# PW20L/RS485
# PW20L/RS232

M-Bus Level Converter with RS485 resp. RS232C
for 20 meters


User Manual

**Table of Content**




www.relay.de

# 1. Features

- M-Bus level converter for 20 end devices
- Transparent level conversion from RS232C or RS485 to M-Bus (2 Versionen)
- Protection against short circuit in the M-Bus
- External DC power supply
- Housing for mounting on DIN rail (low profile)
- LED indicators for power, short-circuit on M-Bus and communication
- RS485-Verson:
    - 2-wire RS485 interface (not addressable)
    - Microcontroller-controlled direction switching of the RS485
- RS232C-Version:
    - RS232C interface with V24 levels

# 2. Installation

## 2.1 Schematic Diagram

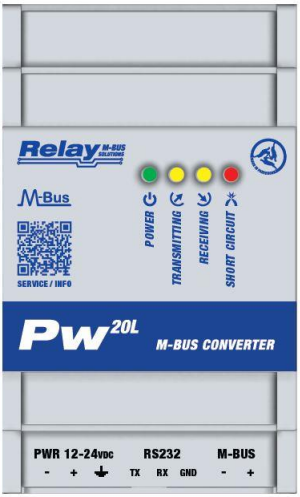

## 2.2 Mounting

The PW20L housing is mounted on a TS35 top-hat rail. The width of the housing occupies 3 division units (3 DU) and, thanks to its low height of 60 mm, fits not only in a switch cabinet but also in a meter cabinet under the covers.

The device requires an external power supply of approx. 12 to 24 VDC. We have suitable power supply units for DIN rail and a plug-in power supply unit in our product range.

## 2.3 Connectors and LEDs

The following illustration shows a top view of the connectors:




All terminals are pluggable, making it easier to wire and replace the PW20L in the event of a fault.

**Attention:** Please ensure that the terminals are correctly replaced in their intended position after removal. Incorrectly positioned terminals can lead to defects.

**Meaning of the LED indicators:**

| Beschriftung | Farbe | Beschreibung |
|---|---|---|
| POWER | green | M-Bus output voltage is on |
| TRANSMITTING | yellow | Master sends data |
| RECEIVING | yellow | A meter replies with data |
| SHORT Circuit | red | M-Bus over current / short circuit (2 Hz flashing) |

**Terminal assignment:**


RS485-Version


RS232-Version

| Type | Signal | Description |
|---|---|---|
| PWR (POWER) | - / + | Power supply output voltage 11-27 VDC (pay attention to polarity) |
| | ⏚ | PE protective conductor for balancing and protecting the M-Bus |
| RS485 | B- / A+ / GND | RS485 interface, 2-wire, B = - / A = + / GND = reference ground |
| RS232 | TX / RX<br>GND | RS232C interface, TX = PC transmits, RX = PC receives,<br>GND = reference ground |
| M-BUS | - / + | M-Bus output, lines to the M-Bus meters |

# 3. Functional Description

The PW20L is a transparent level converter from RS485 or RS232C to M-Bus for a maximum of 20 meters. The device enables externally connected controllers with an RS485 or RS232C interface, such as a BMS, a DDC or a PC, to read the connected meters using M-Bus software (not included in the scope of delivery.

## 3.1 RS232-Version

An RS232 interface is connected to the terminals labelled RS232 (TX, RX, GND). The TX terminal is the line on which the PC or controller transmits and the RX terminal is the line on which the PC receives. GND is the reference potential of the RS232C. All three signals must be connected. If you want to connect the RS232C with a DSUB cable instead of individual wires, you can use the optionally available cable KA006 (cable D-SUB 9-pin female to open ends 3-pin, 20cm)

## 3.2 RS485-Version

A 2-wire RS485 interface is connected to the terminals labelled RS485 (A = + and B = -). Please note that this is a transparent interface without addressing on the RS485 bus. The directional control of the half-duplex 2-wire connection is designed so that the device is switched passively (receiver on, transmitter off) in the basic state and becomes active (receiver off, transmitter on) when meter data is to be transmitted from the M-Bus. The level converter remains active for about 50ms after the last transmitted space (0-bit) of the meter on the RS485. During this time, the master software should not start a new request to the connected meters.

The RS485 bus is terminated at the factory with a 120 resistor. If this termination is not required, the red jumper on the circuit board can be removed after opening the housing. The position of the 2-pole pin header with inserted jumper (shorting jumper) can be seen in the following diagram:

:

# 4. Technical Data

## 4.1 General Data

| | |
|---|---|
| Operating voltage | 11,0 .. 29,0 VDC |
| Power consumption | max. 4W |
| Operating temperature | 0 .. 50°C |
| M-Bus voltage | app. 30 V (Mark), 18V (Space) |
| M-Bus idle current | max. 30 mA |
| Overcurrent threshold | > 50 mA |
| Internal M-Bus resistance | < 100 Ohm |
| Communication speeds | 300 .. 9600 Baud |
| Bit threshold | typ. 7,0 mA |
| Maximum cable length for recommended cable type JYSTY 1 x 2 x 0,8 mm | Total (all wires): 1km (9600 baud), 4km (2400 baud), 10km (300 baud)<br>Max. distance to slave (20 slaves at the end of the cable): 3000 m |
| Galvanic isolation | Not available |
| Housing | Light-Grey and black PC plastic, protective class IP30<br>H x W x D: 90 x 53 x 60 mm (height without terminals)<br>Mounting on DIN rail (width: 3DU) |
| LED indicators | Power, communication Master, Slave, overcurrent M-Bus |
| Interfaces | PW20L/RS232: RS232C with V24 levels<br>PW20L/RS485: RS485 2-wire plus GND |
| Terminals (all plugable) | 1 pair terminal for M-Bus, 3-pin terminal for RS485 / RS232C,<br>3-pin terminal for power supply / protective ground |

## 4.2 Interface Data

| | | |
|---|---|---|
| RS232C | Driver Load | Currentmax. 5mA, resitive: min. 3kΩ, capazitive: max. 2,5 nF |
| | Voltage Level Transmit (at 3kΩ) | Mark: +5V ≤ $U_T$ ≤ +15V<br>Space: -15V ≤ $U_T$ ≤ -5V |
| | Voltage Margin Receive | Mark: +2,5V ≤ $U_R$ ≤ +15V<br>Space: -15V ≤ $U_R$ ≤ -2,5V |

| | | |
|---|---|---|
| RS485 | Driver Load | Current max. 250 mA, resitance min. 54Ω |
| | Signal voltage TX | Space (0): +1.5V ≤ $U_t$ ≤ +5.0V<br>Mark (1): -5.0V ≤ $U_t$ ≤ -1.5V |
| | Adressing | Not supported (transparent) |
| | Max. cable length | 3,0 m |
| | Terminating resistor | 120 Ω (can be deactivated via jumper) |

## 4.3 Ordering Information

| Article Number | Description |
|---|---|
| MB PW20L/RS232 | M-Bus level converter with RS232C for 20 meters |
| MB PW20L/RS485 | M-Bus level converter with RS485 for 20 meters |
| NT013 | Power supply 24VDC, 15W, DIN rail, input voltage 85 .. 264 VAC, 47 .. 63 Hz |
| NT003 | Plug-In power supply 12VDC, 6W |
| KA006 | RS232C cable 9 pin D-SUB female to open wires 3 pin, 20cm |