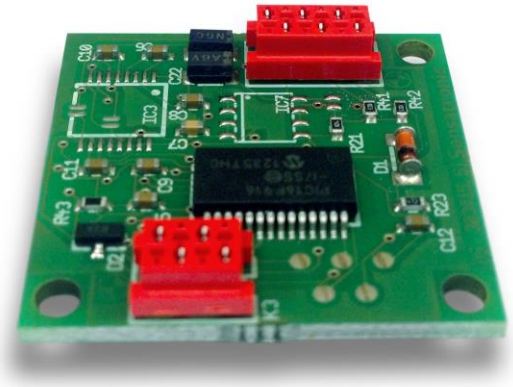
Instruction Manual

OEM-Temp Module



Valid from: 01.03.2015
Hardware version: 303015.5 and following
Software version: 1.2 and following

Responsible: J. Schwarz

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1. Description

The OEM-Temp module has been designed for measuring the body temperature of patients using temperature probes compatible to 400 series characteristics.

The module can work with two probes simultaneously and is characterized by its compact design and low power consumption. Therefore it is best suited even for battery powered application.
The module is highly accurate with interchangeable temperature probes and does not need to be re-calibrated.
The measured data can be interchanged with the host system via a RS-232 interface.

2. Electrical Specification

Supply voltage:	5 -24 V DC ±2%; 3.3 V DC version on request	
Current consumption:	< 10 mA	
Measuring principle:	Constant current mode	
Interface:	RS-232 with level converter (EIA/TIA-232 compatible); TTL level version on request	
	Data rate:	9600 Baud
	Data bit:	8
	Stop bit:	1
	Parity:	none
	Handshake:	none
Digital I/O (optional):	2 x 3.3V compatible, optional for customer specific use	
AD conversion:	Resolution:	14 bit
	Conversion time:	approx. 100 ms (both channels)
	Max. data rate:	10 samples per second

3. Mechanical Specification

Dimensions:	29 x 28 mm (L x W) height max. 10 mm	
Weight:	approx. 8 g	
Mounting holes:	3 x Ø 2.5 mm	
Connectors:	Board supply and communication:	MicroMatch 6-pole
	Temperature probes:	MicroMatch 4-pole

4. Electrical Connections

The module has a 6-pin board connector for supply voltage, communication and data output and a 4-pole connector for the temperature probes.

Board connector K1:

Pin	Signal/Function
1	RS-232 Rx
2	RS-232 Tx
3	Ground signal
4	Digital I/O_2 for external control (option)
5	Digital I/O_1 for external control (option)
6	Supply voltage

Table 1: Board connector K1

The connector K1 is a 6-pin AMP MicroMatch.
The Digital I/O pins 4 and 5 can be used for external control of board functions (must be software-implemented on customer request).

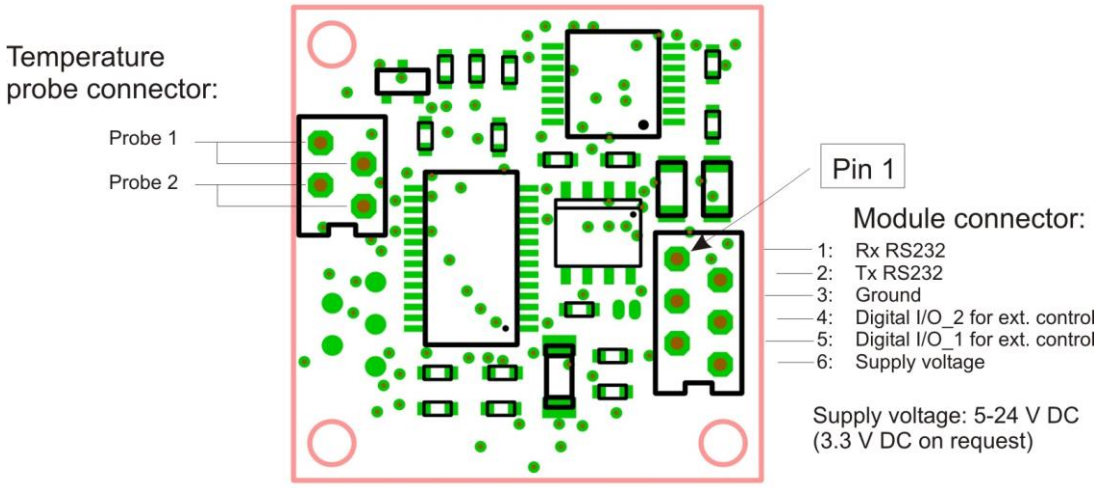

Figure 1: Main components of the PCB

The temperature probes can be connected using the 4-pin connector. It is recommended to limit the length of the sensor connection cable to 0.5 m.

Attention: The Digital I/O pins are expecting a 3.3V high signal, even if the board is powered with 5-24 V DC.

5. Communication

The data exchange with the board is realized using a RS-232 serial interface. The communication is initialized by the host system sending a request byte to the module.

Depending on this byte the module is sending several data as shown in the table below:

Request byte	Answer from module
0x01	Sends one status byte and eight data bytes
0x02	Sends eight data bytes only
0x04	Sends one status byte only
0x10	The module is sending one status byte and eight data bytes continuously approx. every 100 ms (continuous mode)
0x20	End of continuous mode
0x50	The module is sending the serial number in 9 byte ASCII format
0x98	Reset controller
0x99	Send firmware version in ASCII format
Every other byte	Gives ‚BAD CMD' in ASCII

Table 2: Request byte

The status byte can be used to observe the module and sensor status and to determine the validity of the data send afterwards:

	MSB							LSB
Bit	7	6	5	4	3	2	1	0
Significance	Measured value is new (since last AD conversion) for channel 1	Measured value is new (since last AD conversion) for channel 2	No probe detected on channel 1 or measured temp too low	No probe detected on channel 2 or measured temp too low	Temp higher than 50°C on channel 1	Temp higher than 50°C on channel 2	X	X
Active at	1	1	1	1	X	X	X	X

Table 3: Status byte

For example, a status byte '11000000' means: following data is new compared to last AD conversion (for both channels); the status byte which has been sent is valid only for the data bytes sent afterwards. The status byte will be generated prior to every new data request.

The data bytes sent represent the temperature value in a 4 digit ASCII format for each channel, starting with channel 1.

Example:

	Status byte	Data bytes channel 1				Data bytes channel 2			
HEX	C0	33	37	33	31	33	37	34	35
ASCII	Don't care	3	7	3	1	3	7	4	5

In the example, the status byte (C0 hex) is 1100 0000 in binary format (both values are new). The temperature value for channel 1 is 37.31 °C; the temperature value for channel 2 is 37.45 °C

The firmware version (request byte 0x99) is also sent in ASCII format, for example '1.2.01'. The length of returned bytes may vary depending on the actual version number.

6. General application hints

To assure accurate measurements, attention must be paid to the quality of the supply voltage. Especially noisy supply with transients caused by high power loads on the same supply line can lead to inaccurate temperature readings.

If bits 4 or 5 are set in the status byte, the values transmitted for the corresponding channel is '0000'. If the bits 2 or 3 are set in the status byte, the value transmitted for the corresponding channel is '9999'.

The module is calibrated by the factory to meet the required accuracy; however, if higher deviation from the expected value is recognized, check the cable length from the temperature probe to the module and all connecting points in between.

The actual firmware may contain undocumented commands for factory use only. Do not use other commands then documented to avoid malfunction or irreversible damage of the product.