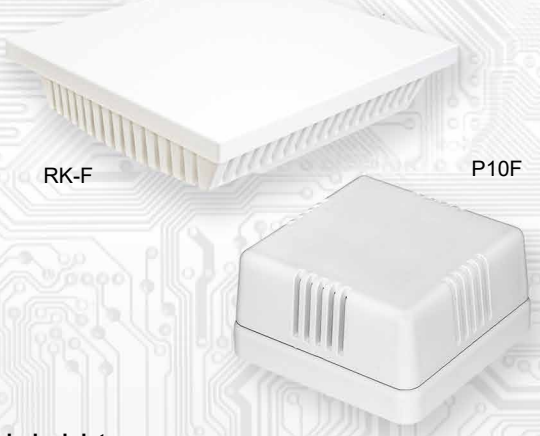
Temperature sensors with frequency output - types P10F, RK-F

- frequency output 1Hz - 20kHz
- sensor configuration by MBSEt program
- Modbus RTU communication over RS485 line



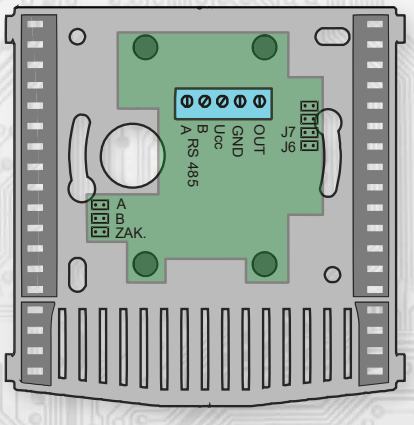
The temperature sensors are intended for general-purpose application in control and regulation systems for the temperature measurement in the interior application. Sensors are provided with degree of protection IP30. The type RK-F is suitable for application with higher demands on the aesthetic design. Both versions are intended for the direct mounting on the wall. The sensors are designed for direct wall mounting. The RKF type can also be mounted on the Ku68 flush-mounted installation box. The temperature sensor is a Pt1000 resistance element, which is located in a metal housing outside the sensor in the P10F sensors. The sensors can be used in control systems processing input signals with frequencies in the range of 1Hz ÷ 20 kHz.

Technical data

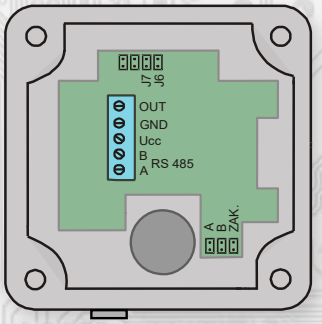
Supply voltage	12 to 30 VDC	Communication	RS485, protocol Modbus RTU
Current consumption	max. 40 mA (Rz = 10 kΩ)	Configuration software	REGMET MBSet; www.regmet.cz
Meassuring range	-30 to 50 °C	Baud rate	1200 ÷ 19200 Bd
Ambient temperature	-30 to 50 °C	Range of output frequency	1Hz ÷ 20kHz
Relative humidity	< 80 %	Protection type	IP30
Accuracy	± 0,5 °C	Terminal board	COB 5/2 or COB 5/3, cross-section 0,35 ÷ 2,5 mm2
Time needed for equalization	30 min.		

Arrangement of jumpers and connectors

RK-F



P10F



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..... + pole
Term. GND... .....- pole (common terminal)
Term. OUT... .....output (frequency signal)

Temperature measurement:

- is conducted over a resistive sensor Pt1000. The sensor is built into the stem and connected to the circuit board by means of a loose lead and connectors. The input signal is evaluated by the electronics, which converts this value to the frequency output signal as per the parameters set in EXTENDED REGISTERS - **Map X RAM (EXTENDED REGISTERS)**.
The current temperature value is sent over the RS485 line in the form of a 16-bit number with a signed integer multiplied by a constant 10.
Register 0 x0005 ** (measurement temperature): 0xFE0C; 65036dek (-50°C) 0x07D0; 2000dek (200°C).
The parametres are set inconfiguration window of program REGMET MBSet or by other program with communication

Properties of the communication protocol

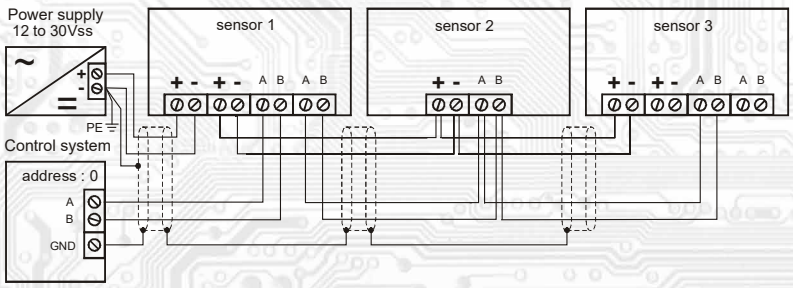
Protocol Modbus RTU with adjustable Baud rate 1200 - 19200 Bd, 8 bits, no parity, 1 stop bit, line RS485, half-duplex operation

Description of data registers

To read these registers use command no. 03 “register reading” (0x03 Read Holding Registers).
Register 0x0001 ** (measured temperature): 0xFE0C; 65036dek (-50°C) 0x05DC; 1500dek (150°C)
In case of fault of the analogue input (short circuit or interruption of the temperature probe), the sensors transmits the value 0x7FFF = 32767dek.

REGMET s.r.o. • Rožnovská 25, 757 01 Valašské Meziříčí • tel.: 602 773 909 • http://www.regmet.cz • e-mail: obchod@regmet.cz

Example of wiring the sensors in the system

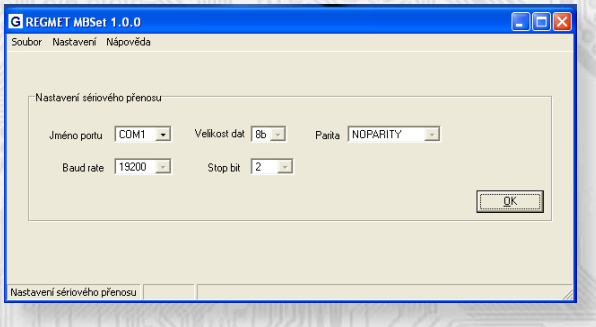


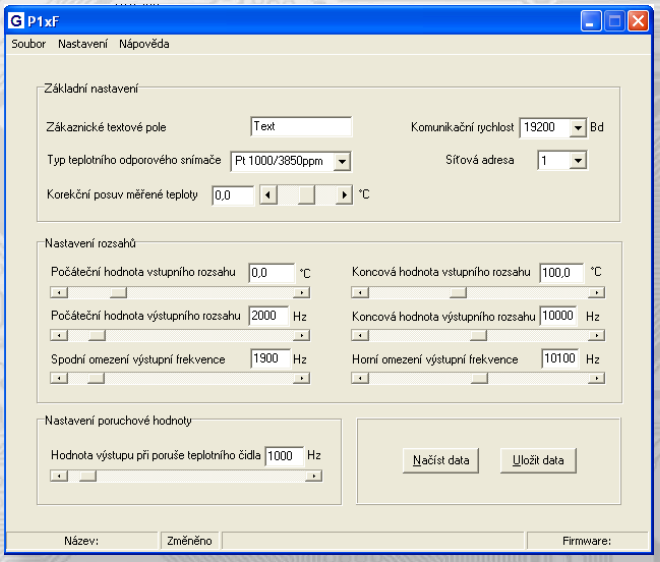
** During the transfer the addresses of registers are indexed from zero, i.e. register 0x0001 is physically sent through the bus bar as 0x0000... (zero based addressing).

SW configuration of sensor using the REGMET MBSet program:

The conguration application REGMET MBSset is freely available at producer´s web pages. The controlled can be configured only when the jumper J6 is inserted before the connection of supply voltage (reset) and J7 jumper (setting the fixed sensor address to 255 and setting the baudrate to 19 200 Bd - these network variables are reserved for configuration only and, therefore, if the required sensor address of 255 is set, the sensor modifies to 254 automatically) are inserted. In case only the J7 jumper is inserted, it is possible to use a fixed address and baudrate without the risk of overwriting the configuration parameters.
After the launching of REGMET MBSset program, the basic window is opened and the connected sensor is automatically connected with the hosting PC.

After running the REGMET MBSet application, the basic window opens, which allows general setup of the application. First, in Nastavení (Settings)→Sériový přenos (Serial tranfer), select the port to which the RS485 communication interface is connected.





EXTENDED REGISTERS can only be modified if the J6 jumper (enabling writing the configuration values) and J7 jumper (setting the fixed sensor address to 255 and setting the baudrate to 19 200 Bd - these network variables are reserved for configuration only and, therefore, if the required sensor address of 255 is set, the sensor modifies to 254 automatically) are inserted. In case only the J7 jumper is inserted, it is possible to use a fixed address and baudrate without the risk of overwriting the configuration parameters. The configuration is carried out by **command 16** (multiple register preset 0x10). The changes are written and configuration is finished by extracting the J6 and J7 jumpers. No reset is necessary for proper function.
X Reg = 8 byte, ie 4 registers MODBUS

	Range of address 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
X Reg 3	0x200D ÷ 0x2010	8205 ÷ 8208

	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	AU_I1/Hi	AU_I1/Lo	AU_I2/Hi	AU_I2/Lo	AU_O1/Hi	AU_O1/Lo
X Reg 3	AU_O2/Hi	AU_O2/Lo	AU_SP/Hi	AU_SP/Lo	AU_FL/Hi	AU_FL/Lo	AU_FH/Hi	AU_FH/Lo

ZD_TEXT The custom text field,range is 10 bytes. It is determined for the client´s identification of the device.

ZD_INT Type of temperature sensor, The range is 1 byte. Takes the value 0 to 255. The number format is 16-bit

value ZD_INT [hex]	0x00	0x01	0x02
value ZD_INT [dek]	0	1	2
type of sensor	Ni 1000/5000ppm	Ni 1000/6180ppm	Pt 1000/3850ppm

ZD_OFF Correction of temperature. Range is 2 bytes, form of number with sign (signed integer) multiplied by the constant 10. 0x0001 = 0,1°C, 0xFFFF = - 0,1°C.

SK_ADR Network address. Range is 1 byte. 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

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

AU-I1: Initial value of the input temperature range. It acquires the values -3276,7 to 3276,6°C. Range is 2 bytes, form of number with sign (signed integer) multiplied by the constant 10. 0x0001 = 0,1°C, 0xFFFF = -0,1°C.

AU-I2: Ended value of the Input temperature range. It acquires the values -3276,7 to 3276,6°C. Range is 2 bytes, form of number with sign (signed integer) multiplied by the constant 10. 0x0001 = 0,1°C, 0xFFFF = -0,1°C.

AU-O1: Initial value of the output Frequency range. Range is 2 bytes, form of number - unsigned integer.. It acquires the values 0x0001 = 1Hz to 0x4E20 = 20kHz

AU-I2: Ended value of the Output Frequency range... Range is 2 bytes, form of number - unsigned integer.. It acquires the values 0x0001 = 1Hz to 0x4E20 = 20kHz

AU-SP: Output value in case of fault of the temperature probe. It acquires the values 0x0001 = 1Hz to 0x4E20 = 20kHz. Range is 2 bytes, form of number - unsigned integer.

AU-FL: Bottom stop value of the output frequency when the input range is undercurrent. It acquires the values 0x0001 = 1Hz to 0x4E20 = 20kHz. Range is 2 bytes, form of number - unsigned integer.

AU-FH: The upper limit value of the output frequency for overflow of the input range. It acquires the values 0x0001 = 1Hz to 0x4E20 = 20kHz. Range is 2 bytes, form of number - unsigned integer.

** During the transfer the register addresses are indexed from zero, i.e. register 0x2001 is physically sent through the busbar as 0x2000... (zero based addressing)

Load data – loads the currently set configuration from the sensor memory
Save data – saves the set configuration in memory

File → Save configuration – it saves the configuration set in the configuration window as the file with suffix .ini
File → Read configuration – it sets the values in the configuration window according to the chosen file

Examples of communication:

Command 03 (0x03): Read Holding Registers:

Master: 02 03 00 00 00 01 Crc Crc
- 02 Address of device (device with address 2)
- 03 Command (Read Holding Registers)
- 00 00 Address of initially read register (0x0001**)
- 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 from register (0x00FF)

The address of initial register is 0x0001 ** which is the address of measured temperature register.
Thus: the measured temperature 0x00FF = 25,5° C.

Command 16 (0x10) Write Multiple Registers:

Master:
FF 10 20 08 00 01 02 09 04 Crc Crc
- FF Address of device (with inserted jumper "service" J6 - address 255)
- 10 Command (Preset Multiple Registers)
- 20 08 Address of first registered register (0x2009**)
- 00 01 Number of registered registers (1)
- 02 Number of bytes (2)
- 09 04 Registered data (0x0904)

Slave:
FF 10 20 08 00 01 Crc Crc
- FF Address of device (with inserted jumper "service" J6 - address 255)
- 10 Command (Preset Multiple Registers)
- 20 08 Address of first registered register (0x2009**)
- 00 01 Number of registered registers (1)

With writing of the value 0x0904 in register 0x2009**
the address 9 is set and the Baud rate 19 200 Bd is set.

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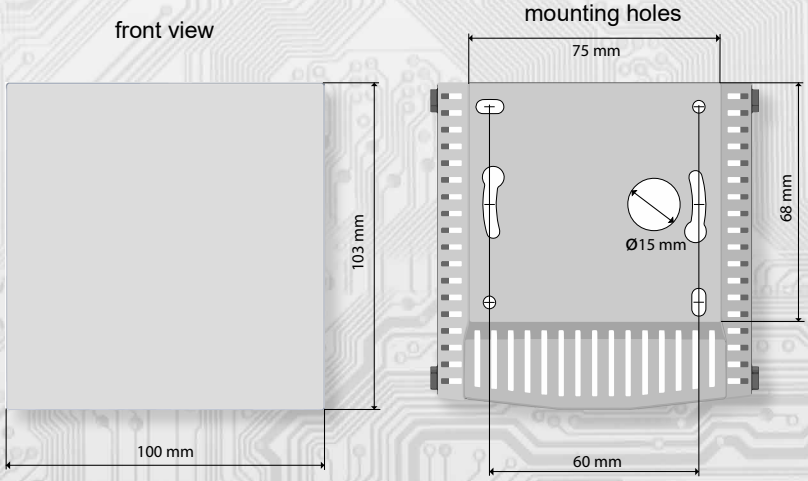
Dimensions

RK-F



P10F