



User Manual

*Temperature
and Humidity Sensor*

THS Sensor 40 12DC WiFi

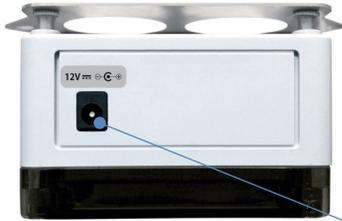
The **THS SENSOR 40 12DC WiFi** is an air temperature and humidity sensor with WiFi LAN interface for transmitting measured values to a master device. It can be used in computer controlled measurement systems or as a peripheral device to a large-size LED display, which displays the measured values.

External power supply adapter 230VAC/12VDC is required to power the sensor (included).

Software for data logging is available for download from:

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

Konektory



*Detachable sensor probe
3,5 mm Jack connector*



WiFi interface

Default network setup:

IP address: 192 . 168 . 0 . 68

Subnet mask: 255 . 255 . 255 . 0

*Or as specified by customer
when ordering.*

*1x Power supply
12 VDC / 500mA*

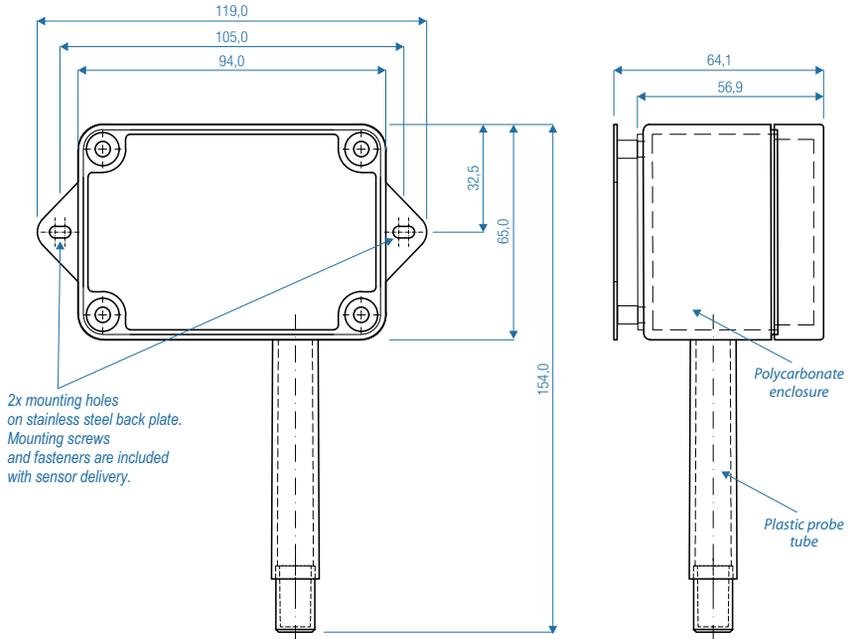
*Sensor protection
stainless steel
sintered cap*



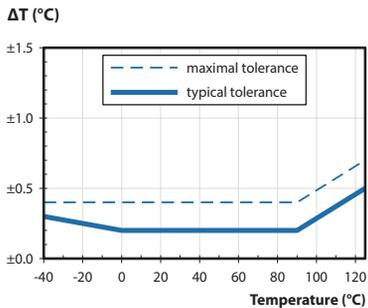
Technical Specifications

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	Wireless LAN WiFi, IEEE 802.11a/b/g (2.4 GHz only) Supports: WEP(Client only), WPA-Personal, WPA2-Personal
Communication protocol	Modbus TCP
Software	<i>DataLoggerTH</i> for Windows (available for download)
Environment of use	Interior (IP 40)
Power supply	Adapter 12 VDC/500 mA (included)
Compatibility	Used with LED displays ELEN, NDA series, or stand-alone

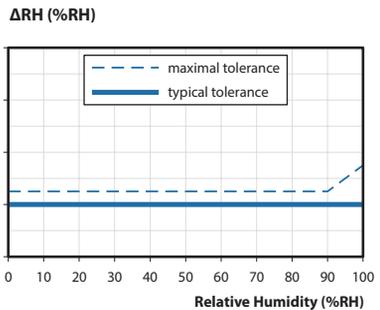
Dimensional Drawing (mm)



Graphs - Sensirion SHT31 parameters



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



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

1. Default sensor settings

The THS Sensor 40 12DC WiFi sensor device is delivered with the following factory default settings:

Mode	Access Point
IP Adress	192 . 168 . 0 . 68
Subnet Mask	255 . 255 . 255 . 0
Port	502

** In some cases the sensor may be delivered with different settings as requested by customer when ordering.*

2. Displaying and recording measured values using DataLoggerTH software application

DataLoggerTH is a simple application for computers running the Windows operating system, which is used to display and store measured data from temperature and humidity monitoring systems. These systems may consist of one or more sensors and large size LED displays. After installing the displays and sensors and connecting them to the RS485 or LAN Ethernet TCP / IP serial line, the data logging software can be used to record the measured values and display them on a remote computer. The computer running DataLoggerTH software must be connected to the same network as scanning devices and displays.

The DataLoggerTH software and the manual for its use can be downloaded from the ELEN website:

<https://www.elen.sk/en/support/Software/DataloggerTH-Air-temperature-and-humidity-datalogger-software.html>

3. Using the sensor in Access Point mode

Connect the sensor to the mains power source using the supplied 12 VDC / 500 mA power adapter.

Then connect the computer to the WiFi network which is transmitted by the sensor. The SSID of this network is „**XpicoWiFi_XXXXXX**“ (instead of „XXXXXX“ there are letters and numbers). The connection password is „**XPICOWIFI**“ (without the quotation marks).

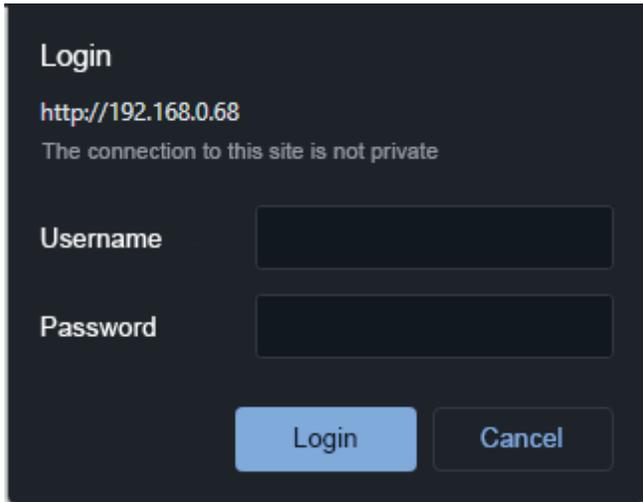
Then open the DataLoggerTH software settings and enter the default values, which are listed in section 6. Sensor default settings. If the values are entered correctly, the software will start communicating with the sensor and display the measured temperature and humidity data.

4. Changing sensor device settings

By default, the sensor operates in Access Point mode. However, if it is necessary to use multiple sensors or integrate the sensor into an existing network, it is advisable to change their operation to Client Mode with a fixed IP address. The following information describes how to make these changes.

Then connect the computer to the WiFi network which is transmitted by the sensor. The SSID of this network is „**XpicoWiFi_XXXXXX**“ (instead of „XXXXXX“ there are letters and numbers). The connection password is „**XPICOWIFI**“ (without the quotation marks).

Launch an Internet browser on your computer. Since the factory-set IP address is **192.168.0.68**, enter this IP address into the browser's URL address field. You will be prompted for a username and password. The username is „**admin**“ and the password is „**PASSWORD**“ (without quotes).



The screenshot shows a dark-themed web browser window with the following content:

- Title: Login
- URL: <http://192.168.0.68>
- Warning: The connection to this site is not private
- Username field:
- Password field:
- Login button: Login
- Cancel button: Cancel

The initial page of the sensor's WiFi network settings and status is displayed.

xPico[®] Wi-Fi[®]
LANTRONIX[®]

QuickConnect

Status

AES Credentials

Bridge

CLI Server

CPM

Clock

Device

Diagnostics

Discovery

File System

HTTP Server

Line

Modem Emulation

Monitor

NTP

Network

Power

Radio

SPI

Tunnel

User

WLAN Profiles

[\[Logout\]](#)

Product Information		
Product Type:	xPicoWifi	
Firmware Version:	1.5.0.3R3	
Serial Number:	0080A3FDC763	
Uptime:	0 days 01:01:49	
Permanent Config:	saved	
Network Settings		
MAC Address:	00:80:A3:FD:C7:63	
Interface ap0		
State:	Up	
SSID:	XpicoWiFi_FDC763	
Security Suite:	WPA2	
IP Address:	192.168.0.68/24	
Interface wlan0		
Connection State:	Disconnected	
Line Settings		
Line 1:	19200, Even, 8, 1, None Protocol: Tunnel	
Line 2:	9600, None, 8, 1, None Protocol: Command Line	
Tunneling		
	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Disabled
Tunnel 2:	Inhibited	Inhibited

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Click „Network“ in the left column.

xPico[®] Wi-Fi[®]
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QuickConnect

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WLAN Profiles

Product Information

Product Type:	xPicoWifi
Firmware Version:	1.5.0.3R3
Serial Number:	0080A3FDC763
Uptime:	0 days 01:01:49
Permanent Config:	saved

Network Settings

MAC Address:	00:80:A3:FD:C7:63
--------------	-------------------

Interface ap0

State:	Up
SSID:	XpicoWiFi_FDC763
Security Suite:	WPA2
IP Address:	192.168.0.68/24

Interface wlan0

Connection State:	Disconnected
-------------------	--------------

Line Settings

Line 1:	19200, Even, 8, 1, None Protocol: Tunnel
Line 2:	9600, None, 8, 1, None Protocol: Command Line

	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Disabled
Tunnel 2:	Inhibited	Inhibited

[\[Logout\]](#)

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In the network settings, first click on „wlan0“ and then on „Configuration“.

The screenshot shows the xPico Wi-Fi web interface. The top header includes the xPico Wi-Fi logo and the LANTRONIX logo. A left sidebar contains a navigation menu with items like QuickConnect, Status, AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network (highlighted in orange), Power, Radio, SPI, Tunnel, User, and WLAN Profiles. The main content area is divided into two sections. The top section is a control panel with buttons for 'ap0', 'wlan0', 'Interface', 'Link', 'Status', and 'Configuration'. The 'wlan0' and 'Configuration' buttons are circled in pink. Below this is the 'Interface ap0 Status' section, which contains a table of properties and their current/after-reboot states. On the right side, there is a '[Logout]' link and a text block explaining DHCP behavior and static IP assignment for the ap0 interface. At the bottom of the interface, a copyright notice reads: 'Copyright © Lantronix, Inc. 2007-2018. All rights reserved.'

QuickConnect
Status
AES Credentials
Bridge
CLI Server
CPM
Clock
Device
Diagnostics
Discovery
File System
HTTP Server
Line
Modem Emulation
Monitor
NTP
Network
Power
Radio
SPI
Tunnel
User
WLAN Profiles

ap0 **wlan0**

Interface Link

Status **Configuration**

Interface ap0 Status

Property	Status
Status:	Link up
MAC Address:	00:80:A3:FD:C7:63
	Current After Reboot
State:	Enabled Enabled
IP Address:	192.168.0.68/24 (DHCP)
MSS:	1460 bytes 1460 bytes
DHCP IP Address Range Start:	192.168.0.1 <Minimum>
DHCP IP Address Range End:	192.168.0.254 <Maximum>

[\[Logout\]](#)

This shows the status of the network interface on the device.

When DHCP fails to discover an IP Address, a new address will automatically be generated using AutoIP. This address will be within the 169.254.x.x space.

ap0 will always use the assigned static IP.

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You will enter the wlan0 interface settings. It is important that „**Enabled**“ is checked in the first row of the „**State**“ table and „**Disabled**“ is checked in the second row of „**DHCP Client**“.

The third line „**IP Address**“ shows the current IP address of the sensor in CIDR (Classless Inter-Domain Routing) format. The number 24 after the slash therefore means that the subnet mask is 255.255.255.0. Here it is possible to change this IP address (before the slash) to the required value.

In the fourth line „**Default Gateway**“ enter the IP address of the router to which the sensor will connect.

The values in the remaining rows do not need to be changed.

The screenshot shows the xPico Wi-Fi configuration interface. The top header includes the xPico Wi-Fi logo and the LANTRONIX logo. A sidebar on the left contains a menu with items like QuickConnect, Status, AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network (highlighted), Power, Radio, SPI, Tunnel, User, and WLAN Profiles. The main content area is titled "Interface wlan0 Configuration" and contains a table of settings. The "State" row has "Enabled" selected with a radio button. The "DHCP Client" row has "Enabled" selected with a radio button. The "IP Address" row has "<None>" selected. The "Default Gateway" row has "<None>" selected. Other rows include Hostname, Primary DNS, Secondary DNS, and MSS (1460 bytes). On the right side, there is a "[Logout]" link and a note: "These settings pertain to the Network Interface on the device. To see the effect of these selections after a reboot, view the corresponding Status. Changes will take effect after reboot or wake from sleep or standby. When ap0 is enabled, DHCP Server will assign IP addresses to ap0's clients. DHCP Server manages up to 4 simultaneous clients. (Only 3 if wlan0 is enabled.)"

State:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
DHCP Client:	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
IP Address:	<None>
Default Gateway:	<None>
Hostname:	
Primary DNS:	<None>
Secondary DNS:	<None>
MSS:	1460 bytes

Then click on „Tunnel“ in the menu.

The screenshot shows the xPico Wi-Fi web interface. The left sidebar contains a menu with the following items: QuickConnect, Status (highlighted with a home icon), AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network, Power, Radio, SPI, Tunnel (circled in red), User, and WLAN Profiles. The main content area displays the following information:

Product Information

Product Type:	xPicoWifi
Firmware Version:	1.5.0.3R3
Serial Number:	0080A3FDC763
Uptime:	0 days 01:01:49
Permanent Config:	saved

Network Settings

MAC Address:	00:80:A3:FD:C7:63
--------------	-------------------

Interface ap0

State:	Up
SSID:	XpicoWiFi_FDC763
Security Suite:	WPA2
IP Address:	192.168.0.68/24

Interface wlan0

Connection State:	Disconnected
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Line Settings

Line 1:	19200, Even, 8, 1, None Protocol: Tunnel
Line 2:	9600, None, 8, 1, None Protocol: Command Line

Tunneling

	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Disabled
Tunnel 2:	Inhibited	Inhibited

[Logout]

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The following window will appear. Click on „Accept“.

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QuickConnect

Status

AES Credentials

Bridge

CLI Server

CPM

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Modem Emulation

Monitor

NTP

Network

Power

Radio

SPI

Tunnel

User

WLAN Profiles

Tunnel 1 Tunnel 2

Status
Line
Packing

Accept
Connect
Disconnect

Tunnel 1 Status

Property	Status
Accept:	Waiting
Connect:	Disabled
Aggregate	
Completed Accepts:	0
Completed Connects:	0
Disconnects:	0
Dropped Accepts:	0
Dropped Connects:	0
Octets from Line:	0
Octets from Network:	0
Accept Connection Time:	0 seconds
Connect 1 Connection Time:	0 seconds
Connect 2 Connection Time:	0 seconds
Current Connection	
There is no active connection.	

[Logout]

This displays all the Tunnel Status both as an Aggregate and broken down by active Accept and Connect tunnels.

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The following table is displayed. The second row „**Local Port**“ shows the currently set port number. For communication via the ModBus TCP communication protocol, the entered port number value must be „**502**“.

The values in the remaining rows do not need to be changed.

The screenshot shows the xPico Wi-Fi configuration interface. The left sidebar contains a menu with items: QuickConnect, Status, AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network, Power, Radio, SPI, Tunnel (highlighted), User, and WLAN Profiles. The main content area is titled 'Tunnel 1 Accept Configuration' and includes a table with the following fields:

	Tunnel 1	Tunnel 2
Status	Accept	Connect
Line	Connect	Disconnect
Packing	Disconnect	

Below this table is the 'Tunnel 1 Accept Configuration' form:

Mode:	Always
Local Port:	502
Protocol:	TCP
Flush Line:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Line:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Block Network:	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled
Password:	

On the right side of the interface, there is a '[Logout]' link and a note: 'Tunnel Accept controls how a tunnel behaves when a connection attempt originates from the network.'

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Once all changes have been made, these changes must be saved.
In the left column, click on „**Device**“, then on „**Save**“ and finally on „**Reboot**“.

xPico[®] Wi-Fi[®] LANTRONIX[®]

QuickConnect [\[Logout\]](#)

Status This displays the current status of the Device.

AES Credentials

Bridge

CLI Server

CPM

Clock

Device

Diagnostics

Discovery

File System

HTTP Server

Line

Modem Emulation

Monitor

NTP

Network

Power

Radio

SPI

Tunnel

User

WLAN Profiles

Device Status

Property	Status
Product Type:	xPicoWifi
Product ID:	Y1
Product SKU:	XPW1001
Antenna:	External
Serial Number:	0080A3FDC763
Firmware Version:	1.5.0.3R3
Build Date:	Aug 29 2018 (11:29:58)
Bootloader Version:	1.0.0.0R7
Bootloader Date:	Apr 2 2014 17:55:26
OTA Upgrade Version:	1.2.0.0R5
Uptime:	0 days 00:37:48
Permanent Config:	saved
	[Save]
	[Reboot]
	[Factory Defaults]
	[Firmware Upload]

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If you have changed the IP address of the sensor, you must enter this new IP address in the address bar of the Internet browser and log in again.

Then click on the first menu item in the left column „**QuickConnect**“.

The screenshot shows the xPico Wi-Fi web interface. The top header contains the logo "xPico® Wi-Fi" and the LANTRONIX logo. On the left is a vertical navigation menu with "QuickConnect" highlighted in orange. On the right is a "[Logout]" link. The main content area displays a configuration table for the device.

Product Information		
Product Type:	xPicoWifi	
Firmware Version:	1.5.0.3R3	
Serial Number:	0080A3FDC763	
Uptime:	0 days 01:01:49	
Permanent Config:	saved	
Network Settings		
MAC Address:	00:80:A3:FD:C7:63	
Interface ap0		
State:	Up	
SSID:	XpicoWiFi_FDC763	
Security Suite:	WPA2	
IP Address:	192.168.0.68/24	
Interface wlan0		
Connection State:	Disconnected	
Line Settings		
Line 1:	19200, Even, 8, 1, None Protocol: Tunnel	
Line 2:	9600, None, 8, 1, None Protocol: Command Line	
Tunneling	Accept Mode	Connect Mode
Tunnel 1:	Waiting	Disabled
Tunnel 2:	Inhibited	Inhibited

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The sensor scans the available WiFi networks and displays them. If scanning does not start automatically, click the „Scan“ button.

The screenshot shows the xPico Wi-Fi management interface. At the top left is the logo "xPico® Wi-Fi®" and at the top right is "LANTRONIX®". A navigation menu on the left lists various settings: QuickConnect, Status, AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network, Power, Radio, SPI, Tunnel, User, and WLAN Profiles. The main content area is titled "WLAN Link Scan" and features a "Network name:" input field and a "Scan" button, which is circled in pink. To the right of the input field is a "[Logout]" link. Below the input field, there is a large loading spinner icon. On the right side of the page, there is explanatory text: "This page shows a scan of the wireless devices within range of the device. Up to 20 networks sorted by RSSI are shown. It reports:" followed by a bulleted list of network details: Network name (Service Set Identifier)(SSI), Basic Service Set Identifier (BSSID), Channel, Received Signal Strength Indication (RSSI), and Security Suite. Below this list, it states: "The  icon indicates the active profile. Click on a network name for QuickConnect configuration." At the bottom of the interface, a copyright notice reads: "Copyright © Lantronix, Inc. 2007-2018. All rights reserved."

From the list of available WiFi networks it is necessary to select the WiFi network of the router to which the sensor will be connected.

xPico® Wi-Fi®
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QuickConnect

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AES Credentials

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CLI Server

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NTP

Network

Power

Radio

SPI

Tunnel

User

WLAN Profiles

WLAN Link Scan

Network name:

Network Name	BSSID	Ch	RSSI	Security Suite
NETGEAR_2.4G	A0:63:91:05:DF:D0	6	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -55 dBm	WPA2-CCMP
TP-Link_F16C	C4:71:54:0C:F1:6C	4	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -63 dBm	WPA2-CCMP
LED-SOLAR Guest	FA:92:BF:C4:71:5F	1	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -64 dBm	None
LED-SOLAR	F4:92:BF:C4:71:5F	1	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -65 dBm	WPA2-CCMP
LED-SOLAR Guest	FA:92:BF:C4:75:14	11	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -67 dBm	None
LED-SOLAR	F4:92:BF:C4:75:14	11	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -68 dBm	WPA2-CCMP
LED-SOLAR	F4:92:BF:C4:74:29	6	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -75 dBm	WPA2-CCMP
LED-SOLAR Guest	FA:92:BF:C4:74:29	6	<div style="display: flex; justify-content: space-around; width: 20px;"> </div> -75 dBm	None

[\[Logout\]](#)

This page shows a scan of the wireless devices within range of the device.

Up to 20 networks sorted by RSSI are shown.

It reports:

- Network name (Service Set Identifier)(SSI)
- Basic Service Set Identifier (BSSID)
- Channel
- Received Signal Strength Indication (RSSI)
- Security Suite

The icon indicates the active profile.

Click on a network name for QuickConnect configuration.

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Click on the name of the desired WiFi network and the scanner will prompt you to enter the password of this WiFi network. Enter the password and then click the „**Submit**“ button.

The screenshot displays the xPico Wi-Fi configuration web interface. The main title is "xPico® Wi-Fi" with the LANTRONIX logo in the top right. A sidebar on the left contains a menu with items like QuickConnect, Status, AES Credentials, Bridge, CLI Server, CPM, Clock, Device, Diagnostics, Discovery, File System, HTTP Server, Line, Modem Emulation, Monitor, NTP, Network, Power, Radio, SPI, Tunnel, User, and WLAN Profiles. The main content area is titled "WLAN Profile 'TP-Link_F16C'" and is divided into three sections: "Connect To", "Security", and "Advanced".

Connect To	
Network Name (SSID):	TP-Link_F16C
BSSID:	C4:71:54:0C:F1:6C
Security Suite:	WPA2-CCMP
Signal Strength:	-63 dBm

Security	
Key Type:	<input checked="" type="radio"/> Passphrase <input type="radio"/> Hex
Password:	<input type="password"/>

Below the Security section is an "Advanced" section with three buttons: "Apply", "Test Connection", and "Submit". The "Submit" button is circled in pink. To the right of the configuration area, there is a "[Logout]" link and three paragraphs of instructional text: "Use the Apply button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.", "Use the Submit button to update the WLAN settings and save them to Flash.", and "Use the Test Connection button to test connecting to the network using this profile."

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Return to „QuickConnect“. If everything went well, next to the name of the router’s WiFi network you connected to will be an icon: 

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QuickConnect

Status 

AES Credentials

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CLI Server

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Monitor

NTP

Network

Power

Radio

SPI

Tunnel

User

WLAN Profiles

WLAN Link Scan

Network name:

Network Name	BSSID	Ch	RSSI	Security Suite
NETGEAR_2.4G	A0:63:91:05:DF:D0	6	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -56 dBm	WPA2-CCMP
 TP-Link_F16C	C4:71:54:0C:F1:6C	4	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -65 dBm	WPA2-CCMP
LED-SOLAR	F4:92:BF:C4:71:5F	1	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -65 dBm	WPA2-CCMP
LED-SOLAR Guest	FA:92:BF:C4:71:5F	1	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -66 dBm	None
LED-SOLAR	F4:92:BF:C4:75:14	11	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -69 dBm	WPA2-CCMP
LED-SOLAR Guest	FA:92:BF:C4:75:14	11	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -69 dBm	None
LED-SOLAR Guest	FA:92:BF:C4:74:29	6	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -75 dBm	None
LED-SOLAR	F4:92:BF:C4:74:29	6	<div style="display: flex; justify-content: space-around; width: 40px;"> ██████ </div> -75 dBm	WPA2-CCMP

[\[Logout\]](#)

This page shows a scan of the wireless devices within range of the device.

Up to 20 networks sorted by RSSI are shown.

It reports:

- Network name (Service Set Identifier)(SSI)
- Basic Service Set Identifier (BSSID)
- Channel
- Received Signal Strength Indication (RSSI)
- Security Suite

The  icon indicates the active profile.

Click on a network name for QuickConnect configuration.

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5. Router setup

For the THS Sensor 40 12DC WiFi sensor to work properly in client mode, it is important that it has its own **fixed IP address**, which will not change, and that it be **on the same network** as the computer running the DataLoggerTH software. We described the IP address setting of the sensor in the previous section. Now you need to set up the router so that it assigns the same IP address to the sensor every time.

There is a large number of manufacturers and models of routers on the market, so it is not possible to describe their settings in more detail. However, the basic condition is that the router must be able to assign fixed IP addresses to the devices connected to it, based on the MAC addresses of these devices.

For example, if the sensor has a MAC address **00:80:A3:FD:C7:63**, you must set the router to assign **only one and the same IP address** to this MAC address. The MAC address and factory default IP address of the sensor are printed on a label located on the side of the sensor.

MAC Address: 00:80:A3:FD:C7:63
IP Address: 192.168.0.68
Subnet Mask: 255.255.255.0
Port: 502

As was already mentioned, the sensor must be **on the same network** as the computer running the DataLoggerTH software application. This means that if the selected network has a range of assigned IP addresses, for example 192.168.0.1 to 192.168.0.255, then the sensor cannot have an IP address, for example 192.168.2.40. Therefore, it is first necessary to determine which network will be used to connect the sensor and the computer to (or what is the range of IP addresses assigned by the router) and what IP address, within this network, should be assigned to the sensor.

6. Service center address

In case of any issues please contact the manufacturer:

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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

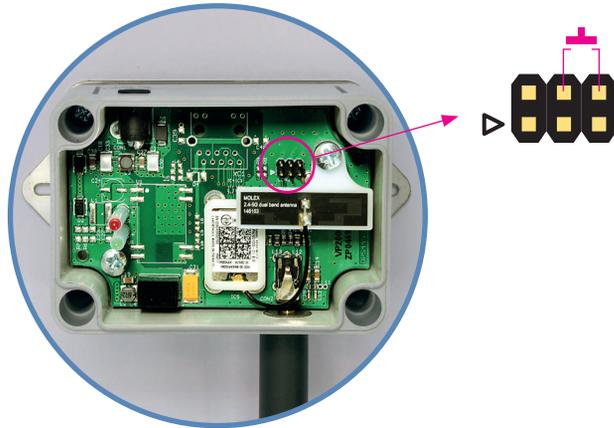
Notes:

- 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!



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