

## M-BUS thermometer MBPT-2

## M-BUS Series

### User manual

**MBPT-2** is a microcontroller thermometer with two inputs for connecting sensor Pt1000 (with or without compensation) and m-bus interface. It is intended for measuring temperature in exact range and transfer data over m-bus, using standard m-bus protocol of communication. Its power supply comes from master m-bus converter and it takes two standard m-bus loads (3mA) to work. There are two separate input channels for connecting Pt1000 sensor and precision of 0.1 °C on each channel. Data transmitted is the last measured value, no historic data is supported.

Mounting is made on a standard M36 DIN-rail.

### 1. Main technical parameters

- |                                     |                                                |
|-------------------------------------|------------------------------------------------|
| - number of input channels          | - 2                                            |
| - permissible m-bus network voltage | - 12-42 Vdc                                    |
| - m-bus current consumption         | - 3 mA (2 m-bus loads)                         |
| - display                           | - N/A                                          |
| - keyboard                          | - N/A                                          |
| - measurement range, °C             | - from -20 (MIN) to +130 (MAX) °C              |
| - precision, °C                     | - 0.1 °C                                       |
| - storage temperature               | - -50÷+90 °C                                   |
| - humidity                          | - 40÷90 %                                      |
| - dimensions (H/W/D max)            | - 86/52/57mm                                   |
| - m-bus interface speed             | - 300/2400 bps, Odd/Even/No parity, 1 stop bit |
| - own weight                        | - < 100 g                                      |
| - initial m-bus settings            | - 2400bps, 8-E-1                               |

### 2. Mode of operation

MBPT-2 device turns automatically ON when m-bus power is provided. It enters in normal mode of operation and starting to measure temperature on both channels, no matter sensors connected or not. There is certain period of time (2-3 seconds) before a valid new measurement can be read through m-bus because analogue part must take enough measurements to achieve desired precision. If temperature measurement is outside measurement range user will get as a value MIN or MAX of the range. All settings are made over m-bus, using Gineers or other provider standard M-bus software (if the device is not locked). MBPT-2 follows m-bus standard in any way and answers on the following telegrams:

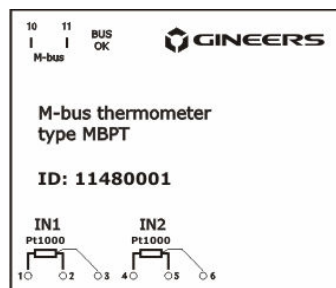
#### M-bus responses

- SND\_NKE -> responds with ACK (0xE5)
- REQ\_UD2 -> responds with long frame (START sequence, header and three data telegrams)
- Changing of primary address (from 1 to 250)
- Changing of secondary address
- Changing of baud rate
- Manufacture specific telegram according to calibration methods

REQ\_UD2 response can be downloaded for further clarification from [www.gineers.com/en/products\\_remote/products\\_remote\\_slave\\_mbpt2.php](http://www.gineers.com/en/products_remote/products_remote_slave_mbpt2.php)

M-bus unique address must be a number from 1 to 250, different for every connected m-bus device; otherwise there will be collisions and wrong readings. All devices come with default primary address of 1 and unique secondary address, written on MBPT-2 front panel. Setting primary m-bus address above 250 is not allowed since these addresses are reserved for special purposes. Primary and secondary addresses can be set in any time, until device is locked with special m-bus telegram. When locked, no further changing of Primary, Secondary address and baud rate are allowed.

Temperature values are given in m-bus telegram as Storage numbers 1 and 2. Value is SIGNED integer, i.e. 4 bytes hexadecimal value. Precision is given by VIF byte, which in this case is 10<sup>-1</sup> degree Celsius. All devices are calibrated in factory for temperature measurement range and measure equally. Calibration is carried due to standard Pt1000 values at different temperatures (IEC751). If non-standard sensor is used - new calibration shall be done to have correct measurement.



### 3. Mounting and electrical wiring

MBPT can be mounted on a standard M36 DIN-rail. All external connections are made with isolated wires, crossing 0.25mm<sup>2</sup>÷1.5mm<sup>2</sup>. Description of terminal blocks:

| No terminal block | Description                                                           |
|-------------------|-----------------------------------------------------------------------|
| 10, 11            | m-bus                                                                 |
| 7-9,12-18         | Not used                                                              |
| 1, 2              | Input channel 1, for connecting two-wire Pt1000 sensor                |
| 3                 | Compensation for input channel 1, if three-wire Pt1000 sensor is used |
| 4,5               | Input channel 2, for connecting two-wire Pt1000 sensor                |
| 6                 | Compensation for input channel 2, if three-wire Pt1000 sensor is used |

Maximal length of wires depends only on exact sensor used.

### 4. Putting MBPT-2 in operation

- step 1: mount MBPT on a DIN-rail
- step 2: connect temperature sensors to MBPT-2 inputs
- step 3: connect m-bus network cable
- step 4: after completing the whole m-bus network turn dedicated m-bus master ON. If everything is OK user will see red LED turned on and now can make parameter change through m-bus and appropriate m-bus configuration software.

### 5. Inputs and temperature measurement

MBPT has two separate independent channels for measuring temperature. They are intended specially for Pt1000 sensors. For this purpose analogue part has two current generators, with very small drift and temperature deviation. Instrumental amplifiers are used to achieve desired precision and time/temperature-independent valid measures. This means that all is calculated according to Pt1000 response for temperature range. This is standardized (DIN EN60751/IEC751) and should comply for all Pt1000 sensors. However, there can be small changes in elements of different MBPT-2 or different sensors. That is why special calibration is provided through m-bus interface. Calibration is carried in two ways:

- offset at 0 degree
- Linearization correction factor at 100 degrees

All MBPT-2 devices are calibrated in the factory according to Pt1000 specifications, so they will measure exactly the same values, assuming ideal Pt1000 sensor is used. However, if there are deviations in the sensor response from normal values user can carry his own calibration with Gineers software.

### 6. Warranty

The warranty of the device is limited to 3 years from the date of sale. If the device shows any defect or malfunctions during that period, the manufacturer is obligated to repair the device in its own service for manufacturer's expense, or, if the repair is impossible, to replace the device with new one. The transportation costs to the manufacturer's service are due to the client. The warranty voids if this manual's instructions are not met, warranty seals are removed or the device was opened by unauthorized by the manufacturer personnel.

Serial number:.....

Sale date:.....

Sign:.....

(if no date of sale, date sale becomes production date, coded in device serial number. If no serial number - no warranty)

### 7. The package contains

- MBPT-2 - 1 pcs.
- User manual - 1 pcs.

### 8. Manufacturer

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