

USB interface for kTux/BAOS

KNX TP USB Interface Stick 333 *secure*

Operation and installation manual



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1 Application

The KNX TP USB Interface Stick 333 *secure* is an extended interface for the KNX bus as a basis for device development.

Like the standard device 332, it can be used as a programming interface for ETS® Software and supports KNX Long Frames. Long telegrams enable a faster download to devices that support these telegrams, and it is necessary for KNX Security.

The LEDs on the device indicate the operating status and communication errors on the bus. The USB connector is galvanic isolated from the KNX bus.

Another application of the KNX TP USB Interface Stick 333 *secure* is the integration of end devices into KNX. Devices such as heat pumps or ventilation systems can be expanded via USB with a KNX TP interface, which can also be configured with the ETS. See [Notes for developers](#).

In addition, the stick also serves as an interface for the kTux software stack from Weinzierl. kTux is a KNX stack for Linux with KNX Security.

2 KNX Security

The KNX standard was extended by KNX Security to protect KNX installations from unauthorized access. KNX Security reliably prevents the monitoring of communication as well as the manipulation of the system.

KNX Data Security describes encryption at the telegram level. This means that the telegrams are encrypted on the twisted pair bus.

The KNX TP USB Interface Stick 333 *secure* supports the so-called KNX long frames (long telegrams) and is therefore compatible with KNX security telegrams.

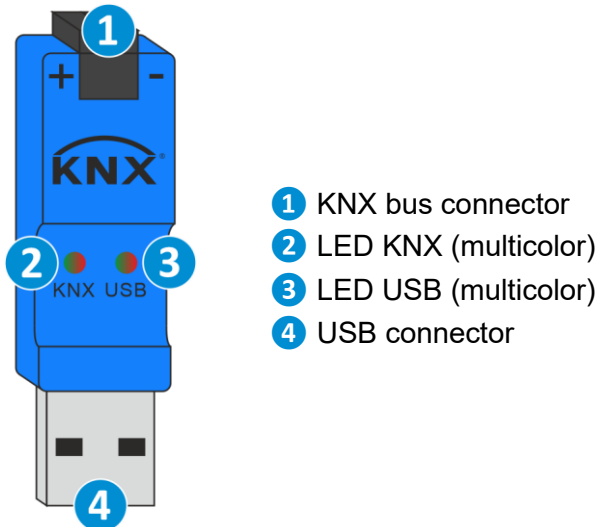
In the KNX specification, USB interfaces used as telegram interfaces are regarded as local devices that do not require additional protection. Access to the USB interface is therefore the same as access to the TP bus. This means that KNX USB interfaces should not be publicly accessible.

However, if the KNX TP USB Interface Stick 333 *secure* is used in stack mode with the BAOS protocol, the device optionally supports KNX Data Security for the KNX bus. The security settings are configured via the ETS. A security extension is also available for the BAOS protocol. Details can be found in the protocol description for BAOS Binary.

As an interface for kTux, the KNX TP USB Interface Stick 333 *secure* not only handles bus access but also includes persistent memory for the security counters.

3 Installation and connection

The KNX TP USB Interface Stick 333 *secure* features the following controls and displays:



- 1 KNX bus connector
- 2 LED KNX (multicolor)
- 3 LED USB (multicolor)
- 4 USB connector

Power is supplied by the PC via the USB connection.



The device is not working without USB connection.

3.1 KNX programming mode

The individual address of the interface can be set locally via the ETS. Therefore no programming button or LED is available on this device.

3.2 Status display

The LED KNX (2) lights up green if the device is successfully connected to the KNX bus. This LED indicates telegram traffic on the KNX bus by flickering.

KNX communication failures (e.g. repetitions of telegrams or telegram fragments) are indicated by a short change of the LED color to red.

Overview of the different indications of the LED KNX (2):

LED Status	Meaning
LED lights green	KNX bus voltage available.
LED flickers green	Telegram traffic on the KNX bus.
LED shortly red	Communication failures on the KNX bus.
LED lights orange	Interface is set to bus monitor mode.
LED flickers orange	Telegram traffic on the KNX bus in bus monitor mode.

The LED USB 3 lights up green if the device is connected to USB. This LED indicates telegram traffic on the USB by flickering.

USB communication failures are indicated by a short change of the LED color to red.

Overview of the different indications of the LED USB 3:

LED Status	Meaning
LED lights green	USB active.
LED flickers green	Telegram traffic on USB.
LED shortly red	Communication failures on USB.

3.3 USB suspend

If the PC or Laptop switches to suspend mode also connected USB devices will be suspended to save energy. Computers running MS Windows ® 8.1 or higher may set unused peripherals to standby even during normal operation. In suspend mode all LEDs of the KNX USB interface are off. If an unused interface is regularly accessed by software (e.g., ETS), this can cause the LEDs to flash, as the suspend mode is interrupted each time.

4 Factory default settings

The following configuration is set by factory default:

Individual address: 15.15.255

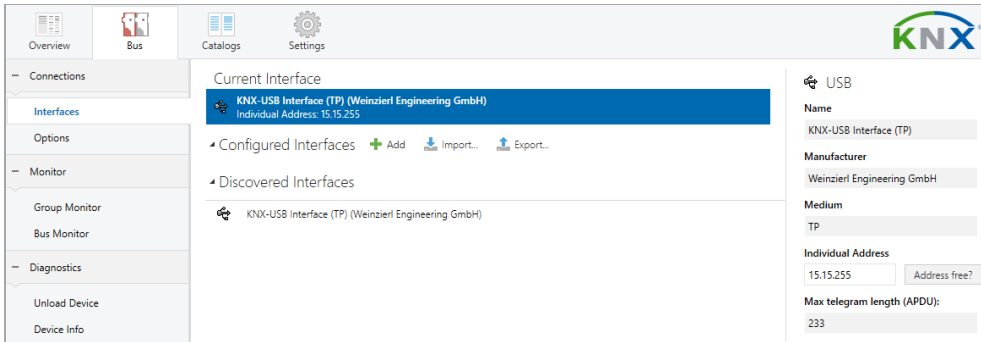
5 Wiring scheme



6 Interface settings in the ETS

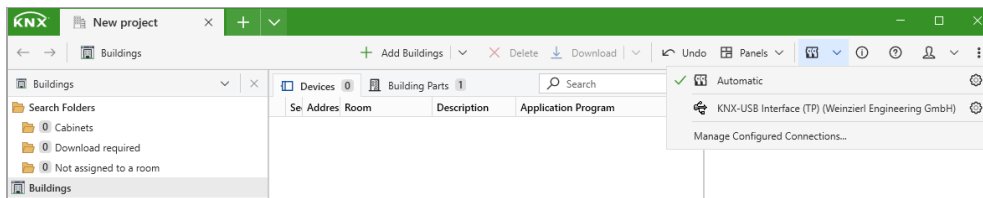
6.1 ETS 5

In the ETS 5, interfaces can be selected and configured via the ETS menu “Bus – Interfaces”. All available connections are listed under “Discovered Interfaces”. After clicking on the desired connection, connection specific information and options appear on the right side of the ETS window. The selected connection can be selected as the “Current Interface” via the “Select” button.



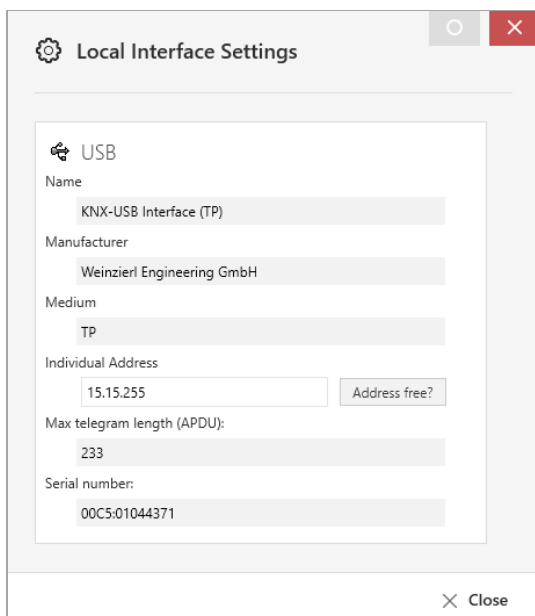
6.2 ETS 6

In the ETS 6, interfaces can be selected and configured in the ETS project via the “Interface” button. All available connections are listed here.



By clicking on a connection, this is selected as the desired interface.

By clicking the gear next to the desired connection, the connection specific information and options appear.



7 Bus monitor mode

The KNX USB interface supports the bus monitor mode and can be used with ETS. In bus monitor mode all traffic on the KNX bus is shown including ACK, NACK and BUSY characters. Invalid telegrams or fragments are also transmitted.

Interfaces in bus monitor mode are completely passively on the bus and therefore cannot be used simultaneously for other operations like download. To monitor an ETS download within the same ETS the group monitor can be used. The group monitor uses the KNX USB interface in normal operation mode (data link layer) and can be used in parallel to other bus operations. In the group monitor also sending of telegrams is possible.

Note that in group monitor mode individual addressed telegrams which do not address the KNX USB interface cannot be received.

8 KNX Long Frames

Standard KNX telegrams are limited to an APDU length of 15. The APDU length is the number of bytes in the payload. A group telegram holding a 14 byte string (KNX data point type 16) results in an APDU length of 15.

To increase the efficiency of KNX communication mainly for the download an extended format has been defined. It can be used to send longer telegrams on the bus. To use this feature it must be supported by

- the tool (ETS)
- the bus interface (USB)
- all couplers in between
- the addressed device

ETS starting with version 5 is able to detect automatically whether long frames can be used and optimizes the download accordingly.

The max APDU length of the KNX USB interface and which is used by ETS is 233. An APDU length of 233 results in total length of a KNX telegram on twisted pair of 242 bytes and occupies the bus for about 340 ms.



The download is much faster if the USB interface is installed in the same line as the target device. With each line coupler in-between the download time grows.

9 Notes for developers

9.1 Use as a telegram interface

The KNX USB communication is based on HID and cEMI telegram coding according to the KNX specification. To integrate the KNX USB interface in applications running on Windows or Linux the cross-platform SDK kDriveExpress is available from Weinzierl.

9.2 Use as a KNX extension for end devices

In addition to the telegram interface via cEMI, the KNX TP USB Interface Stick 333 *secure* includes a complete KNX Stack with communication objects and BAOS protocol V2 *secure*. Thus, the device offers the possibility to extend devices with USB connection (e.g. boards with embedded Linux) to full KNX devices, which can even be programmed with the ETS.

When using the internal KNX stack, the host can also activate KNX programming mode, which is indicated by LED KNX 2:

LED Status	Meaning
LED lights red	The KNX programming mode is active.

For more information about this solution and available SDKs please contact WEINZIERL.

9.3 Use as an interface for kTux

kTux is a KNX stack implementation from Weinzierl. It enables KNX integration in Linux based devices. Bus access for KNX TP is via USB. While the KNX TP USB Interface Stick 332 can also be used in the unsecure version, the secure version requires the KNX TP USB Interface Stick 333 *secure*, or the respective alternative as a module (circuit board without housing).

The device performs the following tasks for kTux

- Connection of KNX TP with ACK
- Galvanic isolation
- Persistent storage of Secure Counters
- Management of additional individual addresses for IP interface function
- License information for kTux



This device is also available as KNX USB Module 323 secure without housing with pins in a 2.54 mm grid.



WARNING

- The device must be mounted and commissioned by an authorized electrician.
- The prevailing safety rules must be heeded.
- The device must not be opened.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.



Product database for ETS 5/6

www.weinzierl.de/en/products/333/ets6

Data sheet

www.weinzierl.de/en/products/333/datasheet

CE Declaration

www.weinzierl.de/en/products/333/ce-declaration

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