THORSTEN REIBEL & JUERGEN SCHILDER

Modbus RTU – KNX TP Gateway MG/S 11.100.1.1

Building Academy Smart Buildings

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Agenda

- Product overview

- Commissioning – ETS Parameter settings, Device Configuration App DCA, …

- Commissioning examples – ABB EQ Energy Meters and ABB Terra AC Wallbox

- Practical demonstration

- Troubleshooting

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Product overview

Modbus RTU – KNX TP Gateway MG/S

Today's situation

- Modbus RTU is found in multiple devices in a wide variety of applications
  - Metering
  - HVAC
  - EV charging
  - Room control
  - …
- It is common to find Modbus devices in the same project where KNX is installed
- The Modbus RTU – KNX TP Gateway MG/S allows to integrate Modbus devices into a KNX installation quickly and easily <u>at the field level</u>

Some examples:

Metering
Collecting metering data from devices into a KNX visualization/display panel
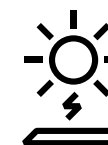
HVAC
Exchanging set points or adjusting fan speeds from KNX sensors to a ventilation unit

Hospitality
Integration of typical room Modbus devices, such as a bedside panel, room thermostat, etc.

Others
Simple data integration to solar, EV charging equipment, etc.

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Modbus RTU – KNX TP Gateway MG/S

General Modbus RTU/RS-485 information

- **Modbus RTU** (Remote Terminal Unit) is a serial communication protocol that was developed for PLC (program. logic controllers)

- It is a communication method for the transmission of information via serial cables between devices

- Modbus has become a de facto standard communication protocol

- The device that requests the information is named the <u>client</u> and the devices which send information are <u>servers</u>

- In a standard Modbus RTU network, there is one client and several servers each with a unique server address

- The cable topology for the Modbus RTU is a purely linear structure

- More information: www.modbus.org

- Furthermore, there is also **Modbus TCP** (based on Ethernet)
It is used, for example, by the Energy Analyzer QA/S to forward data to a higher level (SCADA, BMS, …)

- Another communication protocol is **M-Bus** – do nit mix it up!

Client
A B C

EOL resistor
120 Ohm

EOL resistor
120 Ohm

Server   Server   Server
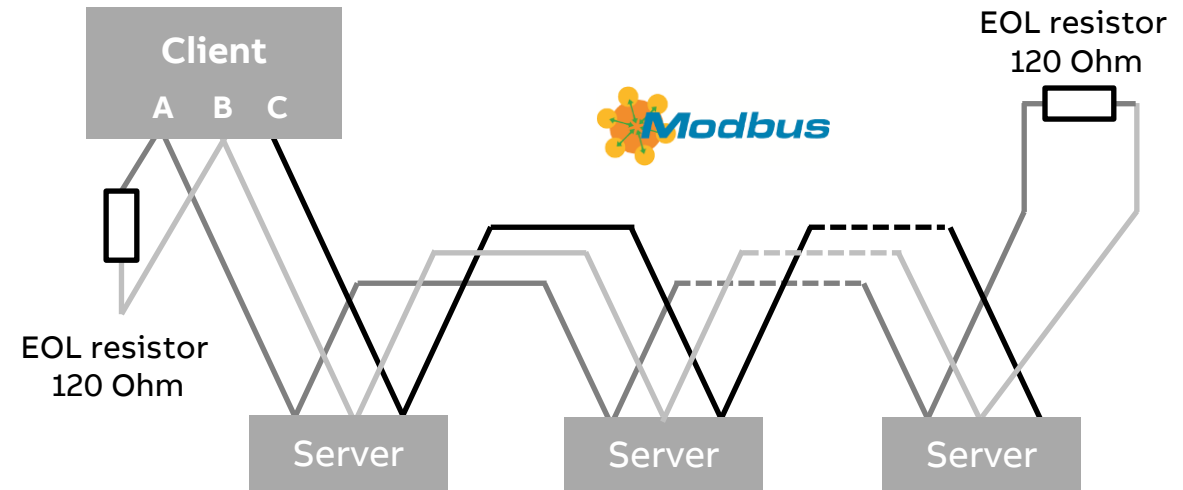
Modbus RTU – KNX TP Gateway MG/S

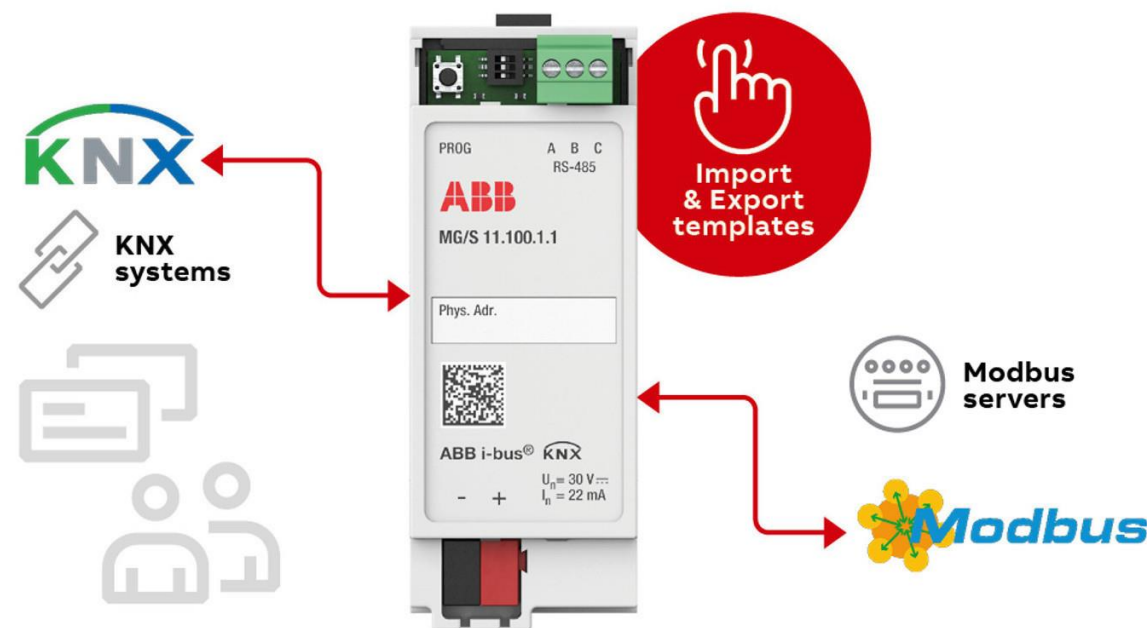**General Modbus RTU/RS-485 information**

- Modbus uses the RS-485 standard

- This standard defines the physical layer of the Modbus interface

- The data are transmitted in serial form via a 2-wire bus (RS-485)

- The termination resistors (EOL) prevent reflections at the end of the cable

- Transmission speed: 1,200; 2,400; 4,800; 9,600; 19,200; 38,400; 57,600; 115,200 baud

- The RS-485 standard is based on the client-server method and defines the bus cable as a cable with a start and an end that are each terminated using an EOL resistor RT (T=Termination)

- The number of Modbus devices depends on the unit load (UL) of the RS-485 transceivers. In the worst case, a transceiver has 1 UL. An RS-485 segment is specified for 32 UL. If more devices are connected, a repeater must be used. Modern RS-485 transceivers have 1/4 or 1/8 UL. If only such devices are used, 128 or 256 devices are possible without repeaters.
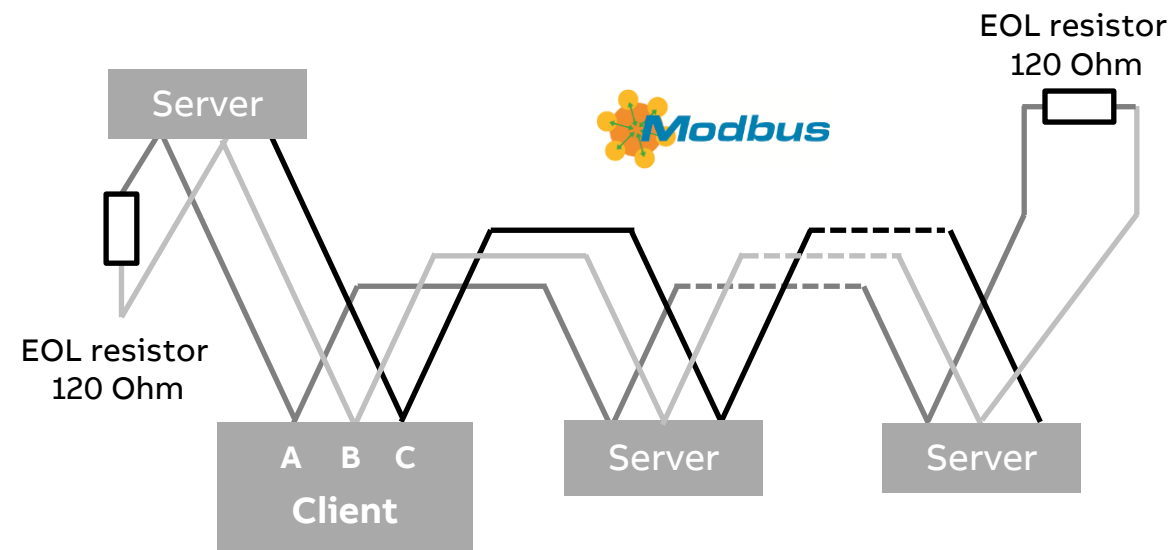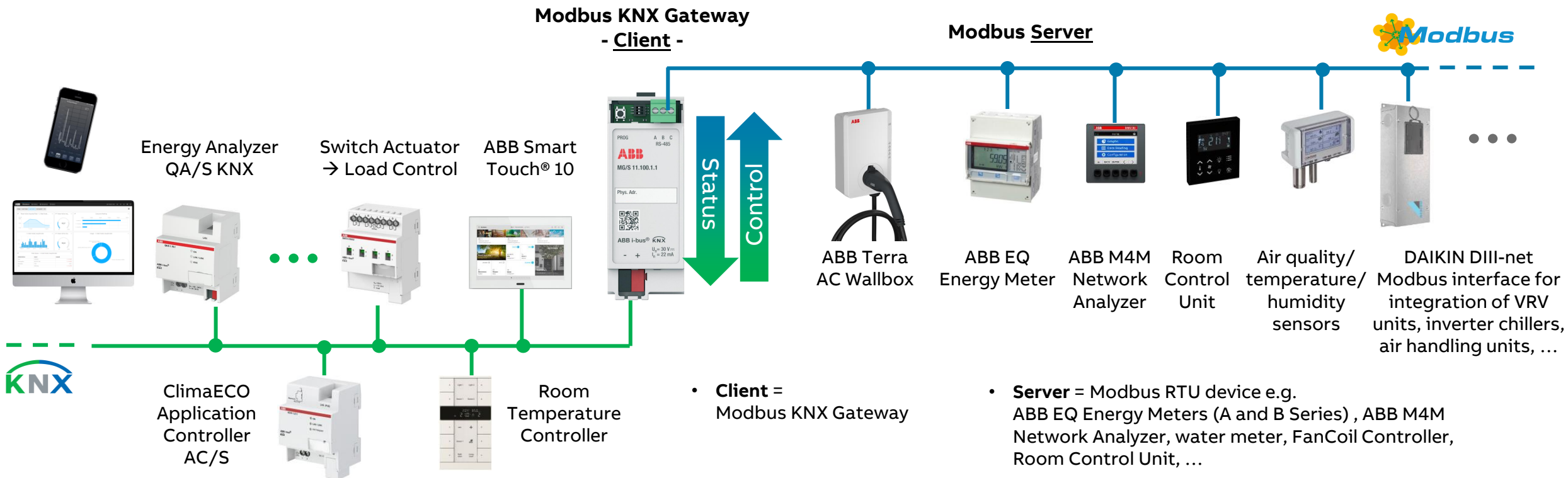
Modbus RTU – KNX TP Gateway MG/S

Device functions

- The Modbus KNX Gateway works as a Modbus RTU client and makes it easy to integrate Modbus devices (server) via RS-485 into a KNX system

- This way, the KNX system perceives the entire Modbus installation as if it were another KNX device of the system

- The gateway is a compact modular installation device

- The Modbus KNX Gateway is a bidirectional gateway with 100 freely configurable data points

  - For this purpose, the gateway continuously polls the Modbus devices and assigns the Modbus data points to the KNX group objects

  - Furthermore, commands are sent from KNX to Modbus

- Modbus-KNX mapping templates are available for download from a database
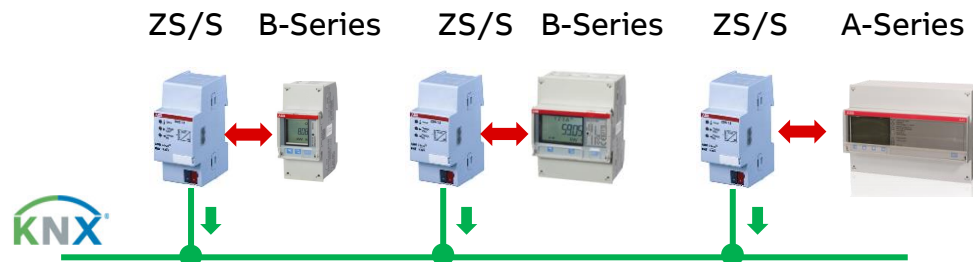
Modbus RTU – KNX TP Gateway MG/S

System Overview

- **Client** = Modbus KNX Gateway

- **Server** = Modbus RTU device e.g. ABB EQ Energy Meters (A and B Series) , ABB M4M Network Analyzer, water meter, FanCoil Controller, Room Control Unit, …

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Modbus RTU – KNX TP Gateway MG/S

KNX Meter Interface Module ZS/S

- The Meter Interface Module receives data and values from energy meters and sends them to KNX

- The device is equipped with an infrared interface for connecting ABB Energy Meters of the A- and B-series

- One Meter Interface Module is required for each meter without communication interface
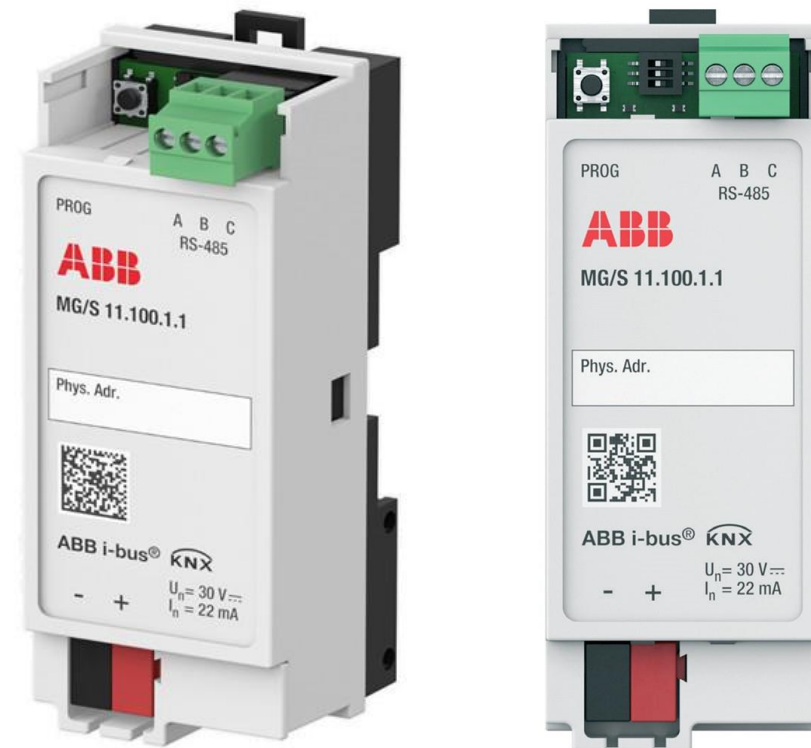
Modbus RTU – KNX TP Gateway MG/S

- The Modbus KNX Gateway is a bidirectional gateway

- 100 freely configurable data points (read, write or read/write)

- Several meters/analyzer/… and only one gateway

- Only for Modbus devices (not for M-Bus)

ZS/S   B-Series   ZS/S   B-Series   ZS/S   A-Series

NEW !!!

Modbus RTU – KNX TP Gateway MG/S

Product overview

- The gateway is a modular installation device (MDRC)
- It is designed for installation in electrical distribution boards and small housings with a 35 mm mounting rail (to EN 60715)
- The device is powered via KNX and requires no additional auxiliary voltage
- The device connects to KNX via a bus connection terminal on the front of the housing
- The "Engineering Tool Software" (ETS) is used for individual address assignment, parameterization and download
- To facilitate configuration, a free of charge DCA is available that allows the export and import of Modbus-KNX mappings in the form of templates
- List of ABB templates → Link

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Modbus RTU – KNX TP Gateway MG/S

Templates (*.knxmbr)

- List of ABB templates → Link
  - ABB Energy Meters B23/B24
  - ABB Terra AC Wallbox
  - ABB Energy Meters A43/A44
  - ABB Energy Meters B21
  - ABB Network Analyzer M1M (series 15, 20 and 30)
  - ABB Network Analyzer M4M (series20 and 30)
  - Eaton
  - Mitsubishi
  - … and more will follow
- Video tutorials
  - How to do the mapping if no template is available → Link
  - How to import a mapping template → Link
  - How to know if a mapping template is available → Link

Modbus RTU – KNX TP Gateway MG/S

Product overview

Ordering details

- Description: Modbus RTU – KNX TP Gateway 100 Points

- Type: MG/S 11.100.1.1

- Order no.: 2CDG120089R0011

Scope of delivery

The device is supplied together with the following components:

- Modbus RTU – KNX TP Gateway MG/S 11.100.1.1
  Individual address: 15.15.255

- Installation and operating instructions
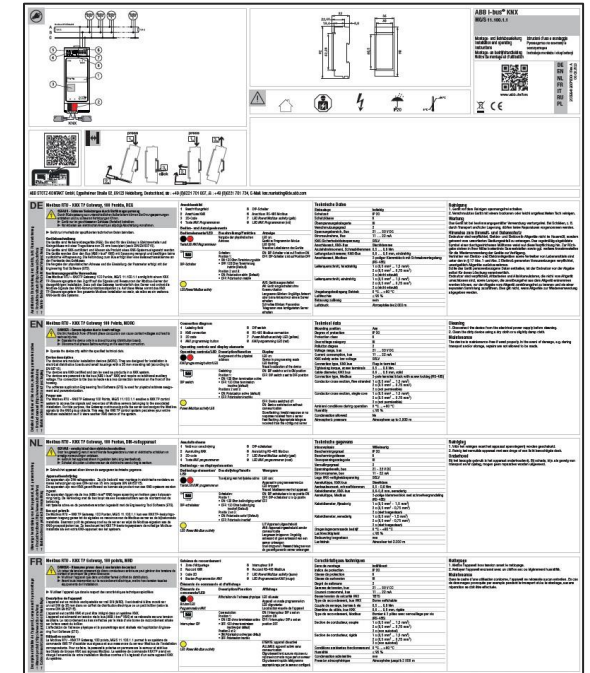
Modbus RTU – KNX TP Gateway MG/S

Product overview

Technical data

- Connections
  - RS-485 Modbus (3-pole terminal block)
  - KNX (bus connection terminal)
- Dimensions: 92 x 36 x 32 mm (H x W x D)
- Mounting width in space units: 2 modules, 18 mm each
- Mounting variant: 35 mm mounting rail
- Current consumption KNX: **max. 22 mA**
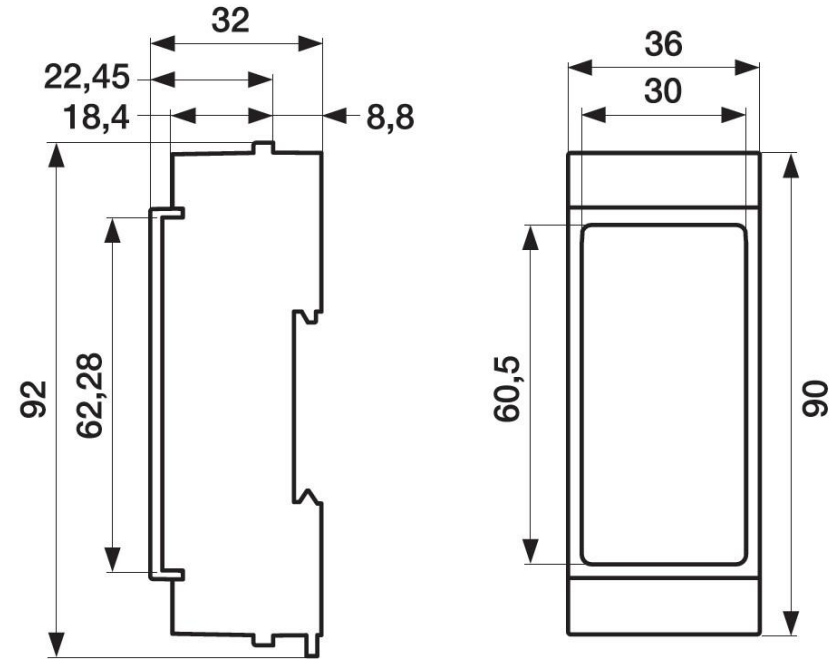
Modbus RTU – KNX TP Gateway MG/S

Product overview

Legend and connection diagram

1. Labeling field
2. KNX connection
3. 2D code
4. KNX programming button
5. DIP switch
6. RS-485 Modbus connection *
7. Power/Modbus activity LED (yellow)
8. KNX programming LED (red)

* Note
With some devices, the data lines "A" and "B" must be swapped, e.g. ABB EQ Energy Meters A- and B-Series

Modbus RTU – KNX TP Gateway MG/S

Product overview – Operating controls and display elements

KNX button
DIP switch
KNX LED
Modbus LED

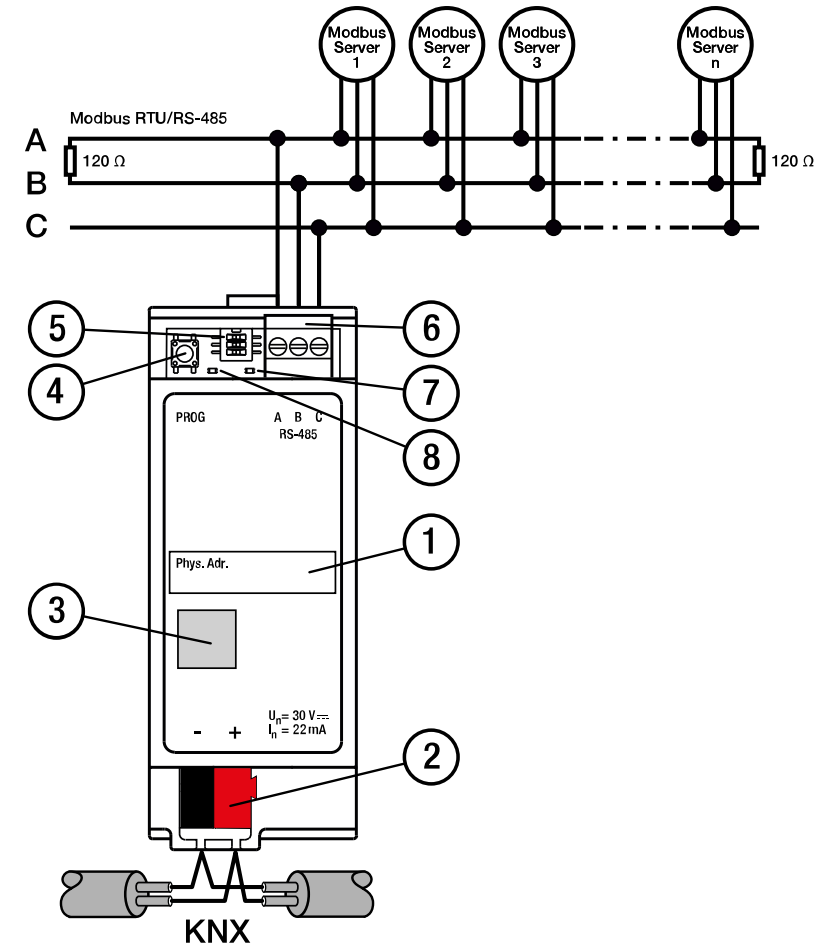| Operating control/LED	Description/function	Display
KNX programming button/LED	Assignment of the individual KNX address	LED ON: Device in KNX programming mode
DIP switch	Position 1: • ON: 120 Ohm termination active • OFF: 120 Ohm termination inactive Positions 2 and 3: • ON: Polarization active (default) • OFF: Polarization inactive	• ON: DIP switch x set to ON position • OFF: DIP switch x set to OFF position
Power/Modbus activity LED		• OFF: No KNX voltage, not ready for operation • ON: Device is ready for operation and without communication • Slow flashing: Invalid response or no response received from a Modbus device • Fast flashing: Valid telegram received from the configured Modbus device
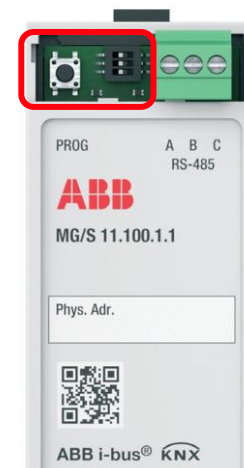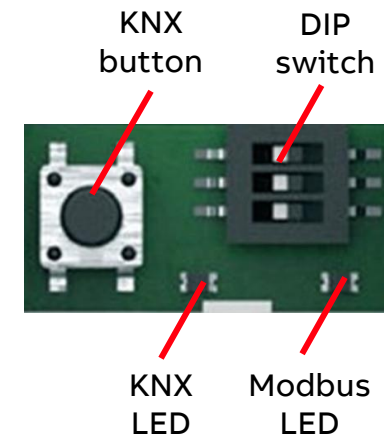
Modbus RTU – KNX TP Gateway MG/S

Product overview – Connection diagram

- The Modbus/RS485 guidelines and standards must be observed (topology, termination resistor,…) → www.Modbus.org
- With some devices, the data lines "A" and "B" must be swapped, e.g. ABB EQ Energy Meters A- and B-Series

120 Ohm

Termination resistor at the end of the line

A B C
RS-485
Modbus connection

DIP switch Position 1 "**ON**":
Internal 120 Ohm terminating is activated
→ Termination resistor at the beginning of the line

C B A

A B C

ABB EQ Energy Meter B21-112-100:
The data lines "A" and "B" must be swapped

ABB Terra AC Wallbox
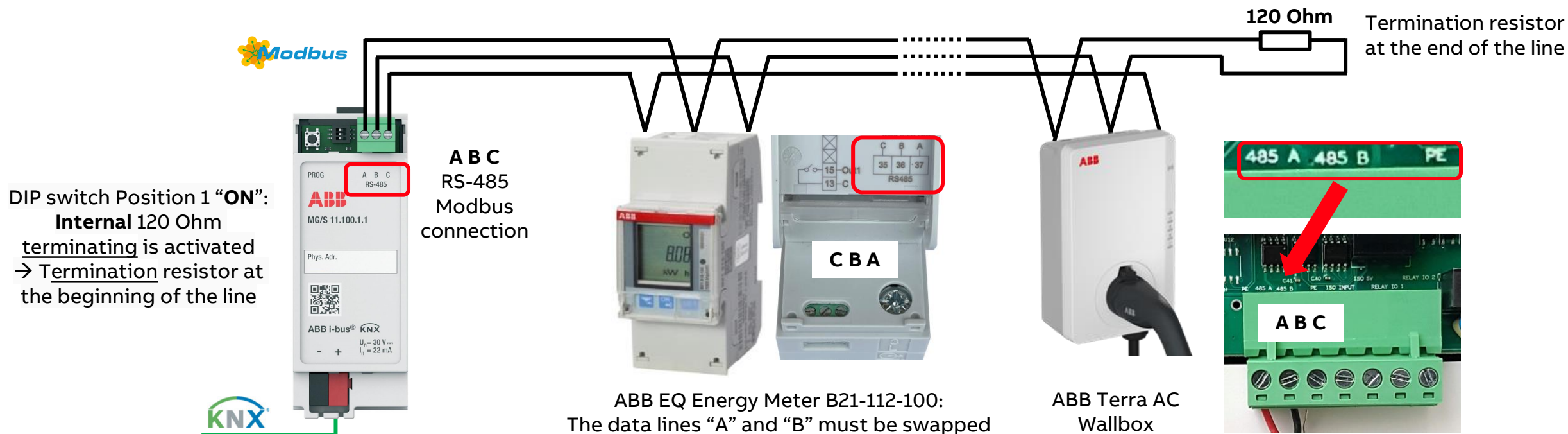
Modbus RTU – KNX TP Gateway MG/S

Product overview – Interfaces

- KNX interface
  - Max. number of group objects: 205
  - 100 status group objects
  - 100 control group objects
  - 4 error status group objects
  - 1 optional group object for "In Operation"
- Modbus interface
  - Max. number of Modbus addresses: 254
  - Max. number of data points (read, write or read/write): <u>100</u>
  - Max. number of Modbus devices supported: 100

<u>Note:</u>
The number of supported Modbus devices depends directly on the maximum number of 100 data points and is therefore limited to 100 devices

Modbus device	data points read	data points write	data points read/write	data points total
No. 1	12	0	2	14
No. 2	17	0	0	17
No. 21	0	20	5	25
No. 78	8	4	8	20
No. …	0	7	0	7
				<u>**83**</u>

<u>Example:</u>
- There are <u>**83**</u> data points in total
- The gateway could therefore support another X Modbus devices with total 17 data points

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Modbus RTU – KNX TP Gateway MG/S

Mounting and installation

- The device can be mounted in any position as required on a 35 mm mounting rail

- Place the mounting rail holder on the upper edge of the mounting rail and push down

- Pull down the lower latching lever with the aid of a screwdriver or similar tool

- Push the lower part of the device toward the mounting rail and let the latching lever return to its original position until the mounting rail holder engages
  → The device is now mounted on the mounting rail

- To release the device, pull down the latching lever with the aid of a screwdriver, lift the device up and off the mounting rail

press

1.

2.

3.

click

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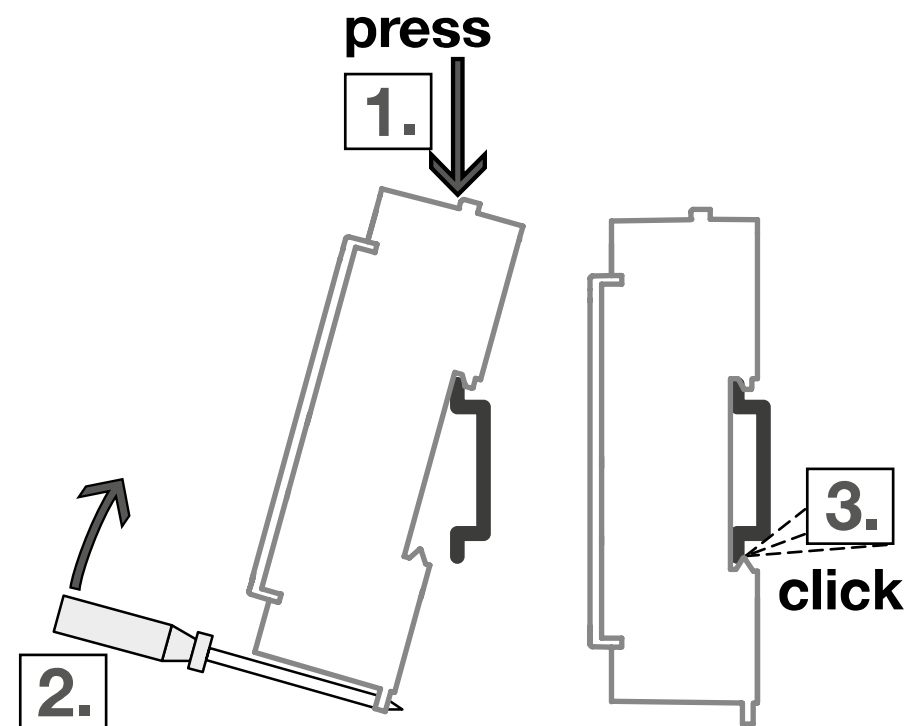
Commissioning

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Requirements

- ETS version: 5.7.7 / ETS 6 or higher
- ETS Application (knxprod-file)
  - www.abb.com/knx → System Infrastructure and Interfacing
- ETS Device Configuration App "ABB MGS Template Configuration" (recommended)
  - For import of ready-made device templates, e.g. ABB EQ Energy Meters or ABB Terra AC Wallbox
  - KNX Online Shop my.knx.org (free of charge)
  - www.abb.com/knx → System Infrastructure and Interfacing
- The Modbus devices are connected and configured, e.g. speed, address, parity, …
- Using an KNX interface that supports "long frames" (e.g. USB/S 1.2 or IPR/S 3.5.1) can significantly shorten the download time

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

- For easy configuration, the DCA "ABB MGS Template Configuration" is recommended

- The DCA can be used to import ready-made device templates from a database

- With this DCA, the mapping of the Modbus KNX data points of a device can be exported as a reusable device template
  → Create your own device templates

- A firmware update can be performed with the DCA

- The DCA is available for download from the

  - KNX Online Shop my.knx.org (free of charge)

  - www.abb.com/knx → System Infrastructure and Interfacing
    → Gateway MG/S
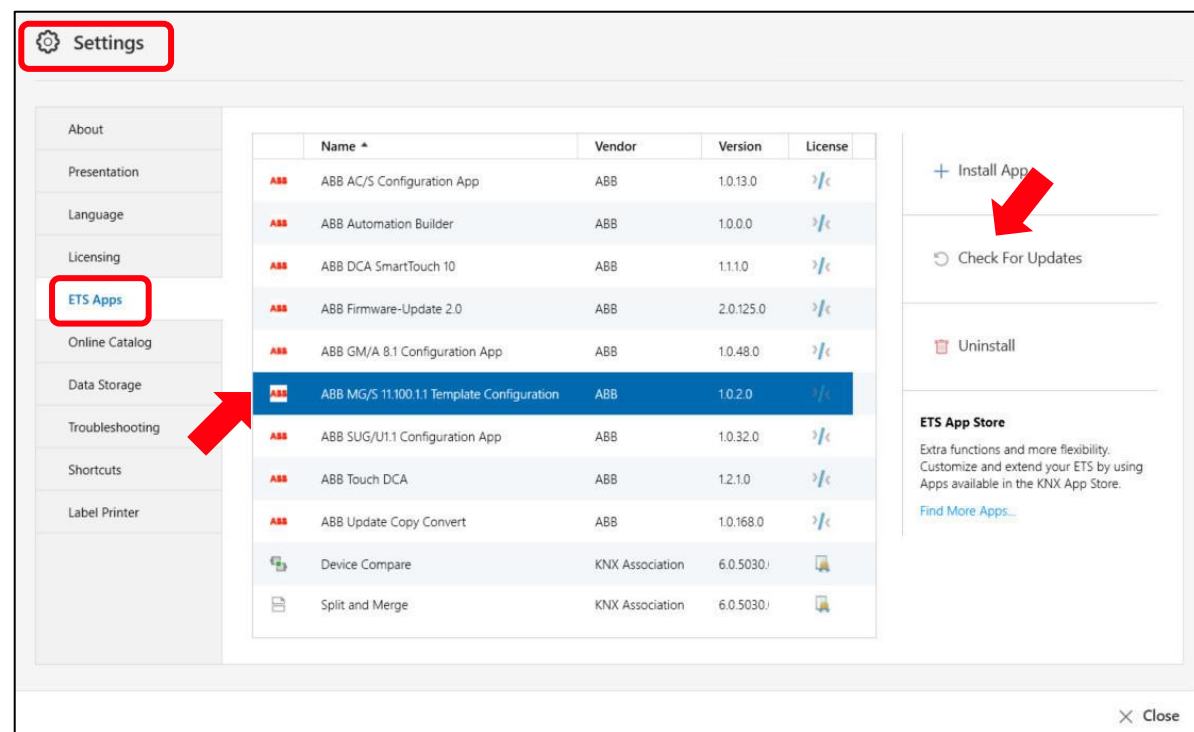
Modbus RTU – KNX TP Gateway MG/S

Commissioning – Steps in ETS

- Set the parameters
  - General for KNX and Modbus
  - Per Modbus device
  - Import device templates
    <u>or</u>
    map the Modbus KNX data points manually
- Link group addresses
- Download individual address and application
- Create and export your self created device templates
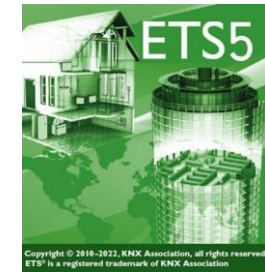
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Modbus RTU – KNX TP Gateway MG/S

Commissioning – Mapping of the Modbus KNX data points

```
┌─────────────────────────────────┐          ┌───────────────────────────────┐          ┌───────────────────────────────────┐
│ Adopt the mapping of the Modbus │ ◄─────── │ Is a device template available? │ ───────► │ Map the Modbus KNX data points    │
│ KNX data points from a device   │          │                                 │          │ manually                          │
│ template                        │   YES    └───────────────────────────────┘    NO     └───────────────────────────────────┘
└─────────────────────────────────┘                                                                       │
                  │                                                                                        ▼
                  ▼                                                                       ┌───────────────────────────────────┐
┌─────────────────────────────────┐                                                      │  • Add another device             │
│ Import the device template from │                                                      │  • Enter a name for the device    │
│ an online database/local storage│                                                      │  • Set the address                │
└─────────────────────────────────┘                                                      │  • Define the number of data points│
                  │                                                                       └───────────────────────────────────┘
                  ▼                                                                                        │
┌─────────────────────────────────┐                                                                       ▼
│ Activate or deactivate data     │                                                      ┌───────────────────────────────────┐
│ points by selecting them        │                                                      │ Set the parameters* of the data   │
│ manually                        │                                                      │ points for                        │
└─────────────────────────────────┘                                                      │  • KNX: Object name and data point│
                  │                                                                       │    type                           │
                  ▼                                                                       │  • Modbus: Read/write function,   │
┌─────────────────────────────────┐     ┌──────────────────────────┐                     │    data format, length, byte      │
│ The gateway will create a new   │ ──► │ Set the desired KNX      │ ◄───────────────────│    order, register addresses,     │
│ device that includes the active │     │ sending behavior for     │                     │    operation                      │
│ data points with parameter      │     │ changing Modbus data in  │                     │                                   │
│ settings e.g. object name, KNX  │     │ the deadband             │                     │ * The Modbus parameters can be    │
│ data point type, read/write     │     └──────────────────────────┘                     │ found in the product manual of    │
│ function, data format, length,  │                   │                                  │ the device                        │
│ byte order, register addresses, │                   ▼                                  └───────────────────────────────────┘
│ operation, …)                   │     ┌──────────────────────────┐                                      │
└─────────────────────────────────┘     │ Link group addresses ….  │                                      ▼
                                         └──────────────────────────┘                     ┌───────────────────────────────────┐
                                                       │                                  │ Export the template               │
                                                       ▼                                  └───────────────────────────────────┘
```
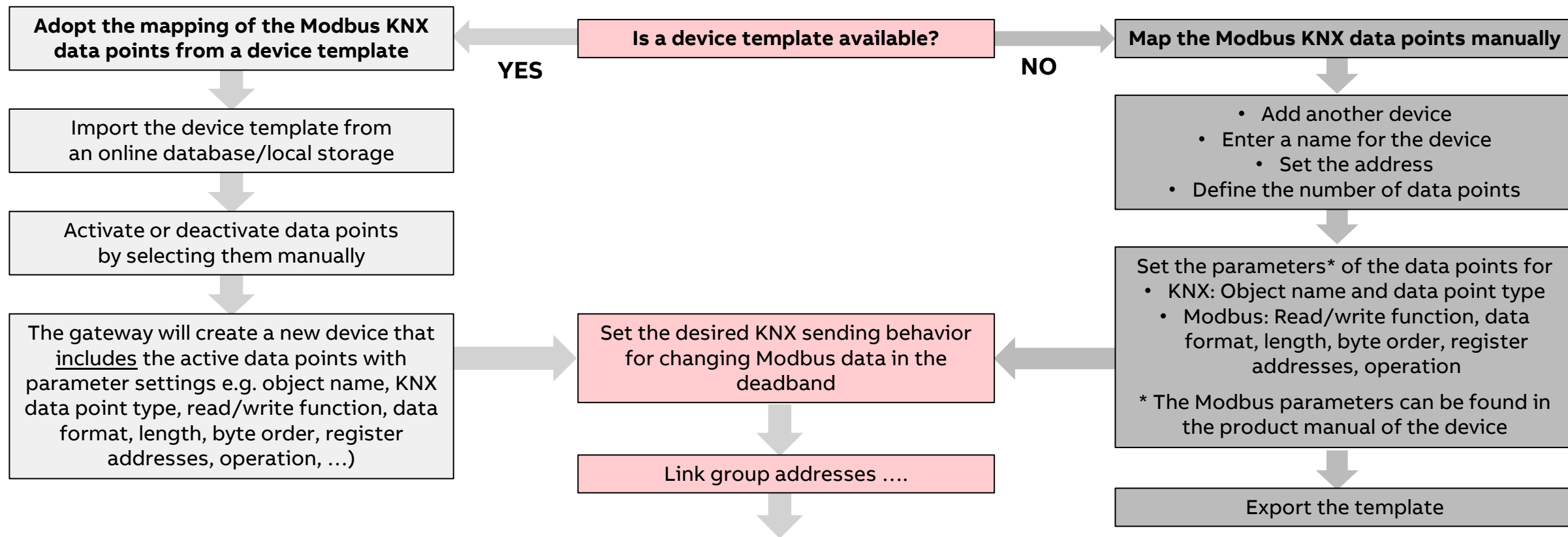
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Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Catalog

- Add a device from the catalog into the project

- The application for the gateway can be found under

    - Manufacturer ABB
      → System Infrastructure and Interface
          → Gateways

    - Enter the filter "MG/S"
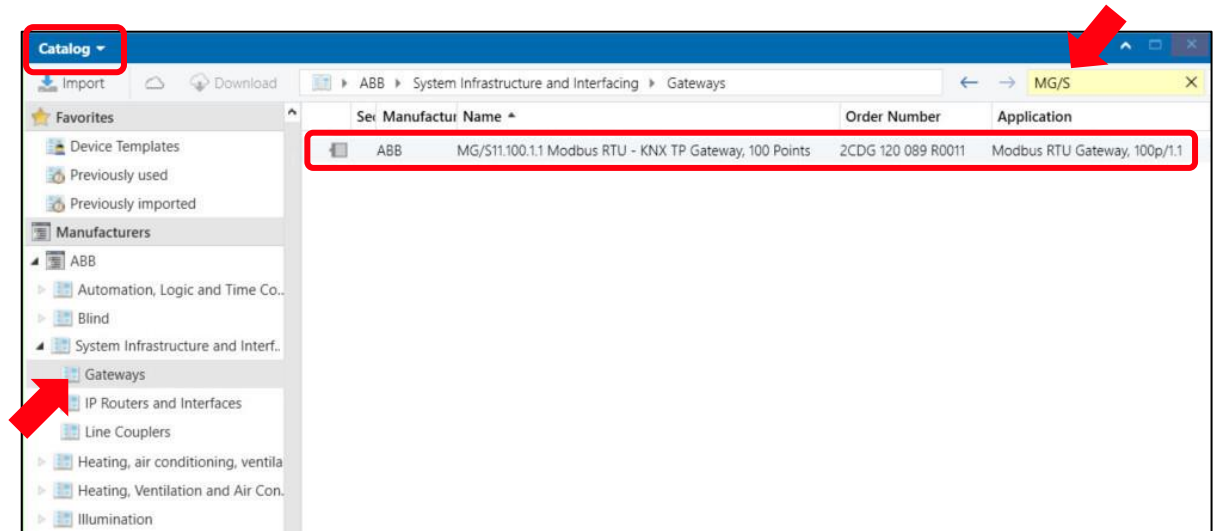
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Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- The parameter "Total Gateway Data Points" indicates how many of the 100 available data points are already in use

- The following settings can be made for

    - KNX

    - Modbus

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- Settings for KNX

  - Read On Init Delay *[0...255 sec.]*
    This parameter is used to define the sending delay of the "GroupValueRead" telegram for group objects with an initialization flag "I" (Note: Transmit flag "T" has to be set)

  - Time Telegram Rate *[0...5000 msec.]*
    This parameter is used to define the waiting time between two telegrams before they are sent on KNX. The bus load generated by the device can be limited.

  - In Operation *[Yes/No]*
    This parameter is used to enable the group object "In Operation". Readiness can be monitored by another KNX device using this group object.

  - Sending cycle *[1 ... 5 ... 255 min.]*
    This parameter is used to define the cycle time in which the "In "Operation" group object sends a telegram
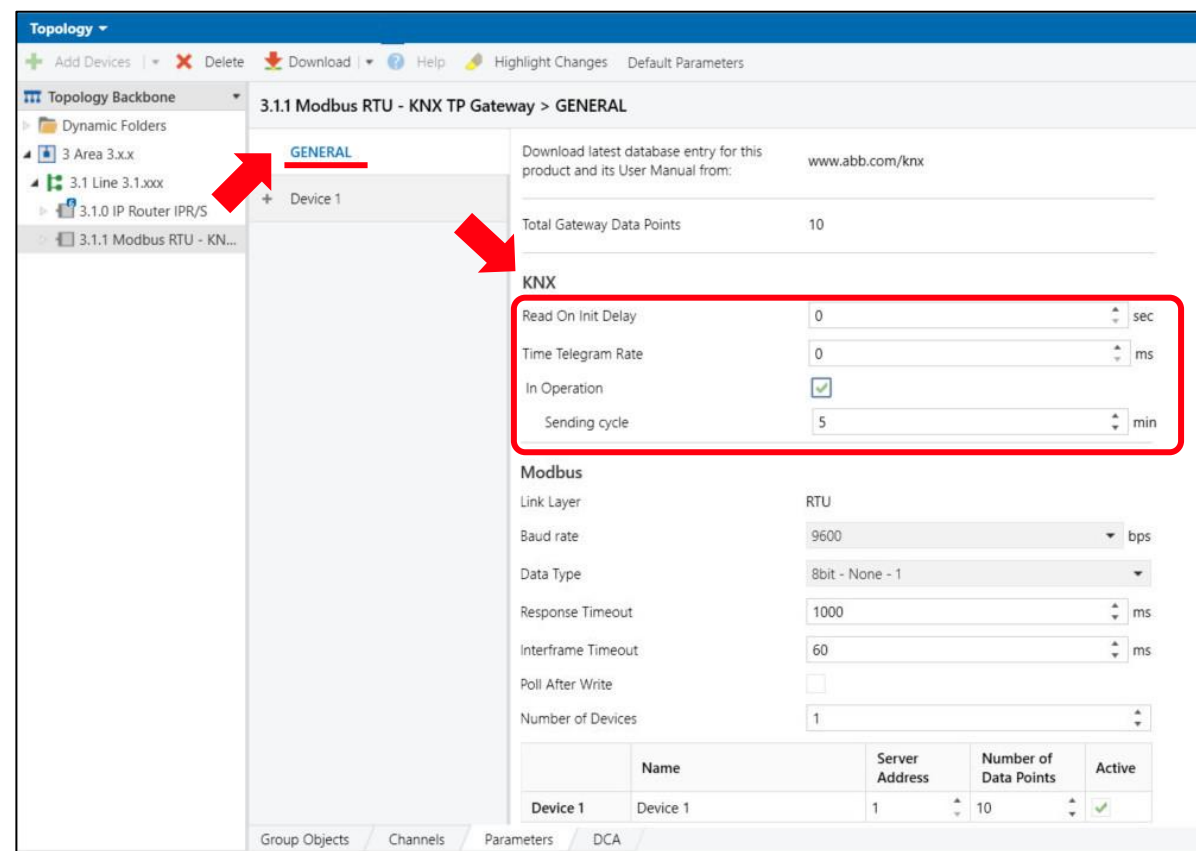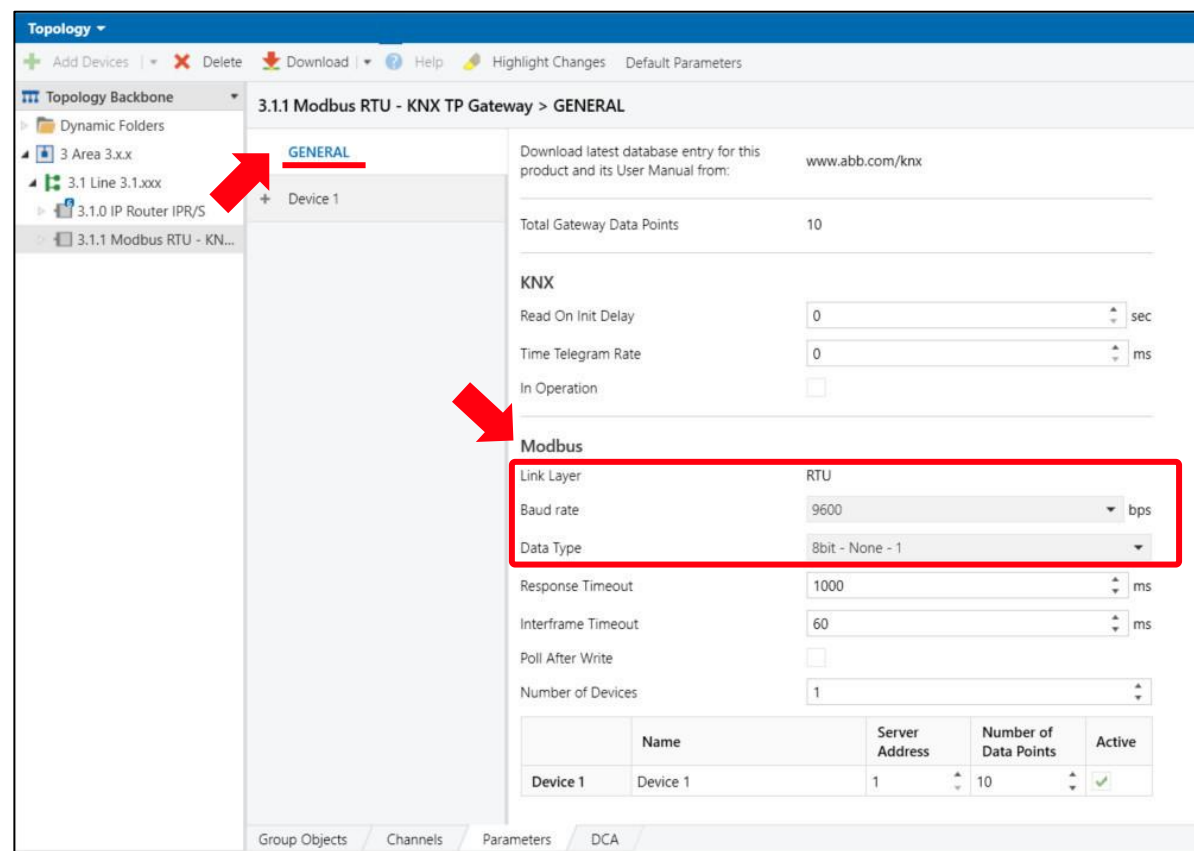
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- Settings for Modbus

  - Baud rate *[1200 bps … 115200 bps]*
    This parameter is used to define the transmission speed of the Modbus RTU interface. The baud rate must be the same for all devices in the Modbus system (client and server).

  - Data Type *[8bit – None/Even/Odd – 1/2]*
    This parameter is used to define the data format. The parity and number of stop bits must be the same for all devices in the Modbus system (client and server).
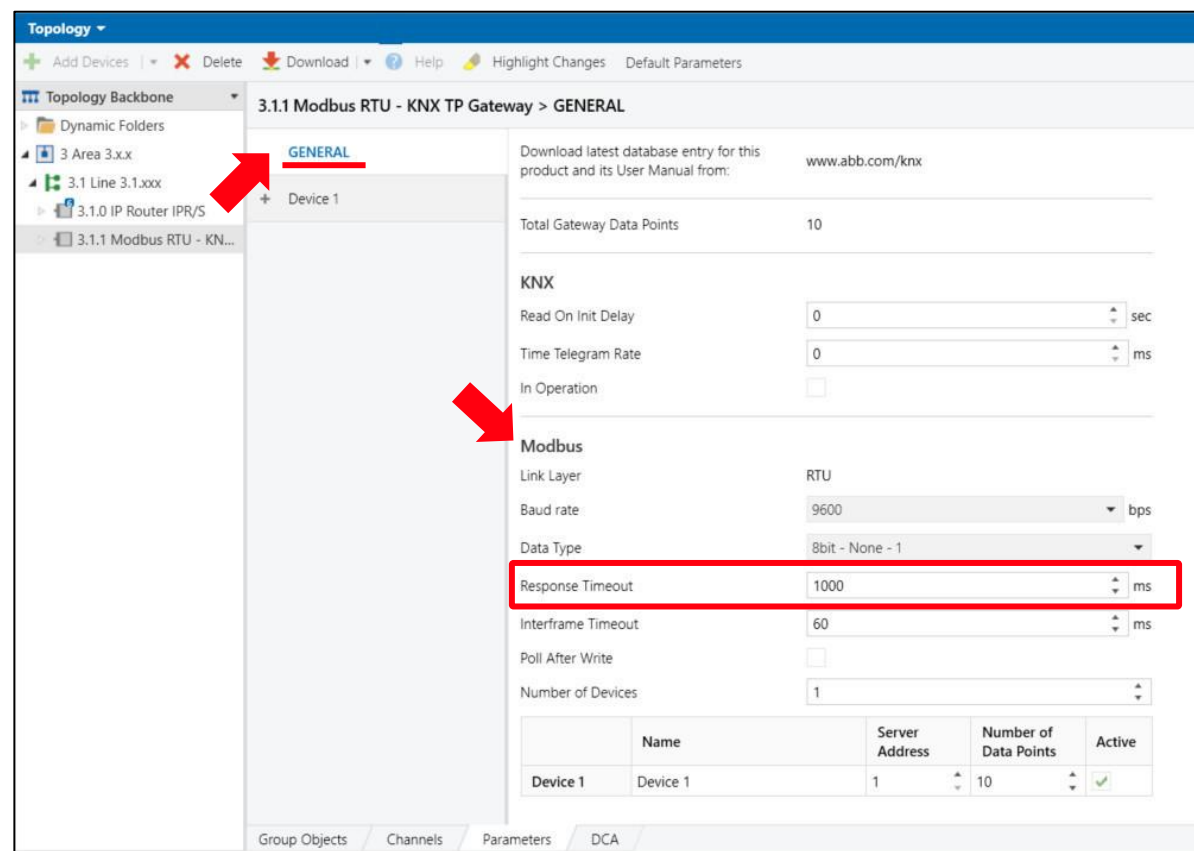
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- Settings for Modbus

  - Response Timeout *[100 … 1000 … 2000 msec.]*
    This parameter defines how many milliseconds the gateway waits between sending a request to a server and receiving a response.
    If the gateway does not receive a response, it re-sends the request. The gateway repeats the request three times before reporting the error via the corresponding "Error Status" group objects.
    Some servers have long processing times. This information is usually provided in the server manual. Take this into account when setting the "Response Timeout" parameter
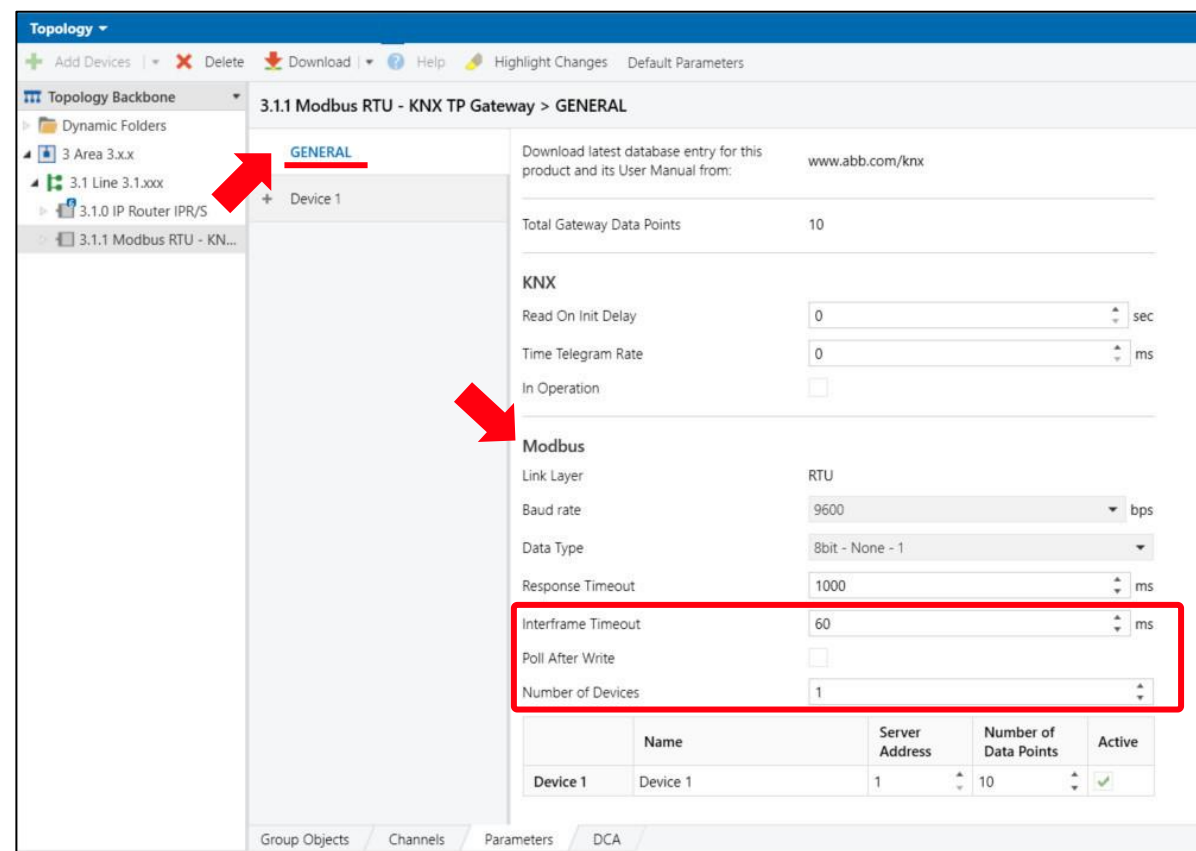
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- Settings for Modbus

  - Interframe Timeout *[0 … 60 … 10000 msec.]*
    This parameter defines how many milliseconds the gateway waits between receiving and sending a Modbus telegram. The Modbus load generated by the device can be limited using the "Interframe Timeout" parameter. This limit relates to all Modbus telegrams sent by the device.

  - Poll After Write *[Yes/No]*
    This parameter is used to activate the function "Poll" after write. Activating this allows the gateway to update the new status of the corresponding KNX group object immediately after a write command to a server.

  - Number of Devices *[0 … 1 … 100]*
    This parameter is used to define the number of integrated Modbus servers. Each server has its own parameter window.

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

General parameter window

- Settings for Modbus

  - Device x: Name *[max. 64 ASCII characters]*
    This parameter is used to specify an individual description for a device

  - Device x: Server Address *[1 … 254]*
    This parameter is used to define the server address

  - Device x: Number of Data Points *[0 … 10 … 100]*
    This parameter is used to define the number of data points on the Modbus device concerned

  - Device x: Active *[Yes/No]*
    This parameter is used to define whether the device is activated. If the device is deactivated, all data points are automatically deactivated.

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Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  - Device x: Name *[max. 64 ASCII characters]*
    This parameter is used to specify an individual description for a device

  - Device x: Server Address *[1 … 254]*
    This parameter is used to define the device address (server)

  - Device x:Number of Data Points *[0 … 10 … 100]*
    This parameter is used to define the number of data points on the Modbus device concerned

  - Device x: Active *[Yes/No]*
    This parameter is used to define whether the device is activated. If the device is deactivated, all data points are automatically deactivated.
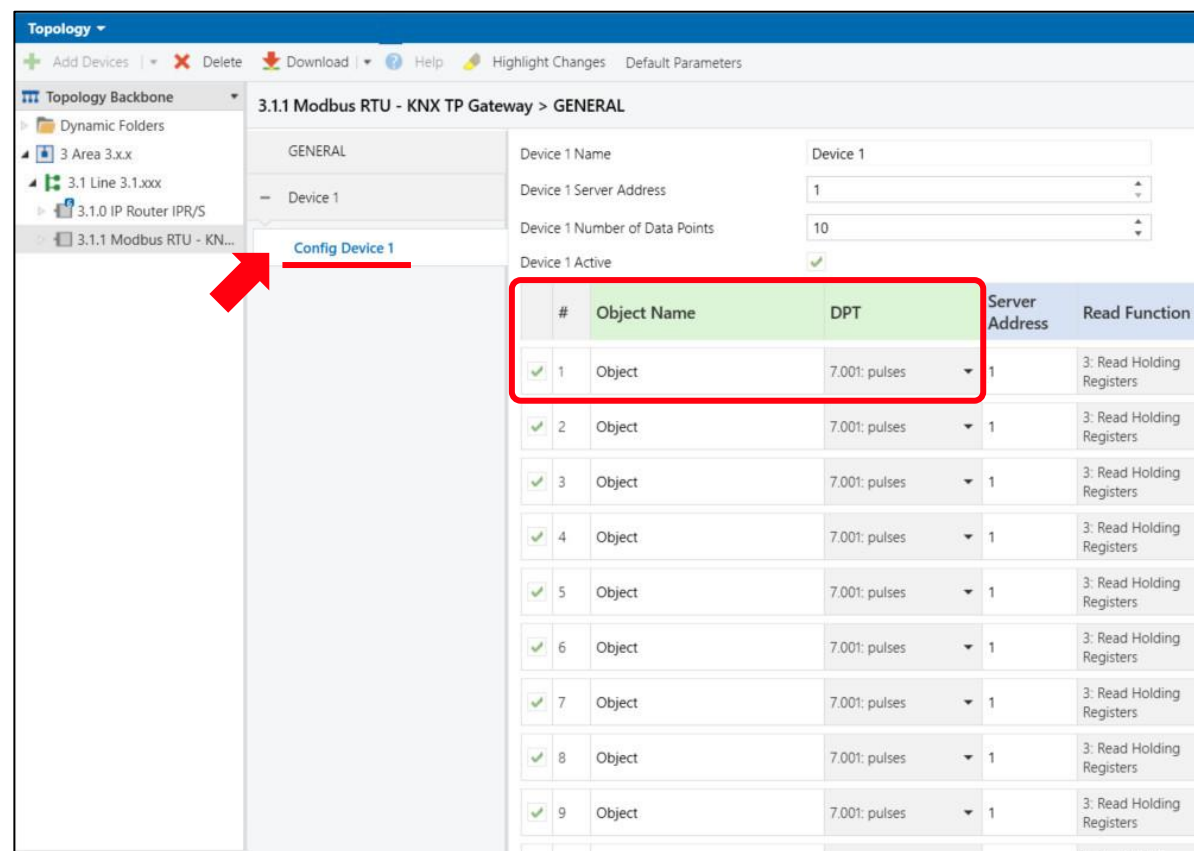
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for KNX

  - "Data point" checkbox *[activated/deactivated]*
    This parameter is used to define whether the individual data point is activated

  - The "#" indicates the data point number from 1 to 100.
    The gateway continuously polls the data points in ascending order (from data point 1 to 100).

  - Object name *[max. 64 ASCII characters]*
    This parameter is used to specify an individual text description for a group object. The description is shown in the name of the corresponding group object.

  - DPT
    This parameter defines the KNX data point types (DPT). For a description of all the data point types available in the ETS application, click here.

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  - Server Address
    Indicates the address of the Modbus device (server)

  - *Read Function *[Read Coils/Holding Registers/…]*
    This parameter is used to define which Modbus function
    code is selected.
    The function code tells the server which memory type (i.e.
    register, coils, etc.) to access and read.

  - *Write Function *[Write Single/Multi Coils/Registers]*
    This parameter is used to define which Modbus function
    code is selected.
    The function code tells the server which memory type (i.e.
    register, coils, etc.) to access and write.

*These parameters can be found in the product manual of the device

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  - *Data Length *[1/16/32/64]*
    This parameter is used to define the size of the Modbus register in bits

  - *Format *[Unsigned/Signed/Float/BitFields]*
    This parameter is used to define the format of the Modbus register data

  - *Byte Order *[Big/Little Endian/Word Inv BE/LE]*
    This parameter is used to define the order in which the bytes are shown (high or low byte/word first)

  - *Register Address *[0 … 65535]*
    This parameter is used to define the address of the register (decimal) in the server's memory range

*These parameters can be found in the product manual of the device

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  - Bit *[1 …x … 15… -]*
    This parameter is used to define the start bit within the data point in the assigned register

  - # Bits *[1 …x … 15… -]*
    This parameter is used to define the number of specific bits in the assigned register

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for KNX and Modbus

  - Operation
    This parameter is used to define the mathematical operation.
    This is necessary, for example, when converting integer
    Modbus measured values into KNX floating point values.
    The options Multiply by and Divide by are <u>arithmetical
    connections</u> that are always available.
    For unidirectional data points (either the Read Function or
    the Write Function), there are also <u>logical connections</u>
    available (equals, less/greater than, …).

  - Operation Value *[-32768 … 0 … 32767]*
    This parameter is used to define the value for the operation

  - Operation definition
    Indicates the mathematical relation between KNX and
    Modbus

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  Example "Operation and value"

  - The integer modus values are converted into KNX floating point values

  - Here, the value and the resolution of the <u>Modus raw data</u> must be observed

  - An ABB EQ Energy Meter B23-112-100 stores the voltage value of "230.8V" as "2308" with a resolution of "0.1" in the Modbus register

    → KNX value = "Register value" <u>multiplied</u> by the "Resolution"
       230.8 = 2308 x 0.1

    → KNX value = "Register value" <u>divided</u> by the inverse "Resolution"
       230.8 = 2308 / 10

Object Name	DPT	Register Address	Deadband	Operation	Operation Value	Operation Definition
Voltage L1	14.027: electric potential (V)	23296	5	Divide by (/)	10	knx = (modbus / 10.00)

Communication with Modbus

9.3   Mapping Tables

Introduction   The purpose of this section is to explain the relation between register number and metering data.

All registers in the following table are read only:

Quantity	Details	Start reg (Hex)	Size	Res.	Unit	Value range	Data type
Active energy import	kWh	5000	4	0,01	Wh		Unsigned
Voltage	L1-N	5B00	2	0,1	V		Unsigned
Current	L1	5B0C	2	0,01	A		Unsigned
Active power	Total	5B14	2	0,01	W		Signed
Frequency		5B2C	1	0,01	Hz		Unsigned
Power factor	Total	5B3A	1	0,001	-	-1,000-+1,000	Signed

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  - Deadband *[0 … 100]*
    This parameter defines the minimum value change of the
    Modbus data before the new value is written to the
    associated KNX status group object (KNX sending behavior).
    This avoids excessive KNX sending when making minimal
    Modbus value changes.

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Parameter settings

Device parameter window

- Settings for Modbus

  Example "Deadband" (KNX sending behavior)

  - When calculating the deadband, always take account of the value and resolution of the Modbus raw data!

  - An ABB EQ Energy Meter B23-112-100 stores the voltage value of "230.8V" as "2308" with a resolution of "0.1" in the Modbus register

    → KNX value = "Register value" multiplied by the "Resolution"

    → KNX value = "Register value" divided by the inverse "Resolution"

  - For a minimum change in value of 0.5 V, the deadband should be set to "5"

  - Deadband = "KNX min. change value" multiplied by inverse "Resol."
    Deadband = "KNX min. change value" divided by "Resolution"
    $$5 = 0.5 / 0.1$$

Object Name	DPT	Register Address	Deadband	Operation	Operation Value	Operation Definition
Voltage L1	14.027: electric potential (V)	23296	5	Divide by (/)	10	knx = (modbus / 10.00)

Communication with Modbus

9.3 Mapping Tables

Introduction — The purpose of this section is to explain the relation between register number and metering data.

All registers in the following table are read only:

Quantity	Details	Start reg (Hex)	Size	Res.	Unit	Value range	Data type
Active energy import	kWh	5000	4	0,01	Wh		Unsigned
Voltage	L1-N	5B00	2	0,1	V		Unsigned
Current	L1	5B0C	2	0,01	A		Unsigned
Active power	Total	5B14	2	0,01	W		Signed
Frequency		5B2C	1	0,01	Hz		Unsigned
Power factor	Total	5B3A	1	0,001	-	-1,000-+1,000	Signed

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- For easy configuration, the DCA "ABB MGS Template Configuration" is recommended
- The following functions are available in the DCA
  - Export device templates
  - Import device templates
  - Edit devices
  - Firmware updates
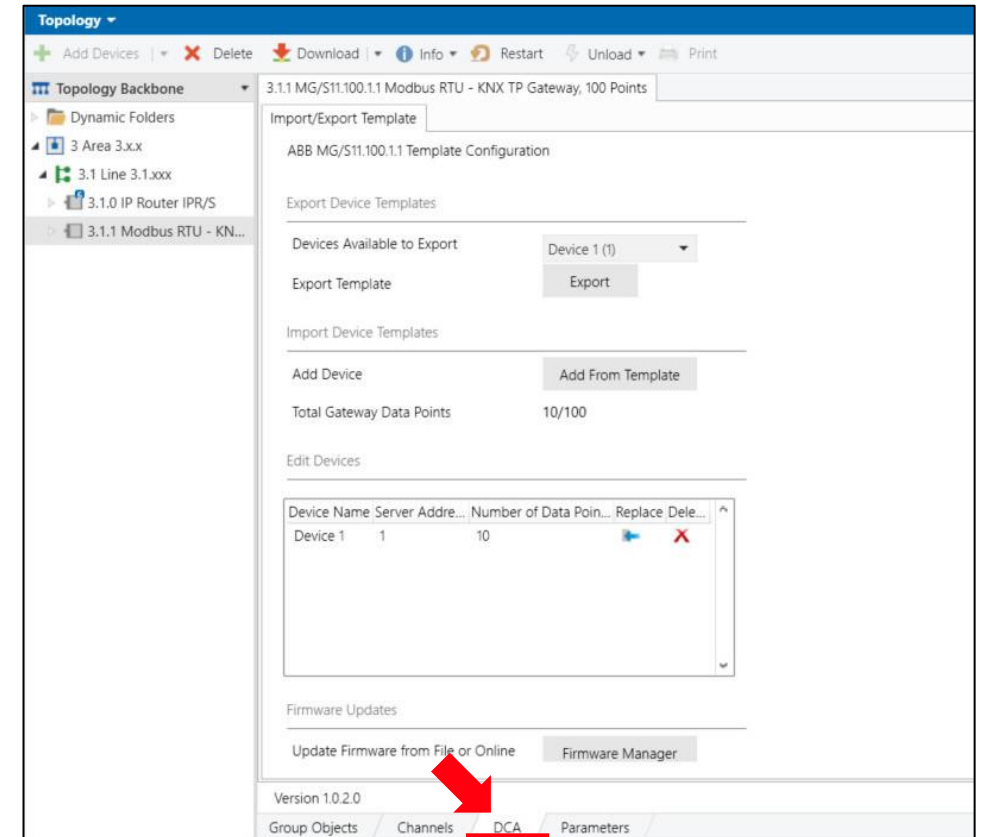
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Export a device template
  - The device is configured in the ETS parameters
  - This configuration and mapping of the Modbus KNX data points can be exported as a template ("_.knxmbr_" file format)
    1. In the list, select the device (server) you wish to export
    2. Select "Export"
    3. Specify a local storage location and click "Save"
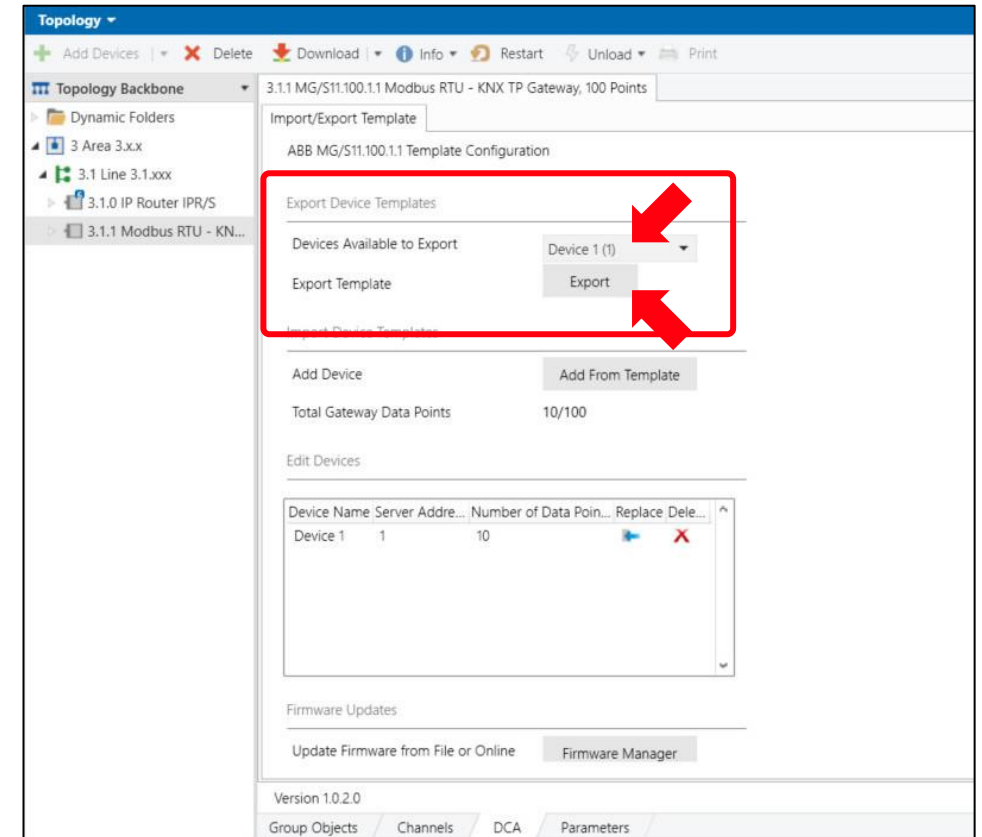
ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Import a device template from the <u>local storage location</u>

  - Click "Add From Template"

  - Select "Import File"

  - A new window opens, select "Import File" and click "Open"

  - ABB device templates currently available
    - EQ Energy Meter B23/B24
    - Terra AC Wallbox
    - more will follow …

  List of ABB templates → Link
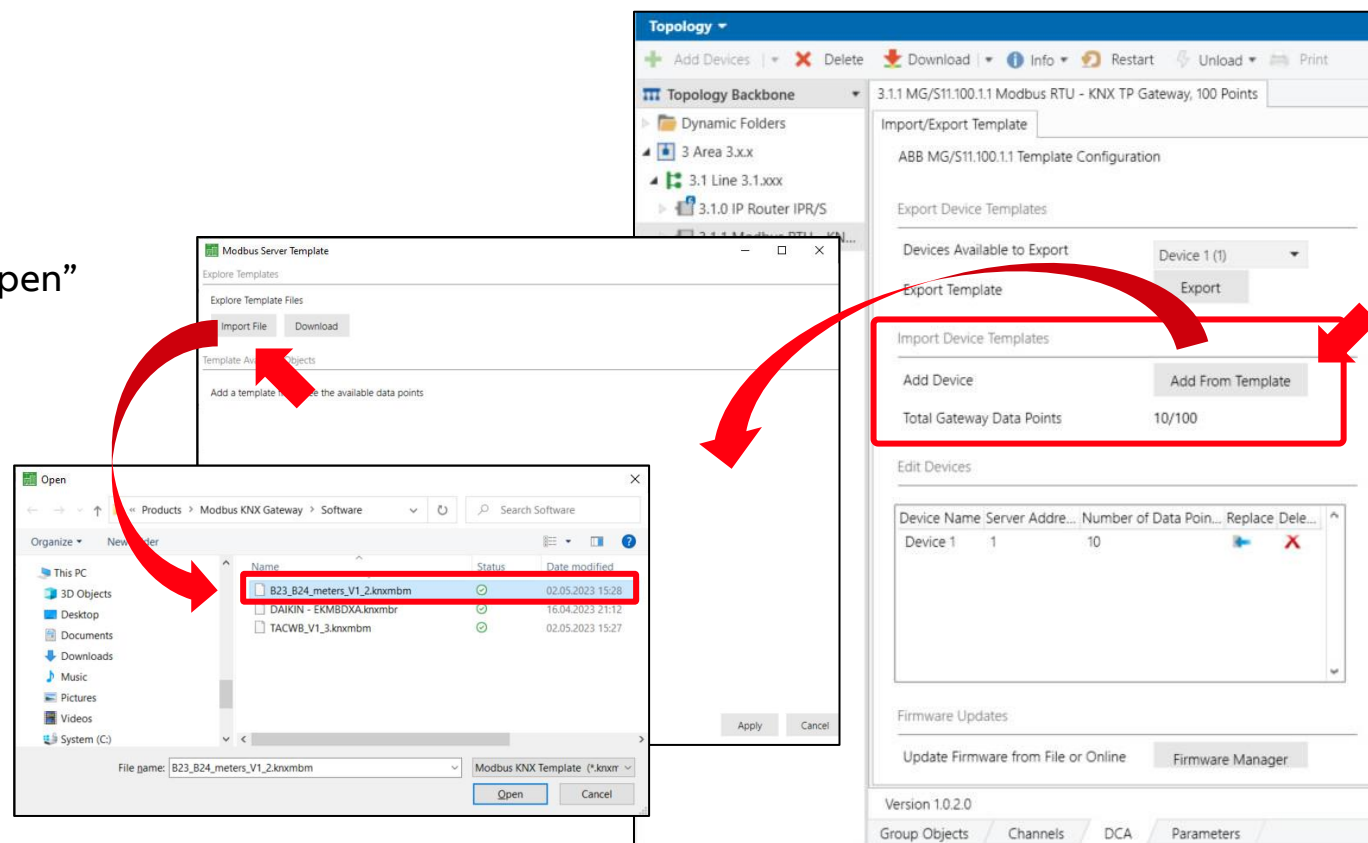
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Import a device template from an <u>online database</u>

  - Click "Add From Template"

  - Select "Download"

  - A new window opens, select the manufacturer and device (model) and click "Load" to import the template

  - ABB device templates currently available
    - EQ Energy Meter B21, B23/B24 and A43/A44
    - Terra AC Wallbox
    - Network Analyzer M1M and M4M
        … more templates will be added to the database soon

  List of ABB templates → Link
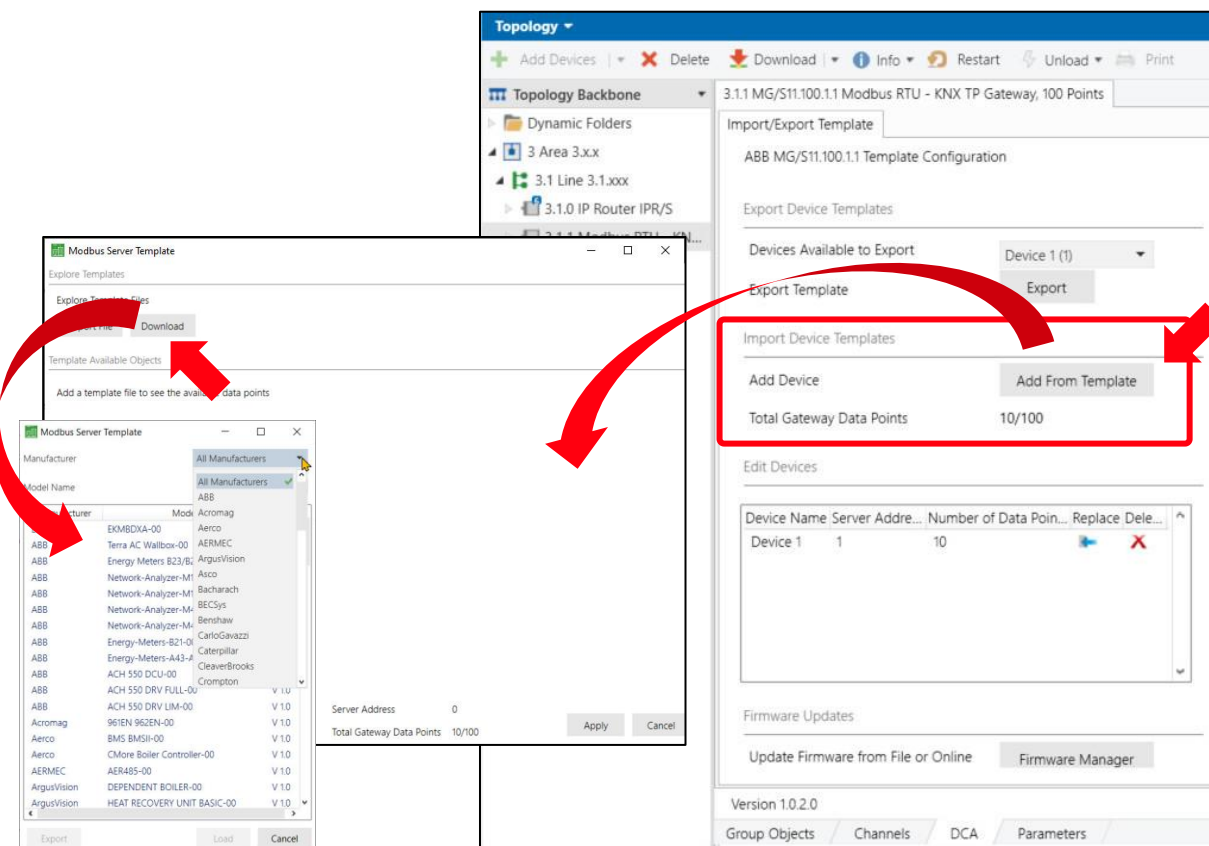
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Import a device template from an online database/local storage
  - All the previously assigned data points from the imported template are listed
  - You can activate or deactivate data points by selecting them manually ("Active" checkbox)
    → Note the maximum number of datapoints
  - The gateway will then create a new device that only includes the active data points
    - Object name
    - KNX data point type
    - Function code
    - Register address
    - …
- Additional relevant information is listed in the lower part of the window (manufacturer, device name, …)

After importing the template from local storage or from the database, this window appears:
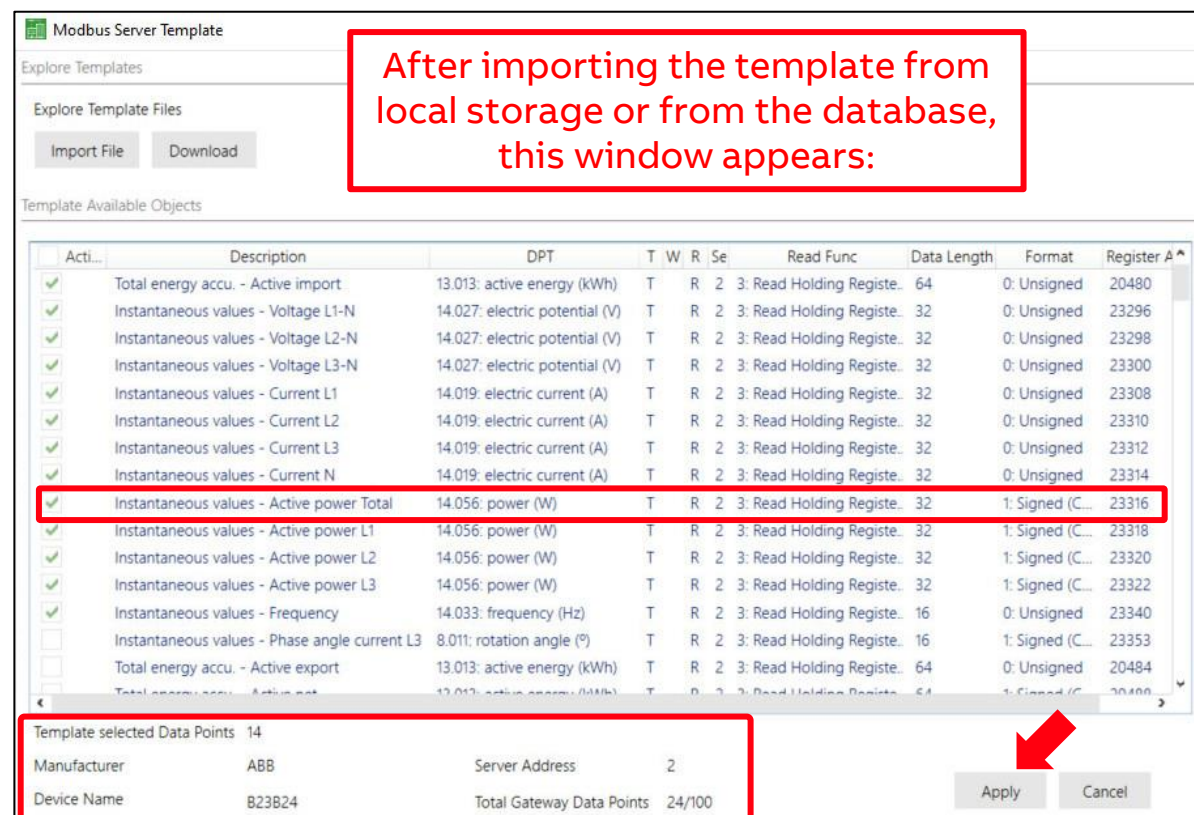
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Edit Devices
  - Click "Replace" 🔄 to import a template into an existing device.
    A new window opens and import a device template from an online database/local storage. Device name and data points are replaced by those of the template.
  - Click "Delete" ✖ to delete the device from the ETS application
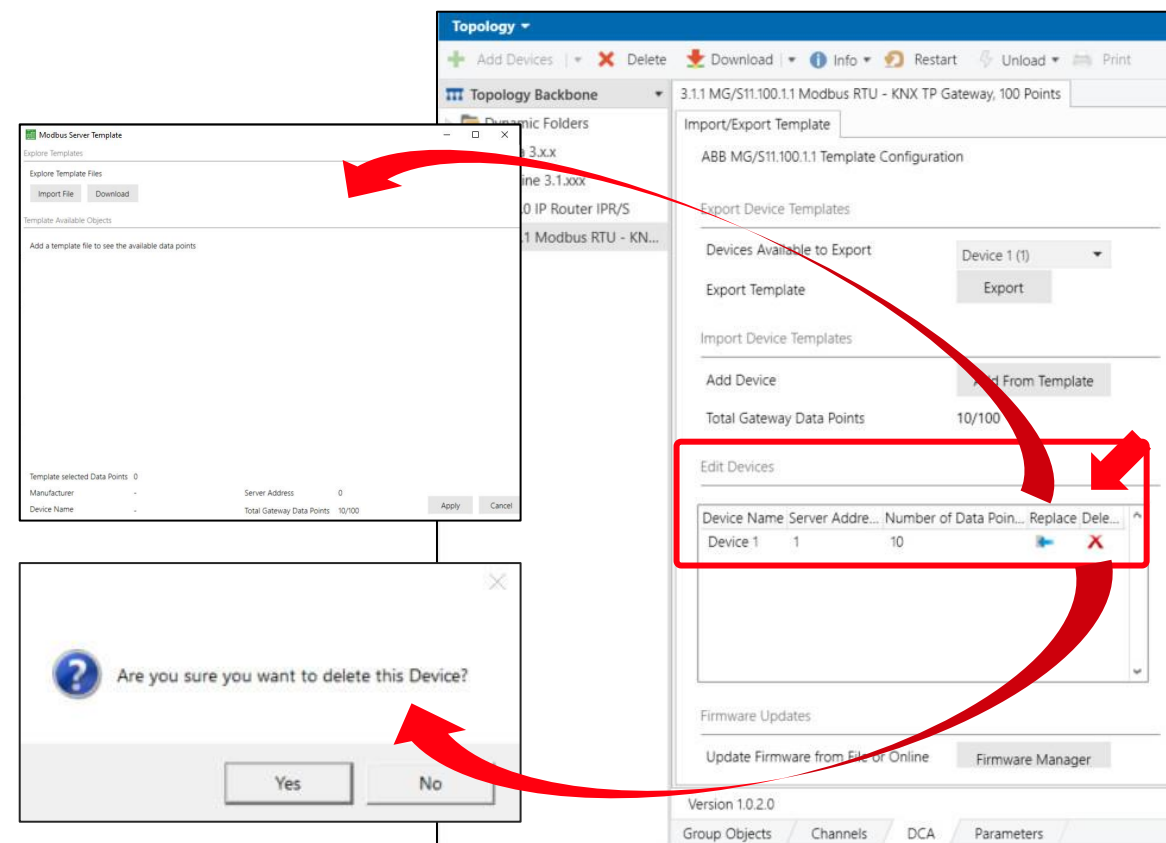
Modbus RTU – KNX TP Gateway MG/S

Commissioning – ETS Device Configuration App (DCA)

DCA window

- Firmware Updates
  - Click "Firmware Manager" to update the firmware of the gateway
  - Select device(s)
  - There are two options:
    - Click "Online mode" [⊕] to select firmware file from online database
    - Click [📂] to select firmware file from local storage location
  - Select the firmware version and click "Update"
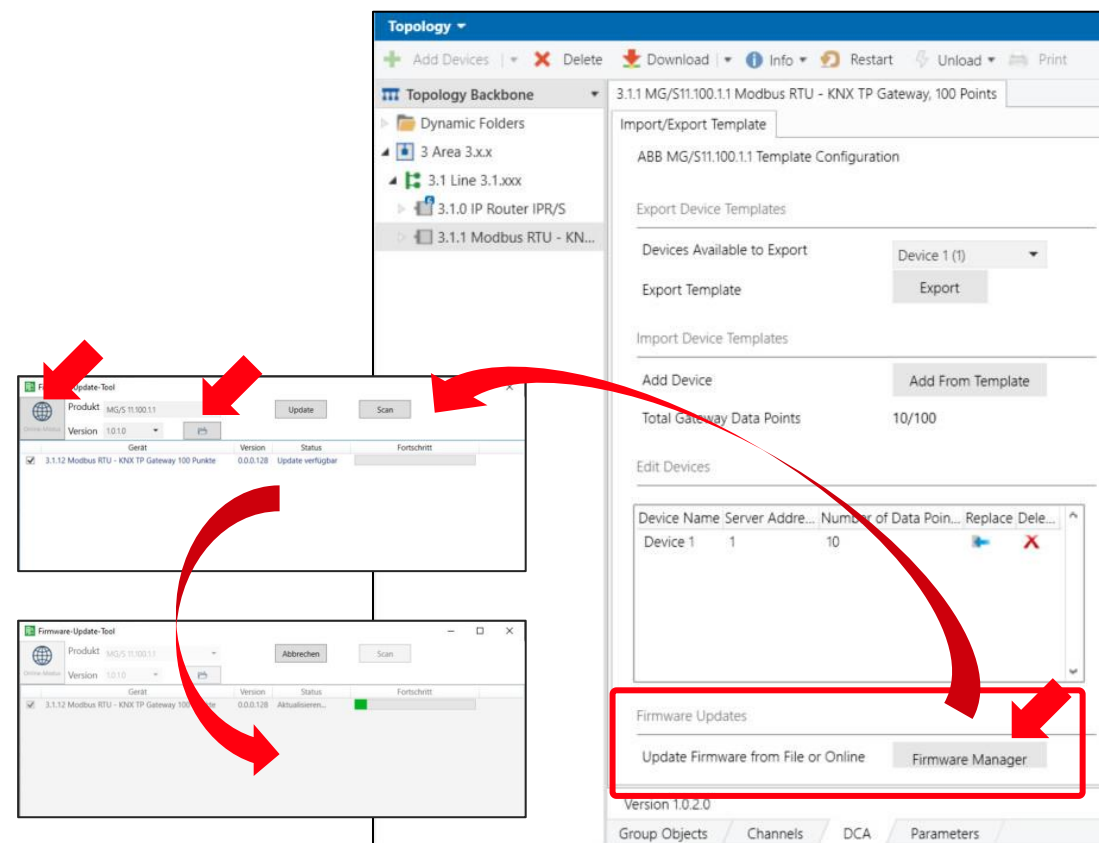
Commissioning Examples
- ABB Terra AC Wallbox
- ABB EQ Energy Meter B23
- ABB EQ Energy Meter B21

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Adoption of the parameterization from a device template and manual parameterization

| Adopt the mapping of the Modbus KNX data points from a device template | ← YES — | Is a device template available? | — NO → | Map the Modbus KNX data points manually |

Left column (YES):
- Adopt the mapping of the Modbus KNX data points from a device template
- Import the device template from an online database/local storage
- Activate or deactivate data points by selecting them manually
- The gateway will create a new device that includes the active data points with parameter settings e.g. object name, KNX data point type, read/write function, data format, length, byte order, register addresses, operation, …)

Right column (NO):
- Map the Modbus KNX data points manually
- • Add another device
  • Enter a name for the device
  • Set the address
  • Define the number of data points
- Set the parameters* of the data points for
  • KNX: Object name and data point type
  • Modbus: Read/write function, data format, length, byte order, register addresses, operation

  * The Modbus parameters can be found in the product manual of the device
- Export the template

Center column:
- Set the desired KNX sending behavior for changing Modbus data in the deadband
- Link group addresses ….

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Examples

Adoption of the parameterization from a device template and manual parameterization

- In the following examples, the parameterization of the gateway for ABB EQ Energy Meters and ABB Terra AC Wallbox is shown

Modbus RTU – KNX TP Gateway MG/S
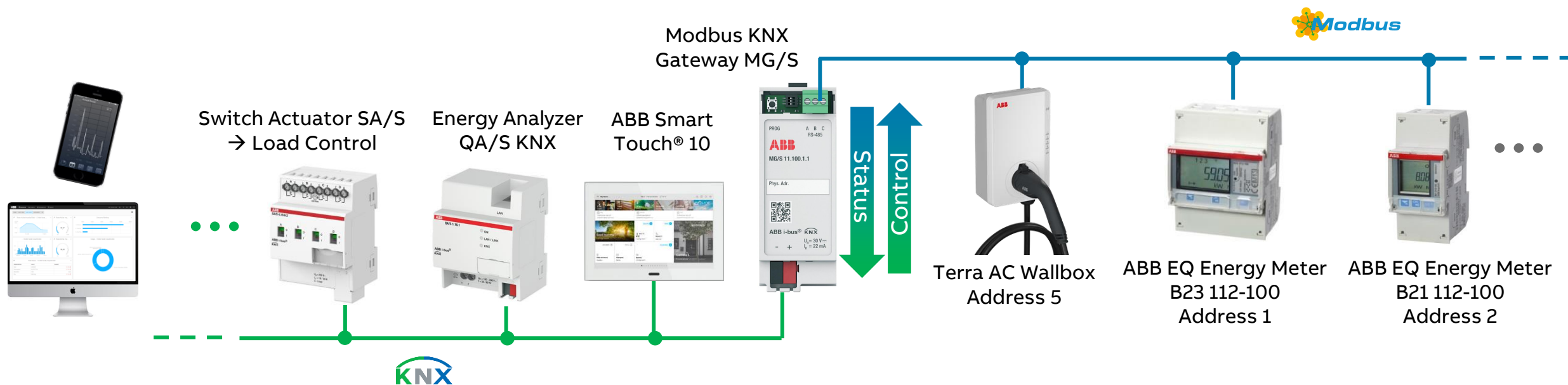
Commissioning – Example (1): ABB Terra AC Wallbox

Adoption of the parameterization from a device template

- A template is available for the ABB Terra AC Wallbox

- Import the device template from an online database/local storage

- You can activate or deactivate data points by selecting them manually ("Active" checkbox)

- The gateway will then create a new device that only includes the active data points (description, KNX data point type, function code, …)

- The desired KNX sending behavior for changing Modbus data must be set in the deadband

- Set the address according to the address set in the device (e.g. 5)

- Link group addresses ….

- Note: Set the wallbox as a secondary device ("TerraConfig" app)
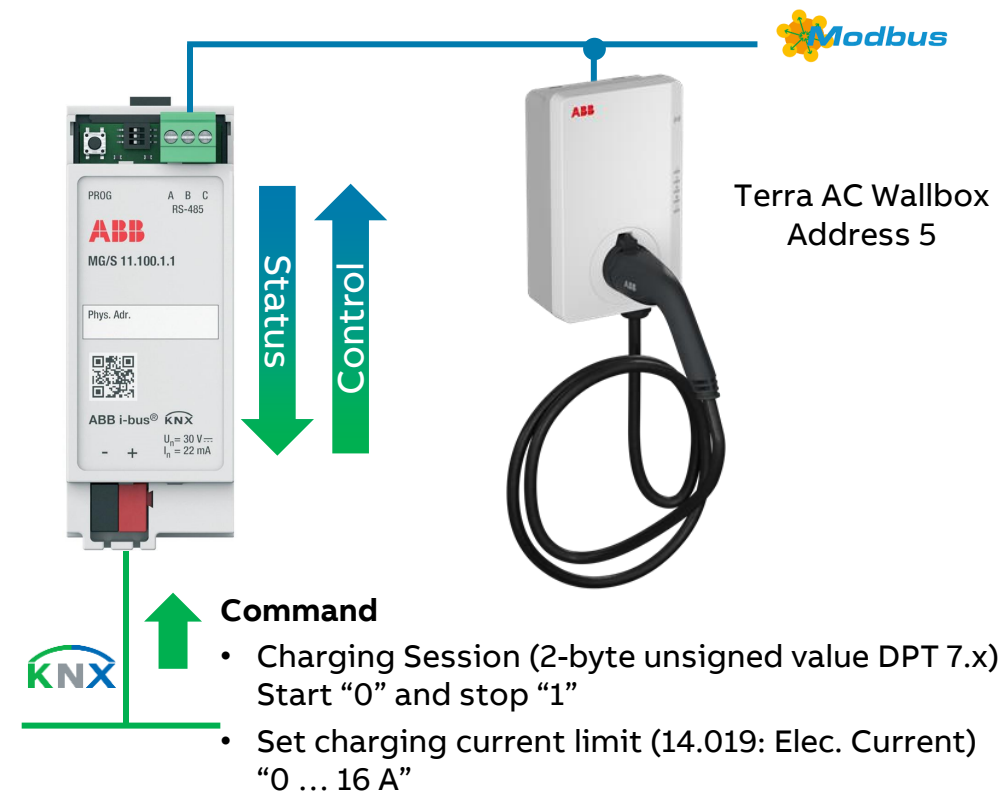
Terra AC Wallbox
Address 5

Command

- Charging Session (2-byte unsigned value DPT 7.x) Start "0" and stop "1"

- Set charging current limit (14.019: Elec. Current) "0 … 16 A"

Device template of ABB Terra AC Wallbox

Modbus Server Template

Explore Templates

Explore Template Files

[Import File] [Download]

Activate or deactivate data points by selecting them manually

Template Ava...

	Description	DPT	Gro...	C	U	T	W	R	Se...	Read Func	Write Func	Data Length	Format	Register Addre
✓	Max rated / settable current (A)	14.019: electric current (A)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16390
✓	Error Code	12.x: (4-byte, Unsigned Val...	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16392
✓	Socket lock state	12.x: (4-byte, Unsigned Val...	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16394
✓	Charging state	12.x: (4-byte, Unsigned Val...	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16396
✓	Current charging current limit (A)	14.019: electric current (A)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16398
✓	Charging current phase 1 (A)	14.019: electric current (A)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16400
✓	Charging current phase 2 (A)	14.019: electric current (A)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16402
✓	Charging current phase 3 (A)	14.019: electric current (A)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16404
✓	Voltage phase 1 (V)	14.027: electric potential (V)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16406
✓	Voltage phase 2 (V)	14.027: electric potential (V)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16408
✓	Voltage phase 3 (V)	14.027: electric potential (V)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16410
✓	Active power (W)	14.056: power (W)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16412
✓	Energy delivered in charging session...	13.010: active energy (Wh)	...		T		R	1	3: Read Holding Registe...	-	32	0: Unsign...	16414
✓	Set charging current limit (A)	14.019: electric current (A)	...	...		W	R	1	-	16: Write Multiple Registers	32	0: Unsign...	16640
✓	Lock/Unlock Socket Cable	7.x: (2-byte, Unsigned Value)	...	...		W	R	1	-	6: Write Single Register	16	0: Unsign...	16643
✓	Start/Stop Charging Session	7.x: (2-byte, Unsigned Value)				W	R	1	-	6: Write Single Register	16	0: Unsign...	16645

Template selected Data Points 17

Manufacturer ABB   Server Address 1

Device Name Terra AC Wallbox   Total Gateway Data Points 34/100

[Apply] [Cancel]

ABB

Device template of ABB Terra AC Wallbox

Device 1 Name: Terra AC Wallbox
Device 1 Server Address: 5
Device 1 Number of Data Points: 17
Device 1 Active: ✓

#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
1	Max rated / settable current (A)	14.019: electric current (A)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16390	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)
2	Error Code	12.x: (4-byte, Unsigned Value)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16392	-	-	0	-	0	
3	Socket lock state	12.x: (4-byte, Unsigned Value)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16394	-	-	0	-	0	
4	Charging state	12.x: (4-byte, Unsigned Value)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16396	-	-	0	-	0	
5	Current charging current limit (A)	14.019: electric current (A)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16398	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)
6	Charging current phase 1 (A)	14.019: electric current (A)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16400	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)
7	Charging current phase 2 (A)	14.019: electric current (A)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16402	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)
8	Charging current phase 3 (A)	14.019: electric current (A)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16404	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)
9	Voltage phase 1 (V)	14.027: electric potential (V)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16406	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
10	Voltage phase 2 (V)	14.027: electric potential (V)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16408	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
11	Voltage phase 3 (V)	14.027: electric potential (V)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16410	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
12	Active power (W)	14.056: power (W)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16412	-	-	0	-	0	
13	Energy delivered in charging session	13.010: active energy (Wh)	5	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	16414	-	-	0	-	0	
	Set charging current limit (A)	14.019: electric current (A)	5	-	16: Write Multiple Registers	32	0: Unsigned	0: Big Endian	16640	-	-	0	Multiply by (x)	1000	modbus = (knx * 1000.00)
15	Lock/Unlock Socket Cable	7.x: (2-byte, Unsigned Value)	5	-	6: Write Single Register	16	0: Unsigned	0: Big Endian	16643	-	-	0	-	0	
	Start/Stop Charging Session	7.x: (2-byte, Unsigned Value)	5	-	6: Write Single Register	16	0: Unsigned	0: Big Endian	16645	-	-	0	-	0	
17	Communication timeout	7.005: time (s)	5	-	6: Write Single Register	16	0: Unsigned	0: Big Endian	16646	-	-	0	-	0	

Group Objects / Channels / DCA / Parameters

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (1): ABB Terra AC Wallbox

Topology ▼					
✚ Add | ▼ ✖ Delete ⬇ Download | ▼ ① Info ▼ ↻ Restart ⚡ Unload ▼ 🖶 Print					

Topology Backbone	Numb	Group Ad	Name	Object Function	Length	C	R	W	T	U	Data Type
▷ 📁 Dynamic Folders	🏴 2	4/2/6	D1.1 Status Max rated / settable current (A) [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
▲ 🖥 3 Area 3.x.x	🏴 4	4/2/8	D1.2 Status Error Code [DPT_12.x]	Modbus -> KNX	4 bytes	C	R	-	T	-	4-byte unsigned value
▲ ⌁ 3.1 Line 3.1.xxx	🏴 6	4/2/10	D1.3 Status Socket lock state [DPT_12.x]	Modbus -> KNX	4 bytes	C	R	-	T	-	4-byte unsigned value
▷ 🖧 3.1.0 IP Router IPR/S	🏴 8	4/2/12	D1.4 Status Charging state [DPT_12.x]	Modbus -> KNX	4 bytes	C	R	-	T	-	4-byte unsigned value
▷ ⬛ 3.1.1 Modbus RTU - KNX TP Gateway	🏴 10	4/2/14	D1.5 Status Current charging current limit (A) [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	🏴 12	4/2/16	D1.6 Status Charging current phase 1 (A) [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	🏴 14	4/2/18	D1.7 Status Charging current phase 2 (A) [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	🏴 16	4/2/20	D1.8 Status Charging current phase 3 (A) [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	🏴 18	4/2/22	D1.9 Status Voltage phase 1 (V) [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
	🏴 20	4/2/24	D1.10 Status Voltage phase 2 (V) [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
	🏴 22	4/2/26	D1.11 Status Voltage phase 3 (V) [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
	🏴 24	4/2/28	D1.12 Status Active power (W) [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
	🏴 26	4/2/30	D1.13 Status Energy delivered in charging session (Wh) [DPT_13.010]	Modbus -> KNX	4 bytes	C	R	-	T	-	active energy (Wh)
	🏴 27	4/2/33	D1.14 Control Set charging current limit (A) [DPT_14.019]	KNX -> Modbus	4 bytes	C	R	W	-	U	electric current (A)
	🏴 29	4/2/35	D1.15 Control Lock/Unlock Socket Cable [DPT_7.x]	KNX -> Modbus	2 bytes	C	R	W	-	U	2-byte unsigned value
	🏴 31	4/2/37	D1.16 Control Start/Stop Charging Session [DPT_7.x]	KNX -> Modbus	2 bytes	C	R	W	-	U	2-byte unsigned value
	🏴 33	4/2/39	D1.17 Control Communication timeout [DPT_7.005]	KNX -> Modbus	2 bytes	C	R	W	-	U	time (s)

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (1): ABB Terra AC Wallbox

Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
11.05.2023 14:56:18,115	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/6	TerraWB Status User settable max current - Mod.>KNX	14.019 electric current (A)	41 80 00 00 | 16 A
11.05.2023 14:56:18,612	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/8	TerraWB Status Error code - Mod.>KNX	12.* 4-byte unsigned value	00 00 00 00 | 0
11.05.2023 14:56:18,643	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/10	TerraWB Status Socket lock state - Mod.>KNX	12.* 4-byte unsigned value	00 00 00 00 | 0
11.05.2023 14:56:18,674	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/12	TerraWB Status Charging state - Mod.>KNX	12.* 4-byte unsigned value	00 00 81 00 | 33024
11.05.2023 14:56:18,704	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/14	TerraWB Status Charging current limit - Mod.>KNX	14.019 electric current (A)	41 26 66 66 | 10,4 A
11.05.2023 14:56:18,737	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:56:18,768	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/18	TerraWB Status Charging current L2 - Mod.>KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:56:19,107	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/20	TerraWB Status Charging current L3 - Mod.>KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:56:19,136	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/22	TerraWB Status Voltage L1 - Mod.>KNX	14.027 electric potential (V)	43 6D 99 9A | 237,6 V
11.05.2023 14:56:19,168	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/24	TerraWB Status Voltage L2 - Mod.>KNX	14.027 electric potential (V)	43 6D CC CD | 237,8 V
11.05.2023 14:56:19,198	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/26	TerraWB Status Voltage L3 - Mod.>KNX	14.027 electric potential (V)	43 6D 33 33 | 237,2 V
11.05.2023 14:56:19,229	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	00 00 00 00 | 0 W
11.05.2023 14:56:19,260	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 00 | 0 Wh
11.05.2023 14:56:19,287	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/2	TerraWB Status Serial number - Mod.>KNX	7.* 2-byte unsigned value	00 33 | 51
11.05.2023 14:56:19,657	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/4	TerraWB Status Firmware version - Mod.>KNX	12.* 4-byte unsigned value	01 06 05 00 | 17171712

Status: : Car connected to wallbox, ready to charge and charging not yet started

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (1): ABB Terra AC Wallbox

Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
11.05.2023 15:29:55,909	fro...		L **Start**	3.1.1	Modbus RTU - KNX TP Gateway	4/5/24	TerraWB Status Voltage L2 - Mod.>KNX	14.027 electric potential (V)	43 6A 00 00 | 234 V
11.05.2023 15:30:06,846	fro...		Low	3.1.14	Control Element	4/5/37	TerraWB Control Start/Stop charg. Session - KNX>Mod.	7.* 2-byte unsigned value	00 00 | 0
11.05.2023 15:30:07,799	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/12	TerraWB Status Charging state - Mod.>KNX	12.* 4-byte unsigned value	00 00 82 00 | 33280
11.05.2023 15:30:11,268	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/14	TerraWB Status Charging current limit - Mod.>KNX	14.019 electric current (A)	41 00 00 00 | 8 A
11.05.2023 15:30:14,239	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/12	TerraWB Status Charging state - Mod.>KNX	12.* 4-byte unsigned value	00 00 84 00 | 33792
11.05.2023 15:30:14,736	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	3F 68 F5 C3 | 0,91 A
11.05.2023 15:30:14,766	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	42 18 00 00 | 38 W
11.05.2023 15:30:17,707	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	40 D4 28 F6 | 6,63 A
11.05.2023 15:30:17,738	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/22	TerraWB Status Voltage L1 - Mod.>KNX	14.027 electric potential (V)	43 6A 66 66 | 234,4 V
11.05.2023 15:30:18,203	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/26	TerraWB Status Voltage L3 - Mod.>KNX	14.027 electric potential (V)	43 6A CC CD | 234,8 V
11.05.2023 15:30:21,176	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	44 BE 80 00 | 1524 W
11.05.2023 15:30:24,150	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/24	TerraWB Status Voltage L2 - Mod.>KNX	14.027 electric potential (V)	43 6B 00 00 | 235 V
11.05.2023 15:30:33,562	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	40 E1 99 9A | 7,05 A
11.05.2023 15:30:34,057	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	44 C8 20 00 | 1601 W
11.05.2023 15:30:41,050	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 0A | 10 Wh

→ **Start charging session via KNX**

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (1): ABB Terra AC Wallbox

Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
11.05.2023 15:31:47,933	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 28 | 40 Wh
11.05.2023 15:32:10,229	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 33 | 51 Wh
11.05.2023 15:32:19,587	fro...	**Change the current**			Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	40 E4 CC CD | 7,15 A
11.05.2023 15:32:26,652	fro...		Low	3.1.14	Control Element	4/5/33	TerraWB Control Set charging current limit - KNX>Mo...	14.019 electric current (A)	41 40 00 00 | 12 A
11.05.2023 15:32:29,001	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/14	TerraWB Status Charging current limit - Mod.>KNX	14.019 electric current (A)	41 40 00 00 | 12 A
11.05.2023 15:32:31,974	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	41 14 00 00 | 9,25 A
11.05.2023 15:32:32,468	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	45 00 90 00 | 2057 W
11.05.2023 15:32:32,524	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 3D | 61 Wh
11.05.2023 15:32:35,442	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	41 33 5C 29 | 11,21 A
11.05.2023 15:32:35,472	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/22	TerraWB Status Voltage L1 - Mod.>KNX	14.027 electric potential (V)	43 69 4C CD | 233,3 V
11.05.2023 15:32:35,937	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	45 21 60 00 | 2582 W
11.05.2023 15:32:41,883	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/26	TerraWB Status Voltage L3 - Mod.>KNX	14.027 electric potential (V)	43 6B CC CD | 235,8 V
11.05.2023 15:32:48,874	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 48 | 72 Wh

Charging in progress, set <u>max</u>. charging current to 12A via KNX

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (1): ABB Terra AC Wallbox

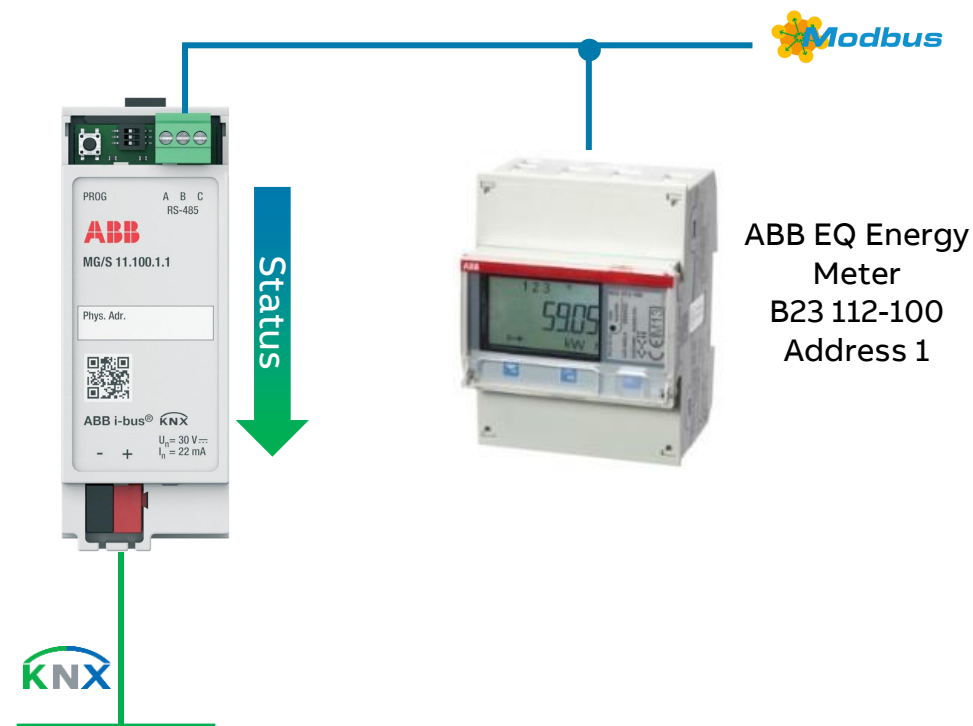| Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
11.05.2023 15:34:37,376	fro...		L	3.1.1	Modbus RTU - KNX TP Gateway	4/5/30	TerraWB Status Energy delivered - Mod.>KNX	13.010 active energy (Wh)	00 00 00 97 | 15140 Wh
11.05.2023 15:34:45,787	fro...		Low	3.1.14	Control Element	4/5/37	TerraWB Control Start/Stop charg. Session - KNX>Mod.	7.* 2-byte unsigned value	00 01 | 1
11.05.2023 15:34:46,734	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/24	TerraWB Status Voltage L2 - Mod.>KNX	14.027 electric potential (V)	43 6C 00 00 | 236 V
11.05.2023 15:34:49,708	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	3F 75 C2 8F | 0,96 A
11.05.2023 15:34:49,738	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/22	TerraWB Status Voltage L1 - Mod.>KNX	14.027 electric potential (V)	43 6B 80 00 | 235,5 V
11.05.2023 15:34:50,202	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	41 30 00 00 | 11 W
11.05.2023 15:34:52,681	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/12	TerraWB Status Charging state - Mod.>KNX	12.* 4-byte unsigned value	00 00 85 00 | 34048
11.05.2023 15:34:52,711	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/14	TerraWB Status Charging current limit - Mod.>KNX	14.019 electric current (A)	41 47 AE 14 | 12,48 A
11.05.2023 15:34:52,743	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/16	TerraWB Status Charging current L1 - Mod.>KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 15:34:53,175	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/5/28	TerraWB Status Active power - Mod.>KNX	14.056 power (W)	00 00 00 00 | 0 W

→ Stop charging session via KNX

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (2): ABB EQ Energy Meter B23

Adoption of the parameterization from a device template

- A template is available for the ABB EQ Energy Meter B23-112-100

- Import the device template from an online database/local storage

- You can activate or deactivate data points by selecting them manually ("Active" checkbox)

- The gateway will then create a new device that only includes the active data points (description, KNX data point type, function code, …)

- Set the address according to the address set in the device (e.g. 1)

- The desired KNX sending behavior for changing Modbus data must be set in the deadband

- Link group addresses ….

ABB EQ Energy Meter B23 112-100 Address 1

Modbus Server Template

Explore Templates

Explore Template Files

[Import File] [Download]

Device template of ABB EQ Energy Meter B23

Template

Activate or deactivate data points by selecting them manually

Acti.	Description	DPT	Grou...	C	...	T	W	R	Server Addre...	Read Func	Write Fu...	Data Length	Format	Register Add
✓	Total energy accu. - Active import	13.013: active energy (kWh)	...		T		R	1		3: Read Holding Registe...	-	64	0: Unsigned	20480
✓	Instantaneous values - Voltage L1-N	14.027: electric potential (V)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23296
✓	Instantaneous values - Voltage L2-N	14.027: electric potential (V)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23298
✓	Instantaneous values - Voltage L3-N	14.027: electric potential (V)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23300
✓	Instantaneous values - Current L1	14.019: electric current (A)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23308
✓	Instantaneous values - Current L2	14.019: electric current (A)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23310
✓	Instantaneous values - Current L3	14.019: electric current (A)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23312
✓	Instantaneous values - Current N	14.019: electric current (A)	...		T		R	1		3: Read Holding Registe...	-	32	0: Unsigned	23314
✓	Instantaneous values - Active power Total	14.056: power (W)	...		T		R	1		3: Read Holding Registe...	-	32	1: Signed (C...	23316
✓	Instantaneous values - Active power L1	14.056: power (W)	...		T		R	1		3: Read Holding Registe...	-	32	1: Signed (C...	23318
✓	Instantaneous values - Active power L2	14.056: power (W)	...		T		R	1		3: Read Holding Registe...	-	32	1: Signed (C...	23320
✓	Instantaneous values - Active power L3	14.056: power (W)	...		T		R	1		3: Read Holding Registe...	-	32	1: Signed (C...	23322
✓	Instantaneous values - Frequency	14.033: frequency (Hz)	...		T		R	1		3: Read Holding Registe...	-	16	0: Unsigned	23340
	Instantaneous values - Phase angle current L3	8.011: rotation angle (°)	...		T		R	1		3: Read Holding Registe...	-	16	1: Signed (C...	23353
	Total energy accu. - Active export	13.013: active energy (kWh)	...		T		R	1		3: Read Holding Registe...	-	64	0: Unsigned	20484
	Total energy accu. - Active net	13.013: active energy (kWh)	...		T		R	1		3: Read Holding Registe...	-	64	1: Signed (C...	20488

Template selected Data Points   14

Manufacturer	ABB	Server Address	1
Device Name	B23B24	Total Gateway Data Points	31/100

[Apply] [Cancel]

ABB

3.1.1 Modbus RTU - KNX TP Gateway > B23_B24 > Config B23_B24

Device template of ABB EQ Energy Meter B23

Config B23_B24

Device 2 Name	B23_B24
Device 2 Server Address	1
Device 2 Number of Data Points	14
Device 2 Active	✓

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	18	Total energy accu. - Active import	13.013: active energy (kWh)	1	3: Read Holding Registers	-	64	0: Unsigned	0: Big Endian	20480	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	19	Instantaneous values - Voltage L1-N	14.027: electric potential (V)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23296	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
✓	20	Instantaneous values - Voltage L2-N	14.027: electric potential (V)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23298	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
✓	21	Instantaneous values - Voltage L3-N	14.027: electric potential (V)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23300	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)
✓	22	Instantaneous values - Current L1	14.019: electric current (A)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23308	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	23	Instantaneous values - Current L2	14.019: electric current (A)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23310	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	24	Instantaneous values - Current L3	14.019: electric current (A)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23312	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	25	Instantaneous values - Current N	14.019: electric current (A)	1	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23314	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	26	Instantaneous values - Active power	14.056: power (W)	1	3: Read Holding Registers	-	32	1: Signed (C2)	0: Big Endian	23316	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	27	Instantaneous values - Active power	14.056: power (W)	1	3: Read Holding Registers	-	32	1: Signed (C2)	0: Big Endian	23318	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	28	Instantaneous values - Active power	14.056: power (W)	1	3: Read Holding Registers	-	32	1: Signed (C2)	0: Big Endian	23320	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	29	Instantaneous values - Active power	14.056: power (W)	1	3: Read Holding Registers	-	32	1: Signed (C2)	0: Big Endian	23322	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	30	Instantaneous values - Frequency	14.033: frequency (Hz)	1	3: Read Holding Registers	-	16	0: Unsigned	0: Big Endian	23340	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)
✓	31	Instantaneous values - Power factor	8.x: (2-byte, Signed Value)	1	3: Read Holding Registers	-	16	1: Signed (C2)	0: Big Endian	23354	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)

Group Objects / Channels / Parameters / DCA

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (2): ABB EQ Energy Meter B23

Topology ▾											

＋ Add Devices ｜ ▾	✖ Delete	⬇ Download ｜ ▾	ⓘ Info ▾	🔁 Restart	⚡ Unload ▾	🖨 Print

Topology Backbone ▾	Numb	Group Ad	Name	Object Function	Length	C	R	W	T	U	Data Type
▸ 📁 Dynamic Folders	36	4/3/1	D2.18 Status Total energy accu. - Active import [DPT_13.013]	Modbus -> KNX	4 bytes	C	R	-	T	-	active energy (kWh)
▸ 📄 3 Area 3.x.x	38	4/3/2	D2.19 Status Instantaneous values - Voltage L1-N [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
◢ ⌁ 3.1 Line 3.1.xxx	40	4/3/3	D2.20 Status Instantaneous values - Voltage L2-N [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
	42	4/3/4	D2.21 Status Instantaneous values - Voltage L3-N [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
▸ 🖳 3.1.0 IP Router IPR/S	44	4/3/8	D2.22 Status Instantaneous values - Current L1 [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
▸ 🖳 3.1.1 Modbus RTU - KNX TP...	46	4/3/9	D2.23 Status Instantaneous values - Current L2 [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	48	4/3/10	D2.24 Status Instantaneous values - Current L3 [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	50	4/3/11	D2.25 Status Instantaneous values - Current N [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
	52	4/3/12	D2.26 Status Instantaneous values - Active power Total [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
	54	4/3/13	D2.27 Status Instantaneous values - Active power L1 [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
	56	4/3/14	D2.28 Status Instantaneous values - Active power L2 [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
	58	4/3/15	D2.29 Status Instantaneous values - Active power L3 [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
	60	4/3/15	D2.30 Status Instantaneous values - Frequency [DPT_14.033]	Modbus -> KNX	4 bytes	C	R	-	T	-	frequency (Hz)
	62	4/3/16	D2.31 Status Instantaneous values - Power factor Total [DPT_8.x]	Modbus -> KNX	2 bytes	C	R	-	T	-	2-byte signed value

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (2): ABB EQ Energy Meter B23

Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
11.05.2023 14:25:55,746	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/4	B23 Status Ins. Val. - Voltage L3-N Modbus->KNX	14.027 electric potential (V)	43 6C 80 00 | 236,5 V
11.05.2023 14:26:04,806	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/1	B23 Status Total energy - Act. import Modbus->KNX	13.013 active energy (kWh)	00 00 00 01 | 1 kWh
11.05.2023 14:26:04,839	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/2	B23 Status Ins. Val. - Voltage L1-N Modbus->KNX	14.027 electric potential (V)	43 6C 80 00 | 236,5 V
11.05.2023 14:26:04,869	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/3	B23 Status Ins. Val. - Voltage L2-N Modbus->KNX	14.027 electric potential (V)	43 6C 33 33 | 236,2 V
11.05.2023 14:26:04,902	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/4	B23 Status Ins. Val. - Voltage L3-N Modbus->KNX	14.027 electric potential (V)	43 6C CC CD | 236,8 V
11.05.2023 14:26:05,272	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/8	B23 Status Ins. Val. - Current L1 Modbus->KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:26:05,302	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/9	B23 Status Ins. Val. - Current L2 Modbus->KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:26:05,334	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/10	B23 Status Ins. Val. - Current L3 Modbus->KNX	14.019 electric current (A)	00 00 00 00 | 0 A
11.05.2023 14:26:05,396	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/12	B23 Status Ins. Val. - Act. power Total Modbus->KNX	14.056 power (W)	00 00 00 00 | 0 W
11.05.2023 14:26:05,426	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/13	B23 Status Ins. Val. - Act. power L1 Modbus->KNX	14.056 power (W)	00 00 00 00 | 0 W
11.05.2023 14:26:05,821	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/14	B23 Status Ins. Val. - Act. power L2 Modbus->KNX	14.056 power (W)	00 00 00 00 | 0 W
11.05.2023 14:26:05,852	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/15	B23 Status Ins. Val. - Act. power L3 Modbus->KNX	14.056 power (W)	00 00 00 00 | 0 W
11.05.2023 14:26:05,888	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/16	B23 Status Ins. Val. - Frequency Modbus->KNX	14.033 frequency (Hz)	42 48 33 33 | 50,05 Hz
11.05.2023 14:26:05,915	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/17	B23 Status Ins. Val. - Power Factor Total Modbus->KNX	14.057 power factor (cos Φ)	00 00 00 00 | 0 cos Φ
Switching "ON" the load ➡	1			3.1.14	Control Element	4/1/51	B23 - Load L1 on/off	1.001 switch	$01 | On
11.05.2023 14:26:11,336	fro...		Low	3.1.13	Switch Actuator	4/1/52	B23 - Load L1 status on/off	1.001 switch	$01 | On
11.05.2023 14:26:11,767	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/13	B23 Status Ins. Val. - Act. power L1 Modbus->KNX	14.056 power (W)	41 A5 70 A4 | 20,68 W
11.05.2023 14:26:12,263	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/17	B23 Status Ins. Val. - Power Factor Total Modbus->KNX	14.057 power factor (cos Φ)	3F 80 00 00 | 1 cos Φ
11.05.2023 14:26:14,685	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/8	B23 Status Ins. Val. - Current L1 Modbus->KNX	14.019 electric current (A)	3E 38 51 EC | 0,18 A
11.05.2023 14:26:14,740	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/12	B23 Status Ins. Val. - Act. power Total Modbus->KNX	14.056 power (W)	42 28 7A E1 | 42,12 W
11.05.2023 14:26:15,236	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/1/13	B23 Status Ins. Val. - Act. power L1 Modbus->KNX	14.056 power (W)	42 28 7A E1 | 42,12 W

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

- If there is <u>no template available</u> or the device should be <u>configured manually</u>

- The parameters of the data points for
  - KNX (object name and data point type)
  - Modbus (function code, register address, format, …)

  must be set manually

- Set the address according to the address set in the device (e.g. 2)

- The desired KNX sending behavior for changing Modbus data must be set in the deadband

- Link group addresses

- ….

ABB EQ Energy
Meter
B21 112-100
Address 2

A template is available for the meter, but it should be configured manually

Status
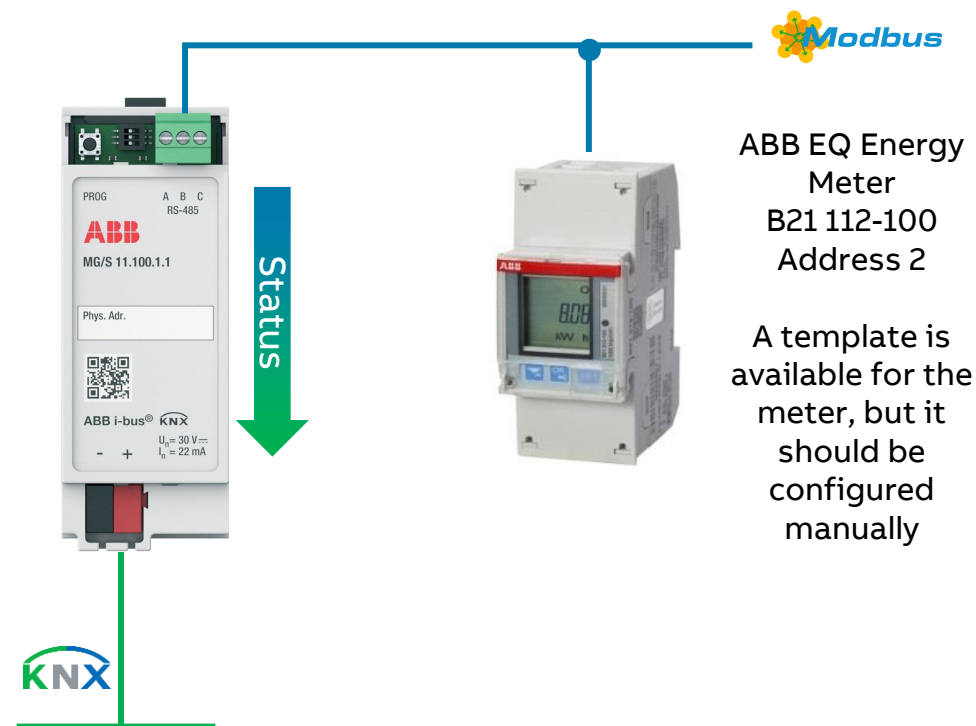
Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

- General parameter window
  - Add another device (increase "Number of Devices" by one)
  - Enter a name for the device
  - Set the address according to the address set in the device (e.g. no. 2)
  - Define the number of data points (e.g. 6)
  - Activate the device (checkbox)

- Note
  - Modbus uses 16-bit registers for data exchange
    - For example: Voltage has a register size of 2 (2x16 bit)
    - This corresponds to a KXN 4-byte float value

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

- Config Device parameter window

  - The Modbus parameters can be found in the product manual of the device (function code, register address, format, …)

Communication with Modbus

9.3 Mapping Tables

Introduction   The purpose of this section is to explain the relation between register number and metering data.

All registers in the following table are read only:

Quantity	Details	Start reg (Hex)	Size	Res.	Unit	Value range	Data type
Active energy import	kWh	5000	4	0,01	kWh		Unsigned
Voltage	L1-N	5B00	2	0,1	V		Unsigned
Current	L1	5B0C	2	0,01	A		Unsigned
Active power	Total	5B14	2	0,01	W		Signed
Frequency		5B2C	1	0,01	Hz		Unsigned
Power factor	Total	5B3A	1	0,001	-	-1,000-+1,000	Signed

  - Set the parameters of the data points for
    - KNX (object name and data point type)
    - Modbus (function code, register address, format, …)

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	32	Active Imported Energy Total	13.013: active energy (kWh)	2	3: Read Holding Registers	-	64	0: Unsigned	0: Big Endian	20480	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)

Parameter settings and mapping for "Energy"	
Object Name:	Active Imported Energy Total
DPT	13.013: Active Energy (kWh)
Read Function	3 – Read Holding Registers
Data Length	64
Format	0 – Unsigned
Byte Order	Big Endian
Register Address	20480 dec
Operation	Divide by (/)
Operation Value	100

Information from the product manual	
Quantity	Total Energy – Active import
Unit	kWh
-	
Size	*4
Data type	Unsigned
-	
Start register	5000 hex
Resolution	0.01

*4 x 16 bit

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Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	33	Voltage L1	14.027: electric potential (V)	2	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23296	-	-	0	Divide by (/)	10	knx = (modbus / 10.00)

Parameter settings and mapping for "Voltage"			Information from the product manual	
Object Name:	Voltage L1	⬅	Quantity	Voltage L1-N
DPT	14.027: Electrical Potential (V)	⬅	Unit	V
Read Function	3 – Read Holding Registers		-	
Data Length	32	⬅	Size	*2
Format	0 – Unsigned	⬅	Data type	Unsigned
Byte Order	Big Endian		-	
Register Address	23296 dec	⬅	Start register	5B00 hex
Operation	Divide by (/)	⬅	Resolution	0.1
Operation Value	10			

*2 x 16 bit

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Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	34	Current L1	14.019: electric current (A)	2	3: Read Holding Registers	-	32	0: Unsigned	0: Big Endian	23308	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)

Parameter settings and mapping for "Current"	
Object Name:	Current L1
DPT	14.019: Electrical Current (A)
Read Function	3 – Read Holding Registers
Data Length	32
Format	0 – Unsigned
Byte Order	Big Endian
Register Address	23308 dec
Operation	Divide by (/)
Operation Value	100

Information from the product manual	
Quantity	Current L1
Unit	A
-	
Size	*2
Data type	Unsigned
-	
Start register	5B0C hex
Resolution	0.01

*2 x 16 bit

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	35	Active Imported Power Total	14.056: power (W)	2	3: Read Holding Registers	-	32	1: Signed (C2)	0: Big Endian	23316			0	Divide by (/)	100	knx = (modbus / 100.00)

Parameter settings and mapping for "Power"	
Object Name:	Active Imported Power Total
DPT	14.056: Power (W)
Read Function	3 – Read Holding Registers
Data Length	32
Format	1 – Signed
Byte Order	Big Endian
Register Address	23316 dec
Operation	Divide by (/)
Operation Value	100

Information from the product manual	
Quantity	Active Power Total
Unit	W
-	
Size	*2
Data type	Signed
-	
Start register	5B14 hex
Resolution	0.01

*2 x 16 bit

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓ 36	Frequency	14.033: frequency (Hz)	2	3: Read Holding Registers	-	16	0: Unsigned	0: Big Endian	23340	-	-	0	Divide by (/)	100	knx = (modbus / 100.00)

Parameter settings and mapping for "Frequency"	
Object Name:	Frequency
DPT	14.033: Frequency (Hz)
Read Function	3 – Read Holding Registers
Data Length	16
Format	0 – Unsigned
Byte Order	Big Endian
Register Address	23340 dec
Operation	Divide by (/)
Operation Value	100

Information from the product manual	
Quantity	Frequency
Unit	Hz
-	
Size	*1
Data type	Unsigned
-	
Start register	5B2C hex
Resolution	0.01

*1 x 16 bit

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Manual mapping of the Modbus KNX data points

	#	Object Name	DPT	Server Address	Read Function	Write Function	Data Length	Format	Byte Order	Register Address	Bit	# Bits	Deadband	Operation	Operation Value	Operation Definition
✓	37	Power Factor Total	14.057: power factor (cos φ)	2	3: Read Holding Registers	-	16	1: Signed (C2)	0: Big Endian	23354	-	-	0	Divide by (/)	1000	knx = (modbus / 1000.00)

Parameter settings and mapping for "Power Factor"	
Object Name:	Power Factor Total
DPT	14.057: Power Factor (cos phi)
Read Function	3 – Read Holding Registers
Data Length	16
Format	1 – Signed
Byte Order	Big Endian
Register Address	23354 dec
Operation	Divide by (/)
Operation Value	1000

Information from the product manual	
Quantity	Power Factor Total
Unit	-
-	
Size	*1
Data type	Signed
-	
Start register	5B3A hex
Resolution	0.001

*1 x 16 bit

ABB

Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Numb	Group Ad	Name	Object Function	Length	C	R	W	T	U	Data Type
64	4/1/1	D3.32 Status Active Imported Energy Total [DPT_13.013]	Modbus -> KNX	4 bytes	C	R	-	T	-	active energy (kWh)
66	4/1/2	D3.33 Status Voltage L1 [DPT_14.027]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric potential (V)
68	4/1/3	D3.34 Status Current L1 [DPT_14.019]	Modbus -> KNX	4 bytes	C	R	-	T	-	electric current (A)
70	4/1/4	D3.35 Status Active Imported Power Total [DPT_14.056]	Modbus -> KNX	4 bytes	C	R	-	T	-	power (W)
72	4/1/5	D3.36 Status Frequency [DPT_14.033]	Modbus -> KNX	4 bytes	C	R	-	T	-	frequency (Hz)
74	4/1/6	D3.37 Status Power Factor Total [DPT_14.057]	Modbus -> KNX	4 bytes	C	R	-	T	-	power factor (cos Φ)

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Modbus RTU – KNX TP Gateway MG/S

Commissioning – Example (3): ABB EQ Energy Meter B21

Practical demonstration

Modbus RTU – KNX TP Gateway MG/S

Practical demonstration

Control Element:
R1: Load B23 L1 & L2 on/off
R2: Load B23 L3 & B21 L on/off
R3: Start/stop charging session
R4: Set charging current limit to 8A and 12A

ETS Group Monitor

Modbus KNX Gateway MG/S

Status

Control

Terra AC Wallbox Address 5

ABB EQ Energy Meter B23 112-100 Address 1

ABB EQ Energy Meter B21 112-100 Address 2

L1 40W

L2 25W

L3 25W

25W

Command

- Charging Session (2-byte unsigned value DPT 7.x) Start "0" and stop "1"

- Set charging current limit (14.019: Elec. Current) "0 … 16 A"

Troubleshooting

Modbus RTU – KNX TP Gateway MG/S

Troubleshooting

To minimize potential sources of error, there are certain principles you should follow

- Installation: Check cable length, polarity, termination resistors, etc.

- Configuration: The baud rate and parity must be the same for all the devices in the Modbus system

- Each Modbus device is assigned a unique address

- The data points (function codes, register numbers, format, etc.) are correctly entered in the gateway in accordance with the device specification

- There are Modbus tools for simulating and testing the communication between client and server.
Example: www.modbustools.com/index.html

- Other support tools, e.g. Engineering Guides, FAQs, etc. are available on our website www.abb.com/knx
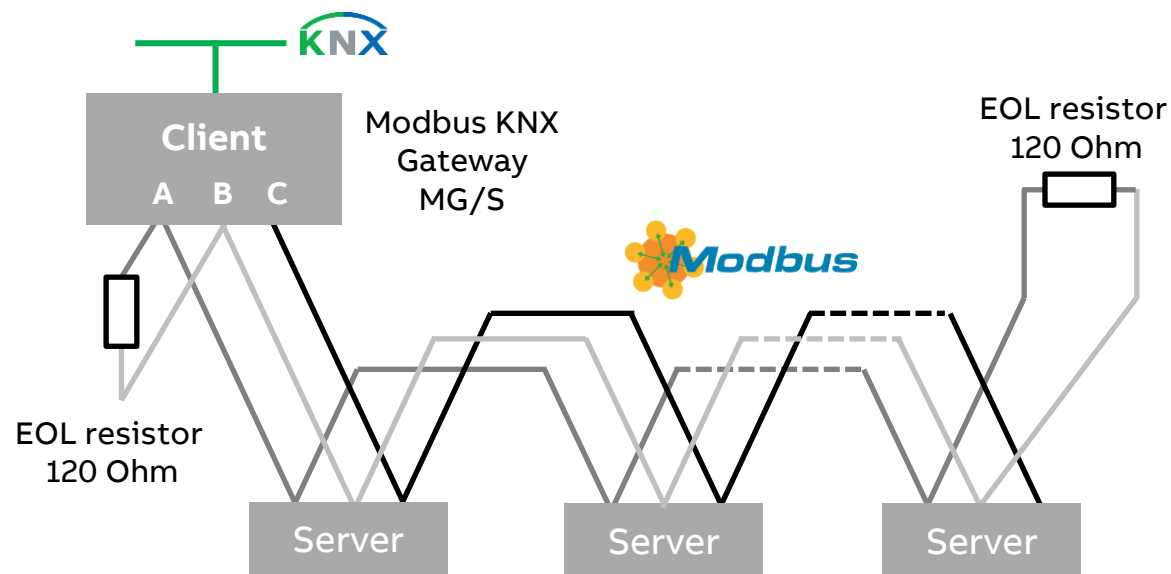
Modbus RTU – KNX TP Gateway MG/S

Troubleshooting

The following communication objects indicate communication problems and can be displayed with the ETS Group Monitor

- No. 202: Status Error alarm
  - Communication problem with a server
    "0" = No alarm and "1" = Alarm
- No. 203: Status Modbus device error
  - Server address of the last Modbus server with an error
- No. 204: Status Modbus register error
  - Register address of the last Modbus server with an error
- No. 205: Status Error text
  - Reports a string signal containing information about the error
  - The format of the string is ss:ff:aaaa:ee, where:
    - ss: Server ID (00 .. 3F)
    - ff: Function code (00 .. 10)
    - aaaa: Address (0000 .. FFFF)

Numb	Group Ad	Name	Object Function	Data Type
202	4/0/202	Status Error Alarm [DPT_1.005]	0-No alarm;1-Alarm	alarm
203	4/0/203	Status Modbus Dev Error [DPT_8.xxx]	Server Address	2-byte signed value
204	4/0/204	Status Modbus Reg Error [DPT_12.xxx]	Register Address	4-byte unsigned value
205	4/0/205	Status Error Text [DPT_16.001]	Error Text	Character String (ISO 8859-1)

ABB

Modbus RTU – KNX TP Gateway MG/S

Troubleshooting

Example: The Modbus device with address "1" has ben disconnected from the gateway

Time	Serv	Flags	Prio	Source	Source Name	Destina	Destination Name	DPT	Info
12.05.2023 07:31:59,305	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/0/202	Gateway Status Error Alarm 0-No alarm;1-Alarm	1.005 alarm	$01 | Alarm
12.05.2023 07:31:59,333	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/0/203	Gateway Status Modbus Dev Error Server Address	8.* 2-byte signed value	00 01 | 1
12.05.2023 07:31:59,365	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/0/204	Gateway Status Modbus Reg Error Register Address	12.* 4-byte unsigned value	00 00 50 00 | 20480
12.05.2023 07:31:59,422	fro...		Low	3.1.1	Modbus RTU - KNX TP Gateway	4/0/205	Gateway Status Error Text Error Text	16.001 Character String (ISO...	30 31 3A 30 33 3A 35 30 30 30 3A 45 52 33 | 01:03:5000:ER3

- Group address 4/0/202: Status Error alarm – "1" = Alarm
- Group address 4/0/203: Status Modbus device error – The Modbus server at address "1" has an error
- Group address 4/0/204: Modbus register error – Register address 20480 with an error
- Group address 4/0/205: Status Error text – String signal containing information about the error

Modbus RTU – KNX TP Gateway MG/S

Troubleshooting

- USB to RS485 Converter

    - Point to point communication to
      - Test the communication settings in the Modbus device
      - Read and write a register
      - View the byte order (High byte or low byte first, …)

    - Price around 20.- €

- Various programs are available free of charge

    - "Baseblock"
      https://www.baseblock.com/PRODUCTS/comtestpro.htm

- With some deices, the data lines "A" and "B" must be swapped, e.g. ABB EQ Energy Meters A- and B-series

C B A

GND
A+
B-
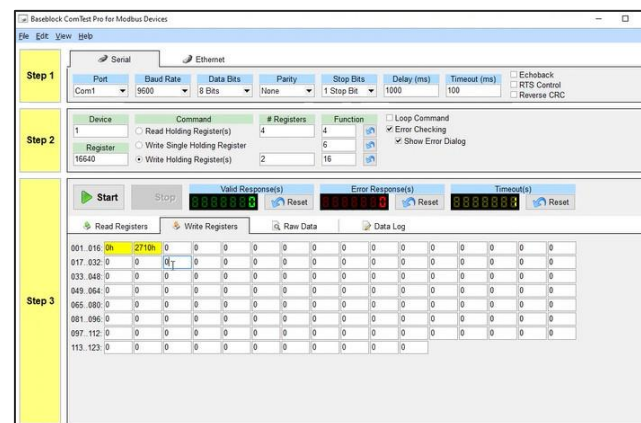
ABB EQ Energy Meter B23:
Swapping the data lines!

ABB

Modbus RTU – KNX TP Gateway MG/S

Troubleshooting

- USB to RS485 Converter and "Baseblock"
  https://www.baseblock.com/PRODUCTS/comtestpro.htm

Modbus settings
- COM port of USB converter
- Baud rate
- Data type
- ….

Device settings
- Modbus address (e.g. 5)
- Register address (e.g. 16406 of Voltage L1)
- Data Length
- Command
- …

Answer:
- 2370 → 237,0 V
- Factor 0,1

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Modbus RTU – KNX TP Gateway MG/S

Summary

- The Modbus KNX Gateway allows to integrate Modbus devices into a KNX installation quickly and easily <u>at the field level</u>

- Bidirectional communication between KNX and Modbus

- Up to 100 Modbus data points (status and commands)

- The devices support standard KNX data points (DPT)

- Auxiliary voltage is not required (max. 22 mA)

- To facilitate configuration, a free of charge DCA is available that allows the export and import of Modbus-KNX mappings in the form of templates

- Modbus-KNX mapping templates are available for download from a database

- 2D Code for unique identification (product information, …)
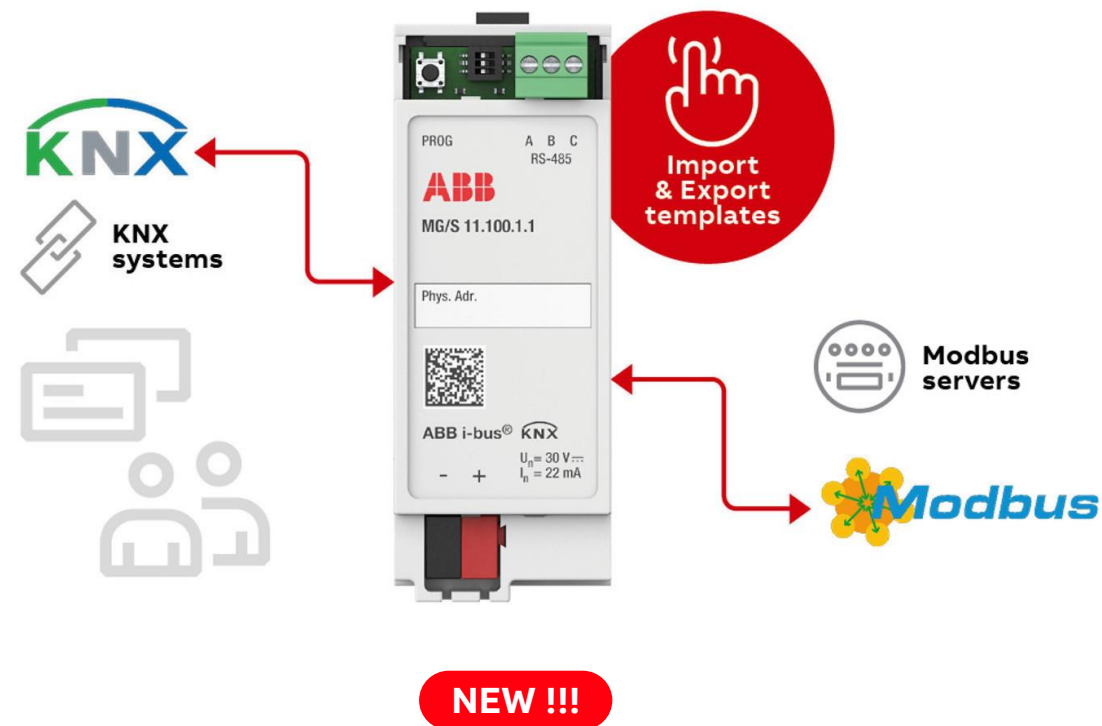
Modbus RTU – KNX TP Gateway MG/S

Homepage

www.abb.com/KNX

→ Products and Downloads

   → System Infrastructure and Interfacing

      → Gateways

         → Modbus RTU – KNX TP Gateway MG/S

         Downloads:

- ETS Application
- Device Configuration App (DCA)
- Product Manual
- Tutorials, webinar presentation and recording
- Selection table "List of templates"
- Installation and Operating Instructions
- Specification Text
- • • •

Modbus RTU – KNX TP Gateway MG/S

Microsite

- Main features of the devices(s)
- Benefits
- Product overview and range
- Service and tools
- Link to the product page with downloads
- …
  - Modbus RTU – KNX TP Gateway MG/S → Link
  - ABB EQ Energy Meters A- and B-series → Link
  - EV Charging Solutions → Link
  - Terra AC Wallbox → Link

Modbus RTU – KNX TP Gateway MG/S

2D code

- The packaging and the front of the device are labeled with a 2D code

- These codes are used for unique identification of the device and include the following information:

  - Link to the product page

  - Order code

  - Device serial number

- The 2D codes can be read using any mobile device with an appropriate 2D code reader

- By scanning the 2D codes with the ABB Product Scanner (available as Android and iOS App), you can open additional digital services

Modbus RTU – KNX TP Gateway MG/S

Scanning the 2D code with the app "ABB Product Scanner"
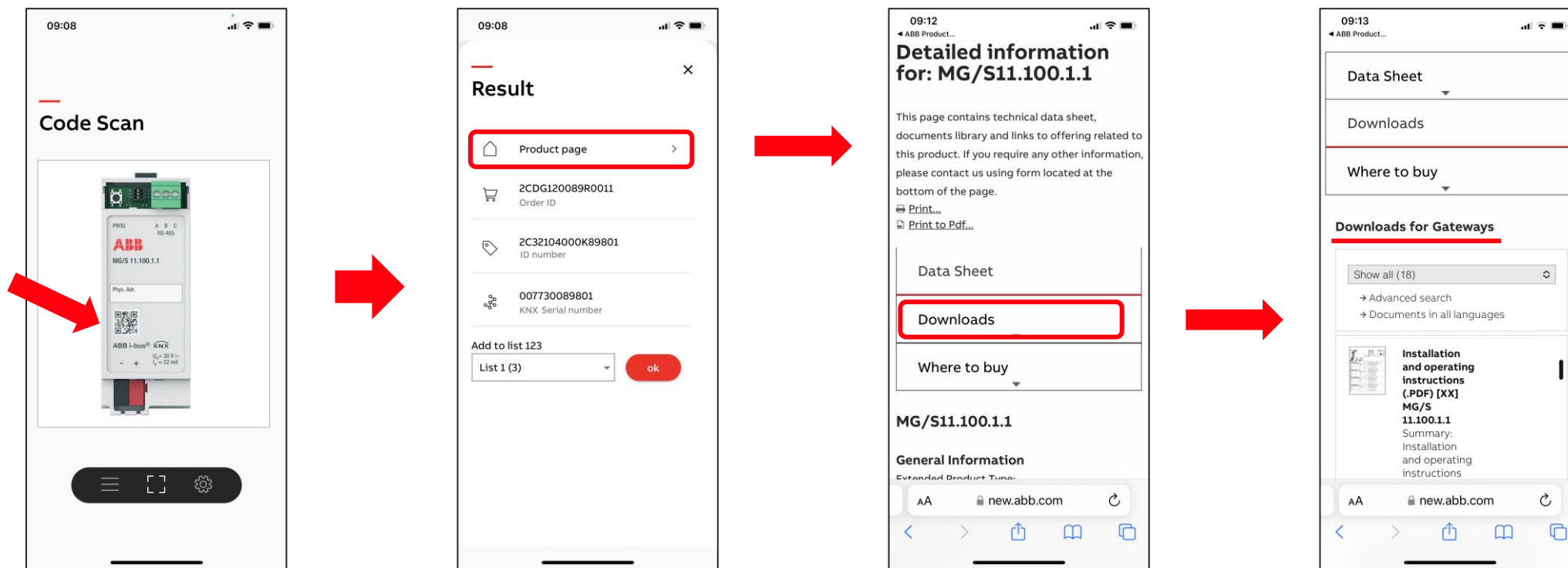
# Modbus RTU – KNX TP Gateway MG/S

Training Material

Training & Qualification Database

- The database contains extensive training content

  - Presentations

  - Video tutorials

  - Webinar slides and videos

  - and more …

- https://go.abb/ba-training

- www.abb.com/knx (→ Services & Tools → Training and Qualification → Training Database)

YouTube

- Channel "ABB Home and Building Automation"

- https://www.youtube.com/user/ABBibusKNX
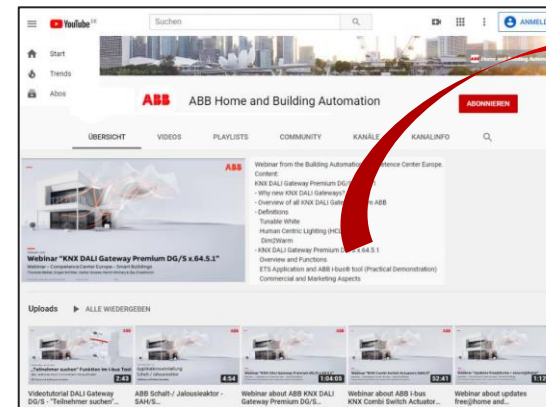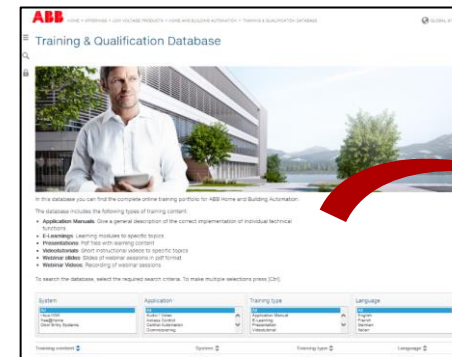
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