Interior temperature sensor - P10M

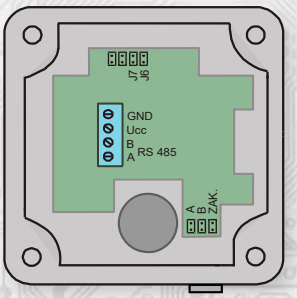
- Modbus RTU communication over RS485 line
- Wide range of power supply
- Hight accuracy

Basic technical parameters

Power supply	12 to 30 VDC
Power consumption	max. 20 mA
Working range	-30 to 50 °C
Ambient temperature	-30 to 50 °C
Relative humidity	< 80 %
Accuracy	± 0,5 °C
Settleing time	30 minutes
Communication	RS485, prorocol Modbus RTU
Baud rate	1200 ÷ 19200 Bd
Protection level	IP30
Type of terminal board	COB 5/2 or COB 5/3, conductor 0,35 ÷ 2,5 mm2

The sensors are designed to measure the temperature of ambient air and other gaseous media in a common indoor environment. The cover and base of the sensor are made of plastic. The sensors are designed for direct wall mounting. The temperature sensor uses a Pt1000 resistance element, which is placed in a metal housing outside the sensor. The communication with superior system is led in the line RS485 by the protocol Modbus RTU and the device always operates in the “slave” mode.

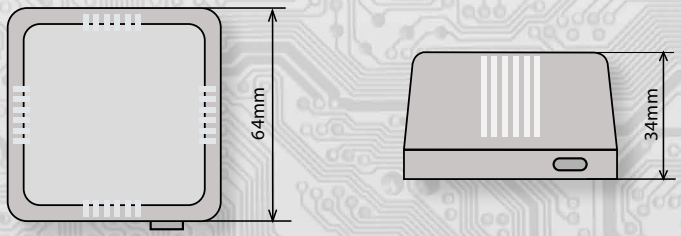
Layout of connecting terminals and connectors (fig. 1)



jumper A…definition of still stand (conductor A)
jumper B…definition of still stand (conductor B)
jumper ZAK …terminal resistor 120R
jumper J6 … device configuration
jumper J7 … definition of diagnostic network mode

Term. A, B... RS485
Term. Ucc... power supply
Term. GND... common pole

Dimensions



Function description

Communication protocol features:
Modbus RTU protocol with selectable baud rate 1200 – 19200 Bd, 8 bits, no parity, RS485 line.

Description of data registers:

To read these registers, use **command 03** (0x03 Read Holding Registers).

Temperature measurement:
is detected with an inbuilt digital sensor that is built in the stainelss steel stem of the sensor. The value is sent in °C in form of 16-bit number with sign (signed integer) multiplied by the constant 10

Register 0x0005 ** (measured temperature): 0xFED4; 65236dek (-30°C) 0x01F4; 500dek (50°C)

In case of an analog input failure (short circuit or interruption of the temperature sensor), the sensor sends a value 0x7FFF = 32767dek.

Description of configuration registers:
The Extended rRegisters can only be configured if jumper J6 (allowing writing of configuration values) and jumper J7 (setting the fixed controller address 255 and setting the communication speed 19200 Bd - these network variables are reserved for configuration only and if the required address 255 is set, the controller will automatically change it to 254) are inserted before connecting the supply voltage (reset). If only jumper J7 is inserted, it is possible to work with a fixed address and speed without overwriting the configuration parameters.
The configuration is written by **command 16**
The changes are saved and the configuration is completed by removing jumpers J6 and J7. A reset is no longer necessary for proper operation.
X Reg = 8 bytes, i.e. 4 MODBUS registers

	Range of addresses X Reg **	
X Reg	[hex]	[dek]
X Reg 0	0x2001 ÷ 0x2004	8193 ÷ 8196
X Reg 1	0x2005 ÷ 0x2008	8197 ÷ 8200
X Reg 2	0x2009 ÷ 0x200C	8201 ÷ 8204

	Content of X Reg							
X Reg	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
X Reg 0	-	-	ZD_TEXT/0	ZD_TEXT/1	ZD_TEXT/2	ZD_TEXT/3	ZD_TEXT/4	ZD_TEXT/5
X Reg 1	ZD_TEXT/6	ZD_TEXT/7	ZD_TEXT/8	ZD_TEXT/9	-	ZD_INT	ZD_OFF/Hi	ZD_OFF/Lo
X Reg 2	-	-	SK_ADR	SK_SPD	-	-	-	-

ZD_TEXT Customer text field. Range 10 bytes. It is intended for customer identification of the sensor.
ZD_INT Temperature sensor type. Range is 1 byte. Takes values 0 ÷ 255. Number format unsigned integer.

value ZD_INT [hex]	0x00	0x01	0x02 to 0xFF
value ZD_INT [dek]	0	1	2 ato 255
sensor	Ni 1000/5000ppm	Ni 1000/6180ppm	Pt 1000/3850ppm

ZD_OFF Correction of measured temperature. The range is 2 bytes, the format is a signed integer number relatively multiplied by the constant 10. 0x0001 = 0,1°C, 0xFFFF = -0,1°C.
SK_ADR The network address of the sensor. The number format is 16-bit unsigned integer. It acquires the values 0 ÷ 255 dek, whereas the address 0 is reserved for the broadcast and the sensor does not respond to it, the address 255 is reserved for the controller configuration. Thus the range of available addresses is 1 ÷ 254
SK_SPD Baud rate. The range is 1 byte. It takes values 0 ÷ 4. The number format is unsigned integer.

value SK_SPD [hex]	0x00	0x01	0x02	0x03	0x04
value SK_SPD [dek]	0	1	2	3	4
Baud rate [Bd]	1200	2400	4800	9600	19200

4.1 Examples of communication:

Command 03 (0x03): Read Holding Registers:

Master: 02 03 00 04 00 01 Crc Crc
- 02 – Address of device (device with address 2)
- 03 – Command (Read Holding Registers)
- 00 04 – Address of initially read register (0x0005)
- 00 01 – Number of read registers (1 registers)

Slave: 02 03 06 00 FF Crc Crc
- 02 – Address of device (device with address 2)
- 03 – Command (Read Holding Registers)
- 06 – Number of bytes (2)
- 00 FF – Data (x00FF)

The starting register address is 0x0005 **, the number of read registers is 1. Thus: the measured value is 0x00FF = 25,5°C.
** During the transfer the addresses of registers are indexed from zero, i.e. register 0x0001 is physically sent through the bus bar as 0x0000... (zero based addressing).

Installation and connection:

After opening the perforated cover, the supply cable is threaded through the hole in the base (Ø 9mm) and the individual wires are connected to the terminal block (Fig. 1). The use of A, B, ZAK. jumpers is subject to general rules for communication through RS485 lines (note: at end points of the RS485 line, it is necessary to connect a terminating resistor through the ZAK. jumper). The transmitters are supplied from a single 12 to 30 VAC power supply, while the supply voltage is connected to the terminals marked by Ucc and GND (Fig. 2).
It is recommended to interconnect the devices using a multi-core shielded cable, which hosts data as well as power supply wires. The cable shield must be interconnected between individual segments of the line and only connected to the lowest potential (PE terminal) in the switchboard. First we set the upper mandrel of transmitter box holder on the upper bar edge and with the help of a screwdriver push out the lower arrestment mandrel lock. We pull the lower box part to the bar and then free the lock. The transmitter is fastened now. We connect the inputs, outputs and power supply into the respective clamps (see fig. 1 and 2). We recommend the connecting cable with the wires cross section 0,35...2 mm 2 , for the active signals with the screening mantle. The base is attached to the wall with two screws through the holes in their opposite corners so that the temperature sensor in the metal housing is at the bottom. The cover is snapped onto the base and the sensor is ready for operation.

Example of wiring the sensors in the system