

Communication interface converter M-Bus to Ethernet - EthMBus-5



Instructions manual

Version: 2014/2.8-EN

Communication converters of the X-Port line



An extended manual can be downloaded from www.prevodniky.sk

Communication converter EthMBus-5

EthMBus-5 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 and a current fuse.

Operation states of the converter are indicated by using six LEDs making it easy to determine the current status 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 data link 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, 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 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 ² cross-section area
Power Supply	
Recommended range of power supply voltages	
DC power supply	10V to 33V
AC power supply	12V to 24V
Protection	overvoltage protection TVS 1500W overcurrent protection with a 0.3A resettable PTC fuse
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 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: 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. Note: the polarity doesn't matter.
- **Ethernet** – RJ45 connector for connecting the Ethernet communication cable.

Status LEDs



Transmit – The status LED is colored green and signifies data transmission on the M-Bus line.



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.



Connection – 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 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 supply voltage is 10V to 33V. For AC power the recommended range is 12V to 24V. 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.

The converter has its own resettable PTC fuse with a trip current of cca. 0.3A at 20°C. The PTC fuse represents a basic overcurrent protection of the converter and the power supply.

*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. For example in case a lower trip current than that of the built-in PTC fuse is desired, limiting 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 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 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.

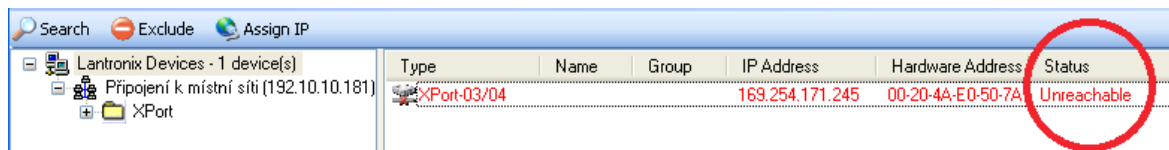
Default settings of the M-Bus communication line

- 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

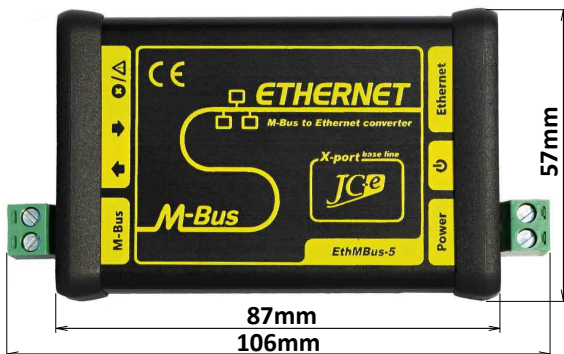
- *Online* – the converter can be accessed through the network and the configuration can begin.
4. The configuration of the converter through the web interface can be done using the *DeviceInstaller* tool or by entering the IP address into the web browser. A second option is to use the Telnet configuration.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

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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