Communication interface converter M-Bus to RS232 – RS232toMBus-XL

Instructions manual

Version: 2026/1.5-EN

Communication converters of the XL line

JC-e

RS232toMBus-XL communication converter

RS232toMBus-XL communication converters are durable converters of the M-Bus industrial communication bus to the common serial interfaces RS232. They are intended for connection of measuring devices with M-Bus interface to control/computer systems for data collection and processing. The converters convert signals from one communication interface to the other directly without any need for setting up the communication parameters or modifications to the transferred messages.

Depending on model the M-Bus port has a connection capacity for 20, 45, 80, 120 or 190 M-Bus slave devices. The interface has the highest rating of surge protection and is resilient to failures on the M-Bus line.

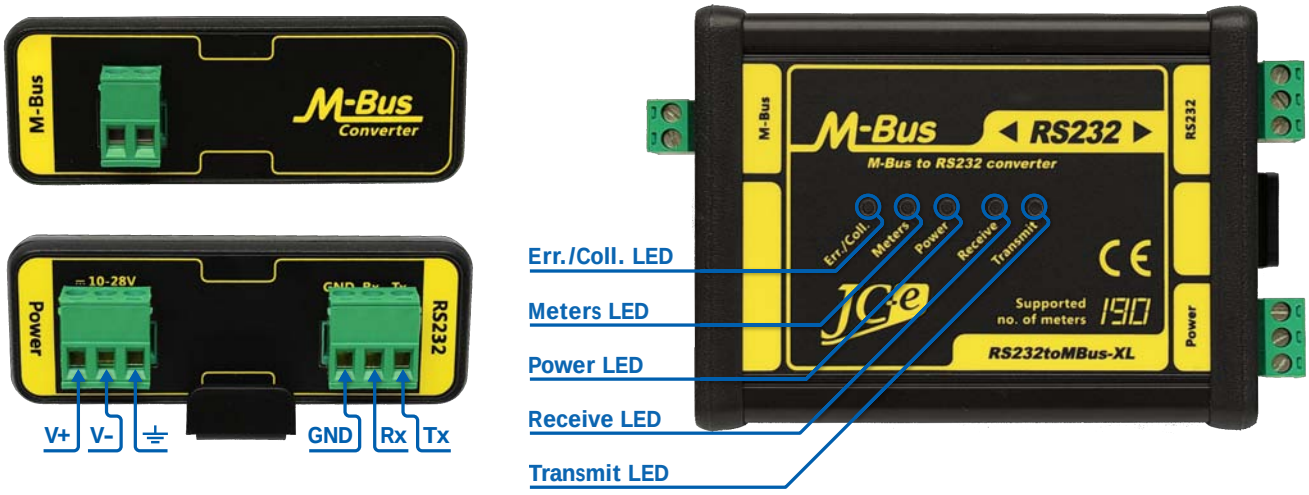
The states of M-Bus line and the converter are evaluated and monitored by a processor. Error states are indicated by status LEDs which simplify identification of the converter's current state and possible causes of a malfunction. The LEDs indicate functionality of the converter, power source state, M-Bus line loading and possible error states on the line.

The converter works at a standard level of DC voltages with polarity reversal protection.

Technical parameters

RS232 communication interface	
Communication signals	RxD, TxD, GND
Protections	protection against ±15kV ESD, filters
Galvanic separation	>1kV from power supply, 1kV from M-Bus line
Connector	plug-in connector for wires of up to 2.5 mm^2 cross-section area
M-Bus Master communication interface	
Number of attachable devices	five versions: 1 to 20, 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.
Galvanic separation	1kV from power supply, 1kV from RS232
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	0.85W to 15W 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 70°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 (XL20, 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 connecting the DC power supply.
  V+ positive pole, **V-** negative pole, ⏚ earth ground.
- **RS232** – Plug-in connector for connecting the RS232 line.
  GND RS232 Ground, **Rx** RS232 Receive line, **Tx** RS232 Transmit line.

Status LEDs

ⓘ *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 >5µF). When turning on the power - capacitive overload on M-Bus line (C of line >1µF). Increased capacitance may be caused by meters during power up. Capacitance can afterwards fall bellow 1µF.
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.

Typical application

Typical wiring of the converter with M-Bus devices, power supply and a RS232 communication line.

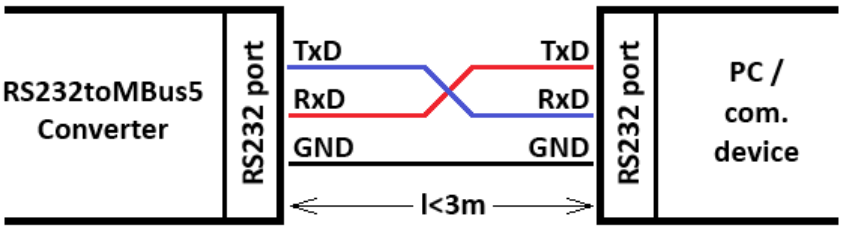
Power Supply

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 15W 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.

RS232 line

The RS232 interface uses a three wire connection of the TxD, RxD and GND signals. TxD is an output. Data is transmitted through it and it must be connected to RxD signal of the receiving device / PC. RxD is an input and data is received with it from the PC. The RxD signal must be connected to the TxD signal of the transmitting device / PC. The GND signals must be connected directly between both devices.



RS232 port connection between the converter and PC.

It is recommended to use a shielded cable for the device connection, for example LiYCY 3x0.14mm^2.

When connecting the RS232 line a simple verification is possible using a volt meter. A voltage can be measured between the GND and TxD or RxD signals. The voltage of the TxD signal is in -5V to -12V range depending on the device. TxD signal of the converter is approx. -10V at idle. Voltage on the RxD signal is zero. A negative voltage must appear on both RxD and TxD pins of the converter in a correct connection.

Pinout: Signal pinouts on a D-SUB 9 pin connector: 2 – RxD, 3 – TxD, 5 – GND.
Signal pinouts on a D-SUB 25 pin connector: 3 – RxD, 2 – TxD, 7 – GND.

Note: The RS232 interface is not suited for environments where an overvoltage can carry over to the communication line. It is not equipped with overvoltage protection and its use in industrial environments is only recommended for shorter distances (l < 3m) or in spaces for IT equipment complying to EN55024.

M-Bus line

The interface is of M-Bus Master type and depending on converter model allows for connection of 20, 45, 80, 120 or 190 M-Bus SLAVE devices. 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.

The connection of the M-Bus line uses a plug-in connector labeled M-Bus. The connector allows a connection of wires with up to 2.5 mm^2 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^2 up to a distance of 100m, LiYCY 2x0.25mm^2 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 1uF.

A voltmeter and an amp meter is sufficient for a basic electrical check of the M-Bus line.
This table contains a summary of verification voltages and currents for checkup measurements.

M-Bus line	SLAVE device	Converter XL 20	XL 45	XL 80	XL 120	XL 190
Idle voltage $U_{M\text{-}Bus}$	min. 21V	31V to 35V				
Idle current $I_{M\text{-}Bus}$	max. 1.5mA	max. 30mA	67.5mA	120mA	180mA	285mA

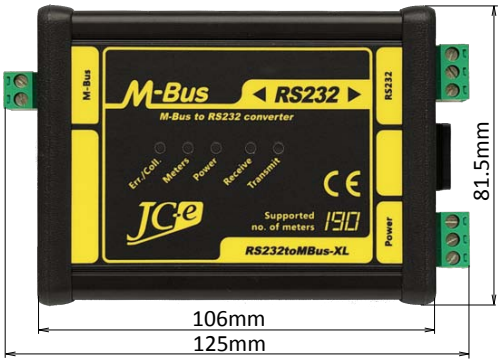
The measurements should be taken in an idle state without ongoing communication and in a state when the converter does not indicate an error on the M-Bus line. The idle voltage on the M-Bus line should be in the 31 to 35V range. The Slave pins of the connected device should have a voltage over 21V which 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 com. 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 depending on the model 30mA (XL20), 67.5mA (XL45), 120mA (XL80), 180mA (XL120) or 285mA (XL190). 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 thorough these wires should be smaller or at the very most equal to 1.5mA.

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 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, RS232 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, RS232 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

- 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 into unsorted communal waste.

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