TX20ETH

Measuring wind speed and direction

Intelligent anemometer with Ethernet

TX20ETH

Datasheet

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BASIC INFORMATION

Description

TX20ETH is an Ethernet anemometer, which is able to measure wind speed and direction. It is connected directly to a computer network (Ethernet). Measured data can be processed automatically or by operating personnel. Wind speed and direction is displayed on the internal web interface. When limits are exceeded TX20ETH is able to notify the operator via e-mail.

For automatic operation and processing, TX20ETH is able to communicate by a data channel via TCP, using protocols SNMP and MODBUS TCP. It can also send messages to a remote server via simple HTTP GET requests. Values from TX20ETH as well as setup are easily accessible even in the XML format.

Sensor configuration is carried out via web interface. Help is available for all parameters in Czech and English language versions.

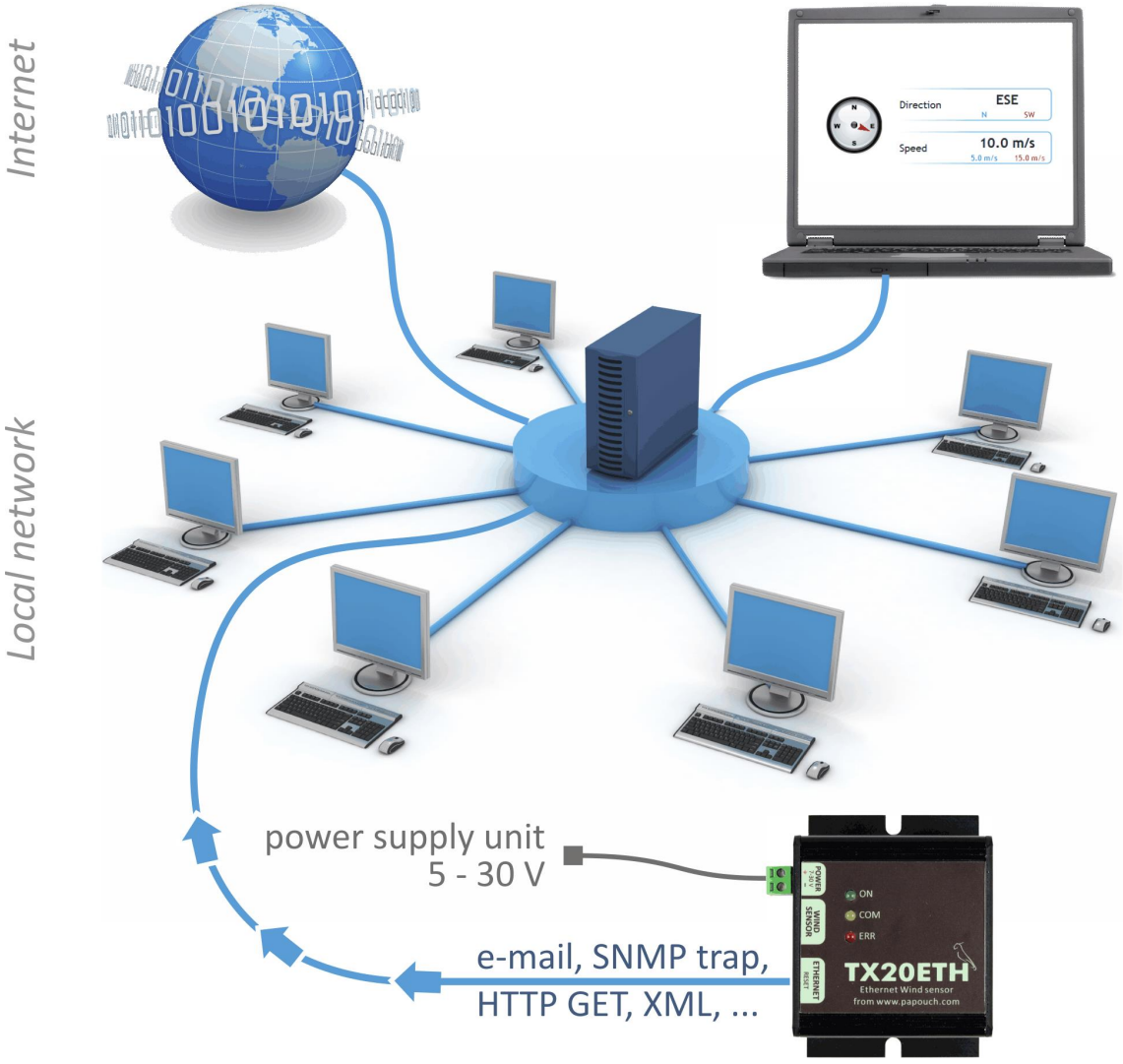


Fig. 1 – Connection and access to TX20ETH within a computer network

Main features

- Wind speed measuring up to 50 m/s (i.e. up to 180 km/h) resolution 0.1 m/s.
- Wind direction measuring – 16 positions within the whole range of 360°.
- It is possible to use a standard mechanical sensor TX20 or TX23.

Fig. 2 – wind speed and direction sensor

- Connection and communication via computer network (Ethernet).
- Data transmission via TCP/IP protocols (10/100 Ethernet).
- Configuration via web interface.
- Power supply 7 V to 30 V (a supplied socket adapter).

Measuring monitoring options:

1. Internal web page with undated values.
2. Possibility to display values from several TX20ETHs on one web page.
3. Automatic sending of values via HTTP GET request.
4. Current values and all configurations easily accessible in the XML format.
5. Automatically sends e-mails when set limits are exceeded.
6. Communication via TCP channel using the Spinel protocol.
7. SNMP protocol.
8. MODBUS TCP protocol.
9. Via the Wix program for PC.[1]

[1] Wix can be downloaded from www.papouch.com and is also available on the supplied CD.

How to get values from TX20ETH

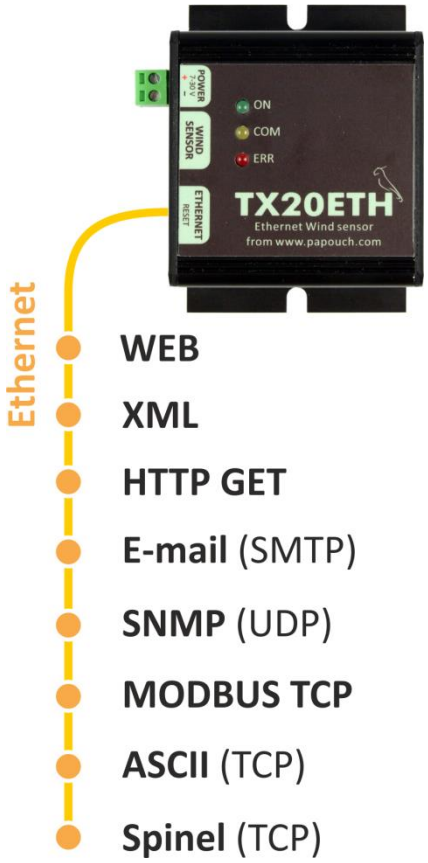


Fig. 3 – Options for access to TX20ETH

1) WEB site

After entering the IP address of the device into the internet browser[2], the relevant internet page is displayed showing the latest measured values. The website of TX20ETH is available in Czech and English depending on the configuration. The system can be configured to display values from several TX20ETHs simultaneously on one page. *(For more information see page 25.)*

2) XML file

A file in the XML format containing the latest measured values, name of the point of measurement, etc. is available at the address *http:///[IP_adresa]/fresh.xml*. *(For more information see page 26.)*

3) Easy transfer of measured values to your server using HTTP GET

TX20ETH enables you to periodically call a script (e.g. PHP) using your web server. The script receives from TX20ETH measured values in a parameter of the HTTP GET type. *(For more information see page 29.)*

[2] Web interface requires JavaScript to be enabled. The interface is optimised for the following browsers: Internet Explorer 7.0, Mozilla Firefox 3.0, Opera 9.6 and Google Chrome 1.0. The minimum recommended resolution for comfortable use is 1024 × 768 pixels.

4) SNMP protocol

According to its configuration, TX20ETH sends SNMP traps whenever the measured values exceed the set limits. It also enables regular sending traps with the latest measured values. This data can also be recalled from integrated SNMP objects whenever needed. *(For more information see page 31).*

5) MODBUS TCP Protocol

TX20ETH is also able to communicate via a standard industrial protocol – MODBUS TCP. *(See page 36.)*

6) Via email

According to its configuration TX20ETH sends notifications via email whenever the measured values exceed the set limits. *(See page 32.)*

7) Spinel (TCP protocol)

In a special mode, TX20ETH is able to communicate via the Spinel protocol. It is possible to choose whether it shall act as a TCP server or a TCP client. The device uses Spinel to communicate the standard way: request-response. Complete documentation of the protocol, including some examples, is available in a separate document.

Detailed Features

Network

- Configuration of the IP address, netmask, gateway, web port number and DNS server address.
- Selection of communication mode: WEB, TCP server, TCP client or UDP. In the modes of TCP and UDP it is possible to communicate with TX20ETH via data connection using the Spinel protocol.
- Configuration of the local and remote data port.
- Restoring the default setting by pressing the Reset button via web.

Security

- Two-level security – user (can only view the measured values) and administrator (can also configure the device)
- A different password for each level.

E-mails

- Sending an email when the limits are exceeded (Can be forwarded to your mobile.[3])
- SMTP authorization of the sender.
- Possibility to sent a test email to verify the configuration.

SNMP

- Sending a SNMP trap when the limits are exceeded.

[3] The functionality depends on the provider of your mobile telecommunication services.

- Recalling the latest values from internal SNMP objects.
- Community configuration for reading and making records.

HTTP GET

- Periodic sending of the latest measured value(s) to your web server using a simple HTTP GET request.
- For TX20ETH identification, the GET request contains also the MAC address.

Measuring

- Measuring of wind speed and direction from an external sensor.
- Possibility to the lower and upper limit for each variable. If any measured value exceeds the set range, the device will send an e-mail and/or a SNMP trap, according to the configuration. Sending can be delayed until the limit is exceeded for a given period.
- Activate monitoring values separately for each channel.

Hardware

- Wind direction measuring – sixteen possible directions.
- Wind speed measuring – up to 50 m/s with 0.1 m/s resolution.
- Length of cable connecting the sensor: 10 metres.
- Power supply: 5 to 30 V (adapter is included in the delivery).

Other

- Possibility to name the device as required.
- Configuration of a port for MODBUS TCP.
- Web interface available in two language versions – Czech or English.[4]
- Possibility to simplify the web display. (E.g. for easy displaying of variables from several sensors on a single web page using HTML IFrame.)
- The web interface requires JavaScript to be enabled. The interface has been optimised for the following browsers: Internet Explorer 9.0, Mozilla Firefox, Opera and Google Chrome. The recommended minimum resolution for comfortable use is 1024 × 768 pixels.

List of versions

Version 1.0

- The first version.

Version 2.0

- Multiple wind speed units available (m/s, mph, km/h, kt).
- WAP page no longer available (main WEB optimized for mobile devices).

[4] Other language versions can be provided upon request.

Design

Electronics

- In a metal box made of anodized aluminium.

Sensor

- Plastic sensor with mechanical detection of wind direction and speed.

Assembly

- Without a mounting clip *(standard design)*
- With a mounting clip for 35 mm DIN rail

Fig. 4 – Design with mounting clip for 35 mm DIN rail

- With a wall mounting plate

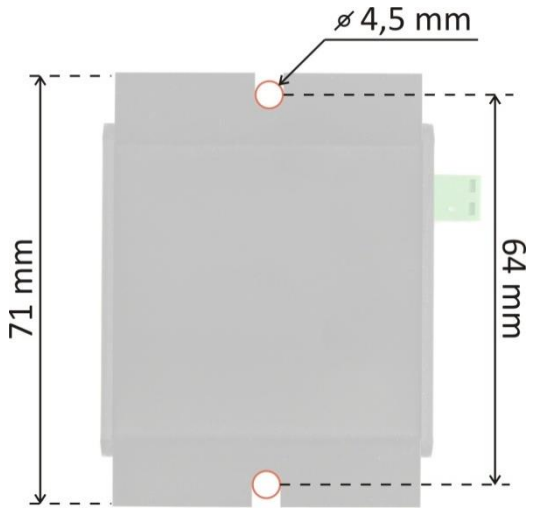


Fig. 5 – Wall mounting plate dimensions

Power Supply

- 7 to 30 V DC (The 12 V power supply unit (adapter) is included in the delivery.)

Do not hesitate to contact us if you have any other special requirements concerning the design and functions of the TX20ETH sensor.

Contents of Package

- Sensor electronics and a sensor for wind direction and speed measuring.
- 12 V power supply unit (socket adapter).
- Straight through Ethernet cable, 1 m long.

CONNECTION

1) Install the wind speed and direction sensor. (Please note that the sensor must be installed in the proper position in accordance with the cardinal directions marked on the sensor.)
2) Connect TX20ETH to power supply using the supplied adapter or another power supply unit of 7 to 30 V.
3) Then connect TX20ETH to the Ethernet (PC network) using the supplied cable[5]. (If you want to connect TX20ETH directly to a single PC, use a crossover cable.)
4) If the IP address range of your network is not compatible with the default IP address (**192.168.1.254**) and netmask (255.255.255.0) of TX20ETH, set an address which is suitable for your network using the Ethernet Configurator program. This software is available on www.papouch.com.

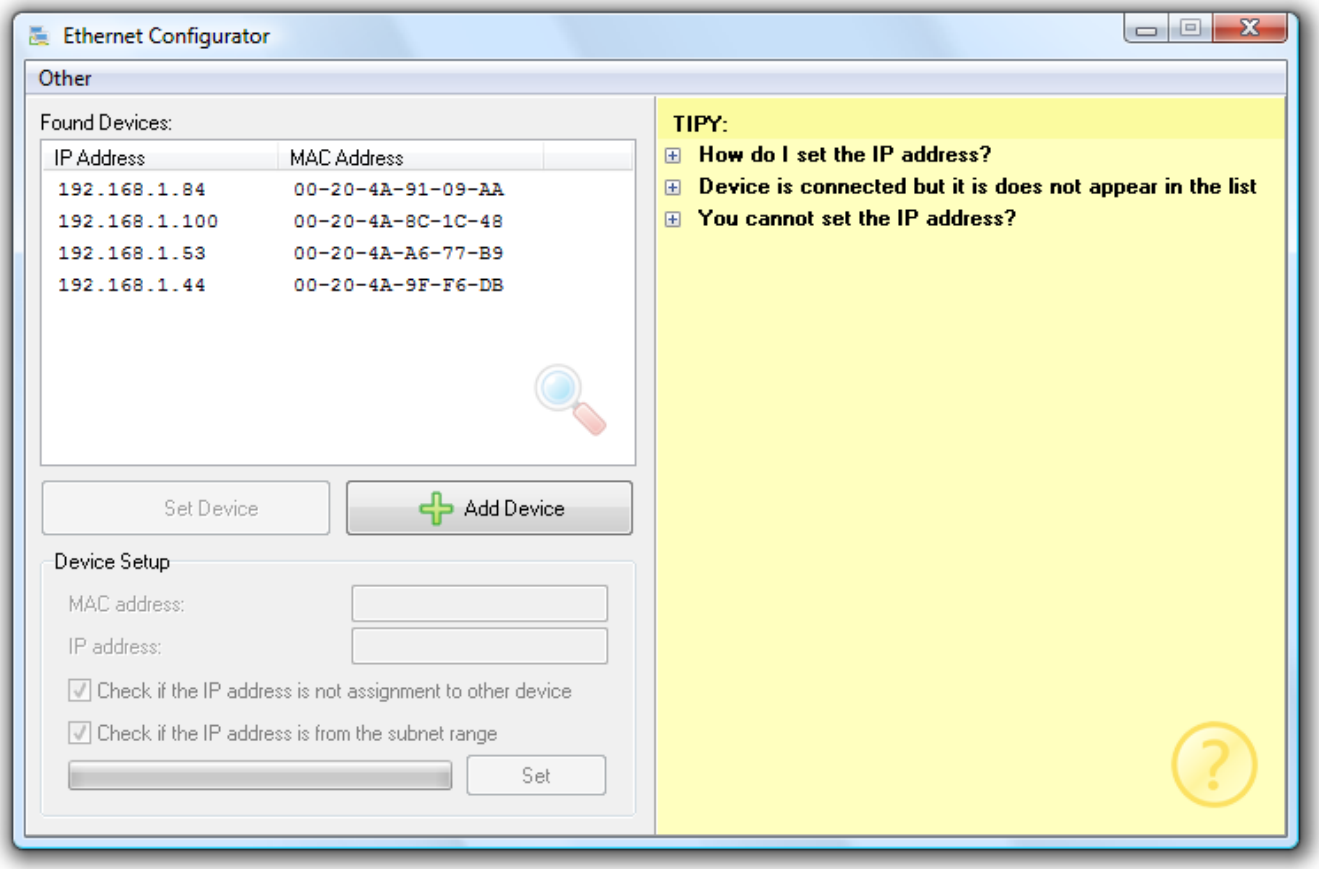


Fig. 6 – Ethernet Configurator for IP address setting

5) After having set the IP address you can connect to TX20ETH using your web browser. The relevant web interface is available directly at the IP address of TX20ETH. Open your web browser and enter the address of the device: *http://192.168.1.254/* (this example uses the default IP address, which has been set by the manufacturer).

[5] A standard straight through cable for PC networks.

DEVICE CONFIGURATION

Configuration of TX20ETH can be performed using:

- **Web interface**
- Telnet protocol (see page 21)
- Ethernet Configurator for the initial configuration of the IP address

Ethernet Configurator

Ethernet Configurator is used for setting the IP address of the device. The relevant software is available on www.papouch.com.

(Before running the software, connect the device to your computer network. Connect it either to a hub, switch, router or directly to a PC using a crossover cable.)

The program is available in Czech and English language and contains brief instructions helping the user to set the required IP address.

A sample screen from the program is shown in Fig. 6 on the previous page.

CONFIGURATION VIA WEB INTERFACE

To enter the configuration mode, press the button in the upper right-hand corner of the main webpage of TX20ETH.

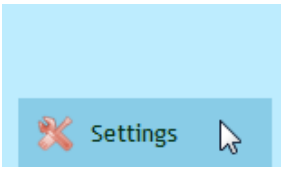


Fig. 7 – Button opening the configuration mode from the main page

Configuration options have been arranged into the following eight tabs:

- *Network* – to configure the interface, IP address, netmask, DNS server, mode, …
- *Security* – to set the passwords for web access
- *E-mail* – receiver, authorization, configuration test
- *SNMP*
- *Sending* – to send values to your server using HTTP GET
- *Values* – to set the limits
- *Others* – device name, MODBUS TCP and language
- *Info* – information about the device

Tips for working with the settings:

- The default language of the website is English. The web can be switched into Czech by changing the *Language* parameter in the *Other* tab.
- Help for all configuration items is displayed when you scroll the pointer over the relevant field. (You can also display Help by scrolling the pointer over headings marked with a question mark.)

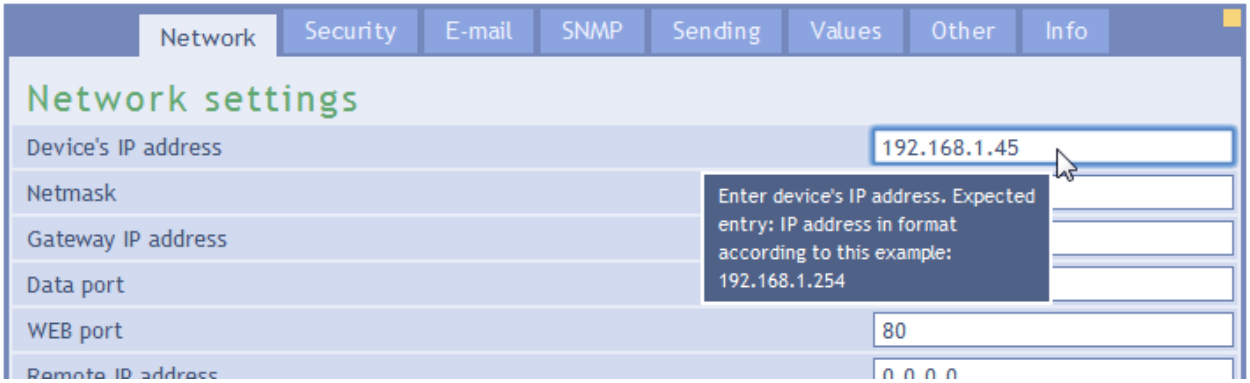


Fig. 8 – Instant help displayed using the mouse cursor

- The configuration window can be moved by clicking and holding the upper right-hand corner of the screen.
- The configuration window can also be accessed by pressing the S key when the web browser window is active.
- The configuration window can be closed by pressing the Esc key when the web browser window is active.

Network

Configuration of sensor network parameters and communication via the TCP data channel.

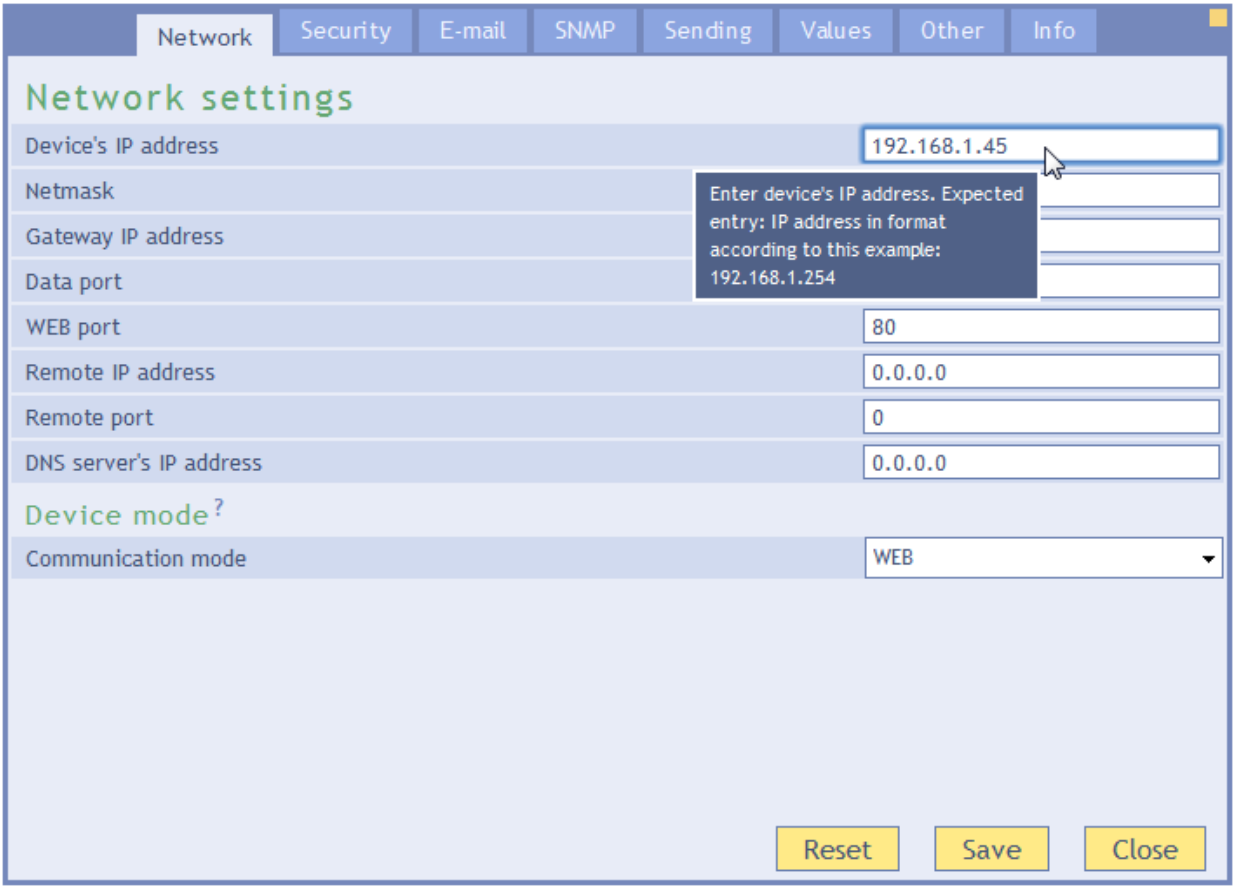


Fig. 9 – Network configuration tab

Device's IP address

The IP address of TX20ETH. In case you are not sure which IP address to enter, ask your network administrator.

Netmask

The mask of the network the TX20ETH is connected to.

Gateway IP address

Address of the network gateway.

Data port

TCP server mode: number of data port. Port functions depend on the set mode (see below). This is the port where TX20ETH expects incoming connections. After a connection has been established, the device expects request in the Spinel protocol

Web port

This is the number of port where the web interface is available, number 80 or 8080.

Remote IP address

IP address of a remote device (usually a server) to which TX20ETH connects in the TCP client mode. The established connection communicates via the Spinel protocol.

Remote port

Port number of a remote device (usually a server) to which TX20ETH connects in the TCP client mode. The established connection communicates via the Spinel protocol.

DNS server's IP address

IP address of the DNS server in your network.

Device mode

WEB: The mode in which it is possible to use all the available functions of the device, except for data communication via the Spinel protocol.

In the following modes it is not possible to view the latest values on the website, to send emails and HTTP GET messages, to use SNMP and MODBUS TCP. In these modes the device communicated via the Spinel protocol.

TCP server: TX20ETH passively waits for connection to be established on the preset port (*Data port*).

TCP client: TX20ETH actively establishes connection with a remote IP address (*Remote IP address*) and port (*Remote port*).

UDP: TX20ETH communicated using the UDP protocol. Incoming messages are expected on the *Data port*.

Device Reset

By pressing this button it is possible to restore the default setting of all the parameters of the device. Only the IP address does not change. The web port is changed to 80.

Security

To configure the security of users' access to the web interface.

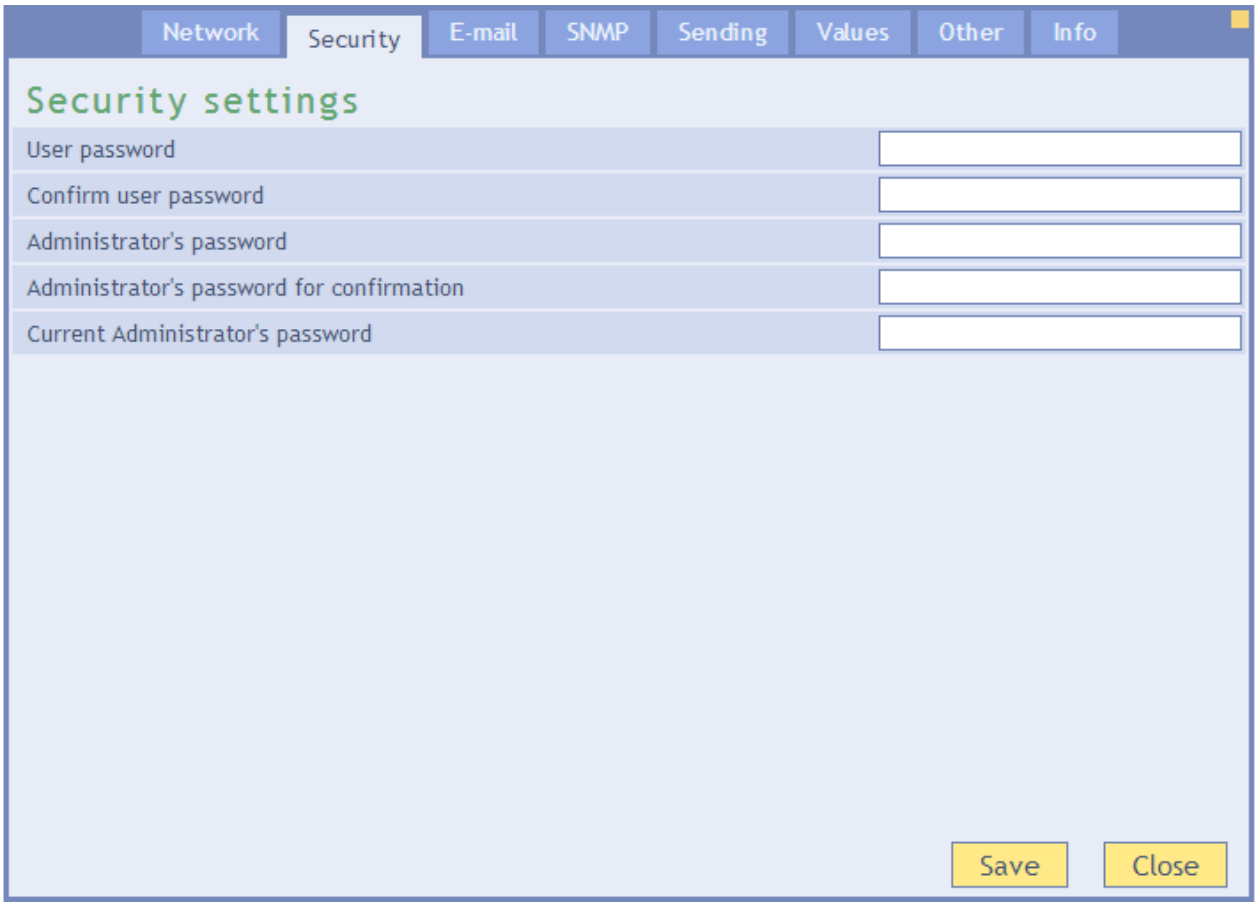


Fig. 10 – Security configuration tab

User password and **Confirm user password** [6]

Here, enter the password for user's access. This security level only enables the user(s) to monitor the measured values. Access to the configuration options is disabled.

User's log-on name is always "*user*"

If a user password has been set, it is also necessary to set an administrator password.

If only an administrator password has been set, the log-on window opening up when accessing the TX20ETH page can be confirmed without entering any details.

If you want to cancel the password, leave the fields empty.

Administrator's password and **Administrator's password confirmation** [6]

Here, enter the password for administrator's access. This security level enables, besides monitoring the values, also configuration of the device.

Administrator's log-on name is always "*admin*"

If you want to cancel the password, leave the fields empty.

[6] The field only serves for entering the required values. After saving the values, no configuration is displayed for security reasons.

Current administrator's password [6]

If the administrator has a password set for the current login, enter it here. It is not possible to change nay passwords without entering the current one.

E-mail

Configuration of emails which are sent when limits are exceeded.

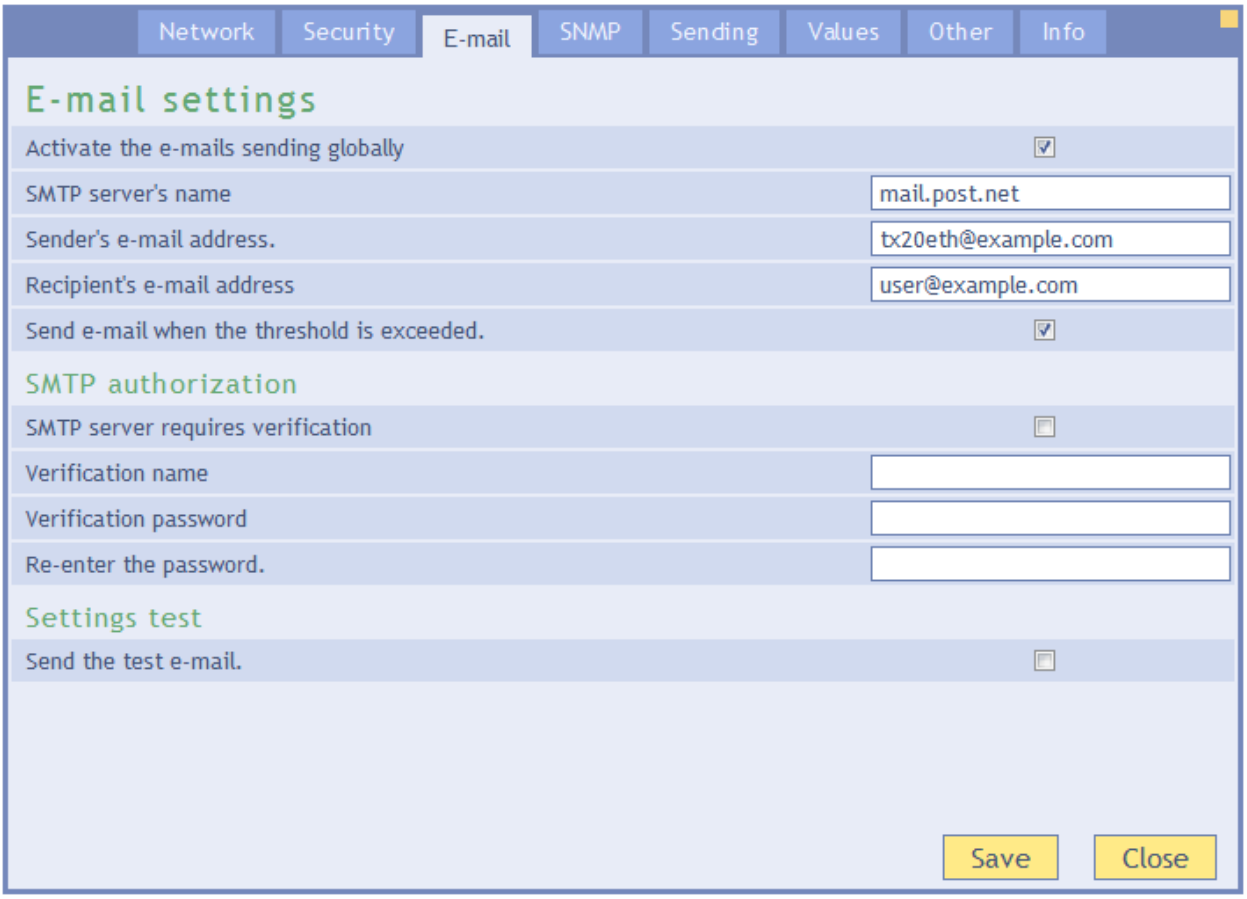


Fig. 11 – Email configuration tab

SMTP server's name

Enter the name or IP address of the SMTP server which is to be used to send the emails.

Sender's email address

A fictitious address of TX20ETH – an address from which the messages will be sent.

Recipient's email address

An email address to which the messages are to be sent.

SMTP authorisation

Here it is possible to enter log on details if the used SMTP server requires sender's identification to be verified. [7]

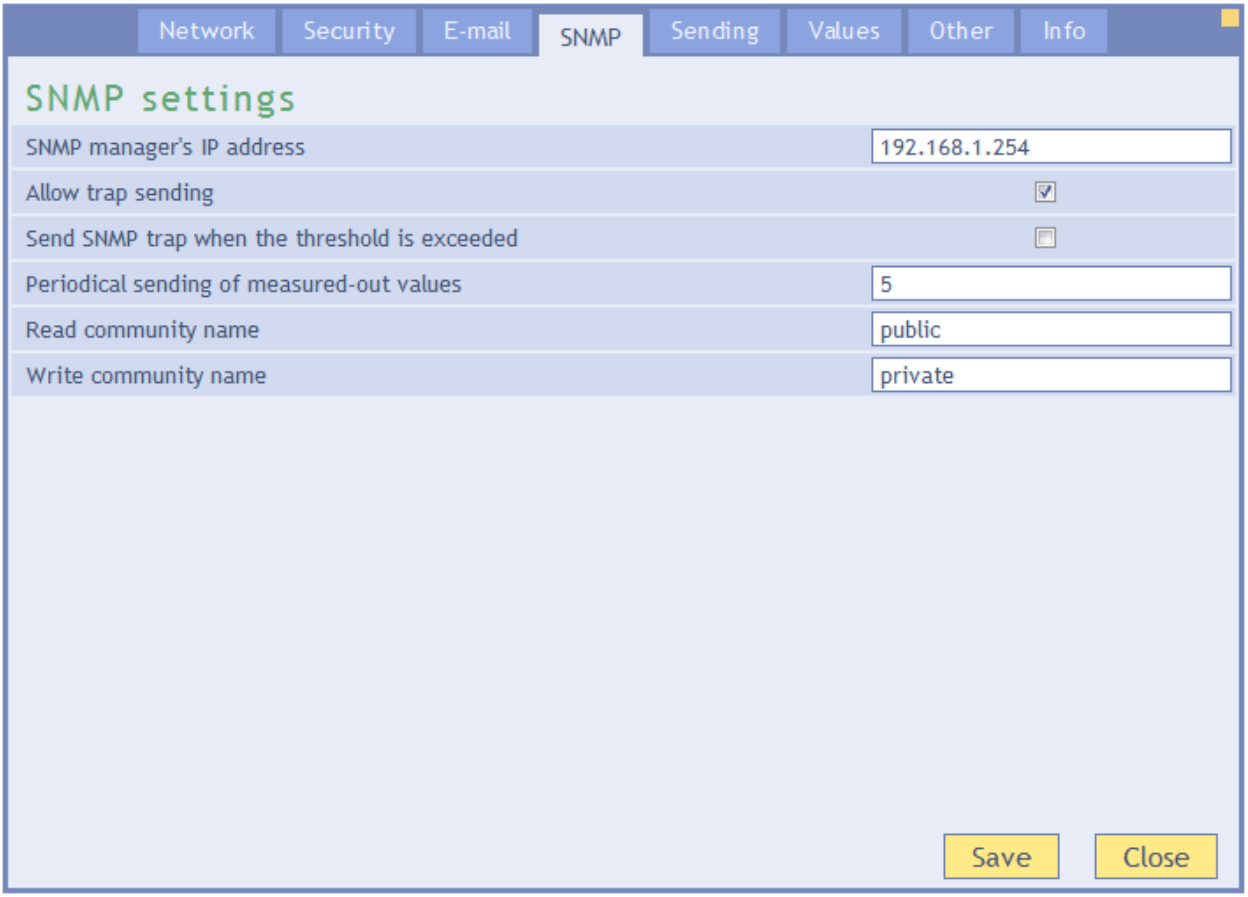
Settings test

Sending a testing email to verify whether the configuration has been carried out correctly.

[7] The field only serves for entering the required values. After saving the values, no configuration is displayed for security reasons.

SNMP

To set parameters for communication via the SNMP protocol. Activation of traps, periodic sending of values, etc.



Fix. 12 – SNMP configuration tab

SNMP manager's IP address

IP address of the server collecting the SNMP messages from devices within the network.

Allow trap sending

Enables SNMP traps to be sent to the manager, which is specified below.

Send SNMP trap when threshold is exceeded

If any measured values exceed the limits set in the *Values* tab, a trap is send with information about this event.

Periodical sending of measured-out values

Here it is possible to enter the frequency in which the values are to be sent into the SNMP manager. The values are sent in the form of SNMP traps. The frequency is set in minutes. If you do not with to use this function, set the frequency to 0.

Read community name

The name of the SNMP community for reading.

Write community name

The name of the SNMP community for writing.

Sending

Parameters for automatic sending of values to the server via the HTTP protocol. HTTP GET is used for sending the values.

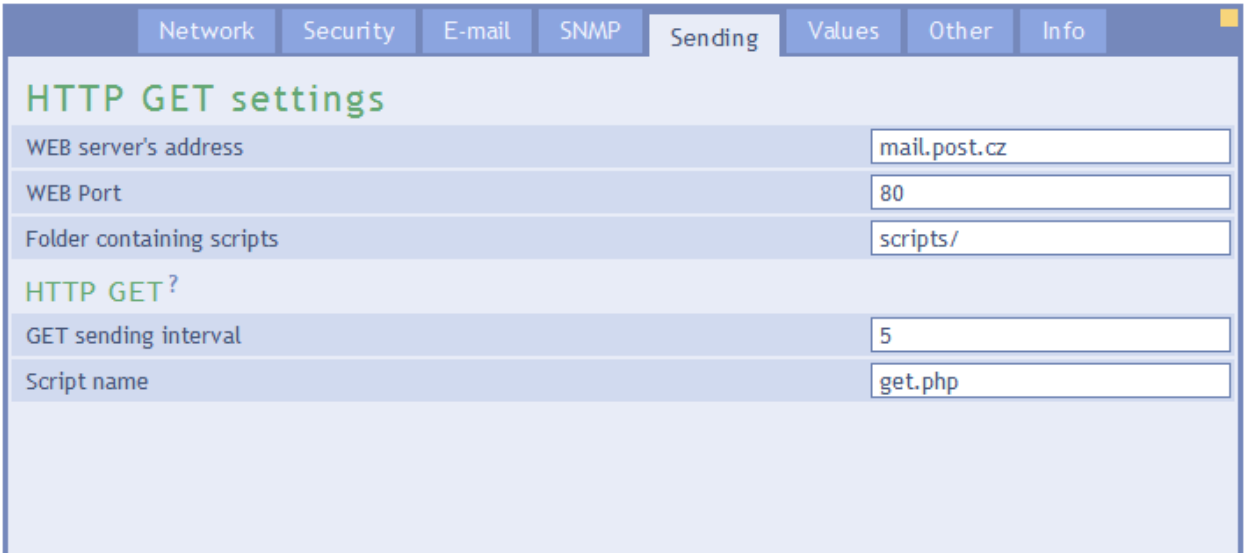


Fig. 13 – Configuration tab for sending values via HTTP protocol

Web server's address

Here you enter the URL address or IP address of the web server which is to receive the measured values. If you are not sure which address to enter, contact your server administrator.

Web port

Web port number of the server which is to receive the measured values. Usually, this is number 80, sometimes 8080.

Folder containing scripts

Here, enter the local path to the script directory. If the script receiving the results is *www.server.net/scripts/get.php*, enter the following part: *scripts/*

HTTP GET

GET can be used for periodic sending of measured values.

GET sending interval

Enter the frequency in which the measured values are to be sent. The frequency is set in minutes.

Script name

Name of the script receiving HTTP GET.

Values

Configuration of limits for the measured variables. After entering this tab it is necessary to choose the required variable by clicking its name in the upper part of the configuration window.

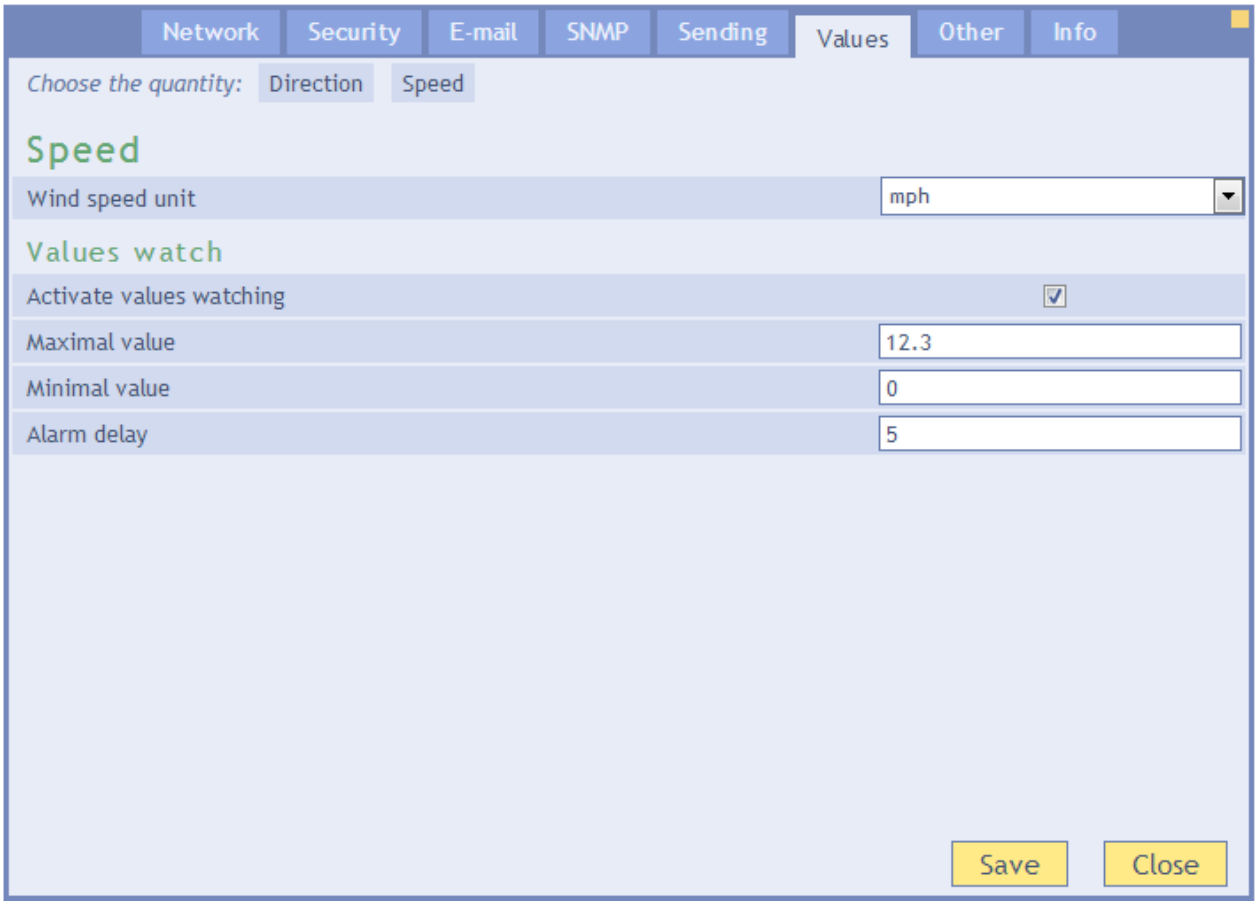


Fig. 14 – Values configuration tab

Wind speed units

Wind speed can be viewed in multiple units: m/s, mph, km/h or kt.

Value Watchdog

Activate values watching

If this field is ticked, the system watched the limit values set below.

Maximal value

When this value is exceeded, an e-mail, SNMP trap, etc. is sent depending on the configuration. The value is highlighted on the web site to indicate that it is outside the permissible range.

Minimal value

When a value is measured which is below this limit, an e-mail, SNMP trap, etc. is sent depending on the configuration. The value is highlighted on the web site to indicate that it is outside the permissible range.

Alarm delay

(Wind speed only.) A period can be set to delay the alarm for a given time.

Other

Here, you can set the name of the device, language and MODBUS port.

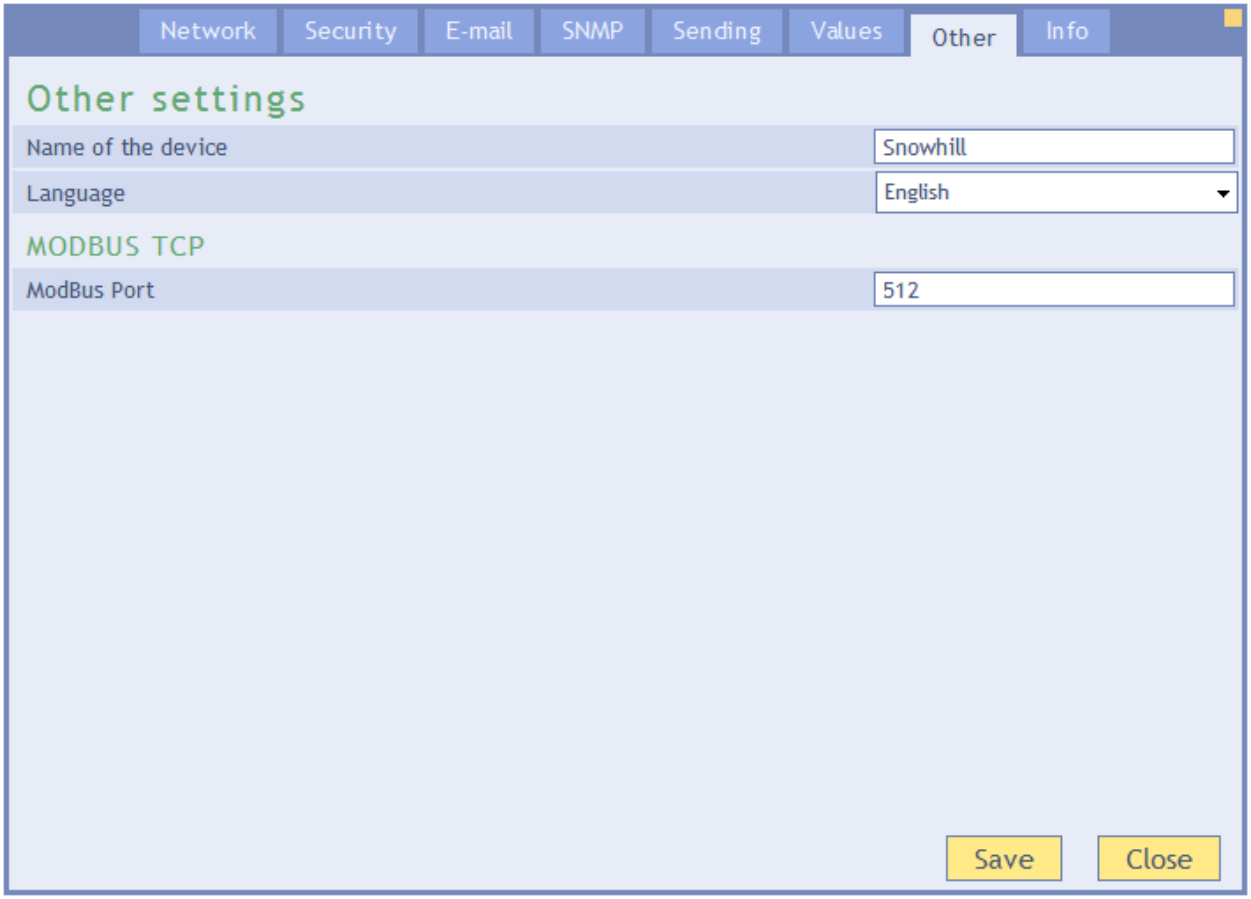


Fig. 15 – Tab for setting other parameters

Name of the device

This field can be used to give each device a name, for example according to its location etc. (Only characters without diacritical marks can be entered.)

Language

Here, you can set the language of the web site. You can choose from Czech and English language versions.[8]

MODBUS TCP

ModBus Port

Here, it is possible to set the number of port for communication via the MODBUS TCP protocol.

[8] Other language versions can be provided upon request.

Info

This tab cannot be configured but contains various types of information about the device, its MAC address, for example.

Fig. 16 – Tab with information about the device

Links

This section contains links to XML files and the mobile version of the website.

TELNET CONFIGURATION

Connection

Unknown IP address

For setting the IP address we recommend using Ethernet Configurator (more on page 11).

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[9])
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 device. (by typing `open [IP address in dot format] 9999` and Enter.)
7) Now you have entered to the configuration of device. IP address is not yet set. It needs to be set in menu Server Configuration > IP Address.
8) If the IP address is valid, device 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.

[9] Telnet client is not standardly 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. [9]
2) Connect to the IP address of the device. (by typing `open [IP address in dot format] 9999` and Enter.)
3) If the IP address is valid, device 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

Device'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 device 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.

OPTIONS FOR CONNECTING TO TX20ETH

For a brief overview of methods which can be used to read the values from TX20ETH see page 5.

WEB interface

After entering the IP address of the device into the web browser[10] the page shown in Fig. 17 is displayed.[11] This page contains the latest measured values, sensor name (if entered) and the set limits. In case any limit is exceeded, it is highlighted. The latest measured values can only be viewed in the WEB mode (see *Device mode* on page *14*).

Here, it is possible to press the *Configuration* button in the upper right-hand part of the window to display the configuration window. (The button in only enabled for the administrator.)

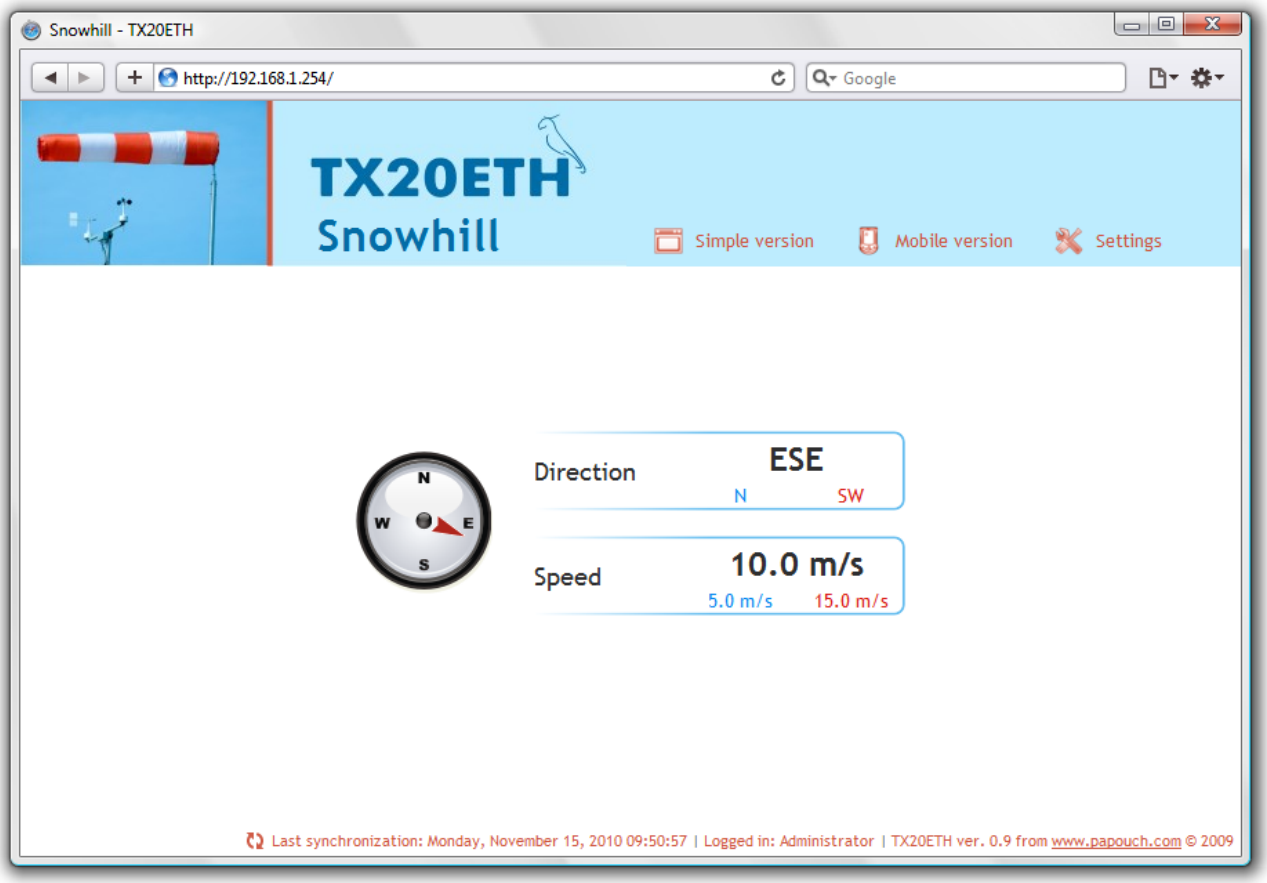


Fig. 17 – Basic window of the Web mode

The website is available in Czech and English languages.

[10] Web interface requires JavaScript to be enabled. The interface is optimised for the following browsers: Internet Explorer 9.0, Mozilla Firefox, Opera and Google Chrome. The minimum recommended resolution for comfortable use is 1024 × 768 pixels. The address should be entered into the following format: *http://[IP_adresa_TX20ETH]/* , e.g. http://192.168.1.254/ for TX20ETH in the default configuration.

[11] If you wish a different design of the web interface or you want it to include the logo of your company etc, do not hesitate to contact us.

Simplify

By clicking the *Simplify* button, the current window is displayed in a simpler form. This form is suitable e.g. when it is necessary to make the display smaller or when it is required to display values from several devices on one page (more information about this option is available below the following figure).

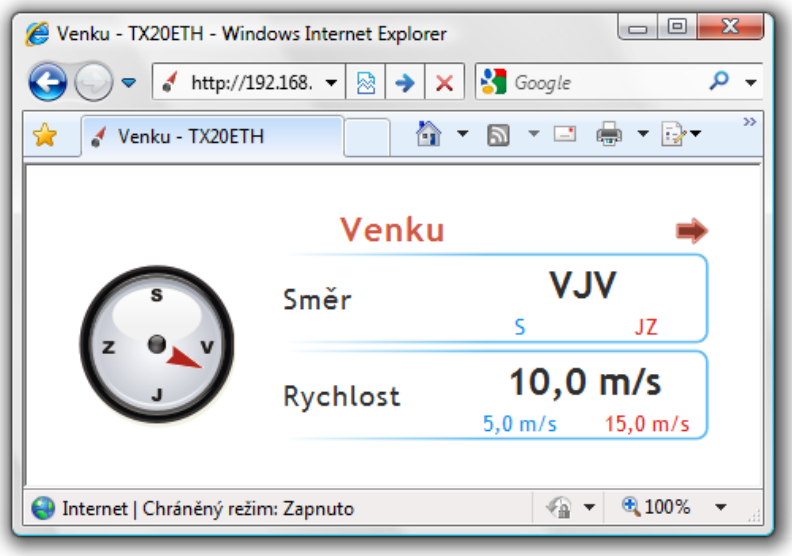


Fig. 18 – Simplified display

Displaying values from several devices on one page

If your system employs more devices, the values received from them can be displayed together on a single web page. An example of this option is shown in the following figure containing values from several anemometers.

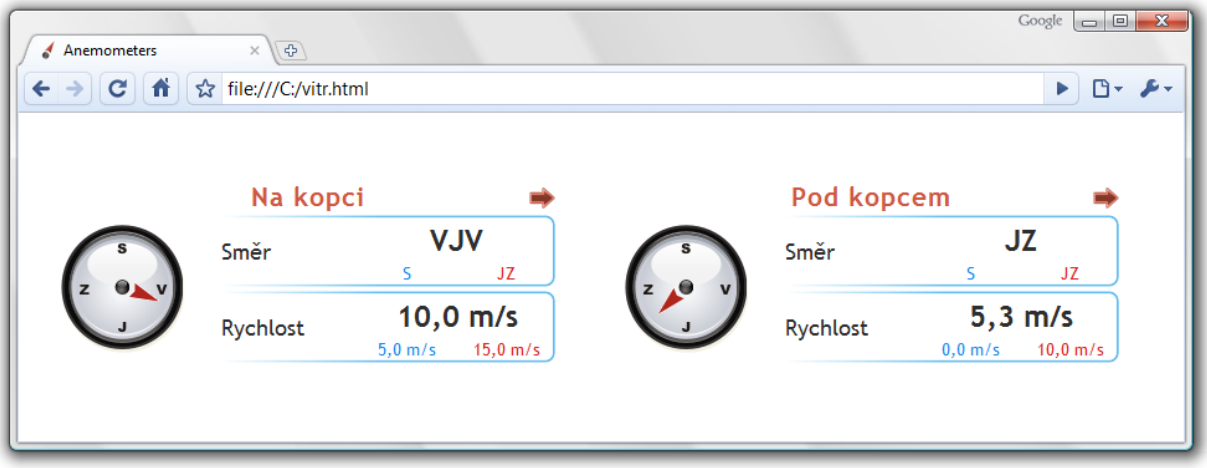


Fig. 19 – Displaying values from several devices on one page

If you wish to display mode devices on a single web page, follow the instruction below:

1) Create a new file called *test.html*, for example
2) Copy the following text into 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>Anemometer</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) The number of devices to be displayed depends on the number of lines starting with *<iframe*. These lines can be added according to your needs. Just replace the IP addresses shown in the lines (highlighted in red) with the IP addressed of your devices.

4) Save the file to your hard drive, to a server within your company's intranet or to the internet if you want to enable other users to use it as well. (If you save the file to a server, the addresses in the lines starting with *iframe* must be entered from the point o view of the particular server, the server must be able to access these IP addresses.)

5) If you save the file directly to e.g. disk C, you display the page in your web browser by entering the following address: *file:///C:/test.html*

Displaying the values on the mobile phone or PDA

By clicking the *Mobile version* button, you display a simple page which is suitable for displaying the values on the mobile phone. The mobile version of the website is available at *http:///[IP-adddress-of-device]/wap.html*

XML file

It is possible to obtain the latest measured values, pre-set limits and device name from TX20ETH in the text file of the XML format. The file is available at the address *http://[IP-address]/fresh.xml* – e.g. at http://192.168.1.254/fresh.xml for TX20ETH in the default setup.

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<root xmlns="http://www.papouch.com/xml/tx20eth/act">
    <sns id="1" type="6" status="0" val="5" vals="NNW" w-min="0" w-max="10" w-enb="1" />
    <sns id="2" type="7" status="0" val="100" unit="2" w-min="50" w-max="150" w-enb="1" />
    <status location="Downhill" />
</root>
```

Fig. 20 – XML sample with the latest values

The XML file contains *sns* tags for each variable and as well the *status* tag:

status

location

User-defined name of the device.

sns

id

Variable sequence number. (starting with 1)

type

Variable type. It can take the following values:

6..... wind direction
7..... wind speed

status

Describes the status of the measured value. It can take the following values:

0..... the value is valid and it represents the latest measured value
1..... waiting for the first measurement
2 or 3.....the measured value exceeded the user-defined limits
4..... measurement error or sensor error (meaning damaged or disconnected sensor)

val

Wind direction: Wind direction index in the range of 0 to 15. 0 stands for the North. 1 is the North-North-East, 2 is the North-East, etc. clockwise. (The *status* attribute indicates the validity of the value.)

Wind speed: the latest measured value of the wind speed expressed as an integer. It represents the actual value multiplied by 10. The wind speed of 15.2 m/s is displayed as number 152 in the xml. (The *status* attribute indicates the validity of the value.)

vals

This attribute is present only for wind direction and contains an English abbreviation for wind direction. (The *status* attribute indicates the validity of the value.)

unit

This attribute is present for wind speed only and consists of numeric representation of the currently set units. It can be one of the following options:

0 ..... m/s
1 ..... mph
2 ..... km/h
3 ..... kt

w-enb

This attribute indicates whether the watchdog monitoring the measured values is active. The value 1 means that the watchdog is activated, 0 shows that it is disabled.

w-min, **w-max**

The lower (*w-min*) and upper (*w-max*) limit of the value defined by the user. The value is shown as an integer like the *val* value. (Limits are watched only when the *w-enb* attribute is set to 1.)

Values transmission to the server using HTTP GET

It is possible to transmit the measured values to your server using a scripting language (for example PHP) which processes the value sent by the device as the HTTP parameter of the GET request. The device periodically calls the script on the server in the Internet (or the company Intranet) with the latest measured values in the GET parameter. It is possible to store this value into the variable on the server and to work with it further – for example to store it into a database or to display it on the web.

The path to the script and the script calling frequency is specified in the setup. It is possible to set the transmission frequency in the range of 1 to 1440 minutes with 1-minute increments.

HTTP GET

In this request type, parameters are sent in the message address as standard HTTP GET parameters. An example:

```
http://www.example.com/script.php?mac=00204AB48DF1&name=Downhill&
        directionS=0&directionV=270.0&speedS=0&speedV=17.4
```

As is evident from the example above, the request has the format well-known to web programmers. It is not necessary to learn new programming principles as it is sufficient to use the mechanism known from web form processing (`<form name="myform" method="get" action=…`).

The request is sent in the interval specified in the item *GET sending interval* on page *18*.

GET parameters are as follows:

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

`name` ..... User-defined device name.

`directionS` ..... describes the wind direction status. It can take the values:
0 ..... the value is valid and it represents the latest measured value
1 ..... waiting for the first measurement
2 or 3 ..... the measured value exceeded the user-defined limits

4 ..... the value is not valid – measurement error or sensor error (damaged sensor or cable)

`directionV` .....Wind direction expressed as an integer in the range of 0 to 359. (The value in degrees from the North clockwise.)

`speedS` .....Describes the wind speed status. (It takes the same values as the direction.)

`speedV` .....Measured wind speed in the set-up units.

How to set HTTP GET – examples

(The context help for entering the script path is displayed on the web interface when the mouse cursor is scrolled over the title *HTTP GET*.)

The Example 1:

Instructions:

The script *script.asp* is prepared on the server awaiting the data from TX20ETH. The full address of the script on the server is *http://www.example1.net/script.asp*

Solution:

It is necessary to set the following items:

Web server address *www.example1.net*
Web port *80*
Script directory on the server.....
Script name.....*script.asp*

The called URL:

http://www.example1.net/script.asp?mac=00204AB48DF1&name=Outside&directionS=0&directionV=45.0&speedS=0&speedV=16.2

The Example 2 – measurement error:

Instructions:

The script *get.php* is prepared on the server awaiting the data from TX20ETH. The full address of the script on the server is *http://www.example.com/ext/get.php*

Solution:

It is necessary to set the following items:

Web server address .....*www.example.com*
Web port *80*
Script directory on the server.....*ext/*
Script name.....*get.php*

The called URL:

http://www.example.com/ext/get.php?mac=00204AB48DF1&name=Outside&directionS=0&directionV=45.0&speedS=0&speedV=16.2

Connection via TCP – TCP and UDP modes

In the TCP server, TCP client and UDP modes, TX20ETH communicates via the Spinel protocol. It is a standard request-response protocol used by all devices in our company. It can be used to configure TX20ETH as well as to read parameters and measured values.

A detailed documentation of the Spinel protocol in TX20ETH, including commented examples, is contained in a separate document on www.papouch.com in the section dedicated to TX20ETH.

SNMP

Introduction

The SNMP protocol (Simple Network Management Protocol) is a standard protocol dedicated for the maintenance of various end devices connected to the Ethernet network. It works over the UDP protocol and it provides quick delivery of controlling requests and responses between devices running SNMP applications.

SNMP is responsible for delivering these requests and responses on behalf of the mentioned applications. It works independently from specific functions of the applications, lower layers architecture or upper layers applications. The protocol contains three basic entities – the administrator (generating commands and receiving notifications), the agent (responding to the commands and creating notifications) and the proxy (handing over the network traffic).

The SNMP administrator sends requests to UDP port 161 of the agent and receives messages (traps) from agents on UDP port 162.

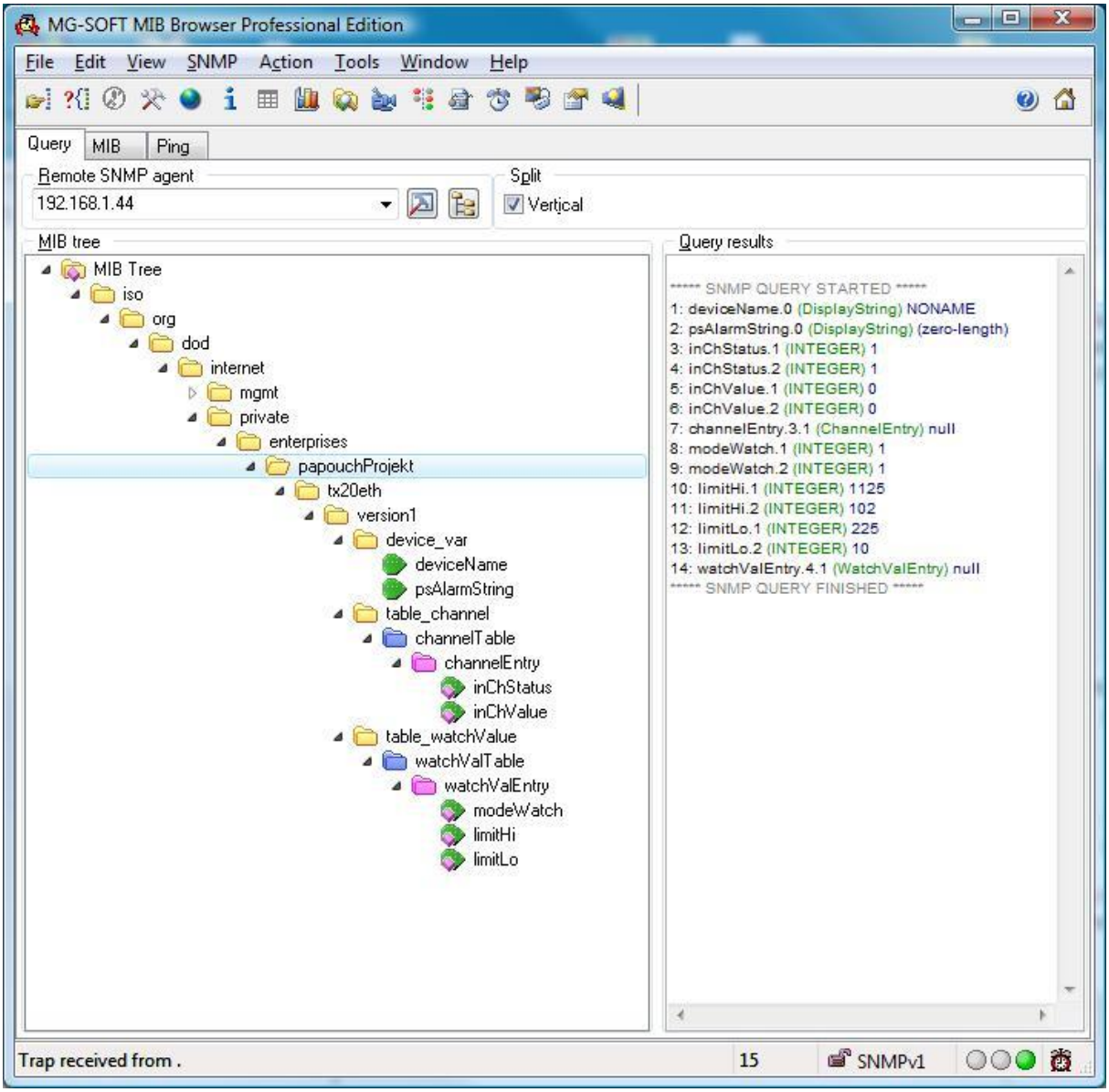


Fig. 21 – MIB tree in TX20ETH

TX20ETH is a SNMP agent. It receives commands on UDP port 161. The administrator is placing enquiries for the data stored in the local MIB database (*Management Information Base* – one of the Internet standards) formed by the hierarchical tree of the maintained values. The device does not contain a standard complex database but only the sub tree necessary for the processing of the data from TX20ETH.

The description of the directory tree of the MIB table and SMI (*Structure of management information*) are attached to the device as the text file TX20ETH_v01.MIB [12]. It is necessary for the programmer to include these description into the structure of the SNMP administrator (SNMP version 1.0).

It is possible to access the data in MIB by entering the object name, expressed as a series of positive integers, divided by points, describing the path to the object within the MIB tree.

TX20ETH, as the SNMP agent, enables sending of automatic messages (traps) to the administrator to UDP port 162.

Use of SNMP

Into your SMNP manager implement the description of the agent's MIB table from TX20ETH_*v01.MIB*.

Then, it is necessary to set the Read community to *public* (for the default setting of TX20ETH).

All SNMP objects in TX20ETH are only available for reading.

SNMP objects – variables

The following objects are available for both the direction and the speed of the wind. The wind direction has 1 as the last digit in the *id* object, the speed is marked as 2.

Variable status

Name: inChStatus

Object ID: 1.3.6.1.4.1.18248.20.1.2.1.1.1.1 to 2

Description: The status of this variable. It describes the latest status of the measurement. It can take one of the following clauses:

0 → The value is valid and within the range.
1 → The value has not been measured yet.
2 or 3 → The value is valid and exceeds the pre-set limits.
4 → The value is not valid –measurement error.

Measured value

Name: inChValue

Object ID: 1.3.6.1.4.1.18248.20.1.2.1.1.2.1 to 2

Description: The measured value expressed as an integer. The real value can be obtained by dividing it by 10.

Value watchdog

Name: modeWatch

[12] Available on www.papouch.com.

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.1.1 to 2

Description: It indicates the status of watching the value from this channel. 1 means that the watching is active. 0 means that the watching of the value from this channel is inactive.

Upper limit

Name: limitHi

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.2.1 to 2

Description: Upper limit of the measured value watching. When this limit is exceeded, a trap or an e-mail is sent, the value is highlighted on the web etc. according to configuration.

Lower limit

Name: limitLo

Object ID: 1.3.6.1.4.1.18248.20.1.3.1.1.3.1 to 2

Description: Lower limit of the measured value watching. When this limit is exceeded, a trap or an e-mail is sent, the value is highlighted on the web etc. according to configuration.

SNMP objects – general

The following two objects refer to the whole device.

Device name

Name: deviceName

Object ID: 1.3.6.1.4.1.18248.20.1.1.1.0

Description: User-defined device name.

Alarm tect

Name: psAlarmString

Object ID: 1.3.6.1.4.1.18248.20.1.1.2.0

Description: The text of the alarm message when the pre-set limits are exceeded.

Automatic messages – traps

TX20ETH enables to send automatic messages (SNMP traps). Two settings correspond to the traps: sending permission and the IP address of the traps recipient (a so called administrator or SNMP manager).

Traps are sent (depending on configuration) if any value exceeds the pre-defined limits.

It is possible to send traps with the latest values periodically according to the configuration.

Trap 1 – Value outside the limits

The trap contains the measured value and the exceeded limit.

Trap is sent only in the case a pre-defined limit has been exceeded. To enable the delivery of the trap, it is necessary to set the correct IP address of the PC with the SNMP manager.

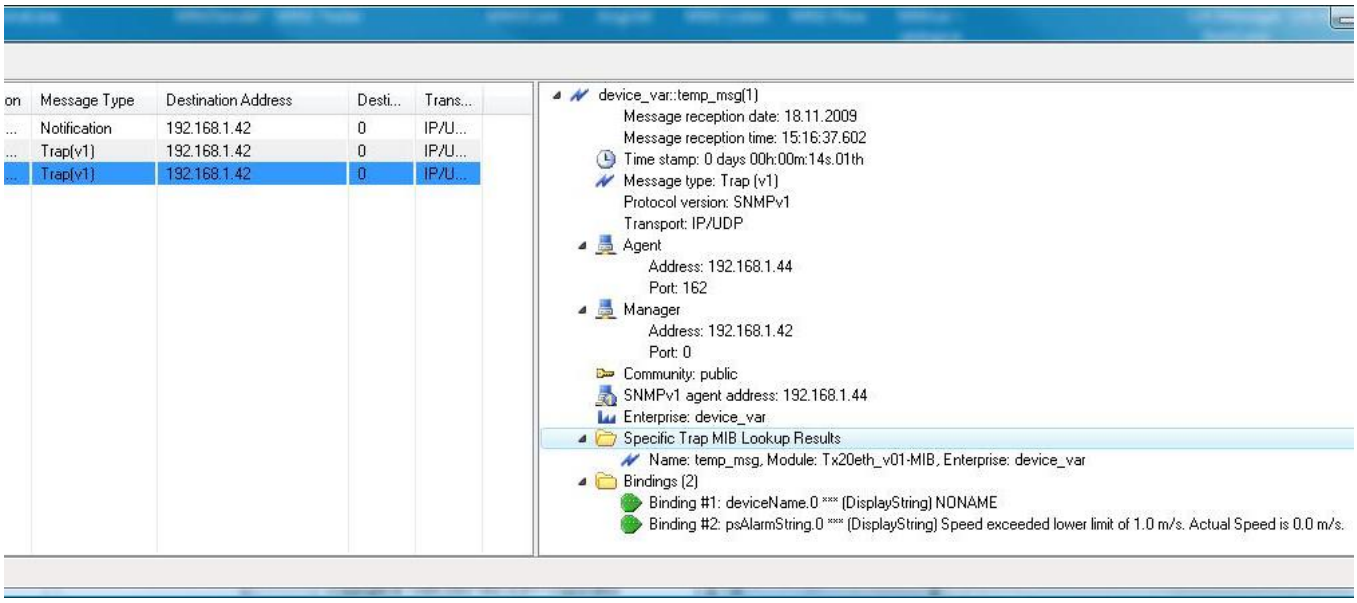


Fig. 22 – SNMP trap when a pre-set limit is exceeded

Trap 2 – Latest measured values

The trap contains all the latest measured values and the user-defined device name.

The trap is sent only if the sending frequency is not set to zero.

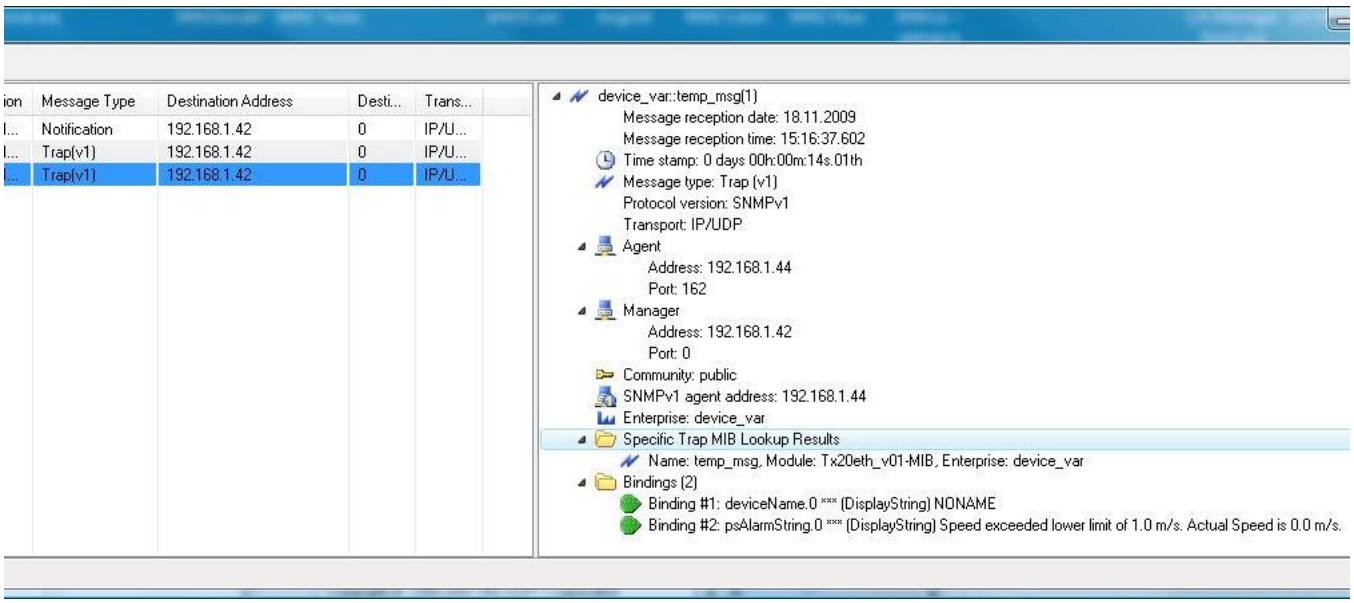


Fig. 23 – Example of SNMP trap

Sending of emails

TX20ETH is able to send an e-mail automatically in the following cases:

- Exceeding of any of the pre-defined limits

Exceeding of some of the pre-defined limits

TX20ETH is able to send an e-mail notifying the user that any of the pre-set limits has been exceeded.

It is possible to forward the e-mail as an SMS to your mobile phone using the services of your mobile phone operator.

MODBUS protocol

MODBUS TCP is a standard industry protocol the TX20ETH uses for communication. Comprehensive information and documentation of the MODBUS TCP protocol is available at www.modbus.org .

Memory table – Input Register

Address	*Access*	*Function*	*Name*
Values and statuses of individual channels – sorted by the channel			
0x0000[13]	reading	0x03	Wind direction – Status
0x0001	reading	0x03	Wind direction – Measured value
0x0002	reading	0x03	Wind speed – Status
0x0003	reading	0x03	Wind speed – Measured value

Values and latest statuses of individual channels

There is always a status and a value available for the direction and speed of wind. The measured values are expressed as integers representing the current value multiplied by 10.

Functional codes:

0x04 – Read Input register

Allocation in the memory and the length:

Initial address	2 Bytes	Direction: 0x0000 Speed: 0x0002
Number of registers	2 Bytes	3

Parameters:

Number of bytes	1 Byte	8
Status	2 Byte	*0x0000* – the value is valid and within the range *0x0001* – the value is not available yet *0x0002* – the value is outside the limits *other values* – another error
INT value	2 Byte	Measured value as an integer multiplied by 10. For direction, it shows the angle measured from the North heading to the East. For speed, the value means m/s.

[13] The first register with address zero.

FAQ

Which settings are required for TX20ETH to work in my network?

It is only necessary to set the network parameters of the device to fit your network (the IP address and perhaps the netmask). The process bellow is described for OS Windows.

1) Connect your TX20ETH to the network and run the Ethernet Configurator program (see Fig. 6).
2) Click *Add device* and enter the MAC address of the device and the required IP address.
3) Click *Set*.
4) Now you can open the web interface of the device using your internet browser.

How to find out the IP address of the device?

1) The default address of the device set by the manufacturer is 192.168.1.254. If you have changed the address or it is impossible to connect to the device using the default address, follow the instructions below.
2) Run the Ethernet Configurator program (see fig. 6). If the device is connected to your network and its IP address is compatible, it will be displays as one of the devices in the *List of detected devices*.
3) If your device is not displayed in the *List*, make sure that it is properly connected and assign it a new IP address following the instructions above in FAQ.

INDICATION

ON indicator light (green LED)

Indication of supply voltage and device functioning. The light glows and flashes to indicate that the device is working properly.

COM indicator light (yellow LED)

It glows when TCP connection has been established on the data port.

ERR indicator light (red LED)

It glows is the sensor is not connected or if the system failed to establish communication with the sensor.

Link indicator light

(the left LED on the Ethernet connector)

No light..... not connected
Yellow ..... connected – connection speed 10 Mbps
Green..... connected – connection speed 100 Mbps

Connection Type indicator light

(the right LED of the Ethernet connector)

No light..... no communication
Yellow ..... Half-Duplex communication
Green..... Full-Duplex communication

DEVICE RESET

Follow the instructions below to restore the default configuration set by the manufacturer. Unlike the reset performed via the web interface (see page 14) or using the Telnet protocol (see page 24) the IP address is also reset to the default value of 192.168.1.254.

1) Disconnect the device from the power supply.
2) Press the button in the small opening below the Ethernet connector.
3) Connect the power supply and wait for 10 seconds.
4) Release the button.
5) The reset has been completed.

TECHNICAL PARAMETERS

Sensor

Wind direction measuring	mechanical
Wind direction – number of positions	16
Wind speed measuring	mechanical
Wind speed – measuring range	0 to 50 m/s; 0.1 m/s resolution
Sensor heating	none
Cable length	10 metres

Ethernet interface

Connection	TBase 10/100 Ethernet
Connectors	RJ45
Default IP address	192.168.1.254
Default netmask	255.255.255.0 (8 bit; mask type: C)
Default IP address of Gateway	0.0.0.0

Electronics

Power supply	7 to 30 V DC (with polarity reversal protection)
Consumption at 12 V	usually 90 mA
Power connector	removable screw terminal block
Operating temperature range	-20 °C to +70 °C
Dimensions	62 × 55 × 24 mm
Box material	anodized aluminium
Degree of protection	IP 30

Other parameters

Weight	85 g

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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