



TH2E

Intelligent Ethernet sensor for
temperature, humidity and dew point



TH2E

Datasheet

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BASIC INFORMATION

Description

Depending on sensor connected to it, **TH2E is able to measure temperature, humidity and calculate dew point**. Measured-out values can be viewed via WEB browser. Values can be logged in the internal memory with capacity for 10 000 records. TH2E is capable to communicate via many standardized protocols, which makes it an ideal component for further integration to an existing system.

Many of TCP/IP family protocols are supported. Available are for example: TCP data channel, SNMP and ModBus protocols, e-mail sending, HTTP GET and POST automatic sending to a remote server. Measured-out values and settings parameters are also available in XML format etc.

All settings can be adjusted via WEB interface. Brief help pops up for all parameters. WEB interface is available in Czech and English.

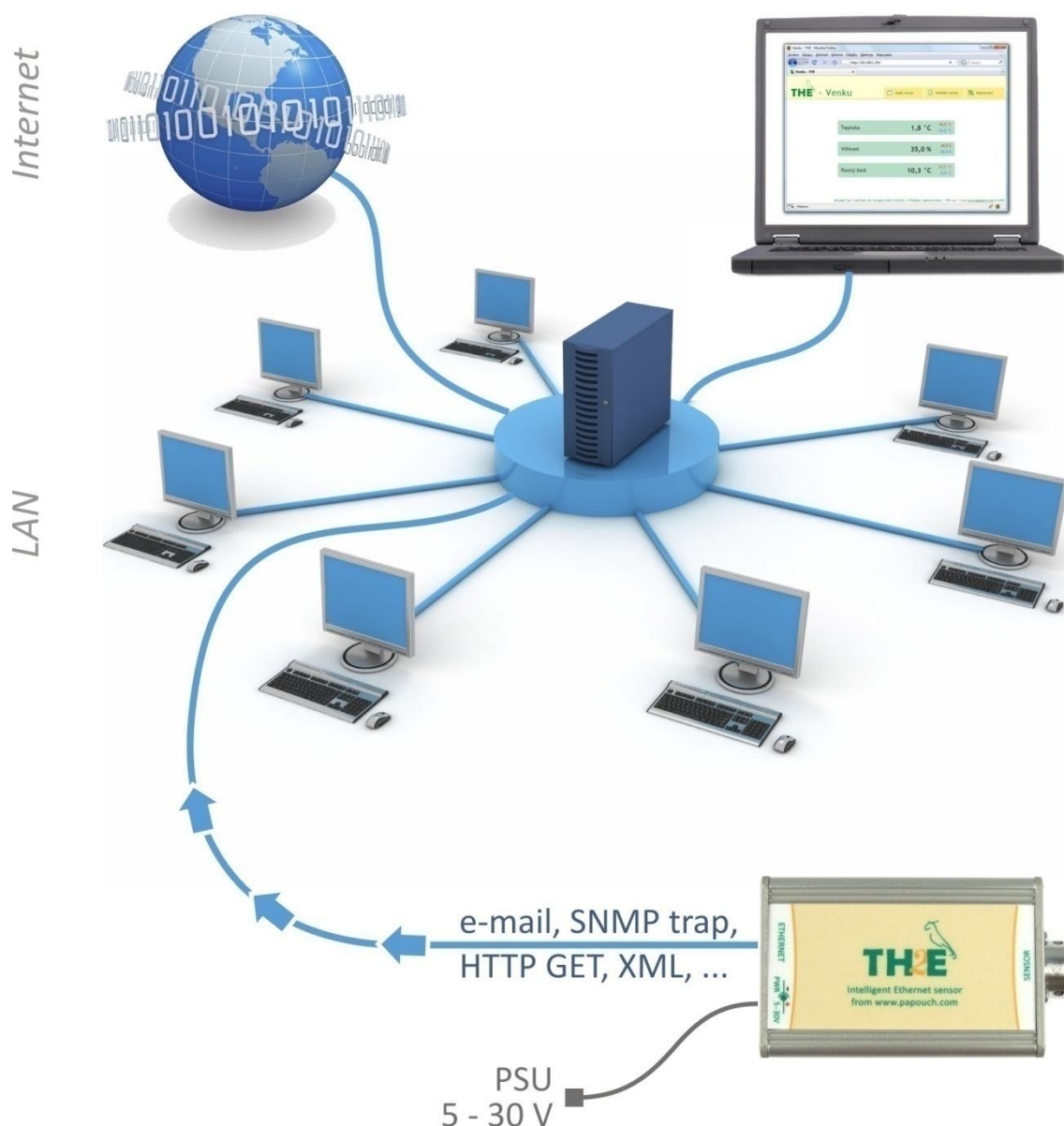


Fig.1 – Connection and Access to the TH2E in computer network

Features

- Measures relative humidity in range 0 % to 100 %. ¹
- Measures temperature in range -40 to +123,8 °C or -55 to +125,0 °C. ¹
- Calculates dew point. ¹
- Converts temperature in several temperature units.
- Saves measured-out values in an internal memory with capacity of 10 000 records (Values remain saved even if the power goes down.) ²
- Extreme values memory function – TH2E saves minimal and maximal measured-out value from all quantities.
- Connects and communicates via computer network (Ethernet).
- Data transfer via TCP/IP protocols (10/100 Ethernet).
- WEB based Configuration.
- Sensors: ²
 - “TH2E” and “TH2E with logging”: Coverage IP 67
 - “TH2E thermometer”: Coverage IP 68
- Sensor is connected by a silicon cable with high temperature resistance.
- Powered from 5 V to 30 V (Wall-plug adaptor included).
- DIN rail mountable.

Feature	Version		
	TH2E	TH2E with logging	TH2E thermometer
Measuring range -40 to +123,8 °C	yes	yes	no
Measuring range -55 to +125,0 °C	no	no	yes
Humidity measurement	yes	yes	no
Dew point calculation	yes	yes	no
Measured values logging	no	yes	yes
Internal RTC circuit (Real Time Clock)	no	yes	yes
Extreme values memory	yes	yes	yes

Tab 1 – differences between TH2E versions

Possibilities of viewing the measurements:

1. Internal WEB server with current readings.
2. Small WEB page meant to be displayed in a mobile phone or PDA.
3. Multiple TH2E readings can be displayed on a single WEB page.
4. Automatic e-mail sending when pre-set thresholds are overrun.

¹ Depending on the sensor connected to TH2E. (Please specify when ordering the device. See Tab 1)

² Functionality depends on the version of TH2E. (Please specify when ordering the device. See Tab 1)

5. Sending measured-out values via TCP data channel (as a string in Celsius degrees).
6. Communication via Spinel protocol over TCP data channel.
7. SNMP protocol.
8. ModBus TCP protocol.
9. Automatic temperature sending via HTTP GET request.
10. Automatic sending of the memory content via HTTP POST in XML format.
11. Measured-out values and all settings easily accessible in XML format.

Options for gathering data from TH2E

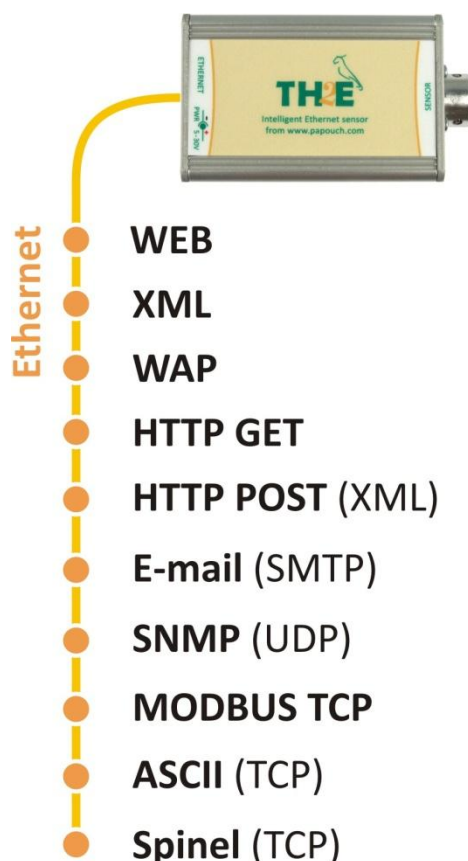


Fig.2 – Temperature acquisition methods

1) Internal website

When the sensor's IP address is set in an Internet browser, 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, Fahrenheit or Kelvin. Multiple TH2E readings in one WEB page are supported. (See page 32.)

2) XML file

At [http://\[IP_address_of_th2e\]/fresh.xml](http://[IP_address_of_th2e]/fresh.xml) the file in XML format contains the actual measured values, the name of the measurement location, etc. (See also page 35.)

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

TH2E enables a periodic call for a script (e.g., PHP or ASP) on a given address - for example, a WEB server. (See also page 37.)

4) SNMP protocol

TH2E According to the settings, TME sends out SNMP traps if the measured values are outside of the set limits. Regular transmission of a trap with the actual readings is also possible. Data can be obtained from integrated SNMP objects at any time. (See also page 41.)

5) MODBUS TCP protocol

TH2E can also communicate via standardized industrial protocol ModBus TCP. (More info on page 46.)

6) E-mail

According to the settings, TH2E sends e-mails with information if the measured values go outside of the set limits. (See also page 45.)

7) TCP protocol

TH2E can send measured values periodically after establishing a TCP connection on a data port.

8) Spinel (TCP protocol)

In a special mode, TH2E can communicate via Spinel protocol. The behavior can be set to either TCP client or TCP server. Spinel protocol uses a standard way of communication: request – response.

9) WAP page for PDA or mobile phone

Entering IP address of the thermometer in the form: *http://[IP_address]/wap.html* on a mobile phone or PDA with WAP browser opens a simple page with current data from the TH2E (current readings, sensor name and limits, if they are set). (See page 34.)

10) Webservice (XML HTTP POST)

Contents of TH2E memory can be sent as a standard HTTP POST in XML format. There is no need to spend time on programming the communication protocol etc. It is only necessary to process the received XML file. (See page 47 for more information)

Detailed characteristics

Ethernet Part

- IP address, subnet mask, gateway and port number configuration
- Automatically sends current value via TCP connection every 10 seconds or:
- ...TCP server mode, TCP client mode or UDP. This mode enables TH2E to communicate via Spinel protocol. Other functions of TH2E are not available in this mode.
- Local and remote port are configurable
- Device can be set to factory defaults by a button in WEB interface.

Security

- Two security levels – user (user can only watch the measured temperature) and Administrator (admin can configure the device)
- Each level has its own password.

E-mails

- An e-mail can be sent when some threshold is exceeded. (E-mail can be forwarded to a mobile phone.³)
- E-mails can be sent periodically when the threshold is exceeded.
- SMTP authorization.
- Test e-mail can be sent to verify the settings.

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 a POST

- Periodical sending of the current measured-out values to your WEB server via a simple HTTP GET request.
- For TH2E identification, MAC address is included in TP GET request.
- Sending contents of memory in XML format as a body of HTTP POST.

Logging in an internal memory ⁴

- TH2E saves measured-out values in an internal memory with capacity of 10 000 records. (1 record = one measured quantity).
- Each record contains it's time marker.
- Power-up and power-down are stored in the memory as well.
- Three logging modes available: Time mode (periodically saves readings every X minutes), Differential (Saves measured value only if it changes more than X) and Logging limit values (saves the limit values only – regulation loops usage).
- When the memory is full, TH2E sends the data as an XML file to server or sends the data as a CSV file via e-mail.

Measurement

- Depending on the sensor connected to it, TH2E can measure temperature, humidity and calculate dew point.⁴
- Extreme values memory for each measured quantity. One record for historically higher and lower measured-out value.
- Extreme values memory can be erased.
- Limits can be set separately for each quantity. If the measured-out value goes outside limits, TH2E sends according to the settings e-mail, or SNMP trap.
- Each quantity can be watched separately.

³ This function depends on your mobile service provider.

⁴ This depends on TH2E version. (Please specify when ordering the device. See Tab 1 on page 5.)

- Temperature units: degrees Celsius, Fahrenheit or Kelvin.
- Hysteresis can be set for localities with fluctuating values.
- Logging can be activated for each measured quantity separately.
- Hysteresis of differential mode can be set separately for each measured quantity as well.

Date and time ⁵

- Each record has its own time marker.
- Time can be automatically updated from chosen NTP server.
- Time differential (from GMT) can be also set.
- Automatic DST settings available.
- In case of local networks without access to NTP server, time can be synchronized with PC.

Hardware

- Measures relative humidity from 0 % to 100 %. ⁵
- Measures temperature from -40 to +123.8 °C or -55 to +125.0 °C. ⁵
- Calculates dew point. ⁵
- Sensor cable length is 3 meters. (If required, we can supply other cable lengths.)
- Silicon cable with metal tip containing the sensor.
- Powered from 5 to 30 V (wall plug adaptor included).

Other

- Device can be labeled.
- ModBus TCP port is adjustable.
- WEB interface languages: Czech or English. ⁶
- Simple WEB display possible. (For example you can view multiple TH2Es on a single WEB page using HTML iFrame element.)
- WEB interface requires JavaScript turned on. Interface is optimized for Internet Explorer 7.0, Mozilla Firefox 3.0, Opera 9.6 and Google Chrome 1.0. Minimal recommended resolution for comfortable view is 1024 × 768 pixels.

⁵ This depends on TH2E version. (Please specify when ordering the device. See Tab 1 on page 5.)

⁶ Other Languages available upon request.

What is new

Version 2.0

- MODBUS TCP protocol added.

Version 1.0

- First version.

Finish

Electronics

- In metal box made from eloxal coated aluminum.

Sensor

- Integrated sensor for temperature and humidity (plus dew point calculation) – placed inside a metal block 40 × 16 × 10 mm.

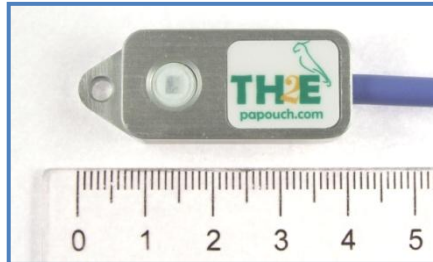


Fig.3 – Integrated sensor for temperature and humidity

- Temperature only – hard aluminum rod. Normalized diameter 6 mm and length 60 mm.



Fig. 4 – Temperature sensor

Cable type

- Silicon cable, diameter 4.7 mm. Temperature resistivity -60 to +200 °C. Blue color.

Cable length

- 3 m (*standard*)
- Maximum 20 meters

Mounting

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

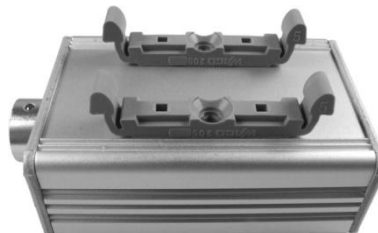


Fig. 5 – TH2E with DIN rail mount

Power

- 5 to 30 V DC (Power supply 5V included. PSU as a wall plug adaptor.)

Please do not hesitate to contact us if you have any specific requirements for TH2E module's workmanship and functionality.

Package Contents

- TH2E with 3 m cable.
- 5 V Power supply (wall plug adaptor).
- 1 m direct PATCH cable.
- CD containing software and documentation.

Accessories

- 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

Default TH2E's IP address is 192.168.1.254.

- 1) Connect the TH2E to the included power supply or to another 5 – 30V DC power supply.
- 2) Then connect the TH2E to the Ethernet (Computer Network) using an included or other PATCH cable⁷. (If you want to connect the TH2E directly to one PC, please use a crosswired cable.)
- 3) If your network is out of subnet range or TH2E IP range, please set the IP address of the TH2E via Ethernet Configurator software. You can find this software on your CD.

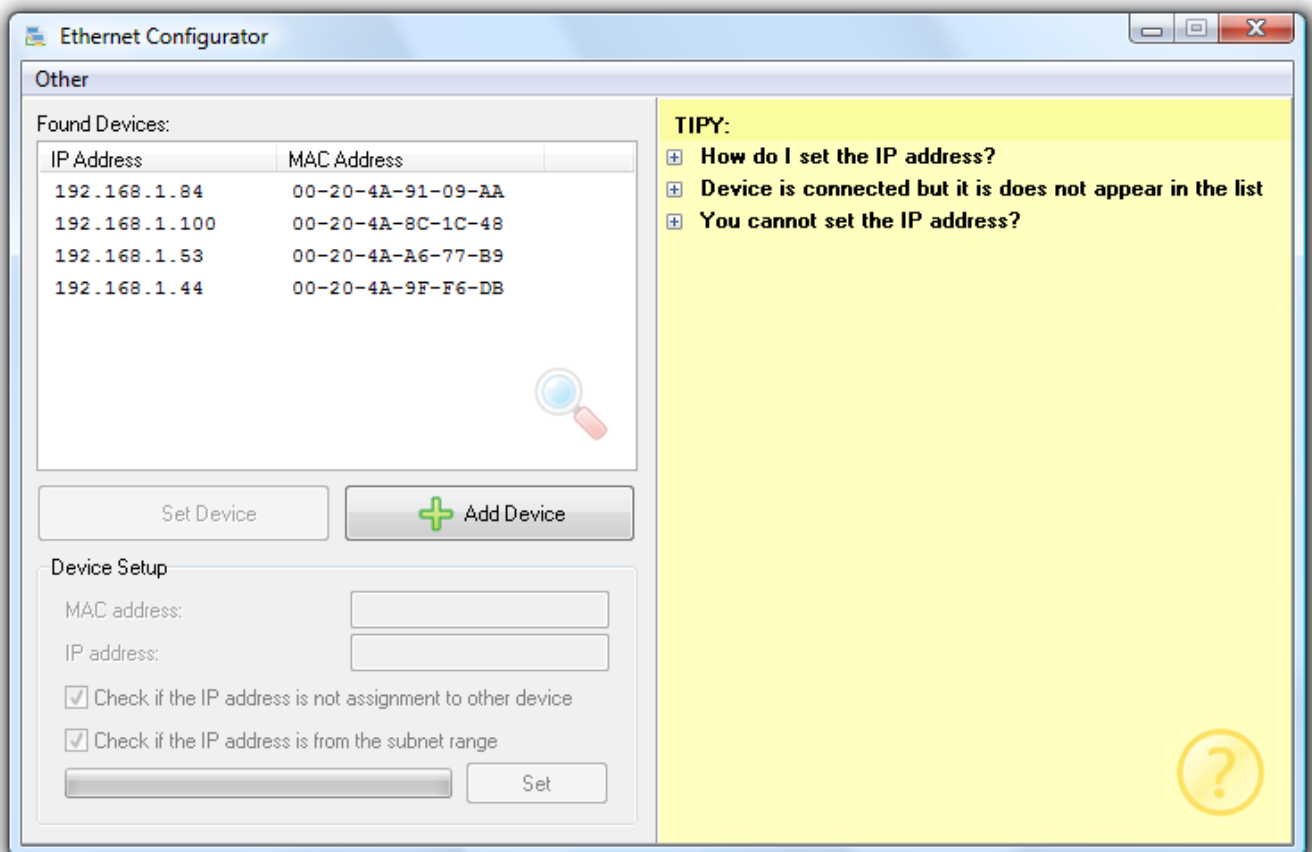


Fig. 6 – Ethernet Configurator software

- 1) After setting the TH2E'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.)

⁷ Common Ethernet cable.

THERMOMETER SETTINGS

You can set-up your thermometer using:

- **WEB interface**
- Telnet protocol (see page [29](#))
- For the first configuration of the IP address, you can use Ethernet configurator.

Ethernet configurator

Ethernet configurator can be used to set TH2E's IP address. You can find the software on your CD.

(Before running the program, please connect your TH2E to a switch, hub or router or directly to your PC using crosswired cable.)

Program is in English and Czech language. It also contains a small help telling you what you need to know when setting your TH2E's IP address.

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

WEB INTERFACE SETTINGS

To enter settings, push "Settings" button in upper right corner of TH2E main WEB page.

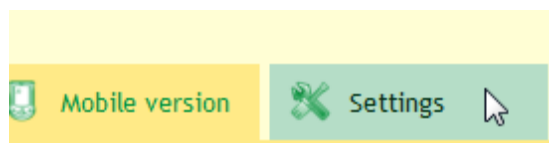


Fig. 7 – Settings button on the main page

Settings are arranged in nine panels:

- *Network* – Network interface configuration, IP address, subnet mask, TCP channel, ...
- *Security* – Access passwords settings
- *E-mails* – recipient, authorization, settings test
- *SNMP*
- *Sending* – sending of the measured temperatures to your server using HTTP GET and POST (XML)
- *Memory* – Modes for logging the values to memory, action upon memory full.
- *Sensors* – thresholds, hysteresis and units settings, logging
- *Other* – device label, WEB interface language, ModBus TCP, temperature units, extreme memory, time 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.

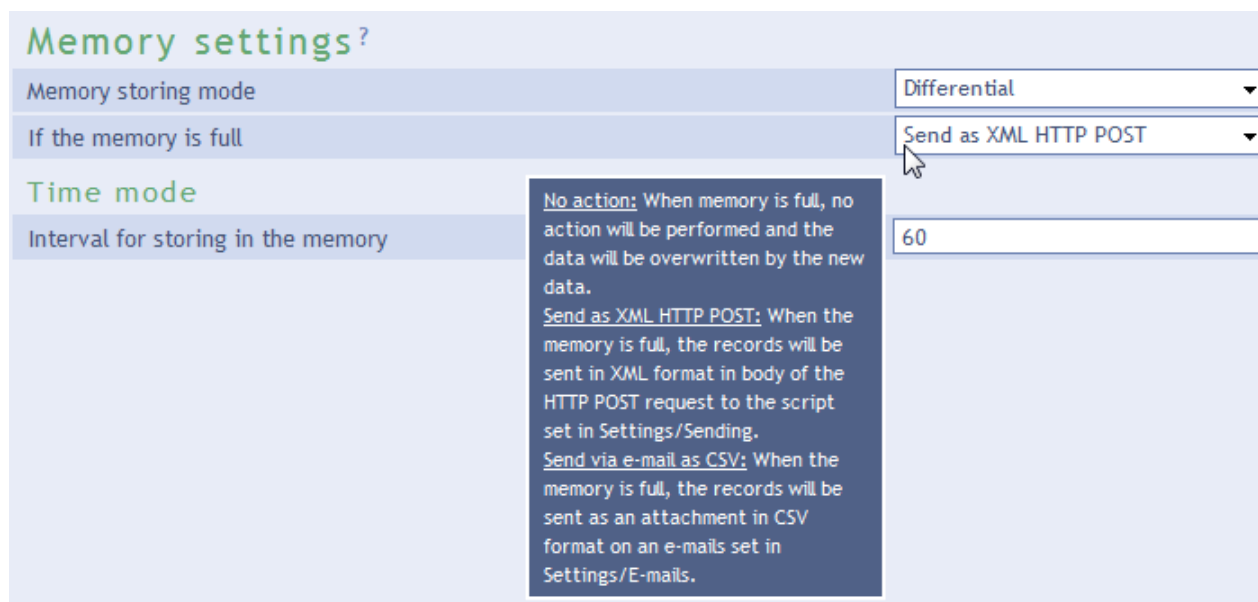


Fig. 8 – Context help for the settings menu items

- Settings window is movable by dragging it by the upper right corner.
- You can also enter the settings menu by pressing S when the browser window is active.
- Settings menu can be closed by Esc key.

Network

Network settings for TH2E and the TCP data channel.

Field	Value
Device's IP address	192.168.1.45
Netmask	255.255.255.0
Gateway IP address	0.0.0.0
Data port	10001
WEB port	80
Remote IP address	0.0.0.0
Remote port	0
DNS server's IP address	0.0.0.0
Device mode?	WEB

Fig. 9 – Network settings panel

Device's IP address

TH2E's IP address. In case you are not sure if the IP address is correct, please consult your Administrator.

Subnet mask

Subnet mask of the network TME is connected into.

Gateway IP address

Network gateway IP address.

Data port

Port number. Function of the data port depends on TH2E Mode (see below):

WEB mode: When TCP data port is open, TH2E sends current readings every 10 seconds.

TCP server mode: TH2E waits for incoming connection on this data Port. After establishing connection, TH2E awaits Spinel commands.

WEB interface port number

Number of the port you will access the WEB on. Usually the port number is 80 or 8080.

Remote IP address

Remote device's IP address (server mostly). TH2E connects to this device in TCP client mode. It communicates via Spinel protocol.

Remote port

Remote device's port number. TH2E connects to this device in TCP client mode. It communicates via Spinel protocol.

DNS server's IP address

An IP address of your local DNS server.

Device mode

WEB: In this mode, all functions are available except for Spinel protocol.

In other modes you cannot view current readings on a WEB page, e-mails cannot be sent, HTTP GET and POST are unavailable, SNMP and ModBus protocols are inaccessible. In these modes TH2E only communicates via Spinel protocol.

TCP server: TH2E awaits incoming connection on the set port (Data port).

TCP client: TH2E establishes connection to the remote IP address (remote IP address) and port (Remote port).

UDP: TH2E communicates via UDP protocol. It awaits incoming messages on the data port.

Device reset

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

Security

Security settings for accessing the WEB interface and the Mobile view.

The screenshot shows a web interface for security settings. At the top, there is a navigation bar with tabs: Network, Security (selected), E-mail, SNMP, Sending, Memory, Sensors, Other, and Info. Below the navigation bar, the title 'Security settings' is displayed in green. The main content area contains the following settings:

- Allow mobile view: A checkbox that is currently unchecked.
- User password: An empty text input field.
- Confirm user password: An empty text input field.
- Administrator's password: An empty text input field.
- Administrator's password for confirmation: An empty text input field.
- Current Administrator's password: An empty text input field.

At the bottom right of the panel, there are two yellow buttons: 'Save' and 'Close'.

Fig.10 – Security settings panel

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 ⁸

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 the fields empty.

Administrator's password ⁸

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

Administrator's name is always "admin". To cancel the password, leave the fields empty.

Current administrator's password ⁸

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

⁸ This field is for entering the values only, there is nothing displayed after saving.

E-mail

E-mail sending settings.

Fig.11 – E-mail settings panel

SMTP server's name

Enter SMTP server's name or IP address, this server will be used to send e-mails.

Sender's e-mail address

Fictional TME address – this address will be shown as “from” in the e-mails about the temperature.

Recipient's e-mail address

E-mail address of the recipient of the alert e-mails or Memory content after the internal memory is full.⁹

SMTP authorization

You can enter login data if the SMTP server requires sender's identity check.¹⁰

Settings Test

This allows you to send a testing e-mail to check the settings.

⁹ Memory contents are sent only if this function is activated in the *Memory* panel.

¹⁰ This field is for entering the values only, there is nothing displayed after saving.

SNMP

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

Network	Security	E-mail	SNMP	Sending	Memory	Sensors	Other	Info
SNMP settings								
SNMP manager's IP address				<input type="text" value="135.12.146.2"/>				
Allow trap sending				<input checked="" type="checkbox"/>				
Send SNMP trap when the threshold is exceeded				<input checked="" type="checkbox"/>				
Periodical sending of measured-out values				<input type="text" value="0"/>				
Read community name				<input type="text" value="public"/>				
Write community name				<input type="text" value="private"/>				
				<input type="button" value="Save"/> <input type="button" value="Close"/>				

Fig. 12 – SNMP settings panel

SNMP Manager's IP address

Address of the server gathering SNMP messages from all devices.

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.

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.

Network	Security	E-mail	SNMP	Sending	Memory	Sensors	Other	Info
HTTP GET and POST settings								
WEB server's address					<input type="text" value="192.168.1.12"/>			
WEB Port					<input type="text" value="80"/>			
Folder containing scripts					<input type="text" value="scripts/"/>			
HTTP GET ?								
GET sending interval					<input type="text" value="0"/>			
Script name					<input type="text" value="get.php"/>			
HTTP POST ?								
Script name					<input type="text" value="post.php"/>			
					<input type="button" value="Save"/> <input type="button" value="Close"/>			

Fig. 13 – HTTP protocol sending settings panel

WEB server's address

Here enter URL or IP address of the WEB server, that will receive measured-out values. If you are not certain, please contact your Administrator.

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 measured-out values is on *www.server.net/scripts/get.php*, enter only this part to the field: *scripts/*

HTTP GET

HTTP GET allows you to send out measured-out values periodically.

Sending interval

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

Script name

Name of the script receiving HTTP GET.

HTTP POST

HTTP POST sends the contents of TH2E's internal memory in an XML format, if this is set in *Memory* panel.

Script name

Name of the script receiving HTTP POST.

Memory

This panel contains parameters for memory operations settings, actions upon memory full. This panel's contents may differ depending on the TH2E sensor. (See Tab 1 on page 5.)

The screenshot shows the 'Memory settings' panel. At the top, there is a navigation bar with tabs: Network, Security, E-mail, SNMP, Sending, Memory (selected), Sensors, Other, and Info. Below the tabs, the title 'Memory settings?' is displayed in green. The panel is divided into two main sections. The first section, 'Memory settings?', contains two dropdown menus. The first is 'Memory storing mode' with 'Differential' selected. The second is 'If the memory is full' with 'Send as XML HTTP POST' selected. The second section, 'Time mode', contains a text input field labeled 'Interval for storing in the memory' with the value '60'. At the bottom right of the panel, there are two yellow buttons: 'Save' and 'Close'.

Fig.14 – Memory settings panel

Memory saving mode

Choose the mode that will be used to store data in memory:

Time mode means, that measured-out values are periodically stored in memory once every X minutes.

Differential mode means, that a hysteresis is set for each measured quantity¹¹. Record is stored only if the change is bigger that the set hysteresis.

Logging limit values is a mode that only saves the value at which the tendency of measured quantity changes. (For example when temperature tendency changes – it stops growing and starts falling, and vice versa). This mode is particularly convenient when watching regulation systems for temperature or humidity. Hysteresis can also be set for this mode.

¹¹ Hysteresis principals are explained in Fig.16 on page 24.

Action upon memory full

No action: When the memory is full, the oldest records just become re-written by the new ones.

Send as XML HTTP POST: When the memory is full, all records are sent as a body of an HTTP POST in XML format according to the *Sending* panel settings.

Send as a CSV file via e-mail: All records are sent as a CSV attachment of e-mail according to the *E-mails* panel settings.

Logging interval

Enter here, how often the values shall be stored in the memory. Entry is in minutes. Expected number is in range of 1 to 10080 (that is 1 minute to 1 week). This setting only applies in *Time mode*.

Sensors

Parameters affecting measuring. Temperature unit, values watching, etc. After choosing this panel, choose the quantity you want to set up.

Choose the quantity: Temperature Humidity Dew point

Temperature

Values watch

Activate values watching

Maximal value

Minimal value

Hysteresis

Memory

Store in memory

Hysteresis for differential storing

Save Close

Fig.15 – Single quantities settings panel

Values watching

Activate values watching

If this field is checked, following threshold values are being watched.

Maximum value

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

Enter the value in units chosen in panel *Other* at *Temperature units* item.

Minimum value

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

Enter the value in units chosen in panel *Other* at *Temperature units* item.

Hysteresis

Hysteresis applied for set thresholds.

Value is entered as an integer and applies below upper threshold and above lower threshold – see Fig.16.

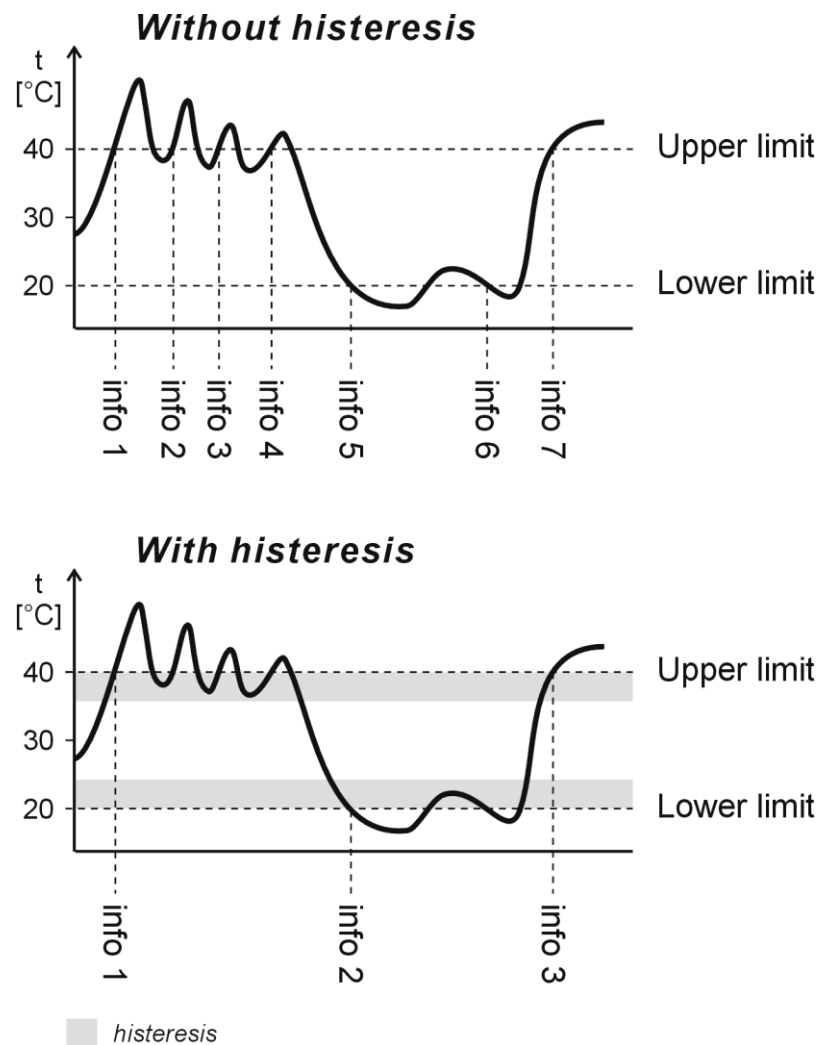


Fig.16 – Hysteresis

Values marked as “info” are temperatures where a message is sent about exceeding limits.

Memory

Log into memory

If this field is checked, quantity is being logged in the memory. It depends on the settings in *Memory* panel.

Hysteresis for differential logging

Enter hysteresis for the differential saving. Expected entry: number 1 or higher with one decimal accuracy. This setting only applies in *Differential* mode or *Logging limit values* mode.

Other

Here you can set language, device name, date, time and some other parameters.

The screenshot shows the 'Other settings' panel with the following configuration:

- Other settings:**
 - Name of the device: Storage
 - Language: English
 - Erase the extreme values memory:
 - Temperature units: Fahrenheit [°F]
- Date and time:**
 - Synchronize device's time with NTP server:
 - NTP server's IP address: 123.120.156.5
 - Time zone: Perth - Western Australia - Australi
 - Auto daylight saving:
 - Synchronize device's time with this PC's time:
- MODBUS TCP:**
 - ModBus Port: 512

Fig.17 – Other parameters panel

Device name

This string can be used to label TH2E, for example by its location etc.

Language

Interface language. English and Czech available.¹²

Erase the extreme memory

If this field is checked, extreme memory for all quantities will be erased upon saving the settings. (Extreme memory saves minimal and maximal values for all quantities)

TH2E versions with RTC circuit have this memory backed up against power loss. Each extreme record has its time marker. (See Tab 1 on page 5.)

Temperature units

Units to display temperatures.

Available are: Celsius, Fahrenheit a Kelvin.¹³

¹² More languages can be added if required.

¹³ If Fahrenheit degrees (°F) are chosen, an error of 0.1 °F may occur in some cases.

Date and Time

If your version supports it¹⁴, you can store measured-out values in the memory. Each record has its time marker. Current time can be updated automatically from NTP server or once from the time of the PC you view the WEB interface on.

Synchronize time with NTP server

If this field is checked, device synchronizes with NTP server (from Internet). (To make this work, TH2E has to have an Internet connection and set *Gateway's IP address* in *Network* panel.)

NTP server's IP address

Enter IP address of the NTP server. This server has to be accessible from the network TH2E is connected to.

Time zone

Choose a city that is in the same time zone as your location.

Auto daylight saving

Check this box if you want the device to automatically change its internal clock on daylight saving and back.

Synchronize TH2E's time with your PC's time

If TH2E is not in a network that has Internet connection, this allows you to synchronize TH2E's internal clock with your PC's clock.

MODBUS TCP

ModBus port

Here you can set the port for ModBus RTU communication. Standard port is 502.

¹⁴ See Tab 1 on page 5.

Info

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

Network Security E-mail SNMP Sending Memory Sensors Other Info

Information about the device

MAC address: 00-20-4A-B4-8D-F1
Firmware version: 1.0

Supplier of the device

Name: Papouch s.r.o.
Web site: www.papouch.com
E-mail: papouch@papouch.com

Browser

Browser core: gecko v.19
System: win

Links

XML file containing current measured-out values: [fresh.xml](#)
XML file containing current configuration: [settings.xml](#)
XML file containing measurement history(reading of all records): [history.xml](#)
XML file containing measurement history (reading of last 10 records): [history.xml?last=10](#)
Simple page viewing current values. Meant for PDAs, Mobil phones etc.: [wap.html](#)

Close

Fig.18 – Other information panel

Links

This part contains links to XML files and mobile view pages in the device.

Warning: Reading history in XML format is very demanding. Reading the history may take several dozens of minutes. If you click multiple links at a time, it may result in system instability and TH2E's WEB interface might be unavailable for a protracted period of time.

TELNET CONFIGURATION

Connection

Unknown IP address

For setting the IP address we recommend using Ethernet Configurator (more on page 14).

- 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]
```


example: `arp -s 192.168.1.254 00-20-4a-80-65-6e`
- 3) Open Telnet. (by typing `telnet` and pressing Enter. ¹⁵)
- 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 TH2E. (by typing `open [IP address in dot format] 9999` and Enter.)
- 7) Now you have entered to the configuration of the Module. IP address is not yet set. It needs to be set in menu `Server Configuration > IP Address`.
- 8) If the IP address is valid, TH2E 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.

¹⁵ Telnet client is not standard installed in OS Windows Vista. You can install it by doing following:

- a) Open Control panel/add or remove programs.
- b) On the left, click on Add/remove Windows functions (You have to have administrator's rights to do this.)
- c) Windows Functions window will open. Check “Telnet client” and confirm. Telnet client will be installed to your system.

IP address is known

- 1) In OS Windows click on Start/Run and type `telnet` and confirm.¹⁵
- 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 TH2E 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 TH2E

A brief overview of methods for obtaining temperature values from the TH2E is on page 6.

WEB interface

After setting the TH2E's IP address in the Internet browser ¹⁶ se you will see the page from Fig.19.¹⁷ There are current values of all measured quantities, sensor name and set limits. If any of those limits is overrun, it shows highlighted. Current measured values can only be viewed in WEB mode (see [Device mode](#) on page 17).

There is a *Settings* button in the upper right corner. (Button is only visible when administrator is logged in.)

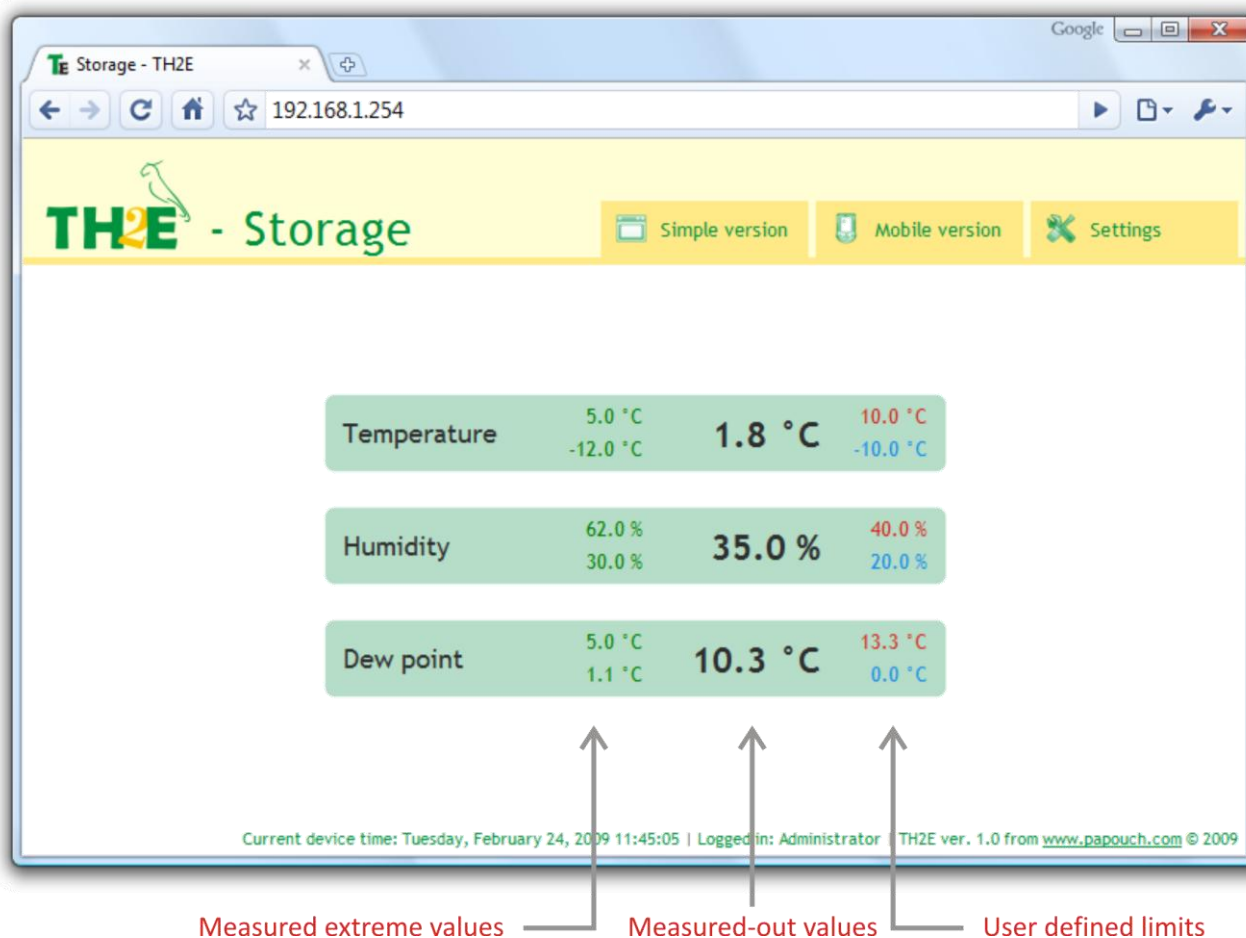


Fig.19 – basic view in WEB mode, also meaning of displayed values.

You can select either English or Czech language.

¹⁶ WEB interface requires JavaScript turned on. Interface is optimized for Internet Explorer 7.0, Mozilla Firefox 3.0, Opera 9.6 and Google Chrome 1.0. Minimal recommended resolution for comfortable view is 1024 × 768 pixels. Set the address in the form [http://\[IP_address_of_TH2E\]/](http://[IP_address_of_TH2E]/) For example, <http://192.168.1.254/> if the default configuration of the TME has been preserved.

¹⁷ The module's pages can be graphically adapted to your requirements.

Simple version

By clicking on *Simple version* you can open current view in a simple form. This is very useful when you need to have the window smaller or when you view multiple devices on a single page. (More information about that is below following figure.)

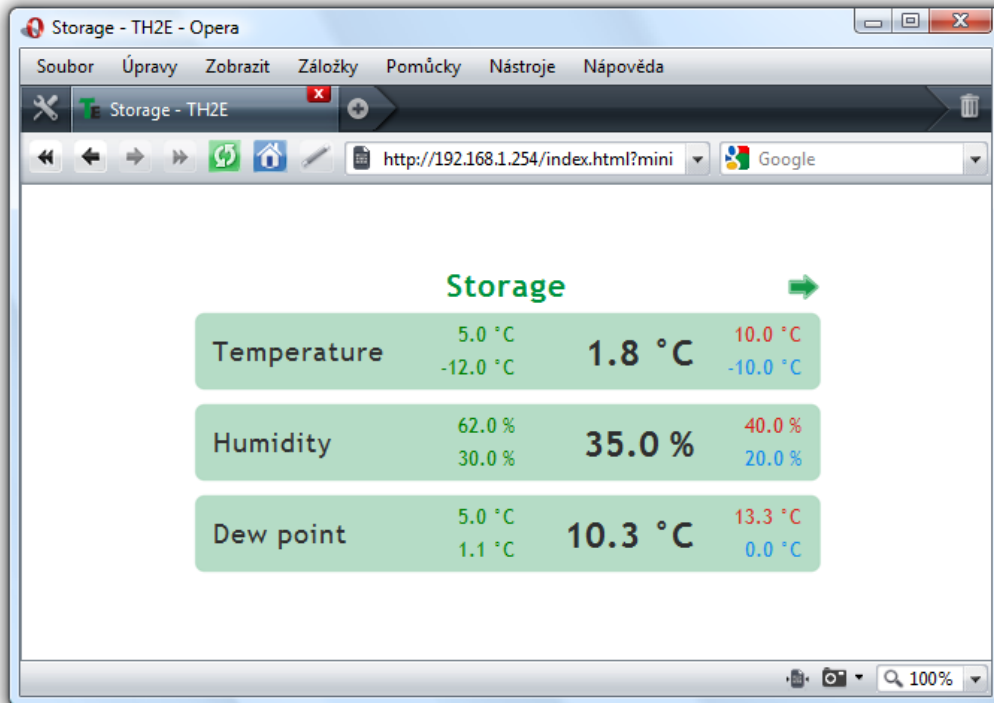


Fig.20 – Simple view

Viewing multiple sensors on a single page

If you have more than one device, you can view multiple sensors on one page. Small example is on following figure.

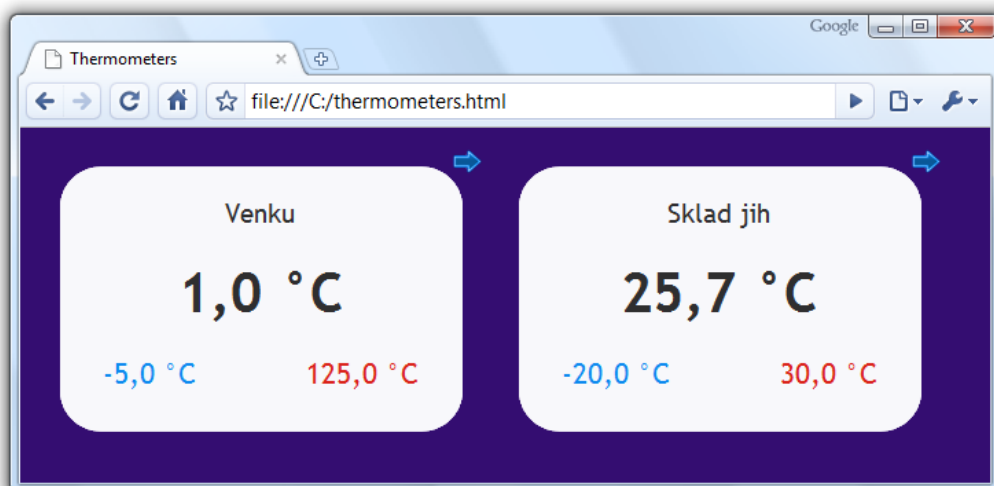


Fig.21 – Multiple sensors view. (browser: Google Chrome)

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:

```
<!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>Hygrometers</title>
</head>
<style>
  body {background-color: WHITE;}
  iframe {border: none; width: 450px; height: 240px;}
</style>
<body>
  <iframe src="http://192.168.1.254/index.html?mini"></iframe>
  <iframe src="http://192.168.1.121/index.html?mini"></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:/hygrometers.html*

Mobile view

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

XML soubor

From the TH2E, you can get the currently measured-outs values, limits and the sensor's name in a text file in XML format. The file is at [http://\[IP_address_of_sensor\]/fresh.xml](http://[IP_address_of_sensor]/fresh.xml) – for example, <http://192.168.1.254/fresh.xml> for the default settings of TH2E.

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<root xmlns="http://www.papouch.com/xml/the/act">
  <sns id="1" type="1" status="0" unit="0" val="1.8" w-min="-10.0" w-max="10.0" e-min-val="-12.0"
    e-max-val="5.0" e-min-dte="09/12/2007 04:56:13" e-max-dte="09/12/2007 04:56:13" />
  <sns id="2" type="2" status="0" unit="0" val="35.0" w-min="20.0" w-max="40.0" e-min-val="30.0"
    e-max-val="62.0" e-min-dte="09/12/2007 04:56:13" e-max-dte="09/12/2007 04:56:13" />
  <sns id="3" type="3" status="0" unit="0" val="10.3" w-min="0.0" w-max="13.3" e-min-val="1.1" e-
    max-val="5.0" e-min-dte="09/12/2007 04:56:13" e-max-dte="09/12/2007 04:56:13" />
  <status location="Storage" time="2/24/2009 11:45:05" />
</root>
```

Fig.22 – XML file example

There are XML tags *sns* for each quantity and also *status* tag:

status

location

User defined name of the thermometer.

time

Current time within TH2E.^{18 19}

sns

id

number of the quantity. (first number is 1.)

type

Quantity type, it can reach these values:

- 1 temperature from range -40 to +123,8 °C or -55 to +125 °C¹⁹
- 2 humidity from 0 to 100 %
- 3 dew point

status

status

Describes status of the measured value. It can be:

- 0 valid value, currently measured-out value
- 1 waiting for first measuring
- 2 measured-out value exceeded user defined upper limit
- 3 measured-out value dropped below user defined lower limit.
- 4 measuring error or sensor error (means damaged sensor or cable)

¹⁸ This applies only if your TH2E version supports time.

¹⁹ See Tab 1 on page 5.

unit

Currently set temperature units:

- 0.....Celsius degrees
- 1.....Fahrenheit degrees
- 2.....Kelvin

val

Current value in units specified in *Unit* parameter, as a number with one decimal. (Validity of the value describes *status* attribute.)

w-min, w-max

Lower (*w-min*) and upper (*w-max*) limit of the value. These are the user defined limits. The value is a number with one decimal.

e-min-val, e-max-val

The lowest (*e-min-val*) and the highest (*e-max-val*) measured-out value from the last reset or from when the device was made. (You can reset this memory in [Other](#) panel.)

e-min-dte, e-max-dte

Date and time of the extreme records: minimal (*e-min-dte*) and maximal (*e-max-dte*) measured-out values (*e-min-val* a *e-max-val*).²⁰ (You can reset this memory in [Other](#) panel.)

²⁰ Values are only valid in case your TH2E version can store measured-out values. (See Tab 1 on page 5.)

Inputting measured values on the server using HTTP GET

All measured values from TH2E can be inserted into a website using a scripting language (such as PHP), which processes the values from the sensor as an HTTP parameter of the GET request. The device periodically calls the script on an Internet (or intranet) server with the actually measured values 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.

Path to the script and sending interval must be set. Interval can be from 1 to 1440 minutes.

HTTP GET

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

```
http://www.example.com/script.php?mac=00-20-4A-B4-8D-F1&name=Sklad&tempS=0&tempV=21.8&humS=0&humV=37.4&dewS=0&dewV=6.6
```

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 [21](#).

HTTP GET Parameters are following:

macMAC address of the device.

namedevice name defined by user.

tempSDescribes the status of currently measured value:

0 valid value, currently measured-out value

1 awaiting first measurement

2 measured-out value exceeded user defined upper limit

3 measured-out value dropped below user defined lower limit

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

tempVMeasured-out temperature as a number with one decimal. (In degrees Celsius)

humSStatus of the measured-out humidity (It is the same as for the temperature)

humVMeasured-out value as a decimal number without units.

dewSStatus of the dew point. (It is the same as for the temperature)

dewVDew point as a decimal number without units. (in degrees Celsius)

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 *script.asp* on your server awaiting the data from TH2E. Full path to the script is *http://www.example1.com/script.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...../ext
Script name..... *script.asp*

Result URL address:

http://www.example1.com/script.asp?mac=00-20-4A-B4-8D-F1&name=Venku&tempS=0&tempV=22.9 &humS=0&humV=38.4&dewS=0&dewV=8.0

Example 2 – measurement error:

What you need to process:

There is a script *get.php* awaiting data from TH2E. Full path to the script is:

http://www.example2.com/scripts/get.php

Solution:

You need to set up these items:

WEB server IP address 218.25.14.3
Server name *www.example2.com*
WEB port..... 80
Script folder...../ext
Script name..... *get.asp*

Result URL address:

http://www.example2.com/ext/get.php?mac=00-20-4A-B4-8D-F1&name=Sklad&tempS=4&tempV=0.0 &humS=4&humV=0.0&dewS=4&dewV=0.0

TCP connection – WEB mode

TH2E allows you to work as TCP client even in WEB mode²¹, awaiting connection on defined port (Adjustable at: *Network/data port*). This mode is particularly convenient if a remote system connects actively to TH2E and requests measured-out values.

TH2E behaves as a server and awaits for a connection on its IP address and data port. After establishing connection, it sends measured-out values every 10 seconds in Spinel protocol.²²

Message format

This is a description of the packet's data part in Spinel protocol (example on the next page):

Acknowledge code: ACK 0EH

Parameters: [(id)(status)(value)] [(id)(status)(value)] [(id)(status)(value)]

Id	Quantity identifier	length: 1 byte
	Identifier tells you what quantity are the following three bytes about. It can be there values: 01H → Temperature, 02H → Humidity, 03H → Dew point	

status	Status of the measured-out value	length: 1 byte
	Status of the measured-out value for the channel with number from previous byte <i>chn</i> . Bits 0 and 1 are set/reset right after any limit is overrun, hysteresis does not apply.	
bit 0, 1	00 = measured-out value is inside the limits(or the watching is off)	
	01 = lower limit is overrun	
	10 = upper limit is overrun	
bit 3, 2	00 = measured-out value is inside the measuring range	
	01 = measured-out value is below measuring range (underflow)	
	10 = measured-out value exceeded the measuring range (overflow)	
bit 7 (MSb)	0 = measured-out value je invalid	
	1 = measured-out value je valid	

value	Value	length: 2 byte
	Current measured-out value as s 16bit integer with sign (signed integer) ²³ multiplied tenfold. Bytes are in order MSB:LSB. Current value with one decimal accuracy can be obtained as following: $\text{current_value} = \text{value} / 10$	

²¹ WEB mode is default TH2E's mode. It can be changed in *Network* panel.

²² Format is compatible with Spinel 97. More info at: <http://spinel.papouch.com/> (Czech only).

²³ Negative numbers are stated as two's complement. Two's complement is a method of coding negative numbers in binary. Absolute value of the negative number can be obtained as following::

Number (two's complement)... FFC6H

Minus one FFC6H – 1 = FFC5H

Negative result..... FFC5H → 003AH, Which is 58 in decimal. The result is -58.

Examples:**Automatic message:**

2AH, 61H, 00H, 11H, 31H, 45H, 0EH, 01H, 80H, 00H, E4H, 02H, 80H, 01H, 59H, 03H, 80H, 00H, 40H, DBH, 0DH

Measured-out temperature is 1.7 °C and humidity 57.0 %. Dew point is -5.7 °C.

Now the highlighted bytes description:

0EH → Automatic message flag

01H → Temperature:

80H → value valid and within range

00H,E4H → 00E4H → 228 → divided by ten → 22.8 °C

02H → Humidity:

80H → value is valid and within range

01H,59H → 0159H → 345 → divided by ten → 34.5 %

03H → dew point:

80H → value is valid an in range

00H,40H → 0040H → 64 → divided by ten → 6.4 °C

TCP connection – TCP and UDP mode

In modes TCP server, TCP client and UDP, TH2E communicates via Spinel protocol. It is a standard request-response communication that is most commonly used. This protocol can be used for configuration and reading values form TH2E.

Detailed description of TH2E Spinel protocol is in a separate document, containing examples with comments. It can be found on a CD and on our WEB site www.papouch.com in TH2E part.

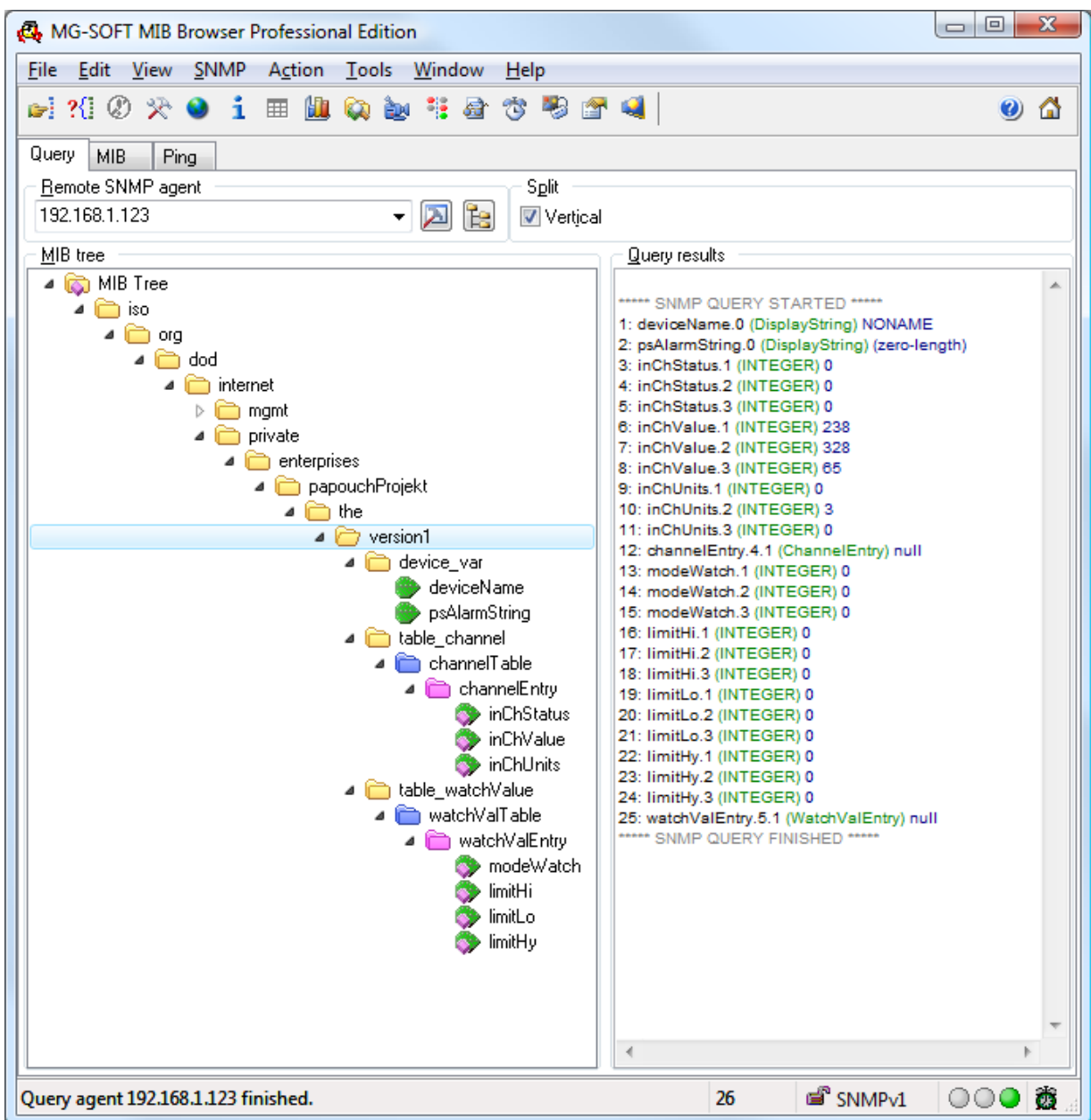
SNMP

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.

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.



obr. 23 – Stróm MIB v TH2E

TH2E 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 TH2E thermometer data.

Descriptions of the MIB table tree and of SMI (Structure of Management Information) are attached in Papouch-SMI.mib and TH2ESNMP.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.

TH2E 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 TH2E_v01.MIB files.²⁴

Then you must set the "Read community" option to "public"

All SNMP objects in TH2E are accessible for reading only.

SNMP objects – quantities

Following objects are available for each quantity. Temperature has *object id* 1, humidity is 2 and dew point is 3.

Status of the Quantity

Name: inChStatus

Object ID: 1.3.6.1.4.1.18248.20.1.2.1.1.1.1 to 3

description: Quantity status. It describes current status of measurement. Following states can occur:

- 0 → Value is valid and within limits.
- 1 → Value was not measured-out yet.
- 2 → Value is valid and upper limit was exceeded.
- 3 → Value is valid and below lower limit.
- 4 → Value is invalid – measurement error.

Measured-out value

Name: inChValue

Object ID: 1.3.6.1.4.1.18248.20.1.2.1.1.2.1 to 3

Description: Measured-out value as an integer. Real value can be obtained by dividing the number by ten.

Unit

Name: inChUnits

Object ID: 1.3.6.1.4.1.18248.20.1.2.1.1.3.1 to 3

²⁴ These files can be downloaded from: www.papouch.com/?cislo=0201 .

Description: Unit of the value. It can be:

- 0 → degrees Celsius.
- 1 → degrees Fahrenheit.
- 2 → Kelvins.
- 3 → percents (humidity)

Values Watch

Name: modeWatch

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.1.1 to 3

Description: It indicates the status of values watching on this channel. 1: watching is active, 0: watching is inactive.

Upper limit

Name: limitHi

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.2.1 to 3

Description: Upper limit of the value watching. When this limit is overrun, action is executed due to other settings. Value is always in degrees Celsius for temperature.

Lower limit

Name: limitLo

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.3.1 to 3

Description: Lower limit of the value watching. When this limit is overrun, action is executed due to other settings. Value is always in degrees Celsius for temperature.

Hysteresis

Name: limitHy

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.4.1 to 3

Description: Hysteresis of both limits. Description of hysteresis and principal explanation can be found on page 25. Value is always in degrees Celsius for temperature.

SNMP objects – general

Following objects apply to whole device.

Device name

Name: deviceName

Object ID: 1.3.6.1.4.1.18248.20.1.1.1.0

Description: User defined name of TH2E.

Alarm text

Name: psAlarmString

Object ID: 1.3.6.1.4.1.18248.20.1.1.2.0

Description: text of the alarm message when some of the limits is overrun.

Automatic traps

The TH2E 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 quantity goes out of the preset quantity limits, and a trap with the measured quantity value is sent out regularly.

Trap 1 – Quantity outside of limits

The trap contains the quantity value that has overrun a limit and the limit value.

This trap is only sent out if the quantity goes beyond the preset limits. The trap can only be delivered if the SNMP manager's IP address is set correctly.

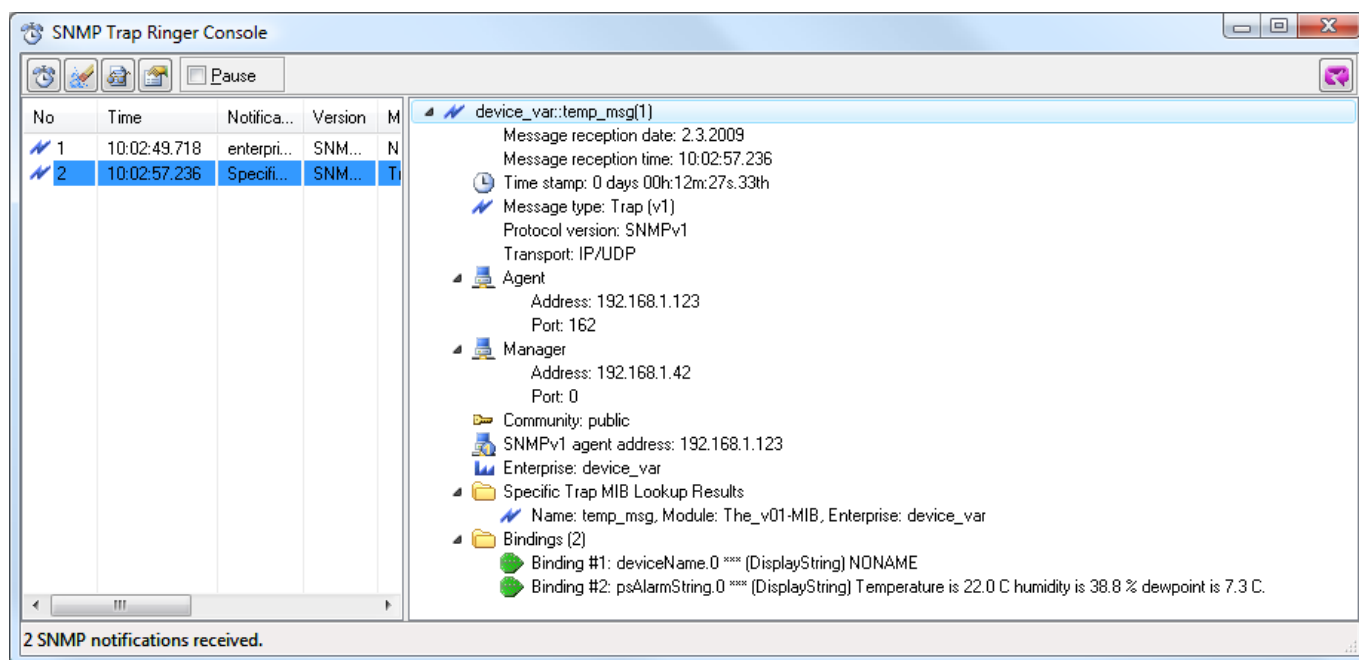


Fig.24 – SNMP trap upon overrunning the specified limit

Trap 2 – Current measured values

In this trap all current values are sent, also the name of the device.

The trap is only sent if a non-zero period is set.

Sending e-mails

TME can send an e-mail with information upon these events:

- Some of the limits is overrun
- Memory is full

Some of the limits is overrun

This e-mail message can be easily forwarded to a mobile phone as an SMS using variety of mobile providers.

Memory is full

When the memory is full, e-mail can be sent containing CSV file²⁵ attachment with all the records from memory. This function can be adjusted in *Memory* panel.

²⁵ This function is only available for versions with internal memory. (See Tab 1 on page 5.)

ModBus protocol

MODBUS TCP is a standard industrial protocol. TH2E can communicate via ModBus TCP. Complete information about the protocol can be found at: www.modbus.org.

Memory table – Input Register

Address	Access	Function	Name
Values and states of each channel – sorted by channel			
0x0000	read	0x03	Temperature – Status
0x0001	read	0x03	Temperature – Value signed integer
0x0002	read	0x03	Temperature – Value float (3. a 2. byte)
0x0003	read	0x03	Temperature – Value float (1. a 0. byte)
0x0004	read	0x03	Humidity – Status
0x0005	read	0x03	Humidity – Value signed integer
0x0006	read	0x03	Humidity – Value float (3. a 2. byte)
0x0007	read	0x03	Humidity – Value float (1. a 0. byte)
0x0008	read	0x03	Dew point – Status
0x0009	read	0x03	Dew point – Value signed integer
0x000A	read	0x03	Dew point – Value float (3. a 2. byte)
0x000B	read	0x03	Dew point – Value float (1. a 0. byte)

Values and current states of channels

Values are available in two formats simultaneously: As a 16bit signed integer (MSB:LSB – decimal value multiplied tenfold).

Second value is a decimal number in 32bit float format according to IEEE 754 standard²⁶.

Function codes:

0x04 – Read Input register

Memory position and length:

Starting address	2 Bytes	Temperature: 0x0000 Humidity: 0x0004 Dew point: 0x0008
Register count	2 Bytes	3

Parameters:

Number of bytes	1 Byte	8
Status	2 Byte	0x0000 – value is valid and in range 0x0001 – value not available yet 0x0002 – upper limit exceeded Other values – other error
Value INT	2 Byte	Measured-out value as signed integer.
Value float	4 Byte	Measured-out value. 32 bit float by IEEE 754

²⁶ IEEE 754 description is available here: http://en.wikipedia.org/wiki/IEEE_754

MEMORY

(Memory is available in some versions only – see Tab 1 on page 5.)

Memory in TH2E is for saving measured-out values. Contents of the memory can be read at any time as an XML file, they can be sent as an XML file to your server or they can be sent by e-mail as a CSV file.

Also time of the power-up of the TH2E event is logged in memory.

Memory has a capacity for 10,000 records. (One record is a value from one quantity, so the memory has a capacity of 3,333 records for all quantities.) Memory behaves as a circle buffer, meaning that when it is full, the oldest records are subsequently re-written by the recent ones.

Each quantity has its own settings for the memory.

After the whole content of the memory is sent as an XML or CSV file, memory is erased.

Each record has its own precise time marker.

Logging modes

Logging is done in three different modes:

Time mode

Log is created once every X minutes.

Differential mode

In differential mode, hysteresis is set. Log is stored once the value changes more than the pre-set hysteresis and this from the last stored value. Only significant changes are logged and memory is saved.

Example: We measure temperature and humidity in a refrigerator box. Temperature for inside the box has been set to -18 °C. Fluctuations up to 1°C are irrelevant. Therefore, hysteresis is set to 1.0 °C. If the temperature fluctuates from -17.1°C to -18.9 °C no value is logged. If however temperature goes up to -17.0 °C, record will be stored in the memory. Next log will be created when temperature goes outside the range of -16.1 °C to -17.9 °C. Not only temperature will be logged, but all quantities set to log. (You can of course set a specific hysteresis for humidity and dew point as well.)

Logging limit values

This is a mode that only saves the value at which the tendency of measured quantity changes. (For example when temperature tendency changes – it stops growing and starts falling, and vice versa). This mode is particularly convenient when watching regulation systems for temperature or humidity. Hysteresis can also be set for this mode.

WARNING: Reading history in XML format is very demanding. Reading the history may take several dozens of minutes. If you click multiple links at a time, it may result in system instability and TH2E's WEB interface might be unavailable for a protracted period of time.

XML

Memory contents can be obtained as follows:

HTTP POST

Whole memory content can be sent as an HTTP POST in XML format. (This function is configured in *Memory* panel.)

History.xml file

Part of it or the whole memory content can be obtained as *history.xml* file.

- By reading *history.xml* (no parameter) whole content of the memory can be obtained in XML format.
- With parameter: *last=10* you can obtain last 10 records from the memory. (you can enter number 1 to 128 as a parameter.)²⁷
- With parameters: *from=100* and *to=150* you can read a specific portion of the memory. (You can read up to 128 records this way.)²⁷
- With parameter: *clear=1* you can erase the memory.²⁷

XML file contains main element *root*, this element contains elements *rec* with individual records. *rec* element is in this format:

```
<rec id="23" dte="02/25/2009 04:55:13" val="26.8"/>
```

CSV file

TH2E can also send the content of its memory as a CSV file. After sending the CSV file, memory is automatically erased.

Each row contains these records divided by semicolon:

record id

Number of the record for identification purposes.

date and time

Date and time of the record.

measured-out value

Value of the measured quantity.

²⁷ Parameter(-s) must be entered separately. You cannot enter more than one at a time.

FAQ

What needs to be set for my TH2E to work in the network?

Only thing you have to set-up for TH2E to work is the network parameters for your Network. (IP address and Subnet mask.) Settings are described for Windows OS.

- 1.) Connect your TH2E to the network and run Ethernet Configurator program (see Fig. 6) from your CD.²⁸
- 2.) Click “Add device” and enter MAC address of your TH2E and desired IP address.
- 3.) Click “Set”
- 4.) Now you can open the WEB interface of your TH2E using any browser.

How do I get TH2E'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 TH2E, follow these instructions:
- 2.) Run Ethernet Configurator program (see Fig. 6) from your CD.²⁸ If your TH2E 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 TH2E is the *list*, check the connection and assign it a new IP address according to the previous question.

²⁸ You can download these files from www.papouch.com/en/ .

INDICATION

ON Indicator (green)

Indicates that power is connected. It also flashes to indicate the proper function of the device. In TCP mode indicator flashes as the data channel is active. (Fig.25 : right LED.)

DCD Indicator (yellow)

Indicates established TCP/IP connection. (Fig.25: left LED.)

DCD Indicator (yellow)

(Left indicator on the Ethernet connector)

Nothing..... disconnected

Yellow..... connected 10 Mbps

green..... connected 100 Mbps

DCD Indicator (yellow)

(Right indicator on the Ethernet connector)

Nothing..... no communication

Yellow..... Half-Duplex

Green Full-Duplex

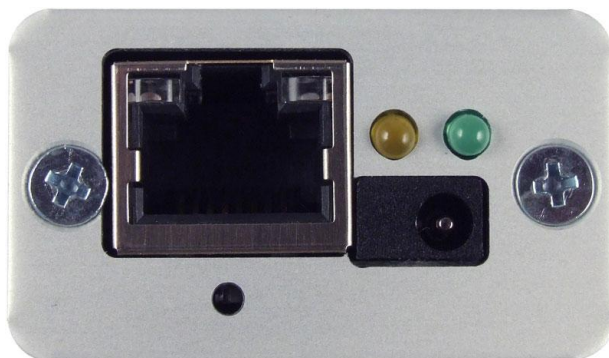


Fig.25 – Indicators, power connector and the Ethernet connector

HARD RESET

If you want to hard-reset the TH2E, follow these instructions:

(When hard-resetting the device, all parameters are set into factory defaults, including the IP address.)

- 1) Disconnect the power supply.
- 2) Push the button under Ethernet connector (see Fig.25).
- 3) Turn the power on and wait for 10 seconds.
- 4) Release the button.
- 5) Hard reset done.

TECHNICAL PARAMETERS

Integrated temperature and humidity sensor

Coverage	IP 67
Dimensions	40 × 16 × 10 mm
Material	hardened aluminum

Humidity sensor

Humidity range	0 % to 100 % RH ²⁹
Resolution	1% RH
Measurement repeatability	± 0.1 % RH
Temperature stability	0.5 % RH in a year typically
Sensor element	polymer sensor
Sensor mechanical finish	inside hardened aluminum block

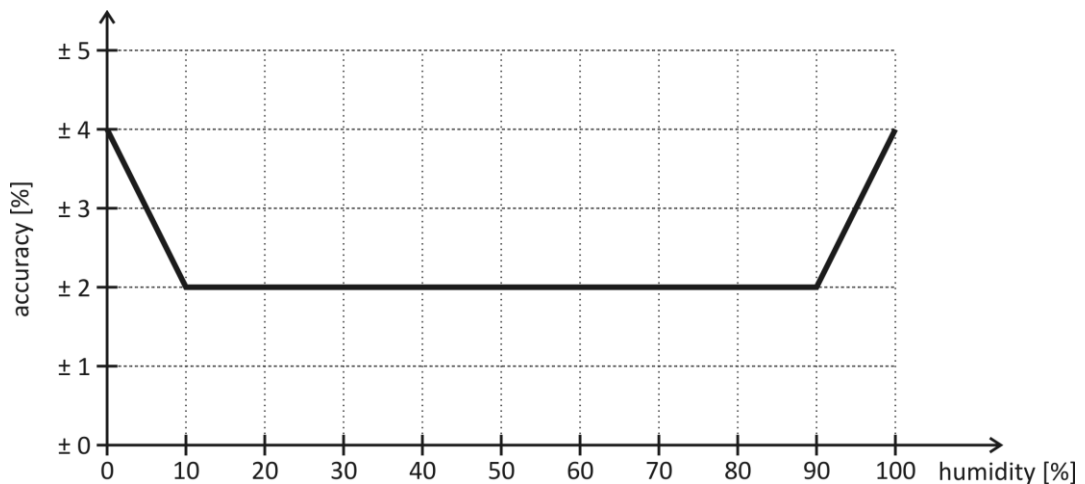


Fig. 26 – Accuracy of humidity measuring

Temperature sensor

Range	-40.0 °C to +123.8 °C ²⁹
Resolution	0.1 °C
Measurement repeatability	± 0.1 °C
Sensor element	semiconductor
Sensor mechanical finish	inside hardened aluminum block

²⁹ See *Operating and Maximum Range of Values* on page 53!

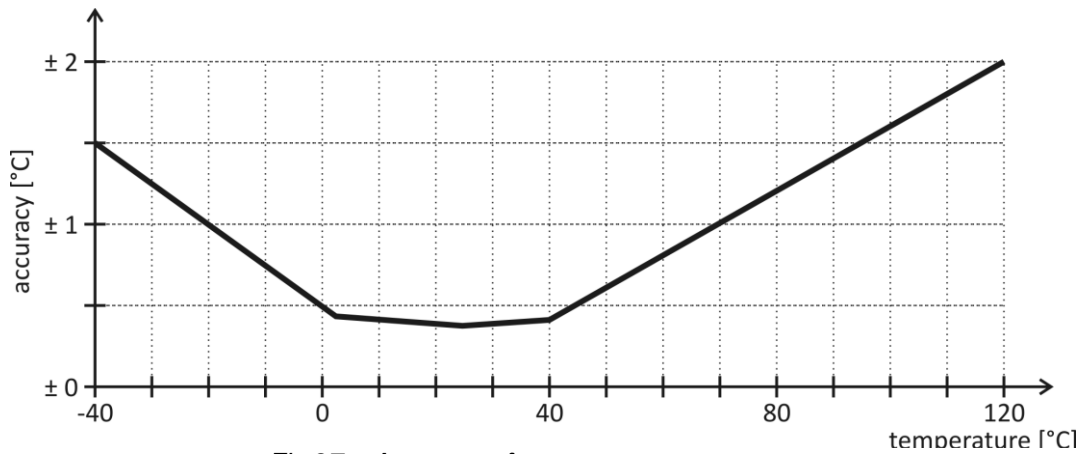


Fig.27 – Accuracy of temperature measurement

Operating and Maximum Range of Values

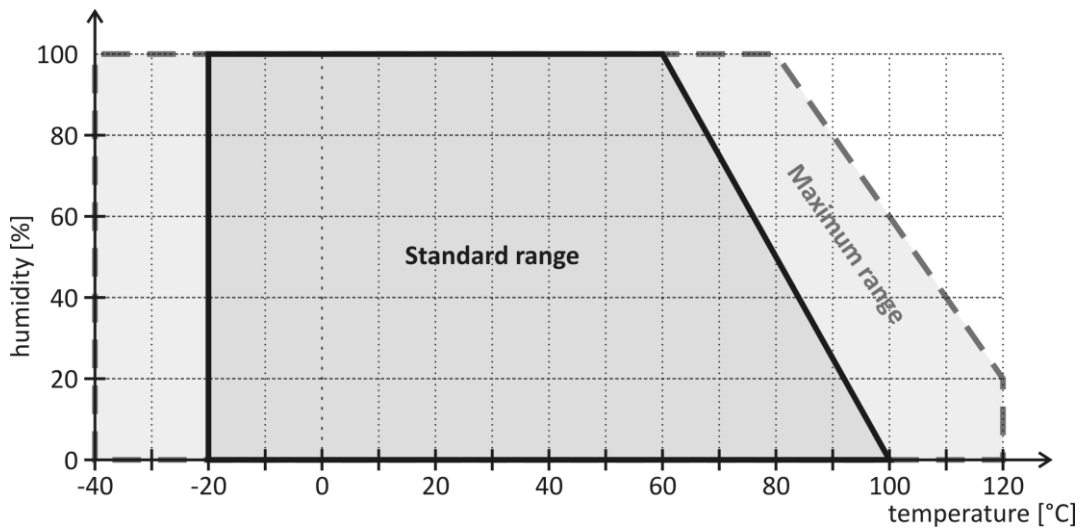


Fig. 28 – working and maximum temperature range

The sensor output can get without any limitation within the standard range of values. Within the range close to maximum values, the humidity sensor accuracy gets worse to $\pm 3\%$ RH. The sensor must not exceed the range of maximum values.

After returning from the range of maximum to standard values, the sensor regains the default calibration and accuracy. The process of regaining the original calibration can be speeded up in the following way:

- 1) For 24 hours keep the sensor in temperature between 80 and 85 °C and humidity of up to 5 %.
- 2) For 48 hours keep the sensor in temperature between 20 to 30 °C and humidity of more than 74 %.

Temperature sensor

Sensor type..... semiconductor
 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 normalized 6 mm diameter, 60 mm length

Cover materialHard Duralumin
CoverageIP68 (indefinite submerge into 1m depth)

Other parameters

Sensor cable

CoatingSilicon
Wires isolationFEP polymer
Length.....3 m standard (up to 20 meters upon request)
Working temperatures range-60 °C to +200 °C
Cable diameter4.7 mm (±0.1 mm)
Cable is highly resistant against moisture, chemicals and carbohydrates.

Ethernet interface

ConnectionTBase 10/100 Ethernet
ConnectorRJ45

Thermometer electronics

Power supply voltage4 to 30 V (Polarity reversal protection)
Power consumption at 5 V.....typ. 150 mA
Power consumption at 12 V.....typ. 70 mA
Power consumption at 24 V.....typ. 45 mA
Maximum power consumption1.5 W
Power connector.....jack 3.8 × 1.3 mm; + inside
Electronics working temperature range-20 °C to +70 °C
Electronics dimensions72 x 41.5 x 24 mm
Enclosure material.....eloxal aluminum
CoverageIP30

Other parameters

Weight80 g (without sensor)

Default Ethernet settings

IP address192.168.1.254
Subnet mask.....255.255.255.0 (8 bits; C mask)
Gateway0.0.0.0

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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