

Communication interface converter M-Bus to Ethernet - EthMBus-3SL LITE



Instructions manual

Version: 2019/1.1-EN

Communication converters of the Base line



Communication converter EthMBus-3SL LITE

EthMBus-3SL 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 three M-Bus slave devices. The interface provides a 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 3 SLAVE devices, idle current max. 4.5mA
Baud rate	300-9600 bps
Protection	- overvoltage protection TVS 400W - overload and short circuit electronic protection on the line, note: converter can withstand temporary short circuit on the line
Galvanic separation	1kV from power supply, >1kV from Ethernet
Connector	terminals for wires of up to 2.5 mm ² cross-section area
Power Supply	
Recommended range of power supply voltages	
DC power supply	8V to 28V
Protection	overvoltage protection TVS 400W
Power consumption	1.0W to 1.8W. Depends on M-Bus line load and communication. Maximum power consumption during a short on the M-Bus line is 2.4W.
Connector	terminals for wires of up to 2.5 mm ² 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

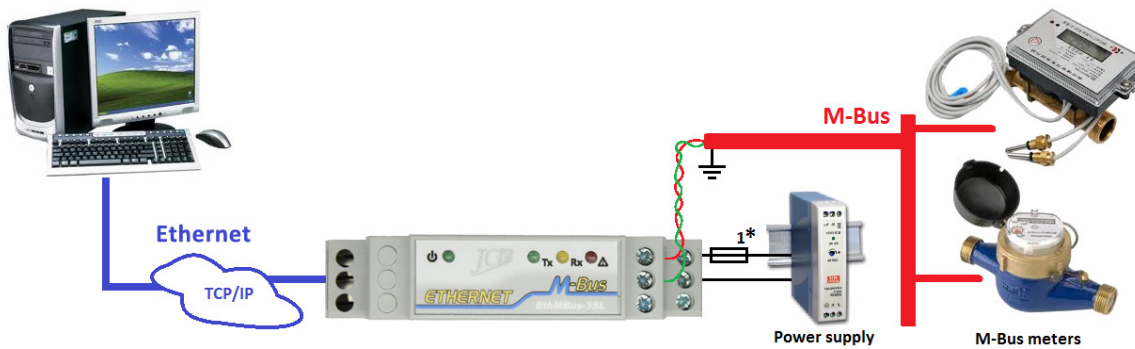
- **M-Bus**
Connector for connecting the M-Bus line with M-Bus slave devices.
- **Power**
Connector for connecting the power supply and earth ground.
Note: Polarity matters.
- **Ethernet**
RJ45 connector for connecting the Ethernet communication cable.



Status LEDs

- 
Tx **Transmit** – The status LED has a green color and indicates data transmission on the M-Bus line.
- 
Rx **Receive/Overload** – The status LED has a yellow color and indicates data transmission on the M-Bus line.
 If the maximum number of devices connected to the M-Bus line is exceeded this LED will be permanently turned on. This state will occur when the idle current is greater than 7.5mA.
Note: The error state when there are more than three meters connected to the converter but the limit of 7.5mA is not exceeded is not indicated and the communication with the meters will not work.
- 
Short – The status LED has a red color 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.
 If the M-Bus wires are shorted, the load on the line is less than 1kΩ or there is a greater number of M-Bus slave devices connected to the M-Bus line, the converter will interpret this state as a short on the line. The red *Short* LED will be permanently turned on.
Note: After fixing the malfunction the default communication mode will resume immediately.
- 
Power – The status LED has a green color and is turned on if a suitable power supply voltage is connected.
- 
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 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 DC power voltage is 8V to 28V. The connection of the power supply uses terminals labeled POWER. The polarity is marked on the terminals label and must be connected correctly. The converter has a polarity reversal protection. Maximum power consumption is 1.8W (2.4W 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 three M-Bus SLAVE devices. The maximum idle current on the line is 4.5mA. 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 interface is designed for connection of shorter lines within a building.

It is best to design the M-bus line within a single or adjacent rooms. With longer lines (several tens of meters) it is necessary to keep within the maximum capacitive load of the line depending on the communication speed.

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

Maximum capacitive load of the M-Bus line with 9600bps communication speed is 50nF and with speeds of 2400bps and slower 100nF.

Note: Suitable types of cable for connecting the M-Bus devices is LiYCY 2x0.14mm²

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.

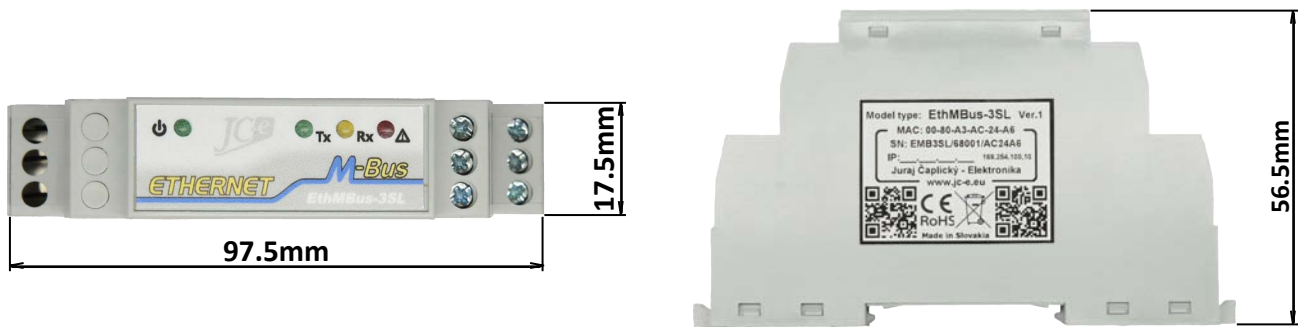
Warning: When changing the IP address it is necessary to re-open the web interface by entering the newly configured IP into the web browser.
- M-Bus line configuration – in the left menu choose *Converter mode*. The top section contains the M-Bus settings. These allow to change the communication speed. 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 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.*	± 1kV / ± 0,5kV
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 has an increased durability against overvoltage. Carrying out this type of test is not required with the use of shield cable.

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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