



The thermometers and controllers SM Series are intended to sense and eventually correct the interior room temperature. The device measures, and by means of control knob sets the temperature correction. The controllers, with their adjustable functions, can be used primarily in applications for individual room temperature control. The controller can be supplied in several functional electronic versions as well as with mechanical covers and installation modes. The circuits are located on PCB's inside the cover. The power supply is typically 24Vss. The temperature sensor itself is placed inside a metal case on the front of the controller.

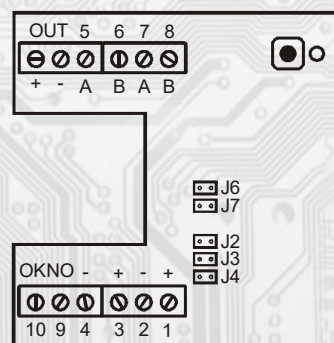
The device allows the choice of attenuation mode (green LED indicator) by a push button application. Communication with the supervisory system passes via the RS485 and the Modbus RTU protocol. The address and the speed of the controller are preset by an entry to the register. All terminals are doubled in order to ease the installation of continuous conductors.

Technical data

Supply voltage	12 to 30 VDC
Current consumption	max. 20 mA
Accuracy	± 0,5 °C
Time needed for equalization	30 min.
Measuring range	-30 ÷ 50 °C
Storage range	-30 ÷ 50 °C
Relative humidity	< 80 %
Output OUT	Active, max 100mA
Output level OUT	Hi ≈ Ucc - 0,8V, Lo ≈ 0V
Communication	RS485, protokol ModBus RTU, 8bits, 1 stop bit, without parity
Communication speed	1200 ÷ 19200 Bd
Indication of attenuation	Green LED
Galvanic separation output PWM	no
Galvanic separation RS485	no
Galvanic separation term.OKNO	no
Protection type	IP40
Terminals	screw terminal (wire max. 1mm ²)

Positive power supply terminals 1,3 and positive terminal OUT(+) are galvanically connected. The negative power supply terminals 2,4 and terminal 10 of OKNO (WINDOW) are electrically connected.

Arrangement of jumpers and connectors



Terminal

A, B RS485 communication line
 + Power source positive terminal
 - Power source ground

J2... definition of idle status (conductor A)
 J3... definition of idle status (conductor B)
 J4... termination resistor 120R
 J6... jumper "service"
 J7.... jumper (setting a fixed address 255 and setup communication speed of 19200 baud)

Terminal: 1,3 - Power source positive terminal
 2,4 - Power source ground
 OUT - Output of switching transistor
 OKNO (WINDOW) – input of window contact

Properties of the communication protocol

Modbus RTU protocol with selectable speed of 1200 to 19200 Bd, 8 bites, less parity, line RS485. Controllers have the address space available from 1 to 255.

Description of data registers

To read these registers use command no. 03 "register reading"
 0x0005 measured temperature -30.0 °C to +50.0 °C
 0x0006 required correction 0 to 100
 0x0007 position of attenuation push button 0 or 1

Temperature measurement:

- is conducted over a resistive sensor Pt1000. The sensor is built into the front panel and connected to the circuit board by means of a loose lead and connectors. The measured temperature is evaluated electronically and the values are transmitted by RS485 to the supervisory system. The temperature sensor is calibrated in the range of -30 to 60 °C. The temperature is transmitted to the control system in as a 16 - bit signed integer multiplied by a constant 10:

Register 0 x0005 ** (measurement temperature): 0xFED4; 65236dek (- 30°C) 0x0190; 400dek (40°C)

Set point correction:

is performed by mechanical turning the knob, which is located on the front panel of cover.

Register 0 x0006 ** (position of the potentiometer): 0x0000; 0dek (min) 0x0064; 100dek (max)

Button attenuation:

can be used for quick switching of the heating mode. The micro button without lock is located in the upper right corner of the front panel. By depressing each button the value of the flip-flop circuit can be adjusted in cycles from log 0 to log 1 and vice-versa. This information is transmitted to the supervisory system over the line.

Register 0 x0007 ** (mode status): 0x 0000; 0dek (LED is OFF) 0 x0001; 1dek (LED is ON)

- Attenuation ON is indicated by a green LED light

The supervisory system can also remotely perform the ON and OFF switching of the attenuation signaling.

This remote switching is done from the supervisory system by command 05 for coil 0x0001**. The position of the flag is transcribed in register 0x0007**.

Description of configuration registers:

The user setting of the address and the communication speed are provided by the inserted "J6 –service" jumper, which is also used for the calibration of the converter. With this jumper plugged in, the converter communicates with a speed of 19.200 Bd at address 255.

During sending of query to device initial register address and number of registers to read are sent. Register addresses are indexed from zero - register 0x0005 is physically send as value 0x0004... (zero based addressing)

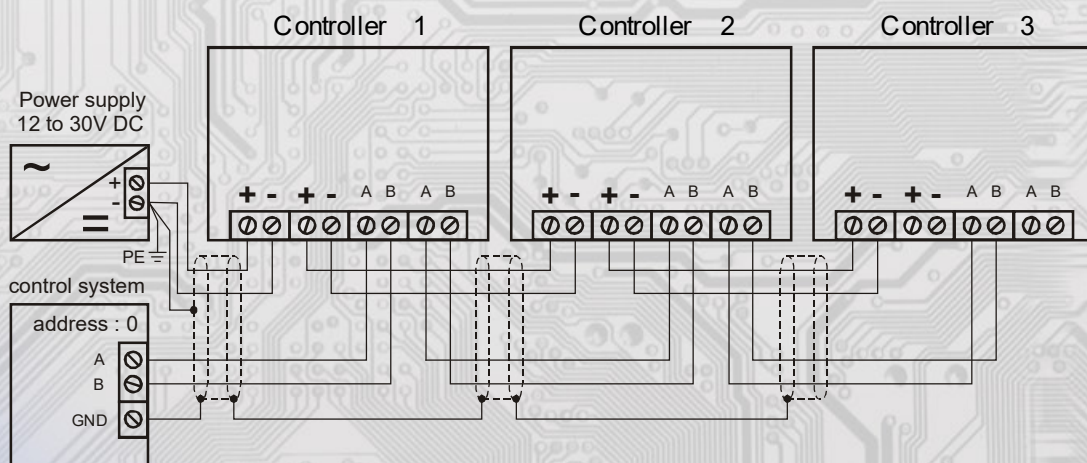
Number formats of data registers:

Measured temperature is transmitted in the form of a 16-bit signed integer relatively multiplied by the constant 10. So for example: 0x00FF temperature is $255/10 = 25.5$ ° C, the temperature 0xFFFF is $-1/10 = -0.1$ ° C. Other values are unsigned integer format.

Description of configuration registers:

User settings of addresses and the communication rate of converter is done by command 16 (write multiple registers) when you insert the jumper J6 and J7. More detailed data are listed in the "Map X RAM".

Example of wiring the controllers in the system

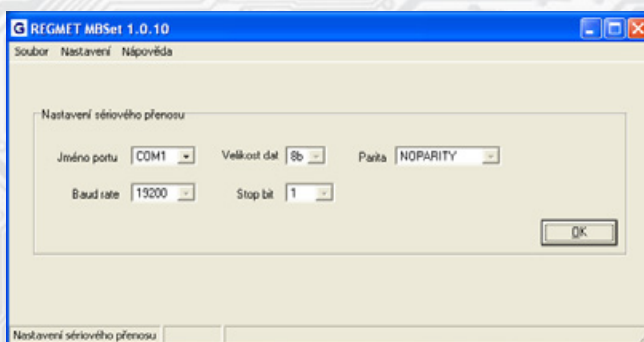


Controllers configuration using REGMET MBSer:

The controllers can be configured only if it is inserted jumper J6 (write enable configuration values) and jumper J7 (setting a fixed address 255 and setup communication speed of 19200 baud - these network variables are reserved for configuration) before voltage connection (power - reset).

If it is set the address 255, the controller automatically changes the address to 254; if it is inserted only jumper J7, it is possible to work with fixed address and speed without overwriting configuration parameters.

After starting the program REGMET MBSer basic window opens in which you can make general settings. First, the command *Nastavení* → *Sériový přenos* (*Settings* → *Serial transfer*) selected port, which is connected to the communication interface RS485.


Other options:

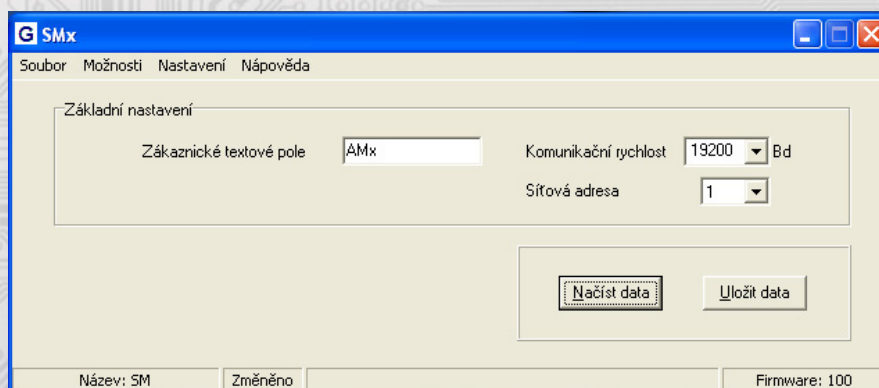
***Nastavení* → *Načíst data po spuštění komponenty* (*Settings* → *Load data after running components*)** - each time you open the configuration window are automatically read data from the device registers.

***Nastavení* → *Automaticky rozpoznat komponentu při startu* (*Settings* → *Automatically detect component at the start of the program*)** – when there is connected device with embedded jumpers J6 and J7 (or at least J7) before starting the program on functional lines, than automatically opens the configuration window of the device.

***Nastavení* → *Načíst uloženou konfiguraci při spuštění* (*Settings* → *Load a saved configuration at startup*)** - every time you start the program, the parameters of the serial transmission are set previously selected in *Nastavení* → *Sériový přenos* (*Settings* → *Serial transfer*).

***Nastavení* → *Zobrazovat plovoucí nápovědu* (*Settings* → *Show floating help*)** - when you place an arrow on a configuration value, than appears to help this setting.

***Nastavení* → *Výběr komponenty* (*Settings* → *Component Selection*)** – to open the configuration window, select the component SMx device from the expanding menu



Setting Options:

Možnosti (Options) → Načtení provozních dat (Loading operating data) Zobrazit (VIEW) –
Open the window Operating data (it is possible to read input and output data)

Možnosti (Options) → Načtení provozních dat (Loading operating data) Zobrazovat při spuštění (Show at startup) – automatically open window **Loading operating data** with configuration window of equipment

Description of configuration values:

Customer text box (ZD_TEXT) - It is intended for customer identification of the sensor

Communication speed (SK_SPD) - choice of communication speed, range 1200 to 19000 Bd

Network address of the controller (AS_ADR) - Network address of the controller, range 1 – 254

Correction of the measured temperature (ZD_OFF) – offset

Load data - load current configuration

Save data - stored in the memory of the controller configuration set

File → **Save configuration** – save the configuration settings (file with extension .ini)

File → **Read configuration** - setting values according to the selected file

Map X RAM (EXTENDED REGISTERS) SM

Advanced registry can be modified by command 16 (write multiple registers) when jumper SERVICE (J6) is inserted .

Change shall be entered after removing the jumper.

X Reg = 8 bytes, ie 4 Modbus registers.

The base address of registers X from is the value of 0x2001 = 8193dek. Private addresses are arranged in ascending order.

Label	volume X Reg								range of addresses X Reg **	
	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	[hex]	[dek]
X Reg 0	-	-	ZD_TEXT/0	ZD_TEXT/1	ZD_TEXT/2	ZD_TEXT/3	ZD_TEXT/4	ZD_TEXT/5	0x2001 ÷ 0x2004	8193 ÷ 8196
X Reg 1	ZD_TEXT/6	ZD_TEXT/7	ZD_TEXT/8	ZD_TEXT/9	-	-	-	-	0x2005 ÷ 0x2008	8197 ÷ 8200
X Reg 2	--	-	SK_ADR	SK_SPD	-	-	-	-	0x2009 ÷ 0x200C	8201 ÷ 8204

** During sending of query to device initial register address and number of registers to read are sent. Register addresses are indexed from zero - register 0x0005 is physically send as value 0x0004... (zero based addressing)