



Ethernet thermometer

TME

a thermometer with Ethernet data transmission

ASCII, HTTP (WEB), SMTP (e-mail), and SNMP protocols



Ethernet thermometer TME

Datasheet

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BASIC INFORMATION

Description

TME is a simple temperature sensor with an Ethernet interface. It measures temperatures from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$. The measured temperature value can be read in several ways, including through an intranet.

Communication is controlled by different TCP/IP protocols. Thanks to that, a method suitable for a given application can be selected. The temperature value is sent in an ASCII format, Spinel compatible; no conversion of the value is necessary. The temperature value is sent directly in degrees Centigrade (Celsius). The system allows communication with the aid of SNMP protocol (UDP), or by sending an e-mail if the temperature goes outside of preset limits.

You can easily insert the temperature from TME into your own website (HTTP GET). Another option is to read the temperature as an XML file.

Features

- Temperature measurements in the range from $-55\text{ }^{\circ}\text{C}$ to $+125\text{ }^{\circ}\text{C}$; resolution $0.1\text{ }^{\circ}\text{C}$
- Data transmission with the aid of TCP/IP protocols (10/100 Ethernet)
- Internal WEB pages
- Data transmission in a simple ASCII format (Spinel) with no necessity of conversion
- How to easily insert temperature into a website
- E-mail alert if the value goes outside of preset limits
- SNMP protocol
- Possible installation on a DIN rail

Software

- An user friendly configuration program is included free of charge
- A demo program, including commented source code, is also free of charge

Acquiring temperature values from a TME thermometer

1) Internal website

When the thermometer's IP address is set in an Internet browser,¹ a website is brought up displaying the actual temperature value and the set temperature limits. A Czech or English language version of this website can be chosen within the settings. The temperature value can be shown in degrees Celsius or Fahrenheit. Either a graphical display resembling a mercury thermometer can be selected, or a plain text. (Cf. also page 21.)

2) XML file

At [http://\[IP_address_of_thermometer\]/tme.xml](http://[IP_address_of_thermometer]/tme.xml), the file in XML format contains the actual temperature value, the name of the measurement location, and the temperature limits. (Cf. also page 22.)

3) Inserting the temperature value into a website using a script (HTTP GET)

Thermometer TME enables a periodic call for a script (e.g., PHP or ASP) on a given address – for example, a WEB server. (Cf. also page 24.)

4) SNMP protocol

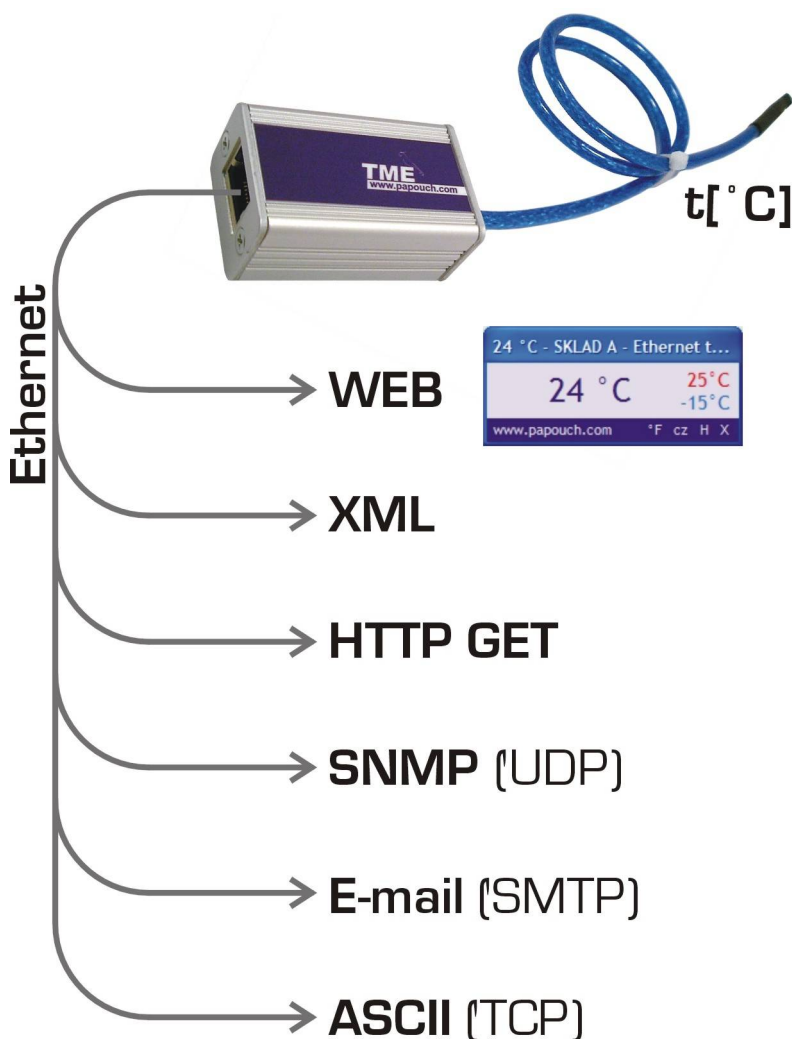
According to the settings, TME sends out SNMP traps if the temperature value is outside of the set limits. Regular transmission of a trap with the actual temperature value is also possible. (Cf. also page 27.)

5) E-mail

According to the settings, the thermometer sends E-mails with information if the temperature value goes outside of the set limits. (Cf. also page 29.)

6) TCP protocol

The thermometer behaves as a server and waits for a connection request on the set IP address and port. Upon connecting, it sends the Client temperature data in ASCII format. (Cf. also page 26.)



¹ Optimised for Internet Explorer 6.0 or Mozilla Firefox 1.5. The browser's JavaScript support must be enabled.

Installation options

Mounting:

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

Length of cable:

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

Sensor workmanship:

- Sealed in shrinking plastic tubing (*standard*)
- In a metal tube, \varnothing 6 mm

Please do not hesitate to contact us if you have specific requirements for the Ethernet thermometer TME module's workmanship and functionality.

Contents of the package

- TME Thermometer with a 3-m cable (the temperature sensor is sealed in shrink-foil wrapping).

Accessories

- The power supply unit with cable and the corresponding connector (3.8 × 1.3 mm).
- 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

The Ethernet interface is connected on the front side into an RJ45 connector. It is connected with a standard (uncrossed) cable to a HUB or Switch.

On the rear side of the module, there is a power-supply connector (cf. the Fig. 2) The power is connected via a coaxial connector with a 3.8 × 1.3 mm (minus outside; plus inside; Fig. 1).



Fig. 1 – power-supply

INDICATORS

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

TITLE: Indication of the power-supply voltage

TCP/IP connection (yellow) indicator (bottom LED indicator in the Fig. 2)

TITLE: Indicates established TCPIP connection.

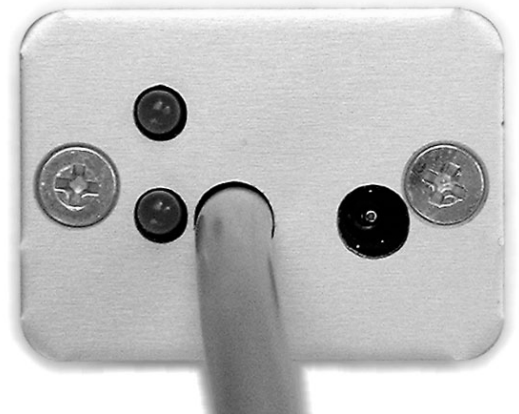


Fig. 2

TECHNICAL PARAMETERS

Power supply	4 to 6 V (max. 230 mA)
Operating temperatures for sense	-55 °C to +125 °C
Accuracy	±0.5 °C from -10 °C to +85 °C; and ±2 °C outside of that range
Operating temperatures for electronic components.....	-40 °C to +85 °C
Ethernet connection.....	TBase 10/100 RJ45
Dimensions	54 × 33 × 24 mm
Weight	135 g (incl. 3 m cable)

ETHERNET DEFAULT SETTINGS

IP address	192.168.1.254
Subnet mask.....	255.255.255.0 (8 bits; C mask)
Gateway	0.0.0.0

FAQ**What settings are necessary so that the thermometer will work in my network?**

The parameters (IP address and subnet mask) of the network connection should be correctly set. The settings are described for Windows operating systems.

- 1) Connect the TME to your network and run the included configuration program.
- 2) Click on "Set up IP". In the dialog box which appears, insert the MAC address written on the label on the thermometer (cf. the Fig. 5).
- 3) The program will try to find the TME according to this address. If it is found, the configuration panel is replaced by a screen shown in the Fig. 9.
- 4) Change the IP address and subnet mask as necessary, and click on "Set."
- 5) After a while the thermometer will register in the network with the new parameters.

How can I find the thermometer's IP address?

- 1) The default IP address of the thermometer is 192.168.1.254. If you have changed this address, or cannot connect to the thermometer at this address, follow the steps described below.
- 2) Activate the included configuration program and find the TME ("Find by MAC") according to the MAC address written on the label placed on the thermometer's side.
- 3) As soon as the program finds the TME, click on "Network Settings." The thermometer's IP address is the first item.

I do not know the actual IP address and I need to change it

- 1) Run the included configuration program and click on "IP settings." A wizard will lead you through the steps of finding the TME and changing its IP address.
- 2) After setting the IP address, you will be able to set up other TME parameters.

SETTINGS

The TME thermometer can be set by:

- Configuration program
- Telnet protocol (cf. page 14)

Configuration program

The configuration program for Windows operating systems can be downloaded for free from www.papouch.com/en/ . It will enable you to set all the necessary parameters of your TME thermometer.

The program can find the TME connected to the network either according to its IP address, or the MAC address, after which you will be able to change its parameters.

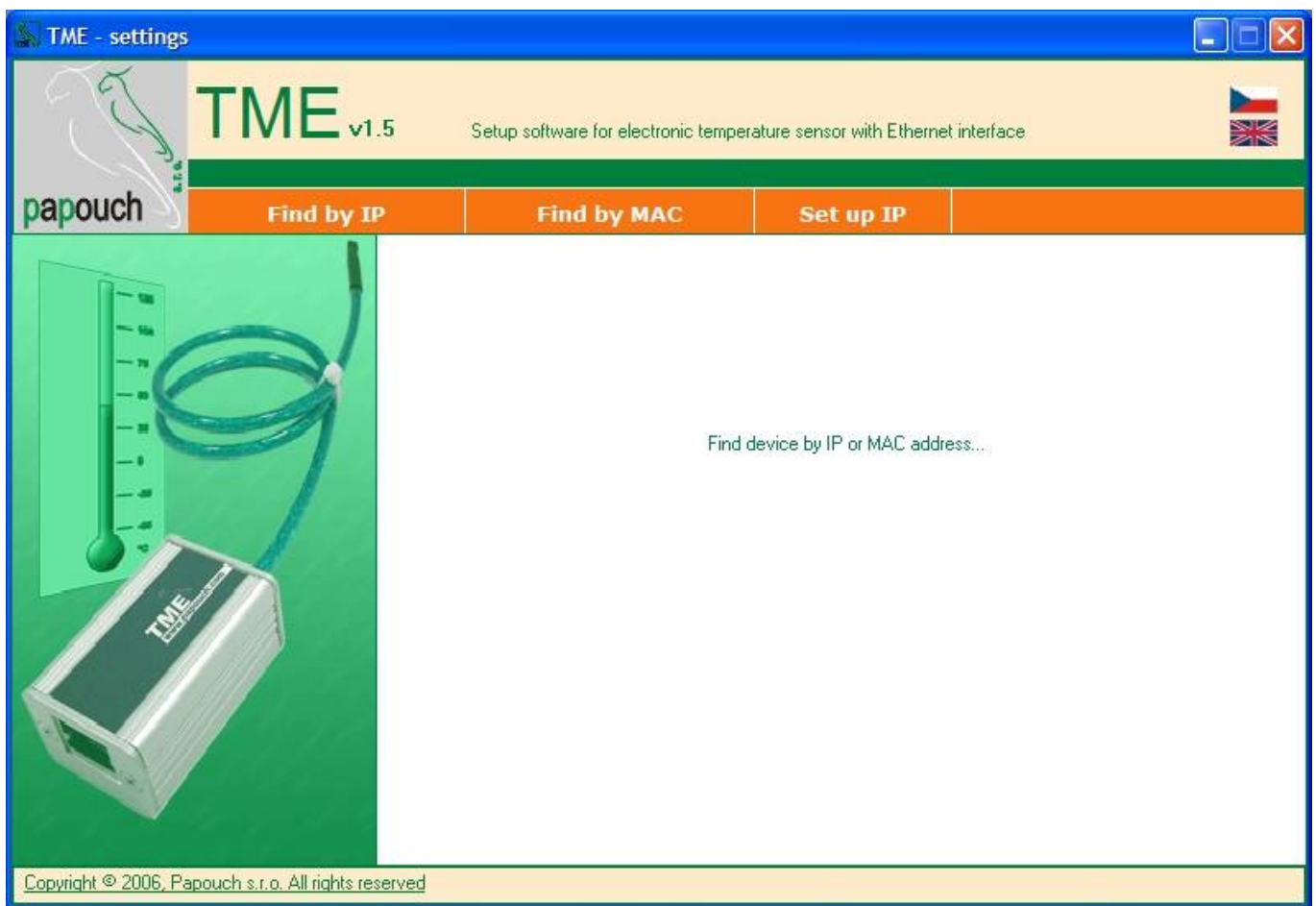


Fig. 3 – the main screen of the configuration program

Search according to IP address

When you click on this button, a dialog box for setting the requested IP address is displayed first (cf. the Fig. 4).



Fig. 4 – entering the requested IP address

The program will then try to find the TME thermometer at the address you have inserted. If you are successful and find the thermometer, the configuration panel will be displayed in the main window of the program.

If the TME thermometer is connected into another network – for example, behind a router – and its IP address is mapped to a different port, check the "Port" field and enter the port value (cf. Fig. 5).



Fig. 5 – entering the IP address and non-standard port to be looked for

Search according to MAC address

When you click on this button, a dialog box for setting the relevant thermometer's MAC address (cf. the Fig. 6) is displayed first (cf. the Figure).²



Fig. 6 – entering the requested MAC address

The program will then try to find the TME according to this address. If you are successful and find the thermometer, the configuration panel will be displayed in the main window of the program.

² The MAC address of the TME thermometer is written on its side. It is a 12-character code, e.g. 01-23-45-67-89-AB.

Setting of IP address

After clicking on this button, the thermometer's parameters are to be set in two steps.

In the first step (cf. the Fig. 7), the TME thermometer's MAC address should be entered.



Fig. 7 – changing the IP address of a thermometer with a known MAC address

In the second step, a new IP address, subnet mask and gateway of the TME thermometer are to be set. If you are not sure what values you should set, please contact your network administrator, who will give them to you.

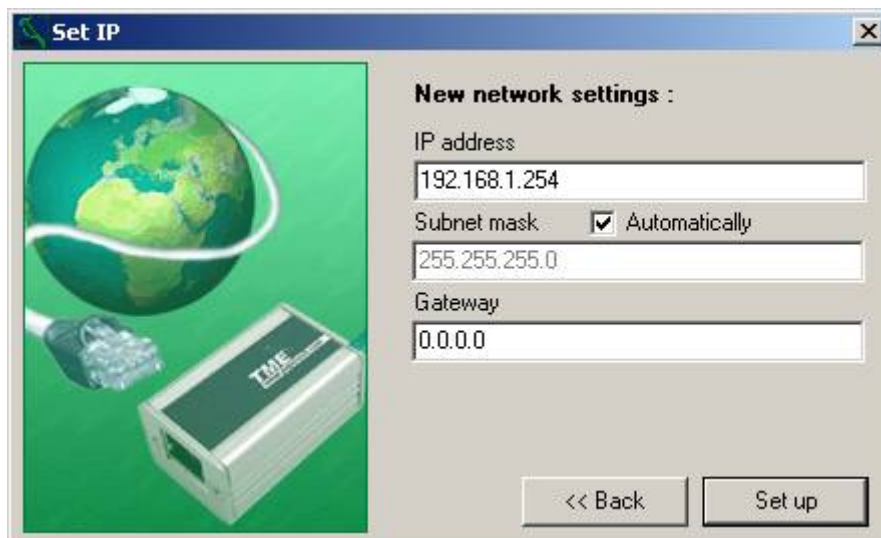


Fig. 8

Configuration panel – thermometer settings

This configuration panel is displayed in the main window after correct connection to the thermometer (after entering its IP or MAC address). When you click on the "Thermometer settings" tab, the following items of the settings will be displayed.

Fig. 9 – Configuration panel – thermometer settings

Identification

TME name

It enables identification of a particular thermometer among others. (The maximum length of a name is 15 characters.)

Temperature sending

Send interval (sec)

Interval (in seconds) in which the measured temperature is sent to HTTP server (Choice „Sending to HTTP server“) or sent using TCP communication. The range of possible values is from 2 s to 3,600 s.

Sending to HTTP server

URL path

Setting a script which will be regularly called and to which the measured temperature value will be sent via the GET parameter. (Cf. also page 24.)

TCP communication

Device port

Here you can set the network port which communicates with the thermometer.

Critical temperature valuesMinimal value

If the temperature falls below this minimum value, an e-mail or SNMP trap (depending on the following setting) will be sent.

Maximal value

If the temperature rises above this maximum value, an e-mail or SNMP trap (depending on the following setting) will be sent.

Signalize email

The following settings are only active if this field is checked.

SMTP server IP

The IP address of the SMTP server to be used for sending the e-mail alerts. It must be a server which does not require the sender's authentication. A symbolic address can be entered into this field and converted to the IP address by clicking on the button marked "@" to the right of the field. (The SMTP server must be available at this time.)

From:

Thermometer's e-mail address.

To:

E-mail address to which "temperature out-of-limits" alerts will be sent.

Sending SNMP traps

The following settings are only active if this field is checked.

SNMP manager IP

The IP address of the PC with the SNMP manager to be used for sending the SNMP traps. A symbolic address can be entered into this field and converted to the IP address by clicking on the button marked "@" to the right of the field. (The SNMP manager must be available at this time.)

Read community

SNMP read community name.

Write community

SNMP write community name.

Keep-alive trap interval

Setting the time interval for sending SNMP traps with measured temperature values. Set this parameter in the format mm:ss. The maximum value is 60 minutes. Setting 0 (0:00) is the equivalent of disabling this function.

Configuration panel – network settings

This configuration panel is displayed in the main window after correct connection to the thermometer (after entering its IP or MAC address). When you click on the "Network settings" tab, the following items of the settings will be displayed.

00-20-4a-87-d4-c3

Thermometer settings Network settings

Device network settings

IP address
192.168.1.254

Subnet mask Automatically
255.255.255.0

Gateway
0.0.0.0

Current IP address : 192.168.1.250

Set up Load from device Default values

Fig. 10 – Configuration panel – network settings

Device network settings

IP address

Thermometer's IP address. If you are not sure that it is correct, consult the matter with your network administrator.

Subnet mask

Mask of the net in which the TME thermometer is connected.

Gateway

Gateway address

Telnet protocol

Logging into the setting mode

You can log into the setting mode via Telnet using the following procedure. The procedure is described for Windows operating systems.

- 1) Type "cmd" in the command line (Start/Run...) and push Enter (cf. Fig. 11).



Fig. 11 – Run...

- 2) Run Telnet. (Type "Telnet" in the newly opened window and push Enter – cf. the Fig. 12).

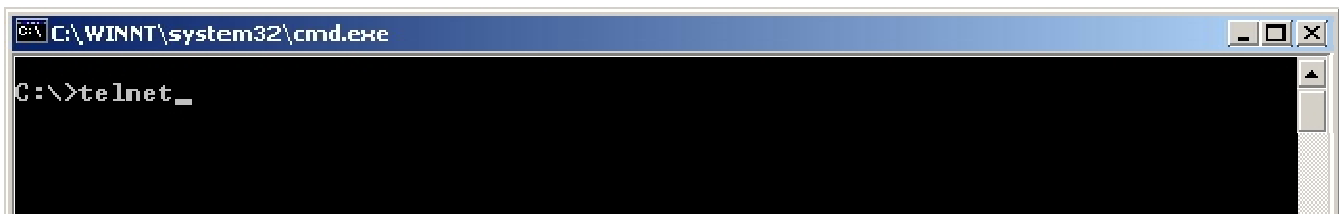


Fig. 12 – Run...

- 3) Now you can connect to the thermometer. Its IP address setting from the manufacturer is 192.168.1.254. (Type "open 192.168.1.254" in the window and push Enter.) (cf. Fig. 13)

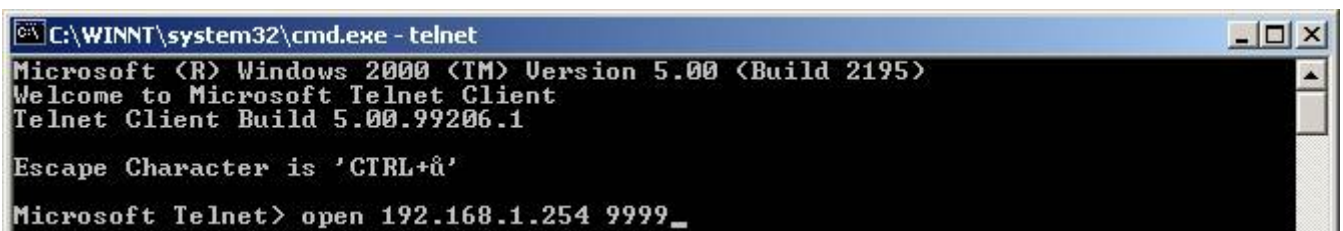
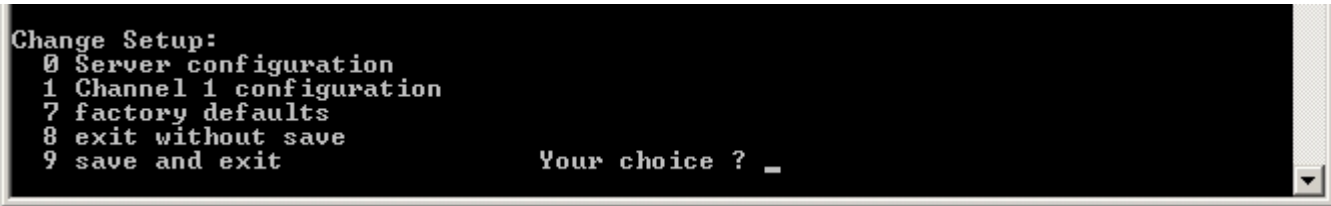


Fig. 13 – Connection to the thermometer

- 4) You have to confirm the option by pushing Enter immediately after loading. The setting menu is now displayed. (Cf. Fig. 14.)

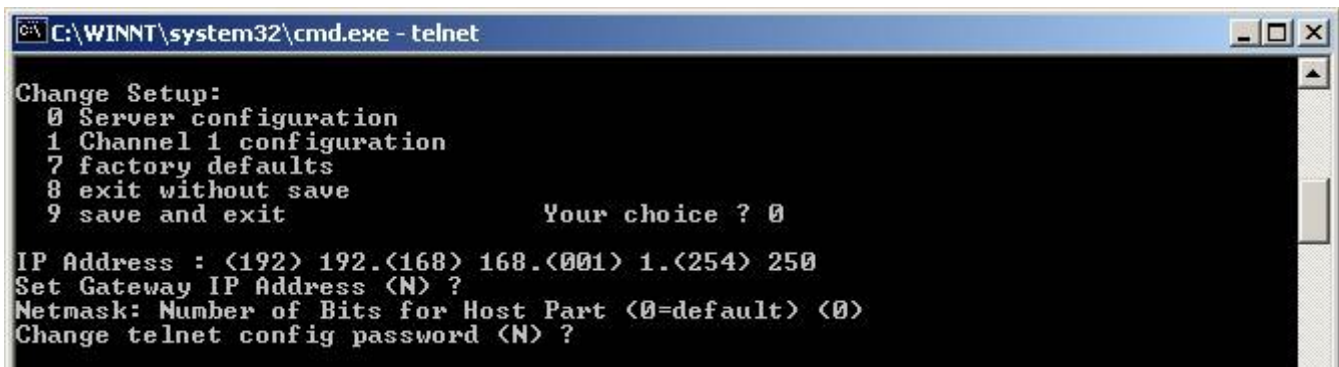


```
Change Setup:
0 Server configuration
1 Channel 1 configuration
7 factory defaults
8 exit without save
9 save and exit
Your choice ? _
```

Fig. 14 – Main setting menu

Server configuration

Items of this menu can be configured after selecting the menu by entering "0" and pushing Enter.



```
C:\WINNT\system32\cmd.exe - telnet
Change Setup:
0 Server configuration
1 Channel 1 configuration
7 factory defaults
8 exit without save
9 save and exit
Your choice ? 0
IP Address : (192) 192.(168) 168.(001) 1.(254) 250
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (0)
Change telnet config password (N) ?
```

Fig. 15 – "Server configuration" menu

IP Address

The IP address of the module. Type each of the four numbers in the IP address separately, and confirm it by pushing Enter.

Initial value: 192.168.1.254

Set Gateway IP Address

Gateway IP addr

For the "Set Gateway IP Address" item, set "Y" to change its value. You will be prompted to enter the new value. Type each of the four numbers in the IP address separately, and confirm it by pushing Enter.

Netmask

Here you can set how many bits of the IP address is the net part.

The subnet mask is given as the number of bits which determine the range of the local subnet. For example, if the value is 2, mask 255.255.255.252 is used. The value determines the number of the bits taken from the right-hand side. The maximum value is 32.

Sometimes mask types A, B, and C are referred to. They signify values of 24, 16, and 8 bits, respectively.

Initial value: 8 (type "C" mask)

Example:

Mask 255.255.255.0 (binary 11111111 11111111 11111111 00000000) signifies 8.

Mask 255.255.255.252 (binary 11111111 11111111 11111111 11111100) signifies 2.

Change Telnet config password**Enter new Password**

This item sets the password which is required for configuration via Telnet.

For the "Change Telnet config password" item, set "Y" to change its value. You will be prompted to enter the new password.

Note: If the password is lost, it cannot be recovered on the user level, and the thermometer must be sent to the manufacturer for a service intervention.

Channel 1 configuration

Items of this menu can be configured after selecting the menu by entering "1" and pushing Enter.

```

***** Channel 1 *****
Source Port      : 10001
Send Temperature : 00000 s
TME Name        : TME
Max_temp        : +999.9
Min_temp        : -999.9
SNMP Parametrs -
Read Community   : public
Set Community    : private
SNMP send Trap   : Enabled
IP SNMP Manager  : 0.0.0.0
Temperature Trap period : (0000)s
SMTP Parametrs -
Send Email       : Enabled
IP SMTP Server   : 0.0.0.0
Email From       :
Email To         :
HTTP Parametrs setting -
Send HTTP GET    : Disable

Change Setup:
0 Server configuration
1 Channel 1 configuration
2 Channel 2 configuration
7 factory defaults
8 exit without save
9 save and exit
Your choice ? 1

Source Port      : (10001)
Send Temperature : (00000) s
TME Name        : (TME)

Max_temp        : (+999.9)
Min_temp        : (-999.9)

SNMP Parametrs setting -
Read Community   : (public)
Set Community    : (private)
Enabled Trap(Y) or (N) (Y) ? Y
IP SNMP Manager  : (000) .(000) .(000) .(000)
Temperature Trap period : (0000)s
SMTP Parametrs setting -
Enabled Email(Y) or (N) (Y) ? Y
IP SMTP Server   : (000) .(000) .(000) .(000)
Email From       : ( )
Email To         : ( )

HTTP Parametrs setting -
Enabled send HTTP GET(Y) or (N) (N) ? Y
Remote Port HTTP Server : (00000)
Remote IP HTTP Server   : (000) .(000) .(000) .(000)
Path                   : ( )

```

Fig. 16 – menu „Channel 1 configuration“

Source Port

This item sets the local port on which the thermometer will expect the TCP/IP connection request.

Initial value: 10001

Send Temperature

Setting the time interval for sending measured temperature values via a TCP/IP connection or by a script or an HTTP server (related to the "HTTP Parameters setting" items). The time can be set within a range from 2 to 3,600 seconds.

Initial value: 10

TME Name

Here you can enter a distinctive name for the thermometer.

Max_temp

It sets a temperature limit; if the temperature goes above it, an e-mail alert or SNMP trap is sent. The initial value is +999.9 °C. If you do not wish to change this setting, you can simply push Enter.

Min_temp

It is set similar to Max_temp. If the temperature goes below it, an e-mail alert or SNMP trap is sent. The initial value is -999.9 °C. If you do not wish to change this setting, you can simply push Enter.

Enabled trap

This feature lets you allow (Y) or disallow (N) the sending of SNMP traps. If trap sending is allowed, settings of the following items can be modified.

IP SNMP Manager

Here you can enter the IP address of the device (usually a PC on which an SNMP manager is installed) to which the traps will be sent. Type each of the four numbers in the IP address separately, and confirm it by pushing Enter.

Temperature trap period

Setting how often the actual temperature value is to be sent as a trap for an SNMP manager. Set the period in seconds – the maximum value is 3,600. If 0 is set, the temperature trap will not be sent out at all.

Enabled Email

This feature lets you allow (Y) or disallow (N) the sending of e-mail alerts. If e-mail sending is allowed, settings of the following items can be modified.

IP SMTP Server

The IP address of the SMTP server via which the "temperature out of limits" e-mail alerts will be sent.

Email From

The e-mail address of the TME thermometer.

Email To

The e-mail address to which the e-mail alerts are to be sent.

Enabled send HTTP GET

Setting whether a script will be regularly called and to which the measured temperature value will be sent via the GET parameter.

Remote port HTTP Server

HTTP server port number. Default: 80.

Remote IP HTTP Server

HTTP server IP address.

Path

Path to the script on an HTTP server. Enter only the local path from the server's root. For www.papouch.com/teplota.php, enter only `teplota.php`. (Cf. also page 24.)

Factory defaults

If you select this item, the thermometer's default values will be reset. After completion, the Telnet connection will be terminated (option number 7).

Exit without save

Termination without saving the changed parameters (option number 8).

Save and exit

This option will save the changes you have made. If you have changed any setting, the thermometer will be restarted. Then you will have to reconnect to it – if you have changed its port and IP address, you will have to modify the connection parameters correspondingly (option number 9).

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,³ you will see the page from Fig. 17.⁴ 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.

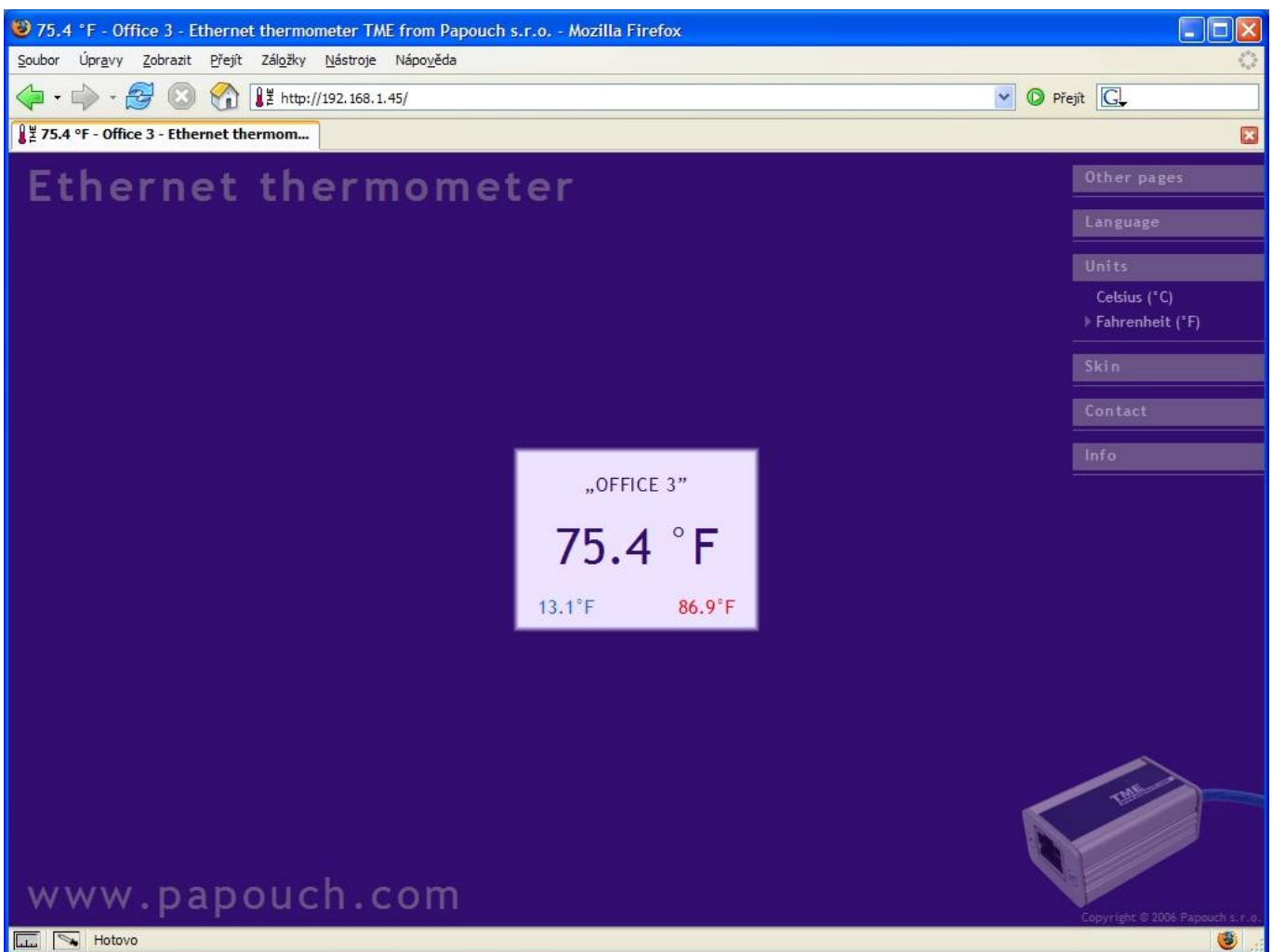


Fig. 17 – appearance: digital thermometer; language: English; units: °F

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

The settings for language, appearance and units are stored in the PC.⁵ When you run it again on the same PC, you will not have to set these parameters.

³ The page is optimized for Internet Explorer 6.0 or Mozilla Firefox 1.5. The browser's JavaScript support must be enabled. Set the address in the form *http://[IP_address_of_TME]/* For example, <http://192.168.1.254/> if the default configuration of the TME has been preserved.

⁴ The module's pages can be graphically adapted to your requirements.

⁵ Cookies with one-month expiration. The setting will only be stored if cookies are enabled on the PC.

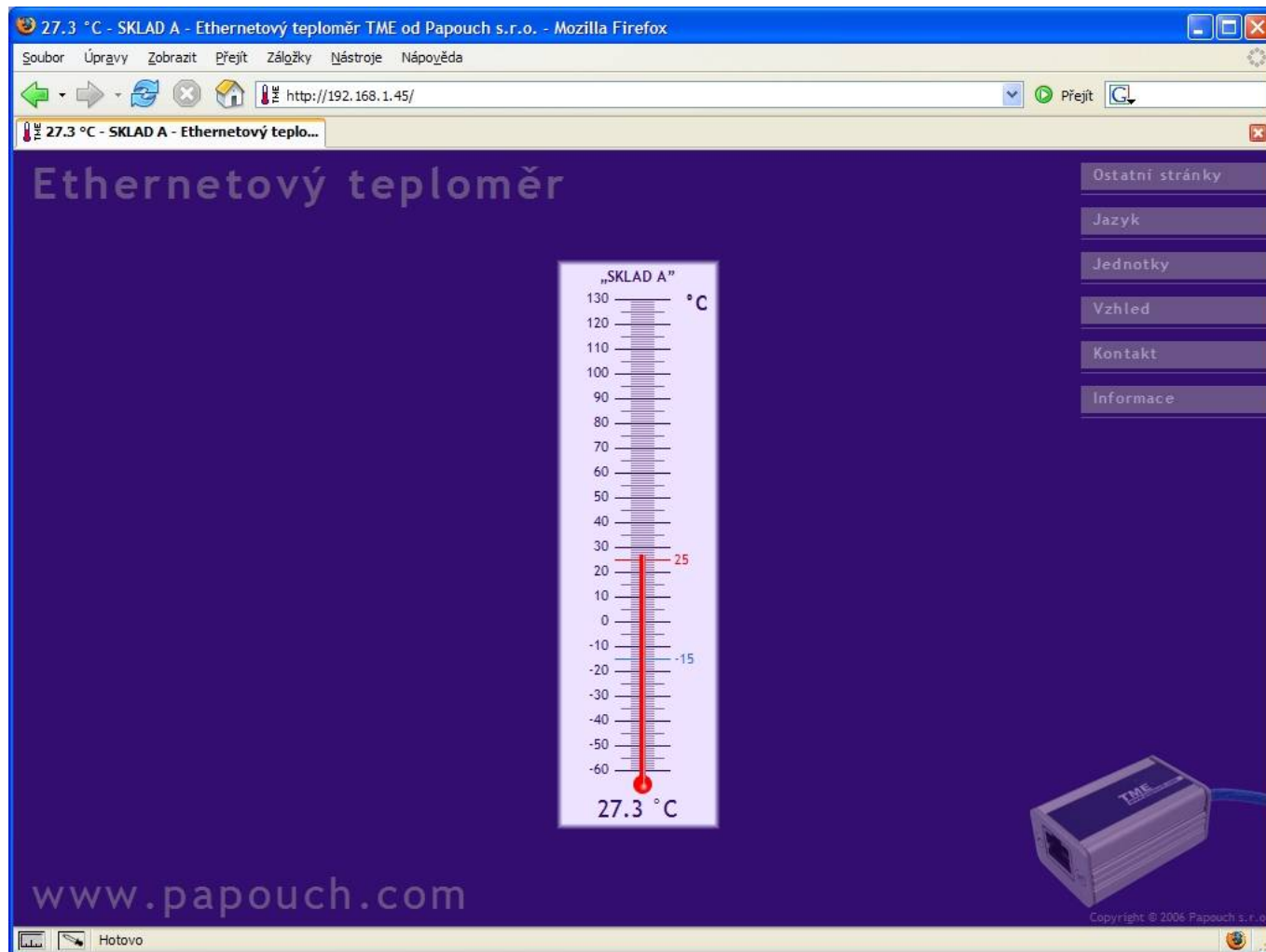


Fig. 18 – appearance: mercury thermometer; language: Czech; units: °C

Clicking on "Other pages > TME mini WEB" a small version of the website will be brought up.⁶ See an example in Fig. 19.



Fig. 19 – TME mini WEB

A balloon tip for a text in the bottom section of the website will be displayed when the cursor goes over it. (The example in the figure is concerned with switching to degrees Fahrenheit, Czech (to display error messages in this language), returning to the main site and closing the window).

⁶ This option is only available in Internet Explorer (it is an HTA application).

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://\[IP_address_of_thermometer\]/tme.xml](http://[IP_address_of_thermometer]/tme.xml) – for example, <http://192.168.1.254/tme.xml> for the default settings of the thermometer.

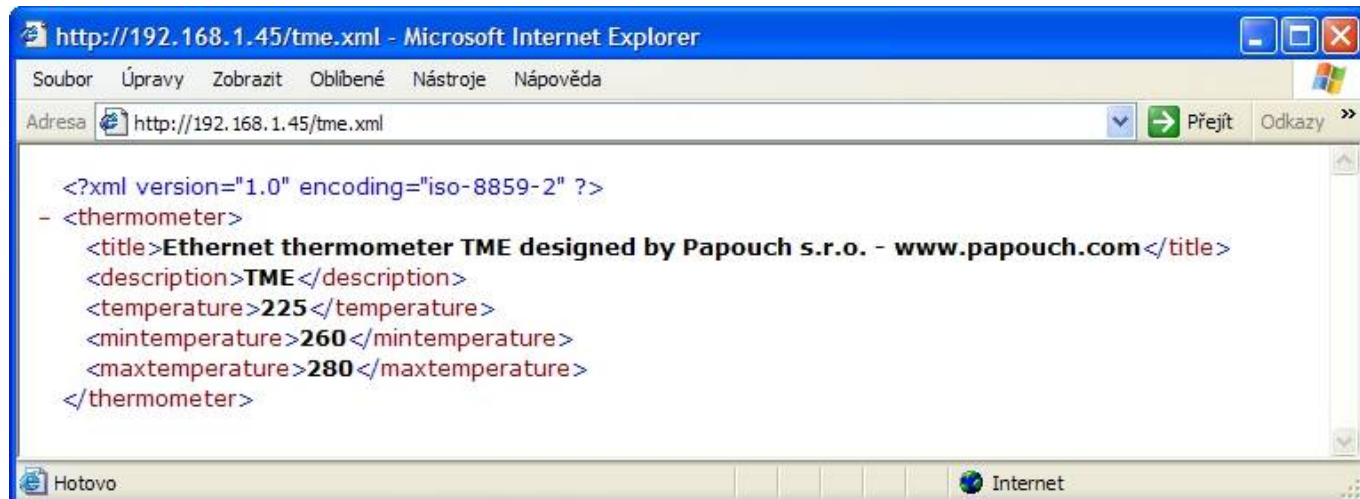


Fig. 20 – view of an XML text

There are the following tags:

title

The page's title.

description

The name of the thermometer entered by the user. (The tag is empty if no name has been entered.)

temperature

The current temperature value in degrees Celsius multiplied by ten. The number 225 in the figure means 22.5 °C. If the temperature value has not been read yet, or there is a sensor error, this tag's value will be 9999.

mintemperature, maxtemperature

The lower and upper temperature limits set by the user. Their format is the same as in the "temperature" tag. If a limit has not been defined, the respective tag's value will be: "N"

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. The thermometer periodically calls the script on an Internet (or intranet) server with the actually measured temperature value in the GET 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 will stop calling the temperature-processing script. The temperature will be sent again when it is successfully measured.

Script path

The path can be set in several formats:

In the configuration program: Set the "URL path" item ⁷	Telnet protocol: Set the "Path" item ⁸	The complete URL of the called script. (An example for a temperature of 25.6 °C)
http://192.168.1.254/scr/t.asp	scr/t.asp	http://192.168.1.254/scr/t.asp?temp=25,6
http://192.168.1.254/scr/t.asp?temperaure=	scr/t.asp?temperature=	http://192.168.1.254/scr/t.asp?temperature=25,6
http://192.168.1.254/scr/t.asp?id=56	scr/t.asp?id=56	http://192.168.1.254/scr/t.asp?id=56&temp=25,6
http://192.168.1.254/scr/t.asp?wrt=ok&tk=	scr/t.asp?wrt=ok&tk=	http://192.168.1.254/scr/t.asp?wrt=ok&tk=25,6

Calling period

The calling period is set in seconds, within a range from 2 to 3,600 sec (i.e., the maximum value is one hour).

⁷ Preferably, the direct IP address of the server should be entered. An IP address including the port can also be entered. If no port is specified, Port 80 will be used.

If you enter the name instead of the direct IP address, you have to click on the "AT" symbol (@) on the right-hand side to activate the translation of the domain name to the corresponding IP address. The server must be available online for successful translation.

⁸ The IP address of the server and the port are entered separately. The IP address is entered into the "Remote IP HTTP server" item. The port is entered into the "Remote port HTTP server" item. If the port is not changed, the standard Port 80 will be used.

Demo program

At www.papouch.com/en/ 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.

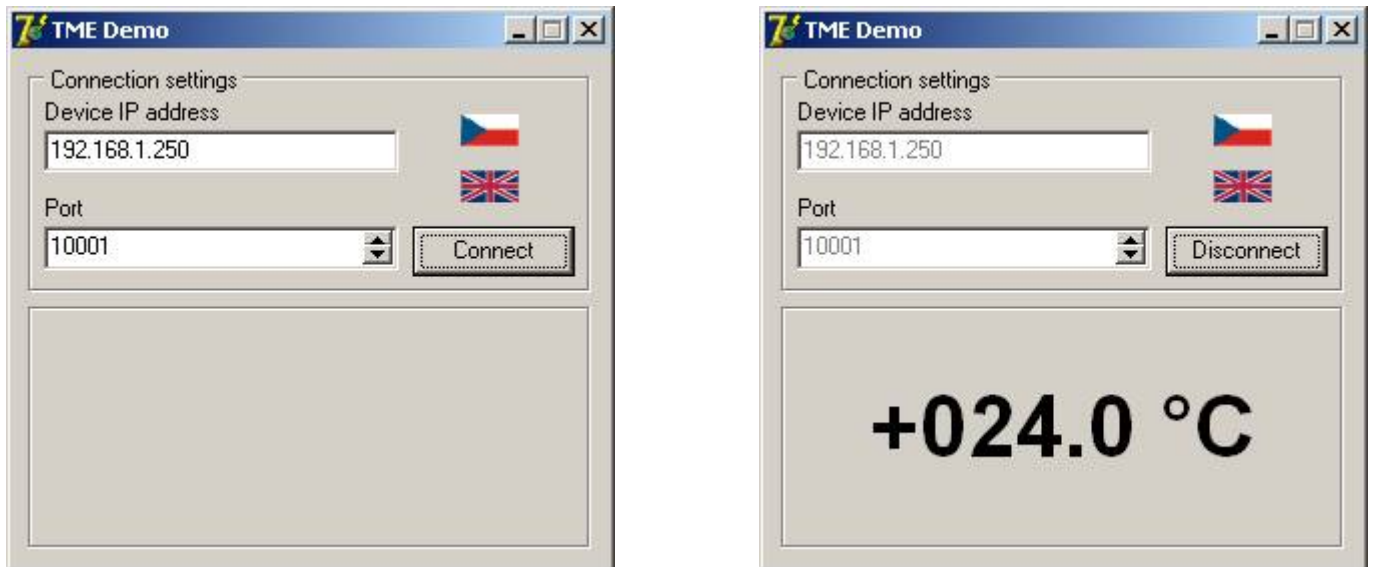


Fig. 21 – demo program

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.

TCP connection

The thermometer plays the role of a server and waits for a connection request on the set IP address and port. After connecting, it sends to the client, within the set time periods, the temperature value in an ASCII format compatible with the Spinel protocol.^{9 10}

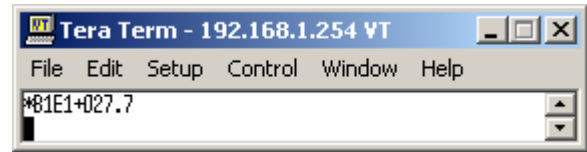


Fig. 22 – thermometer values in the TCP/IP terminal

Example of a connection via a terminal program

(This example is displayed with the aid of Tera Term software¹¹.)

Create a new connection (File/New connection...). The dialog box shown in the Fig. 23 is now displayed. Select the TCP/IP option and enter the thermometer's IP address and port. In the Figure, you can see the initial values valid for the thermometer

Confirm the dialog. Upon successful connection, the window shown in the Fig. 22 will be displayed. This window displays the temperature values sent from the TME thermometer in the set time intervals.

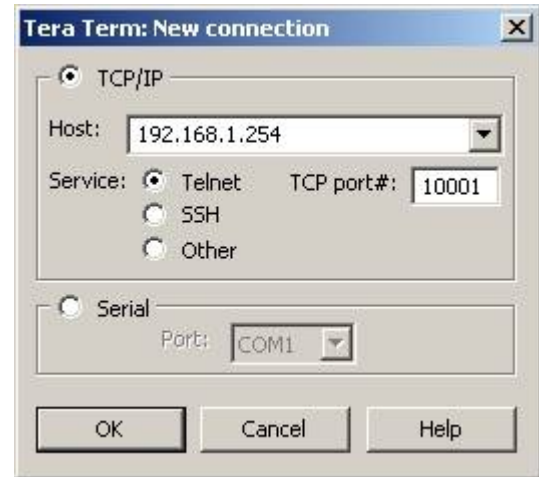


Fig. 23 – new connection

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 degrees Centigrade (Celsius); 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. 22.

⁹ The procedure for setting the parameters is described in Chapter "Settings", which starts on page 9.

¹⁰ The format used is compatible with the Spinel 66 protocol.

¹¹ Tera Term terminal software can be downloaded from:
<http://hp.vector.co.jp/authors/VA002416/teraterm.html>

SNMP

General

SNMP (Simple Network Management Protocol) is a standard protocol for management of various devices in an Ethernet network. It is built on UDP protocol and ensures quick delivery of control codes and responses between devices on which SNMP applications run.

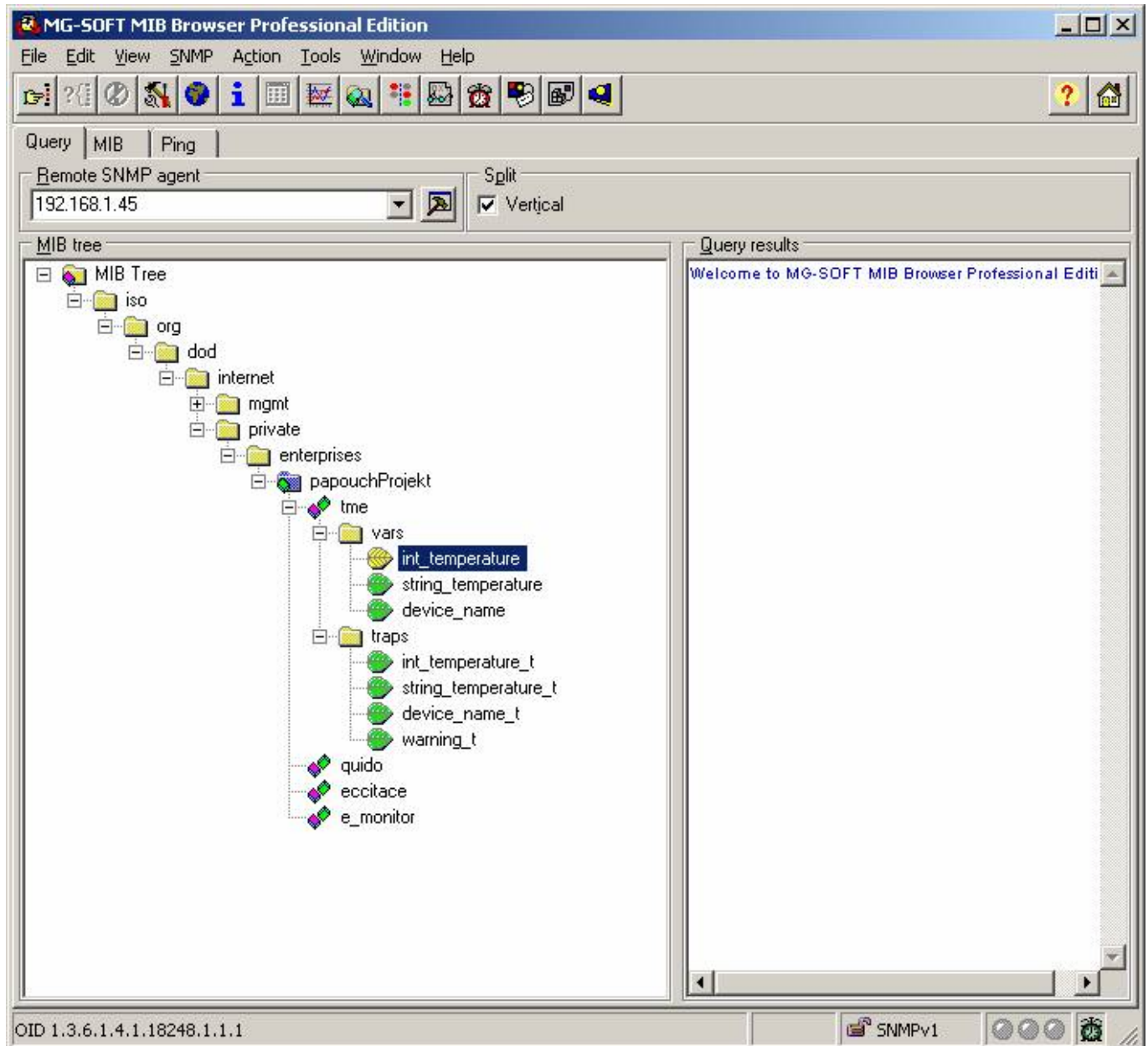


Fig. 24 – MIB tree

SNMP ensures that requests are delivered to and responses from such applications. It works independently of specific features in lower- or higher-level application. This protocol is based on three entities: administrator (which generates commands and receives messages), agent (which responds to commands and creates messages), and proxy (which transfers network traffic).

The SNMP administrator sends requests to the agent's UDP port 161 and receives non-requested messages (traps) from agents on UDP port 162.

TME is an SNMP agent. It receives commands from a UDP port 161. The administrator asks about data stored in the local MIB database (Management Information Base, one of the Internet

standards), which consists of a hierarchic tree structure with the administered data. The module does not contain the standard complex database but only a sub-tree with data necessary for processing the TME thermometer data.

Descriptions of the MIB table tree and of SMI (Structure of Management Information) are attached in Papouch-SMI.mib and TMESNMP.mib text files. The programmer should include these two descriptions into the SNMP administrator structure (SNMP version 2.0).

Data in the MIB tree can be accessed through the name of the object, expressed as a series of positive integers separated with dots and describing the path to the object in the MIB tree structure.

TME as an SNMP agent enables the sending of automatic traps to the administrator via UDP port 162.

Using SNMP

Include in your SNMP manager the description of the MIB table from the Papouch-SMI.mib and TMESNMP.mib files ¹².

Then you should set the "Rad community" option to "public".

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: The measured temperature value in degrees Celsius 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

¹² You can download these files from www.papouch.com/en/.

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 the temperature value in degrees Celsius (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.

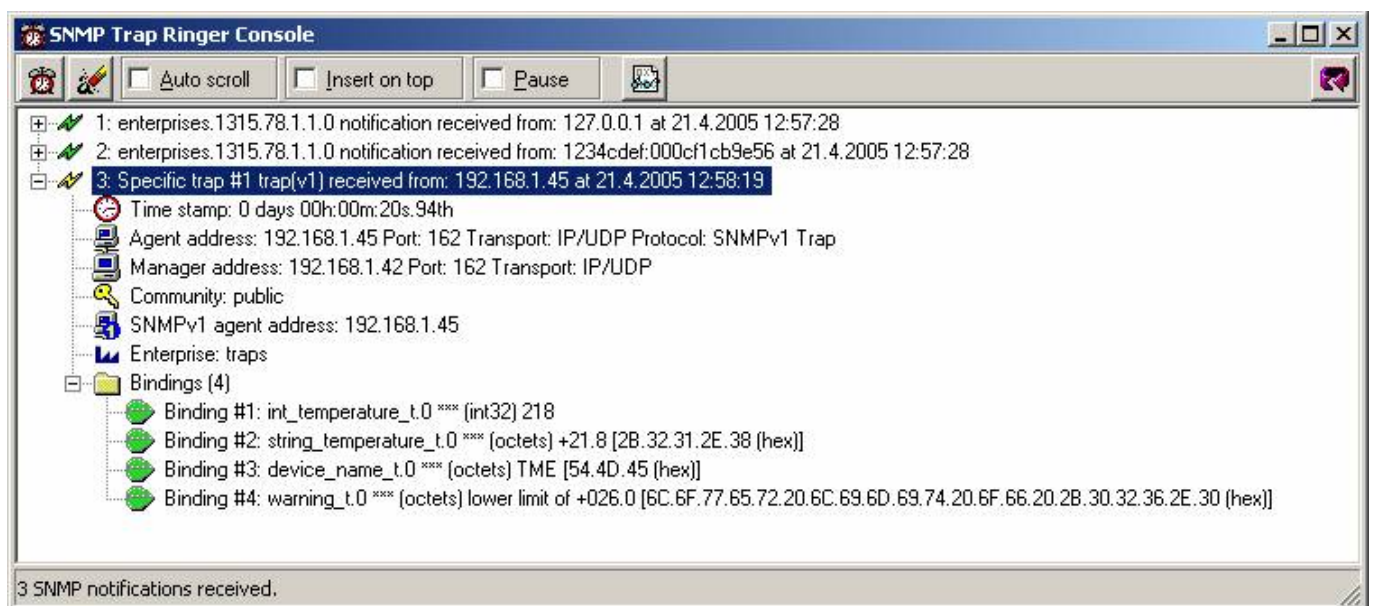


Fig. 25 – Trap 1 – the temperature value occurs below the lower limit

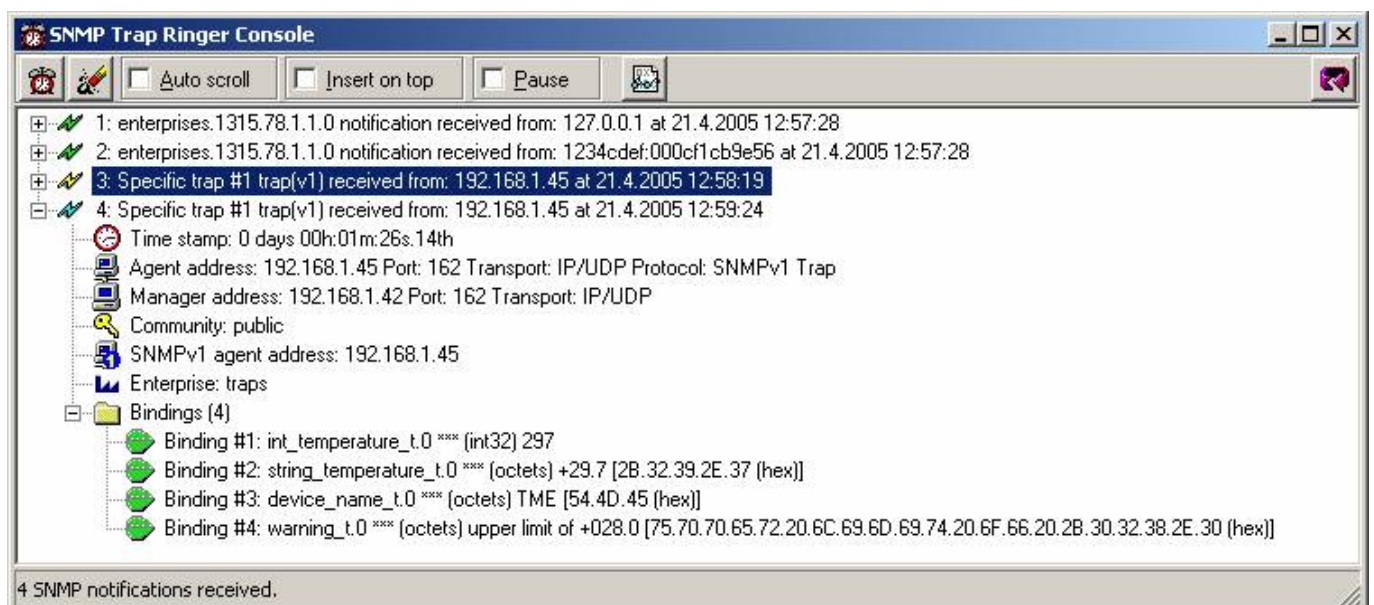


Fig. 26 – Trap 1 – the temperature value occurs above the upper limit

Trap 2 – Measured temperature value

This trap sends the temperature value in degrees Celsius expressed as an integer – multiplied by ten,¹³ 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).

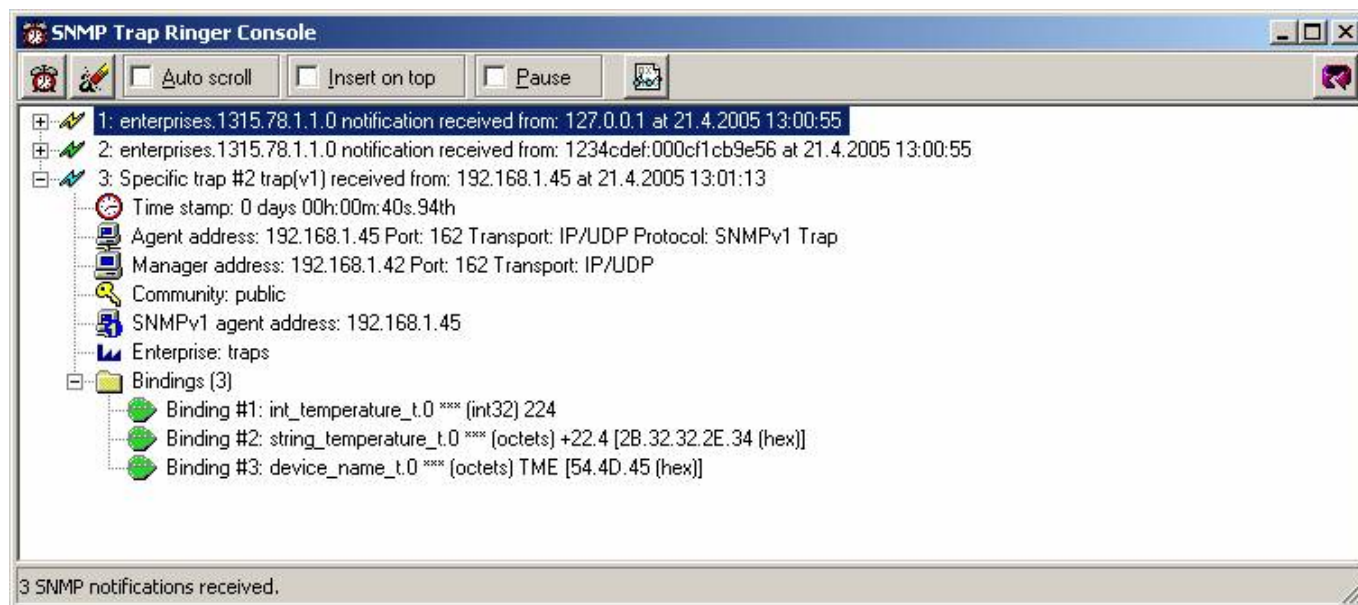


Fig. 27 – Trap 2 – Regular transmission of the measured temperature value as a trap

¹³ In the example in Fig. 27, the value "224" means a temperature of 22.4 °C.

Sending e-mails

The TME thermometer can send e-mail alerts if the temperature value goes outside of the preset limits. These limits are the same as those for SNMP traps, and are set in Item "Signalize email" and the following ones on page 13. (The delivery of e-mail alerts requires the IP addresses of the SNMP server and of the sender and addressee to be correctly set.)

The prompt is only sent when the temperature first goes outside of the limits. After that, the system waits until the temperature goes back within the limits. Another E-mail prompt is sent when another instance of going beyond the limits occurs.

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 custom-made electronic applications.

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