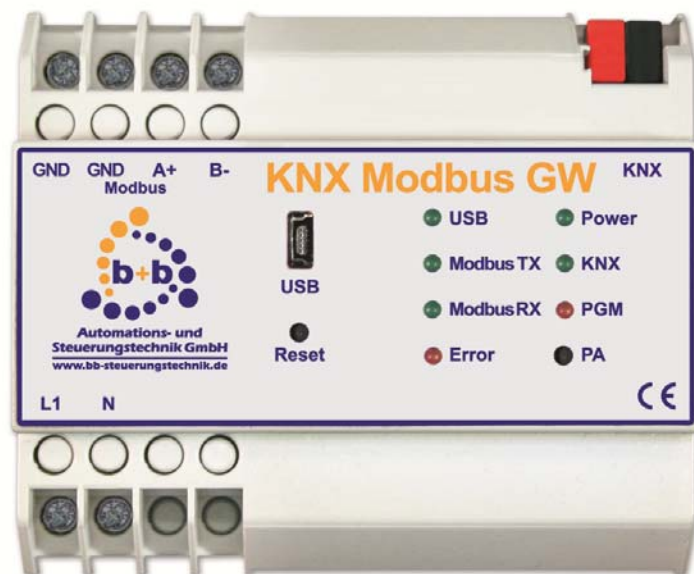**Documentation**

KNX Modbus Gateway

Gateway between Modbus RTU and EIB/KNX to integrate Modbus RTU compatible devices

Order number: E001-H009102

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Only qualified persons are allowed to install our units.

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Table of contents

Highlights KNX Modbus Gateway

- Direct link to EIB/KNX (two-wire)
- Link to Modbus RTU (RS-485)
- Read the current values from electric meters, electricity supply systems, etc.
- Support for all major Modbus Function codes: Read Coils, Read Discrete Inputs, Read Holding Registers, Read Input Registers, Write Single Coil, Write Single Register, Write Multiple Coils, Write Multiple Registers
- Cyclic polling of the slaves
- Each KNX Modbus Gateway can transfer up to 300 measured values
- Up to 30 Modbus slaves can be connected to each KNX Modbus Gateway
- KNX status message in case of a Modbus Slave failure
- Simple parameterization via USB and b+b Terminal software
- Rail mounted device (6TE = 105mm) with integrated 85V – 240V wide range power supply

Fields of application

- Integration of Modbus slaves for the professional performance-, power- and energy-analysis
- Easy integration of Modbus RTU slave in EIB/KNX -systems
- Read/write process values of Modbus slave
- Visualization of energy consumption in the EIB/KNX installation

Contents of delivery

- KNX Modbus Gateway
- USB cable for parametrization/diagnosis
- b+b Terminal Software
- Documentation

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Introduction

The KNX Modbus Gateway is used for communication between the EIB/KNX bus and Modbus compatible meters, power analyzers, etc. The gateway assumes the role of the Modbus Master, i.e. it controls communication. The gateway provides a bidirectional connection. Data from the Slaves can be read either in cycles at certain intervals or on request by the EIB/KNX bus system. The most important function codes for read and write access are supported.

For example, consumption values can be used as an integer or transferred as a floating point value to the EIB/KNX bus. Different data formats can be set for each measured value. Furthermore, it is possible to scale the process values (multiplication/division).

Parametrization and diagnosis is performed through the integrated USB interfaces in connection with our b+b Terminal software.

The gateway hardware consists of a 6TE (=105 mm) wide rail mounting housing with integrated 85V - 240V power supply and connections for Modbus and EIB/KNX. The slave is maintenance-free without fan or any other wear parts.
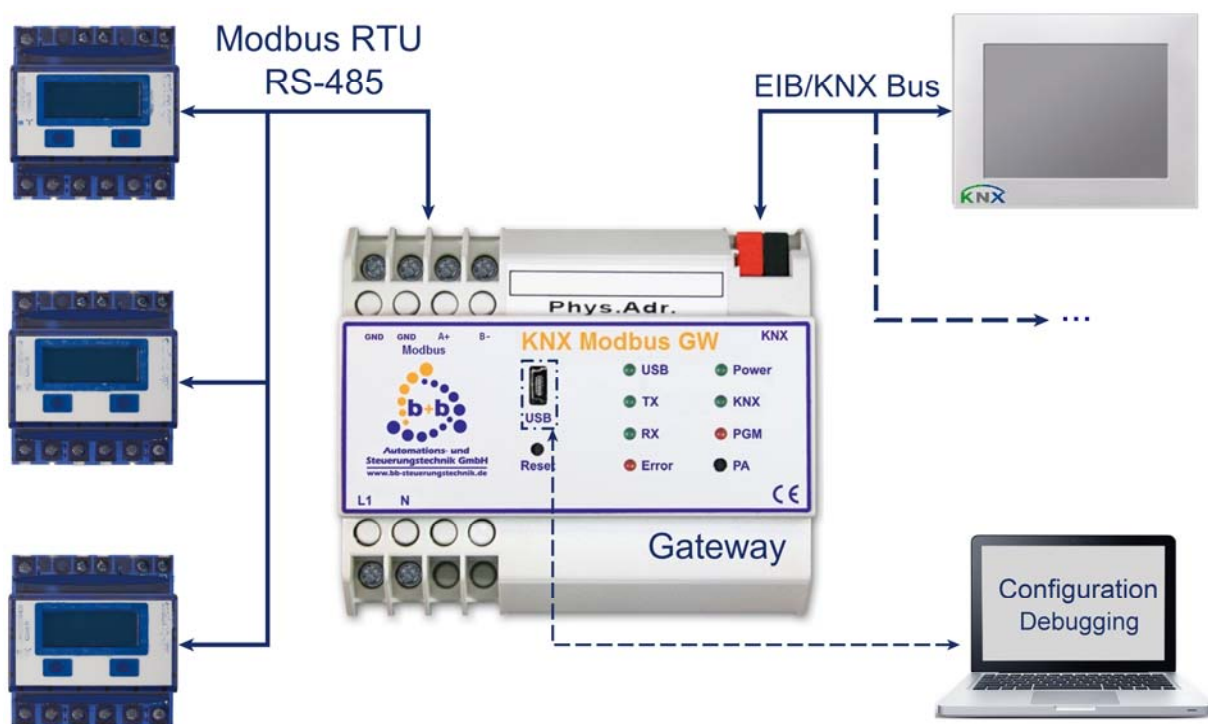

Figure 1: Fields of application KNX Modbus Gateway

Technical data

|	
External dimensions (W x H x D)	105mm x 90mm x 59mm
Casing	DIN rail mounted, plastic, 6TE, lightgrey (RAL 7035)
Weight	0,3 kg
Power supply	85V – 240V AC, 50Hz – 60Hz, over screw terminals (max. 2 x 2,5mm² solid wire / max. 2 x 1,5mm² flexible wire)
Power consumption	30mA
Temperature range	0°C ... +50°C (in operation)
	0°C ... +70°C (storage)
Degree of protection	IP20
Interfaces	1.) Modbus connection over screw terminals: (max. 2 x 2,5 mm² solid wire / max. 2 x 1,5 mm² flexible wire) Modbus Slave requirements: - Modbus RTU transmission protocol - Transfer rate from 1200 up to 38400 Baud Up to 30 Modbus slaves can be connected to one KNX Modbus Gatway. Up to 300 values can be transfer by one KNX Modbus Gateway. 2.) USB as service interface (for parametrisation / diagnosis) over Mini USB Buchse Typ B Virtual COM port Baudrate 57600 3.) EIB/KNX connection via standard EIB/KNX connector

Table 1: Technical data

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Connection overview
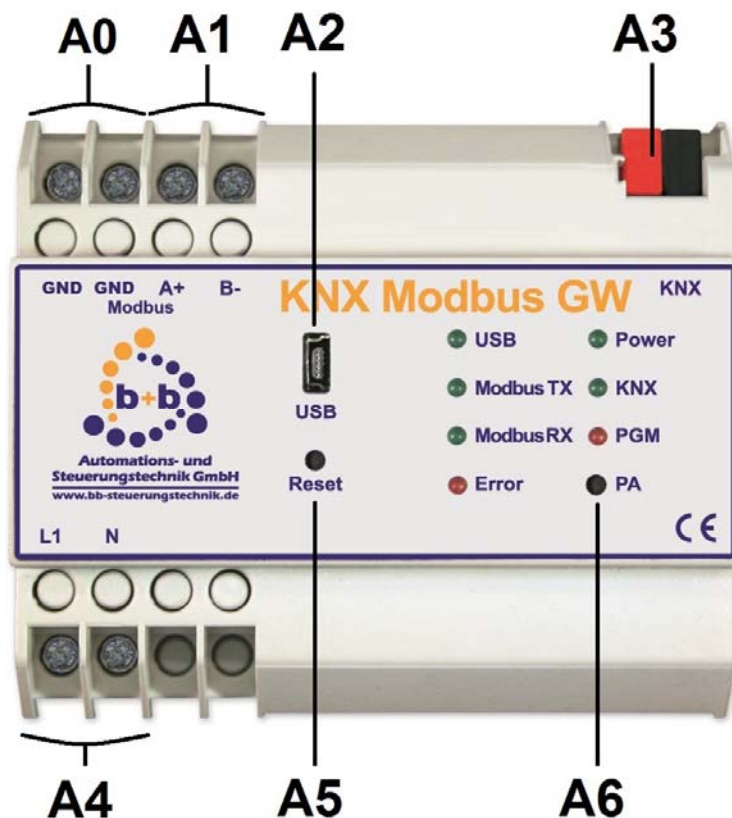
Figure 2: Connection overview KNX Modbus Gateway

A0	**GND**	Modbus Ground
A1	**A+ / B-**	Modbus connector
A2	**USB**	USB connector (Mini USB Typ B)
A3	**KNX**	EIB/KNX connector
A4	**L1 / N**	Power supply 85V – 240V AC **L1**: Phase conductor **N:** Neutral conductor
A5	**RESET**	Reset button
A6	**PA**	Programming button

Table 2: Connection overview KNX Modbus Gateway

Display and control elements
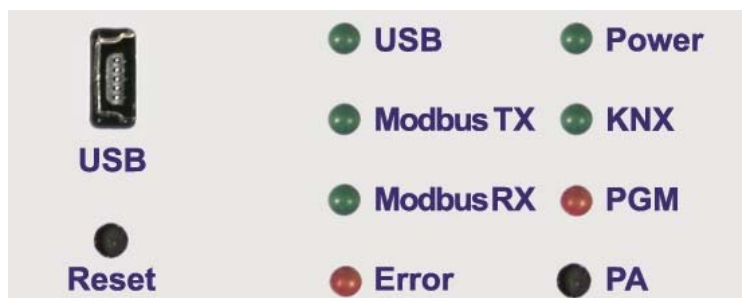
Figure 3: Detail view display and control elements

Button	Function
Reset	**Keypress long** (>= 3 seconds): The KNX Modbus Gateway reboots. **Note:** A reboot is mandatory if you add or remove Modbus slaves to your Modbus installation!
PA	**Keypress short** (< 3 seconds): The KNX Modbus Gateway switches to programming mode for EIB/KNX physical address setup. The programming mode is visualised with an illuminated LED **PGM**. You can leave the programming mode by short pressing the **PA** Button again.

LED	Function
USB	**LED flashing:** A data transmission between the PC and the KNX Modbus Gateway over the USB interface is in progress.
Modbus TX	**LED flashing:** The KNX Modbus Gateway sends a Modbus telegram.
Modbus RX	**LED flashing:** The KNX Modbus Gateway receives a Modbus telegram.
Error	**LED flashing** (frequency: ~ 1Hz): The KNX Modbus Gateway has detected an EIB/KNX busvoltage breakdown. The EIB/KNX bus voltage is checked cyclic every 30 seconds.
Power	**LED illuminated:** Power supply OK
KNX	**LED flashing:** The KNX Modbus Gateway sends or receives an EIB/KNX telegram.
PGM	**LED illuminated:** The KNX Modbus Gateway is currently in programming mode, waiting for an EIB/KNX physical address. **LED flashing** (frequency ~1Hz): The KNX Modbus Gateway is running in normal operating mode.

Table 3: Display and control elements

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Installation instruction

- Mount the KNX Modbus Gateway on a standard DIN rail.
- Connect the KNX Modbus Gateway to the EIB/KNX bussystem. Connect your Modbus installation (max. 30 Modbus slaves!) to the KNX Modbus Gateway.
- Connect the power supply (85V – 240V AC) to your KNX Modbus Gateway.
- If everything is connected properly you can switch on the power supply.

After installing the KNX Modbus Gateway you have to configure it **(see section „Parametrisation with the b+b Terminal software").**

Parametrisation with the b+b Terminal software

Before using the KNX Modbus Gateway you first have to setup the Modbus slaves available in your Modbus installation. The parametrisation of the gateway is handled with a dialog in the b+b Terminal software and can be transferred to the KNX Modbus Gateway over the USB interface.

Note: The parametrisation dialog is available in the b+b Terminal software since version 1.37. If you have already installed our b+b Terminal software on your PC please ensure that you have at least version 1.37 (see menu item „*?\Info about b+bTerminal...*") installed. You can find the current version of our b+b Terminal software on the provided EIB Tools CD or on our homepage under „*Downloads*".

Before you can parametrise the KNX Modbus Gateway you first have to install the driver for the USB interface. The driver can be found on the provided EIB Tools CD in the directory „*...\Support\USB KNX Modbus GW*". For installing the driver please proceed with the following steps:

USB driver installation

There's a setup package available which automatically selects and installs the correct driver which is required by your system. To start this setup doubleclick the file **CDM20802_Setup.exe.** A command prompt window opens for a short period of time and automatically closes. After installing the USB driver you can connect the KNX Modbus Gateway with your PC. The KNX Modbus Gateway is recognized and the needed drivers are loaded automatically.

Manual USB driver installation (Windows XP)

If you have problems with installing the automatic setup program, you can also install the USB drivers manually. There's a ZIP archive named **CDM20802 WHQL Certified.zip** in the directory „*...\Support\USB KNX Modbus GW*" on the EIB Tools CD. Copy this file to your harddisk and extract the content into any directory. Proceed with the following steps for manual driver installation:

Ensure that the KNX Modbus Gateway is connected to the power supply (LED **Power** illuminated) and connect it to your PC with the provided USB cable. You should see the following pop up message in your taskbar:

Figure 4: "Found New Hardware" pop up

After this pop up message the „*Found New Hardware Wizard*" should appear. Select the option „*No, not this time*" and push the „*Next >*" button.

Figure 5: "Found New Hardware Wizard" step 1

In the second step of the Hardware Wizard select the option „*Install from a list or specific location (Advanced)* " and click again on the „*Next >*" button.
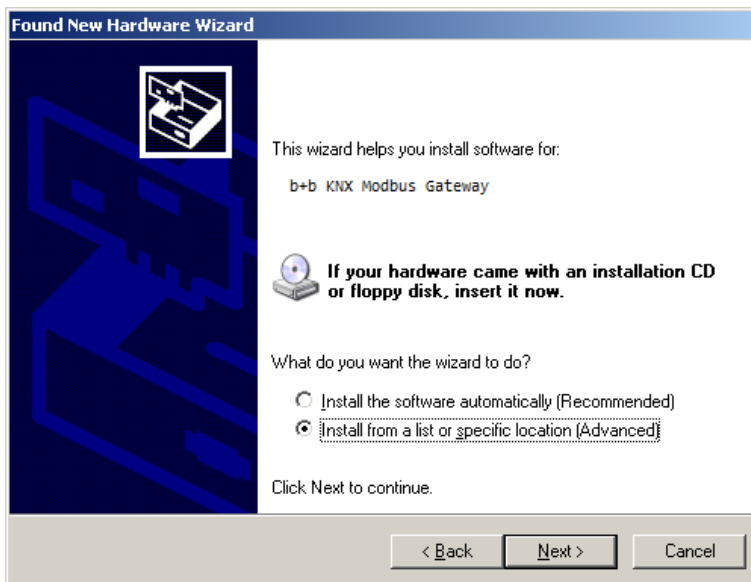

Figure 6: "Found New Hardware Wizard" step 2

In the last step of the Hardware Wizard select the directory on your harddisk in which you have extracted the ZIP archive before and push the button „*Next >*".
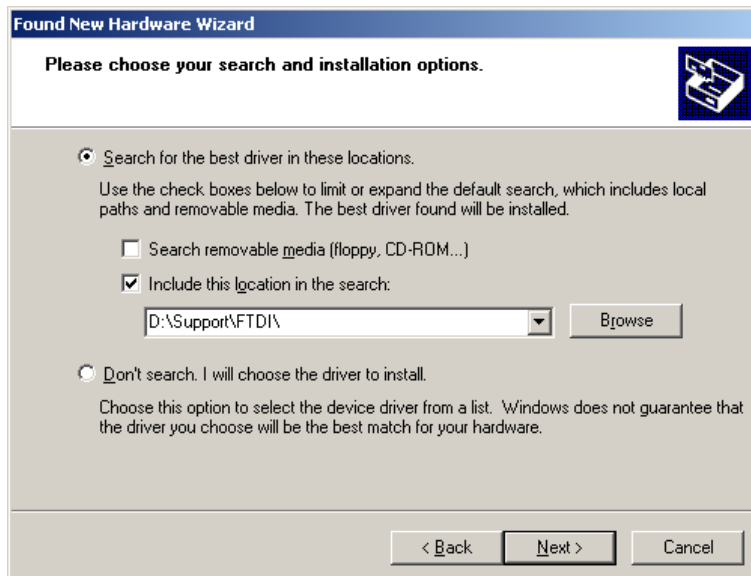
Figure 7: "Found New Hardware Wizard" step 3

The Hardware Wizard signals the successful driver installation in the last dialog. Finish the „*Found New Hardware Wizard*" by pushing the „*Finish*" button.

Figure 8: "Found New Hardware Wizard" successful

After installing the driver for the „*USB Serial Converter*", the Found New Hardware Wizard will ask for a driver for the „*USB Serial Port*". Please repeat the steps of the installation process above to install this driver. The Hardware Wizard again signals the successful driver installation in the last dialog:
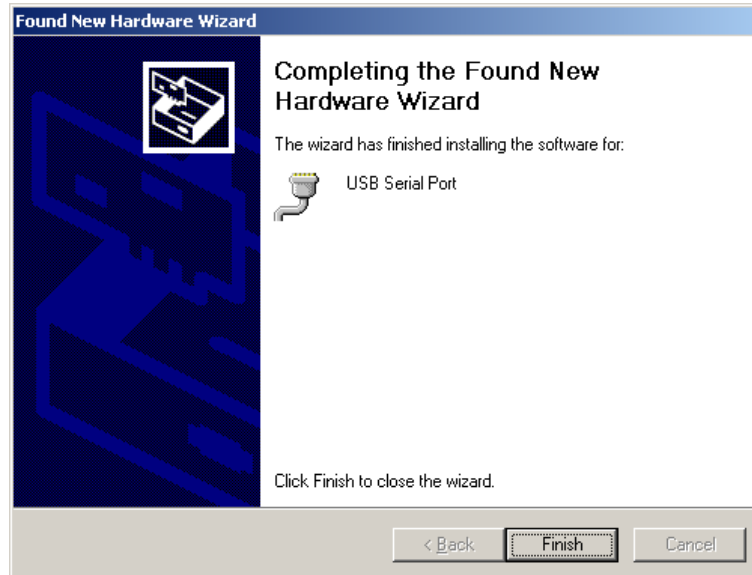
Figure 9: "Found New Hardware Wizard" successful

Finish the Found New Hardware Wizard by pushing the „*Finish*" button.

Establish a connection with the KNX Modbus Gateway

Note: The b+b Terminal software beginning from version1.37 gives you the opportunity to automatically recognize the virtual COM port of the connected KNX Modbus Gateway. Open the menuitem „*Settings* → *Communication port / generic settings*“. Choose „*Serial*“ as connection type and „*b+b KNX Modbus GW*“ in the combobox „*Com port*“. Close the window with the „*OK*“ button. In all versions < 1.37 you manually need to setup the virtual COM port of your connected KNX Modbus GW. Please proceed as follows:

To establish a connection with your KNX Modbus Gateway you have to know the virtual COM port number under which the KNX Modbus Gateway was installed. To find out this COM port number you have to open the „*Device Manger*“ by a right click on the „*My Computer*“ symbol on your desktop and choose the menu entry „*Manage*“. The „*Computer Management*“ window is opened. Select the „*Device Manager*“ entry in the left tree view and click on the „*Ports (COM & LPT)*“ entry.

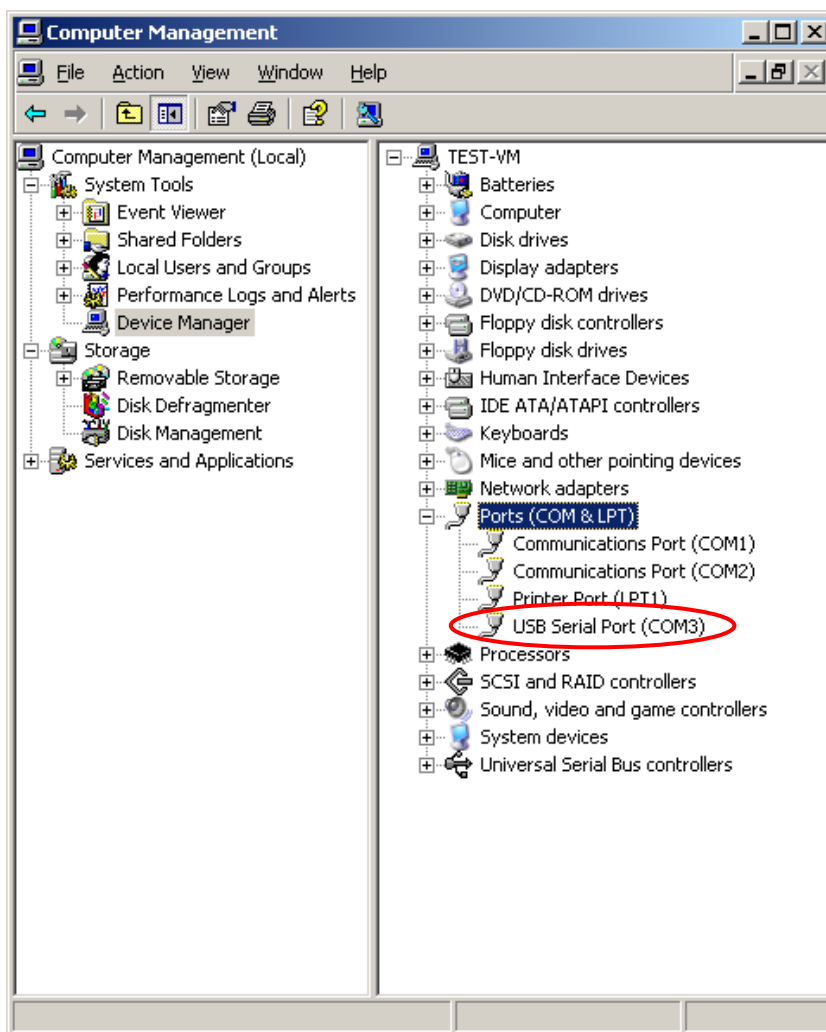You can recognize (and also change) the virtual COM port of your KNX Modbus Gateway behind the entry „*USB Serial Port*“.

Figure 10: Device Manager

With this information you can start the b+b Terminal software. Choose the menu entry „*Settings* →
Communication port / generic settings". The window „*Port settings...*" appears. In this dialog you can
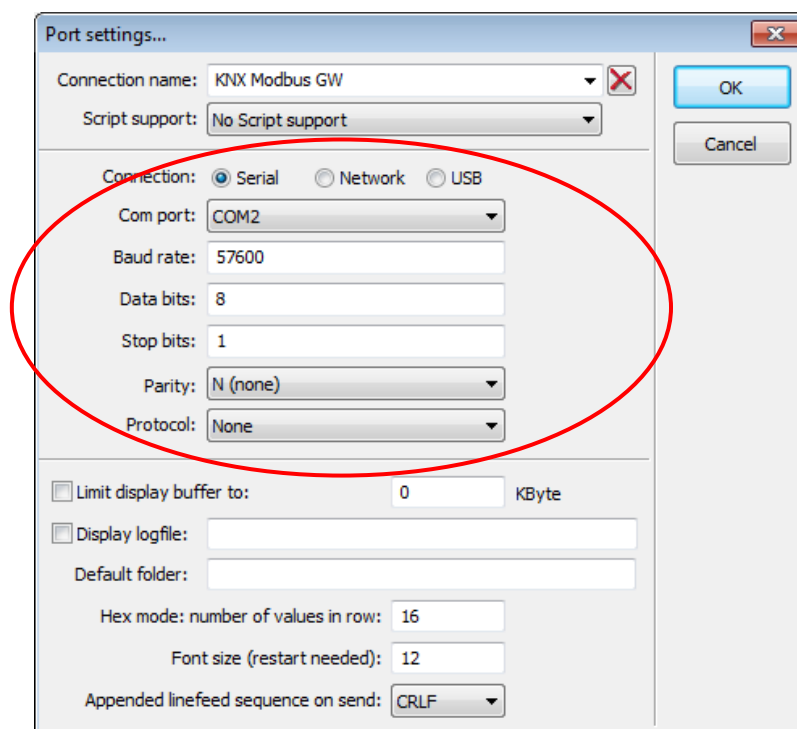select the virtual COM port of your KNX Modbus Gateway and the following settings:

Figure 11: b+b Terminal menu item „*Settings* → *Communication port / generic settings*"

After you've setup the connection, close the window by clicking on the „*OK*" button. To start the communication with your KNX Modbus Gateway you have to click on the green arrow button in the toolbar. To test the connection you can send a „**?v**" command to your gateway. The KNX Modbus Gateway
should respond with the following text (firmware version and serial number may differ):

```
KNX Modbus Gateway   V1.00 (compiled Aug 1 2014)   SN: 02714001
```

KNX Modbus Gateway parametrisation

Note: The data of your installed Modbus slaves which you need to configure the KNX Modbus Gateway, like e.g. Modbus address or available Modbus values, can be retrieved from your Modbus Slave
operating manual. If you have no operating manual for a Modbus Slave, you can try to scan the register
with free software from third-party and a connection to the PC.

To configure your KNX Modbus Gateways select the menu item „*Settings* → *b+b KNX Modbus Gateway
...*" in the b+b Terminal software. The following parametrisation dialog appears:
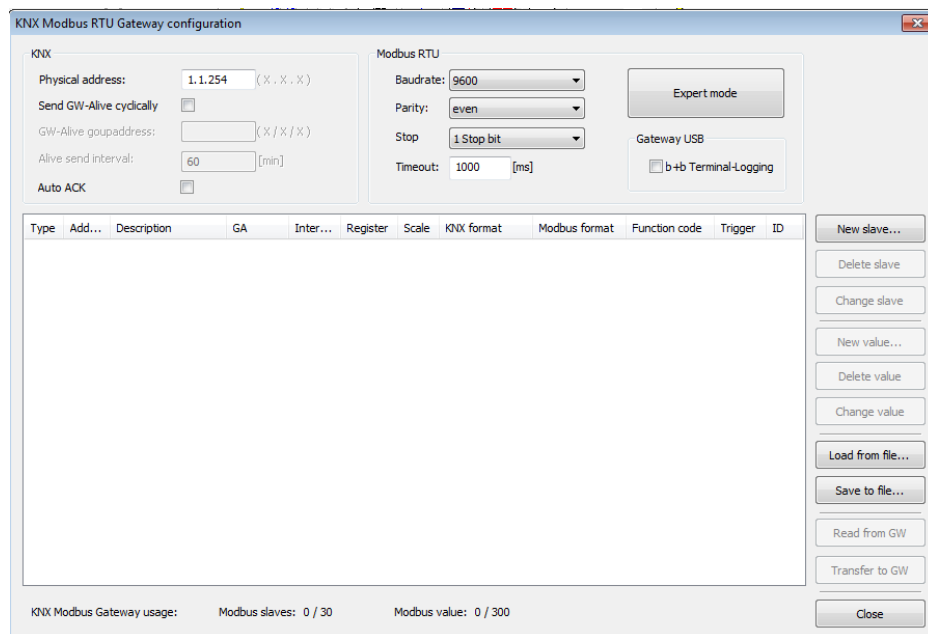
Figure 12: KNX Modbus Gateway parametrisation dialog

In the top section (left) of the dialog you can setup the gateway specific settings. Enter the desired EIB/KNX physical address for your KNX Modbus Gateway in the field „*Physical address*".

In the field „GW-*Alive Groupaddress*" you have the opportunity to setup an EIB/KNX group address. On this group address a „1" is written cyclic (see description of the field „Alive *send interval*") if the KNX Modbus Gateway is alive. The time interval in minutes in which the two EIB/KNX group addresses above are written cyclic can be specified in the field „ Alive *send interval*".

Activating the checkbox „*Auto ACK*" activates the Auto ACK mode in the KNX Modbus Gateway. In the Auto ACK mode the KNX Modbus Gateway automatically acknowledges all EIB/KNX group address telegrams, which can reduce the bus load on your EIB/KNX bussystem.

In the top section (right) of the window you can configure the Modbus-specific settings. These settings must be match with the configuration of the connected Modbus slaves. The settings include the "Baud rate", which determines the transmission speed of the Modbus communication.

In the "*Parity*" field, the user can determine how the characters for the consistency check to be supplemented. If no parity check is selected, 2 stopbits must be used.

The "Stop bits" field determines the number of stop bits in the transmission of a single character within a telegram.

Note: If there is no communication to a Modbus slave, the settings of the Modbus interface should be checked.

In the "*Timeout*" field the user can configure how long a Modbus slave has time to send his response. If a answer comes not in this time interval, so the "Slave Status" will be change to the error state. More information about the "Slave Status" can you find on the description of the field "Slave Status KNX GA" in this chapter. For older Modbus slaves it may be necessary to increase the timeout.

Some Modbus slaves require a modified Modbus timings. For this purpose, you can change the two Modbus parameters determined in "*Expert mode*" For example, if a slave responds too quickly, you can correct the situation by the timing. The changes in the timing effect on all connected slaves! More information about the timing, refer to the official Modbus specification.

If the check box "*b+b Terminal-Logging*" is set, additional error messages and information are displayed in the b+b Terminal. In normal operation, it is recommended to disable the output in the terminal. More information about the "b+b Terminal-Logging" in the section "b+b Terminal-Logging for debugging".

After setting up the Gateway specific data you can start to configure your available Modbus slaves and the corresponding Modbus values.

Note: Any changes will take effect only after the transfer to the Gateway.

To setup a new Modbus slave click on the button „*New slave...*". The following window occures:
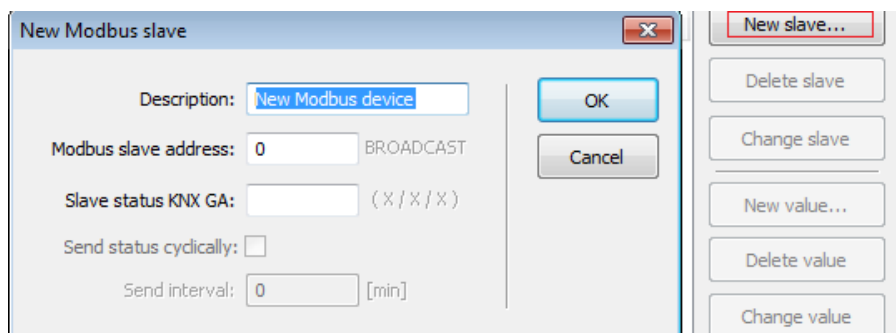

Figure 13: Add a new Modbus slave

In this dialog you have to enter the Modbus slave specific settings. In the field „*Description*" you can enter a description (max. 30 characters) for easily identifying your Modbus slave. The Modbus address needs to be entered in the field „*Modbus slave address*". If the Modbus slave address is zero, all slaves are addressed (Broadcast). Here are only write accesses allowed.

In the field „*Slave status KNX GA*" you have to setup an EIB/KNX group address. If the Modbus Slave does not respond to requests from the KNX Modbus Gateway, a „1" (Modbus Slave failure) is written cyclic (see description of the field „*Send interval*") on this group address. If the communication with the Modbus slave can be reconstructed a „0" (Modbus slave OK) is written once to the parametrised group address.

In the field „*Status interval*" you can enter a time interval (minute) for sending the status.

After you have setup your Modbus slave, you have to apply your settings by clicking on the „*OK*" button. You'll return to the main parametrisation dialog. An **example** of the listview of the values/slaves is in Appendix A.
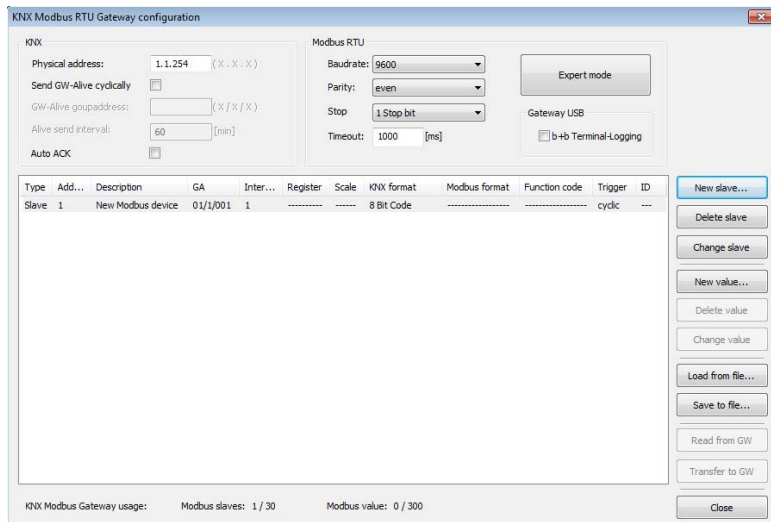
Figure 14: Overview Modbus slaves

To parametrise your Modbus values for the Modbus slave you've just setup, select the Modbus Slave in the listview and click on the button „*New value...*". The following window occurs an fill the dialog from top to bottom:
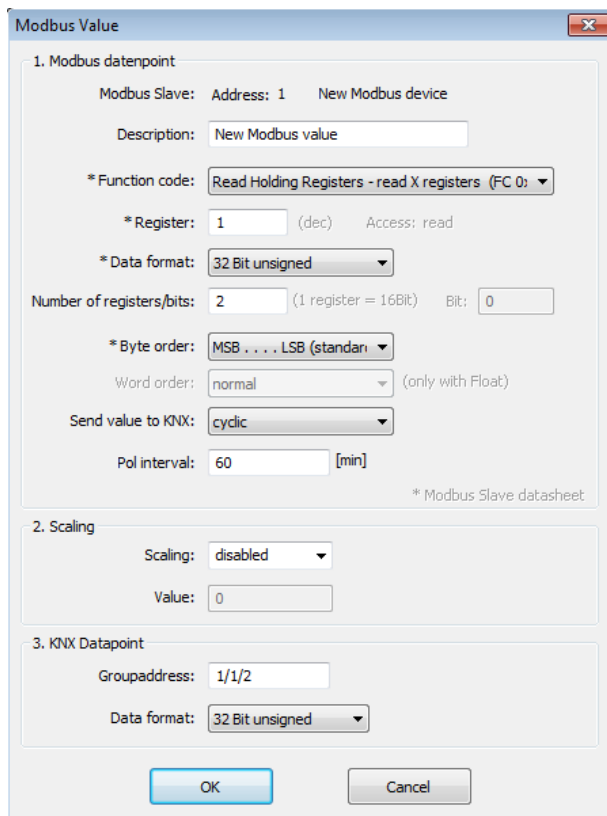

Figure 15: Add a new Modbus value

1. Modbus datapoint

In this dialog you have to setup the Modbus values that you want to write or read out. In the field „*Description*" you can enter a description for your Modbus value (max. 30 characters).

In "*Function Code*" field, select a command to read or write a register. The function codes for the respective registers are preset by the manufacturer of the Modbus slaves and can be taken from the appropriate documentation.

The address of the register can be enter in the "*Register*" field.
Note: The available registers of a Modbus slaves are documented in the operating instructions of the respective Modbus slave.

In the field „ Data Format" you can choose the format of the Modbus data point, such as the Modbus data are available in the register or to be stored. A Modbus register is 16 bits. If you need more than 16-bit, you have to enter the number of available registers in the "Number of registers/bits" field. If the data format is "A bit of a register" you have to entered in the "Bit" field the number of the bit (0 [LSB] to 15 [MSB]). An overview of the data formats shown in the figure below:

Data type	Description
1 Bit binary	The data content of the specified register is only 1 Bit
One bit of a register	(read-only) The data content of the specified register is used as a 2-byte binary value for read access. After the conversion the application sent a specific bit of the 16 bit register on the EIB / KNX bus. Only with the following function codes possible: Read Holding Register & Read Input Registers
8 Bit unsigned	The data content of the specified register is 8 bits unsigned integer
8 Bit signed	The data content of the specified register is 8 bits signed integer
8 Bit Binär (RAW)	The data content of the specified register is used as a 8 bit binary value
16 Bit unsigned	The data content of the specified register is 16 bits unsigned integer
16 Bit signed	The data content of the specified register is 16 bits signed integer
16 Bit binary (RAW)	The data content of the specified register is used as a 16 bit binary value
16 Bit KNX Float	The data content of the specified register is used as a 2-byte EIB / KNX floating point number. This format is particularly useful for temperature values.
32 Bit unsigned	The data content of the specified register is 32 bits unsigned integer
32 Bit signed	The data content of the specified register is 32 bits signed integer
32 Bit binary (RAW)	The data content of the specified register is used as a 32 bit binary value
32 Bit IEEE Float	The data content of the specified register is used as a 2-byte IEEE floating point number. This format is particularly useful for temperature values.
4 Byte binary (RAW)	The data content of the specified register is used as a 14 byte binary value. No conversion allowed

Table 4: Overview available data formats

In the field "Byte Order" and "Word Order" you can change the order of the data bytes. It is only at 32 bit float (as data type) possible to change the word order.

In the "*send value to KNX*" field, the user can choose when does the data sent to the EIB/KNX Bus (on request on a groupadress, at valuechange of the Modbus data register or cyclic).

2. Scaling

By selecting the "Scaling" field a measured value can be scaled (multiplied/divided) before sending value to the EIB/KNX or Modbus. The value must still fit into the target data format. It may be necessary to be transformed into a larger data format.

3. KNX datapoint

In the field „*KNX group address*" you have to enter the EIB/KNX group address to which your Modbus value should be transferred or comes from.

In the field „ Data Format" you can enter the format of the EIB/KNX data point, such as the EIB/KNX data are available or to be stored. An overview of the data formats shown in the table 4.

The following figure shows the possible conversion of each data type based on the selected function code/access.
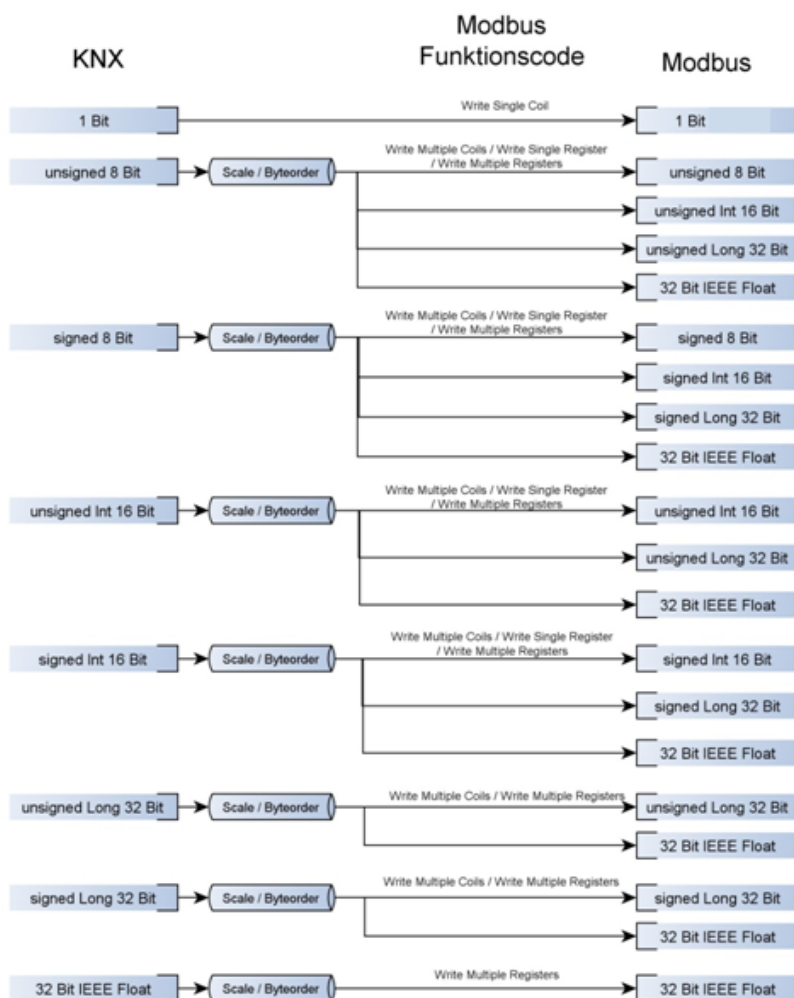

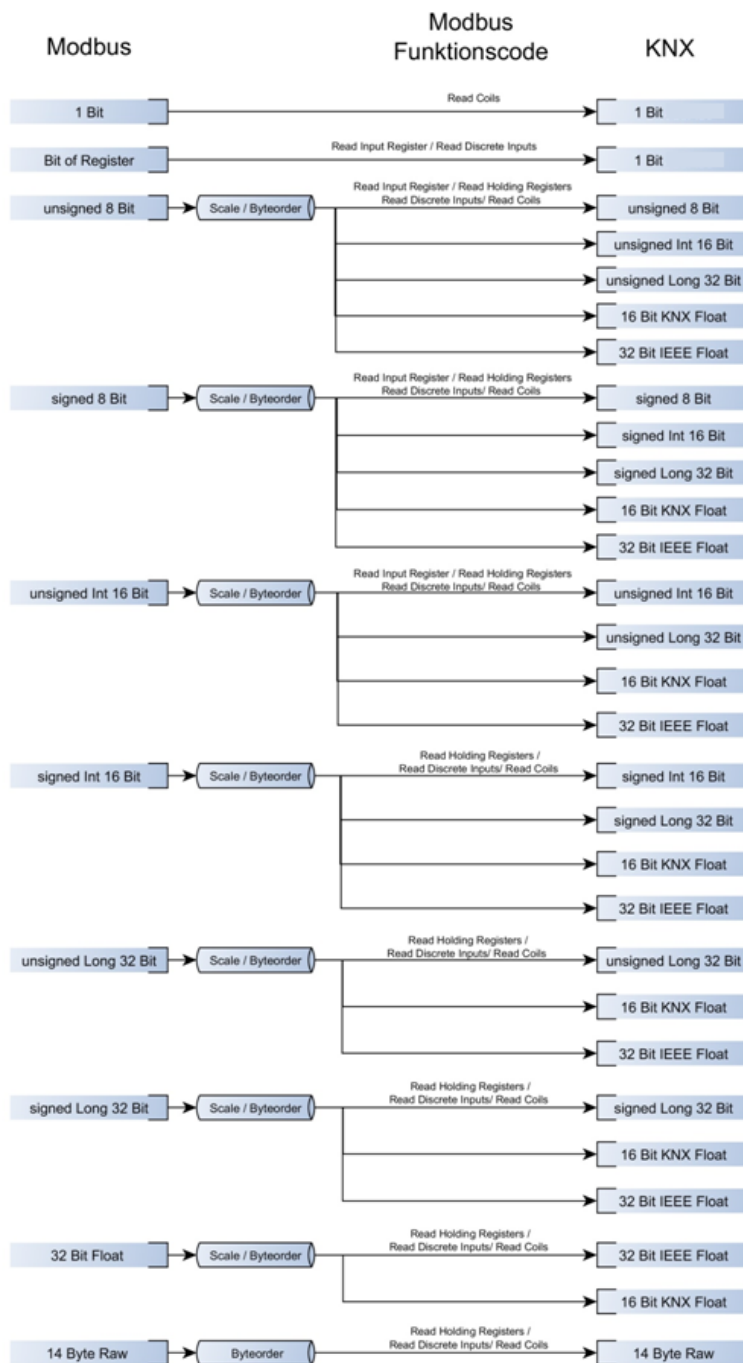Figure 16: possible data type conversions KNX→Modbus

Figure 17: possible data type conversions Modbus→KNX

After you have setup all settings for your Modbus value you can apply your changes by clicking on the „*OK*" Button.

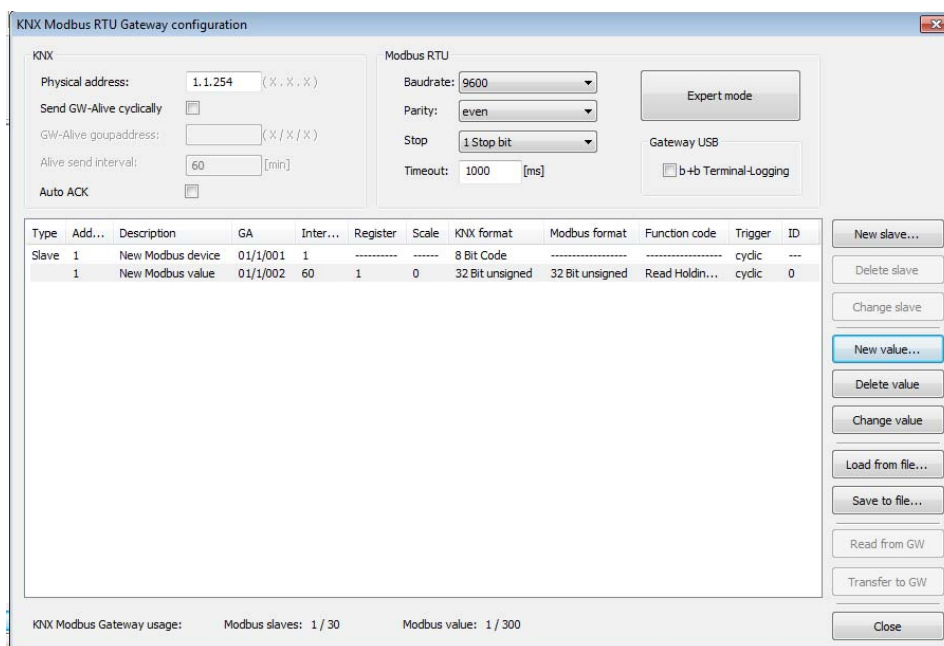You'll return to the main parametrisation dialog.

Figure 18: Overview Modbus slaves and Modbus values

Repeat the described steps above until you have setup all your Modbus slaves (max. 30 Modbus slaves) and alll your Modbus values (max. 300 Modbus values).

With the button „*Save to file...*" you can save your parametrisation in a „*.KMDG*" file. If you want to change your parametrisation you can use the „*Load from file...*" button to reload your parametrisation. On the EIB Tools CD in the "\ ... \ Setup \ bin \ MODBUS \" you will find a sample configuration file (Test.kmdg).

After you have finished your parametrisation you can transfer the parametrisation to the KNX Modbus Gateway by clicking the button „*Transfer to GW*".

Note: If you want to transfer the parametriazation to your KNX Modbus Gateway it is necessary to es-tablish a connection to the gateway before opening the parametrisation dialog. You can establish the connection with the „*Start*" button (green arrow in the toolbar). If there's no connection existing to the KNX Modbus Gateway the button „*Transfer to GW*" and „*Read from GW*" are deactivated and a pa-rametrisation transfer is impossible. An **example** of the listview of the values/slaves is in Appendix A.

Important: If you transfer a new parametrisation to your KNX Modbus Gateway an existing parametri-sation in the slave is overwritten! With the button „*Read from GW*" you can read out the parametrisa-tion of your KNX Modbus Gateway at any time and save it.

Functional description

After the KNX Modbus Gateway was installed and parametrised it is ready for operation.

The KNX Modbus Gateway has seven light emitting diodes (LEDs) on its top to visualise occurred errors to the user. The meaning of these LEDs was described in the section „*Display and control elements*". In the following section the behaviour of the KNX Modbus Gateway in different situations is described:

Parametrisation phase

If the KNX Modbus Gateway is running in parametrisation mode the LEDs **Error, KNX** and **PGM** are blinking altogether (Frequency ~ 1Hz).

System startup

After switching on the power supply the KNX Modbus Gateway needs time for initialization (duration: ~ 10 seconds).

Parametrisation check

After the system startup the KNX Modbus Gateway checks it's parametrisation.

After the parametrisation check succedded the KNX Modbus Gateway sends the text „*KNX Modbus Gateway started*" via the USB interface.

The KNX Modbus Gateway is now runninig in normal operating mode, which is signaled by a cyclic flashing (frequency: ~ 1Hz) of the LED **PGM**.

Diagnosis functions

The KNX Modbus Gateway offers an easy ASCII command interface for doing diagnosis on the Modbus system. The user can connect to the KNX Modbus Gateway with a terminal program or readout the parameterization from the connected Modbus slaves.

The communication between PC and KNX Modbus Gateway is textbased. Each parameterized value has an ID. The ID is used to assign values to text expenditure. The ID of each measured value is displayed after enter the command ″DISPPARA″ or in the Configuration dialog.
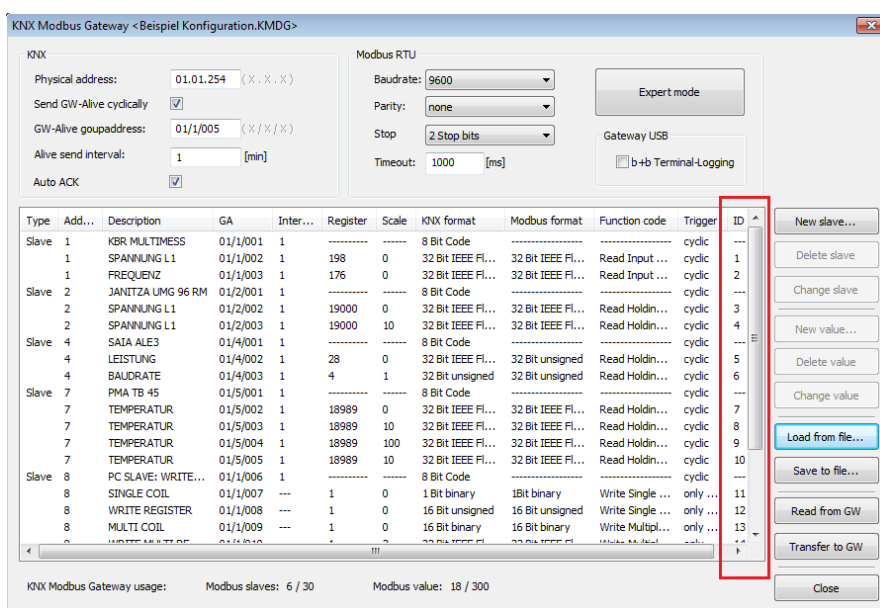
Figure 19: Overview Modbus slaves and Modbus values with ID

ASCII commands overview

Table 5 gives an overview of the ASCII commands which are supported by the KNX Modbus Gateway.

Note: You can also view a short overview of all ASCII commands if you send the command „**?**″ or „**?H**″ to the KNX Modbus Gateway.

Command	Definition
?, ?H	Shows an overview of all available ASCII commands
?V	Shows information about serial number and firmware version of the KNX Modbus Gateway
?P	Check the physical address of the KNX Modbus Gateway
?G	Shows a overview of the KNX Modbus Gateway settings

`DISPGWPARA`	View Gateway parameterization
`DISPCH:<ID>`	Parameterization of the measured value <ID> (<id> = 1 ... 300)
`DISPPARA`	Shows the list of all configured group addresses
`ERASE!`	Reset the parameterization of the KNX Modbus Gateway
`OA{+|-}`	KNX Auto Acknowledge mode: **OA+:** on **OA-:** off
`OL`	Language of the dialogue texts →German
`OLE`	Language of the dialogue texts → English
`PA:<PA>`	Set physical address <PA> (Example <PA> = 1.1.10)
`RESET`	Restart KNX Modbus Gateway

Table 5: Overview ASCII commands

b+b Terminal-Logging for debugging

In addition to the text commands, an additional textual output is possible in the terminal. This issue logs events and operations of the gateway. The output also displays information and error messages. There are two different modes. The following figure shows the setting for the terminal output in the initial dialogue. In the default configuration the "b+b Terminal output" is disabled. In this mode only important information and an Alive status are displayed. If the "b+b Terminal output" is activated additionally information are displayed.
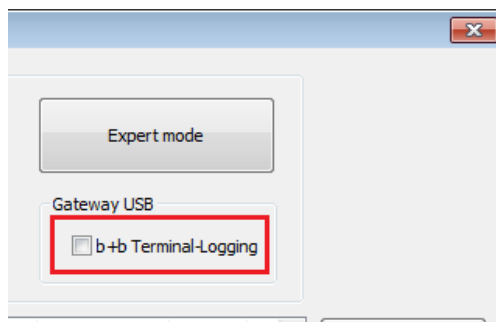

Figure 20: b+b Terminal-Logging

Note: If you enable or disable the "b+b Terminal-Logging", you have to reparameterize the Gateway.

The following table shows the main output texts of "b + b Terminal Output":

Output text	Definition
decode:CRCErrorHigh: (Slave:<Slave> Register:<Register>)	A CRC error was detected
decode:CRCErrorLow: (Slave:<Slave> Register:<Register>)	A CRC error was detected
decode:Error from Slave: <Slave> Register:0x%x bytecount is invalid(%d) max. 14	The number of received bytes does not match with the expected bytes
decode:Error from Slave: <Slave> Register:0x%x Error code:0x%x Exception code:0x%x	Modbus slave has sent an error code according to Modbus specification Error code: 0x8# → "#" = used Function code Exception code: 1 = not an accepted function code 2 = no accepted Register 3 = no valid data 4 = Slave error >4 = see the Modbus specification
decode:invalidTele	Recived telegram is invalid
decode:RegisterError	Acknowledgment from the slave contains an error: Register is different from the expected Register
decode:SlaveAddressError	Acknowledgment from the slave contains an error: Address is different from the expected Address
decode:Value not Change	Value in the Modbus register has not changed
decode:ValueChange	Value in the Modbus register has changed
encode:FCinvalid	Create the telegram failed: invalid function code
encode:invalidData	Create the telegram failed: invalid data
encode:invalidRange	Create the telegram failed: Invalid number of register
Error from Slave:<Slave> (ID:<Id>) is gone (no error)	Slave status was reset
Error from Slave: <Slave> (ID:<Id>) is set	Slave status was set
KNX_TX_Handl: send Telegram to KNX(ID:<ID>)	The message for this ID has been sent to the EIB /

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	KNX bus
`KNX-DATA-Reg(ID:<Id>):<Daten>`	This KNX data has been received or sent
`Modbus-DATA-Reg(ID:<Id>):<Daten>`	This Modbus data has been received or sent
`ModbusHandler: -->next request`	A request to a Modbus slave has been completed and a new request is started.
`ModbusHandler:Broadcast:finish`	A broadcast request to all Modbus slaves has been sent. A Modbus master (gateway) can not detect whether the message has been processed by all Slaves.
`ModbusHandler:Tele encode fail`	Failed to create the telegram
`ModbusHandler:TimeOut Slave:<Slave> (ID:<Id>)`	Slave has not responded or sent a false response to the request.
`ModbusRXHandl:decode->BytesLost`	Acknowledgment from the slave contains an error: Telegram is not complete received
`ModbusRXHandl:decode->FC:WRITE`	Acknowledgment from the slave: write command
`ModbusRXHandl:decode->FC_READ`	Acknowledgment from the slave: read command
`ModbusRXHandl:HandleRX`	Started processing
`ModbusRXHandl:Tele decode fail`	Acknowledgment from the slave contains an error
`ModbusTXHandl:Bad Timing!`	Modbus Master (Gateway) could not comply with the timing. Message is discarded
`ModbusTXHandl:Broadcast`	Modbus master (gateway) sends a broadcast
`ModbusTXHandl:Read Request`	Modbus master (gateway) sends a read request
`ModbusTXHandl:Tele decode OK`	Acknowledgment from the slave contains no error
`ModbusTXHandl:Tele encode done`	No error during the build of the telegram
`ModbusTXHandl:wait for reply`	Modbus master (gateway) is waiting for the response from the Modbus slave

Tabelle 6: Übersicht Terminaltexte

Possible Problems & Solutions

Problem	Possible cause and solution
No sign of life from the connected Modbus Slave	• Polarity of the Modbus connection reversed. Solution → polarity dive (manufacturers use different names) • Gateway Configuration & Modbus slave is not identical (baud rate, stop bits, parity). solution →change setting. • Timing of the connected Modbus slave not according to specification. Solution → see "*KNX Modbus Gateway parametrisation*" → Often t.1 = 2.0 char. • Incorrect Modbus function code selected. Solution → Select the right function code according to the datasheet of the Modbus slaves. • Some manufacturers describes register with offset. Register +1 Solution → Register - 1
Implausible values	• Modbus Slave uses a reversed byte / word order. Solution →, see "*KNX Modbus Gateway parametrisation*" • Some manufacturers describes register with offset. Register +1 Solution → Register - 1 • Incorrect number of registers/bits. Example: There are only read 16 bits instead of 32 bits. Solution → change parameterization
Sporadic error when read out of the Modbus measured values (CRC, timeout)	• Electrical failure on the bus. Solution → reduce Modbus baud rate or the sources of interference, reduce the length of the line (bus). • Excessive number of readings. Some manufacturers limit the number of read out registers in a certain time interval

Table 5: Possible Problems and Solutions

Appendix A

KNX Modbus Gateway <EXAMPLE.KMDG>

KNX

Physical address: 01.01.254   x . x . x

Send GW-Alive cyclically

GW-Alive groupaddress: 01/1/005   x / x / x

Alive send interval: 1   [min]

Auto ACK

Modbus RTU

Baudrate: 9600

Parity: none

Stop: 2 Stop bits

Timeout: 1000 [ms]

Expert mode

Gateway USB

b+b Terminal-Logging

Type	Address	Description	GA	Interval	Register	Scale	KNX format	Modbus format	Function code	Trigger	ID
Slave	1	KBR MULTIMESS	01/1/001	1			8 Bit Code			cyclic	1
	1	VOLTAGE L1	01/1/002	1	198	0	32 Bit IEEE Fl...	32 Bit IEEE F...	Read Input Re...	cyclic	1
	1	FREQUENCY	01/1/003	1	176	0	32 Bit IEEE Fl...	32 Bit IEEE F...	Read Input Re...	cyclic	2
Slave	2	JANITZA UMG 9...	01/2/001	1			8 Bit Code			cyclic	
	2	VOLTAGE L1	01/2/002	1	19000	0	32 Bit IEEE Fl...	32 Bit IEEE F...	Read Holding R...	cyclic	3
Slave	4	SAIA ALE3	01/4/001	1			8 Bit Code			cyclic	
	4	POWER CONSU...	01/4/002	1	28	0	32 Bit IEEE Fl...	32 Bit unsigned	Read Holding R...	cyclic	5
	4	BAUDRATE	01/4/003	1	4	1	32 Bit unsigned	32 Bit unsigned	Read Holding R...	cyclic	6

only on Slave entry per connected Modbus Device

x Value entries per connected Modbus Device

KNX Modbus Gateway usage: Modbus slaves: 3 / 30   Modbus value: 5 / 300

New slave...   Delete slave   Change slave   New value...   Delete value   Change value   Load from file...   Save to file...   Read from GW   Transfer to GW   Close

Example: Configuration for One Modbus Slave

parent entry: Slave with address 1

child entry: Value 1 from this Slave

child entry: Value 2 from this Slave

Configuration for another Modbus Slave

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