

# Communication interface converter USB to M-Bus – USBtoMBus-5K

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## Instructions manual

Version: 2024/1.1-EN



## USBtoMBus-5K communication converter

USBtoMBus-5K is a communication converter intended to connect devices with the M-Bus industrial bus to control systems or computer systems for metering data collection using the USB interface.

The converter can be used as an easy portable configuration tool for setting M-Bus meters.

The converter creates a virtual serial port after it has been connected to a PC. The communication parameters of this port can be configured in its driver settings or directly in the program that will use this port. The converter works as a transparent gateway and the transfer of the M-Bus messages is without modifications to their content.

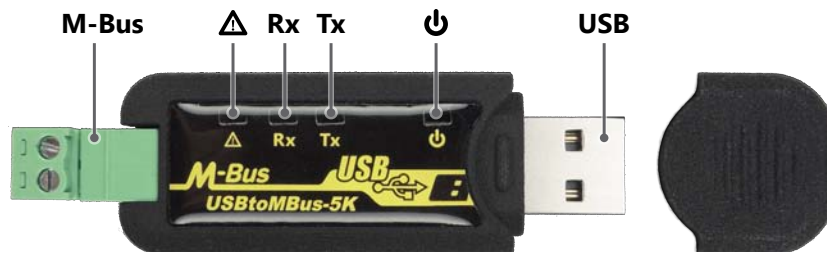
The M-Bus port can accommodate one to five M-Bus slave devices. The interface has a standard durability class of overvoltage protection and is immune against failures on the M-Bus line.

Operation states of the converter are indicated by four LEDs, this allows an easy readout of the current state of the converter or any possible causes of a failure. The LEDs indicate the state of the power supply, M-Bus communication and fail states of the M-Bus line.

### Technical parameters

USB communication interface	
Protections	protection against $\pm 15\text{kV}$ ESD
Galvanic separation	1kV from M-Bus line
Connector	USB type A
Power consumption	0.25W to 1.1W. Depends on M-Bus line load and communication. Maximum power consumption during a short on the M-Bus line is 1.5W.
M-Bus Master communication interface	
Number of attachable devices	1 to 5 SLAVE devices, idle current max. 7.5mA
Baud rate	300 - 9600 bps
Protection	- overvoltage protection TVS 600W - overload and short circuit electronic protection on the line, note: the converter is immune against permanent short on the line
Galvanic separation	1kV from USB
Connector	plug-in connector for wires of up to 1.5 mm <sup>2</sup> cross-section area
Temperature	
Operating range	0°C to 60°C
Mechanical construction	
Mechanical design	plastic box
Dimensions: H x W x L	14.4 x 22 x 73 mm, 14.4 x 22 x 76.1 mm with cap on USB connector
Protection classification	IP40
Weight	17g

## Layout of connectors and status LEDs



### Connectors

**M-Bus** – Plug-in connector for connecting the M-Bus line with M-Bus slave devices.

**USB** – USB type A connector for PC connection.

### Status LEDs

- Tx** **Transmit** – A green status LED that indicates data transmission on the M-Bus line.
- Rx** **Receive** – A yellow status LED that indicates data transmission on the M-Bus line. In case of exceeding the maximum number of devices connected to the M-Bus line the status LED may flash alternately with the *Overload* LED.
- ⚠** **Overload/Short** – A red status LED that indicates faulty state of the M-Bus line. Due to protection of the converter the data transmission and reception is stopped in this state.
  - **M-Bus line is overloaded**  
If there are more than 5 M-Bus SLAVE devices connected to the M-Bus line the *Overload/Short* status LED will start to flash. If there is a greater overload on the line, more than 7 M-Bus SLAVE devices are connected, the *Receive* and *Overload/Short* status LEDs will flash alternately.
  - **There is a short on the M-Bus line**  
If there is a short circuit between the M-Bus wires, the load on the line is less than 500Ω or there is a greater number of M-Bus slave devices connected to the M-Bus line, the converter will interpret such a state as a short circuit on the line. The red *Overload/Short* will be turned on permanently.  
*Note:* The default communication mode will be restored immediately after fixing the malfunction.
- ⏻** **Power** – A blue status LED that is turned on if a suitable power supply voltage is connected.

## Typical application



Typical wiring of the converter with M-Bus devices and a USB connection to the computer.

## USB interface

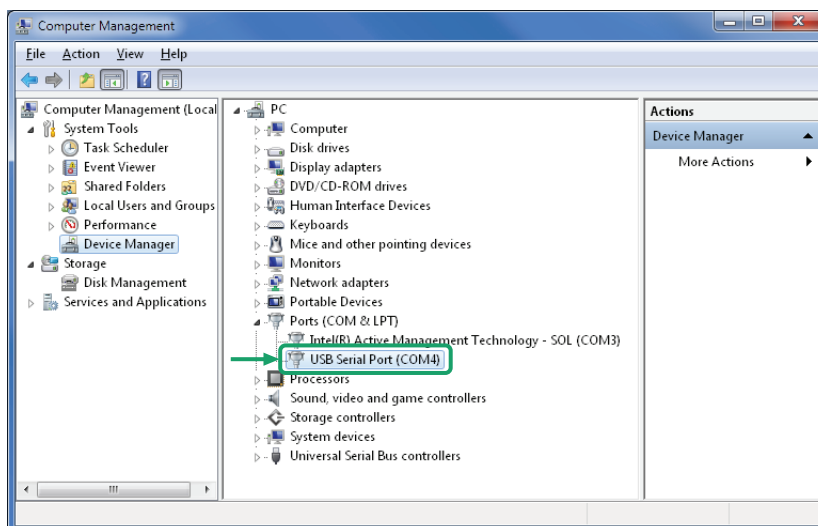
The converter creates a virtual serial port after it has been connected to a PC. The communication parameters of this port can be configured in its driver settings or directly in the program that will use this port.

On Windows 7 systems and newer, the driver for the USB virtual serial port is installed automatically immediately after the converter has been connected to the computer. The drivers for other operating systems and older versions of Windows are available at this address: <http://www.ftdichip.com/Drivers/VCP.htm>

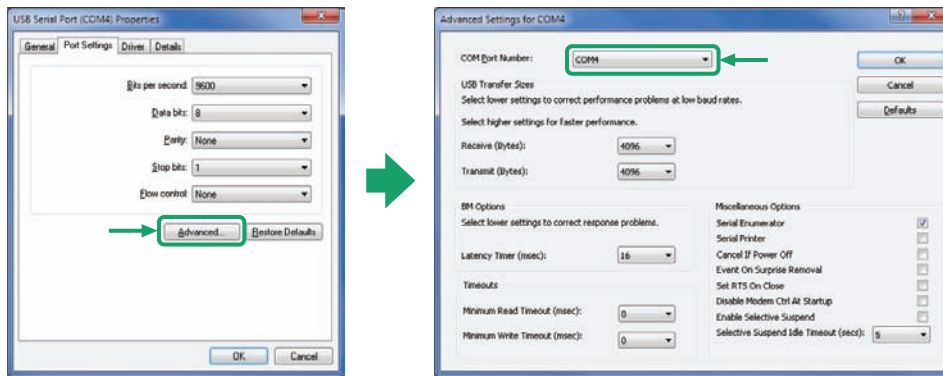
The COM port number depends on the system and it is possible to change it.

Steps to change the COM port number in the Windows operating systems:

1. Click on the *Start* button in the taskbar.
2. Right click on *My Computer*.
3. Choose *Manage* in the context menu.
4. In the *Computer Management* window, click on *Device Manager* in the left panel.
5. In the right panel open the *Ports (COM & LPT)* item.
6. Double click on the *USB Serial Port (COMx)* device - Port number depends on system.



7. On the *Port Settings* tab, press the *Advanced* button.
8. In the *Advanced Settings* window chose the *COM Port Number*.



9. Press the *OK* button for the advanced settings and the *OK* button for the port settings.

The change will occur immediately without the need to restart the computer and the Device manager should show the COM port with the new number.

Other communication parameters of the port in Windows can be changed in the same way as mentioned in the above steps or they can be configured directly in the program that will use the given COM port.

## M-Bus line

The interface is of M-Bus Master type and allows for connection of up to five M-Bus SLAVE devices. The maximum idle current on the line is 7.5mA. The interface is protected against overvoltage, overload and short circuit on the line. It is recommended to use a shielded twisted pair cable in the construction of the communication line. The shielding of the cable should be grounded preferably at the entry point of the switchgear cabinet. The M-Bus port is rated for a standard level of protection. The use of additional rough overvoltage protection is recommended only on the LPZ0A-LPZ1 interface at a building entry point of the M-Bus line.

The communication speed ranges from 300bps to 9600bps. Even parity with one stop bit and 8 bit data word is used as standard.

The connection of the M-Bus line uses a connector labeled M-Bus. The connector allows a connection of wires with up to 1.5 mm<sup>2</sup> cross-section area. It is recommended to use a shielded twisted pair cable for example J-YStY for the connection of the meters.

Suitable types of cables for connecting the M-Bus devices.

- Indoor environments - LiYCY 2x0.14mm<sup>2</sup> up to a distance of 100m, LiYCY 2x0.25mm<sup>2</sup> up to 200m.
- Outdoor/indoor environments - J-YStY 1\*2\*0.6mm up to 200m, J-YStY 1\*2\*0.8mm up to 400m.

The distances can be longer for a smaller amount of SLAVE devices but the capacitance of the M-Bus line must be below 80nF for maximum communication speed.

A voltmeter and an amp meter is sufficient for a basic electrical check of the M-Bus line.

The table contains a summary of verification voltages and currents which can be measured during a check.

M-Bus line	SLAVE device	RS232toM-Bus-5M converter
Idle voltage $U_{M-Bus}$	min. 21V	29V to 30V
Idle current $I_{M-Bus}$	max. 1.5mA	max. 7.5mA

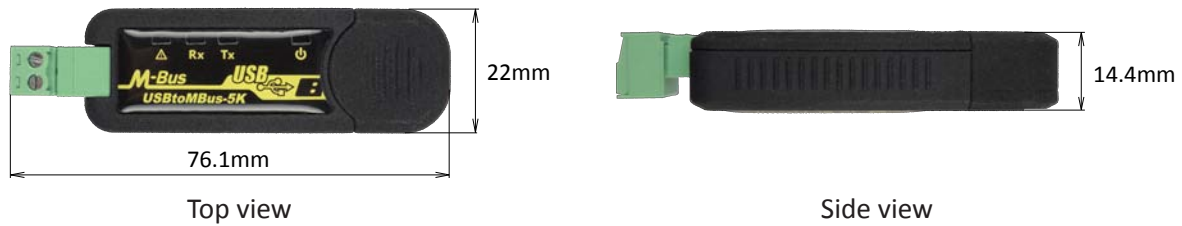
The measurements should be taken in an idle state without ongoing communication and in a state when the converter does not indicate an error on the M-Bus line. The idle voltage on the M-Bus line should be in the 29 to 30V range. The Slave pins of the connected device should have a voltage over 21V which represents the minimal value for a standard M-Bus Slave device (IO-TSS721A). This difference in voltage can be caused by voltage drops on the communication protections and communication line. Using the recommended M-Bus protections and type of wiring guarantees the fulfillment of the minimum voltage requirements.

Maximum current on the line from the converter should be 7.5mA. Its measured value should roughly correspond to the amount of M-Bus Slave devices times 1.5mA.

The idle current of the Slave device must be measured on the wires which lead directly to the meter and do not continue any further. Current through these wires should be smaller or at the very most equal to 1.5mA.

## Mechanical parameters

The converter is in a plastic box that is 3D printed using SLS technology from Nylon 12 powder.



## Handling of electronic waste

- A non-functional, discarded electronic device must be handed to a proper collection authority.
- The electronic device must be separated from unsorted communal waste.
- Failure to handle the scrapped electronic device according the mentioned guidelines may cause negative impact on the environment and human health.
- Handing the old device to a proper collection authority will warrant the recovery of useful materials with which you contribute to their repeated use after recycling.
- All information in this paragraph is represented by the following symbol present on every electronic device.
- The purpose of this symbol is to guarantee the retrieval and separate collection of e-waste. These types of devices cannot be disposed into unsorted communal waste.



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## Warranty

In order to achieve maximum possible level of reliability and quality the converters pass through series of electrical tests, visual inspection and a final functional test of communication during manufacturing. If despite of this an unexpected malfunction appears on a converter, please send the converter with a description of the fault and a copy of the receipt bill back to your authorized dealer. The repair of the converters is performed exclusively by the manufacturer. Any unauthorized modifications to the construction of the converter will result in the loss of warranty.

## Warranty conditions

Warranty is provided for the period of 24 months since the purchase of the product and covers:

- proper functionality of the product according to the information provided in the product's manual
- material and manufacturing faults

The warranty does not cover:

- any form of unauthorized modification to the products' construction
- faults caused by harsh handling, mechanical damage, damage caused by liquids and fire, operating temperature and overvoltage beyond allowed range
- use contradicting the conditions described in manual, general principles, technical or safety regulations

In case of a warranty claim please fill in this claim form and send it together with the faulty product and a copy of your receipt bill.

### Converter defect description:

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