ELEN

LAN PoE

Temperature Humidity & Sensor

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User Manual

*Temperature
and Humidity Sensor*
THS Sensor 40 PoE LAN

The **THS SENSOR 40 PoE LAN** is an air temperature and humidity sensor with Ethernet PoE LAN interface for transmitting measured values to a master device. It can be used in computer controlled measurement systems or as a peripheral device to a large-size LED display, which displays the measured values.

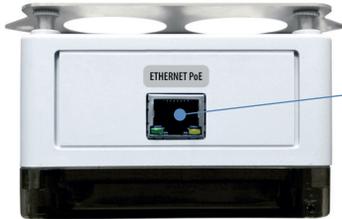Software for data logging is available for download from:

https://www.elen.sk/files/download/
dataloggerth_setup_1_20_03_en.zip

Detachable sensor probe
3,5 mm Jack connector

Connections

1x RJ45 LAN
Ethernet TCP/IP

Default network setup:

IP address: 192 . 168 . 0 . 68
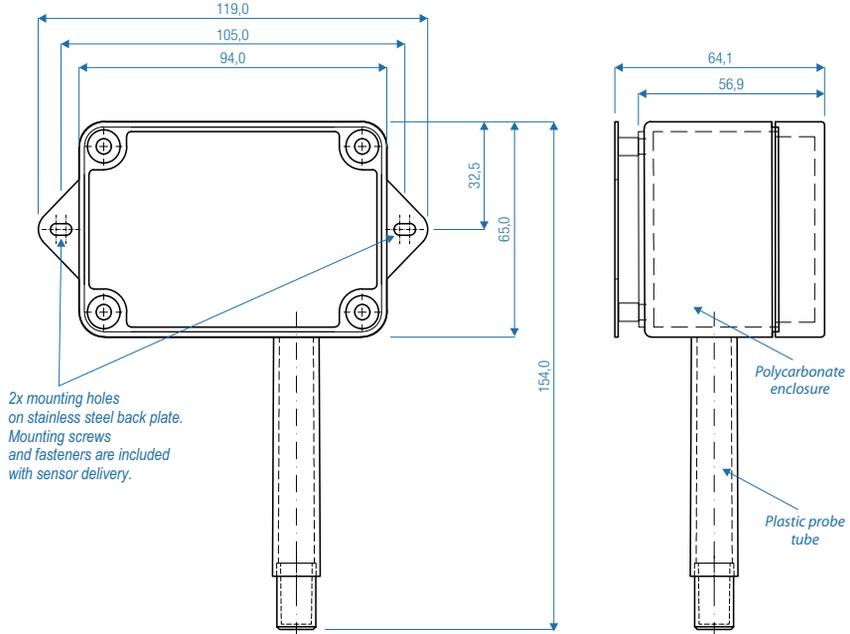*Subnet mask: 255 . 255 . 255 . 0*

Or as specified by customer
when ordering.

Sensor protection
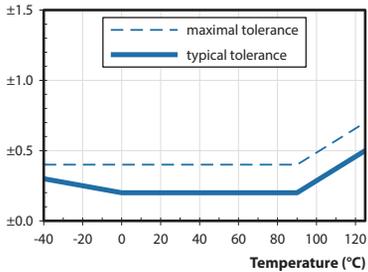*stainless steel*
sintered cap

Technical Specifications

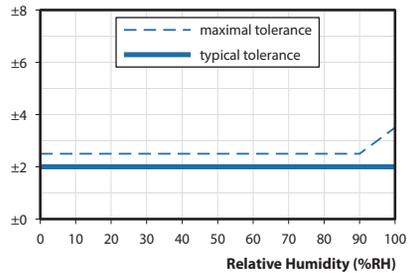| Sensor type	Sensirion SHT31-DIS
Temperature range	−40 °C to +80 °C
Typical temperature accuracy	±0,3 °C (±0,2 °C for T>0 °C)
Relative humidity range	0 to 100 % RH
Typical relative humidity accuracy	±2 % RH
Communication interface	Ethernet 10/100BASE-TX PoE, IEEE 802.3af
Communication protocol	Modbus TCP
Port connector	RJ45 (LAN cable included, 2 m)
Software	*DataLoggerTH* for Windows (available for download)
Environment of use	interior (IP 40)
Power supply	PoE (Power over Ethernet) Class 0
Compatibility	used with LED displays ELEN, NDA series, or stand-alone

Dimensional Drawing (mm)

119,0
105,0
94,0

64,1
56,9

32,5
65,0
154,0

2x mounting holes
on stainless steel back plate.
Mounting screws
and fasteners are included
with sensor delivery.

Polycarbonate
enclosure

Plastic probe
tube

Graphs - Sensirion SHT31 parameters

ΔT (°C)

±1.5
±1.0
±0.5
±0.0

maximal tolerance
typical tolerance

-40 -20 0 20 40 60 80 100 120

Temperature (°C)

Graph No. 1: Accuracy for temperature in °C.

ΔRH (%RH)

±8
±6
±4
±2
±0

maximal tolerance
typical tolerance

0 10 20 30 40 50 60 70 80 90 100

Relative Humidity (%RH)

Graph No. 2: Accuracy for relative humidity at 25°C .

THS Sensors - How to Change LAN IP Address

Brief Description

Communication with THS Sensors is performed via Ethernet TCP/IP Lantronix interface module. This module has fixed MAC address and changeable IP address, Subnet Mask and Gateway. To change these settings follow the next procedure.

Setting Sensor's IP Address, Subnet Mask, Gateway

Sensor's factory default IP address is 192.168.0.68 and Port: 502. It is printed on the production label.
This IP address can be changed using the following procedure.

1. Connect sensor to LAN or PoE LAN network via standard Ethernet cable.

2. On a PC connected to the same network as sensor, e.g. the same switch or hub, open an Internet web browser and enter the sensor's current IP address into the URL address field:

3. A login window will pop up requesting user name and password. Leave both fields empty and click OK.

4. You will enter the LANTRONIX setup menu.

5. From the menu bar on the left select **Network**.

6. You will see the Network Settings window.

Network Settings

Network
Server
Serial Tunnel
  Hostlist
Channel 1
  Serial Settings
  Connection
Channel 2
  Serial Settings
  Connection
Configurable Pins
Apply Settings

Apply Defaults

Network Mode: Wired Only

IP Configuration

◯ Obtain IP address automatically
  Auto Configuration Methods
    BOOTP: ⦿ Enable ◯ Disable
    DHCP: ⦿ Enable ◯ Disable
    AutoIP: ⦿ Enable ◯ Disable

DHCP Host Name: [   ]

⦿ Use the following IP configuration:
  IP Address: 192.168.0.68
  Subnet Mask: 255.255.255.0
  Default Gateway: 0.0.0.0
  DNS Server: 0.0.0.0

Ethernet Configuration
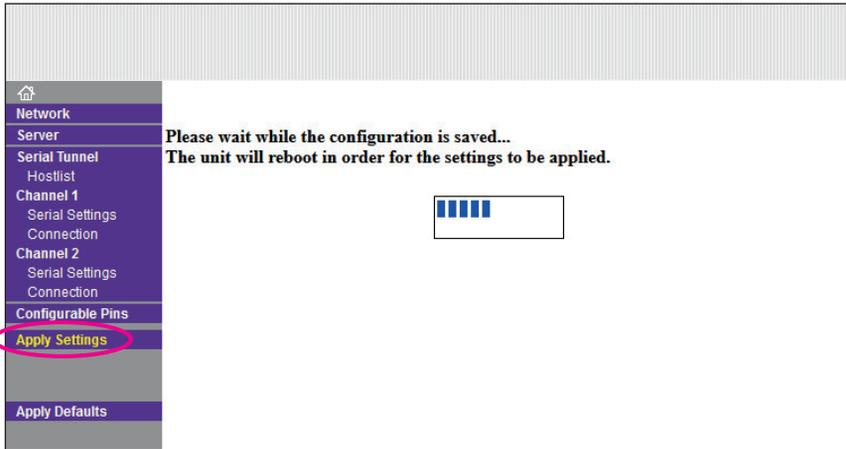
☑ Auto Negotiate
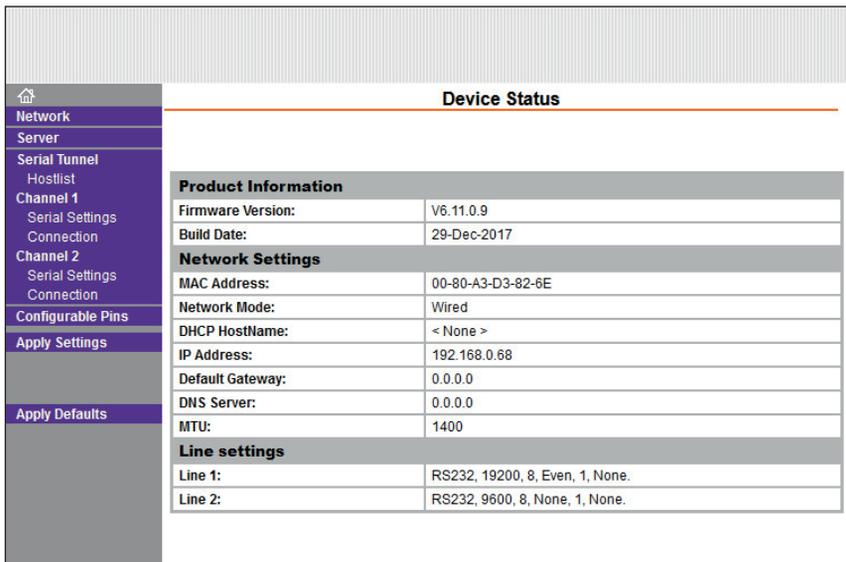 Speed: ⦿ 100 Mbps ◯ 10 Mbps
  Duplex: ⦿ Full ◯ Half

[OK]

7. In the IP configuration you will see the current IP Address, Subnet Mask and Gateway.

   Change these settings as desired and click **OK** button.   (Leave other fields unchanged.)

   You will see a confirmation of the new settings "**Done!**"

   [OK]   Done!

8. Then click on the **Apply Settings** in the left menu. You will see a progress of saving the new settings.

   DO NOT click on the **Apply Defaults** button in the menu selection! This operation will reset and erase all settings made by manufacturer of sensor device. Shall you ever select this option and need to recover original settings please read section **Recovering Factory LAN and Modbus Settings**.
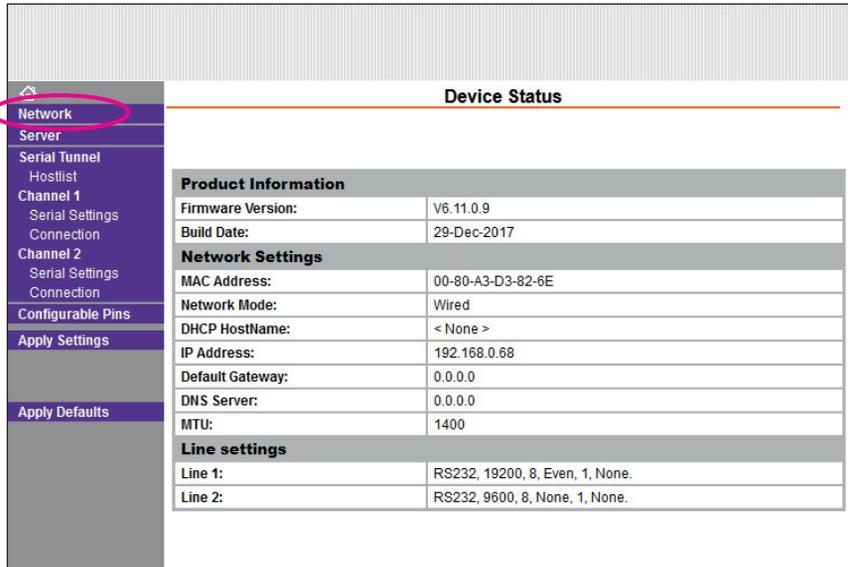
Network	
Server	Please wait while the configuration is saved...
Serial Tunnel	The unit will reboot in order for the settings to be applied.
Hostlist	
Channel 1	
Serial Settings	
Connection	
Channel 2	
Serial Settings	
Connection	
Configurable Pins	
Apply Settings	
Apply Defaults	

9.   When finished, you will see a Device Status window with the new settings. You can close the browser window. The new settings have been applied and saved to the sensor device.

Device Status

Network		
Server		
Serial Tunnel	**Product Information**	
Hostlist	Firmware Version:	V6.11.0.9
Channel 1	Build Date:	29-Dec-2017
Serial Settings	**Network Settings**	
Connection	MAC Address:	00-80-A3-D3-82-6E
Channel 2	Network Mode:	Wired
Serial Settings	DHCP HostName:	< None >
Connection	IP Address:	192.168.0.68
Configurable Pins	Default Gateway:	0.0.0.0
Apply Settings	DNS Server:	0.0.0.0
	MTU:	1400
Apply Defaults	**Line settings**	
	Line 1:	RS232, 19200, 8, Even, 1, None.
	Line 2:	RS232, 9600, 8, None, 1, None.

Recovering Factory LAN and Modbus Settings

This section describes how to recover original settings after accidental reset has been performed. To enter the device's LAN settings menu follow the instructions on page 4 **Setting Sensor's IP Address, Subnet Mask, Gateway**. After logging into the device settings menu, please check and confirm that all menu items on the left side of the menu list are set as described in figures below.

1. Initial screen after loggin **Device Status**. Displays basic information such as MAC and IP address.

Device Status

| Network |
| Server |
| Serial Tunnel |
| Hostlist |
| Channel 1 |
| Serial Settings |
| Connection |
| Channel 2 |
| Serial Settings |
| Connection |
| Configurable Pins |
| Apply Settings |
| Apply Defaults |

Product Information

Firmware Version:	V6.11.0.9
Build Date:	29-Dec-2017

Network Settings

MAC Address:	00-80-A3-D3-82-6E
Network Mode:	Wired
DHCP HostName:	< None >
IP Address:	192.168.0.68
Default Gateway:	0.0.0.0
DNS Server:	0.0.0.0
MTU:	1400

Line settings

Line 1:	RS232, 19200, 8, Even, 1, None.
Line 2:	RS232, 9600, 8, None, 1, None.

2. **Network Settings**. Allows user to set LAN settings. User can set the IP address, SubNet Mask, Gateway. If needed, change it to your desired settings and click **OK**.

3. **Sever Settings.** Confirm if the settings are the same as in figure below.
    If needed, make changes and click **OK**.

4. **Serial Settings** Channel 1. All settings should be the same as in the figure below.
    Make sure that Enable Packing is checked. If needed, make changes and click **OK**.

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5. **Connection Settings, Channel 1**. All settings should be the same as in the figure below.
   Make sure that Local Port is set to 502 (not 10001). If needed, make changes and click **OK**.

No other settings in the menu are needed to be changed.

6. After all changes where made, click on the **Apply Settings** in the menu list. (**DO NOT** click Apply Defaults.) You will see the progress bar when reprogramming new settings.
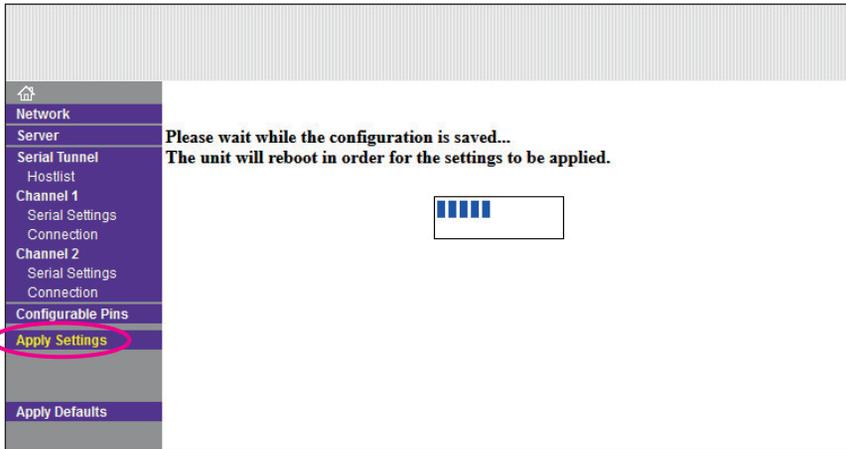
When finished, you will see a **Device Status** window with the new settings. You can close the browser window. The new settings have been applied and saved to the sensor device.

Now your sensor device LAN Modbus settings are recovered to their factory set parameters.

MODBUS Communication Description
of Available Registers and Functions THS Sensors v. 2.1

(rev. 1.0)

1. THS Sensor Configuration

The sensor device contains registers, which are divided into groups and are used to store various configuration settings. Functions **Read Holding Registers (0x03)**, **Write Single Register (0x06)**, or **Write Multiple Registers (0x10)** can be used to access these registers. Although each register is 16 bits wide, its LSB (Least Significant Byte) is used only. All values are entered as ASCII characters, except for the Modbus address and offset correction, which are binary. Functions 0x03 and 0x10 support both reading and writing of certain registers, while the address of the first and last registers must be within the valid range.

Read Holding Registers (0x03) / Write Single Register (0x06) / Write Multiple Registers (0x10)				
Address	**Description**	**Valid Values**	**Default Value**	**Data Type**
1000	Modbus address	1 – 247	1	uint8_t
1001	Communication speed	'0' – 1200 Bd '1' – 2400 Bd '2' – 4800 Bd '3' – 9600 Bd '4' – 14400 Bd '5' – 19200 Bd '6' – 38400 Bd '7' – 57600 Bd '8' – 115200 Bd	'5'	ASCII
1002	Number of data bits	'5', '6', '7', '8'	'8'	ASCII
1003	Parity	'N', 'O', 'E'	'E'	ASCII
1004	Number of stop bits	'1', '2'	'1'	ASCII
1005	CONTROL	0 – 255	0	uint16_t
1006	Reserved			
1007	Behavior in case of configuration error	'0' – set default settings '1' – use configuration settings	'0'	ASCII
1008	Type of sensor device element	'1' – SHT21 '2' – DS18B20 '4' – STS21 '5' – SHT31 '6' – STS31	'5'	ASCII
1009	Communication protocol	'1' – YDN v.1, 9600 '2' – YDN v.2, 19200 '3' – MODBUS '4' – MODBUS TCP	'3'	ASCII
2000	Correction of temperature in tenths of °C	-99 – 99	0	uint16_t
2001	Temperature units		'C'	ASCII
2200	Correction of temperature in tenths of %RH		0	uint16_t

Notes:

• Writing a new value into register has no influence on device functionality until the application restarted (off/on), or when the corresponding value into the CONTROL register is written (REINIT).
• Communication speed is the speed of application with the configurator as well as the speed of communication with a host, (reading measured values, configuration, version, etc.).
• Application behavior in case of configuration error:
    ,0' - default values will be set, while the application will continue with these default values
    ,1' - application will enter status when communication with configurator will be possible only (configuration protocol) – this is indicated with fast blinking of the LED. It is not possible to read measured values (communication with sensor is off).
• Protocol YDN v.2 is essentially the same as YDN, the only difference is in communication parameters, which are fixed to 19200-8-E-1.

2. Reading Firmware Version

Device firmware version is stored in two registers starting from address 5000. These registers can be accessed using function **Read Holding Registers (0x03)**. Data is stored in ASCII format and LSB of the register is used only.

Read Holding Registers (0x03)			
Address	**Description**	**Example**	**Data Type**
5000	Major version	'2' (0x0032)	ASCII
5001	Minor version	'1' (0x0031)	ASCII

3. Reading Measured Values

The measured temperature, relative humidity, or CO2 concentration value are stored in 21 registers starting from address 0. These values are in binary format and can be read with function **Read Holding Registers (0x03)** or **Read Input Registers (0x04)**. If the sensor chip does not support certain measurement, it is disconnected, or there is communication error, returned value will be 9999, which corresponds to 999.9°C, or 999.9 %RH. In case the sensor chip is faulty, the application will try to reinitialize it every 5 seconds.

Read Holding Registers (0x03) / Read Input Registers (0x04)			
Address	**Description**	**Example**	**Data Type**
0	Measured temperature in tenths of °C or °F (sensor 0)	0x00DF (223) = 22,3 °	int16_t
10	Measured relative humidity in tenths of % (sensor 0)	0x01C2 (450) = 45,0 %	int16_t

4. Identification of Device

In order to identify the sensor in MODBUS network, THS supports function **Report Slave ID (0x11)**. THS sensor will send message with:
  • Device ID, which depends on the actual sensor type used:
        0x01   SHT21
        0x02   DS18B20
        0x06   SHT31
        0x07   STS21
        0x08   STS31
  • Indication of running 0xFF, if sensor is functional, or 0x00, if sensor is disconnected or there is communication failure with the sensor.

5. CONTROL Register

Address 1005 holds the CONTROL register. It is accessible with functions **Read Holding Registers (0x03)** and **Write Multiple Registers (0x10)** or **Write Single Register (0x06)**. This register is initialized to 0 during startup. Writing into register is protected with password, which is the MSB value of register. LSB is value, which in case of correct password, is written into CONTROL register. CONTROL register stores binary value, while each bit has its assigned unique function.

Read Holding Registers (0x03) / Write Multiple Registers (0x10)		
Address	**Description**	**Meaning of bits**
1005	CONTROL register	0 – Loading configuration and initialization (restart of application) 1 – Setting default values 2 ... 7 – Not used

MSB – ACCESS PASSWORD							
15	14	13	12	11	10	9	8
1	0	1	0	0	1	0	1

LSB – CONTROL							
7	6	5	4	3	2	1	0
–	–	–	–	–	–	DEFLT	REINIT

Notes:

- Password for access to register is 0xA5.
- It is advised to use function REINT after making changes in configuration registers, which were performed using one of the accessible Modbus functions. After execution of function it is set to 0.
- Function DEFLT can be used to set default values into the configuration registers. Changes will take affect after application restart (off/on), same as when writing configuration, or after writing corresponding value into CONTROL register (REINIT). In this case, the REINIT function responds at the rate at which the request was triggered. The communication speed will not change until the acknowledgment is sent. When the function is performed its value is set to 0.
- DEFLT and REINIT functions can also be requested at the same time (with one entry into the register).

6. Reset to Default Settings (valid for firmware version 3.2 and up)

If needed, it is possible to recover default settings for UART "19200-8-E-1" and sensor address "1". Perform the following procedure:

1. Disconnect the power supply from sensor. (For PoE devices disconnect sensor from LAN.)
2. Use jumper to short pins 4 and 6 of the header connector (see picture below).
3. Connect the power supply to sensor.
4. Depending on what is the desired communication protocol, leave the jumper in position or power applied for the following time period.
   - a. t > 5 seconds…...default settings + MODBUS RTU protocol, green LED turns ON.
   - b. t > 10 seconds...default settings + MODBUS TCP protocol, green LED turns OFF.
5. Remove jumper from the header connector!