SIEMENS

SIMATIC

Industrial PC SIMATIC IPC227G

Operating Instructions

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06/2021

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Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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.

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Disclaimer of Liability

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

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Preface

Preface

These operating instructions contain all the information you need for commissioning and operation of the SIMATIC IPC227G.

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

Basic knowledge requirements

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

Validity of the operating instructions

These operating instructions are valid for all versions of the SIMATIC IPC227G.

The updates of the document will be published on the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/109744171).

Scope of this documentation

The documentation for the SIMATIC IPC227G consists of:

- Product information "Important notes on your device"
- SIMATIC IPC227G Quick Install Guide
- SIMATIC IPC227G Operating Instructions in English, German, Chinese and Japanese

If you ordered the device with an operating system, the documentation is supplied on the USB stick in PDF format (in multiple languages).

Conventions

The terms "PC" and "device" are sometimes used to refer to the SIMATIC IPC227G in this documentation.

Instead of the specific names of the operating system, we are using the abbreviation "Windows 10" throughout.

History

The following editions of these operating instructions have been published:

Edition	Comment
06/2021	First edition

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Overview

1

1.1 Product description

1.1.1 Overview



SIMATIC IPC227G provides high-level industrial functionality:

- Compact design
- Scalability
- High degree of ruggedness
- Various interfaces
- Maintenance-free operation possibility

1.1.2 Configuration plan

Mounting	The device supports the following three mounting types: • Mounting on a standard rail • Wall mounting • Upright mounting
Chipset	• Intel Atom® x6000E series
Processor	• Intel Atom® x6211E Processor (up to 3.0 GHz) • Intel Atom® x6413E Processor (up to 3.0 GHz) • Intel Atom® x6414RE Processor (1.5 GHz)
Main memory	Memory expansion up to 16 GB with the following memory modules: • 4G DDR4 SDRAM • 8G DDR4 SDRAM • 16G DDR4 SDRAM The max speed of memory is up to 3200 MT/s. The processor supports IBECC (In-Band-Error-Correction-Code), and its default value in BIOS is "Disable".
Expandability	• 2 × M.2 Key B connector
Graphics	• Intel® UHD Graphics
Power supply	• 24 VDC (19.2 to 28.8 V)
Drives and storage media	
M.2 NVMe/SATA SSD	• 256GB Eco SSD • 240GB SSD [1] • 480GB SSD [1]
M.2 Module	• Support 2 × M.2 Module on the motherboard
Interfaces	
Ethernet	• 3 × RJ45 Ethernet 10/100/1000 Mbps The device with the Intel Atom® x6414RE Processor supports TSN.
COM (optional)	• 2 × RS232/RS422/RS485 [2]
USB (external)	• 4 × USB 3.1 Gen2 (up to 10 Gb/s)
USB (internal)	• 2 × USB2.0 (500 mA) pin header
DisplayPort	• Connection of a digital monitor, support DisplayPort Standard Version 1.4 • 2 × DP++ [3], support resolution up to 4096 × 2160 pixels at 60 Hz
Keyboard, mouse	Connection through USB port
Operating systems	
Operation Systems	• Without OS • Windows 10 Enterprise 2019 LTSC (Long Term Servicing Channel) 64-bit (MUI) [4]

[1] The 240G/480G SSD has the Power loss protection (PLP).
These configurations are not released in the current version. For the detailed configuration, refer to the Technical data (Page 66).

[2] In the BIOS setup, you can configure support of RS232/RS422/RS485 for each COM port.

[3] DP++ is a DisplayPort Dual-Mode, and it supports HDMI/DP signal output.

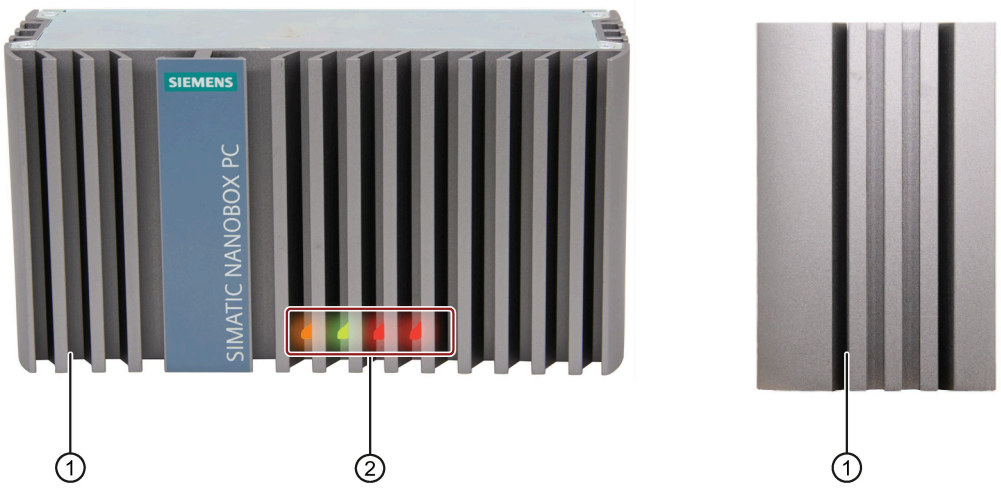
[4] MUI: Multi-language user interface; More language packages are available on the USB stick. You can install them according to your request.

1.2 Structure of the devices

1.2.1 Views of the device

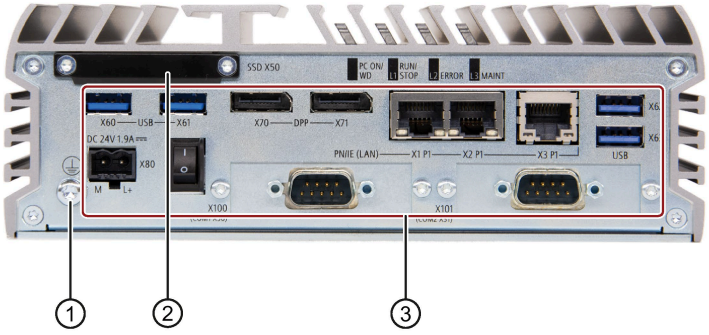
Front view and side view

The front view on the left is the standard mounting position. The side view is on the right.



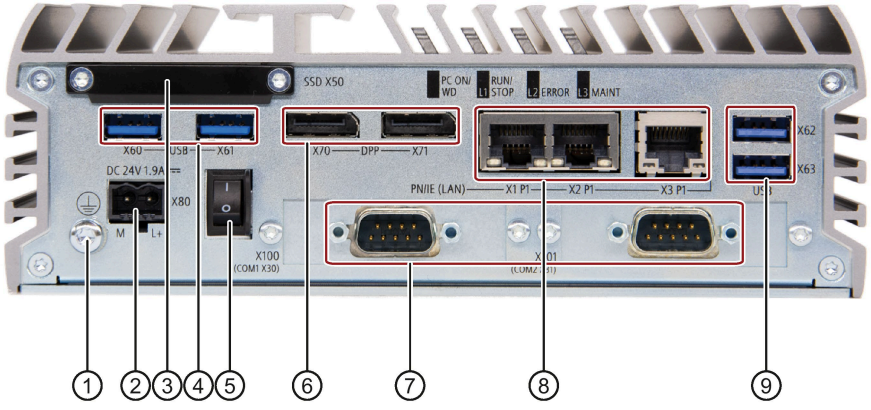
① Cooling fins
② LED display

Bottom view



① Protective conductor connection
② M.2 SSD slot
③ Interfaces

1.2.2 Interfaces of the device



①	Protective conductor	Connection for Protective conductor
②	Power supply	Connection for a 24 VDC power supply
③	M.2 SSD slot (X50)	Slot for M.2 NVMe/SATA SSD module
④	USB 3.1 port (X60/X61)	2 × USB 3.1 port, high current
⑤	On/Off switch	Switch on (position "**I**"); Switch off (position "**O**")
⑥	DPP (X70/X71)	2 × DisplayPort connection
⑦	COM (X30/X31) (Optional)	2 × Serial interface, 9-pin RS232/RS422/RS485 D-sub connector
⑧	LAN (X1P1/X2P1/X3P1)	3 × RJ45 Ethernet connections for 10/100/1000 Mbps
⑨	USB 3.1 port (X62/X63)	2 × USB 3.1 port, high current

1.2.3 Status displays



LED	State	Description
PC ON/WD	Off	-
	Green	BIOS ready to boot
	Flashing green/yellow (1 Hz)	BIOS in POST, power switch on
	Orange	During the S4/S5 state
	Flashing red (1 Hz)	Watchdog status display: active
RUN/STOP / L1	Off	-
	Green	Can be controlled by user program/control program (e.g. software controller)
	Red	
	Orange	
ERROR / L2	Off	-
	Red	Can be controlled by user program/control program (e.g. software controller)
	Green	
	Orange	
MAINT / L3	Off	-
	Orange	Can be controlled by user program/control program (e.g. software controller)
	Green	
	Red	

You can find information on the individual LEDs in the section Control register user LED L1/L2/L3 (Page 81). Example programs for controlling the LEDs on Windows operating systems are available on the Customer Support page of Siemens Industry Automation and Drive Technologies. (https://support.industry.siemens.com/cs/us/en/)

1.3 Accessories

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

Additional accessories can be found on the Internet:

- Industry Mall (https://mall.industry.siemens.com)
- Expansion components and accessories (https://w3.siemens.com/mcms/pc-based-automation/en/industrial-pc/expansion_components_accessories)

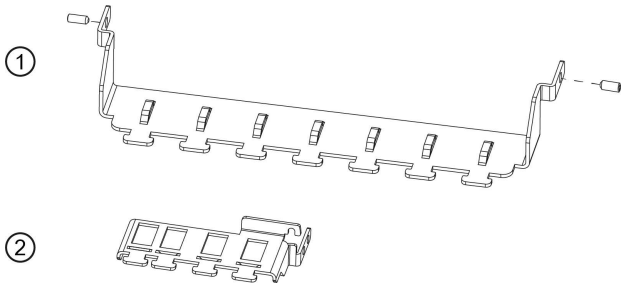
Accessories available for order

Accessories	Article number
Strain relief set cable and plug	6ES7648-1AA50-0XM0
M.2 Key B to Key E adapter	6ES7648-1AA50-0XR0
Lithium battery	A5E48370874

Strain relief

The cable strain relief set contains:

- 5 pieces cable strain relief ①
- 5 pieces Ethernet connector strain relief ②
- Setscrews M3 x 6
- Allen key
- Cable ties



Dust protection set

The Dust protection set interfaces contains:

- 40 pieces covers for USB interface
- 20 pieces covers for RJ45 Ethernet connection
- 10 pieces DisplayPort cover

Safety instructions

2

2.1 General safety instructions

⚠ WARNING

Life-threatening voltages are present with an open control cabinet

When you install the device in a control cabinet, some areas or components in the open control cabinet might be carrying life-threatening voltages.

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

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

⚠ 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 which could result in death or serious injury.

- Ensure that only suitably qualified personnel perform the work.

⚠ WARNING

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) or Protective Extra-Low Voltage (PELV).

This means that electrical circuit in which the voltage cannot exceed 30 VAC (RMS), 42.4 VAC peak or 60 VDC under NORMAL CONDITIONS and CONDITIONS OF A SINGLE FAULT, including ground faults in other circuits.

System expansions

NOTICE

Damage through system expansions

Device and system expansions might be faulty and can affect the entire machine or plant.

The installation of expansions can damage the device, machine or plant. Device and system expansions can violate safety rules and regulations regarding radio interference suppression. If you install or exchange system expansions and damage your device, the warranty becomes void.

Note the following for system expansions:

- Only install system expansion devices designed for this device. Contact your technical support team or where you purchased your PC to find out which system expansion devices can safely be installed.
- Comply with the electromagnetic compatibility (Page 60) requirements.

⚠ WARNING

Risk of fire through expansion cards

Expansion cards generate additional heat. The device might overheat and cause a fire.

Note the following:

- Observe the safety and installation instructions for the expansion cards.
- Install the device in an enclosure that meets the requirements of paragraph 9.3.2 of the IEC/UL/EN/DIN-EN 61010-2-201 standard.

NOTICE

Open Equipment

When the device is used in the area of Industrial Control Equipment in accordance with UL61010-2-201, the device is classified as "Open equipment".

Open equipment must be installed within an enclosure which protects you from hazards, including mechanical hazards, electrical shock and spread of fire.

Battery

⚠ WARNING

Risk of explosion and release of harmful substances

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

Explosion of the batteries and the released pollutants can cause severe physical injury. Worn batteries jeopardize the function of the device.

Note the following when handling lithium batteries:

- Replace used batteries in good time; see the section "Replacing the backup battery (Page 48)" in the operating instructions.
- Replace the lithium battery only with an identical battery or types recommended by SIEMENS (article number: A5E48370874).
- For any requirements on product maintenance, contact Siemens Technical support (Page 86).
- Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

High frequency radiation

NOTICE
Observe immunity to radio frequency (RF) radiation The device has an increased immunity to RF radiation according to the specifications on electromagnetic compatibility in the technical specifications. Radiation exposure in excess of the specified immunity limits can impair device functions, result in malfunctions and therefore injuries or damages. Read the information on immunity to RF radiation in the technical specifications. **Unintentional operating situations** High frequency radiation, for example, from a cellular phone, may interfere with device functions and can cause malfunctions resulting in personal injury or material damage. Avoid high-frequency radiation: • Remove radiation sources from the environment of the device. • Switch off radiating devices. • Reduce the radio output of radiating devices. • Please observe the information on electromagnetic compatibility in the technical specifications.

ESD Guideline

Label electrostatic sensitive devices with the ESD symbol.



NOTICE
Electrostatic sensitive devices (ESD) When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold. If you work with components that can be destroyed by electrostatic discharge, observe the ESD Guideline (Page 61).

2.2 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/industrialsecurity).

2.3 Data protection

Siemens observes the data protection guidelines, especially the requirements regarding data minimization (privacy by design). This means the following for this SIMATIC product: The product does not process / save any personal information, but only technical functional data (e.g. time stamps). If the user links this data to other data (e.g. shift plans) or if the user saves personal information on the same medium (e.g. hard disk) and therefore creates a personal reference in the process, the user has to ensure meeting the guidelines regarding data protection.

2.4 Disclaimer for third-party software updates

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

2.5 Notes on use

NOTICE
Possible functional restrictions in case of non-validated plant operation The device is tested and certified on the basis of the technical standards. In rare cases, functional restrictions can occur during plant operation. Validate the correct functioning of the plant to avoid functional restrictions.

Installing and connecting the device 3

3.1 Preparing for installation

3.1.1 Checking the delivery package

Procedure

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

Note

Damage to the device during transport and storage

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

The device might be damaged.

Do not dispose of the original packaging. Pack the device during transportation and storage.

6. If the contents of the packaging are incomplete, damaged or do not match your order, inform the responsible delivery service immediately.

⚠ WARNING

Electric shock and fire hazard due to damaged device

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

Death or serious injury could occur.

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

NOTICE

Damage from condensation

If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, for example in cold weather, moisture could build up on or inside the device.

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

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

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

7. Keep the enclosed documentation in a safe place. You need the documentation when you commission the device for the first time or meet other problems in the later work.
8. Record the identification data of the device.

3.1.2 Identification data of the device

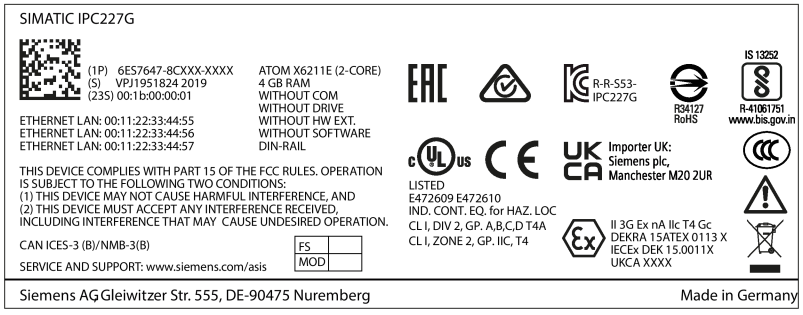
The device can be clearly identified with the help of this identification data in case of repairs or theft.

Enter the identification data in the following table:

Identification data	Source	Value
Serial number	Product label	S VP ...
Order number	Product label	6ES7647-8C...
Production version	Product label	FS
Microsoft Windows Product Key Certificate of Authenticity (COA)	Back of the device	Only devices with preinstalled Windows operating systems have COA labels
Ethernet address 1 (MAC)	Product label	
Ethernet address 2 (MAC)		
Ethernet address 3 (MAC)		

Product label

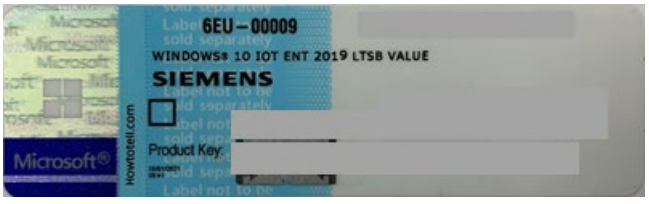
The following image shows the product label on the SIMATIC IPC227G as an example.



COA label

Microsoft Windows "Product Key" on the "Certificate Of Authenticity" (COA):
The COA label is only attached to the rear of the device containing a preinstalled and activated Windows operating system.

- COA label of a device with Windows operating system



3.1.3 Permitted mounting positions

The following mounting positions are permitted:

- Horizontal mounting position

  The horizontal mounting position is the preferred position.



- Vertical mounting position – upright mounting



Take into account the permitted temperature range for operation that depends on the mounting position in accordance with the "Technical specifications (Page 66)" section.

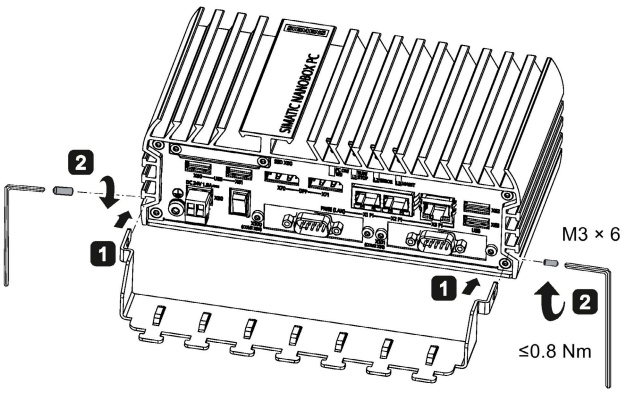
Ensure that the following clearances measurements to another component or to a wall of the enclosure are complied with:

- Underneath of the device at least 100 mm
- Side of the device at least 50 mm

3.1.4 Installing the cable strain relief

The cable strain relief plate carries the cables and prevents unintentional loosening of the connector from the device. The cable strain relief is available as an accessory.

Procedure

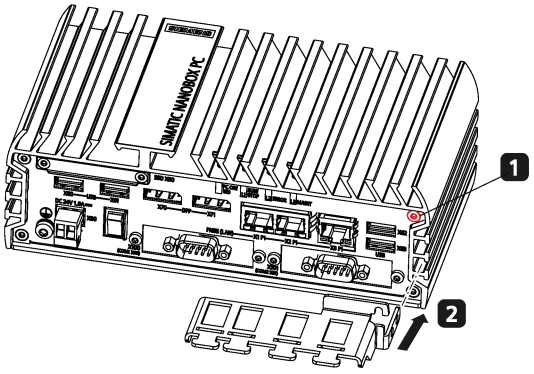


1. Insert the metal plate of the strain relief into the second last groove on the left and right sides.
2. Secure the strain relief with an M3 × 6 setscrew on the left and right sides respectively.
3. Secure the connection cables with cable ties to the cable strain relief.

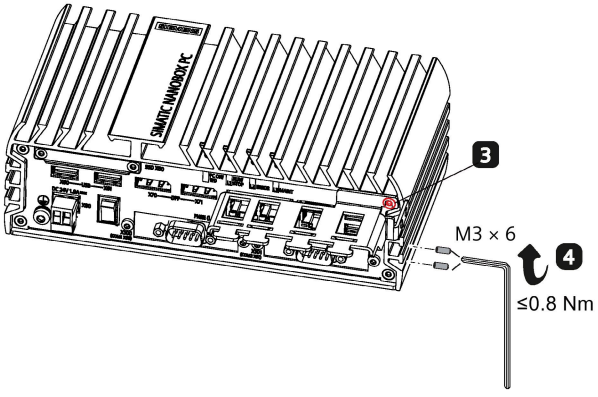
3.1.5 Installing Ethernet connector strain relief

The Ethernet connector strain relief prevents accidental loosening of the Ethernet connector from the device. The Ethernet connector strain relief is available as an accessory.

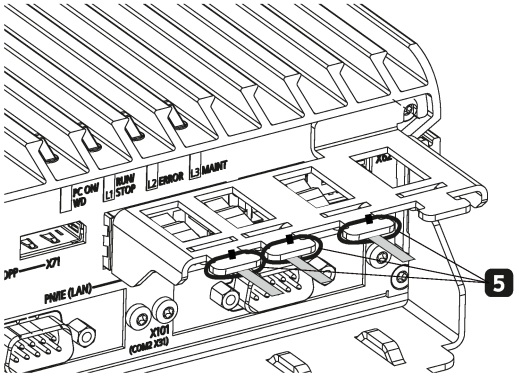
Procedure



1. Unscrew the marked retaining screw.
2. Insert the metal plate of the Ethernet connector strain relief into the second groove.



3. Secure the Ethernet connector strain to the device with the M3 × 8 panhead screw from the accessory.
4. Fasten the Ethernet connector strain relief with two M3 × 6 setscrews on the right side.



5. Secure the Ethernet connector with cable ties for each port.

3.2 Mounting the device

3.2.1 Mounting instructions

Note

If the equipment is used in a manner not specified by the manufacture, the protection provided by the equipment might be impaired.

Note the following:

- The device is approved for indoor operation only.
- When the device is used in the area of Industrial Control Equipment in accordance with UL61010-2-201, the device is classified as "Open equipment". Open equipment must be installed within an enclosure which protects you from hazards, including mechanical hazards, electrical shock and spread of fire.
- Install the device only as one of the described permitted mounting positions.
- For installation of control cabinet, observe the country-specific regulations.
- All the external circuit of the device must be safe extra low voltage (SELV) circuit.
- This device is designed for use in a normal industrial environment. Without additional protective measures (such as the provision of clean air), SIMATIC Box PCs may not be operated in harsh environments that are subject to caustic vapors or gases.

Possible mounting types of the device:

Mounting on a standard rail



Wall mounting



Upright mounting



Position of the interfaces

For standard rails, the interface side of the device can point either up or down. In the case of wall mounting, the interface side of the device can point up, down, to the left or to the right. The position of the interface side is determined by the mounting of the mounting bracket.

Fasten securely

NOTICE

Insufficient load carrying capacity

If the mounting surface for wall and vertical mounting does not have sufficient load carrying capability, the device may fall down and be damaged.

Ensure that the mounting surface on the wall can bear four times the total weight of the device, including fixing elements.

NOTICE

Incorrect fixing elements

If you use anchors and screws other than those specified below for wall and vertical mounting, safe mounting is not guaranteed. The device can fall and may be damaged.

Use only the anchors and screws specified in the following table.

Material	Bore diameter	Fixing element
Concrete	Select according to the specification of the mounting elements used	• Anchor, ∅ 6 mm, 40 mm long • Screw, ∅ 4-5 mm, 40 mm long
Plasterboard, min. 13 mm thick		Toggle plug, ∅ 12 mm, 50 mm long
Metal, min. 2 mm thick		• Screw M4 × 15 • M4 nut

WARNING

Personal injuries or material damage in the case of insufficient load-bearing capacity of wall

The device could fall if the wall to which it is mounted has insufficient load-bearing capacity. This can result in personal injuries or material damage.

Ensure that the wall is capable of bearing four times the total weight of the device (including the brackets and expansion modules). The total weight of the device is approximately 5 kg.

3.2.2 Mounting on a standard rail

Mounting on a standard rail is suitable for horizontal and vertical mounting of the device.

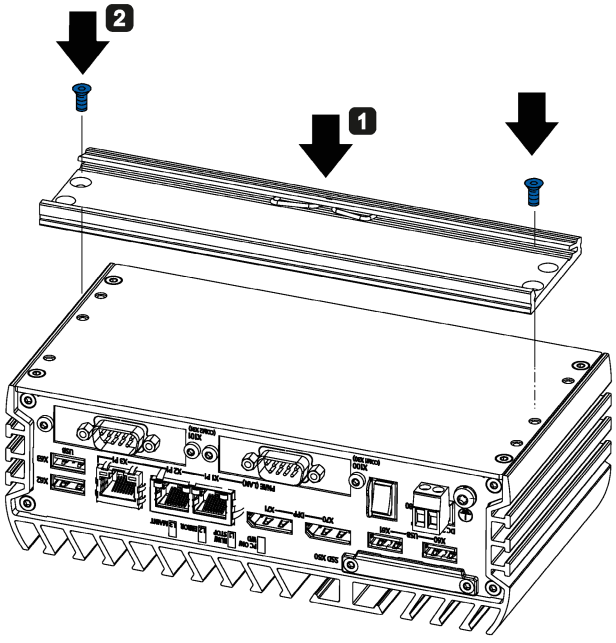
Requirement

- A SIEMENS 35 mm standard rail TH35-15 conforming to EN 60715:2001

  The standard rail is mounted.
- A standard rail bracket

  The standard rail bracket and two screws are included in the order variant "Standard rail mounting".
- A T10 screwdriver

Procedure for mounting



1. Lay the standard rail bracket on the rear of the device.
2. Fasten the standard rail bracket with 2 screws.
3. Place the device with the standard rail bracket onto the mounting rail from above.

   If the device is tilted when you place it down, the standard rail bracket does not grip.
4. Press the device down and toward the standard rail until the standard rail bracket engages.
5. Check whether the device is seated firmly on the standard rail.
6. Applies to vertical standard rail mounting:

   Fasten a standard rail ground terminal below the device.

Procedure for dismantling

1. Press the device down until the lower rail guide frees the device.
2. Swing the device out of the rails.
3. Remove the rail from the device.

3.2.3 Wall mounting

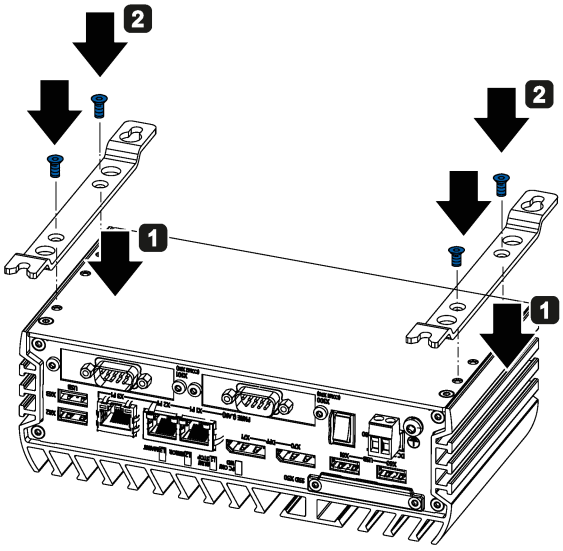
Wall mounting is one of the vertical mounting types.

Requirement

- Two mounting brackets

  The mounting brackets and four screws are included in the order variant "Wall mounting".
- A T10 screwdriver
- Four anchors and four screws

Procedure for mounting



1. Place the mounting bracket on the rear of the device.
2. Secure each of the each mounting bracket with 2 screws.
3. Place the device with the mounting brackets onto the mounting surface.
4. Mark the fixing holes.
5. Drill the fixing holes.
6. Insert the anchors in the drilled holes.
7. Screw on the device.

3.2.4 Upright mounting

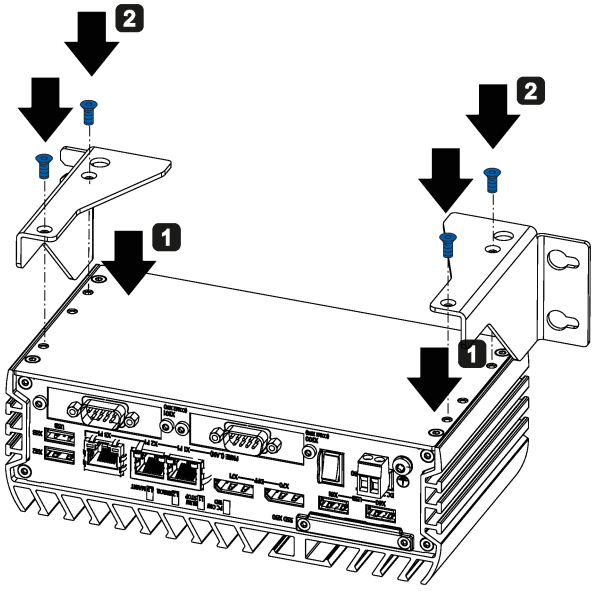
Upright mounting is suitable for vertical mounting of the device. The corresponding mounting bracket allows mounting that requires less space than standard rail mounting and wall mounting.

Requirement

- Two mounting brackets

  The mounting brackets and four screws are included in the order variant "Upright mounting".
- A T10 screwdriver
- Four anchors and four screws

Procedure for mounting



1. Place the mounting bracket on the rear of the device.
2. Secure each of the mounting bracket with 2 screws.
3. Place the device with the mounting brackets onto the mounting surface.
4. Mark the fixing holes.
5. Drill the fixing holes.
6. Insert the anchors in the drilled holes.
7. Screw on the device.

3.3 Connecting the device

3.3.1 Notes on connecting

⚠ WARNING

Risk of fire and electric shock

The on/off switch does not isolate the device from the power supply. Risk of electric shock exists if the device is opened incorrectly or defective. There is also a risk of fire if the device or connecting lines are damaged. This can result in death and serious injury.

You should therefore protect the device as follows:

- Always pull out the power plug when you are not using the device or if the device is defective. The power plug must be freely accessible.
- Use a central power isolating switch for cabinet installation.

⚠ WARNING

Risk of lightning strikes

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

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

Take the following precautions:

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

NOTICE

Fault caused by I/O devices

The connection of I/O devices can cause faults in the device.

The result might be personal injury and damage to the machine or plant.

Note the following when connecting I/O devices:

- Read the documentation of the I/O devices. Follow all instructions in the documentation.
- 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.

NOTICE

Damage through regenerative feedback

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

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

⚠ CAUTION

Use copper cables at connectors with terminal connections

Use copper (Cu) cables for all supply lines that are connected to the device with terminals, e.g. 24 VDC power supply cables to the 24 VDC power supply connectors.

Utiliser des câbles en cuivre sur les connexions à bornes

Utilisez des câbles en cuivre (Cu) pour tous les câbles d'alimentation qui sont raccordés à l'appareil par des bornes, par exemple les câbles d'alimentation 24 V CC sur le connecteur d'alimentation 24 V CC.

3.3.2 Connecting the protective conductor

A connected protective conductor discharges dangerous electrical charges from the metal enclosure. The current flowing through the protective conductor when such a fault occurs triggers an upstream protective device that disconnects the machine from the power supply.

The protective conductor also improves the discharge of interference generated by external power cables, signal cables or cables for I/O modules to ground.

The connection for the protective conductor is labeled with the following symbol:



WARNING

Electric shock and risk of fire

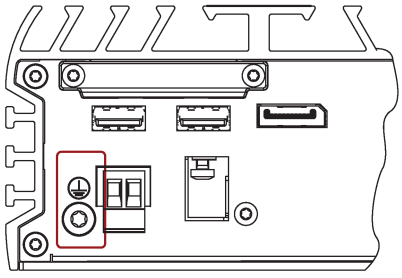
High voltage may be present in a defective device, which can cause fire or an electric shock if touched. This can result in death and serious injury.

- Connect the device to the protective conductor before you put it into operation.
- The PE terminal on the device must be connected to the protective conductor of the control cabinet or system in which the device is installed.
- Never operate the device without protective conductor.
- If a device is defective, remove it from operation without delay and label it accordingly.

Requirement

- T20 screwdriver
- Cable lug for M4
- protective conductor with minimum cross-section of 2.5 mm^2 = AWG14

Procedure



1. Clamp the cable lug on the protective conductor.
2. Firmly attach the cable lug to the protective conductor connection on the device using the M4 thread (see part labeled).
3. Connect the protective conductor to the protective conductor connection of the cabinet or the plant in which the device is installed.

3.3.3 Connecting the power supply

Note

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) or Protective Extra-Low Voltage (PELV).

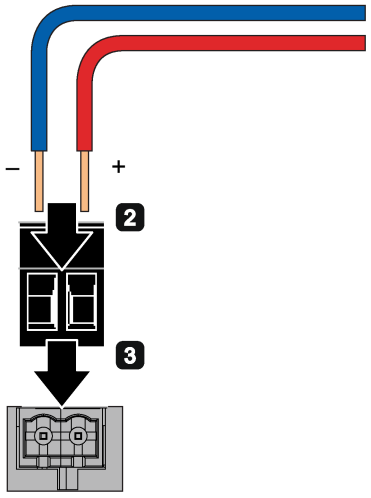
Note

The 24 VDC power supply must be adapted to the input data of the device (see Technical data (Page 66)).

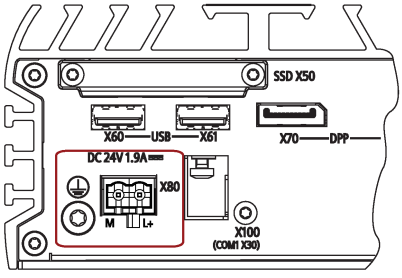
Requirements

- The protective conductor is connected.
- You are using the supplied terminal.
- A two-core cable with a cable cross-section of 0.75 mm^2 to 2.5 mm^2 for the 24 VDC connection.
- Tightening torque: 0.5 to 0.6 Nm
- A slotted screwdriver with approximate 3 mm blade.

Procedure



1. Switch off the 24 VDC power supply.
2. Connect the wires of the power supply.



3. Connect the connection terminal at the marked position.

3.3.4 Securing cables

3.3.4.1 Securing cables for use in hazardous areas

Strain relief

Use cable ties to secure the connected cables (USB, DisplayPort and LAN) to the selected fixing elements for strain relief.

Make sure that the cables are not crushed by the cable ties.

Secure the cable strain relief plate to the device using the supplied screws.

The following figure shows an example of the fixing elements of a built-in device.



3.3.5 Connect device to networks

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

Ethernet

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

You need a suitable software to use this functionality: STEP 7, WinCC, SIMATIC NET.

Industrial Ethernet

You can establish a network between the device and other computers through Industrial Ethernet. The on-board LAN interfaces are twisted-pair TP interfaces that support data transmission rates of 10/100/1000 Mbps.

Note

You need a category 6 Ethernet cable for operation at 1000 Mbps.

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. Information on this can be found on the SIMATIC NET Manual Collection CD. The software package and the documentation are not included in the product package.

Additional information

You can find additional information in Technical support. (Page 86)

Commissioning the device and device functions 4

4.1 General information on commissioning

⚠ CAUTION

Danger of burns

The surface of the device can reach temperatures of over 65 °C. Any unprotected contact may cause burns.

Avoid direct contact during operation of the device. Touch the device only with appropriate protective gloves.

Note

Configuring memory cards in the device

Memory cards used in a device need to be configured on that device. Memory cards configured on other devices will not boot as the drive parameters will be different.

Requirement

- The device is connected to the power supply.
- The protective conductor is connected.
- The connection cables are plugged in correctly.
- The following hardware is available for initial commissioning:
  - One USB keyboard
  - One USB mouse
  - A monitor/display

4.2 Switching the device on/off

For the configuration with operating system pre-installed, the operating system is set up automatically on the device after the initial switch-on. The commissioning procedure in this chapter is only applicable to the IPCs with operating system.

For the configurations without operating system pre-installed, contact the operating system provider to install the operating system first.

Following the initial startup, the operating system preinstalled on the drive is automatically configured on the device.

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

Procedure - Switching on the device

1. Set the On/Off switch to "ON" position.

   The "PC ON/WD" LED lights up. The device carries out a self-test. During the self-test, the following message appears:

   ```
   Press Esc for Boot Options
   ```

2. Wait for the message to disappear.
3. Follow the instructions on the screen.

   Set the region and language. If you want your system language to be international, select English. For information on changing the region and language settings, refer to the section Installing the drivers and software (Page 53).

Procedure - Switching off the device

To turn off the device, always select the function "Start" > "Shut down".

If the device is not going to be used for a long period of time after shutdown, set the On/Off switch to "OFF" position.

Additional information

Information on your operating system can be found on the Internet:

- Microsoft® Windows® 10 (https://support.industry.siemens.com/cs/ww/en/view/109749498)

See also

Installing the drivers and software (Page 53)

4.3 Advanced device functions

4.3.1 Monitoring functions

4.3.1.1 Overview of the monitoring functions

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

- Temperature monitoring (overtemperature or low temperature)
- Monitoring of SSD with S.M.A.R.T. functionality
- Watchdog (hardware or software reset of the computer)
- Operating hours meter (information on total runtime)

SIMATIC IPC DiagBase software

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

Note

For more information on SIMATIC IPC DiagBase software functionality, refer to the SIMATIC IPC DiagBase Operating Manual (https://support.industry.siemens.com/cs/ww/en/view/109749690).

4.3.1.2 Temperature monitoring/display

Temperature monitoring

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

- Processor temperature
- Temperature nearby the RAM module
- Temperature nearby the CPU

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

Reaction	Option
The DiagBase or DiagMonitor software is enabled	None

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

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

4.3.1.3 Watchdog (WD)

Configuration

You configure the watchdog with the DiagBase or DiagMonitor software.

Function

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

A watchdog alarm is retained after a restart and is reset and logged by the DiagBase or DiagMonitor software. The watchdog configuration is retained in the process.

Watchdog reactions

The following reactions can occur if the watchdog is not triggered within the set time:

Option	Reaction
Reset on	Executes a hardware reset when the watchdog expires
Reset off	Executes no action when the watchdog expires
Restart	Restarts the operating system when the watchdog expires
Shutdown	Shuts down the operating system when the watchdog expires

NOTICE
"Reset on" option The "Reset on" option immediately triggers a hardware reset that can cause data loss on Windows and damage to the installation.

Watchdog monitoring times

The hardware supports the following control unit times:

- 1 to 256 seconds
- 1 to 256 minutes

4.3.1.4 Battery monitoring

The installed backup battery has a limited service life, see section "Replacing the backup battery (Page 48)". A two-tier battery monitoring checks the status of the backup battery. The SIMATIC DiagBase and SIMATIC DiagMonitor diagnostic software determines the status of the backup battery.

When the first warning level is reached, the battery for buffering CMOS data still has a remaining service life of at least one month.

4.3.2 Buffer memory NVRAM

The motherboard is equipped with an NVRAM that applications can use to back up data in the event of a power failure. Failure of the supply voltage for a duration longer than 5 ms is indicated by the DC FAIL signal.

At least enough time is provided for copying data to the NVRAM so that 128 kB can be backed up with the full configuration.

A memory window with a maximum size of 512 KB can be displayed by means of PCI address register. The base address is initialized via the BIOS (see section "Input/output address areas (Page 80)").

A corresponding function is implemented there for using the NVRAM under software controller.

Expanding and assigning parameters to the device 5

5.1 Open the device

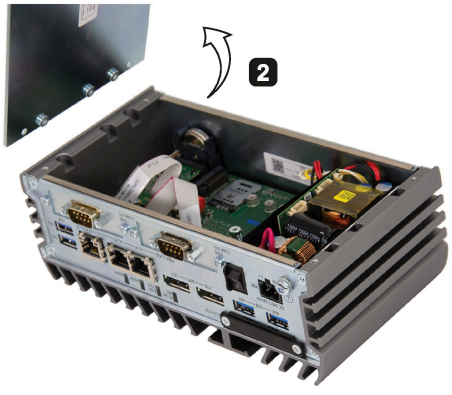
Requirement

- The device is disconnected from the power supply.
- All connecting cables on the device are removed.
- The device is removed from the cabinet.
- A T10 screwdriver

Procedure - opening the device



1 Remove the marked four screws on the rear panel of the device.



2 Lift up the device's rear panel.

Procedure - closing the device

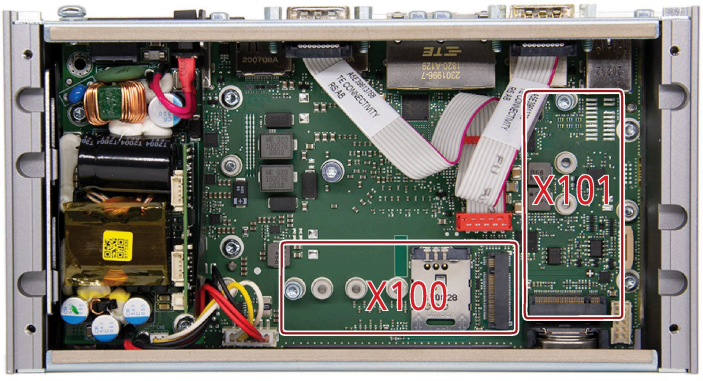
To close the device, carry out the steps for opening the device in the reverse order.

5.2 Installing the M.2 Module

Introduction to the M.2 Module

Siemens uses the M.2 Module to extend the Siemens IPC. It can be produced by Siemens or other third-party suppliers. Our device provides one or several M.2 Key B interfaces and mounting positions. M.2 key B modules (or Key B+M) can be connected to the interfaces slot X100 or X101 on the motherboard.

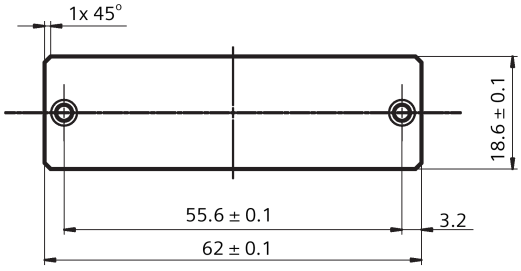
The position of each slot is marked in the following image.



Siemens IPCs provide the standardized openings in the housing to extend the devices with additional external interfaces.

The M.2 Module can go to the housing opening through a cable or with an additional interface-card. The connection to the IPC-housing for additional interfaces going outside is done with an "adapter plate" that fits to the standardized openings in the IPC-housings. The adapter plate is part of a complete M.2 Module solution. The IPC products are delivered with a closed adapter plate/COM interface to cover the opening on IPC housing.

The following image shows the dimension requirements of the closed adapter plate.



Installation of the M.2 Module in our device should not exceed the specified maximum outline or the maximum allowed power dissipation. The following table contains the detailed features and functions of the M.2 Module:

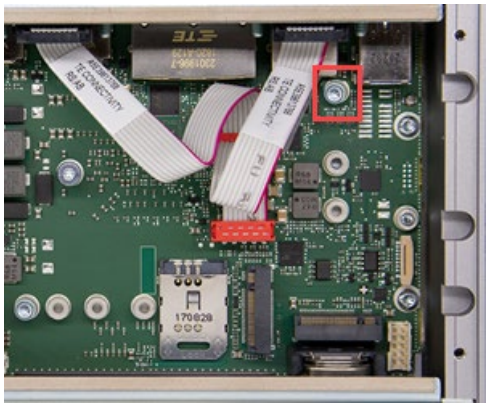
Module **Features and function**	**M.2 Module 1** **(Slot X100)**	**M.2 Module 2** **(Slot X101)**
Size	2230, 2242, 2260, 2280, 3030, 3042, 3052	2230, 2242, 2260, 3030, 3042
Interface	Key B/Key B+M	
Channel	1 × PCIe 3.0 (2 lanes) + 1 × USB2.0	
Support NVRAM	No	Yes
Support WLAN module [1], like Wi-Fi	Yes	Yes
Support WWAN module, like LTE/ 5G	Yes	No
Support Field Bus	Yes	Yes
Support 2nd NVMe SSD	Yes	Yes
Support AI	Yes	Yes
Support Special (DIO)	Yes	Yes

[1] : You can through M.2 Key E to Key B adapter accessory (Page 13) to support Key E and Key A+E module.

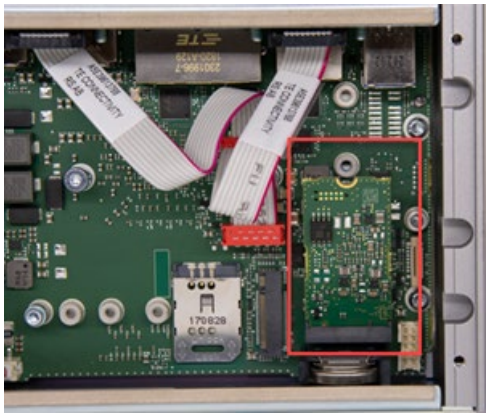
Requirement

- The device is opened.
- A T8 screwdriver

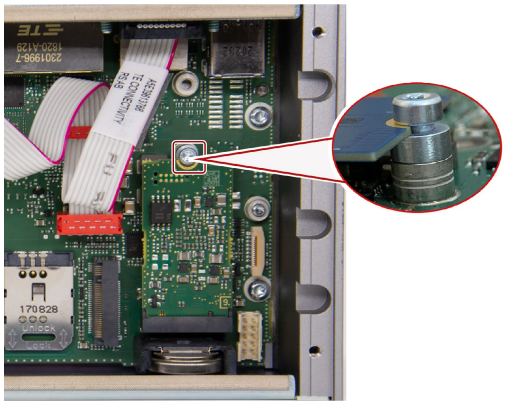
Procedure - Installing the M.2 Module



1. Unscrew the marked screw.



2. Align the golden finger on the M.2 Module on your motherboard, and then press firmly until the M.2 Module is completely seated on the slot.

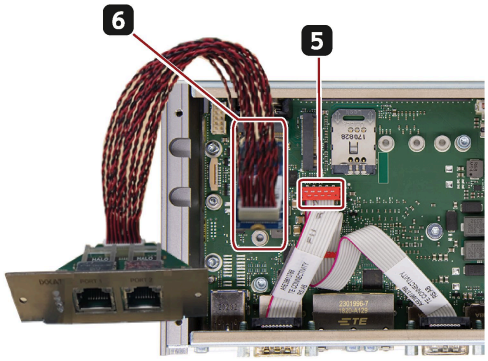


3. Secure the M.2 Module with the screw which is unscrewed in the first step.
   Note: Make sure the M.2 Module board is located between head and spacer of assembly screw.

If the M.2 Module has a cable with an additional interface-card connect to the housing opening, you need to do the following procedures:



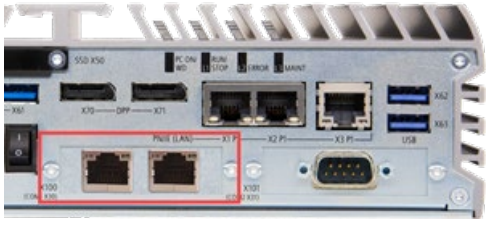
4. Unscrew the marked screws for fixing the COM interface.



5 Remove the COM interface and its jumpers on the motherboard.

6 Follow above steps to install the M.2 Module with an additional interface-card on the X100 or X101 interfaces slot.

Note: The cable length of the M.2 Module should not be shorter than 100 mm and no longer than 200 mm.



7 Secure the additional interface-card in the position of the COM interface with screws.

Procedure - Removing the M.2 Module

Follow the above steps in reverse order to remove the M.2 Module.

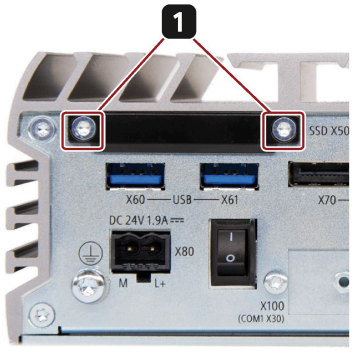
5.3 Installing and removing M.2 NVMe/ SATA SSD

The device has a slot for M.2 NVMe or SATA SSD on the side of the interface panel.

Requirement

- The device is disconnected from the power supply.
- A M.2 NVMe/SATA SSD that is approved for industrial applications.
- A T10 screwdriver

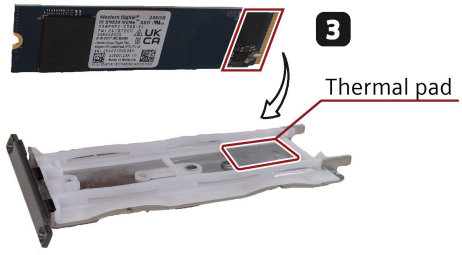
Procedure - installing the M.2 NVMe/SATA SSD



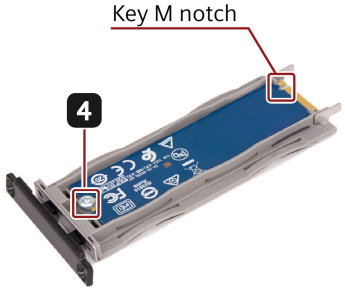
1 Remove the two retaining screws.



2 Pull out the M.2 SSD slot.



3 Place the thermal pad to the corresponding position of the M.2 NVMe/SATA SSD chip.



4 Place the M.2 NVMe/SATA SSD in the slot and secure it with the designated screw.

Note: Keep the Key M notch on the left side of the module as shown in the image.

5 Plug in the slot back into the device and tighten it with designated screws.

Procedure - removing the M.2 NVMe/SATA SSD

To remove the M.2 NVMe/SATA SSD, carry out the steps for installing the M.2 NVMe/SATA SSD in the reverse order.

Maintaining and repairing the device

6

6.1 Maintenance intervals

To maintain high system availability, Siemens recommends you replace some of the PC components that subject to wear in according with the replacement intervals indicated in the table below.

Component	Replacement interval:
CMOS backup battery	5 years

For how to check the status of the backup battery, refer to the battery monitoring (Page 39) function.

6.2 Repair information

Carrying out repairs

Only qualified personnel are permitted to repair the device.

WARNING

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

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

Note

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

⚠ CAUTION

Electrostatic sensitive devices (ESD)

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

Make sure you take precautionary measures when you open the device. For more information, refer to the chapter "ESD Guideline (Page 61)"

Limitation of liability

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

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

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

Tools

For tools to open the device, see section "Open the device (Page 40)". You can make repairs on the device with the following tools:

- T20 screwdriver for protective conductor connection
- T8 screwdriver for spring screw and M.2 Module on the motherboard
- T10 screwdriver for all the remaining screws

6.3 Installing and removing hardware

6.3.1 Replacing the backup battery

Prior to replacement

⚠ WARNING

Risk of explosion and release of harmful substances

An explosion or fire HAZARD could occur through fitting a battery of the wrong type.

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

Explosion of the batteries and the released pollutants can cause severe physical injury. Aged batteries jeopardize the function of the device.

Note the following when handling lithium batteries:

- Replace the battery every 5 years.
- Replace the lithium battery only with the type recommended by the manufacturer. The new lithium battery must be certificated by UL and meet the following requirements:
  - Type: CR2050W
  - Rated voltage: 3 VDC
  - Max abnormal charging current: 10 mA
- For any requirements on product maintenance, contact Siemens Technical support (Page 86).
- Do not throw lithium batteries into fire, do not solder on the cell body, do not recharge, do not open, do not short-circuit, do not reverse polarity, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

⚠ WARNING

Risque d'explosion et d'émission de substances nocives

l'installation d'une pile ou d'un accumulateur de type inadéquat peut provoquer un DANGER d'explosion ou d'incendie.

Une manipulation non conforme des piles au lithium peut conduire à leur explosion.

L'explosion des piles et l'émission de polluants qui en résulte peuvent entraîner de graves lésions corporelles. Des piles usagées constituent un danger pour le fonctionnement de l'appareil.

Observez les remarques suivantes lorsque vous manipulez des piles au lithium :

- Remplacez la pile tous les 5 ans.
- Remplacez la pile au lithium uniquement par une pile du type recommandé par le constructeur. La nouvelle pile au lithium doit avoir une certification UL et satisfaire aux exigences suivantes :
  - Type : CR2050W
  - Tension nominale : 3 V CC
  - Courant de charge anormal max. : 10 mA
- Pour toute demande concernant la maintenance du produit, contactez le support technique (Page 86) Siemens.
- Ne jetez pas au feu des piles au lithium, n'effectuez pas de soudage sur la pile, ne la rechargez pas, ne l'ouvrez pas, ne la court-circuitez pas, n'intervertissez pas les pôles, ne la chauffez pas à plus de 100 °C et protégez-la de l'ensoleillement direct, de l'humidité et de la condensation.

NOTICE

Disposal of batteries

Batteries do not belong in domestic garbage. The user is legally obliged to return used batteries.

Used batteries pollute the environment as special waste. You as a user are liable to prosecution if you do not properly dispose of batteries.

Observe the following when disposing of batteries:

- Dispose of used batteries as hazardous waste in accordance with local regulations.
- You can return used batteries to public collection points and wherever batteries of the type in question are sold.
- Label the battery container "Used batteries".

Requirement

- The device is disconnected from the power supply.
- A T10 screwdriver

Procedure



1 Unscrew the marked four screws on the back side of the device and remove the cover.



2 Slide the battery out 45 degrees from the upper left, pull the battery out gently and insert a new battery.

Note: The positive electrode (+) of the battery should be positioned toward the outside of the device.

6.3.2 Replacing the memory module

Single channel memory

The motherboard provides one DDR4 memory sockets. The memory capacity of the device can be upgraded to a maximum of 16 GB.

The table below shows the supported memory types of motherboard.

Module type	Module Size	Description
DDR4-SDRAM	16GB	DDR4 up to 3200MT/S SODIMM 260pin
DDR4-SDRAM	8GB	DDR4 up to 3200MT/S SODIMM 260pin
DDR4-SDRAM	4GB	DDR4 up to 3200MT/S SODIMM 260pin

Requirement

- The device is disconnected from the power supply.
- All connecting cables on the device are unplugged.
- The device is opened.
- T8, T10 and T20 screwdrivers

NOTICE

Electrostatic discharge

The electronic components on the PCBs are highly sensitive to electrostatic discharge. Always take appropriate precautionary measures when handling these components. Refer to the ESD directives on handling electrostatic sensitive components.

Note

Siemens strongly recommends that you use only memory modules approved by Siemens. Siemens disclaims any liability for impairment of functions caused by the use of third-party memory modules.

To replace the memory module

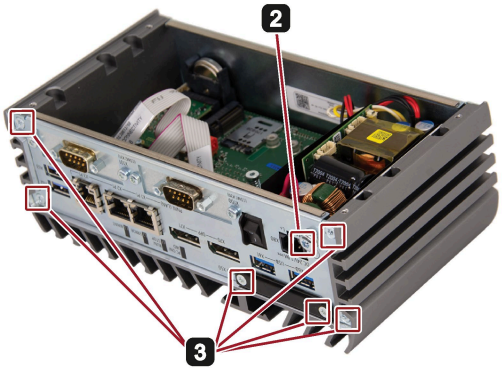
CAUTION

- A memory module cab be installed only when the direction is correct. Make sure your insert the memory card in the correct direction.
- Make sure the memory module you insert is DDR4 memory module. DDR2 and DDR3 memory modules are not compatible with the motherboard.

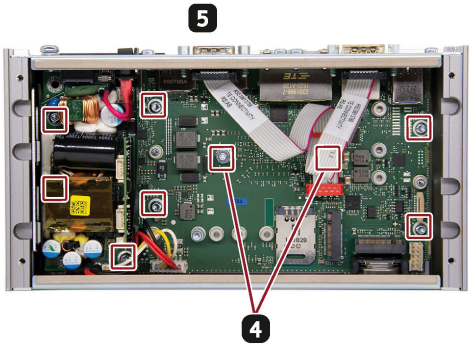
Follow the steps below to install memory module on motherboard memory sockets:



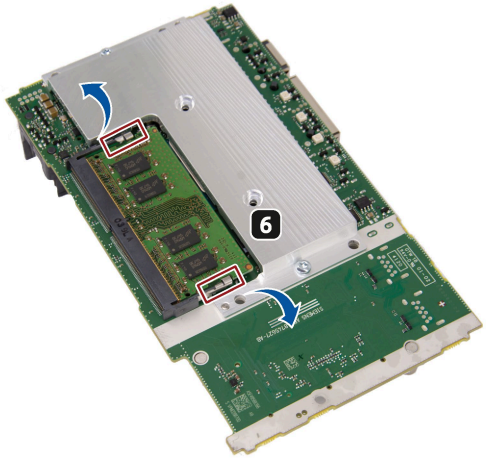
1. Unscrew the marked four screws with a T10 screwdriver on the back side of the device and remove the cover.



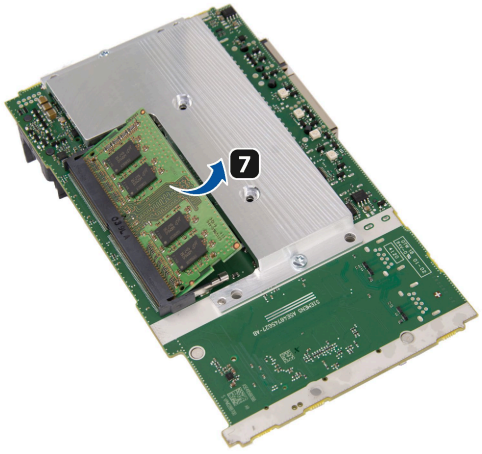
2. Unscrew the marked screw for protective conductor with a T20 screwdriver.
3. Unscrew the marked six screws with a T10 screwdriver on the interface panel of the device.



4. Unscrew the marked two spring screws with a T8 screwdriver on the motherboard.
5. Unscrew the marked two screws on the power module and unscrew the marked other five screws with a T10 screwdriver on the motherboard.



6. Press the retaining clips outward in the direction of the arrows to unlock the memory socket.



7 Pull out the memory module from the socket.

6.4 Installing the drivers and software

Information on installation of the operating system is available on the Internet:

- Microsoft® Windows® 10 (https://support.industry.siemens.com/cs/ww/en/view/109749498)

Requirements

- Windows 10 operating system is installed in your IPC.
- You need to connect a mouse, a monitor and a keyboard to your PC.
- You also need the supplied USB stick to your PC.

Drivers and software list

The following drivers and software need to be installed on Windows 10:

Operating system	Drivers and software needed
Windows 10	• Step1: Intel® Chipset Device Software • Step2: Intel® Converged Security Engine • Step3: Intel® HECI Controller Driver • Step4: Intel® Gigabit Ethernet Driver • Step5: Intel® UHD Graphics Driver • Step6: Intel® Serial I/O Driver • Step7: Intel® Graphics Command Center

Procedure

1. Connect the supplied USB stick to the USB port.
2. Start the program "START_DocuAndDrivers".
3. Select "Drivers" in the index.
4. Select the device and operating system.
5. Select the required driver.
6. Follow the below steps and click the icon to install the required driver.

Note

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

Step 1: install the chipset driver

1. Click **Step1: Intel® Chipset Device Software.**
2. Click to install the chipset driver.
3. Click **Next** to continue.
4. Click **Accept** to accept the license agreement.
5. Click **Install** to allow the computer to start the installation.

   The installation starts.
6. Click **Yes** to confirm the user account control question.
7. Click **Finish.**

   The chipset installation is completed.

Step 2: install the Converged Security Engine

1. Click **Step2: Intel® Converged Security Engine.**
2. Click to install the Converged Security Engine.
3. Click **Yes** to confirm the user account control question.
4. Click **Next** to continue.
5. Select the radio button before "**I have read and accept the license terms**", and click **Install** to allow the computer to start the installation.
6. Click **Finish**.

   The installation is completed.

Step 3: install the HECI Controller Driver

1. Click **Step3: Intel® HECI Controller Driver.**
2. Click  to install the HECI Controller driver.
3. Click **Yes** to confirm the user account control question.
4. Click **Next** to continue.
5. Click **Finish**.

   The installation is completed.

Step 4: install the Gigabit Ethernet driver

1. Click **Step4: Intel® Gigabit Ethernet Driver**.
2. Click  to install the Gigabit Ethernet driver.
3. Click **Yes** to confirm the user account control question.
4. Click **Next** to continue.
5. Click **Finish**.

   The installation is completed.

Step 5: install the UHD Graphics Driver

1. Click **Step5: Intel® UHD Graphics Driver.**
2. Click  to install the Intel® UHD Graphics driver.
3. Click **Yes** to confirm the user account control question.
4. Click **Next** to continue.
5. Click **Yes** to accept license agreement.
6. Click **Next** to confirm the *Readme File Information* and move on.

   The installation starts.
7. Click **Next** to continue.
8. Select the radio button next to "**Yes, I want to restart my computer now**." and click **OK** to restart the computer for the changes to take effect.

Step 6: install the Serial I/O driver

1. Click **Step7: Intel® Serial I/O Driver**.
2. Click  to install the Serial I/O driver.
3. Click **Yes** to confirm the user account control question.
4. Click **Yes** to continue.
5. Click **Finish**.

   The installation is completed.

Step 7: install the Graphics Command Center

1. Click **Step7: Intel® Graphics Command Center**.
2. Click  to install the Intel® Graphics Command Center.
3. Click **Yes** to confirm the user account control question.
4. Click **Yes** to continue.
5. Click **Finish**.

   The installation is completed.

6.5 Recycling and disposal

Due to their low level of pollutants, the devices described in these operating instructions can be recycled. Contact a certified disposal service company for environmentally sound recycling and disposal of your old devices.

Technical specifications

7

7.1 Certificates and approvals

Note

Applicability

The following shows the approvals that may be available. For the device itself, it is certificated as shown on the product label and package label.

ISO 9001 certificate

The Siemens quality management system for all production processes (Development, Production, Sales and Service of Automation Products,-Systems and -Solutions) meets the requirements of ISO 9001:2015

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

Certificate registration no. 001323 QM15.

Software license agreements

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

CE marking

CE

2004/108/EC Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility (until 19.04.2016)

2014/30/EU Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility; Official Journal of the EU L96, 29/03/2014, p. 79–106 (from 20.04.2016)

Low Voltage Directive:

2006/95/EC Directive of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (until 19.04.2016)

2014/35/EU Directive of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; Official Journal of the EU L96, 29/03/2014, p. 357–374 (from 20.04.2016)

EMC	EN 61000-3-2:2006 + A1:2009 + A2:2009, EN 61000-3-3:2013, EN 61000-6-3:2007 + A1:2011, EN 61000-6-2:2005
LVD	EN 61010-2-201:2013;

FCC and Canada

USA	
Federal Communications Commission Radio Frequency Interference Statement	This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of operations	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

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)

UL approval

The following approvals are available for the device:

- Underwriters Laboratories (UL) in accordance with Standard UL61010-1 and UL61010-2-201, File E472609
- Canadian National Standard CAN/CSA No.61010-1-12 and CAN/CSA C22.2 No.61010-2-201

Identification for Eurasian 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)

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.

Korea Certificate

This product meets the requirements of Korean certification.

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

BSMI

This product meets the requirements of CNS14336-1(099/09/30), CNS13438(095/06/01) generic standard.

UKCA

This product meets the requirements of UKCA.

ATEX and IECEx

Cat3G devices for use in Zone 2.

Observe the following standards for use in hazardous areas:

EN 60079-0 : 2012 + A11 : 2013, EN 60079-7 : 2010, IEC 60079-0 :2011 (Ed.6), + Corr.1. 2012 + Corr.2. 2013, IEC 60079-7

Specific conditions of use (for ATEX)

- The modules shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to EN 60079-7, taking into account the environmental conditions under which the equipment will be used.
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

Specific conditions of use (for IECEx)

- The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.
- The modules shall be installed in a suitable enclosure providing a degree of protection of at least IP54 according to IEC 60079-7, taking into account the environmental conditions under which the equipment will be used.
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

  Switch:

  SW1 On/Off switch - will not be used during operational maintenance

The device has to be used in pollution degree 2 environment only.

Use copper supply wires with a diameter of at least 0.75 mm^2 (= AWG18).

WEEE label (European Union)



Disposal instructions, observe the local regulations and the section "Recycling and disposal (Page 56) ".

7.2 Directives and declarations

7.2.1 Electromagnetic compatibility, Industrial and Residential Areas

Electromagnetic compatibility

This product meets the requirements of EC Directive 2014/30/EU "Electromagnetic Compatibility".

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

Scope of application	Requirements for	
	Interference emission	Immunity to interference
Industrial area	EN 61000-6-3 +A1, CAN/CSA-CISPR 22:10	EN 61000-6-2, NAMUR NE 21

7.2.2 RoHs directive

This product meets the requirements stated in the RoHS directive (Restriction of Hazardous Materials): 2011/65/EU

Compliance with the directive has been reviewed according to the following standard: EN IEC63000

7.2.3 ESD guideline

What does ESD mean?

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

The following abbreviations are commonly used for electrostatic sensitive devices:

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

Electrostatic sensitive devices can be labeled with an appropriate symbol.



NOTICE

Damage to ESD from touch

Electrostatic sensitive devices, ESD, can be destroyed by voltages which are far below the human perception limit. If you touch a component or electrical connections of a module without discharging any electrostatic energy, these voltages may arise.

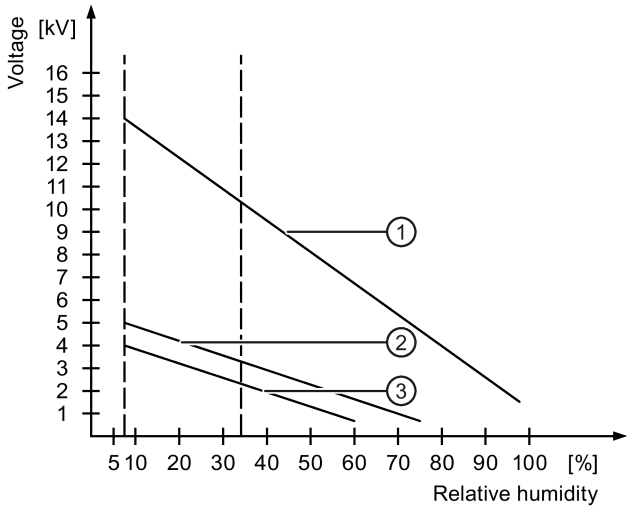
The damage to a module by an overvoltage can often not be immediately detected and only becomes evident after an extended period of operation. The consequences are incalculable and range from unforeseeable malfunctions to a total failure of the machine or system.

Avoid touching components directly. Make sure that persons, the workstation and the packaging are properly grounded.

Charge

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

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



① Synthetic materials

② Wool

③ Antistatic materials such as wood or concrete

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

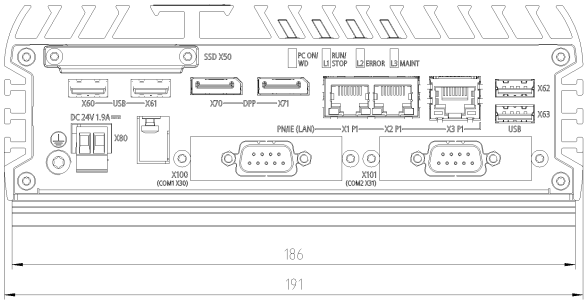
Protective measures against discharge of static electricity

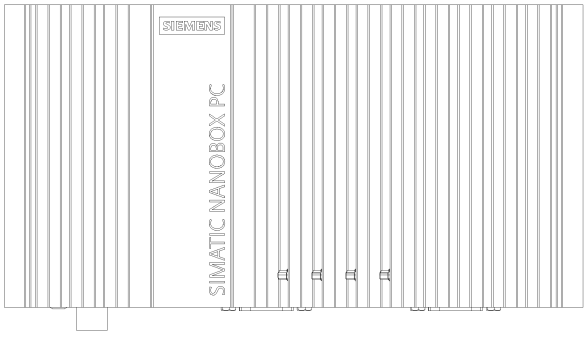
- Disconnect the power supply before you install or remove modules which are sensitive to ESD.
- Pay attention to good grounding:

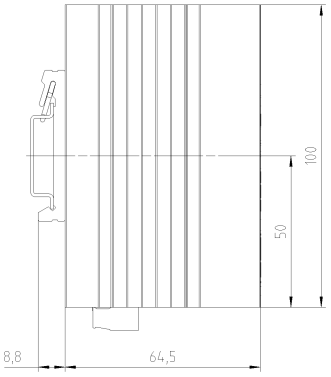
  When handling electrostatical sensitive devices, make sure that persons, the workstation and devices, tools and packaging used are properly grounded. This way you avoid static discharge.
- Avoid direct contact:
  - As a general rule, do not touch electrostatic sensitive devices, except in the case of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

7.3 Dimension drawings

Mounting on a standard rail

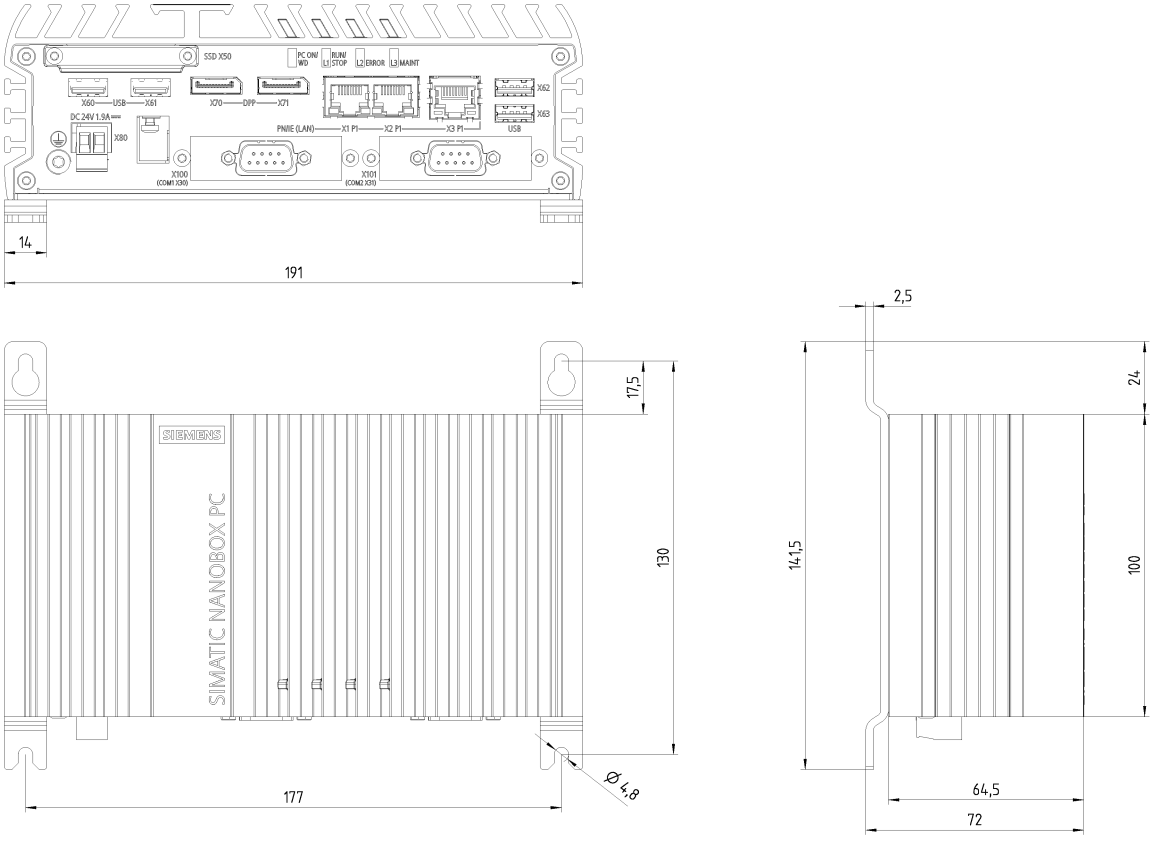






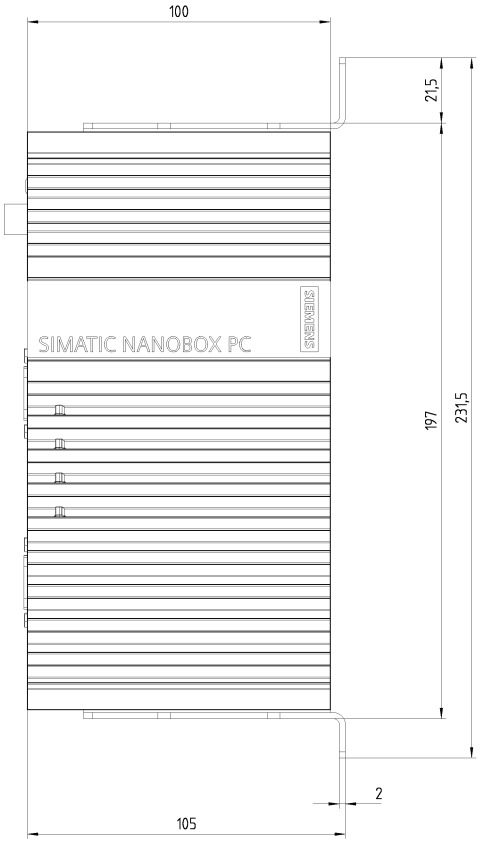
all dimensions in mm

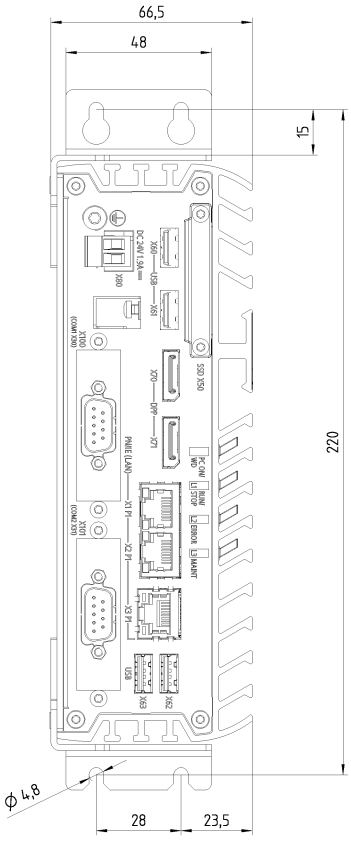
Wall mounting



all dimensions in mm

Upright mounting





all dimensions in mm

7.4 Technical data

7.4.1 General technical specifications

General technical specifications

Weight without mounting brackets	Approx. 1.4 kg
Power supply [1]	• 24 VDC (19.2 to 28.8V) • Rated output power: 30W
Power consumption (DC)	• 40%~60% full load, 24 VDC at 85% efficiency • Pout ≥ 6W, 24 VDC at 70% efficiency • Pout < 6W, 24 VDC at 50% efficiency
Current consumption	• Max. 2.3 A at 19.2 V • Max. 1.9 A at 24 V • Max. 1.6 A at 28.8 V
Noise emission	< 55 dB(A) according to DIN 45635-1
Degree of protection	IP40 in accordance with IEC 60529
Protection class	Protection class I in accordance with IEC 61140
Overvoltage Category	II
Pollution Degree	2
Quality assurance	In accordance with ISO 9001

[1] : The device may only be connected to a 24 VDC power supply which meets the requirements of a safe extra-low voltage (SELV/PELV) in accordance with IEC/EN/DIN EN/UL 61010-2-201. The power supply must fulfill the requirements of Limited Energy according to IEC/EN/DIN EN/UL 61010-2-201.

Electromagnetic compatibility

Radiation Emission (Enclosure port) in accordance with IEC 61000-6-3 + A1/ CAN/CSA-CISPR 22:10	• 30 to 230 MHz: 30 dB(µV/m) Quasi-peak (10 m distance) • 230 to 1000 MHz: 37 dB (µV/m) Quasi-peak (10 m distance) • 1 to 3 GHz: 70 dB (µV/m) Peak; 50 dB (µV/m) Average (3 m distance) • 3 to 6 GHz: 74 dB (µV/m) Peak; 54 dB (µV/m) Average (3 m distance)
Immunity with regard to conducted interference on the supply lines	• ± 2 kV (5 kHz /100 kHz) in accordance with IEC 61000-4-4; Burst • ± 1kV line to line, ±2 kV line to earth in accordance with IEC 61000-4-5; Surge

Noise immunity on signal lines	Burst: • ± 1 kV (5 kHz /100 kHz) in accordance with IEC 61000-4-4; Length of signal port extension cable < 30 m; • ± 2 kV (5 kHz /100 kHz) in accordance with IEC 61000-4-4; Length of signal port extension cable ≥ 30 m Surge: • ± 1 kV line-to-line; ± 2 kV line-to-earth in accordance with IEC 61000-4-5; Length of signal port extension cable ≥ 30 m
Immunity to discharges of static electricity	± 6 kV contact discharge in accordance with IEC 61000-4-2 ± 8 kV air discharge in accordance with IEC 61000-4-2
Immunity to RF interference	Radiation Immunity (according to IEC 61000-6-2) • 80 MHz to 2GHz 10 V/m, 80 % AM (1 kHz) • 2 GHz to 2.7 GHz 3 V/m, 80 % AM (1 kHz) Conducted Immunity (according to IEC 61000-4-6) • 150 kHz to 80MHz: 10 V, 80% AM (1kHz)
Conducted Emission (Low voltage DC mains port), in accordance with IEC 61000-6-3 + A1	• 0.15 to 0.5 MHz / 79 dB (µV) Q, 66 dB (µV) M • 0.5 to 30 MHz / 73 dB (µV) Q, 60 dB (µV) M
Conducted Emission (Telecommunications/Network Port), in accordance with IEC 61000-6-3 + A1	0.15 to 0.5 MHz: 84 dB(µV) to 74 dB(µV) Q 74 dB(µV) to 64 dB(µV) M
	0.5 MHz to 30 MHz: 74 dB(µV) Q / 64 dB(µV) M

Main circuit board

Processor	• Intel Atom® x6211E: Dual Core, 1.3 GHz, burst frequency 3.0 GHz, 6W TDP • Intel Atom® x6413E: Quad Core, 1.5 GHz, burst frequency 3.0 GHz, 9W TDP • Intel Atom® x6414RE: Quad Core, 1.5 GHz, 9W TDP
Main memory	Memory expansion up to 16 GB with the following memory modules: • 4G DDR4 SDRAM • 8G DDR4 SDRAM • 16G DDR4 SDRAM The max speed of memory is up to 3200 MT/s. The memory module supports IBECC function, and its default value in BIOS is "Disable".

M.2 Module	• Slot X100: support NGFF M.2 2230/2242/2260/2280/3030/3042/3052 with Key B/Key B+M • Slot X101: support NGFF M.2 2230/2242/2260/3030/3042 with Key B/Key B+M
Max. permitted totally power loss for each M.2 B key module	Less than 2.5 W

Drive, memory medium

M.2 NVMe/SATA SSD	• Slot X50: support NGFF M.2 2230/2242/2280 with Key M/Key B+M • 256GB Eco SSD
USB stick	External, can be connected via USB port

Graphics

Graphics controller	Intel® Integrated UHD Graphic Controller
Resolution, graphics memory	• 2 × DP++, support resolution up to 4096 × 2160 pixel at 60Hz

Interfaces

Ethernet	3 × Gigabit Ethernet interface (three RJ45) electrically isolated, Wake on LAN and Remote Boot are supported: • X1P1: Marwell 88E1512 • X2P1: Marwell 88E1512 • X3P1: Marwell 88E1512
COM1/2	RS232/RS422/RS485 [1] (optional), max. 115 Kbps, D-sub connector, 9-pin
USB	On the interface panel: • 4 × USB 3.1 (900mA) On the motherboard: • 2 × USB 2.0 vertical (500 mA) You can find additional information in the section "Power demand of the components (Page 70)".
DP	Connection of a DP monitor
Keyboard, mouse	Connection via USB port

[1] In BIOS Setup, you can configure support for RS232/RS422/RS485 for COM1 and COM2 ports.

7.4.2 Ambient conditions

Climatic ambient conditions

For permitted mounting positions, see section Preparing for installation (Page 18).

Temperature, tested in accordance with IEC 60068-2-1, IEC 60068-2-2 and IEC 60068-2-14	
Operation, x6211E, without M.2 Module	0 °C to +55 °C applies to device for horizontal mounting positions
Operation, x6413E/x6414RE, without M.2 Module; or x6211E, M.2 Module load max. 2.5W	0 °C to +50 °C applies to device for horizontal mounting positions
Operation, x6413E/x6414RE, without M.2 Module;	0 °C to +45 °C applies to device for vertical mounting positions
Operation, x6413E/x6414RE, M.2 Module load max. 2.5W; or x6211E, M.2 Module load max. 5W	0 °C to +45 °C applies to device for horizontal mounting positions
Operation, x6413E/x6414RE, M.2 Module load max. 5W	0 °C to +40 °C applies to device for horizontal mounting positions
Temperature during storage/transport	-20 °C to +70 °C
Gradient	• Operation: Max. 10 °C/h • Storage: 20 °C/h, no condensation
Relative humidity, tested in accordance with IEC 60068-2-78, IEC 60068-2-30	
Operation	8% to 85% at 30 °C, no condensation Gradient ≤ 10°C/h
Storage/transport	8% to 90% at 25/55 °C, no condensation Gradient ≤ 20°C/h
Atmospheric pressure	
Operation	1080 to 627 hPa, corresponds to an altitude of -1000 to 3000 m
Storage/transport	1080 to 660 hPa, corresponds to an altitude of -1000 to 3500 m

Multiplication factors for equipment ambient temperature of operation at altitudes up to 3000m, tested in accordance with IEC 61131-2:2017	
Altitude	**Derating ratio for temperature** [1]
0 to 2000 [2]	1.0
3000	0.9

[1] : Equipment ambient temperature rating at 2000 m.

[2] : Atmospheric pressure and air density increases with decreasing altitude. Therefore utilization of the derating factor for 0 m to 2000 m for altitudes below sea level is considered conservative.

Mechanical ambient conditions

Vibration resistance, tested in accordance with IEC 60068-2-6	
Operation	Except DIN-Rail: • 5 to 8.4 Hz: 3.5 mm • 8.4 to 500 Hz: 9.8 m/s² DIN-Rail: • 10 to 58 Hz: 0.0375 mm • 58 to 200 Hz: 4.9 m/s²
Storage/transport	• 5 to 8.4 Hz: 3.5 mm • 8.4 to 500 Hz: 9.8 m/s²
Shock resistance, tested in accordance with IEC 60068-2-27	
Operation	With SSD: • 150 m/s², 11 ms • 5g, 30 ms
Storage/transport	• 250 m/s², 6 ms

7.4.3 Power demand of the components

Maximum power consumption of the auxiliary components

Auxiliary components		**Maximum permitted power consumption**		**Max. total power**
		+5 V	+3.3 V	
USB device 3.1	High current	900 mA	--	6 W (for all USB devices)
USB Device 2.0	High current	500 mA	--	
M.2 Module (slot X100)	Per slot	--	1.5 A	5 W in total
M.2 Module (slot X101)	Per slot	--	1.5 A	

Note

Device may overheat!

The power supply cannot make unlimited power available. The auxiliary components consume energy and produce heat.

The device may overheat. The auxiliary components will be damaged.

7.4.4 Direct current supply (DC)

Technical specifications

Input voltage	24 VDC (19.2 to 28.8 VDC)
Power consumption [1]	Max. 32 W
Maximum input current	• 2.3 A at 19.2 V • 1.9 A at 24 V • 1.6 A at 28.8 V
Buffering upon power failure	Hold-up time > 20 ms (after > 5 ms, DC_FAIL becomes active)
Maximum continuous output power [1]	30 W
Protection class	Safety class I (A protective conductor must be connected to the device)

[1] : The power specifications apply to the power supply component, not to the device.

Note

Inrush current

The requirements in accordance with NAMUR NE21, Section 4.5 are complied with. The maximum inrush current does not exceed 4 A. Typical value with an input voltage of 24 V is 2 A for 25 ms. A 24 V power source with a limit current lower than 2.0 A is not permitted. A voltage drop under 18.0 V during booting of the device is not permitted.

Typical power consumption

	Power consumption (at 24 V rated voltage)
Device with Intel Atom® x6211E	14 W
Device with Intel Atom® x6413E	18 W
Device with Intel Atom® x6414RE	17 W
USB expansion	See section "Power demand of the components (Page 70)"
M.2 Module	

7.5 Hardware descriptions

7.5.1 Technical features of the motherboard

Component / port	Description	Parameters
Chipset	Integrated in CPU	• Intel Atom® x6000E series
CPU	Intel Processor	• Intel Atom® x6211E Processor (up to 3.0 GHz) • Intel Atom® x6413E Processor (up to 3.0 GHz) • Intel Atom® x6414RE Processor (1.5 GHz)
Memory	DDR4 SDRAM	Memory expansion up to 16 GB with the following memory modules: • 4G DDR4 SDRAM • 8G DDR4 SDRAM • 16G DDR4 SDRAM
Graphics	Integrated graphics	• Intel® UHD Graphics

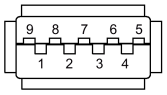
7.5.2 External interfaces

7.5.2.1 Overview of external interfaces

Interface	Position	Description
USB [1]	External	• 4 × USB 3.1 Gen2 (up to 10Gb/s)
Ethernet port	External	• 3 × RJ45 Ethernet 10/100/1000 Mbps
DisplayPort	External	• 2 × DP++
COM	External	9-pin D-sub, either: • 2 × RS232/RS485/RS422

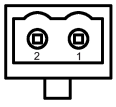
[1] Only four of these USB ports may be operated simultaneously in high current mode, max. 10 W.

7.5.2.2 USB 3.1 port



Pin	Short name	Meaning	Input / output
1	VBUS	+ 5 V (Power switch)	Power out
2	D-	Data channel USB2	Input / output
3	D+	Data channel USB2	Input / output
4	GND	Ground	–
5	RX-	Data channel USB3	Input
6	RX+	Data channel USB3	Input
7	GND	Ground	–
8	TX-	Data channel USB3	Output
9	TX+	Data channel USB3	Output

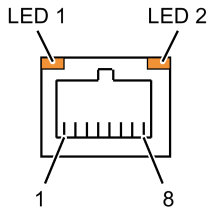
7.5.2.3 DC in connector



Pin	Short description
1	+24V
2	GND

7.5.2.4 Ethernet port

Ethernet RJ45 interface

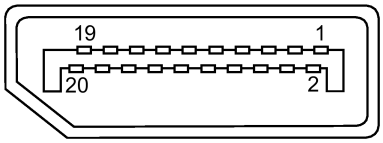


Pin no.	Short description	Meaning	Input / output
1	BI_DA+	Bi-directional data A+	Input/output
2	BI_DA-	Bi-directional data A-	Input/output
3	BI_DB+	Bi-directional data B+	Input/output
4	BI_DC+	Bi-directional data C+	Input/output
5	BI_DC-	Bi-directional data C-	Input/output
6	BI_DB-	Bi-directional data B-	Input/output
7	BI_DD+	Bi-directional data D+	Input/output
8	BI_DD-	Bi-directional data D-	Input/output
S		Shield	–
	LED 1	Orange light:1000 Mbps Off: else	–
	LED 2	Orange light: Link Orange Blink: Activity Off: No Link	–

The Ethernet interface supports MDXI (auto crossover) for all transmission rates.

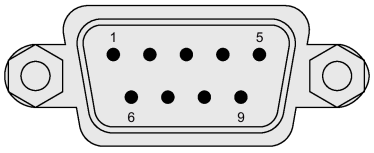
7.5.2.5 DisplayPort

DisplayPort interface



Pin no.	Abbreviation	Meaning	Input/output
1	ML_Lane 0+	DP data 0+	Output
2	GND	Ground	-
3	ML_Lane 0+	DP data 0+	Output
4	ML_Lane 1+	DP data 1+	Output
5	GND	Ground	-
6	ML_Lane1-	DP data 1-	Output
7	ML_Lane 2+	DP data 2+	Output
8	GND	Ground	-
9	ML_Lane 2-	DP data 2-	Output
10	ML_Lane 3+	DP data 3+	Output
11	GND	Ground	-
12	ML_Lane 3-	DP data 3-	Output
13	CONFIG1	CONFIG1	-
14	CONFIG2	CONFIG2	-
15	AUX_CH+	Auxiliary channel+	Bidirectional
16	GND	Ground	-
17	AUX_CH-	Auxiliary channel-	Bidirectional
18	HPD	Hot Plug Detect	Input
19	GND	Ground	-
20	DP_PWR	+3.3 V (Power switch)	power out

7.5.2.6 Serial interface



RS232
RS422
RS485

Pin assignment RS232

Pin	Short description	Meaning
1	DCD	Data carrier detect (I)
2	RxD	Received data (I)
3	TxD	Transmitted data (O)
4	DTR	Data terminal ready (O)
5	M	Ground
6	DSR	Data set ready (I)
7	RTS	Request to send (O)
8	CTS	Clear to send (I)
9	RI	Incoming call (I)

Pin assignment RS422

Pin	Short description	Meaning
1	TX-	Transmit data - (O) for full-duplex mode
2	TX+	Transmit data + (O) for full-duplex mode
3	RX+	Receive data + (I) for full-duplex mode
4	RX-	Receive data - (I) for full-duplex mode
5	M	Signal ground
6	nc	
7	nc	
8	nc	
9	nc	

Pin assignment RS485

Pin	Short description	Meaning
1	Data-	Transmit / receive data - (I/O) for half-duplex mode
2	Data+	Transmit / receive data+ (I/O) for half-duplex mode
3	nc	
4	nc	
5	M	Signal ground
6	nc	
7	nc	
8	nc	
9	nc	

7.5.3 Internal interfaces

7.5.3.1 Overview of internal interfaces

Interface	Position	Description
USB 2.0	Internal	• 2 × USB 2.0 pin header
M.2	Internal	• PCIe x2 lane + USB2.0

7.5.3.2 M.2 interface

M.2 Module (X100)

Pin no.	Signal	Signal	Pin no.
		NC	75
74	3.3V	GND	73
72	3.3V	GND	71
70	3.3V	NC	69
68	SUSCLK	RESET#	67
66	SIM DETECT	ANTCTL3	65
64	COEX_RXD(I)	ANTCTL2	63
62	COEX_TXD(O)	ANTCTL1	61
60	COEX3(I/O)	ANTCTL0	59
58	NC	GND	57
56	NC	REFCLKp	55
54	PEWAKE#	REFCLKn	53
52	CLKREQ#	GND	51
50	PERST#	PETp0	49
48	NC	PETn0	47
46	NC	GND	45
44	ALERT#	PERp0	43
42	SMB_DATA	PERn0	41
40	SMB_CLK	GND	39
38	DEVSLP	PETp1	37
36	UIM-PWR	PETn1	35
34	UIM-DATA	GND	33
32	UIM-CLK	PERp1	31
30	UIM-RESET	PERn1	29
28	NC	GND	27
26	NC	NC	25
24	NC	NC	23
22	NC	NC	21
20	NC	CONNECTOR KEY B	19
18	CONNECTOR KEY B	CONNECTOR KEY B	17

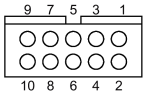
16	CONNECTOR KEY B	CONNECTOR KEY B	15
14	CONNECTOR KEY B	CONNECTOR KEY B	13
12	CONNECTOR KEY B	GND	11
10	NC	USB_D-	9
8	W_DISABLE#	USB_D+	7
6	WWAN_PWR_OFF_N	GND	5
4	3.3V	GND	3
2	3.3V	NC	1

M.2 Module (X101)

Pin no.	Signal	Signal	Pin no.
		NC	75
74	3.3V	GND	73
72	3.3V	GND	71
70	3.3V	CFG1	69
68	SUSCLK	RESET#	67
66	NC	ANTCTL3	65
64	COEX_RXD	ANTCTL2	63
62	COEX_TXD	ANTCTL1	61
60	COEX_NC	ANTCTL0	59
58	NC	GND	57
56	NC	REFCLKp	55
54	PEWAKE#	REFCLKn	53
52	CLKREQ#	GND	51
50	PERST#	PETp0	49
48	COEX_TXD(O)	PETn0	47
46	COEX_RXD(I)	GND	45
44	COEX3(I/O)	PERp0	43
42	SMB_DATA	PERn0	41
40	SMB_CLK	GND	39
38	DEVSLP	PETp1	37
36	NC	PETn1	35
34	NC	GND	33
32	NC	PERp1	31
30	NC	PERn1	29
28	NC	GND	27
26	NC	NC	25
24	NC	NC	23
22	NC	NC	21
20	NC	CONNECTOR KEY B	19
18	CONNECTOR KEY B	CONNECTOR KEY B	17
16	CONNECTOR KEY B	CONNECTOR KEY B	15
14	CONNECTOR KEY B	CONNECTOR KEY B	13
12	CONNECTOR KEY B	GND	11
10	NC	USB_D-	9

8	W_DISABLE#	USB_D+	7
6	NC	GND	5
4	3.3V	GND	3
2	3.3V	NC	1

7.5.3.3 USB 2.0 pin header



Pin	Signal
1	VBUS_USB1
2	VBUS_USB2
3	USB1_D-
4	USB2_D-
5	USB1_D+
6	USB2_D+
7	GND
8	GND
9	GND
10	GND

7.5.4 System resources

Currently allocated system resources

All system resources (hardware addresses, memory utilization, interrupt assignment, DMA channels) are assigned dynamically by the Windows operating system, depending on the hardware equipment, drivers and connected external devices. You can view the current allocation of system resources or possible conflicts in the Control Panel.

Procedure

To view the system resources, proceed as follows:

1. Right-click the Windows Start menu and select "Device Manager".
2. Click on the **View** menu and turn on " Resources by type" or "Resources by connection".

   All the interrupts show under the Interrupt request (IRQ) catalog.

7.5.5 Input/output address areas

7.5.5.1 Overview of the internal module registers

The following addresses are used for the internal registers:

Addresses	Input/output unit
SIO logic device 8 CR F0h	Watchdog control register (Page 80)
SIO logic device 8 CR F1h	Watchdog counter register (Page 80)
SIO logic device 8 CR F2h	Watchdog state register (Page 81)
SIO logic device 7 CR E9h	Control register user LED L1/L2/L3 (Page 81)
SIO logic device 7 CR FDh	Battery status register (Page 81)

For more information and reference code for accessing to Super IO, contact Siemens Technical support.

7.5.5.2 Watchdog control register

Bit	Read/Write state	Meaning of the bits
0	Read/Write	Watchdog Timer I Pulse or Level mode select: • 0: Pulse mode • 1: Level mode
1	Read/Write	Not used for watchdog
2	Read/Write	Not used for watchdog
3	Read/Write	Select Watchdog Timer I count mode. • 0: Second Mode. • 1: Minute Mode.
4 to 7		Reserved

7.5.5.3 Watchdog counter register

Bit	Read/Write state	Meaning of the bits
0 to 7	Read/Write	Watch Dog Timer I Time-out value. Writing a non-zero value to the register causes the counter to load the value into the Watch Dog Counter and start counting down. The accuracy of watchdog timer I about one cycle deviation. Non-zero value will be reloaded to the Watch Dog Counter and the countdown resumes. Reading the register returns the current value in the Watch Dog Counter but not the Watch Dog Timer Time-out value. • 00h: Time-out Disable • 01h: Time-out occurs after one cycle time, the cycle time is based on LD8 CRF0, bit[3], by analogy.

7.5.5.4 Watchdog state register

Bit	Read/Write state	Meaning of the bits
7	Read/Write	Not used for watchdog
6	Read/Write	Not used for watchdog
5	Write "1" Only	Trigger Watchdog Timer I event. This bit is self-clearing.
4	Read/Write	Watchdog Timer I status bit: • 0: Watchdog Timer I is running. • 1: Watchdog Timer I issues time-out event.
3 to 0	Read/Write	Not used for watchdog

7.5.5.5 Control register user LED L1/L2/L3

Meaning of the bits

The "PC ON/WD" LED flashes yellow to indicate the progress of the BIOS self-test during device startup. After the BIOS self-test has been completed, the "PC ON/WD" LED lights up continuously green.

Control register L1/L2/L3								
Bits								
7	6	5	4	3	2	1	0	
						1	1	LED L1 Stop dark (default)
						1	0	LED L1 lit red
						0	1	LED L1 lit green
						0	0	LED L1 lit orange
				1	1			LED L2 Stop dark (default)
				1	0			LED L2 lit red
				0	1			LED L2 lit green
				0	0			LED L2 lit orange
		1	1					LED L3 Stop dark (default)
		1	0					LED L3 lit red
		0	1					LED L3 lit green
		0	0					LED L3 lit orange

7.5.5.6 Battery status register

The status of the CMOS battery is monitored; the status (two-tier) can be read from the battery status register.

Meaning of the bits

Battery status register (read-only, address 404Dh)								
Bit								Meaning
7	6	5	4	3	2	1	0	
	0	0						CMOS battery capacity is still sufficient.
	0	1						CMOS battery capacity is exhausted (remaining capacity is sufficient for approx. one month)
	1	1						CMOS battery is empty

7.5.5.7 NVRAM address register

NVRAM occupies a 512 KB memory address area that can be read via PCI registers.

Meaning of the bits

NVRAM address register		
PCI register address: NVRAM base address register	PCI register content: NVRAM memory address (default setting)	Length of the memory area
Address variable (depending on the slot where NVRAM is located)	Address is assigned dynamically (depending on device configuration)	80000 h

7.6 BIOS description

7.6.1 Overview

Parameterize your device in the BIOS Setup.

BIOS Setup program

The BIOS Setup program, or BIOS Setup for short, is located, together with the setup parameters, in a FLASH block on the motherboard.

Change the setup parameters of the device in the BIOS Setup, e.g. system time or boot sequence.

Changing the device configuration

Your device configuration is preset for operating with the included software. You should only change the default setup parameters if technical modifications to your device require different parameters.

NOTICE
Malfunctions can occur with running software CPU If a BIOS update of the PC is performed while a SIMATIC software controller is running, the software CPU can malfunction, resulting in communication interruptions or failures, for example. Other actions that put a heavy load on the PC hardware, for example, running hardware tests such as benchmarks, can result in malfunctions of the software CPU. Do not run a BIOS update or other actions that would put a heavy load on the hardware during operation of a software CPU. Switch the software CPU to "STOP" before you run a BIOS update or perform other critical actions.

Note

Documentation

BIOS Setup is described for all devices and device configurations. Some BIOS submenus or Setup parameters may not be included, depending on your order. The interface of your BIOS Setup can deviate from the figures in this document.

You can find a detailed description on Firmware/BIOS description (SIMATIC IPC227G, IPC277G) Operating Instructions (https://support.industry.siemens.com/cs/ww/en/view/109797240).

7.6.2 BIOS update

Check regularly if updates are available for download to your device.

You can find additional information on the Internet at the following address:After-sales information system for SIMATIC PC/PG (http://www.siemens.com/asis).

Noting down and restoring BIOS Setup settings

NOTICE
Irretrievable loss of data All BIOS Setup settings might be deleted after the BIOS update. This can put the system in an undefined state. This may damage the device and the plant. 1. Print out the table in the next section "General BIOS Setup settings". 2. Enter your specific BIOS Setup setting in this table before you run a BIOS update. 3. Start BIOS Setup after the BIOS update. 4. Load the BIOS Setup default settings with <F9> "Setup Defaults". Or use the BIOS Setup command "Load Optimal Defaults" in the "Exit" menu. 5. Make your own Setup settings based on the table you have printed out. 6. Save the BIOS Setup settings with <F10> "Save and Exit".

Performing a BIOS update

NOTICE
Damage to the device If you switch off the device during the update, the BIOS will be incomplete and corrupt. This may result in malfunctions. Leave the device switched on during the update.

If you have purchased a new BIOS update for your device, follow these steps to install the update:

1. Connect the device to the power supply.
2. Plug a USB stick with FAT/FAT32 file format to the device.
3. Take the BIOS update you downloaded from the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/75842768)page and place it on the USB stick.
4. Double-click the "BIOS2USB.exe" in the BIOS update folder and wait for the transfer has been completed.
5. Reset the device (warm or cold restart).

   The following message appears briefly on the display at the end of the self-test:

   ```
   Press ESC for boot options
   ```
6. Press <ESC> to open the BIOS selection menu.
7. Click the "BIOS Update" button.
8. Follow the instructions on the screen.

Reboots

There may be several reboots after a BIOS update. These reboots are initiated by the Management Engine (ME). The reboots are required by the ME to adapt itself to the changes of the BIOS update.

7.6.3 Alarm, error and system messages

During startup (the boot process), the BIOS first performs a **P**ower **O**n **S**elf **T**est (POST) and checks whether certain functional units of the PC are operating error-free. The boot sequence is immediately interrupted if critical errors occur.

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

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

On-screen error messages

On-screen error message	Meaning / tip
Operating system not found	Possible causes: • No operating system installed • Incorrect active boot partition • Wrong boot drive settings in SETUP
Keyboard controller error	Controller error. Contact your technical support team.
SMART failure detected on SSD	SSD reports pending failure through S.M.A.R.T.
CMOS battery failed	CMOS battery is not connected.
CMOS battery weak	CMOS battery is weak
Real-time clock has lost power	The CMOS clock was operated without battery or with a battery that was too weak, during battery change, for example. Check the CMOS clock.
Keyboard error	• Field PG: Internal keyboard defective and no external keyboard connected • Other devices: Keyboard defective or not connected
PLD configuration failed	Programming of the PLC on the motherboard has failed.

Technical support

A

A.1 Service and support

You can find additional information and support for the products described on the Internet at the following addresses:

- Technical support

  (https://support.industry.siemens.com/cs/ww/en/)
- Support request form
  (https://support.industry.siemens.com/My/ww/en/requests#createRequest)
- After Sales Information System SIMATIC IPC/PG

  (http://www.siemens.com/asis)
- SIMATIC Documentation Collection

  (http://www.siemens.com/simatic-tech-doku-portal)
- Your local representative

  (http://w3.siemens.com/aspa_app/)
- Training center

  (https://www.sitrain-learning.siemens.com/PLG/?AppLang=en)
- Industry Mall

  (https://mall.industry.siemens.com)

When contacting your local representative or Technical Support, please have the following information at hand:

- MLFB of the device
- BIOS version for industrial PC or image version of the device
- Other installed hardware
- Other installed software

Tools & downloads

Please check regularly if updates and hotfixes are available for download to your device. The download area is available on the Internet at the following link:

After Sales Information System SIMATIC IPC/PG (http://www.siemens.com/asis)

A.2 Troubleshooting

This chapter provides you with tips on how to locate and/or troubleshoot problems.

Problem	Possible cause	Possible remedy
The device is not operational	No power supply	• Check the power supply, the power cord and the power plug. • Check if the On/Off switch is in the correct position.
	Device is being operated outside the specified ambient conditions	• Check the ambient conditions. • After transport in cold weather, wait approximately 12 hours before switching on the device.
The monitor remains dark	The monitor is switched off	Switch on the monitor.
	The monitor is in "power save" mode	Press any key on the keyboard.
	The brightness button has been set to dark	Increase brightness using the brightness button. For detailed information, refer to the monitor operating instructions.
	The power cord or the monitor cable is not connected.	• Check whether the power cord has been properly connected to the monitor and to the system unit or to the grounded shockproof outlet. • Check whether the monitor cable has been properly connected to the system unit and to the monitor.
		If the monitor screen still remains dark after you have performed these checks and measures, contact your technical support team.
The mouse pointer does not appear on the screen	The mouse driver is not loaded	Check whether the mouse driver is properly installed and available when you start the user program. Detailed information about the mouse driver is available in the corresponding documentation.
	Mouse not connected	• Check whether the mouse cord is properly connected to the system unit. • If you use an adapter or extension for the mouse cable, also check these connectors.
		If the mouse pointer still does not appear on the screen after you have performed these checks and actions, contact your technical support team.
Wrong time and/or date on the PC		1. Open the BIOS Setup. 2. Set the time or date.
Although the BIOS setting is OK, the time and data are still wrong	The backup battery is dead.	Replace the backup battery.
USB device does not respond	The USB ports are not correctly supported.	You need to install the USB device drivers for the required operating system.

Problem	Possible cause	Possible remedy
The pop-up message "Windows boot manager failed" shows when you install the operating system in the M.2 NVMe/SATA SSD card and boot to OS.	The M.2 NVMe/SATA SSD card is changed to another boot device.	Press Enter to continue the boot.
	The M.2 NVMe/SATA SSD card lost the boot image or broken.	Reinstall the operating system or change another M.2 NVMe/SATA SSD card.

A.3 Notes on the use of third-party modules

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

Markings and symbols

B

B.1 Overview

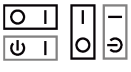
The following tables show all the symbols which may be found on your SIMATIC industrial PC, SIMATIC industrial monitor or SIMATIC Field PG in addition to the symbols which are explained in the operating instructions.

The symbols on your device may vary in some details from the symbols shown in the following tables.

B.2 Safety

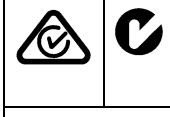
Symbol	Meaning		Symbol	Meaning
	Warning, observe the supplied documentation.			Lock is closed
	Attention, radio equipment			Lock is open
	Disconnect the power plug before opening			Opening for Kensington lock
	Attention ESD (Electrostatic sensitive device)			Warning of hot surface

B.3 Operator controls

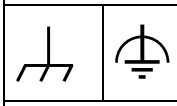
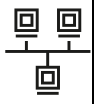
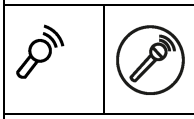
Symbol	Meaning		Symbol	Meaning
	On/off switch, without electrical isolation			Eject CD/DVD
	On/off switch, without electrical isolation			

B.4 Certificates, approvals and markings

The following table shows symbols relating to certificates, approvals and markings which may be on the device. You can find more 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			Disposal information, observe the local regulations.

B.5 Interfaces

Symbol	Meaning		Symbol	Meaning
⎓	Connection to the power supply			PS/2 mouse interface
	Protective conductor terminal			PS/2 keyboard-interface
	Connection for functional earthing (equipotential bonding line)			Multimedia Card Reader
DPP	DisplayPort interface			Smart Card Reader
	DVI-D interface			Line In
LAN  	LAN interface, not approved for connecting WAN or telephone			Line Out
	Serial port			Microphone input
	USB port			Universal Audio Jack
	USB 2.0 high-speed port			Headphone output
	USB 3.0 super-speed port			

List of abbreviations

C

AC	Alternating current	Alternating current
ACPI	Advanced Configuration and Power Interface	
AHCI	Advanced Host Controller Interface	Standardized controller interface for SATA devices. This is supported in Microsoft Windows XP as of SP1 and IAA driver.
APIC	Advanced Programmable Interrupt Controller	
AT	Advanced Technology	
ATA	Advanced Technology Attachment	
AWG	American Wire Gauge	A standardized wire gauge system. Used in North America and Canada.
BIOS	Basic Input Output System	
CAN	Controller Area Network	
CD-ROM	Compact Disc – Read Only Memory	
CE	Communauté Européenne	
CF	CompactFlash	
CMOS	Complementary Metal Oxide Semiconductors	
COA	Certificate of authentication	
COM	Communications Port	Term for the serial interface
CPU	Central Processing Unit	CPU
CSA	Canadian Standards Association	Canadian organization for tests and certifications according to national or binational standards
CTS	Clear To Send	Clear to send
DC	Direct Current	DC current
DCD	Data Carrier Detect	Data carrier signal detection
DMA	Direct Memory Access	
DOS	Disk Operating System	
DP	DisplayPort	
DQS	Deutsche Gesellschaft zur Zertifizierung von Qualitätsmanagement mBH	
DSR	Data Set Ready	Ready for operation
DTR	Data Terminal Ready	Data terminal is ready
DVD	Digital Versatile Disk	
ESD	Components sensitive to electrostatic charge	
EN	European standard	

EEPROM	Electrically Erasable Programmable Read-Only Memory	
ESD	Electrostatic Sensitive Device	Electrostatic Sensitive Devices
	Electrostatic discharge	Electrostatic discharge
EWF	Enhanced Write Filter	
FBWF	File Based Write Filter	
GND	Ground	Chassis ground
HD	Hard disk	Hard disk
HMI	Human Machine Interface	User interface
HORM	Hibernate Once - Resume Many	
HT	Hyper Threading	
I/O	Input/Output	Data input/output for computers
IBECC	In-Band Error Correction Code	The IBECC improves accuracy and reliability by providing error check and correct protection to all or specific regions of the physical memory space.
IDE	Integrated Device Electronics	
IEC	International Electronical Commission	
IGD	Integrated Graphics Device	
IP	International Protection	Degree of protection
	in English-speaking countries: Ingress Protection	
IRQ	Interrupt Request	
ISA	Industry Standard Architecture	Bus for expansion modules
LAN	Local Area Network	Computer network that is limited to a local area.
LEDs	Light Emitting Diode	Light emitting diode
LPS	Limited Power Source	
MAC	Media access control	Media access control
MLFB	Machine-readable product designation	
MRAM	Magnetoresistive random-access memory	Backup memory
MS	Microsoft	
MTBF	Mean Time Between Failures	
MUI	Multilanguage User Interface	Language localization in Windows
NEMA	National Electrical Manufacturers Association	
NTFS	New Technology File System	
NVMe	Non-Volatile Memory Express	
NVRAM	Non Volatile Random Access Memory	Non-volatile data memory. Data memory is retained without external power supply.
ODD	Optical Disk Drive	
PC	Personal computer	
PCI	Peripheral Component Interconnect	High-speed expansion bus

PCIe	Peripheral Component Interconnect express	High-speed serial, differential full-duplex PtP interface with high data rate.
PG	Programming device	
POST	Power On Self Test	
PXE	Preboot Execution Environment	Software for running new PCs without hard disk data via the network
RAID	Redundant Array of Independent Disks	Redundant hard disk array
RAL	Restricted Access Location	
RAM	Random Access Memory	
RI	Ring Input	Incoming call
ROM	Read-Only Memory	
RS 485	Reconciliation Sublayer 485	Bidirectional bus system
RTC	Real Time Clock	Real-time clock
RTS	Request to send	Request to send
RxD	Receive Data	Data transfer signal
SATA	Serial Advanced Technology Attachment	
SCU	Setup Configuration Utility	
SELV	Safety Extra Low Voltage	Safety extra low voltage
SMART	Self Monitoring Analysis and Reporting Technology	Hard disk error diagnostics program
SRAM	Static Random Access Memory	Static RAM
SSD	Solid State Drive	
TFT	Thin-Film-Transistor	
TxD	Transmit Data	Data transfer signal
UEFI	Unified Extensible Firmware Interface	
UL	Underwriters Laboratories Inc.	US organization for testing and certification according to national or binational standards.
USB	Universal Serial Bus	
VDE	Verband der Elektrotechnik, Elektronik und Informationstechnik e.V (Association for Electrical, Electronic and Information Technologies)	
VT	Virtualization Technology	Intel technology which provides a virtual, closed environment.
VT-d	Virtualization Technology for Directed I/O	Enables the direct assignment of a device (e.g. network adapter) to a virtual device.
WD	Watchdog	Program monitoring with error detection and alarming.

Glossary

AHCI mode

AHCI is a standardized method to address the SATA controller. AHCI describes a structure in the RAM, which contains a general area for control and status, as well as a command list.

APIC mode

Advanced peripheral interrupt controller. 24 interrupt lines are available.

Automation system

A programmable controller (PLC) of the SIMATIC S7 system consist of a central controller, one or several CPUs, and various I/O modules.

Backup

Duplicate of a program, data medium or database, used either for archiving purposes or for the protection of vital and non-replaceable data against loss when the working copy is corrupted. Certain applications automatically generate backup copies of data files, and manage both the current and the previous versions on the hard disk.

Baud

Physical unit for the step speed in signal transmission. Defines the number of transferred signal states per second. With only two states, one baud is equivalent to a transmission rate of 1 bps.

Cache

High-speed access buffer for interim storage (buffering) of requested data.

CE marking

Communauté **E**uropéene: The CE symbol confirms the conformity of the product with all applicable EC directives such as the EMC Directive.

Chipset

Located on the motherboard, connects the processor with the PCI or PCIe bus and the external interfaces.

Cold restart

A start sequence, starting when the computer is switched on. The system usually performs some basic hardware checks within the cold start sequence, and then loads the operating system from the hard disk to work memory -> boot

COM interface

The COM interface is a serial V.24 interface. The interface is suitable for asynchronous data transfer.

Configuration files

These are files containing data which define the configuration after restart. Examples of such files are CONFIG.SYS, AUTOEXEC.BAT and the registry files.

Configuration software

The configuration software updates the device configuration when new modules are installed. This is done either by copying the configuration files supplied with the module or by manual configuration using the configuration utility.

Controller

Integrated hardware and software controllers that control the functions of certain internal or peripheral devices (for example, the keyboard controller).

Device configuration

The configuration of a PC or programming device contains information on hardware and device options, such as memory configuration, drive types, monitor, network address, etc. The data are stored in a configuration file and enable the operating system to load the correct device drivers and configure the correct device parameters. . If changes are made to the hardware configuration, the user can change entries in the configuration file using the SETUP program. .

DisplayPort

DisplayPort is a VESA standardized, universal and license-free connection standard for the transmission of image and sound signals. Areas of application are mainly the connection of screens and TVs to computers, DVD players and similar devices.

Drivers

Program parts of the operating system. They adapt user program data to the specific formats required by I/O devices such as hard disk, printers, and monitors.

ECC

Error checking and correction is a method for detecting and correcting errors when saving and transferring data, frequently used in conjunction with RAM modules with and without ECC.

EMC directive

Directive concerning **E**lectro**m**agnetic **C**ompatibility. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

Energy management

The energy management functions of a modern PC allow individual control over the current consumption of vital computer components (e.g. of the monitor, hard disk and CPU), by restricting their activity based on the current system or component load. Energy management is of particular importance for mobile PCs.

Energy options

The energy options can be used to reduce energy consumption of the computer, while keeping it ready for immediate use. This can be configured in Windows by selecting Settings > Control Panel > Energy options.

Enhanced Write Filter

Configurable write filter that allows you to, for example, boot Windows Embedded Standard from write-protected media (e.g., CD-ROM), set write protection for individual partitions, and adapt the file system performance to user requirements (when using memory cards, for example).

ESD Guideline

Guideline for using electrostatic sensitive components.

Ethernet

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

Execute Disable Capability

Hardware implementation that prevents mutual memory accesses by programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Extensible Firmware Interface

Refers to the central interface between the firmware, the individual components of a computer and the operating system. EFI is located logically below the operating system and represents the successor to PC BIOS, focusing on 64-bit systems.

File Based Write Filter

Configurable write filter to protect individual files from write access.

Formatting

Basic partitioning of memory space on a magnetic data medium into tracks and segments. Formatting deletes all data on a data medium. All data media must be formatted prior to their first use.

HORM

Hibernate once, resume many is a method for fast booting from a single Hibernate file that only needs to be created once. HORM ensures restoration of a uniform, saved system state when booting. This minimizes write access, for example to a memory card, when you start up and shut down Windows Embedded Standard 7.

Hub

A term in network technology. In a network, a device joining communication lines at a central location, providing a common connection to all devices on the network.

Hyper Threading

HT technology (multi-threading) enables the parallel computing of processes. HT is only effective when all relevant system components, such as processors, operating systems and applications are supported.

IGD

Integrated Graphics Device. Graphics interface integrated in the chipset.

Image

This refers to the image, for example, of hard disk partitions saved to a file in order to restore them when necessary.

Intel Active Management Technology

This technology permits diagnostics, management and remote control of PCs. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Intel VT

The Intel Virtualization Technology (IVT) is the implementation of a secure closed environment for applications. Special (visualization) software an a VT-capable processor is required for its use.

Interface

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

LAN

Local **A**rea **N**etwork: LAN is a local network that consists of a group of computers and other devices that are distributed across a relatively restricted range and are linked with communication cables. The devices connected to a LAN are called nodes. The purpose of networks is the mutual use of files, printers or other resources.

Legacy Boot Device

Conventional drives can be used as USB devices.

License key

The license key represents the electronic license stamp of a license. Siemens AG issues a license key for each software that is protected by a license.

License key USB flash drive

The license key USB flash drive contains the authorizations or license keys required to enable protected SIMATIC software.

Low-voltage directive

EC Product Safety Directive relating to the safety of products which are operated on low voltage (50 V AC to 1000 V AC, 70 V DC to 1500 V DC) and not specified in other directives. Compliance is confirmed by the CE symbol and the EC certificate of conformity.

Memory card

Memory cards in credit card format. Memory for user programs and parameters, for example, for programmable modules and CPs.

Module

Modules are plug-in units for PLCs, programming devices or PCs. They are available as local modules, expansion modules, interfaces or mass storage (Mass storage module).

Motherboard

The motherboard is the core of the computer. Here, data are processed and stored, and interfaces and device I/Os are controlled and managed.

Operating system

Generic term which describes all functions for controlling and monitoring user program execution, distribution of system resources to the user programs and the operating mode in cooperation with the hardware (for example, Windows 7 Ultimate).

PCIe

PCI-Express (Peripheral Component Interconnect Express) is an extension standard for connection of I/O devices with the chipset of a main processor. PCIe is the successor of PCI, PCI-X and AGP and offers a higher data transmission rate in comparison to its predecessors.

Pixel

The pixel represents the smallest element that can be reproduced on-screen or on a printer.

Plug&Play

Generally, a reference to the ability of a computer to automatically configure the system for communication with peripheral devices (for example monitors, modems or printers). The user can plug in a peripheral and "play" it at once without manually configuring the system. A Plug&Play PC requires both a BIOS that supports Plug&Play and a Plug&Play expansion card.

POST

Self-test performed by the BIOS after the computer is switched on. Performs a RAM test and a graphics controller test, for example. The system outputs audible signals (beep codes) if the BIOS detects any errors; the relevant message indicating cause of error is output on the screen.

PROFINET

PROFINET is the name of the standard for Industrial Ethernet developed and maintained by the PROFIBUS user organization. PROFINET unites protocols and specifications with which Industrial Ethernet meets the requirements of industrial automation technology.

Programmable controller

The programmable controllers of the SIMATIC S7 system consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

PXE server

A **P**reboot E**x**ecution **E**nvironment server is part of a network environment and can provide software to connected computers even before they boot. This can involve operating system installations or servicing tools, for example.

RAL

Restricted **A**ccess **L**ocation: Installation of the device in a production facility with restricted access, for example, a locked control cabinet.

Reset

Hardware reset: Reset/restart of the PC using a button/switch.

Restart

Warm restart of a computer without switching the power off (Ctrl + Alt + Del)

ROM

Read-Only Memory ROM is a read-only memory in which every memory location can be addressed individually. The programs or data are permanently stored and are not lost in the event of a power failure.

S.M.A.R.T

Self-Monitoring, Analysis and Reporting Technology (SMART or S.M.A.R.T.) is an industry standard integrated in storage media. It makes for permanent monitoring of important parameters and early detection of imminent problems.

SATA

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

SETUP (BIOS Setup)

A program in which information about the device configuration (that is the configuration of the hardware on the PC/PG) is defined. The device configuration of the PC/PG is preset with defaults. Changes must therefore be entered in the SETUP if a memory expansion, new modules or a new drive are added to the hardware configuration.

SSD (Solid State Drive)

A Solid State Drive is a drive that can be installed like any other drive; it does not contain a rotating disk or other moving parts because only semiconductor memory chips of similar capacity will be used. This design makes SSDs more rugged, provides shorter access times, low energy consumption and rapid data transfer.

STEP 7

Programming software for the creation of user programs for SIMATIC S7 controllers.

Troubleshooting

Error cause, cause analysis, remedy

Trusted Execution Technology

Hardware implementation that allows secured execution of programs and applications. It is only effective when all relevant system components, such as processors, operating systems and applications are supported.

Wake on LAN

Wake on Local area network. This function allows the PC to be started via the LAN interface.

Warm restart

The restart of a computer after a program was aborted. The operating system is loaded and restarted again. The CTRL+ ALT+ DEL hotkey can be used to initiate a warm restart.

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