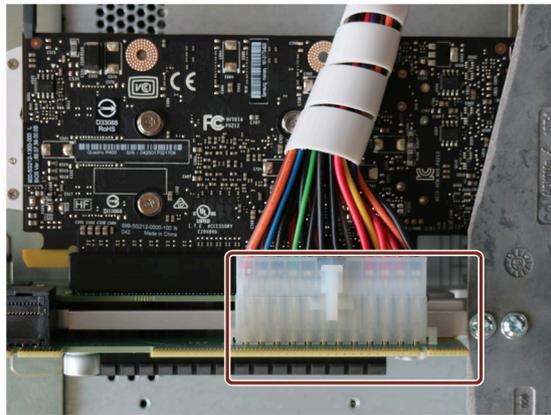
See also

Structure of the bus board (Page 184)

Components of the bus frame (Page 184)

6.2.2 Installing expansion cards

Notes on the use of expansion cards

The mounting location of an expansion card depends on the specification of the slot on the respective riser card. You can find information on this under "Technical specifications of the expansion card slots (Page 162)".

You can find the permitted dimensions for expansion cards under "Dimension drawing of the expansion cards (Page 176)". To rule out contact problems and malfunctions, do not use any expansion cards that exceed the maximum permissible height.

For very low cards, the latching retainer can be stabilized by using a retainer guide.

For expansion cards with lower overall height (low-profile 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.

Requirements

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- Screwdriver T10

- Diagonal cutter

- For low expansion cards:

  – Retainer, latchable

  – Retainer guide

  – Expanding rivets

  Included in the accessory pack of the device or can be ordered as a replacement part, see "Hardware accessories (Page 31)".

Procedure

---

Note

Do not mix up the screws

During this process, screws with different types of threads are removed and reattached.

Make sure that you reinsert the screw with the correct thread type at the respective position.

---

1. Remove the bus frame. (Page 98)

2. Remove the center rail of the bus frame (Page 184) on the side where you want to install the expansion card. To do this, loosen the screws on the link rail (Page 184).
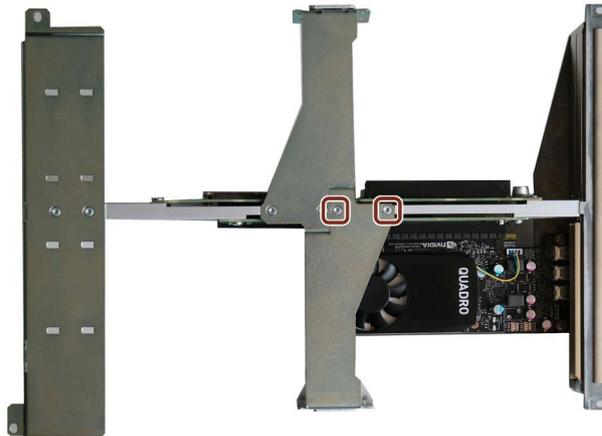
3. Remove the blanking plate at the position where you want to install the expansion card.

   To do this, loosen the screw and be sure to keep it because you will need it later.
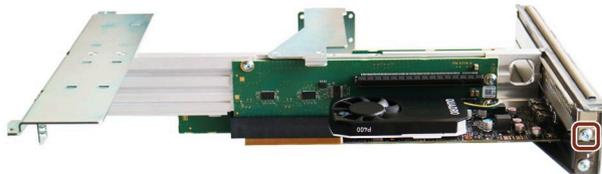
4. Attach the retainer guide to the mounting bracket (Page 184) (end of the center rail of the bus frame) from the inside. Depending on the height of the expansion card, you can attach the retainer guide at the lower position ① or at the upper position ②.

5. Fix the retainer guide from the outside with the two expanding rivets.

6. Insert the expansion card into the corresponding slot on the first riser card or the second riser card (piggyback).

7. Fix the expansion card with the screw you used to remove the blanking plate before. Only use this screw for installation.

8. Push a latching retainer ③ through one of the guide slots of the mounting bracket until the recess of the retainer carefully engages with the expansion card.

Note

Latching retainers can only be moved in the direction of the expansion card and snap into place at the corresponding position.
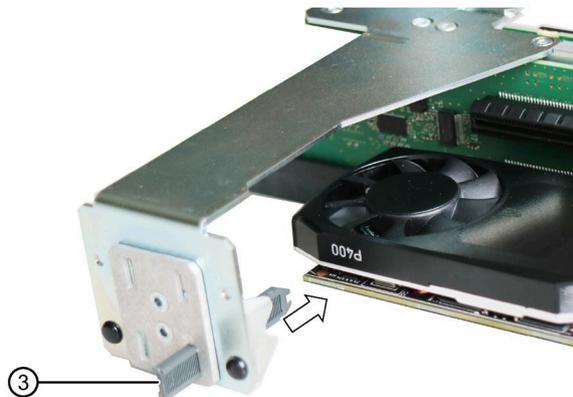
9. Cut off the protruding part of the latching retainerr so that no excess material protrudes.

10. Install the bus frame in the device.

11. Close the device.
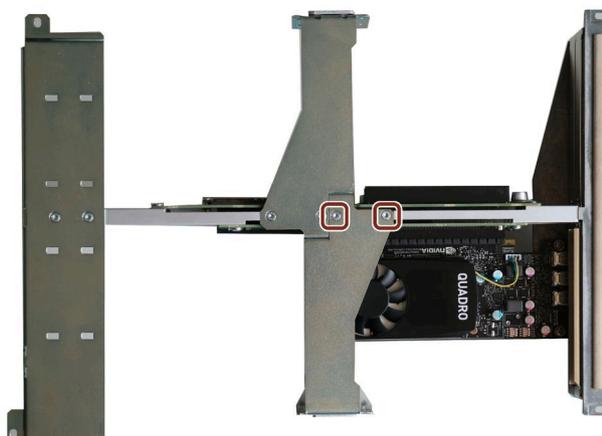
6.2.3   Removing expansion cards

Requirements

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- T10 screwdriver

Procedure

Note

You can find information on the structure of the bus frame under "Components of the bus frame (Page 184)".

---

1. Remove the bus frame (Page 98).

2. Remove the center rail of the bus frame on the side where the expansion card you want to remove is plugged in.

3. Remove the screw that secures the expansion card to the rear of the device. Save the screw for the installation of a blanking plate.
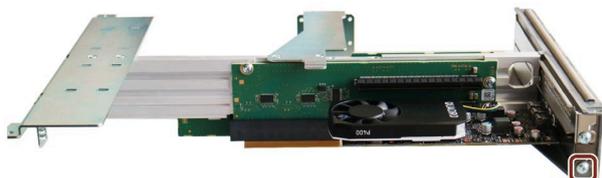
4. Remove the expansion cards without tilting from the slot
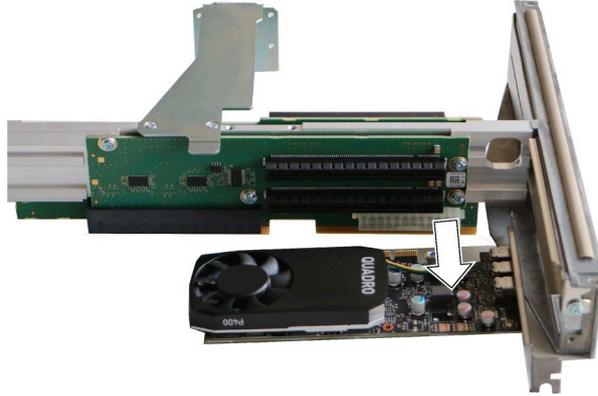
5. If you do not install a new expansion card after removing the expansion card, install a slot blanking plate at the sampling point using the screw previously removed.

6.3 Installing and removing memory modules

6.3.1 Information on using memory modules

Usable memory modules

- DIMM DDR4 memory modules
- Memory transaction rate 2666 MT/sec "unbuffered"
- "without ECC", or "with ECC"

Slots for memory modules

You can find information on the slots of the memory modules under "Layout of the motherboard (Page 182)".

Combination options for memory modules

You can equip each device with 1, 2 or 4 memory modules of the same capacity.

Use the modules to expand the memory capacity of your device to a maximum of 128 GB.

Combinations of three memory modules or the mixing of memory capacities is not permitted.

Depending on the number of memory modules used, these are inserted in defined slots on the motherboard.

The slots are inscribed on the motherboard.

Combination op-tion	Channel A (external)		Channel B		Maximum ex-pansion
	Slot X19 DIMM1-1	Slot X190 DIMM1-2	Slot X20 DIMM2-1	Slot X200 DIMM2-2	
Combination 1			4 GB / 8 GB / 16 GB		16 GB
Combination 2[1]	4 GB / 8 GB / 16 GB		4 GB / 8 GB / 16 GB		32 GB
Combination 3	Combinations of three memory modules are not permitted				
Combination 4[1]	4 GB / 8 GB / 16 GB / 32 GB	4 GB / 8 GB / 16 GB / 32 GB	4 GB / 8 GB / 16 GB / 32 GB	4 GB / 8 GB / 16 GB / 32 GB	128 GB

[1] Only use memory modules with identical memory capacity per slot.

Usable memory modules

- DIMM DDR4 memory modules

- Memory transaction rate 2666 MT/sec "unbuffered"

- Memory module without ECC

- Memory module with ECC

Conditions of use of memory modules

- The memory only works in dual channel mode when two identical memory modules are installed.

- If expansion cards with their own storage, e.g. graphics cards, with 256 MB and more are used, the memory available for an operating system or applications may be less than 64 GB.

- Memory modules with ECC and without ECC may not be used in mixed operation.

- Memory modules with ECC can only be used in conjunction with Core i3 or Xeon processors.

- In faults occur, it may be enough to remove one or two memory modules or use a memory module with less capacity so that the physical memory set up on the motherboard and the reserved memory on the expansion card do not overlap.

6.3.2   Installing memory modules

You can find information on the location of slots for memory modules under "Internal construction of the device (Page 30)".

Requirements

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- You are familiar with the information under "Information on using memory modules (Page 106)".

Order when installing multiple memory modules

If you insert several memory modules, insert them one after another in the following order.

- 1st memory module: DIMM 2-1 slot
- 2nd memory module: DIMM 1-1 slot
- 3rd memory module: DIMM 2-2 slot
- 4th memory module: DIMM 1-2 slot

The slots on the memory module are inscribed on the motherboard.

Procedure

1. Disconnect the device completely from the supply voltage. Be sure to follow the important instructions under "Switching off the device (Page 66)"
2. Open the device. (Page 97)
3. If necessary, remove the bus frame (Page 98).
4. Open the two locks to the left and right of the slot.
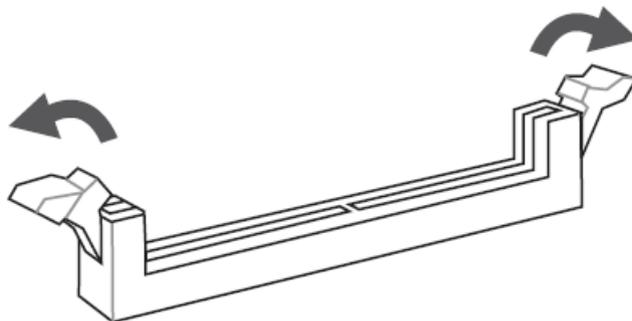
5. Remove the memory module from its packaging.

   Hold it by the upper edges only.

6. Insert the memory module in the slot perpendicular to the motherboard.

   When inserting, pay attention to the cutout (see figure), which must be in line with the coding of the base.
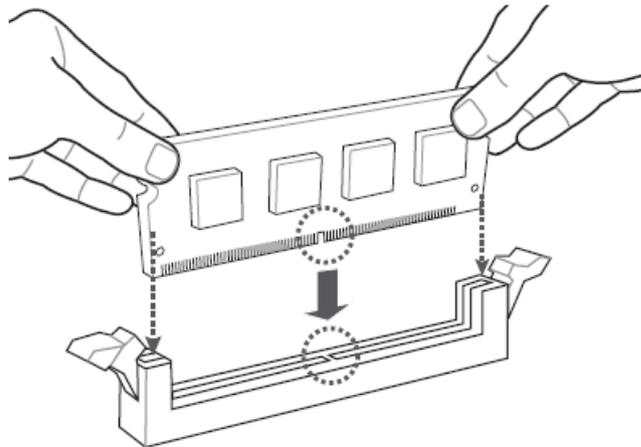
7. To prevent tilting, press evenly on both sides of the memory module until both interlocks audibly engage.
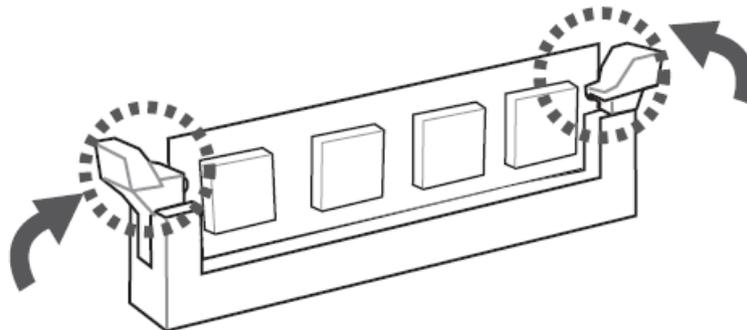
8. If necessary, re-install the bus frame.

9. Close the device.

Display of a changed memory configuration

A changed memory allocation is automatically recognized when the device is switched on.

6.3.3   Removing memory modules

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

Order when removing multiple memory modules

If you remove several memory modules, remove them one after another in the following order.

- 1st memory module: DIMM 1-2 slot

- 2nd memory module: DIMM 1-1 slot

- 3rd memory module: DIMM 2-2 slot

- 4th memory module: DIMM 2-1 slot

The slots on the memory module are inscribed on the motherboard.

Procedure

1. Disconnect the device completely from the supply voltage. Be sure to follow the important instructions under "Switching off the device (Page 66)".

2. Open the device. (Page 97)

3. If necessary, remove the bus frame (Page 98).

4. Open the two latches at the sides of the memory module evenly.

   Remove the memory module from the slot.
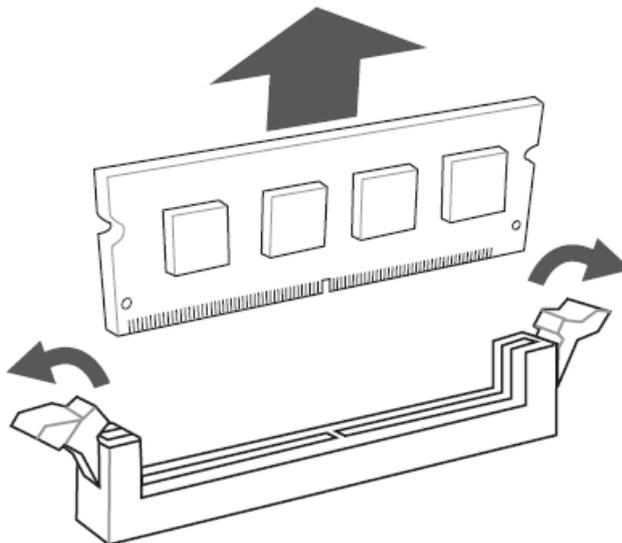
5. If necessary, re-install the bus frame.

6. Close the device.

Display of a changed memory configuration

A changed memory allocation is automatically recognized when the device is switched on.

6.4   Connecting a USB stick to the internal interface

The device has an internal USB port to which you can connect a USB stick.
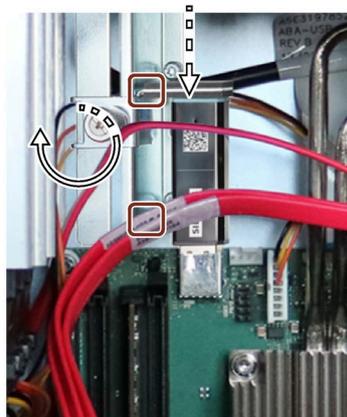
You can find this interface on the motherboard, see "Position of the interfaces on the motherboard (Page 183)".

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- Retainer for locking the internal USB interface, see "Hardware accessories (Page 31)".
- Screwdriver TX10

Procedure

1. Disconnect the device completely from the supply voltage. Be sure to follow the important instructions under "Switching off the device (Page 66)".
2. Open the device. (Page 97)
3. Screw the guide rail of the retainer into the enclosure as shown in the figure.
4. Plug in the USB stick.
5. Slide the retainer in the direction of the USB stick.
6. Fix the retainer by turning the screw on the guide rail.

6.5 Installing and removing an optional graphics card

6.5.1 Installing the optional graphics card

In its delivery state, the device is equipped with integrated graphics interfaces.

For connecting monitors to these graphics interfaces, two or three connection sockets are available as standard on the rear of the device, depending on the type of motherboard.

You can find information on the position of the connection sockets and the labeling on the device in section "Device ports (Page 22)".

To connect additional monitors to the device (multi-monitoring), (Page 62)you can install a so-called "optional graphics card".

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- A graphics card suitable for this device that supports multi-monitoring.

  You can obtain information on this from your local contact person, see "Service and support (Page 192)".

- You have made a note of the firmware settings because the firmware settings of the device can be deleted when an optional graphics card is installed.

  You can find information on this in the firmware description of the device, see "Important instructions and manuals for operating the device (Page 11)".

Procedure

1. The optional graphics card is an expansion card.

   Install the optional graphics card. You can find notes on the specified mounting position under "Technical specifications of the expansion card slots (Page 162)".

   Note the information under "Installing expansion cards (Page 100)".

   Note

   Graphics cards with external power supply

   Connect graphics cards that require an external power supply with the 6-pin connector of the power supply. You can find information on this in the section "Technical specifications of the connectors for the power supply of optional graphics cards (Page 172)".

   The technical conditions of the power supply must be complied with.

2. Check the firmware settings.

3. Configure the function "Multi-monitoring" in the firmware settings of the device.

   Note the following information.

Display message about opening firmware settings on the monitor of the optional graphics card

To configure the firmware, press the <Del> or <Esc> key when the boot message appears during the boot phase of the device to access the firmware settings.

In delivery state the device is configured so that this message is only displayed on a monitor that is connected to a DPP connection or DVI-D connection on the rear of the device, see section "Device ports (Page 22)".

If you want to display this message on a monitor that is connected to an optional graphics card connector, follow these steps.

1. Connect a monitor to the DPP port or the DVI-D port.

2. During the boot phase, when a boot message appears, press the <Del> or <Esc> button.

3. Select "Chipset" > "System Agent (SA) Configuration".

4. Assign the "Auto" value to the firmware setting "Primary Display".

6.5.2 Removing the optional graphics card

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- You have made a note of the firmware settings because the firmware settings of the device can be deleted when the optional graphics card is removed.

  You can find information on this in the firmware description of the device, see "Important instructions and manuals for operating the device (Page 11)".

Procedure

1. The optional graphics card is an expansion card.

   Remove the optional graphics card.

   Note the information under "Removing expansion cards (Page 104)".

2. Check the firmware settings.

6.6 Installing and removing drives

6.6.1 Installing drives in drive cage type A

6.6.1.1 Installation options for drives with drive cage type A

For devices with drive cage type A, you can mount up to 3 drives in the following mounting locations.

- In the drive cage: up to 2 drives (2.5" or 3.5" drives) in removable trays
- Above the drive cage: 1 drive (2.5" drive) with mounting brackets

  The drives above the drive cage are installed internally in the device and are not accessible from the outside.

Number of drives and mounting locations

Observe the numbering of the mounting locations, see "Drive cage type A (Page 18)".

Number of drives	Mounting location	Notes on the installation option
1	In the drive cage, in the removable tray: • Mounting location 0	• Change 2.5" and 3.5" drive in removable tray (Page 115)
	Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal)	• Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
2	In drive cage, in 2 removable trays: • Mounting location 0 • Mounting location 1	• Change 2.5" and 3.5" drive in removable tray (Page 115)
	In the drive cage, in the removable tray: • Mounting location 0 Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal)	• Change 2.5" and 3.5" drive in removable tray (Page 115) • Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
	Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal) • Mounting location 3 (internal)	• Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
3	In the drive cage, in the removable tray: • Mounting location 0 • Mounting location 1 Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal)	• Change 2.5" and 3.5" drive in removable tray (Page 115) • Removing and installing a 2.5" drive (internal) via drive cage (Page 128)

Permissible number of drives depending on ambient air temperature

For devices with drive cage type A, you can install a maximum of 3 drives.

Drive type	Ambient temperature
	+0 to +50 °C
2.5" SATA	2 drives
3.5" SATA	2 drives

Drive type	Ambient temperature	
	+5 to +35 °C	+5 to +40 °C
3.5" SATA Enterprise	2 drives	2 drives
3.5" SAS Enterprise	2 drives	-

6.6.1.2   Change 2.5" and 3.5" drive in removable tray

Requirement

- The device is equipped with the drive cage type A.
- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- You know the information under "Installation options for drives with drive cage type A (Page 114)".
- An original spare part, that is, a drive approved for this device.
- You can find information on the removable tray as a replacement part under "Hardware accessories (Page 31)".
- When replacing an HD: T10 screwdriver
- When replacing an SSD: T8 screwdriver
- You operate the device as an "Onboard RAID1 system".
- The device you wish to replace is inactive.

NOTICE
Risk of damaging the drive and data loss
Drives in the removable drive bays can only be replaced during operation in connection with RAID1 (hot swap).
When you remove the drive while data is being written to it, you may damage the drive and destroy data.
• Only remove the removable tray from the device when the drive is inactive, see "Status displays on removable tray for drives (Page 29)".

Procedure

1. If there is no RAID system:

   Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the front panel (Page 68).

3. Open the removable tray with the corresponding key.


4. Reach into the notch ① in the bracket of the removable tray and pull out the bracket in the direction of the arrow up to a slight resistance.
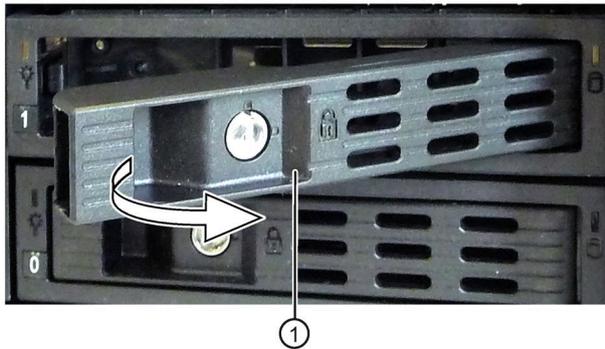
   The removable tray is pushed out of the drive cage by leverage.

5. Grip the removable tray from the front in the middle at the top and bottom and pull the removable tray completely out of the device.

6. Loosen the highlighted screws on the bottom of the removable tray and remove the drive.

   The left figure shows as drive a 3.5" HDD, the right figure a 2.5" SSD.
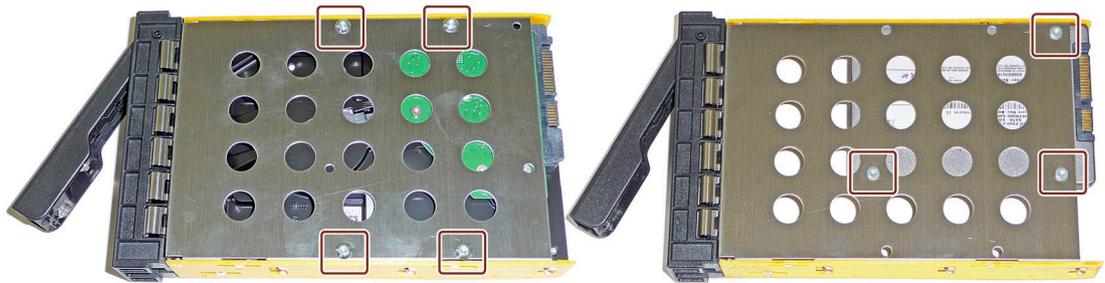
7. Carefully insert the new drive into the removable tray.

   Take care not to touch the contacts of the drive when you do this.

8. Fasten the new drive with the screws to the base of the removable tray.

   Only use the original screws.

9. Carefully insert the removable tray into the drive cage of the device again.

10. Fold the tray bracket out of the removable tray as far as it will go and slide the removable tray fully into the drive cage.

    Ensure that the removable tray fits tightly in the drive cage.

11. Close the tray bracket.

12. Lock the removable tray with the key.

Note

The removable tray must always be locked to ensure reliable operation of the devices with removable trays.

6.6.1.3   Installing a backplane for removable tray

The backplane of the removable tray is installed from inside at the back end of the drive cage type A and is equipped with interfaces for data cables to the motherboard.

This enables the convenient connection of the data cables from the motherboard to the drive in the removable tray at these interfaces.

Removable tray with backplane

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original replacement part. For information on replacement parts, refer to "Hardware accessories (Page 31)".

- The device is equipped with the drive cage type A.

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Press the locks ① of the cover ② together inside the device and keep them pressed.
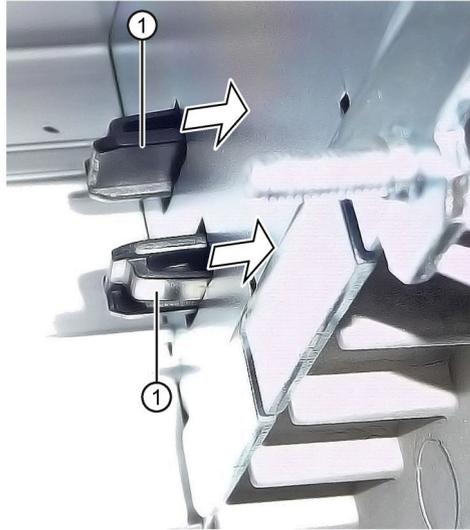
4. Push the locks to the front in the direction of the arrow.
5. Remove the cover ② upwards at an angle at the front of the device.


6. On the front of the drive cage, remove the cover of the mounting locations ③, which may be located to the right of the cover ②.
7. Remove all existing removable trays until the drive cage is freely accessible.

8. Insert the backplane ④ into the drive bay from the front and snap it into place at the back.
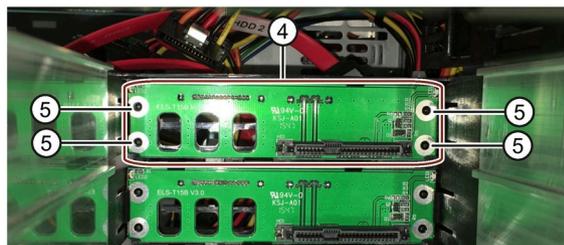
Check the following:

– The backplane lies flat at the back in the drive cage.

– All centering openings ⑤ of the backplane lie in the centering pins.

– The backplane is clipped in behind the latches ⑥.

– All backplanes lie exactly underneath each other, vertically aligned, when viewed from above ⑦.
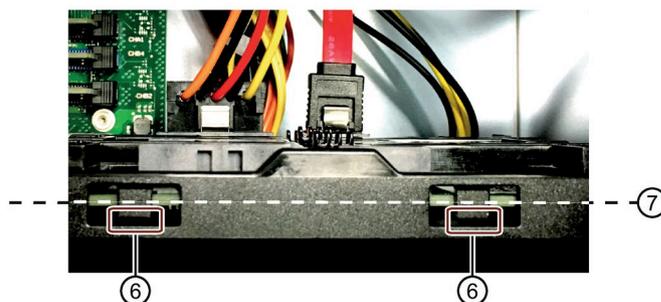
9. Reinstall the required blanking plates or removable trays.

10. Insert the cover ② into the front of the device.

11. At the backplane, connect the data cables with the corresponding interfaces on the motherboard or the hardware RAID controller.

12. Connect the power supply.

13. Close the device.

6.6.1.4 Removing a backplane for removable tray

The backplane of the removable tray is installed from inside at the back end of the drive cage type A and is equipped with interfaces for data cables to the motherboard.

This enables the convenient connection of the data cables from the motherboard to the drive in the removable tray at these interfaces.


Figure 6-1   Removable tray with backplane

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- The device is fully disconnected from the line voltage, see "Switching off the device (Page 66)".

- The device is equipped with the drive cage type A.

Procedure

1. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

2. Note the assignment of all data cables to the motherboard and disconnect all data cables ①.
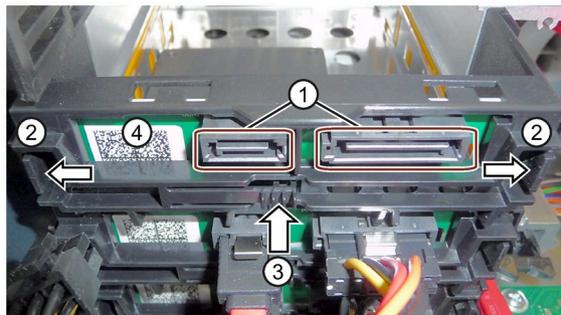
3. Unlock the backplane by pressing firmly in the direction of the arrow on the latching lugs ② and press the ejector ③.

4. Remove the unlatched backplane board ④ by turning it upwards from the brackets and removing it from the drive cage.

5. Close the device.

6.6.2 Installing drives in the drive cage type B

6.6.2.1 Installation options for drives with drive cage type B

For devices with drive cage type B, you can install up to 4 drives in the following mounting locations.

- In the drive cage: up to 2 drives (3.5" drives) in drive bays

- Above the drive cage: up to 2 drives (2.5" drives) with mounting brackets

  The drives above the drive cage are installed internally in the device and are not accessible from the outside.

Number of drives, system and mounting locations

Observe the numbering of the mounting locations, see "Drive cage type B (Page 20)".

Number of drives	Mounting location	Notes on the installation option
1	In the drive cage, in the drive bay: • Mounting location 0	• Removing and installing the 3.5" drive in the drive bay (Page 125)
	• Mounting location 2 (internal)	• Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
2	In the drive cage, in the drive bay: • Mounting location 0 • Mounting location 1	• Removing and installing the 3.5" drive in the drive bay (Page 125)
	In the drive cage, in the drive bay: • Mounting location 0 Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal)	• Removing and installing the 3.5" drive in the drive bay (Page 125) • Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
	Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal) • Mounting location 3 (internal)	• Removing and installing a 2.5" drive (internal) via drive cage (Page 128)
3	In the drive cage, in the drive bay: • Mounting location 0 • Mounting location 1 Above the drive cage, with drive mounting brackets: • Mounting location 2 (internal)	• Removing and installing the 3.5" drive in the drive bay (Page 125) • Removing and installing a 2.5" drive (internal) via drive cage (Page 128)

Maximum vibration load for drives in the respective installation location

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Note

If the device is permanently installed or mounted on telescopic rails, it may only be subjected to the following vibration loads during operation.

The restrictions do not apply to the use of SSD.

Drives in drive cage type B

Drives in drive cage type B may be exposed to the following maximum vibration loads during operation:

• 10 ... 58 Hz: 0.015 mm

• 58 Hz to 500 Hz: 2 m/s^2

Vibrations must not exceed 500 Hz.

Permissible number of drives depending on ambient air temperature

Drive type	Ambient temperature
	+0 to +50 °C
2.5" SATA	2 drives
3.5" SATA	1 drive

Drive type	Ambient temperature
	+0 to +45 °C
2.5" SATA	2 drives
3.5" SATA	2 drive

Drive type	Ambient temperature
	+5 to +35 °C
2.5" SATA	1 drive
3.5" SATA Enterprise	2 drives

6.6.2.2 Removing and installing the 3.5" drive in the drive bay

Requirements

- The device is equipped with the drive cage type B.
- There are no internal drives above the drive cage.

  You can find information on removing the internal drives in "Removing and installing a 2.5" drive (internal) via drive cage (Page 128)".

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".
- You know the information under "Installation options for drives with drive cage type B (Page 123)".
- An original spare part, that is, a drive approved for this device.
- The device is fully disconnected from the mains power supply, see "Switching off the device (Page 66)".
- The device is open, see important information under "Open the device (Page 97)".
- The drive you want to change is inactive, see "System status displays (Page 27)".

Procedure

Removal of an existing drive

1. Open the front door of the device.

2. Unlock the cover of the drive cage (Page 20) from the inside.

   To do this, press down the marked area with a suitable object (e.g. with a screwdriver) until the cover on the drive cage is released.

3. Remove the cover from the front of the device.

4. Disconnect all cables from the drive in the connector area ①.

5. Unlock the drive by pressing the two clips ② inwards at the same time. The drive automatically slides out at the front of the device.

6. Pull the drive out of the drive bay.

7. Remove the drive rails ③ on both long sides of the drive.

Installing a new drive

1. Attach the drive rails ③ to the new drive. The connector area ① points to the two clips ②.

2. Insert the drive into the drive bay from the front. The connector area points into the interior of the device.

3. Slide the drive into the device until the drive clicks into place.

4. Connect all lines in the connector area ①.

5. Replace the cover on the front of the device.

   To do this, first hang the cover with the right side in the notches provided.

   Then close the cover on the left.

6. Close the device.

6.6.3   Removing and installing a 2.5" drive (internal) via drive cage

You can install one or two 2.5" drives above the drive cage type A or above the drive cage type B with mounting brackets.

* Above the drive cage type A: one 2.5" drive

* Above the drive cage type B: one drive or two 2.5" drives

These drives are then built into the device and are not accessible from the outside.

You can find notes on the mounting locations here:

* "Installation options for drives with drive cage type A (Page 114)"

* "Installation options for drives with drive cage type B (Page 123)"

Requirement

* The device is equipped with a drive cage type A or a drive cage type B.

* You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

* An original spare part, i.e. a drive of the same type approved for this device, see "Hardware accessories (Page 31)".

* The device is fully disconnected from the mains power supply, see "Switching off the device (Page 66)".

* The device is open, see important information under "Open the device (Page 97)".

* The drive you want to change is inactive, see "System status displays (Page 27)".

* T10 screwdriver

Procedure

1. Remove the marked screws.
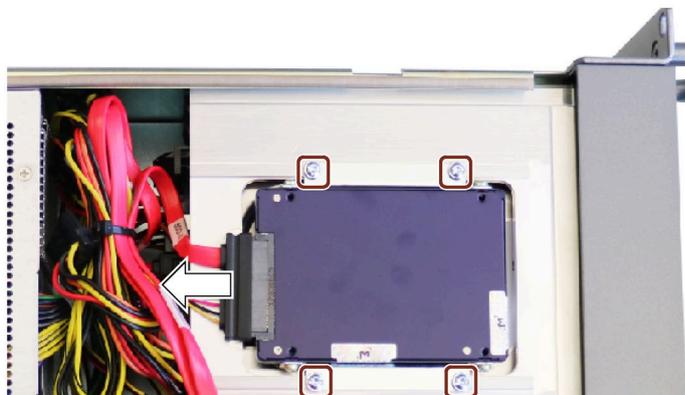
2. Remove the drive with the mounting brackets.

3. Pull off the cables from the drive as shown.

4. Remove the mounting bracket on the sides of the drive.

5. Mount the mounting bracket to the sides of the new drive.

   When attaching the mounting bracket, make sure that the notch on the mounting brackets faces the bottom of the drive.

Figure 6-2   Mounting bracket with 1 drive (for drive cage type A and type B)
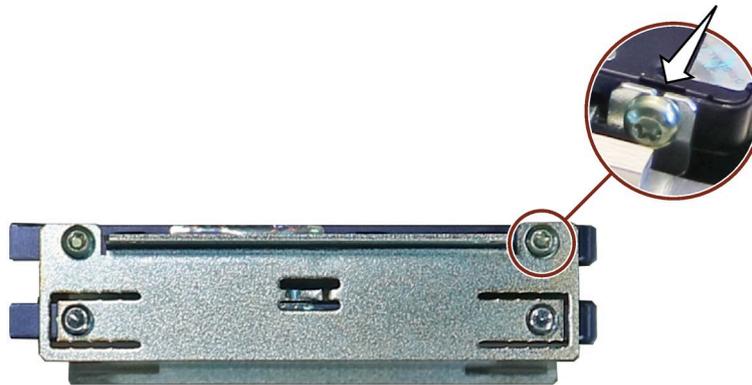

Figure 6-3   mounting bracket with 2 drives (for drive cage type B)

6. Tighten all screws on the two mounting brackets. Tighten the screws on the notches **first** (tolerance compensation).

7. Place the drive in the opening at the top of the drive cage. The notches on the mounting brackets point upwards, i.e. the top of the drive points towards the drive cage.

8. Screw the mounting bracket to the top of the drive cage using the 4 screws previously removed.

6.6.4 Install M.2 NVMe SSD

The direct connector for the M.2 NVMe SSD is located on the first riser card of the bus board, see "Technical specifications of the expansion card slots (Page 162)".

Note

An M.2 NVMe SSD cannot be operated in a RAID system.

Note

An M.2 NVMe SSD must not be used without a thermal pad.

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- Original spare part, i.e. M.2 NVMe SSD approved for this device with heat conduction pad, distance sleeve and flat head screw.

- T10 screwdriver

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove the bus frame. (Page 98)

4. Remove the first riser card of the bus board, see "Components of the bus frame (Page 184)" and "Removing expansion cards (Page 104)".

5. Check how the M.2 NVMe SSD is plugged into the direct connector on the riser card, and then attach the heat pad to the corresponding bottom side of the M.2 NVMe SSD as shown.

   Make sure that the contacts of the direct connector of the M.2 NVMe SSD remain completely free.

6. Insert the M.2 NVMe SSD ③ slightly diagonally from above into the direct connector socket on the first riser card.

7. Position the spacer sleeve on the riser card at the corresponding screw position.

8. Carefully press down M.2 NVMe SSD.

    Fix the M.2 NVMe SSD to the notch at the end of the M.2 NVMe SSD with the pan head screw.

    Tighten the pan head screw without tension.

9. Re-install the riser card with the M.2 NVMe SSD. (Page 100)

10. Re-install the bus frame.

11. Close the device.

Device maintenance and repair

7

7.1 Safety instructions for repairs

Danger from unauthorized or improperly performed repairs

⚠ WARNING
Danger due to unauthorized opening of the device and improperly performed repairs
Improper procedures when performing repairs can lead to material damage to the device or the systems.
If you cause defects in the device by installing or replacing system expansions, this can result in serious dangers for users of the device or the system and the warranty may expire.   • For this reason, please observe the information in "Safety instructions on device and system extensions (Page 46)".

7.2 Maintenance intervals

To maintain a high level of system availability, replace PC components that are subject to wear as a preventive measure according to the recommended replacement interval.

Component	Replacement interval
Drives	3 years
Backup battery	5 years
Front fan	3 years
Filter mat of the fan (front fan)	Depending on the degree of soiling

7.3 Removing and installing hardware

7.3.1 Front fan maintenance

7.3.1.1 Remove the fan cover of the front fan

Requirement

- The front door is open. (Page 68)

Procedure

1. Open the front door ① at least by an angle of approx. 45°.

2. Reach into the recessed grip ② of the fan cover.

3. Open the fan cover in the direction of the arrow and remove it.

7.3.1.2 Change the filter mat of the front fan

Requirement

- The fan cover has been removed; see "Remove the fan cover of the front fan (Page 133)".

- An original spare part, i.e. a filter pad of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

Procedure

1. Remove the filter pad from the fan cover.

2. Insert the new filter pad loosely into the fan cover. Place the filter mat evenly in the fan cover.

3. Replace the fan cover.

7.3.1.3 Changing the front fan

Two front fans are located next to each other on a fan support at the front of the device.

After the maintenance interval (Page 132) has expired, replace the fans and the filter mat of the fans.

A failure of a fan is reported before the monitoring software of the device. Then replace the affected fan.

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original spare part, that is a front fan of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Remove the fan cover. (Page 133)

3. Slide the fan support a bit to the left and move it forward from the front of the enclosure.

4. Set aside the fan support with the openings facing down right in front of the device (fans are on top).

5. Press the clip ② in the middle of both small fan cable plugs one after the other and pull the fan cable plug off the larger adapter plug ③.
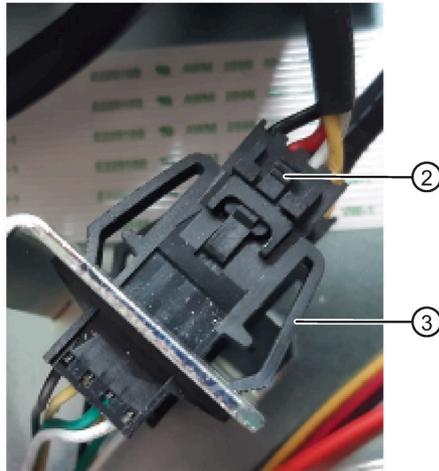
6. Loosen the cable tie with which the two fan cables are fastened to the fan housing.

7. Press the four snap-in hooks on the fan support for each fan together and remove the two fans from the fan support one after the other.
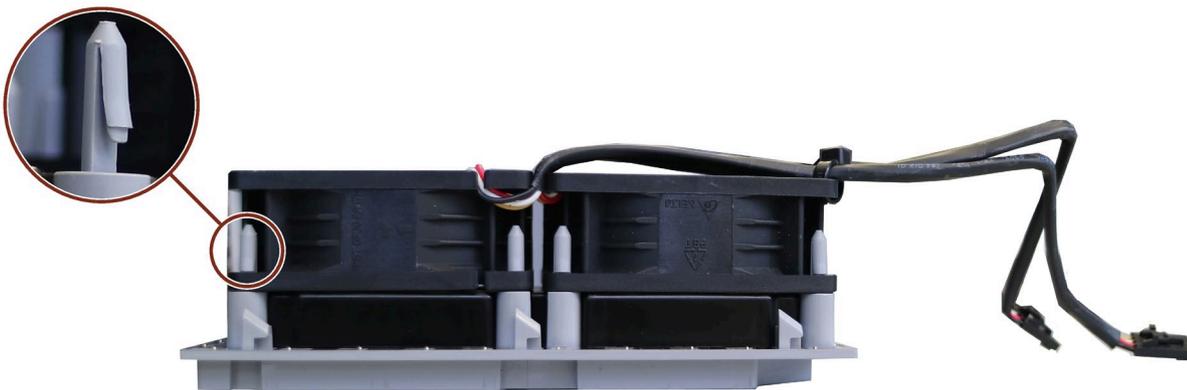
8. Place the two new fans one after the other on the snap-in hooks of the fan support and press the fans down until all snap-in hooks grip.

9. Fasten the two fan cables with a cable tie to the fan housing.

10. Re-insert the small fan cable connectors ② into the larger adapter connectors ③ until they click into place.

11. Replace the fan support with the new fans on the front panel.

12. Replace the fan cover on the front panel.

7.3.2 Changing the backup battery

⚠ WARNING
Risk of explosion and release of harmful substances
Improper use and handling of the backup battery can result in an explosion of the battery.
Pollutants released by an explosion can cause serious physical injury.
Damaged batteries jeopardize the function of the device. • Replace spent batteries promptly, see information under "Maintenance intervals (Page 132)". • Replace the battery only with an identical battery or types recommended by the manufacturer. • Do not throw the battery into a fire. • Do not perform soldering work on the cell body of the battery. • Do not recharge the battery. • Do not open the battery. • Do not short-circuit the battery. • Do not reverse the polarity of the battery. • Do not heat the battery over 100 °C. • Protect the battery from direct sunlight, moisture and condensation.

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original spare part, that is, a backup battery of the same type (article number of lithium battery: A5E00047601 CR2450-N)

- You have made a note of the firmware settings because the configuration data of the device can be deleted when the backup battery is changed.

  You can find information on configuring the firmware settings in the firmware description, see "Important instructions and manuals for operating the device (Page 11)".

- You have observed the local regulations relating to the disposal of used batteries.

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove expansion cards if necessary, see "Removing expansion cards (Page 104)".

4. Remove the battery from socket.
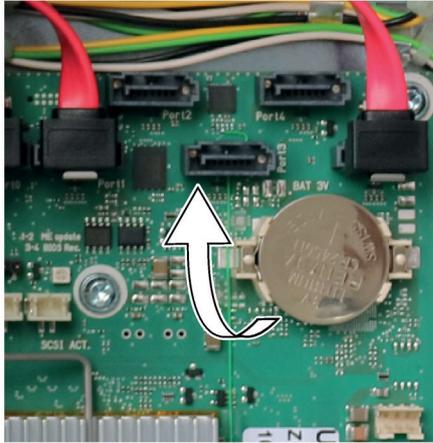
5. Insert the new battery into the base with slight pressure.

6. Close the device.

7. Check the firmware settings.

7.3.3 Replacing the single power supply

Note

It is not possible to convert a simple power supply (400 W) into a redundant power supply and vice versa.

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original spare part, i.e. a single power supply of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

- T10 screwdriver

- Diagonal cutter

- Cable ties

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Disconnect the cables from the drives and the motherboard.

4. Remove the cable ties securing the power cables in the enclosure.

5. Remove the two screws from the mounting bracket that secures the power supply to the bottom of the enclosure.
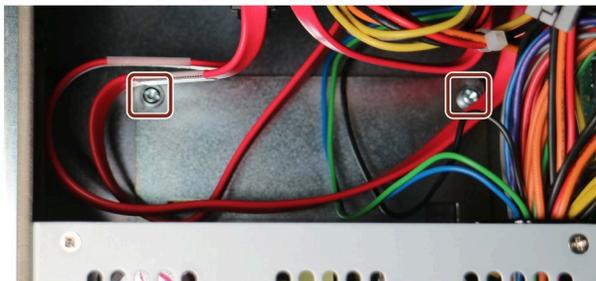
6. Remove the four fixing screws that are marked in the figure below.

    Single power supply (400 W): Fixing screws

7. Pull the power supply upward and out of the housing.

8. Remove the mounting bracket from the enclosure of the old power supply.

9. Mount the mounting bracket on the enclosure of the new power supply.

10. Install the new power supply.

11. Fasten the power supply with the screws shown.

12. Connect the cables to the drives and the motherboard.

13. Use cable ties to reattach the power supply cables to the enclosure.

14. Close the device.

15. Check the safe state of the device.

16. Switch on the power supply.

7.3.4 Changing the module of the redundant power supply

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

The replacement of one of the two modules of the redundant power supply can be performed without shutting down the device.

Requirement

- An original spare part, i.e. a module of the redundant power supply of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

- Cross-tip screwdriver P1

Procedure
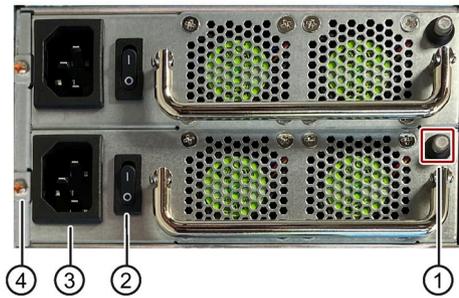
1. Use the status indicator ① to determine which module is defective, see "Status display of redundant power supply (Page 29)".

2. Switch off the defective module using the on/off switch ②.

3. Disconnect the defective module from the line voltage.

   To do so, unplug the power cord from the socket ③ of the defective module.

4. Remove the highlighted screw of the defective module ④.

5. Pull out the defective module at the handle.

6. Install the new module and fasten it with the previously loosened screw.

7. Plug the power cord into the socket of the newly inserted module ③.

8. Check the safe state of the device.

9. Switch the module on again using the on/off switch ② and make sure that the status display is working correctly.

7.3.5 Changing the enclosure of the redundant power supply (AC)

Note

Converting from a single power supply to redundant power supply and vice versa is not possible.

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original replacement part, i.e. the enclosure of a redundant power supply of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

- If necessary, remove expansion cards.

- Short Phillips screwdriver P1

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove both modules of the redundant power supply (Page 140).

4. Turn the screws on the marked positions with the short Phillips screwdriver.

5. Loosen the screws marked in the following picture at the enclosure bottom.

6. Pull the enclosure a bit towards the front so that the cables can be accessed.

7. Remove the cable ties securing the power cables in the enclosure.

8. If additional expansion cards are installed, first remove them (Page 104).

9. Remove the cables from the drives, the motherboard and the bus board. Make a note of their assignment.

10. Fully pull the enclosure of the redundant power supply backwards out of the device.

11. Remove the mounting bracket from the enclosure of the old power supply.

12. Mount the mounting bracket on the enclosure of the new power supply.

13. Install the new enclosure, do not however slide it all the way to the back, so that there is enough space to connect the cables.

14. Reconnect the cables to the drives, motherboard and bus board.

15. If necessary, install the expansion cards again. (Page 100)

16. Fasten the cables with cable ties.

17. Now, slide the enclosure all the way to the back and fix it in the appropriate locations with the screws.

18. Re-insert the two modules of the redundant power supply and close the device.

7.3.6 Replacing the processor

Requirement

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original spare part, i.e. a processor of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

NOTICE
Damage to the processor
If the CPU is operated with a higher clock frequency than permitted, it can be destroyed. This leads to data loss. • Operate the processor only at a clock frequency that is equal to or less than the permitted clock frequency. • You should therefore only install an approved processor.

- Cross-tip screwdriver: PH1

**Procedure**

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove the heat sink of the processor. You can find information on the position of the heat sink in "Internal construction of the device (Page 30)".

4. Unlock the socket and lift the socket cover.
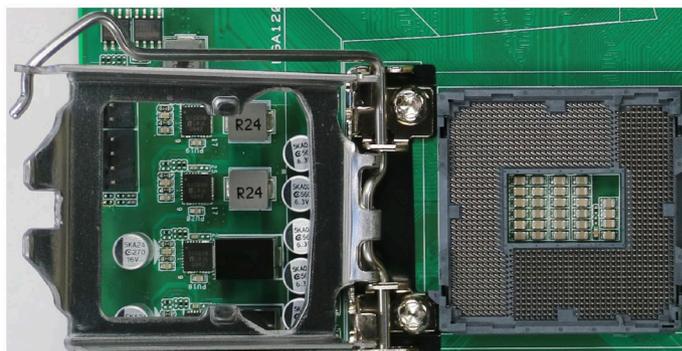
5. Carefully remove the processor.

Note

The contact springs of the base are very sensitive.

Take care not to damage these contact springs both when removing and inserting the processor.

Always touch the contact springs only flat with the contact side of the processor.

---

6. Place the new processor in the socket.

   Note the arrow on the processor when positioning.

7. Lock the processor in place.

8. Install the heat sink of the processor again.

9. Close the device.

7.3.7 Replacing the AI Unit NVIDIA A2

You can find information on the structure and system requirements of the AI Unit NVIDIA A2 under "AI Unit NVIDIA A2 (Page 95)".

You can find information on the mounting location of the NVIDA A2 AI unit under "Technical specifications of the expansion card slots (Page 162)".

Requirements

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- Torx 10 screwdriver

- Device with AI Unit NVIDIA A2

- An original replacement part kit for AI Unit NVIDIA A2

  with enclosure, fan, screws (with NVIDIA A2 Tensor Core GPU), see section "Hardware accessories (Page 31)".

Procedure

Removal of the AI Unit NVIDIA A2

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove the cable tie that attaches the fan cable of the AI Unit NVIDIA A2 to other components.

   Remember the components to which the fan cable was attached. When installing the new AI Unit NVIDIA A2 later, attach the fan cable to the very same components.

4. Remove the bus frame. To do this, perform all steps completely as described in section: "Remove the bus frame (Page 98)".

5. Pull the fan plug ① of the AI Unit NVIDIA A2 from the motherboard. The socket of the fan plug is labeled as "FAN LW" on the motherboard.
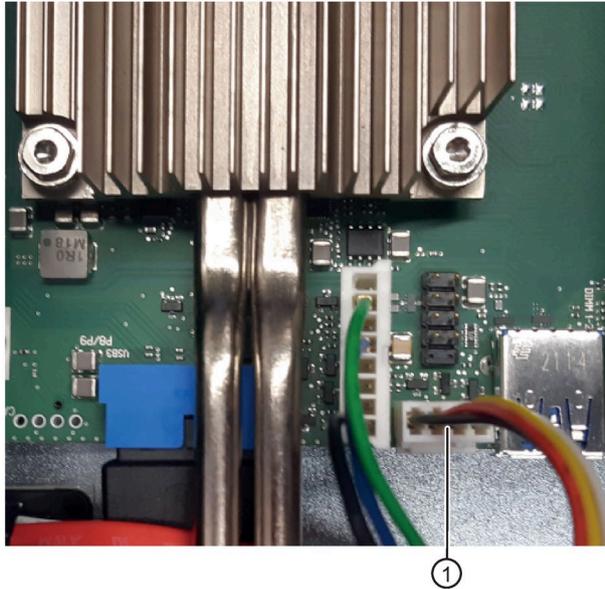
6. Remove the screw used to fasten the blanking plate ④ of the AI Unit NVIDIA A2 to the rear of the device.

   Save the screw to install the new AI Unit NVIDIA A2.

7. Remove the AI Unit NVIDIA A2 from the slot ② without tilting. Note the slot for the installation of the new AI Unit NVIDIA A2.

Installation of the AI Unit NVIDIA A2

1. Pick up the replacement part kit.

2. Place the fan on the closed side of the AI Unit NVIDIA A2 enclosure with the fan side facing up.

3. Guide the fan cable through the cutout at the top frame of the closed side of the enclosure.

4. Close the enclosure with the 7 screws (included in the scope of supply).

5. Carefully plug the new AI Unit NVIDIA A2 into the corresponding slot of the bus board **piggyback** without tilting it.

   Observe the following when positioning the AI Unit NVIDIA A2:

   – Position the direct connector of the AI Unit ② at the corresponding slot of the **piggyback** of the bus board, see "Technical specifications of the expansion card slots (Page 162)".

– Make sure that the hockey stick tab ⑦ does not tilt anywhere when positioning the AI Unit NVIDIA A2.
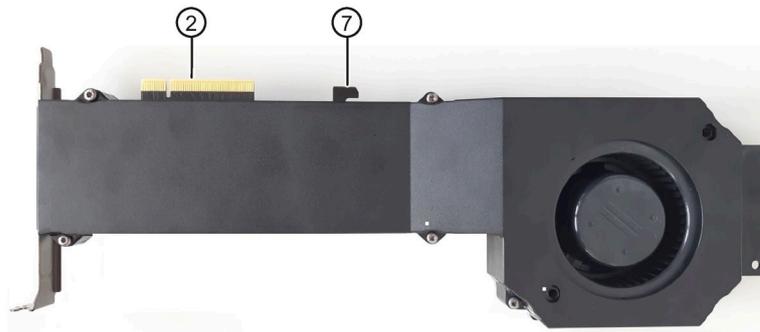
– Avoid tilting the blanking plate ④ of the AI Unit NVIDIA A2 at the rear of the device.

– There are 2 thin surfaces ⑥ on the side of the AI Unit. Slide these surfaces centrally between the stabilization pins ⑤ on the guide rail ③ for long expansion cards.
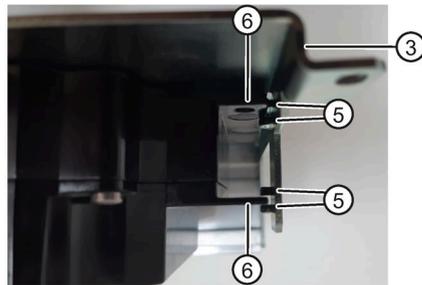
6. Fasten the blanking plate ④ of the AI Unit NVIDIA A2 to the rear of the device using the screw you previously removed. Only use this screw for installation.

7. Plug the fan plug ① of the AI Unit NVIDIA A2 into the corresponding socket ("FAN LW") on the motherboard.

8. Re-install the bus frame in the device.

9. Fasten the fan cable with a cable tie to the components to which it was previously fastened.

   Ensure that the fan cable is fastened so that it is reliably kept away from the area of the fan opening. To do so, fasten the fan cable tightly in the device.

   By doing so, you prevent blocking the fan or damaging the cable.

10. Close the device.

7.3.8 Replacing the fan and NVIDIA A2 Tensor Core GPU of the AI Unit NVIDIA A2

Requirement

- An original replacement part in one of the following designs, see section: "Hardware accessories (Page 31)":
  - When replacing the fan:

    Replacement part kit with enclosure, fan, screws
  - When exchanging the NVIDIA A2 Tensor Core GPU:

    Replacement part kit with enclosure, fan, screws and NVIDIA A2 Tensor Core GPU
- Torx 10 screwdriver
- You have removed the AI Unit NVIDIA A2 from the device. You can find information on this in the section "Replacing the AI Unit NVIDIA A2 (Page 145)".

Components of the AI Unit NVIDIA A2
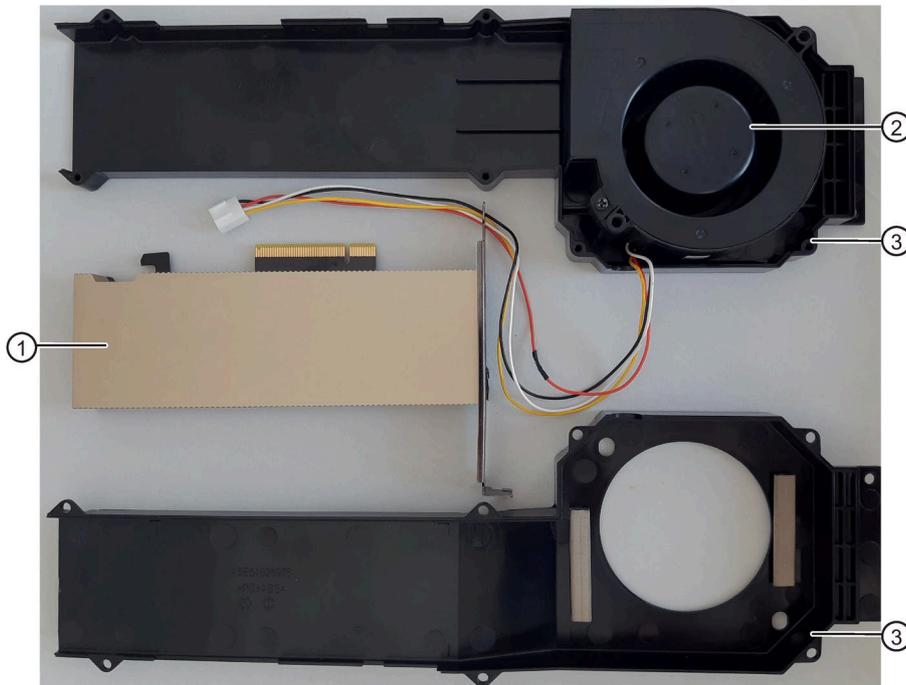
Procedure

1. Open the enclosure ③ of the AI Unit NVIDIA A2. To do this, loosen the 7 screws on the sides of the AI Unit NVIDIA A2.

   Use the Torx 10 screwdriver for this.

2. Remove the existing fan ② from the enclosure of the AI Unit NVIDIA A2.

3. If you also want to replace the NVIDIA A2 Tensor Core GPU ①, replace it now.

4. Place the new fan on the closed side of the AI Unit NVIDIA A2 enclosure with the fan side facing upwards.

5. Guide the fan cable through the cutout at the top frame of the closed side of the enclosure.

6. Close the enclosure with the 7 screws (included in the scope of supply).

See also

AI Unit NVIDIA A2 (Page 95)

7.3.9 Replacing the motherboard

Requirements

- You know the important safety instructions under "Safety instructions on device and system extensions (Page 46)".

- An original spare part, that is, a motherboard of the same type. For information on replacement parts, refer to "Hardware accessories (Page 31)".

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

- You have noted the firmware settings as the configuration data of the device is deleted when the motherboard is replaced.

  You can find information on configuring the firmware settings in the firmware description, see "Important instructions and manuals for operating the device (Page 11)".

- Hexagon bolt screwdriver (5 mm and 5.5 mm) for connection sockets COM1 and DVI-D at the rear of the device.

- Screwdriver T10 for fixing screws on the motherboard.

Procedure

1. Fully disconnect the device from the line voltage, see "Switching off the device (Page 66)".

2. Open the device. Be sure to follow the important instructions under "Open the device (Page 97)".

3. Remove the bus frame. (Page 98)

4. Remove the processor. (Page 143)

5. Note the assignment of all cables to the motherboard.

6. Disconnect all cables from the motherboard.

7. Remove the connection sockets COM1 and DVI-D at the rear of the device. (Page 22)

8. Unscrew the 11 fastening screws of the motherboard marked in the figure.
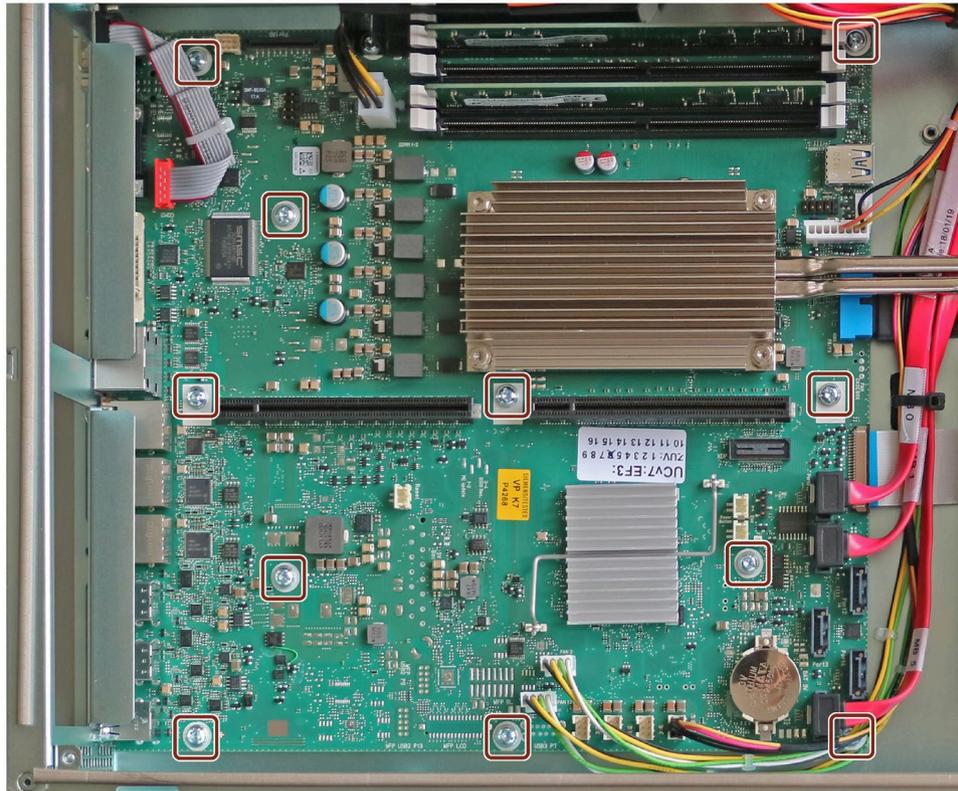
9. Remove the motherboard.

10. Carefully insert the new motherboard into the device and fasten the motherboard with the screws.

11. Install the CPU.

12. Reconnect all cables to the corresponding points.

13. Install the processor.

14. Install the bus frame.

15. Close the device.

16. Reconnect the device to the supply voltage and switch on the device.

17. Update the firmware settings to match the new motherboard version.

    Please note during the update whether you are operating a device with or without a RAID system.

7.4 Installing operating system, software and drivers

7.4.1 Restoring or installing the operating system

You can find information on restoring or re-installing the operating system you ordered with the device in the detailed description of the operating system, see "Important instructions and manuals for operating the device (Page 11)".

7.4.2 Installing software and drivers

On the supplied USB stick (read only), you will find the "Documentation and Drivers" suite which you can use to install all supplied software and drivers.

Procedure

1. Insert the provided USB stick into the device.

2. Run the file "START_DocuAndDrivers.CMD".

   The "Documentation and Drivers" suite opens.

3. Install the components you want.

7.5 Configuring firmware/BIOS

You can find information on configuring the firmware settings in the firmware/BIOS description, see "Important instructions and manuals for operating the device (Page 11)".

Note

If your device no longer boots, for example, after operating system crash during a firmware update, contact your local SIEMENS contact person.

7.6 Backing up data and changing partitions

Use the "SIMATIC IPC Image & Partition Creator" software to back up data under Windows®, see "Important instructions and manuals for operating the device (Page 11)".

7.7 Recycling and disposal

The devices described in these operating instructions can be recycled thanks to their low level of pollutants. Contact a certified disposal service company for electronic scrap for environmentally sound recycling and disposal of your old device, and dispose of it according to the relevant regulations in your country.

Technical specifications

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8.1 Applicability of technical specifications

Note

The following technical specifications only apply under the following conditions:

- The device is in good working order.
- The fan cover and filter pad are installed.
- The device is closed.
- The connected I/O devices meet the requirements for the respective area of application (interference emission according to EN 61000-6-3 / IEC 61000-6-3, immunity to interference according to EN 61000-6-2 / IEC 61000-6-2).

8.2 General technical specifications

See the note in "Applicability of technical specifications (Page 153)".

Article number	6AG4112-3...-.... (for details, refer to the ordering documentation)
Dimensions	481.4 x 88.1 x 446.6 (W × H × D in mm)
	You can find detailed information on the dimensions under "Dimension drawing of the device (Page 174)".
Weight	10 up to 14 kg; depending on the equipment
Supply voltage (U_N; AC)	Single power supply (400 W; AC):
	• 100 V to 240 V AC (-15%; +10%)
	Redundant power supply (350 W, AC):
	• 2 × 100 V to 240 V (-15%; +10%)
Transient overvoltages	Device is designed for connection to supply with overvoltage category II
	(Transient overvoltages up to 2500 V)

Input current	Single power supply (400 W):
	• Continuous current at 100 V: ≤ 6 A
	• Continuous current at 230 V: ≤ 3 A
	• At startup ≤ 80 A for 3.6 ms
	Redundant power supply (350 W):
	• Continuous current at 100 V: ≤ 5 A
	• Continuous current at 230 V: ≤ 2.5 A
	• at startup ≤ 210 A for 1.65 ms for each module
	Information on the dimensioning of the fuses in the higher-level plant circuits
	A fuse that is designed for the following tripping current is integrated in the power supply unit of the IPC:
	• typical 6.3 A (with single power supply 400 W and redundant power supply 350 W).
	The pulse currents during startup are also taken into account by the "time lag" type. In the case of a fault, this fuse ensures the correct disconnection of the device from the power supply system.
	Insert the following fuses for the device:
	• > 6.3 A (with single power supply 400 W and redundant power supply 350 W).
	If you connect additional devices to the higher-level power supply circuit, take into account their total power requirement.
	The tripping characteristic of the higher-level protection must take into account the starting currents of both the IPC and the other devices.
Frequency of the supply voltage	50 to 60 Hz, min. 47 Hz to max. 63 Hz, sinusoidal
Transient voltage interruption	Single power supply (400 W): 20 ms ≤ 10 events/h; recovery time ≥ 1 s
	Redundant power supply (350 W): 20 ms ≤ 10 events/h; recovery time ≥ 1 s
Power consumption	Single power supply (400 W), with maximum configuration and 230 W secondary:
	• ≤ 260 W; with 88% efficiency
	Redundant power supply (350 W), with maximum configuration and 230 W secondary:
	• ≤ 270 W with 85% efficiency
Power loss, heat emission	Single power supply (400 W):
	• 260 W = 260 J/s = 0.25 BTU/s
	Redundant power supply (350 W):
	• 270 W = 270 J/s = 0.26 BTU/s

Current output (DC)	Single power supply (400 W): • +5 V/25 A; +3.3 V/20 A; in total, 190 W are allowed • +12 V_1/14 A; +12 V_2/11 A • −12 V/0.1 A; +5 V_{aux}/2 A The total sum of all voltages amounts to a max. of 230 W.
	Redundant power supply (350 W): • +5 V/20 A, +3.3 V/20 A; in total 100 W are permitted • +12 V_1/16 A; +12 V_2/16 A • -12 V/0.5 A; +5 V_{aux}/3 A The total sum of all voltages amounts to a max. of 230 W.
Noise emission	• < 55 dB(A) at 25°C according to DIN EN ISO 7779 all drives in operation, CPU under heavy load • < 45 dB(A) at 25°C according to DIN EN ISO 7779 all drives in operation, CPU under light load • < 35 dB(A) at 25°C according to DIN EN ISO 7779 silent fan profile, stationary desktop, drives are not active, standard AC power supply
Pollution degree	Device is designed for environments with pollution degree 2
Degree of protection	• Degree of protection 41 (Front) with closed front door [1] • IP 20 on the rear according to EN 60529
Dust protection	With front door closed: Filter class G2 EN 779; particles > 0.5 mm are 99% retained
Safety	
Protection class	Protection class I compliant with IEC 61140
Safety regulations	• IEC 61010-2-201 • EN 61010-2-201 • UL 61010-2-201 • CAN/CSA C22.2 No 61010-2-201

[1] Only for protected installation. Ensure that the installation opening for the device is splash-proof in areas which may be subject to splash water.

See also

8.3 Current and power requirements and power supply

8.3.1 Current and power requirements of the system components

See the note in "Applicability of technical specifications (Page 153)".

Maximum current values

Component	Voltage					
	+3.3 V	+5 V	+12 V	+12 V2	-12 V	5 V$_{aux}$
Motherboard Core i3 processor with cooling [1]	1.53 A	3.44 A	1.3 A	3.3 A	0 A	0.28 A
Motherboard Core i5 /i7 processor with cooling [1]	1.53 A	3.44 A	1.3 A	5 A	0 A	0.28 A
Motherboard Xeon processor with cooling [1]	1.53 A	3.44 A	1.3 A	7.5 A	0 A	0.28 A
SSD SATA (typical)		0.8 A				
Hard disk drive [1] SATA (typical values)		0.6 A	0.3 A			
Hard disk drive [1] SATA type Enterprise (typical values)		0.5 A	0.7 A			
M.2 NVMe SSD	2.24 A					
Fan, front			1.4 A			
Fan of the AI Unit NVIDIA A2			0.87 A			
Optional: NVIDIA Quadro P400 graphics card	3.3 A		1.5 A			
Optional: NVIDIA A2 Tensor Core GPU	3.0 A		5.0 A			
Individual currents, max. permissible, single power supply (400 W)	20 A [2]	25 A [2]	14 A	11 A	0.1 A	2.0 A [3]
Individual currents, max. permissible, redundant power supply (350 W)	20 A [2]	20 A [2]	16 A	16 A	0.5 A	3.0 A
Total power, permissible, single power supply (400 W) or redundant power supply (350 W), (at 40 °C ambient temperature)	230 W					
Efficiency of the single power supply (400 W) [1]	Approx. 90% (230 V; AC) / approx. 90% (120 V; AC)					
Efficiency of the redundant power supply (350 W) [1]	Approx. 85% (230 V; AC) / approx. 85% (120 V; AC)					

[1]   Depends on the selected device configuration

[2]   The accumulated power of the +5 V and + 3.3 V voltage may be max. 190 W with a single power supply (400 W) and max. 100 W with the redundant power supply (350 W).

[3]   3 A for 10 seconds

Typical power values

Component	Current consumption (U = 230 V; AC)	Power consumption
Basic device Core i3	0.39 A	89 W
Base device Core i5/i7	0.46 A	103 W
Base device Xeon	0.53 A	120 W
1 × hard disk drive SATA	0.03 A	7.3 W
2 × hard disk drives SATA	0.07 A	14.7 W
1 × hard disk drive SATA/SAS type Enterprise	0.05 A	12.1 W
2 × hard disk drives SATA/SAS type Enterprise	0.11 A	24.2 W
1 × SSD 2.5" drive SATA	0.02 A	3.6 W
1 x M.2 NVMe SSD	0.03 A	5.9 W
Triple head graphics card (e.g. NVIDIA Quadro P400)	0.14 A	32.8 W
Optional AI Unit NVIDIA A2	0.31 A	70 W
Hardware RAID controller	0.07 A	15 W

Note

Dimensioning of the fuses in the higher-level plant circuits

A fuse, which is designed for a tripping current of typical 6.3 A, is integrated in the power supply of the IPC. The pulse currents during startup are also taken into account by the "time lag" type. In the case of a fault, this fuse ensures the correct disconnection of the device from the power supply system.

It is recommended that a fuse of at least 6.3 A, plus the power demand of the other devices that are also supplied via this circuit, be used for protection of the higher-level power supply circuit. The tripping characteristic of the higher-level protection must take into account the starting currents of both the IPC and the other devices.

8.3.2 Technical specifications of the single power supply (400 W)

See the note in "Applicability of technical specifications (Page 153)".

Output voltage and maximum current

Voltage	Maximum current	Voltage stability
+12 V	11 A	± 5%
+12 V	14 A	± 5%
−12 V	0.1 A	± 10%
+5 V	25 A [1]	± 5%
+3.3 V	20 A [1]	± 5%
+5 V_{aux}	2 A [2]	+5%, -3%

[1]   The total output of the +5 V and +3.3 V voltage must be ≤ 190 W.
   Observe the total power of all voltages permissible for the device, see section "General technical specifications (Page 153)".

[2]   2.5 A for 10 seconds

8.3.3 Technical specifications of the redundant power supply (350 W)

See the note in "Applicability of technical specifications (Page 153)".

Output voltage and maximum current

Voltage	Maximum current	Voltage stability
+12 V	16 A [2]	± 5%
+12 V	16 A [2]	± 5%
−12 V	0.5 A	± 10%
+5 V	20 A [1]	± 5%
+3.3 V	20 A [1]	± 5%
+5 V_{aux}	3.0 A	+5%, -3%

[1]   The total output of the +5 V and +3.3 V voltage must be ≤ 100 W.
   Observe the total power of all voltages permissible for the device, see section "General technical specifications (Page 153)".

[2]   The total current of the +12 V voltage must be ≤ 25 A.

8.4 Electromagnetic compatibility

See the note in "Applicability of technical specifications (Page 153)".

Interference emission	EN 61000-6-3; EN 61000-6-4 CAN/CSA CISPR32 Class B, EN 55032 Class B; FCC Class A; KN 32 Class B EN 61000-3-2 class D, EN 61000-3-3
Immunity to interference	EN 61000-6-1; EN 61000-6-2; KN 35
Interference immunity on power lines	± 2 kV; according to IEC 61000-4-4; burst ± 1 kV; according to IEC 61000-4-5; surge symm ± 2 kV; according to IEC 61000-4-5; surge symm
Noise immunity on signal lines	± 2 kV; according to IEC 61000-4-4; burst; length > 30 m ± 1 kV; according to IEC 61000-4-4; burst; length < 30 m ± 2 kV; according to IEC 61000-4-5; burst; length > 30 m
Immunity to discharges 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 up to 2700 MHz
	
	  80% AM to IEC 61000-4-3
	• 3 V/m; 2.7 to 6 GHz
	
	  80% AM to IEC 61000-4-3
	• 10 V; 10 kHz up to 80 MHz
	
	  80% AM to IEC 61000-4-6

Immunity to magnetic fields	100 A/m; 50 Hz; 60 Hz (according to IEC 61000-4-8)

8.5 Climatic and mechanical and ambient conditions

See the note in "Applicability of technical specifications (Page 153)".

Climatic ambient conditions	
Temperature	Tested according to IEC 60068-2-2; IEC 60068-2-1; IEC 60068-2-14
Operation [1]	+0 to +50 °C Gradient: ≤ 10 K/h; no condensation
	Device with AI Unit NVIDIA A2: +0 to +40 °C Gradient: ≤ 10 K/h; no condensation
Storage/transport	−20 °C up to +60 °C Gradient: ≤ 20 K/h; no condensation
Relative humidity	Tested according to IEC 60068-2-78; IEC 60068-2-30
Operation	5% to 85% at 30 °C; no condensation Gradient: ≤ 10 K/h; no condensation
Storage/transport	5% to 95% at 25 to 55 °C; no condensation Gradient: ≤ 20 K/h; no condensation

Atmospheric pressure	
Operation	1080 up to 689 hPa, corresponds to an altitude of −1000 m to 3000 m
Storage/transport	1080 up to 660 hPa, Corresponds to an altitude of -1000 m to 3500 m
Mechanical ambient conditions	
Vibration	Tested according to IEC 60068-2-6; 10 cycles
Operation [2]	10 to 58 Hz: 0.0375 mm, 58 Hz to 500 Hz: 4.9 m/s^2
Storage/transport	5 up to 8.51 Hz; amplitude 3.5 mm; 8.51 up to 500 Hz: 9.8 m/s^2
Resistance to shock	Tested in accordance with IEC 60068-2-27
Operation [2]	Half-sine: 50 m/s^2, 30 ms, 100 shocks per axis
Storage/transport	Half-sine; 250 m/s^2; 6 ms; 1000 shocks per axis
Special features	
Quality assurance	In accordance with ISO 9001

[1] Limit values depend on the type of drive, see information under:

- Installation options for drives with drive cage type A (Page 114)
- Installation options for drives with drive cage type B (Page 123)

[2] The device must be free of any mechanical faults when disk drives are installed in the removable trays.

8.6 Technical specifications of the drives

See the note in "Applicability of technical specifications (Page 153)".

Information on the drives is available in your order documents.

Maximum number	4 (depends on the selected configuration)
HDD	HDD types (Native Command Queuing is supported): • 3.5" SATA, 6 GB/s; 1000 GB • 3.5" SATA, Enterprise, 6 GB/s; 1000 GB and 2000 GB • 3.5" SAS, Enterprise, 6 GB/s; 2000 GB
SSD	SSD types (flash memory): • 2.5" SATA, 6 GB/s; 480 GB • 2.5" SATA, 6 GB/s; 960 GB
M.2 NVMe SSD	M.2-2280 key M, PCIe Gen3 x4; 512 GB and 1024 GB

8.7 Technical specifications of the motherboard

See the note in "Applicability of technical specifications (Page 153)".

Chipset	Intel® GL82 C246 PCH
Processor	• Intel® Core i3-8100 4C/4T, 3.6 GHz, 6 MB cache • Intel® Core™ i5-8500 6C/6T, 3.0 (4.1) GHz, 9 MB cache, iAMT • Intel® Core™ i7-8700 6C/12T, 3.2 (4.6) GHz, 12 MB cache, iAMT • Intel® Xeon® E-2176G 6C/12T, 3.7 (4.7) GHz, 12 MB cache, iAMT • Intel® Xeon® E-2278GE 8C/16T, 3.3 (4.7) GHz, 16 MB cache, iAMT
RAID (onboard)	Intel® PCH with Intel® Optane™ Memory and Storage Management
Slots for memory modules	4 x DIMM slots for DDR4 2666, expandable to 128 GB
Main memory	4 up to 128 GB, DDR4 SDRAM PC4-2666T, 16 to 64 GB with ECC (only for Intel® Core i3 or Intel® Xeon processors)

8.8 Technical specifications of the expansion card slots

See the note in "Applicability of technical specifications (Page 153)".

You can find information on the function of the riser cards under "Structure of the bus board (Page 184)".

See the note in "Applicability of technical specifications (Page 153)".

Depending on the device configuration, the following 3 variants of bus boards with different combinations are available for the use of riser cards (with or without piggyback).

Bus board variant 1, two riser cards (with piggyback): 2 x PCI / 2 x PCIe

First riser card

Piggyback

Number of the slot, See Rear of the device (Page 21)	Specification slot[1]	Maximum current consumption	

①	**PCI**
	• Rev. 2.3
	• PCI bus primary
		• 5 V; 5 A or 3.3 V; 7 A
		• 12 V; 0.5 A
		• 3.3 V$_{aux}$; 0.2 A
			Power loss per slot at max. ambient air temperature 50 °C, permissible:
			≤ 30 W
			
			• Ambient temperature: Up to max. 50 °C
			  Power loss all slots, permitted:
			  ≤ 55 W (for devices with drive cage type A)
			  ≤ 30 W (for devices with drive cage type B)

④	**PCI** • Rev. 2.3 • PCI bus primary		

③	**PCIe x16**
	• Gen. 3
	• Active lanes: 8
		• 3.3 V; 3 A
		• 12 V; 2.1 A
		• 3.3 V$_{aux}$; 0.4 A
			• Ambient temperature: Up to max. 45 °C
			  Power loss all slots, permitted:
			  ≤ 55 W (for devices with drive cage type A)
			  ≤ 55 W (for devices with drive cage type B)

②	**PCIe x16**
	• Gen. 3
	• Active lanes: 8
			• Power loss of all slots at max. ambient air temperature 35 °C, permissible:
			  ≤ 75 W (for devices with drive cage type A)
			  ≤ 75 W for SATA, HDD/SSD
			  (for devices with drive cage type B)
			  ≤ 55 W for SATA Enterprise
			  (for devices with drive cage type B)
			
			n total, the power must not exceed 3.3 Vaux / 1.2 A.

⑤	**M.2 NVMe** • PCIe • Gen. 3 • Active lanes: 4		

[1] For information on the host device, refer to: "Interrupt assignment of expansion card slots on the bus board (Page 186)".

Mounting position for optional graphics card

③ Piggyback slot 3

Installation position for hardware Raid adapter card

② Piggyback slot 2

Mounting position for optional AI Unit NVIDIA A2

② Piggyback slot 2 (slot 3 cannot be used)

Bus board variant 2, two riser cards (with piggyback): 4 x PCIe

First riser card

Piggyback

Number of the slot, See Rear of the device (Page 21)	Specification slot[1]	Maximum current consumption	
①	**PCIe x16** • Gen. 3 • Active lanes: 4	• 3.3 V; 3 A • 12 V; 2.1 A • 3.3 V$_{aux}$; 0.4 A	Power loss per slot at max. ambient air temperature 50 °C, permissible: ≤ 30 W
④	**PCIe x16** • Gen. 3 • Active lanes: 1		• Ambient temperature: Up to max. 50 °C Power loss all slots, permitted: ≤ 55 W (for devices with drive cage type A) ≤ 30 W (for devices with drive cage type B)
③	**PCIe x16** • Gen. 3 • Active lanes: 8		• Ambient temperature: Up to max. 45 °C Power loss all slots, permitted: ≤ 55 W (for devices with drive cage type A) ≤ 55 W (for devices with drive cage type B)
②	**PCIe x16** • Gen. 3 • Active lanes: 8		• Power loss of all slots at max. ambient air temperature 35 °C, permissible: ≤ 75 W (for devices with drive cage type A) ≤ 75 W for SATA, HDD/SSD (for devices with drive cage type B) ≤ 55 W for SATA Enterprise (for devices with drive cage type B) n total, the power must not exceed 3.3 Vaux / 1.2 A.
⑤	**M.2 NVMe** • PCIe • Gen. 3 • Active lanes: 4		

[1] For information on the host device, refer to: "Interrupt assignment of expansion card slots on the bus board (Page 186)".

Mounting position for optional graphics card

③ Piggyback slot 3

Installation position for hardware Raid adapter card

② Piggyback slot 2

Mounting position for optional AI Unit NVIDIA A2

② Piggyback slot 2 (slot 3 cannot be used)

Bus board variant 3, one riser card (without piggyback): 2 x PCIe

First riser card

Number of the slot, See Rear of the device (Page 21)	Specification slot[1]	Maximum current consumption	
①	**PCIe x16** • Gen. 3 • Active lanes: 4	• 3.3 V; 3 A • 12 V; 2.1 A • 3.3 V_{aux}; 0.4 A	Power loss per slot at max. ambient air temperature 50 °C, permissible: ≤ 30 W

④	**PCIe x16**
	• Gen. 3
	• Active lanes: 16
			• Ambient temperature: Up to max. 50 °C
			  Power loss all slots, permitted:
			  ≤ 55 W (for devices with drive cage type A)
			  ≤ 30 W (for devices with drive cage type B)
			• Ambient temperature: Up to max. 45 °C
			  Power loss all slots, permitted:
			  ≤ 55 W (for devices with drive cage type A)
			  ≤ 55 W (for devices with drive cage type B)
			• Power loss of all slots at max. ambient air temperature 35 °C, permissible:
			  ≤ 75 W (for devices with drive cage type A)
			  ≤ 75 W for SATA, HDD/SSD
			  (for devices with drive cage type B)
			  ≤ 55 W for SATA Enterprise
			  (for devices with drive cage type B)
			
			n total, the power must not exceed 3.3 Vaux / 1.2 A.

⑤	**M.2 NVMe** • PCIe • Gen. 3 • Active lanes: 4		

[1] For information on the host device, refer to: "Interrupt assignment of expansion card slots on the bus board (Page 186)".

Mounting position for optional graphics card

① First riser card slot 1

Installation position for hardware Raid adapter card

④ First riser card slot 4

8.9 Technical specifications of the hardware RAID adapter card

See the note in "Applicability of technical specifications (Page 153)".

Controller	• Host bus adapter
	• SAS Hardware RAID Controller, PCIe x8, RAID 0, 1
	• Type: Microsemi Adaptec SmartRAID 3151-4i
	• Standalone processor, 1024 MB DDR3 cache
Adapter	• 1 × Mini SAS HD adapter (SFF-8643 for 4 drives)
Maximum theoretical controller data rate	• 12 Gbps per port
Memory	• Maintenance-free buffer unit for onboard cache memory

8.10 Technical specifications of graphic

See the note in "Applicability of technical specifications (Page 153)".

Technical specifications of the internal graphics card

Graphics controller	Intel® UHD-Graphics 630 (GT2) integrated in processor:
	• Intel® Core™ i3-8100
	• Intel® Core™ i5-8500
	• Intel® Core™ i7-8700
	• Intel® UHD Graphics P630 (GT2)
	• Intel® Xenon® E-2176G
	• Intel® Xenon® E-2278GE
Graphics memory	Dynamic Video Memory Technology, uses at least 32 MB in main memory
Resolutions/frequencies/colors	• DVI: 1920 × 1200 at 60 Hz; 32-bit color depth
	• DisplayPort: 4096 × 2304 at 60 Hz; 32-bit color depth
	• VGA (via DP-VGA adapter): 2560 × 1600 at 60 Hz; 32-bit color depth

Technical specifications of the optional Nvidia Quadro P400 graphics card

PCIe x16; Triple Head

You can find information on connection options for monitors with adapters under "Hardware accessories (Page 31)".

Graphics controller	256 CUDA core Pascal GPU
Graphics memory	2 GB
Resolutions/frequencies/colors (without adapter)	• 3x Mini DisplayPort 4096 x 2160 at 60 Hz; 32-bit color depth • 1x Mini DisplayPort 5120 × 2880 at 60 Hz; 32-bit color depth
Resolutions/frequencies/colors (with adapter)	• up to 3x DisplayPort: 4096 x 2160 at 60 Hz; 32-bit color depth • 1x DisplayPort: 5120 × 2880 at 60 Hz; 32-bit color depth • up to 3x DVI: 1920 × 1200 at 60 Hz; 32-bit color depth • up to 3x VGA: 2048 × 1536 at 60 Hz; 32-bit color depth

See also

Technical specifications of the connectors for the power supply of optional graphics cards (Page 172)

Technical specifications of the expansion card slots (Page 162)

Safety instructions on device and system extensions (Page 46)

8.11 Technical specifications of the NVIDIA A2 Tensor Core GPU

See the note in "Applicability of technical specifications (Page 153)".

Power consumption	Max. 60 W
PCIe	**PCIe x8** • Gen. 4, Gen. 3 • Active lanes: 8
	Power loss: ≤ 60 W, at maximum current consumption: 12 V; 5 A
	Power loss: ≤ 10 W at maximum current consumption: 3.3 V; 3 A
Clock frequency GPU	1440 MHz to max. 1770 MHz
Memory bandwidth GPU	200 GB/s
VBIOS	EEPROM: 16 Mbits UEFI: Supported
Memory clock frequency	6251 MHz
Memory type	GDDR 6
Memory capacity	16 GB
Memory bandwidth	128 bits
Highest memory bandwidth	Max. 200 GB/s
Ambient temperature (operation) SIMATIC IPC647E with AI Unit NVIDIA A2	Tested according to IEC 60068-2-2; IEC 60068-2-1; IEC 60068-2-14 +0 to +40 °C

Note

For SIMATIC IPC647E with AI Unit NVIDIA A2, the maximum permissible power loss of the expansion cards installed in addition to the AI Unit is a total of 50 W.

8.12 Technical specifications of the interfaces

8.12.1 Technical specifications of the connections on the device

See the note in "Applicability of technical specifications (Page 153)".

Note

You can find detailed information on the position of the connections under "Device ports (Page 22)".

Connec-tion socket	Description	Assignment
COM1 COM2	COM: • Serial interface (standard: RS-232) • Sub-D socket • V.24	 9-pin (±12 V)
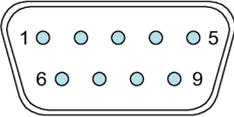
DP	DisplayPort (labeling on the device: DPP)
	An analog monitor can be used with an adapter cable (optional).
	• Connection for monitors with DisplayPort connector
	• Connection for monitors with VGA connector via DP-VGA adapter,
	  See Hardware accessories (Page 31)
	• Connection for monitors with DVI connector via DP-DVI-D adapter,
	  See Hardware accessories (Page 31)
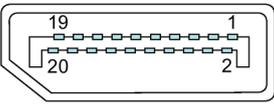		
		20-pin
		(3.3 V; 500 mA)

DVI-D	DVI-D: • Connection for monitors with DVI-D connector Monitors with a DVI-D connector can also be connected to the DPP connection socket using an adapter.	 24-pin (5 V; 500 mA)
USB Type A	USB Type A: • High-current	 5 V
USB Type C	USB Type C: • High-current	 5 V; 1.5 A; up to 10 Gbps
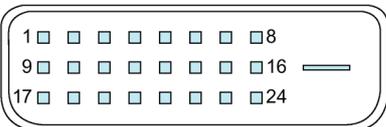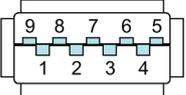
Connection socket	Description	Assignment
LAN 1 LAN 2 LAN 3	LAN: • Connection for Ethernet with RJ45 connector • The LAN ports are numbered on the enclosure. The numbering by the operating system may differ from this. • Data transmission rate: 10/100/1000 Mbps • Wake on LAN, remote boot	 8-pin RJ45 (up to 1 Gbps)
Audio	• Connection for 2.5 mm UAJ stereo jack: Realtek ALC255, 6-channel DAC support • Micro • Line In • Line out: 2 W at 4 Ω	
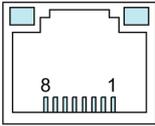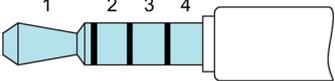
8.12.2 Technical specifications of the connectors for the power supply of optional graphics cards

See the note in "Applicability of technical specifications (Page 153)".

6-pin connector for optional graphics cards

Description	Assignment	
Connector on the wiring harness of the single power supply (400 W) and the redundant power supply (350 W)	1 = +12 V 2 = +12 V 3 = +12 V 4 = GND 5 = GND 6 = GND	
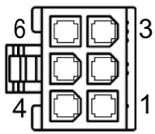
8.13 Technical specifications of the telescopic rails

Ultimate load per pair	≥ 30 kg
Full extraction length	≥ 470 mm
Rail thickness	≤ 9.7 mm
Mounting screws	M5 x 6 mm The mounting screws of the telescopic rails may not protrude by more than 5 mm into the enclosure.

See also

Dimension drawing for drill holes for telescopic rails (Page 176)

8.14 Technical specifications of the operating systems

Depending on the ordered device configuration, the device is equipped with or **without one** of the following installed operating system.

- **Microsoft® Windows® 10**
    - Microsoft® Windows® 10 Enterprise 2016 LTSB, 64-bit, Multi-Language*
    - Microsoft® Windows® 10 Enterprise 2019 LTSC, 64-bit, Multi-Language*
- **Microsoft® Windows® Server**
    - Microsoft® Windows® Server 2016 Standard Edition including 5 Clients, 64-bit, Multi-Language*
    - Microsoft® Windows® Server 2019 Standard Edition, including 5 Clients, 64 bit, Multi-Language*

*Multi-Language User Interface (MUI): 5 languages (German, English, French, Spanish, Italian)

You can find information on ordering Microsoft® Windows® operating system under: Important instructions and manuals for operating the device (Page 11).

Boot mode and partitions in the delivery state

Delivery state for Windows® 10 and Windows® Server

In the delivery state, Windows® 10 and Windows® server operating systems boot in UEFI mode.

The following table lists the partitioning for disks ≥ 200 GB in GPT mode:

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

Dimension drawings

9

9.1 Dimension drawing of the device

> **Note**
> **IEC 60297-3-100**
>
> The system meets the requirements for 2U according to IEC 60297-3-100.

Front view
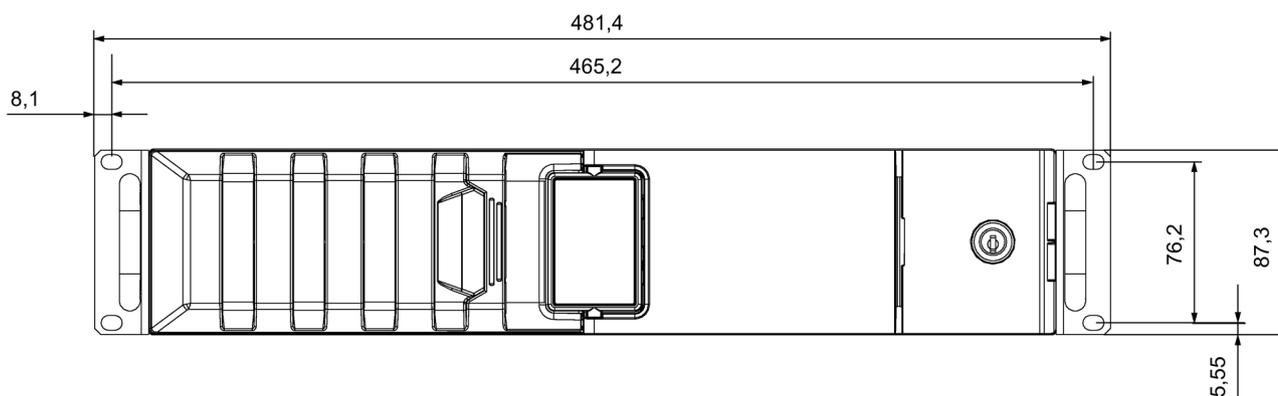
All dimensions in mm

Top view
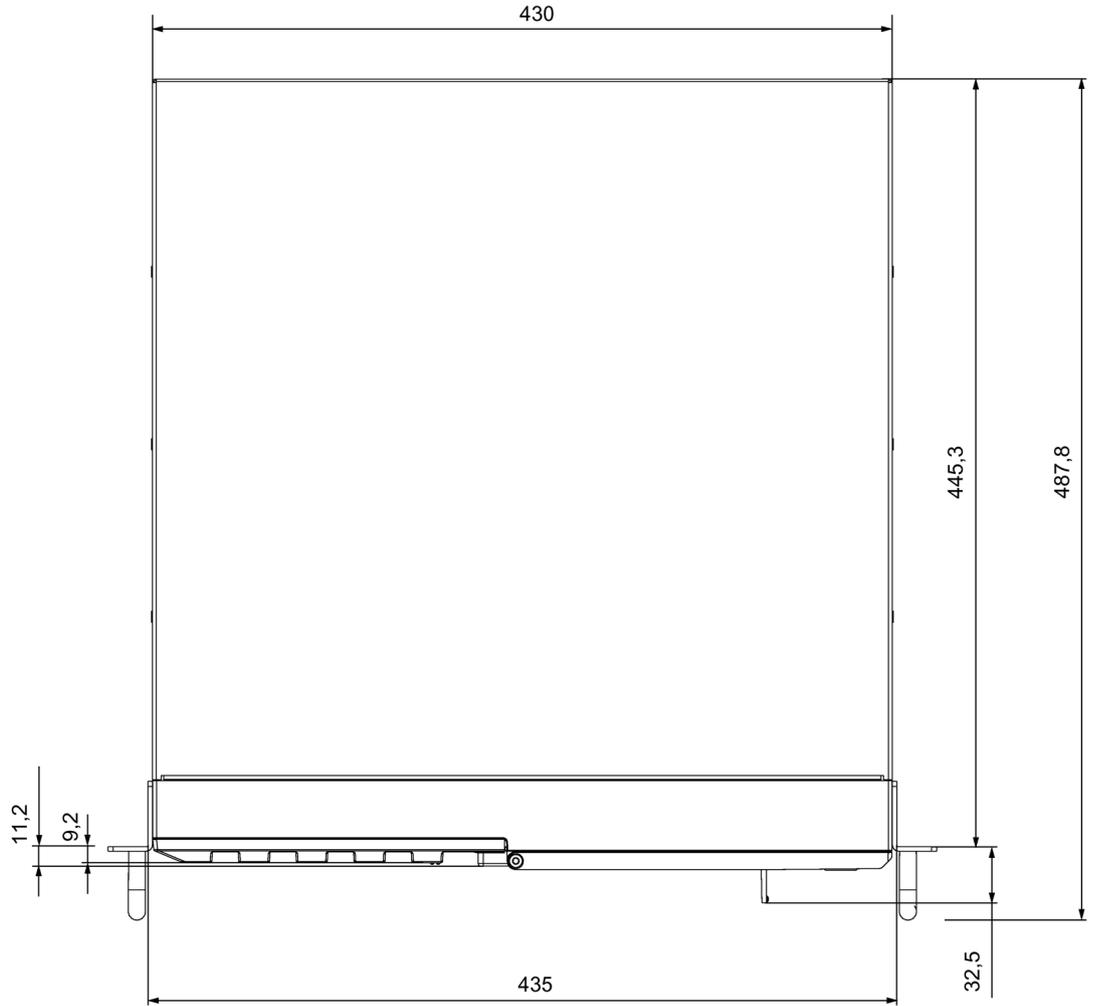
All dimensions in mm

9.2 Dimension drawing of the expansion cards
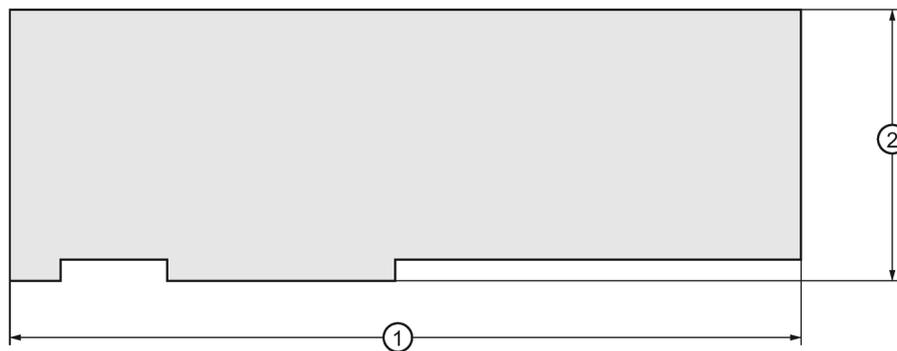
①   Length of the expansion car (PCI or PCIe)
- without extender: up to 312 mm
- with extender: 339 mm

②   Height of the expansion card
- PCI: Max. 106.7 mm
- PCIe: Max. 111.2 mm

9.3 Dimension drawing for drill holes for telescopic rails
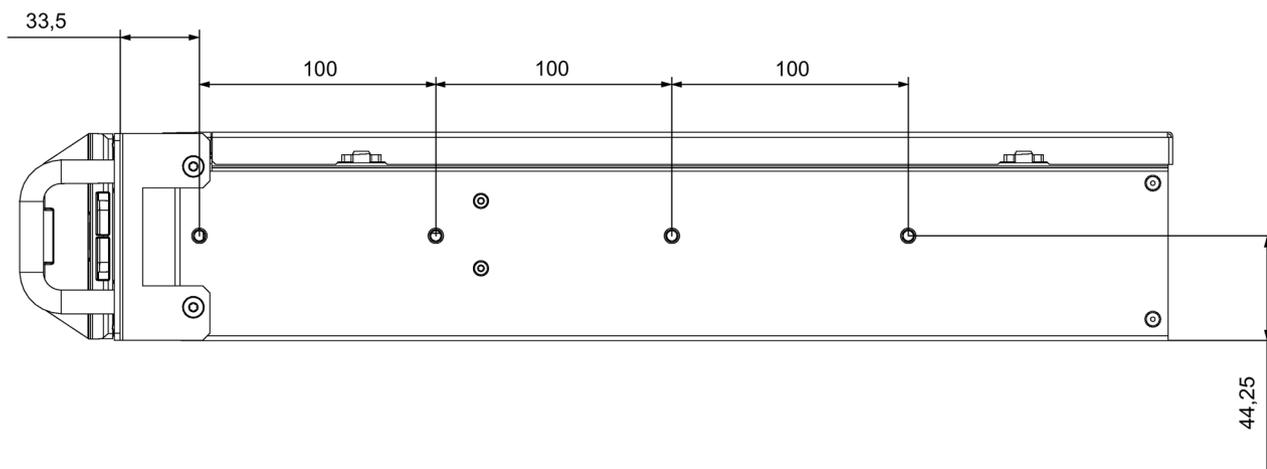
All dimensions in mm

T1 = 0.1 mm

T1 = 0.3 mm

T1 = 0.5 mm

Dimensions of telescopic rails from the Rittal Type company, Type 3659

TS 3659.181 for 600 mm cabinet

TS 3659.191 for 800 mm cabinet

Standards and approvals

10

10.1 Certificates and approvals

10.1.1 ISO 9001 certificate

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

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

10.1.2 Software license agreements

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

10.1.3 UL approval

The following approvals are available for the device:

- Underwriters Laboratories (UL) according to Standard UL 61010-2-201 Second Edition, File E85972 (PROG.CNTLR.)

- Canadian National Standard CAN/CSA-C22.2 No. 61010-2-201 Second Edition

10.1.4 UKCA marking

The device complies with the designated British standards (BS) for electrical equipment published in the official consolidated list of the British Government. The device meets the requirements and protection targets of the following regulations and related amendments:

- Electromagnetic Compatibility Regulations 2016 (EMC)

- Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016 (Explosion Protection) [1]

- Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2012 (RoHS)

[1] : Marking on nameplate, if applicable

UKCA Declaration of Conformity

The associated declaration of conformity is available on the Internet at the following address:

- EU/UK Declaration of Conformity for SIMATIC IPC (https://support.industry.siemens.com/cs/ww/en/view/37369031)

10.1.5 FCC Rules (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.

Responsible party for Supplier's Declaration of Conformity

Siemens Industry, Inc.

Digital Factory - Factory Automation

5300 Triangle Parkway, Suite 100

Norcross, GA 30092

USA

mail to: amps.automation@siemens.com (mailto: amps.automation@siemens.com)

10.1.6 ICES Compliance (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.

10.1.7 RCM (Australia / New Zealand)

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

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

10.1.8   EAC (Eurasian Conformity)

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)

10.1.9   KC Mark (Korea)

This product meets the requirements of Korean certification.

Registration No.: R-R-S49-IPC647E

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.

See also

KC, Registration of Broadcasting and Communication Equipments, SIMATIC IPC647E (https://support.industry.siemens.com/cs/ww/en/view/109764931)

10.1.10   BIS (India)

This product meets the requirements of the Bureau of Indian Standard (BIS).

Tested according to IS 13252(Part 1):2010/ IEC 60950-1 : 2005.

Reference number: R-41061751

10.1.11   Marine approvals

The device has the following marine approvals:

- USA

  ABS: American Bureau of Shipping

- France

  BV: Bureau Veritas

- Norway/Germany:

  DNV/GL: Det Norske Veritas/Germanischer Lloyd

- Great Britain:

  LRS: Lloyds Register

Certificates for marine approvals

Only devices that are named in the corresponding marine certificate have marine approval.

The certificates will be made available after acceptance at:

"SIMATIC IPC647E certificates (https://support.industry.siemens.com/cs/ww/en/ps/6AG4112-3....-..../cert)".

EMC requirements for installation of the device on deck and on the bridge

Using the filter specified in the marine certificate, the device meets the EMC requirements for installation on deck and on the bridge.

10.2 Directives and declarations

10.2.1 CE marking

The device meets the general and safety-related requirements of the following directives and conforms to the harmonized European standards (EN) published in the official gazettes of the European Union:

EU 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).

10.2.2 Electromagnetic compatibility

2014/30/EU "Electromagnetic Compatibility Directive" (EMC Directive)

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

The devices are compliant with EN 61000-3-2 (harmonic currents) and EN 61000-3-3 (voltage fluctuations and flicker).

10.2.3 Low-voltage guideline

2014/35/EU "Electrical equipment for use within specific voltage limits" (Low-Voltage Directive).

Conformance with this standard has been verified according to EN 61010-2-201.

10.2.4 RoHs directive

This device meets the requirements of RoHS Directive 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment".

Hardware description

A

A.1 Motherboard

A.1.1 Layout of the motherboard
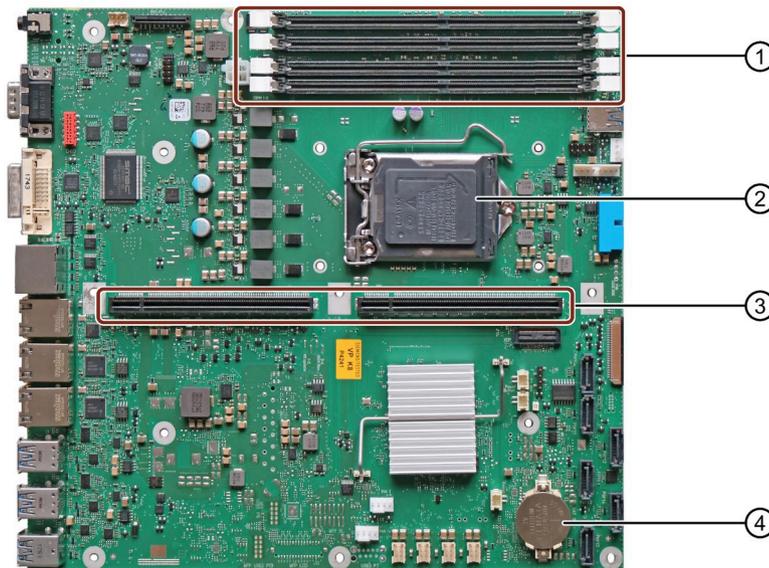
① Slots for memory modules.
   The slots are inscribed on the motherboard.
② Processor socket
③ Slot for first riser card of the bus board (Page 184)
④ Backup battery

Technical features of the motherboard

You can find the technical features of the motherboard under "Technical specifications of the motherboard (Page 161)".

A.1.2 Position of the interfaces on the motherboard
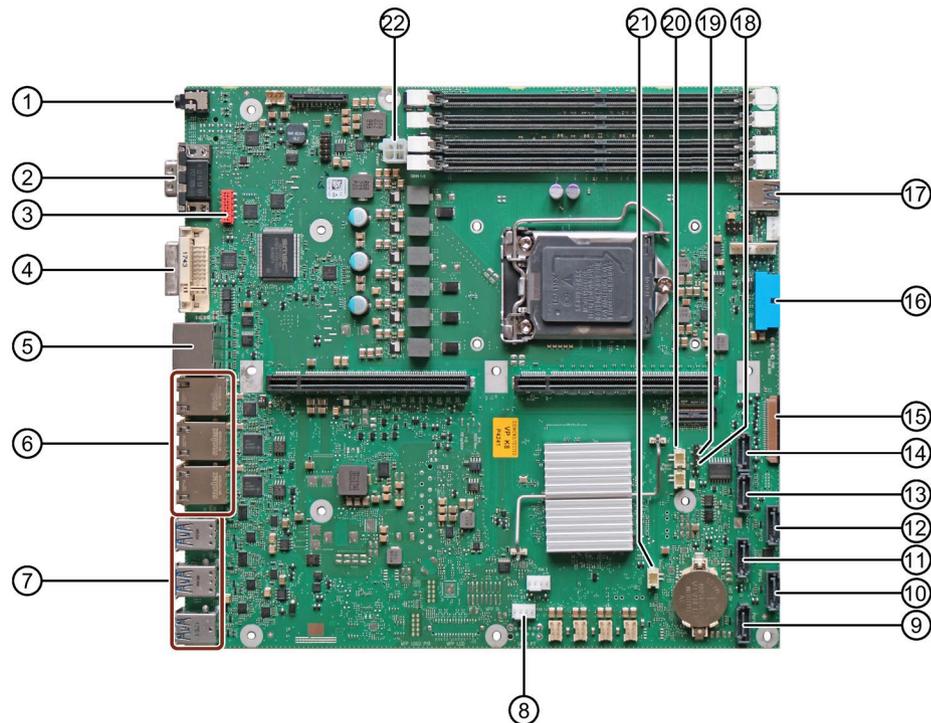
1	Audio (X90)	8	Front fan	17	USB 3.0 (internal) 1x Type A
2	COM1 (X30)	9	SATA 5 (Port 5)	18	Unlock ME
3	COM2, optional (X31)	10	SATA 4 (Port 4)	19	BIOS Recovery
4	DVI-D (X70)	11	SATA 3 (Port 3)	20	On-off button
5	DPP (X71/X72)	12	SATA 2 (Port 2)	21	Reset button
6	LAN 1 (X1 P1)	13	SATA 1 (Port 1)	22	CPU Power
	LAN 2 (X2 P1)	14	SATA 0 (Port 0)		
	LAN 3 (X3 P1)	15	Status indicator on front On-off button Reset button		
7	USB 3.1 (X60-X65) 4x type A 2x type C	16	USB 3.0 behind front door 2x Type A		

A.2 Bus board and bus frame

A.2.1 Structure of the bus board

With SIMATIC IPC647E, the **bus board** consists of one or two **riser cards**.

A first riser card is inserted vertically into the slot provided on the motherboard.

A **second riser card** (the so-called **"piggyback"**) is inserted into a slot on the back of the first riser card in such a way that the second riser card is also positioned perpendicular to the motherboard, see "Components of the bus frame (Page 184)".

The **slots for expansion cards** are located on the first riser card or the second riser card (piggyback), see "Technical specifications of the expansion card slots (Page 162)".

By using riser cards, plug-in expansion cards are arranged parallel to the motherboard.

At the rear of the device there are 4 numbered areas where the connections of a plug-in expansion card are routed out of the device, see "Rear of the device (Page 21)".

A.2.2 Components of the bus frame

Note

You can find information on the arrangement of slots for expansion cards under "Structure of the bus board (Page 184)".

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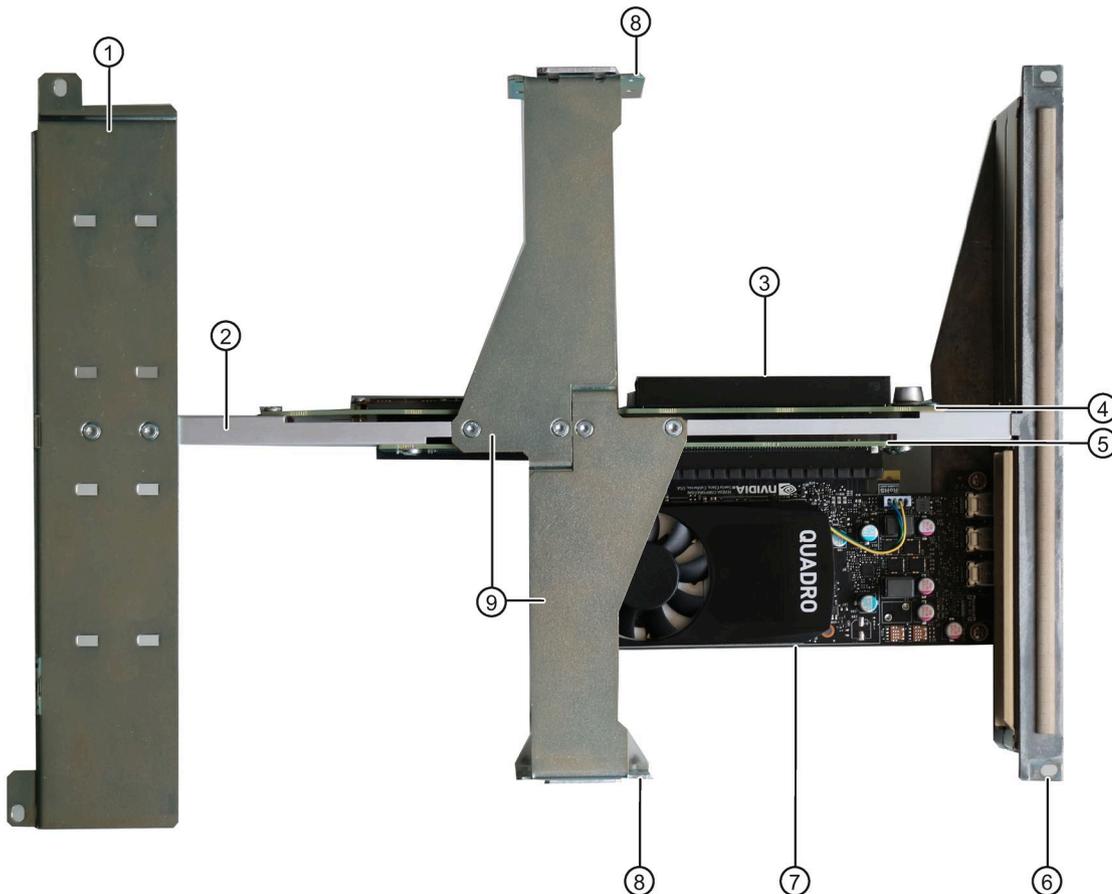
①   **Guide rail** for long expansion cards

②   **Link rail,**

          connects the guide rail for long expansion cards ① with the rail at the rear of the device ⑥.

③   **Slot for expansion card** (here on first riser card)

④   **First riser card** of the bus board, inserted vertically on the motherboard

          Position in the bus frame: in the direction of the rear of the device on the left of the connecting rail ②.

⑤   **Second riser card** of the bus board, called **"piggyback",** plugged into the back of the first riser card and positioned perpendicular to the motherboard

          Position in the bus frame: in the direction of the rear of the device on the right of the connecting rail ②.

⑥   **Rail at the rear of the device**

⑦   Plug-in **expansion card** (here plugged onto Piggyback)

⑧   **Mounting bracket** with insertion slots for latching retainers. Located at the end of each of the two center rails ⑨.

⑨   **Two center rails,**

          mounted on the connecting rail ②

A.3 Interrupt assignment

A.3.1 Interrupt assignment of expansion card slots on the bus board

---

Note

All system resources (hardware addresses, memory allocation, interrupt allocation, DMA channels) are dynamically assigned by the firmware or the operating system based on the hardware equipment, drivers, installed expansion cards and connected external devices.

Assignment is performed automatically and is independent of the resources required by the connected devices and inserted components. 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.
2. Enter "msinfo32" in the "Open" field.
3. Confirm your entry with "OK".

Applications demanding a high-performance interrupt require a high-speed hardware interrupt reaction. In order to enable fast hardware response time, the PCI hardware interrupt may only be allocated to one resource.

Variant 1

You can find information on the slots under "Technical specifications of the expansion card slots (Page 162)".

Slot	Slot 1	Slot 4	Slot 3	Slot 2	M.2
Type	PCI	PCI	PCIe	PCIe	PCIe
Host Device	PCH Port 8 Dev 13	PCH Port 8 Dev 14	PEG 0:1:0	PEG 0:1:1	PCH Port 21
Bus APIC Interrupt	Primary A		n.a.	n.a.	n.a.
INT A	PIRQ D	PIRQ A	PIRQ A	PIRQ B	PIRQ A
INT B	PIRQ A	PIRQ B	PIRQ B	PIRQ C	PIRQ B
INT C	PIRQ B	PIRQ C	PIRQ C	PIRQ D	PIRQ C
INT D	PIRQ C	PIRQ D	PIRQ D	PIRQ A	PIRQ D
B18	Req0	Req1	n.a.	n.a.	n.a.
A17	Gnt0	Gnt1	n.a.	n.a.	n.a.
A26	AD29	AD30	n.a.	n.a.	n.a.

Variant 2:

You can find information on the slots under "Technical specifications of the expansion card slots (Page 162)".

Slot Type	Slot 1 PCIe	Slot 4 PCIe	Slot 3 PCIe	Slot 2 PCIe	M.2 PCIe
Host Device	PCH Port 9 (0:1B.00)	PCH Port 19 (1:1B.01)	PEG 0:1:0	PEG 0:1:1	PCH Port 21
Bus APIC Interrupt	n.a.				
INT A	PIRQ A	PIRQ C	PIRQ A	PIRQ B	PIRQ A
INT B	PIRQ B	PIRQ D	PIRQ B	PIRQ C	PIRQ B
INT C	PIRQ C	PIRQ A	PIRQ C	PIRQ D	PIRQ C
INTD	PIRQ D	PIRQ B	PIRQ D	PIRQ A	PIRQ D

Variant 3:

You can find information on the slots under "Technical specifications of the expansion card slots (Page 162)".

Slot Type	Slot 1 PCIe	Slot 4 PCIe	M.2 PCIe
Host Device	PCH Port 9 (1:1B.0)	PEG 0:1:0	PCH Port 21
Bus APIC Interrupt	n.a.		
INT A	PIRQ B	PIRQ A	PIRQ A
INT B	PIRQ C	PIRQ B	PIRQ B
INT C	PIRQ D	PIRQ C	PIRQ C
INT D	PIRQ A	PIRQ D	PIRQ D

A.3.2 Exclusive PCI hardware interrupt

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

With this device, all system resources (hardware addresses, memory allocation, interrupt allocation, DMA channels) are assigned dynamically by the firmware or the operating system depending on the hardware equipment, drivers, plug-in expansion cards and connected external devices.

The assignment is made automatically and depends on the requested resources of the connected devices and installed components. Due to this configuration dependency, clear statements can only be made by determining them in relation to the system in the final configuration.

A.4 System resources

A.4.1 Currently allocated system resources

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

A.4.2 I/O address allocation

The table describes the assigned I/O addresses in the delivery state of the device.

I/O address (hex)		Size (bytes)	Description of the basic function	Possible alternative function
from	to			
0000 0000	0000 0CF7	415	PCI Express Root Complex	
0000 0020	0000 0021	2	Programmable Interrupt Controller	
0000 0024	0000 0025	2	Programmable Interrupt Controller	
0000 0028	0000 0029	2	Programmable Interrupt Controller	
0000 002C	0000 002D	2	Programmable Interrupt Controller	
0000 002E	0000 002F	2	Motherboard resources	
0000 0030	0000 0031	2	Programmable Interrupt Controller	
0000 0034	0000 0035	2	Programmable Interrupt Controller	
0000 0038	0000 0039	2	Programmable Interrupt Controller	
0000 003C	0000 003D	2	Programmable Interrupt Controller	
0000 0040	0000 0043	4	System timer	
0000 004E	0000 004F	1	Motherboard resources	
0000 0050	0000 0053	4	System timer	
0000 0061	0000 0061	1	Motherboard resources	
0000 0063	0000 0063	1	Motherboard resources	
0000 0065	0000 0065	1	Motherboard resources	
0000 0067	0000 0067	1	Motherboard resources	
0000 0070	0000 0070	1	Motherboard resources	
0000 0070	0000 0070	1	System CMOS/real time clock	
0000 0080	0000 0080	1	Motherboard resources	
0000 0092	0000 0092	1	Motherboard resources	

I/O address (hex)		Size (bytes)	Description of the basic function	Possible alternative function
from	to			
0000 00A0	0000 00A1	2	Programmable Interrupt Controller	
0000 00A4	0000 00A5	2	Programmable Interrupt Controller	
0000 00A8	0000 00A9	2	Programmable Interrupt Controller	
0000 00AC	0000 00AD	2	Programmable Interrupt Controller	
0000 00B0	0000 00B1	2	Programmable Interrupt Controller	
0000 00B2	0000 00B3	2	Motherboard resources	
0000 00B4	0000 00B5	2	Programmable Interrupt Controller	
0000 00B8	0000 00B9	2	Programmable Interrupt Controller	
0000 00BC	0000 00BD	2	Programmable Interrupt Controller	
0000 00F0	0000 00F0	2	Numeric data processor	
0000 02F8	0000 02FF	8	COM 2	
0000 03F8	0000 03FF	8	COM 1	
0000 04D0	0000 04D1	2	Programmable Interrupt Controller	
0000 0680	0000 069F	32	Motherboard resources	
0000 0D00	0000 FFFF	768	PCI Express Root Complex	
0000 164E	0000 164F	255	Motherboard resources	
0000 1800	0000 18FE	255	Motherboard resources	
0000 1854	0000 1857	2	Motherboard resources	
0000 2000	0000 20FE	255	Motherboard resources	

A.4.3   Interrupt assignments

The functions are assigned different interrupts, depending on the operating system. The APIC mode is used.

The table describes the assignment of the interrupts in the delivery state of the device.

Function	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	Comment
Host PCI IRQ Line																	A	B	C	D	E	F	G	H	[1]
Timer Output 0	X																								Fixed
Serial port 2				X																					Can be deactivated
Serial port 1					X																				Can be deactivated
Numeric processor														X											Fixed
SATA																	X								Can be deactivated
USB 3.0 Controller																	X								Can be deactivated
Ethernet 1																	X								Can be deactivated
Ethernet 2																		X							Can be deactivated
Ethernet 3																			X						Can be deactivated
Graphics																	X								Option, can be deactivated
Audio																	X								Can be deactivated

X   Interrupt in APIC mode

[1]   Host PCI-IRQ A to H is assigned to IRQ 16 to 23 permanently in APIC mode.
A specific assignment cannot be forced.

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.

A.4.4 Memory address assignments

The table describes the assignment of the memory addresses in the delivery state of the device.

Address		Size (bytes)	Description of the basic function	Possible alternative function
from	to			
FED1 0000	FED1 7FFF	4k	Motherboard resources	
FED8 0000	FED1 8FFF	4k	Motherboard resources	
FED9 0000	FED1 9FFF	5k	Motherboard resources	
E000 0000	EFFF FFFF	8k	Motherboard resources	
FED2 0000	FED3 FFFF	8k	Motherboard resources	
FED9 0000	FED9 3FFF	2k	Motherboard resources	
FED4 5000	FED8 FFFF	5k	Motherboard resources	
FEE0 0000	FEEF FFFF	8k	Motherboard resources	
FED0 0000	FED0 03FF		High precision event timer	
D000 0000	FD69 FFFF	1k	Motherboard resources	
FD60 0000	FD6C FFFF	1.7 GB	Motherboard resources	
FD6F 0000	FDFF FFFF	2 GB	Motherboard resources	
FE00 0000	FE01 FFFF	1 GB	Motherboard resources	
FE20 0000	FE07 FFFF	3 GB	Motherboard resources	
FF00 0000	FFFF FFFF	8 GB	Motherboard resources	
FE01 0000	FE01 0FFF	4k	SPI flash Controller	

Technical support

<div style="text-align: right">

B

</div>

B.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support (https://support.industry.siemens.com/cs/us/en/)
- Support request form (https://www.siemens.com/supportrequest)
- After Sales Information System SIMATIC IPC/PG (https://www.siemens.com/asis)
- SIMATIC Documentation Collection (https://www.siemens.com/simatic-tech-doku-portal)
- Your local representative (https://www.automation.siemens.com/aspa_app)
- Training center (https://siemens.com/sitrain)
- Industry Mall (https://mall.industry.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- Article number of the device (MLFB)
- 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 (https://www.siemens.com/asis)

B.2 Troubleshooting

B.2.1 Problems with device functions

Problem	Cause	Remedy
The device is not operational	No power supply	• Check the power supply, the power cable and the power plug. • Check to see 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 do not turn the power on until after a waiting period of approximately 12 hours.
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. Detailed information can be found in the operating manual for the monitor.
	The power cord or the monitor cable is not connected.	• Check if the power cord is properly connected to the monitor and to the system unit or to the grounded shockproof power outlet. • Check to make sure the monitor cable is properly connected to the system unit and the monitor.
		Contact your technical support team if the screen still remains dark after all these controls and measures.
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 to make sure that the mouse cable is properly connected to the system unit. • If you use an adapter or extension cable for the mouse cable make sure to check these connections as well.
		Contact your technical support team if the mouse pointer still does not appear on the screen after these controls and measures.
Time and/or date of the PC is not correct		1. Open the firmware configuration menu. To do this, press the <F2> key during the boot operation. 2. Set the date and the time in the "Main" tab.

Problem	Cause	Remedy
Time and date are wrong even after correctly setting them in the firmware (BIOS)	The backup battery is dead.	Replace the backup battery.
USB device not responding	USB ports are deactivated in the firmware (BIOS)	Use a different USB port or activate the port.
	Operating system does not support XHCI	Activate the firmware setting "PS/2 Emulation" in the firmware (BIOS) under "Advanced > USB Configuration".
	USB-2.0/3.0 device connected although USB-2.0/3.0 is deactivated	Activate the USB.
	Operating system does not support the USB interfaces	• Activate the firmware setting "Legacy USB Support" in the firmware (BIOS) under "Advanced > USB Configuration". • For other devices, you need the USB device drivers for the required operating system.

B.2.2 Problems when booting the device

Problem	Cause	Remedy
After changing the hard disk, the system does not boot from the RAID system	RAID system does not have highest boot priority	Change the boot priority in the firmware (BIOS) under "Boot > Boot device". • Permit RAID system in the boot priority • Give RAID system top boot priority
After changing the hard disk, "Unused" is indicated for the relevant SATA port.	System was booted without functioning drive. The removable tray might not be fully pushed in.	Reboot the system with a functioning hard disk.
Computer does not boot or "Boot device not found" is displayed.	The boot medium is not approved	Set the boot priority to "Enabled" in the firmware (BIOS) under "Boot > Boot device".
	The boot device is not in first place of the boot priority in the BIOS setup	Change the boot priority in the firmware (BIOS) under "Boot > Boot device".
	The boot data storage medium is set up with GPT, and UEFI boot is deactivated in the firmware (BIOS)	Activate UEFI mode in the firmware (BIOS).
The startup of a Windows operating system located on a GPT data storage medium is aborted with the following error message: "Status: 0xc0000225 Info: The boot selection failed because a required device is inaccessible"	The settings in the boot loader file "BCD" are incorrect or damaged.	Restore the Windows® operating system. You can find the files and descriptions needed for this on the supplied data storage medium.

B.2.3 Problems with RAID systems

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® 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 with the help of the supplied data storage medium.

B.2.4 Problems when using expansion cards

Problem	Cause	Remedy
The device crashes during startup	• Redundant I/O addresses • Redundant hardware interrupts and/or DMA channels • Signal frequencies or signal levels are not adhered to • Different pin assignment	Check your computer configuration: • If the computer configuration corresponds to the delivery state, contact your technical support team. • In the case of a change in the configuration, restore the delivery state. To do this, remove the expansion card and restart the device. If the error no longer occurs, the expansion card was the cause of the fault. Replace this with a Siemens expansion card or contact the supplier of the expansion card.
		If the device still crashes, contact your technical support team.
	Insufficient output of an external power supply, e.g. UPS	Use a powerful power supply.

Problem	Cause	Remedy
The device does not start up or switches off immediately	A counter voltage is fed into the device by connected or installed expansion cards	Clarify the following with the supplier of the component: • The component can be operated without an external power supply. • The component can be reconfigured so that it only uses the external power supply or that of the device.
The device does not operate normally if an expansion card is integrated. Examples: • The operating system does not boot. • The expansion card is not detected	Contact problem on the contacts of the expansion card or on the connector	Check the plug-in connection • Remove the installed expansion card and reinsert it. • Clean the contact surface of the expansion card with pure ethanol.

Markings and symbols

C

C.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.

C.2 Symbols for safe use and disposal

Symbol	Meaning		Symbol	Meaning
⚠	Warning, observe the supplied documentation.		🔒	Lock is closed
①	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
	Disposal information, observe the local regulations.			

C.3 Symbols for operator controls
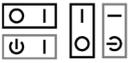
Symbol	Meaning		Symbol	Meaning
	On/off switch, without electrical isolation			
⏻	On/off switch, without electrical isolation			

C.4   Symbols of certificates and approvals

The following table shows symbols relating to certificates, approvals and markings which may be on the device. You can find detailed information in the operating instructions for your device:

Symbol	Meaning		Symbol	Meaning
	Approved for Australia and New Zealand			Marking for the Eurasian Customs Union
	Approved for China			Test mark of Factory Mutual Research
	CE markings for European countries			Marking of Federal Communications Commission for the USA
	EFUP (Environment Friendly Use Period) marking for China			Approved for Korea
	Test mark of the Underwriters Laboratories			Approval for United Kingdom
	Approval for India			

C.5   Interface icons

Symbol		Meaning	Symbol	Meaning
⏚		Protective conductor terminal	((•))	Line In
⏁	⏚	Connection for functional grounding (Equipotential-bonding cable)	((•))	Line Out
DPP		DisplayPort interface	⌐	Microphone input
⊡		DVI port		
LAN	🖳🖳🖳 🚫📞	LAN interface, not approved for connecting WAN or telephone		
|OIOI|		Serial port		
•⟵		USB 2.0 high-speed port		
SS⟵		USB 3.0 Gen 1 SuperSpeed port		
SS⟵10		USB 3.1 Gen 2 SuperSpeedPlus port		
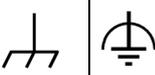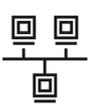
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