



USB thermometer

TMU

thermometer with USB interface

measuring temperatures from -55 °C to +125 °C



TMU

Datasheet

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BASIC INFORMATION**Description**

TMU is a simple thermometer with a USB interface. The thermometer uses the USB interface for communication and also as a power source. It measures temperatures from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$. The communication utilises a simple ASCII protocol. Temperature values are transmitted in degrees Celsius; no numerical conversion is necessary.

The thermometer can be used in various situations requiring temperature measurements within the range from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$ with a $0.1\text{ }^{\circ}\text{C}$ resolution.

The temperature sensor's standard cable is 3 m long and admits a temperature range from $-10\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$. Optionally, a temperature sensor on a cable of up to 20 m long can be delivered. Another optional feature is a cable admitting a temperature range from $-55\text{ }^{\circ}\text{C}$ to $+150\text{ }^{\circ}\text{C}$.

Properties

- Temperature range from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$; resolution $0.1\text{ }^{\circ}\text{C}$
- USB interface
- Temperature data in ASCII format
- No numerical conversion of temperature values is necessary
- Power supply from the USB interface
- Optionally it can be secured to a DIN strip
- Optionally, a cable up to 20 metres long
- Optionally, a cable with a higher temperature resistance
- Different workmanship as requested

Variants of workmanship

Securing:

- Without holder (*standard*)
- With DIN rail holder

Temperature resistance of cable:

- -10 °C to $+80\text{ °C}$ (*standard*)
- -55 °C to $+150\text{ °C}$

Length of cable to temperature sensor:

- 3 m (*standard*)
- 10 cm to 20 metres

Sensor workmanship:

- Sealed in a shrinking tube (*standard*)
- In a metallic tube, diam. 6 mm
- (We can supply various workmanship of the sensor as requested by the customer. For example, attached to a pipe, in a threaded bolt to be screwed into a container or water tank, etc.)

Please do not hesitate to contact us if you need other specific features or function of the TMU module.



Fig. 1 – TMU

Connection

The USB interface is connected to the front USB connector, type B.

Technical parameters

Power supply	5 V from the USB interface
Consumption	typically 27 mA
Sensor's working temperature range	-55 °C to $+125\text{ °C}$
Accuracy	$\pm 0.5\text{ °C}$ within the range from -10 °C to $+85\text{ °C}$; elsewhere $\pm 2\text{ °C}$
Electronic section's working temperature	-40 °C to $+85\text{ °C}$
Dimensions	$54 \times 33 \times 24\text{ mm}$
Weight	145 g (including the 3 m standard cable)

Indicators

ON (green) indicator (the top LED in Fig. 2)

Function: Indication of power supply

Measurement (yellow) indicator (the bottom LED in Fig. 2)

Function: It flashes during communication with the temperature sensor.

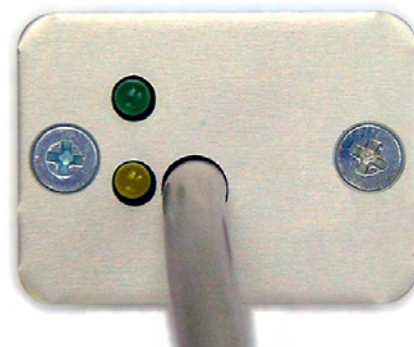


Fig. 2 – rear panel

FAQ

What should I set to make the thermometer work on my PC?

The thermometer need not be specifically set. It is sufficient to install its drivers from the enclosed CD.¹ A description of the installation procedures begins on page 7.

How can I establish the thermometer's port number?

The port number is stated in the "Device Manager" within the Windows OS.(Cf. chapter Changing the serial port number on page 11.)

The thermometer was assigned the wrong port number

The port number can be simply changed using the "Device Manager"(Cf. chapter Changing the serial port number on page 11.)

The thermometer transmits "Err"

This value is sent by the thermometer if the temperature sensor is incorrectly connected. The connection cable of the temperature sensor is likely to be damaged. This defect cannot be repaired by the user and the thermometer must be sent back to the manufacturer.

¹ You can, at any time and free of charge, download the driver from the TMU thermometer's website at www.papouch.com/en.

INSTALLATION

Installation of drivers in a Windows OS

First, a driver for the USB interface must be installed and then a virtual port, which will enable access to the thermometer as a virtual serial line.

- 1) Connect the thermometer to a USB port. In the dialog box, choose "No, not this time" and click on "Next >"



Fig. 3 – Wizard's welcome screen

- 2) In the dialog box shown in Fig. 4, choose "Install from a list or specific location" and click on "Next >"



Fig. 4 – Found New Hardware Wizard screen

- 3) In the next window (Fig. 5), select "Don't search, I will choose the driver to install" and click on "Next >".

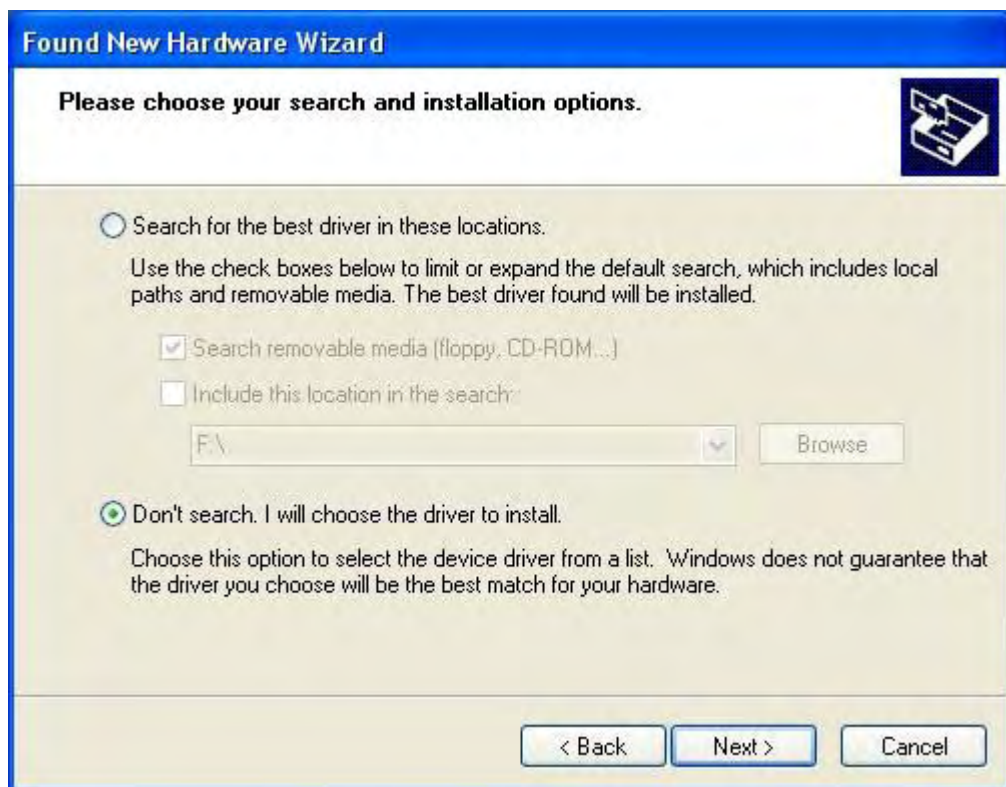


Fig. 5 – search for and installation of the drivers

- 4) If the TMU thermometer is being installed on this particular PC for the first time, the dialog box shown Fig. 6 appears. (If not, the dialog box shown in Fig. 7 is displayed.) Select the first line ("Show all Devices") and click on "Next >".

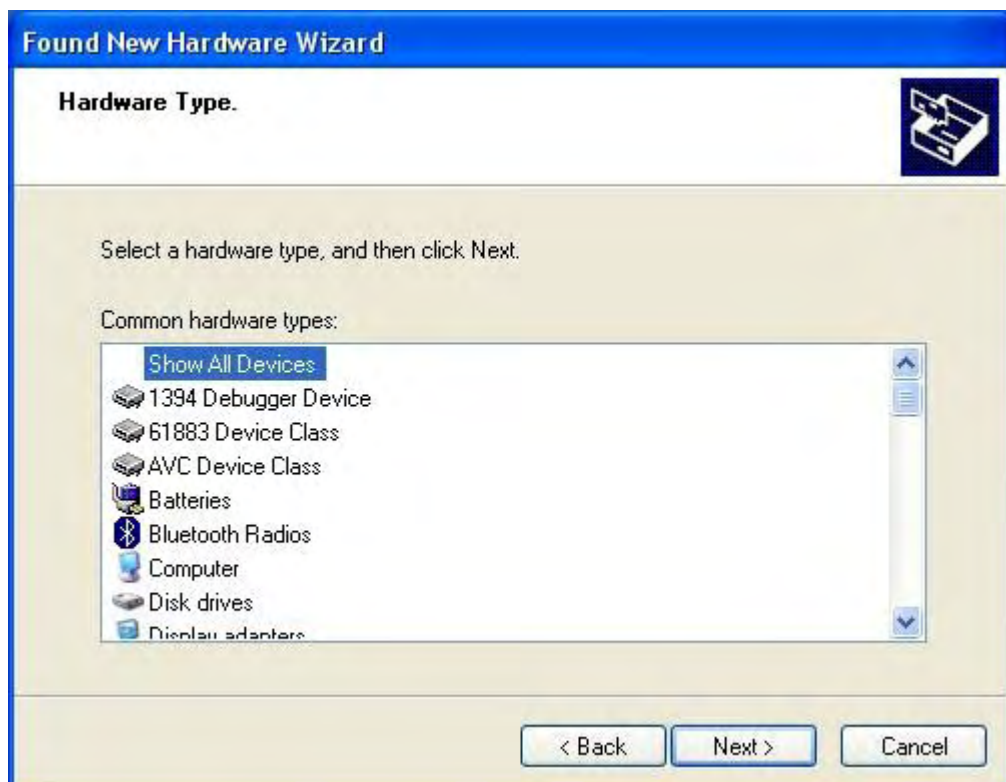


Fig. 6 – selecting the device type

5) In the dialog box shown in Fig. 7, click on "Have Disk..."



Fig. 7 – drivers' location

6) The dialog box shown in Fig. 8 is displayed. Browse for the drivers' path in your Windows version. (When installing from our CD, the drivers path is `CD:\usb-driver\Virtual Port\.`) After selecting the drivers, click on "OK"

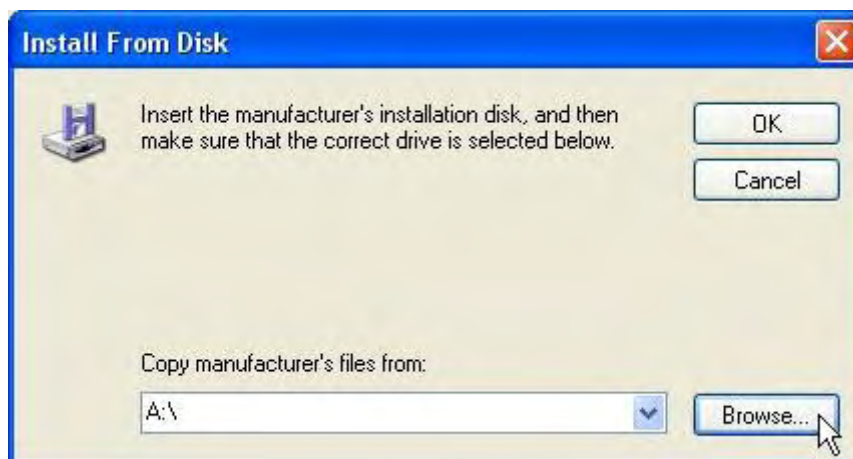


Fig. 8 – drivers' path

7) In the dialog box shown in Fig. 7, choose "Papouch TMU Thermometer VCP" and click on "Next >"

- 8) A warning shown in Fig. 9 will be displayed. Click on "Continue Anyway".



Fig. 9 – "non-compatibility" warning

- 9) Now the drivers for the TMU thermometer's USB interface are installed. After completion, the screen shown in Fig. 10 is displayed.



Fig. 10 – completing the USB interface installation

10) Now continue by installing a virtual serial port. The dialog box shown in Fig. 11 is displayed. Choose "No, not this time" and click on "Next >"



Fig. 11 – virtual port installation wizard's welcome screen

11) Select the option according to Fig. 12.



Fig. 12 – manual selection of drivers

- 12) The same dialog box is shown as in Fig. 5; select "Don't search, I will choose the driver to install" and click on "Next >"
- 13) The dialog box shown in Fig. 13 is now displayed – choose the newest driver and click on "Next >".



Fig. 13 – selection of a particular driver

- 14) A warning shown in Fig. 14 will be displayed. Click on "Continue Anyway".



Fig. 14 – warning

15)The virtual port installation is thus completed. A successful completion of the installation is reported by the dialog box shown in Fig. 15.



Fig. 15 – completion of installation

16)The thermometer is ready for use.

Changing the serial port number

When the TMU sensor is installed, it is automatically assigned the lowest unoccupied port from the interval 1 to 255. Sometimes you may want to change this automatically assigned number. You can do that as follows.

- 1) Open the Device Manager². Expand the "Ports (COM & LPT)" item, right click on "USB Serial Port" and select "Properties".

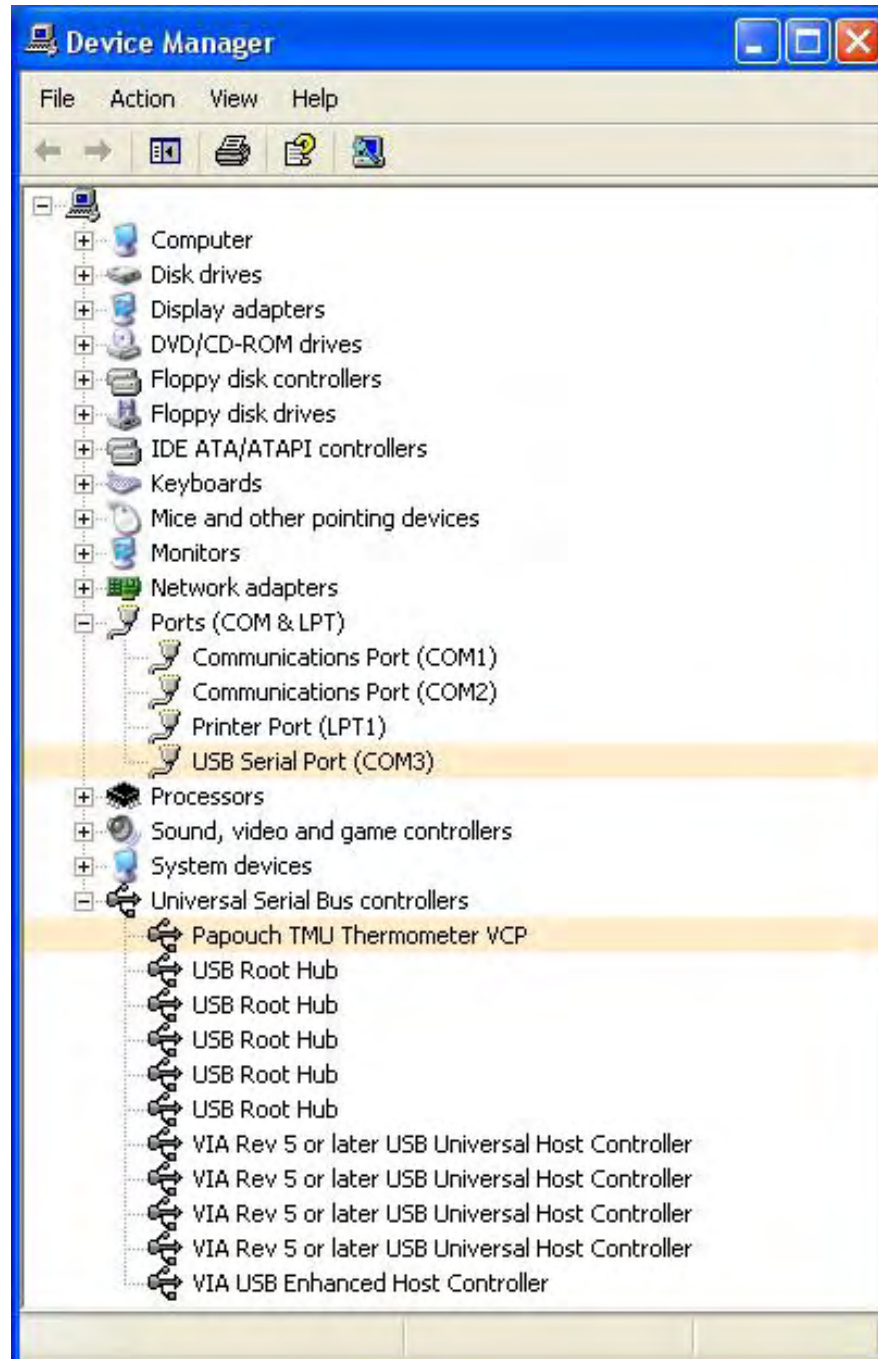


Fig. 16 – Device Manager – important items

² Start/Settings/Control Panel/System/Hardware/Device Manager

- 2) You will see the dialog box shown in Fig. 17. Choose the "Port Settings" tab and click on the "Advanced..." button.

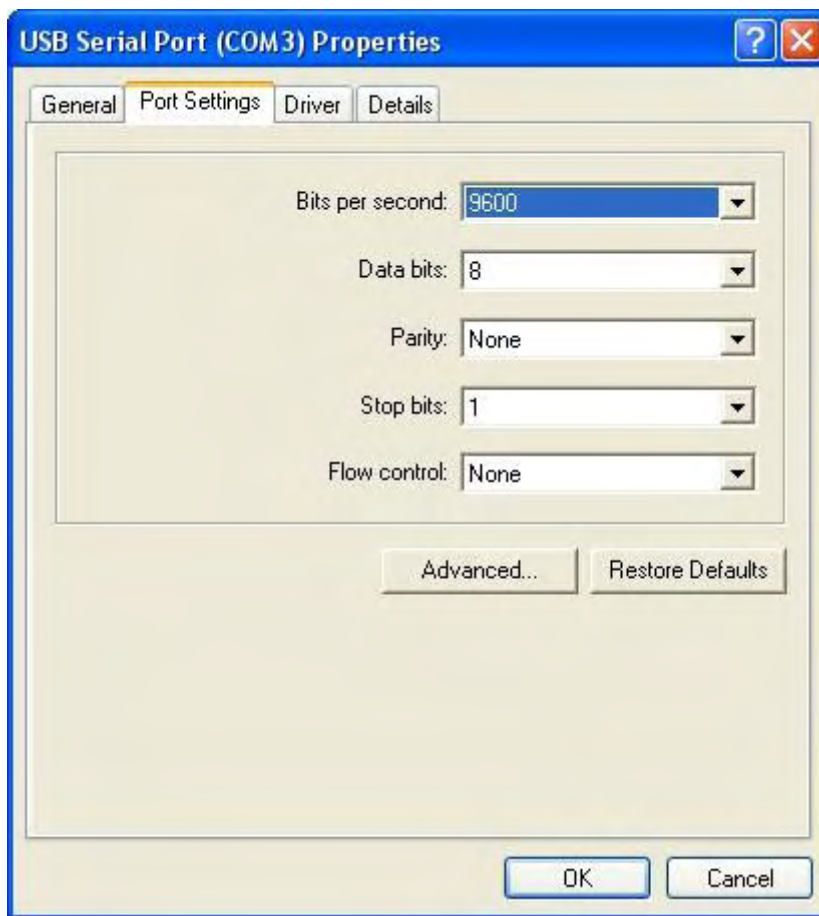


Fig. 17 – Port Settings

- 3) In the "COM Port Number" field in the 'dialog box seen in Fig. 18, there is the actual COM port number. In this field you can assign to the thermometer any port number between 1 and 255.

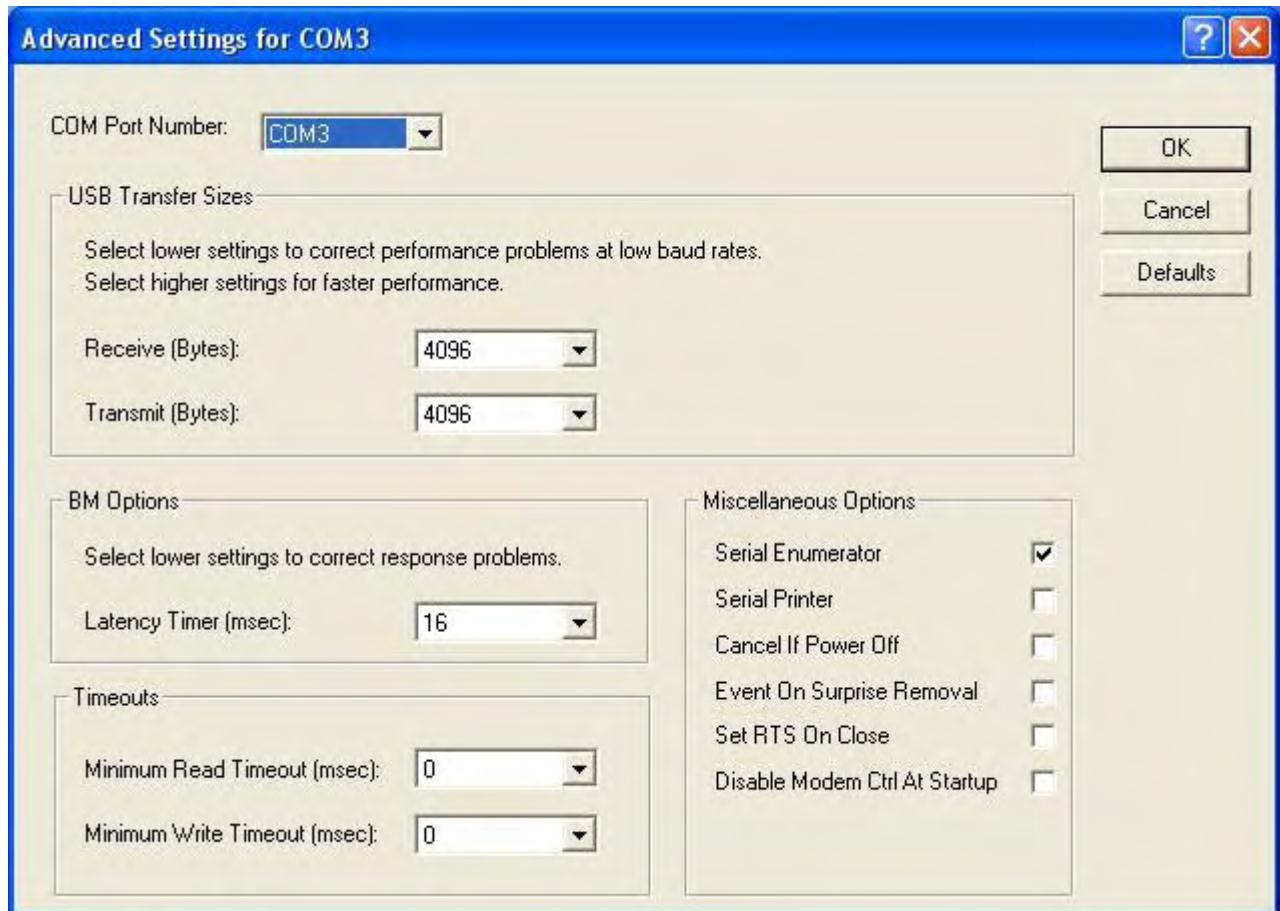


Fig. 18 – advanced settings for the virtual COM port

(If you assign to the thermometer a port already used by another device, the change will be executed and the original device will be automatically assigned another port number.)

- 4) Click on "OK". Close all other windows. In certain instances, the computer has to be rebooted to carry out the change.
- 5) TMU now works with the new port number.

Installation of drivers in other operating systems

Drivers for other operating systems can be downloaded from <http://ftdichip.com/FTDrivers.htm> .

Currently (05/2006), there are drivers for 64-bit Windows, Linux, MAC OS and Windows CE.NET. More detailed information about these drivers can be found at the above-cited download website.

In order to be able to use the drivers, they have to be adapted (VID and PID) to support the TMU thermometer. The TMU thermometer's VID and PID numbers are:

VID: 5050 HEX

PID: 0400 HEX

COMMUNICATION PROTOCOL

TMU cannot receive instructions, it can only send out the temperature values in regular time intervals (approx. 10 seconds). The temperature is send in a format that is compatible with the Spinel protocol.

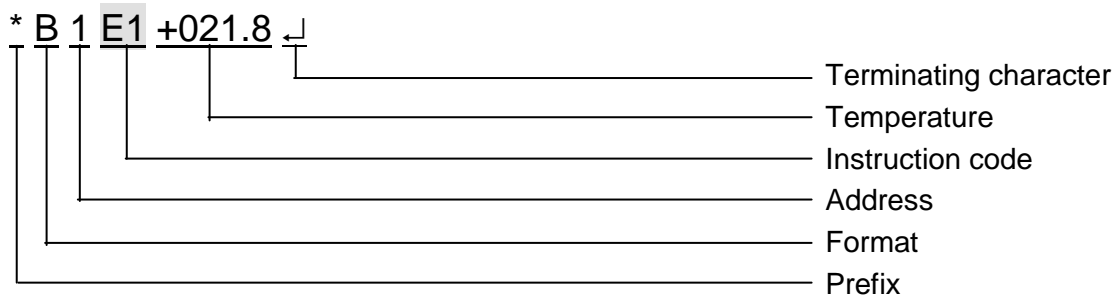
The thermometer's serial line parameters are:

Speed9,600 Baud
 Number of data bits8
 Paritynone
 Number of stop-bits1

Format

The protocol format is shown in this example.

Example (the data are sent without the space characters from the TMU)



Prefix

1 Byte; character "*"

Format

Format code.
 1 Byte; character "B"

Address

The address of the thermometer.
 1 Byte; character "1"

Instruction code

Device instruction code.
 2 Bytes; characters "E1"

Temperature

Actual temperature value. It can be number from "-055.0" to "+125.0" or string "Err".
 6 Bytes
 An ASCII string representing the temperature value including the sign. If there is a thermal sensor's error, the "Err" string is transmitted.

Terminating character

1 Byte; Enter ↵ (HEX: 0DH)

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Data transmission in industry, line and protocol conversions, RS232/485/422/USB/Ethernet/GPRS/WiFi, measurement modules, intelligent temperature sensors, I/O modules, and custommade electronic applications.

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