

M-Bus to Ethernet interface converter EthMBus-XL SMART



Instructions manual

Version: 2020/1.4-EN

Communication converters of the XL line



EthMbus-XL SMART communication converter

EthMbus-XL SMART is a communication converter for remote communication with M-Bus meters using the Ethernet computer network in industry, building automation.

In the *Smart M-Bus* mode the converter works as a server. It communicates with the M-Bus meters independently, processes their data and stores it in its own memory.

The meter data is simultaneously available in form of:

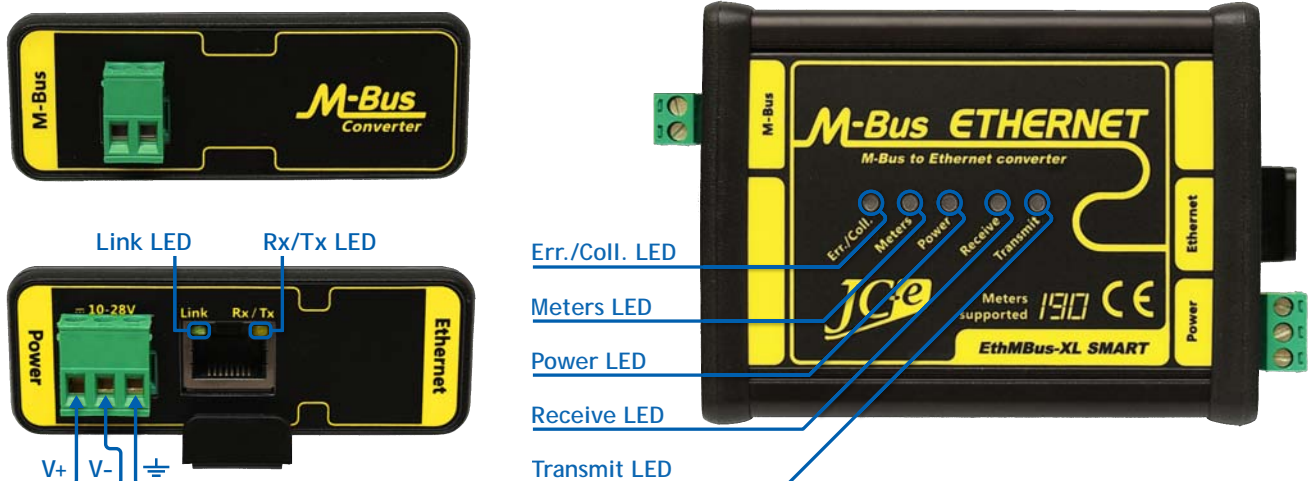
- table on a webpage
- xml, xml(REST) and csv export
- M-Bus protocol communication
- e-mail with attached xml, csv exports
- exports uploaded to an FTP server

In the basic mode the converter works as a transparent gateway for transfer of M-Bus messages using TCP or UDP Ethernet protocols.

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 attachable devices	four versions: 1 to 45, 80, 120, 190 M-Bus slave devices
Baud rate	300 - 9600 bps
Protection	- overvoltage protection TVS 1500W - electronic protection against overloads, short circuit and external voltage on the line. Time of recovery to normal operation within 1 second. Converter can withstand sustained short circuit on the communication line.
Galvanic separation	1kV from power supply, >1kV from Ethernet
Connector	plug-in connector for wires of up to 2.5 mm ² cross-section area
Power Supply	
Recommended range of power supply voltages	
DC power supply	12V to 30V. Model XL190 20V to 30V.
Maximum limits of supply voltage - permanent operation at these voltages is not recommended	
Minimum DC voltage	11V - min. voltage required for converter operation
Maximum DC voltage	31V - at higher the overvoltage protection starts to activate
Protection	overvoltage protection TVS 1500W
Power consumption	1.8W to 16W depends on converter model and number of M-Bus devices
Connector	plug-in connector for wires of up to 2.5 mm ² cross-section area
Temperature	
Operating range	-40°C to 60°C
Mechanical construction	
Mechanical design	aluminium box
Mounting	DIN rail 35 mm (EN 50022 top hat rail)
Dimensions: H x W x L	38 x 81.5 x 107 mm without connectors, 38 x 81.5 x 125 mm with connectors
Protection classification	IP40
Weight	220g (XL45, XL80) 240g (XL120, XL190)

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 DC power supply. **V+** positive pole, **V-** negative pole, \perp earth ground.
- **Ethernet** – RJ45 connector for connecting the Ethernet communication cable.

i Operational states indication

LED	State
Power LED turned on	Converter and power supply is alright.
Transmit LED flashing	Data is transmitted to the M-Bus line.
Receive LED flashing	Data is received from the M-Bus line.
Meters LED turned on	Load on M-Bus line. Meters are connected to the line.
Meters LED turned off	Disconnected M-Bus line. No meters are connected to the line.
Meters LED fast flashing	Max. amount of meters on M-Bus line reached (2 meters tolerance).

! Malfunction states indication

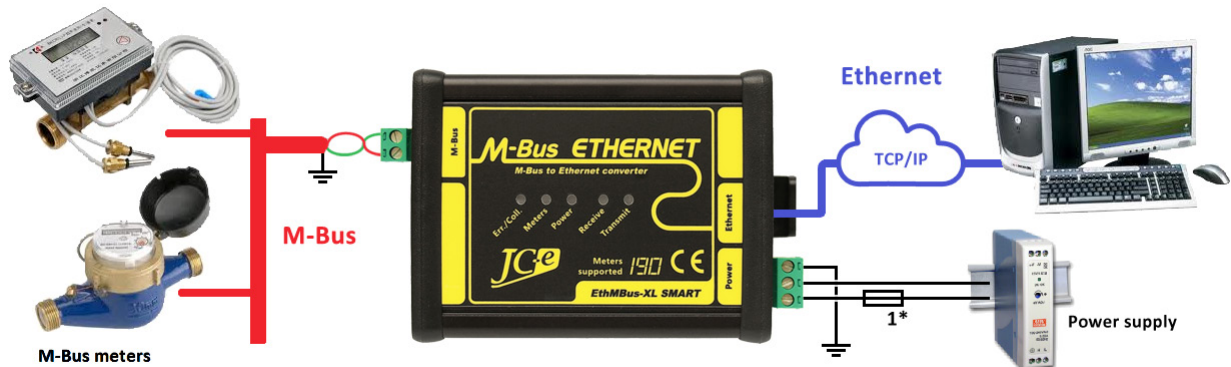
LED	State
Power LED flashing	Internal converter error.
Power LED flashing + turned on Err./Coll. LED	External voltage on M-Bus line or Internal converter error.
Err./Coll. LED flashing or turned on	Converter overload - too many meters, short on the M-Bus line or capacitive overload on M-Bus line (C of line >5 μ F). When turning on the power - capacitive overload on M-Bus line (C of line >1 μ F). Increased capacitance may be caused by meters during power up. Capacitance can afterwards fall below 1 μ F.
Err./Coll. LED turned on for a short while	During data reception - flashing Receive LED . Communication collision. Simultaneous reply from multiple meters. During data transmission - flashing Transmit LED . An error occurs during transmission (incorrect voltages on the M-Bus line). Internal converter error or capacitive overload on M-Bus line.

🔌 Ethernet indication

LED	State
Link LED	Dual colored LED 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 LED Dual colored LED 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 supply voltage is 12V to 30V. The connection of the power supply voltage uses a plug-in connector labeled POWER. Maximum power consumption is 16W and depends on the load on the M-Bus line and converter model.

*Note 1** The use of external current protection is advised for additional protection of the power supply and to limit the short circuit current during overvoltage.

• 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 depending on converter model allows for connection of 45 (67,5mA), 80 (120mA), 120 (180mA) or 190 (285mA) M-Bus SLAVE devices. Note: The brackets show the maximum idle current. The interface is protected against overvoltage, overload, external voltage 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 according to the EN 61000-4-5 standard measured 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.

Note: suitable types of cables for connecting the M-Bus devices

- indoor environment - LiYCY 2x0.14mm² up to 100m length, LiYCY 2x0.25mm² up to 200m
- outdoor/indoor environment - J-YStY 1*2*0.6mm up to 200m, J-YStY 1*2*0.8mm up to 400m

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.

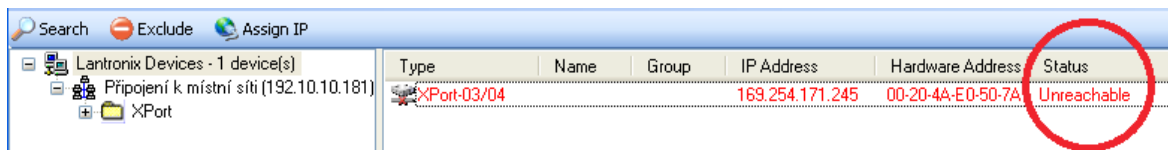
Default settings of the M-Bus communication line

- 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.



Type	Name	Group	IP Address	Hardware Address	Status
XPort	XPort-03/04		169.254.171.245	00-20-4A-E0-50-7A	Unreachable

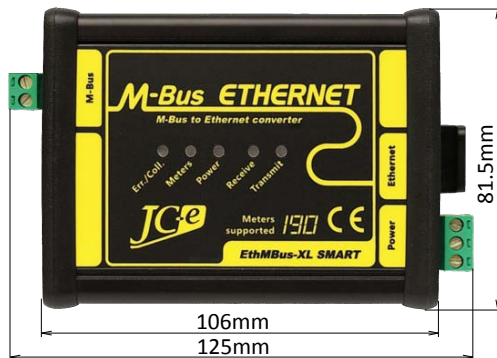
- *Online* – the converter can be accessed through the network and the configuration can begin.
4. The configuration of the converter through the web interface can be done using the *DeviceInstaller* tool or by entering the IP address into the web browser. A second option is to use the Telnet configuration. 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 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 in an accredited laboratory.

EMC testy vyžarovania

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 testy odolnosti

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 / ± 500 V
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. M-Bus line.	10 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 with the use of shield cable. Reaching the highest level of protection on the M-Bus port also guarantees the highest achievable reliability of the converter. The M-Bus interface often poses the greatest risk of overvoltage and the ensuing destruction of the converter.

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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