TME

Thermometer with a range of -55 to +125 °C and direct connection to a computer LAN

Automation of temperature measurement: Modbus, XML, http get a post, SNMP or mail

TME

Datasheet

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Changelog

Version 2.07, 7/2023
- To the manual added information about the TME_P variant with a larger power supply range and connection of the power supply via the terminal block.

Version 2.07
- Temperature is converted to Fahrenheit (according to settings) not only on the WEB interface, but on other functions as well: e-mail, ModBus, SNMP etc. This means more registers and parameters were created to accommodate the current measurement unit.
- TME PoE information was removed from this manual as TME PoE has been succeeded by PAPAGO 2TH ETH.

Version 2.0
- Network tab got the option to add a DNS server IP address.
- Network tab now has the option to choose TME communication protocols.

Version 1.88
- New parameters *mac*, *name*, *tempV* and *tempS* in HTTP GET.
- New parameter's *location* and *mac* in XML.

Version 1.87
- WEB interface made compatible with latest platforms like IE9, FF4 and mobile platforms iPhone and Android.
- User login pops up only if the password is required.
- Configurable delay between temperature overrun and e-mail alert.
- User temperature calibration by line equation ($y = ax + b$). This setting is protected by a special separate password.
- E-mail addresses can be up to 40 characters long.
- E-mail subject edited for the best result when re-sending e-mail to a mobile phone.

Version 1.84
- PoE version addend. [6]
- HTTP GET parameters shifted (Host parameter)

Version 1.82
- Maximum segment size in TCP decreased from 14 000 to 640 bytes.
- Corrected bug: Resetting Server's IP address on the Sending panel after resetting the device.
- Corrected bug: Equal sign recognition at the end of HTTP GET parameter when it is being sent.

Version 1.8
- High temperature resistant silicon cable is a standard.
- Metal enclosed sensor is a standard. Coverage IP68.
- Completely new web interface.
- Device fully configurable via WEB.
- SMTP authentication available.
- Two-level WEB security.
- Automatic keeping alive of the connection.
- Temperature sending in TCP mode is 10 seconds.
- All intervals are entered in minutes.
- Language and unit's settings are stored in the device.
- Mini view can be opened in any browser now. It is not a HTA application for Internet Explorer anymore.
- Maximal length of TME label is 16 characters.
- WEB interface can display multiple thermometers on a single page.

- XML file for HTTP POST is pre-set by default.

Version 1.7
- MODBUS TCP protocol.

Version 1.6
- Support for sending information to the WEB service via SOAP protocol (XML) – easy processing of values from TME in .NET.
- WAP pages for mobile phones or PDA.
- User-defined XML file sent via HTTP POST.
- Possibility to change the port number for WEB. This enables to easily access TME behind the firewall, router, etc.
- New variable consisting of 40 characters added to enable clear identification of TME by a user-defined string. If this variable is completed, it is added as a new parameter into HTTP GET and it can also be used as a variable in the file sent via SOAP protocol.
- The maximum length of the title extended to 23 characters.
- The possibility to define the hysteresis of temperature limits. (Prevents frequent sending of notification of limits violation if the temperature oscillates around a preset limit.)
- E-mails notifying of a limit violation can be sent in a preset interval until the temperature returns to the preset range.
- TME can insert a parameter *Host* with the target server URL into the header of HTTP communication (HTTP protocol v. 1.1.) – this holds for HTTP GET as well as sending XML files to the WEB service.
- When communication via TCP, TME can function not only as a server (passively waits for a connection), but also as a client (actively establishes connection to the defined IP address and port).
- In TCP mode the TME connection can be established permanently or disconnected after the temperature is sent.
- XML page (*tme.xml*) coding changed from iso-8859-2 to iso-8859-1.
- The structure of setup via Telnet modified.
- The error of error messages overlaying on the WEB page corrected.

ABOUT DEVICE

TME is a temperature sensor with a connection to a computer LAN. It measures temperatures from -55 °C to +125 °C. The measured value can be read in several ways, including from the internal website.

Communication is performed using various protocols from the TCP/IP family, allowing for the selection of a suitable method for a specific application. The temperature is always measured in degrees Celsius. TME supports communication via the SNMP (UDP) protocol, Modbus TCP, and it can also send an email when predefined limits are exceeded.

Temperature from TME can be easily integrated into custom web pages using HTTP GET. The measurement result can also be read from an XML file or sent as an HTTP POST in XML format. (A comprehensive overview of the available options for obtaining and using temperature is provided on page 8.)

TME configuration is done through a web interface. TME is powered by a 5V or 8-30V power source, depending on the ordered configuration.
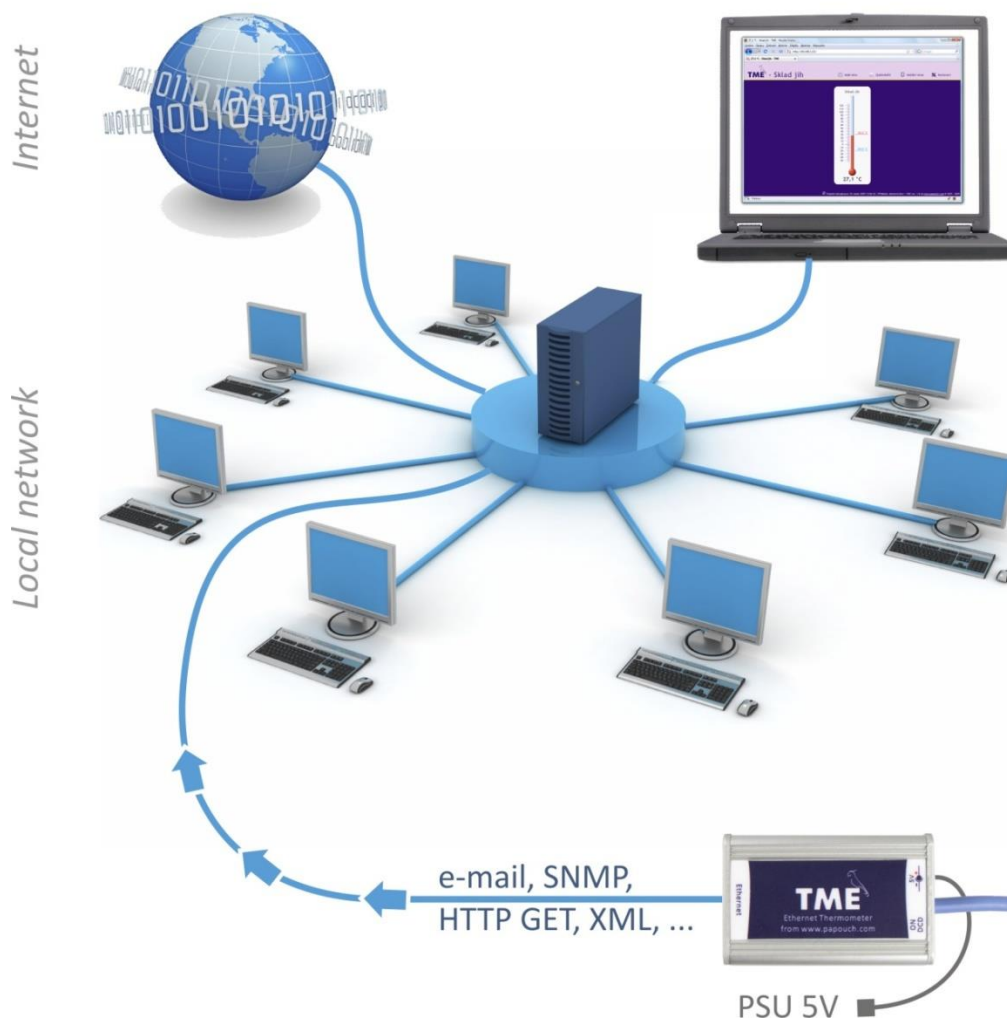

Fig. 1 – Connection and Access to the TME in computer network

F e a t u r e s

- Temperature measurement from -55 °C to +125 °C; 0.1 °C resolution.
- Connection to a computer LAN (10/100 Ethernet).

- Configuration via web interface.

- Temperature sensor in metal rod with IP68 protection.

- Sensor connected to the electronics with a silicone cable up to 20 metres long.

- User calibration of the sensor possible.

- Power supply:
    - TME: 5 V DC from the supplied socket adapter
    - TME_P: 7 - 30 V DC from your power supply

- Can be mounted on DIN 35 mm rail (optional).

Temperature watching:

1. Internal web page with the current temperature.

2. Small web page suitable for display on older mobile devices.

3. Small browser window displaying the current temperature.

4. Ability to display temperatures from multiple TME devices on a single web page.

5. Automatic email notification when the temperature exceeds the predefined limits.

6. Sending temperature through a TCP data channel (directly as a string in degrees Celsius).

7. SNMP and MODBUS TCP protocols.

8. Automatic sending of temperature in an HTTP GET request (with examples).

9. Automatic sending of temperature in an HTTP POST request in XML format.

10. Temperature and all settings easily accessible in XML format.

11. Wix software for displaying values from TME and other Papouch devices.

12. PHP application with clear graphs showing temperature trends over different periods.

13. DLL library for working with TME (including usage examples and source code in C# .NET).

Options for reading temperature from TME

1) Web page

After entering the IP address of the thermometer into a web browser,[1] a website is brought up displaying the actual temperature value and the set temperature limits. TME thermometer pages can be set to display in Czech or English. Temperature can be shown in Celsius or Fahrenheit, with graphical representation resembling a mercury thermometer or a purely numerical display. *(More on page 28.)*

2) XML file

At the address *http://[IP_address]/fresh.xml*, an XML file is available with the current temperature, measuring location name, and temperature limits. *(More on page 32.)*

3) Embedding Temperature in Custom Pages using Script (HTTP GET)

The TME thermometer allows periodic script invocation on a remote web server. TME passes the measured temperature and other data as parameters in the HTTP GET request. *(More on page 33.)*

4) SNMP protocol

According to the settings, TME sends out SNMP traps if the temperature value is outside of the set limits. Regular transmission of a trap with the actual temperature value is also possible. *(More on page 40.)*

5) Mail

Based on the configuration, the thermometer sends an email notification when the temperature exceeds the set limits. *(More on page 41.)*

6) TCP protocol

The thermometer can function as a client or server. As a client, it connects to a remote IP address and sends the measured temperature in ASCII format at the set interval. In server mode, it expects connection requests on its IP address and port. Upon connection, it sends the temperature information to the client at the set interval in ASCII format. *(More on page 37.)*

7) Simple Page for Older Mobile Devices

By entering the IP address of the thermometer in the format http://[IP_address]/wap.html into a mobile device, a simple page with current information from the TME thermometer will be loaded (current temperature, thermometer name, and temperature limits if set). *(See page 31.)*

---
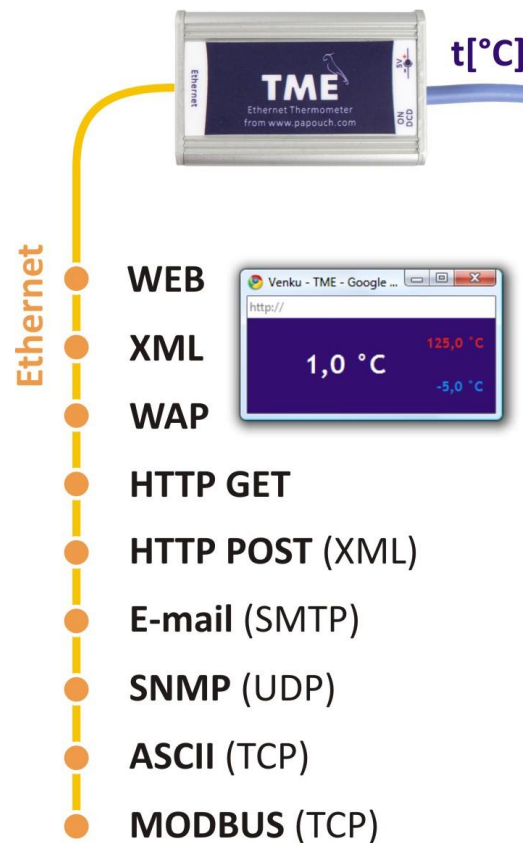
[1] JavaScript support must be enabled.

8) WebService – XML HTTP POST

Information from TME can be sent directly as an XML HTTP POST request at regular intervals. It can be easily processed in common programming languages. *(More on page 35.)*

9) Modbus TCP protocol

Temperature can also be read using the industrial Modbus TCP protocol. *(More on page 42.)*

Detailed characteristics

Ethernet Part

- IP address, subnet mask, gateway and port number configuration

- Automatically sends current value via TCP connection every 10 seconds

- TCP data connection can operate in both client and server mode

- TME can keep the connection alive automatically

- Local and remote port are configurable

- Device can be set to factory defaults by a button in WEB interface

Security

- Three security levels – user (temperature viewing) and administrator (configuration), superadmin (sensor calibration).

- Each level has own password.

Emails

- An e-mail can be sent when the threshold is exceeded.

- E-mails can be sent periodically when the threshold is exceeded.

- SMTP authorization.

SNMP

- SNMP trap can be sent when the threshold is exceeded.

- Periodical sending of the measured-out value.

- Configuration of the read and write community.

HTTP GET and POST

- Periodical sending of the current measured-out value to your WEB server via a simple HTTP GET request or HTTP POST (in XML format).

- You can input your own parameters to the GET.

- Separate scripts for POST and GET.

Temperature measuring

- Temperature units: Celsius or Fahrenheit.

- Upper and lower threshold can be set. If the temperature gets out of the range, TME sends an email or SNMP trap according to the settings.

- Hysteresis can be set for temperature thresholds in regions with fluctuating temperature.

MODBUS TCP

- TME can communicate via MODBUS TCP protocol.

Hardware

- Measuring temperatures in range -55 to +125 °C.

- Sensor cable length 3 m (up to 20 m possible if required).

- Silicon cable and metal enclosed sensor.

- Power supply:
  - TME: 5 V DC from the supplied socket adapter
  - TME_P: 7 - 30 V DC from your power supply

- Cable and sensor directly attached to the main unit.

Other

- Name the device as you like.

- WEB interface language – Czech or English.[2]

- Two skins available – Digital and Mercury thermometer.

- Simple WEB display possible. (For example, you can view multiple TMEs on a single WEB page using HTML iframe element.)

- Mini WEB page with a simple display (JavaScript window).

- The web interface requires JavaScript enabled.

Device options

Sensor

- In a stainless-steel rod with a diameter of 5.7 mm and a length of 60 mm.

Fig. 2 – Standard sensor design

Cable type

- Silicone cable with a diameter of 4.3 mm. Temperature resistance: -60 to +200 °C. Color: Blue.

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[2] More languages can be added if required.

[6] PoE (power over Ethernet) Standard IEEE 802.3af, that allows power devices in the network via data cable.

Cable length

- 3 m *(standard)*

- Maximum 20 meters

Mounting

- Without a holder *(standard)*

- With a DIN 35 mm rail mount

Fig. 3 – TME on the DIN rail

Power

- TME: 5 V DC from the supplied socket adapter

Fig. 4 – TME version (with 5 V power supply)

- TME_P: 7 - 30 V DC from your power supply

Fig. 5 – Variant TME_P (with 7 - 30 V power supply)

Do not hesitate to contact us if you have further specific requirements for the design and function of the TME thermometer.

Package Contents

- TME Thermometer with sensor on 3 m cable.

- TME variant (5 V power supply): socket adapter with 5 V DC output.

- 1 m direct PATCH cable.

A c c e s s o r i e s

- Power-supply cable, 2 m long, with a 3.8 × 1.3 mm connector. The other end is open, with conductors to be wired into the power source.

- A power-supply cable from a USB 2.0 port.

CONNECTION

1) Connect the power supply according to your TME variant:

   a. Standard TME: Connect 5 V DC from the supplied socket adapter or other 5 V DC power supply (max. 1.5 W).

   b. TME_P: Connect a 7 to 30 V DC power supply to the terminal block according to the marked polarity.

2) Then connect the TME to the computer LAN with the supplied patch cable.[3]

3) Default TME's IP address is **192.168.1.254**. If your network is out of device subnet range, please set the IP address of the TME via Ethernet Configurator software.
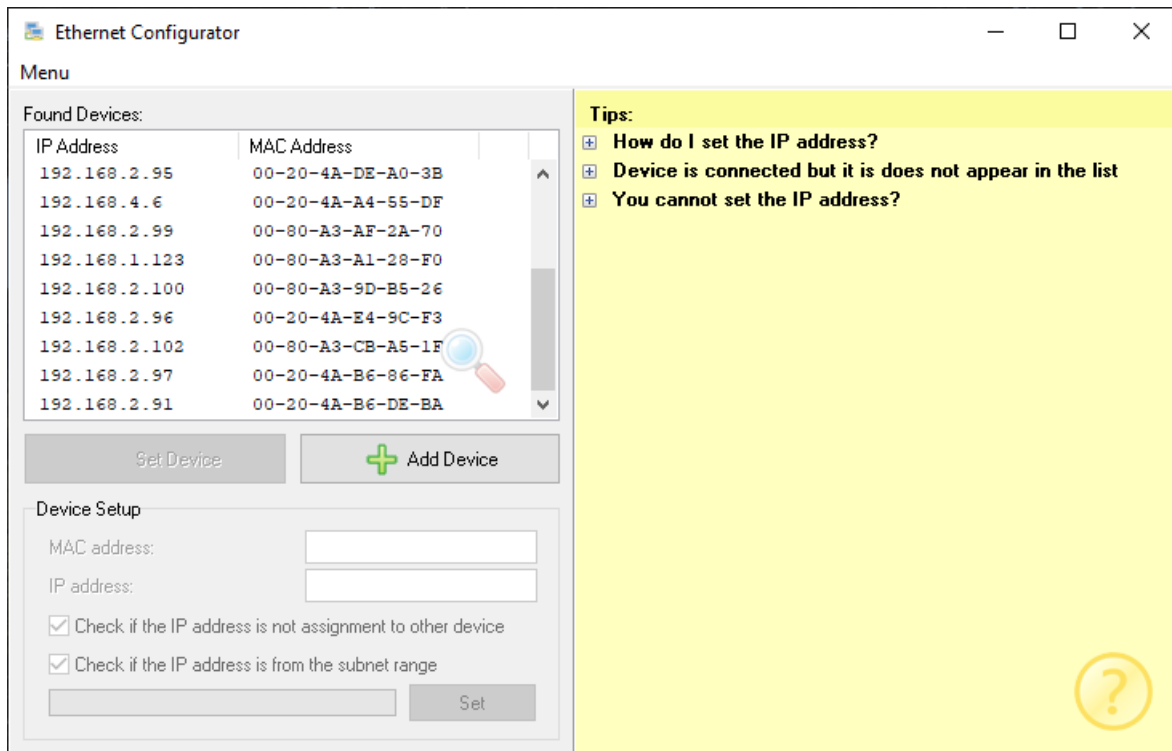

Fig. 6 – Ethernet Configurator software

4) After setting the TME's IP address, you can connect to it by any WEB browser. (For example, by entering *http://192.168.1.254/* - for default IP address.)

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[3] Common un-crossed UTP cable for computer networks. If you want to connect the device directly to one PC, use a crossover cable.

THERMOMETER SETTINGS

You can set-up your thermometer using:

- **WEB interface**

- Telnet protocol (see page 25)

- For First configuration of the IP address, you can use Ethernet configurator.

Ethernet configurator

Ethernet configurator can be used to set TME's IP address. Program is in English and Czech language. It also contains a small help telling you what you need to know when setting your TME's IP address.

You can see the program screen on previous page in Fig. 6.

WEB INTERFACE

To enter settings, push "Settings" button in upper right corner of TME main WEB page.
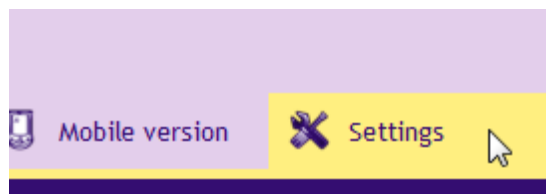

Fig. 7 – Settings button on the main page

Settings are arranged in eight panels:

- *Network* – Network interface configuration, IP address, subnet mask, TCP channel, …

- *Security* – Access passwords settings

- *Email*

- *SNMP*

- *Sending* – sending of the measured temperatures to your server using HTTP GET and POST (XML)

- *Sensor* – thresholds, hysteresis and unit's settings

- Other – device label, WEB interface language and appearance settings

- *Info* – device information

Tips for settings:

- You can view the context help by pointing the cursor at the item. It is also displayed when cursor is over the headlines marked with a question-mark at its end.
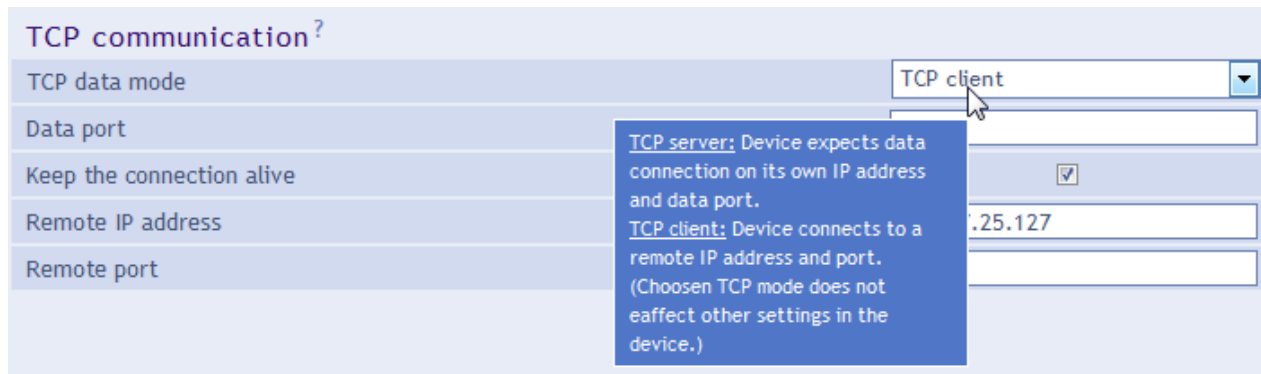

Fig. 8 – Context helps for the settings menu items

- Settings window is movable by dragging it by the upper right corner.

Network

Network settings for the thermometer and the TCP data channel.

Fig. 9 – Network settings panel

Device's IP address

Thermometer's IP address. In case you are not sure if the IP address is correct, please consult your Administrator.

Netmask

Subnet mask of the network TME is connected into.

Gateway IP address

Network gateway IP address.

DNS server's IP address

DNS server IP address (DNS server translates url names to IP addresses).

WEB port

Thermometers WEB interface port.

Device mode

Up to two additional protocols from A to C can be activated at once. (SNMP protocol is active all the time so it is not mentioned.)

A) Email sending

B) Sending via HTTP protocols to a remote server

C) Other protocols

TCP server: TME is awaiting the connection on the pre-set data port passively.

Spinel packet (TCP client): TME establishes connection to the remote IP address actively. The connection can be held open indefinitely ("Keep the connection alive" is checked) or TME can disconnect after transmitting the temperature ("Keep the connection alive" is not checked.)

Miscellaneous

ModBus port

Port number for the TME to communicate via the ModBus TCP protocol.

Keep the connection alive

Checked: TME keeps the connection alive.

Not checked: TME establishes the connection every 10 seconds, sends the temperature and disconnects.

Data port

Port number. TME waits for incoming connection (in the TCP server mode).

Remote IP address

Remote device's IP address (server mostly). TME connects to this device in TCP client mode.

Remote port

Remote device's port number. TME connects to this port number in TCP client mode.

Device reset

This button resets all parameters of the thermometer to factory defaults. IP address does not change, WEB port number will be changed to 80.

Security

Fig. 10 – Security settings panel

Current administrator's/superadmin's password [4]

If administrator's/superadmin's password has already been saved, enter it here. Otherwise, no password changes are allowed.

Allow mobile view

WEB page for the mobile view (accessible at /wap.html) is not secured. This setting can allow or disallow the mobile view.

User's password [4]

Enter password for user access. This level only allows viewing the current temperature. Access to settings is not allowed.

User Name is always "user"

If the user's password is entered, Administrator's password has to be entered as well.

To cancel the password, leave both fields empty.

Administrator's password [4]

Enter administrator's password here. This level also allows access to the settings.

Administrator's name is always "admin". Do not fill the name if there is no password.

To cancel the password, leave the fields empty.

---

[4] This field is for entering the values only, there is nothing displayed after saving.

Superadmpassword and verification [4]

Enter the superadmin password. This level allows you to access all settings including sensor calibration. Temperature is calibrated by line equation ($y = ax + b$).

Superadmin name is always *sadmin*

Superadmin password cannot be cleared. The default password is *1234*.

Email

Setting to send emails – when limits are exceeded or periodically. TME can only send mail via SMTP servers that do not require SSL/TLS encryption.

Fig. 11 – Email settings panel

Send email when the temperature exceeds thresholds

Enter time in minutes. This interval sets the period of sending emails if the temperature is out of limits.

Sender's email address

Fictional TME address – this address will be shown as "from" in the emails about the temperature.

Temperature in email subject

If this field is checked, temperature will be directly in email subject. Example:

TME_info fridge_box -12.3C

SMTP authorization

You can enter login data if the SMTP server requires sender's identity check. [5]

SNMP

SNMP communication parameters are entered here. You can set the SNMP traps activation, periodical sending etc.[6]

Fig. 12 – SNMP settings panel

Enable trap sending

This checkbox activates SNMP trap sending.

SNMP Manager IP address

IP address of the server, that gathers SNMP messages from devices in the network.

Send a trap when threshold is exceeded

If the temperature exceeds the limits, set on *Sensor* panel, SNMP trap will be sent about this event.

Periodical sending of the current values

You can enter the interval for sending current temperature data to the SNMP manager. Temperature is sent as a SNMP trap. Interval is entered in minutes. For turning this feature off, please enter 0 as the interval.

---

[5] This field is for entering the values only, there is nothing displayed after saving.

[6] SNMP temperature is in Celsius degrees no matter what units are sent in settings.

Read community name

Enter SNMP read community name here.

Write community name

Enter SNMP write community name here.

Sending

Parameters for automatic sending of the measured-out temperature via HTTP protocol. Temperature can be sent as a HTTP GET or HTTP POST in XML format. [7]

Fig. 13 – HTTP protocol sending settings panel

WEB server's address

Enter address of the WEB server containing scripts for retrieving the current values. Expected entry: URL address in format: www.server.com (max 30 characters) or IP address in format: 192.168.1.254.

WEB port

Server's WEB port. Usually, the port number is 80 or 8080.

Scripts Folder on the server

Enter a local path to the folder containing the scripts. If the script receiving the temperature is on *www.server.net/scripts/get.php*, enter only this part to the field: *scripts/*

---

[7] Temperature is sent in Celsius degrees no matter what unit is set settings.

Sending interval

Enter the interval of sending HTTP GET with measured-out values. Enter the value in minutes.

HTTP GET

Activate HTTP GET sending

If this checkbox is checked, HTTP GET sending is active.

Script name

Name of the script receiving HTTP GET.

HTTP GET parameters

If you need to add your own parameters to the HTTP GET, enter them here.

Temperature is usually sent with a name *temp* in HTTP GET. If you need to change this name, enter a string ending with equal sign. *temp* will be substituted by your string.

<u>Example</u> – settings *HTTP GET Parameters* are empty:

<div align="center">get.php?temp=+25.4</div>

<u>Example</u> – *p=17* is entered in settings *HTTP GET Parameters*:

<div align="center">get.php?p=17&temp=+25.4</div>

HTTP POST

Activate HTTP POST sending

If it is checked, sending temperature via HTTP POST is active.

Script name

Name of the script receiving HTTP POST.

Sensor

Parameters affecting measuring. Temperature unit, value monitoring, straight line equations, etc.

Fig. 14 – Sensor settings panel

Temperature units

Unit displayed on the WEB page.[8]

Values watch

Maximal value

When this value is exceeded, according to other settings e-mail, SNMP trap etc. will be sent. Temperature on the WEB page will be highlighted as a warning that some limit was exceeded.

Enter the value in units set in *Temperature units* setting.

Minimal value

When the temperature drops below this value, according to other settings e-mail, SNMP trap etc. will be sent. Temperature on the WEB page will be highlighted as a warning that some limit was exceeded.

Enter the value in units set in *Temperature units* setting.

Hysteresis

Hysteresis applied for set thresholds.

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[8] If the units are Fahrenheit degrees °F, there might occur an error of 0,1 °F in some cases.

Value is entered in whole degrees and it applies under upper limit and over lower limit – see Fig. 15.

Without histeresis

With histeresis
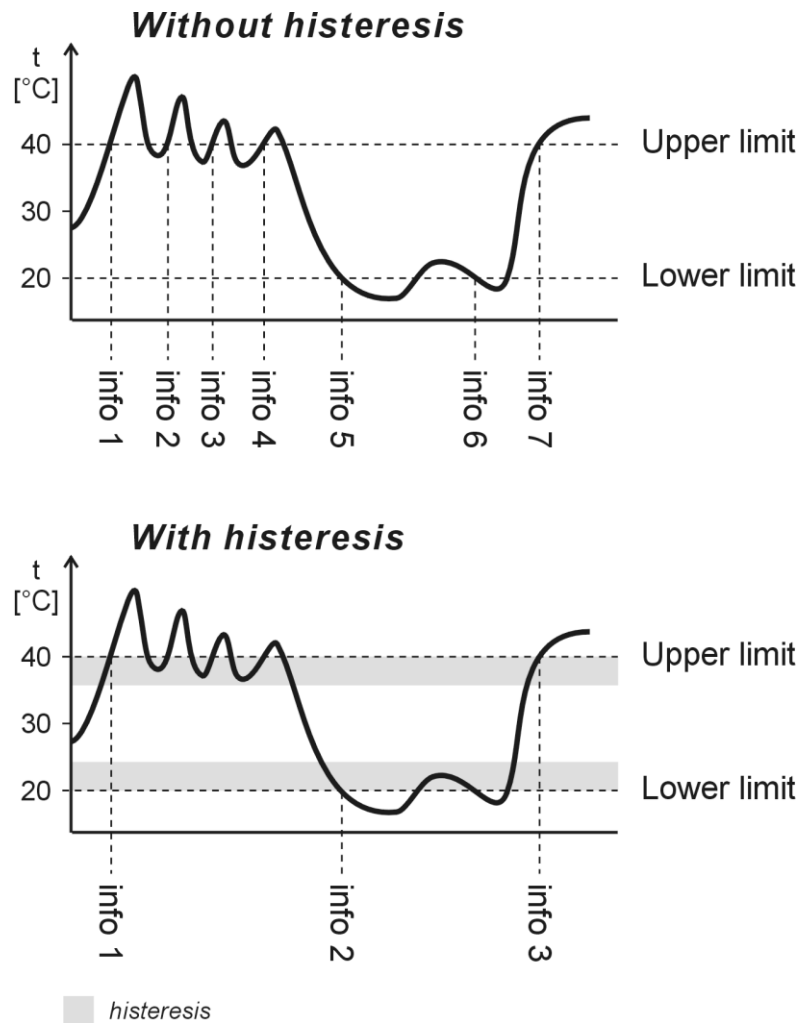
histeresis

Fig. 15 – Temperature hysteresis

Temperatures marked as "info" are temperatures where a message is sent about exceeding limits.

Delay between temperature overrun and e-mail alert.

Enter time in minutes before the e-mail alert is sent after a limit is overrun. The overrun state must persist the whole time. Enter number 0 to 255. If you enter 0, there will be no delay.

Temperature calibration

Following settings are only accessible from superadmin login.
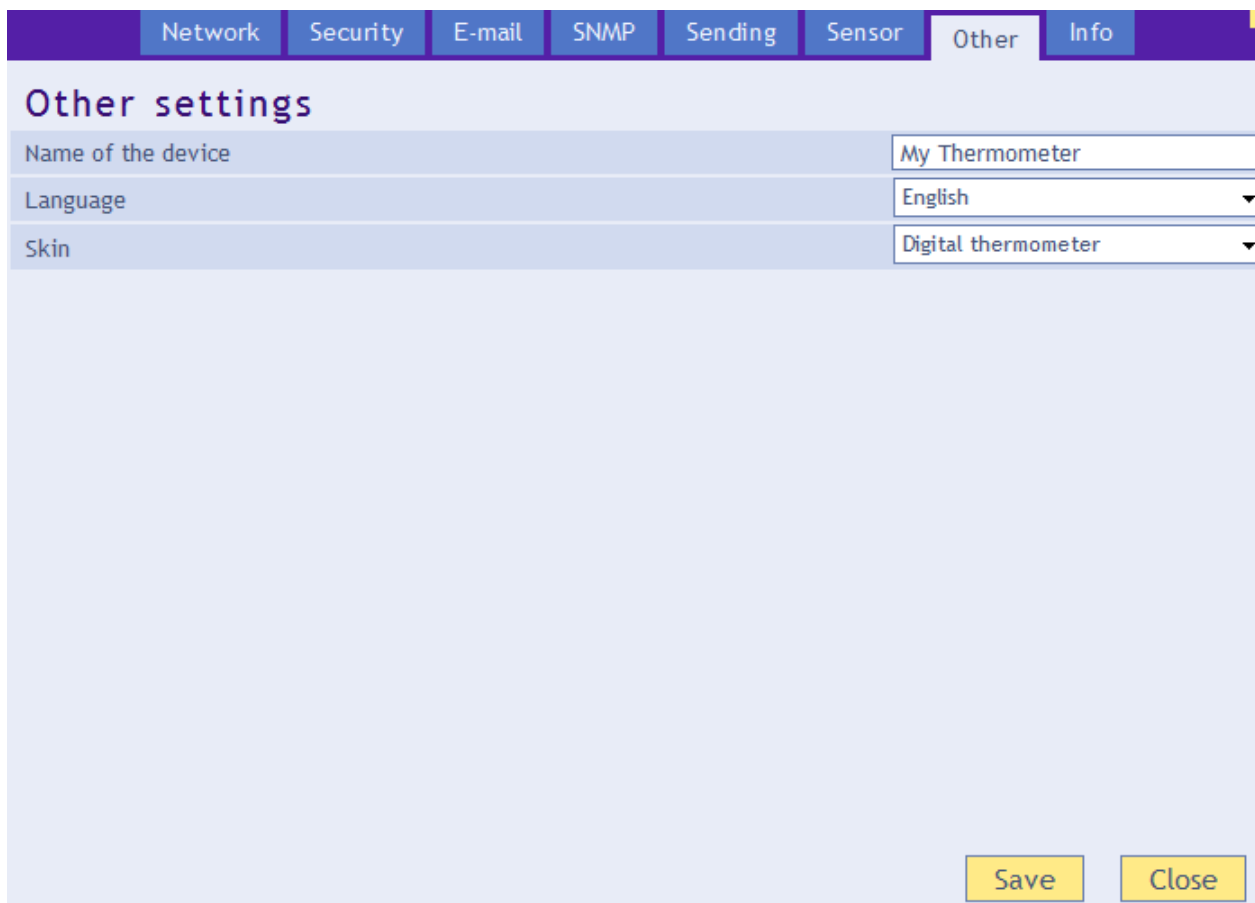
Constants

Temperature is calculated by a line equation using two user defined constants.

Temperature conversion

Temperature from the sensor converts based on following formula: $y = 1 * x + 0$

Fig. 16 – temperature calibration appearance from a standard login

Other

Fig. 17 – Other parameters settings panel

Device name

This string can be used to label the thermometer, for example by its location etc.

Language

Interface language. English and Czech available.[9]

Skin

WEB page thermometer skin. These options are available:

- Mercurial thermometer – imitates the mercurial thermometer.
  This skin can be switched by parameter **m** in the address. (If there are more parameters in the address, divide them by dash. Example: *http://192.168.1.254/index.html?**m***

- Digital thermometer – purely digital display.
  This skin can be switched by parameter **n** in the address. (If there are more parameters in the address, divide them by dash. Example: http://192.168.1.254/index.html?**n**

---

[9] More languages can be added if required.

Info

Other information about the device, MAC address, firmware version and useful links.

Fig. 18 – Other information panel

TELNET CONFIGURATION

Connection

Unknown IP address

For setting the IP address we recommend using Ethernet Configurator (more on page 13).

1) Open a window with command prompt (In Windows OS, click *Run* and type cmd.)

2) Make a record to ARP table:

   a. Type `arp -d` and confirm by Enter. That deletes current ARP table.

   b. Following command assigns IP address to MAC address:

   `arp -s [new_ip_address] [MAC_address]`

   <u>example:</u> `arp -s 192.168.1.254 00-20-4a-80-65-6e`

3) Open Telnet. (by typing `telnet` and pressing Enter[10])

4) Type `open [new_ip_address] 1` and confirm.

5) Terminal shows an error message after a moment. Nevertheless, this action is essential for correct IP address ARP entry.

6) Connect to the IP address of the TME. (by typing `open [IP address in dot format] 9999` and Enter.)

7) Now you have entered to the configuration of TME. IP address is not yet set. It needs to be set in menu Server Configuration > IP Address.

8) If the IP address is valid, TME writes welcoming information ending by text:

   Press Enter for Setup Mode

   Now press Enter or the configuration will be terminated.

9) Device writes complete settings.

10) At the end of the entry you can see „Change setup:" text containing groups of parameters that are configurable. For changing the network parameters choose *Server*. Here you can set a new IP address and other parameters.

---

[10] In Windows 10, the Telnet client is not a standard part of the system. You install it as follows:
   a) In the Windows 10 search box, type *"windows features"* and select *Turn Windows features on or off* in the results.
   b) The Windows Features window opens. In it, check the Telnet Client box and click Ok.

IP address is known

1) In OS Windows click on Start/Run and type `telnet` and confirm. [10]

2) Connect to the IP address of the TME. (by typing `open [IP address in dot format] 9999` and Enter.)

3) If the IP address is valid, TME writes welcoming information ending by text:

   Press Enter for Setup Mode

   Now press Enter or the configuration will be terminated.

4) Device writes complete settings.

5) At the end of the entry you can see „Change setup:" text containing groups of parameters that are configurable. For changing the network parameters choose Server.

Telnet main menu

You can choose the menu items by pressing the number before them and confirming by Enter.

Menu structure is:

```
Change Setup:
  0 Server

  ...

  7 Defaults
  8 Exit without save
  9 Save and exit          Your choice ?
```

Server

Basic Ethernet settings.

Following items are in this part:

```
IP Address : (192) .(168) .(001) .(122)
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) ?
```

IP Address

TME's IP address. Enter the numbers separately and divide them by Enter.

Default: 192.168.1.254

Set Gateway IP Address

Gateway IP address

Type "Y" in the "Set Gateway IP Address" item to change the address. Enter the numbers separately and divide them by Enter.

Netmask

You can set here how many bits from IP address make the network part.

Subnet mask is entered as a number of bits determining range of possible IP addresses of the local network. If for example 2 is entered, subnet mask is `255.255.255.252` . Entered value indicates number of bits from right. Maximum is 32.

Default: 8

Example:
Mask 255.255.255.0 (binary 11111111 11111111 11111111 00000000) -> number 8.
Mask 255.255.255.252 (binary 11111111 11111111 11111111 11111100) -> number 2.

Change telnet config password

Enter new Password

This item sets the password that is required before entering the Telnet configuration or via WEB interface (Administrator's password).

Type "Y" at „Change telnet config password" to change the password

Factory Defaults

By pressing number 7 you can set the device to factory defaults.

This option sets the TME to defaults. IP address does not change, WEB port number will be changed to 80.

Exit without save

Ends the telnet session without saving.

Save and exit

This choice saves the changes. If some settings are changed, device restarts. That may take up to 30 seconds.

HOW TO CONNECT TO TME

A brief overview of methods for obtaining temperature values from the TME thermometer is on page 5.

WEB interface

After setting the thermometer's IP address in the Internet browser,[11] you will see the page from Fig. 19.[12] On the page, there is the actual temperature value, the name of the sensor (if it has been specified), and the temperature limits. If the temperature value gets beyond a limit, the text showing that limit will be flashing.

There is a *Settings* button in the upper right corner. (Button is only visible when administrator is logged in.)
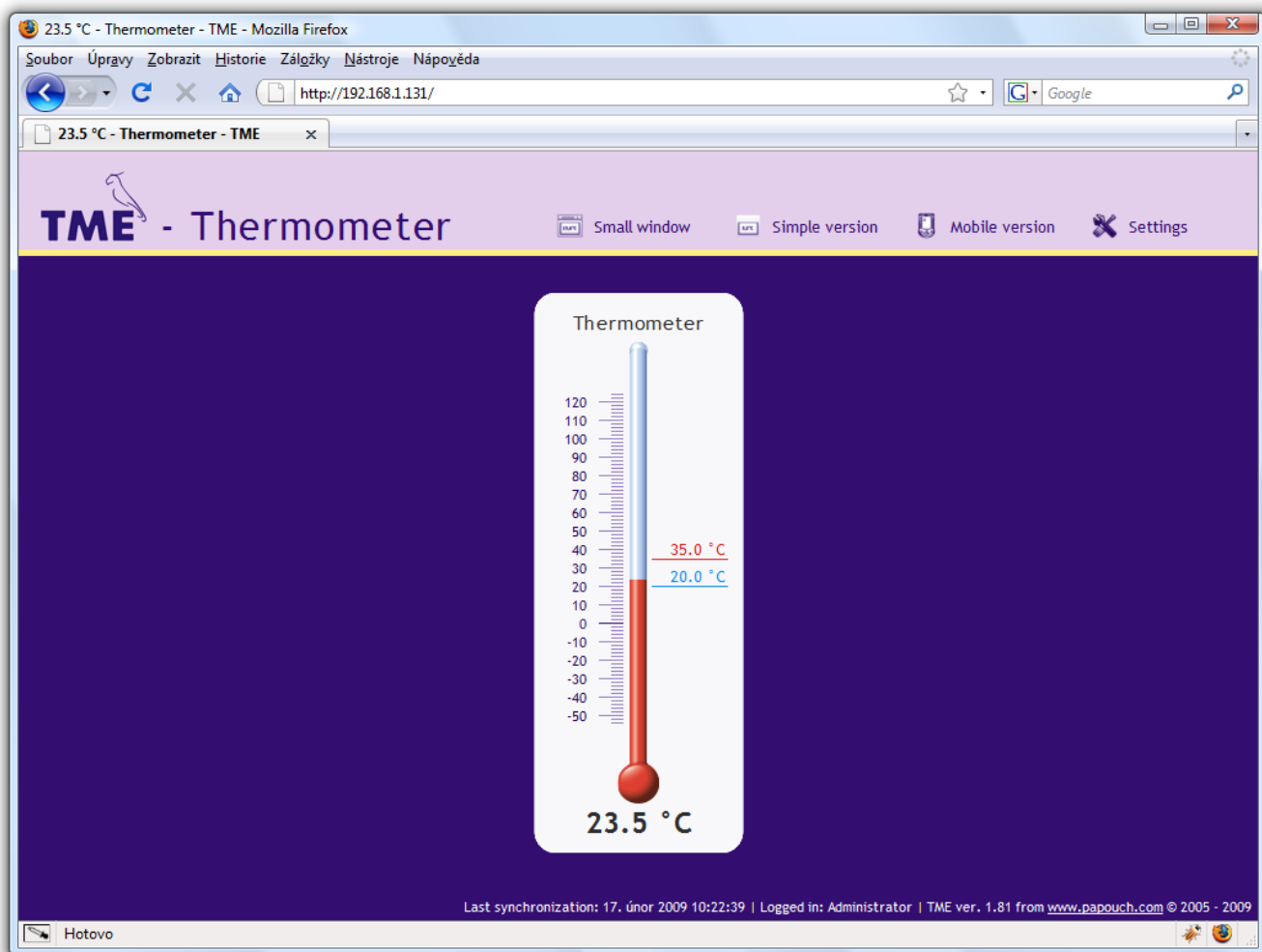
Fig. 19 – skin: mercurial thermometer (browser: Mozilla Firefox)

On the site, you can select language (Czech / English) appearance (mercury / digital) and units (°C / °F).

---

[11] WEB interface requires JavaScript turned on.

[12] The module's pages can be graphically adapted to your requirements.
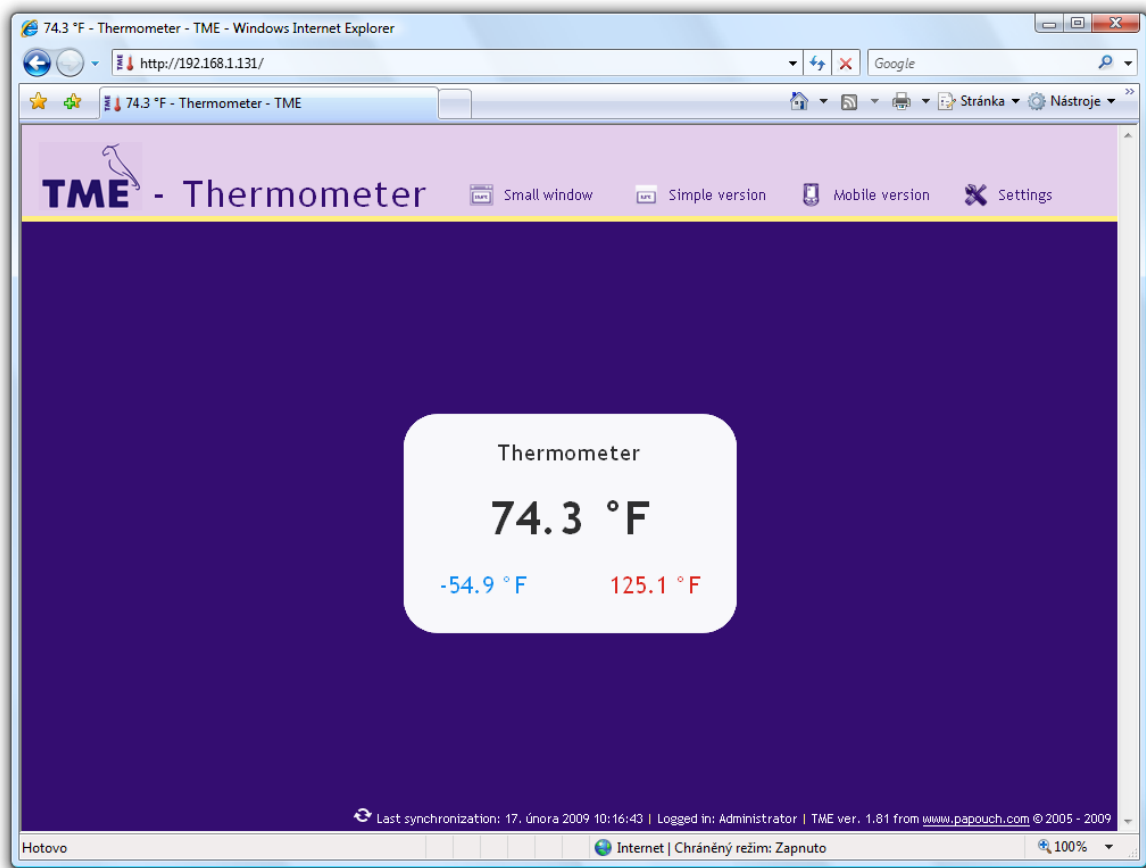
Fig. 20 – skin: digital thermometer. (browser: Internet Explorer)

Mini view

By clicking on Mini view the small window is opened containing small WEB page as shown in Fig. 21.
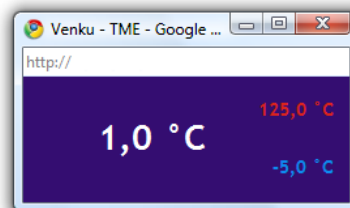
Fig. 21 – TME mini WEB (browser: Google Chrome)

Simplify

You can view simple form of current view by clicking *Simplify*. This form is especially useful when viewing multiple sensors on a single page.
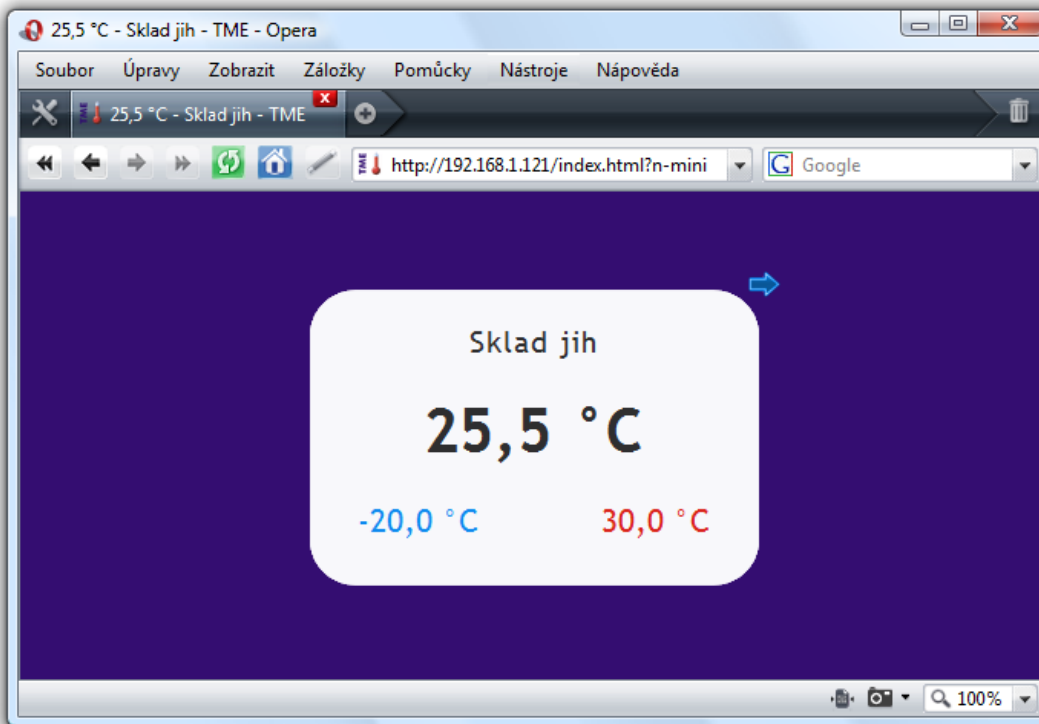
Fig. 22 – simple view; skin: digital (browser: Opera)

Viewing multiple sensors on a single page

If you have more than one TME, you can view them both on a single page like this:
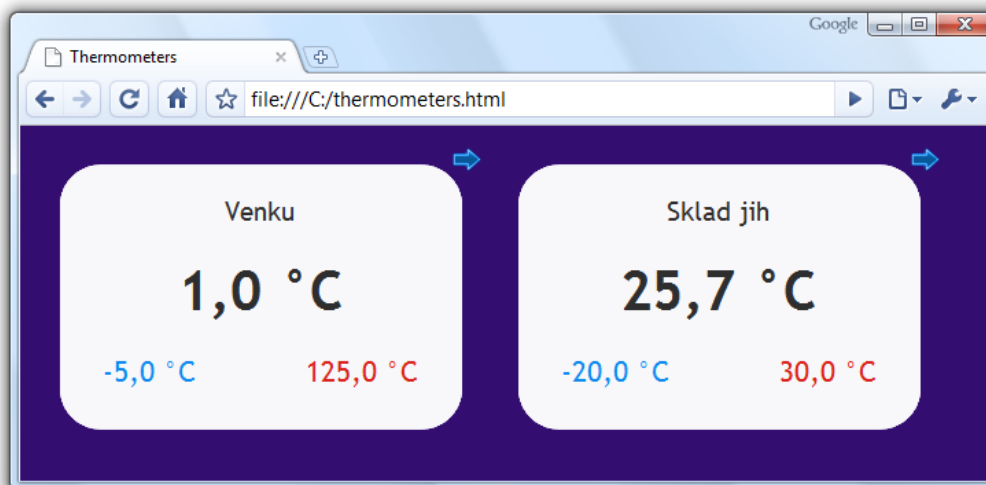
Fig. 23 – Multiple sensors view. (browser: Google Chrome)

If you wish to view multiple thermometers, follow these instructions:

1) Create a new file named *thermometers.html*

2) Copy following text to the file:[13]

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN"
"http://www.w3.org/TR/html4/strict.dtd">
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=windows-1250">
    <title>Thermometers</title>
</head>
<style>
    body {background-color: #340D71;}
    iframe {border: none; width: 340px; height: 240px;}
</style>
<body>
    <iframe src="http://192.168.1.254/index.html?skin=n&mini=1"></iframe>
    <iframe src="http://192.168.1.121/index.html?skin=n&mini=1"></iframe>
</body>
</html>
```

3) Number of thermometers depends on number of lines starting by text *<iframe*. You can add as many as you like. Only thing you have to do is to change the IP addresses (highlighted red) by IP addresses of your thermometers.

4) You can save the file to any location, but be careful about the absolute path the TME.

5) If you have saved the file to your C drive root, you can view the page from your browser by entering: *file:///C:/ thermometers.html*

Viewing on an older mobile phone

You can access a mobile version by clicking on *Mobile version*. Mobile version is available on address: *http://[TME's-IP-address]/wap.html*

Fig. 24 – mobile view

---

[13] Up to fw versions 2.03 change *skin=n&mini=1* to *n-mini*.

XML file

From the TME thermometer, you can get the currently measured temperature value, the temperature limits and the thermometer's name in a text file in XML format. The file is at *http://[IP_address/fresh.xml* – for example, http://192.168.1.254/fresh.xml for the default settings of the thermometer.[14]

```xml
<?xml version="1.0" encoding="iso-8859-1"?>
<root>
    <sns id="1" type="4" location="mySensor" status="0" hi="0" lo="0" unit="0"
val="237" min="-50" max="1000" />
    <status location="mySensor" mac="00204AA7EABC" />
</root>
```

There are following tags in the XML file:

status

location

User defined name of the thermometer. [15]

mac

Device MAC address.

sns

id

Number of the quantity. (Always number 1.)

type

Quantity type. There is always the number 4, which represents the value multiplied by ten.

status

Describes status of the measured value. It can be:

     0......valid value, currently measured-out temperature
     1......waiting for first measuring
     4......measuring error or sensor error (means damaged sensor or cable)

hi

Describes status of exceeding the upper limit. It can be:

     0......current value is below or equals upper limit
     1......current value is above upper limit

lo

Describes status of dropping below the lower limit. It can be:

     0......current value is above the lower limit
     1......current value is below or equals the lower limit

---

[14] XML file compatible with the old versions is still on the same address: *http://[IP_adresa_teploměru]/tme.xml*

[15] This attribute is for reasons of backward compatibility with previous versions, also repeated in the tag *sns*.

unit

Currently set temperature units:

     0 ..... Celsius degrees

     1 ..... Fahrenheit degrees

val

Current measured-out value in set temperature unit, multiplied by ten. (Validity of the value describes *status* attribute.)

min, **max**

Lower and upper limit of the temperature set by user. Temperatures are in the set unit and multiplied by ten.

mac

Devices MAC address. This address can be used to identify the on your server.

Inserting the temperature value into a website using a script

The temperature value from the TME can be inserted into a website using a scripting language (such as PHP or ASP), which processes the value from the thermometer as an HTTP parameter of the GET request or HTTP POST. The thermometer periodically calls the script on an Internet (or intranet) server with the actually measured temperature value in the GET or POST parameter. On the server, this value can be stored as a variable and further processed - for example, stored in a log, displayed on the website, etc.

The TME settings contain the script path and the script calling period. If a measurement error occurs (the temperature value cannot be read from the temperature sensor on the cable), the TME sends 9999 as a temperature value.

If the GUID parameter is filled-in in the thermometer setting, this ID is sent to the HTTP server as a further parameter *.id* (in GET) or *guid* (in POST).

Period can be set from range 1 to 1440 minutes. Resolution 1 minute.

Example of the temperature embedded in a WEB page
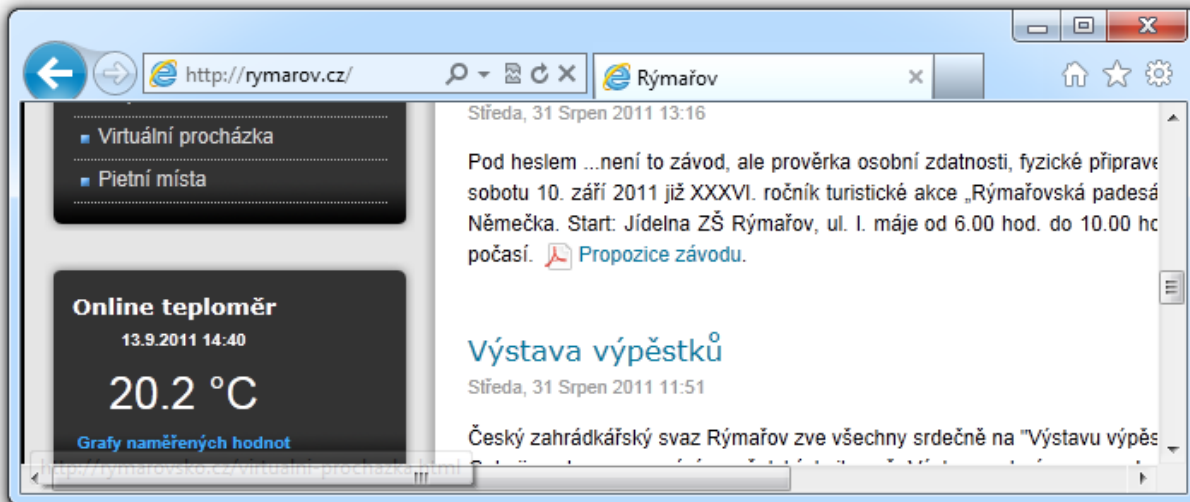
Fig. 25 – example of the temperature embedded to WEB site

Examples to the simple scripts for PHP and ASP processing temperature from the TME is available for download here:

en.papouch.com/how-to-put-thermometer-to-your-web-page-p4038/

There is a brief comment and function description with those examples.

HTTP GET

This request is sent as parameters in the message address as a standard HTTP GET parameters. Example:

```
http://www.example.com/get.asp?temp=25.6
```

As you can see in the example, request is in a format known to the WEB programmers as a standard forms data sending format. There is no need to learn new ways and you can use standard mechanism. (`<form name="myform" action=…`).

Request is sent in period set in item *Sending interval* on page 20.

HTTP GET Parameters are following:

`mac` .... MAC address of the device.

`name` .... Device name defined by user.

`unit` .... Set temperature unit as a letter C or F.

`temp` .... Measured value in the set temperature unit (parameter name can be user defined – see the example)

`tempV` .... Measured value in the set temperature unit.

`tempS` .... Describes the status of currently measured value:

      0 .... valid value, currently measured-out value

      4 .... measuring error or sensor error (means damaged sensor or cable)

`id` .... Device identifier (GUID identifier defined by user. It GUID is not entered, parameter *id* is not sent)

HTTP GET settings - examples

Help for entering the path to the script is displayed when cursor is over HTTP GET title.

Example 1:

What you need to process:

There is a script *temperature.asp* on your server awaiting the data from TME. Full path to the script is *http://www.example1.com/temperature.asp*

Script expects the temperature in *temp* parameter.

Solution:

You need to set up these items:

```
WEB server IP address..................218.25.14.3
Server name ................................ www.example1.com
WEB port ...................................... 80
Script folder..................................
GUID.............................................
Script name................................... temperature.asp
HTTP GET parameter ...................
```

Result URL address when temperature is 25.6°C:

http://www.example1.com/temperature.asp?temp=+25.6&tempV=+25.6&tempS=0&unit=C&mac=00 204A9AE5E2&name=

Example 2:

What you need to process:

There is a script *process.php* awaiting data from TME. Full path to the script is *http://www.example2.com/scripts/process.php*

It expects an *id* variable to identify the thermometer. This parameter is stored in *GUID* (for now we have a string "*98ED78B*").

Server also expects constant variable *sts=ok*.

Solution:

You need to set up there items:

```
WEB server IP address.................28.225.184.31
Server name ................................ www.example2.com
WEB port ...................................... 80
Script folder.................................. scripts/
GUID............................................. 98ED78B
Script name................................... process.php
HTTP GET parameter ................... tst=5
```

Result URL address when temperature is -2.7°C:

http://www.example2.com/scripts/process.php?tst=5&temp=-2.7&tempV=-2.7&id=98ED78B& tempS=0&unit=C&mac=00204A9AE5E2&name=

Example 3:

What you need to process:

There is a script *process.php* awaiting data from TME. Full path to the script is *http://www.example2.com/scripts/process.php*

Script expects the temperature as a parameter *tr5*.

It also expects an *id* variable to identify the thermometer. This parameter is stored in *GUID* (for now we have a string "*98ED78B*").

Solution:

You need to set up there items:

WEB server IP address *28.225.184.31*
Server name *www.example2.com*
WEB port...................................... *80*
Script folder................................. *scripts/*
GUID *98ED78B*
Script name.................................. *process.php*
HTTP GET parameter .... *tr3=*

Result URL address when temperature is -5°C:

http://www.example2.com/scripts/process.php?tr3=-5.0&tempV=-5.0&id=98ED78B&
tempS=0&unit=C&mac=00204A9AE5E2&name=

HTTP POST

Parameters of this type of request are sent as a body of an XML message. XML is formatted according to SOAP v 1.2. protocol.

Request is sent in period set in item *Sending interval* on page 20.

Example message:

Head:

```
POST /post.asp HTTP/1.1
Host: www.example.com
Content-type: application/soap+xml; charset=iso-8859-1
Content-length: [real body length]
```

Body:

```xml
<?xml version="1.0" encoding="iso-8859-1"?>
<soap12:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
  <soap12:Body>
    <WriteSample xmlns="http://www.papouch.com/TME/Sensors">
      <sampleValue>+24.7</sampleValue>
      <unitValue>C</unitValue>
      <passKey>98ED78B</passKey>
    </WriteSample >
  </soap12:Body>
</soap12:Envelope>
```

Meaning of the parameters:

sampleValue ..... measured value in the set temperature unit (if the temperature is unavailable, for example if the sensor is damaged, this parameter is 9999)

unitValue .... set temperature unit as a letter C or F

passKey .... here the GUID parameter is entered (if it is not entered, passkey parameter will not appear in the XML message)

TCP connection

TME thermometer enables active and passive modes of communication via TCP protocol. **Passive mode** means that the thermometer waits for a connection on a defined port. This mode can also be called a Server Mode. **Active mode** means that the thermometer actively connects to a remote

Fig. 26 – thermometer values in the TCP/IP terminal

IP address and a port and sends the temperature. It is possible to define whether the thermometer shall connect only once and keep the connection alive or to connect in regular intervals, sent the temperature and disconnect. This mode can also be called a Client Mode.
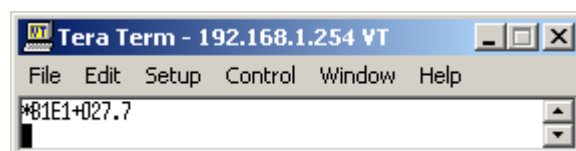
Passive mode (Server)

This mode is suitable in case a remote system requires a measured temperature from TME and connects to TME actively.

The thermometer acts as a server and waits for a connection request on its own IP address and port. When a connection is established it sends the client temperature data in ASCII format compatible with Spinel protocol. [16]

The process of setting these items can be found in chapter starting on page 14.

Example of a connection via terminal program

(This example illustrates a connection using Tera Term[17] program.)

Establish a new connection (File/New connection…). A dialog shown in the picture is displayed. Here you can select TCP/IP and enter the thermometer IP address and defined port. The picture shows default values for the thermometer.
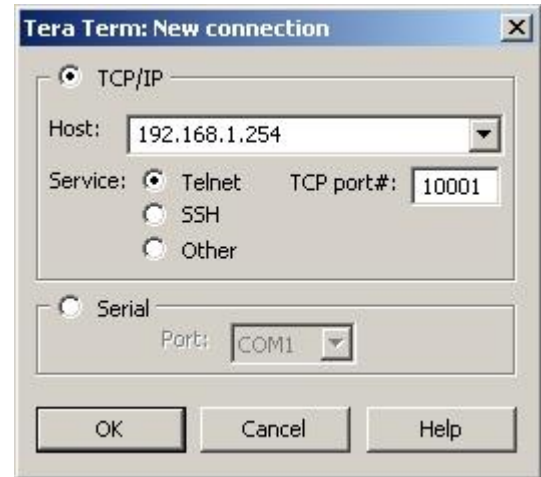
Fig. 27 – New connection

Confirm the dialog. When a successful connection is established, a window shown in the picture appears. It displays temperatures which are regularly sends by TME every 10 seconds. Measured temperature is always sent in the set temperature unit.

Active mode (Client)

This mode is suitable in case one server expects temperatures to be sent from several thermometers or in case TME has not a fixed IP address or is placed behind a firewall or router.

---

[16] The format is compatible with the Spinel 66 format. For more information about the Spinel protocol, please visit en.papouch.com .

[17] Tera Term terminal can be downloaded from: http://www.ayera.com/teraterm/

Message format

The **temperature-value** message is sent in the following format:

```
*B1E1[sign][degrees].[tenths][enter]
```

> [sign] .... 1 Byte; "+" or "−" sign
>
> [degrees] .... 3 Byte; temperature in the set temperature unit; always a three-digit number; filled with zeros from the left as necessary
>
> . ... 1 Byte; decimal point
>
> [tenths] .... 1 Byte; tenths of degree
>
> [enter] .... 1 Byte; terminating character "Enter" (DEC: 13; HEX: 0x0D)

All characters are sent in ASCII format. An example is shown in the Fig. 27.

On Error sending TME this string:

```
*B1E1Err[enter]
```

> [enter] .... 1 Byte; terminating character "Enter" (DEC: 13; HEX: 0x0D)

All characters are sent in ASCII format.

Error can be sensor's internal error or broken sensor cable.

Example including source codes

At en.papouch.com/tme-ethernet-thermometer-p4602 a demo program can be downloaded free of charge, showing how the temperature measurement works. You can also download free of charge its complete commented source code for Delphi 7.
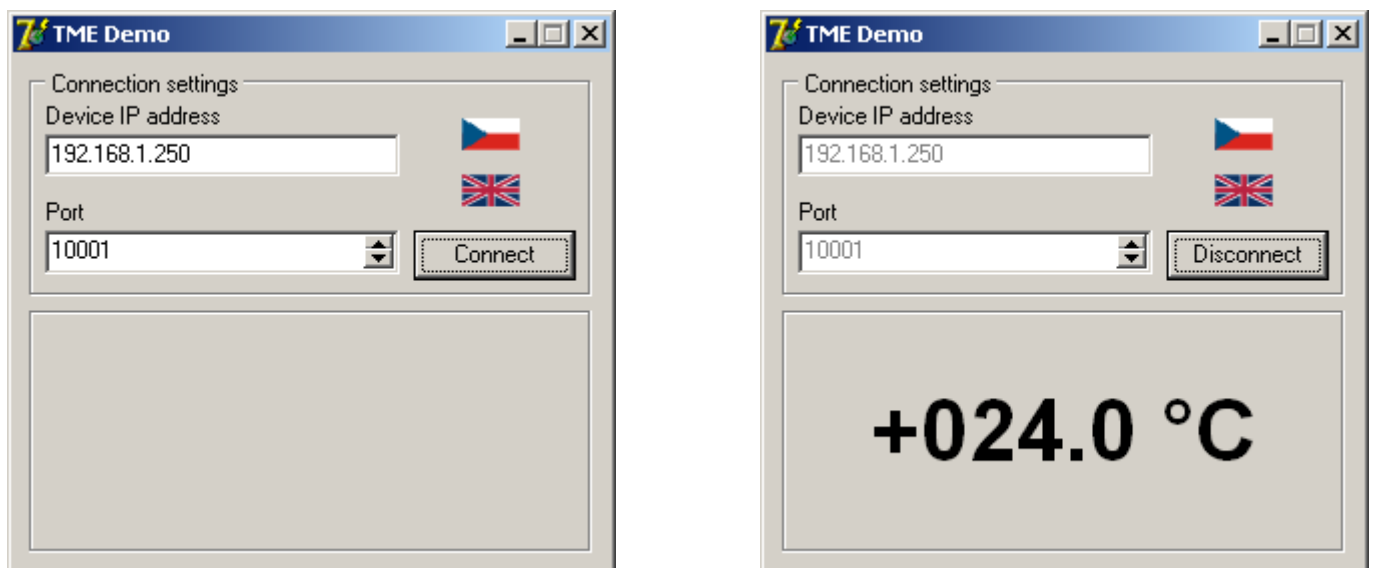
Fig. 28 – demo program

After opening the program, you can fill in the IP address and communication port of the thermometer and push the "Connect" button. If the connection to the thermometer has been successful, the measured temperature value is displayed in the bottom part of the window.

SNMP

The SNMP protocol contains objects with measured values and the current state of the device. A detailed description of the objects follows. A MIB table that you can import into your SNMP manager is available for download at papouch.com.
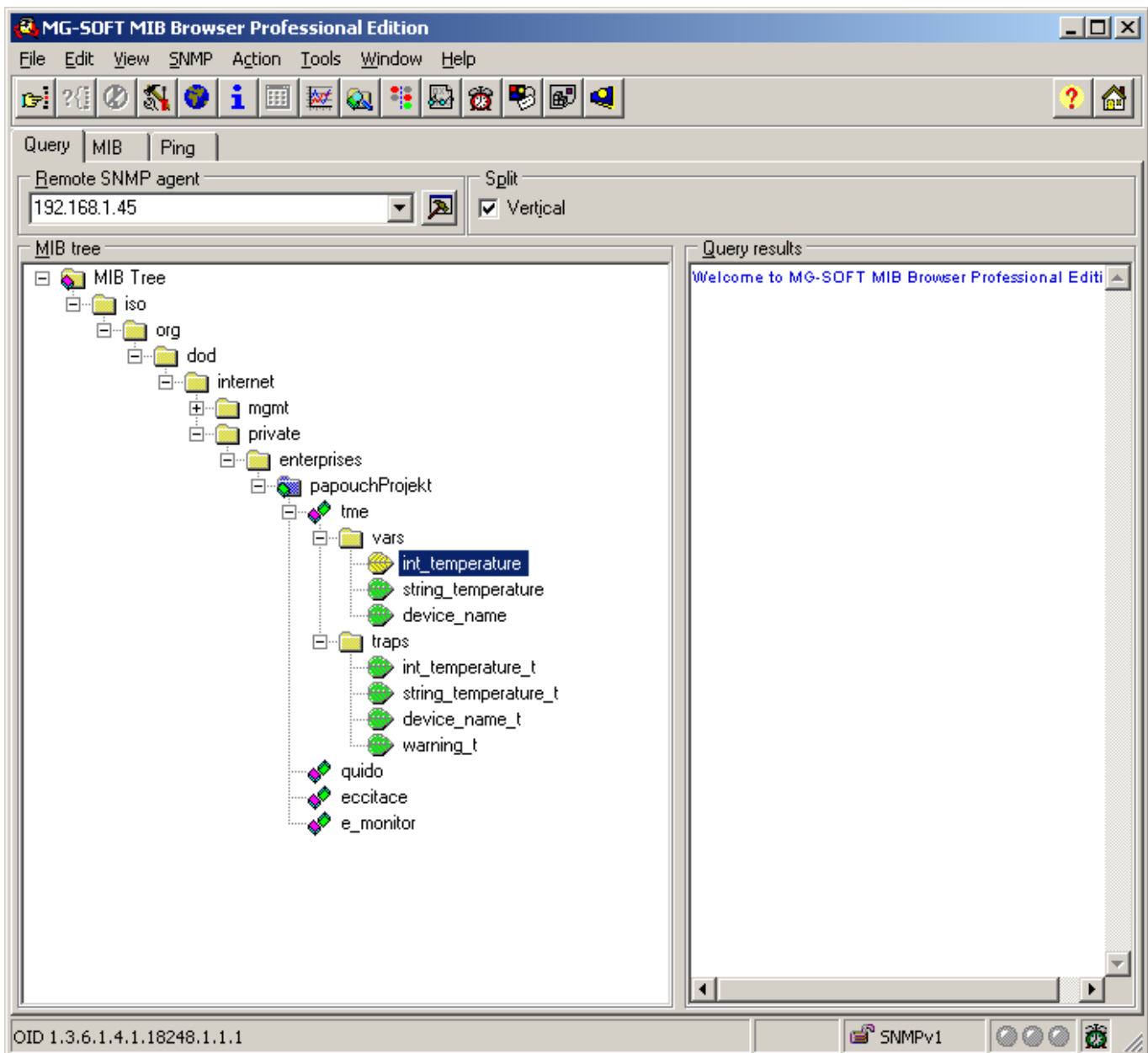
Fig. 29 – MIB tree

Tip: If you want to browse the whole SNMP tree using SNMPWALK utility (Linux), you need to specify exactly where the readout should start after the IP address. For example:

snmpwalk -v1 -c public 192.168.1.254 1.3.6.1.4.1.18248

If you only rad with IP address, you will get just basic system IOD objects of the device.

MIB table

Temperature as number

Name: int_temperature

Object ID: 1.3.6.1.4.1.18248.1.1.1

GET address: 1.3.6.1.4.1.18248.1.1.1.0

Description: Measured value in the set temperature unit as an integer – the measured value multiplied by ten. (For example, 56.9 °C is expressed as 569.)

Temperature as string

Name: string_temperature

Object ID: 1.3.6.1.4.1.18248.1.1.2

GET address: 1.3.6.1.4.1.18248.1.1.2.0

Description: The measured value as a text string. (For example, "+22,4".)

Device name

Name: device_name

Object ID: 1.3.6.1.4.1.18248.1.1.3

GET address: 1.3.6.1.4.1.18248.1.1.3.0

Description: Thermometer name set by user.

Automatic traps

The TME enables sending out automatic traps. There are two settings for the traps: enable/disable sending, and the receiver's IP address (SNMP manager).

Depending on the settings, the traps are sent when the temperature goes out of the preset temperature limits, and a trap with the measured temperature value is sent out regularly.

Trap 1 – Temperature outside of limits

The trap contains temperature in the set temperature unit (expressed as an integer) – the measured temperature value multiplied by ten, as a text string, the thermometer's name and a specification beyond which temperature the limit occurs.

This trap is only sent out if the temperature goes beyond the preset limits. The trap can only be delivered if the SNMP manager's IP address is set correctly.
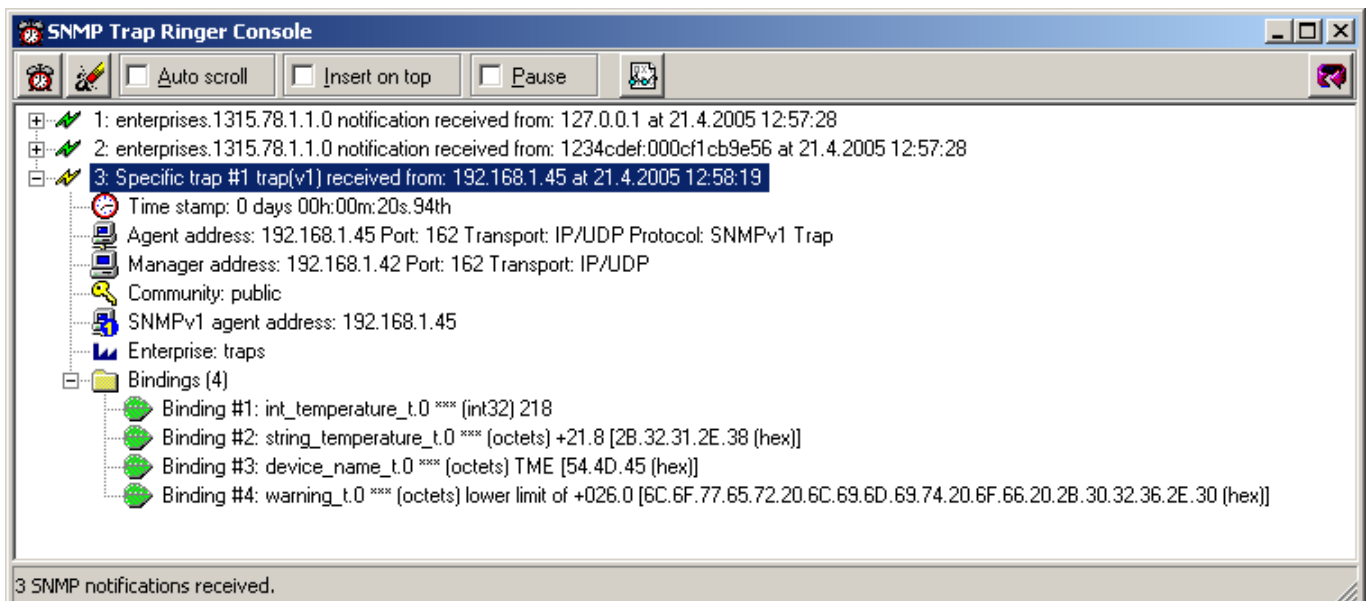
Fig. 30 – Trap 1 – the temperature value occurs below the lower limit
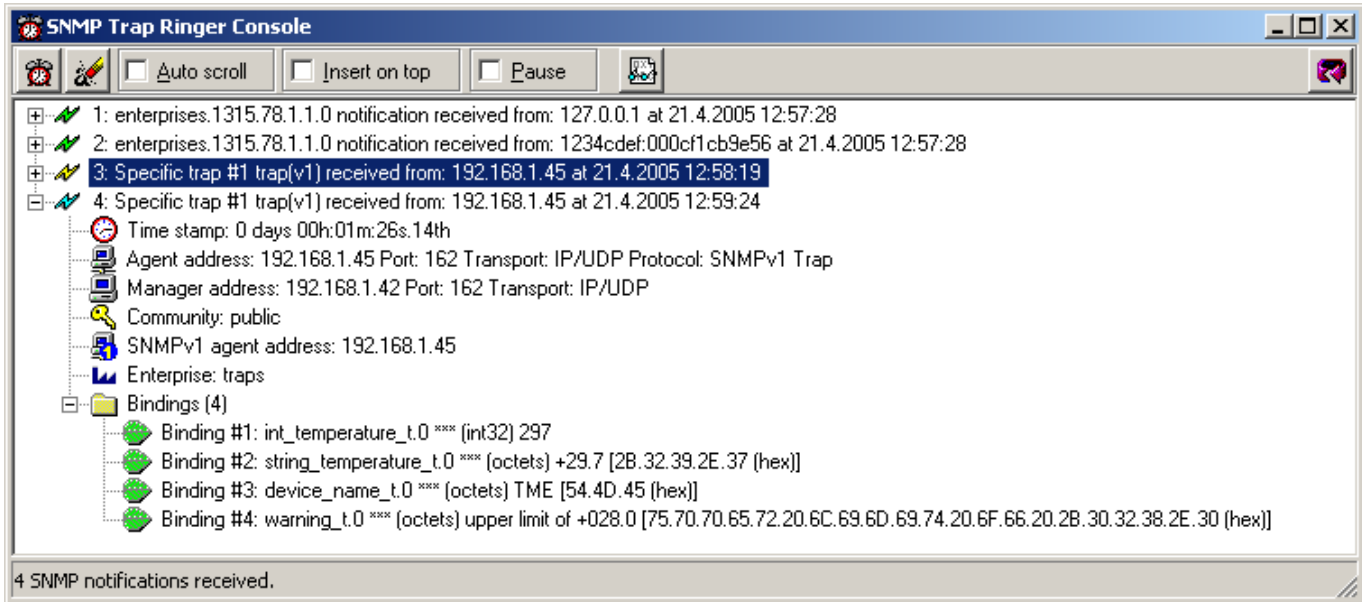
Fig. 31 – Trap 1 – the temperature value occurs above the upper limit

Trap 2 – Measured temperature value

This trap sends temperature in the set temperature unit expressed as an integer – multiplied by ten,[18] and the measured temperature value as a text string. The thermometer's name is sent as a text string.

The trap is only sent if a non-zero period is set ("Temperature trap period" for Telnet; "Keep-alive trap interval" for the configuration program).
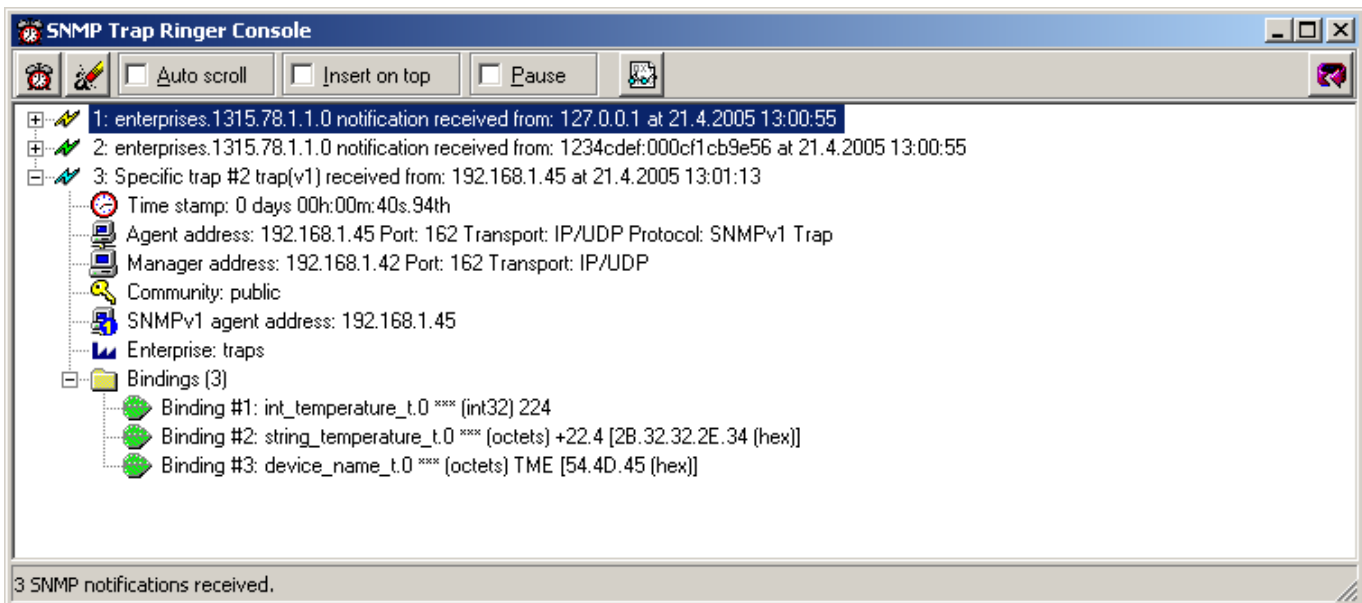
Fig. 32 – Trap 2 – Regular transmission of the measured temperature value as a trap

Sending emails

The thermometer can send information about exceeding temperature limits by email. Alerts can be sent when the temperature is exceeded only once or repeatedly until the temperature is back within the set limits. TME can only send mail via SMTP servers that do not require SSL/TLS encryption.

---

[18] In the example in Fig. 32, the value "224" means a temperature of 22.4 °C.

MODBUS Protocol

ModBus TCP is a standard industrial protocol TME can communicate with. Complete information and documentation of ModBus protocol is available here: www.modbus.org

Input Register

TME communicates via MODBUS TCP protocol on its own IP address and set port.

Address	Access	Function	Name
0 [19]	Read	0x04	**Status** Register has 0 value. In case of an error (for example the temperature sensor fault) it changes to the 1 state.
1	read	0x04	**Temperature** Value of a signed integer type. Current temperature in the set temperature unit multiplied by ten (temperature 12.3°C is shown as value 123). Error value is 9999.
2	read	0x04	**Unit** Set temperature unit is Celsius (0x0000) or Fahrenheit (0x0001).

FAQ

What needs to be set for my thermometer to work in the network?

Only thing you have to set-up for TME to work is the network parameters for your Network. (IP address and Subnet mask.) Settings are described for Windows OS.

1.) Connect your TME to the network and run Ethernet Configurator program (see Fig. 6).

2.) Click "Add device" and enter MAC address of your TME and desired IP address.

3.) Click "Set"

4.) Now you can open the WEB interface of your TME using any browser.

How do I get TME's IP address?

1.) Default IP address is 192.168.1.254. If you have changed the address before of you cannot connect to the TME, follow these instructions:

2.) Run Ethernet Configurator program (see Fig. 6). If your TME is in the network and has a compatible IP address, you will be able to see it in *visible devices* list.

3.) If you cannot see the TME is the *list*, check the connection and assign it a new IP address according to the previous question.

---

[19] První registr s adresou 0 je někdy označován také pořadovým číslem 1.

INDICATION

ON Indicator (green)

Indication of the power-supply voltage. (Fig. 33 upper LED.)

DCD Indicator (yellow) / Connection Indicator (yellow)

Indicates established TCPIP connection. (Fig. 33 lower LED.)

Link Indicator

(Left indicator on the Ethernet connector. Idicator yellow at all times on TME PoE version)

Nothing............disconnected
Yellow..............connected 10 Mbps
green...............connected 100 Mbps

Connection type indicator

(Right indicator on the Ethernet connector. Idicator green at all times on TME PoE version)

Nothing............no communication
Yellow..............Half-Duplex
Green ....Full-Duplex
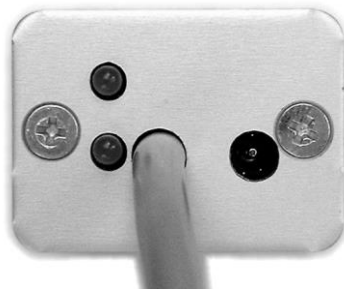
Fig. 33 – indicators, cable and power supply connector

RESET

Use the following procedure to reset the device to its default state. Unlike the reset that can be performed via the web interface (see page 14) or Telnet (see page 27), the IP address will also be set to 192.168.1.254.

1) Disconnect the power supply.

2) Push the button in a hole under the Ethernet connector and hold it.

3) Turn the power on and wait for 10 seconds

4) Release the button.

5) The device reset process is complete.

TECHNICAL PARAMETERS

Temperature sensor

Sensor type ....semiconductor, on a fixed cable

Measuring range...-55 °C to +125 °C

Accuracy.......................................±0.5 °C within the range -10 °C to +85 °C; otherwise ±2 °C

Temperatures drift ....±0.2 °C over 1000 hours at 125 °C

Dimensions...5.7 ±0.1 mm diameter, 60 mm length

Cover material ....316Ti (DIN 1.4571)

Coverage..IP68 (indefinite submerge into 1m depth)

Resistance to external pressure ....to 2.5 MPa

Sensor cable

Material..silicon, blue

Wire insulation ....FEP polymer (MC-AFEP)

Length..3 m standard (up to 20 meters upon request)

Working temperatures range ....-60 °C to +200 °C

Cable diameter ....4.3 mm (±0.1 mm)

Cable is highly resistant against humidity, chemicals and carbohydrates.

TME electronics with 5 V power supply

Power supply ....4 to 6 V (max. 230 mA)

Power connector...jack 3.8 × 1.3 mm; positive pole is inside

Electronics of TME_P variant

Power supply ....7 až 30 V DC; max. 1,5 W

Power connector...removable screw terminal block

Other parameters

Communication...connector RJ45, 10/100 Ethernet

SSL/TLS encryption......................................no

Default IP address 192.168.1.254

Electronics working temperature range ....-40 °C to +85 °C

Electronics working humidity range ....max. 90 %, non-condensing

Electronics dimensions.................................54 × 33 × 24 mm

Enclosure material..eloxal aluminum

Degree of protection IP30

Weight ....135 g (including 3 m standard cable)

Papouch s.r.o.

Industrial data transmission, line and protocol converters, RS232, RS485, RS422, USB, Bluetooth, Ethernet, LTE, WiFi, measurement modules, smart temperature sensors, I/O modules, custom development and manufacturing.

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