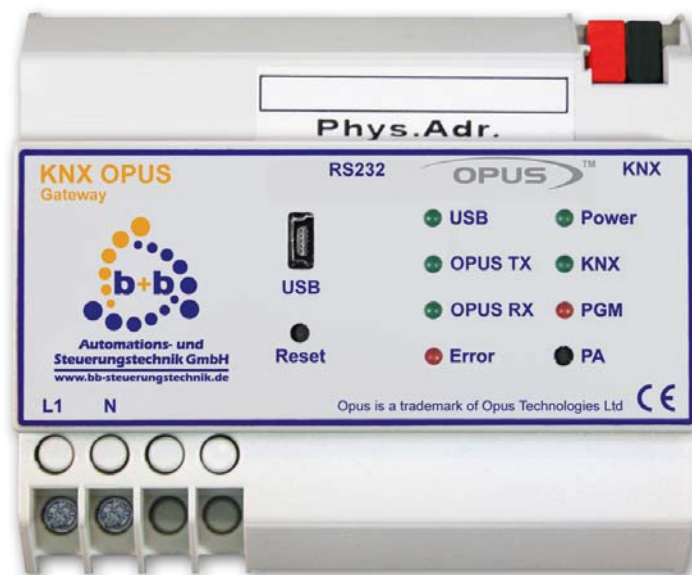**Documentation**

KNX OPUS Gateway

Controlling and visualization of the OPUS MCU610 System with the EIB/KNX

Order number: E001-H028001

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This handbook describes also functions, which are options.
Only qualified persons are allowed to install our units.

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Highlights KNX OPUS Gateway

- Integrated EIB/KNX – bus coupling unit with two wire EIB/KNX connector
- Easy parametrisation with the b+b Terminal software over USB connection
- Each KNX OPUS Gateway can handle up to 200 configuration channels
- Rail mounted device (6TE = 105mm) with integrated 85V – 260V wide range power supply

Field of application

- Simple integration of OPUS MCU610 controller in the EIB/KNX bussystem
- Visualization of OPUS states (e.g. "Input Select", "Volume", ...) in the EIB/KNX bussystem
- Controlling OPUS instructions (e.g. "Volume Up", "Input Select", ...) from the EIB/KNX bussystem

Scope of delivery

- KNX OPUS Gateway
- USB cable
- b+b Terminal software for parametrisation
- Documentation

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Introduction

The KNX OPUS Gateway allows the communication between the EIB/KNX bussystem and the MCU610 controller from OPUS. The Gateway establishes a bidirectional communication, which means you can transmit data from the EIB/KNX bussystem to the OPUS system and you can also transmit data from the OPUS system to the EIB/KNX bussystem.

You can use the gateway on the one hand for visualization of OPUS MCU610 states like e.g. "Volume", "Balance", ... in the EIB/KNX system. On the other hand it is possible to execute OPUS instructions from the EIB/KNX bussystem with an EIB/KNX switch like e.g. "Input Select", "Volume Up"/"Volume Down", ... instructions.

The parametrisation of the KNX OPUS Gateway is performed through the integrated USB interface in conjunction with the b+b Terminal software.

The hardware of the KNX OPUS Gateway consists of a 6TE (= 105mm) DIN rail mounting enclosure with integrated 85V – 260V power unit and connectors for OPUS MCU610 and EIB/KNX. The device is maintenance-free without fan or any other wear parts.
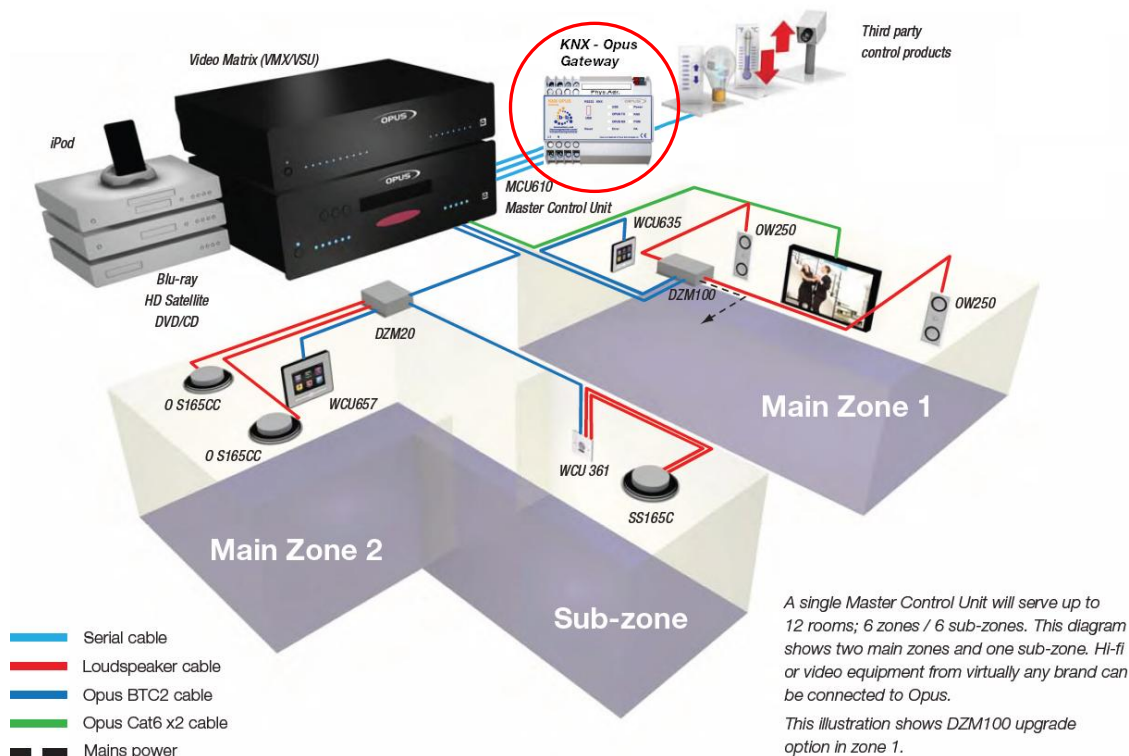

Figure 1: Field of application for the "KNX OPUS Gateway"

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 – 260V AC, 50Hz – 60Hz, connection 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.) RS-232 connection to OPUS MCU610 controller over D-Sub 9 pole (female) connector via a 1:1 cable (male – female)
	2.) USB as service interface (for parametrisation) over Mini USB connector Type B Virtual COM port Baudrate: 57600 Baud
	3.) EIB/KNX connection via standard EIB/KNX connector

Table 1: Technical data

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Connection overview
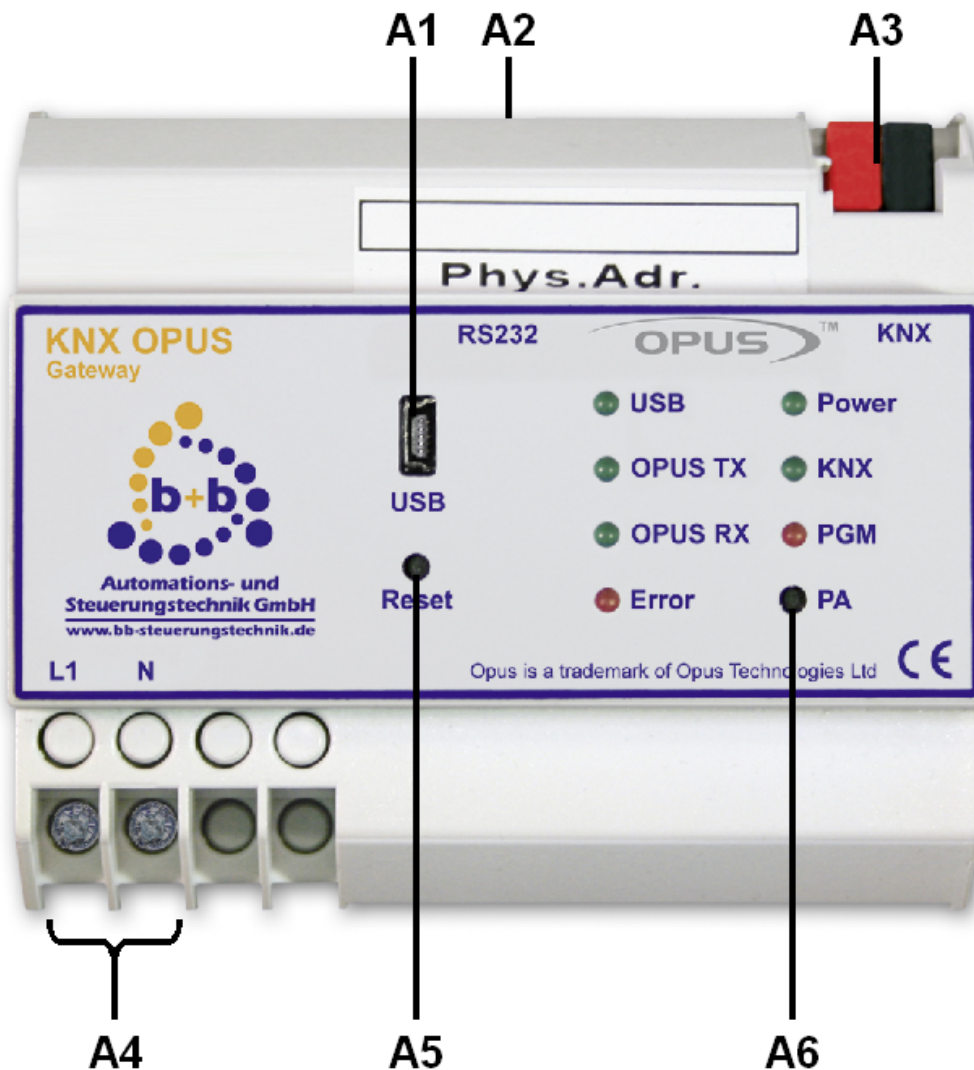
Figure 2: Connection overview KNX OPUS Gateway

A1	**USB**	USB connector (Mini USB Typ B)
A2	**RS232**	Serial connection (RS-232) to OPUS MCU610
A3	**KNX**	EIB/KNX connector
A4	**L1 / N**	Power supply 85V – 260V AC
		L1: Phase conductor **N:** Neutral conductor
A5	**RESET**	Reset button
A6	**PA**	Programming button

Table 2: Connection overview KNX OPUS Gateway

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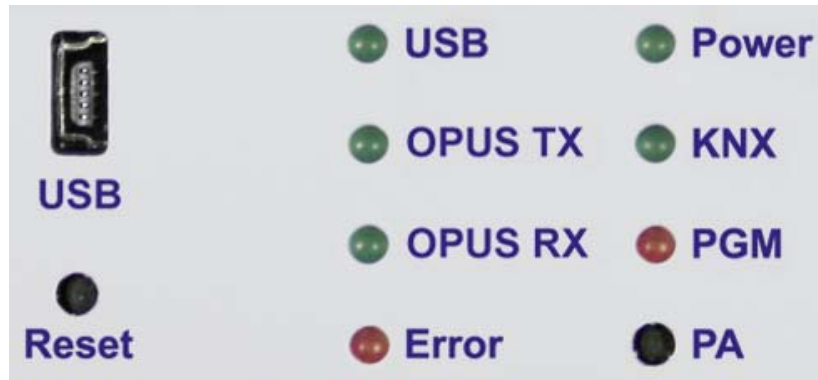
Figure 3: Detail view display and control elements

Button	Function
Reset	**Keypress long** (>= 3 seconds): The KNX OPUS Gateway reboots. **Note:** The long keypress recognition is signalled by illuminating the LEDs **OPUS TX, OPUS RX, Error, Power, KNX** and **PGM**.
PA	**Keypress short** (< 3 seconds): The KNX OPUS 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 OPUS Gateway over the USB interface is in progress.
OPUS TX	**LED flashing:** The KNX OPUS Gateway sends a telegram to the OPUS system.
OPUS RX	**LED flashing:** The KNX OPUS Gateway receives a telegram from the OPUS system.
Error	**LED flashing** (frequency: ~ 1Hz): The KNX OPUS 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 OPUS Gateway sends or receives an EIB/KNX telegram.
PGM	**LED illuminated:** The KNX OPUS Gateway is currently in programming mode, waiting for an EIB/KNX physical address. **LED flashing** (frequency ~1Hz): The KNX OPUS Gateway is running in normal operating mode.

Table 3: Display and control elements

Installation instruction

- Mount the KNX OPUS Gateway on a standard DIN rail.
- Connect the KNX OPUS Gateway to the EIB/KNX bussystem with a standard bus connector.
- Connect your OPUS MCU610 controller via the RS-232 Port 3 to the KNX OPUS Gateway. Use a D-Sub 9 pole serial 1:1 cable (male - female) for this connection.
- Connect the power supply (85V – 260V AC) to your KNX OPUS Gateway.
- If everything is connected properly you can switch on the power supply.

After installing the KNX OPUS 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 OPUS Gateway you first have to setup all OPUS instructions you want to map to EIB/KNX group addresses. The parametrisation of the gateway is handled via a dialog in the b+b Terminal software and can be transferred to the KNX OPUS Gateway over the USB interface.

Note: The parametrisation dialog is available in the b+b Terminal software since version 1.32. If you have already installed our b+b Terminal software on your PC please ensure that you have at least version 1.32 (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 „*Support \ Updates and Downloads*".

Before you can parametrise the KNX OPUS 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 OPUS GW*". For installing the driver please proceed with the following steps:

Automatic USB driver installation

There's a setup package available which automatically selects and installs the correct driver required by your operating system. To start the setup procedure doubleclick the file **CDM20814_Setup.exe**. in the directory „*...\Support\USB KNX OPUS GW*" on the EIB Tools CD. A command prompt window opens for a short period of time and automatically closes. After installing the USB driver you can connect the KNX OPUS Gateway with your PC. The KNX OPUS Gateway is recognized and the needed drivers are loaded automatically.

Manual USB driver installation

If you have problems with installing the automatic setup program, you can also install the USB drivers manually. There's a ZIP archive named **CDM20814 WHQL Certified.zip** in the directory „*...\Support\USB KNX OPUS 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 OPUS 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 (see Figure 5).

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.
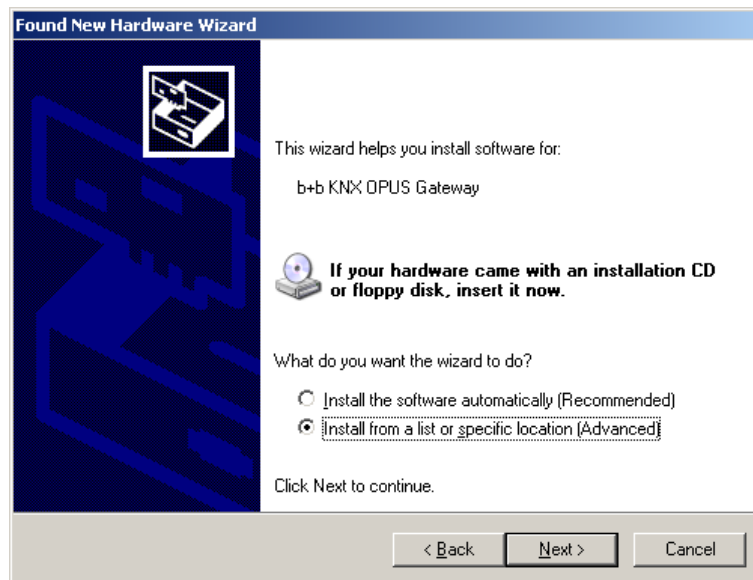

Figure 6: "Found New Hardware Wizard" step 2

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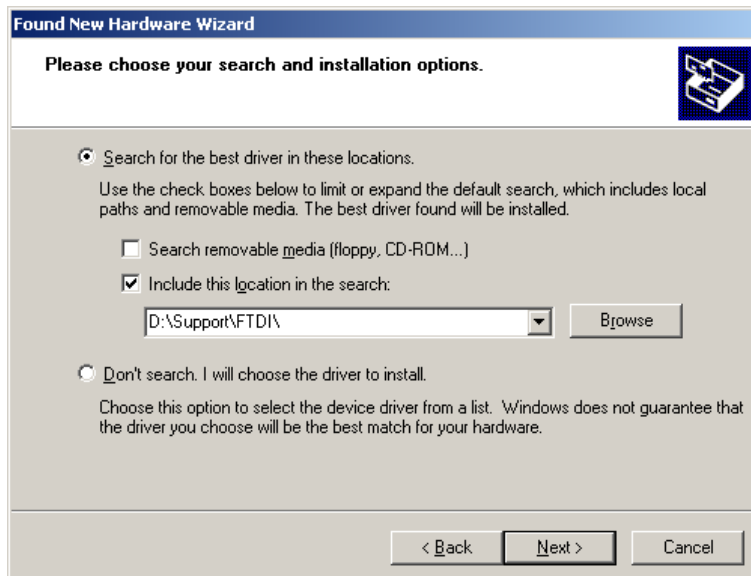
Figure 7: "Found New Hardware Wizard" step 3

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:
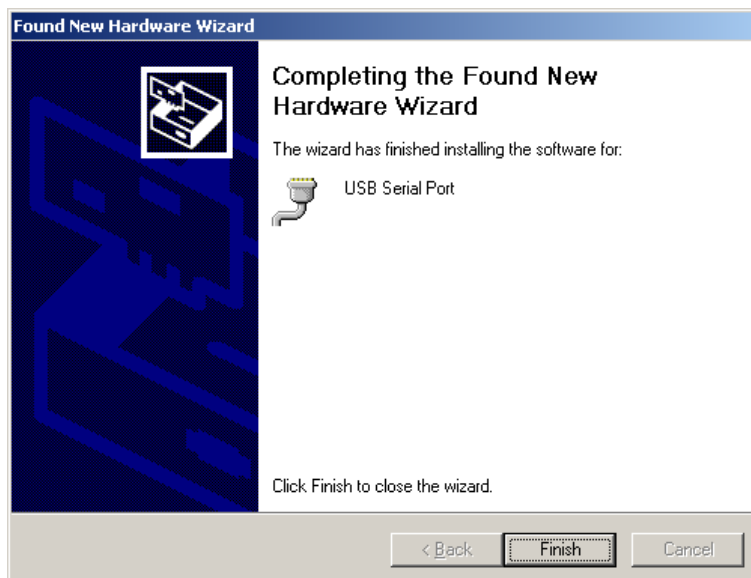
Figure 9: "Found New Hardware Wizard" successful

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

Establish a connection with the KNX OPUS Gateway

Note: The b+b Terminal software beginning from version 1.32 gives you the opportunity to automatically recognize the virtual COM port of the connected KNX OPUS Gateway. Open the menuitem „*Settings → Communication port / generic settings*". Choose „*Serial*" as connection type and „*b+b KNX OPUS GW*" in the combobox „*Com port*". Choose Baudrate 57600, 8 Data Bits, 1 Stop Bit, No Parity, No Protocol. Close the window with the „*OK*" button. In all versions < 1.32 you need to setup the virtual COM port of your connected KNX OPUS GW manually. Please proceed as follows:

To establish a connection with your KNX OPUS Gateway you need to know the virtual COM port number under which the KNX OPUS 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 OPUS Gateway behind the entry „*USB Serial Port*".
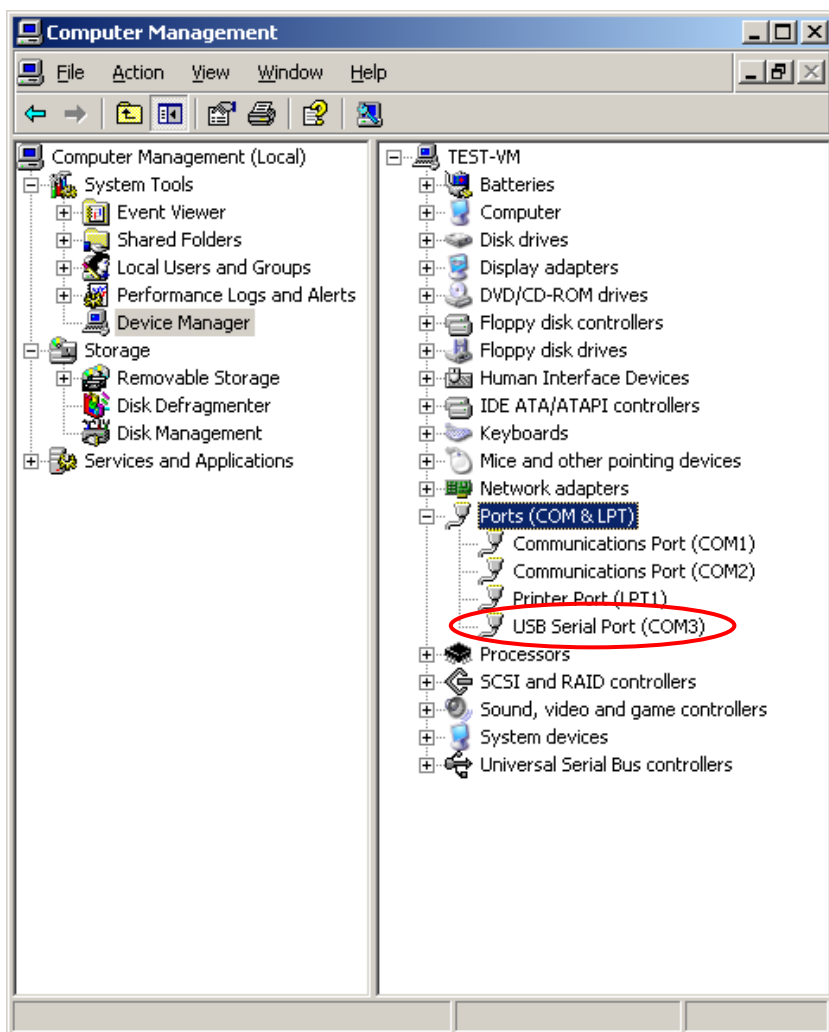

Figure 10: Device Manager

With this information you can now 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 OPUS Gateway and the following settings:
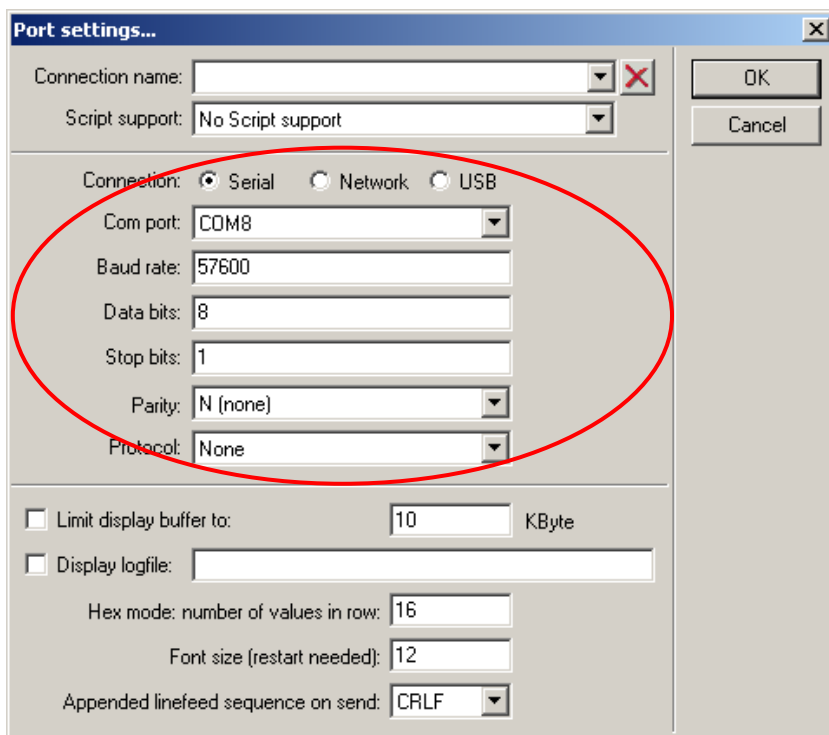

Figure 11: b+b Terminal menu item „*Settings → Communication port / generic settings*"

After you've setup the connection, close the window by clicking on the „*OK*" button. To start the communication with your KNX OPUS 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 OPUS Gateway should respond with the following text (firmware version and serial number may differ):

```
b+b KNX OPUS Gateway  V0.90 (compiled Nov 3 2011)  SN: 12345678
```

Configure gateway specific settings

To configure your KNX OPUS Gateways select the menu item „*Settings → b+b KNX OPUS Gateway ...*" in the b+b Terminal software. The parametrisation main window appears (see Figure 12).
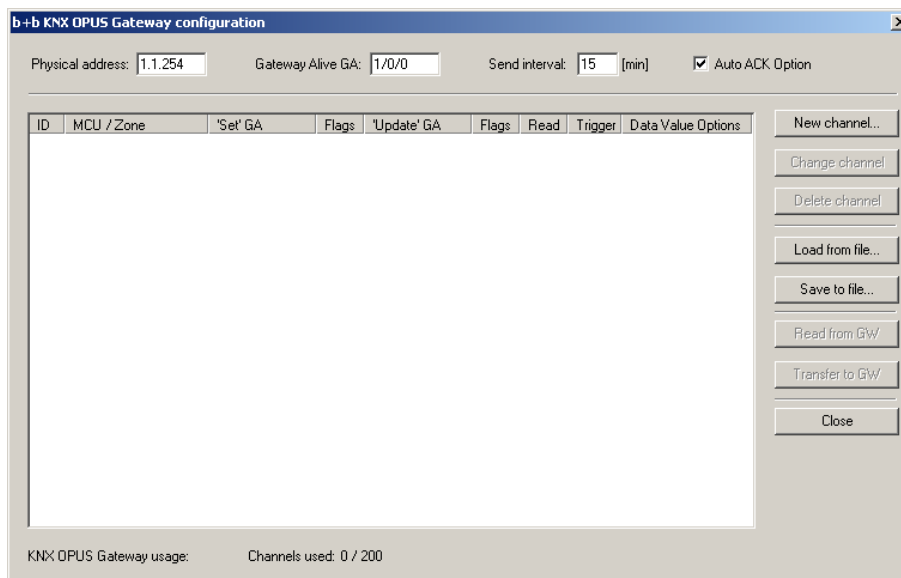
Figure 12: KNX OPUS Gateway parametrisation dialog

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

In the field „*Alive GA*" 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 „*Send Interval*") if the KNX OPUS Gateway is alive.
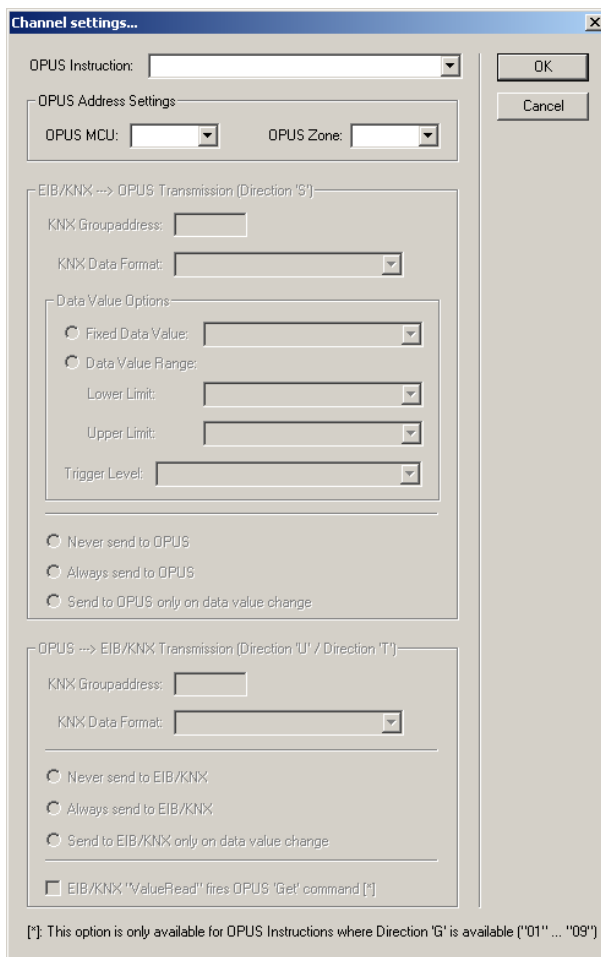
The time interval (in minutes) in which the above EIB/KNX group address is written cyclic can be specified in the field „*Send Interval*".

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

Configure channel settings

After setting up the Gateway specific data you can now start to configure your OPUS instruction to EIB/KNX group address mappings. It is possible to setup up to 200 different channels per KNX OPUS Gateway, which means you can map up to 200 different OPUS instructions to EIB/KNX group addresses.

To setup a new channel click on the button „*New channel...*". The „*Channel settings...*" dialog window occurs (see Figure 13).

Figure 13: Adding a new channel

In this dialog you have to enter the channel specific settings. First choose the OPUS instruction you want to map to an EIB/KNX group address in the field „*OPUS Instruction*". Depending on your OPUS instruction choice different fields on the dialog are now enabled or disabled.

Please choose the OPUS address (MCU and Zone) in the fields „*OPUS MCU*" and „*OPUS Zone*" for which you want to configure your channel.

Next there are two sections for configuration (maybe one of them is disabled, depending on the OPUS instructions you've chosen):

(1.)   EIB/KNX → OPUS Transmission (Direction 'S')

(2.)   OPUS → EIB/KNX Transmission (Direction 'U'/Direction 'T')

EIB/KNX → OPUS Transmission

In the middle of the window (see Figure 14) you can map EIB/KNX group addresses to the OPUS instruction for the transmission direction EIB/KNX → OPUS. This means if you write data to the EIB/KNX group address entered in the field „*KNX Groupaddress*" this data is transmitted to the OPUS system as an OPUS instruction with direction "S".

First enter an EIB/KNX Groupaddress in the field „*KNX Groupaddress*". Depending on the OPUS instruction you've chosen you can now choose a data format, for the EIB/KNX groupaddress you've entered before, in the field „*KNX Data Format*". Sometimes this field is also disabled and a value is entered which you can not change. This is the case for all OPUS instructions which allow only 1 Bit (0 or 1) data value.

Figure 14: "EIB/KNX → OPUS Transmission" section

The OPUS instruction "'01' – Input Select" e.g. is an instruction which allows to choose the KNX data format. If you choose "8 Bit Unsigned" in the combobox „*KNX Data Format*" (see figure 14) you can write a 8 Bit data value to your parametrised EIB/KNX group address, which is then directly used as the data value in the OPUS instruction telegram send to your OPUS system. That means, if you write e.g. the data value "5" to EIB/KNX group address "1/0/1", the KNX OPUS Gateway transmits the OPUS instruction "#11S0105!" to your OPUS system.

If you choose the "1 Bit Binary" entry in the combobox „*KNX Data Format*" you can use e.g. an EIB/KNX switch to control the OPUS instruction "Input Select":

If you select the option „*Fixed Data Value*" (see figure 15) you can save a predefined value in the KNX OPUS Gateway which will be used for the data value in your OPUS instruction telegram whenever you write a "0" or "1" (depending on your choice in the field „*Trigger Level*") to your parametrised EIB/KNX group address.

With the option „*Data Value Range*" you can setup a predefined lower and upper limit for the data value in your OPUS instruction. Whenever you send a "0" or "1" (depending on your choice in the field „*Trigger Level*") to the parametrised EIB/KNX group address the KNX OPUS Gateway walks cyclic through your defined range and sends OPUS instructions with the current range value as data value to the OPUS system. (In case you've chosen the OPUS instruction "Input Select" (see figure 15) you can also select all single values through which the gateway should cycle.)

In the combobox „*Trigger Level*" you can setup if the KNX OPUS Gateway should react on the value "0" or on the value "1" written to your parametrised EIB/KNX group address.
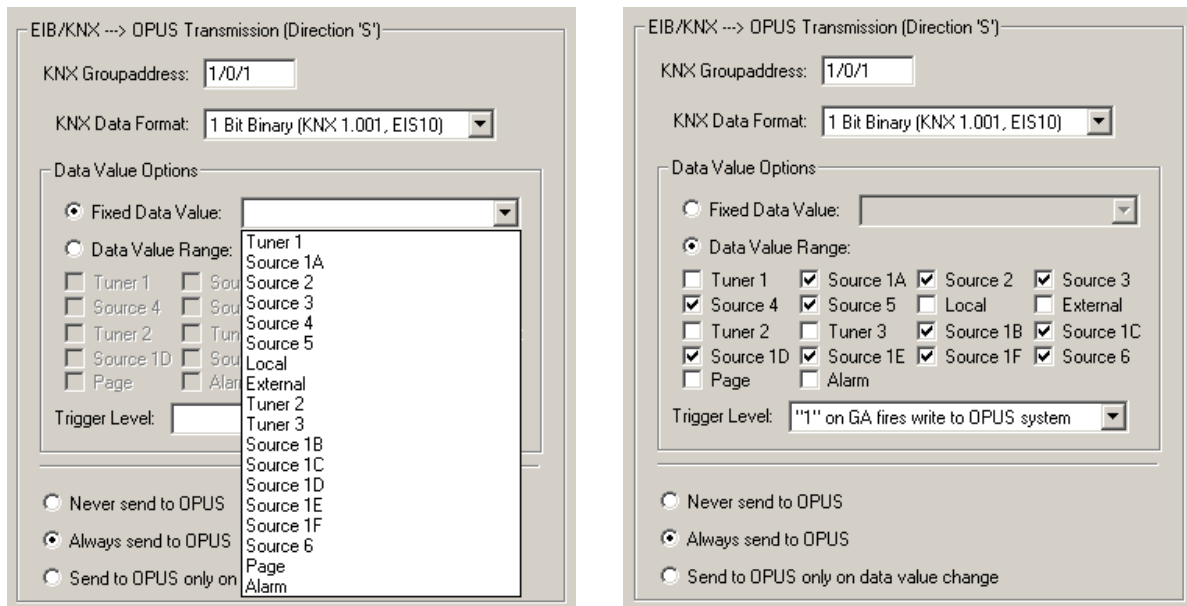
Figure 15: Data Value Options for OPUS Instruction "Input Select"

In the option group below the Data Value Options you can choose when the KNX OPUS Gateway should transmit data from the EIB/KNX bussystem to the OPUS system.

If you choose the option „*Never send to OPUS*", you can disable the transmission EIB/KNX → OPUS for this channel. The option „*Always send to OPUS*" tells the gateway that a WriteValue to the parametrised EIB/KNX group address should always send an OPUS instruction with the direction 'S' to the OPUS system. With the option „*Send to OPUS only on data value change*" the gateway checks on every ValueWrite which value was received before on the parametrised EIB/KNX group address. Only if these two values differ an OPUS instruction with direction 'S' is transmitted to the OPUS system. (This means if you write 3 times the value "2" on your EIB/KNX group address only 1 OPUS instruction telegram with direction 'S' will be generated from the KNX OPUS Gateway.)
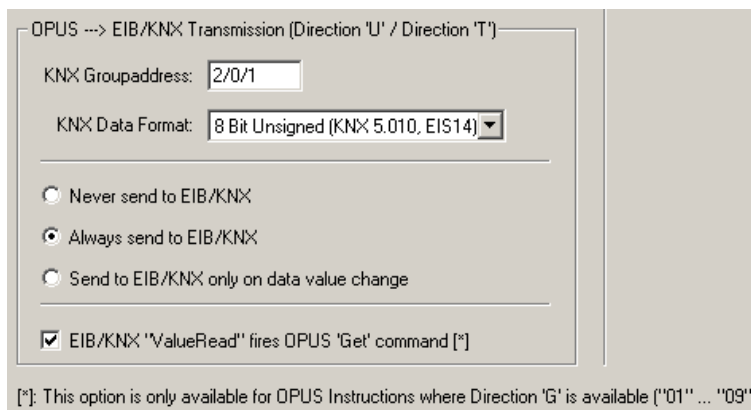
OPUS → EIB/KNX Transmission

Figure 16: "OPUS → EIB/KNX Transmission" section

On the bottom of the window (see Figure 16) you can map EIB/KNX group addresses to the OPUS instruction you've chosen before for transmission direction OPUS → EIB/KNX. These mappings can be used for sending update instructions (Direction 'U') or text instructions (Direction 'T') from the OPUS system to the EIB/KNX bussystem. These values can e.g. be used for visualization purposes.

First you enter a EIB/KNX Groupaddress in the field „*KNX Groupaddress*". Depending on the OPUS instruction you've chosen you can now choose a data format, for the EIB/KNX groupaddress you've entered before, in the field „*KNX Data Format*".

In the option group below the KNX Data Format you can choose when the KNX OPUS Gateway should transmit data from the OPUS system to the EIB/KNX bussystem.

If you choose the option „*Never send to EIB/KNX*", you can disable the transmission OPUS → EIB/KNX for this channel. The option „*Always send to EIB/KNX*" tells the gateway that a an direction 'U' or 'T' instruction should always execute a ValueWrite on the EIB/KNX bussystem for the parametrised EIB/KNX group address. With the option „*Send to EIB/KNX only on data value change*" the gateway checks on every 'U' or 'T' direction OPUS instruction which value was received before from the OPUS system. Only if these two values differ an EIB/KNX ValueWrite with the reveived data value is transmitted to the EIB/KNX bussystem. (This means if you send 3 times the OPUS instruction "#11S0105!" you will see only 1 EIB/KNX ValueWrite to EIB/KNX group address "2/0/1" with the data value "5" on your EIB/KNX bussystem.)

Repeat the described steps above until you have setup all your needed channels (max. 200 channel configurations are possible per KNX OPUS Gateway).

Transfer parametrisation to the KNX OPUS Gateway

With the button „*Save to file...*" you can save your parametrisation in a „*.KOG*" file. If you want to change your parametrisation you can use the „*Load from file...*" button to reload your parametrisation. After you have finished your parametrisation you can transfer the parametrisation to the KNX OPUS Gateway by clicking the button „*Transfer to GW*".

Note: If you want to transfer the parametrisation to your KNX OPUS Gateway it is necessary to establish 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 OPUS Gateway the button „*Transfer to GW*" and „*Read from GW*" are deactivated and a parametrisation transfer is impossible.

Important: If you transfer a new parametrisation to your KNX OPUS Gateway an existing parametrisation in the device is overwritten! With the button „*Read from GW*" you can read out the parametrisation of your KNX OPUS Gateway at any time and save it as a „*.KOG*" file.
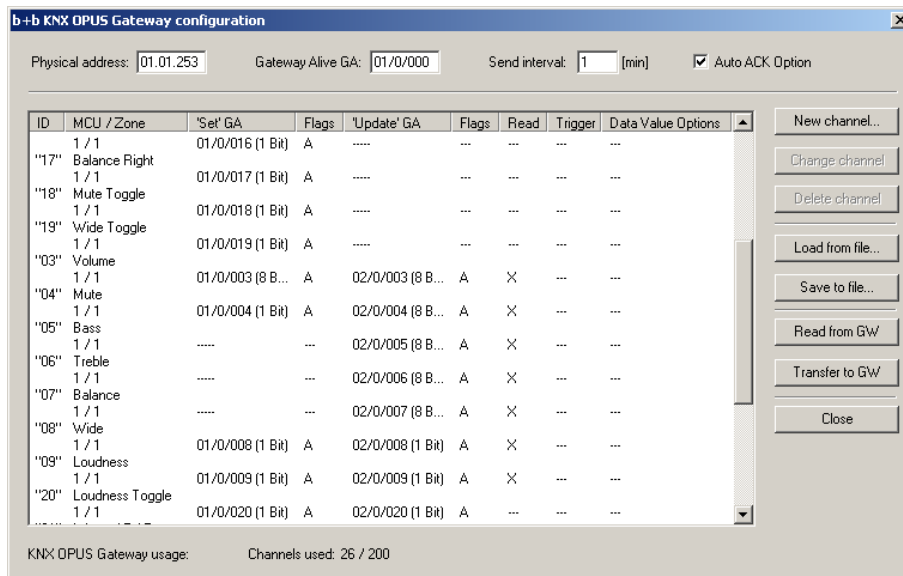
Figure 20: Parametrisation dialog b+b KNX OPUS Gateway (Online)

Functional description

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

The KNX OPUS Gateway has seven light emitting diodes (LEDs) on its top to visualise the current device status, data transmission and 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 OPUS Gateway in different situations is described:

Parametrisation phase

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

Parametrisation check

After the system startup the KNX OPUS Gateway checks it's parametrisation. If the Gateway has no parametrisation or a the current parametrisation is corrupted the LEDs **Error, KNX** and **PGM** are blinking in common. In this case the KNX OPUS Gateway needs to be parametrised for operation (see section „*Parametrisation with the b+b Terminal software*").

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

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

ASCII command interface

The KNX OPUS Gateway offers an easy to use ASCII command interface for diagnosis purposes. The user can connect to the KNX OPUS Gateway with any terminal program over the virtual COM port and transmit ASCII commands to the gateway.

The communication between PC and KNX OPUS Gateway is textbased. The "carriage return" character (0x0D hexadecimal) signals the end of an ASCII command and is abbreviated with **<CR>** in the following text. ASCII commands from the PC are case insensitive.

ASCII commands overview

Table 5 gives an overview of all ASCII command which are supported by the KNX OPUS Gateway.

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

? | ?H	Show ASCII command overview
?V	Show information about serial number and firmware version ot the KNX OPUS Gateway
?P	Show physical address of the KNX OPUS Gateway
?G	Overview KNX OPUS Gateway settings
DISPINSTS	Show all parametrised OPUS Instructions
DISPINST=<INST>	Show parametrisation of OPUS Instruction <INST> (<INST> = 1 ... 85)
DISPALLCH	Show all available channel parametrisations
DISPCH=<CH>	Show parametrisation of channel <CH> (<CH> = 1 ... 200)
DISPCHL=<CH>	Show parametrisation of channel <CH> and all linked channels with the same OPUS Instruction (<CH> = 1 ... 200)
DISPALLGAE	Show a list of all used EIB/KNX group addresses
DISPGA=<GA>	Show settings of EIB/KNX group address <GA> (z.B. <GA> = 0/0/1)
DISP1STGAE	Show index of first EIB/KNX group address entry
ERASE!	Erase KNX OPUS Gateway parametrisation
OA{+|-}	KNX Auto Acknowledge mode: **OA+:** enabled **OA-:** disabled
OL	Language of dialog texts: German

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OLE	Language of dialog texts: English
PA:<PA>	Set physical address <PA> (e.g. <PA> = 1.1.254)
RESET	Restart KNX OPUS Gateway

Table 5: Overview ASCII commands