

LUMEL

MULTICHANNELS DATA LOGGER/RECORDER  
**HT25**



USER'S MANUAL

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## 1. Application

The HT25 recorder is a device designed to display and archive digital values from the connected devices via the RS-485 interface (Modbus protocol). The recorder programming is possible with the built-in web server. The recorder has a 2x16 character LCD readout field and an LED display (4 characters). The device allows you to send e-mail messages informing about the current environmental parameters as well as events that cause exceeding the alarm values. The recorder is powered via Ethernet - PoE (Power Over Ethernet) or standard DC jack.

Features of HT25 recorder:

- Support for RS-485 interface with MODBUS protocol in RTU mode (implemented master and slave mode); the ability to configure up to 10 channels of 10 values each
- 4 binary inputs
- 1 input for measuring the frequency of 0.1 ... 100 Hz (input for anemometer - wind speed measurement)
- signaling of exceeding set alarm values
- programming logic alarm outputs with reaction to the selected input value.
- real-time clock function with clock supply support in case of the recorder power failure
- registration of input signals in programmed time
- Ethernet 10/100 BASE-T
  - protocol: Modbus TCP/IP, HTTP, FTP,
  - services: web server, ftp server, DHCP client, SMTP client,



*Fig. 1. View of HT25 recorder*

## 2. The set of the recorder

- HT25 recorder 1 pc.
- User's manual 1 pc.

## 3. Basic requirements, operational safety

In terms of operational safety the recorder meets the requirements of EN 61010-1.

### ***Safety instructions***



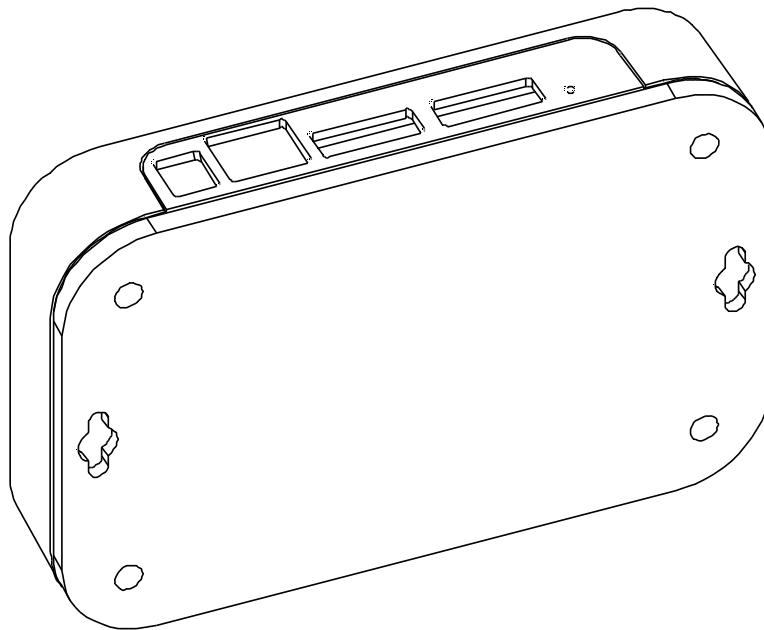
- The assembly and the installation of the electrical connections may be carried out only by a duly qualified electrician.
- Before turning on the recorder verify the connections.

- The recorder is intended for installation and use in industrial electromagnetic environments.
- A switch or a circuit-breaker should be installed in the building or facility. It should be located near the device, easily accessible to the operator, and suitably marked.

## 4. Fitting

### 4.1. Installation

The HT25 recorder can be mounted on the wall by means of a screw connection or be used as a stand alone device. The recorder housing consists of an upper and a lower part.



*Fig. 2. Location of mounting holes*

### 4.2. External connections diagram

The recorder has 4 external slots:

- Ethernet port 10/100 base-T
- DC power slot  $\phi 5.5 / 2.1$  mm
- RS-485 / frequency slot
- binary inputs slot

and 1 button to reset the device to the standard parameters - "Reset"

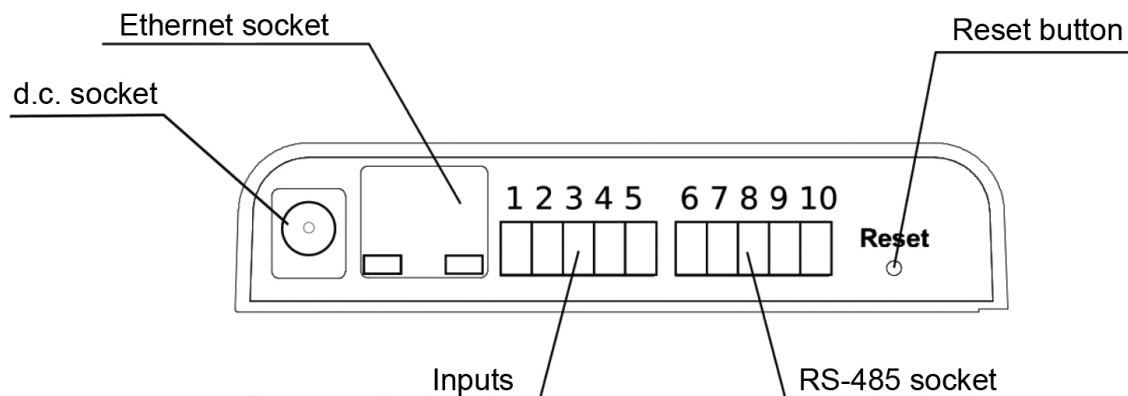


Fig. 3. View of the rear part of the HT25 recorder

Inputs					RS-485 socket				
IN1	IN2	IN3	GND	12 V	F/IN4	GND	12 V	A	B
1	2	3	4	5	6	7	8	9	10

Fig.4. Diagram of connection of input and RS-485 slots of HT25 recorder

## 5. Operation

After wiring, mounting and powering the recorder is ready to work with factory settings. The recorder can be programmed via the embedded web server or by means of the eCon program (Modbus TCP).

The following parameters can be programmed in the recorder:

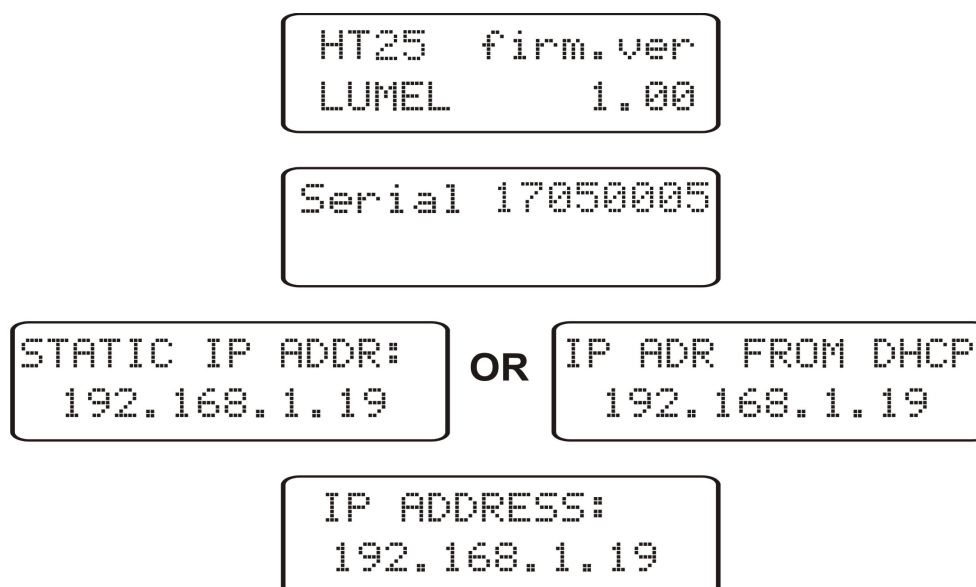
- Ethernet interface settings,
- Modbus settings,
- Archive settings,
- alarm settings,
- SMTP client settings - e-mail (only as unencrypted connection)
- system settings.

### 5.1. Messages after Switching the power on

The HT25 recorder is equipped with an LCD display located in the upper part of the housing and an LED display located in the side of the housing.

After power is turned on the LCD display shows the device and the manufacturer's name and software version. After about 4s the serial number of the device is displayed and the subsequent 4s the IP address in the network, if the device has been connected to Ethernet network - the address can be static or obtained from DHCP server.

The LED display presents one quantity, selected from the recorder's own registers.



*Fig.5. Startup messages of HT25 recorder*

## **5.2. Functions of the RESET button**

The device contains one button in the back part of the casing used for restoring factory settings or displaying the current IP address of the recorder. This button is located on the connector panel – **fig. 3**.

- **restoring factory parameters** - after pressing and holding the button for 10 seconds; Note: each successive restoring of factory parameters enables or disables the service of obtaining network address from a DHCP server, i.e. if the DHCP service is enabled and restoring the factory parameters will be forced, the DHCP service will be disabled (you will be informed about the change by a message on the display) and default static IP address will be assigned to the device: 192.168.1.19 (subnet mask: 255.255.255.0), another request for restoring the factory parameters will enable the DHCP server service - the network parameters will be obtained dynamically from the server;

- **displaying the current IP address of the recorder** – occurs after a short press of the button – about 1 sec.

### 5.3. Button functions on the side panel

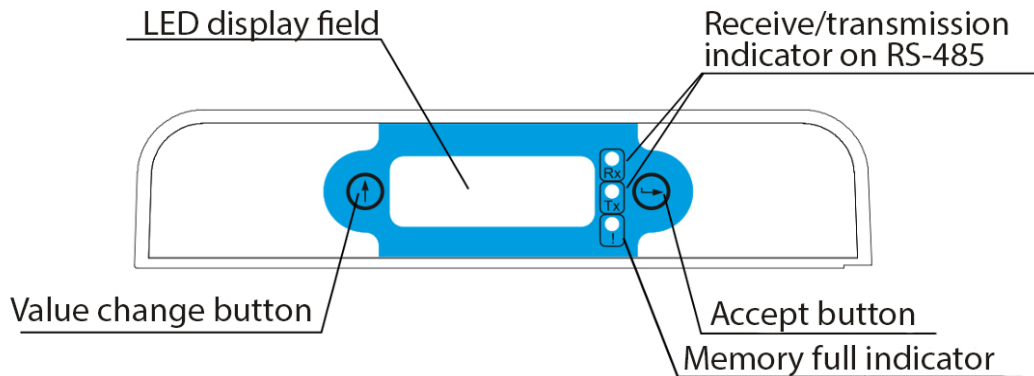



Fig. 6. Front panel view of the recorder

#### 5.3.1. Functions of individual buttons



 - **accept button**

- entering the programming mode (hold this button for about 3 seconds).
- navigating the menu - level selection,
- entering the parameter value changing mode
- accepting the changed parameter value.

 - **value change button**

- changing the displayed value or changing the modified digit (changing the function after holding the button for 3 seconds),
- navigating the selected level,
- changing the value of the selected parameter - increasing the value

#### 5.3.2. Functions of the combination of buttons

  - **combination of the output to the higher level**

- exit from the transducer parameters preview menu,
- resignation from the parameter change,
- absolute exit from the programming mode (hold this button for about 3 seconds).



### 5.3.3. Programming matrix

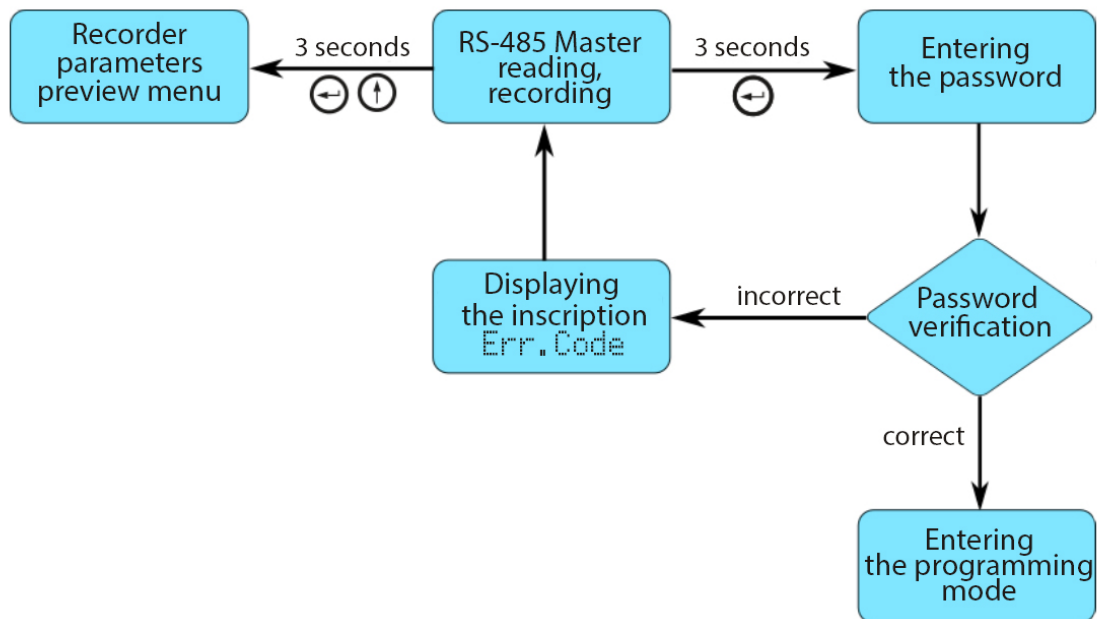










Fig.7. The HT25 recorder operation algorithm

### 5.4. Programming the recorder parameters

Pressing the button  and holding it down for about 3 seconds causes entry into the programming matrix. If the input is password protected then a message will be displayed to enter the password. If an incorrect password is entered `Err. Code` will be displayed. Entering the correct password results in entering the programming mode. Fig. 8 shows the matrix of transitions in the programming mode. Selection of the menu level and navigating the parameters of a given sublevel is done by means of the button . The parameter symbol is displayed on the upper line of the LCD display and the parameter on the bottom line of the LCD display. After pressing the button  it is possible to enter the edition of a given parameter. To resign from editing a given parameter, use a combination of buttons  . To exit from the programming matrix for measurement, press and hold the combination of buttons  . If the transducer is left in parameter programming mode, after 30 seconds, the programming mode will be automatically exited and the device will go into displayed value mode. The change of the button  function takes place cyclically after holding the button for about 3 seconds. The current function of the button is signaled on the LCD display with symbols:








→ going to the next item in the menu (right) or incrementing the digit of the modified parameter




← going to the next item in the menu (left) or change the edited digit of the modified parameter

Settings Display	Bcklight Time	Intensity	LED disp.val							
Display parameters	Display backlight time	Brightness of LCD display backlight	Registration number displayed on the bottom line of the display							
Settings RS-485	Slave address	Mode Unit	Baud Rate	Master/ Slave						
Parameters of the RS- 485 interface	Device address	Frame type	Transmission speed	Base register number (Master mode)						
Settings Ethernet	DHCP Client	IP addr. 32	IP addr. 10	IP mask 32	IP mask 10	gate addr. 3 2	gate addr. 10 10	DNS addr. 32	DNS addr. 10	SMTP port
Parameters of the Ethernet interface	Enable / disable DHCP client	B3, B2 byte of the IP address (IPv4)	B1, B0 byte of the IP address (IPv4)	B3, B2 byte of the subnet mask	B1, B0 byte of the subnet mask	B3, B2 byte of the default gateway address	B1, B0 byte of the default gateway address	B5, B4 byte of MAC address of the transducer	B3, B2 byte of MAC address of the transducer	B1, B0 byte of MAC address of the transducer
		obtained from DHCP or entered manually when DHCP is disabled, format: B3.B2.B1.B0						format: B5:B4:B3:B2:B1:B0		
	Modbus TCP Ad CPport	Modb. T CPport	Modb. T imeout	Modb. MaxConn	FTPco mm. port	FTPdat a port	HTTP port	Transm. rate	Eth. Std. Par	Reinit Ether
	Device address for the TCP / IP modbus	TCP / IP modbus port	Time to close the port of Modbus TCP/IP service when idle	The maximu m number of simultan eous connecti ons to Modbus TCP/IP service	Comme nd port of FTP server	Data port of FTP server	Web server port number	Transmissi on speed	Setting the standard Ethernet interface para- meters	Applying changes in Ethernet interface para- meters
Settings Service	Restore fabr	Security	Time	Date						
service parameters	Enter standard. param.	Enter password	Setting the current time	Setting the current date						

Fig. 8. Programming matrix

### 5.4.1. Changing value of selected parameter

In order to increase the value of the selected parameter, press the button  (when the function  of the button is active). Pressing the button once increases the value by 1. Increasing the value when the digit 9 is displayed sets 0 to this digit. The digit is changed after changing the function of the  button by holding it for 3 seconds (changing the function to ). Pressing the  button when editing the most significant digit results in the change to the digit sign - the sign changes after pressing the button  when the function  is active.

In order to accept the set parameter, press the button . Then the parameter will be saved. Pressing the combination of buttons   when changing the parameter value will cause the write to be canceled.

## 5.5. Connection of the device – configuration

### 5.5.1. Connection of the recorder to the network equipped with a DHCP server

The easiest way to connect HT25 recorder to Ethernet is to use the existing DHCP server, which assigns communication parameters, i.e. IP address, subnet mask, gateway, DNS address to the devices being connected.. In order to use the automatic configuration with DHCP server, make sure the recorder is running with DHCP client service enabled - - to do this, switch on the power of the recorder and observe the initial messages :

```
IP ADR FROM DHCP
192.168.1.19
```

a) message about the recorder operation with DHCP client enabled – the displayed IP address is the current address of the recorder acquired from DHCP server;

```
STATIC IP ADDR:
192.168.1.19
```

b) message about the work of the recorder with disabled DHCP client service - the displayed IP address is the current address of the recorder set manually or the default address (after restoring the default parameters); in order to obtain the address from the DHCP server, restore the recorder to the factory parameters, point 5.2, and restart the device - then a) message should be displayed with the IP address obtained from the DHCP server.

In order to further configure the device a computer (tablet, phone) must be connected to the same Ethernet network (also with DHCP client enabled - automatic acquisition of IP address), open a web browser and in the browser

address field type the IP address displayed by HT25. This will display the login screen to log the web server that will allow further configuration - sign up to the administrator account, p. 5.6.3.2.

After gaining access to the full configuration we recommend that you disable the DHCP client, leaving the acquired network parameters unchanged – IP address, subnet mask, gateway, DNS address will be stored as static parameters.

### **5.5.2. Connecting the recorder to the network without using DHCP server**

In order to use the automatic configuration with DHCP server, make sure the recorder is running with DHCP client service disabled - to do this, switch on the power of the recorder and observe the initial messages:

```
IP ADR FROM DHCP  
192.168.1.19
```

a) message about the recorder operation with DHCP client service enabled – the displayed IP address is the current address of the recorder acquired from DHCP server; to set the a static IP address factory parameters should be restored, p. 5.2, and the device should be restarted – then a message should be displayed b) with the static default IP address.

```
STATIC IP ADDR:  
192.168.1.19
```

b) a message about the recorder operation with disabled DHCP client service - the displayed IP address is the current address of the recorder set manually or the default IP address (after restoring the default parameters), if the displayed address is different from 192.168.1.19 the factory defaults should be restored twice, p. 5.2;

In order to further configure the device a computer (tablet, phone) must be connected to the same Ethernet network (or directly to the recorder) and the automatic acquisition of network parameters must be disabled. Then, the static parameters corresponding to the default network parameters of HT25 must be manually entered into the computer (tablet, phone) p. 5.6.2 (the same subnet mask and any IP address from the pool 192.168.1.X except for the address 192.168.1.19 assigned by default to HT25). After the connection, open your web browser and type the default IP address 192.168.1.19. in the address field of the browser. This will display the login screen to log the web server that will allow further configuration - sign up to the administrator account, p. 5.6.3.2. After logging in to the recorder web server it is possible to change the network parameters according to our needs - especially the IP address must be changed to make sure that the recorder does

not have the default IP address, otherwise the configuration of other recorders working in the same Ethernet network will be difficult.

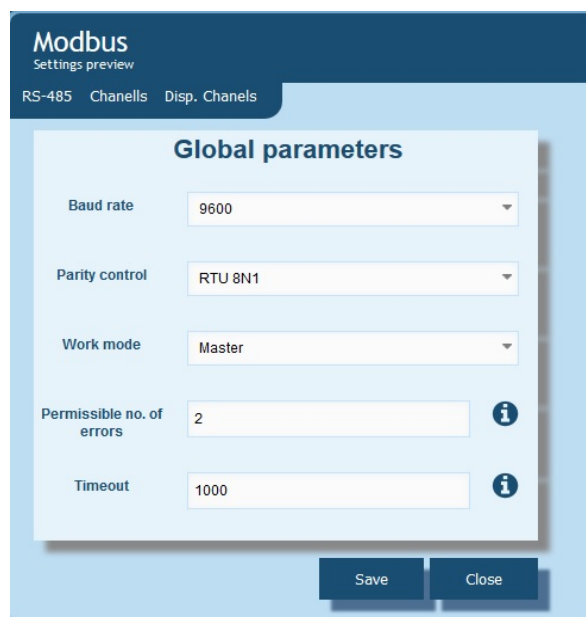
## **5.4. Functions of the recorder**

The HT25 recorder acts as the master of the MODBUS RTU network, reading data from connected devices. To do this, configure the RS-485 port of the recorder to work in "Master" mode. The recorder's "Slave" mode is used to update the software. The recorder can read data from max. 10 devices, and it can read up to 10 registers (10 channels) from each device. The Modbus function of reading n-registers is used to read data from devices (number 3) or the function of reading input registers (number 4). If you need to read more registers from a given device, you must configure separate channels to read the same device with different base addresses. The configuration of the recorder to work in master mode is possible via the embedded web server.

### **5.4.1. Configuration of the RS-485 interface of the recorder**

The main panel of the web server contains the "Modbus" window, after clicking it, the user can configure the recorder to poll devices via the Modbus protocol on the RS-485 link. It is possible to configure 10 channels. Channel No. 8 is dedicated to temperature / humidity transducers / probes (P18, P18D, P19) but can be used to connect any device. The "Modbus" configuration window consists of three tabs:

- 1) RS-485 - global parameters of the RS-485 interface – transmission – the ability to set the speed, parity check, operating mode and in Master mode the permissible number of incorrect responses and the maximum response time, see fig. 9.



The screenshot shows the "Modbus" configuration window with the "RS-485" tab selected. The window title is "Modbus Settings preview". Below the title bar, there are three tabs: "RS-485", "Chanells", and "Disp. Chanels". The main content area is titled "Global parameters" and contains the following settings:

Parameter	Value
Baud rate	9600
Parity control	RTU 8N1
Work mode	Master
Permissible no. of errors	2
Timeout	1000

At the bottom of the window, there are two buttons: "Save" and "Close".

*Fig. 9. View of the "RS-485" tab of the "Modbus" window*

2) Channels - configuration of Modbus Master channels – configuration of the polled device: address, Modbus function selection, initial register number, number of registers, type of registers being polled, polling interval and selection of displayed values on the main web server window (tile dedicated for a given channel) and name definition of the channel

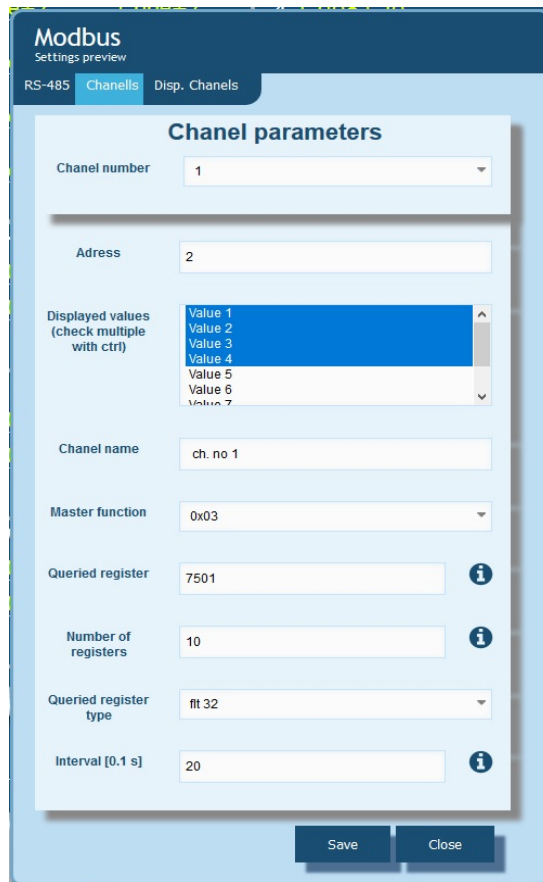


Fig.10 Configuration window of Modbus Master channels

3) Displayed channels - selection of channels for presentation on the main panel of the website in the form of individual tiles of a given channel

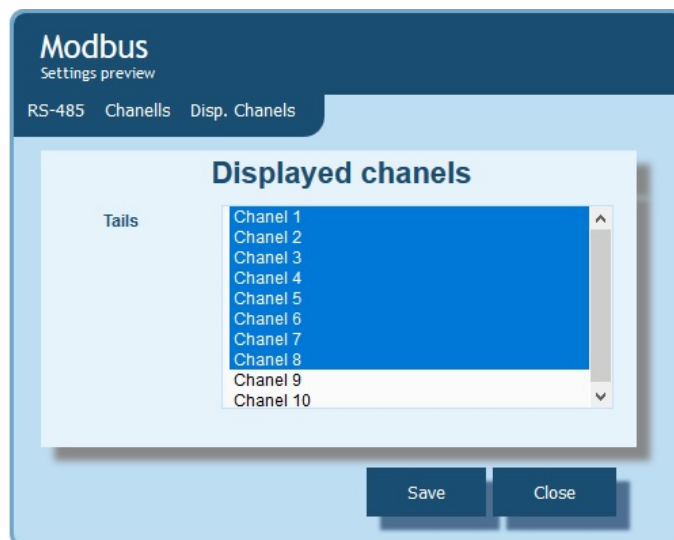


Fig.11. Selection window for Modbus Master channels displayed on the main page of the web server

While working in master mode, the recorder polls the devices in the network, and the data read from them is available in data registers (registers 8000 ... 8099 - channel 1 8000 ... 8009, channel 2 8010 ... 8019, etc.). The devices are polled in the order according to the configuration (channel 1, channel 2, channel 3, etc.), the frequency of device polling depends to a large extent on the speed of devices operating on the bus. For devices with a long response time, it may happen that the time between subsequent data readings from the device is longer than the time set in the recorder configuration. The time difference results from the waiting time for the device response and the duration of data transfer. In the case of setting a long waiting time for the response and the lack of device from which the readings are to be taken, the recorder waits for the time (specified by the "response time" parameter) each time the request is sent, therefore, if the device is switched off from the network, disable it in the recorder by setting address value to "0" (disable polling for a given channel).

### 5.5. Description of HT25 recorder reading field

HT20 is equipped with a backlit LCD display consisting of two lines of 16 characters each.. The top line of the display is used for the presentation of measured values - e.g. temperature and relative humidity and to display status pictographs of the file system internal memory. Bottom line of the display shows the internal memory usage, alarm status, time and date. During normal operation the recorder displays measured values alternately with their symbols.

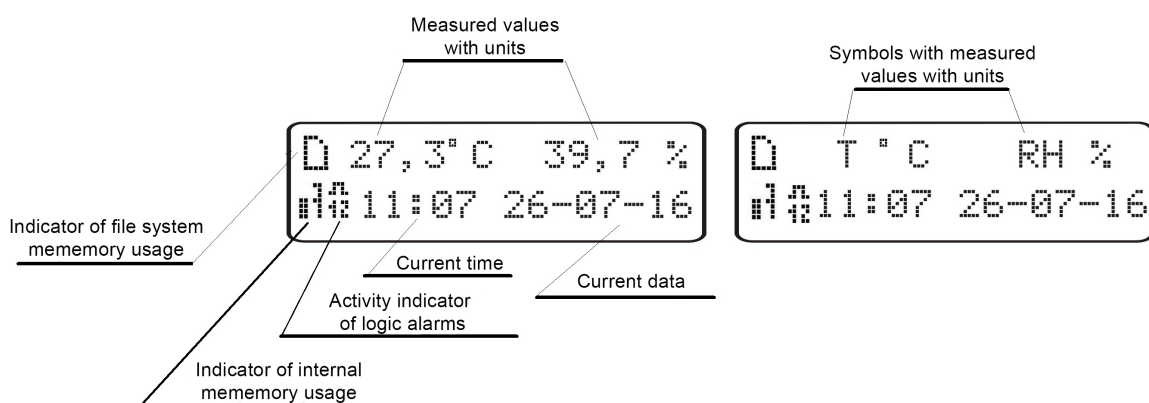



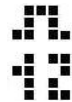
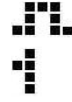












Fig. 12. Description of HT25 recorder reading field

Tables 1, 2 shown the symbols displayed on the LCD, and their meanings.

**Table 1**

Symbol	Display mode	Meaning
	constant	file system internal memory installed and ready for operation
	flashing	error of file system internal memory
	flashing	file system internal memory full
	flashing	file system internal memory installed and ready for operation, active FTP connection
	constant	alarm activity indicator - alarms 1, 2 active
	constant	Alarm activity indicator – active alarm no. 1
	constant	Alarm activity indicator – active alarm no. 2
	constant	alarm activity indicator - alarms inactive

**Table 2**

Symbol								
Percentage of internal memory usage	87.5... 100%	75... 87.5%	62.5... 75%	50... 62.5%	37.5... 50%	25... 37.5%	12.5... 25%	0... 12.5%

Measuring ranges exceedings are indicated by displaying special characters on the top line of the LCD:

- - lower exceeding of the range of the displayed value
- - upper exceeding of the range of the displayed value



## 5.5. Selection of the quantities displayed on the LCD display

By default, temperature and humidity values are displayed on the LCD display together with their units (values read from Channel 8 Modbus Master). The displayed quantity can be changed after clicking the service settings tile and selecting the "Display" tab. The list of displayed quantities selection also contains dew point and absolute humidity or one of 12 registers of the recorder - user-defined registers selected from any 32-bit HT25 registers, e.g. registers with values read from any channel in the range 8000 ... 8099.

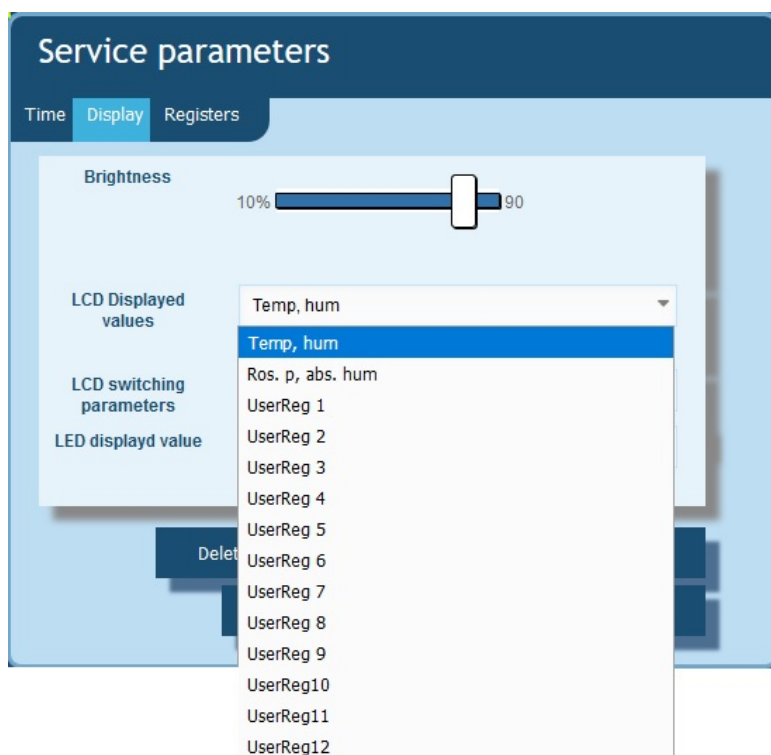
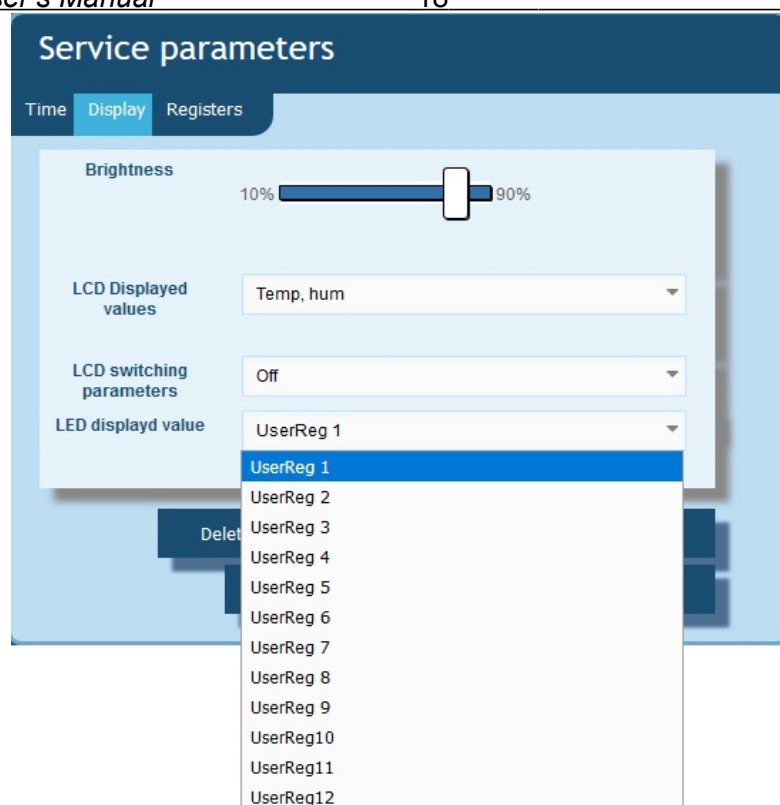


Fig. 13 Selection of the quantity displayed on the LCD display

## 5.6. Description of HT25 recorder LED reading field

The LED display field is located on the side of the housing and consists of four yellow digits. It allows displaying the value of one of the recorder's 12 registers, provided that its value is in the range -999 ... 9999. The displayed quantity can be changed after clicking the service settings tile and selecting the "Display" tab.



*Fig. 14. Selection of the quantity displayed on the LED display*

## **5.7. Ethernet 10/100-BASE-T**

HT25 recorders are equipped with Ethernet interface for the connection (using RJ45 slot) to a local or global network (LAN or WAN) and the use of network services implemented in the recorders: Web server, FTP server, Modbus Slave TCP/IP, SMTP client. In order to use the network services Ethernet parameters of the recorder must be configured. Standard Ethernet parameters of the recorder are shown in **table 4**. The basic parameter is the IP address of the recorder - by default 192.168.1.19, which must be unique within the network to which we connect the device. The IP address can be assigned to the recorder automatically by DHCP server present on the network provided that the the option to acquire IP address from DHCP server is enabled. DHCP service is disabled by default, then the recorder initializes with the default IP address allowing the user to change the IP address through the website.

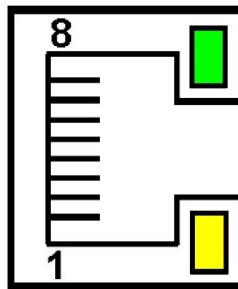
**Caution:** The recorder allows for up to 10 connections simultaneously!! The applications implemented in the recorder use from 1 to 2 connections:

- Modbus TCP/IP - 1 connection

- Web server - minimum 1 connection
- FTP server - 2 connections
- SMTP client - 1 connection

### 5.7.1. Connection of 10/100 BASE-T interface

To access the Ethernet services, it is required to connect the recorder to the network via the RJ45 slot located at the top of the recorder, operating in accordance with TCP/IP.



*Fig. 15. View and numbering of RJ45 slot pins*

Description of the recorder RJ45 slot diodes function:

- Yellow LED - illuminates when HT20IoT is properly connected to the Ethernet network 100 Base-T, does not light up when HT20IoT is not connected to the network or is connected to 10-Base-T network.
- Green LED - Tx/Rx, flickers when the recorder sends and receives data, illuminates constantly when data is transmitted

In order to connect HT20 to the network the User should use twisted pair cable.

- U/FTP – twisted pair cable with each pair foiled,
- F/FTP – twisted pair cable with each pair foiled, additionally cable with foil shield,
- S/FTP (formerly SFTP) – twisted pair cable with each pair foiled, additionally cable with wire mesh shield,
- SF/FTP (formerly S-STP) – twisted pair cable with each pair foiled, additionally with foil and wire mesh shield,

Categories of twisted pair cable according to the European standard EN 50173 minimum: Class D (category 5) - for high-speed local area networks, includes applications using the frequency band up to 100 MHz. The description of the connection is shown in table 3. For Ethernet interface the User should use twisted pair cable of STP type (shielded) category 5 with RJ-45 connector with

conductors colors (in accordance with the colors described in table 3) acc. to the following standard:

- EIA/TIA 568A for both connectors at the so-called simple connection of HT25 to the network hub or switch,
- EIA/TIA 568A for the first connector and EIA/TIA 568B for the second connector at the so-called patch cord connection (crossover) used, among others, when connecting HT25 to a computer.

**Table 3**

Conductor no.	Signal	Conductor color acc. to standard	
		EIA/TIA 568A	EIA/TIA 568B
1	TX+	white-green	white-orange
2	TX-	green	orange
3	RX+	white-orange	white-green
4	EPWR+	blue	blue
5	EPWR+	white-blue	white-blue
6	RX-	orange	green
7	EPWR-	white-brown	white-brown
8	EPWR-	brown	brown

### 5.7.2. Ethernet interface default parameters

**Table 4**

No.	Name	Default value
1.	DHCP	Enabled or disabled (cycled when default parameters restoration is forced)
2.	IP ADDRESS	192.168.1.19 (with DHCP disabled)
3.	Subnet Mask	255.255.255.0 (with DHCP disabled)
4.	Gate	192.168.1.1 (with DHCP disabled)
5.	DNS	8.8.8.8 (with DHCP disabled)

### 5.7.2.1. Changing the parameters of Ethernet interface

Changing the parameters of the Ethernet interface is possible through the built-in web server.

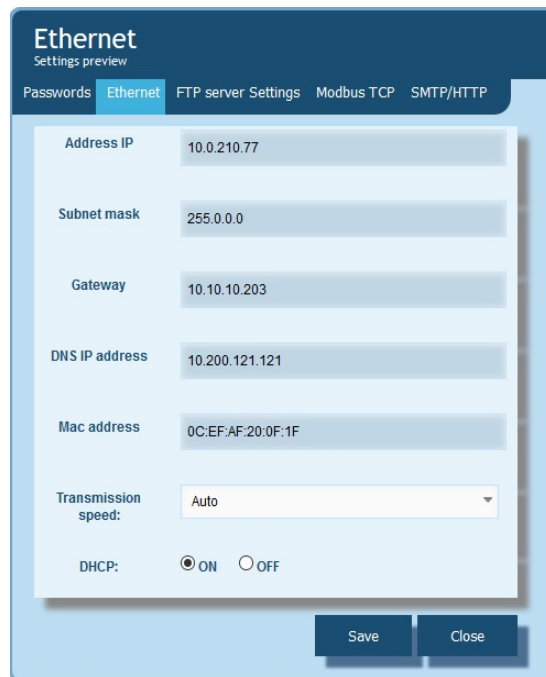


Fig. 16. View of the window to change the parameters of the Ethernet interface

### 5.7.3 Web Server

HT25 recorder provides its own Web server that allows remote recorder of measured values and remote configuration and readout of the recorder status. With the web page the user can:

- obtain device information (serial number, execution code, firmware version, bootloader version, variant (standard or custom-made),
- preview of current values read after RS-485,
- read the status of the device,
- select the language for the Web page,
- perform configuration

Access to the Web server is achieved by entering the recorder IP address in the web browser, e.g. `http://192.168.1.19` (where 192.168.1.19 is set at the recorder). The standard port for web server is port "80". Server port may be changed by the user.

**Caution:** For proper web page operation a browser with JavaScript enabled and compatible with XHTML 1.0 is required (all popular browsers, Internet Explorer, version 8 minimum).

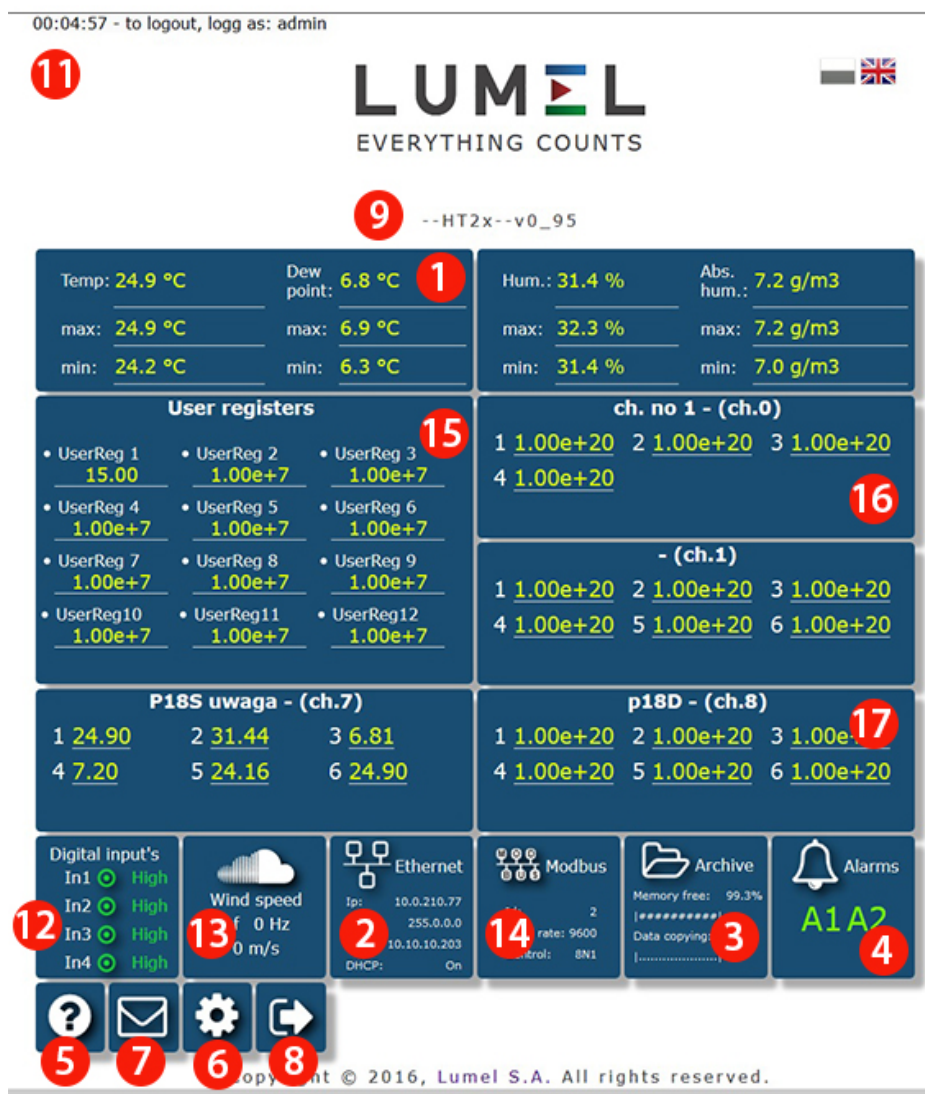


Fig.17. General view of the main website

The function of each tile of the website:

- 1) The view of measurements and after clicking on the tile displaying graphs with trends.
- 2) Ethernet interface settings.
- 3) Archive settings and information about memory usage and the process of data dump to the file system memory.
- 4) Alarm settings and information about their status.
- 5) Information about the device, giving an individual name to the recorder.
- 6) Setting the time, LCD display and configuration of our displayed values - the groups of any of the 12 values of the recorder registers to which we can assign our own name and display it as a separate tile on the website. Defined records can be archived and control the alarms.
- 7) Email configuration.

- 8) Logging off, return to the login page.
- 9) Configurable device name
- 10) Changing the language
- 11) Time to log off during inactivity
- 12) Binary inputs status
- 13) Wind speed value - anemometer measurement at binary input No. 4
- 14) configuration of RS-485 interface and Modbus Master channels
- 15) User registers window
- 16) Window with values from channel 1 of the recorder
- 17) Window with values from channel 8 of the recorder

Service parameters

Time Display Registers

Display Tail with registers

Only 32 bit registers

Describe	Register	Describe	Register
1. UserReg 1	4329	2. UserReg 2	8010
3. UserReg 3	8011	4. UserReg 4	8012
5. UserReg 5	8000	6. UserReg 6	8001
7. UserReg 7	8080	8. UserReg 8	8081
9. UserReg 9	8082	10. UserReg10	8083
11. UserReg11	8084	12. UserReg12	8085

Delete extremes Def. set. Reset dev.

Default. eth. set. Save Close

Fig. 18. View of the window to configure the group's of our own records

### 5.7.3.2. Selection of Web server user

The recorder has two user accounts for the Web server secured by individual passwords:

- user: **"admin"**, password: **"admin"** - access to configuration and the preview of parameters
- user: **"user"**, password: **"pass"** - access to the preview of parameters only.
- user: "guest" - access to the preview of the measured values on the home page only, log on to the guest account does not require entering a user name or password, it is enough to select "Login as a guest" and then click on "Login"

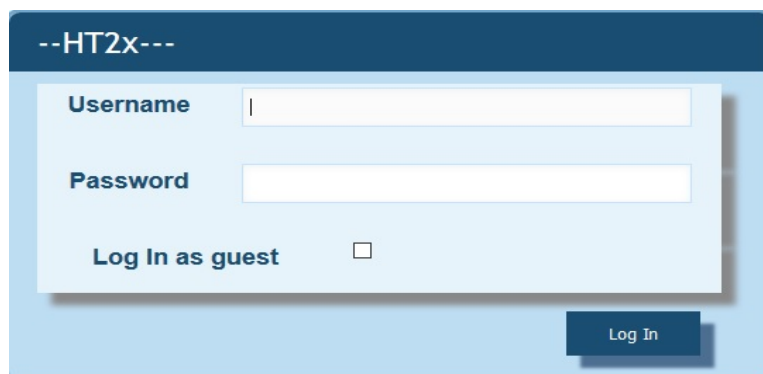


Fig. 19. View of the login window to the website

Calling the recorder IP address in the browser, for example <http://192.168.1.19> will display the start display in the browser where the user must enter the name and user password. Additionally, you can log in to the "guest" account, when you select "Login as a guest" on the login page. "Guest" user account is limited to view the measured values on the main page. Log off occurs after 5 minutes of inactivity.

### 5.7.3.3. Messages to the user

The web server is equipped with a system of messages to the user. If the user tries to save the settings into the recorder, a message is returned on the status of such operation. For mobile applications there is a user notification system built-in the web browser.

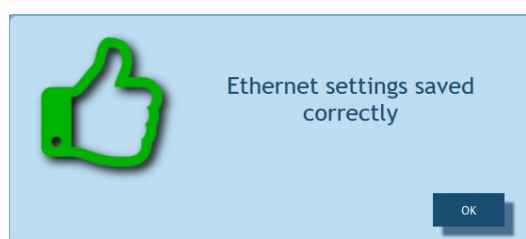


Fig. 20. View of the message window informing that parameters has been correctly recorded in the device.

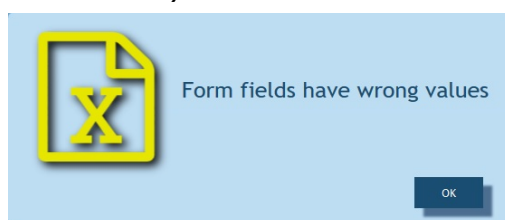
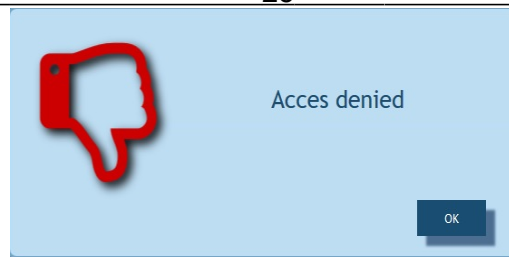


Fig. 21. View of the message window informing about incorrect data of the web form

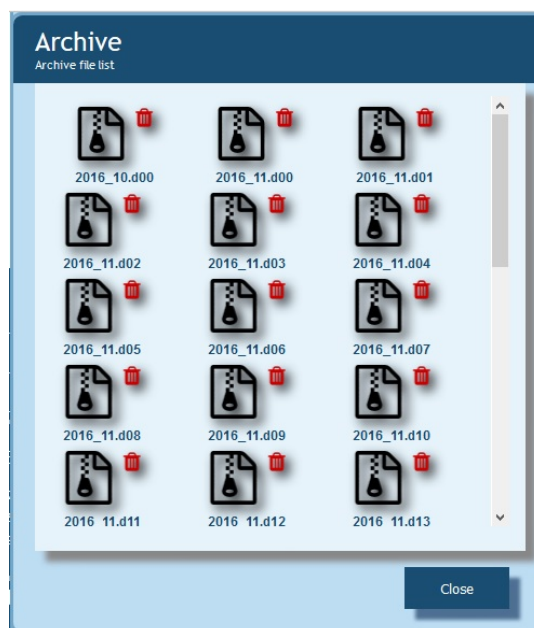




*Fig. 22. View of the message window informing about lack of permission to view the website content.*

#### **5.7.3.4. Access to the archive file through the web server**

HT25 allows for access to archive files through the file manager implemented on the web server that allows the user to retrieve and delete individual files. To start the archive file manager, click on the tile **Archive**, and then click the button **Download archive files**.



*Fig. 23. View of the window of the file manager on the web server*

In order to download the file, click the file icon, and to delete a file, click the trash can symbol next to the file icon.

### 5.7.3.5 Logic alarms

HT25 is equipped with 2 logic alarm outputs. Each alarm can operate in one of six modes. **Fig. 17** shows the operation of alarm in the following modes: n-on, n-off, on, off. The other two modes: h-on and h-off mean respectively, always On and always Off. These modes are designed for manual simulation of alarm states.

The screenshot displays the 'Alarms' configuration window. At the top, the title 'Alarms' is shown in a dark blue header. Below the header, there is a dropdown menu labeled 'Choose setting' with the selected option 'Alarm 1 configuration settings'. The main configuration area contains several fields:

- Alarm control parameter:** A dropdown menu set to 'Temperature'.
- Alarm working mode:** A dropdown menu set to 'h-off', accompanied by an information icon (i).
- Alarm threshold - lower val.:** A text input field containing the value '0'.
- Alarm threshold - upper val.:** A text input field containing the value '0'.
- Alarm ON delay [s]:** A text input field containing the value '0', with an information icon (i).
- Alarm Off delay [s]:** A text input field containing the value '0', with an information icon (i).
- Re-switching alarm delay [s]:** A text input field containing the value '0', with an information icon (i).
- Alarm output (use CTRL to check many):** A list box containing three items: 'Buzzer', 'E-mail Adress1', and 'E-mail Address 2'.

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

*Fig.24. View of alarms configuration window*

AL\_L - Lower threshold of the alarm  
 AL\_H - Upper threshold of the alarm

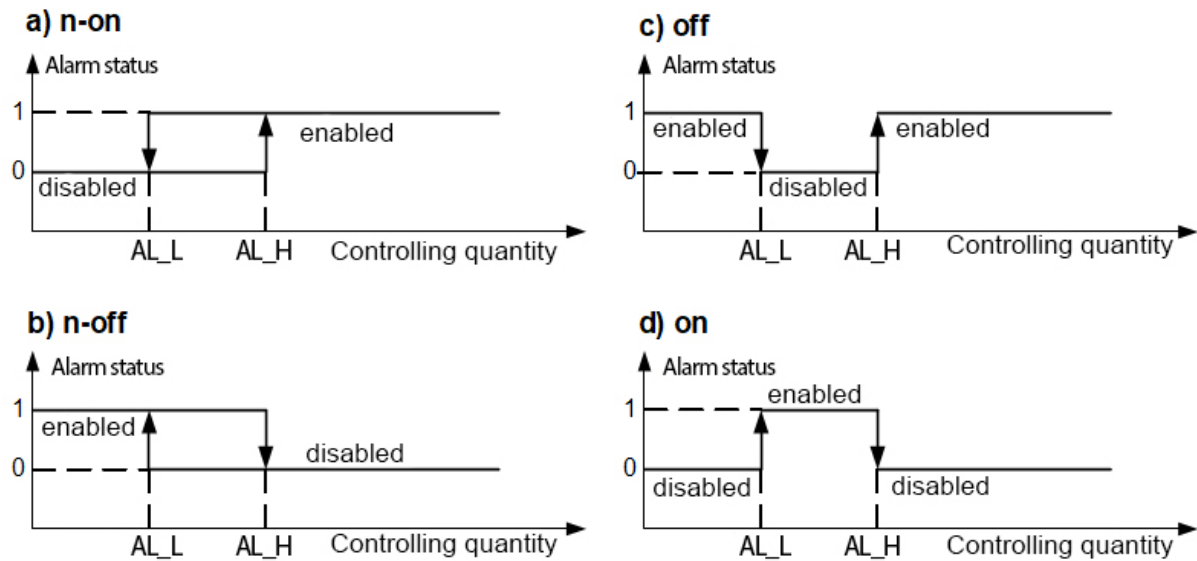


Fig. 25. Types of alarms: a) n-on; b) n-off; c) on; d) off.

**Caution:** In the case of alarm types n-on, n-off, on, off entering  $AL_L > AL_H$  will disable the alarm.

In the "alarm output" tab the user can decide what action will be performed following the change of the alarm state:

- **Buzzer** – audible alarm
- **E-mail address 1** – sending e-mail message to recipient no. 1
- **E-mail address 2** – sending an e-mail to the recipient No. 2

It is possible to simultaneously select several options at once.

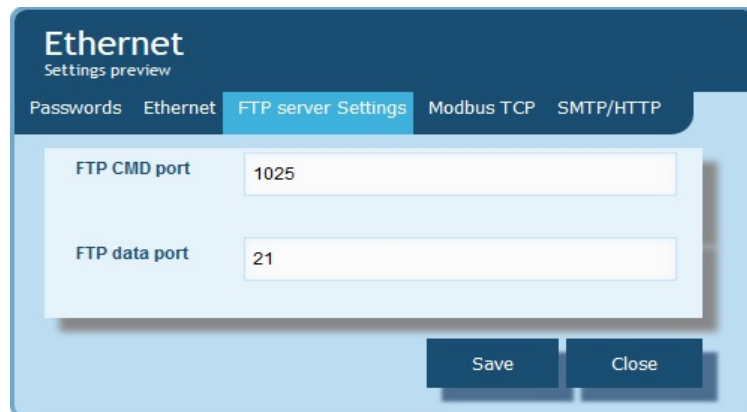
**Caution:** If the user selects the audible alarm for alarm number 1 (2), the same option should not be selected for alarm2 (1) !!!

## 5.7.4 FTP Server

FTP file sharing protocol is implemented in HT25 recorder. The recorder acts as a server, allowing clients to access the internal memory of the meter file system. Access to files is possible using a computer, tablet with installed FTP client or another device acting as FTP client. To transfer files using FTP the following ports are normally used: "1025" - data port and "21" - command port. If necessary, the user can change the port used by the FTP. Please note, that the

configuration of the server and FTP client ports must be the same.

FTP client program should work in passive mode, then the connection is established fully by the client (the customer chooses the data port). For file transfer with the recorder it is possible to use maximum one connection at the same time, that is why the maximum number of connections must be limited to "1" in the client program.



*Fig. 26. View of FTP ports configuration window*

#### **5.7.4.1 Selection of FTP user**

The recorder has two user accounts for the FTP server secured by individual passwords:

- user: "**admin**", password: „**admin**” - access to files saving and reading
- user: "**user**", password: „**passftp**” - access to archive files reading only.

FTP user names can not be changed, however it is possible to change the password for each user - it is recommended to change passwords for security reasons. The password must contain a minimum of 4 characters. Password change is only possible through the web page in "Ethernet" parameters group. Passwords can have a maximum of 8 characters. If the password is lost - making it impossible to use the FTP, the factory defaults of the Ethernet interface must be restored through the Web site, or all settings can be restored to the factory defaults using the "Reset" button point 4.2. All standard parameters of the recorder including the Ethernet parameters and password for FTP server users will be restored:

user "admin" → password: „**admin**” ;

user "user" → password "**passftp**".

FileZilla can be used as the FTP client. By typing the recorder IP address in the address field we can view and download archive files.

### **5.7.5 E-mail service**

HT25 recorders have been equipped with a function to send email messages using SMTP. To send a message the user must provide authentication data to SMTP proxy server. The server should be located

in the same network as the device.

**Caution:**

**SMTP proxy server must support AUTH PLAIN authentication for unencrypted connection.**



The service allows the user to send information about alarm events and information in the form of regular short e-mail messages that contain the following information:

- The time at which the event occurred,
- The quantity that caused the event,
- The measured values which occurred at the moment of alarm status change,
- The name of the device from which the information was sent.

HT25 recorder has a memory buffer allowing for storage of maximum of 20 e-mail messages. If an e-mail can not be sent on a regular basis, for example, due to lack of connection they are queued up one after the other until their number does not exceed 20. When the limit is exceeded, the subsequent messages will be lost. In the case of transmission errors, wrong configuration or other factors beyond the control of the device (e.g. Anti-spam protection of SMPT server), the messages may not reach the recipient.

The screenshot shows an 'E-mail' configuration window with the following elements:

- 1) SMTP server address/IP input field
- 2) Sender address input field
- 3) SMTP user input field
- 4) SMTP password input field
- 5) Address 1 input field
- 6) 15 min dropdown menu
- 7) Test 1 button
- Address 2 input field
- 30 min dropdown menu
- Test 2 button
- Save button
- Close button

*Fig. 27. View of e-mail configuration window*

- 1) SMTP server address, e.g. "smtp.wp.pl" or SMTP server IP number
- Address of the sender, .e.g. "MyName@gmail.com"
- 3) Username registered on the SMTP server
- 4) Password for the specified account on the SMTP server
- 5) Name of the first recipient to whom the message is to be delivered
- 6) The period of sending cyclical messages
- 7) The button sending a test message

The appropriate SMTP server port must be configured on the "Ethernet" tile in the "SMTP" tab. For unencrypted connections usually ports 25 or 587 are used.

The screenshot shows an 'Ethernet' configuration window with the following elements:

- SMTP port address: 25
- WWW port: 80
- Save button
- Close button

*Fig. 28. View of SMTP port configuration window on "Ethernet" tile*

To verify the configuration of e-mail, click on the "Send a test message" button on "E-mail" tile and then, in order to determine the configuration errors, watch the messages appearing in the upper left corner of the website.

## 5.7.6 Modbus TCP/IP

HT25 recorders allow access to internal registers via Ethernet and Modbus TCP/IP Slave. Modbus protocol functions and structure of the registers are described in points 5.7.6.1 – 5.7.6.3. In order to set up a connection it is necessary to set a unique IP address for the recorder and to set the connection parameters listed in table 5.

**Table 5**

No.	Description	Default value
1.	Device address for MODBUS TCP/IP	1
2.	Port number of Modbus TCP	502
3.	Time to close the port of Modbus TCP/IP service [s]	60
4.	The maximum number of simultaneous connections to Modbus TCP / IP service	2

The device address is the address of the device for Modbus TCP / IP. By setting the address of the recorder to "255" the recorder will skip the analysis of the address in Modbus frame (broadcast mode).

The screenshot shows a web-based configuration interface for an Ethernet device. The main title is "Ethernet" with a subtitle "Settings preview". Below the title are several tabs: "Passwords", "Ethernet", "FTP server Settings", "Modbus TCP" (which is currently selected and highlighted in blue), and "SMTP/HTTP". The "Modbus TCP" configuration area contains four input fields with their respective values: "Modbus port number" is 502, "Modbus slave address" is 1, "Waiting Time" is 60, and "Maximum number of connect" is 3. At the bottom right of the configuration area, there are two buttons: "Save" and "Close".

*Fig.29. View of Modbus TCP configuration parameters on "Ethernet" tile*

The implemented protocol is in accordance with the PI-MBUS-300 Rev G of Modicon Company.

### 5.7.6.1. Description of implemented functions

HT25 recorders have the following MODBUS functions:

- 03 (03h) – readout of registers group.
- 04 (04h) – readout of input registers group.
- 17 (11 h) - identification of slave device.

### 5.7.6.2. Map of registers

In HT25 recorder the data is placed in 16- and 32-bit registers. Process variables and parameters of the recorder are located in the address space of registers in a manner dependent on the type of the variable. Bits in 16-bit registers are numbered from the youngest to the oldest (b0 ... b15). 32-Bit registers (4 Bytes) contain floating point numbers in IEEE-754 standard. Order of bytes: B3 B2 B1 B0 – the oldest byte is sent first. 16-Bit registers representing 32-bit values in two subsequent registers are doubled in another address area with the following bytes order: B1 B0 B3 B2 (Tab. 6).

The map of the HT25 recorder registers is presented below.

**Caution:** All given addresses are physical addresses. In some computer programs, logical addressing is applied, then addresses must be increased by 1.

**Table 6**

Address range	Value type	Description
4300 - 4325	Integer (16 bits)	Value is placed in 16-bit register.
6000-6198	float (32 bits)	Value is placed in two successive 16-bit registers. Registers contain the same data as 32-bit registers of 7500 range. Registers are read-only. Bytes order (B1,B0,B3,B2)
7000 -7198	float (32 bits)	Value is placed in two successive 16-bit registers. Registers contain the same data as 32-bit registers of 7500 range. Registers are read-only. Bytes order (B3,B2,B1,B0)
7500-7599	float (32 bits)	Value is placed in 32-bit register. Registers are read-only.
8200-6398	float (32 bits)	Value is placed in two successive 16-bit registers. Registers contain the same data as 32-bit registers of 8000 range. Registers are read-only. Bytes order (B1,B0,B3,B2)
8400 -7598	float (32 bits)	Value is placed in two successive 16-bit registers. Registers contain the same data as 32-bit registers of 8000 range. Registers are read-only. Bytes order (B3,B2,B1,B0)



8000-8099	float (32 bits)	Value is placed in 32-bit register. Registers are read-only.
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### 5.7.6.3. Read-only registers.

Table 7

Value is placed in 16-bit registers.	Writing (w) /readout (r)	Range	Description	
4300	r	0 ...9999	Software version * 100	
4301	r	0 ...9999	Bootloader version * 100	
4307 ...4307	r		reserved	
4308	r		Production status 1	
			Bit15 ... Bit0	Serial number (1...99999)
4309	r		Production status 2	
			Bit15 ... Bit12	RESERVED
			Bit11 ... Bit6	Manufacturing year year (0...63)
			Bit5 ... Bit0	Manufacturing month (0...12)
4316.. ...4328			RESERVED	
4329	r	0 ...15	Binary inputs status	
			Bit 0	"0" , „1" - status of binary input 1
			Bit 1	"0" , „1" - status of binary input 2
			Bit 2	"0" , „1" - status of binary input 3
			Bit 3	"0" , „1" - status of binary input 4
4330	r	0 ...1	Status of binary output no. 1	
4331	r	0 ...1	Status of binary output no. 2	
4332	r	0 ...1	Status of binary output no. 3	
4333	r	0 ...1	Status of binary output no. 4	

Table 8

Value is placed in two successive 16-bit registers. These registers contain the same data as 32-bit registers of 7500 range.	Value is placed in 32-bit registers.	Name	Writing (w) / readout (r)	Unit	Unit name
7000/6000	7500	T	o	°C	Measured temperature
7002/6002	7501	RH	o	%	Measured relative humidity
7004/6004	7502	DP	o	°C	Calculated dew point
7006/6006	7503	AH	o	g/m <sup>3</sup>	Calculated absolute humidity
7008/6008	7504		r	°C	Wet bulb temperature
7010/6010	7505		r	hPA	Saturated vapor pressure
7012/6012	7506				Enthalpy
7014/6014	7507	f	r	Hz	Signal frequency at input no. 4
7016/6016	7508		r	m/s	Wind speed (input no. 4)
7018/6018 ...7034/6034	7509 ...7517				reserved
7036/6036	7518		r		Device ID
7038/6038	7519				Status
7040/6040	7520				% of internal archive usage
7042/6042	7521				Reserved
7044/6044	7522				Progress of internal archive rewriting To the file system
7046/6046	7523	Current time	r	-	Current time
7048/6048	7524	Date - year	r	YYYY	Current date - year
7050/6050	7525	Month, day	r	MMDD	Current date - month, day
7052/6052	7526				Reserved
7054/6054	7527		r		the amount of file system memory free space (kB), value "-1" means a memory error
7056/6056	7528		r		Total storage capacity of file system memory (kB), value "-1" means no properly installed memory
7058/6058 ...7072/6072	7529-7536		r		Reserved
7074/6074	7537		r		The first defined register displayed

7076/6076	7538		r		The second defined register displayed
7078/6078	7539		r		The third defined register displayed
...	....				.....
7096/6096	7548		r		The twelfth defined register displayed

**Table 9**

Value is placed in two successive 16-bit registers. These registers contain the same data as 32-bit registers of 800 range.	Value is placed in 32-bit registers.	Name	Writing (w) / readout (r)	Unit	Unit name
8400/8200	8000	Channel 1 register 1	w/r	—	Channel 1 Modbus Master – first read register
...	...	...	...	...	...
8418/8218	8009	Channel 1 register 10	w/r	—	Channel 1 Modbus Master – tenth read register
8420/8220	8010	Channel 2 register 1	w/r	—	Channel 2 Modbus Master – first read register
...	...	...	...	...	...
8438/8238	8019	Channel 2 register 10	w/r	—	Channel 2 Modbus Master – tenth read register
8440/8240	8020	Channel 3 register 1	w/r	—	Channel 3 Modbus Master – first read register
...	...	...	...	...	...
8458/8258	8029	Channel 3 register 10	w/r	—	Channel 3 Modbus Master – tenth read register
8460/8260	8030	Channel 4 register 1	w/r	—	Channel 4 Modbus Master – first read register
...	...	...	...	...	...
8478/8278	8039	Channel 4 register 10	w/r	—	Channel 4 Modbus Master – tenth read register
8480/8280	8040	Channel 5 register 1	w/r	—	Channel 5 Modbus Master – first read register
...	...	...	...	...	...
8498/8298	8049	Channel 5 register 10	w/r	—	Channel 5 Modbus Master – tenth read register
8500/8300	8050	Channel 6 register 1	w/r	—	Channel 6 Modbus Master – first read register
...	...	...	...	...	...

8518/8318	8059	Channel 6 register 10	w/r	—	Channel 6 Modbus Master – tenth read register
8520/8320	8060	Channel 7 register 1	w/r	—	Channel 7 Modbus Master – first read register
...	...	...	...	...	...
8538/8338	8069	Channel 7 register 10	w/r	—	Channel 7 Modbus Master – tenth read register
8540/8340	8070	Channel 8 register 1	w/r	—	Channel 8 Modbus Master – first read register
...	...	...	...	...	...
8558/8358	8079	Channel 8 register 10	w/r	—	Channel 8 Modbus Master – tenth read register
8560/8360	8080	Channel 9 register 1	w/r	—	Channel 9 Modbus Master – first read register
...	...	...	...	...	...
8588/8388	8089	Channel 9 register 10	w/r	—	Channel 9 Modbus Master – tenth read register
8580/8380	8090	Channel 10 register 1	w/r	—	Channel 10 Modbus Master – first read register
...	...	...	...	...	...
8598/8398	8099	Channel 10 register 10	w/r	—	Channel 10 Modbus Master – tenth read register

## 5.8. Firmware upgrade

HT25 recorders implements a feature that allows the user to upgrade the software using a PC. Free eCon software and update files are available on the [www.lumel.com.pl](http://www.lumel.com.pl). RS-485 to USB converter connected to a computer is needed to perform the upgrade, e.g.: PD10 converter.

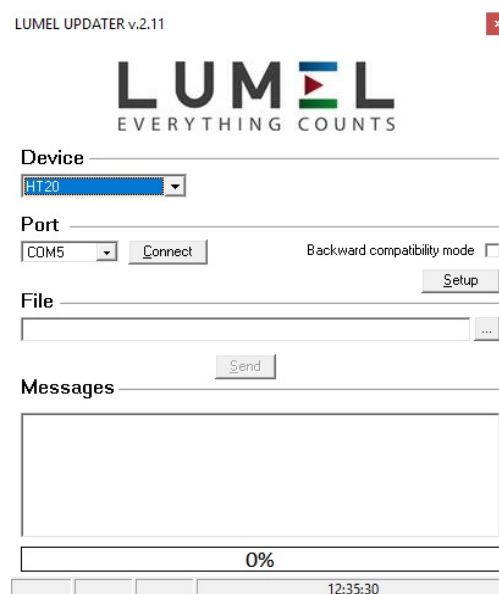


Fig. 30. View of the program to upgrade the firmware.

**Caution!** After upgrading the software, set up the factory setting of the recorder.



Before commencing the update, connect the computer with the RS-485 interface to the HT25 recorder (terminals No. 9, 10)

After starting the eCon program the speed, mode, the recorder IP address and RS-485 port must be set in the **Communication** tab. Then click the **Connect** icon. Then click the link **Upgrade firmware** which will display the window of LUMEL UPDATER (LU) – **fig. 30**. Then, while pressing the button „ ... ” load the file with the new version of the software in LUMEL UPDATER. Click the **Connect** button **Messages** information window contains info about the progress of the upgrade process. When the port is properly opened the display shows: **Port opened**. Switching to the upgrade mode is performed remotely via LU (based on the settings in eCon or the website - address, mode, speed, COM port) - upgrade according to the recommended communication parameters, i.e. speed 115200 kb/s, 8N2 mode. If the recorder establishes communication with LUMEL UPDATER the following message is displayed in LU program **Device found: HT25** and the version of the main program and the bootloader of the connected device, and the recorder display will show the message "Device is ready." When the file is properly opened, LU program displays information **File opened**. Press the **Send** button. During upgrade, the percentage update progress is displayed on the bottom row of the display. After successful upgrade the recorder switches to normal operation, and the information window shows **Done** and the upgrade duration.

The current software version can also be checked by reading the greeting messages of the recorder displayed after powering up.

**Caution:** Software upgrade is only possible when the recorder is directly connected to PC (no other **Master** devices connected to RS-485)



**Caution:** Turning off the power during the software upgrade may result in permanent damage to the recorder!



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## **5.9. Measured values archiving**

### **5.9.1. The recorder memory structure**

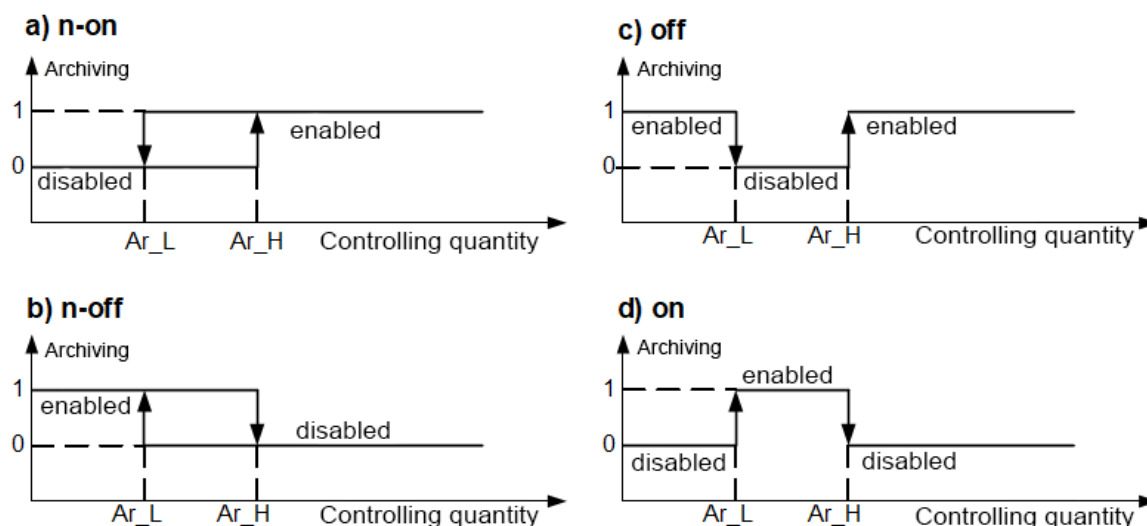
HT25 recorders are normally equipped with 4MB of internal memory for storing the the current data recorded by the recorder. The recorder can record any parameter of the 4 measured values - temperature, relative humidity, dew point and absolute humidity. Additionally, the user can archive each of 12 defined displayed quantities. Internal memory of the recorder allows for storage of 534336 records. If you save by default 50% of the internal memory (or other value defined by the user), the archive is automatically rewritten to the file system memory. The memory is a circular buffer. After the memory is full, the oldest data is overwritten. The internal archive can be read, copied and deleted.

HT25 recorders have file system internal memory of the size of 8GB (memory size of the file system can be increased on request or according to the needs of the manufacturer) to which the data from the internal memory are automatically rewritten in the form of files. Data can be downloaded via Ethernet using FTP or Web site.

Minimum archiving period is 10 seconds.

### **5.9.2. Configuration of archiving**

Website is used to configure the archiving parameters. Archiving can be continuous and conditional. Triggering conditional archiving may be performed according to one of the four possibilities shown in **fig. 30** ( n-on, n-off, off, on). Continuous archiving is activated by selecting h-on archiving type, and it is turned off by selecting the h-off option.



*Fig. 31. Types of conditional archiving*

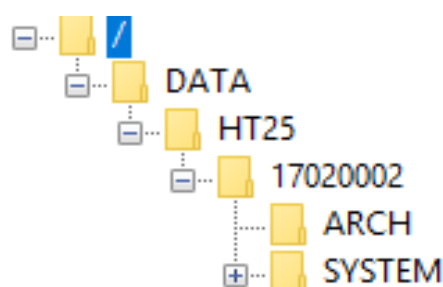
Ar\_L - Lower threshold of archiving

Ar\_H - Upper threshold of archiving

### 5.9.3. File system internal memory

HT25 recorders are equipped with file system internal memory. FAT and FAT32 file systems are supported. During operation the recorder creates file directories containing historical data.

During recording the recorder creates directories and files of the file system in the internal memory. An example of the directory structure is shown in **fig. 31**.



*Fig. 32. Directories structure in the memory.*

Apart from the ARCH directory, in which the archived data is placed, SYSTEM directory is also created on the card where the following files are located:

- start.txt - date and time of the file system internal memory installation (when the recorder is restarted after power failure)
- manual.pdf - current user's manual

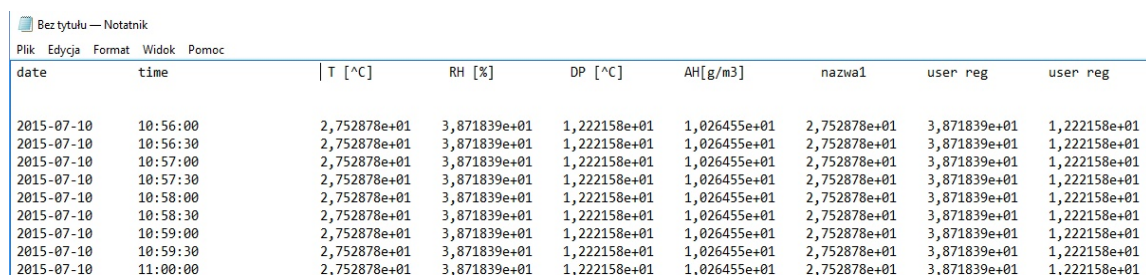
- enarch.gif – graphic file with info about alarms / archiving configuration

**Caution:** If these files are deleted, some elements of the website - hints, instructions, may not be displayed; these files can be removed after logging in FTP server to administrator account.

Data in the memory is stored in files located in the directories with names corresponding to the device name and the serial number - see **fig. 32**. Whereas the names of the files correspond to the date of recording and they have the following format *XXXX\_YY.Dzz*, where *XXXX* → year , *YY* → month. The format of the archive file extension is *Dzz*, where "zz" is the subsequent number of the archive file from a given month. For example, the first file in the archive in the month of May 2016 will be 2016\_05.D00, the next file: 2016\_05.D01 itd. etc. max. 32 files can be created for a given month (\*.D00 ... \*.D31). The file is changed automatically when the file size reaches 29 MB.

### 5.9.4. Structure of archive files

Files containing archived data in the internal memory of the file system are structured as columns, where successive columns of data are separated from each other by a tab character. The first line of the file contains the columns header. Data records are sequentially arranged in rows and the fields of the record are separated from each other by a tab character. View a sample archive file with archiving further 12 user's displayed values is shown in **fig. 33**.



date	time	T [°C]	RH [%]	DP [°C]	AH[g/m3]	nazwa1	user reg	user reg
2015-07-10	10:56:00	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:56:30	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:57:00	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:57:30	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:58:00	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:58:30	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:59:00	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	10:59:30	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01
2015-07-10	11:00:00	2,752878e+01	3,871839e+01	1,222158e+01	1,026455e+01	2,752878e+01	3,871839e+01	1,222158e+01

*Fig. 33. Sample data file*

Subsequent fields included in the row describing the record have the following meaning:

- *date* – the date of the data registration, the date separator character is "-"
- *time* – hour, minute, second of the recorded data, time separator character is ":"
- *T, RH, DP, AH, name1, user reg, ....* – name of the value to be archived, the default decimal separator character is "." however, the separator can be changed to "," by selecting the proper option in the Archive window of the website.



## 5.10. Binary inputs

In the back part of the recorder housing (Fig.3) there are slots with 4 binary inputs marked in the diagram IN1 ... IN4.

Inputs					RS-485 socket				
IN1	IN2	IN3	GND	12 V	F/IN4	GND	12 V	A	B
1	2	3	4	5	6	7	8	9	10

Fig. 34. Diagram of slots connections with binary inputs

The inputs are universal contact type (potential-free) – shorting any input to GND potential will cause that a low or active state will be registered on the input – voltage – applying voltage of the value of  $> 3V$  to any input will result in registering high state on the given input. State of binary inputs is shown in register 44329 ( bit “0” - state of input IN1, bit “1” - state of input IN2, bit “2” - state of input IN3, bit “3” - state of input IN4) and on the recorder web server. Additionally, in the registers 4330 ... 4333 there are values of individual binary inputs tabl. 7.



Fig. 35. Tiles of the web server presenting the state of binary inputs

Binary input no. 4 may be used to measure the frequency in the range (0 ...100 Hz) - measurement of the anemometer signal (wind speed measurement). Rescaling constant of input No. 4 for wind speed and the selection of the level of active state of the inputs can be set after clicking the binary inputs tile.

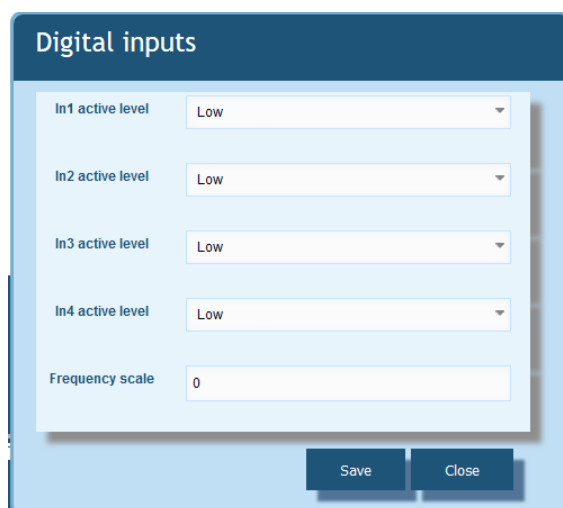




Fig. 36. View of the window of configuration of binary inputs


The four binary inputs of the recorder can be configured freely, i.e. the user decides on the selection of the active state level of each input. By default, the active state of each binary input is high (applied voltage > 5V or leaving the input not shorted with ground potential).

## 6. Additional accessories

HT25 recorders are available with additional accessories such as D.C. and PoE IEEE 802.3af. power supply units Table 7 shows the available items with their commercial codes.

Table 11

No.	Accessory	Appearance	Ordering code	Technical data
1.	12 VDC power supply		20-090-00-00023	Voltage: 12 V d.c. $\pm$ 5% Maximum power: 12W* Input voltage: 90...253 V a.c. Operating temperature: 0...40 o C* Dimensions: 63.6 x 29.5 x 45.6 mm* Conductor length: 1,4 m $\pm$ 10%* Plug: $\phi$ 5.5 / 2.1 mm *power supply parameters can change
2.	PoE power supply		20-090-00-00022	Input voltage: 100 – 240 VAC Input frequency: 47 – 63 Hz Current consumption: 0.35 A max. for 240 VAC Output voltage: 48 VDC Power output: 15.4 W Operating temperature: 0 – 40 °C Dimensions: 140 x 65 x 36 mm Weight: 0.2 kg

3.	power cord for PoE power supply		20-069-00-00146	conductor length: 1,8 m
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## 7. Technical data

### Basic parameters:

#### Ethernet Interface: **10/100-Base-T**

- max. number of simultaneous connections 10
- max. load capacity of 12V d.c power supply 3 W

#### Binary inputs:

- high state voltage at binary input 3...24 V
- minimum duration of low and high level 8 ms

#### Frequency measurement inputs

- range 0.1...100 Hz
- minimum duration of low and high level 50 us

### Nominal operating conditions:

- power supply 12 V d.c.  
or PoE IEEE 802.3af
- power consumption < 5 VA
- ambient temperature – 20...23...60 °C
- air relative humidity: < 95% <sup>[1]</sup>
- time of initial warm-up 15 minutes
- degree of protection provided by housing IP 20
- fitting on the wall or stand alone
- weight <0.3 kg
- dimensions (120 x 80 x 25) mm
- operating position: any

### Electromagnetic compatibility

- - immunity to electromagnetic interference acc. to EN 61000-6-2
- - emission of electromagnetic disturbances acc. to EN 61000-6-4

**Safety requirements according to PN-EN 61010-1 standard**

- installation category III
- degree of pollution 2
- operating voltage relative to earth 50V
- altitude < 2000m

**Parameters of DC power supply unit (option):**

- voltage 12 V d.c.  $\pm$  5%
- maximum power 12W\*
- input voltage 90...253 V a.c.
- operating temperature 0...40 °C\*
- dimensions 63.6 x 29.5 x 45.6 mm\*
- cord length 1,4 m  $\pm$  10%\*
- plug  $\phi$ 5.5 / 2.1 mm

\* power supply parameters can change

□ water vapor condensation is not permissible

**8. Ordering code****Table 12**

<b>HT25 recorder</b>	<b>X</b>	<b>X</b>	<b>XX</b>	<b>X</b>	<b>X</b>
<b>Power supply *</b>					
12 V d.c.	1				
12 V d.c. , PoE IEEE 802.3af	2				
<b>Accessories</b>					
none		0			
12 V d.c. power supply unit		1			
<b>Version</b>			00		
Standard			XX		
Custom-made					
<b>Language</b>					
Polish				P	
English				E	
other				X	
<b>Acceptance tests:</b>					
without additional requirements					0
with quality inspection certificate					1
with calibration certificate					2
acc. to customer's requirements					X

\* - Recorders of HT25 1XXXXX version require external supply voltage 6 V d.c. Recorders of HT25 2XXXXX version can be supplied both from Ethernet interface through PoE (Power over Ethernet), and from external power supply 12 V d.c..

**Coding example:**

**HT25 2100E1** means a recorder supplied by PoE IEEE 802.3af and 12 V d.c. with 12 V d.c. power supply unit included in standard version with english language version and quality inspection certificate.



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