SIEMENS

Connect Box

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

The Connect Box is a universal and open IoT solution to connect and monitor small and medium-sized buildings

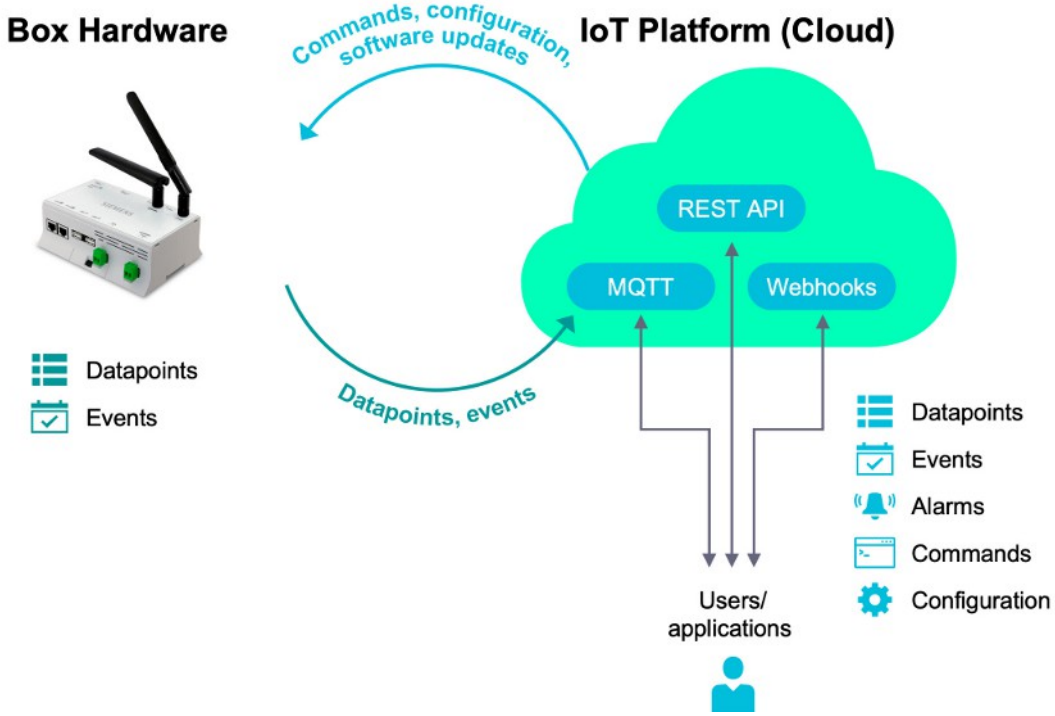
- Powerful IoT device: Combines the essential functionality of a gateway, controller, and a modem in a single device.
- Connects to a wide range of equipment in a building: Sensors and meters; heating, cooling, and air handling equipment; building automation and control systems (BACS) based on a manufacturer-agnostic devices and equipment catalog.
- Quick and easy installation: Connects to existing BACS via its bus as a third-party device. Automatically creates a new BAC system if none is available. Fully configurable remotely via a dedicated user web interface.
- Flexible (remote) monitoring, controls, and logging: Collects data and controls equipment on-premise and/or in the cloud.
- Smart protocol gateway: Unifies typical communication protocols in one device.
- Plug and play web connectivity: Automatically connects to the Internet and receives over the air updates via GSM/4G (or optionally via Ethernet).
- Integrated building management essentials: Dashboard, visualization and alarm handling functionality are available in the web interface.

Functions

The Connect Box radically lowers the effort, investment, and complexity of integrating devices and equipment to a common system and retrofitting additional functionality to optimize the building:

- Plug and play installation and configuration experience optimized for installers such as electricians
- Library of over 500 field and equipment devices ready to connect
- Smart protocol gateway supports 11 communication protocols; both standard and proprietary, wired and wireless protocols including a local IoT private network based on LoRa
- Typically retrieves equipment data at 10-minutes intervals – adjustable by user per protocol and data point
- Powerful integration of third-party applications via public APIs, MQTT or Webhooks
- User web interface to remotely configure and provide optional, but important BMS functionality for selected licenses at https://connectbox.siemens.com

The delivery consists of the Connect Box hardware, and a software license to unlock individual functionality in the IoT platform as well as the user web and machine-readable interfaces. An overview of the basic topology is shown below.



Both software types leverage the IoT platform via the user web interface at https://connectbox.siemens.com to activate, manage and configure the Connect Box and connected devices. The customer selects the required software license type based on use case; the plan can be changed remotely at a later time during the product life cycle.

Type summary

NOTICE	
!	**LoRaWAN and GSM frequency band restrictions** The use of LoRaWAN and GSM frequencies may be restricted in your region: ● Verify compatibility with local LoRaWAN and GSM frequency bands when selecting the hardware type for your region – refer to Technical data [▷ 6] for details. ● Products using wireless technology are subject to international and national approvals – do not import and operate in regions where required approvals are not obtained.

Type	Order number	Details
CWG.BOX-EU	S55813-Y100	Connect Box Hardware for EMEA and selected regions
CWG.BOX-NA	S55813-Y110	Connect Box Hardware for North America, incl. Australia, New Zealand and selected Asian regions
CWG.BOX-A	S55813-Y120	Connect Box Hardware for Asia

Software

A software license is required to activate Connect Box. See Connect Box Product and Service Data Sheet for details and available options, available at https://siemens.com/bt/download → ID: **A6V13605416**.

Additional material (not provided with the hardware)

- Power supply: DC 24 V ±10%, min. 2 A

The following power supply is available from Siemens:

Manufacturer	Type	Detail
Siemens	6EP3332-6SB00-0AY0	Power supply DC 24 V / 2.5 A

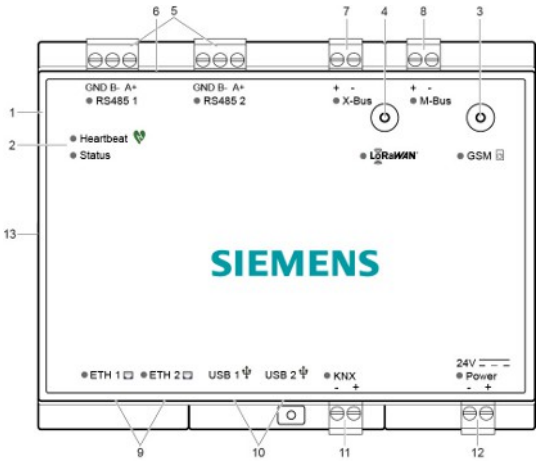
Optional hardware and additional material (not provided with the hardware)

The optional hardware depends on connection type and protocol:

- Bus connection cable: 2 wires, minimum cross section 0.22 mm^2 / AWG 24, braided
- Power supply cable: 2 wires (red, black), 0.35 mm^2 / AWG 22
- Ethernet cables
- Ethernet switch
- LoRaWAN network tester (e.g. Adeunis ARF8123AA)
- High-gain external GSM antenna (e.g. Siretta Oscar 40)
- High-gain external LoRaWAN antenna (e.g. EAD WMO86916)

Siemens may not provide all listed optional hardware and additional material directly.

Technical and mechanical design



1	Plastic housing
2	Heartbeat and status LEDs
3	GSM antenna
4	LoRaWAN antenna
5	Plug-in terminal block with screw terminals RS485 1 / RS485 2 (e.g. Modbus RTU)
6	USB micro socket (used for maintenance only)
7	Plug-in terminal block with screw terminals LPB
8	Plug-in terminal block with screw terminals M-Bus
9	Ethernet socket 1 and 2 (e.g. BACnet IP, Modbus TCP)
10	USB socket 1 and 2 (e.g. LON/IP)
11	Plug-in terminal block with screw terminals KNX
12	Plug-in terminal block with screw terminals Power supply
13	Notch for mounting on DIN rails

LED displays

	LED	Color	Activity	Function
● Heartbeat	Heartbeat	Green	Continuously OFF Flashing	No "heartbeat", device not operational "Heartbeat" OK, device operational
● Status	Status	-	LED currently not used	-
● GSM	GSM antenna	Green	Continuously ON Flashing 1.2 s Flashing 0.4 s	GSM active Connected Communicating
● LoRaWAN	LoRaWAN antenna	-	LED currently not used	-
● RS485 1 ● RS485 2	RS485 1/2	Yellow	Continuously ON Continuously OFF	Communication No communication to subsystem
● X-Bus	X-bus	Yellow	Continuously ON Continuously OFF	Communication No communication to subsystem
● M-Bus	M-Bus	Yellow	Continuously ON Continuously OFF	Communication No communication to subsystem
● ETH 1 ● ETH 2	Ethernet 1/2	Yellow	Continuously ON Continuously ON	Link active No connection
● KNX	KNX	Green	Continuously ON Continuously OFF	Communication No communication to subsystem
● Power	Power supply	Green	Continuously ON Continuously OFF	Power supply OK Power supply faulty or incompatible

Product documentation

Related documents such as the environmental declarations, CE declarations, etc., can be downloaded from https://siemens.com/bt/download.

Notes

Safety

⚠ CAUTION	
	**National safety regulations** Failure to comply with national safety regulations may result in personal injury and property damage. ● Observe national laws and comply with the appropriate safety regulations.

Mounting

The Connect Box can be snapped onto standard DIN rails or screwed onto the wall. Use 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.

Installation

⚠ WARNING	
	**Risk of electric shock!** Incorrect installation of the device may lead to injuries from electric shock when touching the device! ● Install the device in a secured cabinet or use terminal covers. ● Do not install the device in locations where children are likely to be present. ● Conductors with a cross section of 0.21 mm^2 (AWG 24) or greater must meet requirements per IEC 60332-1-2 and IEC 60332-1-3 or IEC TS 60695-11-21.

NOTICE	
!	**Radio frequency energy** Interference to radio communications ● Install and use equipment in accordance with installation guide. ● Read all regulatory compliance information.

Disposal

	The device is considered an electronic device for disposal in accordance with European Directive and may not be disposed of as domestic waste. ● Use only designated channels for disposing the devices. ● Comply with all local and currently applicable laws and regulations. ● Dispose of empty batteries at designated collection points.

Technical data

Power supply specification (not provided with the hardware)

Power supply	
Input	DC 24 V ±10 %, min. 2 A
Internal protection of Connect Box	LED indicator – protection against overvoltage, undervoltage, and overcurrent from the power supply

Function data

Hardware information	
Processor	ARM Cortex A7, 528 MHz
Operating system	Linux
Data storage	512 MB RAM 4 GB Flash

Interfaces

Ethernet interface	
Plug	2 x RJ45, shielded
Interface type	10Base-T / 100Base-TX, IEEE 802.3 compatible
Bit rate	10/100 Mbps, autosensing
Protocol	BACnet/IP on UDP/IP, TCP/IP, and HTTPS on TCP/IP
Cabling (in-house cabling only), cable type	10 Mbps: Min. CAT3, shielded cable is recommended 100 Mbps: Min. CAT5, shielded cable is recommended
Cable length	Max. 100 m (330 ft)

Modbus RTU interface	
Physical interface	RS-485-1 RS-485-2
Interface type	EIA-485, not isolated
Baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200 (depending on the configuration)
Bus termination	Configurable by software
Internal bus polarization	No
Cabling (in-house cabling only) Cable length	3-wire braided cable, shielded cable recommended (shield must be connected to building earth in the mounting panel) Max. 500 m (1640 ft) at 38400 bauds; Max. 1000 m (3281 ft) at 19200 bauds
Wire size	Rigid conductor: 0.2...1.5 mm^2 / AWG 24...16
	Flexible conductor: 0.75...1.5 mm^2 / AWG 19...16
	Flexible conductor with ferrule: 0.25...1.0 mm^2 / AWG 23...17
Protection	Short-circuit protection with resettable fuse -7 V to +12 V common-mode 15 V overvoltage protection
System limits	Max. 31 devices per interface

M-Bus interface (primary)	
Interface type	M-Bus manager according to EN 13757 for max. 10 mA, galvanically isolated
Baud rate	300, 600, 1200, 2400, 4800, 9600 (depending on the configuration)
Cabling (in-house cabling only) Cable length	2-wire cable, 0.5 mm^2 / AWG 20 Max. 100 m (330 ft)
Bus power	Min. 24 V Max. 42 V
Bus supply current	Max. 10 mA
Number of M-Bus devices	Max. 3 unit loads With an additional M-Bus converter connected to the M-Bus interface, more devices can be powered.
Protection	Short-circuit proof Protection against faulty wiring with DC 24 V

KNX interface	
Type	KNX TP1 PL-Link, no galvanic isolation Baud rate: 9600 bauds
Cabling (in-house cabling only)	2-wire cable, 0.5 mm^2 / AWG 20 or 0.8 mm^2 / AWG 18
Bus current	5 mA - external KNX bus power supply required

USB interface	
Plug	Type A (USB device)
Data rate (USB 2.0 full speed)	12 Mbps
Protective switch against surges and over current	Yes
Galvanic isolation of system neutral ⊥	No

Cellular interface		
Interface type	Cellular 3G / 4G CAT1	
Supported standards Frequency band and antenna gain Maximum radio-frequency power	CWG.BOX-EU CWG.BOX-NA	GSM850 33 dBm EGSM900 33 dBm DCS1800 30 dBm PCS1900 30 dBm GSM850 (8-PSK) 27 dBm

Cellular interface		
		EGSM900 (8-PSK) 27 dBm DCS1800 (8-PSK) 26 dBm PCS1900 (8-PSK) 26 dBm WCDMA B1-2-5-8 24 dBm LTE-FDD B1-3-4-5-7-8-12-13-18-19-20-26-38-40-41 23 dBm Rx sensitivity -110 dBm 698~960MHz 1.0~5.0 dBi 1710~2690MHz -1.0~3.8 dBi
	CWG.BOX-A	-
Antenna type	Omnidirectional rubber antenna with SMA connector	
Typical impedance	50 Ohm	

LoRaWAN interface		
Interface type	Long range wide area network (LoRaWAN) 1.0	
Supported standards Frequency band and antenna gain Maximum radio-frequency power	LoRa 868 or 915 From 863 to 870 MHz 3.56dBi or 902 to 928 MHz 4.51 dBi Tx power up to 27dBm Rx sensitivity -139dBm@SF12, BW 125 kHz	
Supported frequency bands	CWG.BOX-EU CWG.BOX-A	**Europe - EU_863_870** All SF5 to SF12 Uplink: 868.10 MHz, 868.30 MHz, 868.50 MHz, 867.10 MHz, 867.30 MHz, 867.50 MHz, 867.70 MHz, 867.90 MHz Downlink: 869.525 MHz **India - IN_865_870** All SF5 to SF12 Uplink: 865.0625 MHz, 865.4025 MHz, 865.985 MHz Downlink: 866.550 MHz
	CWG.BOX-NA	**Asia - AS_923_1** All SF5 to SF12 Uplink: 923.20 MHz, 923.40 MHz, 923.60 MHz, 923.80 MHz, 924.00 MHz, 924.20 MHz, 924.40 MHz, 924.60 MHz Downlink: 923.2 MHz **Asia - AS_923_2** All SF5 to SF12 Uplink: 921.40 MHz, 921.60 MHz, 921.80 MHz, 922.00 MHz, 922.20 MHz, 922.40 MHz, 922.60 MHz, 922.80 MHz Downlink: 921.4 MHz **Australia - AU_915_928** All SF5 to SF12 Uplink: 916.8 MHz, 917.0 MHz, 917.2 MHz, 917.4 MHz, 917.6 MHz, 917.8 MHz, 918.0 MHz, 918.2 MHz Downlink: 923.3 MHz **US - US_902_928** All SF5 to SF12 Uplink (sub-band 2): 903.90 MHz, 904.10 MHz, 904.30 MHz, 904.50 MHz, 904.70 MHz, 904.90 MHz, 905.10 MHz, 905.30 MHz Downlink: 923.3 MHz
Antenna type	Omnidirectional rubber antenna with SMA connector	
Typical impedance	50 Ohm	

Availability of frequencies depends on the hardware version. The product requires wireless approval testing and documentation. Do not use in countries where the respective approval has not been obtained and the product has not been released by Siemens.

Screw terminals, plug-in	
Cu-wire or Cu-strand with wire end sleeve	1 x 0.6 mm Ø to 2.5 mm^2 (AWG 22... 14) or 2 x 0.6 mm Ø to 1.0 mm^2 (AWG 22...18)
Cu-strand without wire end sleeve	1 x 0.6 mm Ø to 2.5 mm^2 (AWG 22... 14) or 2 x 0.6 mm Ø to 1.5 mm^2 (AWG 22...16)
Stripping length	6...7.5 mm (0.24...0.29 in)
Screwdriver	Slot screws, screwdriver size 1 with shaft ø = 3 mm
Max. tightening torque	0.6 Nm (0.44 lb ft)

Interface and protocol drivers

Interface and protocol drivers need to be enabled and configured via the user web interface before use. General technical and system limits apply as indicated below. Additional limits might apply based on the limitations of chosen software and connected equipment – please consult the manufacturer for further guidance.

Protocols and system limits	
BACnet IP (client)	Device limitations as per general BACnet system limitations and connected network
BACnet IP server / gateway	*Important: BACnet IP client and BACnet gateway / server cannot run at the same time*
Diematic	Max. 31 devices per interface *Important: Use RS485 terminal*
KNX S and LTE	Device limitations as per general KNX system limitations *KNX S and LTE mode cannot run at the same time*
LPB	Max. 15 devices *Important: Use X-Bus terminal*
LoRaWAN 1.0 Local private	Max. 500 devices *Important: Supported frequency bands depend on version, see above*
M-Bus	Max. 3 devices
Modbus RTU	Max. 31 devices per interface *Important: Use RS485 terminal*
Modbus TCP/IP client	Device limitations as per general Modbus TCP/IP system limitations of connected bus
Modbus TCP/IP gateway / server	-

Ambient conditions and protection classification	
Classification as per EN 60730 Automatic action Control function Degree of pollution Overvoltage category	 Type 1 Class A 2 I
Protection against electric shock	Protection class III
Degree of protection of housing to EN 60529	IP2X
Climatic ambient conditions ● Storage / Transport (packaged for transport) as per IEC EN 60721-3-2 ● Operation as per IEC/EN 60721-3-3	 ● Class 1K22 / 2K12 Temperature -20...85 °C (-4...185 °F) ● Class 3K23 Operation in enclosed dry locations, having no temperature or humidity control Temperature 0...40 °C (32...104 °F)
Mechanical ambient conditions ● Transport per IEC/EN 60721-3-2 ● Operation as per IEC/EN 60721-3-3	 ● Class 2M4 ● Class 3M11

Standards, directives and approvals	
Product standards	IEC/EN 62368-1 – Information Technology Equipment
Electromagnetic compatibility (EMC)	For residential, commercial, and industrial environments
EU conformity (CE)	See CE declaration [1)]
UKCA conformity	See UKCA declaration [1)]
RCM conformity	See RCM declaration [1)]
ISED	CAN ICES-003. Contains: ● IC: 23761-8PYA009 (cellular module) ● IC: 25908-RAK5146 (LoRa module)
FCC	2A2KQ-WSGW1. Contains: ● FCC ID: 2AJYU-8PYA008 (cellular module) ● FCC ID: 2AF6B-RAK5146 (LoRa module)
Environmental compatibility [1)]	The product environmental declaration [1)] contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal).

[1)] Documents can be downloaded from https://siemens.com/bt/download.

European Union conformity

Contact for regulatory topics: (EU) Siemens AG, Berliner Ring 23, DE-76437 Rastatt

United Kingdom conformity assessed

Contact for regulatory topics: (GB) Siemens plc, Sir William Siemens House, Princess Road, Manchester, M20 2UR

Compliance with FCC regulations requires exact antenna mounting positions – please refer to section Mounting [▸ 14].

FCC Statement

Changes or modifications not expressly approved by Siemens Switzerland Ltd. could void user authority to operate the equipment. United States representative: https://new.siemens.com/us/en/products/buildingtechnologies/home.html

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This

equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation

Cellular RF information

- This device contains a cellular RF module with FCC ID: 2AJYU-8PYA008
- This device contains a cellular RF module with IC: 23761-8PYA009

FCC Caution:

- This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.
- Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cellular antenna characteristics

The cellular antenna delivered by Siemens meets the FCC-IC regulations. If the installer makes the choice to use another antenna, it must follow the specifications listed below for the device used to comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation.

- Whip antenna type
- 50 Ohm typical impedance

The following table shows the maximum permissible antenna gain for each frequency band.

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

Frequency band	Antenna gain (dBi)
LTE Band25	10
LTE Band26	8
LTE Band41	9
LTE Band66	9

LoRaWAN RF

- This device contains a LoRaWAN RF module with FCC ID: 2AF6B-RAK5146
- This device contains a LoRaWAN RF module with IC: 25908-RAK5146

FCC Warning:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions.

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This module complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

The LoRaWAN antenna delivered by Siemens meets the FCC-IC regulations. If the installer makes the choice to use another antenna, the maximum antenna gain allowed is 5.8 dBi to comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation.

CAN ICES-003 Compliance

This device complies with FCC and ISED RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This radio transmitter (23761-8PYA005 and 25908-RAK5146) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s license-exempt RSS(s). Operation is subject to the following two conditions:

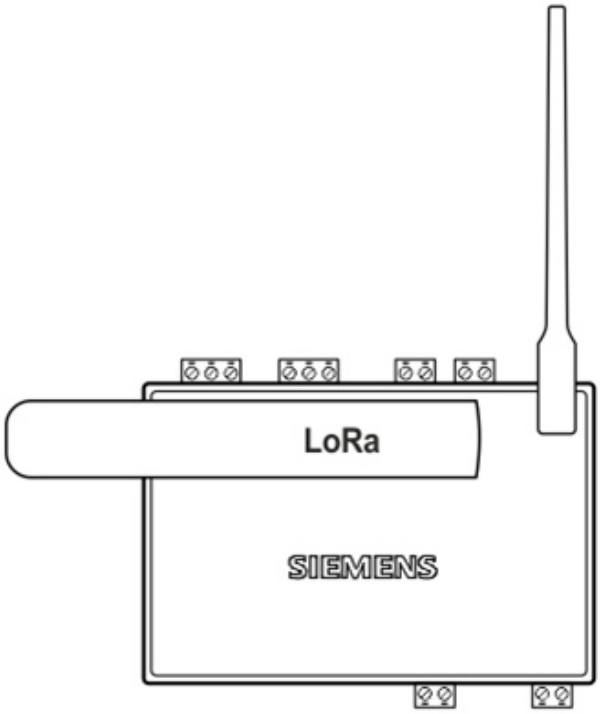
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

LoRaWAN antenna characteristics

- Whip antenna type
- 50 Ohm typical impedance
- Gain: 5.8 dB

Mounting

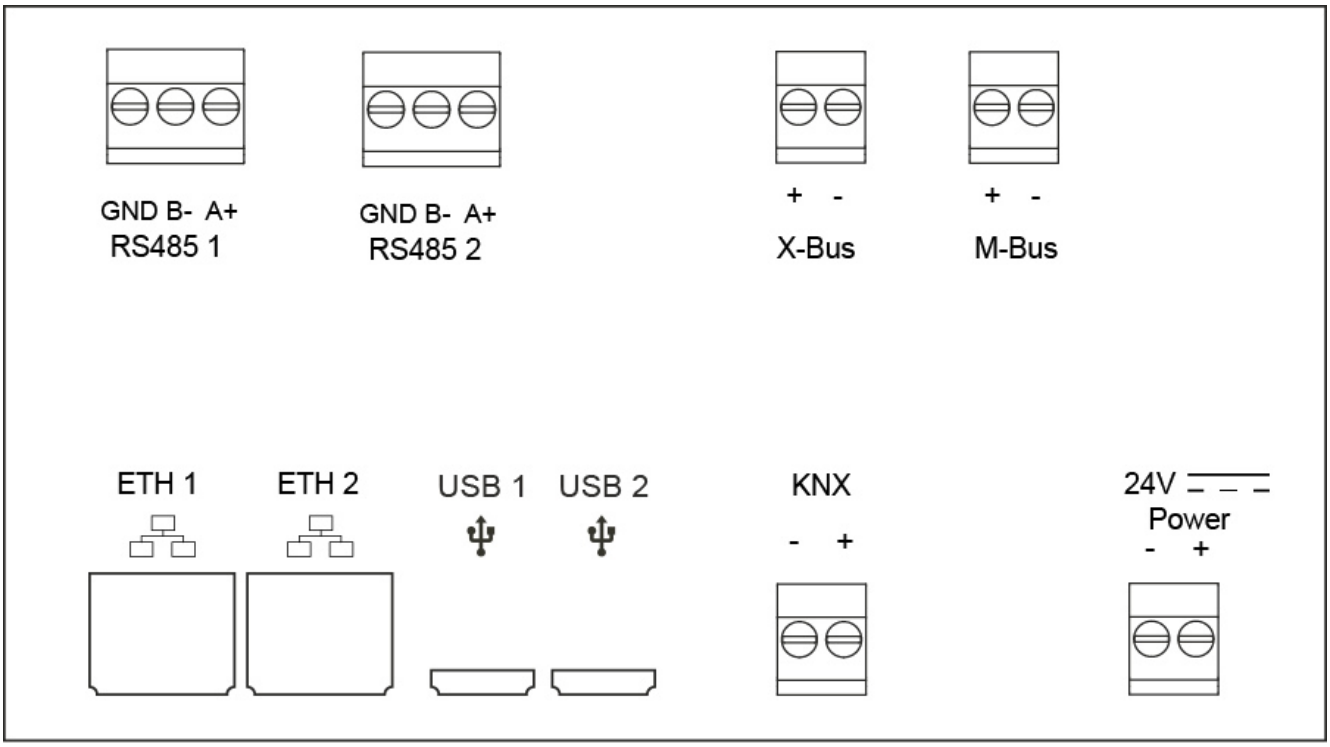
The recommended antenna mounting position is shown in the diagram below. The outlined antenna position is mandatory for FCC & IC compliance - please ensure installation accordingly in respective markets.



Housing

Housing	
Color	Grey
Dimensions	DIN 43880, see Dimensions [▷ 16]
Weight without/with packaging	350 g - 385 g with antenna

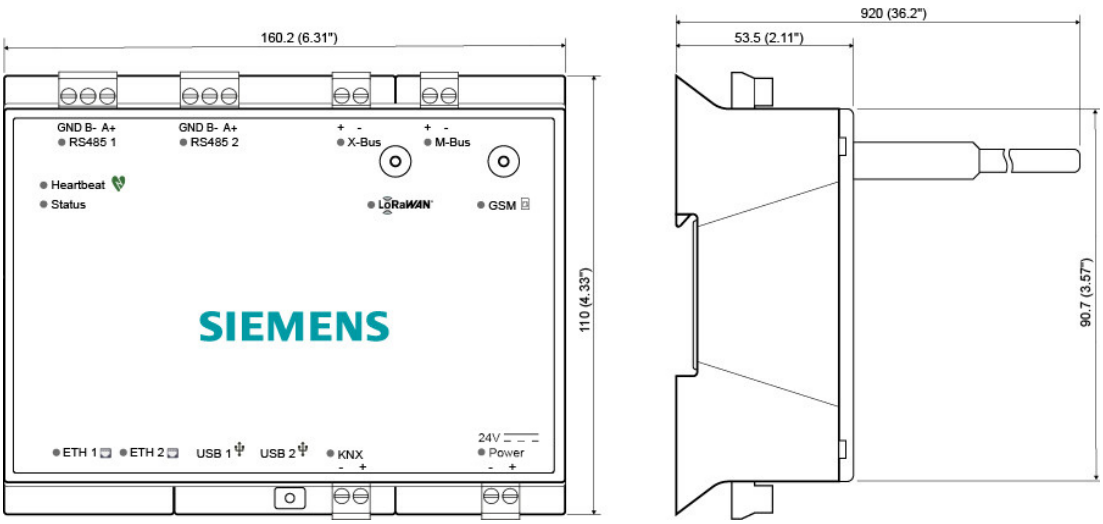
Connection terminals and interfaces



Symbol	Description
RS-485 1 RS-485 2	2 x EIA-485 interface (Modbus RTU)
X-Bus	X-bus interface for LPB
M-Bus	M-Bus interface
ETH 1 ETH 2	2 x RJ45 interface for Ethernet
USB 1 USB 2	2 x USB 2.0 interface
KNX	KNX interface
Power	DC 24 V power input

Dimensions

All dimensions in mm and inches.



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