SIEMENS

SIEMENS

SINAMICS

SINAMICS CONNECT

Operating Instructions

Software 1.0.0

10/2018
A5E45421408

Legal information

Warning notice system

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

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

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

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

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

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

Trademarks

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

Disclaimer of Liability

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

Preface

These operating instructions contain all the information you need for commissioning and operation of the SINAMICS CONNECT.

It is intended both for commissioning and testing personnel who commission and operate the device and connect it with converters, as well as for service and maintenance personnel who carry out fault/error analyses.

Basic knowledge requirements

Knowledge of personal computers and operating systems is required to understand this manual. General knowledge in the field automation control engineering is recommended.

Scope of this documentation

The device documentation comprises:

- SINAMICS CONNECT Operating Instructions
- SINAMICS CONNECT Quick Install Guide

Conventions

The term "device" refers to a SINAMICS CONNECT unit.

Figures

This manual contains figures of the described devices. The supplied devices may differ in some details from the figures. Within some of the figures, one device is used to represent all devices.

Reference

You can find the overview of documentation and links to download documents as well as to use documentation online at:

More information (https://support.industry.siemens.com/cs/ww/en/ps/25436/man).

Product maintenance

The components are subject to continuous further development within the scope of product maintenance (improvements to robustness, discontinuations of components, etc).

These further developments are "spare parts-compatible" and do not change the article number.

In the scope of such spare parts-compatible further developments, connector positions are sometimes changed slightly. This does not cause any problems with proper use of the components. Please take this fact into consideration in special installation situations (e.g. allow sufficient clearance for the cable length).

Use of third-party products

This document contains recommendations relating to third-party products. Siemens accepts the fundamental suitability of these third-party products.

You can use equivalent products from other manufacturers.

Siemens does not accept any warranty for the properties of third-party products.

Compliance with the General Data Protection Regulation

Siemens respects the principles of data protection, in particular the data minimization rules (privacy by design).

For this product, this means:
The product does not process neither store any person-related data, only technical function data (e.g. time stamps). If the user links these data with other data (e.g. shift plans) or if he stores person-related data on the same data medium (e.g. hard disk), thus personalizing these data, he has to ensure compliance with the applicable data protection stipulations.

Table of contents

Safety instructions

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

1.1 Fundamental safety instructions

1.1.1 General safety instructions

> ## ⚠ WARNING
>
> **Electric shock and danger to life due to other energy sources**
>
> Touching live components can result in death or severe injury.
>
> - Only work on electrical devices when you are qualified for this job.
> - Always observe the country-specific safety rules.
>
> Generally, the following six steps apply when establishing safety:
>
> 1. Prepare for disconnection. Notify all those who will be affected by the procedure.
> 2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
> 3. Wait until the discharge time specified on the warning labels has elapsed.
> 4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
> 5. Check whether the existing auxiliary supply circuits are de-energized.
> 6. Ensure that the motors cannot move.
> 7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
> 8. Check that the correct drive system is completely locked.
>
> After you have completed the work, restore the operational readiness in the inverse sequence.

> ## ⚠ WARNING
>
> **Risk of electric shock and fire from supply networks with an excessively high impedance**
>
> Excessively low short-circuit currents can lead to the protective devices not tripping or tripping too late, and thus causing electric shock or a fire.
>
> - In the case of a conductor-conductor or conductor-ground short-circuit, ensure that the short-circuit current at the point where the inverter is connected to the line supply at least meets the minimum requirements for the response of the protective device used.
> - You must use an additional residual-current device (RCD) if a conductor-ground short circuit does not reach the short-circuit current required for the protective device to respond. The required short-circuit current can be too low, especially for TT supply systems.

> **⚠ WARNING**
>
> **Risk of electric shock and fire from supply networks with an excessively low impedance**
>
> Excessively high short-circuit currents can lead to the protective devices not being able to interrupt these short-circuit currents and being destroyed, and thus causing electric shock or a fire.
>
> - Ensure that the prospective short-circuit current at the line terminal of the inverter does not exceed the breaking capacity (SCCR or Icc) of the protective device used.

> **⚠ WARNING**
>
> **Electric shock if there is no ground connection**
>
> 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**
>
> **Electric shock due to connection to an unsuitable power supply**
>
> When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage that might result in serious injury or death.
>
> - 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**
>
> **Electric shock due to equipment damage**
>
> Improper handling may cause damage to equipment. 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.
>
> - Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
> - Do not use any damaged devices.

> **⚠ WARNING**
>
> **Electric shock due to unconnected cable shield**
>
> Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.
>
> - As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

> **⚠ WARNING**
>
> **Arcing when a plug connection is opened during operation**
>
> Opening a plug connection when a system is operation can result in arcing that may cause serious injury or death.
>
> - Only open plug connections when the equipment is in a voltage-free state, unless it has been explicitly stated that they can be opened in operation.

> **⚠ WARNING**
>
> **Electric shock due to residual charges in power components**
>
> Because of the capacitors, a hazardous voltage is present for up to 5 minutes after the power supply has been switched off. Contact with live parts can result in death or serious injury.
>
> - Wait for 5 minutes before you check that the unit really is in a no-voltage condition and start work.

> **NOTICE**
>
> **Property damage due to loose power connections**
>
> Insufficient tightening torques or vibration can result in loose power connections. This can result in damage due to fire, device defects or malfunctions.
>
> - Tighten all power connections to the prescribed torque.
> - Check all power connections at regular intervals, particularly after equipment has been transported.

> **⚠ WARNING**
>
> **Spread of fire from built-in devices**
>
> In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.
>
> - Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
> - Ensure that smoke can only escape via controlled and monitored paths.

> **⚠ WARNING**
>
> **Active implant malfunctions due to electromagnetic fields**
>
> Inverters generate electromagnetic fields (EMF) in operation. People with active implants in the immediate vicinity of this equipment are at particular risk.
>
> - As the operator of an EMF-emitting installation, assess the individual risks of persons with active implants. The following clearances are usually adequate:
>   – No clearance to closed control cabinets and shielded MOTION-CONNECT supply cables
>   – Forearm length (approx. 35 cm clearance) to distributed drive systems and open control cabinets

⚠ **WARNING**

Unexpected movement of machines caused by radio devices or mobile phones

When radio devices or mobile phones with a transmission power > 1 W are used in the immediate vicinity of components, they may cause the equipment to malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- If you come closer than around 2 m to such components, switch off any radios or mobile phones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

NOTICE

Damage to motor insulation due to excessive voltages

When operated on systems with grounded line conductor or in the event of a ground fault in the IT system, the motor insulation can be damaged by the higher voltage to ground. If you use motors that have insulation that is not designed for operation with grounded line conductors, you must perform the following measures:

- IT system: Use a ground fault monitor and eliminate the fault as quickly as possible.
- TN or TT systems with grounded line conductor: Use an isolating transformer on the line side.

⚠ **WARNING**

Fire due to inadequate ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

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

⚠ **WARNING**

Unrecognized dangers due to missing or illegible warning labels

Dangers might not be recognized if warning labels are missing or illegible. Unrecognized dangers may cause accidents resulting in serious injury or death.

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

NOTICE

Device damage caused by incorrect voltage/insulation tests

Incorrect voltage/insulation tests can damage the device.

- Before carrying out a voltage/insulation check of the system/machine, disconnect the devices as all converters and motors have been subject to a high voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

⚠ WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in 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 Integrated functions

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

⚠ WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization (parameter assignments) against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

1.1.2 Equipment damage due to electric fields or electrostatic discharge

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

NOTICE
Equipment damage due to 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).

1.1.3 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.1.4 Industrial security

Note

Industrial security

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:

Industrial security (http://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 customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at:

Industrial security (http://www.siemens.com/industrialsecurity)

Further information is provided on the Internet:

Industrial Security Configuration Manual
(https://support.industry.siemens.com/cs/ww/en/view/108862708)

⚠ **WARNING**

Unsafe operating states resulting from software manipulation

Software manipulations (e.g. viruses, trojans, malware or worms) can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- Protect the drive against unauthorized changes by activating the "know-how protection" drive function.

1.1.5   Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from 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-ray, 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

6. Influence of network-connected communication systems, e.g. ripple-control transmitters or data communication via the network

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

1.2 Additional safety instructions

1.2.1 General safety instructions

⚠ WARNING
Life-threatening voltages due to use of 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, which may result in death or serious injury.
• Switch off the power supply to the cabinet before opening it.

System expansions

NOTICE
Lost approval for an "Open Type" device due to incorrect use
For an "Open Type" device, approval is lost and the protection associated with it may be impaired if the device is used in a manner not specified by the manufacturer.
• Use a UL61010-2-201 conform enclosure for an "Open Type" device.

NOTICE
Invalid approvals due to certain modifications
The device approvals are voided if the following modifications are made:
• The enclosure was physically modified, for example, openings were created to make LEDs on a plug-in card in the device visible.
• Cables are routed from the inside out of the device or from the outside into the device, for example, to connect sensors or displays.
Recommendation:
• Submit the device for approval again after modifications are made.

Note

Unauthorized changes due to administrator accounts without protection

• Ensure there are adequate safeguards for protecting the administrator accounts to prevent unauthorized changes.

• Use secure passwords and a standard user account for normal operation.

• Other measures, such as the use of security policies, should be applied as needed.

1.2.2 Notes on use

Note

Possible functional restrictions in case of non-validated plant operation

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

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

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.

Overview

2

2.1 Product description

Overview

The SINAMICS CONNECT is designed to acquire data through the serial port on the converter and synchronize the data to MindSphere, the Siemens Industrial IoT operating system.
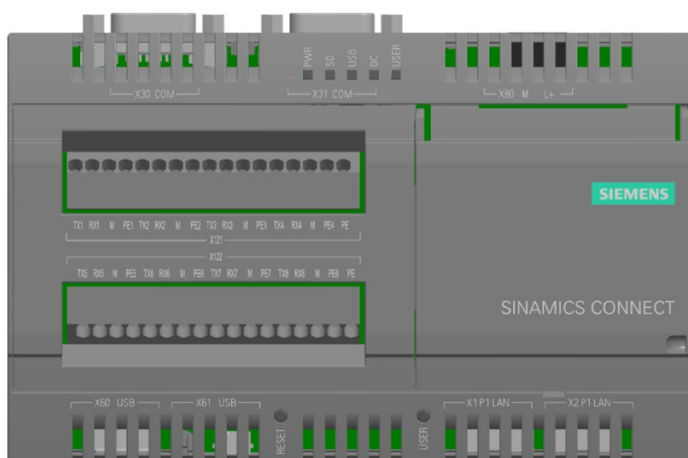
The SINAMICS CONNECT can be used to connect the following converters to MindSphere:

- SINAMICS V20
- SINAMICS G120 series (G120D excluded)
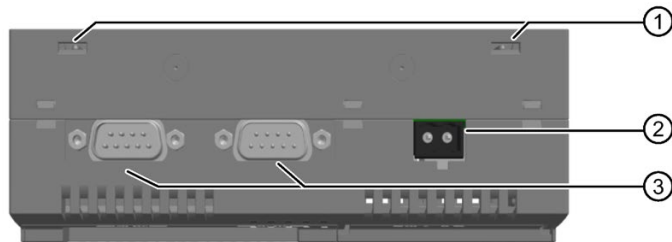- MICROMASTER 440

Highlights and benefits

- High degree of ruggedness
- Compact design
- RS232 and Ethernet interfaces
- Maintenance-free operation possible

Features

The SINAMICS CONNECT is available with the following features:

- Intel Quark X1020 processor
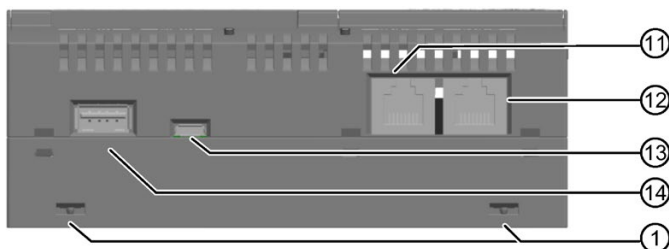- 1 GB RAM
- 2 x Ethernet interfaces
- 8 x RS232 ports

2.2 Structure of the device

Top view
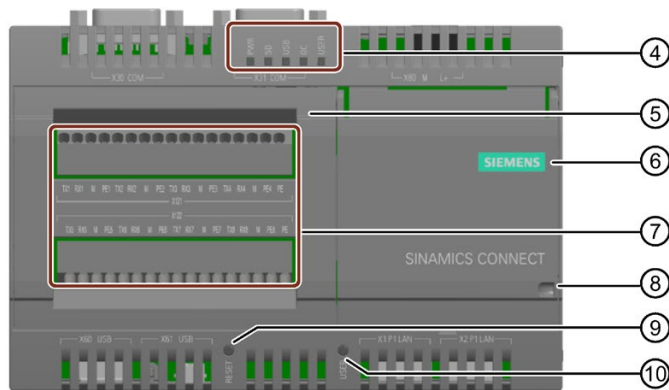
Front view

Bottom view

①	Openings for push-in lugs for wall mounting	⑧	Securing device
②	Power supply connector	⑨	RESET button for the CPU
③	COM interfaces (reserved)	⑩	USER button
④	LED display, see Section "Interface overview (Page 88)"	⑪	Ethernet interface 10/100 Mbps
⑤	Cover on left	⑫	Ethernet interface 10/100 Mbps
⑥	Cover on right	⑬	USB Type Micro B (reserved)
⑦	RS232 interface	⑭	USB Type A (reserved)

2.3 Scope of delivery

Check the scope of delivery for completeness and intactness:

- One SINAMICS CONNECT device with one DC terminal block mounted
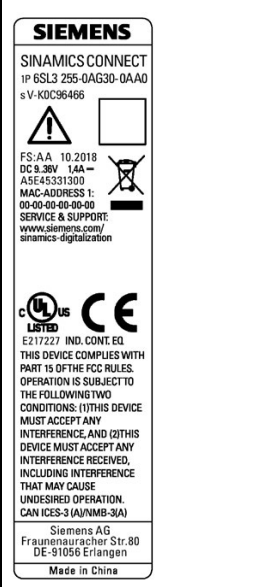- Quick Install Guide in English

---

Note

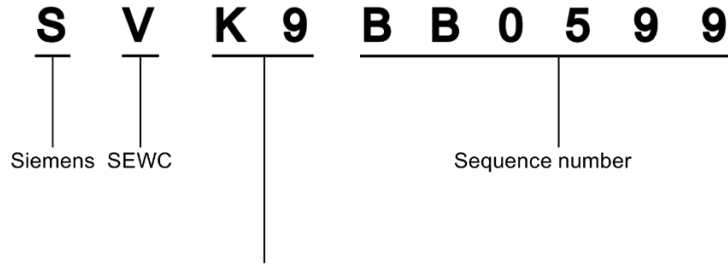The device contains open-source software (OSS). The OSS license terms are saved in the device.

Identification data of the device

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

You can find this information on the rating plate. The following illustration shows an example.

Example rating plate	Enter the identification data in the table below	
	Article number	6SL ...
	Serial number	S V
	Production version	FS
	All existing Ethernet addresses (MAC)	

Serial number explanation (example)

S V K 9 B B 0 5 9 9

Siemens SEWC

Sequence number

Production date (year/month)

Code	Calendar year	Code	Month
A	1990, 2010	1	Janauary
B	1991, 2011	2	February
C	1992, 2012	3	March
D	1993, 2013	4	April
E	1994, 2014	5	May
F	1995, 2015	6	June
H	1996, 2016	7	July
J	1997, 2017	8	Auguest
K	1998, 2018	9	September
L	1999, 2019	0	October
M	2000, 2020	N	November
N	2001, 2021	D	December
P	2002, 2022		
R	2003, 2023		
S	2004, 2024		
T	2005, 2025		
U	2006, 2026		
V	2007, 2027		
W	2008, 2028		
X	2009, 2029		

2.4 Accessories

The following accessory is not included in the scope of delivery and can be ordered separately.

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

Push-in lugs

Set with 100 push-in lugs for wall mounting

Article number: 3RB1900-0B

Mounting

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

3.1 Preparing for installation

3.1.1 Checking the delivery

Procedure

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

> **NOTICE**
>
> **Damaged packaging of a device during transport and storage**
>
> A damaged packaging indicates that ambient conditions have already had a massive impact on the device. If a device is transported or stored without packaging, shocks, vibrations, pressure and moisture may impact the unprotected unit. This may cause damage to the device.
>
> - Do not dispose the original packaging.
> - Pack the device during transportation and storage.

5. Check the scope of delivery for completeness and intactness:
   – One SINAMICS CONNECT device with one DC terminal block mounted
   – Quick Install Guide in English
6. If the contents of the packaging are incomplete, damaged or do not match your order, inform the responsible delivery service immediately.

> **⚠ WARNING**
>
> **Electric shock and fire hazard due to damaged device**
>
> A damaged device can be under hazardous voltage and trigger a fire in the machine or plant. A damaged device has unpredictable properties and states. This may cause death or serious injury.
>
> - Make sure that the damaged device is not inadvertently installed and put into operation.
> - Label the damaged device and keep it locked away.
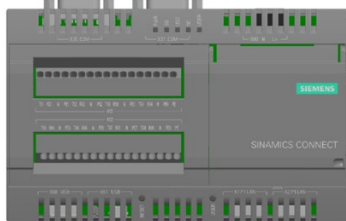> - Send off the device for immediate repair.

NOTICE

Damage from condensation

If the device is subjected to low temperatures or extreme fluctuations in temperature during transportation, for example in cold weather, moisture could build up on or inside the HMI device (condensation). Moisture causes a short circuit in electrical circuits and damages the device.

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

---

7. Please keep the enclosed documentation in a safe place. It belongs to the device. You need the documentation when you commission the device for the first time.

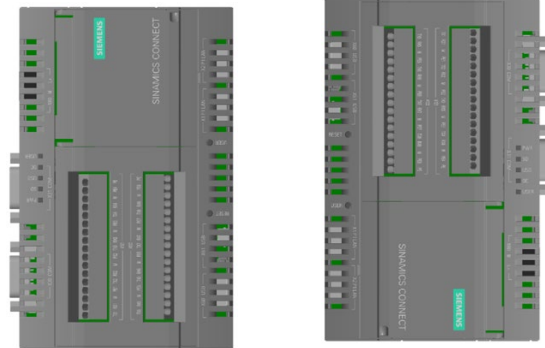8. Write down the identification data of the device.

3.1.2 Permitted mounting orientation and mounting types

The device can be attached horizontally or vertically on a DIN rail or to a wall.

**Horizontal mounting, preferred**   **Vertical mounting**

Take into account the permitted temperature range for operation that depends on the mounting position in accordance with Section "Ambient conditions (Page 86)".

Clearances

Make sure that the following clearances to another component or to the wall of a housing are complied with:

- Both above and below the device: ≥ 50 mm
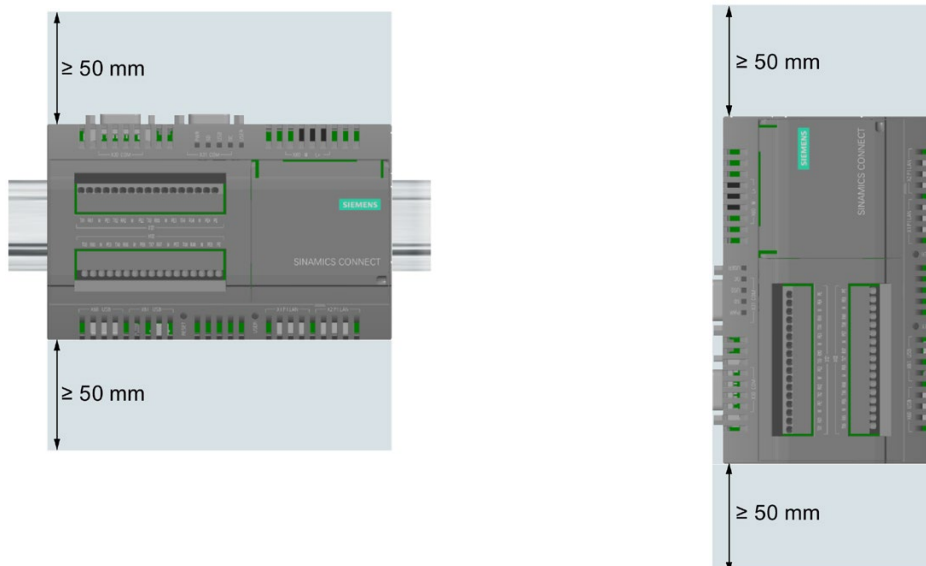
3.2 Mounting the device

Protection against the spread of fire

The device may be operated only in closed housings or in control cabinets with protective covers that are closed, and when all of the protective devices are used. The installation of the device in a metal control cabinet or the protection with another equivalent measure must prevent the spread of fire and emissions outside the control cabinet.

Protection against condensation or electrically conductive contamination

Protect the device, e.g. by installing it in a control cabinet with degree of protection IP54 according to IEC 60529 or NEMA 12. Further measures may be necessary for particularly critical operating conditions.

If condensation or conductive pollution can be excluded at the installation site, a lower degree of control cabinet protection may be permitted.

3.2.1 Mounting instructions

Note the following:

- The device is approved for indoor operation only.

- For installation in a cabinet, observe the relevant DIN/VDE requirements or the applicable country-specific regulations.

- When the device is used in the area of Industrial Control Equipment in accordance with UL61010-2-201, note that the device is classified as "Open Type". A UL61010-2-201 conform enclosure is therefore a mandatory requirement for approval or operation according to UL61010-2-201.

- To protect the enclosure of the device against unauthorized opening, after installing the expansions you can screw the rear panel of the enclosure to the front panel of the enclosure using two screws. The screws are not included in the scope of delivery. Use only screws of the type WN1452-K30x20-ST-A2F and tighten the screws using a torque of 0.5 Nm.

- The device is designed for operation in the second environment (industrial area) and may not be used in the first environment (residential area) unless the appropriate noise suppression measures have been adopted.

Fasten securely

NOTICE
Equipment falling due to insufficient load carrying capacity
If the mounting surface for wall mounting does not have a sufficient load-bearing capacity, the device may fall and be damaged.
• Ensure that the mounting surface on the wall can bear four times the total weight of the device, including fixing elements.

NOTICE
Equipment falling due to incorrect fixing elements
If you use anchors and screws other than those specified below for wall mounting, safe mounting is not guaranteed. The device can fall and may be damaged.
• Use only the anchors and screws specified in the following table.

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

3.2.2 Mounting on DIN rails

Requirement

- A DIN rail, 35 mm standard profile

  The DIN rail is installed at the installation site.

Procedure

Mounting

1. Place the device and rail clip on the upper edge of the standard profile rail at the position shown and push the device down.
2. Swing the rail clips of the device from below via the standard profile rail.
3. Push the device in the direction of the standard profile rail. You will hear the device click into place.
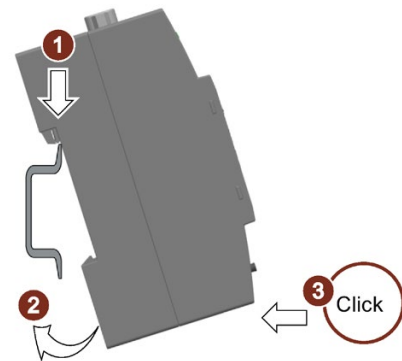
Removing

1. Push down the device until it is released by the rail clips.

2. Swing the device out of the standard profile rail.

3. Lift the device up and off.

3.2.3 Wall mounting

The device is suitable for horizontal or vertical wall mounting.

Requirement

- Four push-in lugs.
  The push-in lugs must be ordered separately, see Section "Accessories (Page 22)".

- Four anchors and four screws.

Procedure

1. Guide a push-in lug through the corresponding opening at the top of the device, as shown in the figure.

2. Press the push-in lug down.

3. Mark the bore holes, drill the required holes in the wall and fasten the device to the wall using four screws and corresponding anchors.

Connecting

4
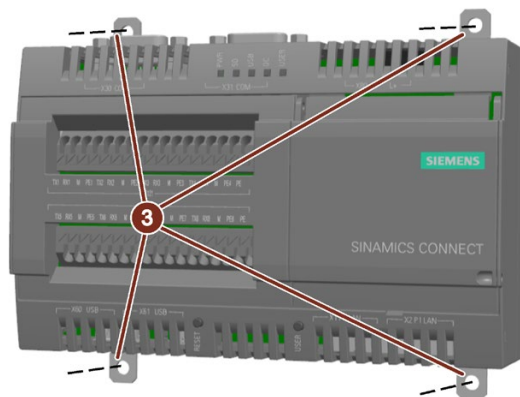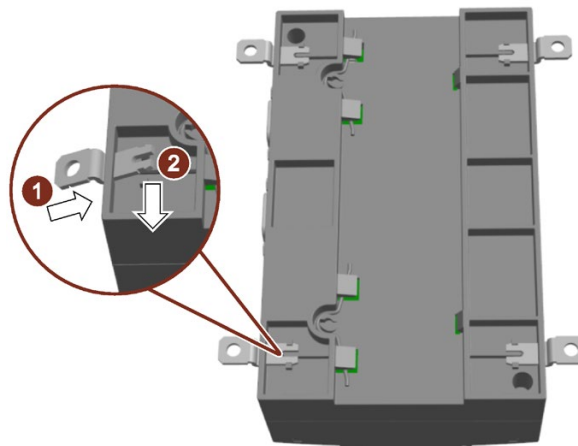
4.1 Connecting the device

4.1.1 Notes on connecting

⚠ WARNING
Personal injury due to lightning strikes
A lightning flash may enter the mains cables and data transmission cables and jump to a person, which may cause death, serious injury and burns.
• Disconnect the device from the power supply in good time when a thunderstorm is approaching.
• Do not touch mains cables and data transmission cables during a thunderstorm.
• Keep a sufficient distance from electric cables, distributors, and systems.

⚠ CAUTION
Fault caused by I/O devices
The connection of I/O devices can cause faults in the device, which may result in personal injury and damage to the equipment.
• Read the documentation of the I/O devices. Follow all instructions in the documentation.
• Only connect I/O devices which are approved for industrial applications in accordance with EN 61000-6-2 and IEC 61000-6-2.
• Connect I/O devices that are not hotplug-capable only after the device has been disconnected from the power supply.

NOTICE
Damage through regenerative feedback
Regenerative feedback of voltage to ground by a connected or installed component can damage the device.
• Do not supply any voltage to the device by using a connected or built-in I/Os, for example, a USB drive.
• Generally avoid any regenerative feedback.

NOTICE
Ferrite required at USB cables
The interference immunity of the device according to the data in the technical specifications is only guaranteed when the cables at USB and micro USB ports are equipped with a ferrite magnet.
• Use only USB cables equipped with a ferrite magnet.

4.1.2 Connecting the power supply

Connect the power supply to interface X80 of the device.

Note

The power supply must be adapted to the input data of the device, see Section "General technical specifications (Page 85)".

For more information about the requirements of power supply, see Chapter "Technical data (Page 85)".

Requirement

- You are using the supplied terminal.
- A two-core cable with a cable cross-section of AWG 18 to 13 (0.75 mm² to 2.5 mm²).
- A slotted screwdriver with a 3 mm blade.

Note
- The power cable is not provided at delivery.
- Use a copper conductor suitable for temperatures ≤ 75 °C.
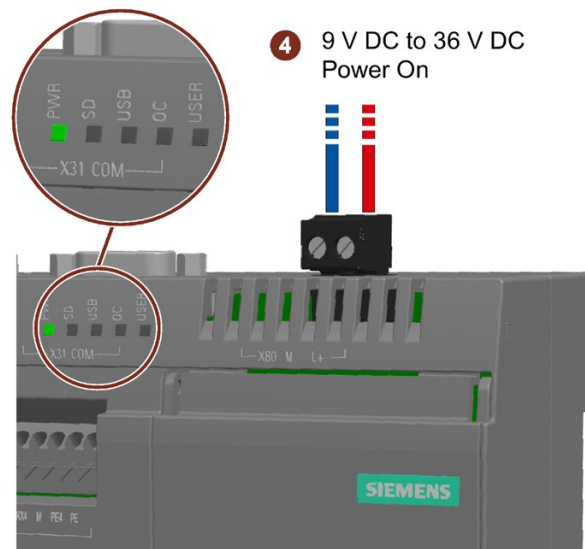
Procedure

1. Switch off the power supply on the device.
2. Connect the cores of the power supply.

3. Insert the terminal to the indicated position.
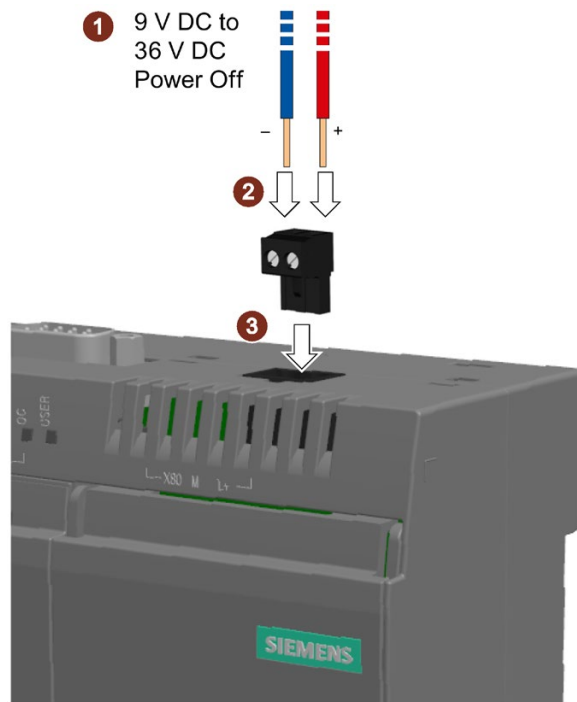
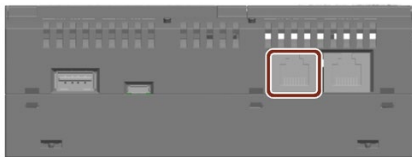4. Switch on the power supply, the "PWR" LED will light up green.

4.1.3　Connecting the device to MindSphere network

Connect the device to the MindSphere network via interface X1.

Interface	IP address	Description
X1	DHCP address	RJ45 Ethernet connection 2 for 10/100 Mbps. Access to the Internet (to MindSphere). **Required to get connected to MindSphere.**

Procedure

Insert the Ethernet cable for Internet into the port labeled with X1 P1 on the device.

4.1.4　Connecting the device to a PC

Connect the device to a PC via interface X2.

⚠ WARNING
Safety notice for connections with the LAN X2 connector
Improper connection might cause high voltages. The LAN X2 connector is designed for connection to a Local Area Network "Environment A" according to IEEE802.3 or "Environment 0" according to IEC TR 62102 only. • Do not connect the LAN X2 connector directly to the telephone network or a WAN (Wide Area Network).

Interface	IP address	Description
X2	Static IP address	RJ45 Ethernet connection 1 for 10/100 Mbps. Access to the plant network (to PC). **Required to configure the SINAMICS CONNECT.**

Procedure

1. Insert one end of the Ethernet cable to an Ethernet port of the PC.

2. Insert the other end of the Ethernet cable to the port labeled with X2 P1 on the device.
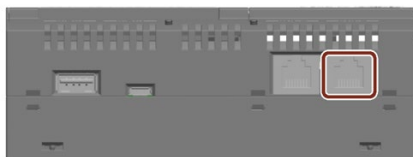
Note

The length of the Ethernet cable must be less than 30 m or the communication will be unstable.

4.1.5 Securing the cables

Use cable ties or cable clamps to secure the connected cables to suitable fixing elements for strain relief.

Make sure that the cables are not crushed by the cable tie or the cable clamps.
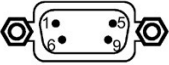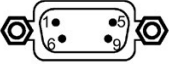
4.2 Connecting the converter to the device

4.2.1 Connecting the converter

Connect the converter to interface X121 (ports 1 to 4) or X122 (ports 5 to 8) of the device. Each port has four terminals (TX$_n$, RX$_n$, M, PE$_n$; n = port number).
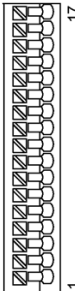
You can connect one SINAMICS CONNECT device to one or more (maximum eight) of the following converters via the RS232 interface on the converter specific optional module or Control Unit:

● SINAMICS V20

● SINAMICS G120 series (G120D excluded)

● MICROMASTER 440

Interface assignment (converter side)

Module	RS232 interface on the module	Pin No.	Signal name	Description
BOP Interface Module for SINAMICS V20		1	RXD	Receive data
		2	TXD	Transmit data
		3	GND	Signal ground
Control Unit for SINAMICS G120 series (G120D excluded)		2	RXD	Receive data
		3	TXD	Transmit data
		5	GND	Signal ground
PC converter connector module for MICROMASTER 440		2	RXD	Receive data
		3	TXD	Transmit data
		5	GND	Signal ground

Interface assignment (device side)

RS232 interface on the device	X121		X122		Description
	Pin No.	Pin name	Pin No.	Pin name	
	1	PE	17	PE	Protective earth
	2	PE4	16	PE8	Protective earth
	3	M	15	M	Signal ground
	4	RX4	14	RX8	Receive data
	5	TX4	13	TX8	Transmit data
	6	PE3	12	PE7	Protective earth
	7	M	11	M	Signal ground
	8	RX3	10	RX7	Receive data
	9	TX3	9	TX7	Transmit data
	10	PE2	8	PE6	Protective earth
	11	M	7	M	Signal ground
	12	RX2	6	RX6	Receive data
	13	TX2	5	TX6	Transmit data
	14	PE1	4	PE5	Protective earth
	15	M	3	M	Signal ground
	16	RX1	2	RX5	Receive data
	17	TX1	1	TX5	Transmit data

Wiring example

The following takes SINAMICS V20 and X121 port 1 as an example to indicate the wiring between the converter and the SINAMICS CONNECT.
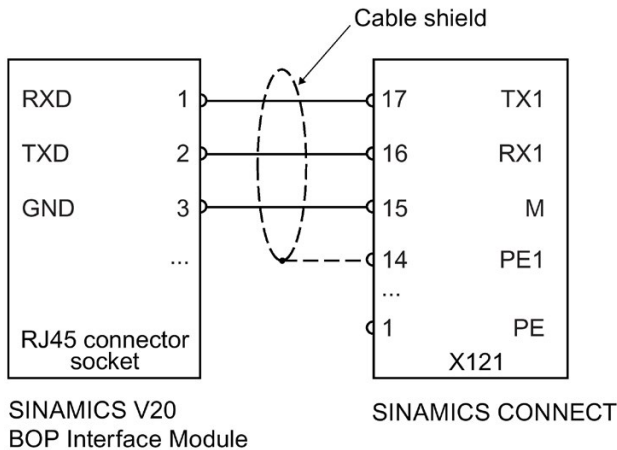
Note

To achieve better EMC performance, Siemens recommends you to observe the following when connecting the converter:

* Use the shielded cable for RS232 communication between the converter and the device.
* Do not connect the device to the ground via the PE terminal (pin 1 at X121, pin 17 at X122).
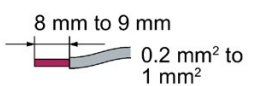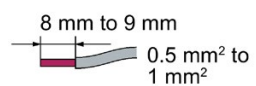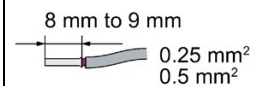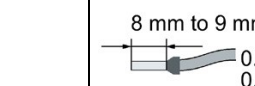* Route the signal cables and power cables separately in different cable conduits.

Requirement

- A flat-bit screwdriver (bit size: 0.4 mm × 2.5 mm).

- Cable with a cross section of 0.2 mm^2 to 1 mm^2.

Note

The signal cable is not provided in the delivery.

Permissible cable and wiring options

Solid conductor	Stranded conductor	Stranded conductor, with non-insulated ferrule	Stranded conductor, with insulated ferrule
8 mm to 9 mm 0.2 mm^2 to 1 mm^2	8 mm to 9 mm 0.5 mm^2 to 1 mm^2	8 mm to 9 mm 0.25 mm^2 to 0.5 mm^2	8 mm to 9 mm 0.25 mm^2 to 0.5 mm^2

For more information about how to assemble the cable terminals on the SINAMICS CONNECT side, see Section "Assembly of cable terminals on the device side (Page 91)".

Procedure

The following takes X121 port 1 as an example to indicate the connection of cable on the SINAMICS CONNECT side.

1. Align the screwdriver with the terminal, and push it downwards on the release lever with a maximum force of 12 N.

2. Insert the cable from above.

3. Release the screwdriver after the cable is inserted in the indicated position.
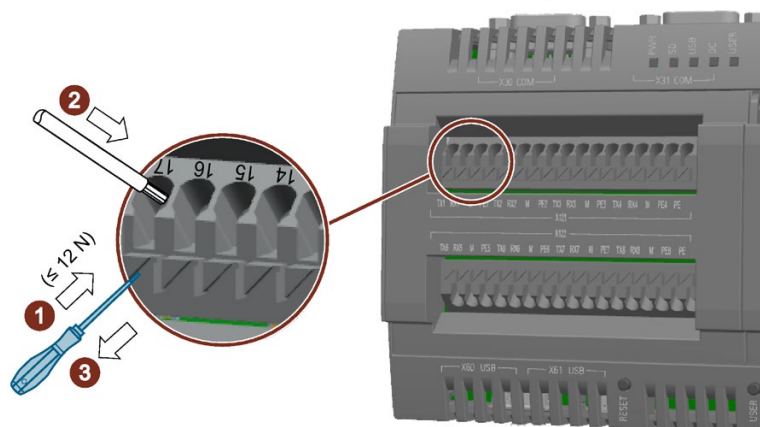
Note

Siemens recommends that you use the signal cable with a length less than 3 m.

4.2.2 Identifying the converter (optional)

The SINAMICS CONNECT supports port modes of "Auto" and "Manual" which you can set via the SINAMICS CONNECT Web server. For more information, see Section "Configuring ports (Page 50)".

- Auto (default): Press the USER button to identify the converter at the port immediately, or wait (up to 5 minutes) for the device to identify the converter.
- Manual: Ignore the step of identifying the converter. In this case you need to set the basic parameters of the converter manually via the Web server.

Requirement

- The converter is connected to the device.
- The device is powered on.
- The port mode is set to "Auto".

Procedure

Keep pressing the USER button for at least 1 second to identify the converter.
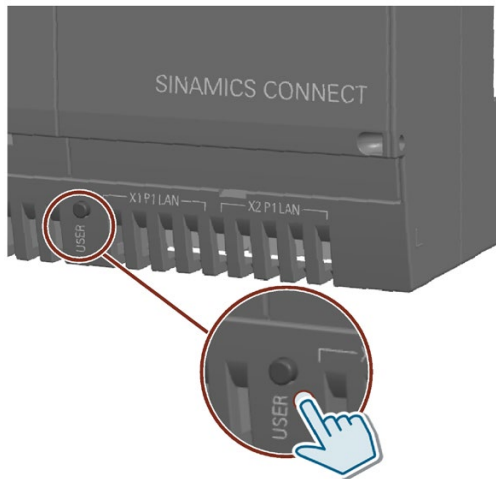
Configuring the device

<div align="right" style="font-size:2em">5</div>

5.1 Accessing the Web pages

You can access the SINAMICS CONNECT standard Web pages from a PC that connects to the Web server.

> **Note**
>
> To ensure normal Web page accessing, do not overwrite the inserted SD card with operations such as formatting.

> **Note**
>
> To avoid any cyber threats, only access the SINAMICS CONNECT Web pages when you are performing Web page operations.

System requirements

Operating system	Recommended Web browser [1)
Windows 7	• Google Chrome version 63.0.3239.108 or later
Windows 10	• Google Chrome version 63.0.3239.108 or later • IE version 11.345.171340 or later • Mozilla Firefox version 61.0.2 or later • Edge version 41.16299.5470 or later
Apple MAC OS 12.0 or later	• Safari version 12.0 or later

[1) Siemens recommends that you use the Web browsers listed above to achieve optimum Web browsing performance.

Requirement

Make sure that the device and your PC are on a common Ethernet network or are connected directly to each other with a standard Ethernet cable. For more information, see Section "Connecting the device to a PC (Page 32)".

Procedure

To access the SINAMICS CONNECT standard Web pages from a PC, follow these steps:

1. Power on the SINAMICS CONNECT to enable the network connection of the device.
2. Set the IP address of your PC to 192.168.200.x, where "x" is an integer between 2 and 254.
3. Open a Web browser and enter the IP address of the SINAMICS CONNECT device "**http://192.168.200.1**".

Result

The Web browser opens the login page.

5.2 Standard Web pages

5.2.1 First login

5.2.1.1 Logging in

In the case of the first login, after you enter the URL of the SINAMICS CONNECT Web address, the Web browser goes to the first login page.

Requirement

- You have never logged in to the Web server.
- You have accessed the Web pages successfully.

Procedure

1. Enter the default user name (Admin) and default user password (Admin) in the Username and Password input fields respectively.

2. Click "Login" to log in to the Web server.
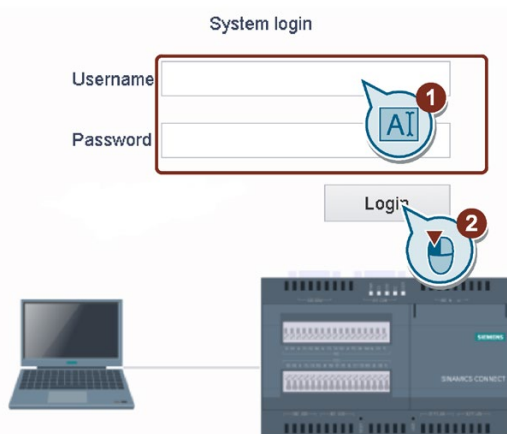
Note

Currently, you are not permitted to change the default user name.

Result

- If you enter the correct user name and password, the Web browser opens the page for changing the default password (Page 39).
- If you enter the incorrect user name and/or password, the login fails. In this case, the background of the input field(s) becomes red, prompting you to correct the name and/or password.

5.2.1.2 Changing the default password

Requirement

- You have logging in the Web server successfully for the first time.

Procedure

1. Enter a new password in the "New Password" input field.

Note

To protect against unauthorized access, by an attacker, for example, select a password that is as secure as possible.

- A new password must meet all the following minimum requirements:
  – At least 8 characters (maximum character length: 20)
  – Numbers: 0 ... 9
  – Uppercase letters: A ... Z
  – Lowercase letters: a ... z

- To achieve better network access security, enter a new password that meets all the following requirements:
  – At least 10 characters (maximum character length: 20)
  – Numbers: 0 ... 9
  – Uppercase letters: A ... Z
  – Lowercase letters: a ... z
  – Special characters: _
  – No space character

Note that this password change page includes a security level indicator. The indicator uses different colors to indicate the security strength of your current password. For detailed information, see the table below:

Password security level		Description
	Invalid	The password failed to meet the minimum requirements.
	Low	The password includes 8 or 9 characters and is a mixture of numbers, uppercase and lowercase letters.
	Medium	The password meets one of the following two requirements: • The password includes 10 to 20 characters and is a mixture of numbers, uppercase and lowercase letters. • The password includes 8 or 9 characters and is a mixture of numbers, uppercase and lowercase letters, and special characters.
	High	The password includes 10 to 20 characters and is a mixture of numbers, uppercase letters, lowercase letters, and special characters.

2. Repeat the password in the "Repeat Password" input field.

   Note: If the two inputs are inconsistent, the background of the two input fields becomes red, which results in a saving failure.

3. Click "Save" to activate the password changing.

   Note: Only a password of the medium level or higher can be saved successfully.

Result

The Web browser opens the page for setting security questions (Page 40).

5.2.1.3   Setting security questions

Requirement

- You have finish changing the default password.

Procedure

1. Choose from the drop-down list the first security question to be answered (totally 10 options for you to select in each drop-down list).

2. Enter your answer for the question in the "Answer" input field.

3. Repeat steps 1 and 2 to complete the settings of the remaining questions.

4. Click "Save" to activate your settings.

Note

You must set totally four security questions, three of which will be asked when you forget your password. Only when you give right answers for all the three questions, you are allowed to enter a new password. For more information, see Section "Retrieving the password (Page 42)".

Result

The Web browser opens the quick configuration page (Page 46).

5.2.2 Normal login

5.2.1 Logging in

In the case of the normal login, after you enter the URL of the SINAMICS CONNECT Web address, the Web browser goes to the normal login page.

Requirement

- You have logged in to the Web server and then logged out at least once.
- You have accessed the Web pages successfully.

Procedure

1. Enter the user name and password in the "Username" and "Password" input fields respectively.

2. Click "Login" to log in to the Web server.
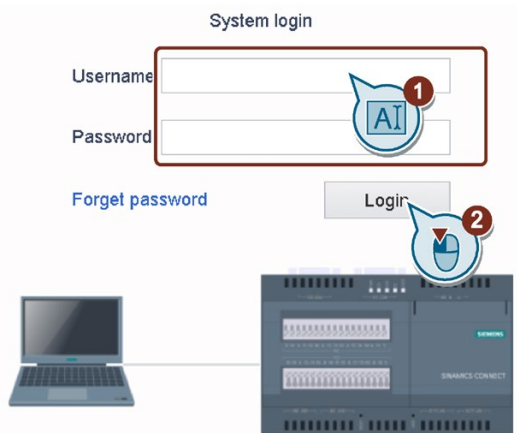
Result

- If you enter the correct user name and a password other than "Admin", the Web browser brings you to the home page (Page 44).

- If you enter the correct user name and the password "Admin", the Web browser brings you to the page for changing the default password (Page 39).

- If you enter the incorrect user name and/or password, the background of the input field(s) becomes red, prompting you to correct the name and/or password. In case that you forget the password, retrieve the password (Page 42) to proceed with the login process.

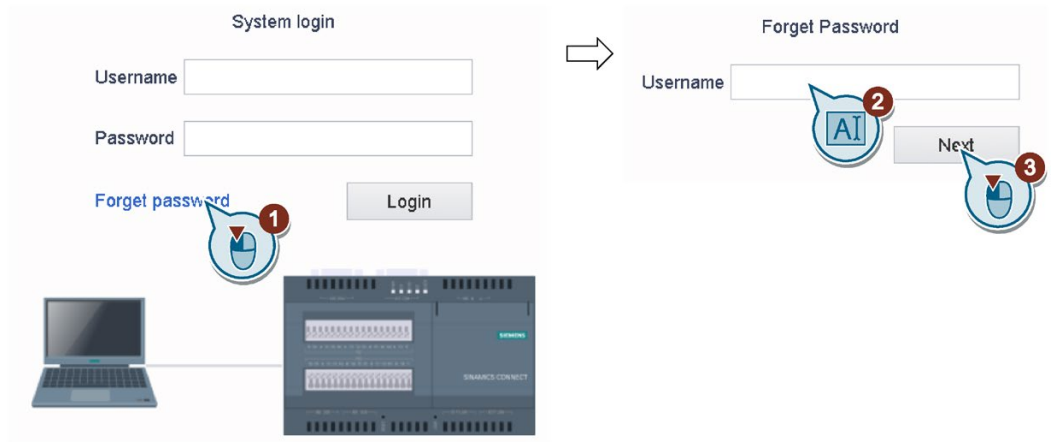### 5.2.2.2   Retrieving the password

Requirement

- You have entered the correct user name on the login page.

- You have forgotten the password.

Procedure

1. On the login page click "Forget Password".

2. Enter the correct user name.

3. Click "Next".

4. Answer totally three security questions correctly. Then click "Next".

   Note: Only when you give the same answer as when you set the security question for all of the three questions, you can proceed with the next step; otherwise, the background of the three input fields becomes red, prompting you to give the right answer.

5. Click "Next".

6. Enter a new password and confirm the password. Then click "Save".
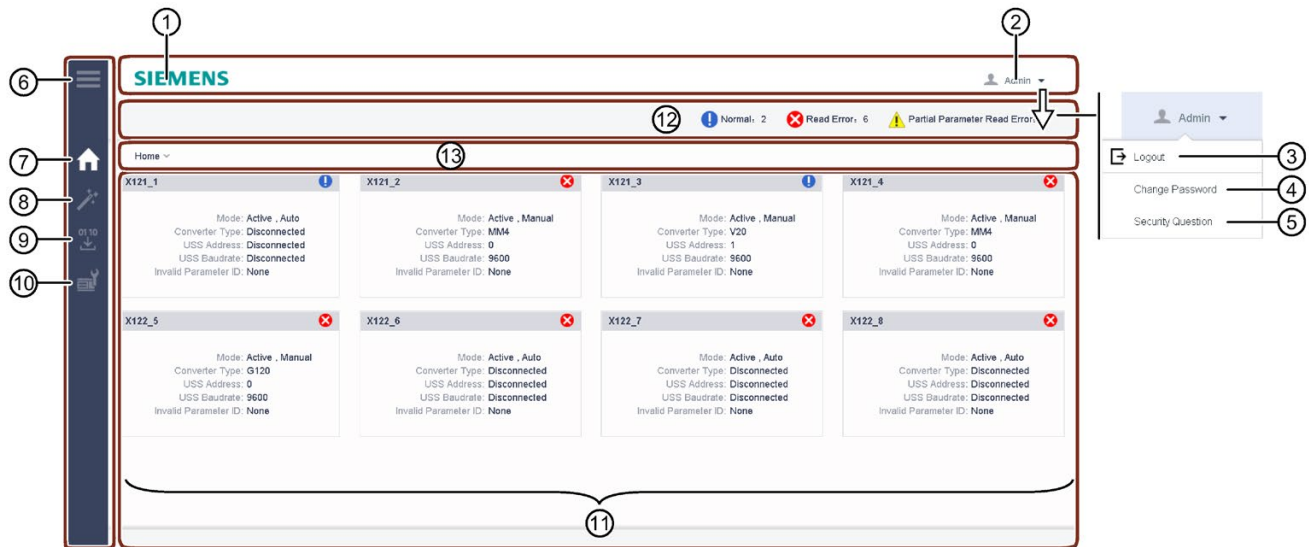
7. Click "Save" to activate your settings.
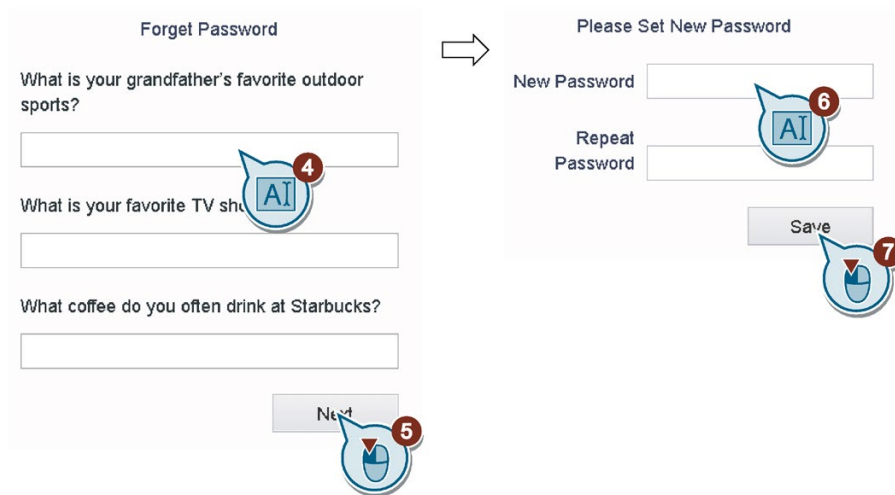
Result

The Web browser brings you to the normal login page (Page 41).

5.2.3 Home page

5.2.3.1 Overview

The Web pages display a representation of the converter to which you are connected and lists all the Web page operations that the Web server supports.

Home page

Web page header area

- ① Siemens logo
- ② User name
- ③ Changing the password (Page 59)

- ④ Changing security questions (Page 59)
- ⑤ Logging out (Page 60)

Main navigation bar

- ⑥ Menu icon
- ⑦ Home page icon (Page 44)
- ⑧ Setup Wizard icon (Page 46)

- ⑨ Data Acquisition icon (Page 50)
- ⑩ Device Configuration icon (Page 55)
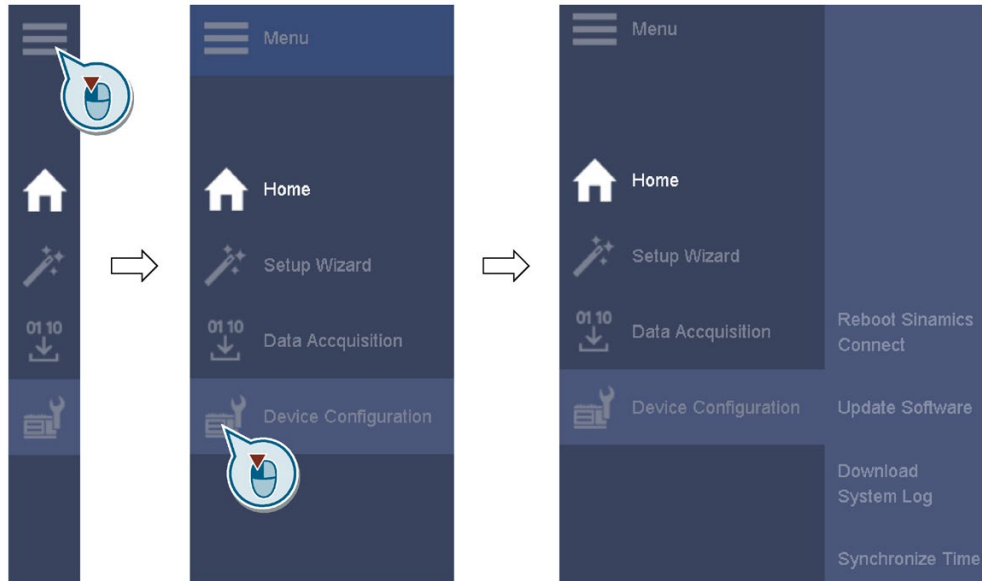
Port information display area

- ⑪ Viewing the port information (Page 45)
- ⑫ Status indicator lights

Breadcrumb navigation bar

- ⑬ Breadcrumb navigation bar

Hierarchy of the main navigation bar

Clicking one of the icons in the main navigation bar expands/collapses its menu and sub-menus (if any).

5.2.3.2 Viewing the port information

See below for structure of the information display area of a port on the home page:

①	Status indicator light	⑤	USS address (0 to 31)
②	Port number	⑥	Transmission baud rate
③	Activation status, port mode	⑦	Inactive parameter ID
④	Converter type		

Viewing the connection status

You can view the connection status (① in the above figure) of each port from the status indicator light in the upper-right corner of the information display area of the port.

Light	Status	Description
🛈	Normal	• Communication between the device and the converter is established. • The device successfully reads all the parameters from the port.
❌	Read error	• Communication between the device and the converter fails. • The device reads no parameter from the port.
⚠	Partial parameter read error	• Communication between the device and the converter is established. • The device reads only part of parameters from the port.

Viewing the basic parameter settings

You can view the basic parameter settings (② to ⑦ in the above figure) of a port from the port information display area of the port. You can modify these parameter settings of the port from the page for configuring the port (Page 50).

5.2.4 Quick configuration

The Web server provides you with a setup wizard for quick converter configuration, including port configuration and MindSphere configuration.

Requirement

You can access the quick configuration page when any one of the following conditions is met:

• You have finished setting security questions in the case of the first login.

• You have accessed the home page after a successful normal login.

Procedure

Note

• First login: The Web browser jumps to the quick configuration page automatically from the page for setting security questions.

• Normal login: You can open the quick configuration page from the "Setup Wizard" menu in the navigation bar on the home page.

Note

Before configuring MindSphere, make sure that you have produced the configuration file (.txt) from the onboarding key value that is downloaded from MindSphere.

The quick converter configuration helps you with the following tasks in order:

• **Task 1: configuring the desired port(s) of the device (steps 1 to 11)**

• **Task 2: configuring MindSphere (steps 12 to 17)**

• **Task 3: confirming the configuration results (steps 18 to 19)**

1. On the quick configuration home page, activate (for example) port 1 via the check box.

   Note: By default, all the eight ports are activated.

2. Click the toggle button to select the port mode for port 1.

   – Auto (default): The device identifies the converter at the port automatically.

   – Manual: You need to set the basic parameters of the converter at the port manually.

   Note: If you select the automatic port mode, you need to press the USER button on the device to complete the identification or wait for the device to identify the converter by itself. For more information, see Section "Identifying the converter (optional) (Page 36)".

3. Assuming that you select the manual port mode, click "Converter Settings" to start setting the basic parameters of the port.

   Note: When the automatic port mode is selected, the "Converter Settings" button is disabled. In this case, click "Parameters" to directly start configuring converter parameters (skip to step 7).

4. In the window that opens, select, from the drop-down lists, the desired converter type, USS address, and transmission baud rate respectively.

5. Click "Save" to activate the parameter settings or click "Cancel" to cancel the settings.

6. The Web browser jumps back to the quick configuration home page. Click "Parameters" to start setting converter parameters.

7. In the window that opens, activate (for example) parameter 1 via the check box.

8. Set the sampling period (an integer equal to or greater than 1) in the "Sample Cycle" input field. The period is measured in seconds.

   (Repeat steps 7 and 8 to set other one or more parameters as desired.)

9. Click "Save" to activate the parameter settings or click "Close" to cancel the settings.

Note: For the first login, all the parameters are displayed with their default settings in the predefined parameter list (Page 76). You can also click "Default" to restore all the parameters to their default settings.

10. The Web browser jumps back to the quick configuration home page. Repeat steps 1 to 9 to complete configuring the remaining ports as desired.

11. Click "Next" in the lower-right corner to start configuring MindSphere.

12. In the window that opens, choose whether to use a proxy server for transferring data to MindSphere via the check box.

    Note: By default, the check box is deselected.

13. Assuming that you choose to use a proxy server, configure the proxy server by setting the basic server parameters in the input fields.

    Note: When you do not use a proxy server, skip to step 5 to directly start uploading the configuration file.

14. Click "Apply" to save the settings.

15. In the window that opens, click "Browse" to navigate to and select the local configuration file (.txt).

Note: The .txt file is produced from the onboarding key value that is downloaded from MindSphere. For more information, see Section "Transferring configuration to the device (Page 70)".

16. Click "Onboard" to upload the file onto the SINAMICS CONNECT. Then a pop-up box displays, asking whether to continue the operation.

17. Click "OK", a message box displays, indicating that the file uploading succeeds.

Note: Clicking "Delete" removes the uploaded file.

18.Click "Next" to view the port configuration results.

– Button a: jumps back to the quick configuration home page for you to make further modifications.

– Button b: discards all the settings and brings you back to the home page.

– Button c: saves all the settings in the SD card of the device and jumps back to the home page.

Note: After you click button b or c, a pop-up box displays, asking whether to continue the operation.

19.After checking the port configuration results that display, click button c to submit the settings.

Result

The Web browser jumps back to the home page.

5.2.5   Acquiring the converter data

To acquire data from the converter and then synchronize the data to MindSphere, perform the following tasks:

● Configuring ports (Page 50)

● Configuring MindSphere (Page 53)

5.2.5.1   Configuring ports

Requirement

● You have accessed the home page after a successful normal login.

Procedure

1. Choose the "Port Configuration" menu from the home page.

2. Activate (for example) port 1 via the check box.
   Note: On the port configuration home page, all the eight ports are displayed and activated by default.

3. Click the toggle button to select the port mode for port 1.
   – Auto (default): The device identifies the converter at the port automatically.
   – Manual: You need to set the basic parameters of the converter at the port manually.
   Note: If you select the automatic port mode, you need to press the USER button on the device to complete the identification or wait for the device to identify the converter by itself. For more information, see Section "Identifying the converter (optional) (Page 36)".

4. Assuming that you select the manual port mode, click "Converter Settings" to start setting the basic parameters of the port.
   Note: When the automatic port mode is selected, the "Converter Settings" button is disabled. In this case, click "Parameters" to directly start configuring converter parameters (skip to step 7).

5. In the window that opens, select, from the drop-down lists, the desired converter type, USS address, and transmission baud rate respectively.

6. Click "Save" to activate the parameter settings or click "Cancel" to cancel the settings.

7. The Web browser jumps back to the port configuration home page. Click "Parameters" to start setting converter parameters.

8. In the window that opens, activate (for example) parameter 1 via the check box.

9. Set the sampling period (an integer equal to or greater than 1) in the "Sample Cycle" input field. The period is measured in seconds.

   (Repeat steps 8 and 9 to set the remaining parameters as desired.)

10. Click "Save" to activate the parameter settings or click "Close" to cancel the settings.
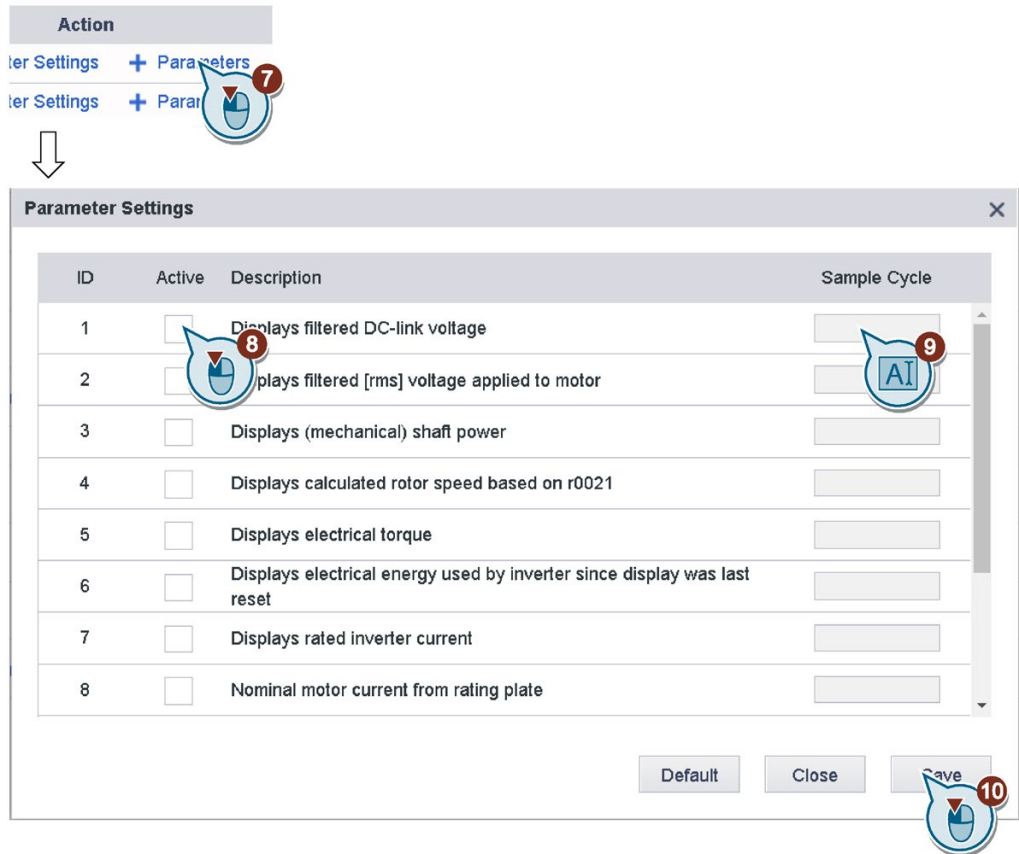
Note: Clicking "Default" resets all the parameters to their default settings in the predefined parameter list (Page 76).

11. The Web browser jumps back to the port configuration home page.
    (Repeat steps 2 to 10 to configure other ports as desired.)

12. The Web browser jumps back to the port configuration home page. Click "View Modifications" in the lower-right corner to view the port configuration results.

   – Button a: jumps back to the port configuration home page for you to make further modifications.

   – Button b: discards all the settings and brings you back to the home page.

   – Button c: saves all the settings in the SD card of the device and jumps back to the home page.

   Note: After you click button b or c, a pop-up box displays, asking whether to continue the operation.

13. After checking the port configuration results that display, click button c to submit the settings.

Port	X121_1
Modifications	Model: Active , Manual converter Type: MM4 USS address: 0 USS Baudrate: 9600 Active Parameters: 1 Sample Cycle: 5

Back And Modify   Discard All Modifications   Submit All Modifications

Result

The Web browser jumps back to the home page.

5.2.5.2 Configuring MindSphere
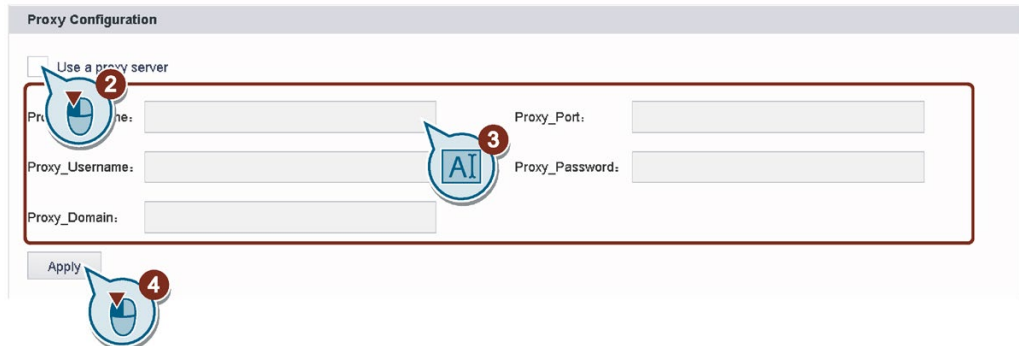
Requirement

- You have accessed the home page after a successful normal login.

Note

Before configuring MindSphere, make sure that you have produced the configuration file (.txt) from the onboarding key value that is downloaded from MindSphere.

Procedure

1. Choose the "MindSphere Configuration" menu from the navigation bar.

2. On the MindSphere configuration home page, choose whether to use a proxy server for transferring data to MindSphere via the check box.

   Note: By default, the check box is deselected.

3. Assuming that you choose to use a proxy server, configure the proxy server by setting the basic server parameters in the input fields.

   Note: When you do not use a proxy server, skip to step 5 to directly start uploading the configuration file.

4. Click "Apply" to save the settings.

Proxy Configuration

Use a proxy server

Pr___ ne: Proxy_Port:

Proxy_Username: Proxy_Password:

Proxy_Domain:

Apply

5. On the MindSphere configuration home page, click "Browse" to navigate to and select the local configuration file (.txt).

Note: The .txt file is produced from the onboarding key value that is downloaded from MindSphere. For more information, see Section "Transferring configuration to the device (Page 70)".

6. Click "Onboard" to upload the file onto the SINAMICS CONNECT. Then a pop-up box displays, asking whether to continue the operation.

7. Click "OK", a message box displays, indicating that the file uploading succeeds.
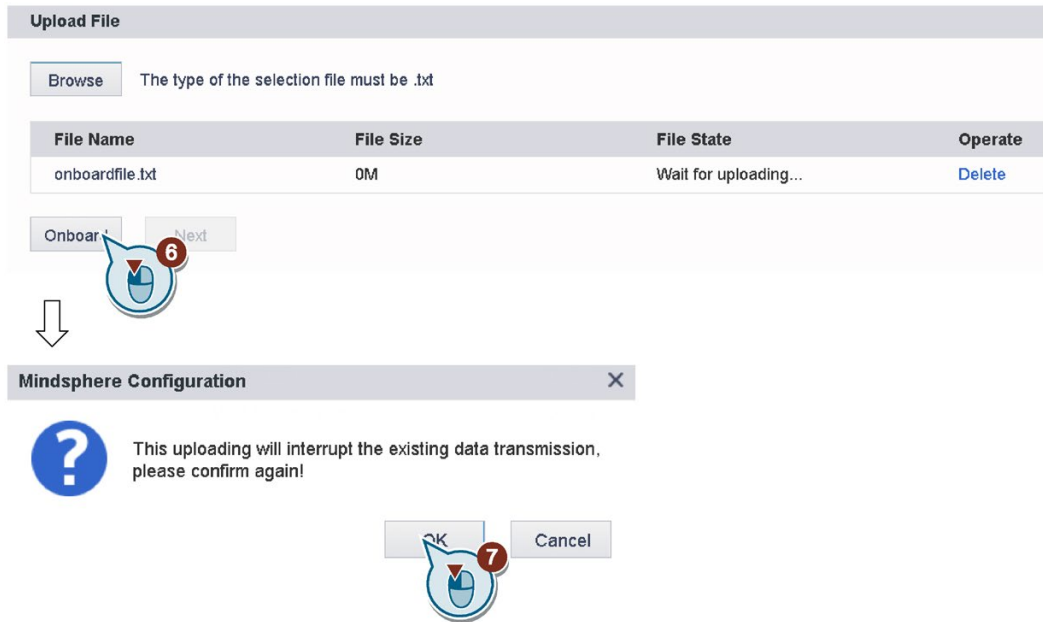
Note: Clicking "Delete" removes the uploaded file.

Result

The Web browser stays on the current page.

5.2.6 Optional setting pages

On the optional setting pages, you are allowed to complete the following device related settings:

- Rebooting the device (Page 55)
- Upgrading (Page 55)
- Downloading system logs (Page 56)
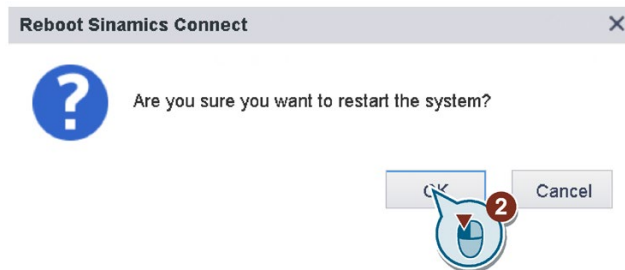- Synchronizing time (Page 57)

5.2.6.1 Rebooting the device

The Web server provides you with the function of rebooting the SINAMICS CONNECT when necessary.

Requirement

- You have accessed the home page after a successful normal login.

Procedure

1. Choose the "Reboot SINAMICS CONNECT" menu from the navigation bar. A pop-up box displays, asking whether to continue the operation.

2. Click "OK", a pop-up box displays, indicating that the rebooting is ongoing, with the remaining time being displayed.

When the time expires, the rebooting is completed.

Result

The device is rebooted successfully. Now you are logged out and requested to log back in for further operations in the Web server.

5.2.6.2 Upgrading

The Web server provides you with the function of upgrading the SINAMICS CONNECT with the upgrade file.

Requirement

- You have accessed the home page after a successful normal login.

Procedure

1. Download the upgrade file (.zip) from the customer support Web site (https://support.industry.siemens.com/cs/ww/en/ps/25436) to the local drive on your PC.

2. Choose the "Update Software" menu from the navigation bar.

3. On the upgrading home page, click "Browse" to navigate to and select the local upgrade file (.zip).
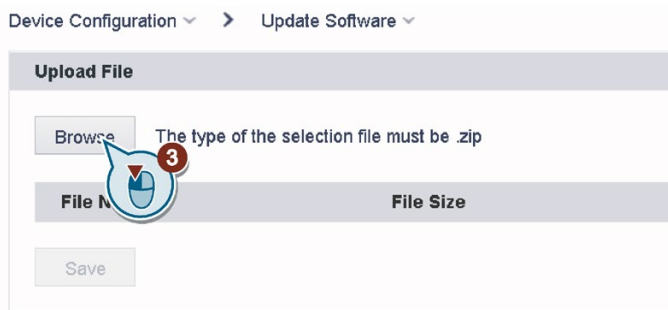
4. Click "Save" to save the file into the device. Then wait until a message box displays, indicating that the file saving succeeds and the device will be upgraded after a restart.
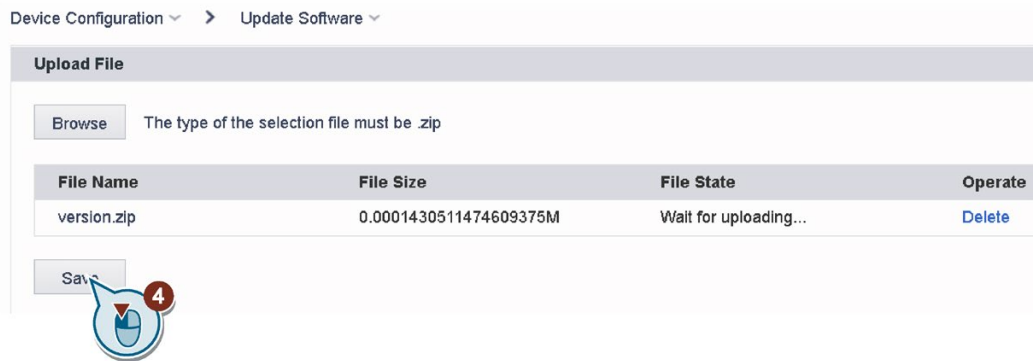
Note: Clicking "Delete" removes the uploaded file.

5. Restart the device, and the upgrade is executed automatically.

Note: After the upgrade completes, the Web browser displays the current version number of firmware in the upper-left corner of the Web pages.

Result

- If the upgrade succeeds, the updated version of firmware runs directly after restart.

- If the upgrade fails, the last version of firmware keeps running after restart.

5.2.6.3 Downloading system logs

The Web server provides you with the function of downloading system logs of the SINAMICS CONNECT, from which you can obtain the running status, information on faults and alarms, and other information of the SINAMICS CONNECT.

Requirement

- You have accessed the home page after a successful normal login.

Procedure

1. Choose the "Download System Log" menu from the navigation bar.

2. On the system log home page, click "Download" to save the log file (.txt) to the local drive on your PC.

Result

The Web browser stays on the current page.

5.2.6.4 Synchronizing time

The Web server provides you with the function of synchronizing the time of the SINAMICS CONNECT when the system time is lost.
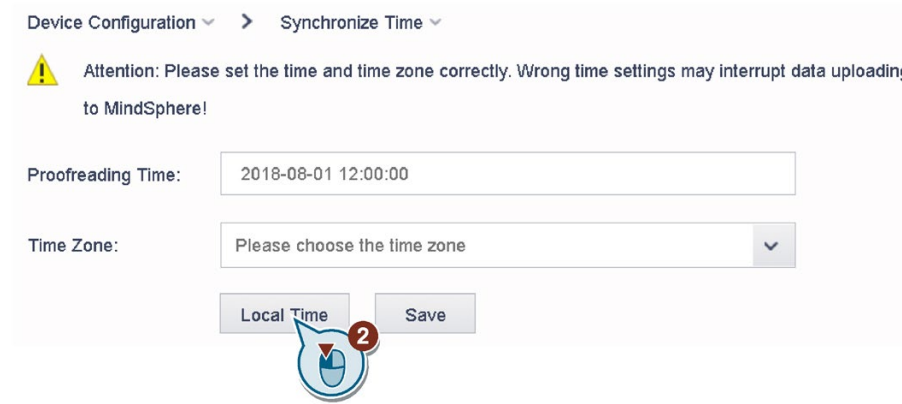
Requirement

- You have accessed the home page after a successful normal login.

Procedure

1. Choose the "Synchronize Time" menu from the navigation bar.

2. On the time synchronization home page, click "Local Time" to synchronize the system time with your local time automatically.
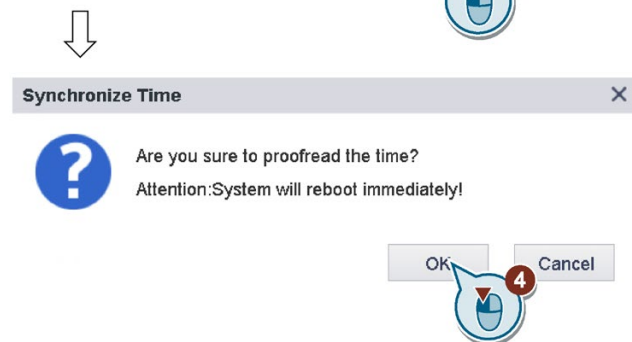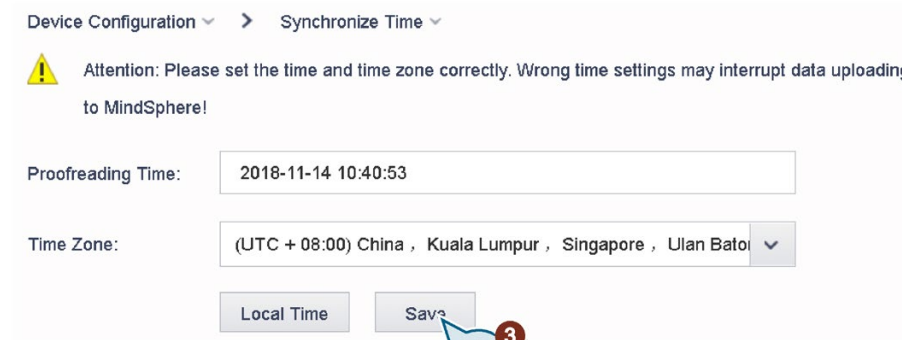
Note: You can also enter the local time manually in the "Proofreading Time" input field, and then select the desired time zone from the "Time Zone" drop-down list.

Device Configuration ⌄ > Synchronize Time ⌄

⚠ Attention: Please set the time and time zone correctly. Wrong time settings may interrupt data uploading to MindSphere!

Proofreading Time: 2018-08-01 12:00:00

Time Zone: Please choose the time zone

Local Time   Save

Note

Make sure that you set the local time accurately (permissible time error: ±2 minutes). Improper settings with a time error of greater than 2 minutes may cause a failure of data transfer.

3. Click "Save" to activate the time settings. Then a pop-up box displays, asking whether to continue the operation.

4. Click "OK", and then a pop-up box displays, indicating that the rebooting is ongoing, with the remaining time being displayed.

Device Configuration ⌄ > Synchronize Time ⌄

⚠ Attention: Please set the time and time zone correctly. Wrong time settings may interrupt data uploading to MindSphere!

Proofreading Time: 2018-11-14 10:40:53

Time Zone: (UTC + 08:00) China , Kuala Lumpur , Singapore , Ulan Bator

Local Time   Save

Synchronize Time   ✕

❓ Are you sure to proofread the time?
Attention:System will reboot immediately!

OK   Cancel

When the time expires, the rebooting is completed.

Result

The system time is synchronized successfully. Now you are logged out and requested to log back in for further operations in the Web server.

5.2.7 Account related settings
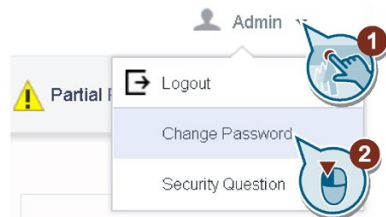
5.2.7.1 Changing the password

You can choose to change the password from the drop-down list in the upper-right corner of any page that displays after you have logged in successfully.

Requirement

- You have accessed the home page after a successful normal login.

Procedure

1. Hover on the user name in the upper-right corner of the Web page.

2. Select "Change Password" from the drop-down list.

3. Change the password by following the steps described in Section "Changing the default password (Page 39)".

Result

The Web browser brings you to the normal login page (Page 41).
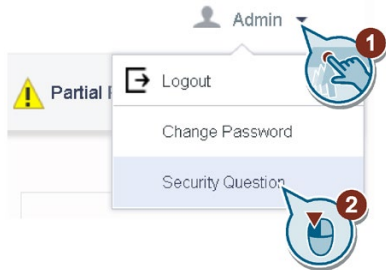
5.2.7.2 Changing security questions

The Web server provides you with the function of changing security questions from any page that displays after a successful login.

Requirement

You have accessed any one Web page that displays after a successful login.

Procedure

1. Hover on the user name in the upper-right corner of the Web page.

2. Select "Security Question" from the drop-down list.

3. Change security questions by following the steps described in Section "Setting security questions (Page 40)".

Result

The Web browser brings you to the normal login page (Page 41).
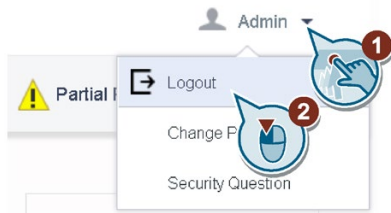
5.2.7.3 Logging out

The Web server provides you with the logout function from any page that displays after a successful login.

Requirement

- You have accessed any one Web page that displays after a successful login.

Procedure

1. Hover on the user name in the upper-right corner of the Web page.

2. Select "Logout" from the drop-down list. Then you are logged out.

Result

The Web browser brings you to the normal login page (Page 41).

Getting connected to MindSphere

<div style="text-align: right; font-size: 3em;">6</div>

6.1 Overview

MindSphere is the Siemens Industrial IoT operating system comprising the core cloud services and applications, whereas the SINAMICS CONNECT provides secure and easy connectivity from your converter to MindSphere. In MindSphere, the data acquired and submitted by the SINAMICS CONNECT is processed and stored for analysis and further management purposes.

Workflow for getting connected to MindSphere

- Creating an asset in Asset Manager (Page 62)

  In this step you create an asset in MindSphere.

- Transferring configuration to the device (Page 70)

  In this step you establish the connection between SINAMICS CONNECT and MindSphere.

- Data mapping (Page 73)

  In this step you map the data of the SINAMICS CONNECT to the aspects and variables of the asset in MindSphere.

6.2 Logging in to MindSphere

Requirement

- You have an account for MindSphere with the user role of "TenantAdmin".
- Your PC is equipped with a Web browser with access to the Internet.

Procedure

To log in to MindSphere, proceed as follows:

1. Click the link provided via mail by the Siemens AG.

   Note

   The URL is in the format: http://<your-tenant-name>.eu1.mindsphere.io

2. Log in to MindSphere with your Webkey login credentials.

Result

You are directed to your personal MindSphere Launchpad after login. You can access the applications via this user interface.

Note: The application icons displayed on the Launchpad vary with the service you ordered.
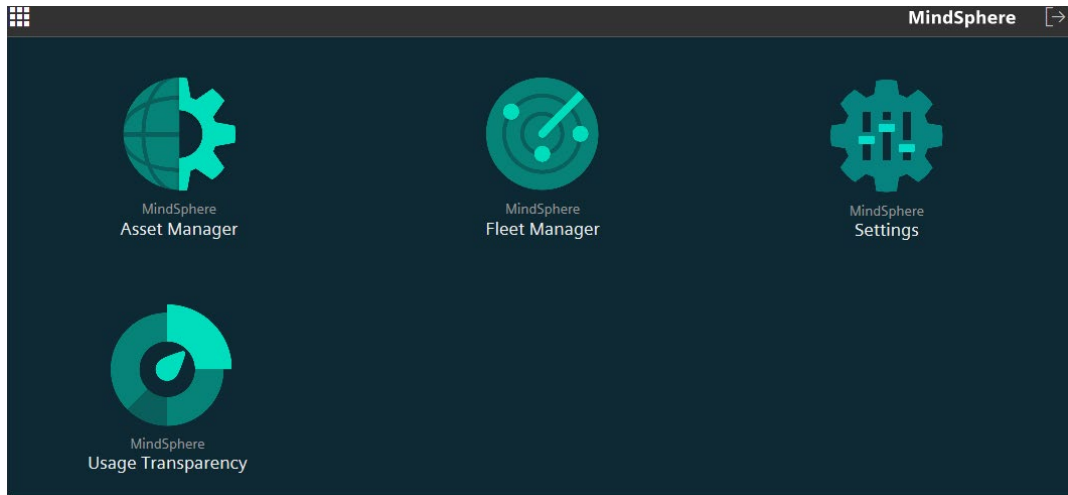
6.3 Creating an asset in Asset Manager

Asset Manager is a component of MindSphere. In Asset Manager you model the structure of an industrial process using assets, types, and aspects.

In order to create an asset in Asset Manager you need to perform the following steps:

1. Creating aspects and variables (Page 62): In this step you create aspects and variables you want to use in MindSphere.

2. Creating a type (Page 66): In this step you create a type with the previous created aspects and variables.

3. Creating an asset (Page 69): In this step you create a new asset by selecting a type with aspects and variables.

6.3.1 Creating aspects and variables

Aspects are combined, pre-configured data and form the context for the evaluation of industrial processes. An aspect can consist of several variables. Within the industry process, assets transfer the aspects as time series data in MindSphere.

"Aspects" user interface
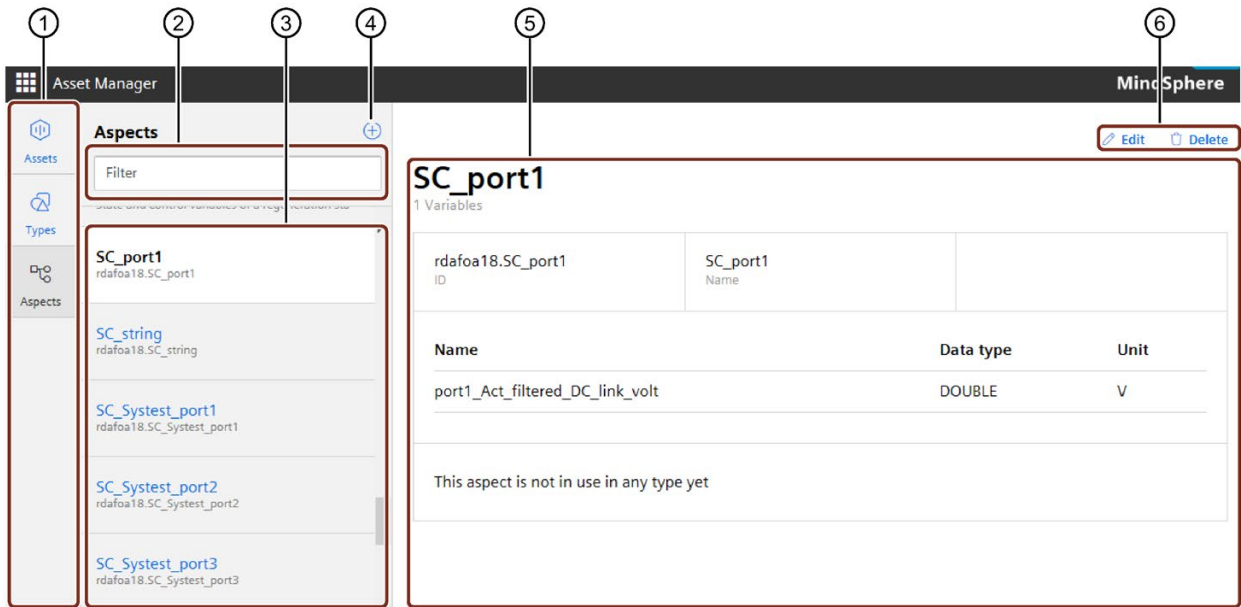
①	Navigation bar	④ Create a new aspect
②	Search field	⑤ Detail view of aspect
③	Selection list	⑥ Edit or delete aspect

Requirement

- You have logged in to MindSphere.
- You have accessed the "Aspects" page in Asset Manager.

Procedure

1. To create a new aspect, click ⊕, and the "Create aspect" window is open.

   Note

   Make sure your user role is "TenantAdmin", otherwise, you cannot create aspect, type or asset in Asset Manager.

2. Under "Aspect information", enter the name of the aspect in the "Name" input filed, for example, "SC_port1".

   Note: You are recommended to name the aspects in the format of "XXX_portX".

3. When required, enter the description for the aspect.

4. Choose the category "Dynamic".

Create aspect

5. Under "Variables", click the button "Add variable".

6. Proceed with the following steps for each variable, for example,
   "port1_Act_filtered_DC_link_volt":
   – 6a: Enter the name of the variable.
   – 6b: Select the data type of the variable.
   – 6c: Enter the unit of the variable.

7. Click "Add variable" to add the next variable.
   – Repeat step 6 until all of your variables are added.

Note

For each variable, make sure that you enter exactly the same values in the "Name", "Data type", and "Unit" input fields as those in the corresponding columns in the pre-defined parameter list. For more information, see Section "Parameter list (Page 76)".

8. Confirm the entries with "Save", and the new aspect with its variables is now created.

Note

Once you have created the aspect, you cannot edit the "Type ID", "Name", and the "Description" of the aspect.

Once you have saved the variables, you cannot remove or edit the variables.

9. Repeat steps 1 to 8 until all of your eight aspects are created.

Result

All of the eight aspects with their variables are now available in the aspect list.
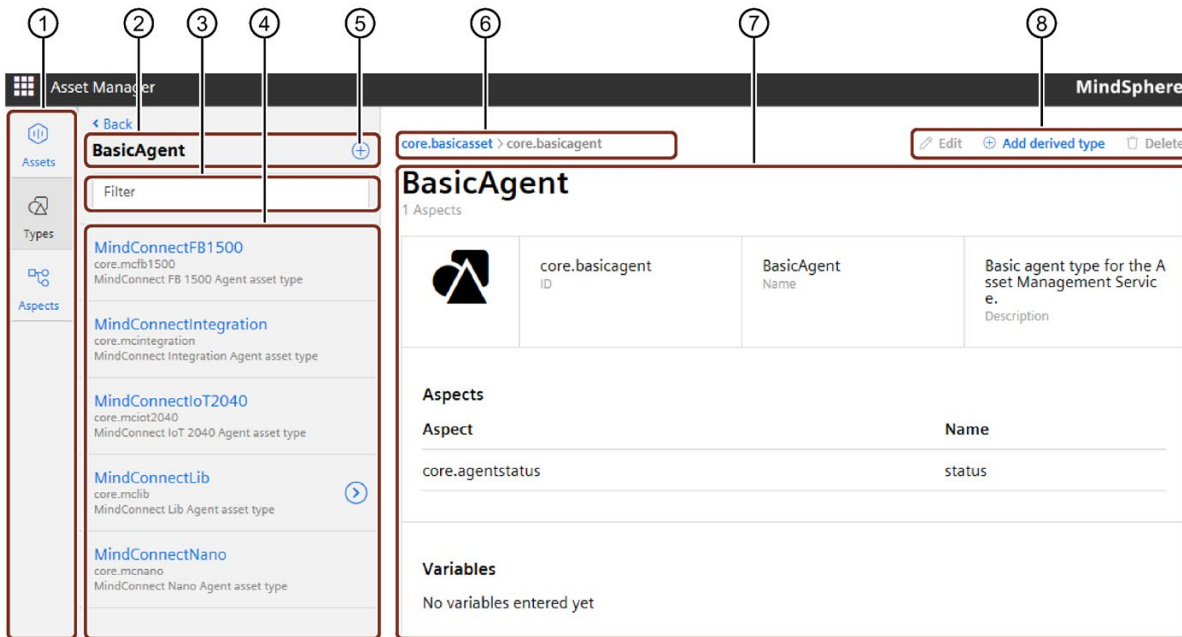
6.3.2 Creating a type

A type is a pre-configured template for an asset. Assets take on the properties of the type on which they are based. Within the type, you can define which aspects are integrated into the template.

"Types" user interface

①	Navigation bar	⑤	Create a new type
②	Parent type	⑥	Hierarchy
③	Search field	⑦	Detail view of type
④	Selection list	⑧	Operating tools

Requirement

- You have created an aspect.
- You have accessed the "Types" page in Asset Manager.

Procedure

1. Select "BasicAgent" from the selection list, and click ⊙.

2. Select "MindConnectLib", and click ⊙.

3. To create a new type, click ⊕ .
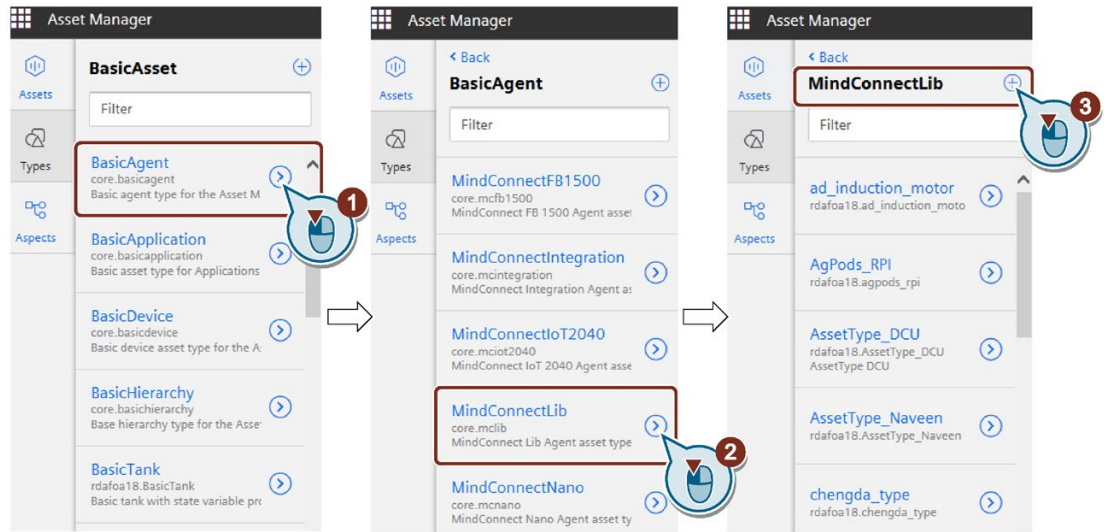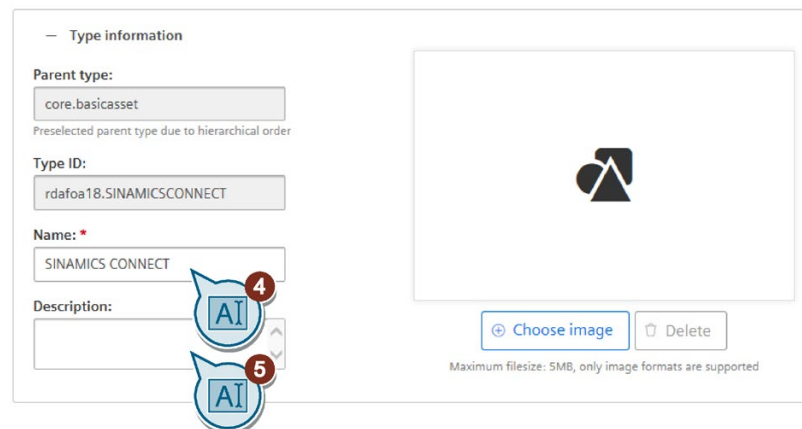
Note

Make sure that you create the type under the parent type "MindConnect Lib".

4. The "Create type" window is open. Under "Type information", enter a name for the type, for example, "SINAMICS CONNECT".

5. When required, enter the description of the type.

6. Under "Aspects", select an aspect from the drop-down list, for example, "SC_port1".

   Note: The "Name" input filed is automatically generated.

7. Click "Add aspect".
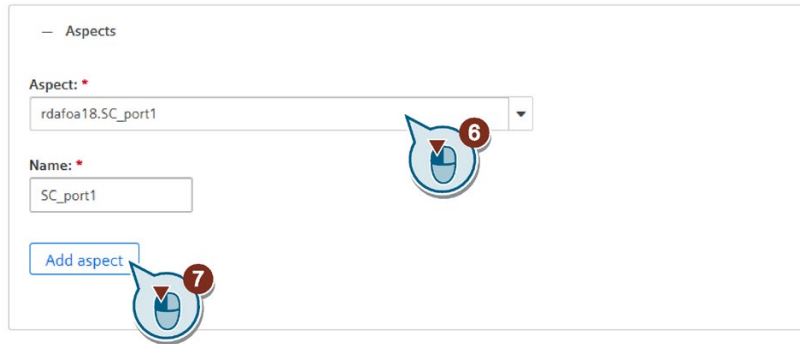
8. Repeat steps 6 to 7 until all your eight aspects are added to the type.

9. To save the type click "Save".

Note

Once you have created the type, you cannot edit the "Parent Type", "Type ID", "Name", and the "Description" of the type.

Result

You created a new type. The new type with eight aspects is now available in the presets.
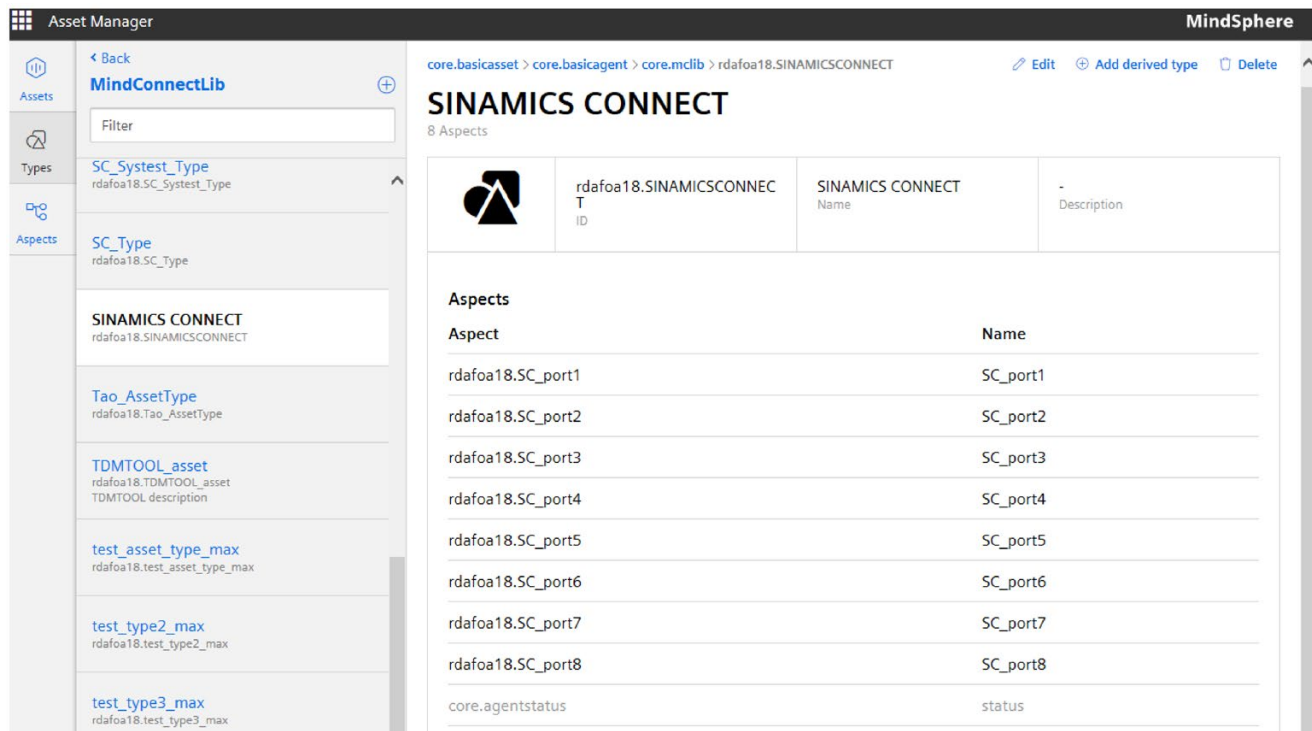
6.3.3 Creating an asset

"Assets" user interface
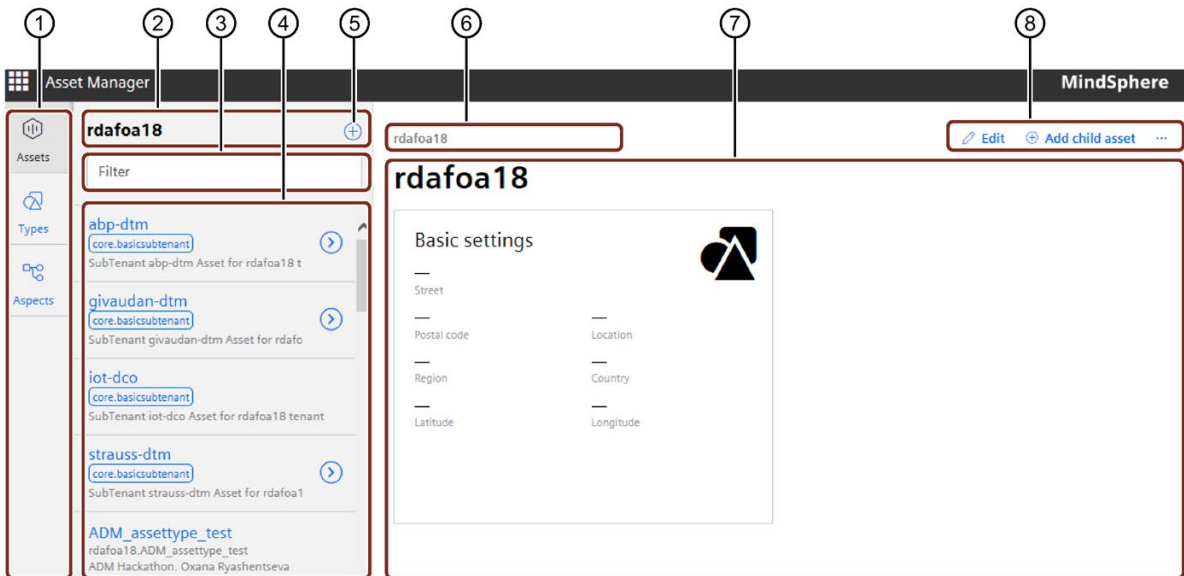
① Navigation bar
② Parent asset
③ Search field
④ Selection list

⑤ Create a new asset
⑥ Hierachy
⑦ Detail view of asset
⑧ Operating tools

Requirement

- You have created a type with eight aspects and their variables.
- You have accessed the "Assets" page in Asset Manager.

Procedure
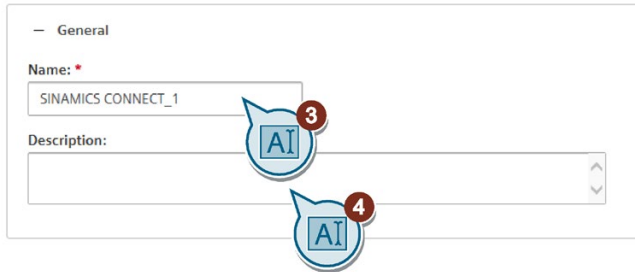
1. To create a new asset, click ⊕, and the "Select type" window is open.

2. Select the type for your new asset, for example, "SINAMICS CONNECT".
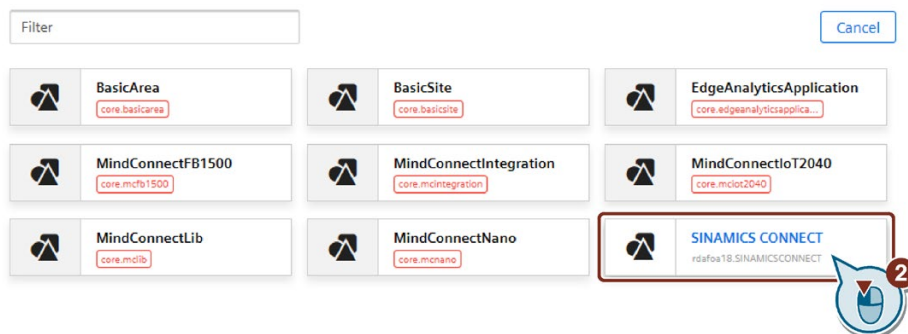
3. The "Add asset" window is open. Under "General", enter a name for the new asset, for example, "SINAMICS CONNECT_1".

4. When required, enter the description of the asset.

5. Confirm the entries with "Save".

Result

The new asset is now available in the selection list.
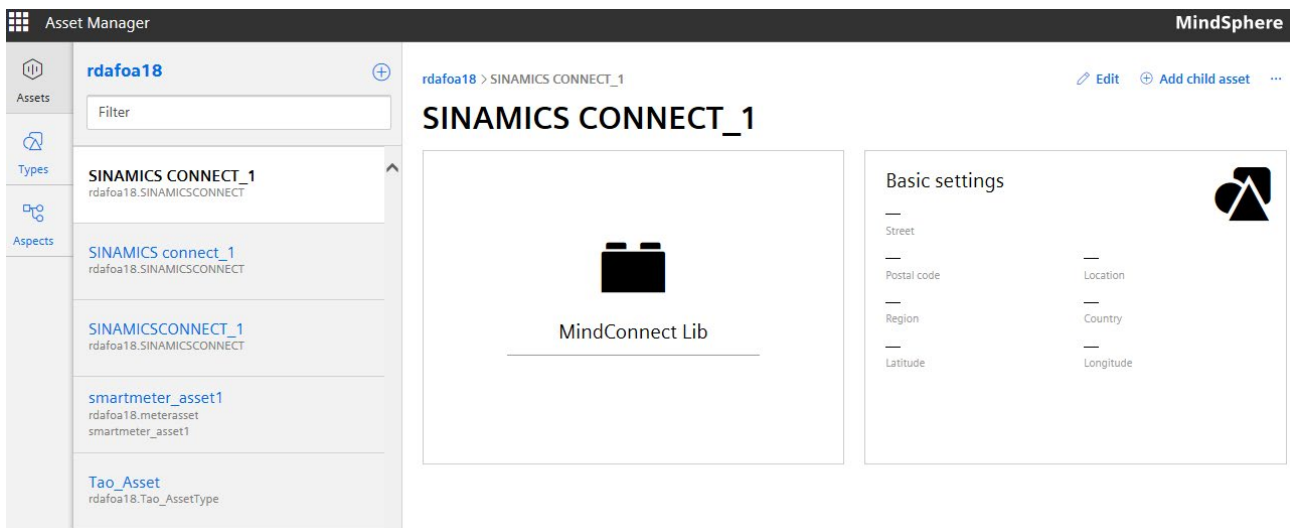
6.4 Transferring configuration to the device

Requirement

- The device is connected to the Internet and powered on. For more information, see Section "Connecting the device to MindSphere network (Page 32)".

- The device is connected to a PC. For more information, see Section "Connecting the device to a PC (Page 32)".

- You have access to the SINAMICS CONNECT Web server.

- You have created an asset in Asset Manager.

- You have accessed the "Assets" page in Asset Manager.

Procedure

Export the configuration

1. Click the asset you have created, for example, "SINAMICS CONNECT_1".

2. Click the "MindConnect Lib" box.

3. The "Configure MindConnect Lib" page is open. Select the security profile "SHARED_SECRET" from the drop-down list.

4. Click "Save".

Note

Only the security profile "SHARED_SECRET" is applicable to the SINAMICS CONNECT.

5. The "Edit boarding configuration" page is open. Click "Generate onboarding key".

6. Click "Copy to clipboard" to copy the configuration object into clipboard.
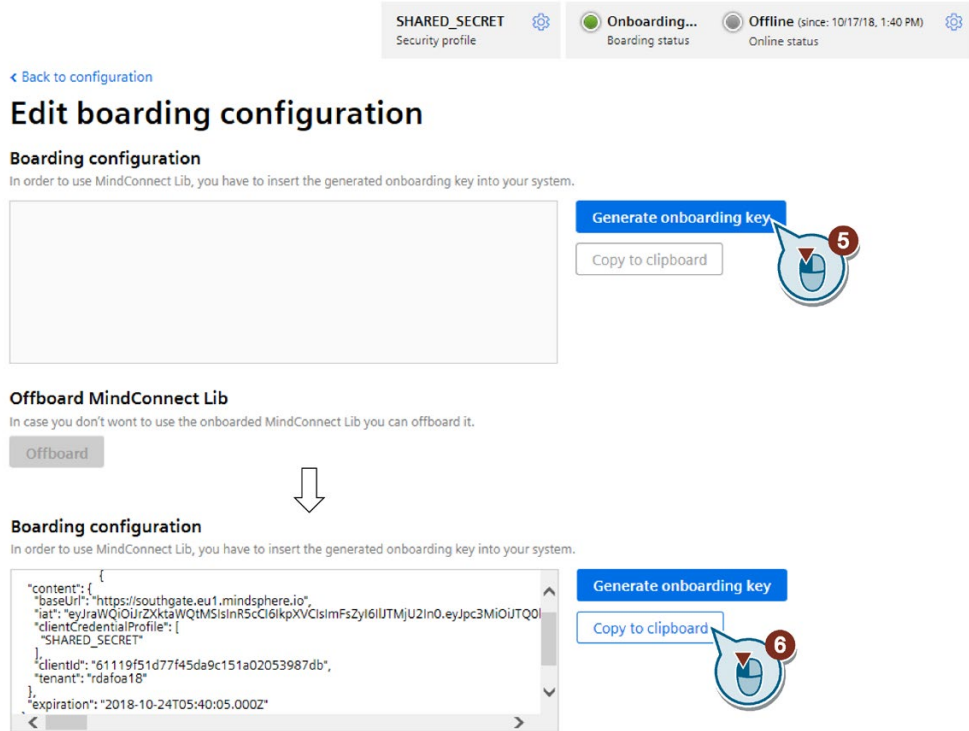
Note

You can come back to the "Configure MindConnect Lib" page by clicking ⚙ besides the "Security profile". Once the device is onboard, you cannot change the security profile.

Note

The expiration date of the onboarding key is indicated in the configuration object.

7. Save the configuration object into a TXT file and name it in the format of "XXX.txt", for example, "onboardfile.txt". Make sure that you do not modify the configuration object.

8. Now the configuration is exported.

Import the configuration to the device

1. Import the configuration to the device via the Web server.

   For more information about how to operate on the Web server, see Section "Configuring MindSphere (Page 53)".

2. Check the boarding status of the asset in Asset Manager. It should turn from "Onboarding" to "Onboarded".

Note

Subject to Internet response, it takes a few minutes for the status to change accordingly.

Result

The boarding status of the asset has changed to "Onboarded". The configuration of the asset has been transferred to the SINAMICS CONNECT. The connection between the SINAMICS CONNECT and MindSphere is established.

Viewing the boarding status and online status

You can view the boarding status and online status from the status indicator bar.
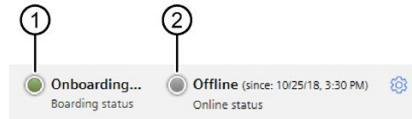
Boarding status ①

Color	Boarding status	Description
Solid green	Onboarded	The connection between the device and MindSphere is established.
Flashing green	Onboarding	The connection between the device and MindSphere is to be established.
Solid grey	Not onboarded	The device is disconnected from MindSphere.

Online status ②

Color	Online status	Description
Solid green	Online	The device is transmitting data to MindSphere.
Solid grey	Offline	The device is not transmitting data to MindSphere.

6.5 Data mapping

Data mapping means matching variables of an aspect with the respective data points of a data source.

- Variables of an aspect represent the MindSphere data.

- Data points of a data source represent the data of the SINAMICS CONNECT.

To use the data of your SINAMICS CONNECT you have to map the data points of a data source to the respective variables of an aspect.

Requirement

- You have created an asset based on your desired aspect and type.

- Your SINAMICS CONNECT is onboard.

Procedure

1. Click your asset in the asset list, for example, "SINAMICS CONNECT_1".

2. Click the "MindConnect Lib" box.

   Note: Once your SINAMICS CONNECT is onboard, the default data source and its data points are automatically loaded.

   The graphic below shows the default data source and data points loaded after the device is onboard.
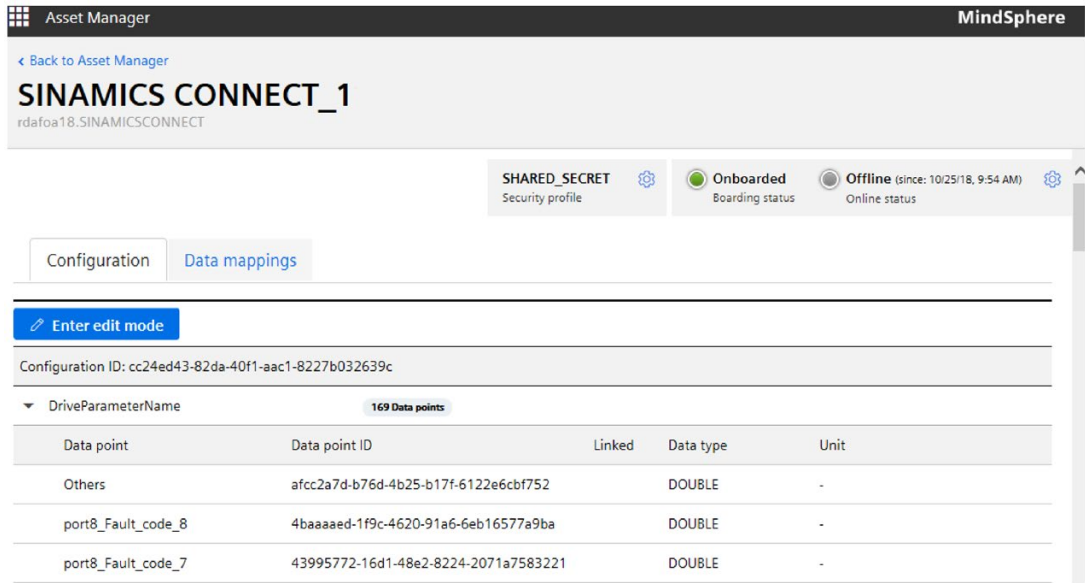
Note

Do not click "Enter the edit mode" to edit the default data source or data points by yourself, otherwise it will cause data mapping failure.

3. Click the "Data mappings" tab.

4. Select the data point you want to map from the list, for example, "port1_Act_filtered_DC_link_volt", and click "Link variable".
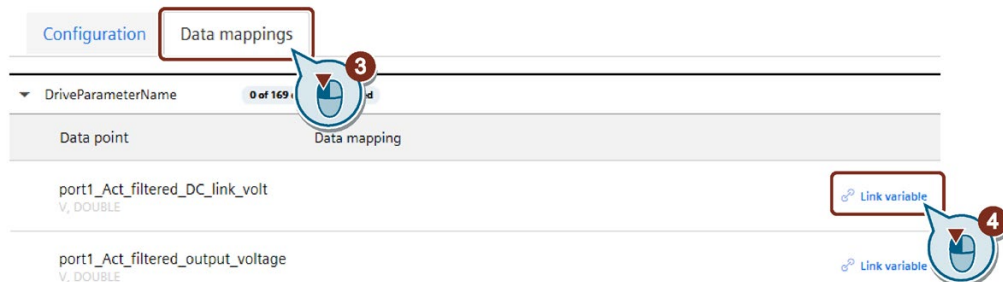
5. Select the asset you created, for example, "SINAMICS CONNECT_1".

   Note: To select a different asset, click "Change".

6. Select the aspect, for example, "SC_port1".

7. Select the variable you want to map to the data point, for example,
   "port1_Act_filtered_DC_link".

8. Click "Accept", and the data point is mapped.
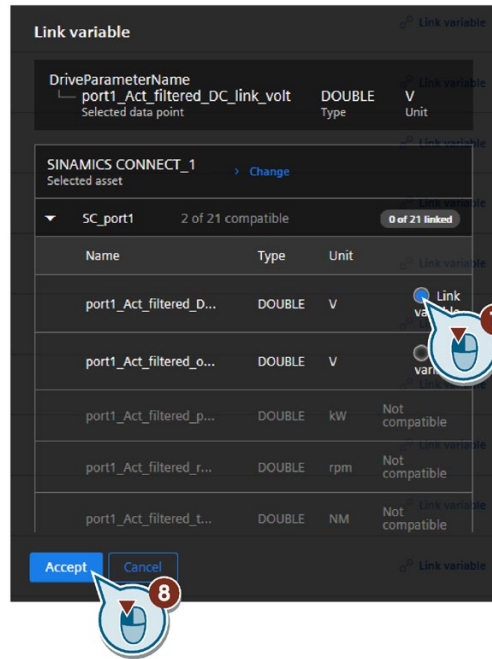
The graphic below shows the new data mapping added.
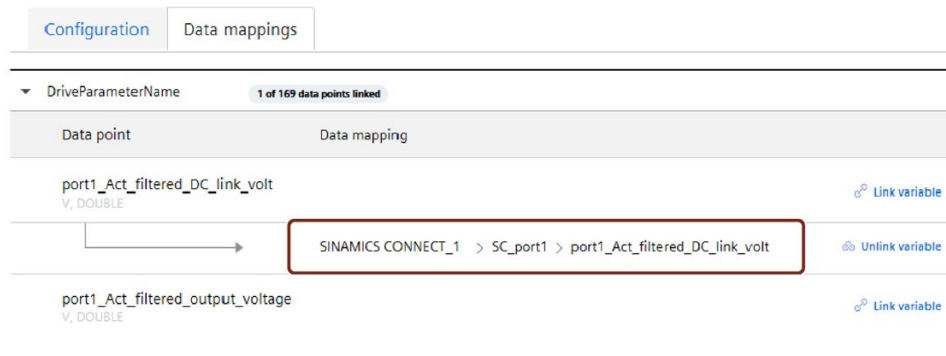
Note

Only units and data types that match exactly with the aspects and variables are available.
If the units or the data types are not matched, the variable cannot be connected to the
data point (also case sensitive).

9. Repeat steps 4 to 8 until all of your data points are mapped.

Note

You cannot map the data point named "Others". It is an automatically generated data
point for time series uploading protection buffer.

Result

The data points are now mapped to the variables.

6.6 Parameter list

The parameter list provides an overview of the parameter data that SINAMICS CONNECT can collect from the converters and upload to MindSphere for further analysis. With the parameter number, you can refer to converter specific documentation for more details of each parameter.

To create aspects and variables in Asset Manager, you have to follow this parameter list. For each aspect (eight aspects in total), you need to add the variables one by one as per the name, unit, and data type of each parameter (one entry for one variable). For more information about how to add variables, see Section "Creating aspects and variables (Page 62)".

Pa-rame-ter ID	Parameter No.			Name	Description	Unit	Data type[1]	Sam-pling cycle	Activa-tion status
	V20	MM440	G120						
1	r0026	r0026	r0026	portX_Act_filtered_DC_link_volt [2]	Displays filtered DC-link voltage	V	Double	5 s	Active
2	r0025	r0025	r0025	portX_Act_filtered_output_voltage	Displays filtered [rms] voltage applied to motor	V	Double	5 s	Active
3	r0032	r0032	r0032	portX_Act_filtered_power	Displays (mechanical) shaft power	kW	Double	5 s	Active
4	r0022	r0022	r0022	portX_Act_filtered_rotor_speed	Displays calculated rotor speed based on r0021	rpm	Double	5 s	Active
5	r0031	r0031	r0031	portX_Act_filtered_torque	Displays electrical torque	NM	Double	5 s	Active
6	r0039[0] [3]	r0039[0]	r0039[0]	portX_Energy_consumpt_meter	Displays electrical energy used by converter since display was last reset	kWh	Double	5 s	Active
7	r0207[0]	r0207[0]	r0207[0]	portX_Rated_converter_current	Displays rated converter current	A	Double	5 s	Active
8	p0305[0]	p0305[0]	p0305[0]	portX_Rated_motor_current	Nominal motor current from rating plate	A	Double	5 s	Active
9	r0002	r0002	r0002	portX_Converter_state	Displays actual converter state	-	Double	5 s	Active
10	r0018	r0018	r0018	portX_Firmware_version	Displays version number of installed firmware	-	Double	5 s	Active
11	– [4]	r0030	r0030	portX_CO_Act_filtered_current_Isq	Displays torque-generating current component	A	Double	5 s	Active
12	r0037[0]	r0037[0]	r0037[0]	portX_CO_Converter_temperature	Heat sink temperature	degC	Double	5 s	Active
13	r0035[0]	r0035[0]	r0035[0]	portx_CO_Act_motor_temperature	Displays calculated motor temperature	degC	Double	5 s	Active
14	r0947[0]	r0947[0]	r0945[0]	portX_Fault_code_1	Recent fault trip 1	-	Double	5 s	Active
15	r0947[1]	r0947[1]	r0945[1]	portX_Fault_code_2	Recent fault trip 2	-	Double	5 s	Active
16	r0947[2]	r0947[2]	r0945[2]	portX_Fault_code_3	Recent fault trip 3	-	Double	5 s	Active
17	r0947[3]	r0947[3]	r0945[3]	portX_Fault_code_4	Recent fault trip 4	-	Double	5 s	Active

Pa-rame-ter ID	Parameter No.			Name	Description	Unit	Data type[1]	Sam-pling cycle	Activa-tion status
	V20	MM440	G120						
18	r0947[4]	r0947[4]	r0945[4]	portX_Fault_code_5	Recent fault trip 5	-	Double	5 s	Active
19	r0947[5]	r0947[5]	r0945[5]	portX_Fault_code_6	Recent fault trip 6	-	Double	5 s	Active
20	r0947[6]	r0947[6]	r0945[6]	portX_Fault_code_7	Recent fault trip 7	-	Double	5 s	Active
21	r0947[7]	r0947[7]	r0945[7]	portX_Fault_code_8	Recent fault trip 8	-	Double	5 s	Active

[1] The data type in this column is the data type used in MindSphere.

[2] In this column, X=port No. (ranges from 1 to 8). For example, for port 1, the name of parameter r0026 is "port1_Act_filtered_DC_volt".

[3] [Index] indicates that the parameter is an indexed parameter.

[4] Parameter r0030 is not applicable to SINAMICS V20.

Maintaining and repairing the device

<div style="text-align: right; font-size: 2em;">7</div>

7.1 Maintenance

To retain a high level of system availability, or devices with a back-up battery, we recommend the preventative replacement of the back-up battery at replacement intervals of 5 years.

7.2 Repair information

Carrying out repairs

Only qualified personnel are permitted to repair the device. To contact your local representative, see Section "Technical support (Page 93)".

7.3 Replacing the backup battery

Prior to replacement

⚠ WARNING
Explosion and release of harmful substances due to improper handling of lithium batteries
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.   • Replace the battery every 5 years.   • Replace the lithium battery only with the type recommended by the manufacturer.   • 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 soak in water, do not heat above 100°C and protect from direct sunlight, moisture and condensation.

NOTICE
Disposal of batteries
Used batteries pollute the environment as special waste. You as a user are liable to prosecution if you do not properly dispose of batteries.   • Dispose used batteries separately as hazardous waste in accordance with local regulations.   • Return used batteries to public collection points and wherever batteries of the type in question are sold.   • Label the battery container "Used batteries".

Note

The lithium metal button cell contained in the device meets the preconditions of Special Provision 188 of the "UN Recommendations on the Transport Of Dangerous Goods", 18th revised version and is classified according to the following standards:

- ADR/RID/ADN/IMDG Code: UN 3091 Lithium metal batteries contained in equipment, class 9, preconditions of Special Provision 188 met.

- ICAO-TI/IATA-DGR: UN 3091 Lithium metal batteries contained in equipment, class 9, preconditions of Section II of Packing Instruction (PI) 970 met.

Siemens recommends that you use a UL (BBCV2) certified lithium battery which meets the following requirements:

Technical data of the recommended battery:

Battery type	BR2450A from Panasonic
Nominal capacity	550 mAh
Nominal voltage	3 V
Maximum abnormal charging current	5 mA

Requirement

- The device is disconnected from the power supply.
- A replacement battery is available.

Procedure

NOTICE

Equipment damage due to times loss

The time will be deleted if it takes you longer than 30 seconds to replace the battery. The device is no longer synchronous. Time-controlled programs will no longer run or will run at the wrong time. This may damage the device.

- Reset the time for the device.

1. Open the cover on the right.

2. Pull the plug of the battery cable from the motherboard.

3. Remove the battery from the battery box.

Insert the replacement battery, plug in the battery cable on the motherboard and close the cover on the right.
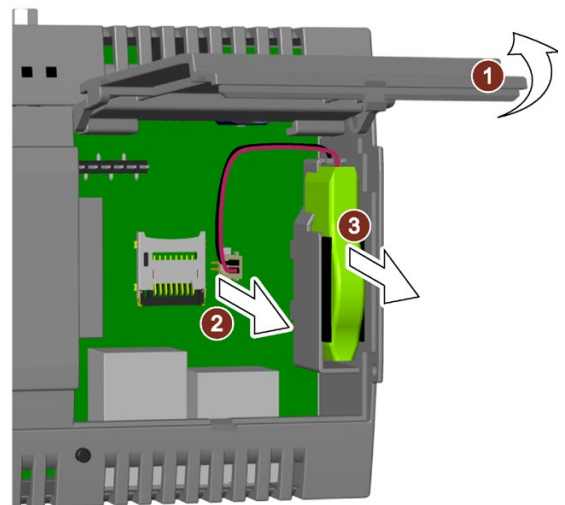
7.4 Replacing the SD card

Note

For the SD card, the replacement can only be implemented by appropriately trained Siemens service personnel.

Please contact the Siemens service personnel for replacing the SD card.

7.5 Recycling and disposal

For environmentally-friendly recycling and disposal of your old device, please contact a company certified for the disposal of waste electrical and electronic equipment, and dispose of the old device as prescribed in the respective country of use.

Technical specifications 8

8.1 Certificates and approvals

NOTICE
Invalid approvals due to certain modifications
The device approvals are voided if the enclosure is physically modified (for example, openings were created to make LEDs on a plug-in card in the device visible) or if cables are routed from the inside out of the device or from the outside into the device (for example, to connect sensors or displays).
• Submit the device for approval again after the modifications are made.

The device meets the guidelines listed in the following sections.

EU Declaration of Conformity

The associated declaration of conformity is available on the Internet at the following address:
EU Declaration of Conformity
(https://support.industry.siemens.com/cs/ww/en/ps/25435/cert).

UL approval

The following approvals are available for the device:

● Underwriters Laboratories (UL) in accordance with standards UL61010-1 and UL61010-2-201 (IND.CONT.EQ), File E217227

● Canadian National Standard CAN/CSA-C22.2 No. 61010-1-12 and CAN/CSA-C22.2 No. 61010-2-201

European RoHS Directive

The SINAMICS CONNECT complies with the Directive 2011/65/EU regarding limiting the use of certain hazardous substances.

8.2 Directives and declarations

8.2.1 Notes on CE marking

Electromagnetic compatibility

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

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

Scope of application	Requirements for	
	Interference emission	Immunity to interference
Second environment, Category C2	EN 61000-6-4:2007 +A1:2011	EN 61000-6-2:2005

8.2.2 ESD guideline

What does ESD mean?

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

The following abbreviations are commonly used for electrostatic sensitive devices:

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

Electrostatic sensitive devices can be labeled with an appropriate symbol.

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

Charge

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

The material with which this person comes into contact is of particular significance. The figure shows the maximum electrostatic voltages with which a person is charged, depending on humidity and material. These values conform to the specifications of IEC 61000-4-2.
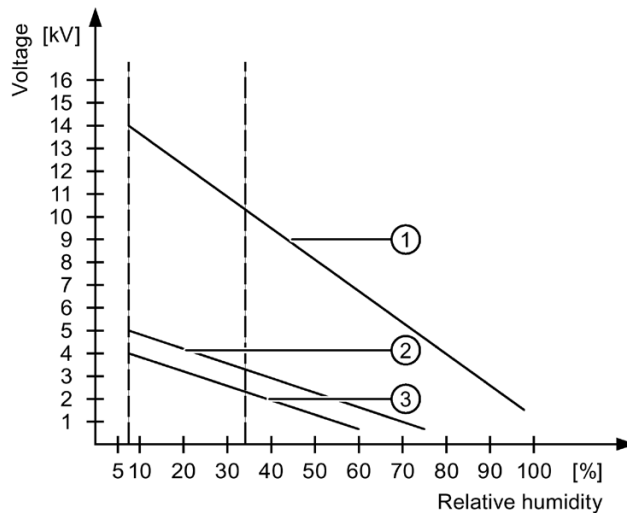
① Synthetic materials
② Wool
③ Antistatic materials such as wood or concrete

NOTICE

Damage to ESD due to failure of grounding

There is no equipotential bonding without grounding. An electrostatic charge is not discharged and may damage the ESD.

- Protect yourself against discharge of static electricity.
- When working with electrostatic sensitive devices, make sure that the person and the workplace are properly grounded.

Protective measures against discharge of static electricity

- Disconnect the power supply before you install or remove modules which are sensitive to ESD.

- Pay attention to good grounding:

  – When handling electrostatical sensitive devices, make sure that persons, the workstation and devices, tools and packaging used are properly grounded. This way you avoid static discharge.

- Avoid direct contact:

  – As a general rule, do not touch electrostatic sensitive devices, except in the case of unavoidable maintenance work.

  – Hold the modules at their edge so that you do not touch the connector pins or conductor paths. This way, the discharge energy does not reach and damage the sensitive components.

  – Discharge your body electrostatically before you take a measurement at a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

8.3 Dimension drawings

The following figures show the dimension drawings of the SINAMICS CONNECT.
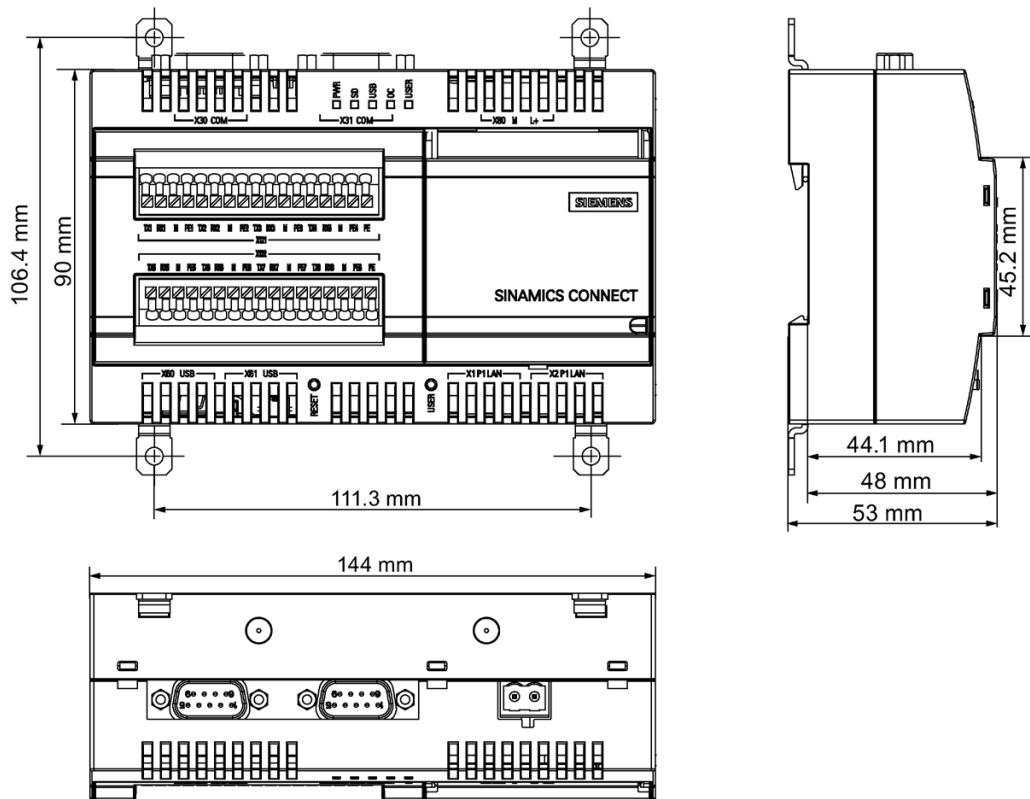
8.4 Technical data

8.4.1 General technical specifications

General technical specifications

Article number	6SL3255-0AG30-0AA0
Weight without mounting brackets	Net weight: 0.258 kg
	Gross weight: 0.328 kg
Power supply [1]	9 V DC to 36 V DC, no galvanic isolation
Brief voltage interruption in accordance with Namur	≤ 5 ms buffer time at 24 V DC and full load [2]
	≤ 10 events per hour; recovery time at least 10 s
Current consumption	≤ 1.4 A
Noise emission	< 40 dB(A) according to DIN EN 27574-1
Degree of protection	IP20 according to IEC 60529
Degree of pollution	2
Quality assurance	In accordance with ISO 9001

[1] The device should only be connected to a power supply which meets the requirements of safe extra low voltage (SELV) according to IEC/EN/DIN EN/UL 60950-1. The power supply must meet the requirement NEC Class 2 or LPS according to the IEC/EN/DINEN/UL 60950-1.

[2] In the event of low supply voltage, the buffer time is reduced.

Electromagnetic compatibility

Immunity with regard to conducted interference on the supply lines	± 2 kV according to IEC 61000-4-4; burst
	± 1 kV according to IEC 61000-4-5; asymmetrical surge
Noise immunity on signal lines	± 1 kV according to IEC 61000-4-4; burst; length < 30 m
	± 2 kV according to IEC 61000-4-4; burst; length > 30 m
	± 1 kV according to IEC 61000-4-5; surge; length > 30 m
Immunity to discharges of static electricity	± 4 kV contact discharge in accordance with IEC 61000-4-2
	± 8 kV air discharge in accordance with IEC 61000-4-2
Immunity to RF interference	10 V/m, 80 MHz to 1 GHz, 80% AM in accordance with IEC 61000-4-3
	3 V/m, 1.4 GHz to 2 GHz, 80% AM in accordance with IEC 61000-4-3
	1 V/m, 2 GHz to 2.7 GHz, 80% AM in accordance with IEC 61000-4-3
	10 V, 150 KHz to 80 MHz, 80% AM in accordance with IEC 61000-4-6

If there are voltage peaks on power supply lines, use a protective device in the form of a varistor (MOV) UMOV = U-rated x 1.2 (BLITZDUCTOR BVT AVD 24 (918 422) or compatible).

Motherboard

Processor	Intel Quark X1020, 400 MHz
RAM	1 GB
BIOS SPI Flash	8 MB
Micro SD	Slot for one Micro SD card

Interfaces

LAN interface X1 P1, RJ45 [1]	SOC LAN controller
LAN interface X2 P1, RJ45 [2]	SOC LAN controller
RS232 ports X121, X122	RS 232, ≤ 115 Kbps, terminal block, 17-pin
	Maximum permitted cable length: 3 m

[1] Termination can be set with the software.

[2] For unique labeling, the LAN interfaces are numbered on the enclosure. The numbering by the operating system can differ.

8.4.2 Ambient conditions

Climatic ambient conditions

The temperature values have been checked in accordance with IEC 60068-2-1, IEC 60068-2-2 and IEC 60068-2-14. For more information about permitted mounting positions, see Section "Permitted mounting orientation and mounting types (Page 24)".

Ambient temperature	
Operation	0 °C to 50 °C [1]
Storage/transport	-20 °C to 70 °C
Gradient	
Operation	≤ 10 °C/h
Storage	20 °C/h, no condensation
Relative humidity, tested in accordance with IEC 60068-2-78, IEC 60068-2-30	
Operation	5% to 85% at 30 °C, no condensation
Storage/transport	5% to 95% at 25/55 °C, no condensation
Atmospheric pressure	
Operation	1080 hPa to 795 hPa, corresponding to an elevation of -1000 m to 2000 m
Storage/transport	1080 hPa to 660 hPa, corresponding to an elevation of -1000 m to 3500 m

[1] For more information, see Section "Power demand of the components (Page 87)".

Mechanical ambient conditions

Vibration resistance, tested in accordance with IEC 60068-2-6	
Operation	Vibration load 1 g, 10 cycles per axis:
	• 5 Hz to 8.4 Hz, deflection 3.5 mm
	• 8.4 Hz to 200 Hz, acceleration 9.8 m/s^2
Storage/transport	• 5 Hz to 8.4 Hz: deflection 3.5 mm
	• 8.4 Hz to 500 Hz: acceleration 9.8 m/s^2
Shock resistance, tested in accordance with IEC 60068-2-27	
Operation	150 m/s^2, 11 ms
Storage/transport	250 m/s^2, 6 ms

8.4.3 Power demand of the components

Maximum power consumption of the auxiliary components

The information below applies to the horizontal mounting position of the device at an ambient temperature of 50 °C and to the vertical mounting position of the device at an ambient temperature of 45 °C.

● Maximum total power of all components: 6 W

NOTICE
Equipment damage due to overheat
The power supply cannot make unlimited power available. The auxiliary components consume energy and produce heat. This may cause damage to the device and auxiliary components.
• Operate the device according to the relevant specifications.
• Only operate the device in conjunction with effective temperature monitoring.
• Immediately switch off the device if excessively high temperatures occur.

8.4.4 Direct current power supply (DC)

Technical specifications

Input voltage	9 V DC to 36 V DC
Power consumption	≤ 10 W

Typical power consumption

	Power consumption (at a rated voltage of 24 V)
Basic device	3.5 W

8.4.5 Address of CE-authorized manufacturer

The CE Declaration of Conformity is held on file available to the competent authorities at the following address:

Siemens AG

Digital Factory

Motion Control

Frauenauracher Straße 80

DE-91056 Erlangen

Germany

8.5 Hardware description

8.5.1 Interface overview

Component/interface	Description	Meaning
PWR	Power supply LED	Power (green)
SD	SD card LED	Micro SD card active (green)
USB	USB LED	USB power (5 V) available (green)
OC	Over current LED	Over current (red)
USER	User LED	Reserved
RESET	RESET button	For a reset of the CPU
USER	USER button	For converter identification
X1	Ethernet port 1	RJ45 Ethernet connection 1 for the access to the Internet (to MindSphere)
X2	Ethernet port 2	RJ45 Ethernet connection 2 for the access to the plant network (to PC)
X80	Power supply	Power supply interface
X121	RS232 interface 1	For connecting the converter to the SINAMICS CONNECT
X122	RS232 interface 2	For connecting the converter to the SINAMICS CONNECT

8.5.2 Power supply

Plug connector, 2-pin

Name of interface on the device: X80
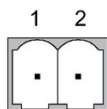
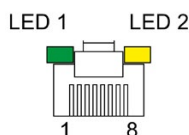| Pin	Assignment
1	GND (M)
2	+9 V DC to +36 V DC (L+)

8.5.3 Ethernet interface

RJ45 socket

Name of interface on the device: X1 P1 LAN, X2 P1 LAN

Pin	Short description	Meaning
1	BI_DA+	Bidirectional data A+, input/output
2	BI_DA–	Bidirectional data A–, input/output
3	BI_DB+	Bidirectional data B+, input/output
4	BI_DC+	Bidirectional data C+, input/output
5	BI_DC–	Bidirectional data C–, input/output
6	BI_DB–	Bidirectional data B–, input/output
7	BI_DD+	Bidirectional data D+, input/output
8	BI_DD–	Bidirectional data D–, input/output

X1 P1 LAN:

LED	Short description	Meaning
1	LED 1	Off: 100 Mbps Lit green: 10 Mbps
2	LED 2	Off: cable not connected Lights up yellow: connection established Flashes: data transfer active

X2 P1 LAN:

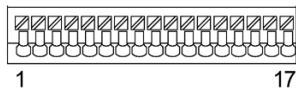| LED	Short description	Meaning
1	LED 1	Off: 10 Mbps Lit green: 100 Mbps
2	LED 2	Off: cable not connected Lights up yellow: connection established Flashes: data transfer active

8.5.4   RS232 interface

Terminal block, 17-pin

Name of interface on the device: X121, X122

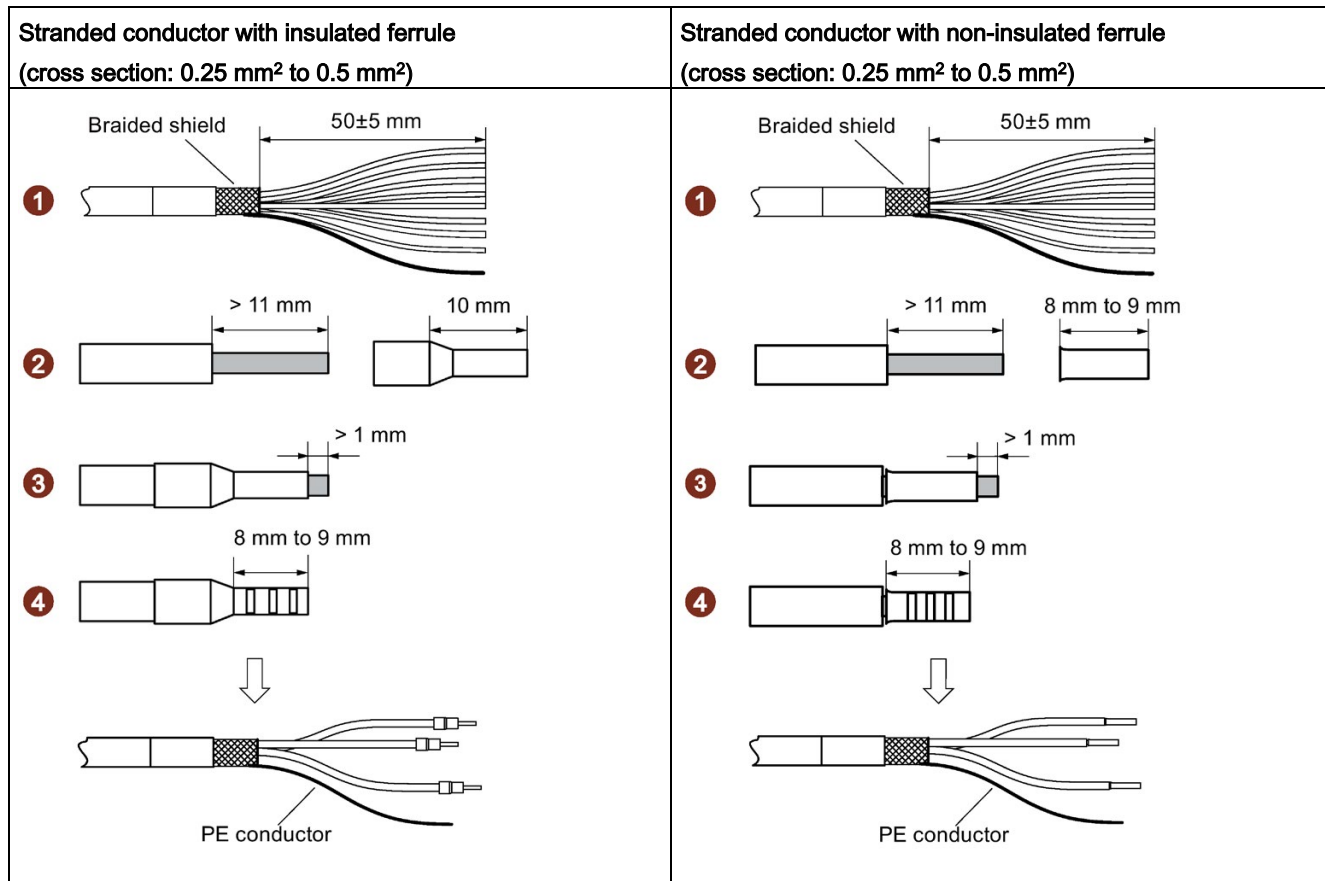| X121			X122			Meaning
Port	Pin	Short de-scription	Port	Pin	Short de-scription	
-	1	PE	-	17	PE	Protective earth
4	2	PE4	8	16	PE8	Protective earth
	3	M		15	M	Signal ground
	4	RX4		14	RX8	Receive data (I) for full-duplex mode
	5	TX4		13	TX8	Transmit data (O) for full-duplex mode
3	6	PE3	7	12	PE7	Protective earth
	7	M		11	M	Signal ground
	8	RX3		10	RX7	Receive data (I) for full-duplex mode
	9	TX3		9	TX7	Transmit data (O) for full-duplex mode
2	10	PE2	6	8	PE6	Protective earth
	11	M		7	M	Signal ground
	12	RX2		6	RX6	Receive data (I) for full-duplex mode
	13	TX2		5	TX6	Transmit data (O) for full-duplex mode
1	14	PE1	5	4	PE5	Protective earth
	15	M		3	M	Signal ground
	16	RX1		2	RX5	Receive data (I) for full-duplex mode
	17	TX1		1	TX5	Transmit data (O) for full-duplex mode

Appendix A

A.1 Assembly of cable terminals on the device side

Assembling the terminals for cable without ferrule

Solid conductor (cross section: 0.2 mm² to 1 mm²)	Stranded conductor (cross section: 0.5 mm² to 1 mm²)
1. Remove the specified length (see illustration) of the outer sheath of the cable, and make a PE conductor from the braided shield. 2. Strip the specified length (see illustration) of the insulation at the end of the wire.	

Assembling the terminals for cable with ferrule

Stranded conductor with insulated ferrule (cross section: 0.25 mm^2 to 0.5 mm^2)	Stranded conductor with non-insulated ferrule (cross section: 0.25 mm^2 to 0.5 mm^2)

1. Remove the specified length (see illustration) of the outer sheath of the cable, and make a PE conductor from the braided shield.
2. Strip the specified length (see illustration) of the insulation at the end of the wire.
3. Insert the stripped end into the pin-type terminal.
4. Crimp the terminal using a crimping tool, and then cut off the excess part of the wire.

A.2 Technical support

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

- Technical support (https://support.industry.siemens.com)

- Support request form (http://www.siemens.com/automation/support-request)

- SINAMICS Digitalization (www.siemens.com/sinamics-digitalization)

- Your local representative (http://www.automation.siemens.com/mcms/aspa-db/en/Pages/default.aspx)

- Training center (http://sitrain.automation.siemens.com/sitrainworld/?AppLang=en)

- Industry Mall (https://mall.industry.siemens.com)

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

- MLFB of the device

- Image version of the device

Glossary

Aspect

Aspects are a data modeling mechanisms for assets. Aspects group the data points based on logical sense. For example: The pump skid has an aspect, for example, "Energy_consumption" that contains the data points "power", "current", "voltage", etc.

Aspect is specified in Asset Manager and its name can be freely chosen, but should bring together a logical grouping of data points and a physical asset.

Asset

An asset is a digital representation of a machine or an automation system with one or multiple automation units (for example, PLC) connected to MindSphere.

MindSphere data collection and data provisioning is based on so called (virtual) assets. This can be anything such as a pump, motor, PLC, an entire tool machine, a production line, a robot, a crane, a car, a wind turbine and so on. The data of an asset is collected and sent to MindSphere to make that data available for further processing and analytics.

Asset Manager

Asset Manager is a Web Graphical User Interface for asset configuration. According to these configurations, the following functions are available:

Asset Configuration: assets can be created, onboarded, modified, cloned, moved, deleted or offboarded.

Asset type

Asset type is a sort or kind of a product line made by one manufacturer.

Components

Components represent built-in functionality in MindSphere. Components are:

- Asset Manager
- Fleet Manager
- User Management
- UTC Reporting

For the complete list and description of Components, refer to the "MindSphere" documentation.

Data point

Data points refer to elements (variables), which allow values to be obtained from data sources. They are combined into a relevant aspect. For example, "temperature" and "torque" are data points of an aspect "Energy_consumption".

Data points are configured in "Asset Manager".

Data source

A data source is a physical element of a device, which can be monitored by MindSphere.

MindSphere

MindSphere is the Siemens Industrial IoT operating system comprising the core cloud services and applications, whereas the SINAMICS CONNECT provides secure and easy connectivity from your converter to MindSphere. In MindSphere, the data acquired and submitted by the SINAMICS CONNECT is processed and stored for analysis and further management purposes.

For more information, refer to the "MindSphere" documentation.

MindSphere Launchpad

MindSphere Launchpad is the entry point for Components as well as for available MindApps.

Time series

Time series is a sequence of measurements which are produced by data sources over time. Analysis and visualization tools can retrieve collected time series and present it to the user after processing. In Asset Manager, the measurements, that have to be collected, can be specified.

Index

B

Backup battery
    Installing, 79

C

CE marking, 81
Certificates, 81
Clearance, 25
Components sensitive to electrostatic charge, 82
Condensation, 24
Connecting
    Peripherals, 29
Current consumption, 85

D

DC power supply, 87
Degree of protection, 85
Directive
    ESD Directive, 82

E

ESD, 82
ESD Directive, 82
EU Declaration of Conformity, 81

F

Flash, 86

G

General technical specifications, 85

I

Identification data, 20
Installation on a DIN rail, 24
Installing
    Backup battery, 79
Interfaces, 86

M

Marking
    EU Declaration of Conformity, 81
MindSphere, 61
Mounting
    Wall, 27
Mounting position, 24
Mounting type, 24

N

Noise emission, 85

P

Packaging, 23
    Checking, 23
    Removing, 23
Power supply
    DC power supply, 87
Processor, 86
PROFINET, 88
Protective measure
    Static electricity, 84

R

RAM, 86
Rating plate, 20
RoHS, 81

S

Safety instruction
    Storage, 24
    Transportation, 24
Static electricity
    Protective measures, 84
Supply voltage, 85

T

Technical features, 88

W