



FIGURE 1 structure of wireless sensor network

### General description

The wireless Ouman sensor system enables a quick and easy reading of precise room temperature data in a building without the laborious laying of cables and drilling of walls. Base station (WL-BASE) calculates automatically average room temperature based on values which are collected from selected sensors. The calculated value can be used when controlling of heating. The base station can be connected as Modbus slave to different SCADA systems or as Modbus master to OUMAN unit controllers S203, C203, H23 or EH-203. MODBUS slave register can be obtained from base station user interface.

The sensor system comprises a base station (WL-BASE), sensors that act as routers and are connected to the mains, and battery-operated wireless sensors (WL-TEMP-RH). In the event of failure, a damaged sensor can be replaced without changing the register list. This makes the installation of the replacement sensor quicker and easier.

The mesh structure of the wireless network improves network reliability. The signal has multiple routes, from which the system automatically selects the strongest. The larger the number of routers in the coverage area, the more routing options the signal has. One wireless base station can monitor data from up to 100 sensors.

### Base station connections:

- Direct connection to base station with browser. (over the Internet/locally)
- Ounet connection directly from the base station. (over the Internet)
- local Modbus RTU connection.

(Connections can be utilised simultaneously)

### Initial engineering in network construction:

- Building structures are crucial in network engineering. Metal structures weaken the signal, which is also the case for lift wells, electrical power centres, fire doors, etc.
- Old concrete buildings are easier in regard to networks than buildings constructed in the 2010s, where the amount of steel in the structures is higher. Newer buildings require more routers than old ones.
- From the base station, the network should be built by first finding a suitable "backbone" for the network and applying the operating voltage to the sensors, so that they will act as routing elements in the network. See FIGURE 1.
- Once the network is operational in this regard, battery-operated sensors are placed as part of the network.
- The positioning of room sensors must take into account that the sensor should never be exposed to direct sunlight. It must also be ensured that no other external sources of heat affect the sensor, such as refrigerators, television sets, ventilation windows, water radiators, etc.
- It is often the easiest way to place the base station to the same space with the automation substation (heat distribution room, AHU room), but due to the weak 3G signal the optimal location can also be in the other parts of the building. Centrally selected location for the base station can improve the functionality of the sensor network, because more sensors can be directly connected to the base station without routers.
- It is able to select external antenna to the base station which improves reception of the sensor network when needed to achieve better signal levels.
- The base station requires a separate housing, e.g. K118 which also includes the needed power supply. (must be applied when certain IP protection class is needed)

## Installation

### Base station



The base station is mounted to a wall or to the centre with a DIN bar. In the centre installation, the base station requires an external antenna. The base station must be installed indoors (0°C...+50°C).

The base station can be connected to Ounet, or independently to the Internet, in which case, measurement data can be inspected from outside the property through a remote connection. If the property already has an Internet connection, you can use it. If there is no Internet connection ready, we recommend you use the 3G connection provided by Ouman.

The base station can also be directly connected to the computer in the local internal network, and as part of the rest of the automation system through the modbus RTU route.

### Temperature and humidity sensor:



Rooms sensors can be mounted to the wall with screws or adhesive tape. Please note that the sensor is installed so that the black terminal strips are in the bottom left corner **1**.

Place the room sensor at a height of about 150 cm in a location where it measures the average temperature of the room. Do not install the room sensor in a location where direct sunlight or another source of heat may distort the measurement result.

The room sensor must be installed indoors (0°C ... +50°C). External temperature measuring, digital input or transmitter measurement (see page 5) can be connected to the sensor by using the room sensor's AUX connection

**PLEASE NOTE: When connected to an external power source (5 VDC), the room sensor is a routing room sensor, but when equipped with AA batteries, it acts as a room sensor. The room sensor will automatically recognise the power source.**

## Commissioning the wireless network through the Internet connection

### Base station



1. First install the base station.

2. Connect the antenna (or the extra antenna with an extension cord) to the antenna connection of the base station. **Do not detach or attach the antenna when the base station is live!**

3. Connect the Ethernet cable between the base station's RJ45 connector and the Internet connection (router/3G modem).

4. Switch on the operating voltage. The voltage is connected to the terminal strip  $\sim$  and ground to the adjacent  $\perp$  connector.

5. Wait for the LINK light to remain green. This may take a couple of minutes.

6. When the LINK light remains, the base station has successfully been connected to the Ouman ACCESS network.

7. If you have a QR reader, read the QR code of the base station label. In other case, enter the label's website address or IP-address received from device DHCP in your Web browser. Device IP can be found by DiscoveryTool. Software is available free of charge in Ouman Oy.

8. Perform base station login. The password is indicated in the label on the side of the base station. Username = service. Upon your first login, the system proposes that the password be changed. This can be set, for example, the object name. The name can also be changed in the settings.

9. We recommend that you do that. If you do not change the password, the password will remain (each base station has a unique password).

In addition, you can specify a user password in the base station; the user password only entitles you to view measurement data. Username = user, password = Wireless

10. Switch on installation mode in the user interface. The RF status of the base station is green (see p. 6 Web UI Figure 2, Section 4.)

11. It takes about one minute for the installation mode to be activated. After that, the mode will remain active for 90 minutes, unless you interrupt it in the user interface (you can adjust the default time in the base station settings).

12. Go to "sensor commissioning" (p. 4).

## Commissioning the wireless base station without the Web browser interface



1. Connect the antenna (or the extra antenna with an extension cord) to the antenna connection of the base station. **Do not detach or attach the antenna when the base station is live!**
2. Switch on the operating voltage. The voltage is connected to the terminal strip  $\sim$  and ground to the adjacent  $\perp$  connector.
3. Press the base station's installation mode button.
4. Check that the RF-Status light of the base station is on. When the light is green, the commissioning mode is active.
5. Go to "sensor commissioning" (p. 4).

### Option

#### WL-BASE POWER (Contact plug transformer):

External power source to the WL-BASE base station 24 VDC

Connection: Red  $\sim$ , Black  $\perp$

## Base station signal light legend

### INIT / ERR

- Red light is on  
Upon start-up, the light will be red for about 30 seconds. If the indicator light does not go out, contact your dealer.
- Blinking red light  
The power supply voltage is too low. The device shuts down and attempts to restart again.
- Blinking green light  
The light is green and blinking when the base station is active.

### LINK

- Yellow light on  
The light is on when the connections are in order (both the Internet connection and the ACCESS connection are operational)
- The light is almost continuously on, but is off at times.  
Internet connection is operational, but there is no ACCESS connection
- The light is off most of the time, but blinks at times.  
LAN connection is operational, but there is no Internet and ACCESS connection.
- No light  
No LAN connection.  
If the LINK LED is not blinking or is not on at all, check that the LAN cable is properly connected to the base station and router. The signal lights of the base station's Ethernet connector are on if the network cable is physically in order and connected.



### RF STATUS

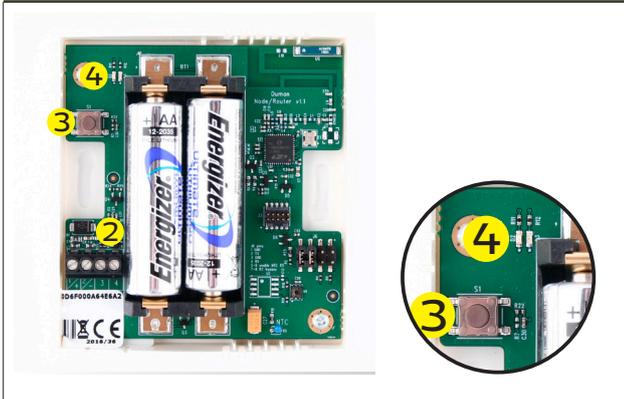
- Green light on  
The base station is in installation mode
- Blinking green light  
The base station is in normal mode

## The base station interfaces:

- Modbus RTU Slave
- Modbus TCP slave
- Modbus RTU Master (Unit controller support)\*\*

\*\* The controller writes the calculated average to the adjustable register.

## Commissioning the sensors



1. Commission the base station before commissioning the sensors (see pp. 2–3).
  2. Open the room sensor's cover and install the batteries or switch on the operating voltage if you intend to make the sensor a routing sensor. If both batteries and a fixed operating voltage is connected to the sensor, the sensor will act as a routing sensor as long as both the operating voltages are missing!
- Routing is somewhat slower using batteries, and it must also be remembered that batteries will not last very long if electricity supply is cut off for several days. (Battery consumption depends on the number of sensors to be routed)



3. If neither LED is blinking rapidly, briefly press the sensor installation button (or insert the batteries).



4. Green and red LEDs are blinking rapidly alternately when the connection is being analysed. After the analysis, the LEDs show the status of the connection. The LEDs will blink/light up depending on situation.

### Situation 1: The sensor is connecting to the network

- A rapidly blinking green light (blinks 5 times)
- ■ 3s The green and red light are on for 3 seconds and are then switched off.
- ■ ■ Slowly blinking red light (blinks 3 times)

The sensor receives confirmation from the base station. The connection is in order.

Connection to either router or base station, but failed to connect. Try again to connect the sensor to the network (press the installation button).

The sensor is not in the coverage area of the router or base station or the deployment mode is not on. (The sensor has not been connected to any network).

### Situation 2: Sensor is already connected to the network

- 3s The red light on (for a minimum of 3 seconds) and is then switched off
- ■ 3s The green and red lights are on for 3 seconds and are switched off after that.
- 3s The red light is on (for 3 seconds).
- The green and red lights are off
- 3s The green light is on (for 2 seconds).

The sensor received confirmation from the base station. The connection is in order.

The connection to one router is in order but the connection to the base station is not. (There was no acknowledgment from the base station)

The sensor is not in the coverage area of the router or base station. (The sensor is connected to a network but there is no connection.)

### The sensor is in normal mode and in operating condition

The sensor is receiving new settings from the base station.

### Situation 3: The sensor has lost connection

- ■ ■ ■ The red light blinks once.
- ■ ■ ■ 10 s The red light blinks every 10 seconds.
- ■ ■ ■ 30 s The red light blinks every 30 seconds.
- ■ ■ ■ 15 min The red light blinks every 15 minutes.

The sensor is trying to send data but is not in the coverage area.

The sensor has lost connection to the network max. 3 minutes earlier.

The sensor has lost connection to the network max. 3-15 minutes earlier.

The sensor has lost connection to the network more than 15 minutes earlier.

### Instruction: if the sensor has lost connection:

#### ■ 5s Removing the sensor from the network

Pay extra attention to the reception of the routing sensors, because they are the "backbone" of the network (see FIGURE 1, p. 1).

### If the network is not found, move closer to the base station or the already installed routing sensor

You can remove the sensor from the network by keeping the installation button pressed down for five seconds. (You also need to

#### The RSSI figure indicates signal strength

Good	... -85dBm
Medium:	-85 ... -95dBm
Poor:	-95dBm ...

## Room sensor battery replacement

The Web UI shows the remaining battery life of each wireless sensor. If life is less than 10%, the figure is red, and there is a red exclamation mark in the right upper corner of the user interface.

## Sensor configuration

If the base station is connected more than 10 sensor, the simultaneous high-speed sensor sampling interval slows down the configuration significantly. By pressing the OK button on the user interface you will change sensor sampling interval 2 min (see p.7 Web UI figure 4)

### Option

#### WL-ROUTER POWER, 5VDC

External power supply for WL-TEMP-RH sensor. If you connect an external power supply to the sensor, the sensor become a routing sensor.

Connection: Black -, white +

#### WL-BATTERY-AA-ALK

The delivery includes 10 pieces of 1.5V. EN91 Energizer 2800 mAh batteries

#### WL-BATTERY-AA-LIT

The delivery includes 10 pieces of 1.5V. Energizer L91 Ultimate Lithium 3100 mAh batteries

1. When the sensor has found the network, it will automatically appear last in the user interface list (or in place of a sensor removed from the list).

2. You can edit the default name (SensorX) of the added sensor to match the location. Example: Room 101 (see p. 6 Web UI, Figure 2)

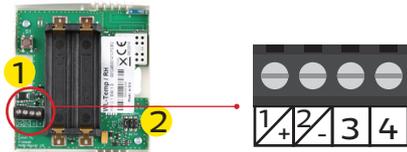
3. In the sensor route table, you can see how the added sensor is connected to the network (see p. 7 Web UI, Figure 3). Please note: The sensor will automatically find its route by the best reception. **You cannot change the route manually.**

4. Set the failed response alert limit and updating interval for the base station on a sensor-specific basis. (see p. 5 Web UI, Figure 1)

5. Likewise, the calculation interval of the permanence value. (see p. 5 Web UI, Figure 1). Stability value can be calculated for temperature values.

Instructions: You can define joint maximum and minimum limits for all base station sensors. (Default 21°C and 24°C) Example: if the calculation interval is 10 h and temperature is 2h of the timeline over the maximum limit or under the minimum limit → The permanence value is 80% for the calculated time..

## AUX connection of wireless room sensor



In the wireless sensor or routing sensor, it is possible to connect an external temperature measurement, digital input, status data or 0-10 VDC transmitter measurement by using the AUX connection.

### AUX connection in temperature measurement

Connect temperature measurement in terminal strips 3 and 4 **1**

### AUX connection as digital input

Connect the digital input in terminal strips 3 and 4 **1**

### AUX connection as transmitter measurement

**First remove the jumper on the battery side** from the sensor's circuit board **2**

Connect the transmitter measurement to terminal strips 3 and 4 (power source's ground  $\perp$ ) **1**

## AUX connection settings from WEB UI:

1. Select the type of AUX input in the drop-down menu.

2. You can name the input as you like. The name will appear in the AUX connection tooltip in the Web UI.

Reception alert will be indicated with a red exclamation mark in the right upper corner of the Web UI. The exclamation point can also explain the low battery in any device. Clicking on the exclamation mark, displaying all active alarms.

Setting the stability interval for the sensor's permanence value (see p. 5).

Usually, you do not need to adjust other settings.

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English

**OU MAN**

Devices

Route table

Settings

Gateway

Any sensor low signal	Any sensor battery low	Over 50% of batteries under 30%	Temperature avg
No	No	No	23.9

Devices (12 connected)

#	Location name	Type	MAC	Temp (°C)	Temp stability	Humidity (%)	Aux	Signal (dBm)	Battery (%)	Status	Last seen
1	H 2.0 router	Router	00:12:4b:00:10:cc:a1:6c	25	0	10				OK	2 m
2	TP 1.2 Sensor2	End device	00:12:4b:00:14:1d:4b:35	21.2	100	7				OK	ago

4. You can also enter the installation mode through the Web UI by clicking this icon. To exit the installation mode, click the icon. Or, if you do not do that, an automatic exit will take place after 90 minutes.

1. Click the icon with three dots, and the function menu will open.

Select visible columns

Columns

Select all

#	Location name	Type	Number	Humidity (%)	Aux	Signal (dBm)	Battery (%)	Status	Last seen
1	H 2.0 router	Router	Location	10	-	Good -25	-	OK	2 m
2	TP 1.2 Sensor2	End device	Type						
3	TP 1.3	End device	MAC						
4	H 2.1 Sensor4	End device	Temperature						
5	H 2.2	End	Temperature stability						
			Humidity						
			Aux	11	-	Good -24	93		
			Signal						
			Battery	9	-	Good	96		
			Status						
			Last seen						

Click the icon and select which columns will be displayed.

2. Select "Edit location" to rename the sensor location.

Settings

Copy values

Edit location

Change position

Delete

CLOSE SAVE CHANGES

3. Enter a new, unique name for the sensor location.

Apartment 101

CANCEL CHANGE LOCATION

Settings

Copy values

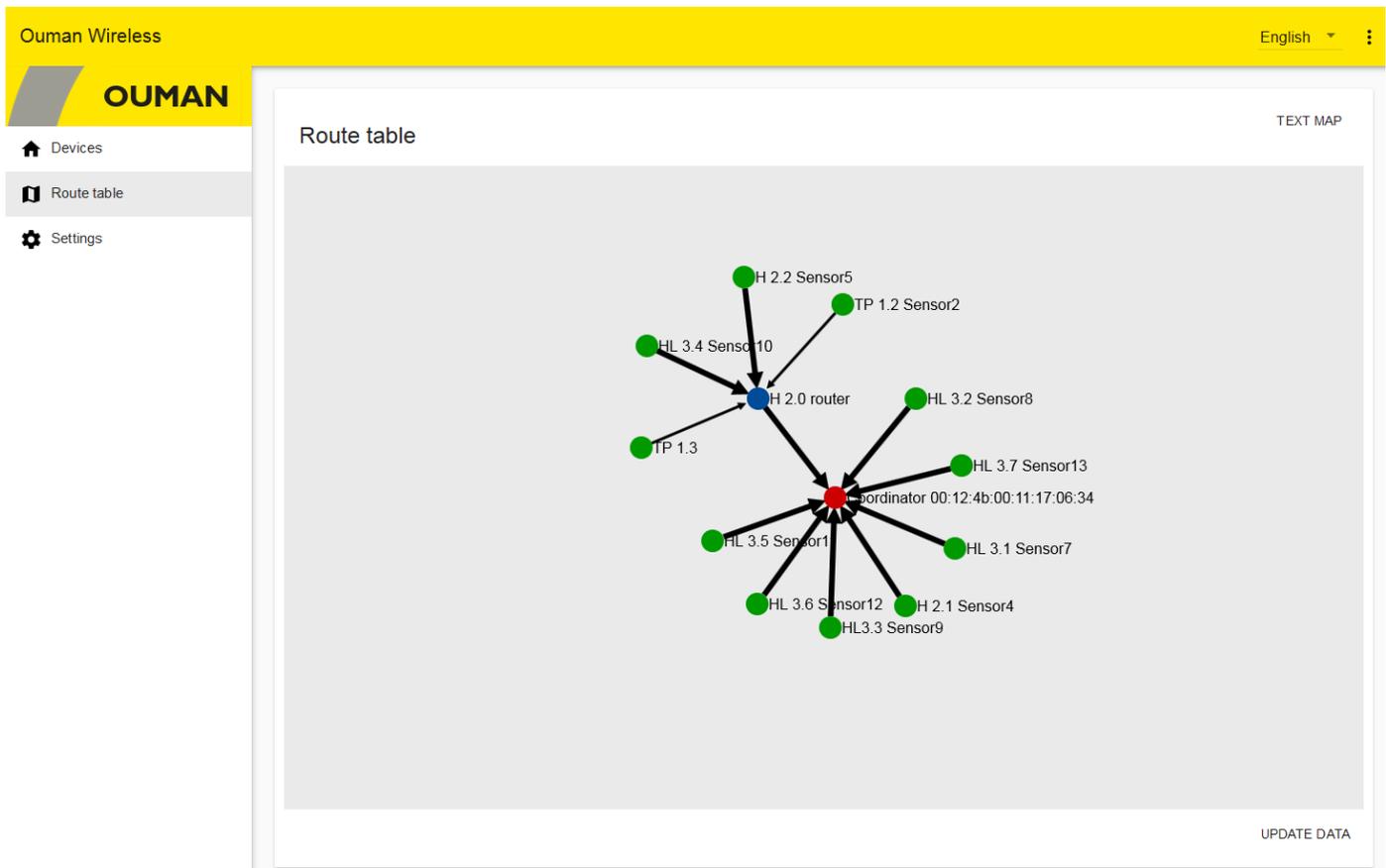
Edit location

Change position

Delete

Press and select "Change location"

#	Location name	Type	MAC	Temp (°C)	Temp stability	Humidity (%)	Aux	Signal (dBm)	Battery (%)	Status	Last seen
1	Sensor 1.1	End device	000D6F000A64B13A	26.1	0					OK	12 m
3	Sensor 1.3	Router	000D6F000A64B06A	27.2	0			Good -76	100	OK	51 s ago



## Base station configuration

**Gateway**

Any sensor low signal	Any sensor battery low	Over 50% of batteries under 30%	Temperature avg	Lowest temperature	Highest temperature	Test
No	No	No	23.9	21.2	25.3	Settings Edit average settings

**Devices (12 connected)**

	#	Location name	Type	MAC	Temp (°C)	Temp stability	Humidity (%)	Aux	Signal (dBm)	Battery (%)	Stat
OK	1	H 2.0 router	Router	00:12:4b:00:10:cc:a1:6c	25.1	0	10	-	Good -25	-	C
OK	2	TP 1.2 Sensor2	End device	00:12:4b:00:14:1d:4b:35	21.3	100	7	-	Good -81	95	C

OK button – In the installation mode, the sensor sampling interval is 10 seconds by default. When there are 10 or more sensors in “join mode”, the sampling interval will slow down the device. When you press “OK”, the sensor’s sampling interval will change to two minutes, which will accelerate the device.

If you do not change the sampling interval in the install mode, it will automatically change to 15 minutes when you exit the install mode. The minimum sampling interval is one minute.

The device has a setting of “Update interval to gateway” (sampling interval). The sensor checks whether the set-point is changed, whenever the sensor sends the measurement data to the base station.

# Gateway sensor settings

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Waiting sensors (24 min left) ✓

Gateway

Any sensor low signal	Any sensor battery low	Over 50% of batteries under 30%	Temperature avg	Lowest temperature	Highest temperature	Temperature stability avg
No	No	No	23.9	21.2	25.3	40

Settings **1**  
Edit average settings

Ouman Wireless English

**OUMAN**

Waiting sensors (23 min left) ✓

Gateway

Any sensor low signal	Any sensor battery low	Over 50% of batteries under 30%	Temperature avg	Lowest temperature	Highest temperature	Temperature stability avg
No	No	No	23.9	21.2	25.3	40

**Gateway settings**

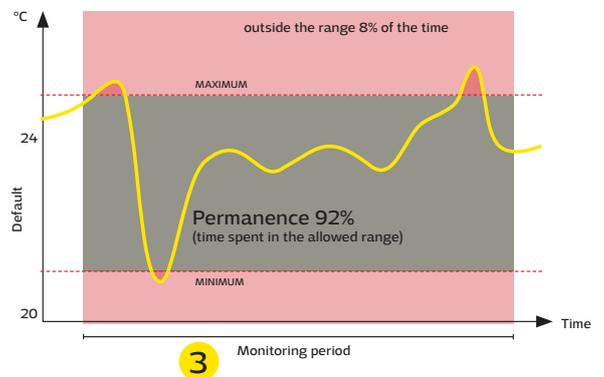
Temperature stability limits  
Low limit: 20 High limit: 24

Battery low limit  
Low limit: 10

CANCEL UPDATE VALUE **2**

## Temperature stability

In addition to displaying measurements, the base station will calculate averages of selected measurements and filter erroneous readings. For quick review, permanence is calculated for all temperatures to reflect how well the temperature has remained within the set limits.



# Average calculation settings

Devices-> Gateway -> ⋮ -> Edit average settings

Ouman Wireless English

**OUMAN**

Waiting sensors (24 min left) ✓

Gateway

Any sensor low signal	Any sensor battery low	Over 50% of batteries under 30%	Temperature avg	Lowest temperature	Highest temperature	Temperature Settings
No	No	No	23.9	21.2	25.3	Edit average settings 1

Temperature average calculation settings

GENERAL SETTINGS SENSOR SELECTION

Sensors used in avg calculations

Select all

- H 2.0 router
- TP 1.2 Sensor2
- TP 1.3
- H 2.1 Sensor4
- H 2.2 Sensor5
- HL 3.1 Sensor7
- HL 3.2 Sensor8
- HL3.3 Sensor9
- HL 3.4 Sensor10
- HL 3.5 Sensor11
- HL 3.6 Sensor12
- HL 3.7 Sensor13

CLOSE SAVE CHANGES

Average calculation settings

**Avg calculation time span** Time span (h) 0

Average calculation time window. Value 0 means, time window is not used.

**Avg calculation method** Method Normal 2

Method used in measurements average calculations.

- Normal
- Min-max limited
- Pick out mode
- Min-max and pick out combination

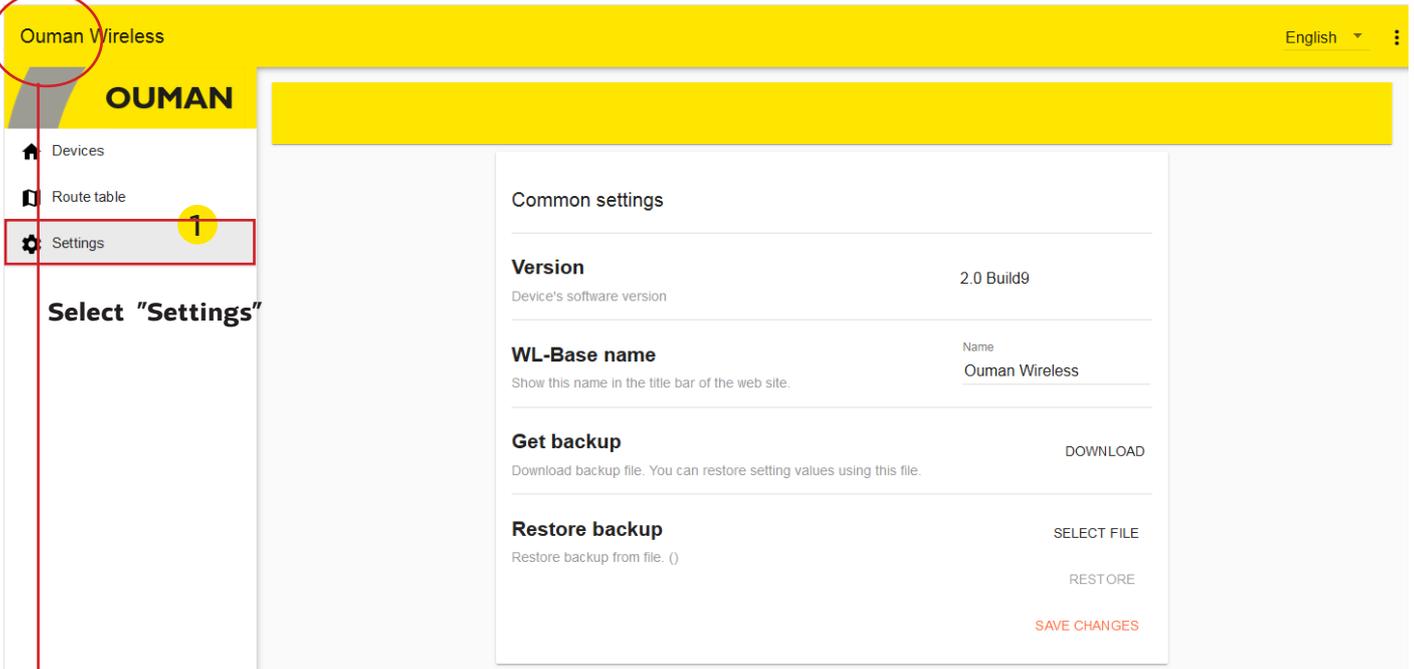
CLOSE 3 SAVE CHANGES

Gateway: General settings	
<b>Avg calculation time span</b>	The calculation can be performed as sliding for a specific period. If the value is 0, the value is an "online" value.
<b>Avg calculation method</b>	
Normal	Will calculate the average of all sensors included in the calculation.
Min – max limited	In the calculation, this function removes measurements not in the minimum and maximum range
Pick out mode	This function removes the selected number of measurements from the calculation. Example: The two lowest temperatures and the highest temperature.
Min - max and pick out combination	The program will first perform the selection and then the limiting process.

If any sensor drops out of the network, it will not be taken into account in the average calculation.

# Base station configuration

Web UI Figure7



## Gateway: Common settings

### Version

Shows the software version of the device.

### WL-Base name

The name that is displayed on the web page title bar. Enter to the name to the name field and click "Save settings".

### Get backup

When a wireless system is created, download a backup. If the base station fails and you need to replace a new base station, the configuration is easier, when you can restore the backup.

Click **Download**: The device creates a copy in which there are saved the device names paired to sensor MAC-code and also other settings of base station

### Restore backup:

Returns the names and settings, but every sensor has again to be taken into use to the new base station. First the sensors are removed from the old network (press 5 s the sensor button ) and then added them to the new network pressing shortly. Finally, select "Save Changes".

## Gateway settings

### Clear sensor network

Click the **CLEAR** to remove all the installed sensors from network.

### Restore default values

Click the **RESTORE** to restore default values to sensors. Installed sensors are also removed.

### Reboot

Click the **REBOOT** to reboot the gateway



Display update button

## Network settings

DHCP	Selectable: On / Off
Access	Selectable: On / Off
Access address	Access IP address.
IP address	Local IP address.
Gateway address	
Subnet mask	
Name server address	
Save changes	

If DHCP is turned on, the base station automatically retrieves the network settings when the machine is connected to the network and turned on.

## Modbus RTU settings

RTU type	Selectable Master or Slave
Device selection	Preselect master device. When Ouman unit controller is selected as a device, average value is set as a register value of "H1 (H2) Room temperature via bus". You must select from the controller H1 (H2) Room temp.from bus in use.
Baud rate	Baud rate (speed) of the bus. All devices in the same bus must have same baud rate. Default baud rate is 9600, but it can be changed.
Data bits	Amount of the databits of bus. All devices in the same bus must have same Data bits setting.
Parity	Parity of the bus. All devices in the same bus and this field must have same parity.
Stop bits	All participants must have the same setting. Amount of the stop bits of the bus. All devices in the same bus must have same stop bit setting.
Modbus address	Give individual address
Save changes	If you do the changes to the Modbus RTU settings, you have to select "save changes".

## Modbus TCP/IP settings

Enabled	Modbus TCP/IP -communication is allowed when mode is enabled (On).
Modbus TCP/IP port	
Sockets	Server load can be limited by changing that setting. The setting defines maximum amount of the allowed connections at once from different IP addresses to the server.
Save changes	If you do the changes to the Modbus TCP/IP settings, you have to select "save changes".

## SNMP settings

Enabled	On/Off selection enable/disable SNMP function.
IP address	IP-address of the target server where the message will be sent. Default address is Ounet IP address 10.1.1.23.
Save changes	If you do the changes to the SNMP settings, you have to select "save changes".

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Waiting sensors (34 min left)

Gateway

Any sensor low signal

No

Download modbus CSV file

Download Ounet template

Download Ouflex RTU template

Version info

Change password

Logout

40

You can open the function menu by clicking the three dot icon in the upper right corner of the Web UI. You can download a modbus CSV file, Ounet template and a Modbus RTU template onto your computer. The menu also includes the Web UI version information, password change, and logout.

## Technical details



### WL-BASE Base station

Case	ABS plastic
Operating temperature	0°C...+50°C
Protection class	IP20
Measurement interval in installation mode	10 seconds
Measurement interval in normal mode	can be adjusted (1–240 min).
Dimensions	90 x 70 x 59 mm
Installation	Mounted to DIN bar
Operating voltage	24 VAC / 5.5 VA or 10...30 VDC / 3W
Power consumption in use	12 VDC 160mA 24VDC 85mA 24 VAC 210mA
Network size	up to 100 sensors

### Base station

- Access function that enables logging on the internal Web server over the Internet
- Built-in Web server to facilitate installation
- Short measurement interval in installation mode
- Ethernet, Modbus TCP/IP
- RS-485, Modbus RTU slave/ master
  - Support unit controllers C203, S203, H23, EH-203.
  - When WL-Base is a Modbus RTU Master device, it calculates an average of the room temperature and writes the calculated value to the unit controller via bus measurement.
- The maximum number of direct connections to the base station is 80 pieces. The signal can pass through the routing sensor, reducing the need for direct contacts.

**NOTE!** Base station should not be connected to the public internet without firewall! That is, for example, a fixed IP address that is visible from outside network. Typically 3G-modem, adsl/wdsl/cable modem operates firewall functionality, wherein the separate accessory is usually not required but the situation need to make sure the network administrator.



### WL-TEMP-RH Temperature sensor and humidity sensor

Case	ABS plastic
Operating temperature	0°C...+50°C
Protection class	IP20
Temperature meas. accuracy +10...60°C	± 0.3°C
Measurement area	-30...+100°C
Humidity meas. accuracy 20...80%rh	± 3 %rH
Measurement area	0...100%rH
<b>Any of the following measurements can be implemented by using the AUX connection:</b>	
• AUX temperature measur.	
– Measurement area	-30°C...+50°C
– Measurement accuracy (25 °C)	± 0.3°C
• AUX 0-10VDC transmitter	
– Measurement area	scaleable
– Measurement accuracy	0.5% / 50mV
Power source operating as non-routing temperature sensor	2 x AA batteries
Power source operating as router	5...24 VDC
<b>Battery life (not included in delivery):</b>	
Energizer L91 Ultimate Lithium 3100 mAh:	
15 min measurement interval	9.5-15 years
60 min measurement interval	12-20 years
Energizer EN91 2800 mAh	
15 min measurement interval	6-10 years
60 min measurement interval	7.5-13 years
External power source (operating as routing temperature sensor)	5 VDC
Dimensions	80 x 85 x 30 mm
Installation	Surface installation

### Temperature and humidity sensor:

- Built-in antenna
- Sensor coverage is not impaired when the battery is low.
- 869 MHz
- Connector for outdoor temperature sensor (with a fixed cable connection to outside)
- Option to connect second temperature measurement, 0–10 V transmitter measurement or contact terminal information.

### Key factors affecting battery life:

- Sampling interval
- Ambient temperature
- Sensor placed in a weak signal (Occasionally dropped out from the network)