

# Communication interface converter M-Bus to Ethernet

## EthMBus-5 LITE

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## Instructions manual

Version: 2021/1.3-EN

### Communication converters of the X-Port line



An extended manual can be downloaded from [www.prevodniky.sk](http://www.prevodniky.sk)

## Communication converter EthMBus-5 LITE

EthMBus-5 LITE is a converter with increased durability intended for communication connection of devices with the M-Bus industrial bus to an Ethernet computer network. It enables transfer of M-Bus messages using the TCP and UDP Ethernet protocols without modifying the content of the M-Bus messages.

It supports connection of one to five M-Bus slave devices. The M-Bus port has a very high durability against overvoltage and malfunctions on the line. The converter supports a wide range of the direct and alternating current power supply voltages with surge protection.

Converter operation states are indicated with six LEDs making it easy to determine the current state of the converter or possible causes of failure.

Communication with the converter and a PC application can be realized using a virtual serial COM port or directly via TCP/IP connection. The virtual serial port connection is suitable for older programs designed to work only with the serial communications interface.

## Technical parameters

Ethernet communication interface	
Communications interface	10BASE-T or 100BASE-TX (auto-sensing)
Communication protocols	ARP, UDP, TCP, ICMP, AutoIP, DHCP, HTTP
Connector	RJ45
Compatibility	Ethernet: Version 2.0/IEEE 802.3
M-Bus Master communication interface	
Number of connectable devices	1 to 5 SLAVE devices, idle current max. 7.5mA
Baud rate	300-9600 bps
Protection	- overvoltage protection TVS 1500W - overload and short circuit electronic protection on the line, note: converter can resist sustained short circuit on the line
Galvanic separation	1kV from power supply, >1kV from Ethernet
Connector	plug-in connector for wires of up to 2.5 mm <sup>2</sup> cross-section area
Power Supply	
Recommended range of power supply voltages	
DC power supply	9V to 39.5V
AC power supply	9V to 27.5V
Protection	overvoltage protection TVS 1500W
Power consumption	1.7 to 3W* depends on load and power supply. *M-Bus line shorted
Connector	plug-in connector for wires of up to 2.5 mm <sup>2</sup> cross-section area
Temperature	
Operating range	0°C to 60°C
Mechanical construction	
Mechanical design	aluminium box
Mounting	DIN rail 35 mm (EN 50022 top hat rail)
Dimensions: height x width x length	33 x 57 x 87mm – note: length with connectors 106mm
Protection classification	IP40
Weight	136g

## Layout of connectors and status LEDs



### Connectors

- **M-Bus** – Plug-in connector for connecting the M-Bus line with M-Bus slave devices.
- **Power** – Plug-in connector for connecting the power supply and earth ground.  
Note: the polarity doesn't matter.
- **Ethernet** – RJ45 connector for connecting the Ethernet communication cable.

### Status LEDs

- Tx **Transmit** – The status LED is colored green and signifies data transmission on the M-Bus line.
- Rx **Receive** – The status LED is colored yellow and signifies 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 will flash alternately with the *Overload* LED.
- ⚠ **Overload/Short** – The status LED is colored red and indicates faulty state on 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 the *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** – The status LED is colored green and is turned on if a suitable power supply voltage is connected.
- Link **Connection** – LED indicates status of the Ethernet network connection. The LED is turned off if no connection is available. The LED is on when the connection is active.
- Rx/Tx **Rx/Tx activity** – LED indicates communication activity. The LED is turned on only during network activity, data transfers.

## Typical application



Typical wiring of the converter with M-Bus devices, power supply and Ethernet network connection.

### • Power Supply

The recommended range of DC power supply voltage is 9V to 39.5V. For AC power the recommended range is 9V to 27.5V. The connection of the power supply voltage uses a plug-in connector labeled POWER. Maximum power consumption is 3W and depends on the load on the M-Bus line.

*Note 1\** One of the power wires should be grounded - connected with the PE (Protective Earth) wire. Otherwise the converter will not comply with the EN 55011 EMC standard. *Note:* this depends on the used power supply and connection of further devices to the same power supply.

*Note 2\** The use of external current protection is advised for further protection of the power supply.

### • Ethernet

The connection uses a standard RJ45 connector and it is recommended to use a STP (Shielded Twisted Pair) Ethernet cable. Supported transfer speeds are 100Mbps and 10Mbps in duplex and half-duplex modes.

*Note:* Because the Ethernet interface isn't equipped with protection against overvoltage or with noise filters, in industrial environments it is recommended to use it only for short lengths (less than 3m) or in spaces which comply with the EN55024 standard for IT environments.

### • 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 at the highest level of protection - Class 5 in the EN 61000-4-5 standard measured also on an unshielded cable. The use of a shielded cable further increases the level of protection. The use of additional rough overvoltage protection is recommended only on the LPZ0A-LPZ1 interface on 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 2.5 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.

## Configuration of the converter through the web interface example

### Default network settings of the converter

- Static IP address of the converter 192.168.0.7
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.0.1 *Note:* communication runs within local network.
- Communication protocol TCP Server. *Note:* virtual COM port or an application with a TCP interface.
- Login credentials for the web interface user: *admin* password: *admin*

### Default settings of the M-Bus communication line

- Transfer speed 2400bps.
- Data format: 8 bits, even parity, 1 stop bit.

### Converter configuration steps

1. Connect power supply to the converter – POWER connector. The *Power* LED should turn on.
2. Connect the converter to the network or directly to a PC via an Ethernet cable. When a successful connection is established the *Link* status LED turns on and the *Rx/Tx* LED starts to flash.
3. Configuration of the converter can be done with the web interface by entering the IP address into a web browser.

Web interface configuration:

- Converter mode - in the left menu choose *Converter mode* and under *Connection Mode* select one of the following modes: *TCP Server*, *TCP Client*, *UDP Single* or *UDP Multi*. According to the selected mode fill in the values for *Local Port Number*, *Remote Port Number* and *Remote Server Addr*. Click the *Save* button to save the new settings.
- Network settings - in the left menu choose *Ethernet Config* and enter the network settings. To use a static IP address under *IP type*: select *Static IP*. Fill in the *Static IP* address, network mask in *Submask*, and if necessary *Gateway* IP address and *DNS server* IP address. Click the *Save* button to save the new settings.  
Warning: When changing the IP address it is necessary to re-open the web interface by entering the newly configured IP into the web browser.
- M-Bus line configuration – in the left menu choose *Converter mode*. The top section contains the M-Bus settings. These allow to change the communication speed. The default is 2400bps. When changing this configuration, click the *Save* button to save the settings.

*Note:* The Lite version of the SL converter cannot be used with the *Lantronix DeviceInstaller* application. It also does not offer a configuration interface through a Telnet terminal.

To create a virtual serial port the USR-VCOM application can be used. It can be downloaded here:

<https://www.usriot.com/support/downloads/usr-vcom-virtual-serial-software.html>

## Mechanical parameters of the converter

The converter is made from a robust aluminium box which ensures excellent mechanical durability, enhanced interference resistance and improved heat dissipation from the converter to the environment. The converter is designed to be mounted on a 35 mm DIN rail (EN 50022 top hat rail).



Top view



Side view with DIN rail attached

## EMC compatibility

EMC compatibility of the M-Bus converter has been tested according to the following industrial environment standards.

EMC emission tests		
Standard	Test	Level
EN 55011	Power line - CONDUCTED EMISSIONS 10/150 kHz - 30 MHz	Class A
EN 55011	RADIATED EMISSIONS (Electric Field) 30 MHz - 1000 MHz	Class A

EMC immunity tests		
Standard	Test	Level
EN 61000-4-2	ELECTROSTATIC DISCHARGE (ESD) - Contact discharge	± 4kV
EN 61000-4-2	ELECTROSTATIC DISCHARGE (ESD) - Air discharge	± 8kV
EN 61000-4-3	RADIATED RADIO-FREQUENCY ELECTROMAG. FIELD 80MHz - 1GHz	10 V/m
EN 61000-4-3	RADIATED RADIO-FREQUENCY ELECTROMAG. FIELD 1,4GHz - 2GHz	10 V/m
EN 61000-4-3	RADIATED RADIO-FREQUENCY ELECTROMAG. FIELD 2GHz - 2,7GHz	3 V/m
EN 61000-4-4	ELECTRICAL FAST TRANSIENT/BURST - Power line	± 4 kV
EN 61000-4-4	ELECTRICAL FAST TRANSIENT/BURST - M-Bus line	± 4 kV
EN 61000-4-5	SURGE IMMUNITY - Power line. Common/differential mode.	± 1kV / ± 1kV
EN 61000-4-5	SURGE IMMUNITY - M-Bus line. Cable shielding.	± 4 kV
EN 61000-4-5	SURGE IMMUNITY - M-Bus line. Common/differential mode.*	± 4kV / ± 2kV
EN 61000-4-6	CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS 0,15MHz - 80 MHz. Power line and M-Bus line.	10 V

\* test carried out at the request of the manufacturer. The M-Bus port has an increased durability against overvoltage. Carrying out this type of test is not required with the use of a shielded cable.



## Handling of electronic waste

- 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 of to unsorted communal waste.



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