

# TMU

# USB thermometer

### Thermometer with USB interface

Measuring temperatures from -55  $\,^\circ\text{C}$  to +125  $\,^\circ\text{C}$ 



# ΤΜυ

## Datasheet

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#### TABLE OF CONTENTS

Basic information	4
Description	4
Properties	4
Placing temperature from TMU to your own WEB site	4
Variants of workmanship	5
Connection	5
Technical parameters	6
Indicators	7
FAQ	7
What should I set to make the thermometer work on my PC?	7
How can I establish the thermometer's port number?	7
The thermometer was assigned the wrong port number	7
The thermometer transmits "Err"	7
Installation	8
Installation of drivers in a Windows OS	8
Changing the serial port number	16
Installation of drivers in other operating systems	19
Communication protocol	20
Format	20

#### **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 °C to +125 °C. The communication utilizes 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 °C to +125 °C with a 0.1 °C resolution.

Sensor connected to a 3m silicon cable with high temperature resistance. We can supply cable up to 20m upon request.

#### Properties

- Temperature range from –55 °C to +125 °C; resolution 0.1 °C
- Sensor connected to a silicon cable with high temperature resistance.
- Temperature data in ASCII format
- No numerical conversion of temperature values is necessary
- Communication over the USB interface, powered from USB as well
- Optionally it can be secured to a DIN strip
- Optionally, a cable up to 20 meters long
- Different workmanship as requested

#### Placing temperature from TMU to your own WEB site

You can put the measured-out temperature from TMU to your own web page. How to do this is described here:

http://www.papouch.com/en/website/mainmenu/how-to/web-thermometer/

#### Variants of workmanship

#### Housing

• Anodized aluminum chassis.

#### Sensor

• Stainless steel coating of normalized 6mm diameter and 60mm length.



Fig. 1 – Standard sensor make

#### Sensor Cable type

• Silicon cable 4.3 mm diameter. Temperature resistance -60 to +200 °C. Light blue color.

#### Length of cable to temperature sensor

- 3 m (standard)
- 10 cm to 20 meters

#### Securing

- Without holder (standard)
- With DIN rail holder



Fig. 2 – TMU with DIN rail holder

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

#### Connection

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

#### **Technical parameters**

Temperature	sensor
-------------	--------

	-	
	Туре	semiconductor
	Measuring temperature range	-55 °C to +125 °C
	Accuracy $\pm 0.5~^\circ C$ within the	range from –10 °C to +85 °C; elsewhere $\pm$ 2 °C
	Temperatures drift	$\pm 0.2$ °C for 1000 hours at 125 °C
	Dimensions	normalized diameter 6 mm, length is 60 mm
	Cover material	hardened stainless steel alloy
	Ingress protection	IP68 (continuous immersion up to 1 meter)
C	able to the sensor	
	Outer coat	silicone rubber, blue
	Wire insulation	FEP polymer (MC-AFEP)
	Length	standard 3 m (optional up to 20 meters)
	Operating temperature range - continuous	-60 °C to +200 °C
	Maximum permissible temperature	+220 °C
	Cable diameter	4.3 mm (±0.1 mm)
	The cable has excellent resistance to moistu	re, chemicals and hydrocarbons.
Μ	ain module	
	Power supply	5V from USB interface
	Current consumed from the USB	typ. 27 mA
	Operating temperature range	-40 °C to +85 °C
	Dimensions	54 × 33 × 24 mm
	Box	anodized aluminum
	Ingress protection	IP30
0	ther parameters	
	Weight	145 g (including the 3 m standard cable)

#### Indicators

#### ON (green) indicator

Power indicator. (The top LED in Fig. 3 – green.)

#### Measurement (yellow) indicator

It flashes during communication with the temperature sensor. (The bottom LED in Fig. 3 – yellow.)



Fig. 3 – 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.<sup>1</sup> A description of the installation procedures begins on page 8.

#### 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 12.)

#### 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 12.)

#### 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 beck to the manufacturer.

<sup>&</sup>lt;sup>1</sup> You can, at any time and free of charge, download the driver from the TMU thermometer's website at <u>www.papouch.com/en</u>.

#### 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.

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

Found New Hardware Wizard		
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy	
	Can Windows connect to Windows Update to search for software? Yes, this time only Yes, now and every time I connect a device No, not this time	
	Click Next to continue.	
	< Back Next > Cancel	

Fig. 4 – Wizard's welcome screen

 In the dialog box shown in Fig. 5, choose "Install from a list or specific location" and click on "Next >"



Fig. 5 – Found New Hardware Wizard screen

 In the next window (Fig. 6), select "Don't search, I will choose the driver to install" and click on "Next >".



Fig. 6 - 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. 7 appears. (If not, the dialog box shown in Fig. 8 is displayed.) Select the first line ("Show all Devices") and click on "Next >".



Fig. 7 – selecting the device type

5) In the dialog box shown in Fig. 8, click on "Have Disk..."

Found New Hardware Wizard	
Select the device driver you want to in	nstall for this hardware.
Select the manufacturer and model of y have a disk that contains the driver you	our hardware device and then click Next. If you a want to install, click Have Disk.
Model	
Papouch TMU Thermometer VCP	
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk
	< Back Next > Cancel

Fig. 8 – drivers' location

6) The dialog box shown in Fig. 9 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. 9 - drivers' path

7) In the dialog box shown in Fig. 8, choose "Papouch TMU Thermometer VCP" and click on "Next >" 8) A warning shown in Fig. 10 will be displayed. Click on "Continue Anyway".



Fig. 10 - "non-compatibility" warning

 Now the drivers for the TMU thermometer's USB interface are installed. After completion, the screen shown in Fig. 11 is displayed.



Fig. 11 – completing the USB interface installation

10)Now continue by installing a virtual serial port. The dialog box shown in Fig. 12 is displayed. Choose "No, not this time" and click on "Next >"



Fig. 12 - virtual port installation wizard's welcome screen

11)Select the option according to Fig. 13.

Found New Hardware Wizard		
	This wizard helps you install software for: USB Serial Port If your hardware came with an installation CD or floppy disk, insert it now. What do you want the wizard to do?	
	<ul> <li>Install the software automatically (Recommended)</li> <li>Install from a list or specific location (Advanced)</li> </ul>	
	Click Next to continue.	
	< Back Next > Cancel	

Fig. 13 - manual selection of drivers

- 12)The same dialog box is shown as in Fig. 6; select "Don't search, I will choose the driver to install" and click on "Next >"
- 13)The dialog box shown in Fig. 14 is now displayed choose the newest driver and click on "Next >".

Found New Hardware Wizard	
Select the device driver you want to ir	nstall for this hardware.
Select the manufacturer and model of y have a disk that contains the driver you	your hardware device and then click Next. If you u want to install, click Have Disk.
Model	
USB Serial Port	
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk
	< Back Next > Cancel

Fig. 14 – selection of a particular driver

14) A warning shown in Fig. 15 will be displayed. Click on "Continue Anyway".

Hardware Installation		
	The software you are installing for this hardware: USB Serial Port has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.) Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.	
	Continue Anyway STOP Installation	

Fig. 15 – warning

15)The virtual port installation is thus completed. A successful completion of the installation is reported by the dialog box shown in Fig. 16.



Fig. 16 - 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 Manager<sup>2</sup>. Expand the "Ports (COM & LPT)" item, right click on "USB Serial Port" and select "Properties".

🚇 Device Manager 📃 🗖 🔀
File Action View Help
Computer Disk drives Display adapters DVD/CD-ROM drives DVD/CD-ROM drives Floppy disk controllers Floppy disk drives DE ATA/ATAPI controllers Keyboards Mice and other pointing devices Monitors Network adapters Ports (COM & LPT) Communications Port (COM1) Communications Port (COM2) Printer Port (LPT1)
USB Serial Port (COM3)
<ul> <li>Sound, video and game controllers</li> <li>System devices</li> <li>Universal Serial Bus controllers</li> <li>Papouch TMU Thermometer VCP</li> <li>USB Root Hub</li> <li>USB Root Hub</li> </ul>
USB Root Hub USB Root Hub USB Root Hub VIA Rev 5 or later USB Universal Host Controller VIA USB Enhanced Host Controller

Fig. 17 – Device Manager – important items

<sup>&</sup>lt;sup>2</sup> Start/Settings/Control Panel/System/Hardware/Device Manager

2) You will see the dialog box shown in Fig. 18. Choose the "Port Settings" tab and click on the "Advanced..." button.

USB Serial Port (COM3) Properties	? 🔀
General Port Settings Driver Details	
Bits per second: 9600 Data bits: 8 Parity: None Stop bits: 1 Flow control: None	
Advanced Restore D	Defaults

Fig. 18 – Port Settings

3) In the "COM Port Number" field in the 'dialog box seen in Fig. 19, there is the actual COM port number. In this field you can assign to the thermometer any port number between 1 and 255.

Advanced Settings for COM3		? 🛛
COM Port Number: COM3  USB Transfer Sizes Select lower settings to correct performance problems at low Select higher settings for faster performance. Receive (Bytes): 4096  Transmit (Bytes): 4096	baud rates.	OK Cancel Defaults
BM Options Select lower settings to correct response problems. Latency Timer (msec): 16	Miscellaneous Options Serial Enumerator Serial Printer Cancel If Power Off	
Timeouts Minimum Read Timeout (msec): 0 • Minimum Write Timeout (msec): 0 •	Event On Surprise Removal Set RTS On Close Disable Modem Ctrl At Startup	

Fig. 19 – 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 (09/2009), there are drivers for this operating systems:

- Windows Vista x64
- Windows XP x64
- Windows Server 2003 x64
- Windows Vista
- Windows XP
- Windows Server 2003
- Windows 2000
- Windows ME
- Windows 98
- Linux
- Mac OS X
- Mac OS 9
- Mac OS 8
- Windows CE.NET (Version 4.2 and greater)
- Free BSD
- Open BSD
- QNX

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: 0403 HEX

PID: 6001 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:

#### 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)

# Papouch s.r.o.

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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