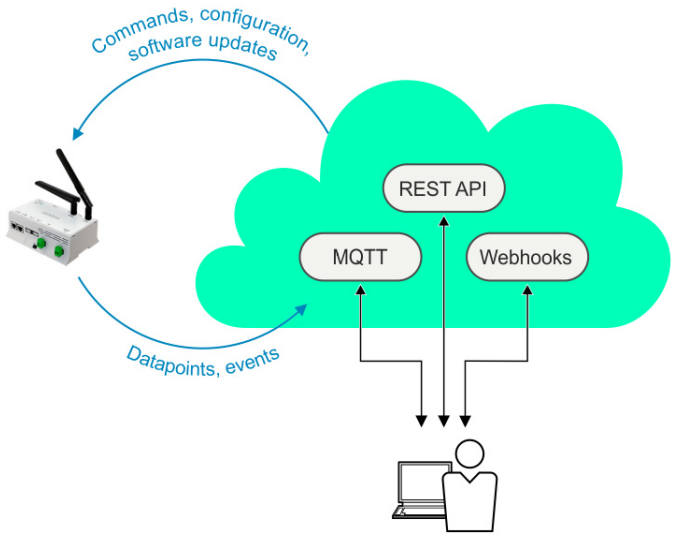
SIEMENS



Connect Box

Installation

CWG.BOX-A, CWG.BOX-EU, CWG.BOX-NA

A6V13606292_en--_e
2023-12-05

Smart Infrastructure

Table of Contents

1 Safety

⚠ CAUTION	
	**Incorrect wiring or operating outside specifications** Risk of device damage and other hazards ● Use only qualified personnel to install the device. ● Ensure that the device is wired correctly before turning on power. ● Operate the device within the specified operating ranges (temperature, humidity, voltage, shock, mounting direction, atmosphere, etc.). ● Use only for the intended purpose of monitoring and control. ● Operate inside only. ● Do not operate over a power-over-ethernet (POE) network. Connecting the device to a network segment supplying power may cause a device failure. In this case, disconnect the device from the POE network segment, turn it off and on again.

⚠ WARNING	
	**Improper device handling during installation, maintenance, and mounting** Risk of electric shock! ● Always disconnect the power supply before installation or maintenance. ● Turn off power before wiring, removing, or mounting the device. ● Do not touch electrically connected parts, such as power terminals. ● Do not disassemble the device. ● Keep out of reach of children. ● Install the device in a controlled environment relatively free of contaminants.

⚠ WARNING	
	**Operating outside specifications or loose electrical wires** Risk of fire! ● Operate the device within the specified operating ranges (temperature, humidity, voltage, shock, mounting direction, atmosphere, etc.). ● Tighten the electrical wires on the connector. ● Install the device in a controlled environment relatively free of contaminants

⚠ CAUTION	
	**National safety regulations** Failure to comply with national regulations may result in personal injury and other damage. ● Use only copper conductors. Connect the device in accordance with local, state, and national electrical codes and regulations.

2 Preparations

Location (Environment)

The Connect Box can be snapped onto standard DIN rails or screwed onto the wall. Use included plug-in screw terminals to connect power and interfaces.

Do not install in environments

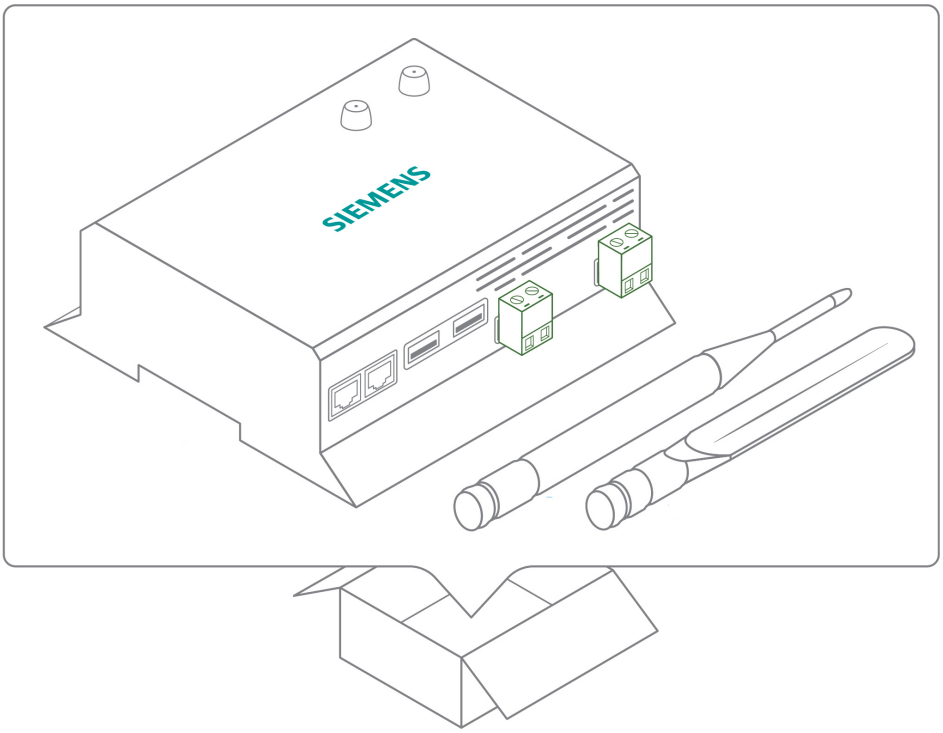
- with excessive moisture, corrosive fumes, or explosive vapors,
- exposed to vibration or shock,
- subject to electrical interference (near large electrical contractors, electrical machinery, welding equipment, etc.).
- If mounted in a control cabinet, the cabinet must maintain the specified operating temperature range (allowing for 24 watts of heat dissipation by the controller).
- Do not install outdoors.

EN 60730-1 Power supply considerations

- Electrical safety in building automation and control (BAC) systems relies primarily on the use of extra-low voltage, strictly separated from the mains voltage (SELV or PELV, according to EN 60730-1).
- Protect against electric shock:
  - Limit voltage (low voltage supply DC 24V ±10%, SELV or PELV).
  - Separate SELV installation from all circuits other than SELV and PELV.
  - Separate SELV system from other SELV systems, PELV systems, and ground.
- Connect field devices such as sensors, state contacts, or actuators to the low voltage inputs and outputs of the I/O modules as per SELV or PELV requirements. Interfaces to field devices and other systems must also comply with SELV or PELV requirements.
- Install a safety transformer or converter designed for continuous operation to power SELV or PELV circuits if supplied by mains voltage.

Provided material

- Connect Box
- GSM standard antenna
- LoRaWAN standard antenna
- Info card



Additional material and optional hardware (not provided)

A DC 24 V power supply is required, see Connect Box Data sheet, https://siemens.com/bt/download → ID: **A6V13605540**, for details.

Additional on-boarding material

Consult the on-boarding material and videos at https://www.siemens.com/connectbox/training for detailed instructions to configure and set up Connect Box using the user web interface.

NOTICE	
!	All hardware products leverage an integrated 4G for remote activation, firmware updates, configuration and troubleshooting. The SIM card is pre-mounted in all hardware types and compatible in all supported regions, the GSM/4G plan is part of all software license types and does not need to be purchased separately.

NOTICE	
!	Connect Box hardware requires a license to activate and configure the device. Cloud and On-premise licenses cannot be combined for same device. Please consult Connect Box Product and Service Data Sheet https://siemens.com/bt/download → ID: **A6V13605416**, for details on license types and purchase instructions. Account, organization, device, user and file management are available at https://connectbox.siemens.com after activation for all license types.

Access the user interface and pair Connect Box

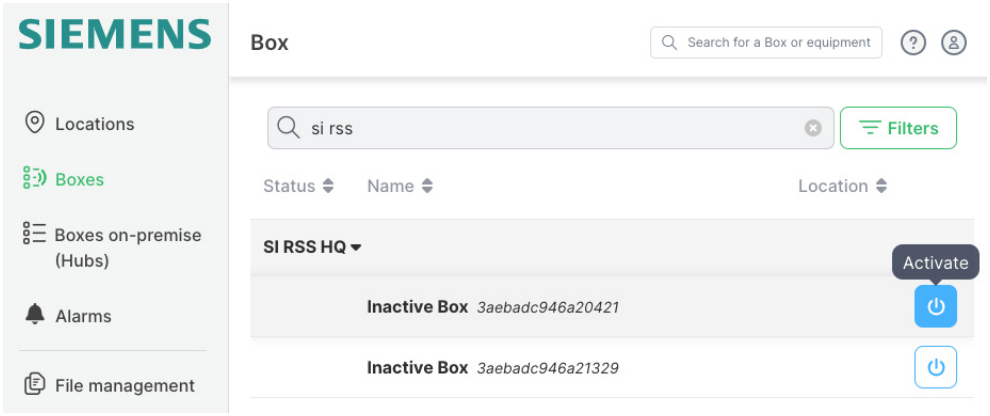
- Alongside the access credentials, each customer receives a dedicated space in the user web interface at https://connectbox.siemens.com to pair, activate and configures assigned devices.
- Access credentials to the user web interface are send via e-mail during the ordering process. Please check the mail inbox of organization administrator that was given during ordering and license registration process.
- The Connect Box device needs to be paired to a registered license and activated as instructed below before it can be installed and configured. Siemens or partner may pair the licenses as part of the ordering process on behalf of the end customer while preparing the device for activation as described below.
- Please see Connect Box Organization and User Management, https://siemens.com/bt/download → ID: **A6V13741097**, for details on user administration and creation, creating and managing organizations and possible restrictions.
- Troubleshooting: If it is not possible to activate the device or the device does not show up in the web interface, request the organization's administrator to grant minimum "installation" permissions in order to activate the device. In case of doubt, contact Customer Support for additional guidance.

Connect Box pairing to license in user web interface

1. Log in by entering your email address and password, and click **Log in**.
2. Click on the notification link on the top to jump directly to unpaired devices, or navigate to the individual device via the **Organization** tab on the left.
3. Review the assigned license and pair with the **Device ID** (the unique alphanumeric device identifier of the hardware) printed on the device label as indicated in the screen instructions.

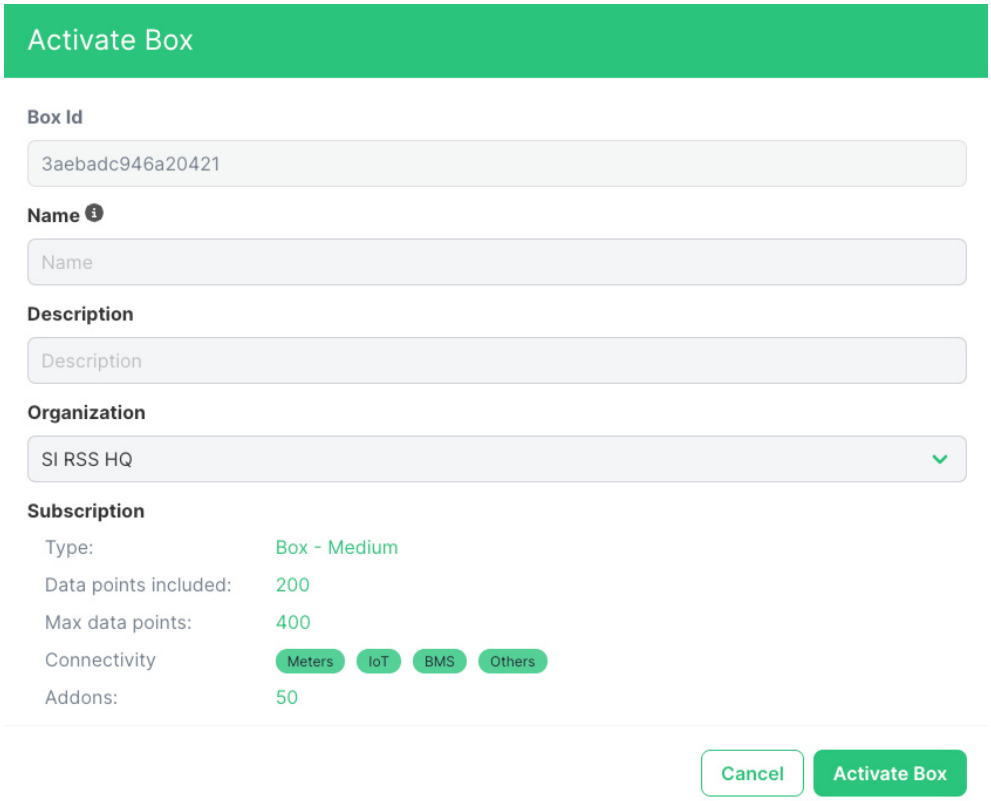
Connect Box activation in user web interface

1. To log in, enter your email and password and click **Log in**.
2. In the search field on top, enter the device ID to filter and search for it.
3. Click **Activate**.



4. In the **Name** field, enter a device name (for example, the name of the site where the device is installed).
5. Add additional information in the **Description** field to further identify the device (for example, the floor or exact location where the device is installed if there are several devices at the same site or building).

6. Click **Activate Box**.



⇨ You can now connect and configure devices online as per the assigned license.

3 Mounting the device and connecting the power supply

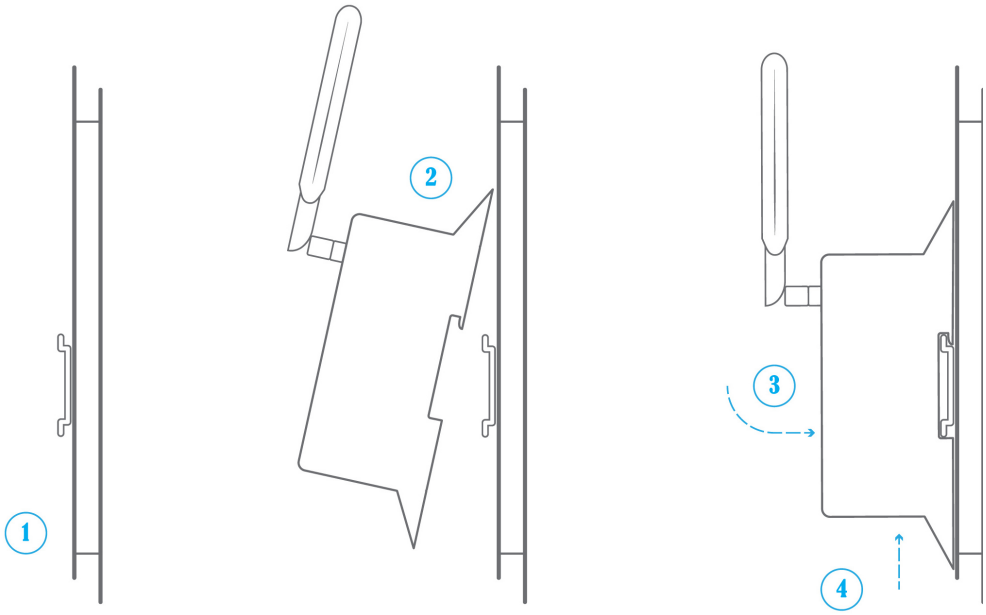
▷ Activate the device online prior to installing, see Preparations [➙ 4]

▷ Install power supply as specified in the data sheet

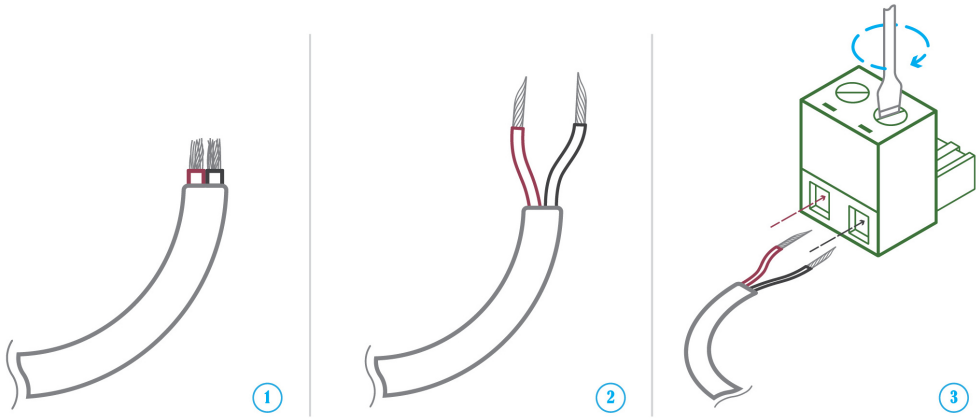
▷ Connect the power supply cable to the device:
2 wires (red, black), min. 22 AWG or 0.35 mm²

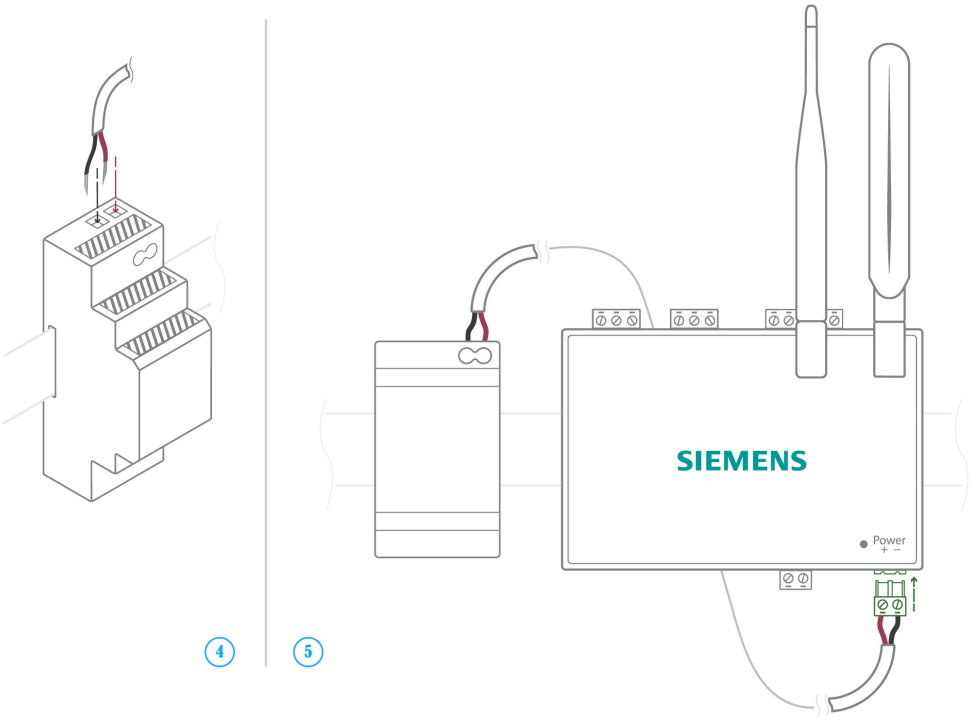
1. Install the device preferably in an electric panel or control cabinet. An external antenna may be required depending on cabinet material and type, see GSM setup and antenna details [➙ 11]. Follow general and antenna mounting instructions in data sheet.

2. Attach and mount the device:
   – Mount the device on a DIN rail.

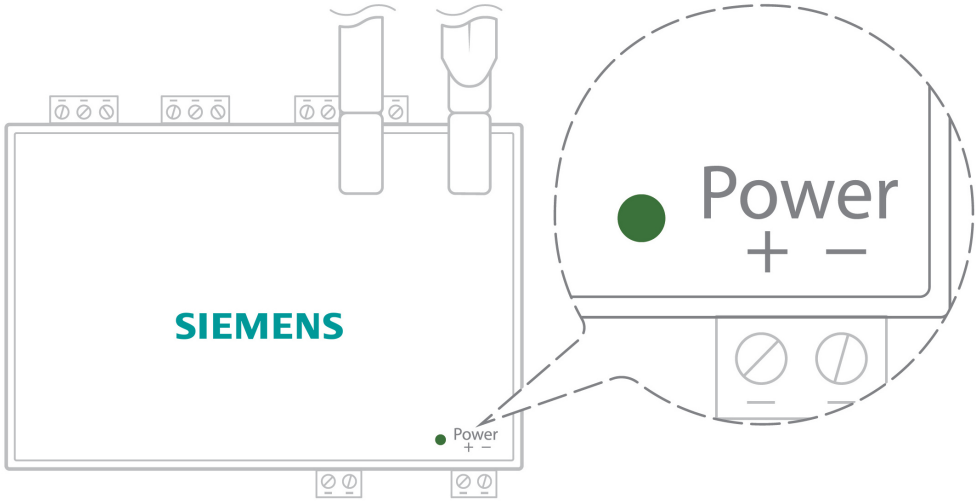


3. Connect the cable to the power supply.





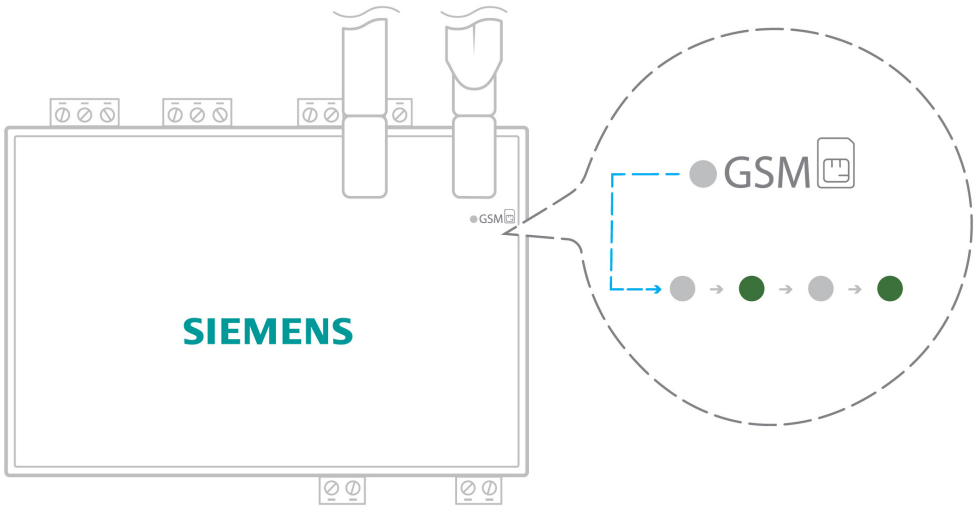
4. Make sure the Power LED is on (steady green light).
   – The device is protected against overvoltage, undervoltage, overcurrent as indicated by the Power LED: Green LED if the power supply is compatible, red if not.



   – If the Power LED is red, change the power supply to avoid damaging Connect Box.

5. Wait until the Heartbeat LED flashes (green light, ca. 10 seconds).

6. Wait until the GSM LED flashes; if the LED does not flash after a few minutes, see GSM setup and antenna details [➙ 11].



7. Check the user web interface: The status indicator on the Connect Box changes from red (offline) to green (online).
8. The device is operational if displayed online. Connect the Connect Box to the equipment and/or to the building network as outlined in chapters 5 and 6.
9. If the device does not display online, see GSM setup and antenna details [➙ 11].

4 GSM setup and antenna details

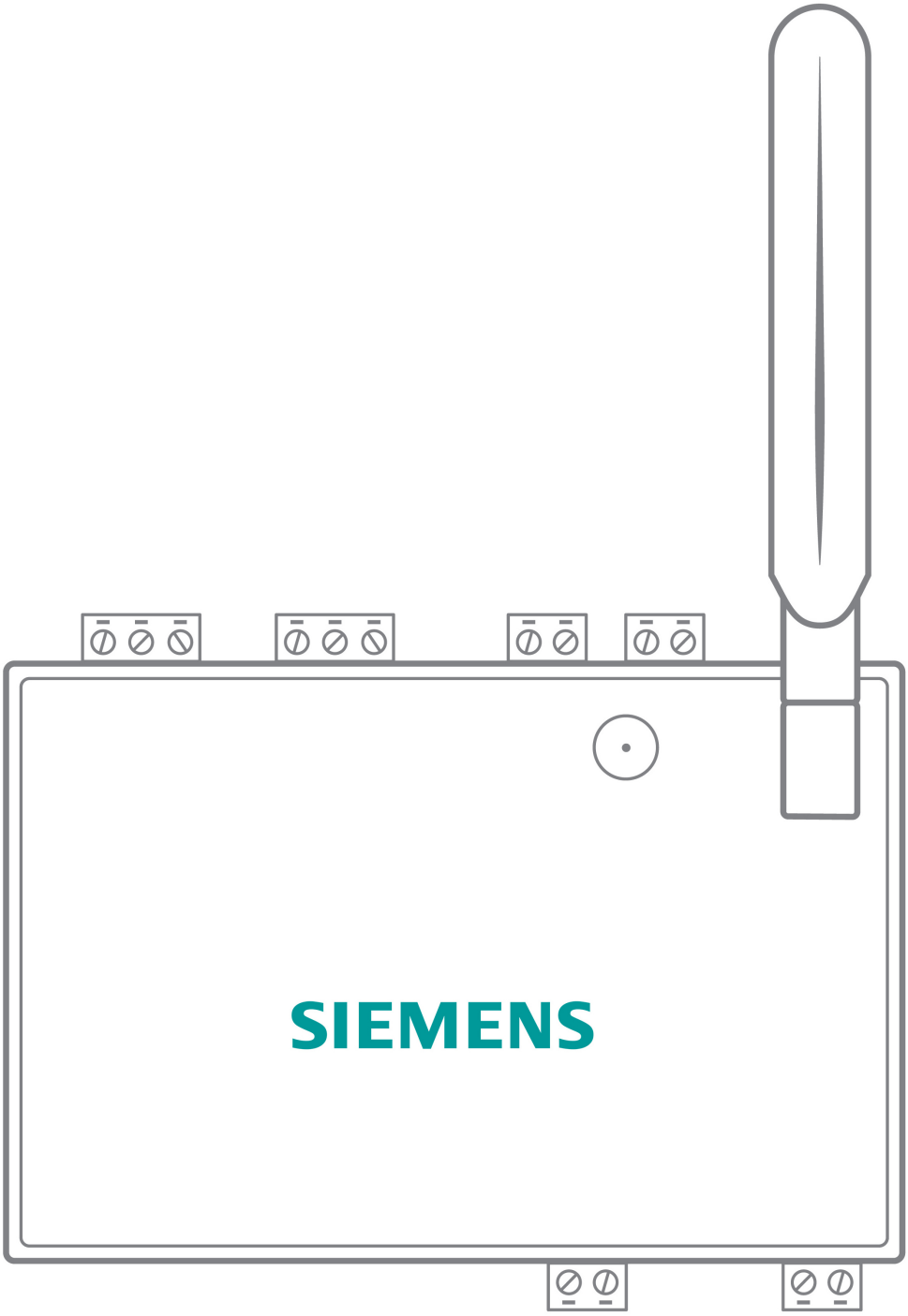
The device is supplied with a standard GSM antenna.

When installed and operated in the United States, ensure that the antenna does not exceed the values listed in the table below and is installed as per additional instructions in the Hardware data sheet:

Frequency band	Antenna gain (dBi)
GSM850	-1
GSM1900	6
GPRS850 4TS	-1
GPRS1900 4TS	6
WCDMA Band2	10
WCDMA Band4	9
WCDMA Band5	7
LTE Band2	10
LTE Band4	11
LTE Band5	7
LTE Band7	10
LTE Band12	6
LTE Band13	6
LTE Band25	10
LTE Band26	8
LTE Band41	9
LTE Band66	9

▷ If the GSM signal is too weak:
- add an RF extension cable with SMA connector (max. 2 meters) + 1 adhesive support;
- use a high-gain antenna (max. 10 meters of cable)

1. Use the antenna supplied with the device if the GSM signal is sufficiently strong in the selected location.

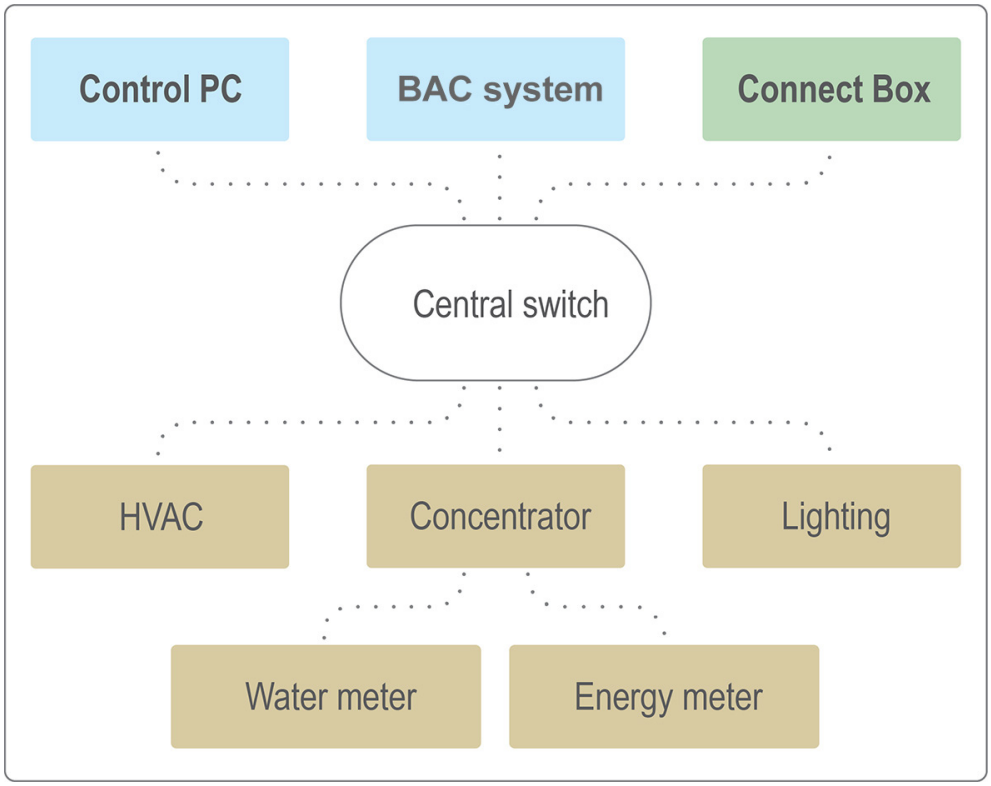


2. If the signal is too weak, move the original antenna out of the cabinet; add an RF extension cable with SMA connector (max. 2 meters) + 1 adhesive support to hold the antenna.
3. If the signal quality is still too weak, install a high-gain antenna with a maximum of 10 meters of cable; the antenna can, for example, be moved outside or to other floors to improve signal reception. Do not use a cable longer than 15 meters as this degrades reception quality. Follow general and antenna mounting instructions in the data sheet.

5 Connecting to a BAC system

The following chapter describe the basic installation and configuration sequence for connecting devices of the respective type to the Connect Box. For configuration details please consult the onboarding video at https://www.siemens.com/connectbox/training.

Chapter 5 describes how to physically connect the Connect Box with an existing BAC system and / or devices based on BACnet or LON. Please refer to Chapter 6 for installation instructions for individual devices without connecting to an existing BAC system.



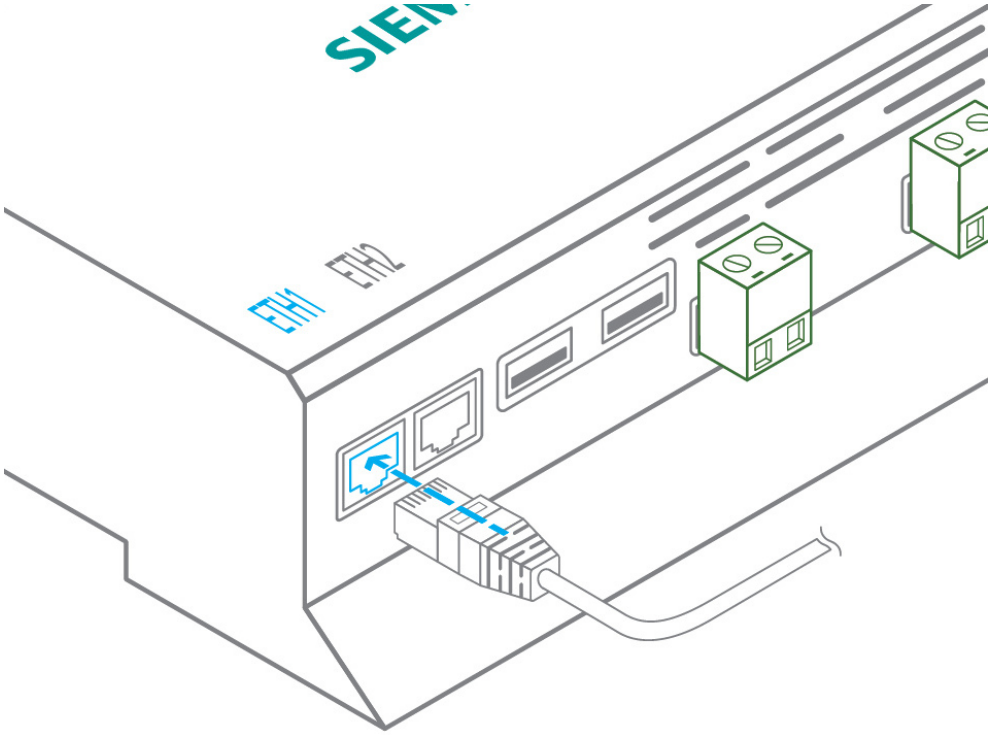
Preparations

1. Determine the type of network (communication protocols between the BAC system and technical equipment).
2. If possible, the IT planners for a diagram of the communication network.
3. Identify where and how the BAC system connects to the building network in order to connect it with the Connect Box.

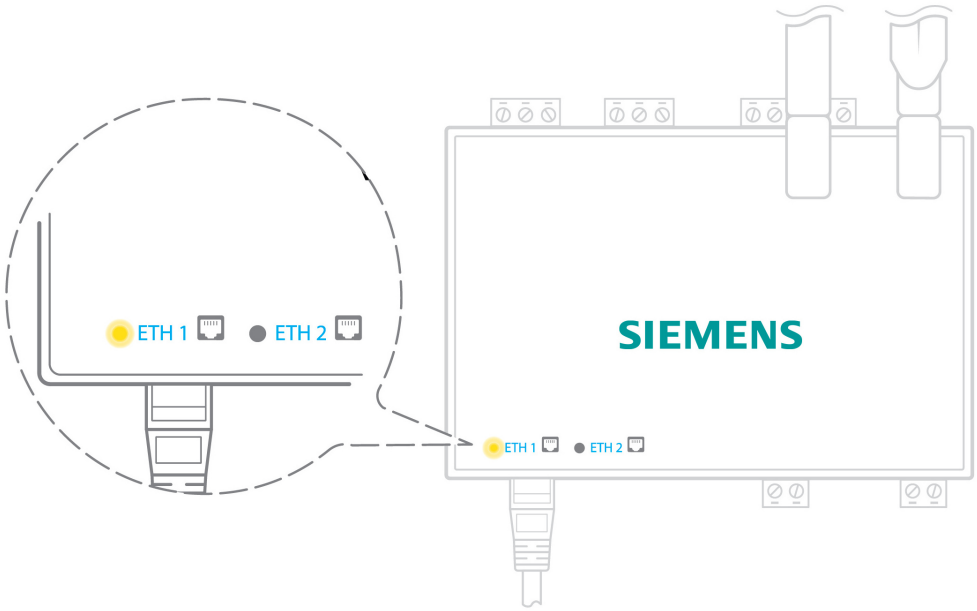
5.1 Connecting to an IP network (except LON)

▷ An additional Ethernet cable is required

1. Connect the cable to Ethernet port ETH1 or ETH2.



2. Connect the device to the same switch (IP network) as the monitoring PC/BAC system server.
3. Ensure that either LED ETH1 or ETH2 is on.



Configuring the Connect Box network online

1. If DHCP is not used or available in the network, manually assign a static IP address, network mask and gateway to the selected ETH port at https://connectbox.siemens.com.
2. The address is assigned automatically if the network uses a DHCP server, consult with the Owner / Building IT manager if required before plugging in the Ethernet cable and configuration at https://connectbox.siemens.com.

Configure the protocols online

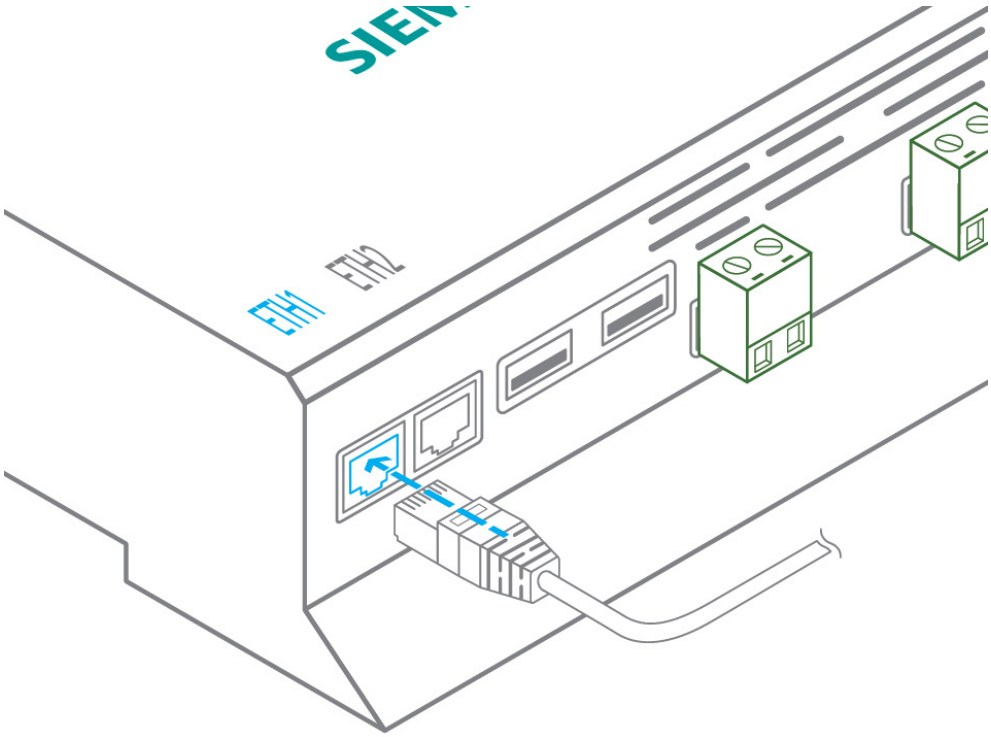
1. Devices communicating over Modbus TCP:
   - Export available properties from the BAC system for a list of data types provided by the different devices.
   - If the information cannot be retrieved from the BAC system, note the IP address and TCP port (server address, brand and model of the equipment, and any additional information as applicable). The information is required to configure installation and retrieve data at https://connectbox.siemens.com.
2. Devices communicating over BACnet IP network:
   - Note the network BACnet port ID. The information is required to configure installation and retrieve data at https://connectbox.siemens.com.
   - **Important**: The Connect Box can either receive data from the network as a BACnet client or send it to the network using the BACnet IP Gateway. Parallel operation is not supported.

5.2 Connecting to a LON IP-852 network

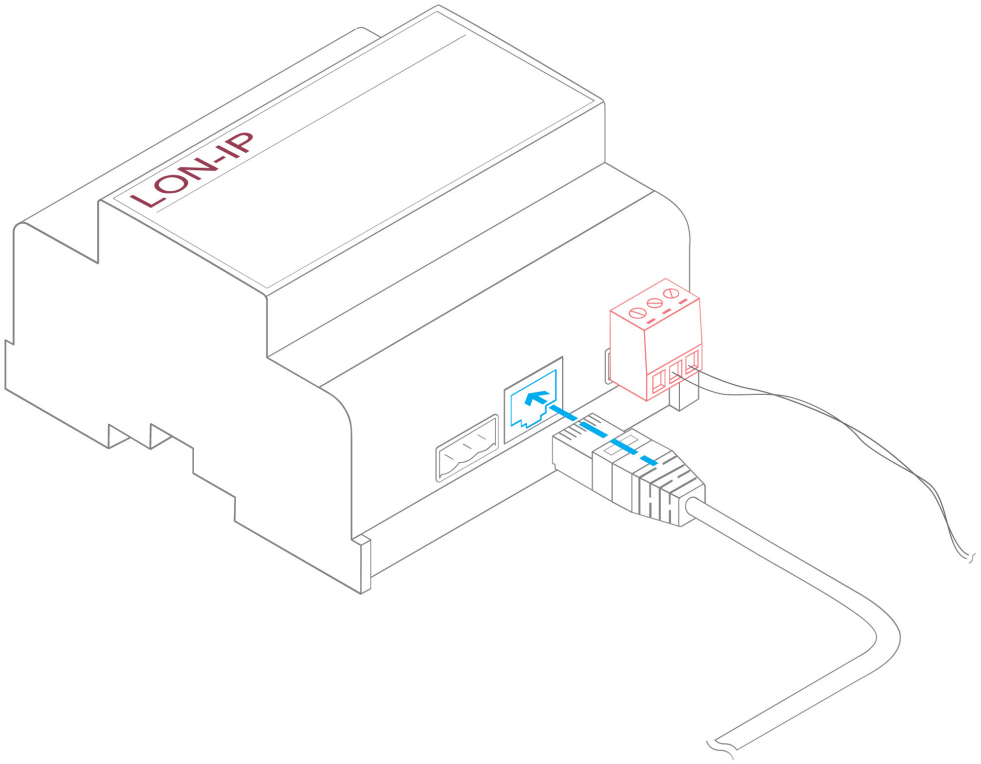
One or more device types

▷ An additional Ethernet cable is required

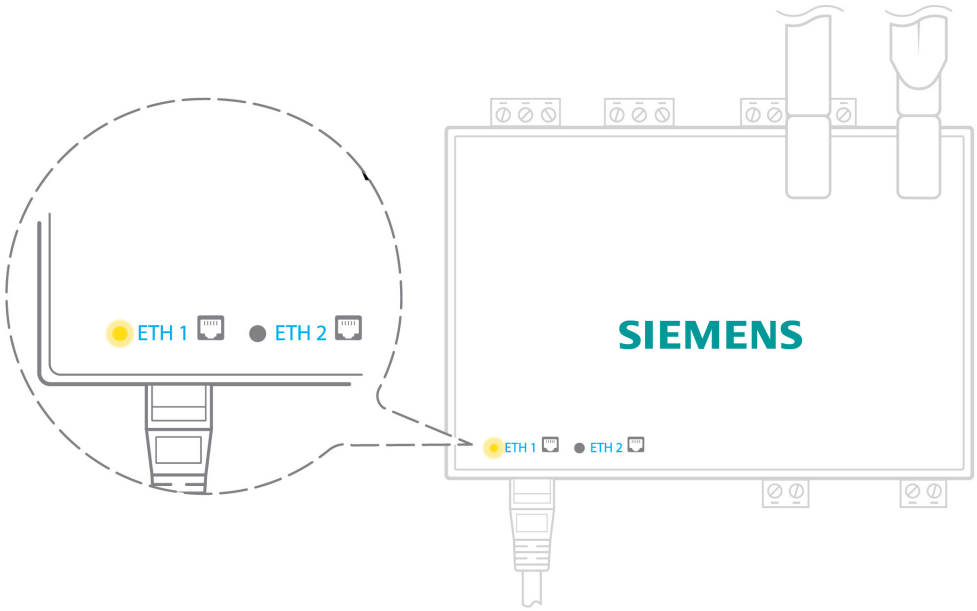
1. Connect the cable to Ethernet port ETH1 or ETH2.



2. Connect the other end of the cable to the IP-852 server on the LON network.



3. Ensure that either LED ETH1 or ETH2 is on.



4. Register the device IP address on the LON network IP-852 server. The IP-852 server may be password protected.

Configure the protocol online

1. Retrieve the equipment Neuron-ID.
2. Note the Neuron-ID, brand, and model of the equipment and any identifying information. The information is required to configure installation and retrieve data.
3. Export the LON database as an NLC file if using the NL220 software.

6 Connecting without a BAC system

Preparations

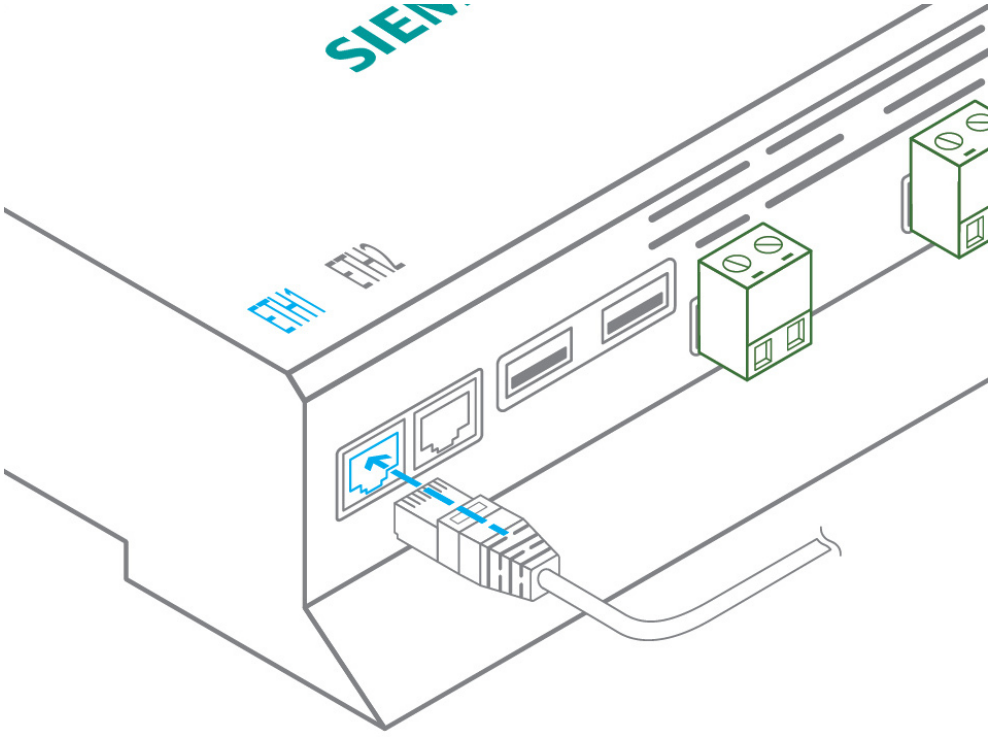
1. Ideally, prepare a list of devices and communication protocols to be connected.
2. Have the appropriate technical documentation available for each device, accessible via the respective manufacturer.
3. Ideally, draft an installation diagram for documentation purposes.

6.1 Connecting to a Modbus IP network

Single device

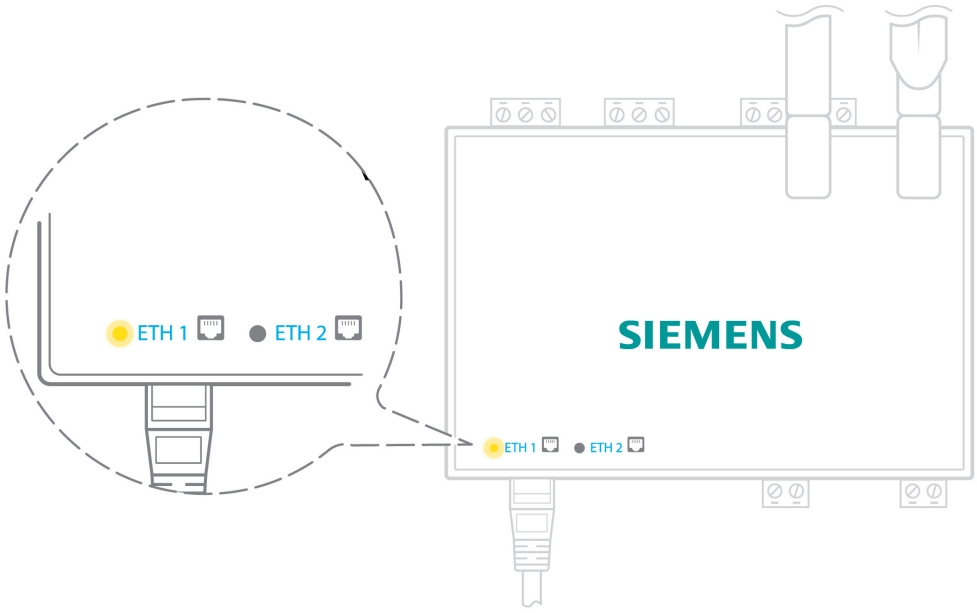
▷ An additional Ethernet cable is required

1. Connect the cable to Ethernet port ETH1 or ETH2.



2. Connect the other end of the cable to the device or network.

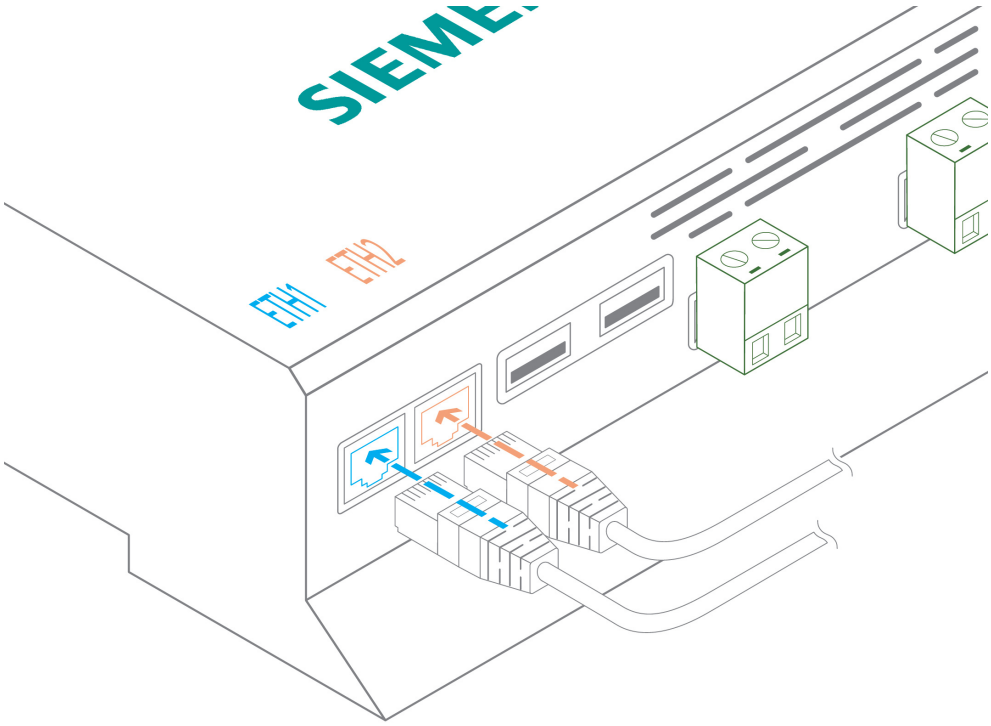
3. Ensure that either LED ETH1 or ETH2 is on.



Two individual devices or networks

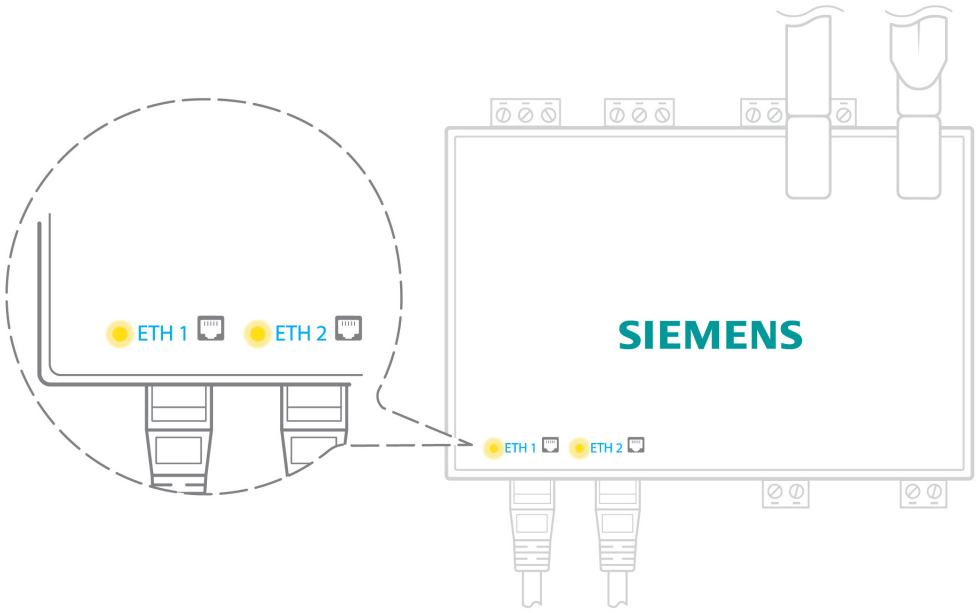
▷ Two additional Ethernet cables are required

1. Connect the cables to Ethernet ports ETH1 and ETH2.



2. Connect the cables to the two Modbus devices or networks.

3. Ensure that both LEDs ETH1 and ETH2 are on.



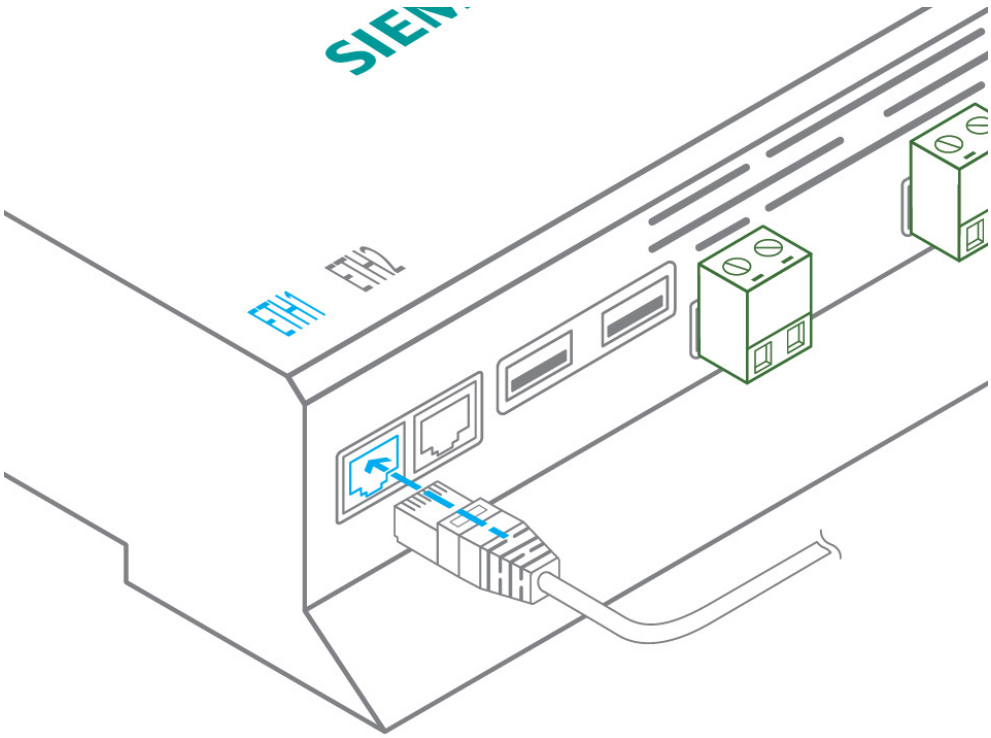
Three or more devices

▷ An additional Ethernet cable and an Ethernet switch are required

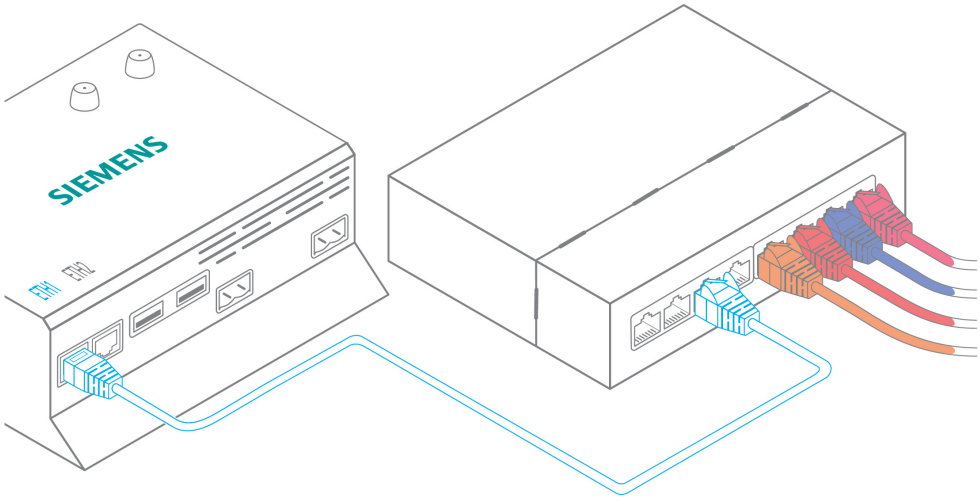
▷ Connections to devices also require separate Ethernet cables

▷ Connect the switch to the same or a separate power supply.

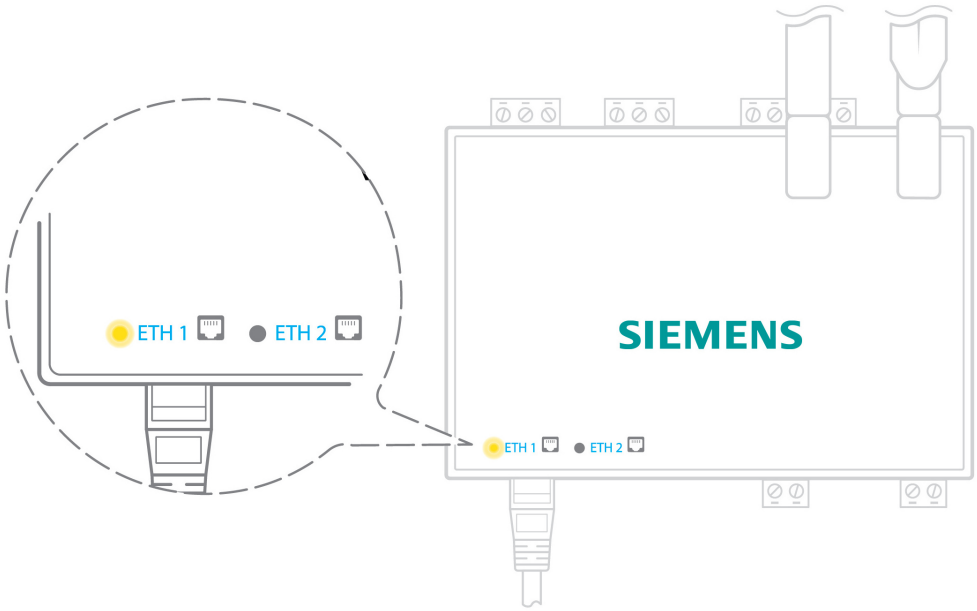
1. Connect an Ethernet cable to Ethernet port ETH1 or ETH2.



2. Connect the other end of the cable to the Ethernet switch.



3. Ensure that either LED ETH1 or ETH2 is on.



4. Connect all devices to the switch via Ethernet cables.

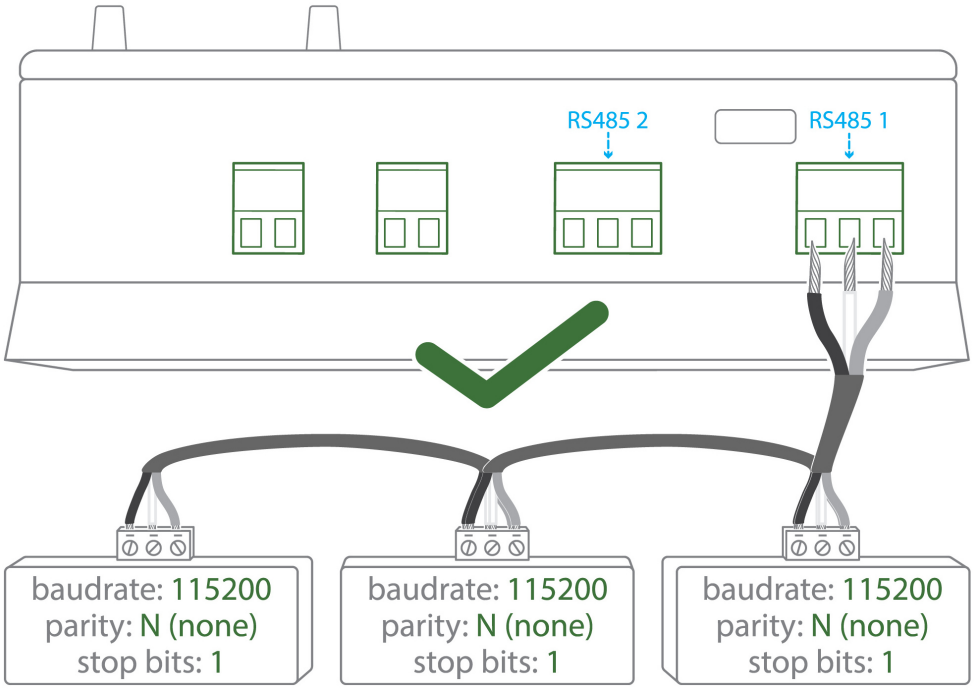
Configure the protocol online

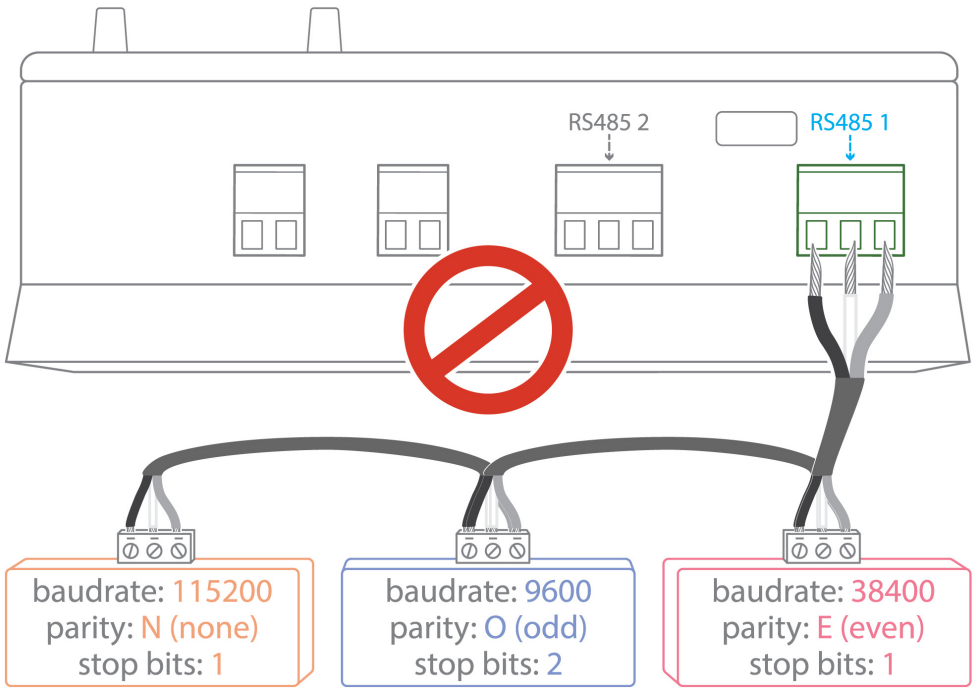
1. Consult device technical documentation for the IP address and TCP port (where needed, the address of the server or server ID).
2. Manually assign an IP address as per manufacturer documentation instructions if one is not yet assigned: 192.168.1.1 for the first device, 192.168.1.2 for the second device, and so on.
3. Note the IP address and TCP port (server ID as applicable), the brand and model of the equipment, and any information that allows it to be identified. The information is required to configure the device and retrieve data at https://connectbox.siemens.com.

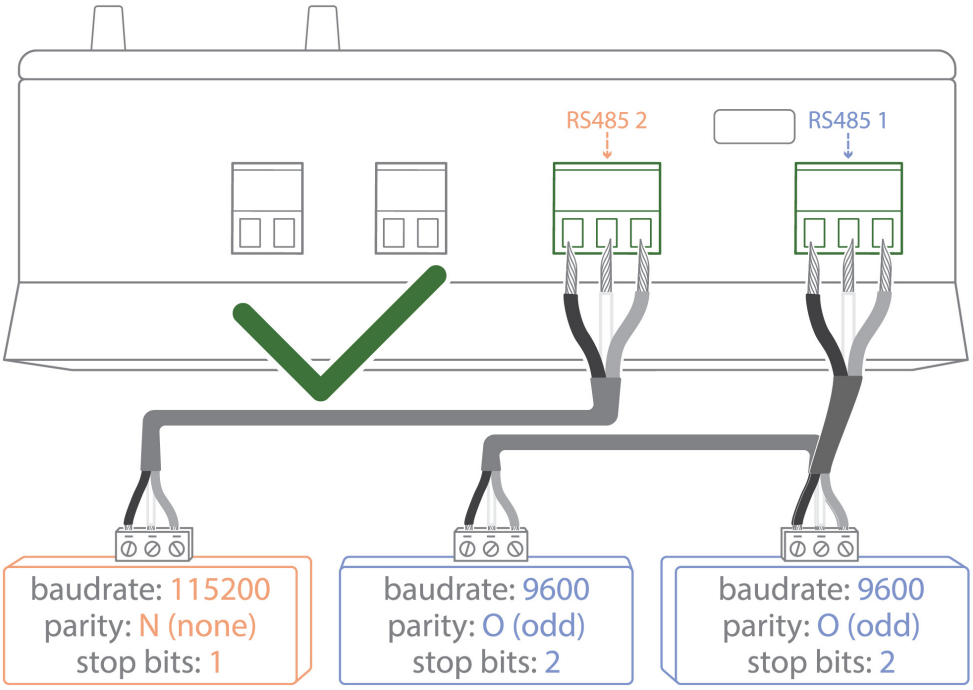
6.2 Connecting to a Modbus RTU (RS485) network

Bus architecture

- Note communication settings: Bus speed, character size, parity bit, stop bit (from the user console configuration wizard, from the manufacturer's technical documentation, or directly from the equipment control panel).
- Create a maximum of two networks, each grouping equipment using the same communication settings and assign them to the two available RS485 terminals.
- Additional accessories are required if the equipment should connect to more than two networks.



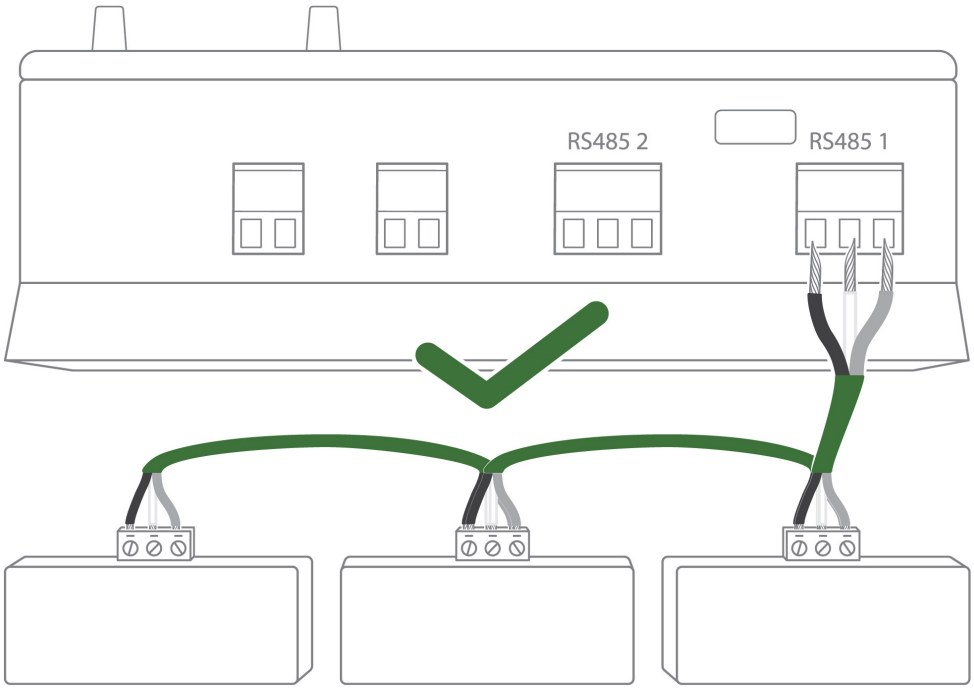


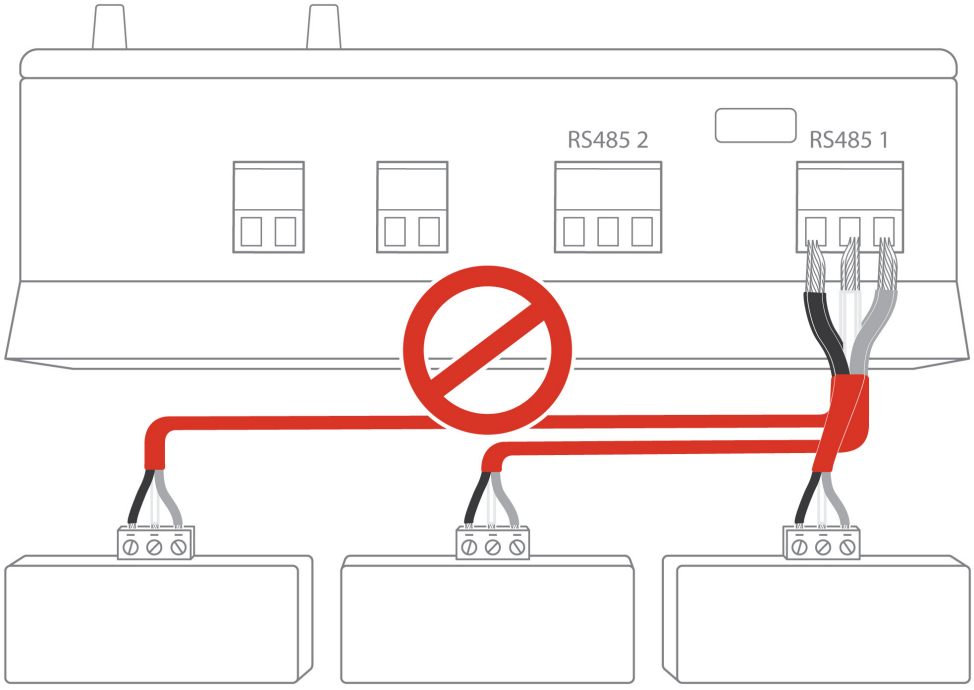


Connecting device

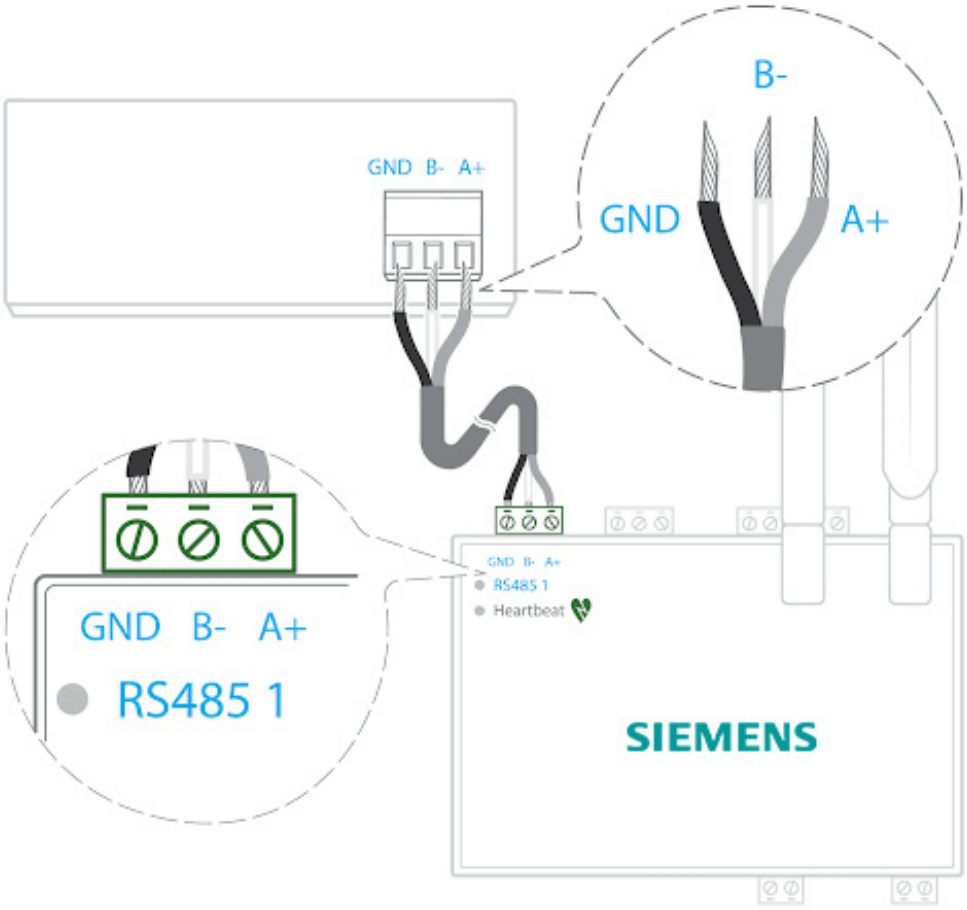
Caution: Do not group devices using different communication parameters (baud rate, parity, etc.) on the same bus.

1. Connect the network in series to one of the two network terminals.





2. Connect the network to one of the two RS485 terminals as shown below.



Configure the protocol online

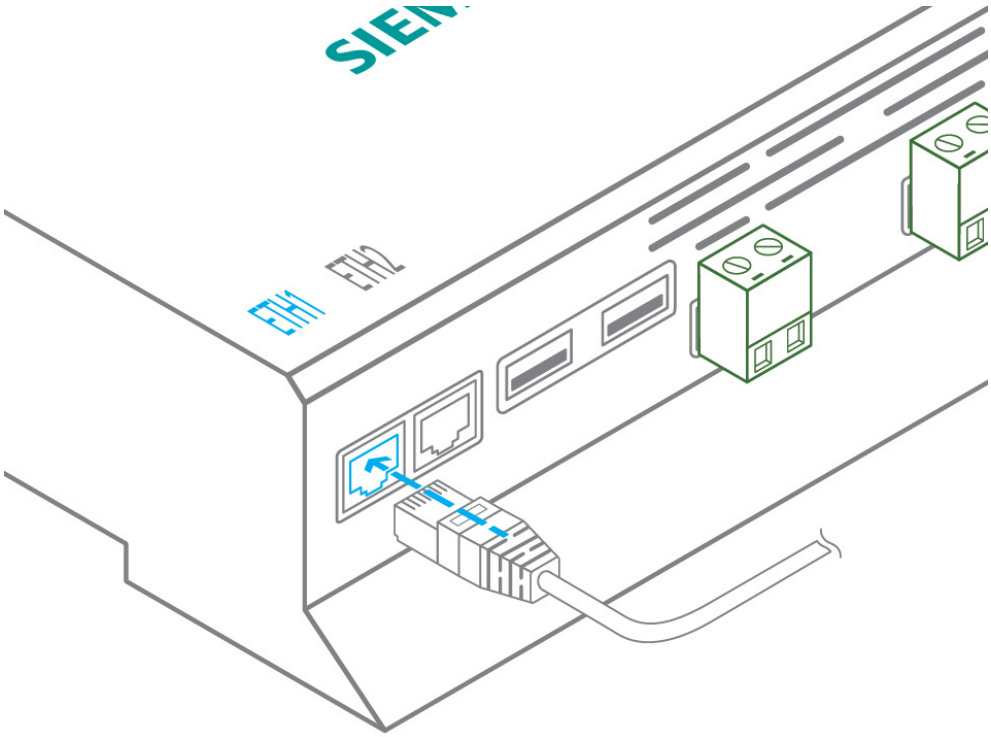
1. Configure the address of the 1st Modbus server to 1; the 2nd to 2; the 3rd to 3 and so on.
2. **Caution**: Each server on the network must have a unique address.
3. Note the network address as well as the brand and model of the equipment, and any information that allows it to be identified. This information is necessary for the configuration and to retrieve data at https://connectbox.siemens.com.

6.3 Connecting to a BACnet IP network

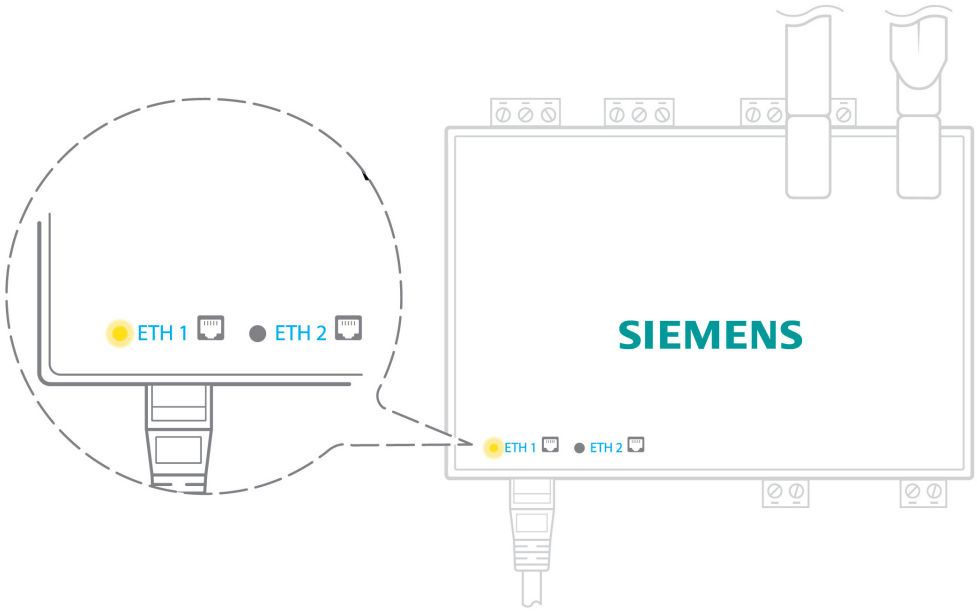
Single or two devices / networks

▷ An additional Ethernet cable is required

1. Connect the cable to Ethernet port ETH1 or ETH2.



2. Connect the other end of the cable to the device.
3. Ensure that either LED ETH1 or ETH2 is on.



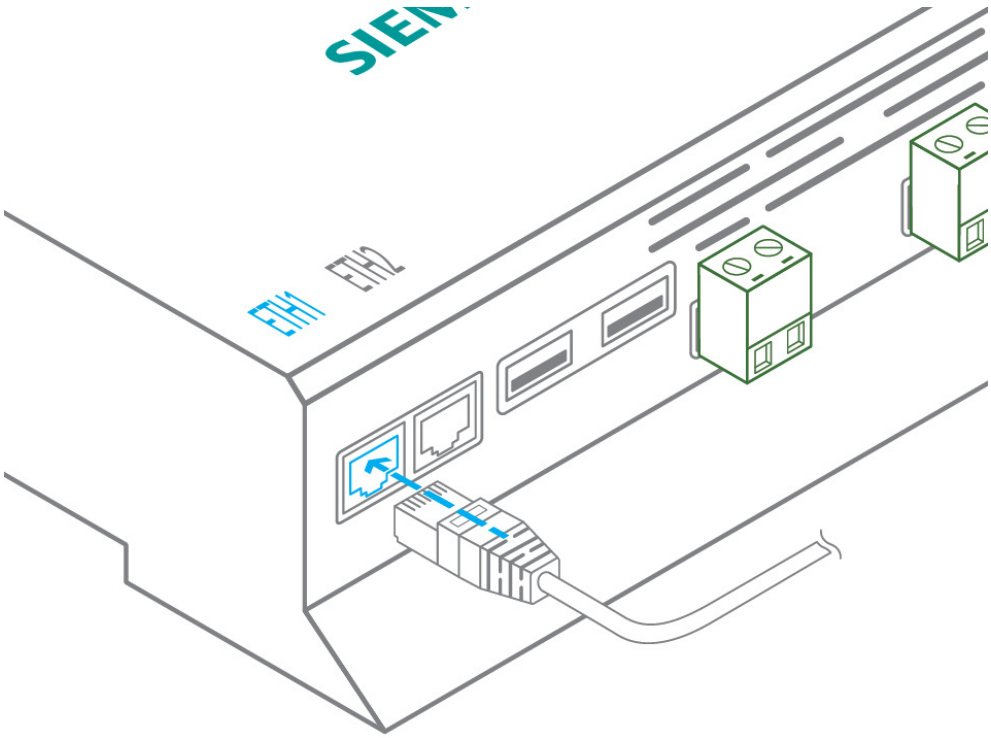
Three or more devices

▷ An additional Ethernet cable and an Ethernet switch are requires

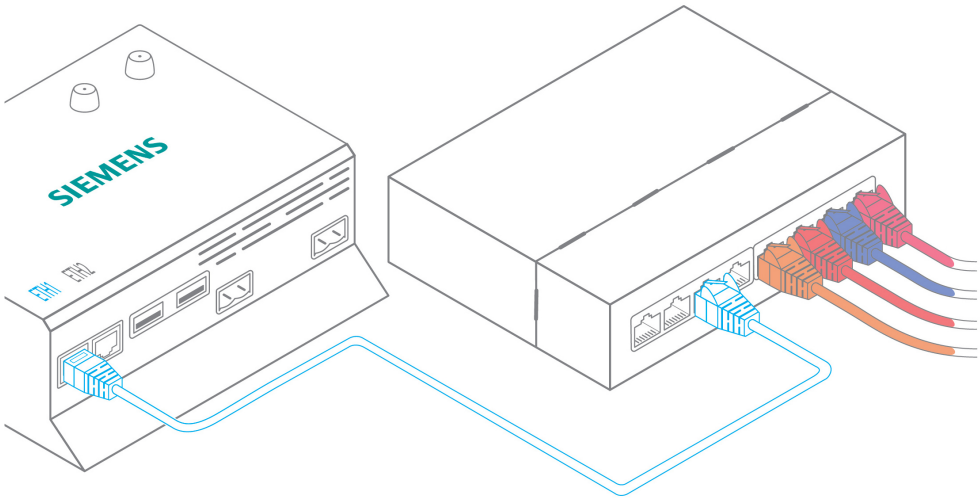
▷ Connections to devices also require separate Ethernet cables

▷ Connect the switch to the same or a separate power supply.

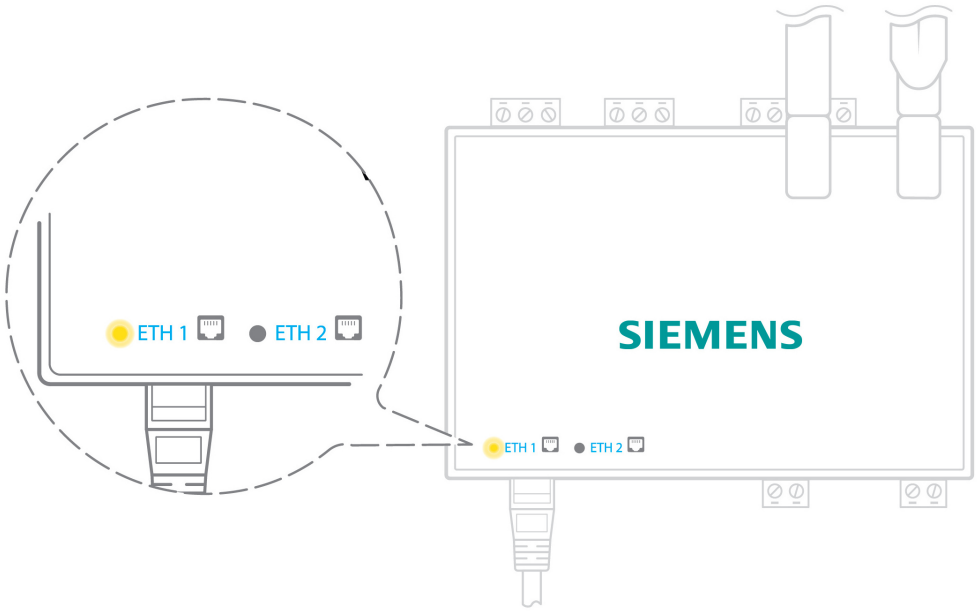
1. Connect an Ethernet cable to Ethernet port ETH1 or ETH2.



2. Connect the other end of the cable to the Ethernet switch.



3. Ensure that either LED ETH1 or ETH2 is on.



4. Connect all devices to the switch via the Ethernet cables.

Configure the protocol online

1. Consult device technical documentation for the IP address and TCP port (server address where applicable).
2. Manually assign an IP address as per manufacturer documentation instructions if one is not yet assigned: 192.168.1.1 for the first device, 192.168.1.2 for the second device, and so on.
3. Note the IP address and TCP port (server ID as applicable), the brand and model of the equipment, and any information that allows it to be identified. The information is required to configure the device, for example by using BACnet scan, and to retrieve data at https://connectbox.siemens.com.

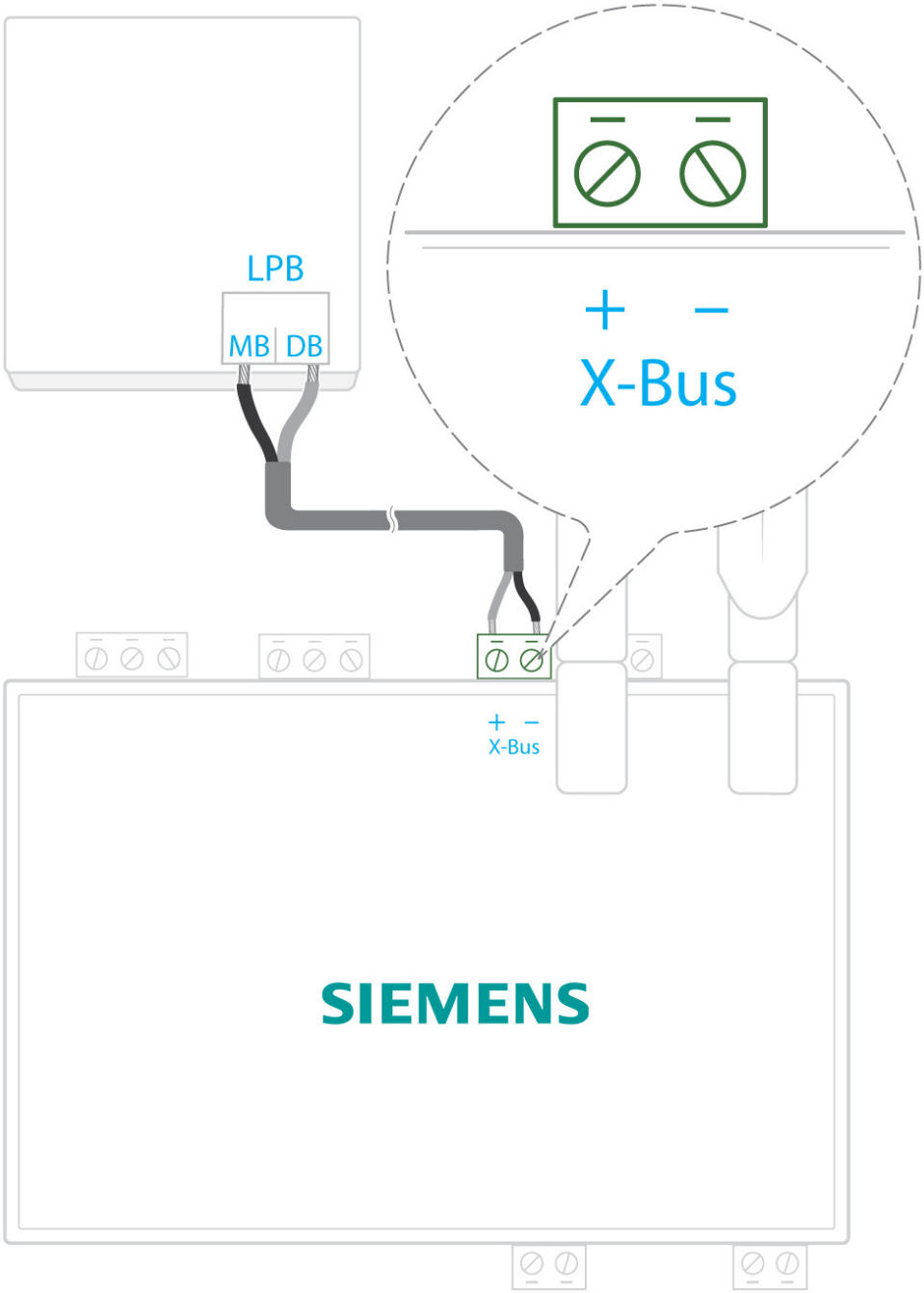
6.4 Connecting to a LON IP-852 network

Please see Connecting to a LON IP-852 network [→ 16] in *Connecting to a BAC system*.

6.5 Connecting to an LPB-bus

One or more devices

1. Connect the LPB-bus to the X-bus terminal.
2. For each device, connect the MB cable to the X-bus (-) connector and the DB cable to the X-bus (+) connector.



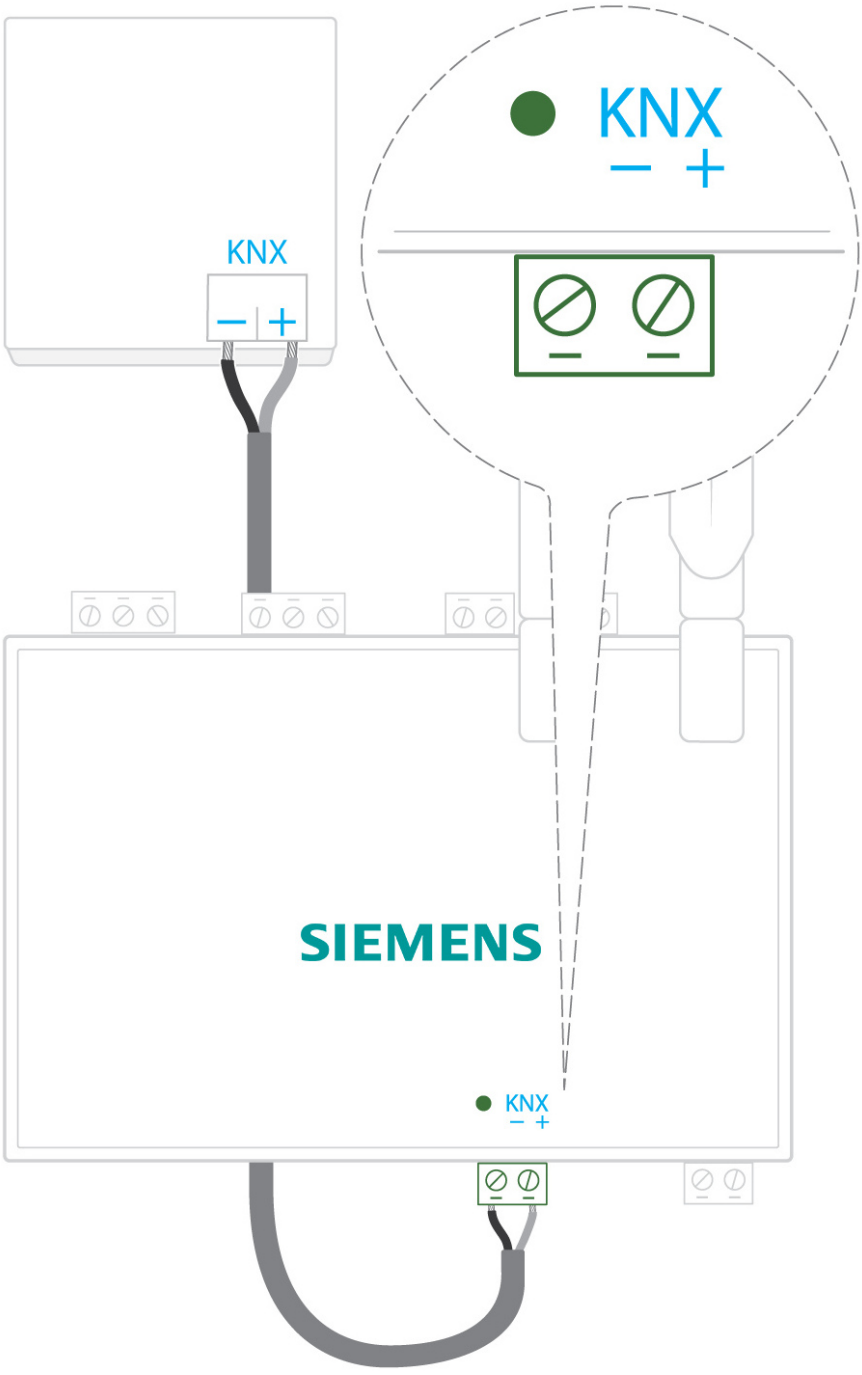
Configure the protocol online

1. Turn off the LPB-bus during installation. Turn it back on after installing.
2. Configure a unique segment address for each device (from 1 to 14).
3. Physically connect the device and configure it at https://connectbox.siemens.com.
4. Designate only one device as the one that powers the bus.

6.6 Connecting to a KNX network

One or more devices

1. Connect the KNX-bus to the KNX terminal.
2. Each device must connect the (-) signal to the (-) connector and the (+) signal to the (+) connector. Please see the Connect Box Data sheet (ID: A6V13605540) for KNX power supply limits. A dedicated KNX bus power supply is recommended.



Configure the protocol online

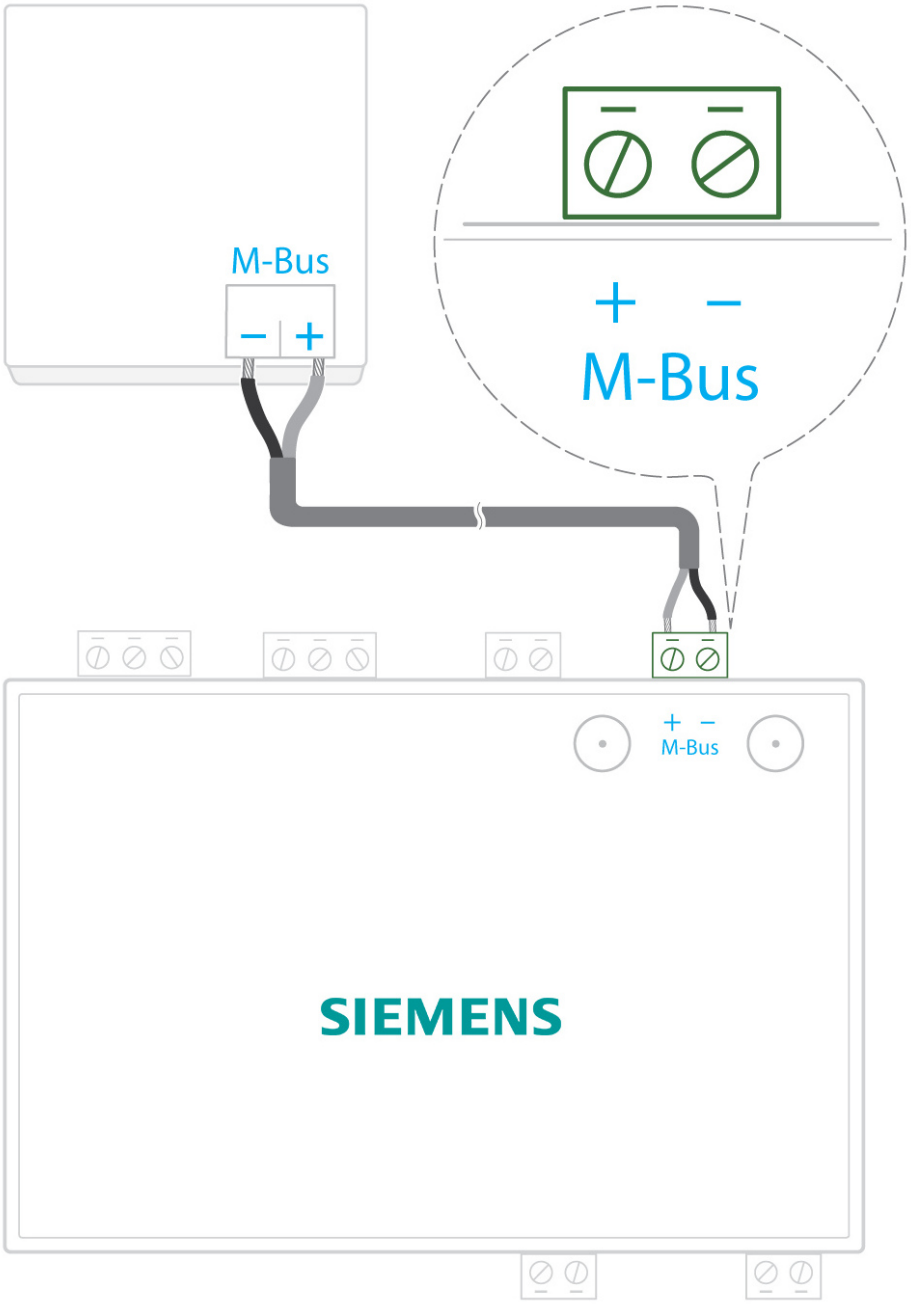
- Configure network and devices at https://connectbox.siemens.com using KNX LTE or S-Mode.

6.7 Connecting to M-Bus

One or more devices

The Connect Box can handle a maximum load of three devices (3.6 mA). Install an M-Bus signal repeater for more than three M-Bus devices.

1. Physically connect the M-Bus device to the M-Bus terminal.
2. Each M-Bus device must connect the (-) signal to the M-Bus (-) connector and the (+) signal to the (+) connector.



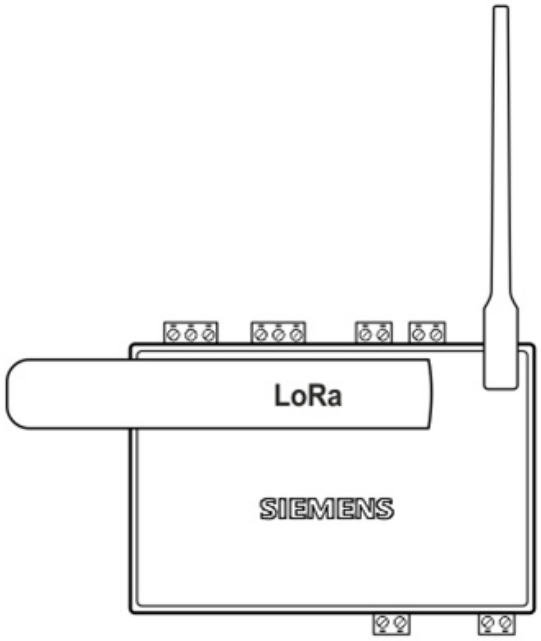
Configure the protocol online

- Configure at https://connectbox.siemens.com, for example by using the M-Bus scan for device identification based on primary/secondary address.

6.8 Connecting LoRaWAN equipment

NOTICE	
!	Supported LoRaWAN frequencies for available Connect Box hardware types are listed in the Hardware Data sheet (ID: A6V13605540).

1. Install the Connect Box in a central location, capable of receiving data from all LoRaWAN equipment installed in the building as per datasheet instructions.



2. Use the original antenna on the Connect Box and other LoRaWAN devices when the signal reception is strong enough.

   – To check LoRa signal strength:
   - Use a network tester (e.g. Adeunis ARF8123AA)
   - You can verify signal strength online in the user web interface once the LoRaWAN device has been added and configured in the **configure** tab
   - The table below can be used in both cases to estimate the signal strength

Measure	Indicator	LoRaWAN					
		SF7	SF8	SF9	SF10	SF11	SF12
RSSI – Received signal power	Poor	< -117 dBm	< -120 dBm	< -123 dBm	< -127 dBm	< -129 dBm	< -130 dBm
	Fair	< -107 dBm	< -110 dBm	< -113 dBm	< -117 dBm	< -119 dBm	< -120 dBm
	Strong	> -107 dBm	> -110 dBm	> -113 dBm	> -117 dBm	> -119 dBm	> -120 dBm
SNR - Radio link quality	Poor	< 0 dB	< -5 dB	< -8 dB	< -10 dB	< -12 dB	< -15 dB
	Fair	< 10 dB	< 5 dB	< 2 dB	< 0 dB	< -2 dB	< -5 dB
	Strong	> 10 dB	> 5 dB	> 2 dB	> 0 dB	> -2 dB	> -5 dB

3. If the signal is too weak: Move the original antenna out of the cabinet; use an RF extension cable with SMA connector (max. 2 meters) + 1 adhesive support to mount the antenna.

4. If the signal is still too weak: Install a high-gain antenna with a maximum of 10 meters of cable; this antenna can for example be used outside or in other floors to obtain a better signal quality.
5. Supported frequencies for available device types are listed in the Connect Box Data sheet (ID: A6V13605540).

Configure the protocol online

◈ Change LoRaWAN network frequency at https://connectbox.siemens.com if required. The actually available frequencies are restricted by the hardware type.

Proceed as follows for each LoRaWAN device:

1. Add the equipment at https://connectbox.siemens.com using the configuration wizard or bulk creation mode by entering the unique PAA EUI, DEV EUI and the Application Key. Choose a unique and meaningful name.
2. Save and send the configuration to the device.
3. Power on and activate the equipment: Please refer to the manufacturer's technical documentation. Please note that different activation mechanisms exist, such as NFC, and that some devices require a specific activation sequence.
4. Check online that the equipment was detected, and that data is transmitted, for example via the live data tab.

Issued by
Siemens Switzerland Ltd
Smart Infrastructure
Global Headquarters
Theilerstrasse 1a
CH-6300 Zug
+41 58 724 2424
www.siemens.com/buildingtechnologies