W&T

www.WuT.de

Manual

Installation, Startup and Applications

WLAN-Thermometer

valid for models:

#97701	WLAN-Thermometer 1x Pt100

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Subject to errors and changes:

As we can make mistakes, none of our statements may be used without verification. Please notify us of any errors or misunderstandings you become aware of so that we can identify and correct them as quickly as possible.

Only carry out work on or with W&T products if it is described here and you have read and understood the instructions in full. Unauthorized actions can cause hazards. We are not liable for the consequences of unauthorized actions. If in doubt, please ask us or your dealer again!

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1. Legal information

Warning concept

These instructions contain information that must be observed for your personal safety and to prevent damage to property. The instructions are highlighted by a warning triangle. Depending on the hazard level, the warnings are shown in descending order as follows:

⚠DANGER

indicates a hazard that will result in death or serious injury if appropriate precautions are not taken.

⚠WARNING

indicates a hazard that can result in death or serious injury if appropriate precautions are not taken.

⚠CAUTION

indicates a hazard that may result in minor physical injury if appropriate precautions are not taken.

⚠ATTENTION

indicates a hazard that can result in material damage if appropriate precautions are not taken.

If there are several hazard levels, the warning of the highest level is always used. If a warning notice with a warning triangle warns of personal injury, a warning of property damage may also be included in the same warning notice.

Qualified personnel

The product described in these instructions may only be installed and commissioned by personnel who are qualified for the task in question.

The relevant documentation for the respective task must be observed, in particular

the safety and warning instructions contained therein.

Qualified personnel are able to recognize risks and avoid potential hazards when handling the described products due to their training and experience.

Disposal

Electronic devices must not be disposed of with household waste, but must be disposed of properly.

Symbols on the product

Symbol	Explanation
CE	CE labeling The product complies with the requirements of the applicable EU directives.
	WEEE labeling The product must not be disposed of with household waste, but must be disposed of in accordance with the disposal regulations for electrical waste applicable at the place of installation.

2. Safety information

General information

These instructions are intended for the installer of the WLAN Thermometer described in the manual and must be read and understood before starting work. The devices may only be installed and commissioned by qualified personnel.

Intended use

⚠DANGER

The WLAN Thermometers from Wiesemann & Theis are temperature monitoring devices with network access via WLAN.

Any other use or modification of the described devices is not in accordance with the intended use.

Electrical safety

⚠WARNING

Before starting any work on the WLAN Thermometer, the power supply must be completely disconnected using suitable measures. Make sure that the device cannot be accidentally switched on again!

The WLAN Thermometer may only be used in closed and dry rooms.

The device should not be exposed to high ambient temperatures or direct sunlight and should not be operated in the vicinity of heat sources. Please note the restrictions with regard to the maximum ambient temperature.

Ventilation openings must be free of any obstructions. The WLAN Thermometer should be kept at a distance of 10-15 cm from neighboring heat sources.

The input voltage must not exceed the nominal values of the specification.

During installation, make sure that no stray wires protrude through the ventilation slots of the WLAN Thermometer into the interior of the housing. Make sure that no

individual wires are sticking out of strands, that the entire strand is in the terminal and that the screws of the connection terminals are firmly tightened. Tighten the screws of unused terminals.

The power supply unit used to supply the WLAN Thermometer must ensure safe isolation of the low-voltage side from the supply network in accordance with EN62368-1 and have „LPS“ properties.

EMC

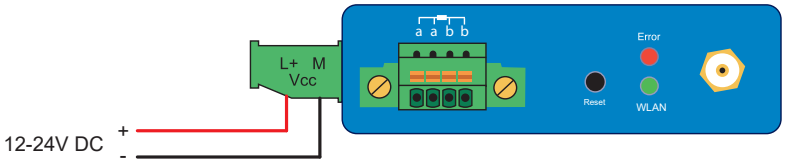
⚠ ATTENTION

The WLAN Thermometers comply with the industrial immunity limits and the stricter emission limits for households and small businesses. Therefore, there are no EMC-related restrictions with regard to the usability of the devices in these environments.

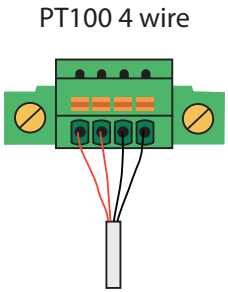
The complete declarations of conformity for the devices described in the instructions can be found on the respective Internet data sheet page on the W&T homepage at http://www.wut.de.

3. Quick commissioning

Power supply



Connection of the sensor



Assembly

The WLAN Thermometer is intended for installation in the control cabinet. For mechanical fixing, the WLAN Thermometer should be snapped onto a 35 mm top-hat rail in accordance with DIN EN 50022. The WLAN Thermometer requires a width of 22mm.

Setting up the WLAN

The device is in access point mode ex works. Connect to the device‘s WLAN with a client. The WLAN name is WLANIO- followed by the last three digits of the MAC address:

e.g. WLANIO-0A0905

As soon as the device is connected to the WLAN, open a web browser and establish a connection to the default IP address of the device. This is:

192.168.4.1

Set the network parameters of the desired WLAN via the configuration menu of the device. After saving the parameters, the network interface of the device restarts with the desired settings. The device is now ready for use.

4. Product introduction

Hardware features

Network interface:	WLAN 802.11 b/g/n 2,4GHz
Power supply:	Screw terminal 12-24V DC

Device status and error status are signaled via corresponding LEDs.

Access permissions

The WLAN Thermometer is configured and operated in the browser and is only possible after logging in as an administrator, provided a password has been assigned.

Configuration changes only take effect once they have been confirmed by clicking on the Save button.

Functionality

The W&T WLAN Thermometer contains all the functions in one box to record and display your climate data and make it available on the network using the W&T Cloud, MQTT and ntfy.sh services.

The measurement data can be called up in your own applications via a single value query. In this manual you will find all the information you need to install, configure and operate the WLAN Thermometer.

5. Commissioning

Once the WLAN thermometer has been properly installed and wired, the supply voltage can be switched on. The boot phase only takes a few seconds. The green LED indicates the WLAN status. Permanently on: The device is in client mode and is connected to a WLAN network. Flashing: 1/s: Access point mode (one subscriber can connect). 2/s. Emergency mode (see Service, maintenance and decommissioning).

Assigning the IP address

The device is in access point mode ex works. This means that you must first connect to this access point with a client in order to gain access to the device configuration. This can be a desktop PC, a smartphone or similar. It is only important that a web browser is available on the client. The WLAN name is *WLANIO-* followed by the last three digits of the MAC address.

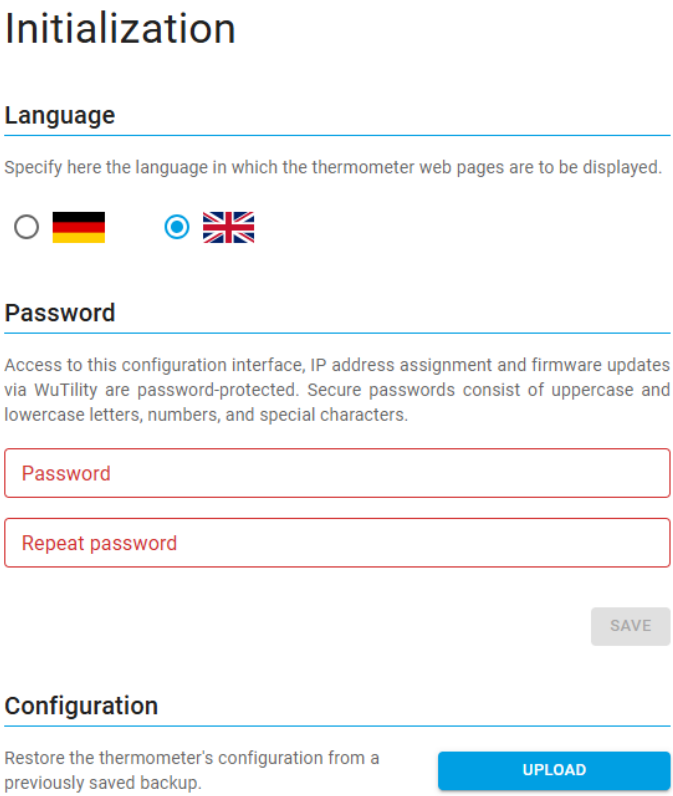
e.g. WLANIO-0A0905

Use a web browser to establish a connection to the address

192.168.4.1

Set the network parameters of the desired WLAN via the configuration menu of the device.

Initialization



When setting up the device for the first time, you must first set a device password.

Alternatively, you can upload a previously saved configuration file. This file contains all device parameters, as well as the original password and network settings.

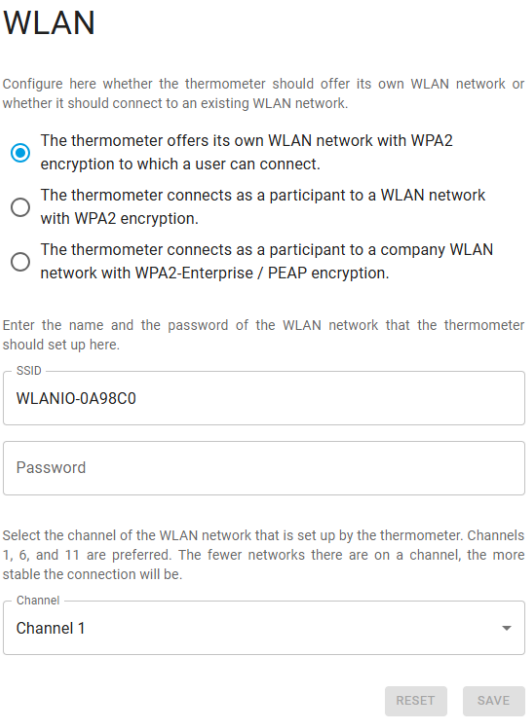
6 Network settings

In the configuration menu, go to

System -> WLAN

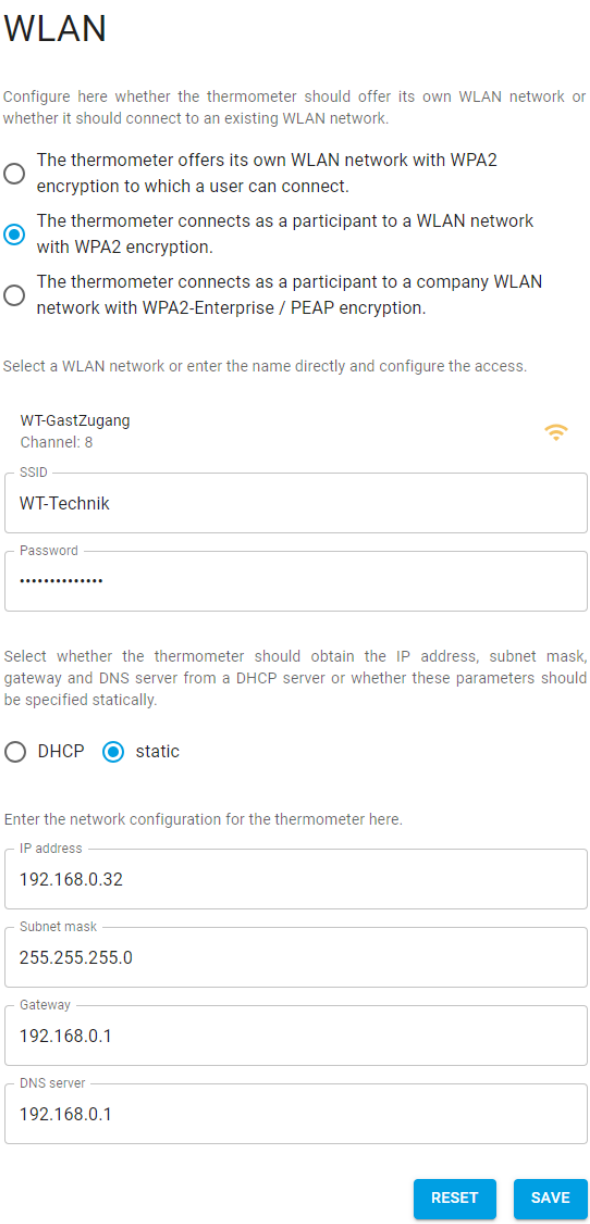
to configure the network settings.

Access point mode



In this mode, you establish a connection to the WLAN Thermometer via access point mode with your client. Once the connection is established, you can reach the device via the IP address **192.168.4.1**. Please note that no online service, such as the W&T Cloud, is available in this mode.

WLAN client mode



In this mode, you connect the device to an existing WLAN network. Enter the *SSID* and *password* parameters in the input screen.

Here you have the option of obtaining the IP parameters of the device automatically via DHCP or setting them manually.

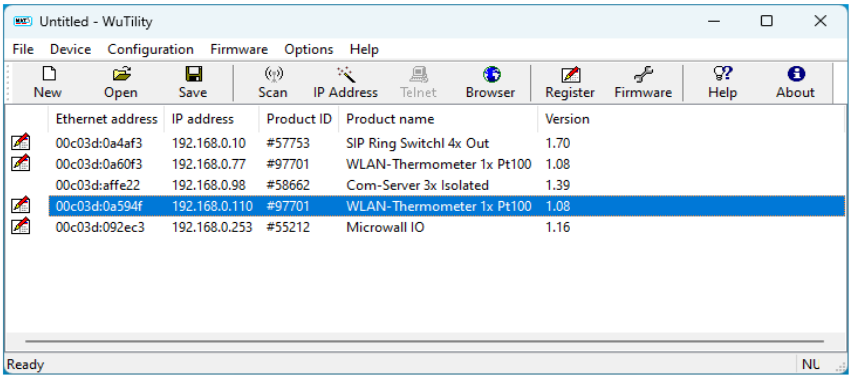
After clicking on the *save* button, the device is ready for use.

First IP assignment via WuTility

If you have connected to an existing WLAN in which a Windows computer is also available, you can use our WuTility tool to change the IP parameters or carry out a firmware update, for example.

You can find the WuTility tool at:

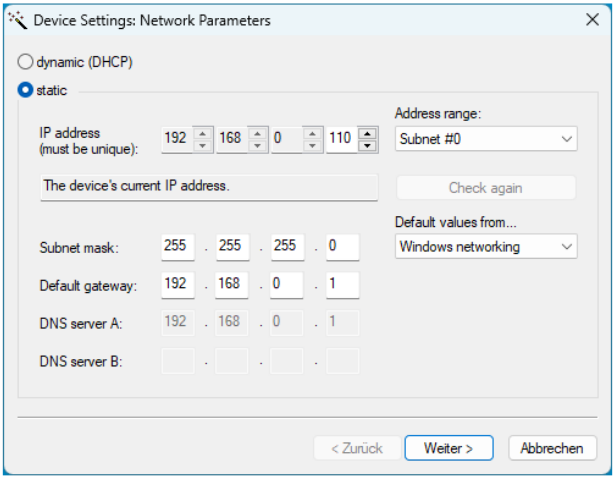
https://www.wut.de/wutility



After starting, *WuTility* automatically searches the local network for connected W&T network devices. The search process can be repeated as often as required by pressing the Scan button.

Identify the WLAN Thermometer in the inventory list using its MAC address.

Select the WLAN Thermometer and press the IP address button:



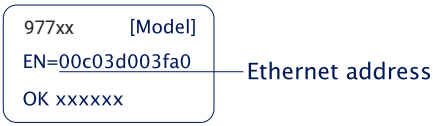
The *static* option allows the assignment of fixed IP parameters while simultaneously deactivating the DHCP protocol. Enter the desired values for IP address, subnet mask and gateway address in the corresponding input fields. The DHCP option activates the DHCP protocol in the WLAN Thermometer and operation with a static IP address is no longer possible.

The *Next* button transfers the entered values to the WLAN Thermometer. If the assignment is successful, all columns in the *WuTility* inventory list are updated.

Further configuration of the WLAN Thermometer is carried out via web-based management. To do this, click on the Browser button.

Networks with DHCP

If a DHCP server is active in the network in which the WLAN Thermometer is connectedDHCP server is active, the device should be automatically assigned an IP address. To be able to address the WLAN Thermometer specifically, you should configure a reservation in the DHCP server so that the device can always be reached at the same address. address. The Ethernet address required for this can be found on the white sticker on the device.

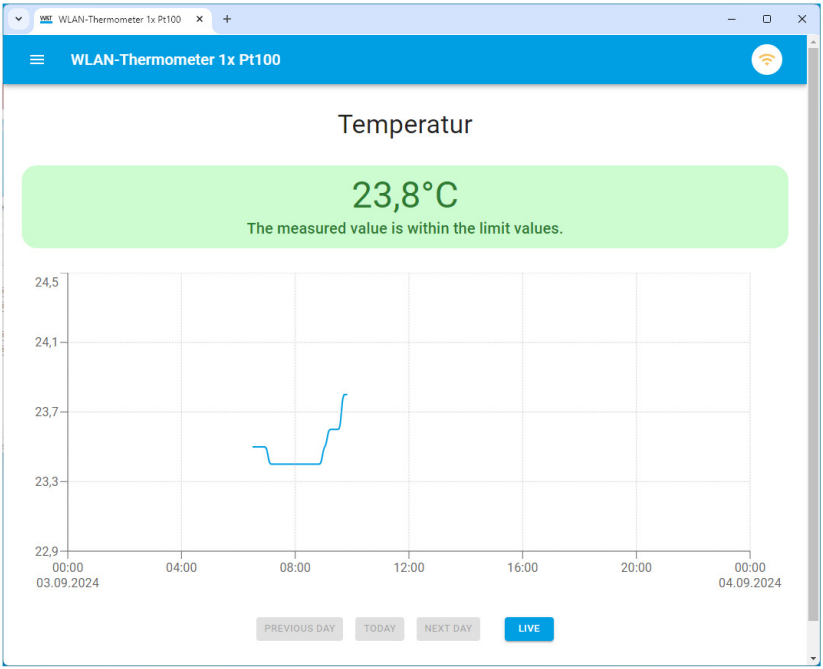


If in doubt, ask your network administrator.

⚠ *Once the IP address has been initially assigned, it can only be changed via the device's website or in emergency mode.*

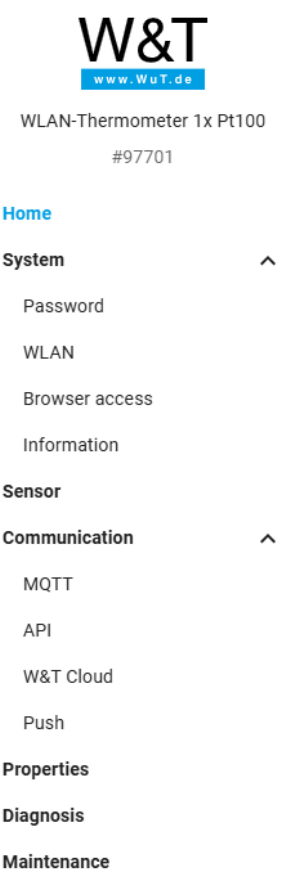
7. Basic settings

After entering the IP address in the web browser, you will be taken to the start page of the device.



Click on the menu symbol at the top left to access the main menu of the device.

97701 WLAN Thermometer 1x



Password: Protect the device configuration with a password

WLAN: Make the network settings for the device here

Browser access: Select the browser language and, if desired, the encrypted connection via HTTPS.

Information: Enter the device name here, which you can use to identify the device on the network.

Sensor: Configure limit values for an automatic message here.

MQTT: The settings for MQTT communication are configured here.

API: To carry out individual queries via TCP client or browser, activate these services here.

W&T Cloud: Configure the automatic transmission of measured values to the W&T Cloud here

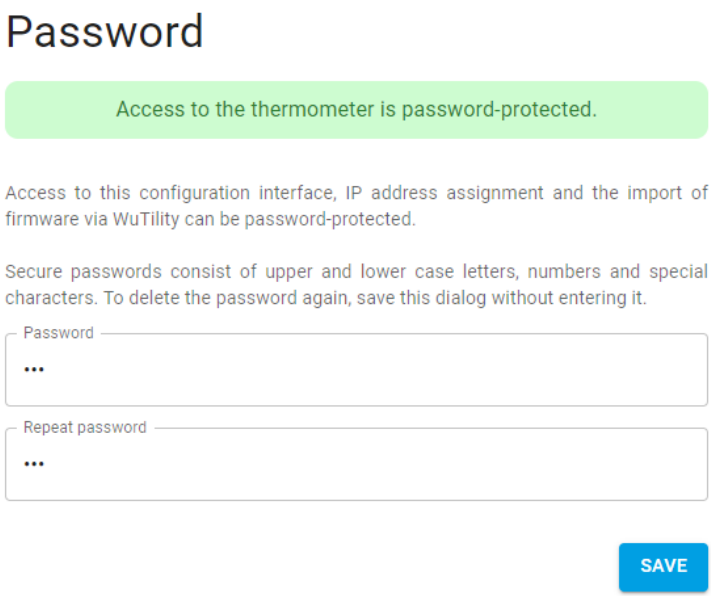
Push: You can use the ntfy.sh service to transmit push messages to your smartphone, for example.

Properties: Here you will find information on the network status and device version.

Diagnosis: Information about the device status.

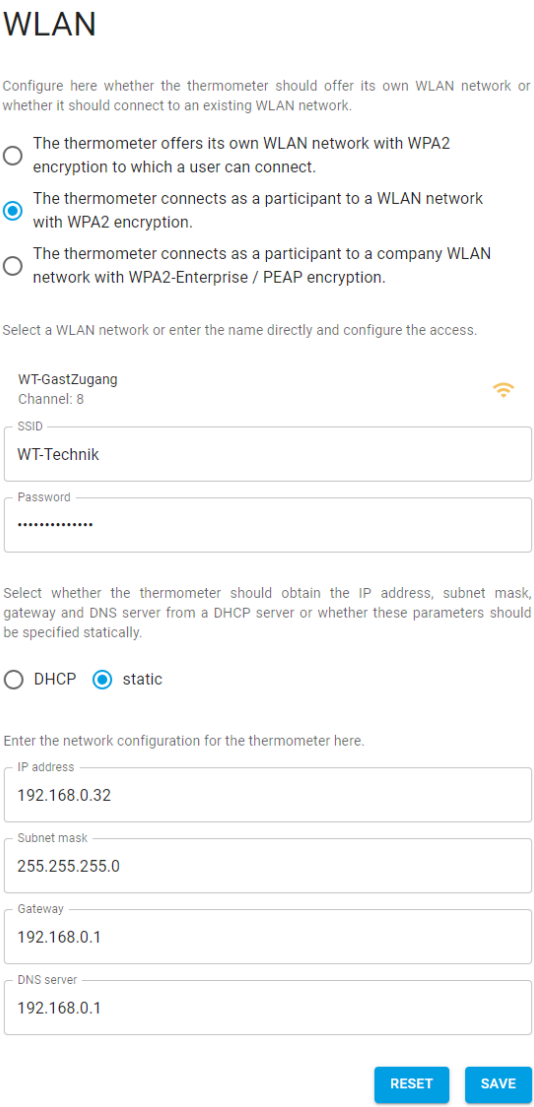
Maintenance: Perform a hardware reset or reset the device to the factory settings here.

Password



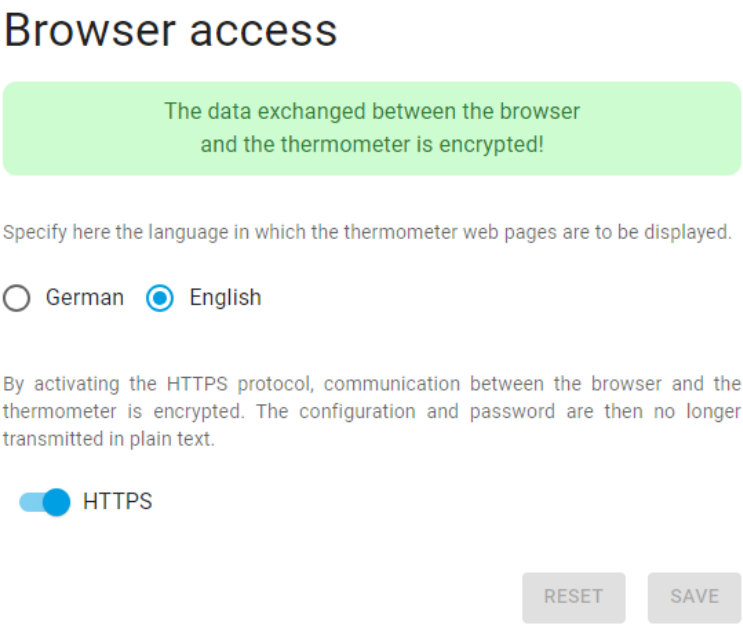
Here you can set or change the password to protect the configuration and to import the firmware via WuTility.

WLAN



Make the necessary settings for your WLAN here.

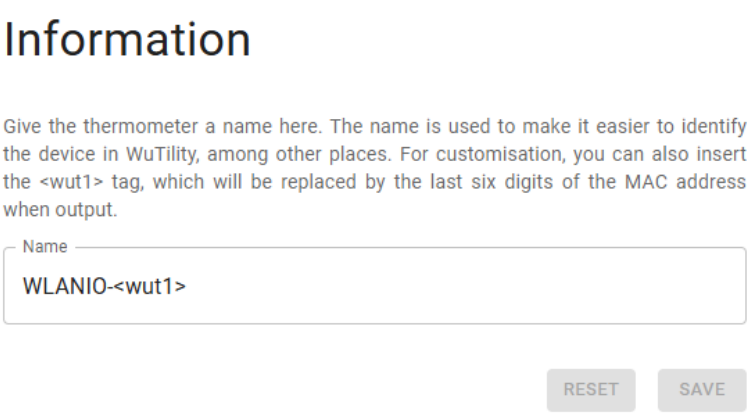
Browser access



Select the browser language. You can switch between German and English.

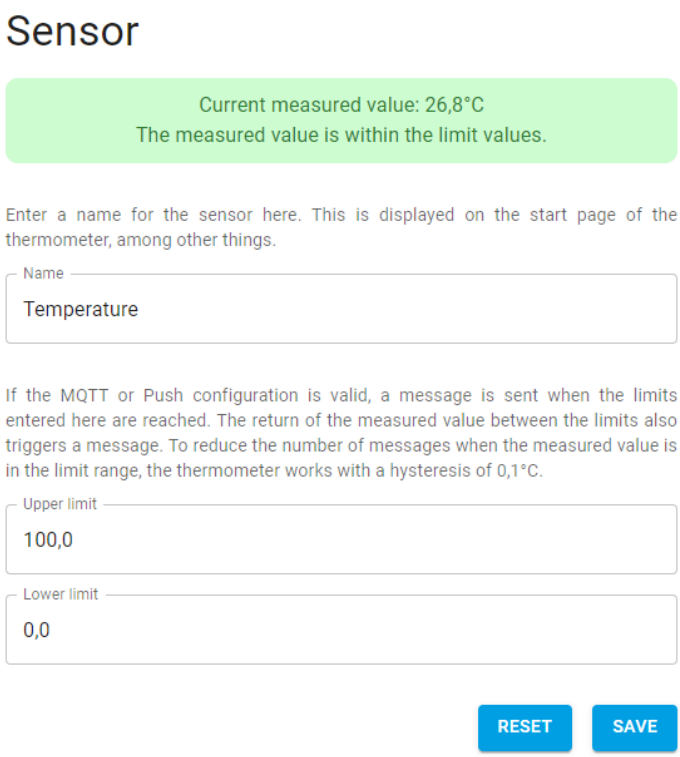
Activate encrypted browser access via HTTPS if you wish.

Informationen



The device uses the name configured here to identify itself, for example, in the WuTility commissioning tool. The expression <wut1> is replaced here by the last six digits of the MAC address.

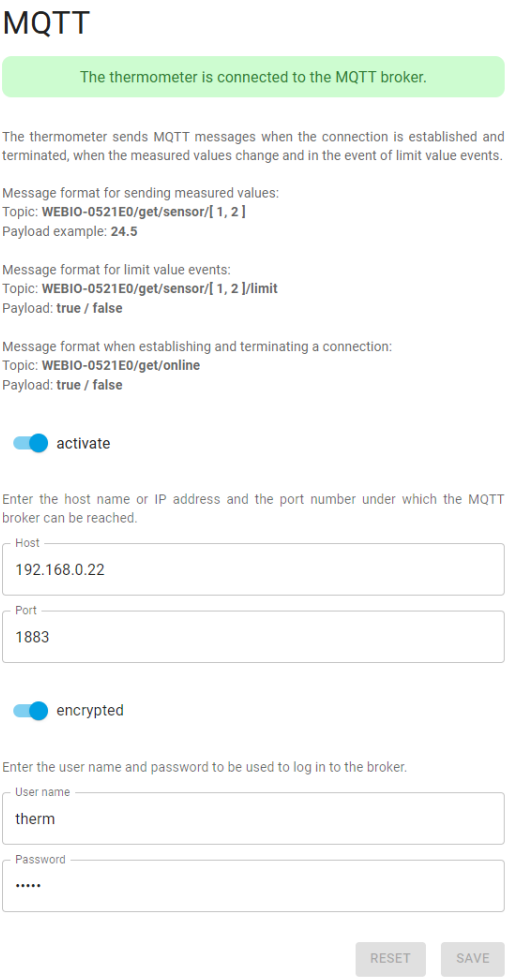
Sensor



Enter the limit values here at which a message is to be sent via MQTT and push message. If you only want to monitor one limit, e.g. a pure temperature overrun, only enter the upper limit value. For a temperature undercut, enter the lower limit accordingly.

8. Communication

MQTT



If you want to send messages via MQTT, configure the settings for the MQTT broker here. To do this, you need the IP address and the port number under which your MQTT broker can be reached. If you want an encrypted connection, activate the corresponding switch.

The WLAN Thermometer sends the measured value to the MQTT broker each time the connection is established or terminated and when the value changes.

The topic used has the following format:

<*device name*>/get/sensor/1

The payload is specified as a point-separated measured value. E.g.

24.7

Additional information is also sent:

<*device name*>/get/sensor/1/limit

Payload: true /false

As soon as a limit value event occurs, *true* is sent as the payload when a limit is exceeded/fallen short of and *false* is sent when returning to the normal range.

<*device name*>/get/online

As soon as a connection to the MQTT broker has been established, *true* is sent as the topic and *false* when the connection is terminated.

API

It is possible to query the current measured values via a socket connection. This function is used to obtain the individual data without the web interface.

Open a connection to the IP address of the WLAN Thermometer and port 42280 with any TCP client.

Then send the following command to the device:

```
GET /Single1
```

The device then responds with a text string containing the current temperature with unit. E.g.

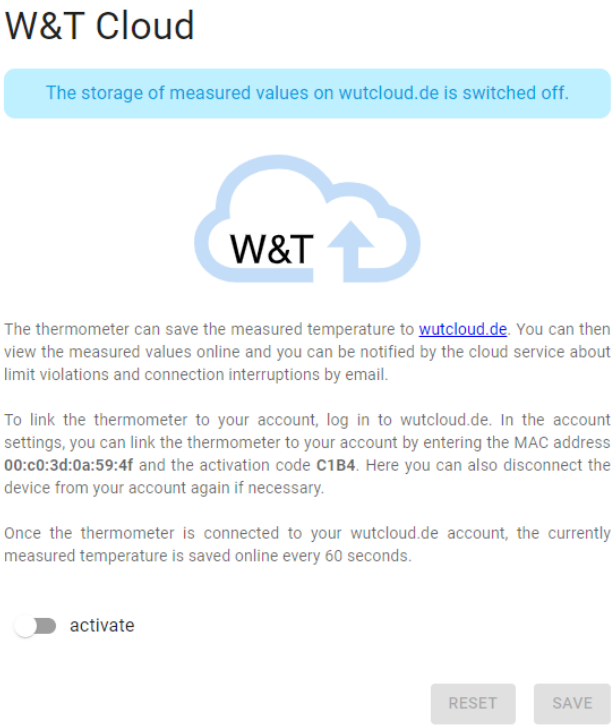
```
24,5°C
```

You can also query the individual measured value via HTTP. Send the request to the device:

```
http://<ip-address>/single1
```

You receive the measured value in an HTTP response. The device responds with the current temperature and the unit.

W&T Cloud



With the cloud service, W&T offers a comprehensive solution that enables data to be backed up in online storage.

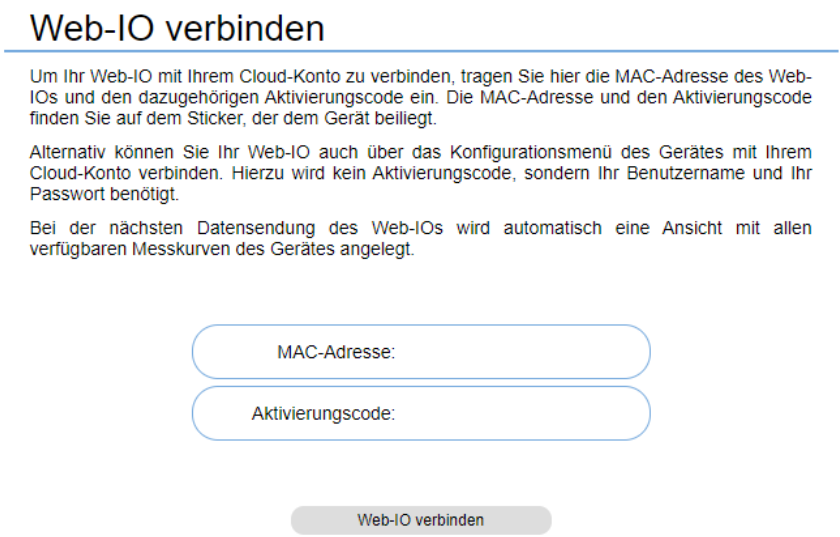
Measurement data is sent directly from the measuring point to the cloud and is therefore available online.

A user account is required to use the W&T Cloud. You can create this on the Cloud website at:

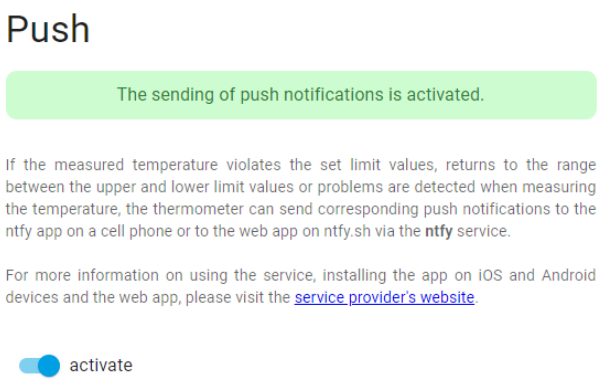
http://wutcloud.de

You will find an activation code for cloud use that is suitable for your device in the device packaging.

Enter the MAC address of the device and the activation code in your user account at http://wutcloud.de to connect the device to your cloud account. The device will now send its data to the cloud cyclically.



Push

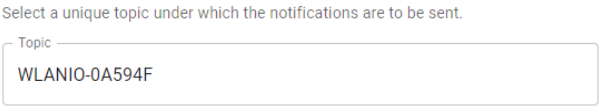


The device can send push messages via the third-party provider ntfy.sh, which can be received on a smartphone using the corresponding app, for example.

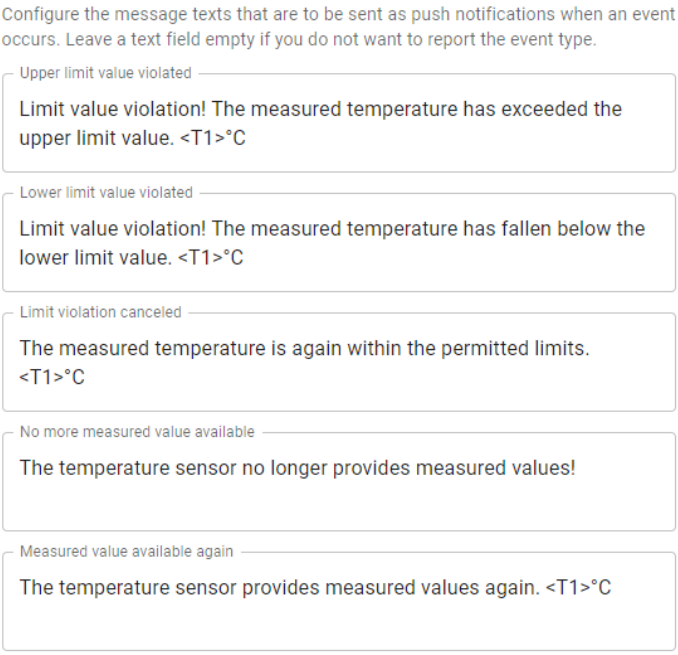
You can find more information about downloading the apps at

https://ntfy.sh/

You must select a „Topic“ for the notification so that the data sent can be assigned to your WLAN Thermometer:



Configure message texts for the various events.



In addition to the continuous text, you have the option of inserting the current measured value in the form of a tag. This is given in angle brackets and can be inserted at any point in the text.

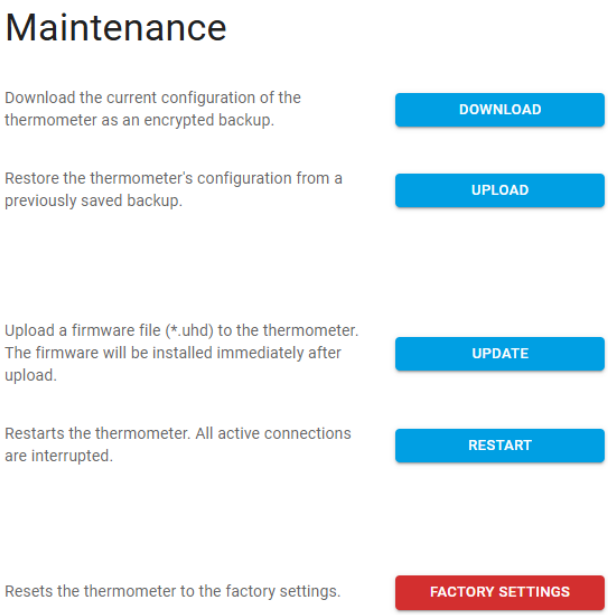
<T1> returns the measured value with comma separation. E.g. **24,5**

<t1> returns the measured value with point separation. E.g. **24.5**

You can find an application example for sending push messages at:

https://www.wut.de/ntfy

9. Maintenance



Download the configuration, restore a configuration from a file, upload a new firmware, restart the device or reset it to the factory settings. After restoring the factory settings, you can configure the device again as described in the *Commissioning* chapter.

10. Security information

The following sections contain relevant information and recommendations for commissioning, configuration, operation and maintenance of the WLAN Thermometer from an IT security perspective.

Function and typical use

The WLAN Thermometers from Wiesemann & Theis are temperature monitoring devices with network access via WLAN.

Measurement data is transmitted through the network as a TCP payload and optionally also within higher protocol instances.

WLAN Thermometers are not designed ex works for operation in a secure network environment. The factory settings focus on the most convenient transmission of measurement data and uncomplicated commissioning and configuration. In insecure network environments and/or with increased security requirements, additional steps must be taken to prevent unauthorized access.

Requirements for integrators and operators

Depending on the individual network environment and the security requirements, the factory settings for operational use must be checked from a security perspective. Changes and/or additional measures may be required by the integrator or operator. These include in particular:

- Choosing a secure password in terms of length and composition.

- Deactivation of unneeded services and/or access restrictions via an additional external firewall.

Installation location

The installation location of the WLAN Thermometer must ensure that no unauthorized physical access is possible (e.g. suitably secured room, switch cabinet, etc.). Physical access to the WLAN Thermometer entails the following risks, for example:

- Decommissioning of the device (removal of the power supply ...) and loss of all connections to communication partners.

Commissioning

The commissioning of the WLAN Thermometer is divided into the WLAN configuration and the subsequent assignment of the IP address (DHCP, WuTility), as well as the subsequent further configuration via web-based management. All configuration services are freely accessible with the factory settings. Commissioning must therefore be carried out in such a way that no unauthorized access is possible until the system password has been assigned and the configuration is secure.

IP assignment

During initial commissioning, ensure that the WLAN Thermometer is not accessed by unauthorized persons until a system password has been assigned. A suitable measure is, for example, commissioning via a point-to-point connection in access point mode. Only then is the WLAN Thermometer connected to the actual target network.

Password

The WLAN Thermometer should not be used operationally without a password. The password is the central protection against unauthorized access to the configuration and management of the WLAN Thermometer. We recommend using a secure password with a length of at least 15 characters, consisting of upper and lower case letters, numbers and special characters.

The system password is not transmitted to the WLAN Thermometer in plain text during normal operation. For password-protected access from supposedly insecure or public networks, additional measures such as the use of a VPN tunnel must be taken.

Registration for security-relevant information

Devices can be registered with W&T via the WuTility inventory tool. In the event of security-relevant updates and/or information, you will be notified immediately by

email. In addition to the personal data provided, device-specific data is also stored during registration.

Operation and configuration

WLAN Thermometers support the incoming and outgoing services listed in the following table.

Incoming:

Port number	Application	Password?	Configurable/ Can be switched off?
80 (TCP)	Web-based management Single value temperature query via HTTP	*Configuration only*	no
42280 (TCP)	Single value temperature query via TCP socket	no	no
8002 (TCP)	Initialization firmware update	yes	no
8513 (UDP)	Inventory	no	no
68 (UDP)	WuTility IP assignment	yes	no
69 (UDP)	Firmware update	yes	no
ICMP	Echo request	no	no

Outgoing:

Port number	Application	Password?	Configurable/ Can be switched off?
53 (UDP)	DNS client (activation on demand)	no	no
67 (UDP)	DHCP client (deactivation through static IP assignment)	no	no
1883 (TCP)	MQTT client	yes	yes
443 (TCP)	Cloud transmission Push transmission	no	no/yes
68 (UDP)	WuTility IP assignment	yes	no
69 (UDP)	Firmware update	yes	no
ICMP	Echo request	no	no

Firmware updates

W&T publishes firmware updates for the Com-Servers to rectify functional errors, any weaknesses that have been discovered or to extend the functionality. Updates are uploaded to the device using the WuTility management tool.

Update files always contain the entire firmware or the entire system of the Com-Server. For this reason, firmware updates always involve a restart of the Com-Server and therefore also an interruption to operation. Individual configuration data (IP parameters, firewall rules, etc.) are not affected by a firmware update and are retained.

The firmware is uploaded via TFTP (UDP) and the system password is transmitted in plain text on the network side. Additional external measures are therefore required in insecure networks or in environments with increased security requirements.

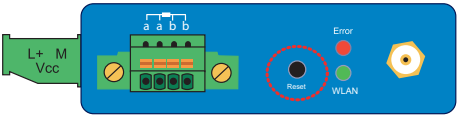
11. Service, maintenance and decommissioning

Despite high quality standards, electronics can fail at any time, e.g. due to external events. Depending on the availability requirements of the respective application, we recommend taking suitable precautions.

- Provision of a replacement device if necessary
- Documentation of the procedure for device replacement

When decommissioning, the device should be reset to the factory settings to protect all confidential information stored in the WLAN Thermometer (IP ranges, external access data, etc.). This can be done via the web-based management configuration.

Reset



The reset button on the front of the housing has the following functions:

- Press briefly: The device performs a hardware reset. All network connections are disconnected as a result.

- Hold for longer than 5 seconds: The device switches to emergency mode. The current Wi-Fi connection is disconnected and the device switches to access point mode. Connect to the emergency WLAN with the designation EMERGENCY- followed by the last three digits of the MAC address. E.g.:

EMERGENCY-0A0905

Now open a web browser and establish a connection to the address 192.168.4.1

You can now change all device parameters without entering a password and reset the device to the factory settings, for example.

12. Technical data

Connections and displays

WLAN:	802.11 b/g/n 2,4GHz
Radio channels:	14
Mid-frequency range: (radio channels)	2412 to 2484 MHz
Max. transmission power:	16 dBm
Displays:	LEDs for system and error
Supply voltage:	12..24V DC (+/- 10%) via screw terminal
Power consumption:	typ. 40mA@24V DC, typ. 70mA@12V

Sensor

Sensor:	1x Pt100 connection
Measuring range:	W&T sensor: -50°C...180°C PT100 measurement input -200°C...650°C
Resolution:	1/10°C
Measuring frequency:	1/second
Maximum measurement error	
WLAN-Thermometer:	±0,3°C, ±0,2%
Sensor supplied:	±0,15°C, ±0,2%

Housing and other data

Housing:	Plastic housing with integrated DIN rail mounting 105 x 22 x 75mm (L x W x H)
Storage temperature:	-40...+70°C
Operating temperature:	0...60°C
permitted humidity:	0...95% relative humidity, non-condensing

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