SIEMENS

SIMOTION

SIMOTION P320-4 E / P320-4 S

Commissioning and Hardware Installation Manual

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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.

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Preface

Preface

This document is part of the **SIMOTION P documentation package**.

This documentation describes the SIMOTION P320-4 hardware platform which can be delivered in the SIMOTION P320-4 E and SIMOTION P320-4 S hardware versions:

- SIMOTION P320-4 E with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P320-3.
- SIMOTION P320-4 S with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.
  Successor to SIMOTION P350-3.

References

The following documents contain the descriptions for the SIMOTION P hardware platform:

- SIMOTION P320-4 E / P320-4 S, Manual, Edition 10/2016
- SIMOTION P320-4 E / P320-4 S, Commissioning and Hardware Installation Manual, Edition 10/2016

Validity range

This Commissioning and Hardware Installation Manual is valid for the SIMOTION P320-4 E and SIMOTION P320-4 S devices as of product level SIMOTION V4.5.

Standards

The SIMOTION system has been developed in accordance with ISO 9001 quality guidelines.

Sections in this documentation

The following sections describe the purpose and the use of this documentation:

- Safety instructions
  This section contains fundamental safety instructions for SIMOTION and specific safety instructions for the SIMOTION P320-4.
- Industrial Security
  You can find important information on industrial security here. What is industrial security? Which specific measures can be taken to protect your system from threats.
- Description
  System overview and product description for the SIMOTION P320-4.
  The communication versions are displayed.

- Application planning
  Points to note in advance:
  Upon delivery, the permitted installation positions, environmental and ambient conditions and electromagnetic compatibility.
  You will find this information in the manual SIMOTION P320-4 E / P320-4 S.
- Installation
  Description of the installation, mounting and assembly of the SIMOTION P320-4.
- Connection
  This section describes the requirements for connecting and the connection overview for the SIMOTION P320-4, and information on the connection of PROFINET, PROFIBUS and Ethernet.
- Power on and software installation
  Information on the first power-up of the SIMOTION P320-4 and additional software for HMI.
- Operation (hardware)
  Detailed description of the SIMOTION P State application.
- Parameter assignment / addressing
  This section contains the requirements for parameter assignment / addressing and an overview of the factory settings.
  One section describes the SIMOTION P Control Manager.
  Communication with Ethernet and PC internal is described.
  References are supplied for the PROFINET and PROFIBUS communication.
- Commissioning (software)
  This section contains information, notes and requirements for the commissioning and a recommended sequence for the first commissioning of the SIMOTION P320-4.
  The topics data backup, data storage concept and SIMOTION P general reset are described.
- Service and maintenance
  Information on the recording of diagnostics data, restoring factory settings, installing and removing the backup battery.
  Description of special power-up situations.
- Alarm, fault, and system messages
  Information on diagnostics via LED displays.
  Description of possible alarm and fault messages.
- Troubleshooting/FAQs
  List of possible errors and their remedies.
- Appendix
  The appendices contain information on standards and approvals, on the ESD guideline as well as a list of abbreviations.
- Index
  Alphabetical directory for locating information.

SIMOTION Documentation

An overview of the SIMOTION documentation can be found in the SIMOTION Documentation Overview document.

This documentation is included as electronic documentation in the scope of delivery of SIMOTION SCOUT. It comprises ten documentation packages.

The following documentation packages are available for SIMOTION product version V5.2:

- SIMOTION Engineering System Handling
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION IT
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C
- SIMOTION P
- SIMOTION D
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

SIMOTION at a glance

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

https://support.industry.siemens.com/cs/ww/en/view/109480700

Additional information

Click the following link to find information on the following topics:

- Documentation overview
- Additional links to download documents
- Using documentation online (find and search manuals/information)

https://support.industry.siemens.com/cs/ww/en/view/109479653

My Documentation Manager

Click the following link for information on how to compile documentation individually on the basis of Siemens content and how to adapt it for the purpose of your own machine documentation:

https://support.industry.siemens.com/My/ww/en/documentation

Training

Click the following link for information on SITRAIN - Siemens training courses for automation products, systems and solutions:

http://www.siemens.com/sitrain

FAQs

Frequently Asked Questions can be found in SIMOTION Utilities & Applications, which are included in the scope of delivery of SIMOTION SCOUT, and in the Service&Support pages in **Product Support**:

https://support.industry.siemens.com/cs/de/en/ps/14505/faq

Technical support

Country-specific telephone numbers for technical support are provided on the Internet under **Contact**:

https://support.industry.siemens.com/cs/ww/en/sc/2090

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Safety notes

1

1.1 Fundamental safety instructions

1.1.1 General safety instructions



⚠ DANGER

Danger to life due to live parts and other energy sources

Death or serious injury can result when live parts are touched.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, six steps apply when establishing safety:

1. Prepare for shutdown and notify all those who will be affected by the procedure.
2. Disconnect the machine from the supply.
   - Switch off the machine.
   - Wait until the discharge time specified on the warning labels has elapsed.
   - Check that it really is in a no-voltage condition, from phase conductor to phase conductor and phase conductor to protective conductor.
   - Check whether the existing auxiliary supply circuits are de-energized.
   - Ensure that the motors cannot move.
3. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water.
4. Isolate or neutralize all hazardous energy sources by closing switches, grounding or short-circuiting or closing valves, for example.
5. Secure the energy sources against switching on again.
6. Ensure that the correct machine is completely interlocked.

After you have completed the work, restore the operational readiness in the inverse sequence.



⚠ WARNING

Danger to life from hazardous voltage when connecting an unsuitable power supply

Touching live components can result in death or severe injury.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠ WARNING

Danger to life from touching live parts on damaged devices

Improper handling of devices can result in damage.

For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Observe the limit values specified in the technical specifications during transport, storage, and operation.
- Do not use damaged devices.



⚠ WARNING

Danger to life through electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.



⚠ WARNING

Danger to life due to electric shock when not grounded

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

⚠ WARNING

Danger to life due to fire spreading if housing is inadequate

Fire and smoke development can cause severe personal injury or material damage.

- Install devices without a protective housing in a metal control cabinet (or protect the device by another equivalent measure) in such a way that contact with fire inside and outside the device is prevented.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Danger to life from unexpected movement of machines when using mobile wireless devices or mobile phones

Using mobile radios or mobile phones with a transmit power > 1 W closer than approx. 2 m to the components may cause the devices to malfunction, influence the functional safety of machines therefore putting people at risk or causing material damage.

- Switch off wireless devices or mobile phones in the immediate vicinity of the components.

⚠ WARNING

Danger to life due to fire if overheating occurs because of insufficient ventilation clearances

Inadequate ventilation clearances can cause overheating of components followed by fire and smoke development. This can cause death or serious injury. This can also result in increased downtime and reduced service life for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

⚠ WARNING

Danger of an accident occurring due to missing or illegible warning labels

Missing or illegible warning labels can result in accidents involving death or serious injury.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, in the national language if necessary.
- Replace illegible warning labels.

⚠ WARNING

Danger to life when safety functions are inactive

Safety functions that are inactive or that have not been adjusted accordingly can cause operational faults on machines that could lead to serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for safety functions

If you want to use safety functions, you must observe the safety notices in the safety manuals.

1.1.2 Safety instructions for electromagnetic fields (EMF)



⚠ WARNING

Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

- Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.1.3 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.1.4 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 under (https://www.siemens.com/industrialsecurity).

1.1.5 Danger to life due to software manipulation when using removable storage media

⚠ WARNING

Danger to life due to software manipulation when using removable storage media

The storage of files on removable storage media involves a high risk of infection, e.g. via viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect the files on removable storage media against harmful software through appropriate protective measures, e.g. virus scanners.

1.1.6 Residual risks of power drive systems

When performing the risk assessment for a machine or plant in accordance with the respective local regulations (e.g. EC Machinery Directive), the machine manufacturer or plant constructor must take into account the following residual risks associated with the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance and repairs caused by, for example:
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices / mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-rays, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage
3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

1.2 Specific safety instructions for SIMOTION P320-4

1.2.1 General safety instructions for the SIMOTION P320-4

⚠ 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 may be carrying life-threatening voltages.

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

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

System expansions

NOTICE

Damage through system expansions

Device and system expansions may 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 may 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 may safely be installed.
- Observe the information on electromagnetic compatibility (Page 227).

NOTICE

"Open Type" UL508

Note that the device is classified as "Open Type" for use in the area of Industrial Control Equipment (UL508). Installation of the device in an enclosure according to UL508 is conditional for approval or operation according to UL508.

Battery and rechargeable 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" in the Commissioning and Hardware Installation Manual.
- Replace the lithium battery only with an identical battery or types recommended by the manufacturer (Article No.: A5E30314053).
- 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

Unintentional operating situations

High frequency radiation, e g. from a cellular phone, interferes with device functions and can result in malfunctioning of the device.

Persons are injured and the plant is damaged.

Avoid high-frequency radiation:

- Remove radiation sources from the environment of the device.
- Switch off radiating devices.
- Reduce the radio output of radiating devices.
- Observe the information on electromagnetic compatibility (Page 227).

ESD Guideline

Electrostatic sensitive devices can be labeled with an appropriate symbol.



NOTICE

Electrostatic sensitive devices (ESD)

When you touch electrostatic sensitive components, you can destroy them through voltages that are far below the human perception threshold.

If you work with components that can be destroyed by electrostatic discharge, observe the ESD Guideline.

Further information

You can find more detailed information about the **EGB Guideline** in Annex B in the section with the same name.

1.2.2 Notes on use

⚠ WARNING

Hazards on an unprotected machine or plant

According to the results of a risk analysis, hazards can occur on an unprotected machine. The hazards can result in personal injury.

According to the risk analysis, the risk of personal injury can be avoided with the following measures:

- Additional protective devices on the machine or plant. With this, especially the programming, configuration and wiring of the inserted I/O modules have to be executed, in accordance with the necessary risk analysis identified safety performance (SIL, PL or Cat.).
- The correct use of the device has to be verified with a function test on the system. This test can detect programming, configuration and wiring errors.
- Documentation of the test results that you can enter in the relevant safety records when required.

NOTICE

Ambient conditions

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

Note the following:

- Operate the device only in closed rooms. Failure to comply nullifies the warranty.
- Operate the device only in accordance with the ambient conditions specified in the technical specifications.
- Protect the device against dust, moisture and heat.
- Do not expose the device to direct sunlight or other strong sources of light.
- Without additional measures, such as a supply of clean air, the device may not be used in locations with harsh operating conditions caused by acidic vapors or gases.
- Observe the permissible mounting positions of the device.
- Do not obstruct the venting slots of the device.

Note

Use in an industrial environment without additional protective measures

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

Industrial security

2

2.1 Security concept for SIMOTION P320-4

2.1.1 Security

Note

Observe the general security information in this documentation for Industrial security.

Regular change of the Windows password

Note

Changing the Windows password

For security reasons, the Windows password should be changed regularly.

It is essential that the AutoLogin is also adapted for this purpose.

You can find instructions in the following sections:

- Changing the Windows user password (Page 36)
- AutoLogin for SIMOTION P (Page 40).

Unlocking Windows

Note

Windows locked

Windows may be accidentally locked, e.g. through shortcut key Windows + L.

If you do not know the password for the SIMOTION P320-4, please contact the Siemens Industry Online Support (https://support.industry.siemens.com).

Windows firewall

Note

Windows firewall

To allow the Windows IP to be accessed externally, this must be set as an exception in the Windows firewall **File and Printer Sharing**. Otherwise, there is only limited access to Windows from outside.

Security and networks

Note

You will find information on the security of networks in Section General security measures (Page 28).

Remote desktop connection

Note that for the SIMOTION P320-4 with Headless operation, you require a user name and password for a remote desktop connection. Per default, the remote desktop connection is already set up.

Note

Deactivating the remote desktop connection

If you do **not** use the remote desktop connection, it must be deactivated for security reasons.

See Section Deactivating the remote desktop connection (Page 47)

SIMOTION IT

Note

Security concept

Note the security concept of HTTP/S, FTP and Telnet access on the Web server when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section Security concept.

Note

User administration

Note the information on the user administration when working with SIMOTION IT.

You will find information in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual or the SIMOTION online help in Section User administration.

Information on industrial security

The following sections are taken from the Motion Control Industrial Security Configuration Manual:

- Why is industrial security so important? (Page 26)
- General security measures (Page 28)
- Product-specific measures (virus scanners) (Page 35)

You can view the entire document in the Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/108862708).

2.2 Why is industrial security so important?

The topic of data security and access protection (security) is becoming more and more important in industrial environments. The progressive networking of entire industrial plants, the vertical integration and networking of the individual levels of a company, and new technologies, such as remote maintenance and remote access, are leading to increased requirements for protecting industrial plants.

The threats are diverse and the consequences far-reaching.

Possible threats:

- Espionage of data, recipes, etc.
- Sabotage of production plants
- System stoppage, e.g. due to virus infection and malware
- Manipulation of data or application software
- Unauthorized use of system functions

Possible effects of a security incident

- Loss of intellectual property
- Loss of production or reduced product quality
- Company image and economic damage
- Catastrophic environmental influences
- Danger to persons and machines

2.2.1 Trends in the IT sector

Overview

There are many new trends which affect industrial security:

- Cloud computing in general
  The number of network connections across the world is constantly increasing. This enables innovations such as cloud computing and the applications that go hand in hand with it. In conjunction with cloud computing, there has been a massive increase in the number of mobile devices, such as mobile phones and tablet PCs.
- Wireless technology
  On the other hand, the increasing use of mobile devices has only become possible thanks to the ubiquitous availability of mobile networks. Wireless LAN is also becoming increasingly available.
- Smart Grid
  Networking is not only limited to data networks, it also influences our energy infrastructure.

- Worldwide remote access to plants, machines and mobile applications
- The "Internet of things"
  Millions of electronic devices are becoming network-capable and are communicating via the Internet, such as onboard computers in cars, which send warranty information to dealers, or water meter sensors that transmit water consumption data to municipal water suppliers via radio.

However, in order for everything from cloud computing to sensors to work without service disruptions, you need reliable network infrastructures that are well protected against attacks from malware and hackers.

2.2.2 Possible corporate security holes

Possible security holes or weak points

The security chain of a company is only as strong as its weakest link. Security holes can exist at numerous points. The following list gives only a few examples:

- Employees
- Production plants
- Network infrastructure
- Data centers
- PC workstations
- Laptops
- Tablet PCs
- Printers
- Smartphones
- Portable storage media
- Guidelines and regulations

For this reason, a holistic approach is required to deal with the issue of security. Coordinated guidelines and regulations are required that cover all areas: Devices, systems, processes and employees.

2.3 General security measures

2.3.1 Overview

In the following section you will learn about the general security measures you can take in order to protect your system from threats. All of the measures are recommended.

Additional specific security measures for SINUMERIK, SIMOTION and SINAMICS products can be found in Section Product-specific security measures (Page 35).

Basically, the measures should be coordinated with one another and correspond to the ring-shaped principle of the "Defense in Depth" strategy. The measures are structured according to the "onion" principle and each measure forms an additional protective layer around the core: the production plant.



Figure 2-1 Defense in depth strategy

- **Plant security**
  Plant security represents the outermost protective ring. Plant security includes comprehensive physical security measures, e.g. entry checks, which should be closely coordinated with protective measures for IT security.
- **Network security**
  The measures, grouped under the keyword "Network security", form the core of the protective measures. This refers to the segmentation of the plant network with limited and secure communication between subnetworks ("secure islands") and the interface check with the use of firewalls.
- **System integrity**
  "System integrity" represents the combination two major measures. PC-based systems and the control level must be protected against attacks. Steps include the following measures:
  - User authentication for machine or plant operators with individual authorization levels
  - Integrated access protection mechanisms in the automation components to prevent unauthorized changes via the engineering system or during maintenance
  - The use of antivirus and whitelisting software to protect PC systems against malware
  - Maintenance and update processes to keep the automation systems up-to-date (e.g. patch management, firmware updates, etc.)

2.3.2 Plant security

2.3.2.1 Physical protection of critical production areas

Unauthorized persons may be able to enter the production site/building and damage or alter production equipment as a result of gaps in a company's physical security. Confidential information can also be lost. This can be prevented if both the company's site and the production areas are protected accordingly.

Company security

The company's physical security can be ensured via the following measures:

- Closed off and monitored company premises
- Entry control, keys / card readers and/or security personnel
- Escorting of external personnel by company employees

Physical production security

The physical security of a production location can also be ensured via the following measures:

- Separate access control for production areas.
- Installation of critical components in securely lockable cabinets / switching rooms including monitoring and alarm signaling options
- Prohibited production areas with restricted access rights

- Configuration of the radio field to restrict the WLAN range so that it is not available outside the defined areas (e.g. factory building).
- Guidelines that prevent the use of third-party data storage media (e.g. USB sticks) and IT devices (e.g. notebooks) classified as insecure on the control.

Further information

Further information on integrated security solutions can be found on the Surveillance page (http://www.buildingtechnologies.siemens.com/bt/global/en/security-solution/Pages/security-solution.aspx).

2.3.3 Network security

2.3.3.1 Network segmentation

Separation between production and office networks

One important protective measure for your control is the strict separation of the production networks and the other company networks. This separation creates protection zones for your production networks.

Note

The products – drives, controllers, commissioning tools (e.g. STARTER or Startdrive) – described in this manual must only be operated in protection zones.

Separation by means of a firewall system

In the simplest scenario, separation is achieved by means of an individual firewall system which controls and regulates communication between networks.

Separation via a DMZ network

In the more secure version, the coupling is established via a separate DMZ network. In this case, direct communication between the production network and the company network is completely prevented by firewalls and only takes place indirectly via servers in the DMZ network.

Note

The production networks should also be divided into separate automation cells in order to protect critical communication mechanisms.

General security measures

Observe the general security measures even within protection zones, for example:

- Virus scanners (Page 33)
- Reduction of attack points (Page 33)

Network segmentation with SCALANCE S

Siemens provides SCALANCE S security modules to meet network protection and network segmentation requirements.

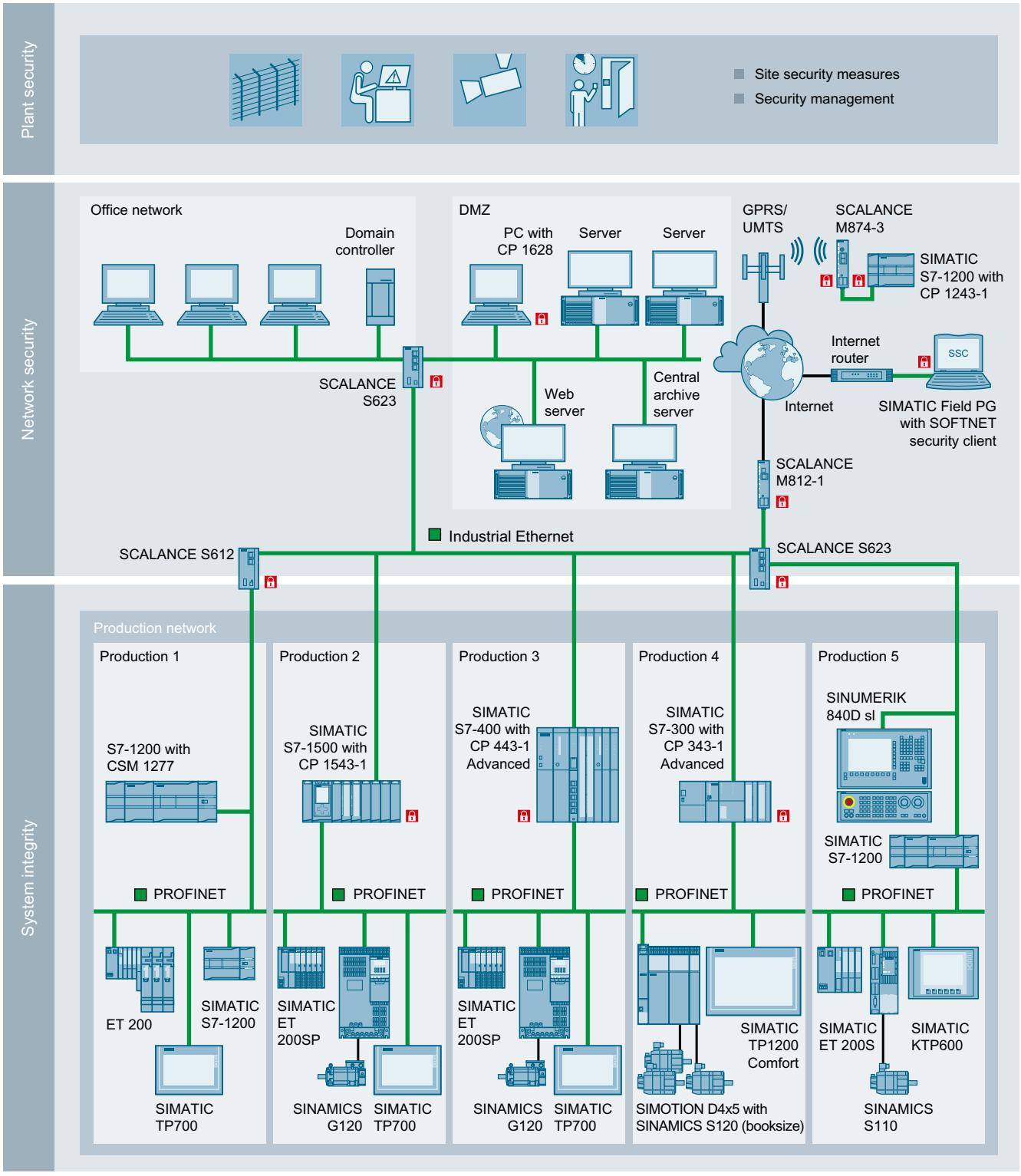
SCALANCE S security modules

SCALANCE S security modules with Security Integrated provide:

- Stateful inspection firewall
  In order to implement user-specific control and logging, firewall rules can also be specified that only apply to certain users.
- VPN via IPsec (data encryption and authentication)
  This establishes a secure tunnel between authenticated users whose data cannot be intercepted or manipulated. The most important aspect is the protection against external access via the Internet.
- NAT/NATP (address translation)
- Router functionality (PPPoE, DDNS) for broadband Internet access (DSL, cable)
- S623 with additional VPN port (DMZ) enables the secure connection of an additional network for service and remote maintenance purposes. S623 also permits the secure, redundant connection of subordinate networks by means of routers and firewall redundancy.

Principle

This application example shows cell segmentation by several SCALANCE S modules, each of which is upstream of the automation cell. The data traffic to and from the devices within automation cells can be filtered and controlled with the SCALANCE S firewall. If required, the traffic between the cells can be encrypted and authenticated. Secure channels and client access from the PCs to the cells can be established via SOFTNET Security Client, VPN client software for PCs.


Plant security
Site security measures
Security management
Network security
Office network
Domain controller
DMZ
PC with CP 1628
Server
Server
GPRS/ UMTS
SCALANCE M874-3
SIMATIC S7-1200 with CP 1243-1
Internet router
SSC
Internet
SIMATIC Field PG with SOFTNET security client
SCALANCE S623
Web server
Central archive server
SCALANCE M812-1
Industrial Ethernet
SCALANCE S612
SCALANCE S623
System integrity
Production network
Production 1
S7-1200 with CSM 1277
PROFINET
ET 200
SIMATIC S7-1200
SIMATIC TP700
Production 2
SIMATIC S7-1500 with CP 1543-1
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 3
SIMATIC S7-400 with CP 443-1 Advanced
PROFINET
SIMATIC ET 200SP
SINAMICS G120
SIMATIC TP700
Production 4
SIMATIC S7-300 with CP 343-1 Advanced
PROFINET
SIMATIC TP1200 Comfort
SIMOTION D4x5 with SINAMICS S120 (booksize)
Production 5
SINUMERIK 840D sl
SIMATIC S7-1200
PROFINET
SIMATIC ET 200S
SIMATIC KTP600
SINAMICS S110

2.3.4 System integrity

2.3.4.1 System hardening

Reduction of attack points

Network services and ports

Activated services represent a risk. To minimize the risk, only the necessary services for all of the automation components should be activated. Ensure that all activated services are taken into account (especially web servers, FTP, remote maintenance, etc.) in the security concept.

A description of the ports used can be found in the Manuals and Function Manuals of the respective products.

User accounts

Any active user account allows access to the system is thus a potential risk. Therefore, take the following security measures:

- Reduction of configured/activated user accounts to the actually needed minimum
- Use of secure access data for existing accounts
- Regular checks, especially of the locally configured user accounts
- Regular change of passwords

Passwords

NOTICE
Changing default passwords The misuse of passwords can also represent a considerable security risk. We recommend that default passwords be changed during the commissioning and changed at regularly defined intervals as required.

Virus scanner

The use of a virus scanner must not impact the production operations of a plant. As the last consequence, this will lead to even a virus-infected computer not being permitted to immediately shut down if this would cause the control of the production process to be lost.

In order to be used on industrial control components, a virus scanner should therefore meet the following requirements:

Virus scanner requirements

- If a local firewall that has been adapted to the production operations is used, it must be possible to install the virus scanner without its own firewall.
- The virus scan clients can be divided into (product- and task-specific) groups and configured separately.
- It must be possible to deactivate the automatic distribution of the virus signatures and other updates.
- It must be possible to carry out the distribution of the virus signatures and updates manually and in groups.
- It must be possible to conduct a file scan and system scan manually and in groups.
- For the virus detection scenario, a message can be configured without a file action such as "Delete", "Clean", etc. being automatically carried out.
- It must be possible to log all of the messages on the virus scan server.
- On a virus scan client, it must be possible to suppress the local message window because it could obscure important messages from the production process.

Note

Installation of software

The installation of software is often a process which represents a serious and complicated change to the respective system. The storage location of the files to be installed must always be free of viruses (e.g. a file server with its own virus scanner or DVD checked for viruses).

Patch management

Microsoft security updates

The **WSUS** (Windows Server Update Service) system functionality provided by Microsoft is available for current Windows systems. WSUS supports administrators by providing Microsoft updates in large local networks. WSUS automatically downloads update packages from the Internet (Microsoft Update) and offers them to the Windows clients for installation.

The fully automatic update process ensures that Microsoft security updates are always available on Siemens clients.

2.4 Product-specific measures

2.4.1 Virus scanners, Windows security patches, SIMOTION P

General information on virus scanners

Once an industrial PC system is connected to the Internet, either directly or via an internal company network, there is a danger that it can become infected with a virus. However, malicious software is not only able to reach the system via the Intranet/Internet, but also, for example, via a removable storage device (such as a USB memory stick) attached to the system for backing up data.

SIMOTION P320-4 virus scanners

A virus scanner that runs on Microsoft Windows, as used in office or home computers, has a deep impact on a system's processes. There are, for example, processes such as real-time scans or regular system scans. Such interventions can cause performance issues for the system, and as a result, for the SIMOTION Runtime software. Although the SIMOTION Runtime software runs in a real-time environment, it still depends on the available system resources.

Note

Because of the resulting performance impairments, the installation and use of a standard virus scanner on a SIMOTION P320-4 during system runtime does not make sense and is not permitted.

Using a virus scanner

As a standard virus scanner cannot be used for SIMOTION P320-4, an alternative procedure is followed. The virus scanner is installed to a separately bootable Windows PE operating system. It is started, for example, from a CD or a USB storage device and then performs a virus scan.

Note

FAQ in Industry Online Support

More information on using a virus scanner on a SIMOTION P320-4 can be found in the FAQ "How can a virus scanner be used on a SIMOTION P320-4?" (https://support.industry.siemens.com/cs/ww/en/view/59381507), which is available as a download from the Industry Online Support portal.

Windows security patches

A brief test is performed when a new SIMOTION version is released. During this brief test, a check is performed to establish whether the installation of the security update has affected any basic functions.

2.4.2 Changing the Windows user password

Permitting the Windows password to be changed

Before the Windows password can be changed, it must be permitted for the user.

If the following procedure is not observed, an error message is issued and the Windows password cannot be changed.

Note the following procedure:

1. Select the entry point **Control Panel** > **All Control Panel Items** > **Administrative Tools** > **Computer Management**.
   Double-click **Computer Management**.

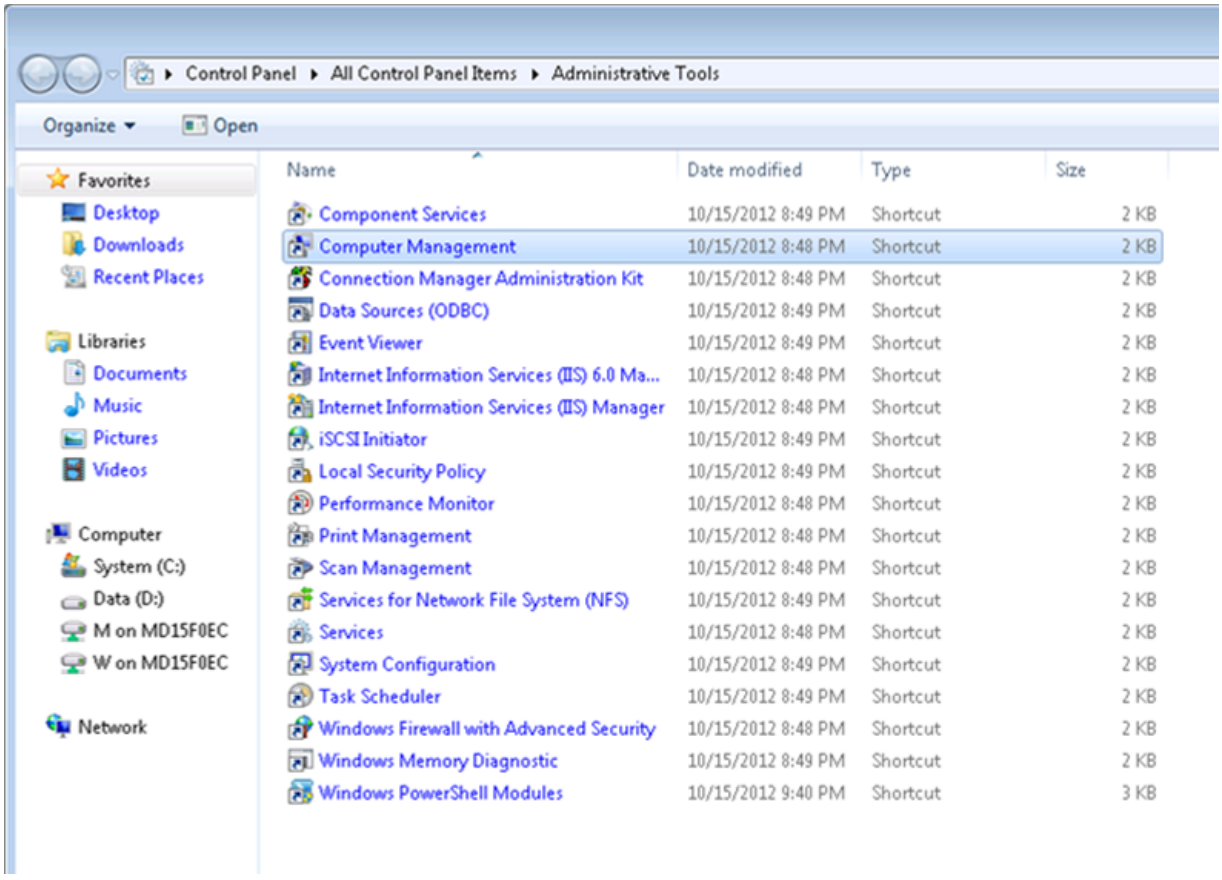


Figure 2-2 Homepage:

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

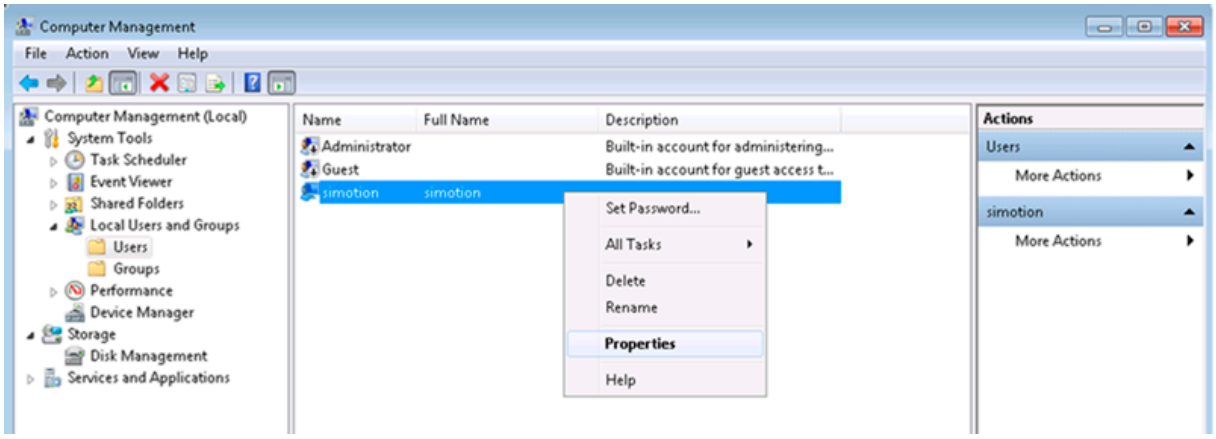


Figure 2-3 Computer management

3. With the selection of **Users simotion**, you can display the properties via **Properties**.
4. Deactivate the "**User cannot change password**" checkbox in the **General** tab on the **simotion Properties** dialog box.
   This checkbox must be deactivated for the user to change the Windows password.

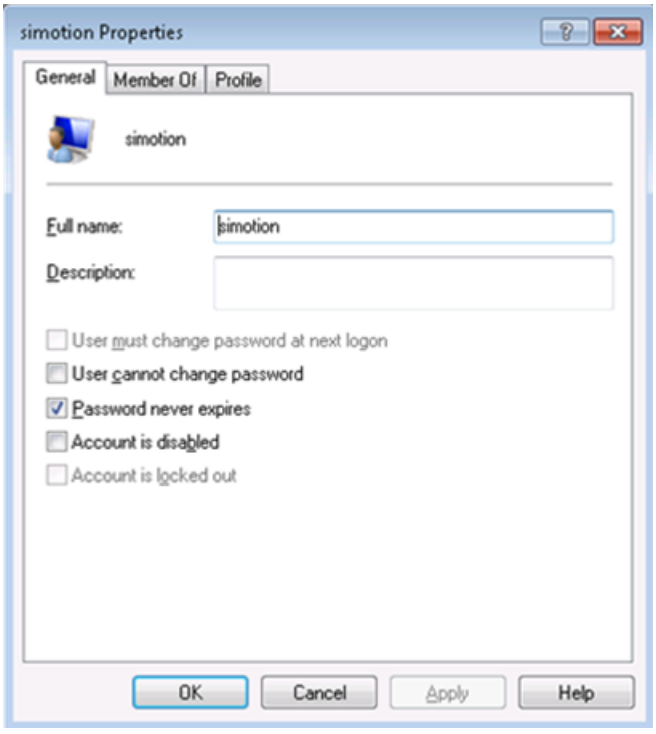


Figure 2-4 SIMOTION properties

Changing the Windows password

You can find general information on the Windows password on the website at Microsoft - Changing des Windows-password (http://windows.microsoft.com/en-us/windows/change-windows-password#change-windows-password=windows-7).

To change the Windows password, proceed as follows:

1. Press Ctrl+Alt+Del. The following Windows window opens.

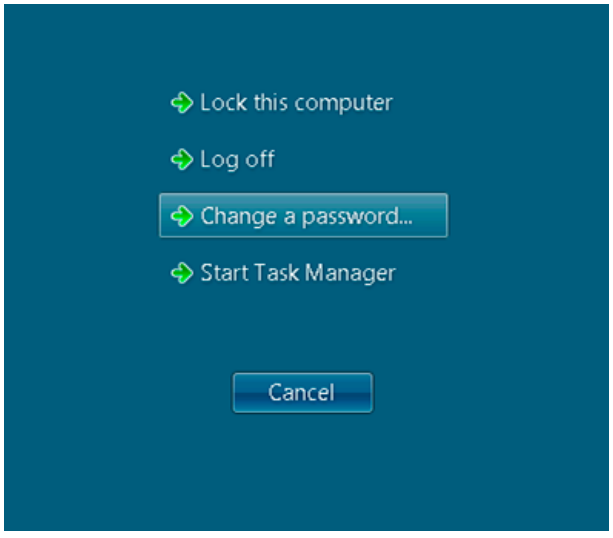


Figure 2-5 Changing the Windows password

2. After you have confirmed **Change a password...** , the Windows window to change the Windows password opens.
   First enter your current password and then the new Windows password. You must enter the new Windows password a second time for confirmation.

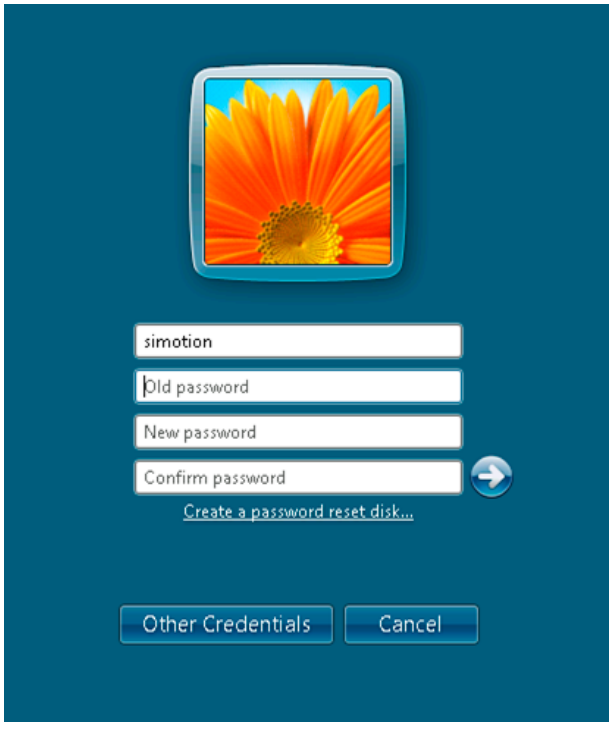


Figure 2-6 Entering the new Windows password

3. The password was changed successfully.

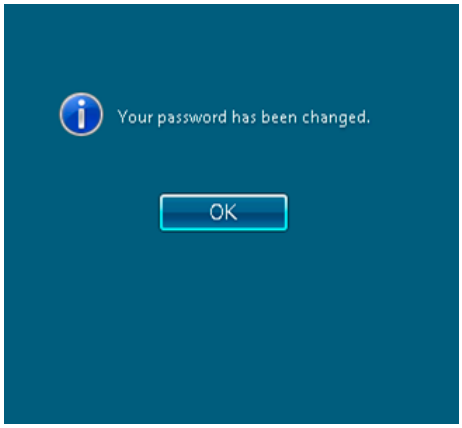


Figure 2-7 Confirmation of change

4. In the event of an error when the "User cannot change password" checkbox is activated, the following error message is displayed.
The Windows password has not been changed.

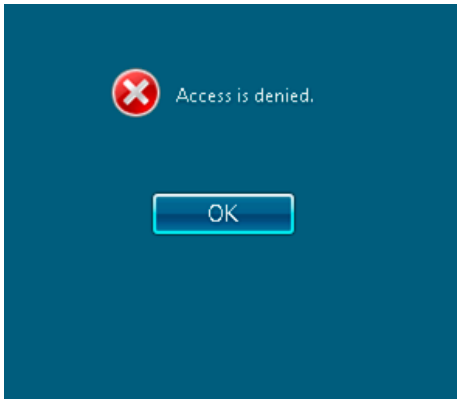


Figure 2-8 Error message when changing the Windows password has not been permitted.

2.4.3 Changing the AutoLogin

2.4.3.1 SIMOTION P AutoLogin

The password for the AutoLogin must be changed when the user has changed the Windows password.

The Windows user password is changed in the normal way, e.g. "Change Password" screen.
See also Section Changing the Windows user password (Page 36).

Automatically Log On

SIMOTION P320-4 is preset so that the user does not have to enter the user name and the password to log on.

Preparation for changing the AutoLogin

In order that an AutoLogin still functions after changing the Windows password, the password for the AutoLogin must be changed.

The required procedure is shown in the following so that the change of the AutoLogin for SIMOTION P320-4 can be prepared:

1. Open the **Computer Management** window via **Control Panel > All Control Panel Items > Administrative Tools** .

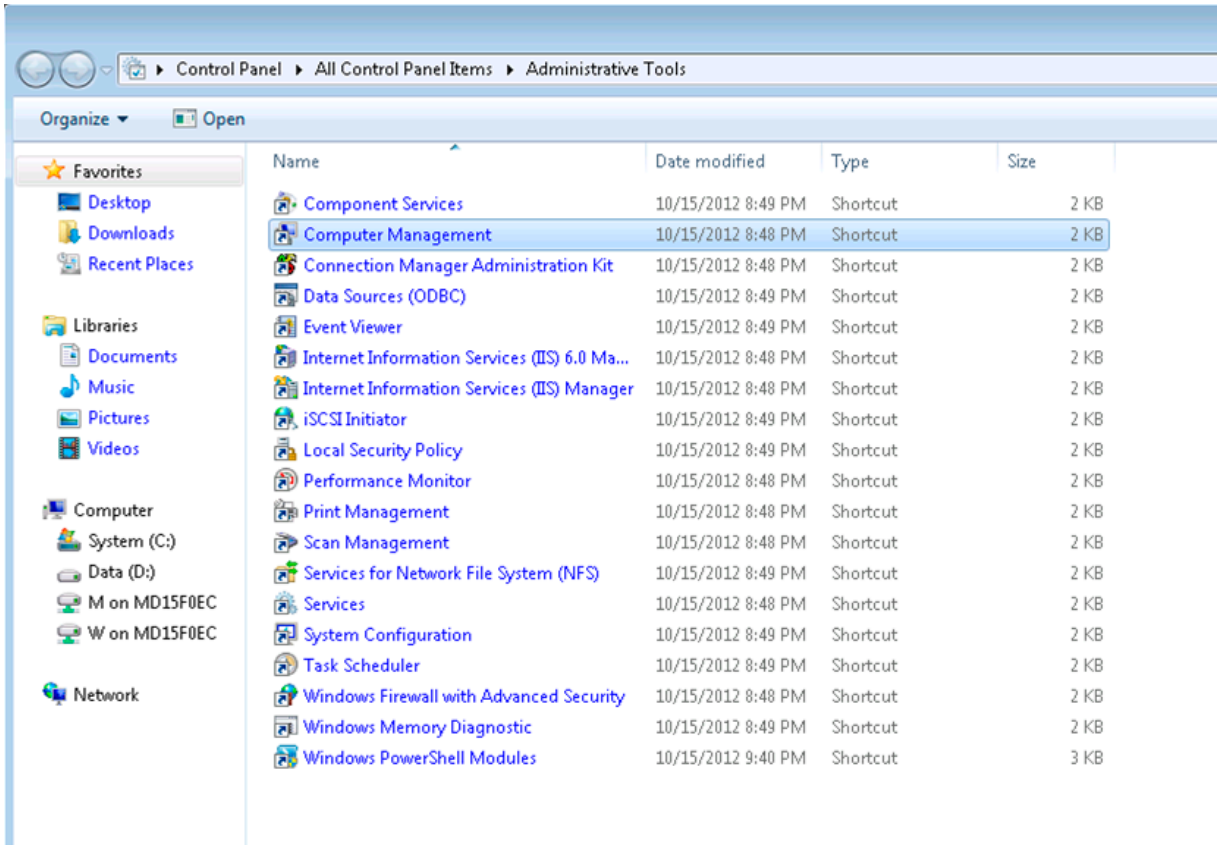


Figure 2-9 Computer Management entry point

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

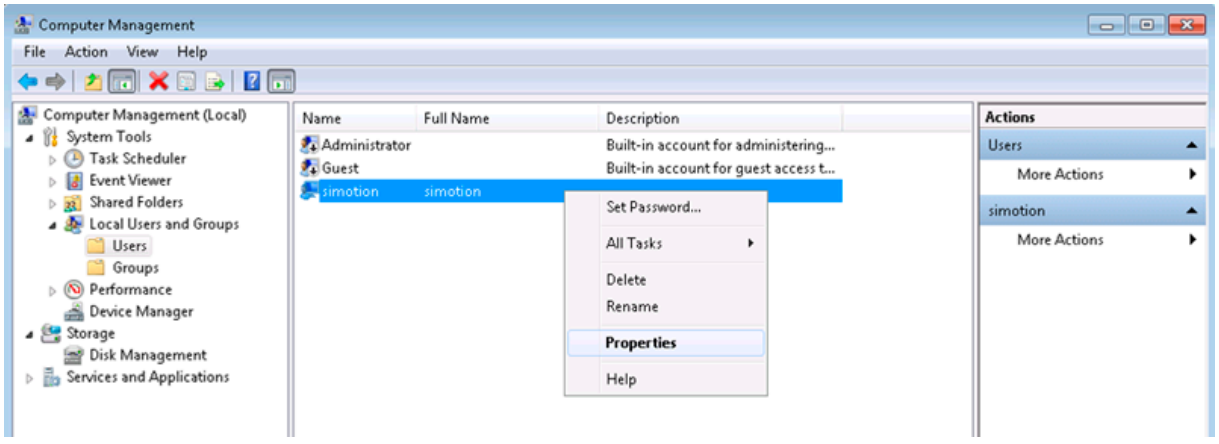


Figure 2-10 Computer Management - Users

3. With the selection of **Users> simotion**, you can display the properties via **Properties**.

4. Deactivate the **User cannot change password** checkbox in the **simotion Properties** dialog box.

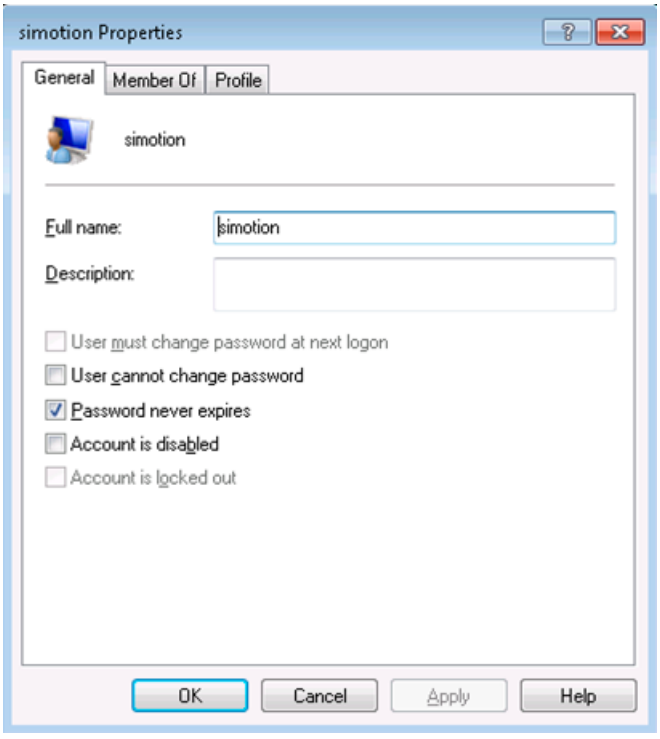


Figure 2-11 simotion Properties - General dialog box

5. Confirm with **OK.**

Changing the password for AutoLogin

To change the password for the AutoLogin, proceed as follows:

1. Open the search via **Windows-Start** and enter: **netplwiz**

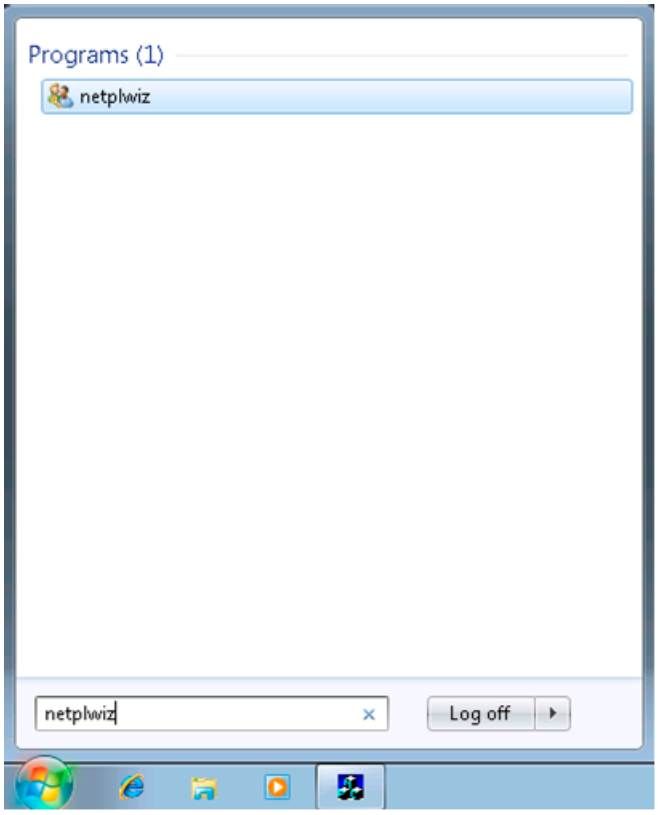


Figure 2-12 Programs netplwiz

2. The following **User Accounts** dialog box opens.

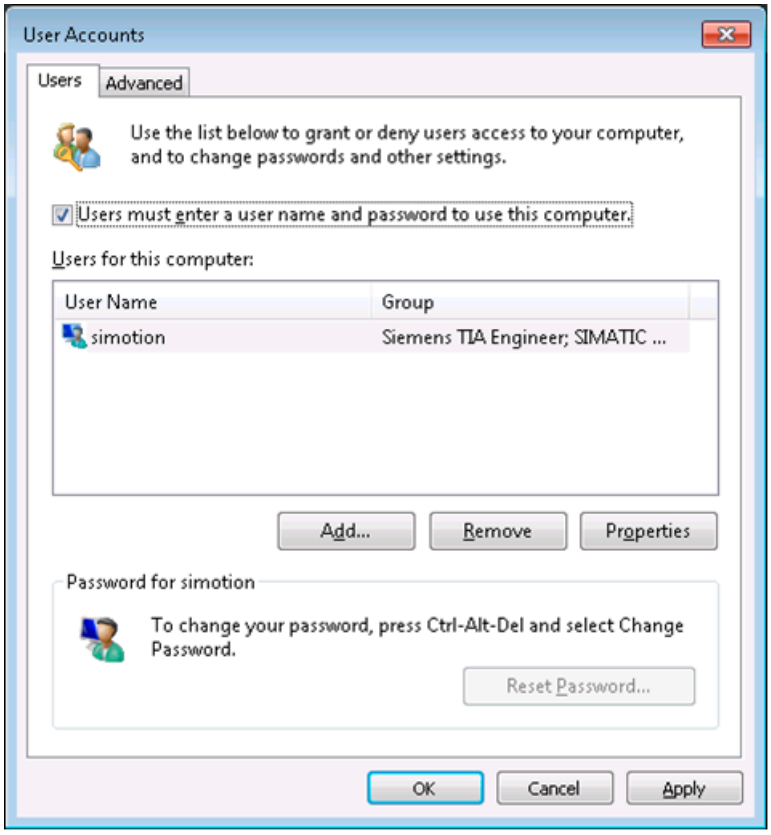


Figure 2-13 User Accounts

3. In the **Users** tab, activate the **Users must enter a user name and password to use this computer** checkbox.
   The **Apply** button is now active. Deactivate the checkbox and accept the changes now with the **OK** or **Apply** button.
   This is necessary so that the **Automatically Log On** dialog box is subsequently displayed.

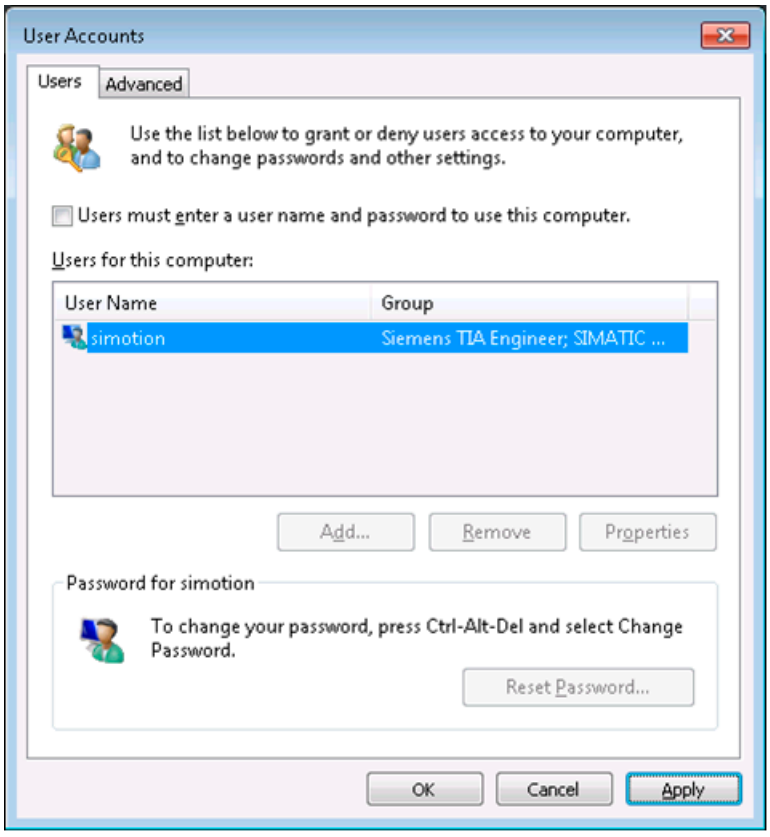


Figure 2-14 User accounts

4. Enter your changed Windows user password in the **Automatically Log On** dialog box and confirm it by entering it a second time.

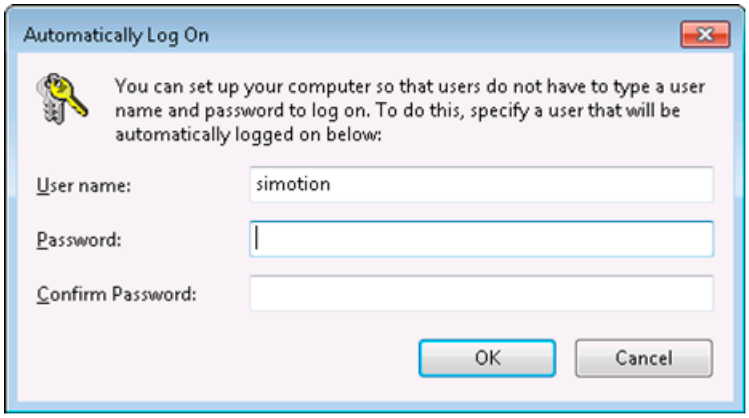


Figure 2-15 Automatically Log On dialog box

5. Confirm the password with **OK**.

2.4.4 Deactivating the remote desktop connection

Deactivating the remote desktop connection

If you do not use the headless mode and do not require a remote desktop connection, we recommend that you explicitly disable the remote desktop connection.

NOTICE
Deactivating the remote desktop connection To ensure that the remote desktop connection is not used, it must be explicitly deactivated.

Procedure for deactivating the remote desktop connection

1. Using the Control Panel, select **System** > **Remote settings**.

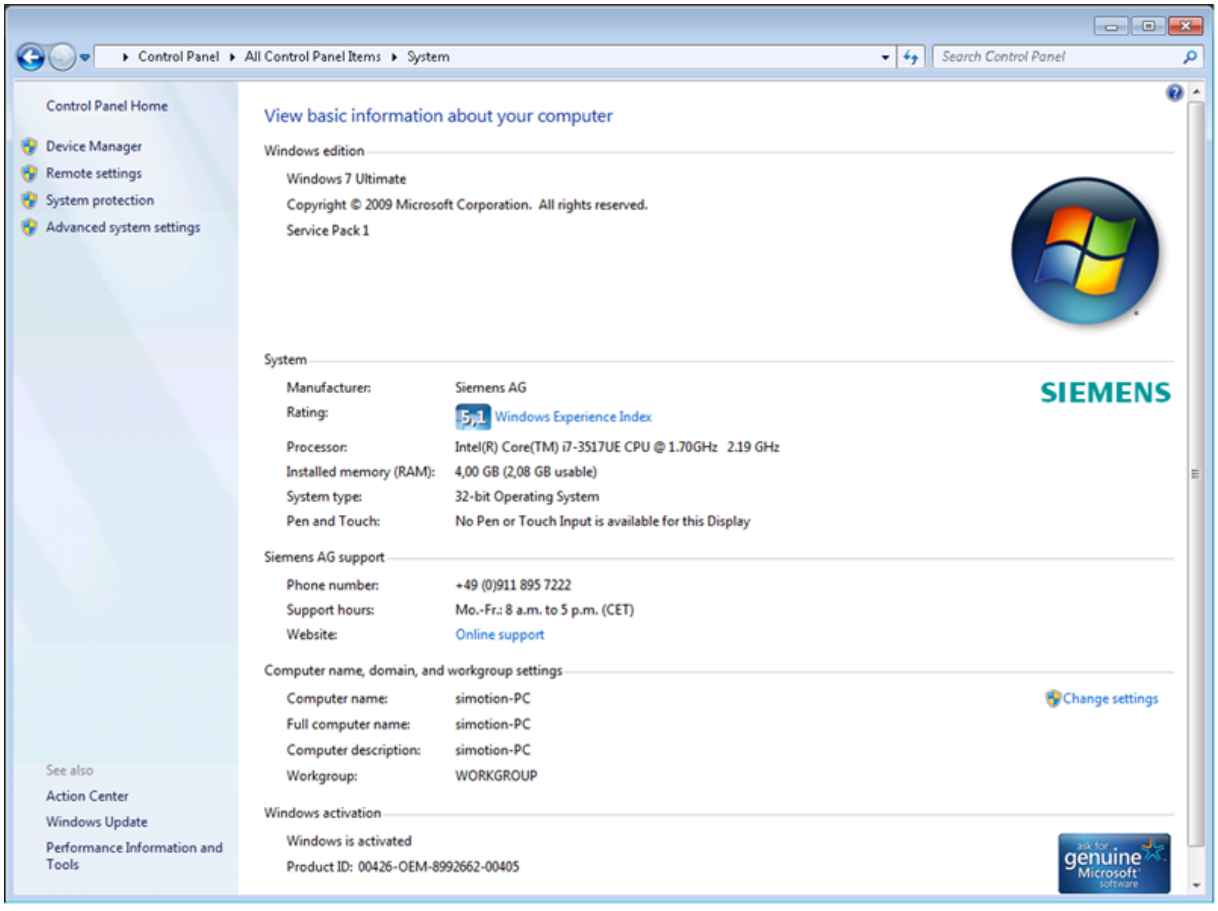


Figure 2-16 Remote settings

2. Select the **Remote** tab in the **System Properties** dialog box.

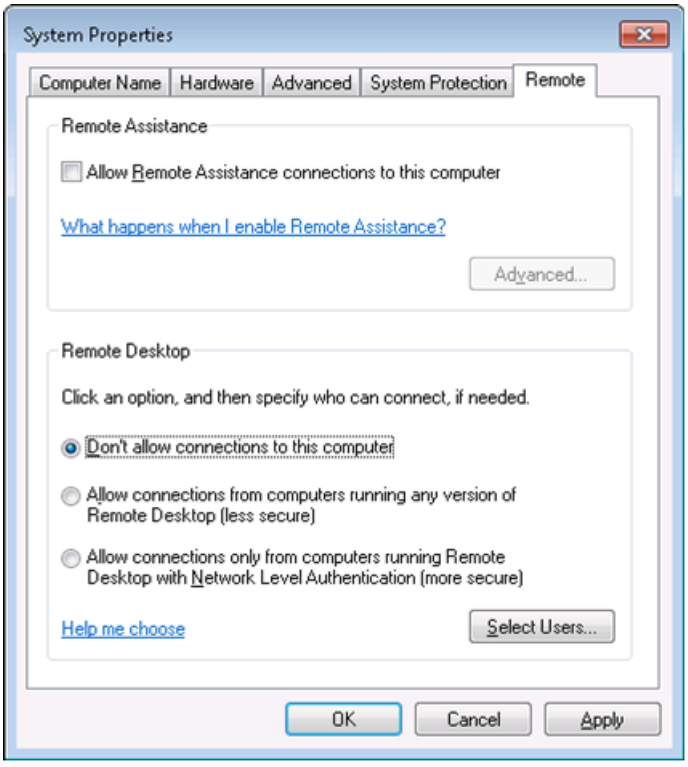


Figure 2-17 System Properties dialog box

3. Select the **Don't allow connections to this computer** option at **Remote Desktop**.
4. Confirm with **OK**.

Any remote desktop access is deactivated with this operation.

Description 3

3.1 System overview

Overview

SIMOTION P is a PC-based, open Motion Control System from SIMOTION.
Control, motion control, and HMI functions are executed together with standard PC applications on the SIMOTION P hardware platform. SIMOTION P combines the compatibility of the Windows operating system with real-time capability of SIMOTION P Runtime.

The fully independent SIMOTION P Runtime runs in parallel to Windows on SIMOTION P. This real-time expansion makes it possible to implement demanding motion control applications with high performance requirements on platforms of the SIMOTION P range. The hardware consists of a computing unit with innovative Intel technology, which is ready for operation at the time of delivery.

The drives and I/O devices are connected either via PROFINET onboard or IsoPROFIBUS board (optional).

The SIMATIC Flat Panel IFP1500, IFP1900 and IFP2200 can be used for the operation of the SIMOTION P320-4 hardware platform in a distributed configuration.

SIMOTION P320-4 versions

The SIMOTION P320-4 can control various I/O systems and HMI components via PROFINET onboard or the optional IsoPROFIBUS board.
If required, a USB DVD drive can be connected, for example.

The following versions of the SIMOTION P320-4 are available:

- SIMOTION P320-4 E
  with the Windows Embedded Standard 7 32-bit operating system and real-time expansion for SIMOTION.
- SIMOTION P320-4 S
  with the Windows 7 Ultimate 32-bit operating system and real-time expansion for SIMOTION.

Application

The SIMOTION P320-4 applications are directed at machines that require a high level of integration of PLC, motion control and technology functions on account of the increasing use of servo drives:

- Packaging machines
- Plastic and rubber processing machines
- Presses, wire-drawing machines
- Textile machines

- Printing machines
- Machines for processing wood, glass, ceramics, and stone
- Production lines in the renewable energy sector, e.g. solar technology, wind power installations

3.2 SIMOTION P320-4 product description

3.2.1 SIMOTION P320-4 overview

The SIMOTION P320-4 provides high-level industrial performance. It features:

- Compact design
- Maintenance-free operation
- High degree of ruggedness
- Long-term availability

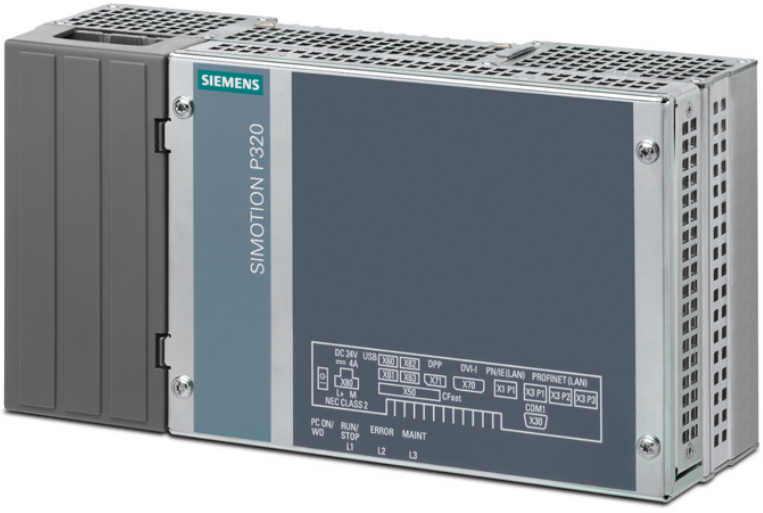


Figure 3-1 SIMOTION P320-4 view



Figure 3-2 SIMOTION P320-4 (open perspective) with plugged-in optional IsoPROFIBUS board

3.2.2 Features

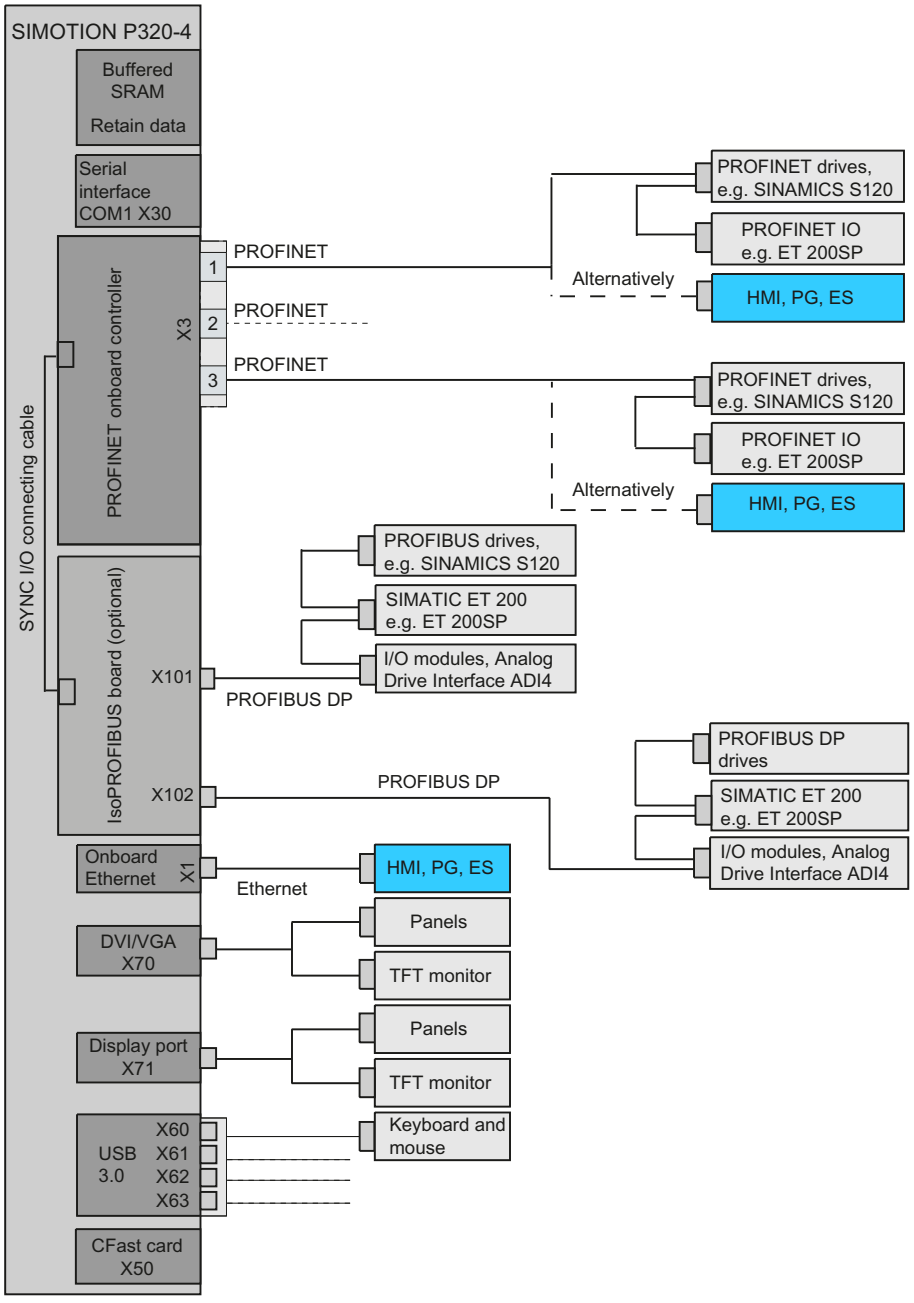
Basic data	
Installation	• Standard rail mounting • Vertical mounting
Processor	
P320-4 E **P320-4 S**	Intel Core i3-3217UE, 2 x 1.6 GHz, 3 MB cache Intel Core i7-3517UE, 2 x 1.7 GHz, 4 MB cache
Main memory	4 GB DDR3 RAM
Optional IsoPROFIBUS board (PROFIBUS DP)	2 x SUB-D socket with configurable baud rates (9.6 Kbit/s - 12 Mbps)
Graphics	• Integrated Intel HD2000 or HD4000 • DVI resolution of 640 × 480 pixels up to 1920 × 1200 pixels • Display port resolution max. 1920 × 1200 pixels • Graphics memory is occupied in the main memory (dynamic UMA)
Power supply	24 VDC (-20%/+20%) max. 4 A
Operating conditions	Operation without fan
Drives and storage media	
CFast card or SSD (Solid State Disk)	Depending on the hardware version of the SIMOTION P320-4

Basic data	
P320-4 E	**2 x CFast card** Internal interface: CFast External interface: CFast
P320-4 S	**SSD (Solid State Disk)** Internal interface: SSD **CFast card** External interface: CFast
USB stick	External, can be connected via USB interface
Interfaces	
Serial	COM (RS 232)
Graphics	DVI-I: Suitable for use as DVI or VGA DPP++: Display port, DVI via DPP-to-DVI adapter
USB	4 × USB 3.0, simultaneous operation of high current, backward compatible with USB 2.0/1.1
Ethernet	1 × RJ45 (10/100/1000 Mbps)
PROFINET I/O	3 × RJ45 (100 Mbps)
Keyboard, mouse	Can be connected via USB interface

Software	
Operating systems	
P320-4 E	Windows Embedded Standard 7 32-bit
P320-4 S	Windows 7 Ultimate 32-bit

3.2.3 SIMOTION P320-4 (hardware) structure

The following figure shows the integration of the SIMOTION P320-4 with integrated PROFINET onboard and optional IsoPROFIBUS board in a target system.

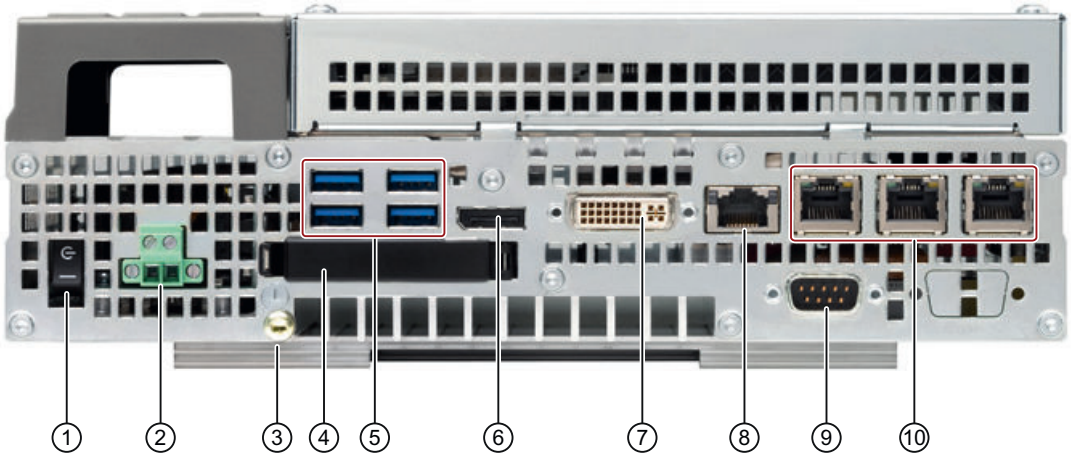


HMI Human Machine Interface
PG Programming device
ES Engineering system

Figure 3-3 SIMOTION P320-4 system overview

3.2.4 Interfaces and operating elements

SIMOTION P320-4



①	On/off switch	Position **OFF** is the delivery state. The on/off switch does not isolate the device from the power supply.
②	24 V DC	Power supply connection
③	Protective conductor	Protective conductor terminal
④	Memory card slot	Cover for the CFast card
⑤	4 × USB 3.0	USB 3.0 high current, backward compatible with USB 2.0/1.1
⑥	Display port	Display port connection for digital monitor
⑦	DVI-I	DVI connector for CRT or LCD monitor with DVI interface
⑧	Ethernet	RJ45 Ethernet connection for 10/100/1000 Mbps
⑨	COM1	Serial interface
⑩	3 × PROFINET	PROFINET ports with three RJ45 sockets

3.2.5 SIMOTION P Runtime (software) structure

SIMOTION P Runtime contains the SIMOTION P Kernel which performs the motion control and interface control.

A SIMOTION project is planned, configured, assigned parameters, commissioned and programmed via the SIMOTION SCOUT engineering system (ES).

The user data can be stored on the data media of the SIMOTION P320-4 .

Siemens WinCC flexible software can be used to visualize operational sequences or to operate the machine. Third-party systems can be linked via the OPC interface.

SIMOTION P Runtime

With the SIMOTION P320-4, the PLC and motion control functionality (starting from position controller upwards) is located centrally in a strictly deterministic task outside the Windows operating system.

Its main field of application is centralized motion control and control tasks requiring close coordination between multiple axes and/or input/output modules.

Functionality ranges from simple positioning to high-performance synchronous operation.

SIMOTION SCOUT

The SIMOTION SCOUT engineering system can be installed on the SIMOTION P320-4 S or connected via the interfaces integrated in SIMOTION P320-4 .

SIMOTION SCOUT TIA

As of version V4.5, the SIMOTION SCOUT TIA engineering system no longer supports the Windows 7 32-bit operating system and therefore cannot be installed.

HMI software

HMI/Runtime software can be operated on the same PC, e.g. the Siemens WinCC flexible software. Other software packages can be linked by means of the OPC interface.

The **HMI software** is used as the general term in the following.

Internal communication

A locally installed HMI can use the local communication to access the following:

- Variables in SIMOTION RT
- Drives on PROFINET IO or PROFIBUS DP
- Other SIMOTION devices on PROFINET IO or PROFIBUS DP

Scope of delivery

The system software supplied with the SIMOTION P320-4 is either already installed on the SIMOTION P320-4 storage medium or is ready to be installed:

- SIMOTION P Kernel
- SIMOTION IT
- SIMOTION IT VM Virtuell Machine (subject to license)

3.2.6 Components

The most important components of the SIMOTION P320-4 and their functions are listed below.

Distributed I/O systems (PROFINET)

Table 3-1 Components for distributed I/O

Component	Function
SIMATIC ET 200M	Modular I/O system for cabinet installation and high channel densities.
SIMATIC ET 200S	Finely modular I/O system for cabinet installation including motor starters, safety technology, and individual grouping of the load groups.
SIMATIC ET 200SP	Finely scalable I/O system for cabinet installation; SIMATIC ET 200SP features a single-cable and multi-cable connection with push-in terminals, compact dimensions, high performance, and low part variety.
SIMATIC ET 200MP	Modular I/O system for cabinet installation and high channel densities in the SIMATIC S7-1500 packaging system. SIMATIC ET 200MP permits the shortest bus cycle times and fastest response time even with large volumes of data.
SIMATIC ET 200eco	I/O system with IP67 degree of protection for machine-related, cabinet-free applications, featuring a flexible and fast connection system in ECOFAST or M12.
SIMATIC ET 200pro	Modular I/O system with IP65/67 degree of protection for machine-related, cabinet-free applications, including motor starters.

Note

Note that not all modules of the above-mentioned I/Os or I/O systems have been released for SIMOTION.

There may also be system-dependent functional differences with regard to the use on SIMOTION and on SIMATIC.
For example, special process-control functions (e.g. HART modules, etc.) are not supported by SIMOTION for the ET 200M distributed I/O system.

For a detailed and routinely updated list of I/O modules enabled with SIMOTION as well as application information, visit us online at:

SIEMENS Industry Online Support - Product support - Supplementary system components (https://support.industry.siemens.com/cs/de/en/view/11886029)

Further modules are integrated via the GSD file of the device's manufacturer.

Note

Note that in individual cases, additional supplementary conditions must be fulfilled.

Drive systems (via PROFINET IO)

Table 3-2 List of typically connected drive systems

Component	Function
SINAMICS S120	Servo drives, innovative single-axis and multi-axis solution

Optional components

Table 3-3 Optional components

Centralized I/O	Function
IsoPROFIBUS board	PROFIBUS connection
UPS	Uninterruptible Power Supply The drivers for the UPS are not pre-installed on the PC. Install the current drivers that are supplied with the UPS.

Note

An IsoPROFIBUS board may be inserted in addition to the PROFINET onboard.

3.3 HMI and SIMOTION SCOUT

3.3.1 HMI and SIMOTION SCOUT Overview

The operational sequences on the SIMOTION P320-4 are either monitored via the HMI system (Human Machine Interface) or the SIMOTION SCOUT engineering system.

The HMI or ES software can be connected using the following versions:

- Local (Page 61)
- via PROFINET (Page 74)
- via Ethernet (Page 75)
- via IsoPROFIBUS (optional) (Page 76)

Local communication of the HMI/ES

If HMI or ES is installed locally on the SIMOTION P320-4, **PC internal** can establish a connection to the local **SIMOTION P Runtime** . Only a local connection is permitted.

See section Local HMI or ES on SIMOTION P320-4 (Page 61)

Communication of the HMI / ES via PROFINET / Ethernet / PROFIBUS

By using one of these communication versions, you can control and monitor several SIMOTION devices.

3.3.2 Local HMI or ES on SIMOTION P320-4

The model described below is used for the communication of the SIMOTION P320-4 with a local HMI or ES. The SIMOTION SCOUT engineering system or the HMI system can be installed directly on the **SIMOTION P320-4 S**.

For this model, you must set the communication (access point) to **TCP/IP** .

The SIMOTION P320-4 is already configured for this communication version at the time of delivery.

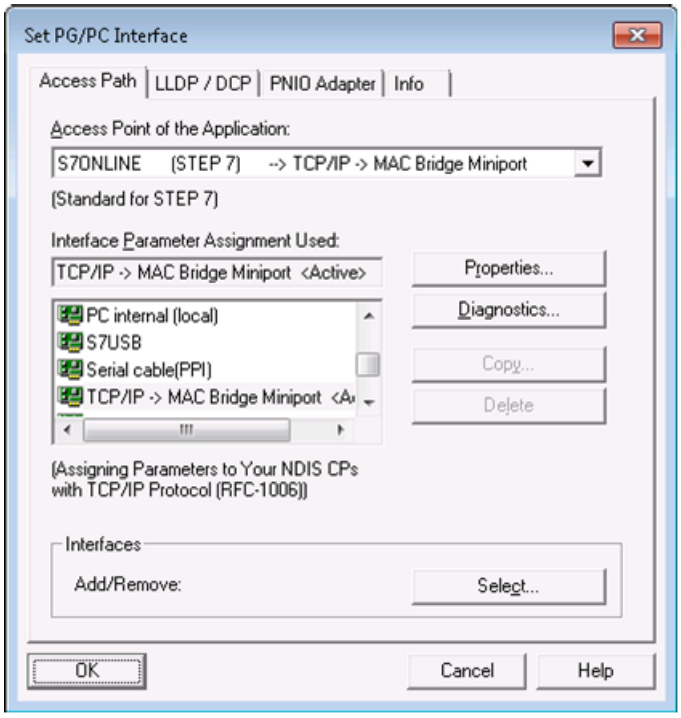


Figure 3-4 Set PG/PC Interface - TCP/IP -> MAC Bridge Miniport dialog box

Note

Local communication via Ethernet (TCP/IP)

For the communication via Ethernet (TCP/IP) to function locally, a link must be available to the Ethernet interface or a LAN cable must be connected **or** the MAC bridge set up.

Note

Setting up the MAC bridge miniport

See also Section Setting up a network bridge - MAC bridge miniport (Page 63)

Note

Only HMI-Runtime can be installed on the **SIMOTION P320-4 E** version.

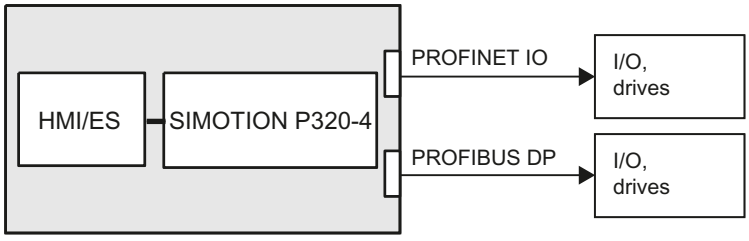


Figure 3-5 Model: Local HMI or ES

Alternatively to TCP/IP , SIMOTION SCOUT can also communicate locally via PC internal (local) .

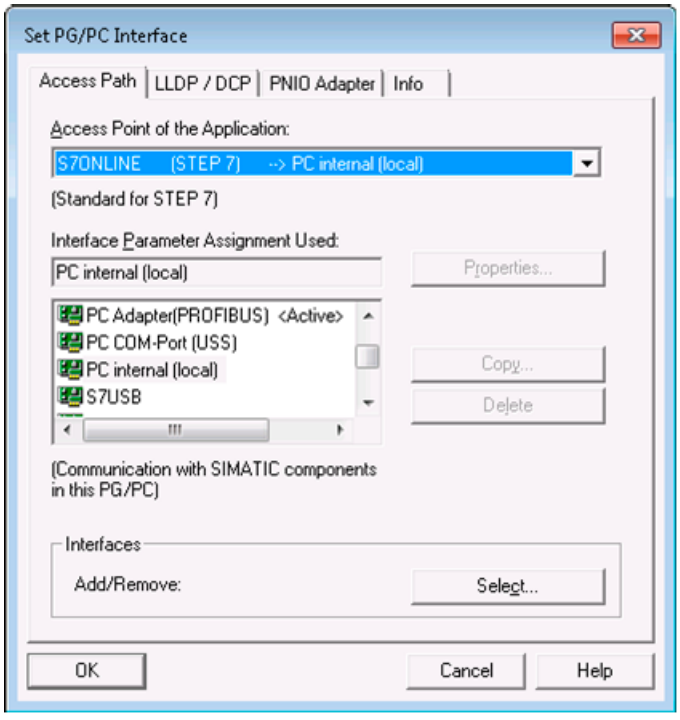


Figure 3-6 Set PG/PC Interface - PC internal (local) dialog box

3.3.2.1 Setting up a network bridge - MAC bridge miniport

Note

If you are working with SIMOTION P320-4 version V4.5, the Network Bridge is already preset.

The network bridge must be preset, configured via script and set up as described in the following. Note that the MAC address of the network bridge is different to the MAC address of the Ethernet adapter.

The following is a step-by-step description of how the network bridge **MAC Bridge Miniport** is set up.

Network connections initial situation

Open the **Network and Internet** via the Control Panel.

- Select **Control Panel > All Control Panel Items > Network and Sharing Center > Change adapter settings**.
- Open the **Network and Internet > Network Connections** dialog box.
  The network connections of your PC are shown here.

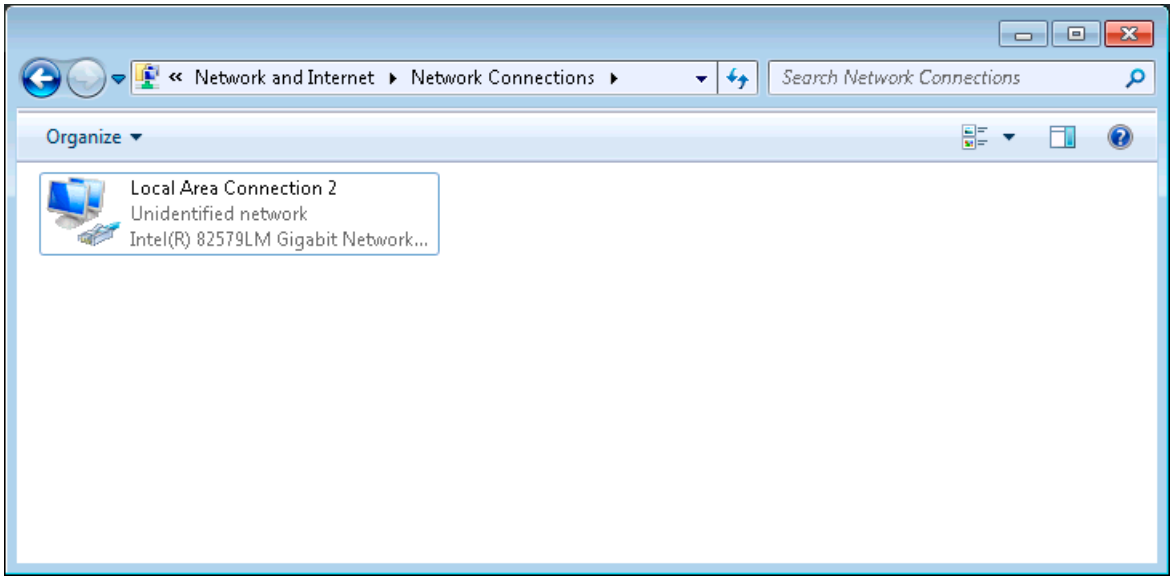


Figure 3-7 Initial situation - Network connections

Device Manager

Open the Device Manager via the Control Panel:

Control Panel > All Control Panel Items > System > Device Manager.

1. Select the **Network adapters** in the dialog box below the "SIMOTION PC".
   The available network connections are shown here.

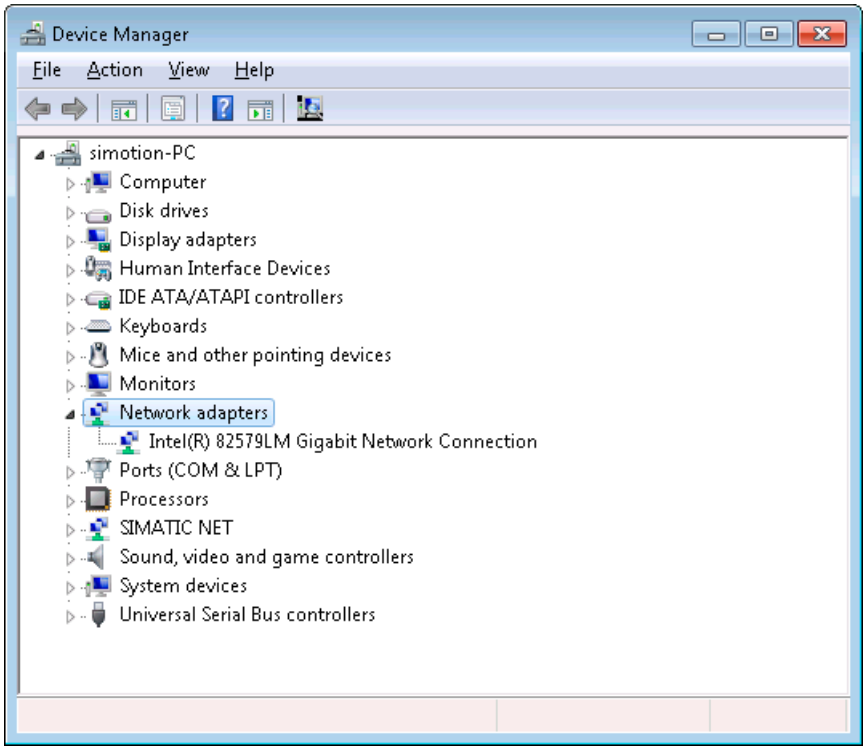


Figure 3-8 Opening the Device Manager

2. Install the **Microsoft Loopback Adapter** via the Device Manager.
3. To do this, select the menu **Action > Add legacy hardware**.
   The **Add Hardware Wizard** then opens.

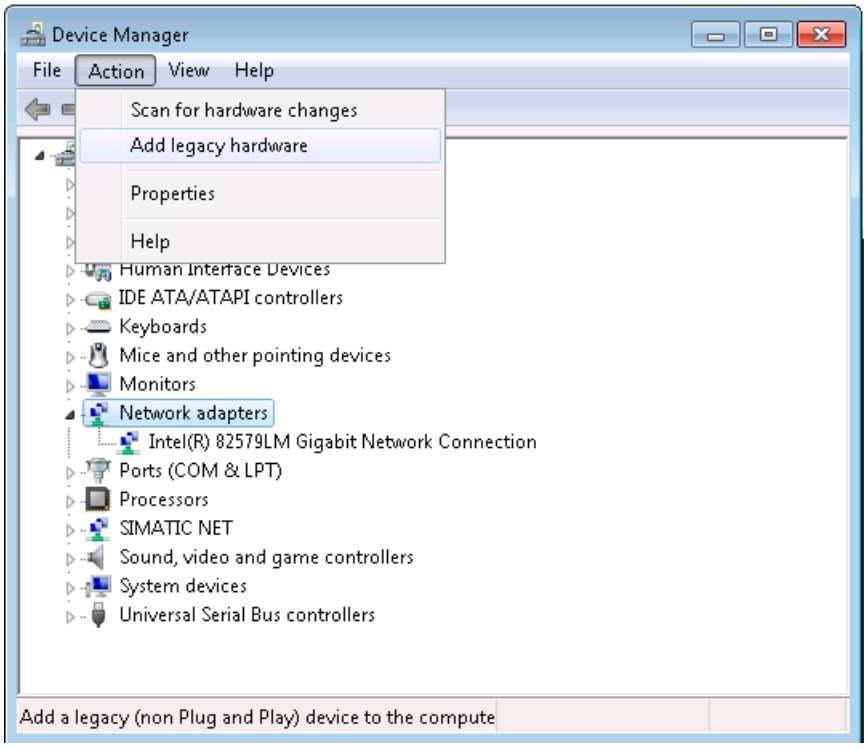


Figure 3-9 Device Manager - Action menu

Add Hardware Wizard

Use the **Add Hardware Wizard** to install the network bridge.

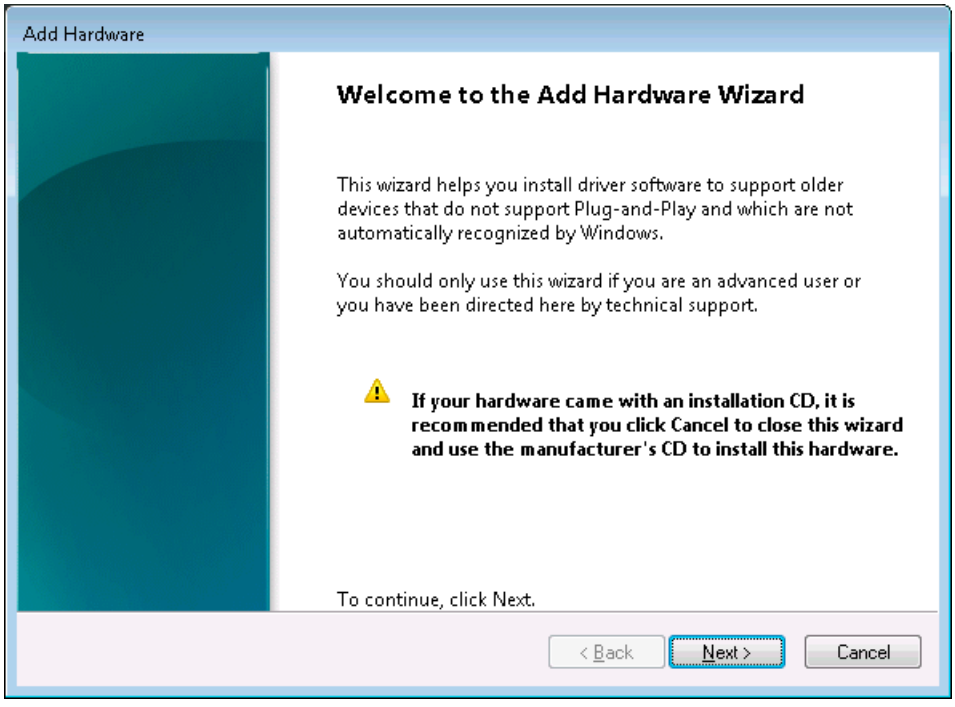


Figure 3-10 Add Hardware - Starting the wizard

1. Click **Next** to start the software wizard.
2. Select the option: **Install the hardware that I manually select from a list (Advanced)** and continue in the wizard with **Next**.

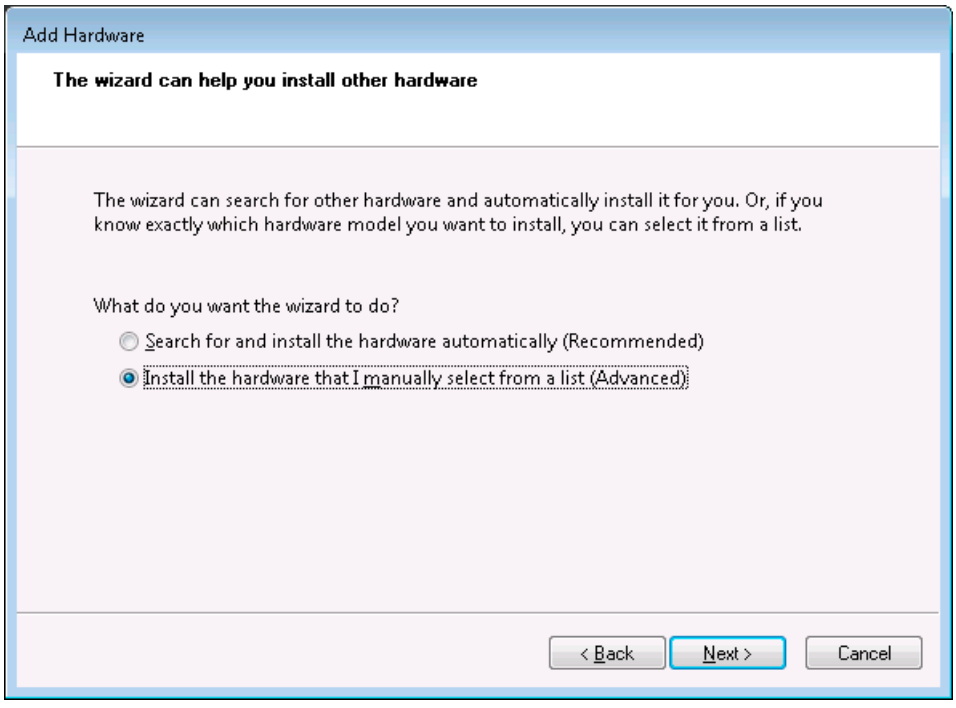


Figure 3-11 Add Hardware - Manual selection from a list

3. Select **Network adapters** in the dialog box now open and continue in the wizard with **Next**.

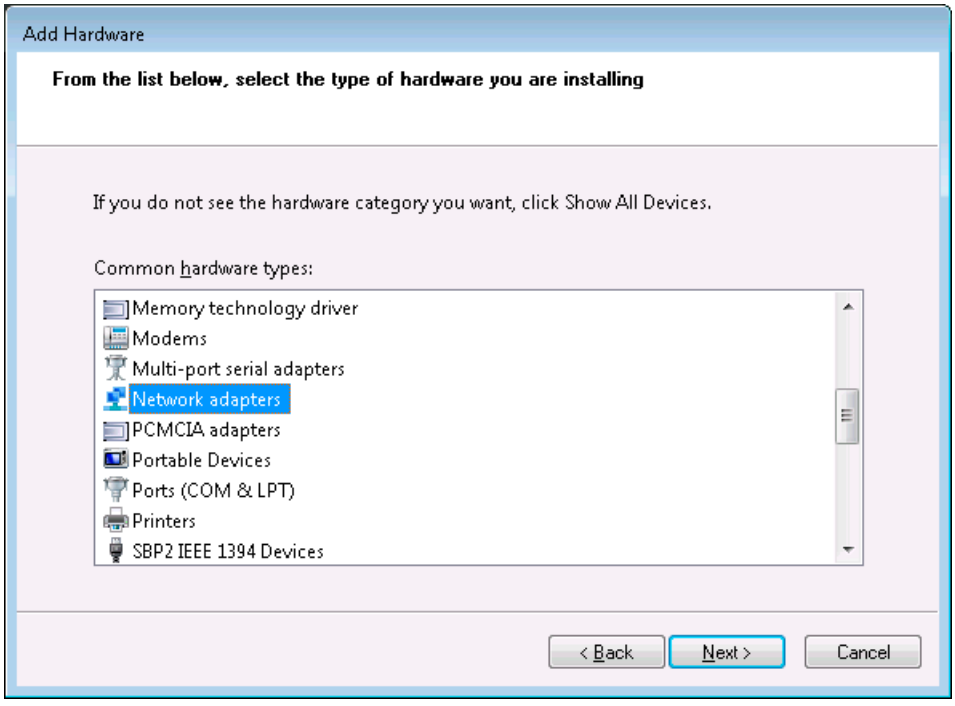


Figure 3-12 Select Add Hardware - Network adapters

4. In the following dialog box, select the **Microsoft Loopback Adapter**.
5. To do this, select Microsoft at **Manufacturer** and the Microsoft Loopback Adapter at **Network Adapter**.

6. Continue in the wizard with **Next**.

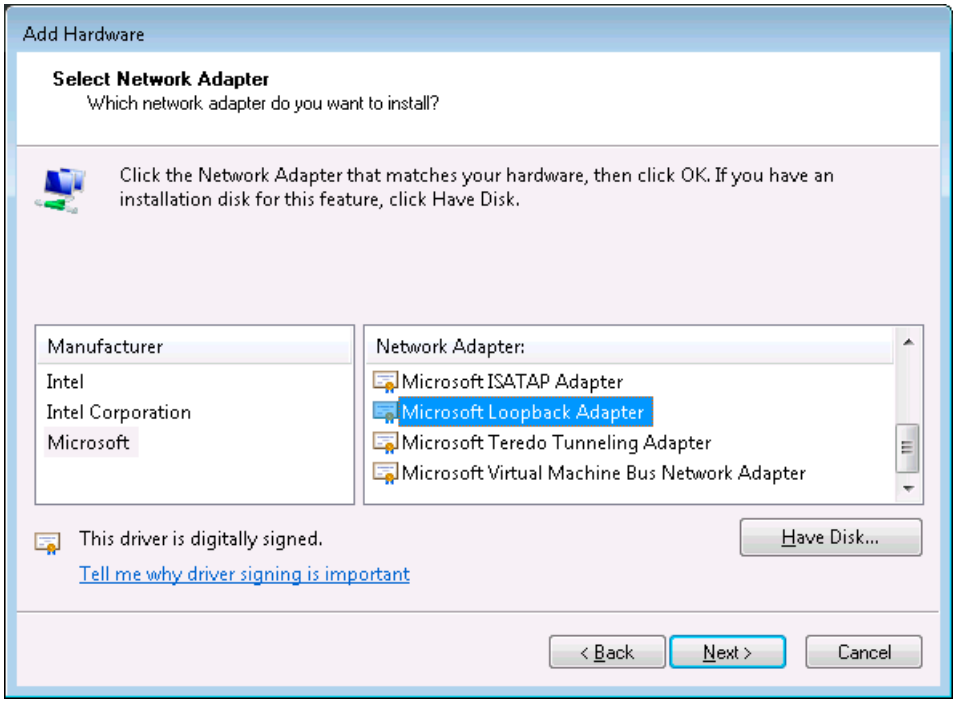


Figure 3-13 Add Hardware - Selecting the desired Network Adapter

7. The selected Network Adapter is shown in the following dialog box.
   Click **Next** to confirm and install.

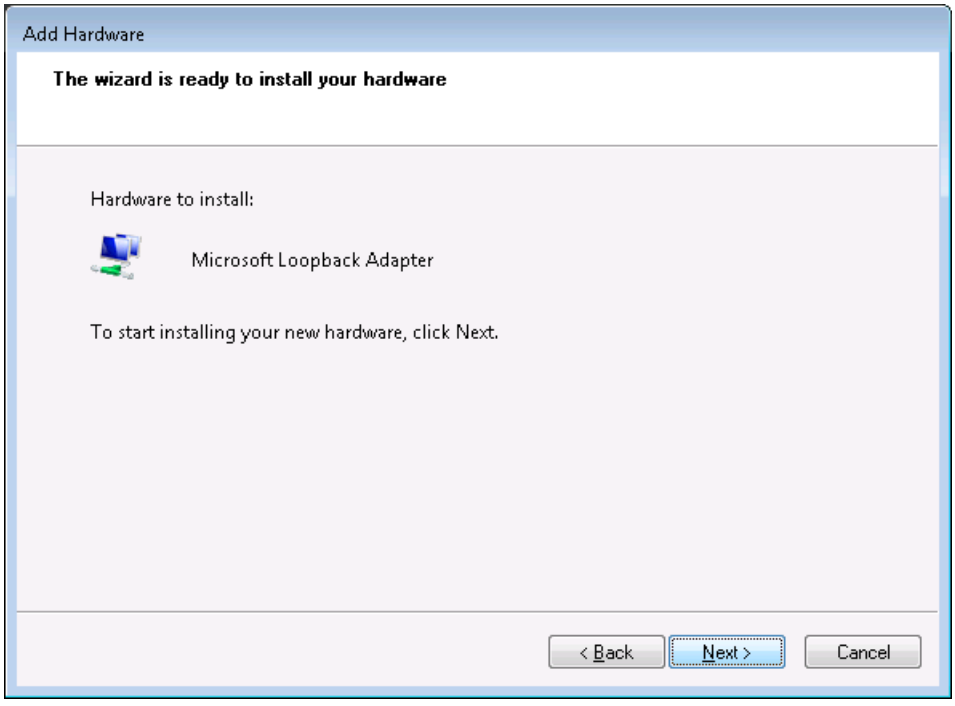


Figure 3-14 Add Hardware - Selected Network Adapter can be installed

8. After finishing the installation, the following dialog box is displayed.
   Exit the wizard with **Finish**.

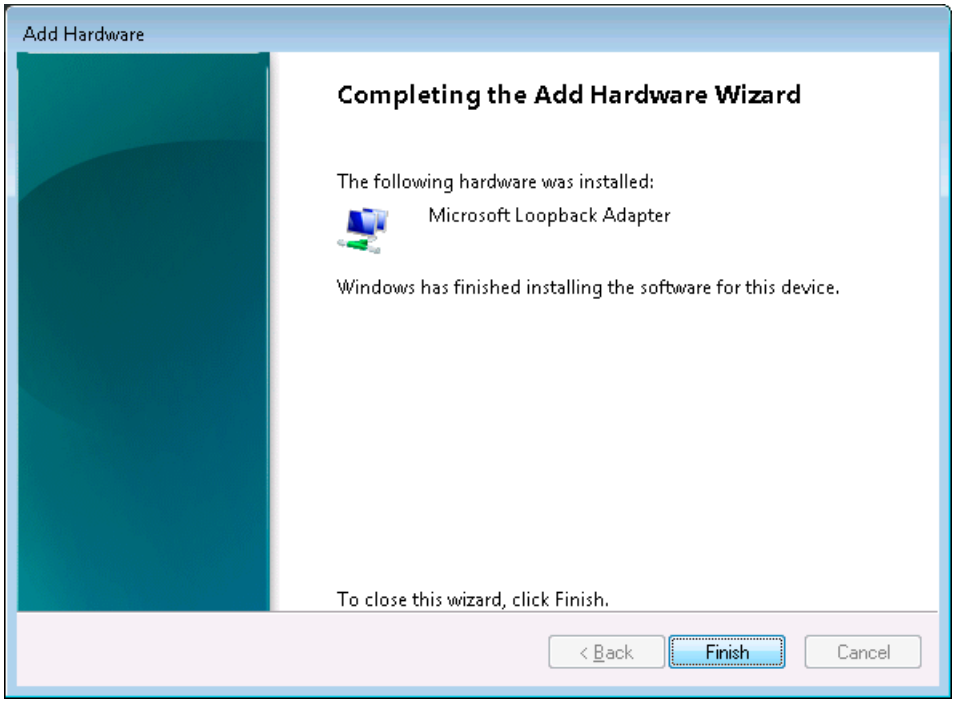


Figure 3-15 Add Hardware - Installation of the Microsoft Loopback Adapter is finished

Checking the installation of the network adapter

You can check the successful installation of the **Microsoft Loopback Adapters** in the

- Device Manager
- Internet connections

Device Manager

The Microsoft Loopback Adapter is displayed at **Network adapters** in the Device Manager.

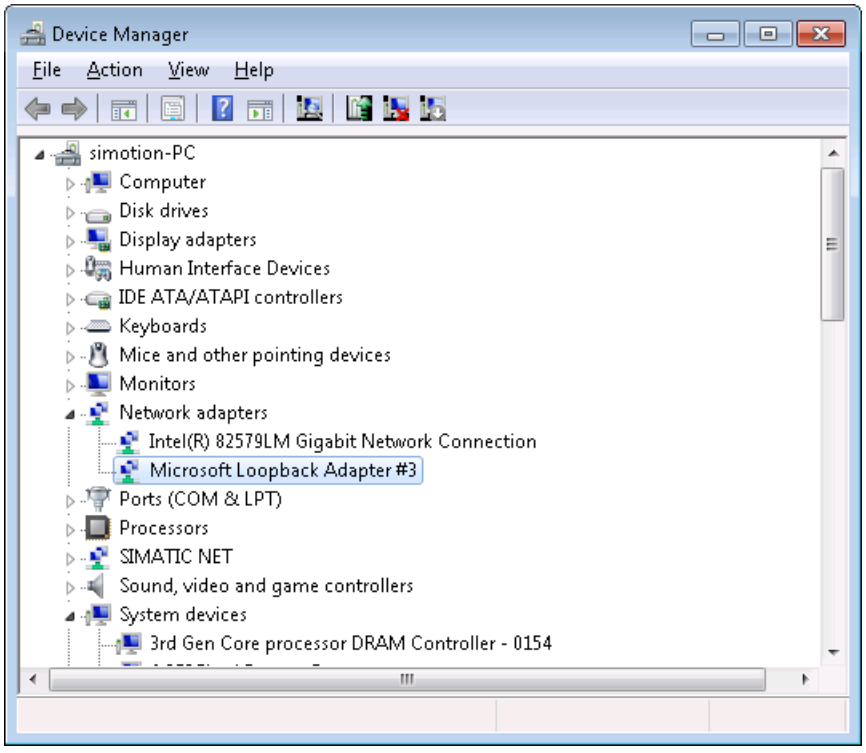


Figure 3-16 Device Manager - Microsoft loopback adapter

Network connections

The newly installed Microsoft Loopback Adapter is also displayed at **Network Connections**.

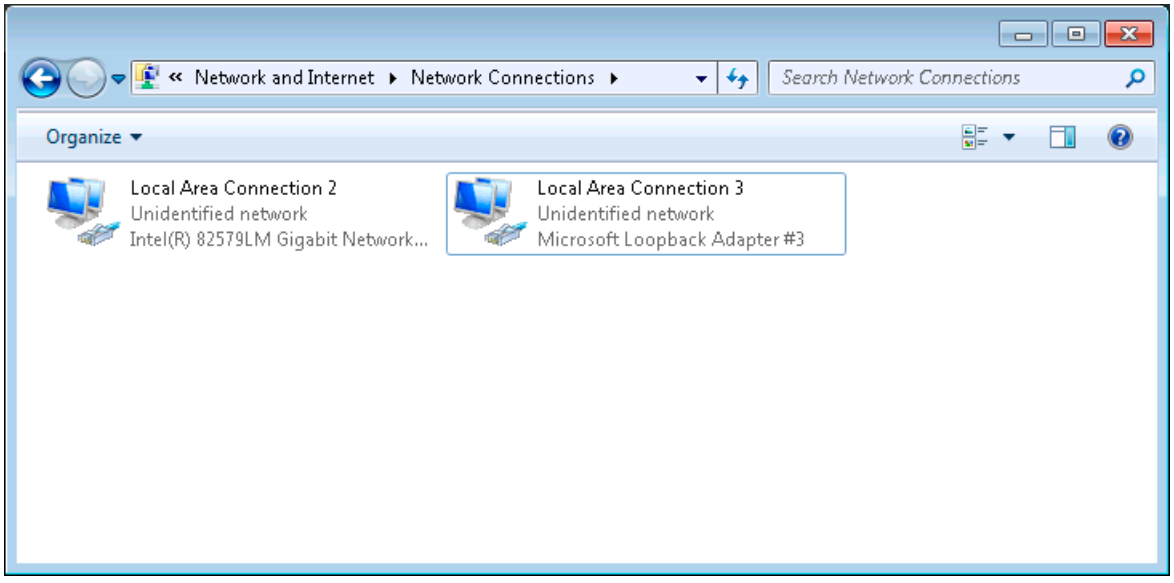


Figure 3-17 Network connections - Display of the newly installed Microsoft loopback adapter

Creating the network bridge

To activate the network bridge, proceed as follows:

1. Select both adapters at Network Connections
2. Select Bridge Connections via the context menu.

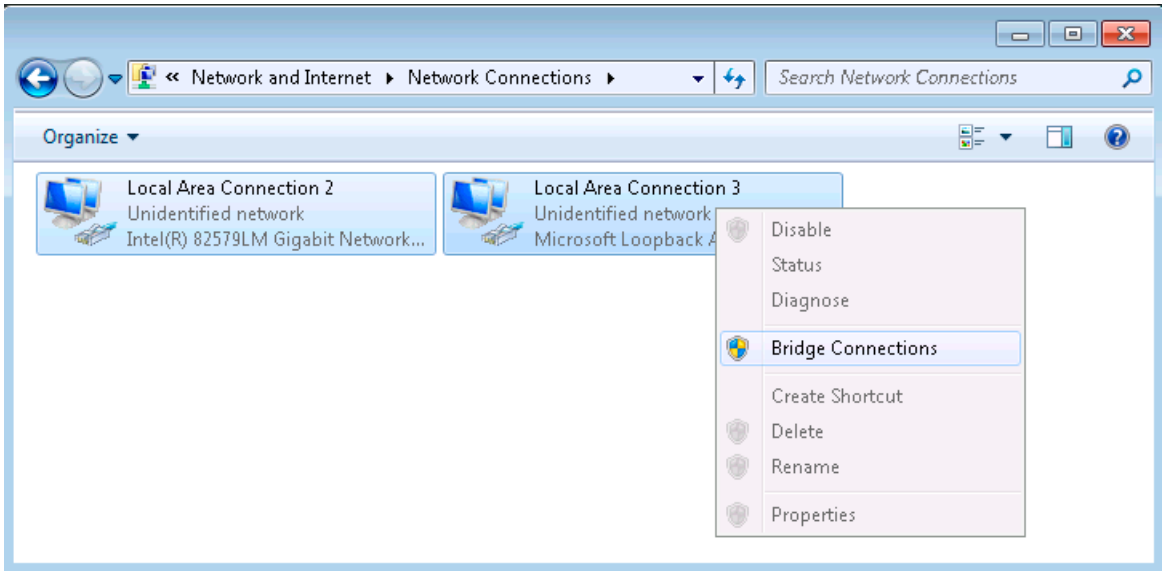


Figure 3-18 Network Connections - Setting the Bridge Connection

3. The Network Bridge MAC Bridge Miniport is displayed.

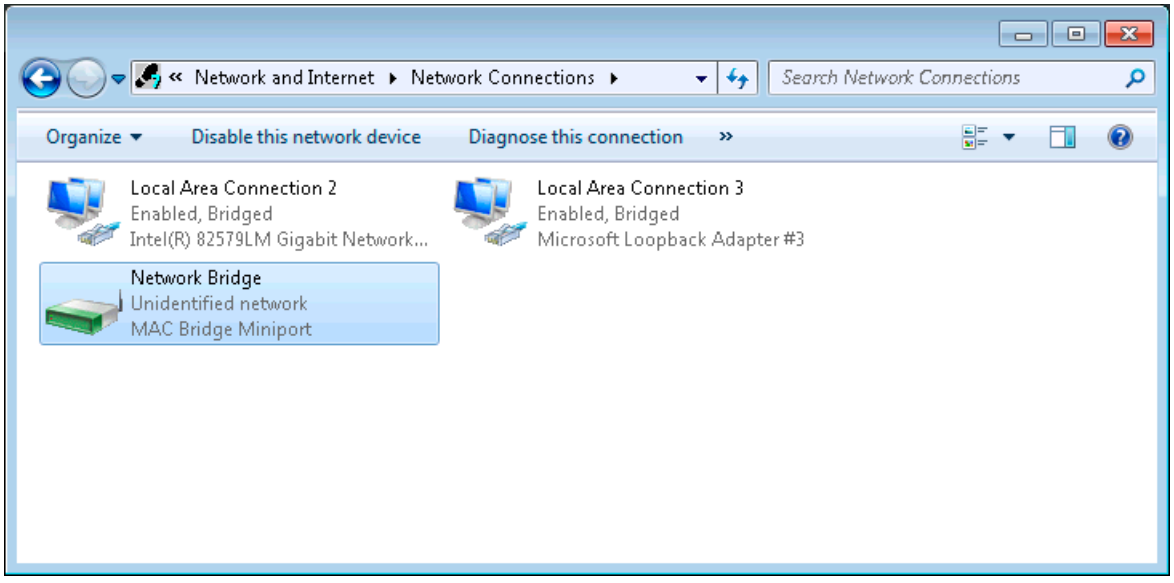


Figure 3-19 Network Connections - Display of the Network Bridge MAC Bridge Miniport

4. To initialize the network bridge, execute the **sp_bridge.cmd** Windows command script.
   The additional script can be found at C:\SiMotion\tools\sp_bridge.cmd
   After executing the batch file, the network bridge has been set up.

Setting "Set PG/PC interface"

Now open the PG/PC interface to complete the setting for the **Network Bridge** .

1. Open the **Set PG/PC Interface** dialog box via the **Control Panel** entry point.
2. Deactivate the **MAC Bridge Miniport DCP** checkbox in the **LLDP / DCP** tab.
   If you do not deactivate the MAC Bridge Miniport DCP, the SIMOTION P320-4 may not be found via Accessible nodes.

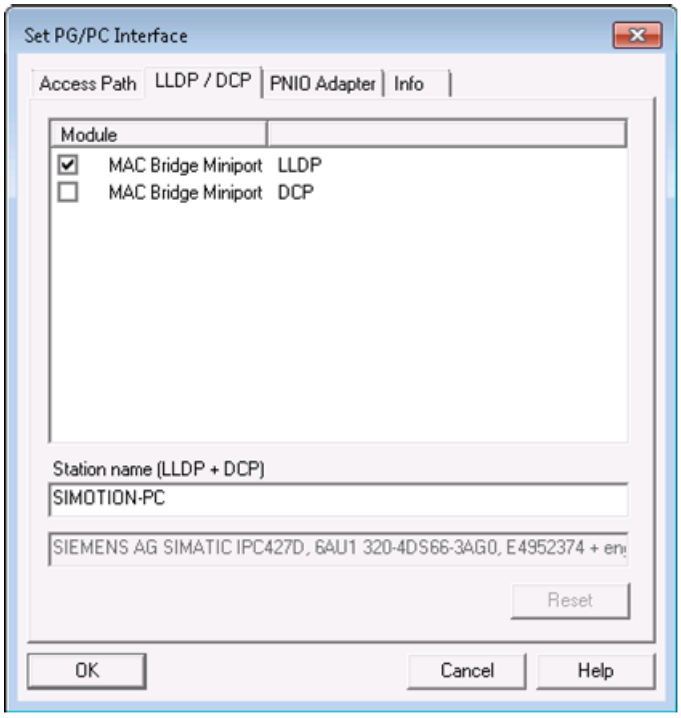


Figure 3-20 Set PG/PC interface

The settings for the network bridge have now been completed.

3.3.3 HMI or ES via PROFINET

Networking via PROFINET

PROFINET is the innovative and open Industrial Ethernet standard (EN 61158) for industrial automation. With PROFINET, devices can be linked up from the field level through to the management level.

With PROFINET, an external HMI or ES can also be integrated into the network and data can be exchanged directly with the SIMOTION P320-4 device.

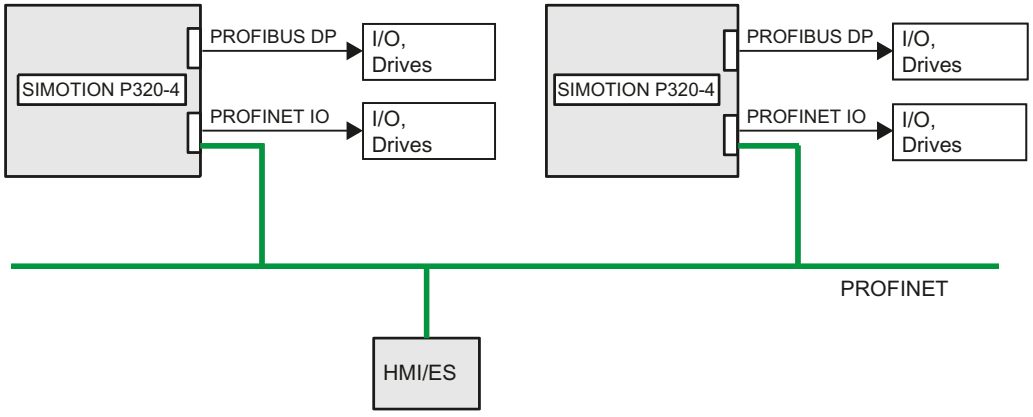


Figure 3-21 Model: Networking via PROFINET

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, Section HMI (Human Machine Interface) coupling.
- SIMOTION SCOUT, Configuration Manual
- SIMOTION SCOUT TIA, Configuration Manual
- SIMOTION SCOUT TIA Device Proxy, Configuration Manual

3.3.4 HMI or ES via Ethernet

Networking via Ethernet

A complex interconnection with several HMIs or ESs is only possible using an Ethernet communication. This allows both an external HMI or ES to access several SIMOTION devices or one SIMOTION device to access another one, for example, to display the production data.

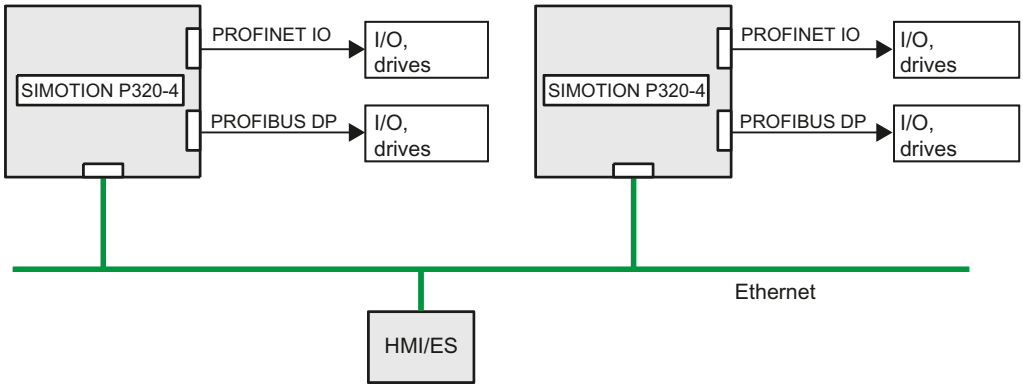


Figure 3-22 Model: Networking via Ethernet

The following services are possible on a SIMOTION device via Ethernet:

- HMI software
  WinCC flexible or the OPC server can use Ethernet to access one or more SIMOTION devices.
- SIMOTION SCOUT Engineering System
  SIMOTION SCOUT can also use Ethernet to access one or more SIMOTION devices.
- SIMOTION IT
  SIMOTION P320-4 offers communication with standard IT protocols (HTTP) over the integrated Ethernet interface.
  This makes it possible to access data or diagnostic information in the SIMOTION P320-4 from any location via intranet or the Internet.
- HTTP (browser, OPC XML)
  Setting in WebCFG.xml - default 80

- HTTPS (browser, OPC XML)
  Setting in WebCfg.xml - default 443
- FTP 21
- Telnet

References

You can find further information in the documentation for SIMOTION IT:

- SIMOTION IT Diagnostics and Configuration
- SIMOTION IT Programming and Web Services
- SIMOTION IT Virtual Machine and Servlets

3.3.5 HMI or ES via IsoPROFIBUS (optional)

Networking via PROFIBUS DP

If you connect a central HMI via PROFIBUS DP, the X101 and X102 interfaces of the IsoPROFIBUS board are available.

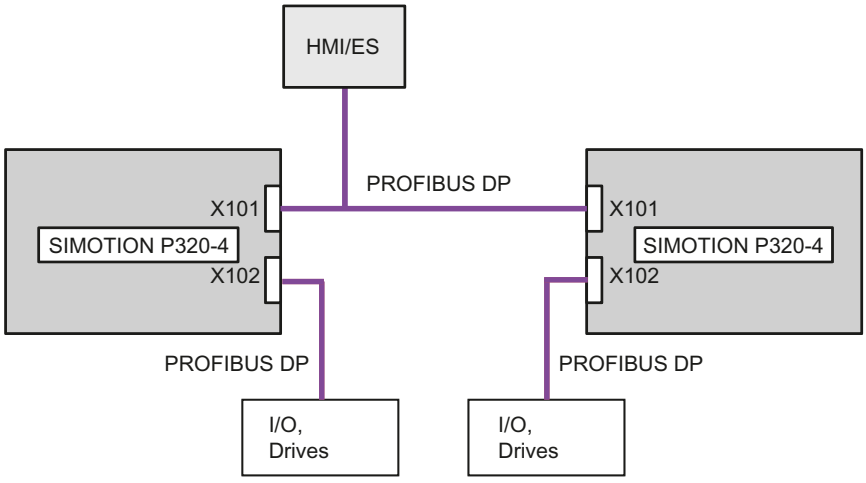


Figure 3-23 Model: Networking via PROFIBUS DP

References

You can find further information on the HMI in the documentation:

- SIMOTION Runtime Basic Functions, section HMI (Human Machine Interface) coupling.

Use planning

4

The use planning is described in the SIMOTION P320-4 E / P320-4 S manual.
There you receive the following information:

- Unpacking and checking the delivery
- Device identification data
- Information about the permitted mounting positions
- Environmental conditions
- Electromagnetic compatibility
  Link to further information about relevant standards for electromagnetic compatibility (EMC).

Mounting

5

5.1 Installation overview

The SIMOTION P320-4 is installed in a cabinet or in a controller housing.

Unlocking Windows

Note

Windows locked

Windows may be accidentally locked, e.g. through shortcut key Ctrl+L. If you do not know the password for the SIMOTION P320-4, please contact the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/).

Operating mode

Two operating modes are available for the installation of a SIMOTION P320-4:

- SIMOTION P320-4 - Headless operation (Page 80)
- Distributed configuration of the SIMOTION P320-4 with a remote panel (Page 83)

5.2 Headless operation

5.2.1 SIMOTION P320-4 - Headless operation

The SIMOTION P320-4 is operated without a screen, e.g. SIMATIC panel, SIMOTION P320-4 is installed in a cabinet.

The maintenance and configuration is performed via a computer that accesses the SIMOTION P320-4 by means of remote desktop.

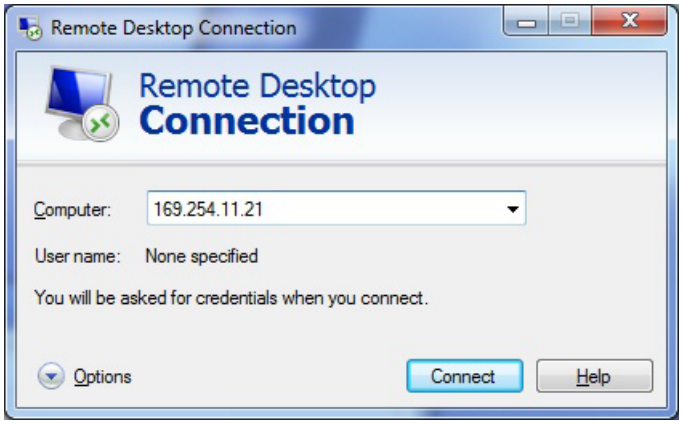


Figure 5-1 Headless to be accessed by means of remote desktop connection

Note

Headless operation or remote desktop connection

To log in via a remote desktop connection, you require a user name and a password.

If you do not have a password, please contact the hotline.

Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/)

5.2.2 Deactivating the remote desktop connection

Deactivating the remote desktop connection

If you do not use the headless mode and do not require a remote desktop connection, we recommend that you explicitly disable the remote desktop connection.

NOTICE
Deactivating the remote desktop connection
To ensure that the remote desktop connection is not used, it must be explicitly deactivated.

Procedure for deactivating the remote desktop connection

1. Using the Control Panel, select **System** > **Remote settings**.

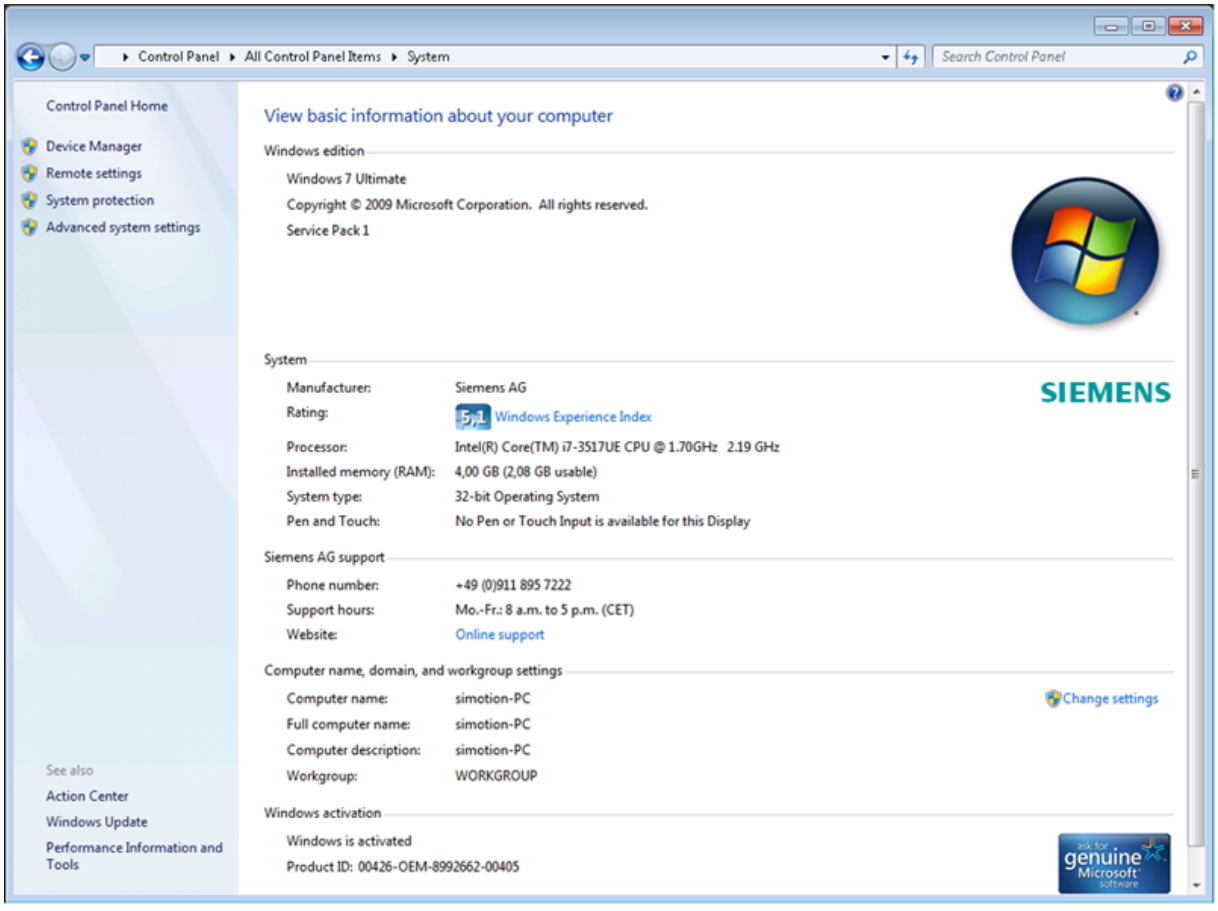


Figure 5-2 Remote settings

2. Select the **Remote** tab in the **System Properties** dialog box.

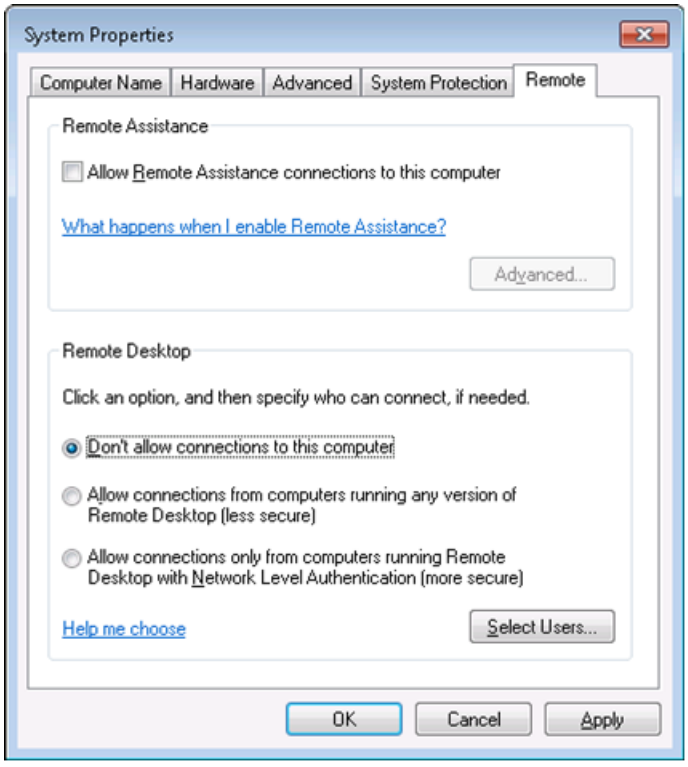


Figure 5-3 System Properties dialog box

3. Select the **Don't allow connections to this computer** option at **Remote Desktop**.
4. Confirm with **OK**.

Any remote desktop access is deactivated with this operation.

5.3 Decentralized structure

Distributed configuration of the SIMOTION P320-4 with a remote panel

The distributed configuration provides greater flexibility in terms of location and enables the SIMOTION P320-4 to be positioned in non-critical areas of the plant (e.g. cabinet).

The distributed configuration of a panel with the SIMOTION P320-4 can be performed via the DisplayPort or DVI connection. Please note the cable lengths that are supported for the panel.

5.4 Important information about installation

When installing the unit in an enclosed housing, make sure that sufficient space is available for air circulation.

Ensure that the clearance to other components or the sides of cabinets is at least 50 mm above and 100 mm below the device.

The maximum ambient temperature of the SIMOTION P320-4 depends on the mounting position:

- Horizontal (preferred position): Maximum +55° C (in RAL)
- Vertical (power supply at the top): Maximum +45° C
- Suspended: Maximum +40° C
- Vertical mounting: Maximum +45° C

RAL = Restricted Access Location (installation of device in operating facilities with restricted access, for example, a locked control cabinet)

Further information can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.5 Withdrawing/inserting the CFast card

SIMOTION P320-4 has an external slot for a CFast card on the interface side. Always use SIMATIC IPC CFast cards for industrial applications.

The CFast card is mandatory for operation of the SIMOTION P320-4. The CFast card is supplied with the SIMOTION P320-4.

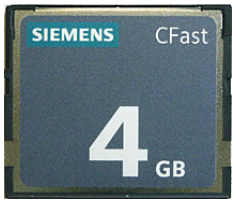
NOTICE
Damage to the device
The CFast and CompactFlash connections are not compatible. The device will be damaged.
Use the slot described in this section only for a CFast card.

Note

Note the version of the CFast card

Note the following:

- **Always** insert a CFast card as of production version 02.
- Always replace a CFast card with a CFast card of the same or higher production version.
- The production version can be found on the CFast card (see marking).





CFast card - ordering data			
Designation	**Article number**	**Further information**	
CFast	6ES7648-2BF10-0XG0	4 GB	INDUSTRIAL GRADE

Note

Only use the CFast card specified with the article number above for the external interface.

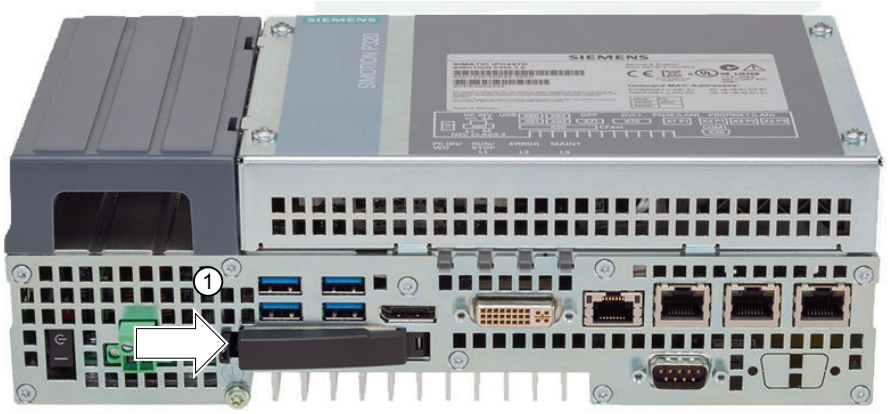
Requirement

- The device is switched off.
- SIMATIC IPC CFast card approved for industrial applications.

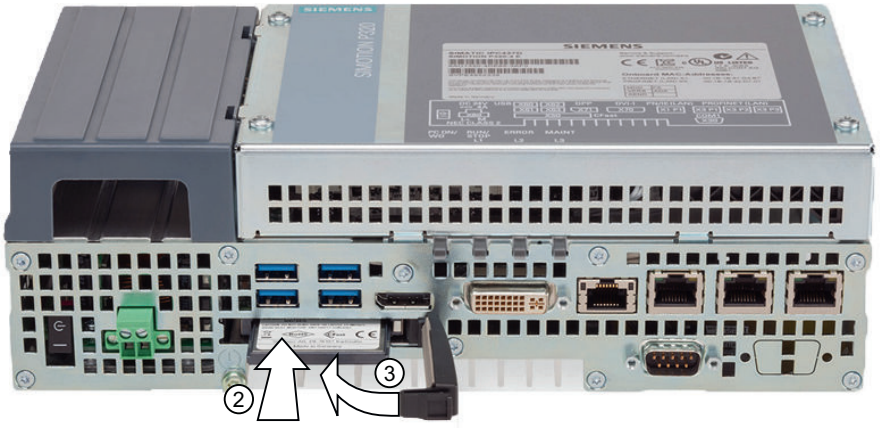
Withdrawing the CFast card

To withdraw the CFast card, proceed as follows:

1. Release the lock of the cover. Push against the cover in the direction indicated.
   Open the cover completely.



2. Remove the CFast card from the memory card slot by pushing it in until it is ejected by about 5 mm (ball-point pen mechanism).
   Then withdraw the CFast card from the memory card slot.



3. After removing the CFast card, close and lock the cover.

Inserting the CFast card

NOTICE
Inserting the CFast card If you insert a CFast card into a built-in SIMOTION P320-4 in a system, observe the safety regulations for working with electrical systems. Insert the CFast card carefully into the slot, and without applying excess force.

To insert the CFast card into the memory card slot again:

Push the CFast card into the memory card slot until it locks into place (ball-point pen mechanism).

5.5.1 Automatic restart for SIMOTION P Runtime

Note

Not a Windows restart

Note that this is not a Windows restart!

Starting the SIMOTION P320-4 with withdrawn CFast card

Power-up of the SIMOTION P Runtime is **not** possible without the CFast card. A prompt referring to the missing CFast card is displayed. The prompt is displayed until the CFast card is inserted. The power-up is then continued and the prompt closed automatically.

The automatic restart of the SIMOTION P Runtime is performed when the **Enabled** checkbox is activated in the **SIMOTION P Control Manager** in the **Administration** tab at **Automatic Restart By Plug-In External Memory Card**.

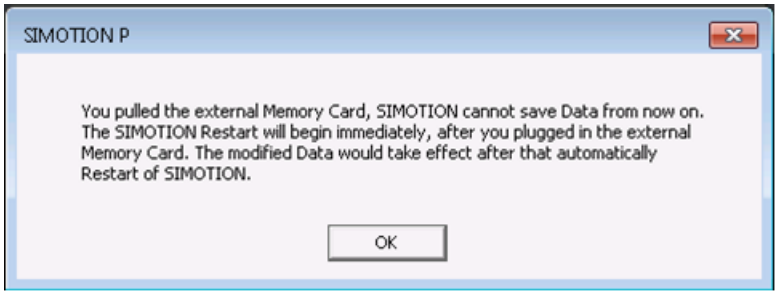


Figure 5-4 Prompt about the missing CFast card - automatic restart Enabled

Note

The prompt does not close automatically after inserting the CFast card.

If the prompt shown above is not automatically closed after inserting the CFast card and there is no automatic restart of the SIMOTION P Runtime, check the BIOS settings.

See Section Hotplug Enabled BIOS settings (Page 221).

If the **Disabled** status has been selected in the SIMOTION P Control Manager, there is no automatic restart of the SIMOTION P Runtime after the CFast card has been inserted. In this case, the following prompt is displayed.

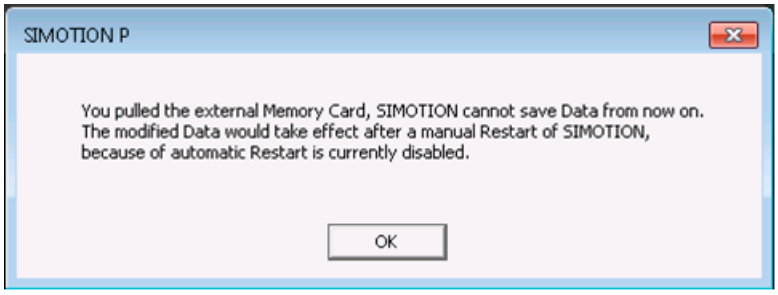


Figure 5-5 Prompt about the missing CFast card - automatic restart Disabled

CFast card withdrawn during operation

If the CFast card is withdrawn during normal operation, the SIMOTION P Runtime goes into the **General reset request** state.

This state can be exited through MRES (general reset) on the mode selector or a restart via SIMOTION P State.

In addition to the general reset request, a prompt is also displayed informing about the withdrawn CFast card and whether an automatic restart of the SIMOTION P Runtime will be performed.

Note

Automatic restart for SIMOTION P Runtime setting

The automatic restart settings are made in the SIMOTION P Control Manager.

The default setting in the Administration tab at Start SIMOTION P is Enabled.

Further information can be found in Section **SIMOTION P Control Manager > Administration tab >** Automatic Restart By Plug-In External Memory Card (Page 141).

5.6 Installing the SIMOTION P320-4 in the control cabinet

5.6.1 Notes on installation

Requirement

Before you install the device, observe the following installation notes:

NOTICE
Observe the DIN/VDE requirements Adhere to the relevant DIN/VDE requirements or the country-specific regulations when installing in cabinets.

NOTICE
Observe UL508 For use in the area of **Industrial Control Equipment** (**UL508**), remember that SIMOTION P320-4 is classified as **Open type**. Installation of the device in an enclosure according to **UL508** is conditional for approval or operation according to **UL508**.

Types of installation

The following SIMOTION P320-4 installation types are permitted and described in the following sections:

- Standard rail mounting (Page 89)
- Vertical mounting (Page 92)

5.6.2 Standard rail mounting

Mounting the SIMOTION P320-4 on a standard rail

Note

Use of Siemens 35 mm standard mounting rail is recommended.

Mounting the standard mounting rail clip

Before you can install the device on a standard mounting rail, you will need to attach the standard mounting rail clip included in the scope of delivery.

The fasteners and screws required are supplied with the device for mounting depending on the order number.

Requirement

- 1 standard mounting rail clip
- 2 screws
- 1 T20 screwdriver

Use the two screws to mount the standard mounting rail clip on the SIMOTION P320-4 enclosure.

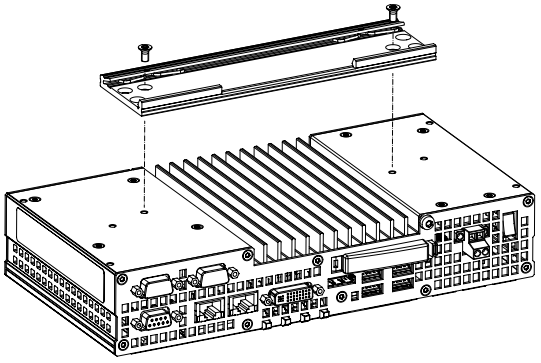


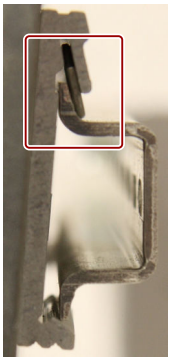
Figure 5-6 Mounting the standard mounting rail clip

Standard rail mounting

Steps for mounting on standard rail

Proceed as follows:

1. First place the SIMOTION P320-4, which is equipped with rail clips, at an angle on the upper rail guide.



2. Press the SIMOTION P320-4 slightly downward.
3. Swivel the SIMOTION P320-4 completely onto the rail until both clamps lock completely into place.
   Ensure that the locking into place of the SIMOTION P320-4 is audible.



Note

To ensure secure vertical mounting on standard rails, a standard rail ground terminal should be mounted beneath the device.

Mounting/installing the device

Examples of mounting types		
Material	**Bore diameter**	**Fixing**
Concrete	8 mm diameter 60 mm depth	Wall plug: 8 mm diameter 50 mm length Screws: 4 mm diameter 50 mm length
Plasterboard (min. 13 mm thick)	14 mm diameter	Cavity fixings: 4 mm diameter 50 mm length
Metal (min. 2 mm thick)	5 mm diameter	Metal screws M 4: 4 mm diameter 15 mm length

NOTICE

Observe the total weight of the SIMOTION P320-4

Ensure that the wall can hold four times the total weight of the device (including mounting rail and additional expansion modules).

Removing the device from the mounting rails

- Push the device down until the bottom clamp releases the device.
- Swing the device away from the rails.

Additional references

Further information on standard rail and vertical mounting can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.6.3 Vertical mounting

The optionally available vertical mounting front kit allows a space-saving installation.

Note

Vertical mounting front kit - SIMOTION P320-4

Only use the mounting kit that is specified for SIMOTION P320-4.

Mounting kits for previous versions cannot be used.

Fixing the vertical mounting bracket to the device

Note

Information on installation and operation is available in the supplement of the accessories.

Spare parts and accessories			
Parts for the SIMOTION P320-4	**Article number**	**Scope of delivery**	**Accessories**
Vertical mounting front kit	6ES7648-1AA20-0YP0	-	x

You can order the vertical mounting front kit via the Siemens Industry Mall (https://mall.industry.siemens.com).

Additional references

Further information on standard rail mounting and vertical mounting can be found in the SIMOTION P320-4 E / P320-4 S Manual.

5.7 SIMOTION P AutoLogin

The password for the AutoLogin must be changed when the user has changed the Windows password.

The Windows user password is changed in the normal way, e.g. "Change Password" screen. See also Section Changing the Windows user password (Page 36).

Automatically Log On

SIMOTION P320-4 is preset so that the user does not have to enter the user name and the password to log on.

Preparation for changing the AutoLogin

In order that an AutoLogin still functions after changing the Windows password, the password for the AutoLogin must be changed.

The required procedure is shown in the following so that the change of the AutoLogin for SIMOTION P320-4 can be prepared:

1. Open the **Computer Management** window via **Control Panel > All Control Panel Items > Administrative Tools** .

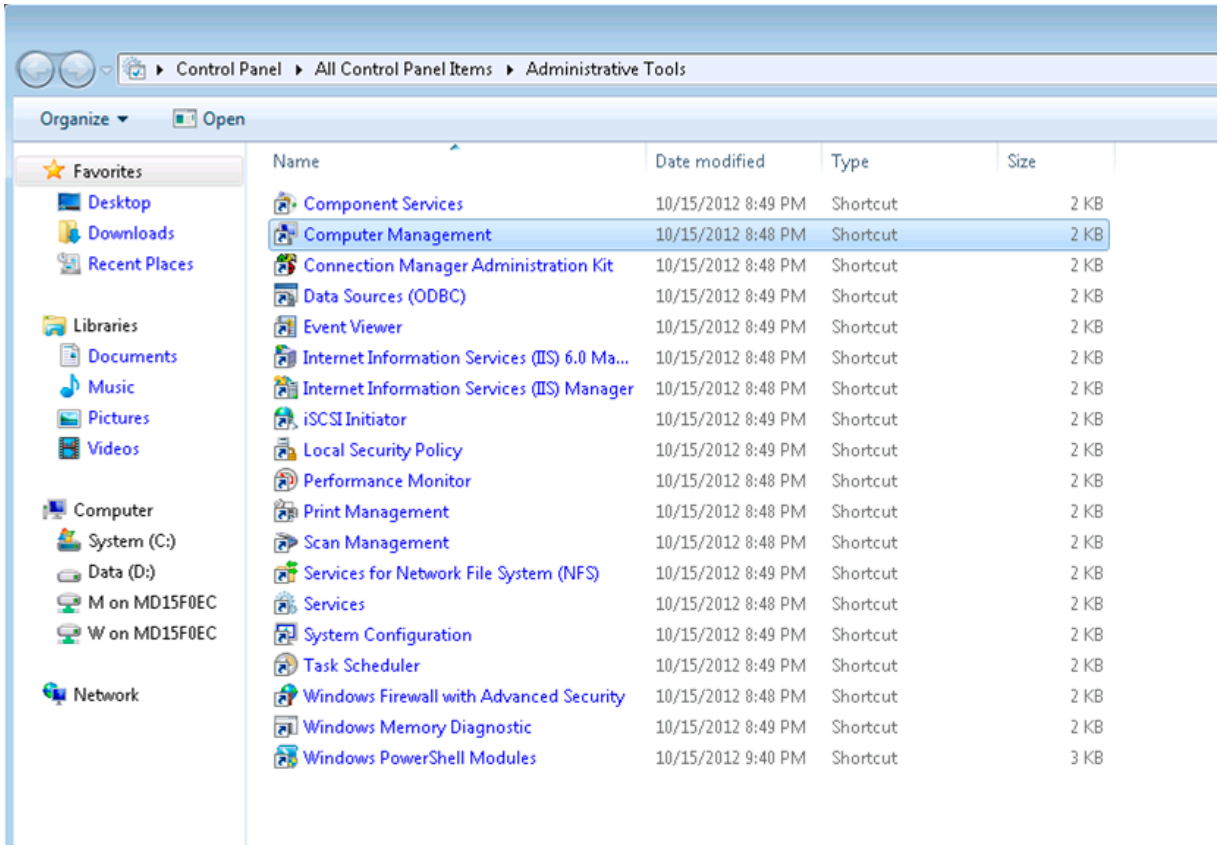


Figure 5-7 Computer Management entry point

2. The **Users** folder is displayed at **Local Users and Groups** in the **Computer Management** window.
   Click the **Users** folder. The available user groups are displayed.

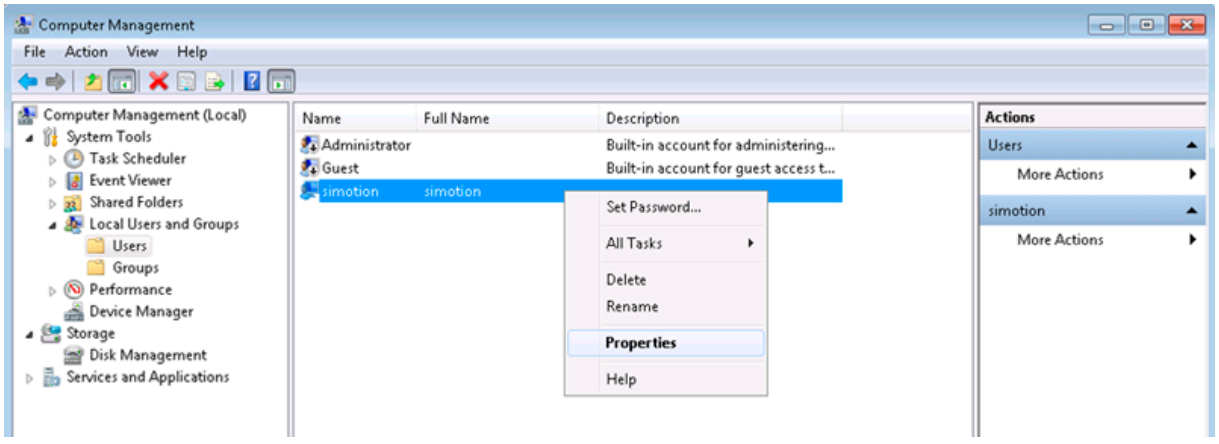


Figure 5-8 Computer Management - Users

3. With the selection of **Users> simotion**, you can display the properties via **Properties**.

4. Deactivate the **User cannot change password** checkbox in the **simotion Properties** dialog box.

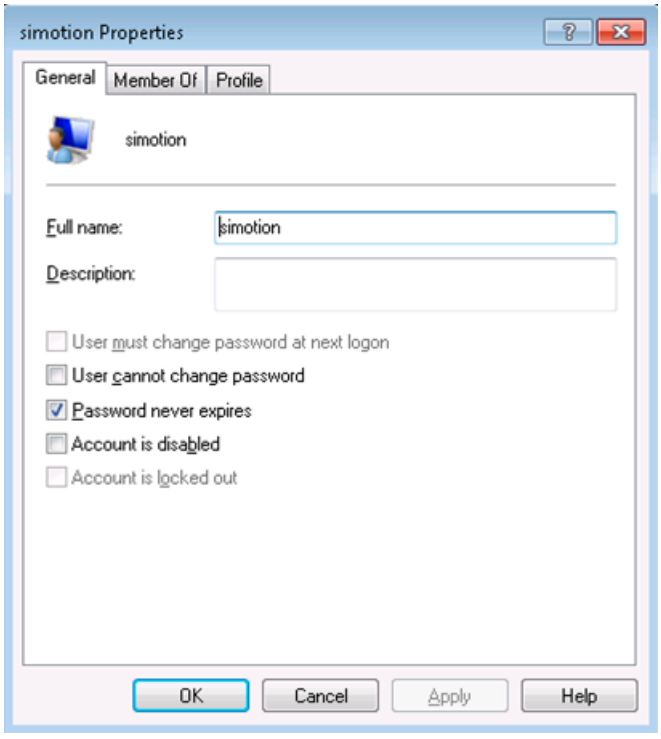


Figure 5-9 simotion Properties - General dialog box

5. Confirm with **OK.**

Changing the password for AutoLogin

To change the password for the AutoLogin, proceed as follows:

1. Open the search via **Windows-Start** and enter: **netplwiz**

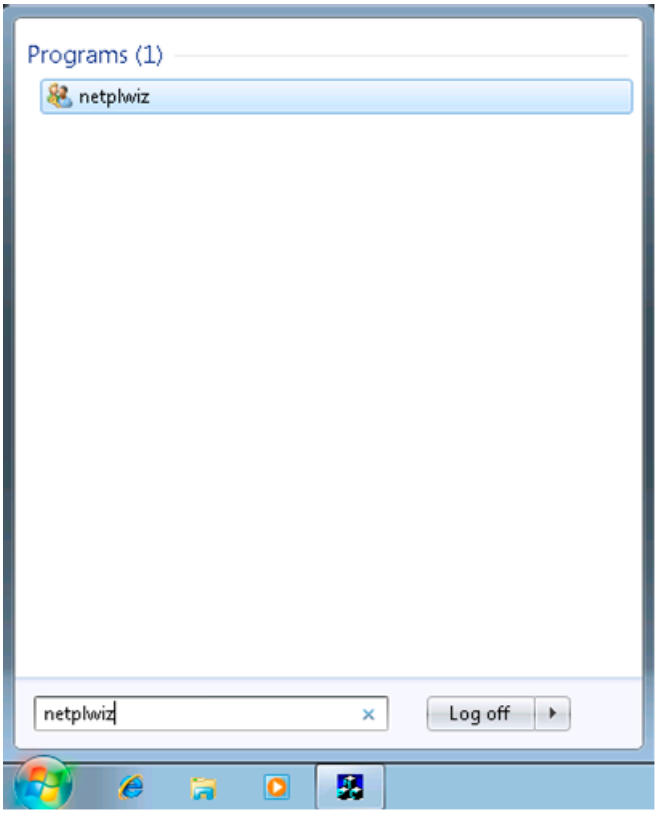


Figure 5-10 Programs netplwiz

2. The following **User Accounts** dialog box opens.

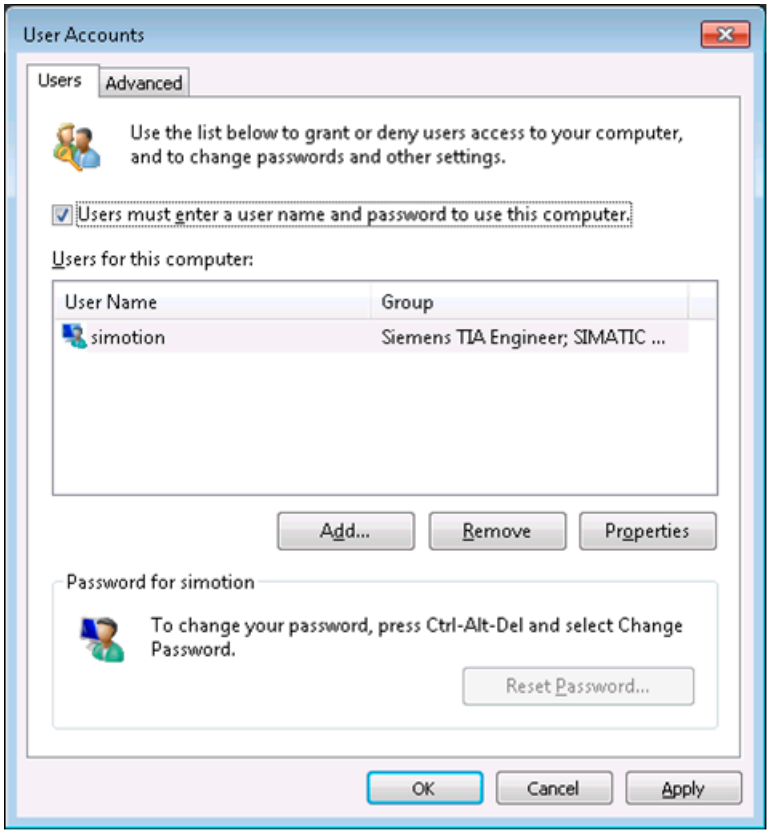


Figure 5-11 User Accounts

3. In the **Users** tab, activate the **Users must enter a user name and password to use this computer** checkbox.
   The **Apply** button is now active. Deactivate the checkbox and accept the changes now with the **OK** or **Apply** button.
   This is necessary so that the **Automatically Log On** dialog box is subsequently displayed.

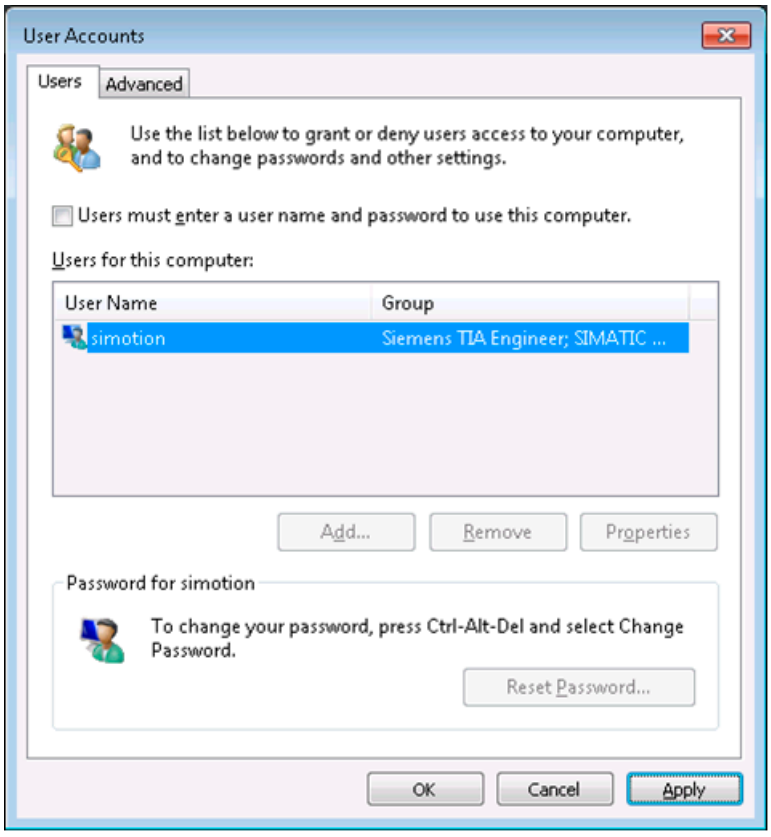


Figure 5-12 User accounts

4. Enter your changed Windows user password in the **Automatically Log On** dialog box and confirm it by entering it a second time.

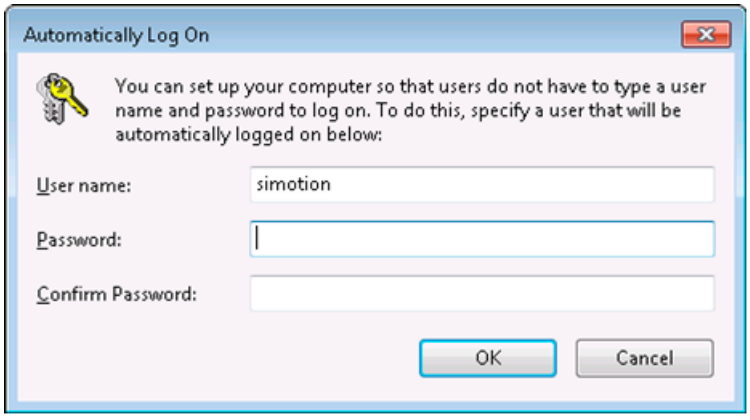


Figure 5-13 Automatically Log On dialog box

5. Confirm the password with **OK**.

Connection

6

6.1 Connection requirements

In this section it is described how the components of SIMOTION P320-4 are connected and the elements for communication prepared.

During the installation of SIMOTION modules, you must pay attention to the electrical configuration design.

You obtain information on wiring and networking a complete SIMOTION system.

Requirement

The SIMOTION P320-4 is already installed in a cabinet or in a controller housing.

Open equipment

These modules are open equipment. Therefore, only install modules in housings, cabinets, or in electrical equipment rooms that can only be entered or accessed with a key or tool. Only instructed or authorized personnel have access.

Observe the following points during installation:

- The device may only be connected to 24 VDC power supplies that meet the requirements in accordance with SELV. The cable cross-section must be chosen large enough to ensure that no damage can result from cable overheating in the event of a short-circuit in the SIMOTION P320-4.
- Protect the device against dust, moisture, heat and severe vibration.
- Do not subject the SIMOTION P320-4 to direct sunlight.
- Install the device in such a way that it cannot present a hazard (e.g. by toppling).
- Ensure that the clearance to other components or the sides of cabinets is at least 50 mm above and 100 mm below the device.

6.2 Overview of connections

Below the SIMOTION P320-4 interfaces to which the I/O devices can be connected are shown.

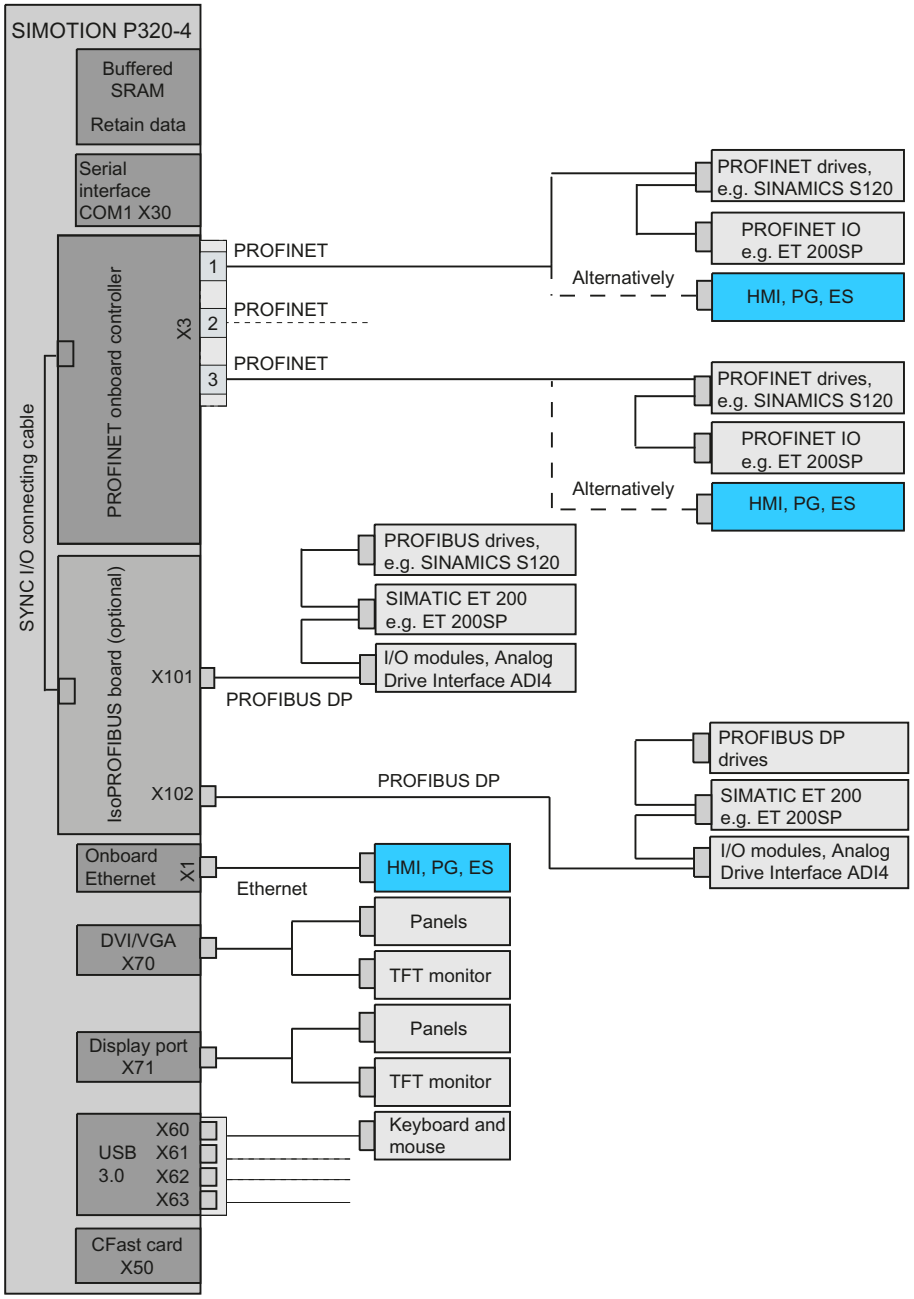


Figure 6-1 System overview SIMOTION P320-4 (hardware)

The cabling for all elements and components of the complete system must only be carried out when disconnected from the mains.
It does not matter in which order connection takes place.

The connection of the individual elements is described in the following sections:

- Connecting PROFINET (Page 104)
- Inserting IsoPROFIBUS (Page 108)
- Connecting Ethernet (Page 117)
- Connecting keyboard/mouse (Page 118)
- Connecting the power supply (Page 119)

6.3 Connecting PROFINET

6.3.1 PROFINET onboard

The system is connected to the Real-time Ethernet (PROFINET IO with RT and IRT) using the permanently integrated PROFINET interface. The device has a PROFINET interface with 3 ports.

The PROFINET IO with IRT allows IT services to be performed in parallel to the real-time communication on an Ethernet cable, where the PROFINET IO with IRT has a reserved area that provides a decoupling from the standard communication.

Note

PROFINET onboard is not a plug-in board. Instead, it is integrated in the SIMOTION P320-4.

6.3.2 Connection

Connection example

The figure shows a connection example of a PROFINET application with SIMOTION P320-4, SINAMICS S120 (CU320-2) and ET 200 PN.

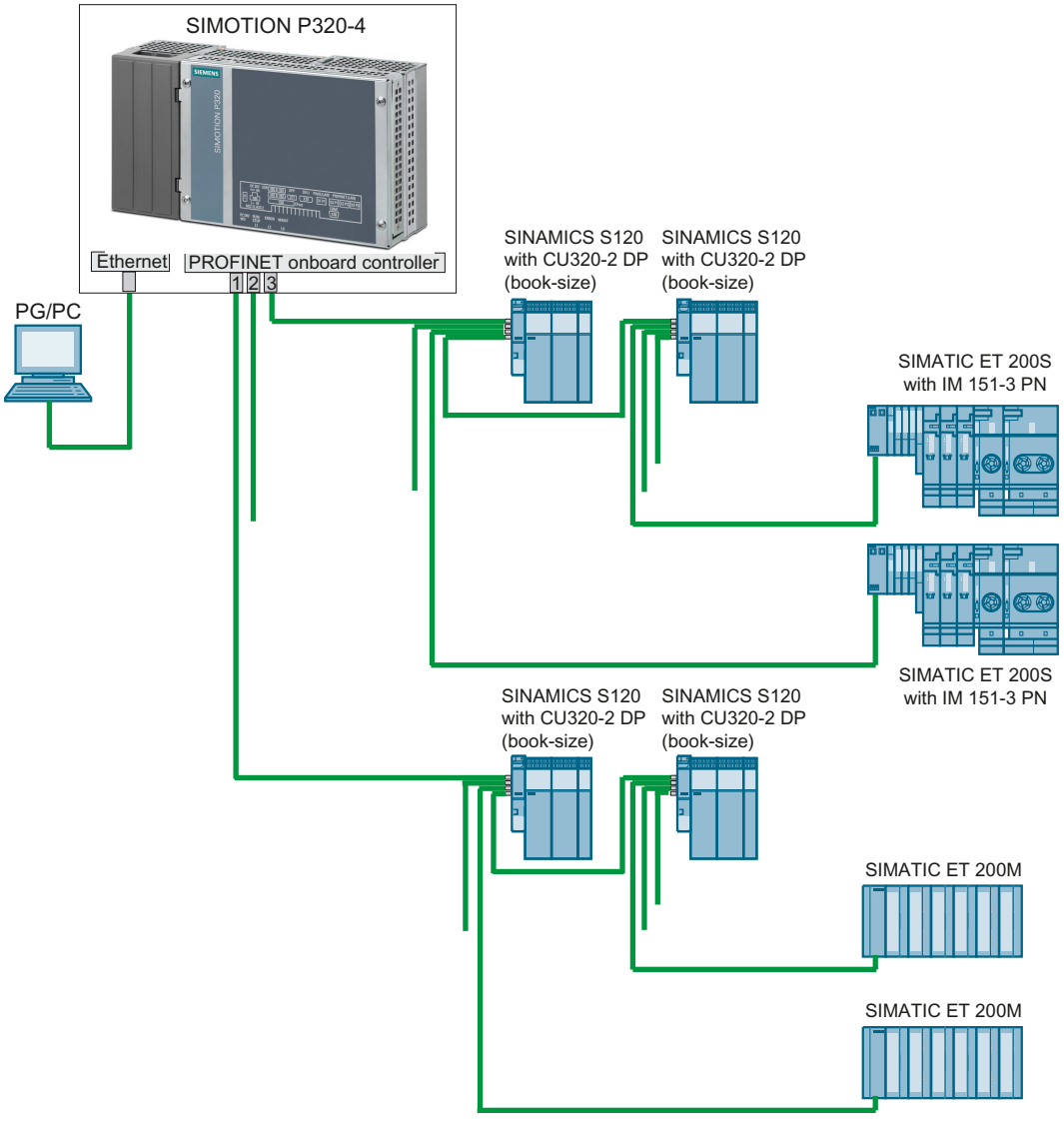


Figure 6-2 Example for a PROFINET application

Note

If the integrated ports of SIMOTION P320-4 and SINAMICS are not sufficient, an external SCALANCE switch can be used.
If PROFINET IO with IRT communication is to be enabled downstream of the switch, then a suitable switch (which supports IRT) must be used.

Cable

4-wire, shielded installation cables are used as PROFINET cables for IE FC RJ45.

Connector

RJ45 PN connectors with straight or angled exit can be used. Standard RJ45 connectors cannot be used.

Strain relief

When inserted, a PROFINET cable will cause unwanted forces to be exerted on the sockets of the PROFINET onboard (strain, lateral pressure). In order to prevent the sockets being subjected to these forces, you must install the strain-relief bracket and attach the cable tie supplied in the accessory kit.

For further information see Mounting a strain relief (Page 107).

Additional references

You can find further information on the website www.siemens.com/simotion (www.siemens.com/simotion):

- Drives and I/O modules that are released for SIMOTION
- You will also find current brochures and catalogs

6.4 Mounting a strain relief

A strain relief for SIMOTION P320-4 is included in the scope of delivery.

The strain relief is designed to prevent the lines connected to the device from being accidentally pulled out.

Note

One cable tie is required for each interface. The cable ties are not included in the scope of delivery and must be ordered separately.

Requirement

- 1 strain relief
- 2 screws
- 1 T10 screwdriver

Procedure

Proceed as follows to secure the strain relief:

1. Remove the marked countersunk screws of the SIMOTION P320-4.

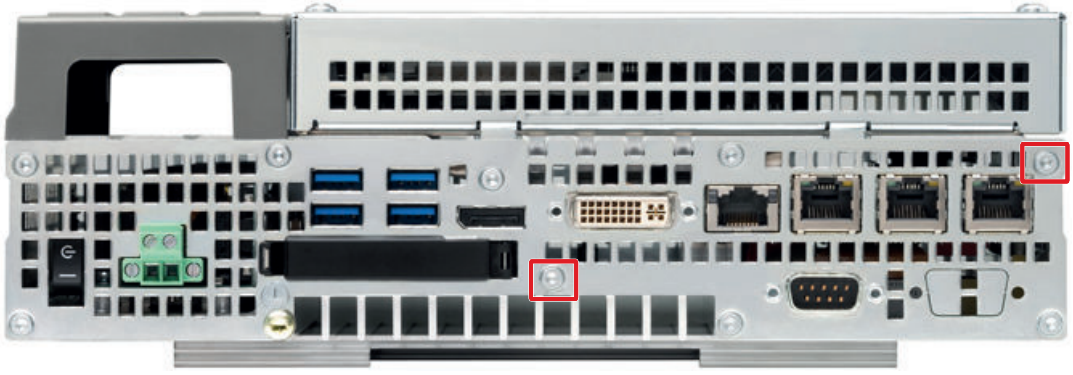


Figure 6-3 Strain relief - marking of the screws

2. Secure the strain relief at the marked points.
   Only use the enclosed lens head screws for securing the strain relief.

6.5 Connecting PROFIBUS

6.5.1 Requirement

- SIMOTION P320-4 is switched off and disconnected from the mains
- IsoPROFIBUS board (Article No. 6AU1390-0AA00-0AA1)

6.5.2 SYNC I/O connecting cable / Plugging in the IsoPROFIBUS board

To be able to plug in the IsoPROFIBUS board, the device must be opened and the SYNC I/O connecting cable must be rerouted:

1. Remove the screws of the upper cover plate and open the SIMOTION P320-4.
   At the factory, the SYNC I/O connecting cable is secured in the device using an adhesive tape.

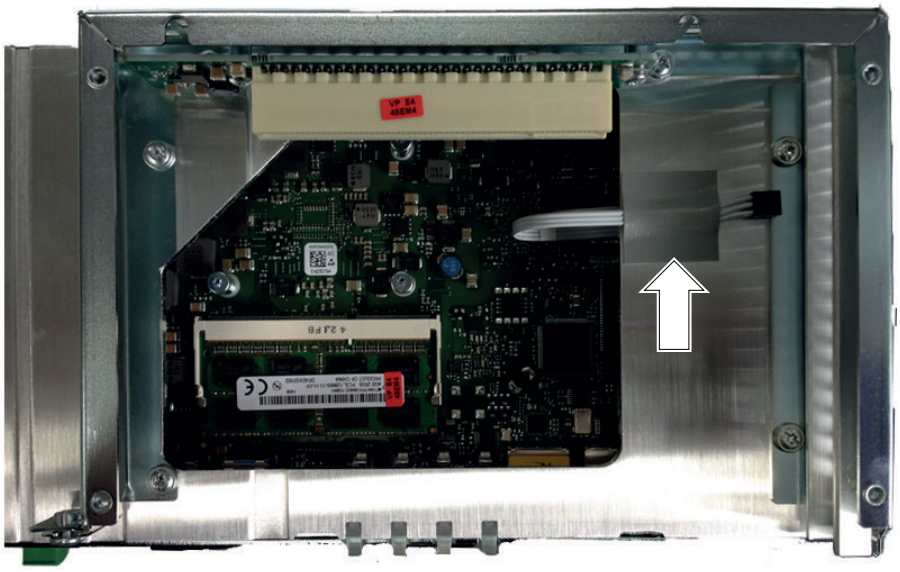


Figure 6-4 Opened SIMOTION P320-4 with SYNC I/O connecting cable as delivered ex works

2. Remove the adhesive tape and change the position of the SYNC I/O connecting cable as follows:
   the SYNC I/O connecting cable is routed to the interface side of the device and secured there again.



Figure 6-5 SIMOTION P320-4 with changed position of the SYNC I/O connecting cable

3. Remove the slot plate on the left side to expose the cutout for the interfaces of the IsoPROFIBUS board.
4. The IsoPROFIBUS board is inserted in the next step:
   Slide the IsoPROFIBUS board on the left into the guide rail of the previously removed slot plate and push it backward guided by the rail.

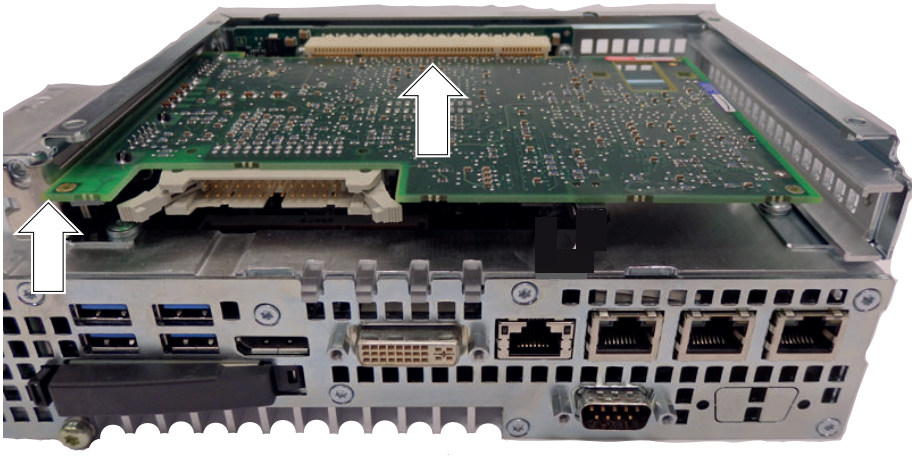


Figure 6-6 Inserting the IsoPROFIBUS board

5. The IsoPROFIBUS board is inserted into the rear PCI slot by applying slight pressure.

6. Then the SYNC I/O connecting cable is connected to the IsoPROFIBUS board.
   The cable is plugged directly into the 3-pole socket on the IsoPROFIBUS board for this purpose.

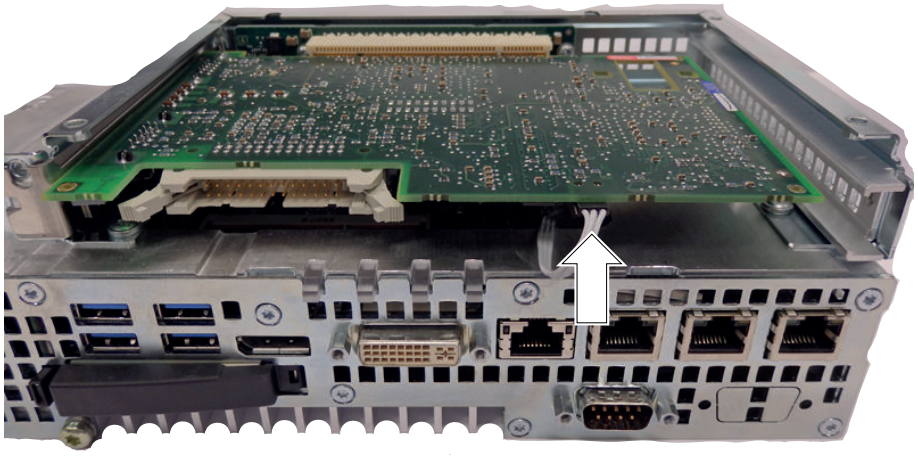


Figure 6-7 Plugging in the SYNC I/O connecting cable

7. Close the cover plate of the SIMOTION P320-4 and fasten the screws.

6.5.3 Connecting the IsoPROFIBUS board

The interface for the optional IsoPROFIBUS board is protected by a cover. There are two holes in the cover for wiring.

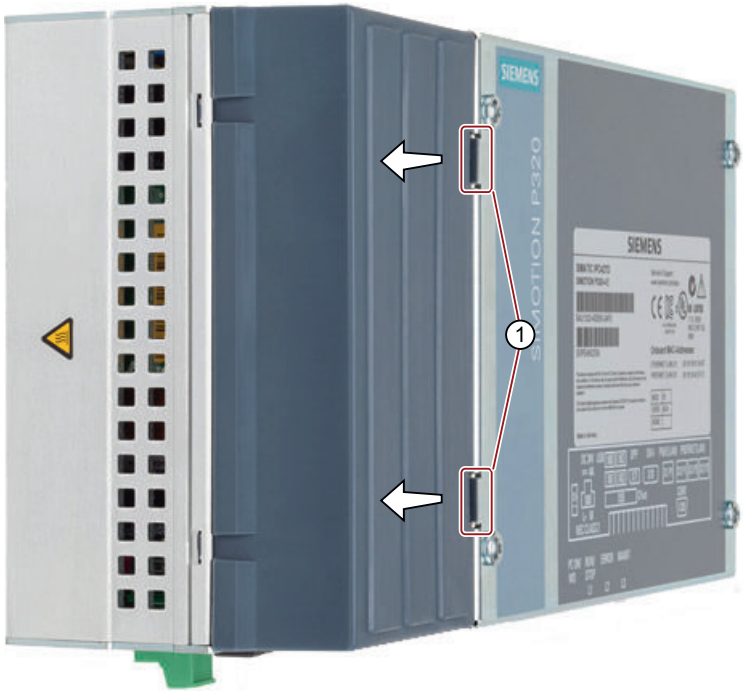
Requirement

The device is switched off.

Procedure

To connect the IsoPROFIBUS board, proceed as follows:

1. Unlock the cover by pushing the latches in the direction of the arrow;
   swivel the released cover in the direction of the arrow and remove it. The interfaces for the optional IsoPROFIBUS board are then free.



2. Connect the IsoPROFIBUS board to the slots shown.



3. Place the cover on the positions shown and close it.
   Make sure that the latches engage to secure the cover in its position.

6.5.4 IsoPROFIBUS board and PROFIBUS DP

PROFIBUS DP connection example

Both interfaces of the IsoPROFIBUS board can be used as PROFIBUS DP interfaces. The following screen shows an example of a PROFIBUS application.

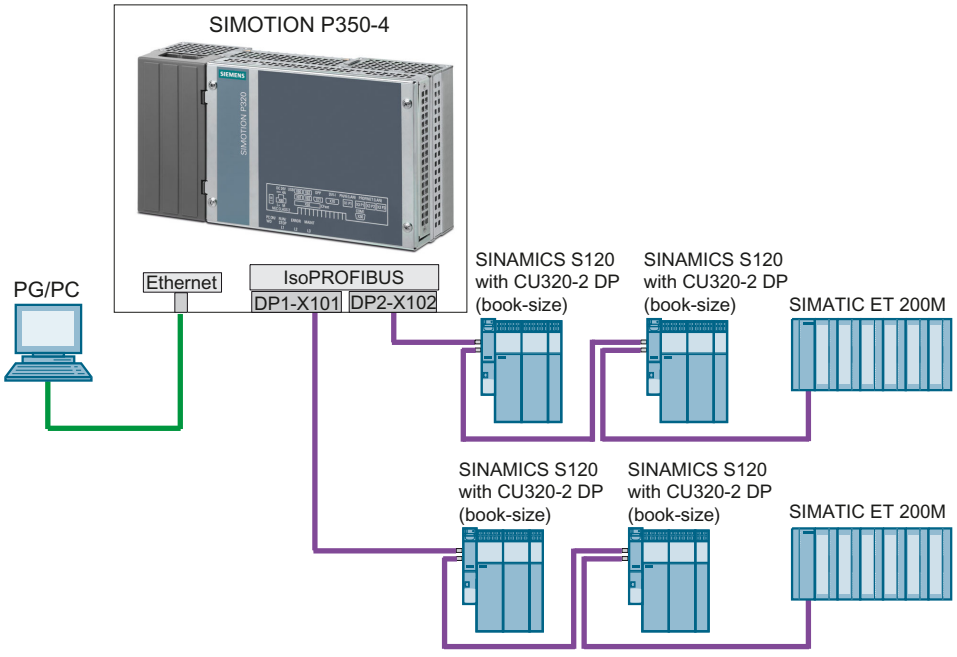


Figure 6-8 Example for a PROFIBUS application

6.5.5 Connecting the bus connectors for the X101 and X102 interfaces (IsoPROFIBUS)

The bus connector is used to connect the PROFIBUS cable to the IsoPROFIBUS interface (X101, X102). thus establishing a connection to additional stations.

Connecting the bus connector

Proceed as follows to connect the bus connector:

1. Plug the bus connector into the IsoPROFIBUS interface on the module.
2. Screw the bus connector onto the interface.
3. If the bus connector is located at the start or end of a segment, you must connect the terminating resistor (switch position "ON").

Terminating resistor connected 

Terminating resistor not connected 

Figure 6-9 Bus connector: Terminating resistor switched on and off

⚠ WARNING

Data exchange on the bus can be interrupted!

A bus segment must always be terminated with the terminating resistor at both ends. This is not the case, for example, if the last node with a bus connector is de-energized. Because the bus connector takes its voltage from the station, this terminating resistor is ineffective.

Make sure that the stations at which the terminating resistor is connected are always energized.

6.5.6 PROFIBUS cable

Properties of the PROFIBUS cable

The PROFIBUS cable is a two-stranded, twisted, and shielded cable.

Table 6-1 Properties of the PROFIBUS cable

Features	Values
Surge impedance	Approximately 135 to 160 Ω (f = 3 to 20 MHz)
Loop resistance	≤ 115 Ω/km
Operating capacity	30 nF/km
Attenuation	0.9 dB/100 m (f = 200 kHz)
Permitted strand cross-section	0.3 mm^2 to 0.5 mm^2
Permissible cable diameter	8 mm ± 0.5 mm

Rules for laying

When you install a PROFIBUS cable, you must not:

- Twist
- Stretch
- Or compress it.

When installing the indoor bus cable, you should also remember the following boundary conditions (d_A = outer diameter of the cable):

Table 6-2 Boundary conditions for indoor routing of bus cable

Features	General conditions
Bending radius for a single bend	≥ 80 mm (10 × d_A)
Bend radius for multiple bends	≥160 mm (20 × d_A)
Permissible temperature range for installation	- 5° C to + 50° C
Temperature range for storage and stationary operation	- 30° C to + 65° C

Note

The length codes for the pre-assembled cables can be found on the website www.siemens.com/simotion (www.siemens.com/simotion).

6.6 Connecting Ethernet

Procedure

Plug the LAN cable into the Ethernet interface of the SIMOTION P320-4. You must hear the connection engage properly.

Cables

Standard shielded twisted pair cables are used for the networking in this case.

The following connection cables are recommended:

- SIMATIC NET, ind. Ethernet TP XP CORD RJ45/RJ45, TP CORD assembled with 2 RJ45 connectors, send and receive cables crossed (cross-over)
  Order no.: 6XV1850-2H*)
- SIMATIC NET, ind. Ethernet TP CORD RJ45/RJ45, TP CORD assembled with 2 RJ45 connectors
  Order no.: 6XV1850-2G*)

*) Length code		Dimensions
	E50	0.5 m
	H10	1 m
	H20	2 m
	H60	6 m
	N10	10 m

Note

Further information on the use of these cables can be found in the SIMATIC NET Twisted-Pair and Fiber-Optic Networks Manual (https://support.industry.siemens.com/cs/ww/en/view/8763736).

6.7 Connecting the keyboard and mouse

USB interfaces

You can connect the keyboard and the mouse to the USB interfaces of the SIMOTION P320-4.

6.8 Connecting the power supply

6.8.1 Safety rules

Basic rules

Only the basic rules for electrical installation can be described in this section on account of the diverse applications possible. At a minimum, you must comply with these basic rules to ensure problem-free operation.

Rules for safe operation

In order to ensure safe operation of your equipment, implement the following measures, adapting them to suit your conditions:

- An EMERGENCY OFF concept in accordance with the generally accepted rules of current engineering practice (e.g. European standards EN 60204, EN 418, and similar).
- Additional measures for limiting the end position of axes (e.g. hardware limit switches).
- Equipment and measures for protection of motors and power electronics in accordance with the SIMOTION installation guidelines.
  In order to identify hazards, we also recommend that a risk analysis be conducted on the entire system in accordance with the basic safety requirements set out in Appendix 1 of EU machinery directive.

Additional references

- Guidelines on Handling Electrostatic Sensitive Devices (ESD), see Appendix ESD Guidelines (Page 229).
- For installing a system with SIMATIC ET 200 I/O (e.g. ET 200S, ET 200M, etc.), refer to the documentation for the relevant ET 200 I/O systems.

6.8.2 Standards and Regulations

VDE guideline compliance

During wiring, you must observe the appropriate VDE guidelines, in particular VDE 0100 and VDE 0113 for tripping devices and short-circuit and overload protection.

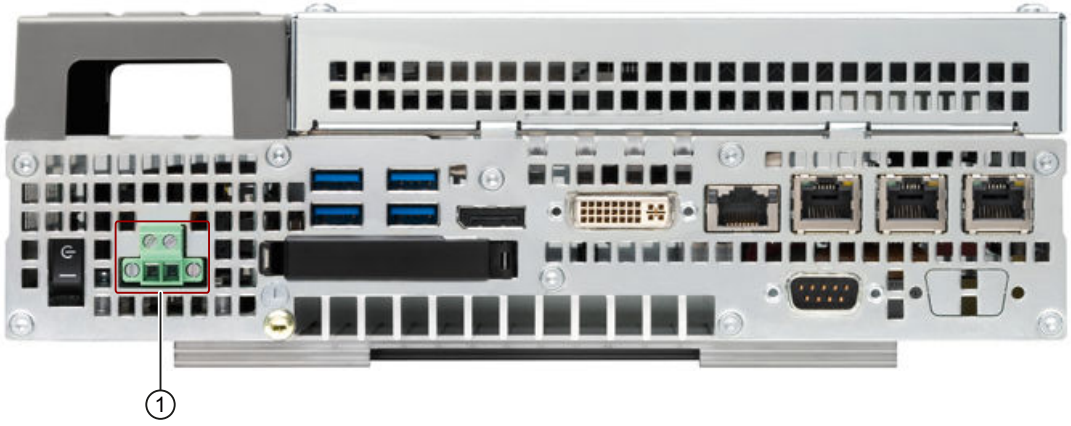
System start-up after specific events

The following list identifies considerations required for startup of a system following certain events.

- If the system starts up again following a voltage drop or power failure, all hazardous operating states must be prevented from occurring. If necessary, force an EMERGENCY OFF.
- If the system starts up again after the EMERGENCY OFF apparatus is released, the startup must not be unchecked or undefined.

6.8.3 Connecting the power supply

Connect your power supply (e.g. SITOP smart 24 V / 10 A) directly to the power-supply socket of the SIMOTION P320-4.



① 24 VDC power supply

Figure 6-10 Power supply connection

⚠ WARNING
On/Off switch The On/Off switch does not disconnect the device from the power supply system. To remove power from the device, the power supply plug must be removed.

6.8.4 Protective conductor connection and potential equalization

Connect the equipotential bonding strip on the SIMOTION P320-4 (large surface, large-area contact) with the central grounding point of the cabinet or system in which the devices are installed.
The protective conductor must not have less than a minimum core cross-section of 2.5 mm^2.



① Protective conductor connection / potential equalization

Power on and software installation

7

7.1 Power-up

SIMOTION P320-4 is supplied with pre-installed software modules. After activation, Windows with SIMOTION P is powered up automatically.

The SIMOTION P320-4 issues the following message after successful power-up:



Figure 7-1 SIMOTION P320-4 after power-up

The SIMOTION P320-4 responds in this way to every subsequent power-up.

7.2 Additional software for HMI

Note

Action before installing additional software

Before installing additional software, make sure that you terminate the runtime of the SIMOTION P.

You terminate SIMOTION P in the application SIMOTION P State using the button **Terminate SIMOTION P**.

If required, the following software can be installed directly on the SIMOTION P320-4:

- WinCC flexible Runtime
- WinCC flexible engineering system for P320-4 S
- OPC client from other manufacturers
- Utilities of the OEMs
- SIMATIC NET

This software must be purchased separately and is not contained in the SIMOTION P320-4 scope of delivery.

Please refer to the documentation supplied with the software for details regarding the procedure for installing the respective software.

7.3 Customer-specific software

To ensure high-quality and reliable working of the device, SIMOTION P320-4 is fully configured and ready for operation at the time of delivery.

For this purpose, the system components used are subject to a certification procedure with Siemens as the system manufacturer. The certification process establishes and documents the real-time features of the complete system.

NOTICE
Changes or expansions of PC components (hardware or software) by a third party If PC components (hardware or software) are modified or expanded by a third party, compliance with product features cannot be guaranteed. The OEM or user involved must assume sole responsibility for such components. Compliance with product features can only be guaranteed by SIEMENS.

Operator Control (hardware)

8

8.1 SIMOTION P state application

8.1.1 SIMOTION P State application overview

The LEDs, mode selector, and CF card handling indicators, which are implemented as hardware on other SIMOTION platforms, are visualized on the screen for SIMOTION P320-4.

The display is performed by the **SIMOTION P State** application. The following figures show SIMOTION P State in the started state with/without inserted IsoPROFIBUS board.

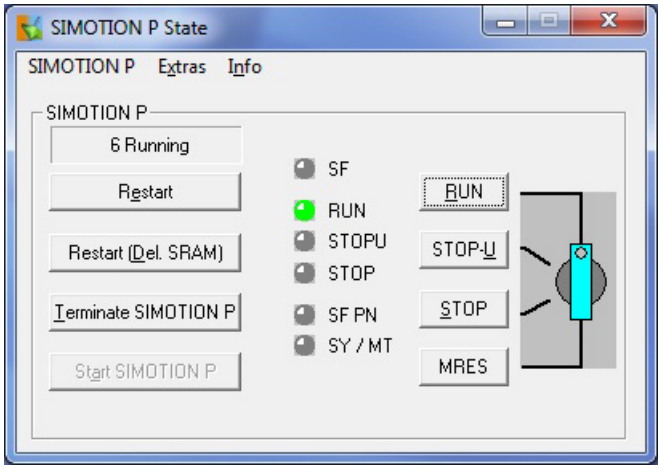


Figure 8-1 SIMOTION P State - PROFINET onboard

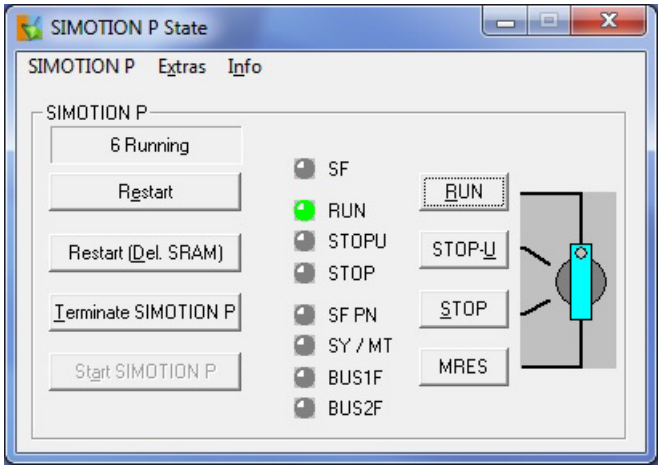


Figure 8-2 SIMOTION P State - PROFINET onboard and additionally with optional IsoPROFIBUS board

Note

The SIMOTION P State application is in English.

Generally, only English is supported on the SIMOTION P320-4, this also applies for the Win7 operating system.

8.1.2 LED display

Meaning of LEDs

The meaning of the LEDs and their colors is described in the table below.

LED display		Meaning	Description
SF	Red	Fault	The fault state of the SIMOTION P320-4 is displayed.
RUN	Green	SIMOTION P320-4 in RUN mode	The user program is running.
STOPU	Yellow	SIMOTION P320-4 in the STOP User Program	The technology packages (e.g. synchronous operation, cam) are active. Test and commissioning functions can be executed without a user program. The user program is not active.
STOP	Yellow	SIMOTION P320-4 in STOP mode	There is no user program running. The technology packages are not active.
SF PN	Red	PROFINET bus fault	A fault state is displayed on the PROFINET interface (X3).
SY/MT	Yellow	Sync of the PROFINET interface	It is displayed whether the PROFINET interface has been synchronized.
BUS1F	Red	Group fault	A fault state is displayed on the IsoPROFIBUS interface (X101).
BUS2F	Red	Group fault	A fault state is displayed on the IsoPROFIBUS interface (X102).

Note

LEDs for IsoPROFIBUS board

The LEDs BUS1F and BUS2F are **only** shown if an IsoPROFIBUS board is connected.

Additional references/information

You can find additional information at:

- Diagnostics via LED displays (Page 207) (for a more accurate diagnosis of an LED state)
- Operating displays (SIMOTION P320-4 E / P320-4 S Manual: Information on display modes, of the SF PROFINET LEDs only displayed on the hardware side, in the operating displays section)
- PROFINET bus error occurs (Page 215)

8.1.3 Mode selector

Mode selector in SIMOTION P State

Use the mode selector to set the SIMOTION P320-4 to different states. The controller can be switched in **RUN** or **STOP** / **STOPU** mode and perform an overall reset.

The change of the operating state with the mode selector has **priority** over a state selected via SIMOTION SCOUT.

Note

Setting the operating state via the mode selector

The **STOP**/**STOPU** switch position cannot be set to **RUN** via the SIMOTION SCOUT.

To change the operating state, use the mode selector.

Further information

Further information can be found in Section Overall reset with the mode selector (on the screen) (Page 186).

8.1.4 Current operating status

The current state of the SIMOTION P320-4 is displayed in the upper left area of the **SIMOTION P State** application.

Table 8-1 The following state displays are possible:

Not started	SIMOTION P320-4 is not started.
0 … 5	The progress of the SIMOTION P320-4 power-up is displayed.
6 Running	SIMOTION P320-4 has completed power up and the cyclic tasks are activated.
Disabled	SIMOTION P320-4 is deactivated.

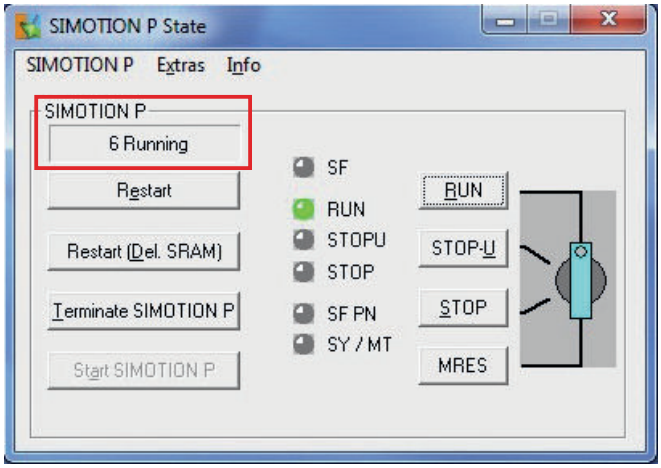


Figure 8-3 SIMOTION P State - state display

The status LEDs and the current operating state are also displayed in the Windows task bar:



RUN state: Green



STOP state: Yellow



NOT STARTED state: Gray

Note

FAQs can be found in Section Troubleshooting/FAQs (Page 219).

8.1.5 Function elements

Functions of the buttons

Below the current SIMOTION P320-4 status display, you will find a selection of buttons which can only be operated with administrator rights.

Description of the button functions:

Table 8-2 Function of the buttons in SIMOTION P State

Button	Function
Restart	Restarting SIMOTION P320-4. The information in the SRAM is retained. If RamToRom is called beforehand, the project backup is restored. **Note** This is only possible if SIMOTION P320-4 has been powered up (status not "0" to "5", "not started").
Restart (Del. SRAM)	Restarts SIMOTION P320-4 and deletes the information in the SRAM. If RamToRom is called beforehand, the project backup is restored. **Note** This is only possible if SIMOTION P320-4 has been powered up (status not "0" to "5", "not started").
Terminate SIMOTION P	Stop SIMOTION P320-4. **Note** This is possible only if SIMOTION P320-4 has powered up.
Start SIMOTION P	Start SIMOTION P320-4. **Note** This is possible only if SIMOTION P320-4 has not been started

Resetting to the delivery condition

SIMOTION P320-4 can be reset to the default settings at the time of delivery (Page 195) via SIMOTION P State.

8.1.6 SIMOTION P State - menus

The menus of the SIMOTION P State application are described below:

- SIMOTION P
- Options
- Info

SIMOTION P menu

SIMOTION P	Description
Temperature	Display of the temperatures in the device, monitoring of the threshold value. An alarm (Page 211) is issued when a threshold value is reached or exceeded.
Set Diagnostic Switch	Diagnostic switch for recording diagnostic data and backing up the non-volatile SIMOTION data on the external CFast card. Diagnostics data can be recorded during power-up and during operation for the error diagnostics. The diagnostics switch is automatically reset after writing the data. **See also the following sections**: Recording diagnostic data (Page 193). Backing up non-volatile SIMOTION data (retain data) (Page 179)
Webserver	Access to the SIMOTION IT Web server is protected by a multi-level security concept. Upon delivery, the security level is low to allow configuration of the device. The security state of the Web server can be set here. The following selection options are available: • Security Level: normal • Security Level: low

Temperature specifications

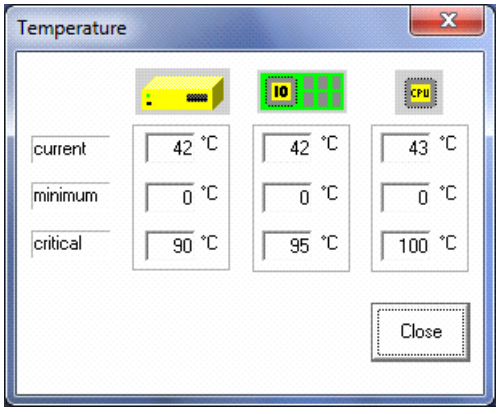


Figure 8-4 Dialog Temperature

The temperature specifications for the SIMOTION P320-4 can be found at **SIMOTION P > Temperature**.

The current, the minimum and the critical temperature are determined at the housing, mainboard and CPU measuring points and displayed in this dialog box.

Options menu

Options	Description
Reset to factory default	Restore the factory default. This will delete the following data: • The non-volatile SIMOTION data (retain data) in the SIMOTION device • The backup of the non-volatile SIMOTION data on the external CFast card (PMEMORY.XML/PMEMORY.BAK) • The user data from the "Volatile SIMOTION data" area (RAM) and on the external CFast card (ROM) • The communication configuration (IP and DP parameters) on the external CFast card is set to the factory settings. The licenses on the CFast card are retained.

Note

Station Configurator settings

Settings made with the Station Configurator are reset to the default values at the time of delivery as well.

Further information

can be found in Section Defined states > Restore the factory settings using SIMOTION P State (Page 182)

Info menu

Info	Description
Hardware Version	Display of the hardware information.
Software Version	Display of the software versions.
Info about SIMOTION P State	Display of the SIMOTION P version.

Note

The versions in the **Info** menu only become visible after the Windows power-up after the SIMOTION P320-4 has been started once.

Parameter assignment/addressing 9

9.1 Parameter assignment / addressing requirements

The following actions should be completed before you start parameterizing or addressing:

- The SIMOTION P320-4 and the other hardware are installed.
- The devices are connected.
- The required software is installed.
- The SIMOTION P320-4 has been switched on.

The actual state should be saved after the parameterization.

9.2 Factory settings

9.2.1 Factory settings overview

Requirement

You have obtained information about the various communications models. Further information can be found under HMI and SIMOTION SCOUT (Page 61).

You are familiar with the Windows Control Panel.

Resetting the factory settings

It is possible to reset SIMOTION P320-4 to the factory settings (see section Resetting the SIMOTION P to the initial state (Page 196)).

9.2.2 Ethernet - TCP/IP local

SIMOTION P320-4 delivery state

Local communication in the SIMOTION P320-4 between Windows programs such as HMI and the SIMOTION P Runtime software is handled via the preset **TCP/IP** Ethernet communication.

As an alternative to TCP/IP, the **PC internal (local)** communication can also be used. Further information on how to check the settings in the Windows Control Panel can be found in Section Check PC internal settings (Page 146).

9.3 SIMOTION P control manager

9.3.1 Requirement

NOTICE
SIMOTION P Control Manager Because the settings made via the SIMOTION P Control Manager change the factory default parameters, they should only be made by authorized persons.

9.3.2 SIMOTION P Control Manager overview

The SIMOTION P Control Manager is used to configure the SIMOTION P software.

Call

The SIMOTION P Control Manager is only used by the **administrator**. Only the administrator is authorized to make changes.

The **SIMOTION P Control Manager application** is called by means of the operating system's Control Panel.

Properties

SIMOTION P Control Manager has the following features:

- The following settings take effect immediately after a change:
  - Start SIMOTION P
  - Automatic Restart By Plug-In External Memory Card
  - Ethernet-IP address
- The values to be set are generally required only by the administrator.
  These are:
  - License handling
  - IP addresses

9.3.3 Calling SIMOTION P Control Manager from the control panel

You can call the SIMOTION P Control Manager in the Windows Control Panel (Start > Control Panel).

The call can only be made as administrator. If you are not logged on as administrator, a prompt will appear notifying you of this fact.

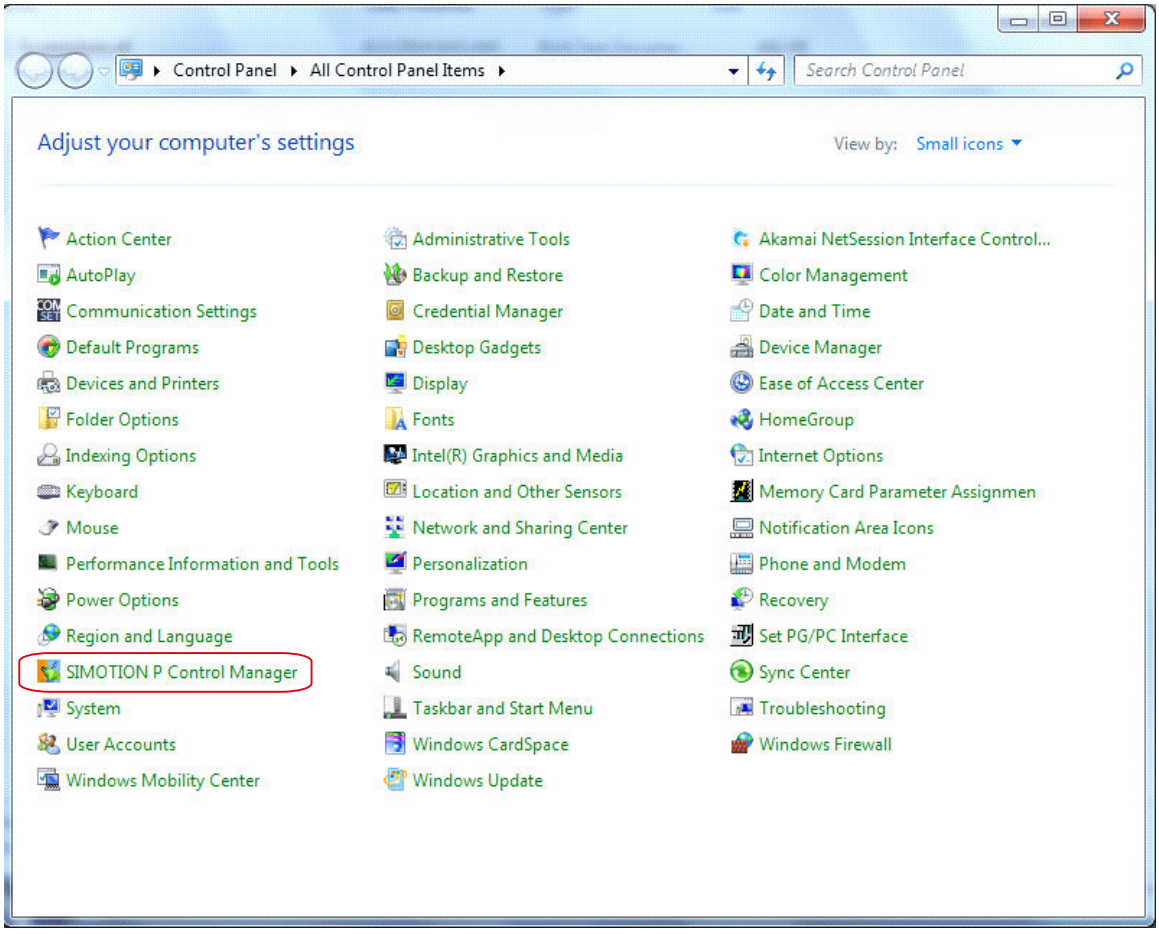


Figure 9-1 Calling the SIMOTION P Control Manager

If the call was successful, the **SIMOTION P Control Manager** dialog, **Administration** tab, is displayed.

The SIMOTION P Control Manager application is in English.

9.3.4 Administration tab

The **Administration** tab contains:

- Start SIMOTION P (Page 140)
- Automatic Restart By Plug-In External Memory Card (Page 141)
- Runtime Network Connections (Page 142)

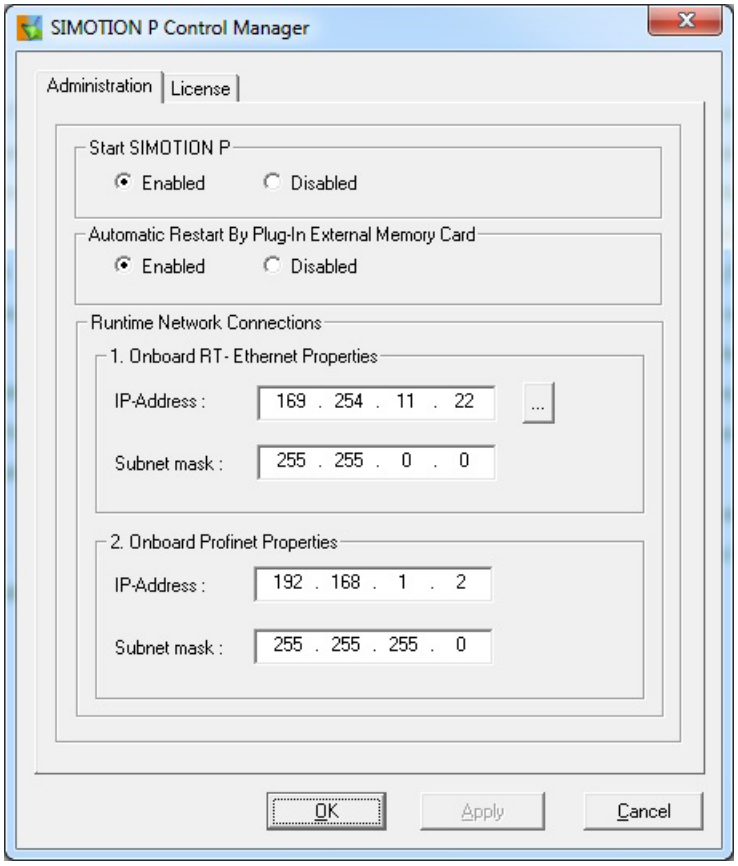


Figure 9-2 SIMOTION P Control Manager - Administration tab

9.3.4.1 Start SIMOTION P

The following settings are possible:

- **Enabled**
  Immediately cancels the lock set with **Disabled**. The SIMOTION P320-4 must be booted to automatically start SIMOTION P.
  SIMOTION P can also be started by means of the SIMOTION P State application using the **Start SIMOTION P** button.
- **Disabled**
  Prevents the automatic starting of SIMOTION P while the Windows system is booting up. SIMOTION P cannot be started until this lock is canceled.

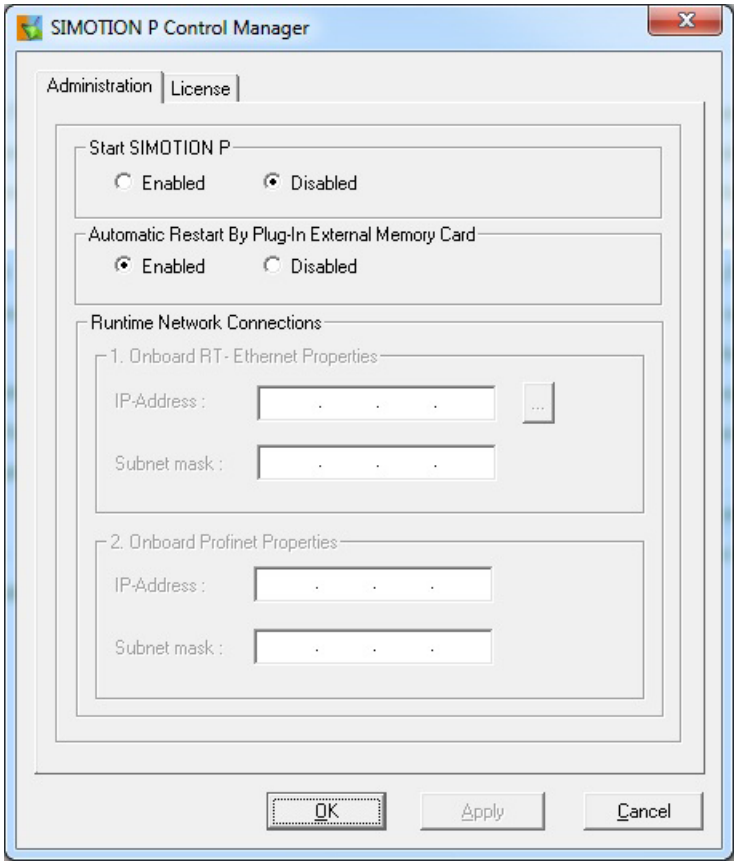


Figure 9-3 Start SIMOTION P - Disabled

SIMOTION P State display

If "Disabled" is selected in the **Administration** tab at **Start SIMOTION P**, the "Disabled" status is also displayed at **SIMOTION P State** .

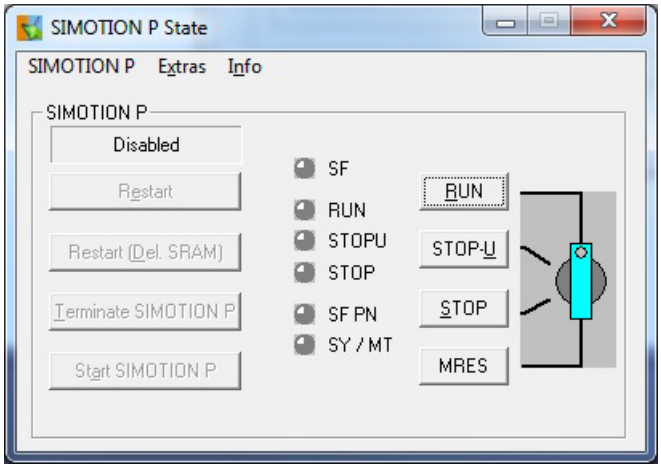


Figure 9-4 SIMOTION P State - Disabled status

9.3.4.2 Automatic Restart By Plug-In External Memory Card

Note

Not a Windows restart

Note that this is not a Windows restart!

The following settings are possible:

- **Enabled**
  An automatic restart of the SIMOTION P Runtime is performed at the start of the SIMOTION P320-4 with withdrawn CFast card or for a CFast card withdrawn during operation.
  The automatic restart of the SIMOTION P Runtime for the Enabled default setting is performed when the CFast card is inserted.

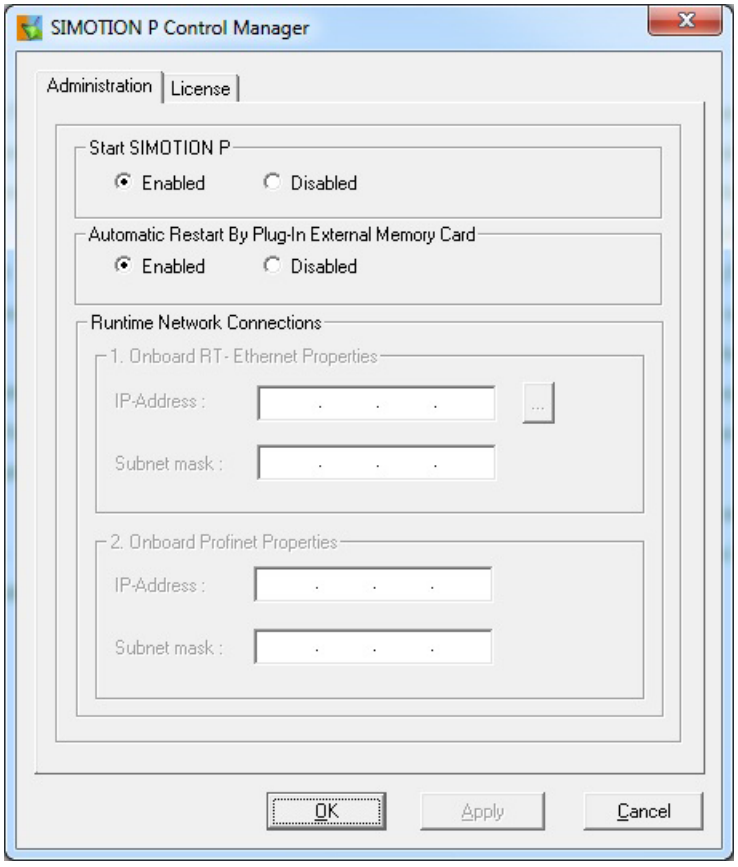


Figure 9-5 Administration tab - Automatic Restart By Plug-In External Memory Card

- **Disabled**
  The automatic restart of the SIMOTION P Runtime is prevented after inserting the CFast card.

Note

Behavior with withdrawn CFast card

Further information on the behavior of the SIMOTION P320-4 with withdrawn CFast card can be found in Section Automatic restart of the SIMOTION P Runtime (Page 87).

9.3.4.3 Runtime Network Connections

The Ethernet interface of the SIMOTION P320-4 is displayed here. It can be addressed via the SIMOTION P Runtime.

The IP address can be set here, however, it is not permanent.

The IP address set here loses its validity when the following actions are carried out:

- Booting of the SIMOTION P320-4
- Downloading a project to the SIMOTION P320-4
- Exiting the SIMOTION P Runtime (Terminate SIMOTION P)
- Restarting SIMOTION P Runtime (Restart)

The IP address in SIMOTION SCOUT can be changed permanently using the HW Config or user program.

Changing the IP address

You can change the IP settings after selecting the button, the **Onboard RT - Ethernet Properties** dialog box opens.

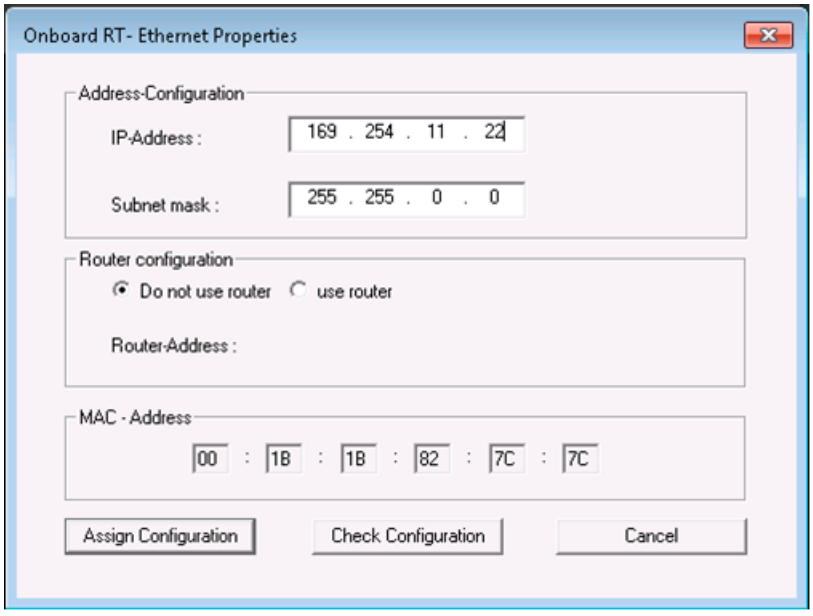


Figure 9-6 Onboard RT - Ethernet Properties

Click **Check Configuration** to validate the settings of the Runtime Ethernet configuration and check for agreement with the Windows Ethernet interface.
You can find further information about this in Section Ethernet communication overview (Page 150).

Click **Assign Configuration** to also check the settings and accept them.

Note

The IP data is only displayed when the SIMOTION P320-4 is started.

9.3.5 License tab

The **License** tab can be used

- To view currently installed licenses
- To enter new License Keys.

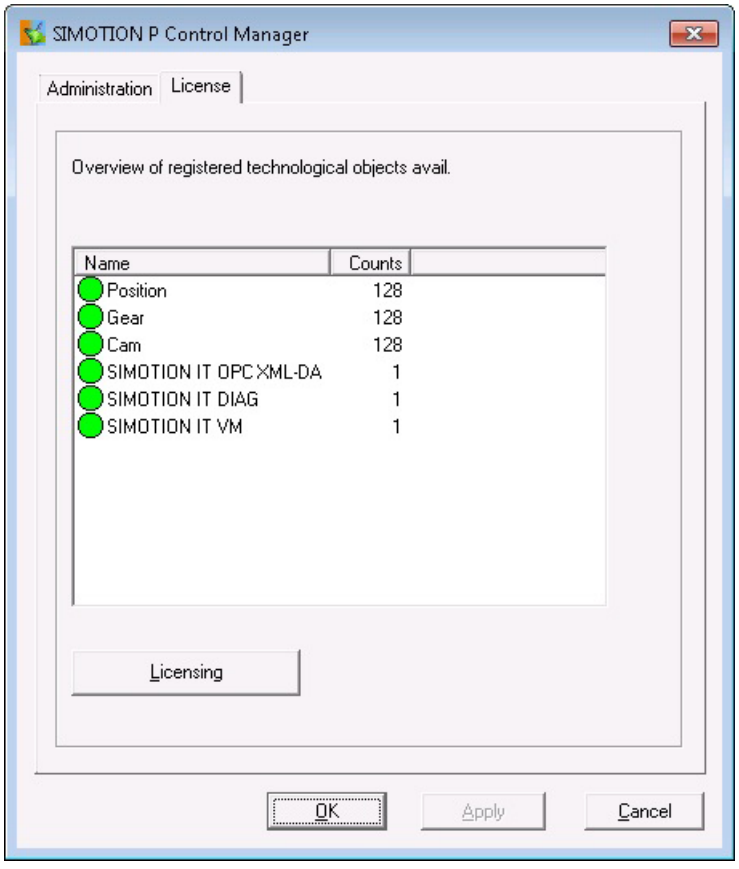


Figure 9-7 License tab

This tab displays the licenses currently installed on this hardware. If you wish to modify the licensing of this hardware, click the **Licensing** button.

The **License Manager** dialog box is displayed; here you enter a new **License Key**.

License Manager

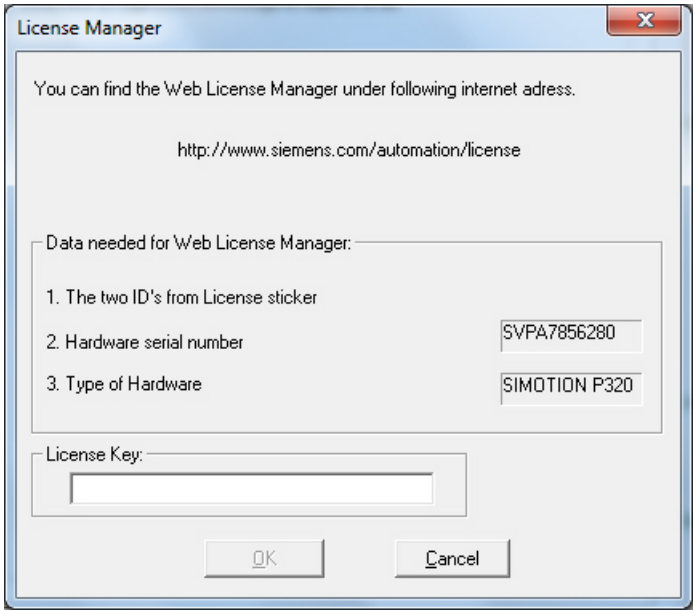


Figure 9-8 Dialog License Manager

Impact of hardware replacement on licensing:

The replacement of the SIMOTION P320-4 means that the License Keys which were generated for the previous SIMOTION P320-4 must be regenerated and transferred to the new SIMOTION device.

In this case, contact the hotline: http://support.automation.siemens.com

Note

You must restart the SIMOTION P320-4 after licensing. To do this, in SIMOTION P State press

- either the **Restart** button
- or the "**Terminate SIMOTION P**" button and then **Start SIMOTION P**.

Note

For more information on licensing, see the SIMOTION SCOUT Configuration Manual.

9.4 Local communication via PC internal

9.4.1 Local communication (PC-internal) overview

Local communication in the SIMOTION P320-4 between Windows programs such as HMI and the SIMOTION P runtime software is handled by the PC's internal communications mechanisms.

9.4.2 Checking the PC-internal settings

Configuration in the Windows Control Panel of the SIMOTION P320-4

To enable local communication the following settings must have been made:

You can access the settings via the Control Panel of Windows:

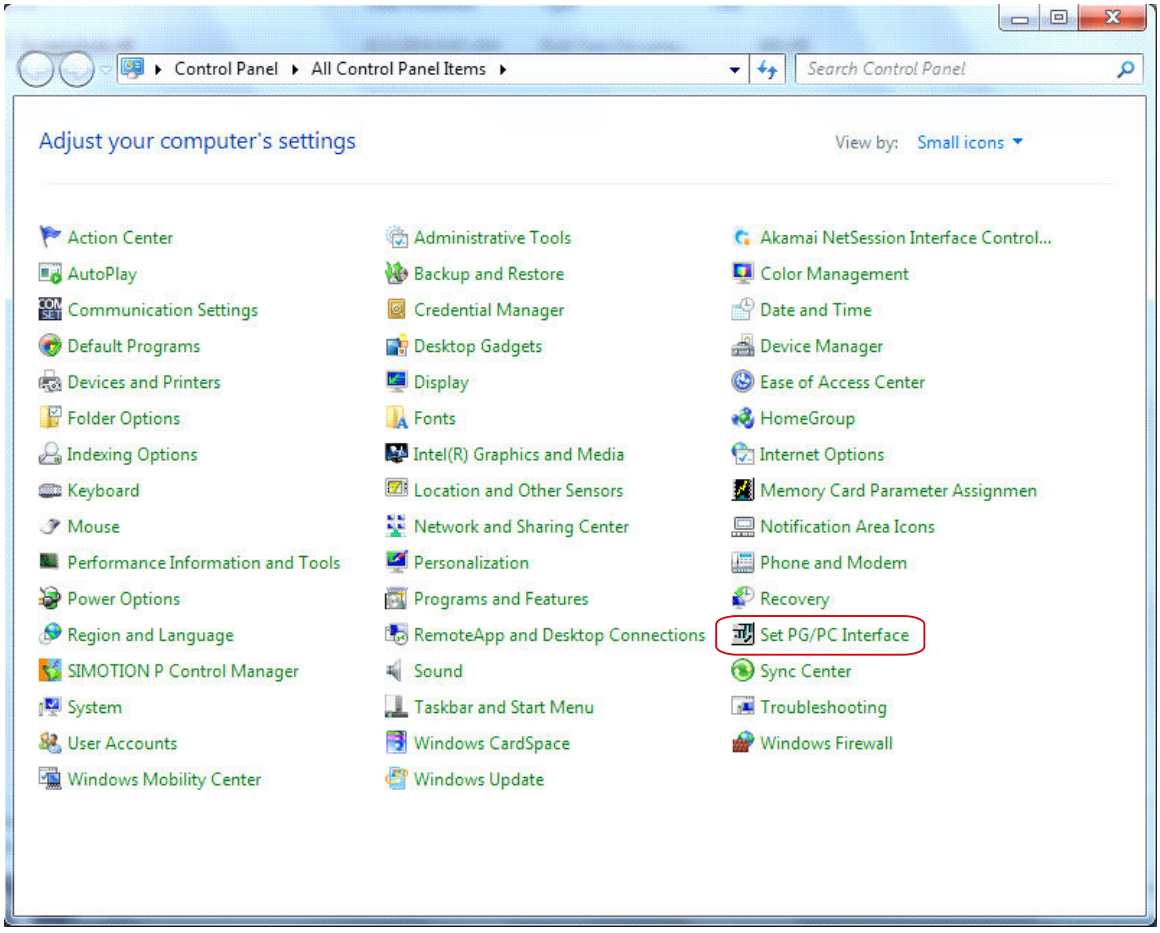
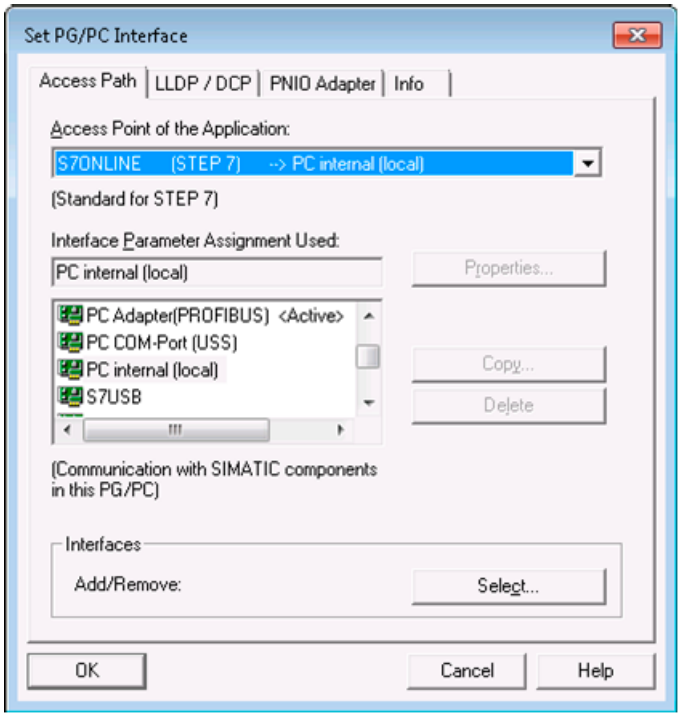


Figure 9-9 Control Panel - Set PG/PC Interface

Procedure

Proceed as follows to set the local communication to "PC internal (local)":

1. Call **Set PG/PC Interface**.
2. In the **Access Path** tab, set the field **Interface Parameter Assignment Used** to **PC internal (local)**.



3. Confirm with **OK**.

Note

SIMOTION P320-4 delivery condition

The preset communication version for the SIMOTION P320-4 is TCP/IP.

Further information can be found in Section Local HMI or ES on SIMOTION P320-4 (Page 61).

9.4.3 Station Configurator

The **Station Configurator** is required to configure the communication paths for the HMI software.

The Station Configurator is provided directly as desktop icon of the SIMOTION P320-4.



Figure 9-10 SIMOTION desktop with Station Configurator

Note

Changes via Station Configurator

If you want to make changes via the **Station Configurator** , it is essential that you terminate SIMOTION P before calling the function (with **Terminate SIMOTION P** in the SIMOTION P State application).

Observe uniform configuration

Check if the offline configuration set via SIMOTION SCOUT (HW Config) corresponds exactly to the online configuration set in the Station Configurator :

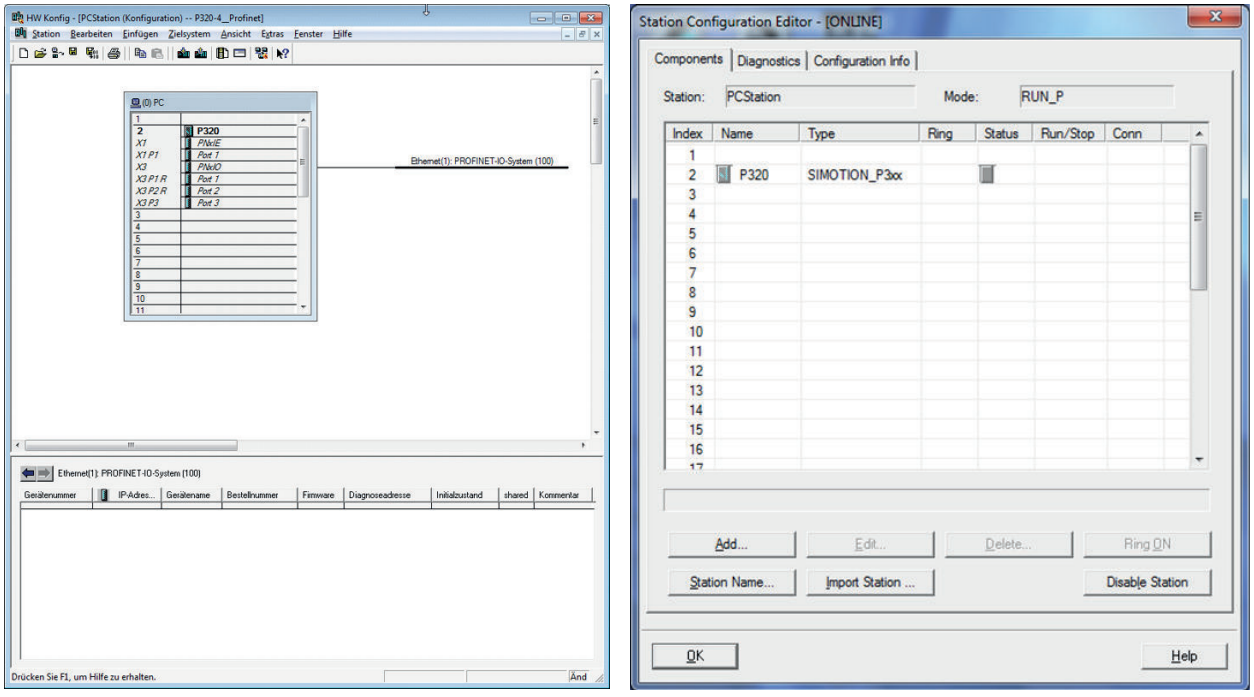


Figure 9-11 Illustration of the offline HW Config (left) - online Station Configurator (right)

9.5 Ethernet communication

9.5.1 Ethernet communication overview

SIMOTION P320-4 has one onboard Ethernet interface.

NOTICE
SIMOTION P Runtime During SIMOTION P Runtime, the onboard Ethernet interface must be **activated** under Windows. The onboard Ethernet interface must not be deactivated or activated during operation.

You can connect Industrial Ethernet to the Ethernet interface X1.

Industrial Ethernet is a communication network with a transmission rate of 10/100/1000 Mbps.

Note
Operating Ethernet locally

The SIMOTION P320-4 is configured for the **TCP/IP** communication version in the delivery condition.

See also Local HMI or ES on SIMOTION P320-4 (Page 61).

9.5.2 Ethernet interface

SIMOTION P320-4 has an onboard Ethernet interface.

An Ethernet interface can always have two IP addresses, one for Windows and one for the access from SIMOTION.

Table 9-1 Ethernet ports overview

Ethernet ports	Access to/from the SIMOTION P Runtime	Access to/from Windows
Onboard Ethernet 1	X	X
PROFINET onboard	X	-

The IP addresses have been set to the default values.

- Onboard Ethernet interface X1 reserved for Windows/SIMOTION (see section Default IP addresses for Windows and SIMOTION P (Page 153))
  - Windows setting: Default address
  - SIMOTION P Runtime: Default address

If the Windows IP address is taken from a DHCP server, the assignment of the runtime IP address and runtime subnet mask must also be selected in accordance with the default setting of the DHCP server.

The following applies (see Section Communication via an Ethernet interface (Page 153)):

- Windows IP address ≠ runtime IP address
- Windows IP address and runtime IP address must be in the same subnet

Ethernet interface for SIMOTION P Runtime

The IP address of the **Ethernet interface for SIMOTION P Runtime** can be:

- Displayed and changed via SIMOTION SCOUT
- Displayed in the **Administration** tab via the SIMOTION P Control Manager application. Here, however, the IP address can only be changed temporarily.
  Its validity ends with:
  - Booting, downloading, as well as terminating or restarting of SIMOTION P Runtime.
    Further information can be found in Section Administration tab (Page 138).

Ethernet interface for Windows

The IP address of the **Ethernet interface for Windows** can **only** be modified via the Windows Control Panel > Network and Sharing Center.

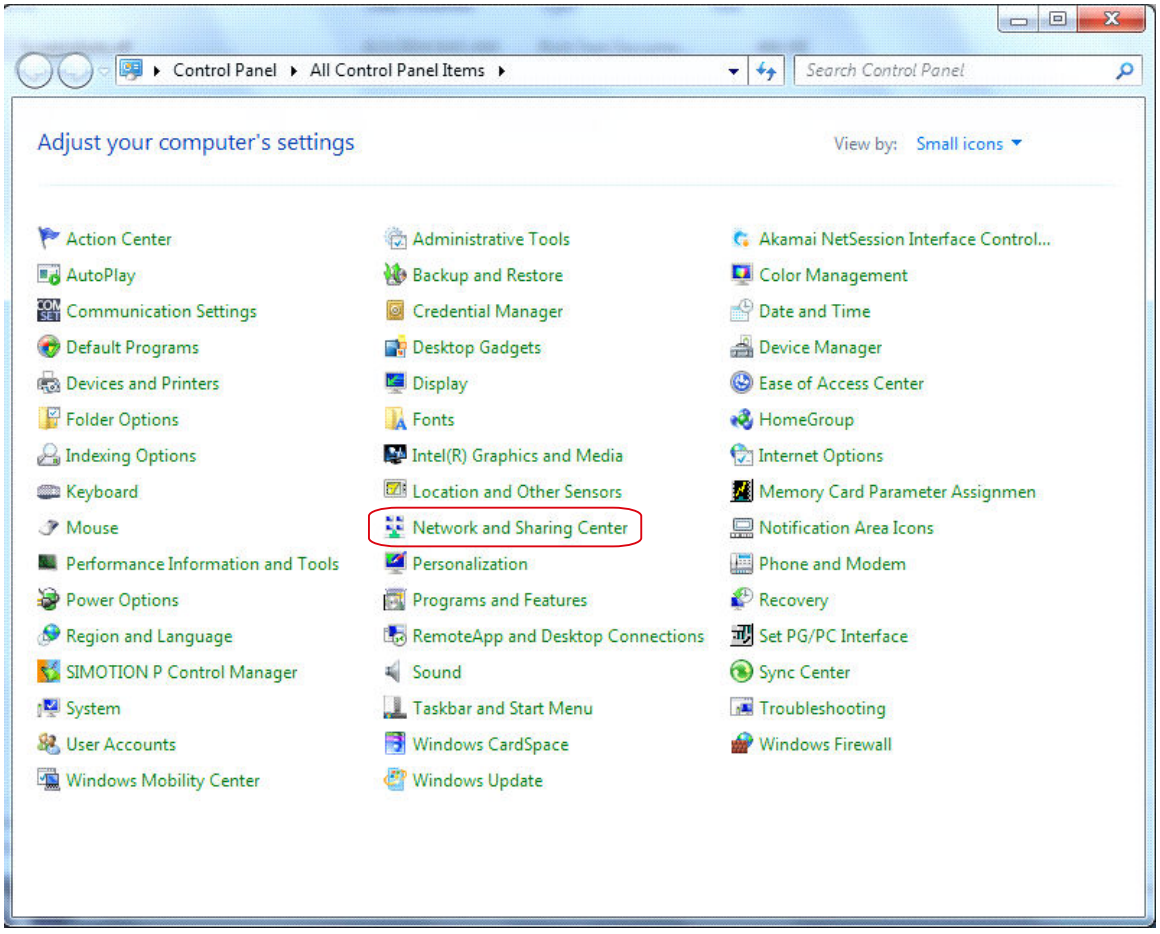


Figure 9-12 Windows Control Panel-Network and Sharing Center

Note

Windows Firewall

To allow the Windows IP to be accessed externally, this must be set as an exception in the Windows firewall **File and Printer Sharing**. Otherwise, there is only limited access to Windows from outside.

9.5.3 Default IP addresses for Windows and SIMOTION P Runtime

Default Ethernet addresses for use from Windows and SIMOTION P are preset.

Table 9-2 Default Ethernet address for Windows and SIMOTION P Runtime

Ethernet interface	Windows	SIMOTION P Runtime
Onboard Ethernet 1	169.254.11.21	169.254.11.22

The default IP address for Windows can result in IP addresses being assigned twice, e.g. during series commissioning (see Troubleshooting/FAQs (Page 219)).

If DHCP is set under Windows, the IP addresses for Windows are determined automatically.

9.5.4 Communication via an Ethernet interface

If both Windows and SIMOTION use the onboard Ethernet interface X1, the following configuration is present:

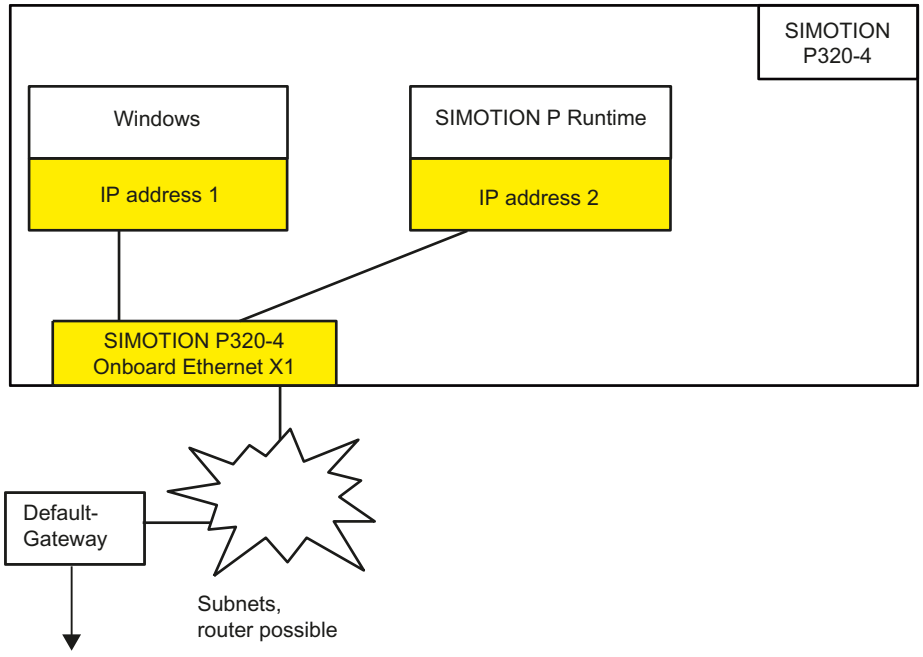


Figure 9-13 Distribution of the IP addresses for Windows and SIMOTION P Runtime

Note

If no change of the default IP addresses is desired, all conditions with the default IP addresses are fulfilled and no change is required.

The following conditions apply:

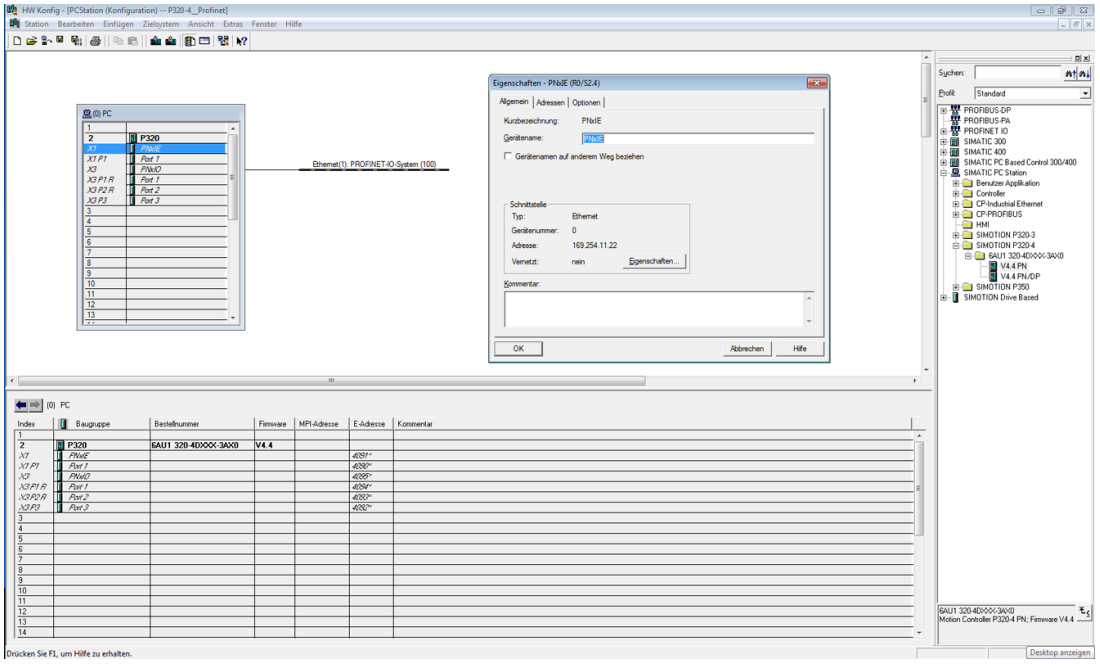
- IP address 1 ≠ IP address 2
- IP address 1 is in the same subnet as IP address 2
- IP address 1 is configured as of Windows 7 under > Control Panel > Network and Sharing Center.

Note

The setting for the default gateway must be identical for the IP addresses 1 and 2.

Procedure in HW Config to change the default IP addresses

1. Double-click **PNxIE** of the PC station. The following dialog box is opened.



2. Click the **Properties...** button of the Properties - PNxIE dialog box.

3. Enter the **IP address** for SIMOTION in the entry field (the default IP address is shown here).

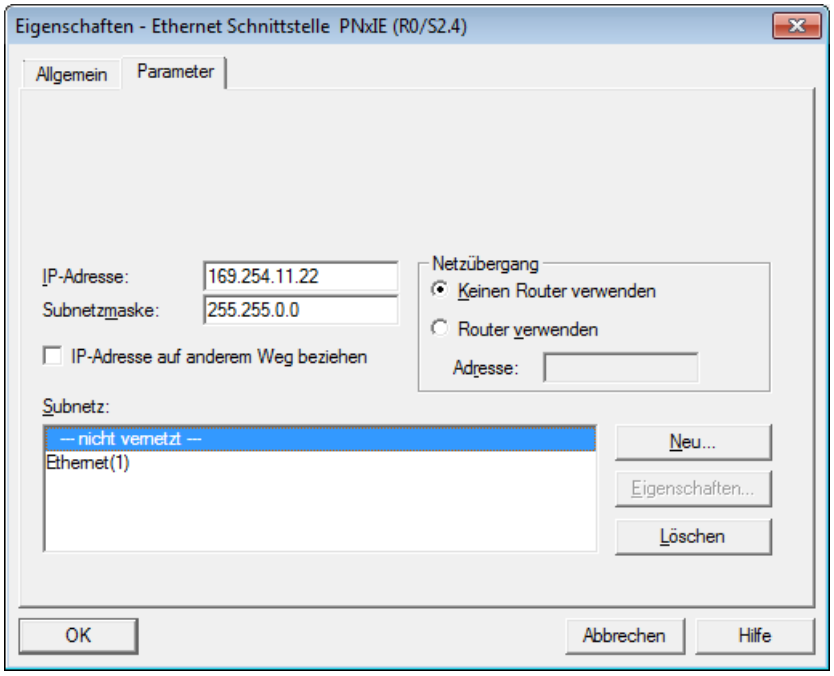


Figure 9-14 Changing the RT address for onboard Ethernet (1) - Properties dialog box

4. Enter the desired subnet mask in the **Subnet mask** entry field and, if required, a router that is to be used as default gateway.
5. Confirm with **OK**.

Activation state of the onboard Ethernet interfaces

The onboard Ethernet interface must be activated for the SIMOTION P Runtime (default setting = activated).

You can check the activation via the **Administration** tab of the **SIMOTION P Control Manager** (accessible via the Windows Control Panel with Start > Control Panel).

The **Activate Device** checkbox is displayed after selecting the button for **Onboard RT - Ethernet Properties**.

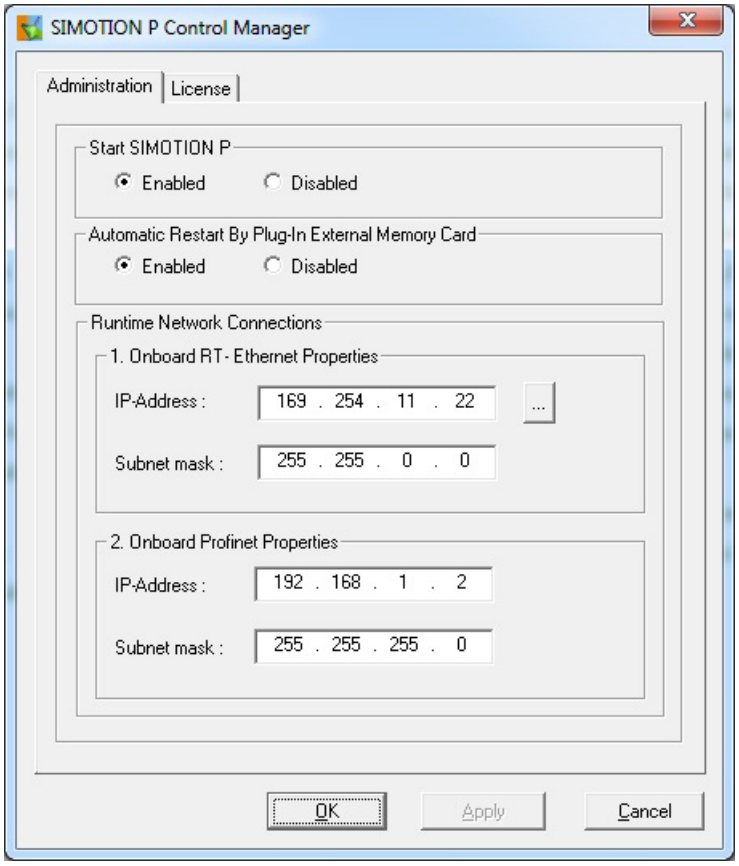
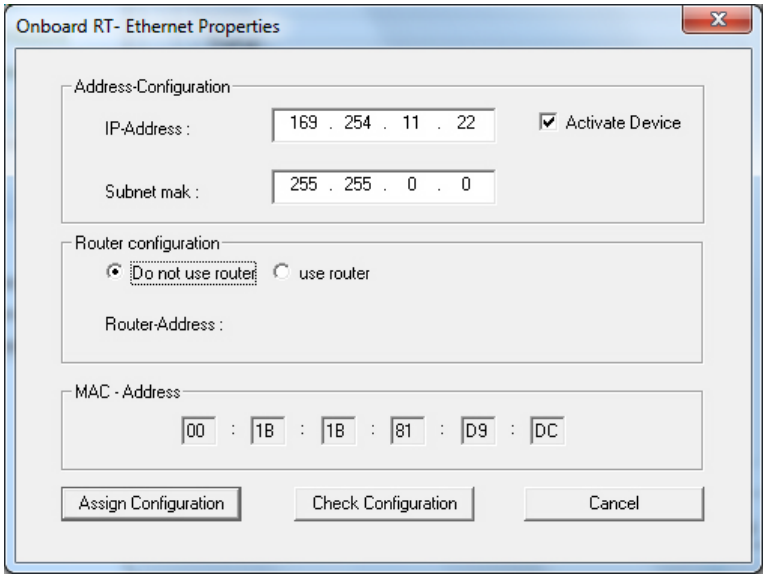


Figure 9-15 SIMOTION P Control Manager - Administration



NOTICE
SIMOTION P Runtime During the runtime of SIMOTION P, the Windows settings must be **activated** for the onboard Ethernet interface. The onboard Ethernet interface must not be deactivated or activated during operation.

9.5.5 Establishing the active flag for an external PG/PC

Requirement

A PG/PC is required to create projects and download them to the target device.
SIMOTION SCOUT can only be installed on the SIMOTION P320-4 S.

Note

Observe the online access point for SIMOTION P320-4 S

For SIMOTION P320-4 S, use **S7ONLINE** as access point to avoid inconsistencies.

Procedure

Proceed as follows to open NetPro and assign an interface in the PG/PC:

1. Open the project in SIMOTION SCOUT.
2. Click the button **Open NetPro**.
   NETPRO is accessed, and the configured network is graphically displayed. The PG/PC connection to the configured network is shown not bold and in a color **other than** yellow.
3. Double-click on the PG/PC that you would like to configure.
   The **Properties - PG/PC** dialog box is displayed with the **Assignment** tab in the foreground.
4. In the field **Assigned:** select the interface and activate S7ONLINE access by clicking the corresponding checkbox.
5. Accept the settings by clicking **OK**.
   The PG/PC connection to the configured network is now displayed in **bold** and **yellow**.
6. Save the changes via **Network > Save and compile** and upload them to SIMOTION P320-4.

Result

Now you can go online via the PG/PC.

9.6 PROFINET communication

9.6.1 Documentation

Description of PROFINET communication

A detailed description of PROFINET communication can be found in:

- SIMOTION Communication System Manual or
- SIMOTION SCOUT Online Help under **Basics** > **Communication** > **PROFINET IO**.

9.7 PROFIBUS communication

9.7.1 Documentation

Description of PROFIBUS communication

A detailed description of PROFIBUS communication can be found in:

- SIMOTION Communication System Manual or
- SIMOTION SCOUT Online Help under **Basics** > **Communication** > **PROFIBUS DP**.

9.8 Project download

Requirement

The **P320-4 PN** and **P320-4 PN/DP** modules have the same article number. For this reason, there is no distinction between the device during a download.

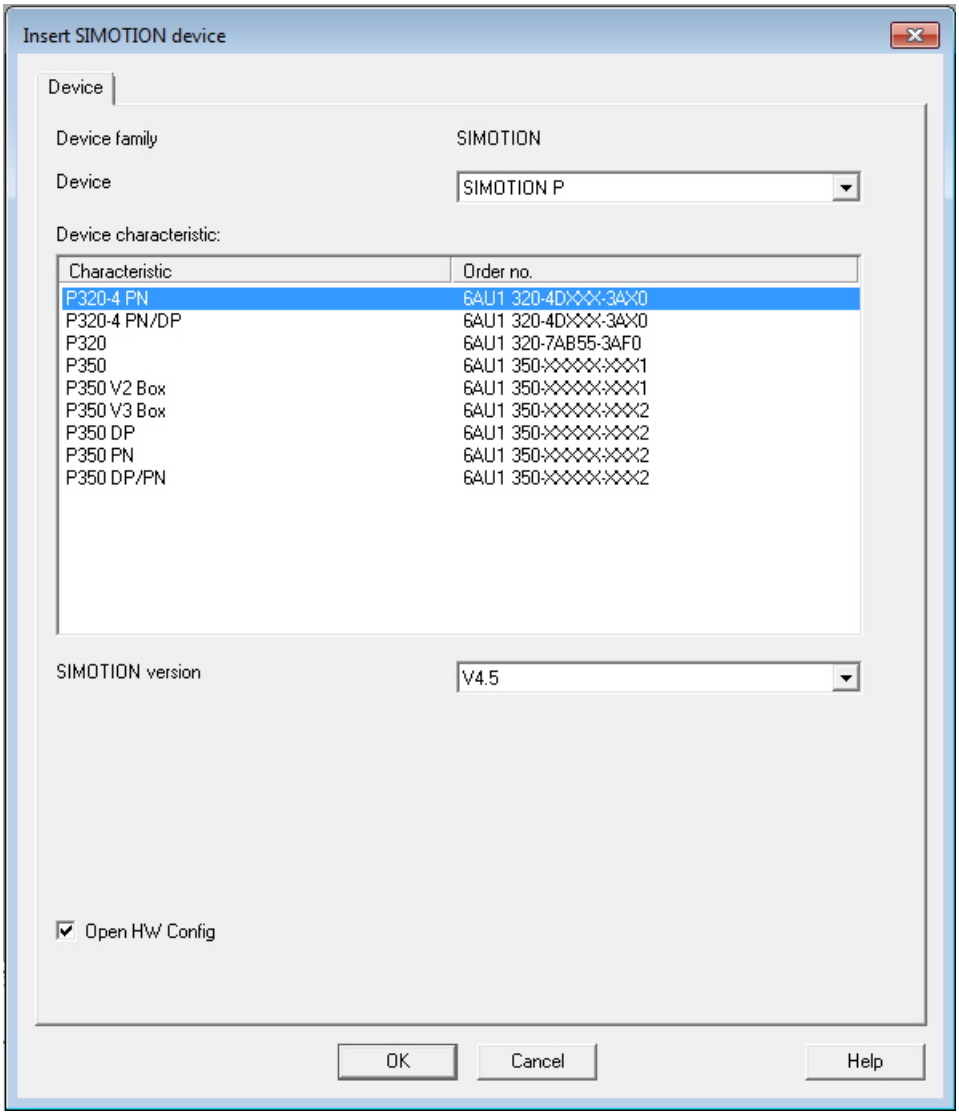


Figure 9-16 Inserting a SIMOTION device - selecting the device version

Behavior of the P320-4 PN device with the P320-4 PN/DP module

- If a **P320-4 PN** device with created PN line is loaded to a **P320-4 PN/DP module**, the project runs exactly as on a **P320-4 PN module**.

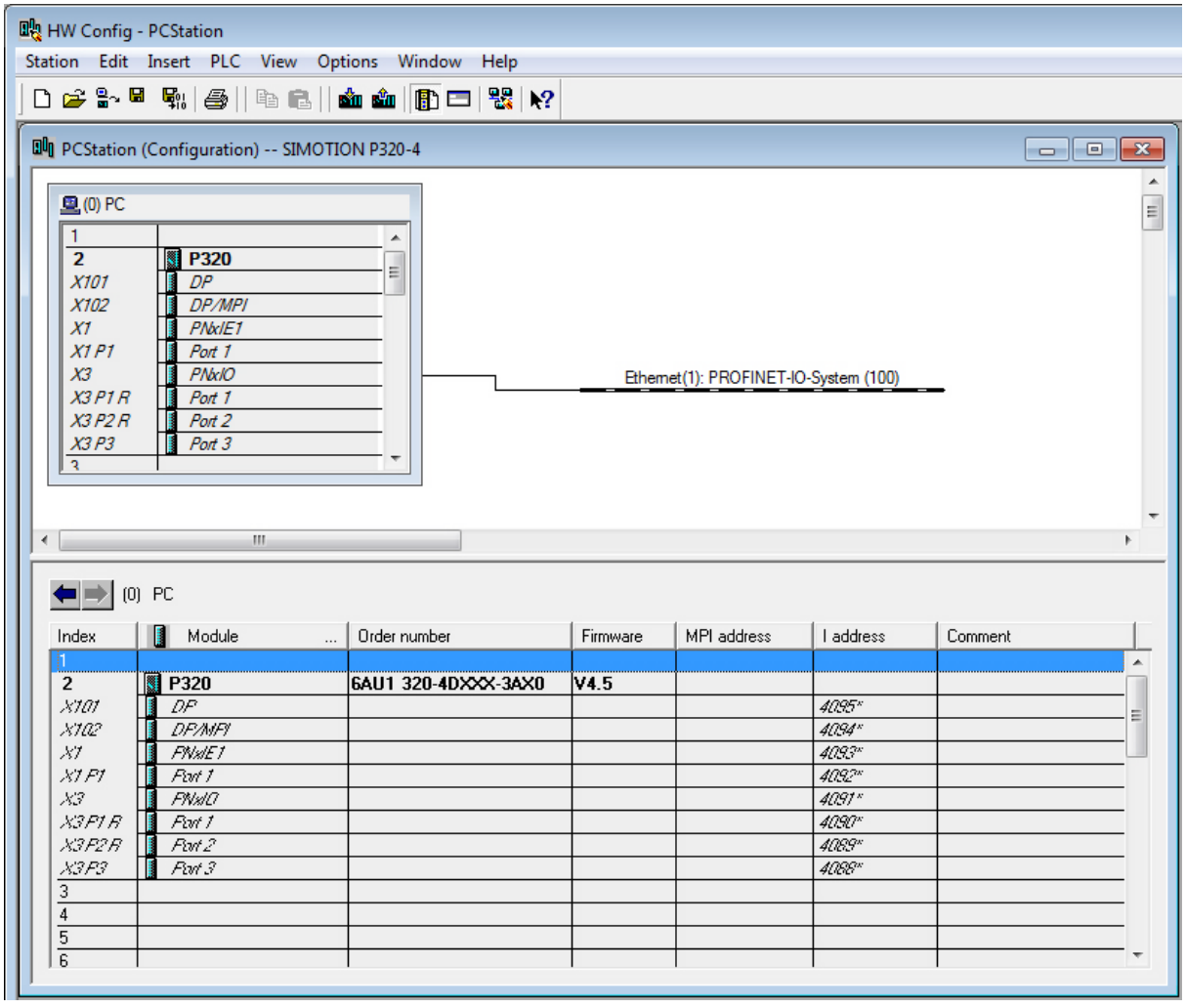


Figure 9-17 P320-4 PN/DP with created PN line (PROFINET-IO system)

- If a **P320-4 PN** device without created PN line is loaded to a **P320-4 PN/DP module**, there is no guarantee that the module runs with the configured base cycle clock.

Behavior of the P320-4 PN/DP device with the P320-4 PN module

Note

A **P320-4 PN/DP** device generally does not run on a **P320-4 PN module**.

The following message is displayed in the diagnostic buffer:

"Source 0 could not be loaded (inconsistency)".

The loaded configuration is not suitable.

9.9 Battery monitoring

The installed buffer battery has a service life of at least 5 years. The status can be checked with two-tier battery monitoring.

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

You will find further information on the battery warning at: Two-stage battery monitoring (Page 199)

Lithium battery - ordering data		
Designation	**Article number**	**Further information**
Lithium battery	A5E30314053	Spare part

Commissioning (software) 10

10.1 Note before commissioning

Delivery condition

SIMOTION P320-4 is delivered with:

- Windows operating system
- SIMOTION P Runtime application

NOTICE
Risk of damage to the SIMOTION P320-4
If condensation has developed, wait at least 12 hours before commissioning the device.

10.2 Basic commissioning - initial startup

Requirement

The following requirements must be met before initial commissioning:

- The device is connected to the 24 VDC power supply.
- Equipotential bonding is connected.

10.3 Commissioning requirements

Prior activities

You have already performed the following actions:

- Your system has been installed and wired.
- The installation and parameterization has been completed.
- When networking via PROFINET, the PROFINET addresses of the bus nodes with which the SIMOTION P320-4 communicates are set.

See also

Connection requirements (Page 101)

Parameter assignment / addressing requirements (Page 135)

10.4 Notes on commissioning

Starting up communications

The following components must be commissioned:

- SIMOTION P320-4
- PROFINET component

Commissioning is performed either via the programming device or by installing the software required for commissioning on the SIMOTION P320-4.

If a panel is used, it must be connected.

Commissioning the components

Please refer to the relevant documentation for the commissioning of the components used with SIMOTION P320-4:

- ET 200 PN I/O
- PROFINET IO drives,

10.5 Recommended order for first commissioning

The individual steps for first commissioning are listed below in the recommended order.

1. The complete system is connected mechanically and electrically, and has been verified.
   - SIMOTION P320-4
   - Drives
   - Motors
   - SIMATIC S7 I/O components
   - HMI user interfaces
2. The article numbers of the drives and SIMATIC S7 I/O components should be available. You need these order numbers when setting up a SIMOTION project to verify that the components selected from the hardware catalog in the **HW Config** application correspond to the ones used in the system.
3. Prepare the drives for communication on the PROFINET IO.
4. Commission the drives via PROFINET IO.
   Literature: Function description of the associated drives
5. Carry out a test run for all axes.
6. Perform the optimization of the drives.
7. Switch on and power up the SIMOTION P320-4; all the basic settings are made automatically.

See also

License tab (Page 144)

10.6 Data backup

10.6.1 Memory media

The storage media of the SIMOTION P320-4 are divided into internal and external memories on drives C: and D:.

The SIMOTION P Kernel and Windows system software are located on the internal storage medium on drive C:.

Media

The following figure shows the partitioning of the storage medium in the delivery state, depending on the version of the SIMOTION P320-4.

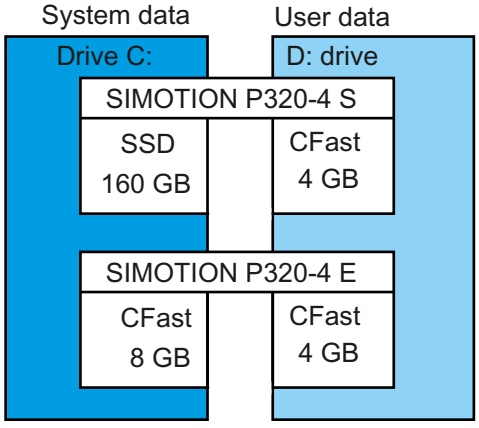


Figure 10-1 Storage media of the SIMOTION P320-4

Drive C:

Drive C: reserved for the Windows system software, SIMOTION P kernel, etc.

NOTICE
Compression for drive C: Not permissible Compression must not be activated for files and folders on drive C: for correct operation of the SIMOTION P320-4.

Drive D:

Drive D: contains the **user data**, e.g. programs, configuration data, parameter assignments of SIMOTION P Runtime.

Note

Storage of user data

It is recommended that only the user data be saved on drive D:.

10.6.2 SIMATIC data backup

Data backup under Windows Embedded Standard 7 32-bit / Windows 7 Ultimate 32-bit

For backing up data under Windows Embedded Standard 7 32-bit and Windows 7 Ultimate 32-bit, we recommend the software tool **SIMATIC IPC Image & Partition Creator** (as of V3.3.1). This tool allows the easy backing up and quick restoration of entire memory cards.

The SIMATIC IPC Image & Partition Creator only supports the burning of DVD media.

This software is available via the online ordering system Siemens Industry Mall (http://www.siemens.com/industrymall). You can find more accurate information about the tool in the associated product documentation.

10.6.3 Restore DVD

SIMOTION P320-4 is supplied with pre-installed hardware and software and is therefore ready for connection and operation.

The delivery kit includes a restore DVD. Using the restore DVD, you can restore the delivery state of the SIMOTION P320-4, e.g. in case of a problem when installing additional software packages such as HMI software.

It is recommended that you create a data backup after commissioning by the OEM. Save the data backup on an external hard disk or a USB flash drive.

The fundamentals of the data storage concept and the various types of data back-ups of the SIMOTION P320-4 are described in the section on the Data storage concept (Page 171).

Note

SIMOTION licenses

SIMOTION Runtime licenses are retained (e.g. axis licenses) when the SIMOTION P320-4 is restored to its delivery state.

Only the licenses of the **Automation License Manager** are deleted (e.g. for the SIMOTION SCOUT engineering system).

10.7 Power-up of the SIMOTION P Kernel

The SIMOTION P Kernel is started by default when Windows is booting. It is therefore available after each power-up of the SIMOTION P320-4. The startup process is triggered by an installed service, the **SIMOTION P Startup Service**. This service ensures that the SIMOTION P Kernel starts automatically during the Windows power-up.

SIMOTION P320-4 is started with the project last saved from RAM to ROM and starts running immediately if the operating state was set to RUN when the system was switched off.

If you want to explicitly terminate the SIMOTION P320-4 without exiting Windows, use the **SIMOTION P State** application.

To do this, you must be logged on with administrator privileges. Only the administrator is offered the button for the **Terminate SIMOTION P** function.

After explicitly terminating the SIMOTION P Kernel via the SIMOTION P State application, the SIMOTION P Kernel can be restarted via this application (Start SIMOTION P button). A restart of Windows also results in a restart of the SIMOTION P Kernel.

You can find more detailed information about SIMOTION P State in Section SIMOTION P State application (Page 127).

10.8 Data storage concept

10.8.1 Data storage concept overview

Overview

The backup possibilities described in the following section can be used to backup and restore the complete SIMOTION P320-4 installation with the current configuration and customization.

The SIMOTION version on the target device does not need to match the version of the device on which the backup was created.
Under certain preconditions, e.g. identical hardware for storage medium image, series commissioning can also be carried out using these backup and restoration mechanisms.

Storage medium image

With a storage medium image, the entire storage medium can be backed up and restored. This allows series commissioning to be performed (requirement: identical hardware!).

A storage medium image must be created both for the internal storage medium (Drive C) and for the external CFast card (Drive D). When creating the image with the **SIMATIC IPC Image Creator**, an image can be created jointly for one internal and one external storage medium.

When loading an image, be aware that the images for the internal and external storage media must be loaded separately and that the wizard must therefore be run twice. It is not possible to load the image onto both drives in a single process.

The restore DVD contains a storage medium image of the plant with which the delivery state of the SIMOTION P320-4 can be restored.

Various mechanisms are available for backing up and restoring data for the SIMOTION P320-4.

These mechanisms are described in the following sections, starting with the largest possible scope of a backup to the backing up of variables.

Although the backup/restore of data in many cases is initiated by the user, it is sometimes also performed automatically or started by the user program.

In addition to restoring defined states and updating/reloading a project in the target device, data backups are also needed to prevent data loss resulting from a hardware defect or failure of the backup battery.

Project update

The Project update (Page 173) section describes options for updating/retransferring or backing up a SIMOTION project.

Application

- Transfer of a project to the newly installed SIMOTION P320-4
- Series commissioning

Advantage

Series commissioning is also possible without a programming device or using remote maintenance.

Disadvantages

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

Single backups

The Single backups (Page 177) section describes the options for backing up and restoring retain variables, retain TOs, unit variables, and global device variables.

Application

- Data backup when replacing the SIMOTION P320-4
- Restore the SRAM after a failed consistency check (battery failure,…)
- Backup the data for Unit variables and device-global variables from the RAM
- Backup values (variables) from the RAM
- Restore a defined state of the machine

Advantages

- The user program can use system functions to perform a backup
- Version-independent restoration of the retain data (non-volatile SIMOTION data)

Disadvantages

No complete backup

Defined states

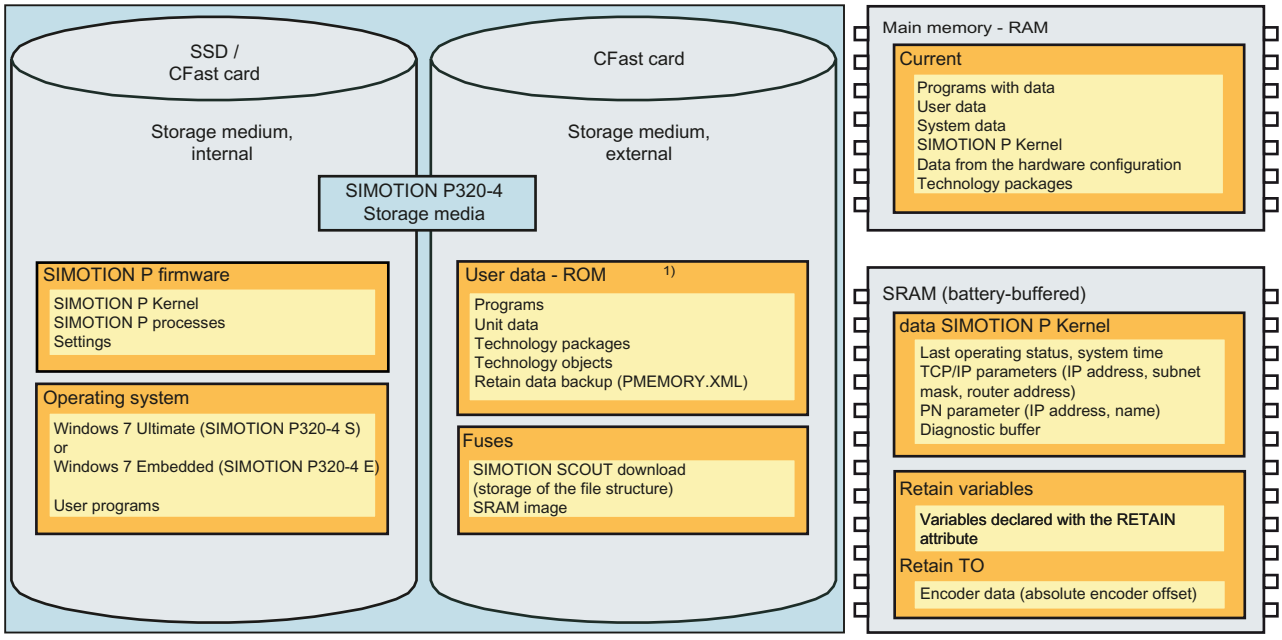
The Defined states (Page 181) section describes the options for restoring a defined state / initial state.

Application

- System defect
- Windows defect
- Restore a defined initial state, for example, during commissioning

10.8.2 Memory model

The following figure shows which data memories are used by SIMOTION P320-4 and which data is saved in them.



1) The user data must not be written by Windows during runtime (SIMOTION P State = RUN).
User data can be written from the Explorer or other applications in the **Terminate SIMOTION P** state.

Figure 10-2 SIMOTION P320-4 memory model

10.8.3 Project update

10.8.3.1 Overview

The backup possibilities described in the following section can be used to update, retransmit or back up a SIMOTION project.

The **download of project data** (file structure or ZIP file) via **SIMOTION SCOUT** can be used to perform series commissioning of a SIMOTION project.

SIMOTION IT allows series commissioning using remote maintenance via a web browser. Supported web browsers are, for example, Internet Explorer or Mozilla Firefox.

Detailed information about the backup options for the project update can be found at:

- SIMOTION Project Download online (Page 174)
- SIMOTION SCOUT - download of the project data (file structure) (Page 174)
- SIMOTION SCOUT - download of the project data with SIMOTION IT (ZIP file) (Page 175)
- Backing up and restoring project data (file structure) (Page 177)

10.8.3.2 SIMOTION Project Download online

The project data is loaded from a programming device with engineering system to the work memory (RAM) and selected parameters (e.g. TCP/IP) to the SRAM or exchanged between SRAM and work memory (RAM).

The explicit import of user data into the external CFast card is initiated by SIMOTION SCOUT (**Copy RAM to ROM**).

Note

Identical names in SIMOTION SCOUT / Station Configurator are essential

It is essential for the download that the name of the station is identical in the engineering system (SIMOTION SCOUT) and in the Station Configurator of the SIMOTION P320-4.

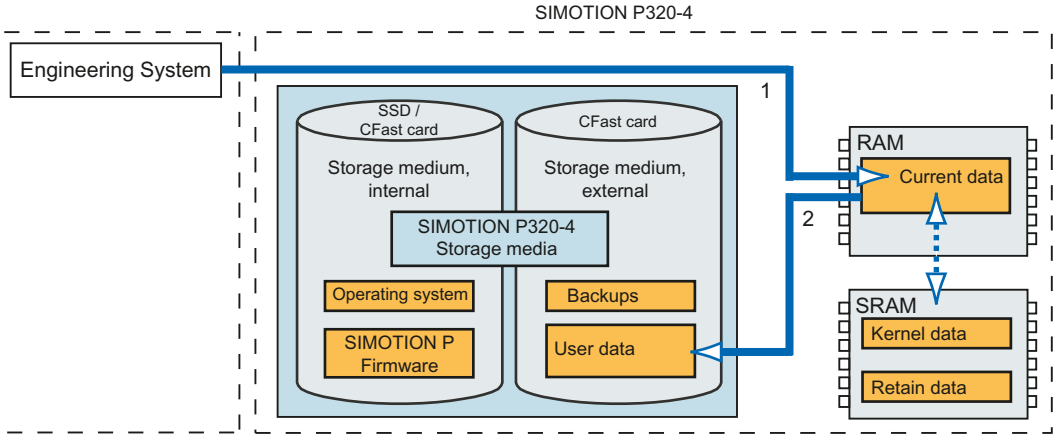


Figure 10-3 SIMOTION SCOUT download from the engineering system

SCOUT project download online process

1. Load the project data via **SIMOTION SCOUT**, menu **Target system > Load > Load project into target system...**, into the working memory of the SIMOTION P320-4.
2. To transfer the data to the external storage medium, use the menu **Target system > Copy RAM to ROM** in SIMOTION SCOUT.

The project data is transferred to the controller.

10.8.3.3 SIMOTION SCOUT - download of the project data (file structure)

The project data is saved by SIMOTION SCOUT in the form of the file structure in a file system (e.g. a programming device with an engineering system).
The user copies this file structure to the external CFast card of the SIMOTION P320-4.

This permits a series commissioning of SIMOTION programs.

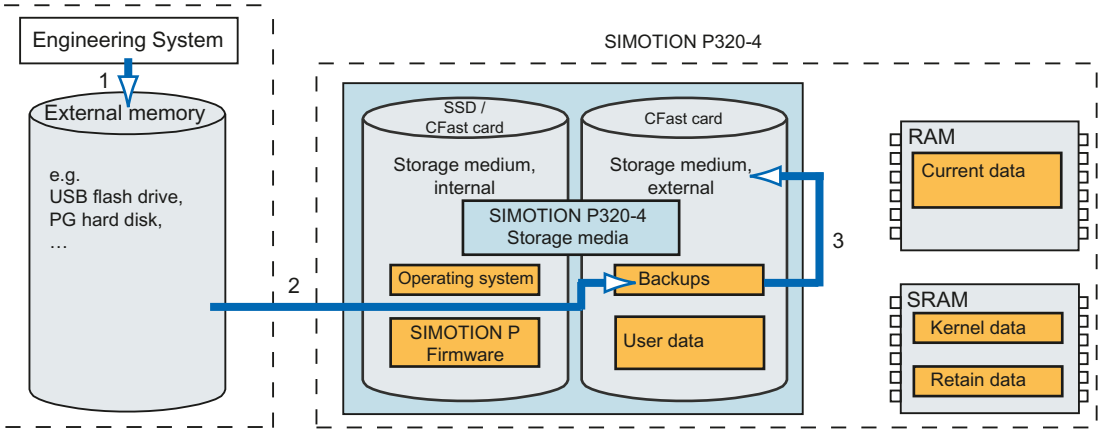


Figure 10-4 SCOUT download (file structure)

Download of the project data process (file structure)

1. Save the data via SIMOTION SCOUT, menu **Edit > Load to file system ...** (option **Save normally**), on the file system of your programming device.
2. Copy this data (file structure) to the external CFast card (drive D) of SIMOTION P320-4 (e.g. with USB memory stick and Windows Explorer).
   SIMOTION P must be in the **terminated** state for this.

Note

Note the SIMOTION version

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

10.8.3.4 SIMOTION SCOUT - download of the project data with SIMOTION IT (ZIP file)

SIMOTION SCOUT stores the project data in the form of a ZIP file to a file system (e.g. a programming device with engineering system). This ZIP file can be transferred by the user to the SIMOTION IT web server with the web browser and it is then automatically imported into the user data.

This permits a project download using remote maintenance or series commissioning.

Note

Note the SIMOTION version

The SIMOTION version on the target device must exactly match the version of the device on which the backup was created.

After the upload of a SIMOTION project into the SIMOTION P320-4 (SIMOTION device update), the time stamps in the user data and the SIMOTION SCOUT project are different. The project is shown as inconsistent in SIMOTION SCOUT.
The consistency can be established via a project download or a download of the HW Config in the SIMOTION SCOUT.

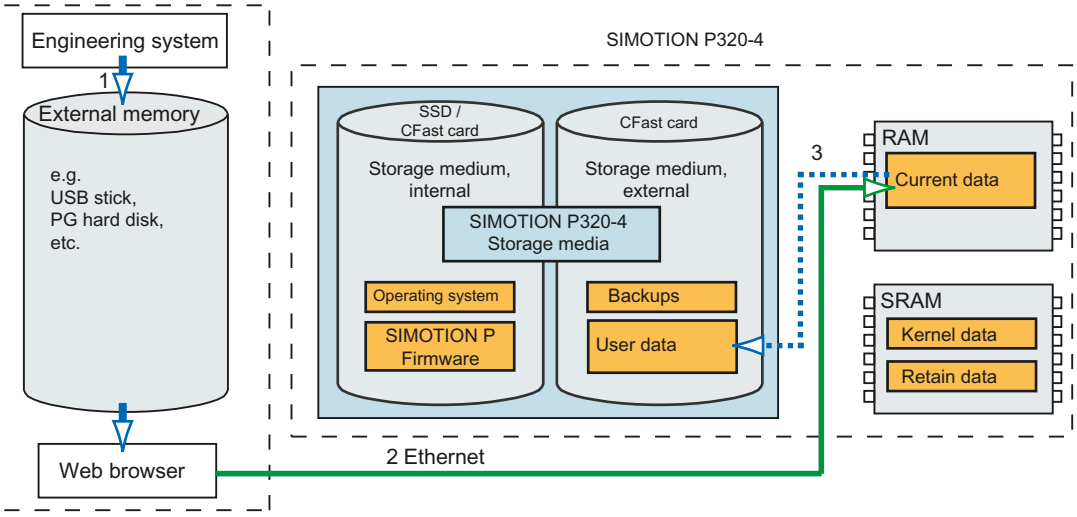


Figure 10-5 SIMOTION SCOUT download (ZIP file)

Download of the project data process (ZIP file)

1. Save the data via SIMOTION SCOUT, menu **Edit > Load to file system ...** (option Save compressed), on the file system of your programming device.
2. Transfer the ZIP file via the web browser and the project download of SIMOTION IT: **Manage Config** > [Login dialog] > **Device Update** > **Send new update data (*.ZIP)**
3. The unpacking and the import of the data into the user data on the external CFast card is performed automatically.

Note

SIMOTION IT

You can find further information about SIMOTION IT in the following documentation:

- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION IT Programming and Web Services Programming Manual
- SIMOTION IT Virtual Machine and Servlets Programming Manual

10.8.3.5 Backing up and restoring project data (file structure)

The project data (file structure) is located in the **USER** directory on the **external CFast card** (drive D) of the SIMOTION P320-4.

1. To save the project data, copy the USER directory from the external CFast card, e.g. to a storage medium of the SIMOTION P320-4 or to a USB flash drive.
2. To restore the project data, copy the USER directory, e.g. from a storage medium of the SIMOTION P320-4 or a USB flash drive, to the external CFast card and replace the existing directory.

This also enables series commissioning without a programming device or SIMOTION SCOUT.

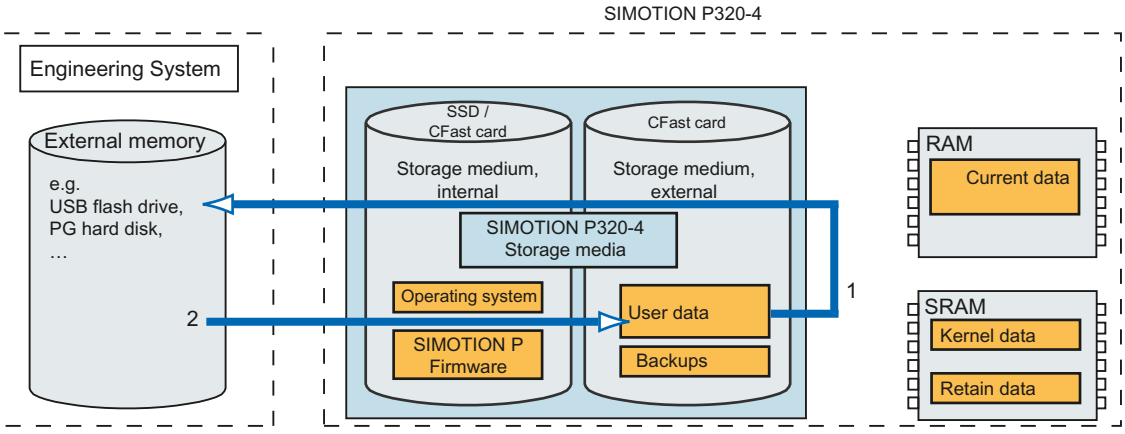


Figure 10-6 Backing up and restoring a file system

Sequence of a series commissioning

Copy the **USER** directory from a storage medium to the external CFast card (Drive D) of the SIMOTION P320-4 to be newly commissioned.

SIMOTION P320-4 must be in the **terminated** state for this.

10.8.4 Single backups

10.8.4.1 Overview

The backup options described in the following section can be used to back up and restore retain variables, retain TOs, unit variables and global device variables.

If the consistency check results in an SRAM error (because of a power failure if the battery has fallen below the threshold value) or the SIMOTION P320-4 is replaced, the backup can be used to restore the contents of the SRAM.

A user program can use system functions to initiate a backup.

Unit variables and global device variables can be backed up from the RAM to allow them to be recovered in the event of a power failure, for example.

This allows the initial state of the machine (reference points, sensor values, …) to be restored.

Detailed information about the individual backup options can be found under:

- Backup/restore SRAM (Page 178)
- Backing up non-volatile SIMOTION data (retain data) (Page 179)
- Restoring non-volatile SIMOTION data (retain data) (Page 180)
- Backing up unit variables and global device variables (Page 181)

10.8.4.2 Back up/restore SRAM

The correct shutdown of Windows automatically initiates **Terminate SIMOTION P** (SIMOTION P State). This automatically saves the retain data from the SRAM to the external CFast card.

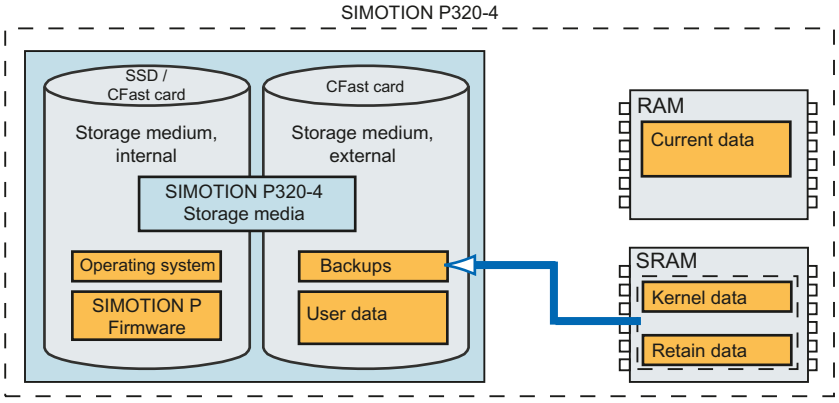


Figure 10-7 Saving SRAM with Terminate SIMOTION P

A consistency check of the SRAM is performed at each SIMOTION power-up. If an error is detected here, the SRAM data will be restored from the backup.

If, for example, the SIMOTION P320-4 needs to be replaced, this backup/restore mechanism allows the data to be transferred to the SIMOTION P320-4.

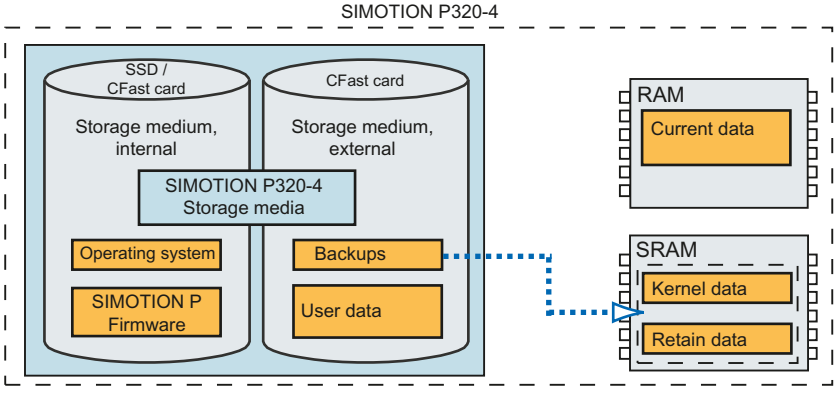


Figure 10-8 SRAM restore at startup

Further information

can be found in the section Non-volatile data and SRAM handling (Page 203).

10.8.4.3 Backing up non-volatile SIMOTION data (retain data)

The non-volatile SIMOTION data (retain data) can be backed up from the user program and via SIMOTION SCOUT.

You can use the backup to restore the retain data independent of the version after an update or a hardware replacement (SIMOTION P320-4) or to create a current backup to use in the event of an inadvertent deletion.

You can save the retain data as follows:

- From the user program with the **_savePersistentMemoryData()** system function
  The contents are saved to the "PMEMORY.XML" backup file in the "USER\SIMOTION" directory.
  The data is saved in the PMEMORY.XML file on the external CFast card.
- To back up the retain data via SIMOTION SCOUT , go online and in the context menu of a created source, execute **Save variables...**.
  The data is saved in the **unitdata.xml** file on the computer with SIMOTION SCOUT .
- Alternatively, the retain data is saved via the **SIMOTION P State** application, via the **SIMOTION P > Set Diagnostic Switch** menu.
  The contents are saved to the "PMEMORY.XML" backup file in the "USER\SIMOTION\HMI\SYSLOG\DIAG" directory.
- To restore the retain data via SIMOTION SCOUT, go online and execute **Restore variables...** in the menu.
  Restores the saved variables, also over different versions.

On the system side, the **_savePersistentMemoryData()** system function ensures that a consistent overall image of the non-volatile SIMOTION data is always available the next time the device is switched on, even if there is a power failure during backup.

An already existing backup file is renamed to "PMEMORY.BAK" before a new backup file is generated. If the save operation to the new backup file fails (e.g. because the capacity of the external CFast card is insufficient), this backup copy of the backup file is used the next time an attempt is made to restore the non-volatile SIMOTION data content. If the new file is successfully created, the backup copy of the backup file is deleted.

NOTICE
Loss of data due to failure to make backup copies Back up the non-volatile SIMOTION data on the CFast card. Non-backed-up non-volatile SIMOTION data can be lost on hardware replacement (module defect). For example, failing to back up the current values of the retain variables will result in them being lost and reset to their initial values.

NOTICE
Homing required again after absolute encoder overflow If an absolute encoder overflow occurs after _savePersistentMemoryData, the actual position value is no longer correct after the non-volatile data is restored. In this case, homing (absolute encoder adjustment) must be repeated.

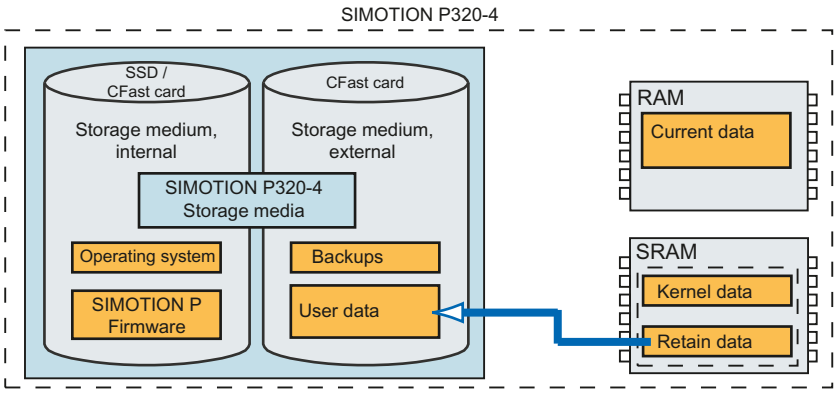


Figure 10-9 Save retain data

10.8.4.4 Restoring non-volatile SIMOTION data (retain data)

The backup of the non-volatile SIMOTION data (variables declared as retain) is restored in the memory if a data inconsistency is detected after a power failure (the backup battery has fallen below a threshold value) or a general reset has been performed on the CPU. This means that the user can perform a general reset to force the data to be reloaded.

Condition for restoring is that the **PMEMORY.XML** file is present on the external CFast card and the content of this backup file matches the project on the external CFast card.

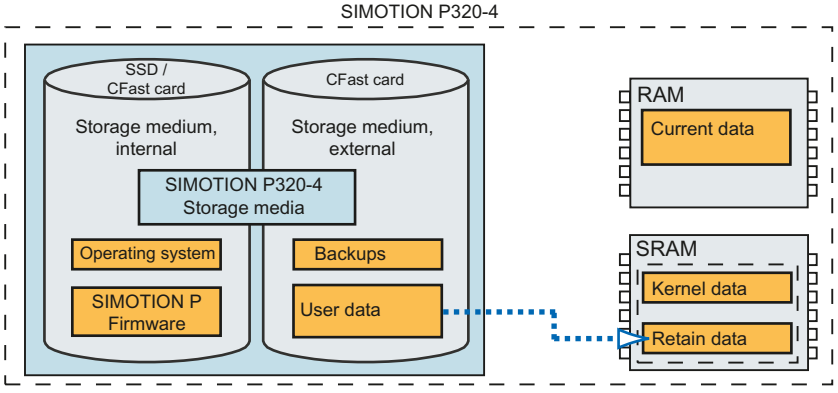


Figure 10-10 Restore retain data

Note

In the event of a power failure of the SIMOTION P320-4, the retain data in PMEMORY.XML will **not** be restored automatically.

Note

If a data inconsistency exists in the event of a power failure because the backup battery has fallen below a threshold value, the data backup from PMEMORY.XML will be written back into the SRAM.

10.8.4.5 Save unit variables and global device variables

Unit variables and global device variables are never retentive; the data will be lost in the event of a power failure.

If the unit variables and global device variables which have not been declared as retain variables are to be recovered after a power failure, the user program can use system functions to save this data to data sets (files on the external CFast card).

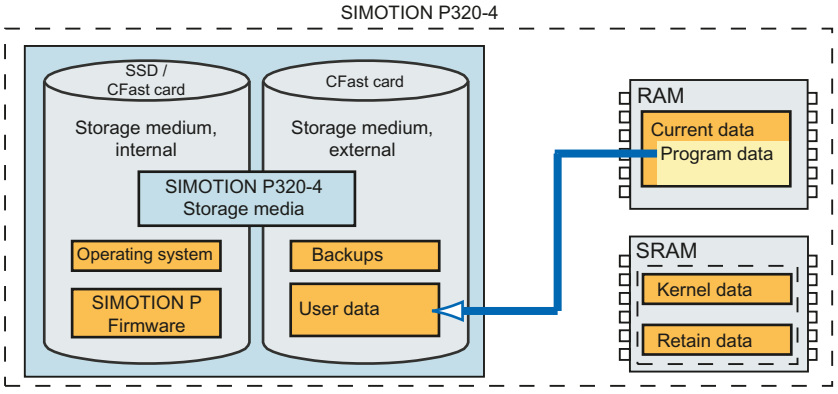


Figure 10-11 Saving unit variables and global device variables

System functions for backing up / restoring unit variables and global device variables:

- _loadUnitDataset()
- _saveUnitDataset()
- _importUnitDataset()
- _exportUnitDataset()

With unit variables, however, generally only unit variables of the interface section can be saved. In addition, all variables of the unit declared as retain variables will be saved.

Save variables… SIMOTION SCOUT function:

- The data is saved in the unitdata.xml file on the SIMOTION SCOUT computer.

Restore variables… SIMOTION SCOUT function:

- Restores the saved retain variables, also across different versions.

10.8.5 Defined states

10.8.5.1 Overview

An initial state can be restored by loading data backups, as described in the section Project update (Page 173), or via the reset functions of the **SIMOTION P State** application.

Transfer backup from the file system

Download backups that were stored on the file system using the backup mechanisms described previously.

For further information see Single backups (Page 177).

Detailed information about the backup options for detailed states can be found at:

- Restore the factory setting using SIMOTION P State (Page 182)
- Overall reset using SIMOTION P State - operating mode switch setting MRES (Page 183)
- Delete SRAM via SIMOTION P State - button Restart (Del. SRAM) (Page 183)

10.8.5.2 Restore the factory setting using SIMOTION P State

The condition on delivery is restored via the menu item **Extras > Reset to factory default**.

Note

The SRAM and the PMEMORY.XML file will also be deleted.

The controller is restarted automatically.

Any licenses on the card will not be deleted.

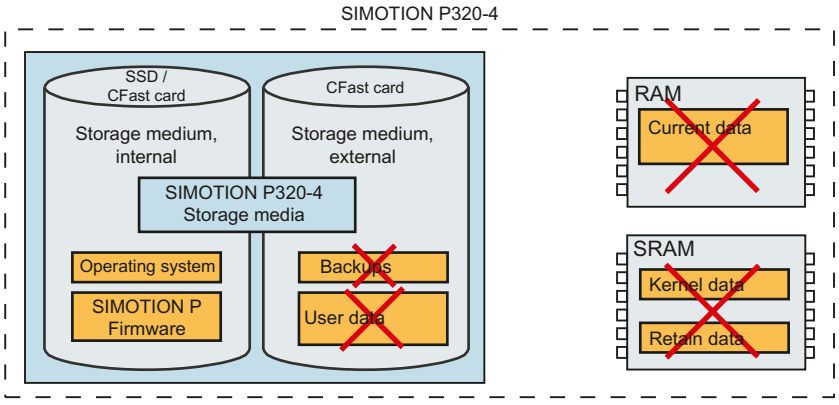


Figure 10-12 Restoring factory settings

Further information

on the SIMOTION P State - menus (Page 131)

10.8.5.3 Overall reset using SIMOTION P State - operating mode switch setting MRES

A general reset deletes the non-volatile SIMOTION data and retain data.

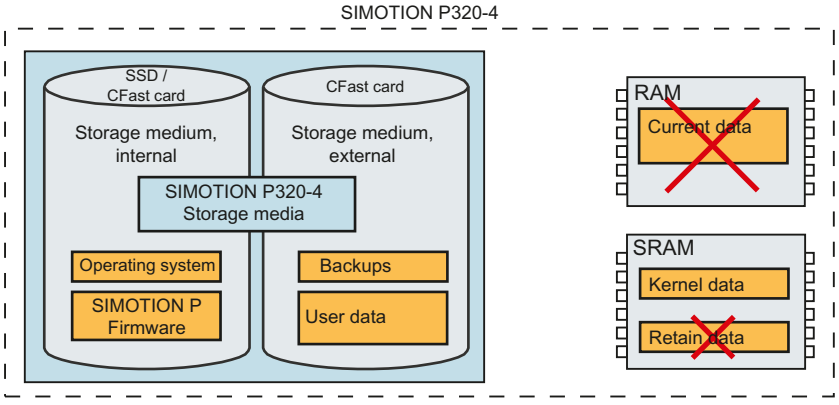


Figure 10-13 General reset

If a backup of the retain data (PMEMORY.XML) exists, this data will be accepted after the general reset. Thus, the user can perform a general reset to force the saved retain data to be restored.

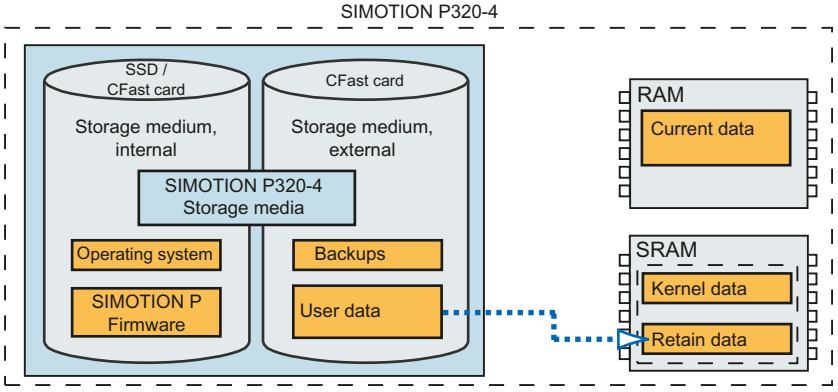


Figure 10-14 Restore retain data

10.8.5.4 Delete SRAM via SIMOTION P State - button Restart (Del. SRAM)

SIMOTION P320-4 will be restarted and the data in the SRAM will also be deleted.

The loading of a backup allows the SIMOTION P320-4 to be returned to a defined initial state. The backed up program variables and retain variables and thus the encoder values, homing data will be restored.

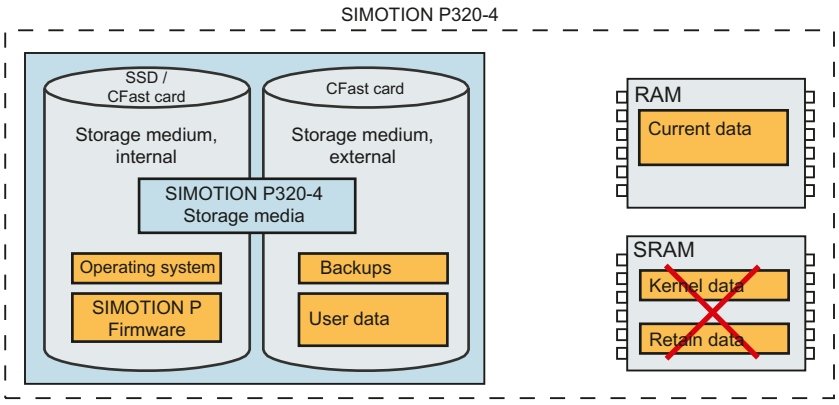


Figure 10-15 Delete SRAM - Restart (Del. SRAM)

If the SIMOTION SCOUT function **Target system > Copy RAM to ROM** was called previously, the saved project will be reloaded.

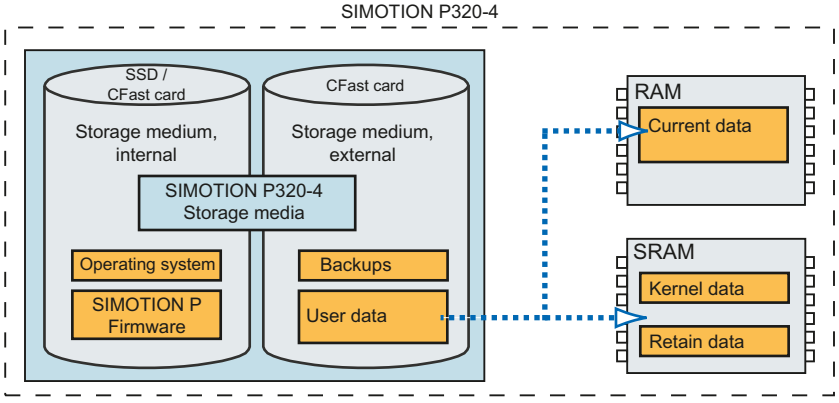


Figure 10-16 Load project after Restart (Del. SRAM)

Further information

on the SIMOTION P State buttons can be found in the Function elements (Page 130) section.

10.9 SIMOTION P overall reset

10.9.1 SIMOTION P overall reset overview

Introduction

When a general reset is performed, the RAM on the SIMOTION P320-4 will be cleared along with any non-volatile data in the SRAM - with the exception of the communication configuration (e.g. baud rates and network addresses). For further information see Non-volatile data and SRAM handling (Page 203).

Below is a list of the data that is either capable or not capable of withstanding a general reset. Data on the external CFast card is retained.

When must a general reset be performed on SIMOTION P320-4?

If you wish to undo changes in your user data (programs, configuration data, parameter assignments) in the **volatile data** area of the SIMOTION P320-4.

NOTICE
Differences when performing a general reset in connection with the RAM to ROM function
The following generally applies:
If **no** RAM to ROM was executed before the general reset, all programs and parameter assignments are considered as **data deleted on general reset**.
If data was backed up **with** RAM to ROM before the general reset, this data is considered as **data not deleted on general reset**.

Data deleted on general reset

The following data is deleted on the SIMOTION P320-4:

- Configuration data
- Programs
- Parameter assignments
- Technology packages
- Data from absolute encoders (absolute encoder adjustment, cyclic range overflows)

  Note

  Absolute encoder data is deleted during a general reset operation and must, therefore, be readjusted after the general reset.

- Retain variables
  Retain variables are variables that are defined as **non-volatile data** in the user program by the key word **Retain**.

Data not deleted on general reset

The following data is retained:

- Baud rate
- PROFINET IP address / name of the SIMOTION P320-4
- IP addresses
- Contents of the diagnostics buffer
- Data that was saved with the _savePersistentMemoryData(), _saveUnitDataSet(), _exportUnitDataSet() commands and with RAM to ROM.
  If the retain data is backed up (with _savePersistentMemoryData()), this data is backed up again to the non-volatile data after the general reset. Thus, the user can perform a general reset to force the saved retain data to be restored.
- Licenses

The technology packages and user data (configuration data, programs, parameter assignments) previously backed up to an external CFast card by means of the **Copy RAM to ROM** menu command are transferred to the **volatile data** area of the SIMOTION P320-4 after the general reset.
Thus, an existing configuration on the external CFast card is loaded to the SIMOTION device following the general reset.

Further information

Data storage concept overview (Page 171)

10.9.2 Overall reset using the mode selector (on screen)

For SIMOTION P320-4, the overall reset using a simulated mode selector is performed using the SIMOTION P State application.

Note

MRES mode switch position

If you set **MRES** via the SIMOTION P State application, the SIMOTION P320-4 automatically goes into the **STOP** operating state.

Proceed as follows to initiate an overall reset:

1. Turn the mode selector to **MRES** and keep **MRES** pressed until the **STOP** LED stops flashing.
   When the LED permanently lights up yellow, the **STOP** operating state has been reached.

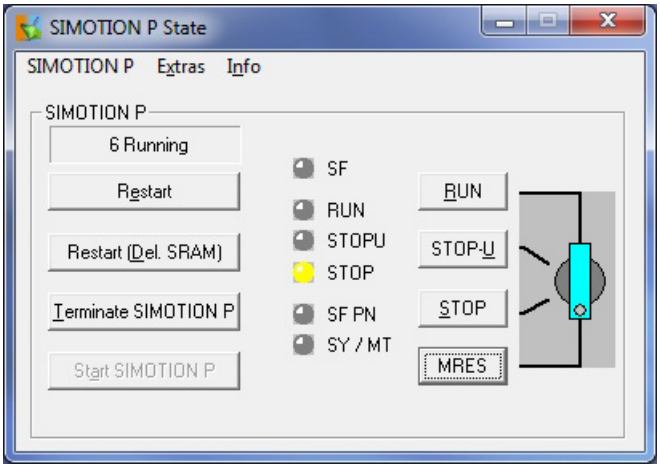


Figure 10-17 SIMOTION P State - STOP operating state

2. When you release **MRES**, the mode selector points to the **STOP** position again.

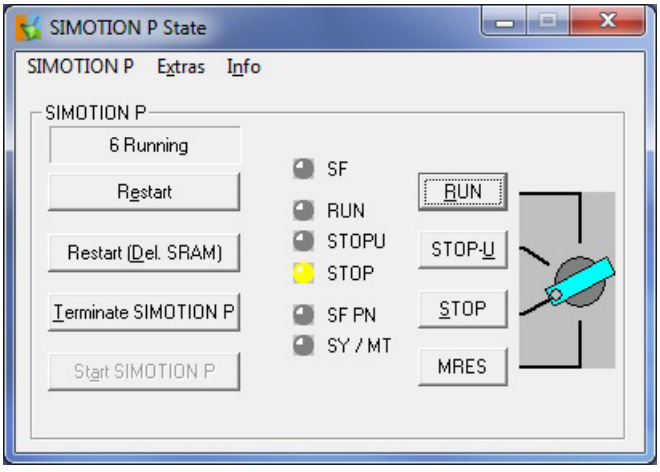


Figure 10-18 SIMOTION P State - Mode selector from position MRES to STOP

3. You must turn the switch back to the **MRES** position within three seconds.
   MRES is then displayed in the status.

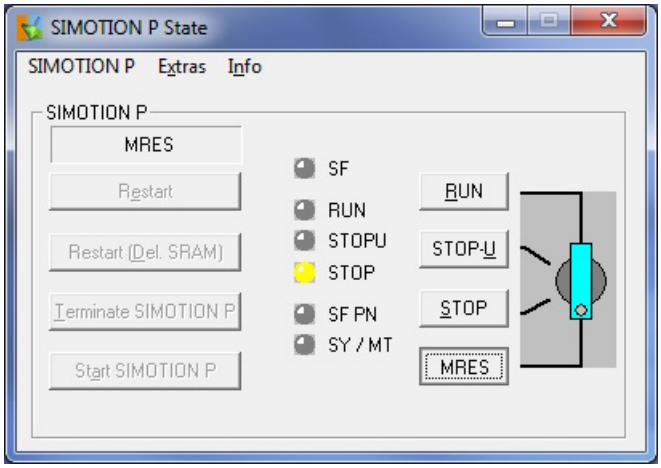


Figure 10-19 SIMOTION P State - status MRES

The mode selector then goes into the **STOP** position.

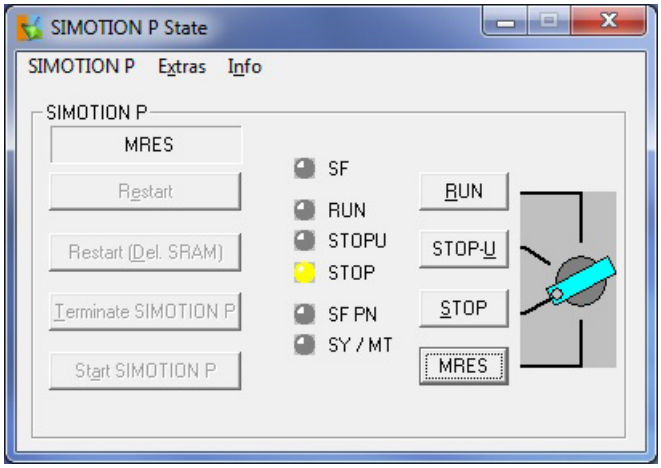


Figure 10-20 SIMOTION P State - status MRES, mode selector STOP

4. The SIMOTION P320-4 then restarts automatically.

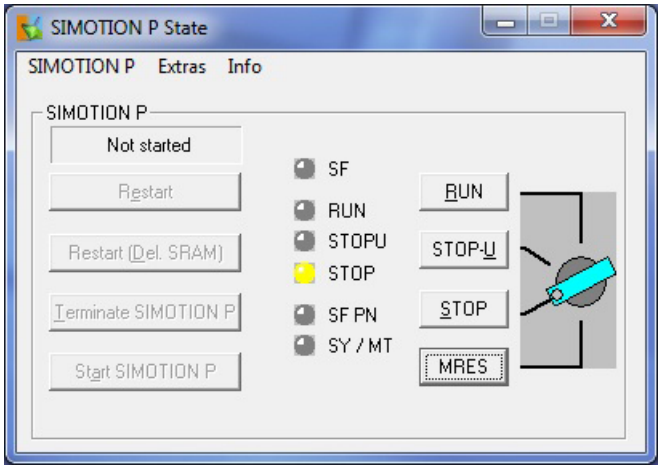


Figure 10-21 SIMOTION P State - status before the automatic restart

10.10 Deleting user data on the CFast card

Requirement

You can delete the user data with SIMOTION SCOUT. The SIMOTION P320-4 must be online. The user data in the RAM, the persistent data in the SRAM (except for the communication configuration), and the user data on the CFast card are deleted. You can thus continue to access the SIMOTION P320-4 with your PG/PC.

Procedure

To delete the user data:

1. In SIMOTION SCOUT, open the project you want to edit.
2. Go online with SIMOTION P320-4.
3. Select **Target system > Delete user data on card...**.

The data is deleted.

10.11 Switching off

Windows

To ensure the safe operation of the SIMOTION P320-4, Windows must be properly shut down before the SIMOTION P320-4 is switched off.

Note

Use the Windows start menu to correctly shut down the Windows system: **Start > Shut down**

If Windows is not shut down properly, the Windows installation may become damaged to the extent that it may no longer be possible to run the SIMOTION P320-4.

Note

Only applies to the SIMOTION P320-4 E

SIMOTION P320-4 E is delivered with deactivated EWF (Enhanced Write Filter).

After commissioning the SIMOTION P320-4 E, activate the EWF for drive C:, which ensures:

- An extended service life for the **internal** CFast card
- No data loss on the **internal** CFast card when switching the device off via the line side switch or through disconnection from the power supply

NOTICE
Do not protect external CFast cards with EWF
Drive D: - the **external** CFast card - must not be protected with EWF as otherwise the functionality of SIMOTION cannot be assured.

NOTICE
Threat of data loss
Always shut down SIMOTION correctly as otherwise there is a threat of data loss.

SIMOTION P320-4

If Windows is shut down properly, the SIMOTION P320-4 will also be shut down properly.

If the SIMOTION P320-4 is switched off before Windows is shut down correctly, the POWER FAIL functionality causes the following events to occur.

- SIMOTION P320-4 is stopped correctly
- The SIMOTION P retain variables are saved in the non-volatile memory of the SIMOTION P320-4.

When SIMOTION P320-4 powers up again, the backed-up user data will be available once more.

This means that the SIMOTION P320-4 is ready to run immediately without loss of data, provided that the Windows installation was not damaged by the switch-off.

Behavior with Shut down, Logoff or Restart

If a Windows Shutdown, Logoff or Restart is initiated although the SIMOTION P320-4 is still in the **Running** state, the SIMOTION P320-4 is terminated automatically.

With large projects, a black screen may be displayed in Windows with the message **Waiting for SIMOTION P – Please wait - SIMOTION P is terminating**.

The termination of the SIMOTION P Runtime can vary depending on the size of the project.

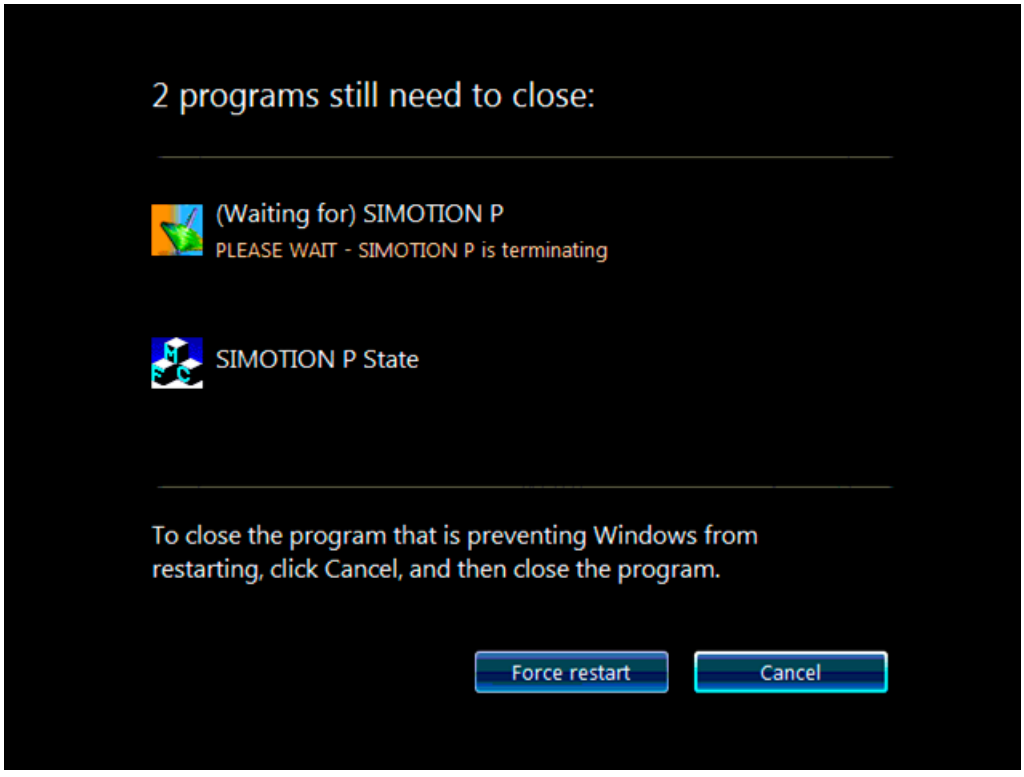


Figure 10-22 Black screen

Service and maintenance 11

11.1 Recording diagnostic data

Diagnostics data can be recorded during power-up and operation for the diagnostics and error analysis.

Saving diagnostic data during power-up

1. Terminate the SIMOTION P320-4 via the **Terminate SIMOTION P** button of the **SIMOTION P State** application.
2. Activate the diagnostics switch via the following option:
   SIMOTION P State, menu item **SIMOTION P > Set Diagnostic Switch**.
   The diagnostic data is recorded during power-up and the **SIMOTION P > Set Diagnostic Switch** switch automatically reset after writing the data.
3. After writing the diagnostic data, **SIMOTION P** must be terminated (RUN LED flashes continuously green).

Saving diagnostic data during operation

1. Make sure that the SIMOTION P320-4 has been started and powered up, e.g. with SIMOTION P State.
2. Activate the diagnostics switch via the following option:
   SIMOTION P State, menu item **SIMOTION P > Set Diagnostic Switch**

The diagnostic data is recorded during operation and the **SIMOTION P > Set Diagnostic Switch** switch automatically reset after writing the data.

Backing up diagnostic data

Following a fault on a SIMOTION device, diagnostic data (e.g. diagnostic buffer content, current content of website, etc.) can provide important information on the cause of the fault. The diagnostic data can be recorded during power-up or operation and backed up on the external CFast card by means of a simple operation as described below.

External CFast card

You can copy the backed-up data from the external CFast card.

Path: D:\USER\SIMOTION\HMI\SYSLOG\DIAG

SIMOTION IT / FTP

You can load the backed-up diagnostic data by means of SIMOTION IT or FTP:

You can find more detailed information at:

- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION online help

Evaluating diagnostic data

You can also use the diagnostic data for diagnostic purposes or forward it to Technical Support for evaluation purposes.

Further information

SIMOTION P State - menus (Page 131)

Diagnostics via LED displays (Page 207)

Single backups (Page 177)

11.2 Restoring factory settings

11.2.1 Overview of restoring the factory settings

Note

When the factory settings are reset/restored, licenses are retained.

11.2.2 Resetting the SIMOTION P320-4 to the delivery status

The **SIMOTION P State** application is used for this function.

Procedure

Proceed as follows to restore the delivery status of SIMOTION P320-4:

1. First, terminate SIMOTION P320-4 via the **Terminate SIMOTION P** button of the SIMOTION P State application.
2. Then select **Extras > Reset to factory default** in the menu.

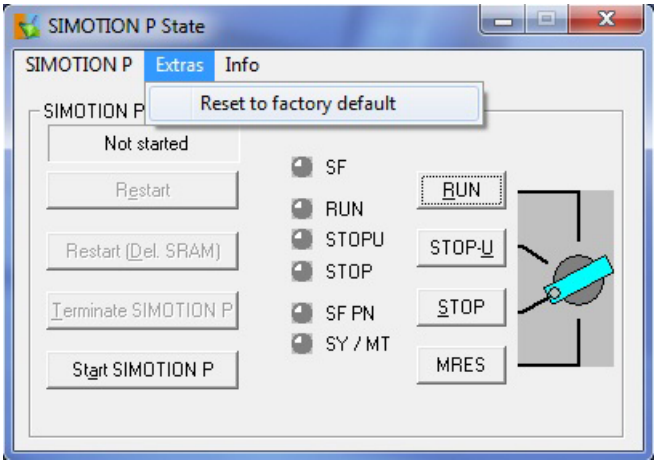


Figure 11-1 Restoring the delivery status

NOTICE
Note the consequences of user changes!
All data and settings for SIMOTION P320-4 changed by the user will be deleted!
The settings made using the **Station Configurator** will also be reset to the delivery status.

11.2.3 Reset SIMOTION P320-4 to the initial state

If an error occurred during parameter assignment, download, or when other settings were configured or if you are not sure whether you have specified all the information correctly, it may be useful or necessary to reset the SIMOTION P320-4 to its state prior to parameter assignment.

Requirements

You have saved an image of the memory medium on a remote computer/remote medium.

You can now use this image to reset the SIMOTION P320-4 to the factory settings. Note that the changes made on the SIMOTION P320-4 will be lost in the process.

NOTICE
Retain data Once the image has been loaded, the user may have to delete the retain data.

Procedure

Use the **Restart (Del. SRAM)** function from the SIMOTION P State application to reset.

Further information

Function elements (SIMOTION P State) (Page 130)

11.3 Upgrading runtime and firmware

As of the SIMOTION P320-4 Box, the current software version is always supplied. The previous version is available on the included restore DVD.

The upgrade to the latest hotfix (HF) can be performed via a setup.

Procedure

Possible types of upgrade:

- Upgrade with external DVD drive.
  First, the upgrade software must be copied to an external DVD or USB memory stick.
- Upgrade using a remote computer in the network (connect the SIMOTION P320-4 to the drive of the remote computer via the network)

Start the upgrade by calling the **Setup.exe** file.

See also

Further information on upgrading can be found in the following documentation:

- Updating SIMOTION devices
- SIMOTION online help

11.4 Installing/removing the back-up battery of the SIMOTION P320-4

11.4.1 Preventive maintenance

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

Component	Exchange interval:
CMOS backup battery	4 years

11.4.2 Replacing the backup battery

Note

The service life of the backup battery is approximately 5 - 8 years, depending on the environmental conditions.

To be noted before you replace the battery

NOTICE

Risk of damage!

The lithium battery may only be replaced with an identical battery or with a type recommended by the manufacturer (article number: A5E30314053)

⚠ WARNING

Risk of explosion and release of harmful substances!

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

Note

A backup battery maintains the contents of the SRAM data on the SIMOTION P320-4 after the supply power is switched off.

Battery monitoring

The 3 V lithium battery to back up the SRAM and the clock module is monitored in two stages:

Table 11-1 Two-stage battery monitoring

Battery voltage	Message
2.7 V ± 0.1 V	Diagnostic buffer entry: Battery warning Battery warning threshold reached
2.25 V ± 0.25 V	Diagnostic buffer entry: Battery error Voltage below limit

In order to prevent data being lost, the battery should be replaced once the **Battery warning** entry appears in the diagnostics buffer or, at the very latest, the first time the **Battery error** entry appears in the diagnostics buffer.

Disposal

NOTICE
Dispose of batteries properly Batteries must be disposed of in accordance with local regulations.

Preparation

Note

The configuration data and contents of the SRAM in the device are buffered for at least 30 seconds when the battery is replaced.

Preparation – make a note of the BIOS settings

Note

Note specific BIOS setup settings if changes have been made.

Preparation – save SRAM data

As a result of replacing the battery (SRAM not backed up during this time), data loss may occur in the SRAM of the SIMOTION P320-4 if the battery replacement takes longer than 30 seconds.

1. To avoid a lengthy repeat of the commissioning procedure, ensure that a backup of the non-volatile data is available before changing the battery. This is performed, for example, automatically when Windows is shutdown correctly.
2. Shut down the SIMOTION PP320-4 or Windows correctly via:
   Windows taskbar: **Start > Shut down**
3. Isolate the device from the power supply and disconnect all connecting cables.

Note

If Windows was not shut down properly before backup battery replacement, loss of bit values in SRAM memory cells during battery replacement cannot be detected reliably.

SIMOTION P320-4 must then undergo an overall reset.

Tools

You will need a T10 screwdriver to open the battery compartment.

Replacing the battery

NOTICE
Switch off the device before replacing the battery The battery can also be exchanged when the device is operating. However, we recommend switching off the device beforehand.

NOTICE
Time setting is lost If the battery change takes longer than 30 seconds, the time setting is deleted. The time on the device is no longer synchronized. Time-controlled programs no longer run or they run at the wrong time. This can damage the system. Set the device time again.

Procedure

Steps for replacing the battery:

1. Open the battery compartment.



2. Remove the battery holder.
3. Unplug the battery connector.



4. Connect the battery plug to the new battery.
5. Remove the old battery from the holder.
6. Secure the new battery in the holder.
7. Close the battery compartment.

Reconfiguring the BIOS Setup

The battery change does not take longer than 30 seconds with the device switched off, the BIOS settings are retained.

The SRAM and CMOS data of the SIMOTION P320-4 is certainly deleted only when the battery is disconnected for a longer period of time (more than 15 minutes) and in the switched-off state.

The BIOS Setup must be performed again if the data has been cleared. The CMOS data must be restored to the default values; the date, time, and any special settings must be set again.

Note

Exception:

If the CMOS data has been saved previously with a USER profile, only the date and the time may be set again. All other settings will be made automatically. This means that the default values may **not** be loaded in this special case.

11.5 Special power-up situations

11.5.1 Special startup situations overview

The special power-up situations are described in the following:

- Non-volatile data and SRAM handling (Page 203)
- After new installation / update of the SIMOTION P Kernel (Page 205)
- After importing a backup copy (Page 205)
- After a power failure/POWER FAIL (Page 205)

Requirements

You are familiar with the user storage concept of the non-volatile data on the SIMOTION P320-4.

11.5.2 Non-volatile data and SRAM handling

Non-volatile data, also called retain data, is retained when SIMOTION P320-4 suffers a power failure. The data is buffered with the battery in the static memory area (SRAM) on the SIMOTION P320-4.

SRAM handling

If the serial number of the SIMOTION P320-4 is known:

The serial number of the SIMOTION P320-4 corresponds to the one that was last saved on the SIMOTION P320-4.

SRAM image (storage medium) or SRAM backup (storage medium) is **OK**, if:

- The SIMOTION software release of the SRAM image/backup matches the installed software release.
- Windows has been shut down properly (the POWER FAIL mechanism of SIMOTION P does not suffice here).
- The checksum test on the SRAM image/backup was successful.
- The battery status was good when the SRAM image was backed up.

Table 11-2 SRAM handling if the serial number is known

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
Yes	Not applicable	Not applicable	Board [1)]	Normal statup
No	Yes	Not applicable	IMAGE [2)]	No message box or alarms

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
No	No	Yes	BACKUP [3]	No message box or alarms
No	No	No	Overall reset	Required

[1] The user data backed up in the SRAM of the SIMOTION P320-4 is used.

[2] The user data backed up in the SRAM image on the storage medium of the SIMOTION P320-4 is used.

[3] The user data backed up in the SRAM backup on the storage medium of the SIMOTION P320-4 is used.

If the serial number of the SIMOTION P320-4 is not known:

The serial number of the SIMOTION P320-4 does not correspond to the one that was last saved on the SIMOTION P320-4, for example, after the replacement of the SIMOTION P320-4.

SRAM image (storage medium) or SRAM backup (storage medium) is **OK**, if:

- The SIMOTION software release of the SRAM image/backup matches the installed software release.
- Windows has been shut down properly (the POWER FAIL mechanism of SIMOTION P does not suffice here).
- The checksum test on the SRAM image/backup was successful.
- The battery status was good when the SRAM image was backed up.

Table 11-3 SRAM handling if the serial number is unknown

SRAM "OK"?	SRAM image (storage medium) "OK"?	SRAM backup (storage medium) "OK"?	User data used	Note
Yes	Yes	Not applicable	Board [1] or IMAGE [2]	Query made
Yes	No	Yes	Board [1] or BACK-UP [3]	Query made
Yes	No	No	Board [1]	No message box
No	Yes	Not applicable	IMAGE [2]	No message box
No	No	Yes	BACKUP [3]	No message box or alarms
No	No	No	Overall reset	Required

[1] The user data backed up in the SRAM of the SIMOTION P320-4 is used.

[2] The user data backed up in the SRAM image on the storage medium of the SIMOTION P320-4 is used.

[3] The user data backed up in the SRAM backup on the storage medium of the SIMOTION P320-4 is used.

11.5.3 After new installation / update of the SIMOTION P Kernel

If a compatible SIMOTION P Kernel is installed on an already commissioned SIMOTION P320-4, the user data backed up in the SRAM is retained.

However, the current software version of the SIMOTION PP320-4 must be identical to the software version with which the backed-up user data of the SRAM was created.

Now SIMOTION P320-4 is immediately ready to run again.

Note

If you do not want the backed up user data to be used again, you will have to recommission the SIMOTION P320-4.

Note

Restart of SIMOTION P320-4 required

After a new installation or update of the SIMOTION P Kernel, a restart of the SIMOTION P320-4 is generally required.

If the device is not restarted, the new SIMOTION P Kernel is not activated and you continue to work with the old firmware.

11.5.4 After restoring a backup copy

If a backup copy (storage medium image) of a commissioned SIMOTION P320-4 is reloaded, the backed-up user data stored in the SRAM of the SIMOTION P320-4 is used.

Now SIMOTION P320-4 is immediately ready to run again.

11.5.5 After a power failure/POWER FAIL

Case 1: SRAM saved

In the event of a power failure, the POWER FAIL detection feature integrated in the SIMOTION P320-4 will automatically cause the SIMOTION P firmware to save the user data in the SRAM of the SIMOTION P320-4. An SRAM image, however, cannot be created any more in this case.

When the power supply returns or when the system is booted again, the data is available again.

Now SIMOTION P320-4 is immediately ready to run again.

Note

Backup of the user data in the SRAM of the SIMOTION P320-4 in case of power failure is only guaranteed if the SIMOTION P320-4 is operated within its defined specifications.

Case 2: SRAM not saved

If the hardware of the SIMOTION P320-4 was operated outside of the defined specifications, the user data might not have been backed up in the SRAM of the SIMOTION P320-4 under certain circumstances.

Alarm, error and system messages

12

12.1 Diagnosis using the LEDs

Each LED can assume various states, such as ON, OFF, flashing. The status of the respective LED indicates the current status of the device.

Table 12-1 Diagnostics LEDs of the SIMOTION P320-4

LED display		Meaning	Meaning
SF	Red	**System fault**	This LED indicates that a fault has occurred on SIMOTION P320-4.
LED	On		An interrupt which can be acknowledged is present (alarm, message, note). (See Diagnostics Guide)
LED flashing	0.5 Hz		No license exists for technology/optional objects under license. Licensing must be performed to correct the fault, see License tab.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
LED	Off		SIMOTION P320-4 works error-free.
RUN	Green	**SIMOTION P in RUN mode**	This LED indicates the state of the user program.
LED	On		The user program is running.
LED flashing	2 Hz		When the **RUN** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
STOPU	Yellow	**SIMOTION P in the STOP user program**	This LED indicates that the technology packages are active. No user program is being executed.
LED flashing	2 Hz		When the **STOPU** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
STOP	Yellow	**SIMOTION P in STOP mode**	This LED indicates that no user program is running.
LED	On		The technology packages are not active.
LED flashing	0.5 Hz		An overall reset request is indicated by slow flashing, see Overall reset with the mode selector (on the screen) (Page 186).
	2 Hz		When the **STOP** operating state is selected, the LED will flash until the operating state is actually attained.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).

LED display		Meaning	Meaning
SF PN		**PROFINET bus error**	
LED	Red		This LED indicates a fault at the PROFINET interface.
LED	Off		PROFINET onboard interface is operating without error; the data exchange to all configured I/O devices is running.
LED	On		Bus fault
LED flashes	2 Hz		Failure of a connected I/O device. At least one of the assigned I/O devices cannot be addressed. Configuring error.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
SY/MT		**Sync of PROFINET interface**	
LED	Yellow		This LED indicates whether the PROFINET interface has been synchronized.
LED	Off		The PROFINET interface has not yet synchronized with the send cycle clock of PROFINET IO with IRT, or PROFINET IO with IRT has not been configured.
LED	On		The PROFINET interface has synchronized to the send cycle clock of PROFINET IO with IRT.
LED flashes	2 Hz		A PROFINET firmware download is in progress.
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
BUS1F **BUS2F**	X101 X102	**Status of IsoPROFIBUS interface**	
LED	Red		If this LED is red, it indicates a fault at the IsoPROFIBUS interface.
LED	On		Bus fault Parameter assignment error
LED	Green		If this LED is green, it indicates the bus status of the IsoPROFIBUS interface.
LED	On		Cyclic data exchange
LED flashes	2 Hz		Bus status "Clear"
	5 Hz		FAULT state SIMOTION software does not run in the FAULT state (all LEDs flash simultaneously).
LED	Off		No fault or no interface configured.

LED combinations

STOP

When the user program reaches a breakpoint, SIMOTION P320-4 then assumes the **HALT** state.
A LED display indicates this state. The **HALT** state is also left when the breakpoint is left.

Table 12-2 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
STOP	x	0.5	1	1	x	x	x	x

x Not applicable

0.5 Flashes with a frequency of 0.5 Hz.

1 ON

DCP flashing

The DCP flashing function checks the correct assignment of a module and its interfaces.

The DCP flashing function is accessed via:

- Accessible nodes
- HW Config
- NetPro

Start the **Accessible nodes** function in SIMOTION SCOUT . Select a device and "Flashing" or "Stop flashing" is selected via the context menu.

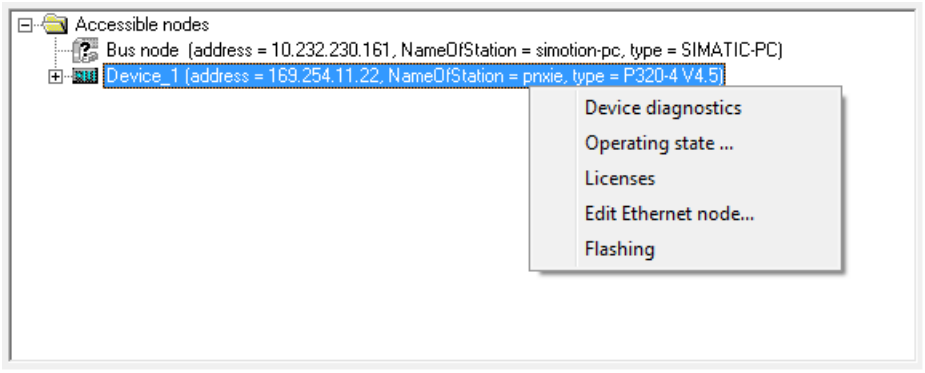


Figure 12-1 Accessible nodes

Alternatively, you can also activate the DCP flashing function in **HW Config** or in **NetPro** under the following path:

Target system > Ethernet > Edit Ethernet node... via the **Browse...** button, in the **Search Network** dialog box via the **Flashing** button of STEP 7.

The LED combination flashes as long as the dialog box is open and the **Flashing** function has not been deactivated.

If the dialog box is closed without deactivating the **Flashing** function, the previous state of the LED becomes active again.

Table 12-3 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
DCP flashing	x	2 (green/yel-low)	x	x	x	x	x	x

x Not applicable
1 ON
2 Flashes with a frequency of 2 Hz.

Note

You can carry out a detailed diagnosis using a PG/PC and the Engineering System.

FAULT

A fault has occurred to which the user program cannot respond.

The following actions may be required to rectify the fault:

- Power OFF/ON
- Recommissioning

Table 12-4 LED combinations

LED	SF	RUN	STOPU	STOP	SF PN	SY/MT	BUSF1	BUSF2
FAULT	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)	5 (red)

5 Flashes with a frequency of 5 Hz.

12.2 Temperature alarm

For SIMOTION P320-4, two different temperatures are monitored in the device as regard to whether they reach their respective threshold value.

System variables

_cpudata.temperature

_cpudata.moduletemperature

Error response

An I/O alarm is activated.

Cause of error / troubleshooting

One of the two monitored temperatures has reached or exceeded its threshold.
The temperature must fall below the threshold value before the alarm is reset.

If the temperature alarm is issued, the user and/or the machine manufacturer (user program) must decide whether or not processing should be interrupted and SIMOTION P320-4 exited and switched off.

The user can program a customized response to this and allow the program to continue, if appropriate.

The default response is for the operating mode to switch to **STOP**.

Note

Further information on programming alarm responses can be found in the SIMOTION Runtime Basic Functions Function Manual.

12.3 Battery alarm

When the critical battery status is reached, the battery must be replaced as quickly as possible. Because the SIMOTION P320-4 often cannot be shut down at short notice during operation, it is important to perform a programmable response to this battery state.

For this case, the system variable

- persistentdatapowermonitoring.warningbatteryvoltagelevel1

can be used to catch the complete loss of the retain data if the battery cannot be replaced fast enough.

Users should periodically save their retain data (e.g. with the _savePersistentMemoryData function). This ensures that the operating state established after the next start up represents the most current status of the retain data possible.

⚠ WARNING

System variable persistentDataPowerMonitoring

If no response to this system variable has been programmed, there is the danger of the complete loss of retain data if a power failure occurs before the battery can be replaced.

In this case, only the retain data for the last back up, normally the last shut down of the SIMOTION P320-4, is available after the next power-up.

12.4 Power failure / POWER FAIL

In the event of a power failure, the consequences described below must be considered separately.

SIMOTION P Runtime

If a power failure occurs, the POWER FAIL functionality of the SIMOTION P Runtime will perform the following steps:

- SIMOTION P Runtime is shut down correctly
- The user data marked as retain is saved in the non-volatile memory of the SIMOTION P320-4

The backed-up user data is available again at the next power-up of the SIMOTION P Runtime. SIMOTION P Runtime is therefore ready for operation again without any data loss.

Note

Backup of the user data in the SRAM of the SIMOTION P320-4 in case of power failure is only guaranteed if the SIMOTION P320-4 is operated within its defined specifications.

The message **POWER FAIL** is displayed if the supply voltage for SIMOTION P320-4 falls below 20.4 V. In this case, check the voltages in the external power supply:

1. Check if the input voltage (mains voltage) for the external power supply has the rated value.
2. If so, check the output voltage of the external power supply. If the voltage is not within the limits for the supply voltage of the SIMOTION P320-4 (19.2 … 28.8 VDC), then change the external power supply.

Windows

If the SIMOTION P320-4 is shut down during operation, the Windows installation may be damaged.

The consistency of Windows applications cannot be guaranteed during a power failure.

In these cases, we strongly recommend use of an EWF or a UPS system.

NOTICE
Do not protect external CFast cards with EWF Drive D: - the **external** CFast card - must not be protected with EWF as otherwise the functionality of SIMOTION cannot be assured.

Note

Only applies to the SIMOTION P320-4 E

SIMOTION P320-E is delivered with deactivated EWF (Enhanced Write Filter).

After the device is commissioned, activate the EWF for drive C: because this ensures:

- An extended service life for the **internal** CFast card
- No data loss on the **internal** CFast card when switching the device off via the line side switch or through disconnection from the power supply

NOTICE
Data loss on the external CFast card **Always** shut down SIMOTION correctly as otherwise there is a threat of data loss on the **external** CFast card. See also Section: Switching off (Page 191).

12.5 PROFINET bus error occurs

The flashing red **SF PN** LED on the SIMOTION P320-4 indicates a problem of an I/O device on the bus or a configuring error.

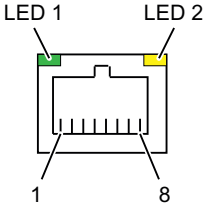
Information about further display modes of the LED can be found under SIMOTION P State application > LED display (Page 128).

Error causes with flashing

- Failure of a connected I/O device
- At least one of the assigned I/O devices cannot be addressed
- Incorrect or no configuration.

PROFINET (LAN) X3 Port P1, P2, P3

The two LEDs on the respective PROFINET ports also provide information on the current connection status:

PROFINET interface		
		
LED 1	On	Lights up green: Link
	Off	No physical connection available. Troubleshooting: Check for loose connector, defective cable, etc.
LED 2	On	Lights up yellow: Activity
	Off	No logical connection, i.e. no Ethernet telegrams are exchanged. Troubleshooting: Check IP configurations, parameterize required router, etc.

12.6 Under-licensing

Error

The red system error LED (**SF**) flashes at 0.5 Hz.

Cause

No license exists for technology/optional objects under license.

Licensing must be performed to correct the error.

Note

Further information for the licensing of technology/option objects can be found in the SIMOTION SCOUT Configuration Manual.

12.7 Boot error messages

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

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

The following lists the error messages from the system BIOS. For information on error messages output by the operating system or programs, refer to the corresponding manuals.

Error messages on the screen

Error message on the screen	Meaning / suggestions
Operating system not found	Possible causes: • No operating system present • Incorrect active boot partition • Wrong drive settings in SETUP

Troubleshooting/FAQs

13

13.1 Error correction

This section provides you with tips on how to locate and troubleshoot common problems.

FAQs / error correction	Possible cause	Possible remedy
The device is not operational.	There is no power supply to the device.	• Check whether the 24 VDC power supply is connected. See SIMOTION P320-4 E / P320-4 S Manual, Section Connecting the power supply (24 VDC). • Check whether the line side switch is activated. See SIMOTION P320-4 E / P320-4 S Manual, Section Operator controls.
SIMOTION P does not start after connecting the CFast card.	BIOS settings are not set to Hotplug Enabled.	You can find out how to check and correct the BIOS settings in Section Hotplug Enabled BIOS settings (Page 221).
SIMOTION P does not start after a reboot.	The user is not logged in automatically.	Set the password for the AutoLogin (Automatically Log On). See Section SIMOTION P AutoLogin (Page 94).
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 connected keyboard.
	The brightness button has been set to dark.	Set the monitor brightness button to obtain more light. 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, please contact your technical support team.
The mouse pointer does not appear on the screen.	The mouse driver is not loaded.	Check whether the mouse driver is properly installed and present when you start the application program. For more detailed information on the mouse driver, refer to the documentation for the mouse or application programs.
	The mouse is not connected.	Check whether the mouse is properly connected to the system unit. If you use an adapter or extension on the mouse cable, also check the connectors.
		If the cursor still does not appear on the screen after you have performed these checks and measures, please contact your technical support team.

FAQs / error correction	Possible cause	Possible remedy
Error message on the screen: Operating system not found	• No operating system present. • Incorrect active boot partition. • Incorrect drive entries in the SETUP.	Check whether one of the specified causes is present:
Wrong time and/or date on the PC.	-	• Press <ESC> during the boot sequence to open BIOS Setup. Detailed information on the BIOS setup can be found in the section Starting Bios settings Hotplug Enabled - BIOS Setup (Page 221). • Set the time and date in the setup menu.
Although the BIOS setting is OK, the time and date are still wrong.	The backup battery is empty.	Replace the backup battery. See Section Service and maintenances > Replacing the back-up battery (Page 198). If the problem cannot be resolved by replacing the battery, then contact your technical support team.
UPS does not function.	The operating system does not have a suitable driver for the UPS.	Install a suitable driver; the correct driver can often be downloaded from the homepage of the device's manufacturer. See also Section Customer-specific software (Page 125).
IP address assigned twice (e.g. through series commissioning).	Default IP address for Windows See Default IP addresses for Windows and SIMOTION P (Page 153).	Assign a new IP address for Windows. The IP address must be different to the previous specified IP address and must not have been assigned already in the network.
The display in the BIOS for the PROFINET MAC address is incorrect (00:00:00:00:00:00).	-	The correct MAC addresses can be taken from the rating plate on the housing. See also Manual SIMOTION P320-4 E / P320-4 S Manual, Section Device identification data, MAC addresses.

13.2 Hotplug Enabled BIOS settings

Starting the BIOS setup

Proceed as follows:

1. Reset the SIMOTION P320-4 (warm or cold restart).
   Depending on the device version, the default settings may differ from the following figures.
2. After completing the startup test, you can start the program setup with BIOS.
   The following message is shown on the display:



Figure 13-1 SIEMENS Press Esc boot options

Press **Esc**.

3. After booting, the BIOS selection menu is displayed:



Figure 13-2 BIOS selection menu

4. The following buttons are available in the BIOS selection menu:

Button	Function
Continue	Exit BIOS menu, continue with the startup process
Boot Manager	Selection of the boot drive
Boot From File	Starting from a .EFI file
SCU	Device configurator (Setup Configuration Utility)
BIOS Update	BIOS update from USB stick
MEBx	Start the Intel Management Engine BIOS Extension

5. Select the **SCU** device configurator.

6. In the BIOS window, select the **Advanced** tab using the arrow keys and then select **IDE Configuration**.
   Press Enter to confirm the selection.

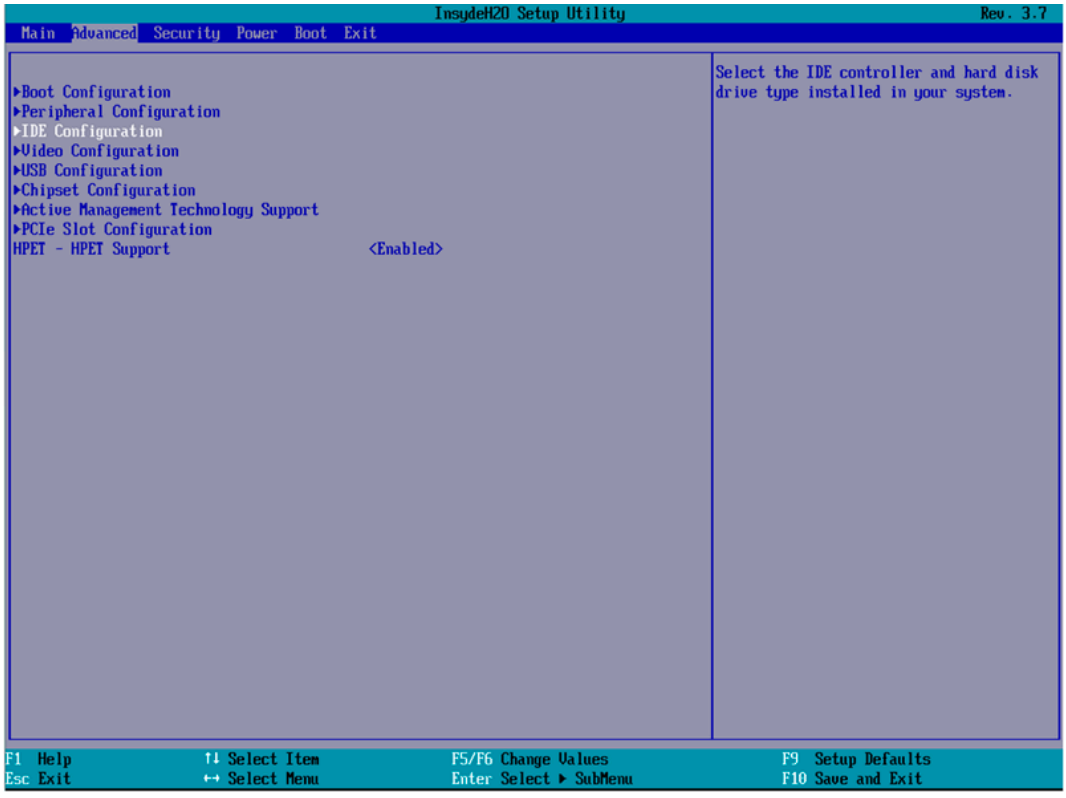


Figure 13-3 Advanced > IDE configuration

7. In the **IDE Configuration** window, select **SATA Port 2 HotPlug**.

8. Change the **Disabled** selection shown here to **Enabled**.

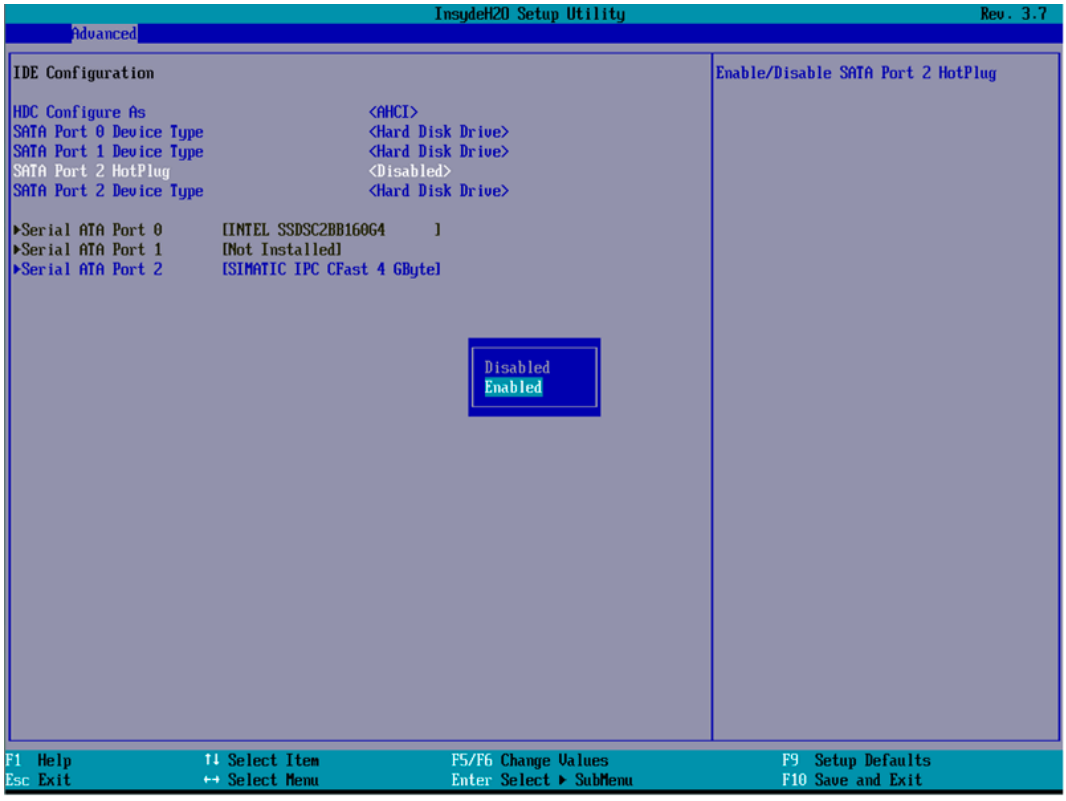


Figure 13-4 IDE Configuration > SATA Port 2 HotPlug

9. Press **F10** Save and Exit. The new entries are accepted.
10. Confirm the subsequent prompt to save the settings and exit the BIOS setup with **Yes**.

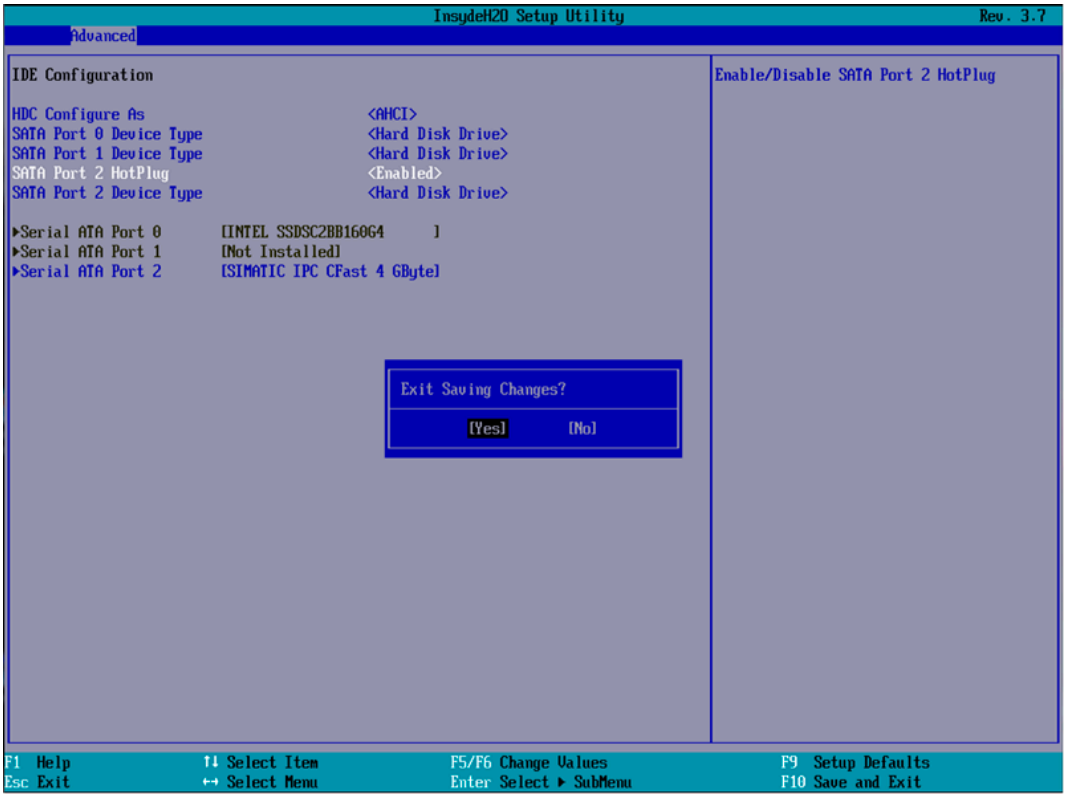


Figure 13-5 Confirming SATA Port 2 HotPlug > Enabled

Standards and approvals

A

A.1 General rules

CE marking

CE	Our products satisfy the requirements and protection objectives of the EC Directives and comply with the harmonized European standards (EN).

Electromagnetic compatibility

Standards for EMC are satisfied if the EMC Installation Guideline is observed.

SIMOTION products are designed for industrial use in accordance with product standard DIN EN 61800-3, Category C2.

cULus approval

c UL us	Listed component mark for United States and the Canada Underwriters Laboratories (UL) according to Standard UL 508, File E164110, File E115352, File E85972.

You can find further information on the respective device on the Internet at http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm Enter the first seven characters of the article number at **Keyword**. Then click **Search**.

Korea certification

KC	KC registration number: KCC-REM-S49-SIMOTION Note that this device complies with limit class A with regard to the emission of radio frequency interference. This device can be used in all areas except residential areas. 이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Declaration of conformity

The current Declaration of conformity is available on the Internet at Declaration of conformity (http://support.automation.siemens.com/WW/view/en/10805446/134200).

ESD guidelines

B

B.1 ESD definition

What does ESD mean?

Electrostatic sensitive devices (ESDs) are individual components, integrated circuits, modules or devices that may be damaged by either electrostatic fields or electrostatic discharge.



NOTICE

Damage caused by electric fields or electrostatic discharge

Electric fields or electrostatic discharge can result in malfunctions as a result of damaged individual parts, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber or aluminum foil.
- Only touch components, modules and devices if you are first grounded by applying one of the following measures:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

B.2 Electrostatic charging of individuals

Any person who is not conductively connected to the electrical potential of the environment can accumulate an electrostatic charge.

This figure indicates the maximum electrostatic charges that can accumulate on an operator when he comes into contact with the indicated materials. These values comply with the specifications in IEC 801-2.

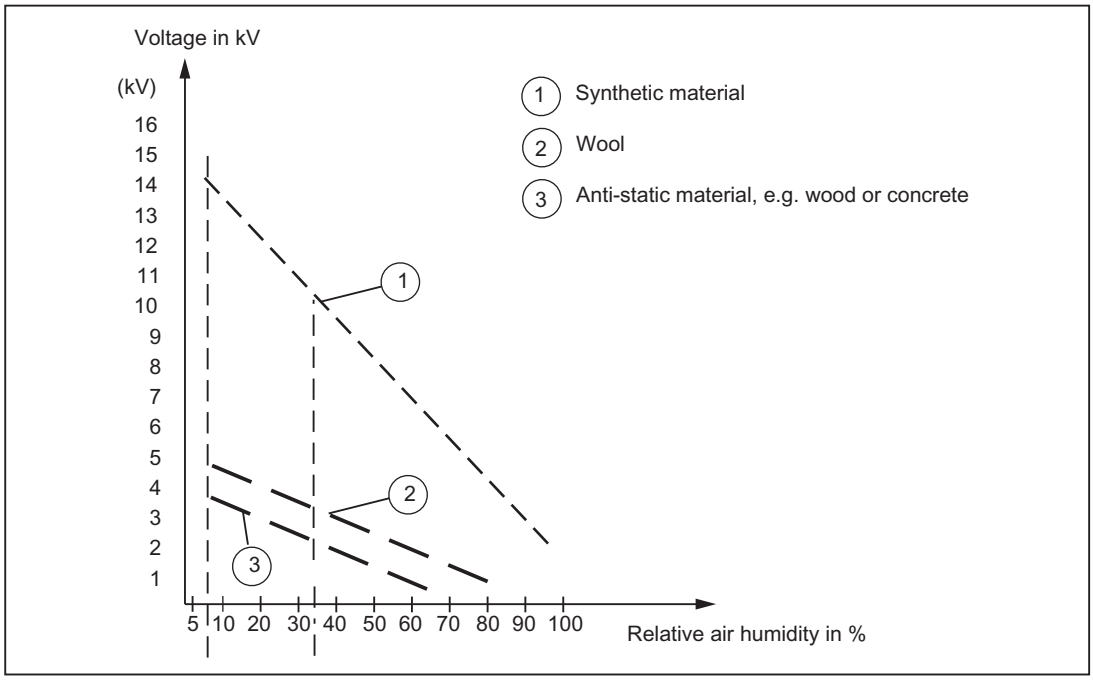


Figure B-1 Electrostatic voltage that can accumulate on operating personnel

B.3 Basic measures for protection against discharge of static electricity

Ensure sufficient grounding

When working with electrostatic sensitive devices, make sure that the you, your workstation, and the packaging are properly grounded. This prevents the accumulation of static electricity.

Avoid direct contact

You should only touch ESD components if unavoidable (for example, during maintenance work). When you touch modules, make sure that you do not touch either the pins on the modules or the printed conductors. If you follow these instructions, electrostatic discharge cannot reach or damage sensitive components.

If you have to take measurements on a module, make sure that you first discharge any static that may have accumulated in your body. To do this, touch a grounded metal object. Only use grounded measuring instruments.

List of abbreviations

C

C.1 Commissioning Manual, Abbreviations

Abbreviation	Term	Meaning
CE	Communauté Européenne (CE-Symbol)	The product is in conformance with all applicable EC directives.
CMOS	Complementary Metal Oxide Semiconductor	Complementary metal oxide semiconductors
COM	Communications Port	Term for the serial interface
CPU	Central Processing Unit	CPU
CRT	Cathode Ray Tube	-
CSA	Canadian Standards Association	Canadian organization for tests and certifications according to own or binational standards (with UL / USA) standards
CTS	Clear To Send	Clear to send
DRAM	Dynamic Random Access Memory	Dynamic RAM
DC	Direct Current	DC current
DMA	Direct Memory Access	Direct memory access
DP	Distributed I/O	-
DQS	Deutsche Gesellschaft zur Zertifizierung von Management-Systemen	-
DSR	Data Set Ready	Ready for operation
DTR	Data Terminal Ready	Data terminal is ready
DVI-I	Digital Visual Interface	Digital display interface with digital and VGA signals
ESD	Components sensitive to electrostatic charge	-
EN	European standard	-
EWF	Enhanced Write Filter	Configurable write filter (SIMOTION P320-4 E)
FAQ	Frequently Asked Questions	FAQs
GND	Ground	Chassis ground
HMI	Human Machine Interface	User interface
HW	Hardware	-
I/O	Input/Output	Data input/output on computers
IEC	International Electronical Commission	-
IP	Ingress Protection	Degree of protection
IRQ	Interrupt Request	Interrupt request
LAN	Local Area Network	Computer network that is limited to a local area.
LCD	Liquid Crystal Display	Liquid crystal display
LED	Light Emmitting Diode	Light emitting diode
MUI	Multilanguage User Interface	Language localization in Windows
NC	Not Connected	Not connected
OPC	OLE for Process Control	Standardized interface for industrial processes

Abbreviation	Term	Meaning
PC	Personal Computer	-
PCI	Peripheral Component Interconnect	High-speed expansion bus
PE	Protective Earth	Protective conductor
PG	Programming device	-
POST	Power On Self Test	-
RAL	Restricted Access Location	Installation of device in operating facilities with restricted access, for example, a locked switchgear cabinet
RAM	Random Access Memory	RAM
ROM	Read-Only Memory	-
RTS	Reliable Transfer Service	Request to send
RxD	Receive Data	Data transfer signal
SDRAM	Synchronous DRAM	-
SELV	Safety Extra Low Voltage	Safety extra low voltage
SRAM	Static Random Access Memory	Static RAM
SVP	Serial No. of the device	-
SW	Software	-
TFT	Thin-Film-Transistor	Type of LCD flat-screen
TxD	Transmit Data	Data transfer signal
UL	Underwriters Laboratories Inc.	US organization for tests and certifications according to own or binational standards (with CSA / Canada) standards
UMA	Unified Memory Architecture	Video memory
USB	Universal Serial Bus	-
UPS	Uninterruptible power supply	-
VCC	-	Positive supply voltage of integrated circuits
VDE	Verein deutscher Elektrotechniker (Union of German Electrical Engineers)	-
VGA	Video Graphics Array	Video adapter which meets industrial standard
WD	Watchdog	Program monitoring with error detection and alarming.

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