OPERATING INSTRUCTIONS

TUL32

BW-TUL32-BA-EN · Rev. 1.0 · 2026-09-25

TUL32 — KNX TP interface for USB and Wi-Fi

These instructions describe connection, commissioning and safe operation of the TUL32. Read them before commissioning, keep them, and pass them on together with the device.

1 Safety information

DANGER — Connect the KNX bus terminal to a KNX TP bus only, never to mains voltage (230 V) or any other voltage source. Work on distribution boards and installations carrying mains voltage must be carried out by qualified electricians only.

CAUTION

- bare circuit board, no enclosure: the components are sensitive to electrostatic discharge. Hold the device by its edges only, do not place it on conductive surfaces, and protect it from moisture, dust and mechanical stress.
- Operate only in: dry indoor locations, 0 … +40 °C, 5 … 85 % RH, non-condensing.
- Do not put a damaged device into operation.
- Connect only to USB ports of equipment, or to USB power supplies, that comply with the applicable safety standards themselves.
- As delivered, the TUL32 does not transmit: it is supplied without firmware, and the “USB-serial emulation” firmware does not switch on the radio either. Only firmware installed by the customer can transmit. With radio firmware the device transmits in the 2.4 GHz band; then do not operate it where radio transmission is prohibited. During radio operation keep a distance of at least 20 cm between the device and persons.
- With network firmware the device is reachable on the local network and can access the KNX bus. Operate it only in trusted networks and do not expose it directly to the internet.
- Install firmware only from a trusted source, e.g. the installer named in section 5.

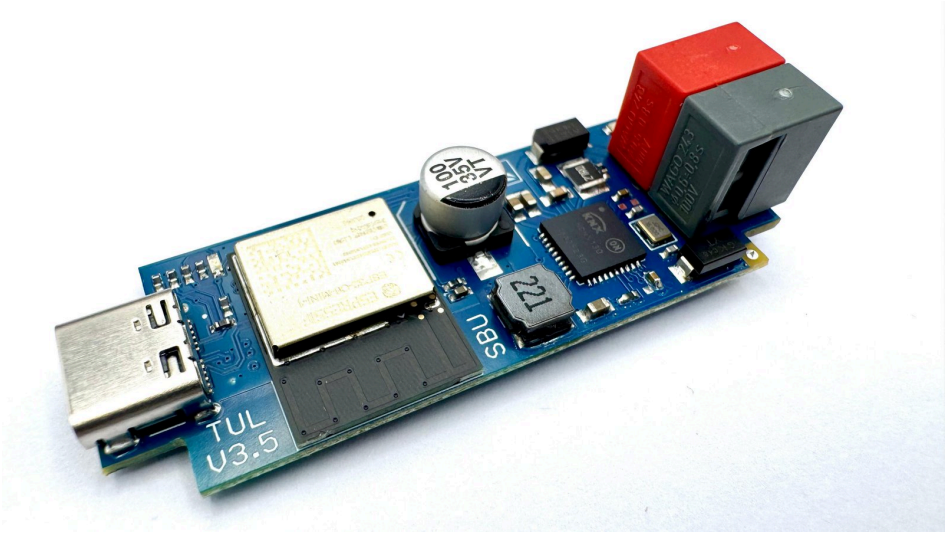
2 Intended use

The TUL32 is a hardware component for DIY use: an interface between a KNX TP bus and a computer (USB) or an IP network (Wi-Fi; Ethernet with an expansion board). It is powered via USB or the expansion connector J2 and is intended for use in dry indoor locations. It is not intended to perform safety functions as the sole means (e.g. personal protection, fire or intrusion alarm). Any other use is considered improper.

3 Scope of delivery

TUL32 (circuit board TUL V3.5) with KNX bus terminal. The device is shipped without firmware; the customer installs it. Optional: enclosure for self-assembly, available as an option.

4 Device overview



TUL32 (top side)

Element	Location	Function
USB-C receptacle	front end	power, data connection, firmware installation
Radio module with antenna	top side	Wi-Fi, Bluetooth LE, IEEE 802.15.4
Blue LED / red LED	top side	blue LED next to the USB receptacle, red LED next to the bus terminal
KNX bus terminal	end opposite USB	connection of the KNX bus cable
Push button “BOOTLOAD”	bottom side	download mode, further function depends on firmware
Expansion connector J2	bottom side	expansion boards, e.g. Ethernet

5 Commissioning

5.1 Installing the firmware

The device is shipped without firmware; the customer installs it. Installation runs in the web browser (Chrome, Edge or Opera (Web Serial)).

1. Connect the TUL32 to the computer with a USB-C cable. The cable must carry data lines (charge-only cables do not work).
2. Open https://install.busware.de/TUL/, select product and firmware variant, click **INSTALL** and select the serial port of the TUL32.
3. If no port appears: unplug the TUL32, hold down the push button “BOOTLOAD” on the bottom side, plug the TUL32 back in, release the button, then repeat step 2.

Firmware available for the TUL32:

Firmware	Function
USB-serial emulation	Transparent bridge USB ↔ KNX transceiver, e.g. for knxd
KNX-TP ↔ TCP Bridge (cdc2net)	KNX transceiver reachable over TCP on the network

Firmware	Function
KNX/IP for TUL (ip4knx)	KNXnet/IP gateway over Wi-Fi or Ethernet (https://install.busware.de/ip4knx/)
MCP for TUL	KNX commissioning through the Model Context Protocol (https://install.busware.de/TUL/mcp/)

Set-up and operation of the firmware (e.g. Wi-Fi credentials) are described in the documentation of each firmware.

5.2 Connecting the KNX bus

1. Pull the bus terminal off the TUL32.
2. Insert the bus cable: red = +, dark grey = − (silkscreen “+”/“−”); solid conductors Ø 0.6 … 0.8 mm, two conductors per pole.
3. Plug the bus terminal back on. The red LED lights up as soon as bus voltage is present.

The KNX side is galvanically isolated from the USB side. You can therefore connect and disconnect the KNX bus independently of USB.

6 Indicators and controls

Element	State	Meaning
Red LED	on	bus voltage present, bus-side supply active
Red LED	off	no bus voltage, bus cable reversed or not connected
Blue LED	—	depends on firmware
Push button	held while plugging in	download mode for firmware installation
Push button	during operation	depends on firmware

7 Troubleshooting

Problem	Possible cause	Remedy
Red LED does not light	no bus voltage; bus cable reversed	check bus voltage; check polarity (red = +, dark grey = − (silkscreen “+”/“−”))
Computer shows no serial port	no firmware; USB cable without data lines	use download mode (section 5.1, step 3); use a different cable
Installation in the browser not possible	browser without Web Serial	use Chrome, Edge or Opera (Web Serial)

8 Maintenance and cleaning

The device is maintenance-free. Do not clean it with liquids or solvents. It contains no user-serviceable parts.

9 Technical data

The complete technical data are given in datasheet BW-TUL32-DB-EN.

Item	Value
Supply	5 V DC via USB-C (sink, 5.1 kΩ on CC1/CC2)
Current consumption USB	approx. 46 mA without radio, approx. 90 mA receiving Wi-Fi, up to approx. 400 mA peak when transmitting Wi-Fi (calculated)
Current drawn from the bus	typ. 3 mA at 30 V, max. approx. 7 mA (calculated)
KNX	KNX TP1, 21 … 32 V DC (SELV)
Operating temperature	0 … +40 °C

Radio information (Directive 2014/53/EU, Article 10(8)):

Radio technology	Frequency band	Maximum transmit power
Wi-Fi (IEEE 802.11b/g/n/ax (Wi-Fi 6), 2.4 GHz)	2400 – 2483.5 MHz	19.81 dBm EIRP
Bluetooth (Bluetooth LE 5.3)	2400 – 2483.5 MHz	18.46 dBm EIRP
IEEE 802.15.4 (Thread, Zigbee)	2405 – 2480 MHz	10.40 dBm EIRP

10 Disposal

Disposal. The crossed-out wheeled bin symbol means that electrical and electronic equipment must not be disposed of with household waste. Take the device to a collection point for waste electrical equipment. Delete stored data before disposal (e.g. Wi-Fi credentials): reinstall the firmware or erase the flash memory. The device contains no batteries.

WEEE reg. no. (Germany): DE 54401172

11 Manufacturer and product identification

Type: TUL32 · Hardware revision: V3.5 (printed on the circuit board) · serial number = busware MAC address (A4:50:55:02:xx:xx)

Manufacturer
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