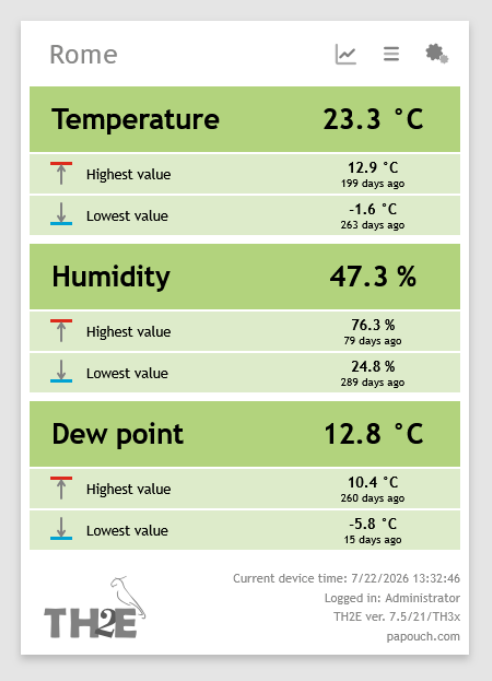
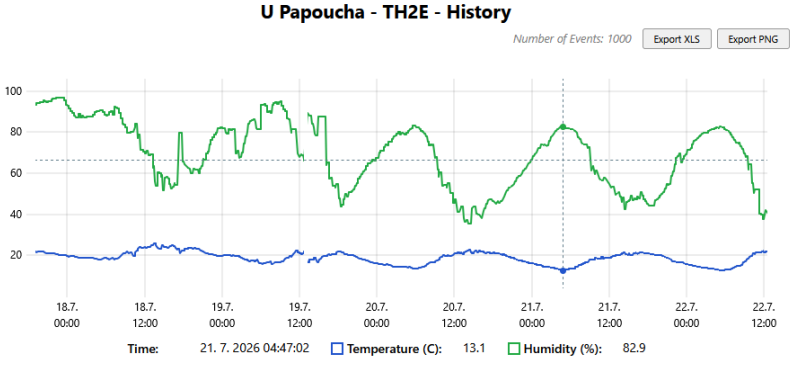
TH2E

Intelligent Ethernet sensor for temperature, humidity and dew point







TH2E

Datasheet

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Changelog

Firmware v.7.5

- Charts in the measurement history, export to XLS and PNG, removed WAP web, minor UI changes.

2026-03

- The package now includes a 15 V power supply (previously 5 V).

Firmware v.7.2

- Added the option to disable Telnet, firmware upgrade, and SNMP.
- Pressing the Reset button allows obtaining an IP address from the DHCP server.
- Extended the password input fields (the length is always indicated in the configuration field title) and clarified field titles.
- GET/POST: Extended the length of fields containing script paths and removed GUID.

Firmware v.5.2

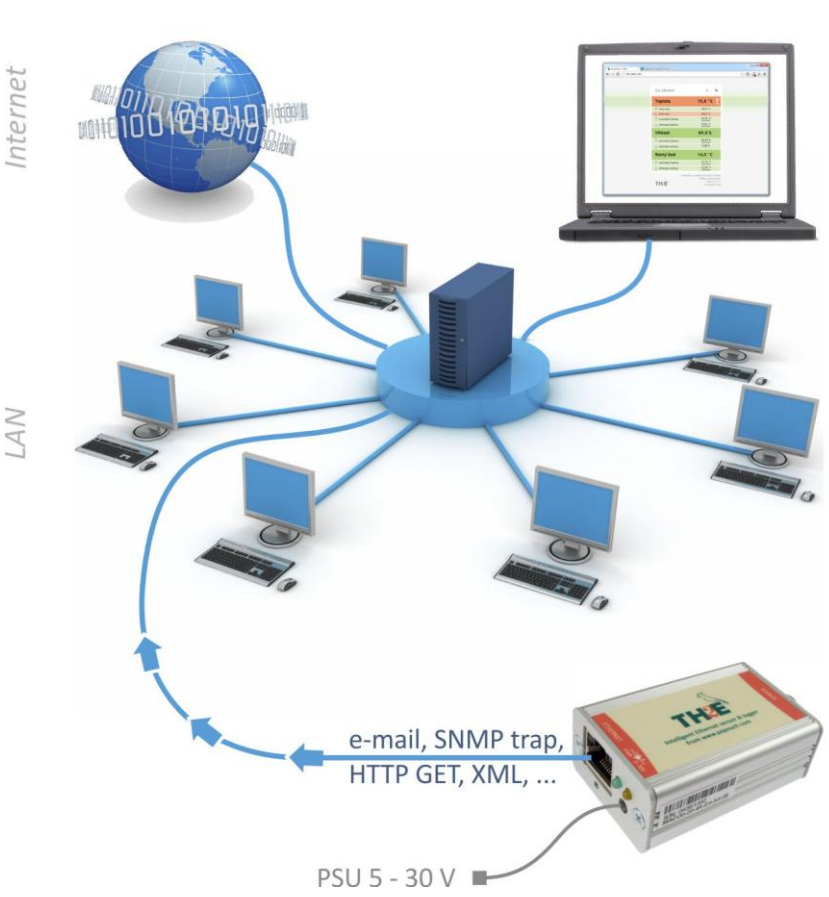
- TH2E and TH2E_LOG unified into one new version with logging and SNMP protocol.
- New version can be differentiated at a first glance by the new label design that has red-orange stripes at both sides of the device (See image on the first page of this document.)
- Telnet configuration restricted to network settings and communication mode.

Firmware v.2.0

- MODBUS TCP protocol added.

ABOUT TH2E

TH2E measures temperature and humidity according to the connected sensor and calculates the dew point. Measured values are available in a web browser and stored in internal memory with a capacity of 1,000 records, which can be exported to XLS.



The device supports multiple standard TCP/IP protocols, making it easy to integrate into existing systems. Available options include a TCP data channel, SNMP, Modbus TCP, e-mail sending with measured values, automatic data transmission to a remote server via HTTP GET and POST, and access to values and settings in XML format.

Configuration is performed through a web interface with built-in help. The interface is available in both Czech and English.

Main features

- Relative humidity measurement in the range of 0% to 100%. [1]
- Temperature measurement in the range of -40 to +125 °C or -55 to +125 °C. [1]
- Dew point calculation. [1]
- Temperature conversion to various temperature units.
- Logging of values to internal memory with a capacity of up to 1,000 records. Export to XLS. (Values are retained even in the event of a power outage.)
- Extreme value memory function – The TH2E stores the maximum and minimum measured values for each measured quantity.
- Connection and communication via computer network (Ethernet).
- Data transfer using TCP/IP protocols (10/100 Ethernet).
- Configuration via a web interface.
- **Connectable sensors:** (sensor to be ordered separately)
    - **TH3: Temperature and humidity sensor:** IP 54 protection rating.
    - **Temperature sensor:** IP 68 protection rating.
    - Sensor connected to the electronics via a highly durable silicone cable.
- Power supply: 5 V to 30 V from the included plug-in adapter.
- Can be mounted on a 35 mm DIN rail.

Feature	Device type		
	TH3	TH2E thermometer	TME (for reference)
Measuring range -40 to +125 °C	yes	*no*	*no*
Measuring range -55 to +125 °C	*No*	yes	yes
Humidity measurement	yes	*no*	*no*
Dew point calculation	yes	*no*	*no*
Measured values logging	yes	yes	*no*
Internal RTC circuit (Real Time Clock)	yes	yes	*no*
Extreme values memory	yes	yes	*no*

Tab 1 – Differences in TH2E sensors and comparison with TME

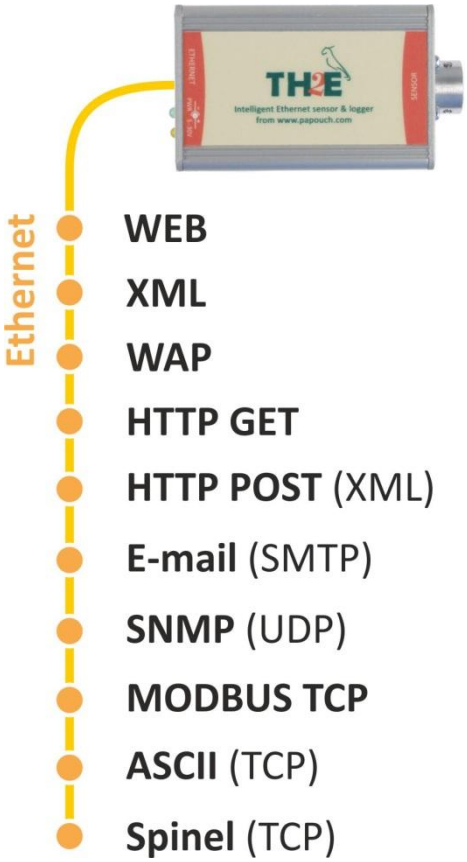
Options for monitoring measurements:

1. Internal web page with real-time values.
2. Small web page suitable for display on older mobile phones or PDAs.
3. Ability to display values from multiple TH2E devices on a single web page.
4. Automatic email notification when predefined thresholds are exceeded.
5. Sending values via TCP data channel (directly as a Celsius string).

[1] Depending on the type of connected sensor. (Specify when ordering the device. See Tab 1.

6. Communication via TCP channel using the Spinel protocol.
7. SNMP protocol.
8. Modbus TCP protocol.
9. Automatic value transmission in an HTTP GET request.
10. Automatic memory content transmission in an HTTP POST request in XML format.
11. Real-time values and all settings easily accessible in XML format.

Options for gathering data from TH2E



1) Internal web page

When the sensor's IP address is entered into an internet browser, a website is loaded, displaying the current measured values and predefined limits. The website provides the option to choose between Czech and English languages. Temperature values can be displayed in degrees Celsius, Fahrenheit, or Kelvin. Additionally, instructions are available on how to display values from multiple TH2E devices on a single web page. *(See page 30.)*

2) XML file

At *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 33.)*

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

TH2E enables a periodic call for a script (e.g., PHP) on a given address - for example, a WEB server. *(See also page 34.)*

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 38.)*

5) MODBUS TCP protocol

TH2E can also communicate via standardized industrial protocol Modbus TCP. *(More info on page 42.)*

6) Email

According to the settings, TH2E sends e-mails with information if the measured values go outside of the set limits. *(See also page 41.)*

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) **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 43 for more information)*

Detailed characteristics

Network and communication

TH2E allows configuration of network parameters such as IP address, subnet mask, gateway, DNS server, and web port number. Current values can be sent automatically over a TCP connection, or the device can communicate in TCP server, TCP client, or UDP mode using the Spinel protocol. In this mode, the other device functions are not available. The device can also be reset to factory settings through the web interface.

Security

Two access levels are available: user for monitoring values and administrator for device configuration. A separate password can be set for each level. Telnet access and firmware upgrade can also be disabled if required.

Alerts and remote data transfer

When limits are exceeded, TH2E can automatically send an e-mail or an SNMP trap. It also supports periodic transmission of values to a server via HTTP GET and sending memory contents in XML format using HTTP POST. Current values and settings are also accessible through SNMP and XML.

Memory and data logging

The device stores measured values in internal memory with a capacity of 1,000 records, including measurement timestamps. Several logging modes are available, such as timed logging, change-based logging, and limit-state logging. When the memory is full, the stored data can be automatically sent to a server in XML format or by e-mail as a CSV file.

Measurement and alarms

Depending on the connected sensor, TH2E measures temperature and humidity and calculates dew point, or measures temperature only. For each measured variable, upper and lower limits, hysteresis, and individual memory logging can be configured. The device also stores minimum and maximum recorded values. Temperature can be displayed in Celsius, Fahrenheit, or Kelvin.

Date and time

Each record includes an exact measurement timestamp. Time can be synchronized automatically using an NTP server or manually from a PC. Time zone selection and automatic daylight-saving time adjustment are supported.

Hardware

TH2E measures relative humidity in the range of 0 to 100% and temperature, depending on the sensor type, in a range of up to -55 to +125 °C. It also calculates dew point. The sensor is connected by a cable 1 to 20 meters long, depending on the selected version. Power supply is 5 to 30 V, and the power adapter is included.

Other

The device can be assigned a custom name. The web interface is available in Czech and English and requires JavaScript to be enabled.

Hardware Options

Accessories are ordered separately and are not included with TH2E.

Sensor Cable Type

- Silicon cable, diameter 4.3 mm. Temperature resistivity -60 to +200 °C. Blue colour.

Sensor Cable Length

- 1 to 20 meters

Mounting

- Without mounting *(standard)*
- With a DIN rail mount (35 mm)



Fig. 1 – TH2E with DIN rail mount

Power

- 5 to 30 V DC (Power supply 15V included. PSU as a wall plug adaptor.)

Please feel free to contact us if you have any specific requirements regarding the TH2E sensor design or functionality.

Package Contents

- TH2E electronics (without sensor)
- 15V power supply in the form of a wall adapter
- 1m straight-through Ethernet cable
- A card with a brief guide on how to connect TH2E to Ethernet.

Available Accessories

Sensor

- **TH3: Temperature and humidity sensor:** Integrated sensor for temperature and humidity (plus dew point calculation) – placed inside a metal block 40 × 16 × 10 mm.



Fig. 2 – Integrated sensor for temperature and humidity

- **Temperature sensor** with a standardized diameter of 6 mm and a length of 60 mm, housed in an aluminium stem.



Fig. 3 – Temperature sensor

- **TH15:** This older type of sensor with green-red marking "TH2E" supports TH2E up to serial number 0436/14732 (ie manufactured up to approx. 4/2020).



- Power cable, 1 meter in length, terminated with a coaxial connector for TH2E. The other end has bare wires for connection to a power source.
- Cable for powering from a USB 2.0 port (or power adapter).

CONNECTION

1) Connect the sensor to TH2E. (It is necessary to connect the sensor before powering on to ensure proper sensor initialization.)
2) Connect TH2E to a power source using the supplied power adapter or another 5 to 30V power supply.
3) Then, connect TH2E to Ethernet (computer network) using the supplied cable. (If you want to connect TH2E directly to a PC, use a crossover cable.)
4) The device's default IP address is **192.168.1.254**, and the subnet mask is **255.255.255.0**. What should you do if the default settings are not compatible with your network?
    a. Configure IP address assignment via DHCP – see the Reset section (page 46).

b. Set a new address using the **Papouch Device Finder** app (papouch.com/finder).

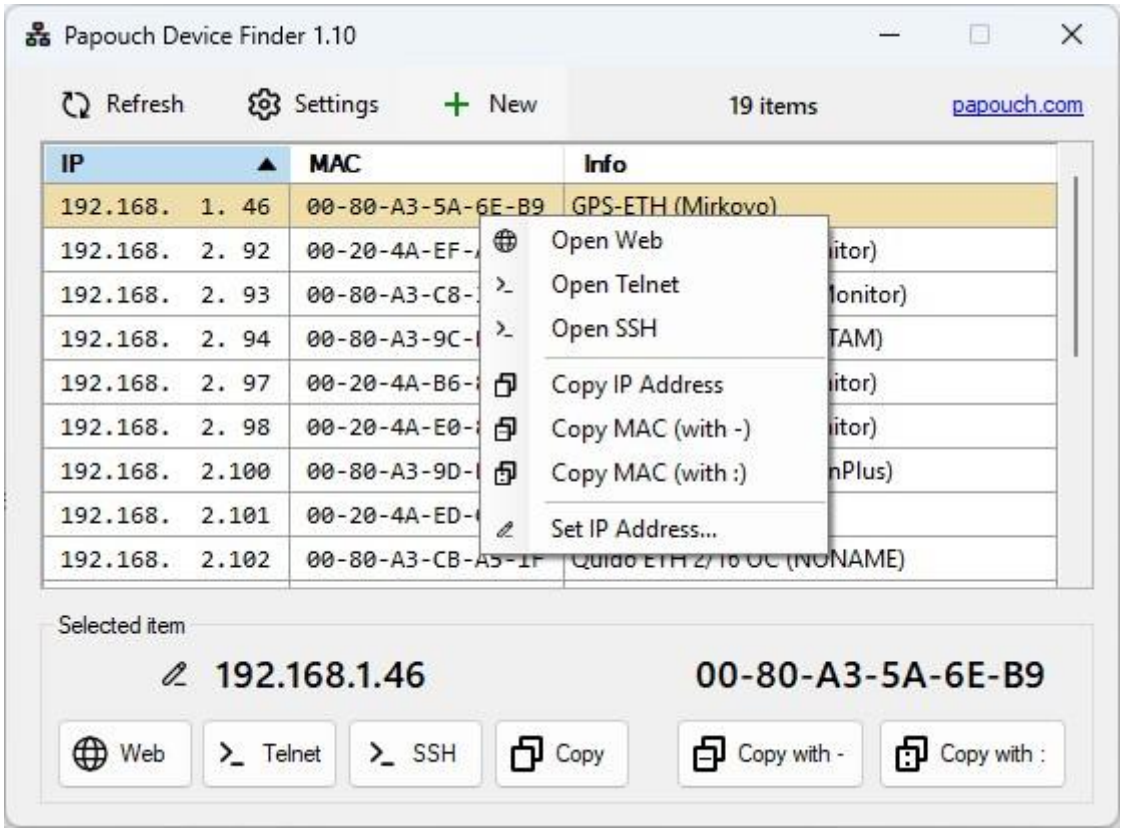


Fig. 4 – Papouch Device Finder

5) After setting the address, you can connect to TH2E using a web browser. The web interface is accessible directly at the IP address of TH2E. Enter the device address in your browser like this: http://192.168.1.254/ (this example is given for the default IP address set from the factory).

DEVICE CONFIGURATION

Device configuration is performed through the **Web interface** for TH2E. For network settings, you can also use the Telnet protocol (see page 27).

The **Papouch Device Finder** program (papouch.com/finder) is designed to locate devices on the network and configure their IP addresses. The Finder is shown in Fig. 4.

WEB INTERFACE SETTINGS

To enter settings, push *Settings* button in upper right corner of TH2E main WEB 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 over http to your server

- *Memory* – Modes for logging the values to memory, action upon memory full.
- *Sensors* – thresholds, hysteresis and unit's settings, logging
- *Other* – device label, WEB interface language, temperature units, extreme memory, time settings, …
- *Info* – device information

Tips for settings:

- Help for all configuration items is displayed automatically when hovering the mouse cursor over the respective field. (Help is also displayed when hovering the mouse over headings marked with a question mark symbol at the end.)

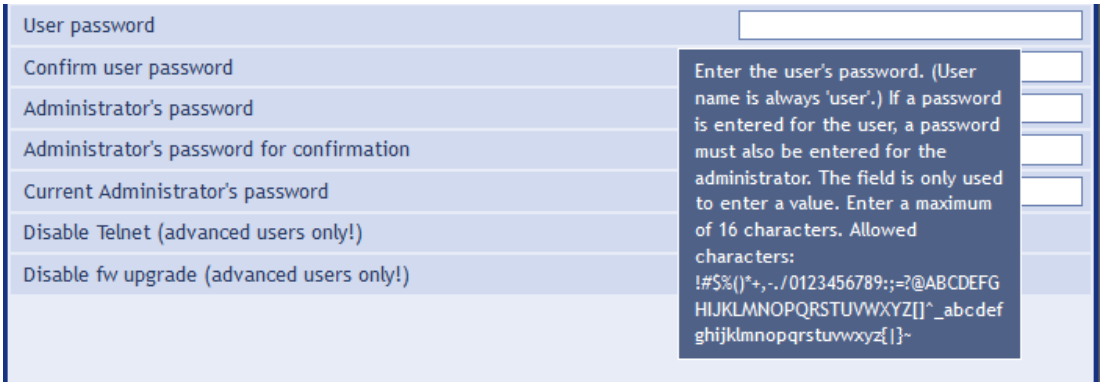


Fig. 5 – Context help for the settings menu items

- The settings can also be opened by pressing the S key when the browser window is active.
- The settings can be closed by pressing the Esc key when the browser window is active.

Network

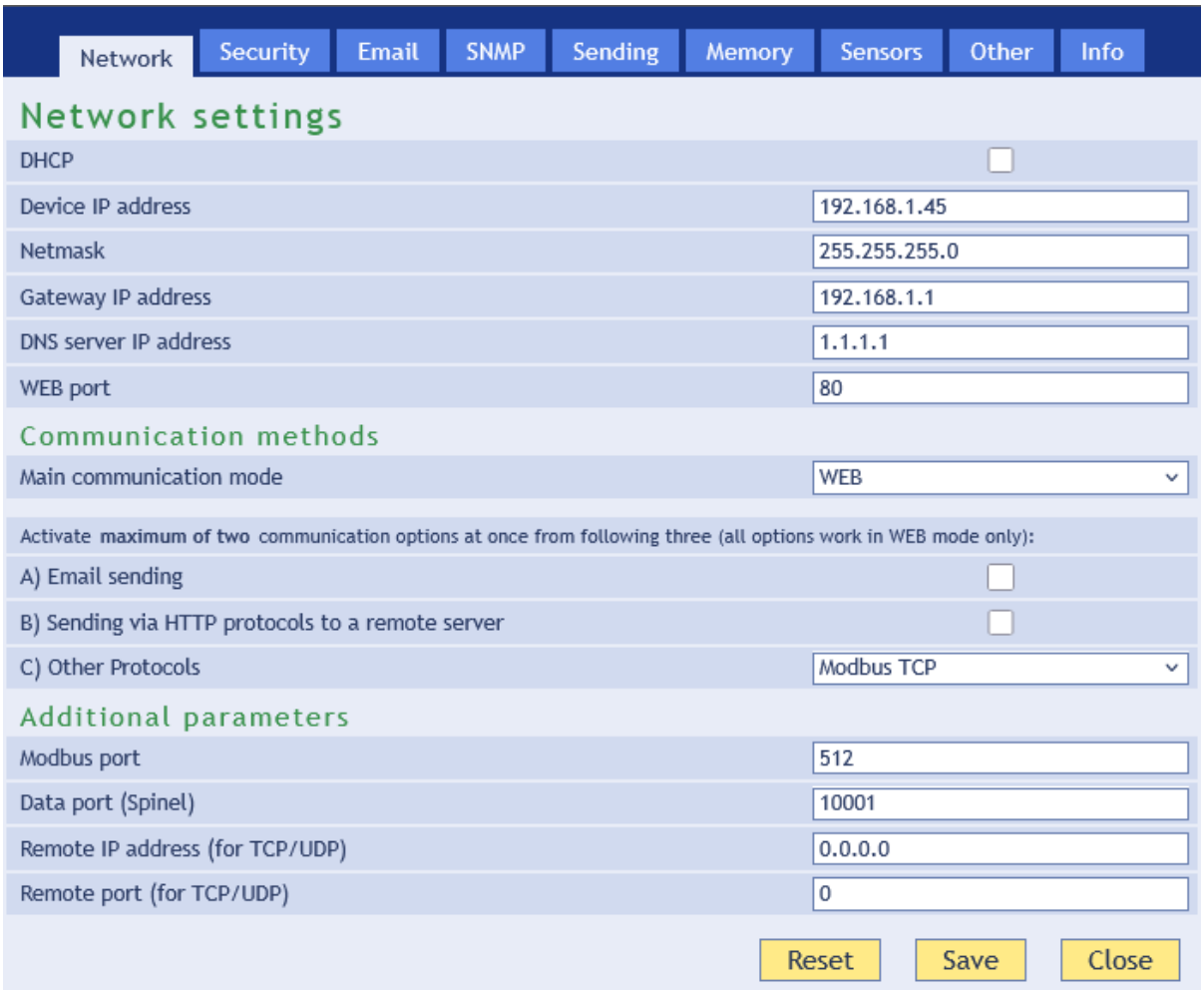


Fig. 6 – Network settings panel

Device mode

Communication 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.

Enable two communication protocols from the following three options at a time (choices are only available if the main communication mode is set to WEB.):

A) E-mail sending

This option allows e-mails to be sent if set in E-mails panel. This option is also affected by *Memory* panel settings if the CSV format e-mail sending is set.

B) Sending via HTTP protocols to a remote server

This option allows the HTTP GET and HTTP POST sending, this can be configured in *Sending* panel. This option is also affected by *Memory* panel settings if the HTTP POST in XML format sending is set.

C) Other protocols

Choose some of the following options:

- *Spinel packet:* Information of the measured-out values is periodically sent to Spinel port. (This option is only active in WEB mode.)
- *Modbus TCP:* Communicates with a superior system via ModBus TCP protocol on assigned port. (This option only works in WEB mode.)
- *Disabled*

Miscellaneous

ModBus port

Here you can set the port for ModBus RTU communication. Standard port is 502. *(Port is accessible only if the option is enabled.)*

Data port (Spinel)

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.

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.

Device reset

This button allows you to reset all device settings to their default values. Only the IP address will remain unchanged. The web port will be changed to 80. A full reset can also be performed using the hardware button.

Security

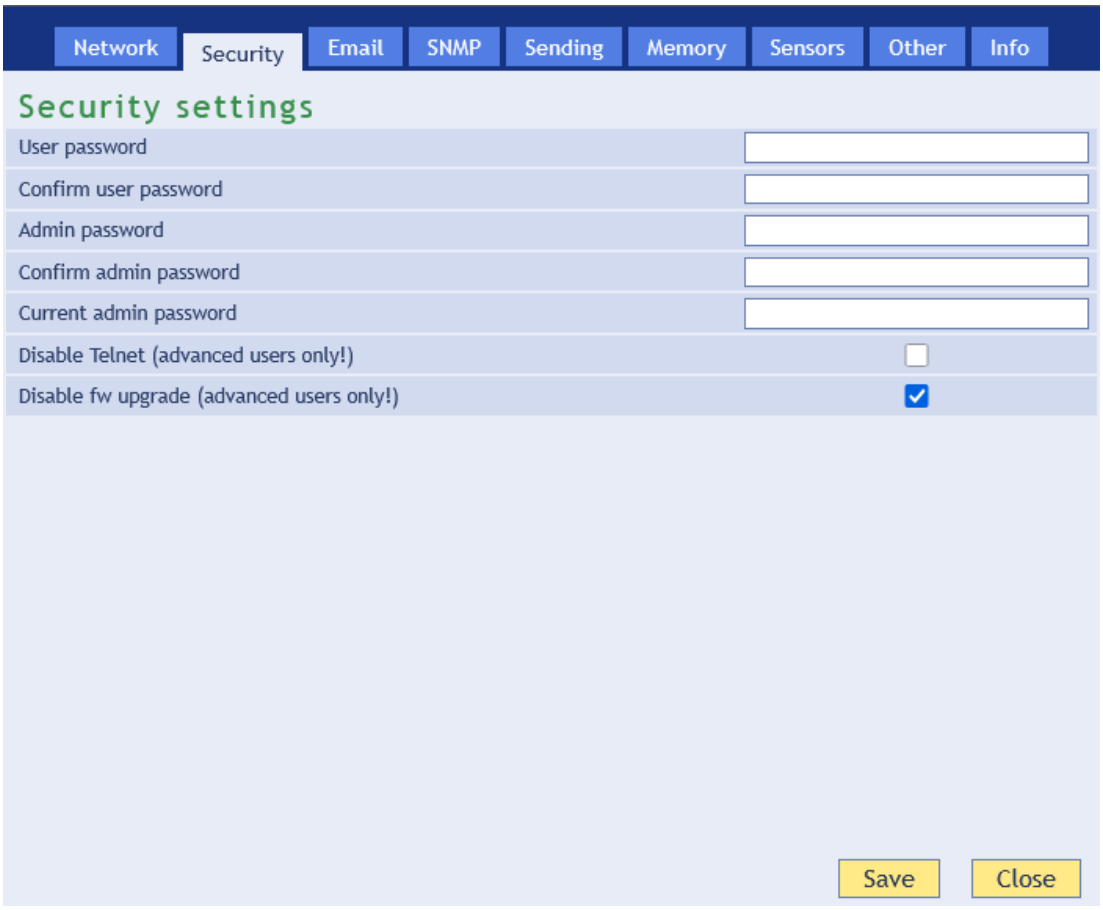


Fig. 7 – Security settings panel

User password [2]

Enter the password for user access here. This security level allows users to view only the current readings. Access to settings is not permitted.

The login username is always "user". To cancel the password, leave the fields empty.

Admin password [2]

Enter the administrator password here. This security level allows access to the device configuration.

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

Current admin password [2]

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

Disable Telnet (advanced users only!)

If you disable the Telnet protocol and encounter problems when flashing the firmware, you may need to contact the manufacturer for service!

[2] The password can be up to 16 characters long and may contain only the following characters: !#$%()*+,-./0123456789:;=?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[]^_abcdefghijklmnopqrstuvwxyz{|}~

If a password is entered for a user, a password must also be entered for the administrator. This field is used only for entering values. For security reasons, no settings are displayed after saving.

Disable fw upgrade (advanced users only!)

If you disable firmware updates, any necessary repairs may only be performed by the device manufacturer.

Email

E-mail sending settings. *This function is activated globally in the Network panel!*

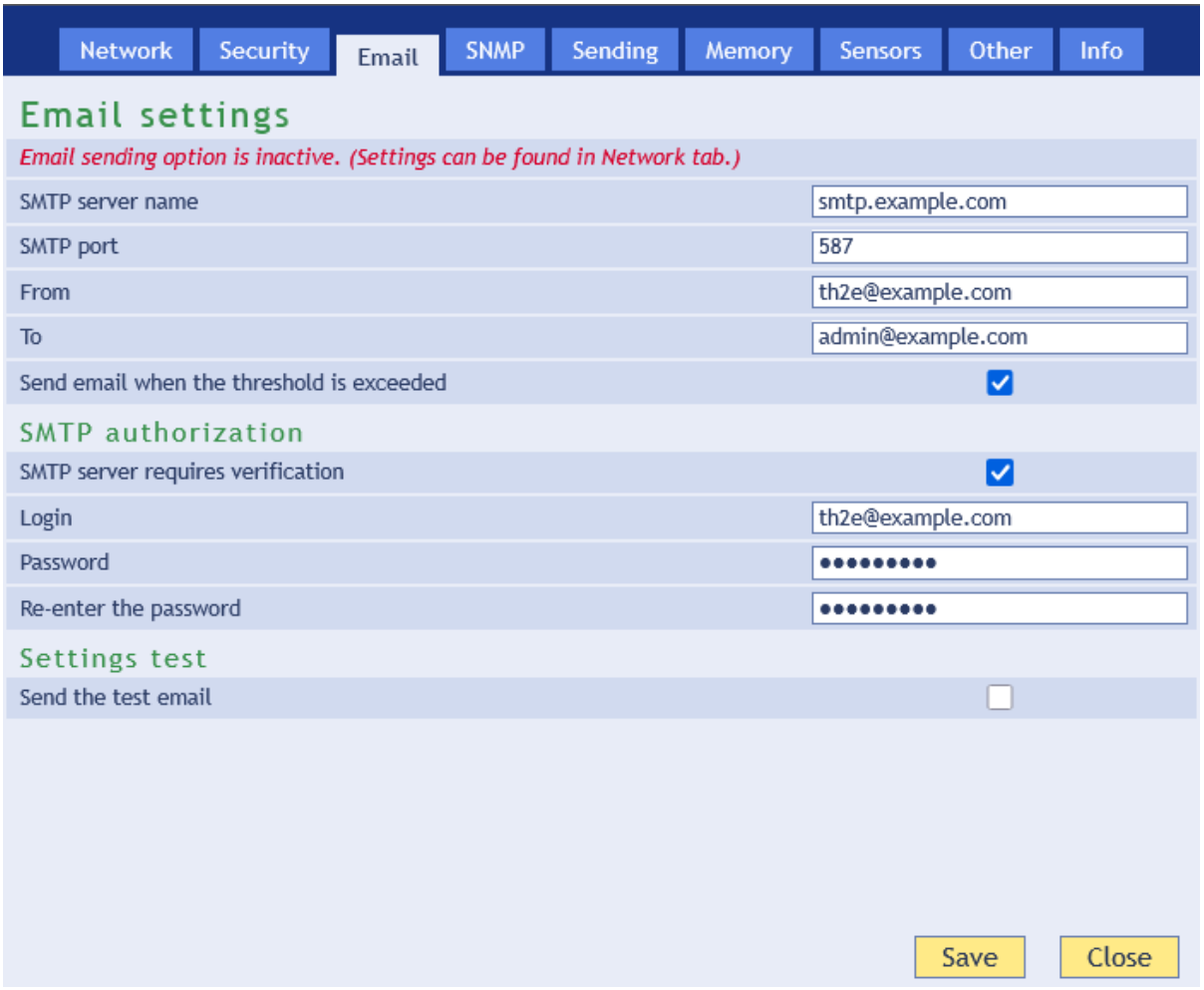


Fig. 8 – E-mail settings panel

SMTP server name

Enter the name or IP address of the SMTP server through which emails are to be sent. (The email sending feature can only be used with SMTP servers that do not require SSL-encrypted communication.)

From

Fictitious address TH2E – the address from which measurement data will be sent.

To

The email address to which measurement data and memory contents should be sent once the memory is full.[3]

[3] The memory contents are sent only if the function is enabled in the *Memory* panel

SMTP authorization

Here you can enter your login credentials if the SMTP server you are using requires sender authentication. [4]

SNMP

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

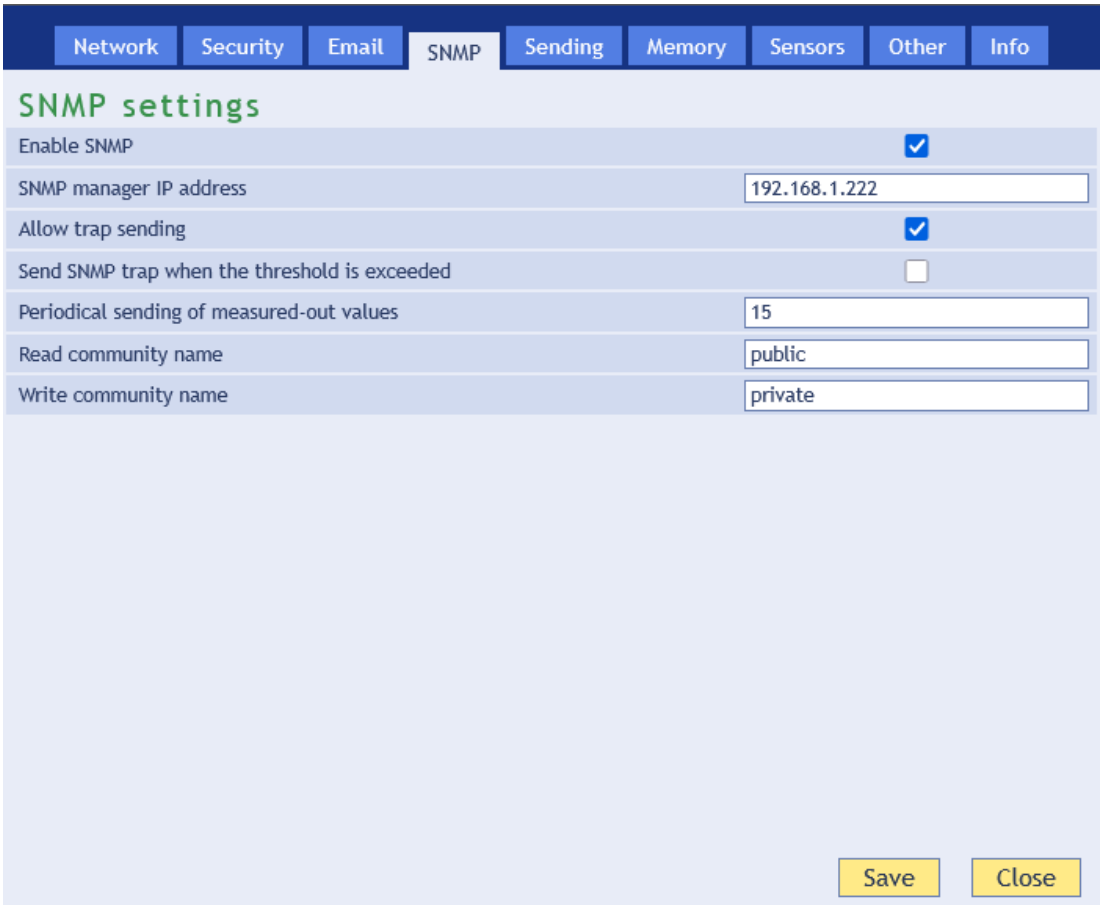


Fig. 9 – SNMP settings panel

Enable SNMP

If the checkbox is not selected, logging is completely disabled on the device.

SNMP manager IP address

The IP address of the server that collects SNMP messages from devices on the network.

Allow 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.

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

Periodical sending of measured-out values

Enter the interval at which the current measured values should be sent to the SNMP manager. The values are sent as SNMP traps. The interval is specified in minutes. If you do not wish to use this feature, enter 0 as the interval.

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. *This function is activated globally in the Network panel!*

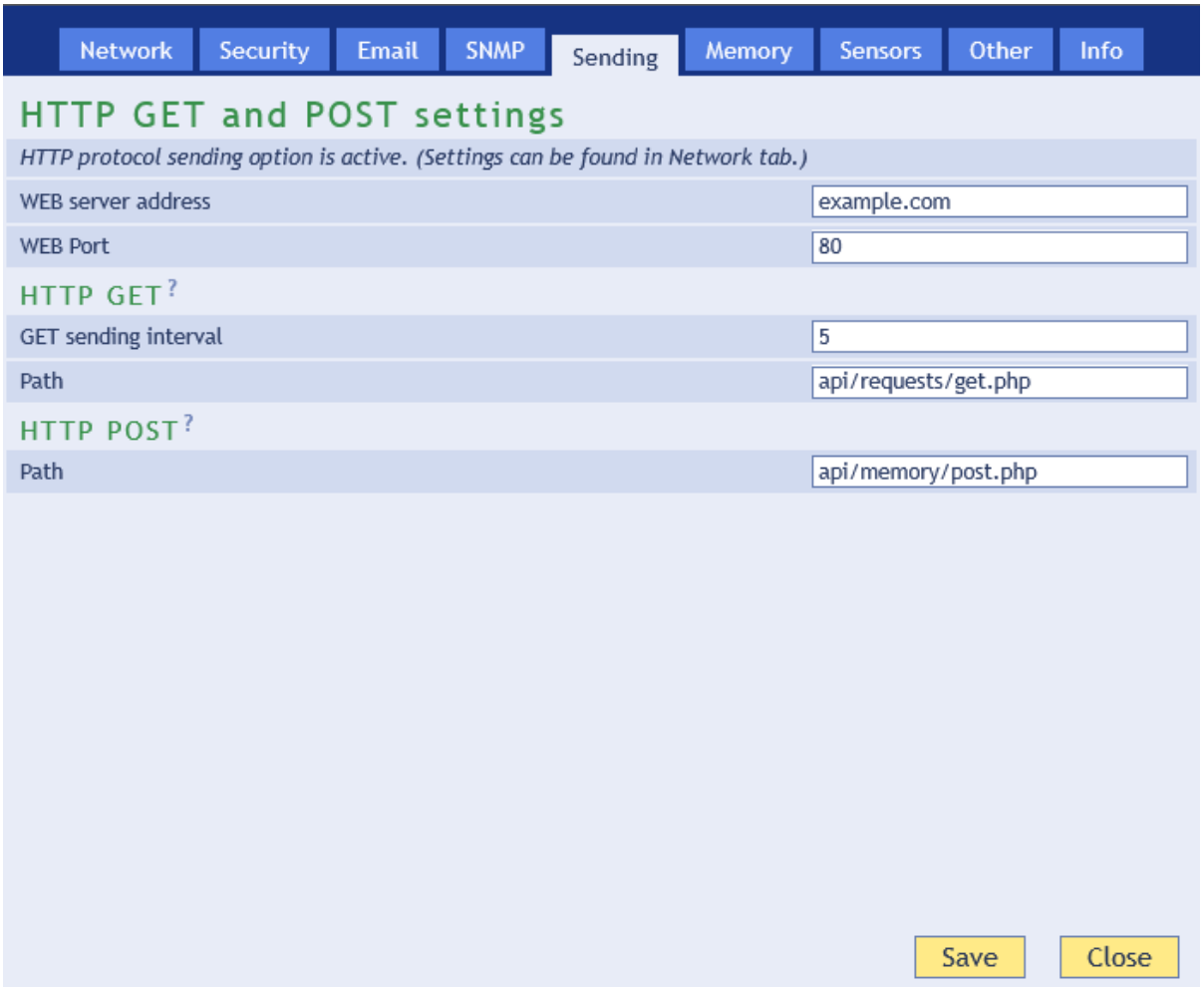


Fig. 10 – HTTP protocol sending settings panel

WEB server address

Enter the URL or IP address of the web server that is to receive the measured values here. If you are unsure which address to enter, contact your server administrator.

WEB port

The web port number of the server that is to receive the measured values. It is usually 80, but sometimes 8080.

HTTP GET

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

GET sending interval

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

Path

Enter the path to the script on the server. For example, if the complete address of the script is *http://example.com/api/th2e/get*, enter only this: */api/th2e/get*

Maximum length is 50 characters `a-zA-Z0-9.-/_=?`

HTTP POST

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

Path

Enter the path to the script on the server. For example, if the complete address of the script is *http://example.com/api/th2e/get*, enter only this: */api/th2e/post*

Maximum length is 50 characters `a-zA-Z0-9.-/_=?`

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.)

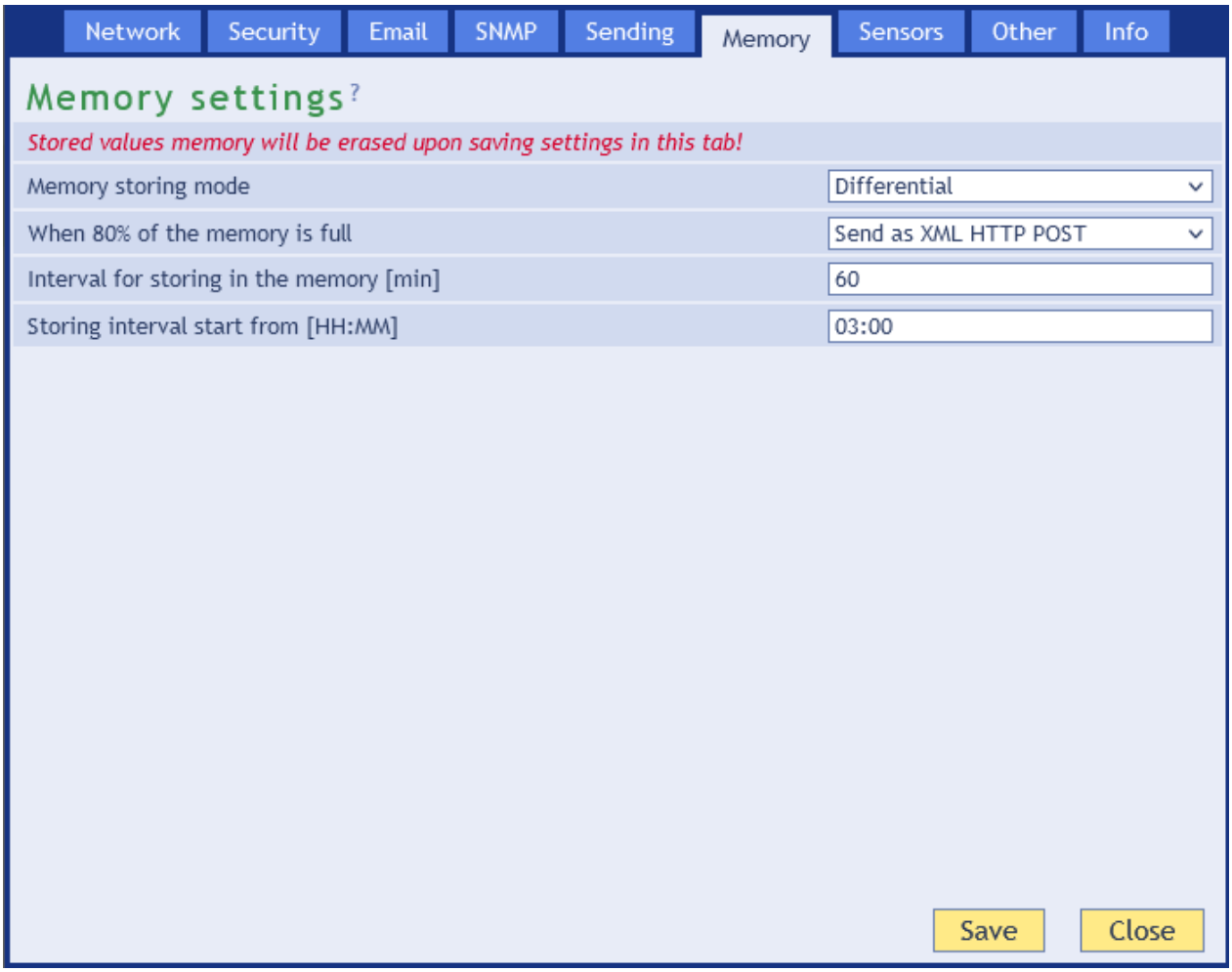


Fig. 11 – Memory settings panel

Memory storing 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 quantity[5]. 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 verso). This mode is particularly convenient when watching regulation systems for temperature or humidity. Hysteresis can also be set for this mode.

When 80% of the memory is full

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

[5] Hysteresis principals are explained in Fig. ***13*** on page 24.

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.

Interval for storing in the memory

Enter here, how often the values shall be stored in the memory. Entry is in minutes. Expected number is in range of 1 to 1440 (that is 1 minute to 1 day). This setting only applies in *Time mode.*

If the period is a number incommensurable with the number of minutes in a day (1440), the time between the last record before the *"Storing interval start from"* and the first after it will be shorter than the desired period.

Logging time can differ from the actual measuring time for up to +3 sec.

In *Time Mode*: Specifies the interval after which a reading is to be stored in memory.

In *Differential Mode* and *Extreme Values Mode*: The maximum time interval between two readings being stored in memory. If this time elapses since the last reading, a reading is always stored.

Storing interval start from

This specifies the starting point from which the storage period in memory is to be counted. This setting is used to ensure precise timing of entries in memory.

Enter the value in the format hh:mm.

Example: If 00:00 is set and the period is set to 15 minutes, data will be saved at 0, 15, 30 and 45 minutes past the hour.

Sensors

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

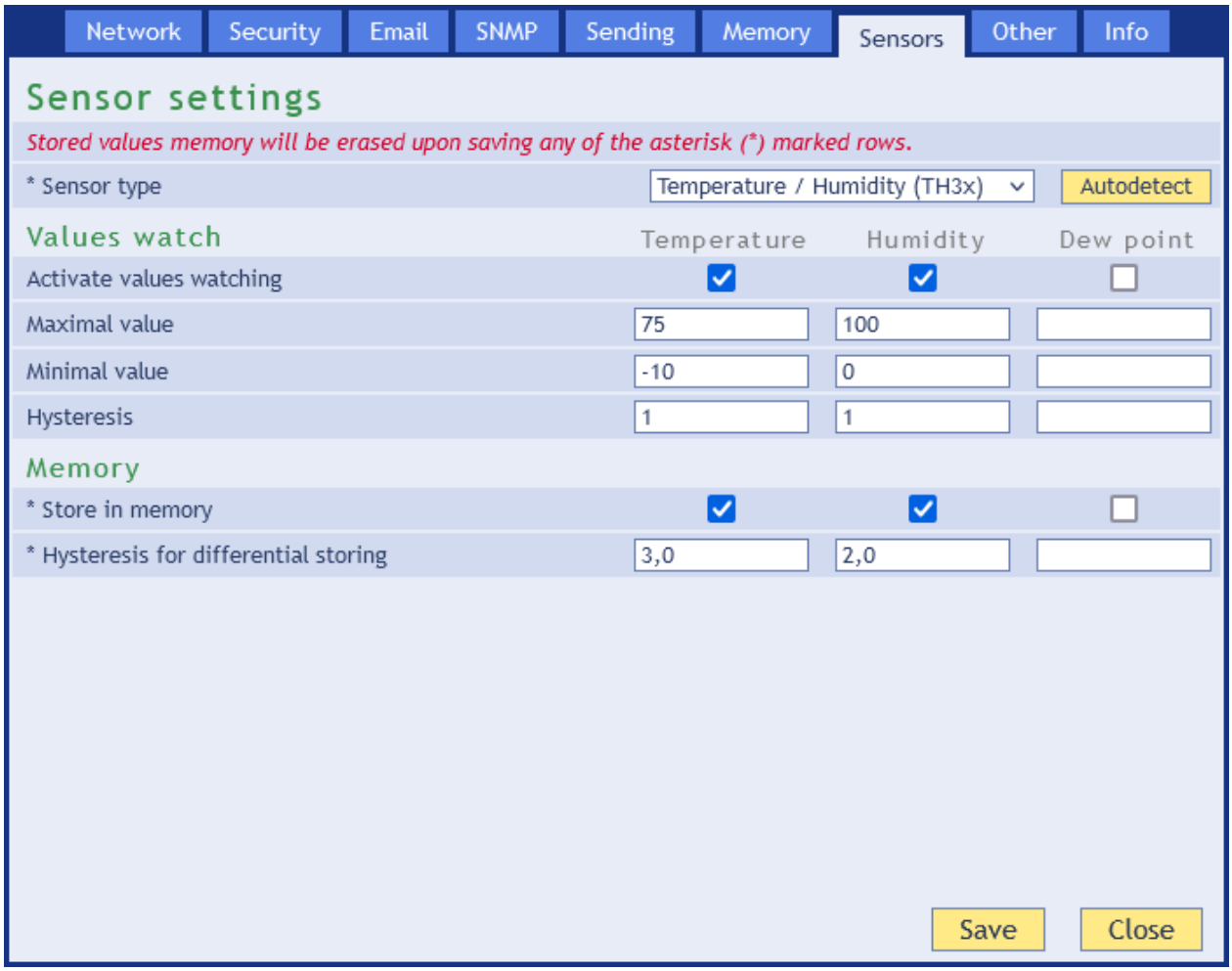


Fig. 12 – Single quantities settings panel

Sensor type

Chose the type of sensor connected or click *Autodetect* button and wait for TH2E to autodetect the sensor. You can choose from these types of sensors:

1) Temperature (DS)
2) Temperature (TMP)
3) Temperature / Humidity (TH15) [6]
4) Temperature / Humidity (TH3x) – factory default

Values watching

Activate values watching

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

[6] This older type of sensor with green-red marking "TH2E" supports TH2E up to serial number 0436/14732 (ie manufactured up to approx. 4/2020).

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. 13.

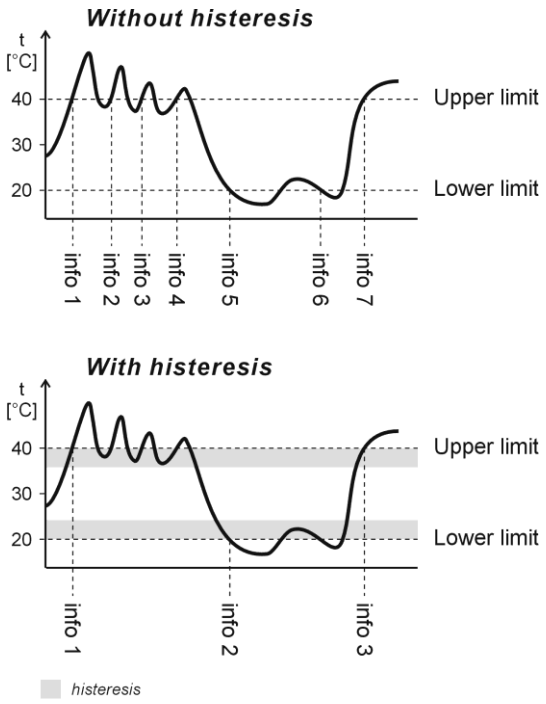


Fig. 13 – Hysteresis

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.

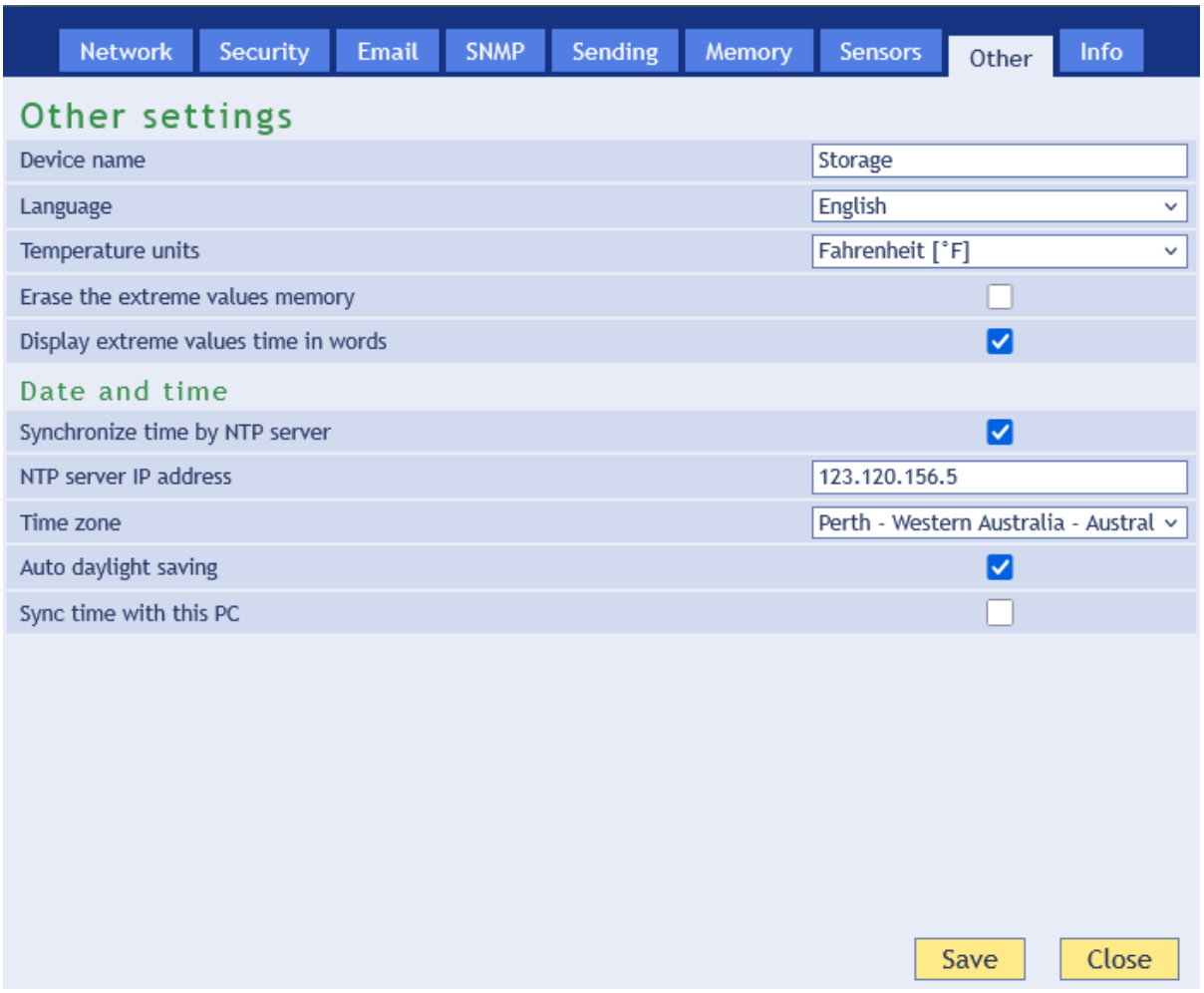


Fig. 14 – Other parameters panel

Device name

You can use this string to identify the device based on its location, for example. (Only characters without diacritical marks can be entered.)

Language

Interface language. English and Czech available.[7]

Temperature units

Units to display temperatures.

Available are: Celsius, Fahrenheit a Kelvin.[8]

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)

Display extreme values time in words

If checked, time of extreme values will be displayed on the main page as a word expression: *An hour ago*, *Yesterday* etc... If it is unchecked, the time will be displayed as a standard time value in the national format (date and time).

[7] More languages can be added if required.

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

Date and Time

A timestamp is also stored in the memory with every measurement. The device's current time can be set automatically via an internet time server or manually via the PC on which the web interface is open. (This is suitable for local networks without internet connectivity.)

In addition to measurements, the following events are also stored in the memory: device restart or power-up, device power-down.

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 ant set *Gateway's IP address* in *Network* panel.)

NTP server IP address

Enter IP address of the NTP server. This server has to be accessible from the network TH2E is connected to. [9]

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.

Sync time with this PC

If the device does not have network access to the Internet, you can check this box to synchronize the time once when you save the settings for this panel. The time is synchronized with the PC's clock.

[9] For example, you can use the public server tak.cesnet.cz, which has the IP address 195.113.144.238.

Info

This panel is not a configuration panel, but it contains various device information, such as the MAC address, firmware version, a link to the measurement history, and so on.



Fig. 15 – Information panel

Measurement history

The measurement history is available when you open the *history.html* page.

Caution: Reading measurement history in XML format is very time-consuming for the device. It takes several tens of seconds to load the complete history. Use these links only when absolutely necessary. Multiple consecutive history queries will cause the device to become unstable, and the web interface may subsequently be unavailable for an extended period of time.

An example of the measurement history page is shown in Fig. 18. The **Export XLS** button allows you to save the measurement table for further processing, or to export the graph as a PNG image.

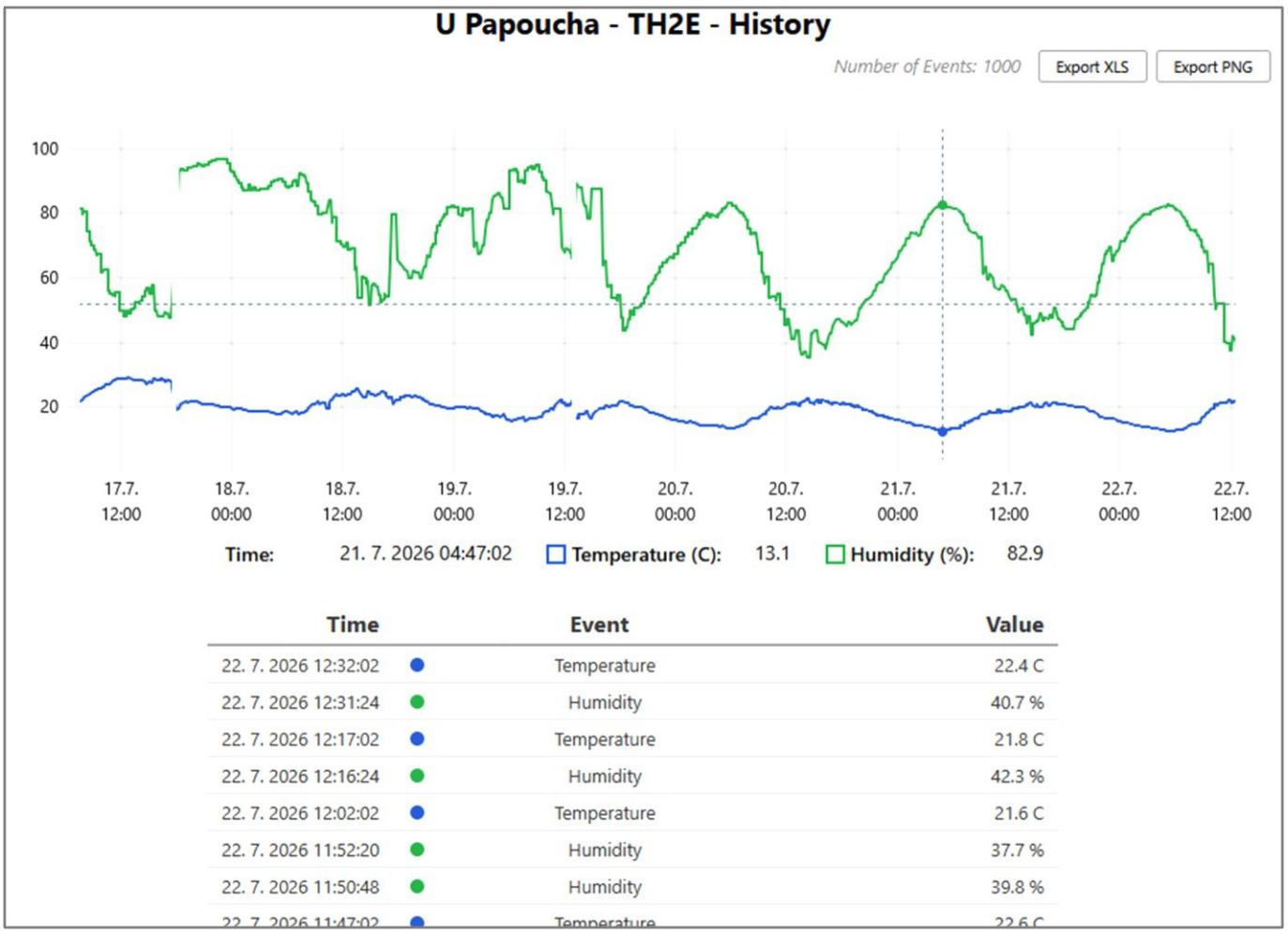


Fig. 16 - measurement history, graph, table and export to XLS or export the graph to PNG

TELNET CONFIGURATION

Telnet can be disabled this way through the web interface.

Connection

Unknown IP address

To configure the IP address, we recommend using the Papouch Device Finder program – d see page 10.

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. [10]
4) Type `open [new_ip_address] 1` and confirm.
5) Terminal shows an error message after a moment. Nevertheless, this action is essential for correct IP address ARP entry.
6) Connect to the IP address of the 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.

[10] In OS Windows 11, the client for Telnet is not a standard part of the system. Installation procedure:

a) Enter "windows features" to search bar in Windows 10 and choose *Turn Windows features on or off*.
b) Windows features window opens, check Telnet Client and click OK.

IP address is known

1) In OS Windows click on Start/Run and type `telnet` and confirm.
2) Connect to the device's IP address (by typing `open [IP address in dot format] 9999` and Enter).
3) If the IP address is valid, the device displays some basic information, which ends with the following 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

Device 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

See page 6 for a brief overview of the ways in which TH2E values can be read.

Web interface

Entering the IP address (the default is 192.168.1.254) into your browser will display the web interface (fig. 17). [11] The page shows the current values, the sensor name (if specified), and the set limits. If any of the limits are exceeded, they will be highlighted in color. Current values can only be monitored in *web* mode.[12]

In the upper-right corner, there is a button with a gear icon for accessing the settings.

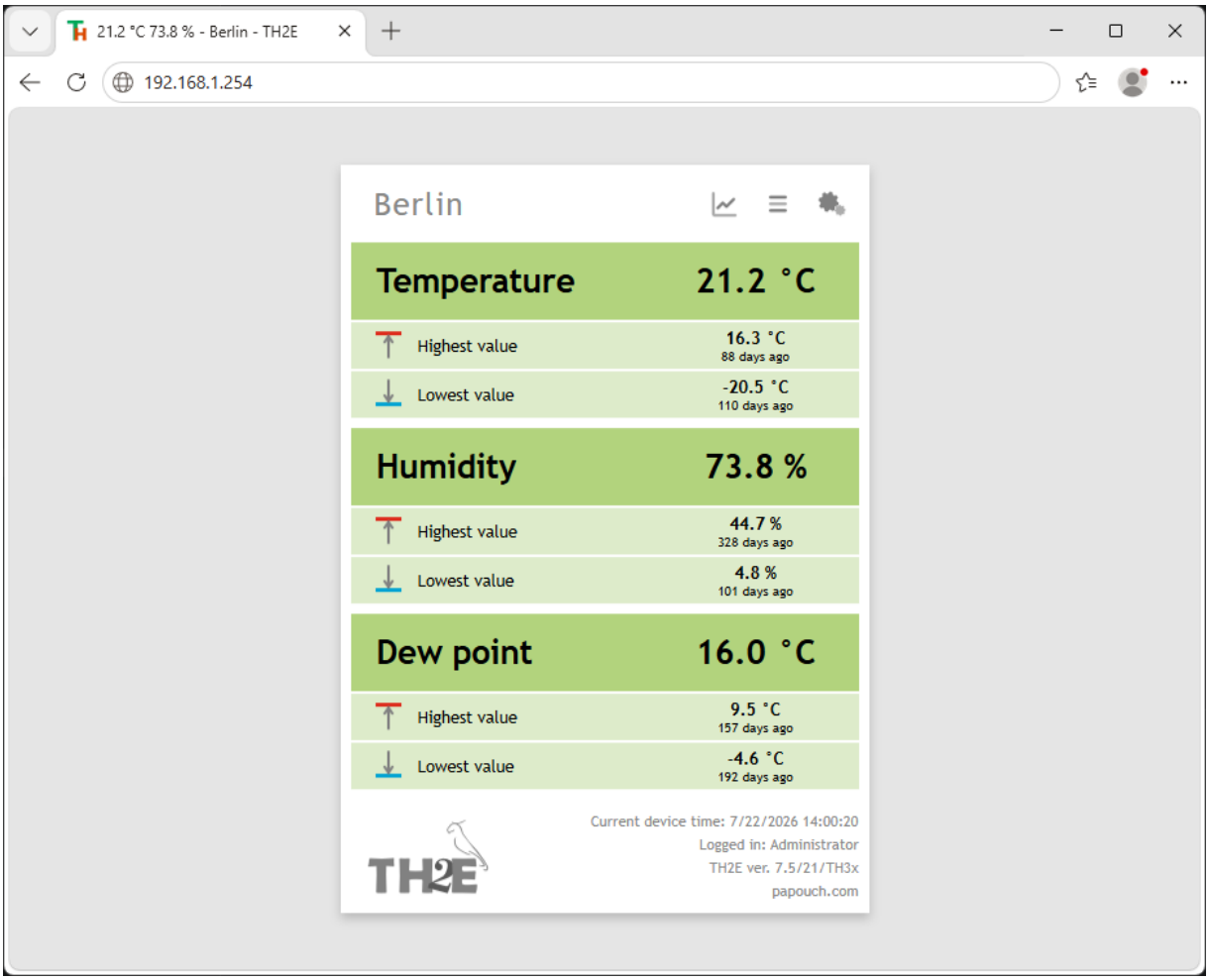


fig. 17 – Main web screen

[11] If you are interested in customizing the appearance of the web interface or adding your company logo, etc., please contact us.

[12] The mode is configured under *Network > Main Communication Mode*.

Simple version

Tapping the three-bar icon in the header opens the current view in a smaller window.

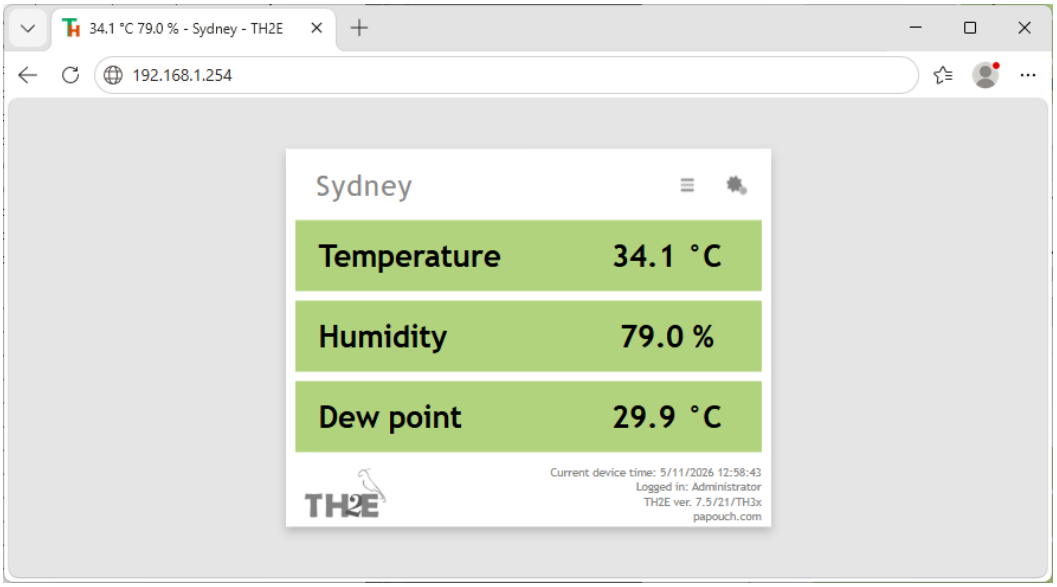


Fig. 18 – Simplified page

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.

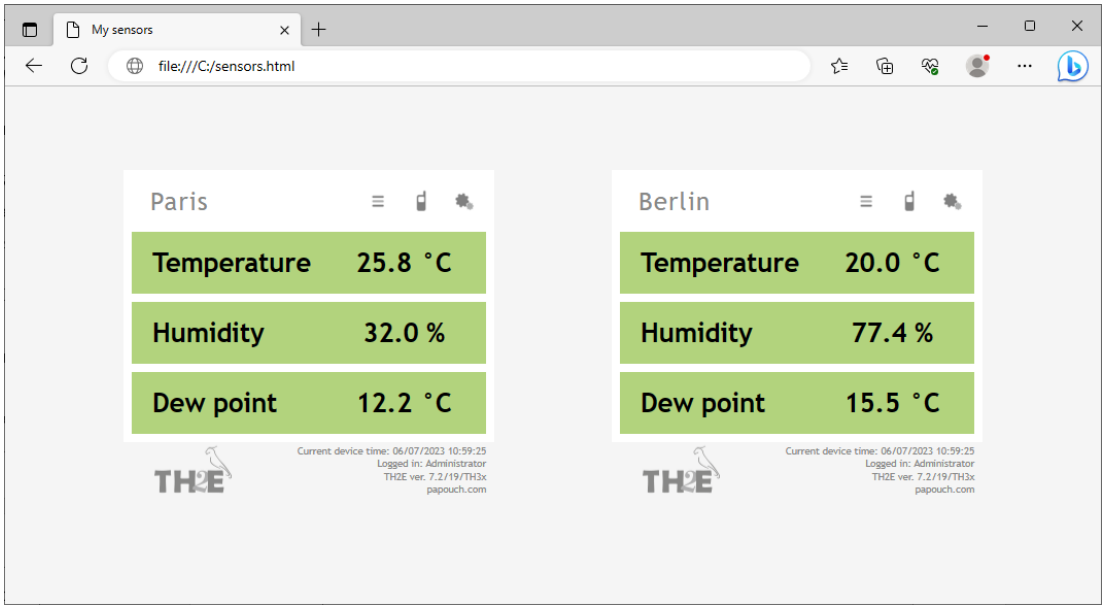


Fig. 19 – Display values from multiple TH2E on one page

The simplest way to implement the above example is to use a static page with html iframes:

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

2) Copy following text to the file:

```
<!DOCTYPE html>
<html>
<head>
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge" >
    <title>My Sensors</title>
</head>
<style>
    body {
        background-color: #F5F5F5; display: flex; justify-content: space-evenly;
        height: 100vh; margin: 0; align-items: center; flex-wrap: wrap;
    }
    iframe {
        border: none; min-width: 200px; height: 340px; width: 360px;
    }
</style>
<body>
    <!-- Rewrite the examples below with your TH2E addresses.
        Change the number of lines according to how many TH2Es you have. -->
    <iframe src="http://192.168.1.56/index.html?mini"></iframe>
    <iframe src="http://192.168.1.38/index.html?mini"></iframe>
</body>
</html>
```

3) Number of devices 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` by IP addresses of your devices.

4) Save the file to your hard drive, or to a server on your company's intranet or on the internet, if you wish other users to have access to it. (If you save the file to a server, the addresses in the lines beginning with 'iframe' must be specified from the perspective of that server. The server must be permitted to access these IP addresses.)

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

XML file

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* – for example, http://192.168.1.254/fresh.xml for the default settings of TH2E.

```
<root xmlns="http://www.papouch.com/xml/th2e/act">
  <sns id="1" type="1" status="0" unit="0" val="20.1" w-min="" w-max=""
       e-min-val="-15.3" e-max-val="37.0"
       e-min-dte="02/15/2021 07:19:45" e-max-dte="06/30/2019 17:10:59" />
  <sns id="2" type="2" status="0" unit="3" val="46.9" w-min="" w-max=""
       e-min-val="17.3" e-max-val="100.0"
       e-min-dte="06/30/2019 17:20:34" e-max-dte="10/15/2015 22:15:22" />
  <sns id="3" type="3" status="0" unit="0" val="8.4" w-min="" w-max=""
       e-min-val="-17.1" e-max-val="22.5"
       e-min-dte="02/15/2021 07:20:13" e-max-dte="06/13/2020 15:43:22" />
  <status frm="1" location="U Papoucha" time="06/02/2023 14:59:11" />
</root>
```

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

status

location

User defined device name.

time

Current device time.

sns

id

The ordinal number of the quantity. (First number is 1.)

type

Quantity type, it can reach these values:

1 ..... temperature from range -40 to +125 °C or -55 to +125 °C [13]
2 ..... humidity from 0 to 100 %
3 ..... dew point

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)

[13] 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*). (You can reset this memory in Other panel.)

Sending values to 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 GET sending interval on page 18.

HTTP GET Parameters are following:

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

`name` ..... device name defined by user.

`tempS` ..... Describes 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)

`tempV`.....Measured-out temperature as a number with one decimal. (In degrees Celsius)

`humS`.....Status of the measured-out humidity (It is the same as for the temperature)

`humV`.....Measured-out value as a decimal number without units.

`dewS`.....Status of the dew point. (It is the same as for the temperature)

`dewV`.....Dew 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 mode[14], 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 waits for a connection on its IP address and data port. After establishing connection, it sends measured-out values every 10 seconds in Spinel protocol. [15]

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 *chn*. 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) [16] multiplied tenfold. Bytes are in order MSB:LSB. Current value with one decimal accuracy can be obtained as following: current_value = value / 10		

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

[15] Format is compatible with Spinel 97. More info at: https://en.papouch.com/spinel.

[16] 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 our WEB site papouch.com in TH2E part.

SNMP

SNMP contains objects with the current TH2E states. A detailed description of the objects follows. A MIB table that you can import into your SNMP manager can be downloaded from papouch.com. TH2E uses SNMP version 1.

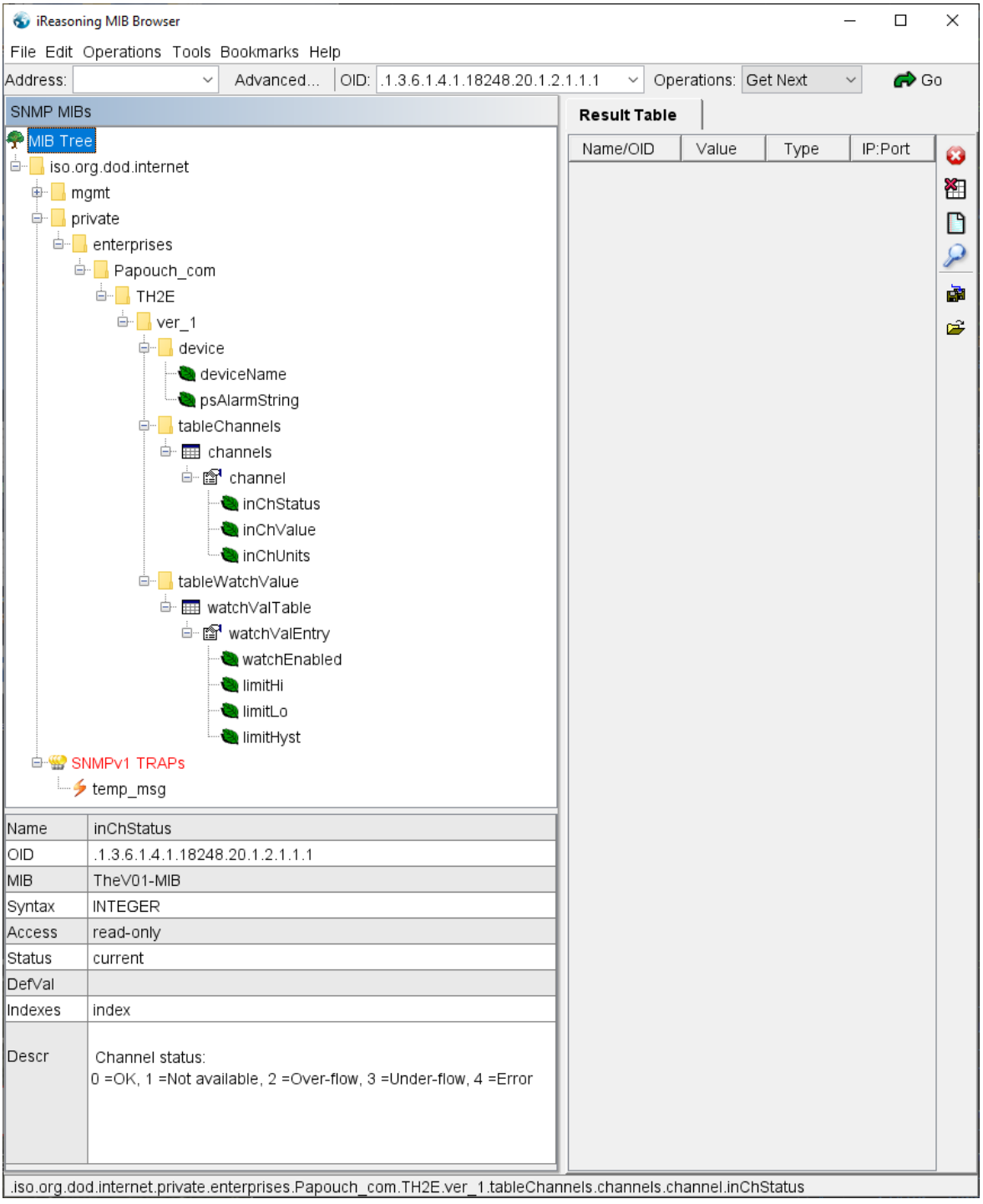


Fig. 20 – MIB tree

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

snmpwalk -v1 -c public 192.168.1.254 1.3.6.1.4.1.18248

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

Using SNMP

Include in your SNMP manager the description of the MIB table from *TH2E_v01.MIB file*. [17]

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

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.

[17] These files can be downloaded from: papouch.com .

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 22. 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.

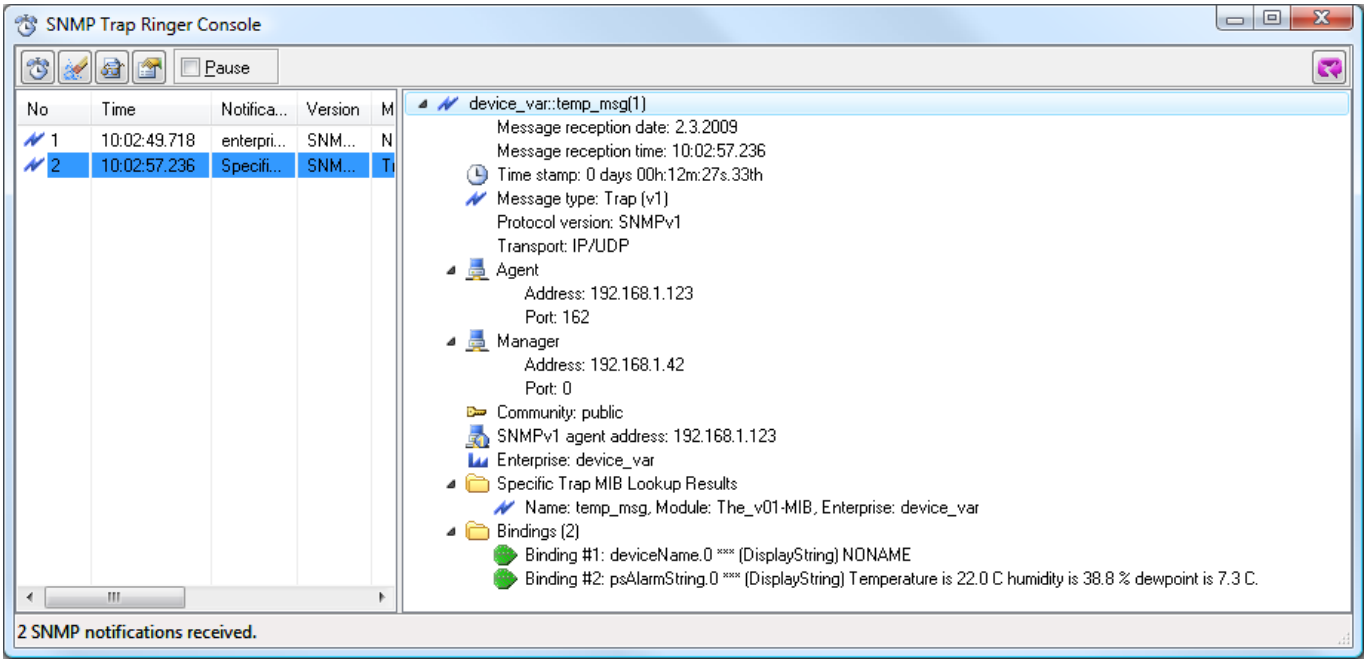


Fig. 21 – SNMP trap upon overrunning the specified limit

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

TH2E can send an email in the following situations:

- If any of the set limits are exceeded
- If the memory is full

Some of the limits is overrun

TH2E can send e-mail information that some of the limits have been 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 file attachment with all the records from memory. This function can be adjusted in *Memory* panel.

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	0x04	Temperature – Status
0x0001	read	0x04	Temperature – Value signed integer
0x0002	read	0x04	Temperature – Value float (3. a 2. byte)
0x0003	read	0x04	Temperature – Value float (1. a 0. byte)
0x0004	read	0x04	Humidity – Status
0x0005	read	0x04	Humidity – Value signed integer
0x0006	read	0x04	Humidity – Value float (3. a 2. byte)
0x0007	read	0x04	Humidity – Value float (1. a 0. byte)
0x0008	read	0x04	Dew point – Status
0x0009	read	0x04	Dew point – Value signed integer
0x000A	read	0x04	Dew point – Value float (3. a 2. byte)
0x000B	read	0x04	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 standard[18].

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	4

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*

[18] IEEE 754 description is available here: http://en.wikipedia.org/wiki/IEEE_754

Value INT	2 Byte	Measured-out value as signed integer.
Value float	4 Byte	Measured-out value. 32 bit float by IEEE 754

MEMORY

Memory in TH2E is for saving measured-out values. Contents of the memory can be red 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.

Memory storing for each value can be set individually. Record with time stamp is stored in the internal memory on startup as well.

Memory has a capacity for 1000 records. (One record is a value from one quantity, so the memory has a capacity of 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.

After the whole content of the memory is sent as an XML of 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 verso). This mode is particularly convenient when watching regulation systems for temperature or humidity. Hysteresis can also be set for this mode.

WARNING: Loading the entire measurement history in XML format is very time-consuming for the device. Retrieving the complete history takes several tens of seconds. Use this function only if absolutely necessary. Sending multiple consecutive queries for the history in a short period can cause instability in the device, and the web interface may become unavailable for an extended 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

Whole memory content is accessible in *history.xml*.

- All memory contents in XML format can be obtained by reading *history.xml* (with no parameter).
- Last 30 records can be obtained by entering the *last* parameter.
  (Example: *http://192.168.1.254/history.xml?last*)

XML file contains main *root* element which contains *event* elements with individual records. e*vent* element is in following format:

```
<event type="tmp" value=" 22.40" time="02/25/2009 04:55:13" />
<event type="hum" value=" 38.50" time="02/25/2009 04:55:13" />
<event type="dew" value="  7.60" time="02/25/2009 04:55:13" />
<event type="res" value="   0.0" time="02/25/2009 04:57:00" />
```

`type` attribute defines elements as follows:

- `tmp` .....temperature
- `hum` .....humidity
- `dew` .....dew point
- `res` .....last time record (time when the device has been turned off)

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.

FAQ

What settings do I need to configure for TH2E to work on my network?

All you need to do is configure the device's network settings for your network (IP address and, if necessary, subnet mask). Use the Papouch Device Finder program see page 10.

How do I find a device's IP address?

Use the Papouch Device Finder program see page 10.

INDICATION

STS Indicator (green + red)

WEB communication mode:

- *light green on:* waiting to initialize the main processor
- *green on and red flashes briefly:* the device is in operation + sensor working
- *red on and turns off briefly:* the device is in operation + sensor error

TCP/UDP communication mode:

- *light green on:* waiting to initialize the main processor
- *green on:* the device is in operation + the connected sensor is working
- *red on:* the device is in operation + sensor error
- *red flashes briefly:* the connected sensor is working + the device received data packet after TCP / UDP connection

TCP indicator (green)

In TCP/UDP communication mode, it is lit when a connection is established on the data port.

Link indicator

(Left indicator on the Ethernet connector)

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

Connection type Indicator

(Right indicator on the Ethernet connector)

Nothing ..... no communication
Yellow ..... Half-Duplex
Green..... Full-Duplex

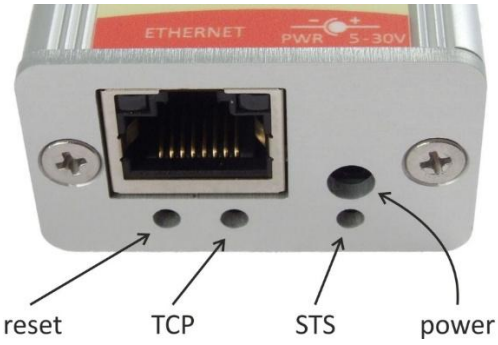


Fig. 22 – Indicators, power connector and the Ethernet connector

RESET

Use the following procedure to reset the device to "factory settings". Unlike the reset that can be done via the web or Telnet, the IP address will be changed to 192.168.1.254 or assigned by the DHCP server.

1) Disconnect the device from the power supply.
2) Press and hold the Reset button (see Fig. 22).
3) Continue according to how you want to assign the IP address:
    a. **IP address 192.168.1.254**:
        i. Turn on the power.
        ii. Wait for a few seconds and release the button between the 5th and 10th sec.
        iii. IP address is set, device is in "factory setting".
    b. **IP address assigned by the DHCP server**:
        i. Turn on the power.
        ii. Wait approx. 25 sec and release the button.
        iii. The device is in "factory setting". The IP address assigned by the DHCP server can be found in your DHCP server (typically in your router). The section with such assigned addresses has different names - for example, *DHCP Client List*, *DHCP Clients*, etc.

TECHNICAL PARAMETERS

Integrated temperature and humidity sensor[19]

(Applicable to „TH2E“ version according to Tab 1 on page 5.)

Important Notice: Polymer sensor is a highly sensitive element that reacts with chemicals. Do not expose even the outer shell of the sensor to chemicals or their vapours (cleaning with alcohol, petrol etc.). Especially organic solvents and compounds can negatively affect the sensor accuracy by as tens of percent RH.

Coverage .....IP 54

Dimensions.....40 × 16 × 10 mm

Material.....hardened aluminum

Humidity sensor

Humidity range .....0 % to 100 % RH

Recommended measurement range .....20 – 80 %

Resolution.....1% RH

Humidity measurement accuracy .....see Fig. 23

Sensor element .....polymer sensor

Sensor mechanical finish.....inside hardened aluminum block

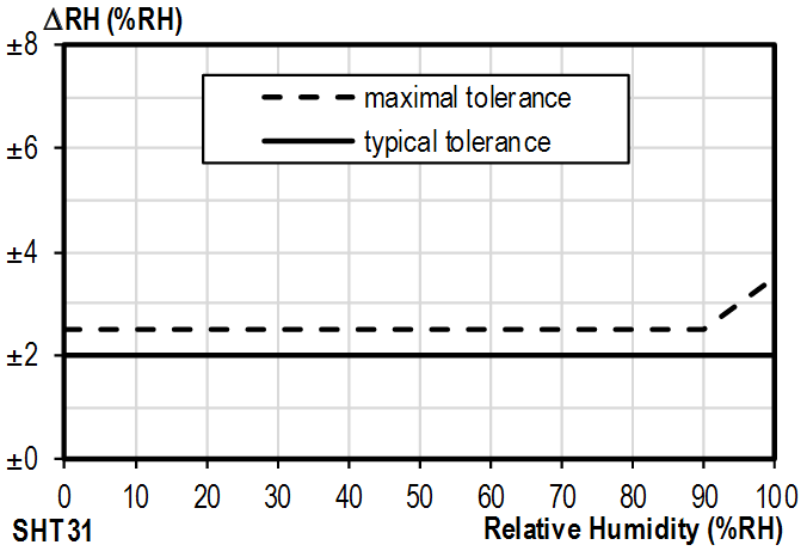


Fig. 23 – Accuracy of humidity measuring

[19] Sensor marked TH3 is supported in firmwares including and above version 2.12 / 3.12 (the first number is a hardware version). If you have an older firmware, you will have to flash the firmware to be able to read from TH3 sensor. Here are the key differences between the old version (Marked as TH2E) and TH3 version:

	TH3 (new sensor)	**TH2E (old sensor)**
Measurement accuracy within 0 – 10 %	±2 %	±2 to ±4 %
Measurement accuracy within 90 – 100 %	±2 %	±2 to ±4 %
Recommended measurement range	20 – 80 % RH	
Temperature measurement range	-40.0 °C to +125.0 °C	-40.0 °C to +123.8 °C
Temperature measurement accuracy	±0.3 to ±0.5 °C	±0.4 to ±2.0 °C

Operating and Maximum Range of Values

- Sensor is stable in standard range of humidity values. Long-term exposure to conditions outside these values (humidity above 80% in particular) can temporarily shift the measured-out values (by +3% for 60 hours). When the sensor is back to standard ranges, it returns to its pre-calibrated state slowly.[20]
- Long-term exposure to extreme conditions or to chemically aggressive vapor can speed up the aging process of the sensor significantly. It can also shift the measurements.

Temperature sensor

Range ..... -40.0 °C to +125 °C

Resolution ..... 0.1 °C

Sensor element ..... semiconductor

Sensor mechanical finish ..... inside hardened aluminum block

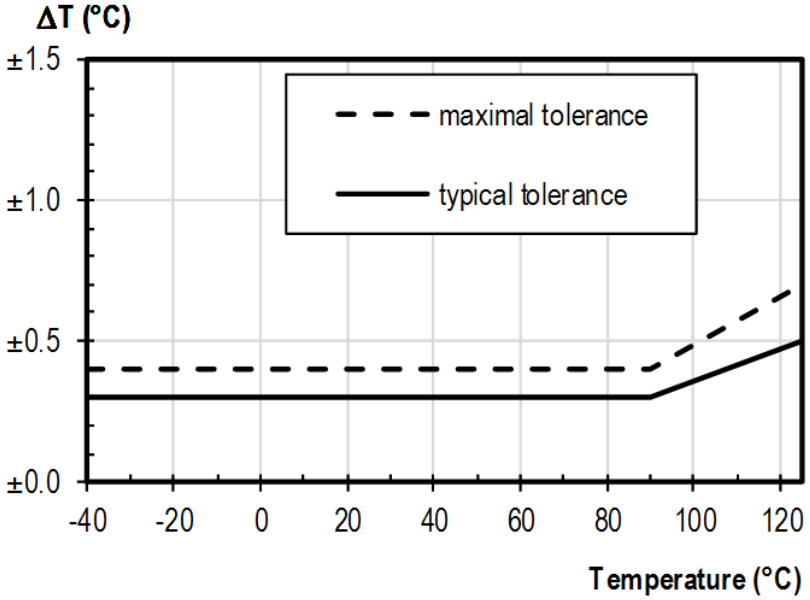


Fig. 24 – Accuracy of temperature measurement

Temperature sensor

(Applicable to „TH2E“ version according to Tab 1 on page 5.)

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 material ..... Hard Duralumin

[20] You can speed up this process by doing following:
1) Leave the sensor in environment above 100 to 105 °C and humidity below 5 % for at least 10 hours.
2) Leave the sensor in environment above 20 to 30 °C and humidity approximately 75 % for around 12 hours. (Humidity 75% can be achieved with saturated solution of NaCl.)

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

Other parameters

Sensor cable

Coating ..... Silicon

Wires isolation ..... FEP polymer

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

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

Maximum permitted temperature ..... +220 °C

Cable diameter ..... 4.3 mm (±0.1 mm)

Cable is highly resistant against moisture, chemicals and carbohydrates.

Ethernet interface

Connection ..... TBase 10/100 Ethernet

Connector RJ45

SSL/TLS ..... no

Clock circuit and internal measurement memory

Real-time clock (RTC) backup ..... super-capacitor (cannot be replaced by user)

No power RTC backup time ..... 5 days
(provided the device has been connected for at least 3 hours without interruption)

Data life expectancy in Memory ..... 10 - 45 yrs. (depends on ambient temperature)

Memory writes count ..... virtually unlimited in normal conditions

Thermometer electronics

Power supply voltage ..... 5 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 consumption ..... 1.5 W

Power connector ..... jack 3.8 × 1.3 mm; + inside

Electronics working temperature range ..... -20 °C to +70 °C

Operating humidity for electronics ..... 0 to 95 % RH (non-condensing)

Electronics dimensions ..... 41.5 × 24 × 72 mm

Enclosure material ..... anodized aluminum

Coverage IP30

Other parameters

Weight ..... 80 g (without sensor)

Default Ethernet settings

IP address 192.168.1.254

Subnet mask ..... 255.255.255.0 (8 bits; C mask)

Gateway 0.0.0.0

Security of device network operation

The device is intended exclusively for operation within a trusted local area network (LAN) behind a network router or firewall. It is not designed for direct connection to the public Internet or for direct access from external networks, for example via a public IP address or port forwarding.

The device communication interface does not use encrypted data transmission (HTTPS) and does not provide security mechanisms suitable for operation on a public network. The built-in authentication serves only as basic protection against unintended access within a local network and does not provide protection against attacks originating from public networks.

If remote access is required, we recommend using a secure connection via VPN or a similar security mechanism.

Papouch s.r.o.

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

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