Communication interface converter M-Bus to Ethernet

EthMBus-3SL SMART

Instructions manual

Version: 2019/1.3-EN

Communication converters of the Base line

JCe

Communication converter EthMBus-3SL SMART

EthMBus-3SL SMART 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.

In *Smart M-Bus* mode the converter communicates with the meters independently and processes their data which are then available as a HTML table on a web page, XML or CSV exports, e-mail with export attachment, uploads to FTP server and direct M-Bus messages. Programs that do not support the 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, Telnet, TFTP, AutoIP, DHCP, HTTP, SNMP
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 mm² cross-section area
Power Supply	
Recommended range of power supply voltages	
DC power supply	8V to 28V
Protection	overvoltage protection TVS 400W
Power consumption	1.4W to 2.2W. Depends on M-Bus line load and communication. Maximum power consumption during a short on the M-Bus line is 3.4W.
Connector	terminals for wires of up to 2.5 mm² 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 then 7.5mA.

Note: The error state when there are more then 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 then 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 **Link –** The status LED is dual colored and indicates status of the Ethernet network connection. The LED is turned off if no connection is available. A 100Mbps connection is indicated with green and a 10Mbps connection with orange LED light.

Rx/Tx **Rx/Tx activity –** The status LED is dual colored and indicates the type of connection and communication activity. The LED is turned on only during network activity. Green color indicates full-duplex mode. Orange indicates half-duplex mode.

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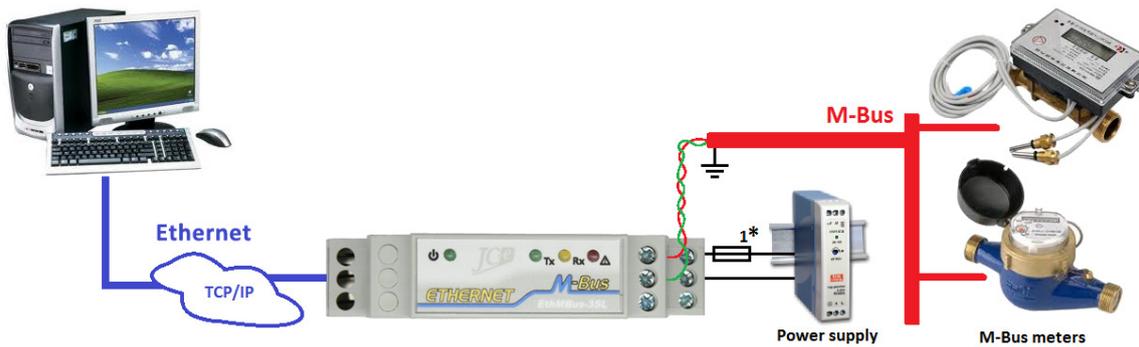
Typical wiring of the converter with M-Bus devices, power supply and Ethernet network connection.

- **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 2.2W (3.4W 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 deigned 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 2x0.14mm^2

Configuration of the converter through the web interface example

Default network settings of the converter

- Static IP address of the converter 169.254.100.10
- Subnet mask: 255.255.0.0
- Default gateway: 0.0.0.0 *Note:* communication runs within local network.
- Communication protocol TCP. *Note:* virtual COM port or an application with a TCP interface.

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 status LED *Power* LED starts to flash.

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. Search for the converter (optional). Launch the *Lantronix DeviceInstaller* application and select the network interface where the converter should be searched. The converted must appear in the Lantronix device list. The converted can be listed with different values in the *Status* field:

   - *Unreachable* – the converter is displayed in red color which means that it cannot be directly accessed in the given network and no configuration is possible. In this case using the *Assign IP* button the converter must be assigned an IP address based on its MAC address which is labeled on the back side of the converter.
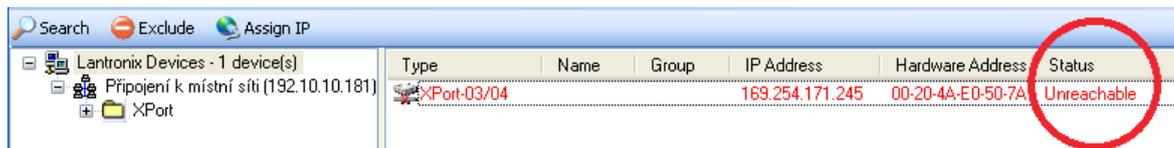

   - *Online* – the converter can be accessed through the network and the configuration can begin.

4. The configuration of the converter through the web interface can be done using the *DeviceInstaller* tool or by entering the IP address into the web browser. A second option is to use the Telnet configuration. Web interface configuration:

   - *Converter mode* menu – choose one of the following modes of operation: TCP/IP, UDP or Smart M-Bus application. Click the *Configure* button to set up the mode's details.
     The basic settings for the default *TCP/IP to M-Bus converter* mode with *Active* connection type are: *Destination IP*, *Destination port* and *Source port*.

   - *Ethernet configuration* menu – enter desired network settings.
     To use a static IP address set the *IP address* option to *Static*. Fill in the *IP address, Netmask* and if necessary *Gateway IP address* and *DNS server IP address*.

   - *M-Bus line configuration* menu – under normal circumstances default settings can be used.

   - When changing the configuration click the *Apply Settings* button to confirm the changes.

   - It is necessary to save the entire configuration by entering the *Save settings* menu and pressing the *Save settings* button. Doing so will prompt the converter to save the configuration into its internal memory followed by a restart with the new settings. After the restart it will be possible to connect to the converter again by entering the new IP address into the web browser or by re-discovering the converter with the *Search* button in the *DeviceInstaller* application.

   The Lantronix application can be downloaded from the Lantronix website www.lantronix.com.

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.
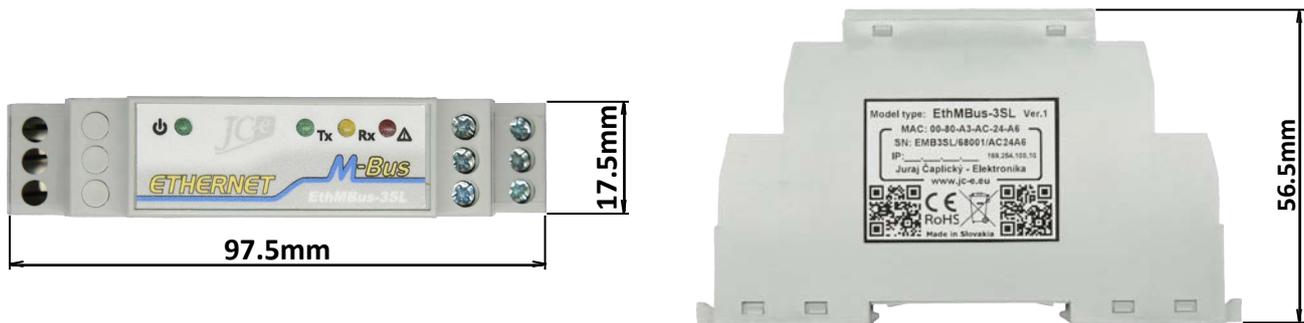
Top view

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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