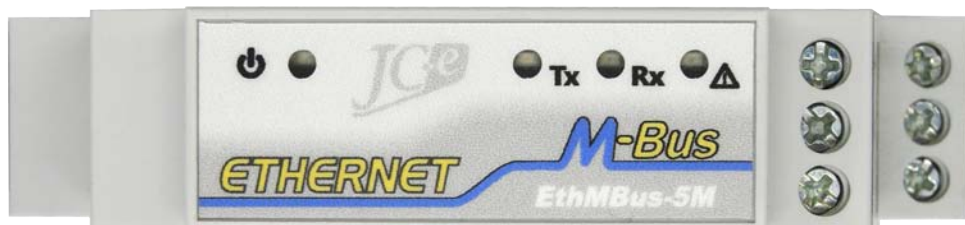


# Communication interface converter M-Bus to Ethernet

## EthMBus-5M LITE

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### Instructions manual

Version: 2021/1.1-EN

**Communication converters of the Base line**



## Communication converter EthMBus-5M LITE

EthMBus-5M LITE is a communication converter designed for the connection of devices with the M-Bus interface to control/computer systems for data collection from meters using the Ethernet network. The converter can work as a transparent gateway where the transfer of M-Bus messages occurs without a change to their content using the TCP or UDP protocol. The converter can work in client or server mode.

Programs that do not have a TCP/IP interface can use a virtual serial COM port application for communication.

The M-Bus port has a connection capacity for one to five M-Bus slave devices. The interface provides an above standard grade of surge protection and is resilient against failures on the M-Bus line.

Operation states of the converter are indicated by six LEDs which makes it easy to determine the actual state of the converter or possible causes of failure. The LEDs indicate the state of the power supply voltage, Ethernet communication, M-Bus communication and fault conditions of the M-Bus line.

### 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 600W - overload and short circuit electronic protection on the line, note: converter can withstand a sustained short circuit on the line
Galvanic separation	1kV from power supply, >1kV from Ethernet
Connector	terminals 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	8.5V to 40V
AC power supply	8.5V to 28V
Protection	overvoltage protection TVS 400W
Power consumption	1.3W to 2.2W. Depends on M-Bus line load and communication. Maximum power consumption during a short on the M-Bus line is 2.7W.
Connector	terminals for wires of up to 2.5 mm <sup>2</sup> cross-section area
Temperature	
Operating range	0°C to 45°C
Mechanical construction	
Mechanical design	plastic box
Mounting	DIN rail 35 mm (EN 50022 top hat rail)
Dimensions: height x width x length	56,5 x 17,5 x 97,5mm
Protection classification	IP20
Weight	52g

## Layout of connectors and status LEDs

### Connectors

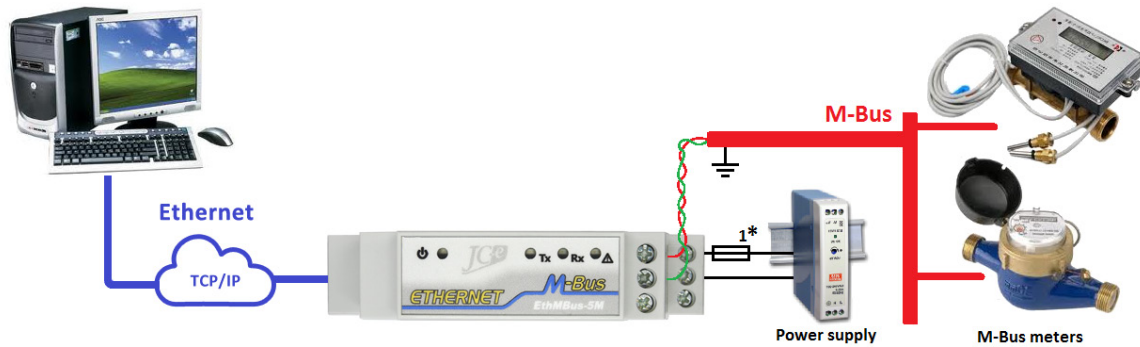
- **M-Bus**  
Connector for connecting the M-Bus line with M-Bus slave devices.
- **Power**  
Connector for connecting the power supply and earth ground.
- **Ethernet**  
RJ45 connector for connecting the Ethernet communication cable.



### Status LEDs

- Tx** **Transmit** – The status LED has a green color and indicates 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 has a blue color and is turned on if a suitable power supply voltage is connected.
- Link** **Link** – The status LED indicates status of the Ethernet network connection. The LED is turned off when no connection is available. The LED is turned on when the connection is active.
- Rx/Tx** **Rx/Tx activity** – The status LED indicates communication activity. The LED is turned on only during network activity.

## Typical application



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

### • Power Supply

The recommended range of power supply voltages is 8.5V to 40V DC and 8.5V to 28V AC. The power supply is connected to terminals labeled POWER. Maximum power consumption is 2.2W (2.7W in case of a short on the M-Bus line) and depends on the M-Bus line load and power supply.

*Note 1\*:* The use of external fusing is advised if additional power source protection is required e.g. to limit the short circuit current during overvoltage etc.

### • Ethernet

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

### • 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 a high level of protection according to 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.

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	EthMbus-5M LITE 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.

## 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.

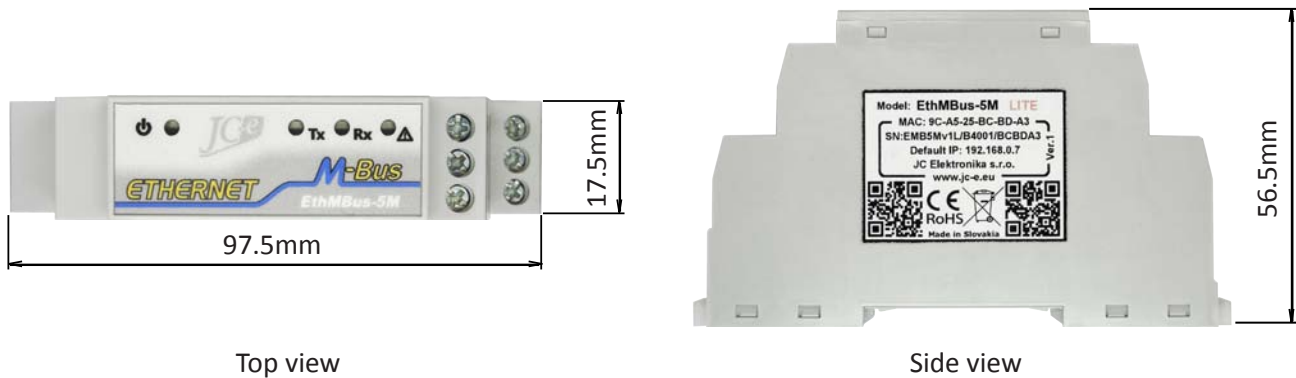
*Note:* The LITE version of the converter cannot be used with the *Lantronix DeviceInstaller* application. It also does not offer a configuration interface through a Telnet terminal.

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 built in a standard plastic box designed for mounting on a 35 mm DIN rail. The converter has a very small width of just 17.5mm.



Top view

Side view

## EMC compatibility

EMC compatibility of the M-Bus converter has been tested according to the following standards in an accredited laboratory.

### EMC emission tests

Standard	Test	Level
EN 55022	Power line - CONDUCTED EMISSIONS 10/150 kHz - 30 MHz	Class B
EN 55022	RADIATED EMISSIONS (Electric Field) 30 MHz - 1000 MHz	Class B

### 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 61000-4-4	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 / ± 0,5kV
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.*	± 2kV / ± 1kV
EN 61000-4-6	CONDUCTED DISTURBANCES, INDUCED BY RADIO-FREQUENCY FIELDS 0,15MHz - 80 MHz. Power line and M-Bus line.	3 V

\* Test carried out at the request of the manufacturer. The M-Bus port of the converter achieves the highest level of overvoltage protection according to the EN 61000-4-5 standard. Carrying out this type of test is not required when a shielded cable is used.

## 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 of to unsorted communal waste.



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