



# INTEL-IRRIS

Intelligent Irrigation System for Low-cost Autonomous Water Control  
in Small-scale Agriculture



# Intelligent Irrigation System for Low-cost Autonomous Water Control in Small-scale Agriculture



## The INTEL-IRRIS starter-kit user guide



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# INTEL-IRRIS starter-kit

- "Intelligent Irrigation in-the-box", "plug-&-sense"
- From idea to reality!



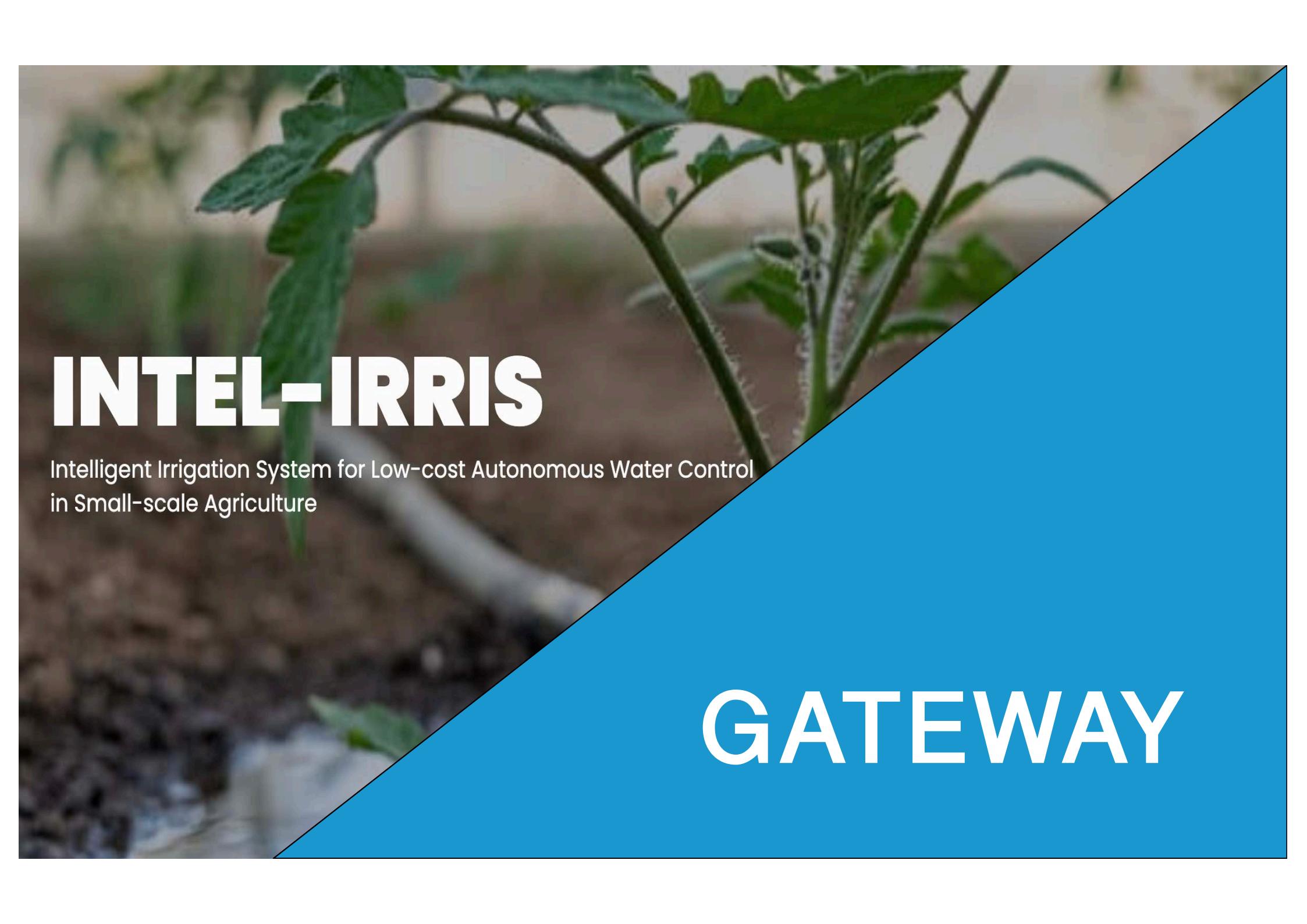
# 2 versions of the soil device



A soil temperature sensor can be added

# Installation steps for the starter-kit

- Boot and check the INTEL-IRRIS WaziGate
- Preparing soil sensor device
- Testing transmission to INTEL-IRRIS WaziGate
- **IMPORTANT**
  - 1 starter-kit = 1 soil sensor device + 1 INTEL-IRRIS WaziGate
    - device can be either with capacitive sensor or tensiometer sensor
  - 1 starter-kit per farm to be deployed and tested
  - The INTEL-IRRIS WaziGate is **pre-configured to be ready for**
    - 1 capacitive sensor & 1 tensiometer sensor (but only 1 device in starter-kit)
    - If there are need for other devices in a farm, see **advanced configuration**
- **All tutorials & videos: <https://intel-iris.eu/tutorials-slides>**

A close-up photograph of a young green plant with large, serrated leaves growing in dark brown soil. The plant has several thin stems and leaves, some with small white flowers or buds. The background is slightly blurred.

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# GATEWAY

# Installing a higher gain antenna



- The "small" antenna shipped by default with the INTEL-IRRIS gateway may be too small to provide good reception in case of large distance or many obstacles between the soil sensor device and the gateway
- You can use a higher gain antenna to be screwed in an indoor antenna base
- More information in the [antenna tests tutorial](#)



# WaziGate power consumption



RPI3B consumes less than 300mA

There can be peak up to 800mA when booting

However, a 2.5A micro USB charger is needed to avoid undervoltage

# Synching the RTC module

## Solution 1: with Internet, on boot

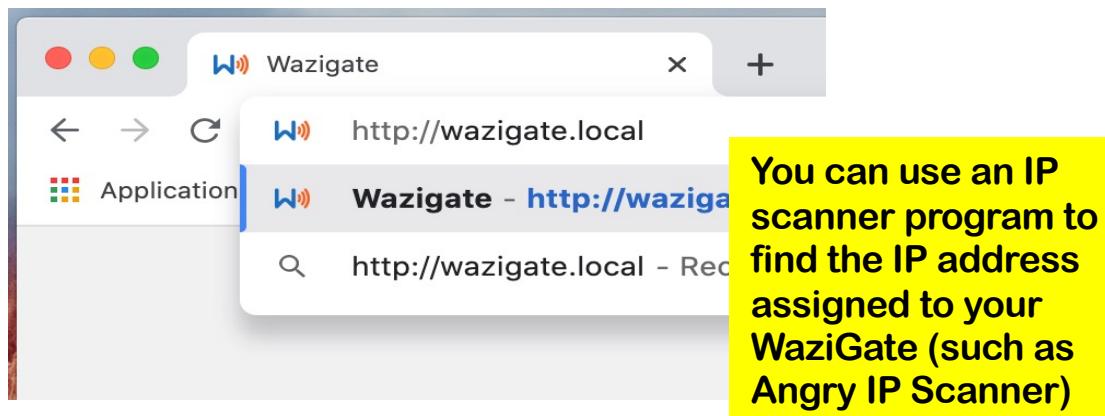
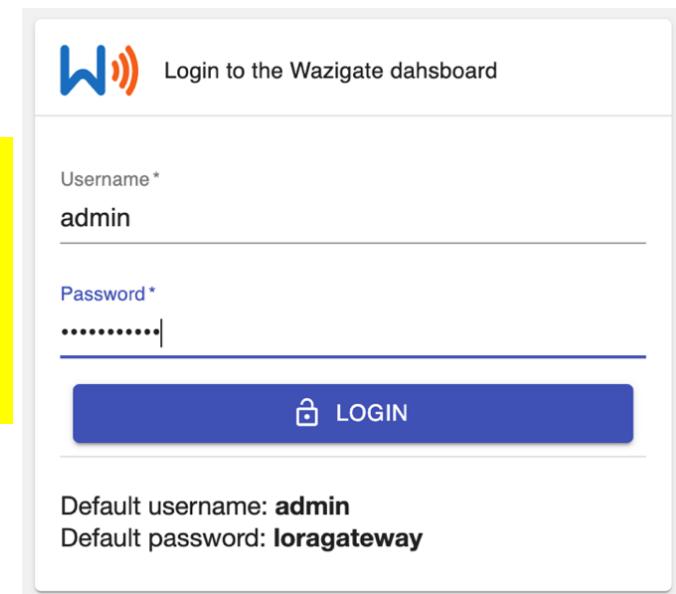
- As WaziGate will run without Internet access, its clock should be synched with an **RTC module that also needs to be synched once**
- Use your laptop that should itself be **connected to the Internet** (using your smartphone's WiFi sharing feature for instance)
- Make sure that your laptop will share its Internet connection to devices connected on its Ethernet port. See how to do so:  
<https://www.waziup.io/documentation/wazigate/v2/install/#connect-with-ethernet-cable-to-pc>
- **Before powering WaziGate, connect it to your laptop by Ethernet cable**
- Then power the WaziGate and you should see the first [Internet OK] screen. Wait until the main INTEL-IRRIS OLED screen appears
- **On boot (and only on boot), the RTC module will then be automatically synched with Internet's time & date**



# Checking the WaziGate

## Solution 1: with Ethernet cable connection

- Connect the WaziGate to your **laptop which has Internet**
- Enable Internet sharing, laptop provides IP address to WaziGate
- Power the WaziGate, wait 3-4mins for boot process
- Open web navigator. Go to <http://wazigate.local> or use IP address

Login to the Wazigate dashboard

Username \*  
admin

Password \*  
.....|

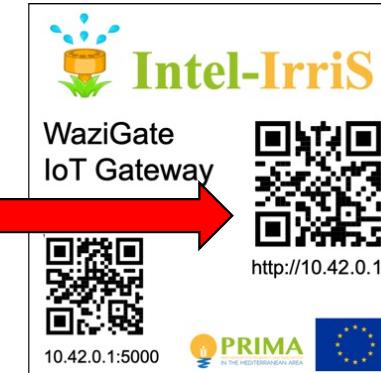
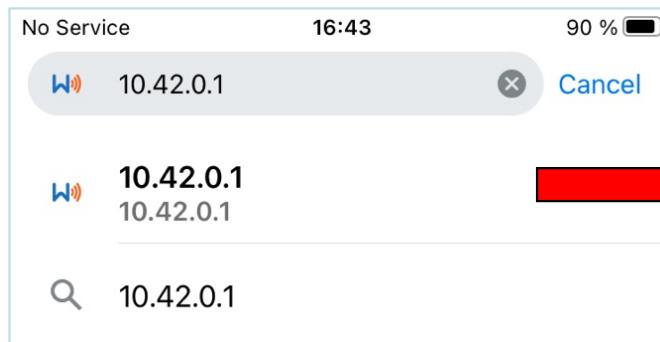
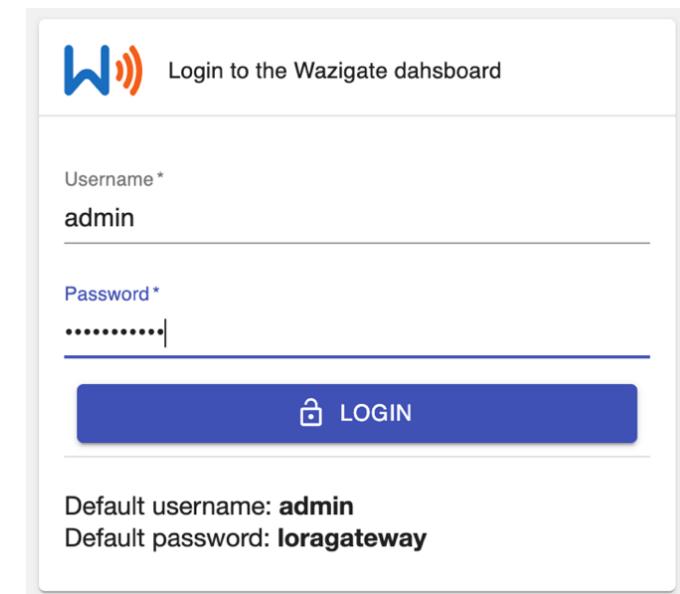
Default username: **admin**  
Default password: **loragateway**

- Use default login to connect
  - User: admin
  - Password: loragateway

# Checking the WaziGate

## Solution 2: with WiFi

- Use a smartphone/laptop to access WaziGate through WiFi
- Connect to **WAZIGATE\_XXXXXXXXXXXXXX** WiFi network
  - default WiFi password is loragateway
- Open web navigator. Go to <http://wazigate.local> or <http://10.42.0.1> or flash QR code

Login to the Wazigate dashboard

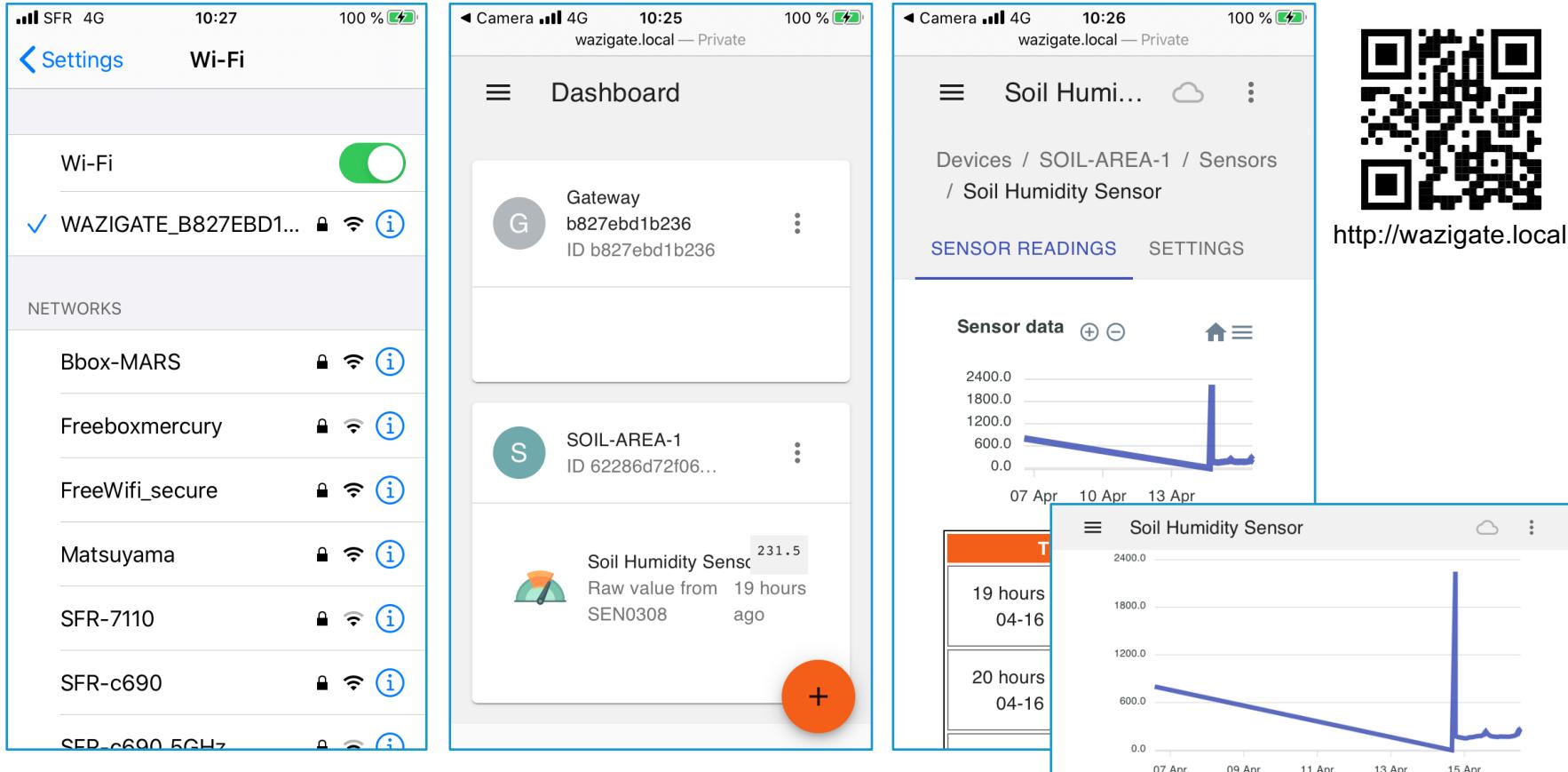
Username \*  
admin

Password \*  
.....

Default username: **admin**  
Default password: **loragateway**

- Use default login to connect
  - User: admin
  - Password: loragateway

# Dashboard from a smartphone



The figure displays three screenshots of a smartphone interface for monitoring a soil humidity sensor.

- Screenshot 1: WiFi Settings**  
 Shows the WiFi section of the device's settings. The WiFi is turned on and connected to "WAZIGATE\_B827EBD1...". Other networks listed include "Bbox-MARS", "Freeboxmercury", "FreeWifi\_secure", "Matsuyama", "SFR-7110", "SFR-c690", and "SFR\_c690\_5GHz".
- Screenshot 2: Dashboard**  
 Shows the main dashboard with two main items: "Gateway" (b827ebd1b236) and "SOIL-AREA-1" (ID 62286d72f06...). A "Soil Humidity Sensor" card shows a raw value of 231.5 from SEN0308 19 hours ago. A large orange "+" button is visible at the bottom right.
- Screenshot 3: Soil Humidity Sensor Details**  
 Shows detailed sensor readings for the "Soil Humidity Sensor". It includes a graph from April 7 to April 15, 2018, and a table of recent measurements:

Time	Value
19 hours 04-16	231.5
20 hours 04-16	231.5

Look at [Video n°4 at t=239s](#)

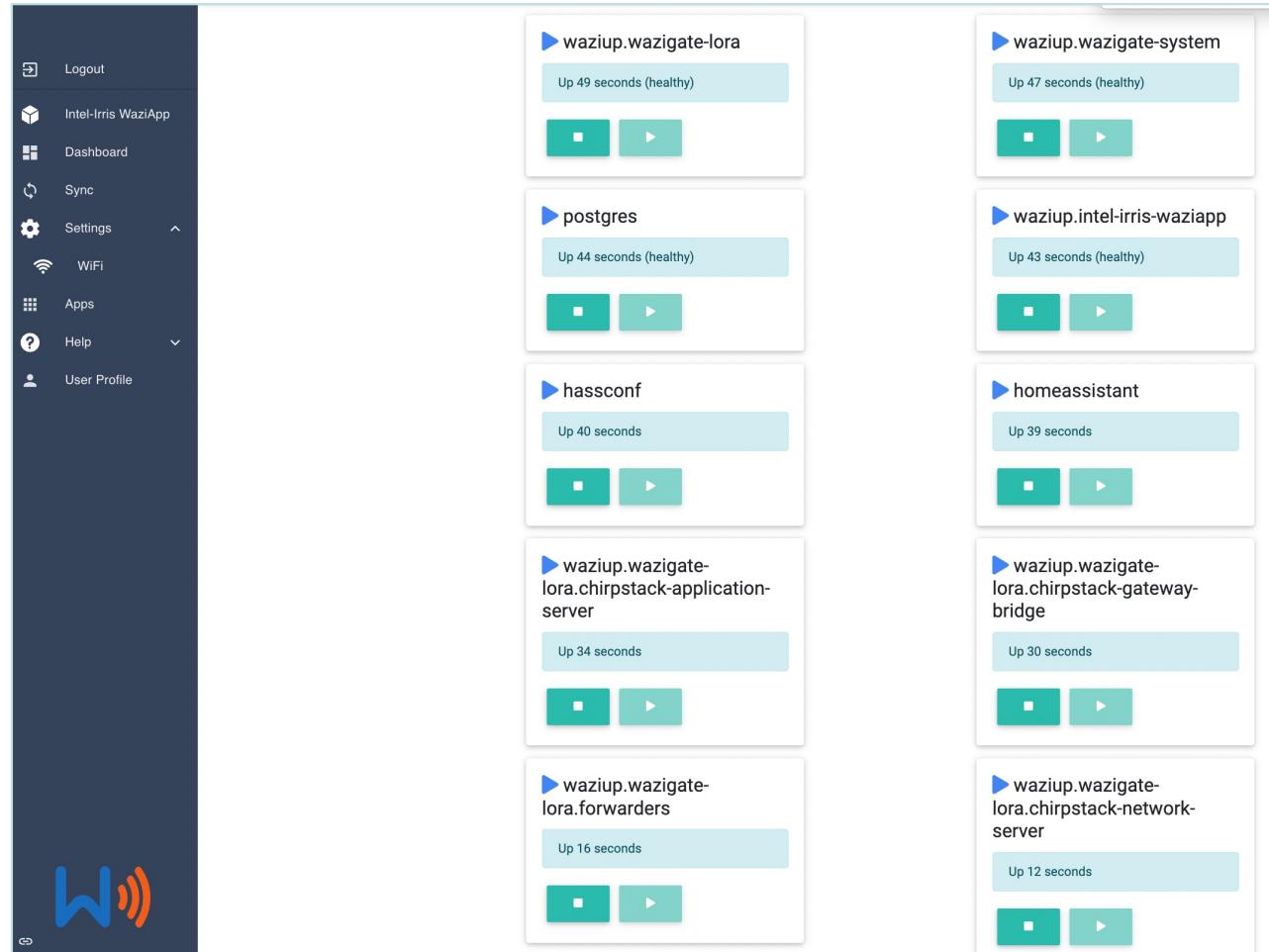
<https://youtu.be/j-1Nk0tv0xM?t=239>



<http://wazigate.local>

# Check all containers

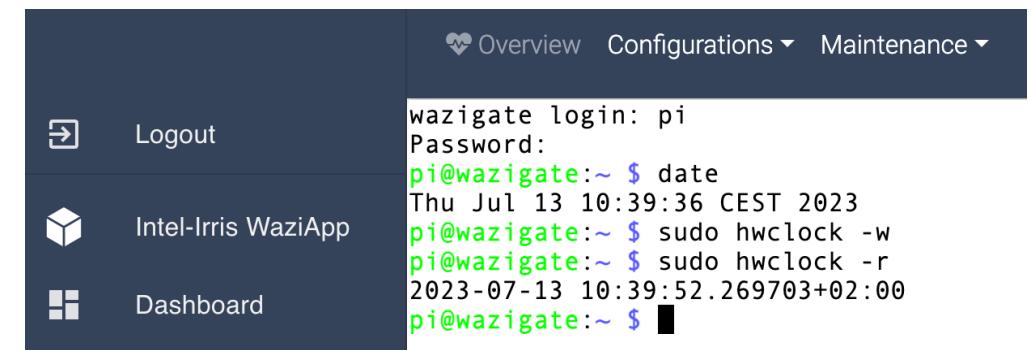
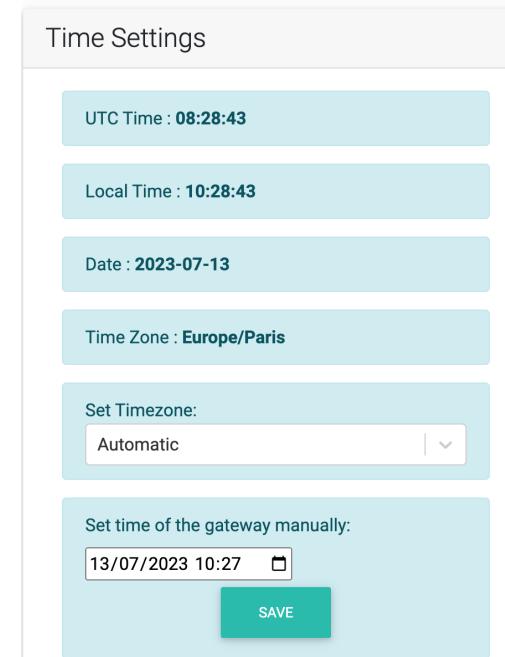
- Go in Settings/Maintenance/Containers
- Check that all containers are up and running
- Otherwise, click on the "run" icon of the faulty container



# Synching the RTC module

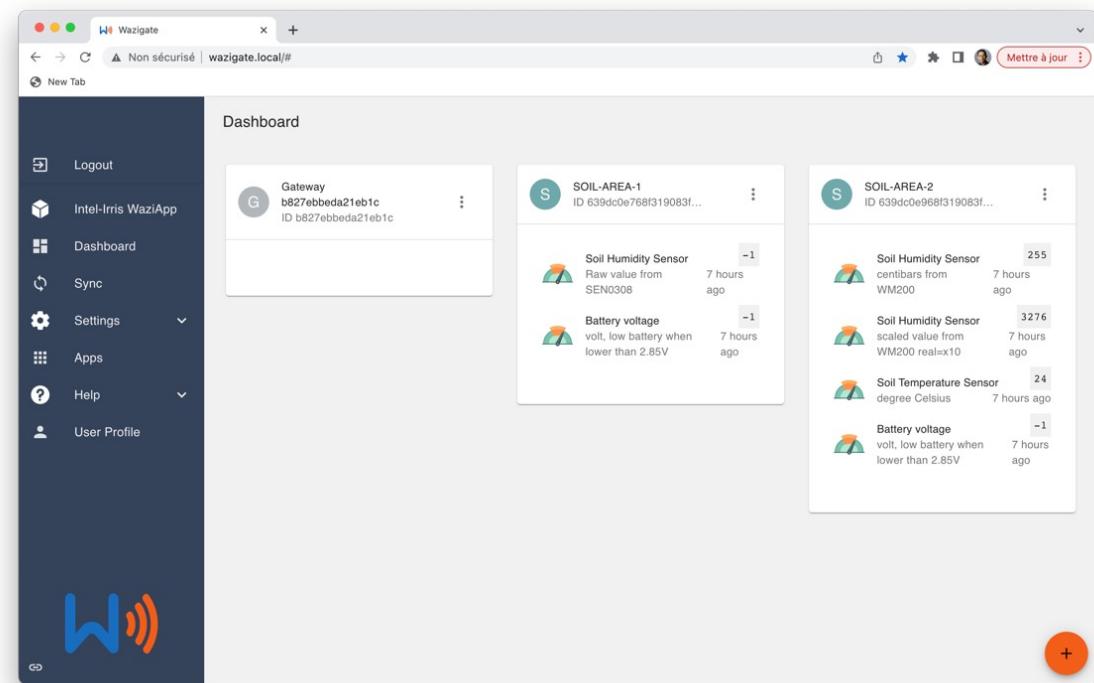
## Solution 2: without Internet, or not on boot

- It is possible to sync the RTC manually
- Go to Settings then Configuration in Configurations top menu
- Set time and date manually, then click on SAVE
- Then use the embedded SSH functionalities (in Settings/Maintenance) to log in the WaziGate (user pi/ pwd loragateway)
- Then type "date" to check if the previously date & time has been saved
- Then "sudo hwclock -w"
- Check with "sudo hwclock -r"
- **It is possible to sync other RTC modules with this method by hot plugging another RTC module**

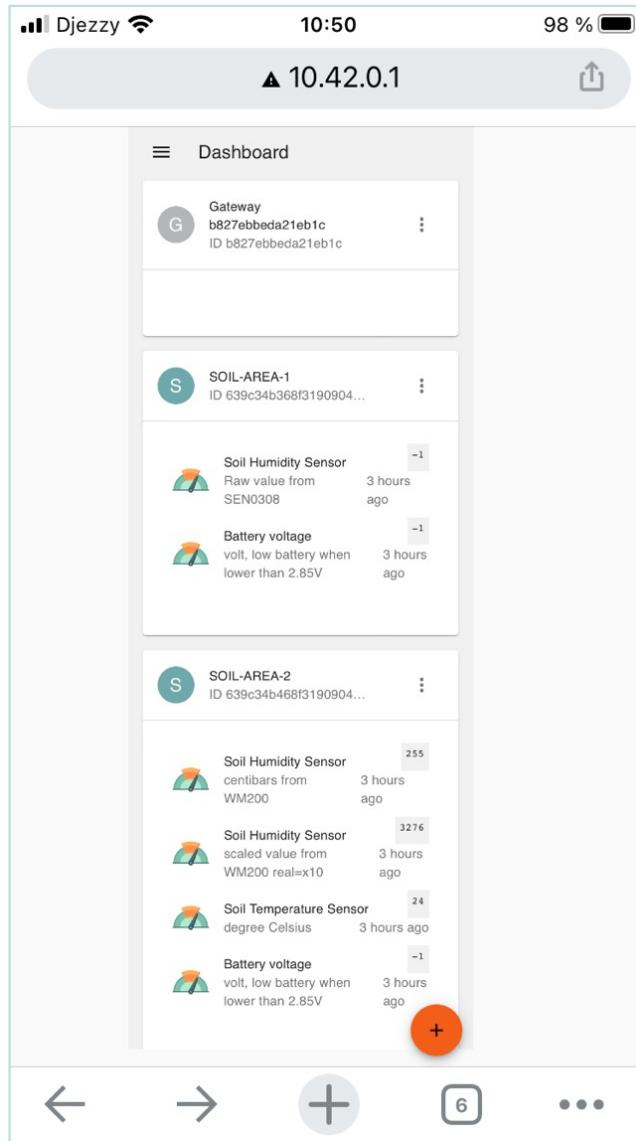
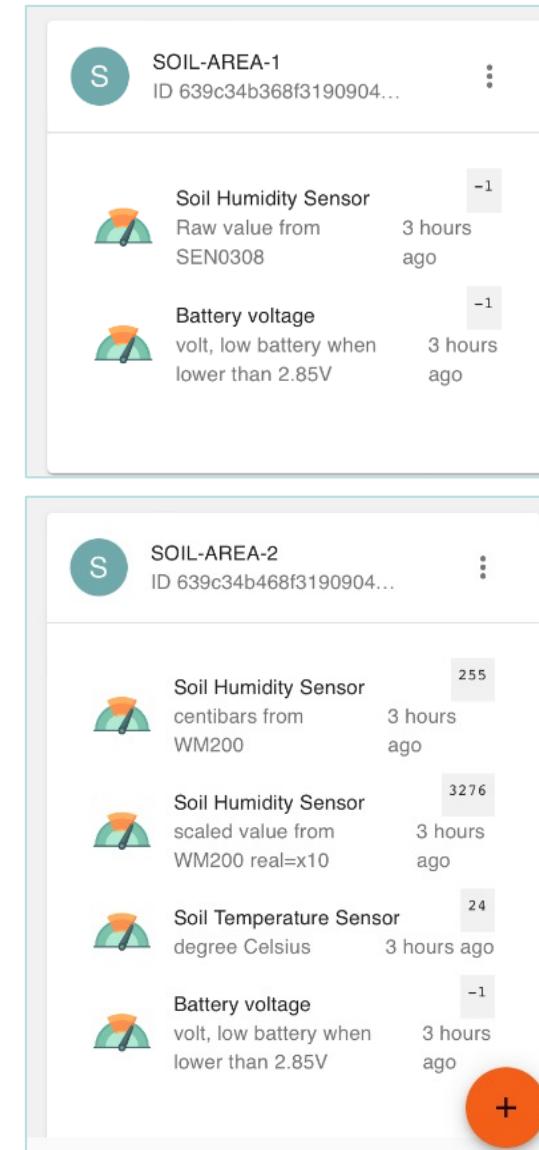


# Default WaziGate configuration (1)

- For the starter-kit, the INTEL-IRRIS WaziGate will be ready for
  - **1 capacitive sensor named SOIL-AREA-1 with address 26011DAA**
  - **1 tensiometer sensor named SOIL-AREA-2 with address 26011DB1**
- Capacitive device will show humidity and battery values
- Tensiometer device will show centibar, raw resistance, soil temperature and battery values



# Default WaziGate configuration (2)

This section shows the WaziGate mobile application interface for two different soil monitoring areas: SOIL-AREA-1 and SOIL-AREA-2.

- SOIL-AREA-1:** Displays two entries:
  - Soil Humidity Sensor: Raw value from SEN0308, value "-1", timestamp "3 hours ago".
  - Battery voltage: volt, low battery when lower than 2.85V, value "-1", timestamp "3 hours ago".
- SOIL-AREA-2:** Displays four entries:
  - Soil Humidity Sensor: centibars from WM200, value "255", timestamp "3 hours ago".
  - Soil Humidity Sensor: scaled value from WM200 real=x10, value "3276", timestamp "3 hours ago".
  - Soil Temperature Sensor: degree Celsius, value "24", timestamp "3 hours ago".
  - Battery voltage: volt, low battery when lower than 2.85V, value "-1", timestamp "3 hours ago".

Each entry includes a small sensor icon and a timestamp indicating when the data was last updated.

**Default values for the SEN0308 capacitive sensor**



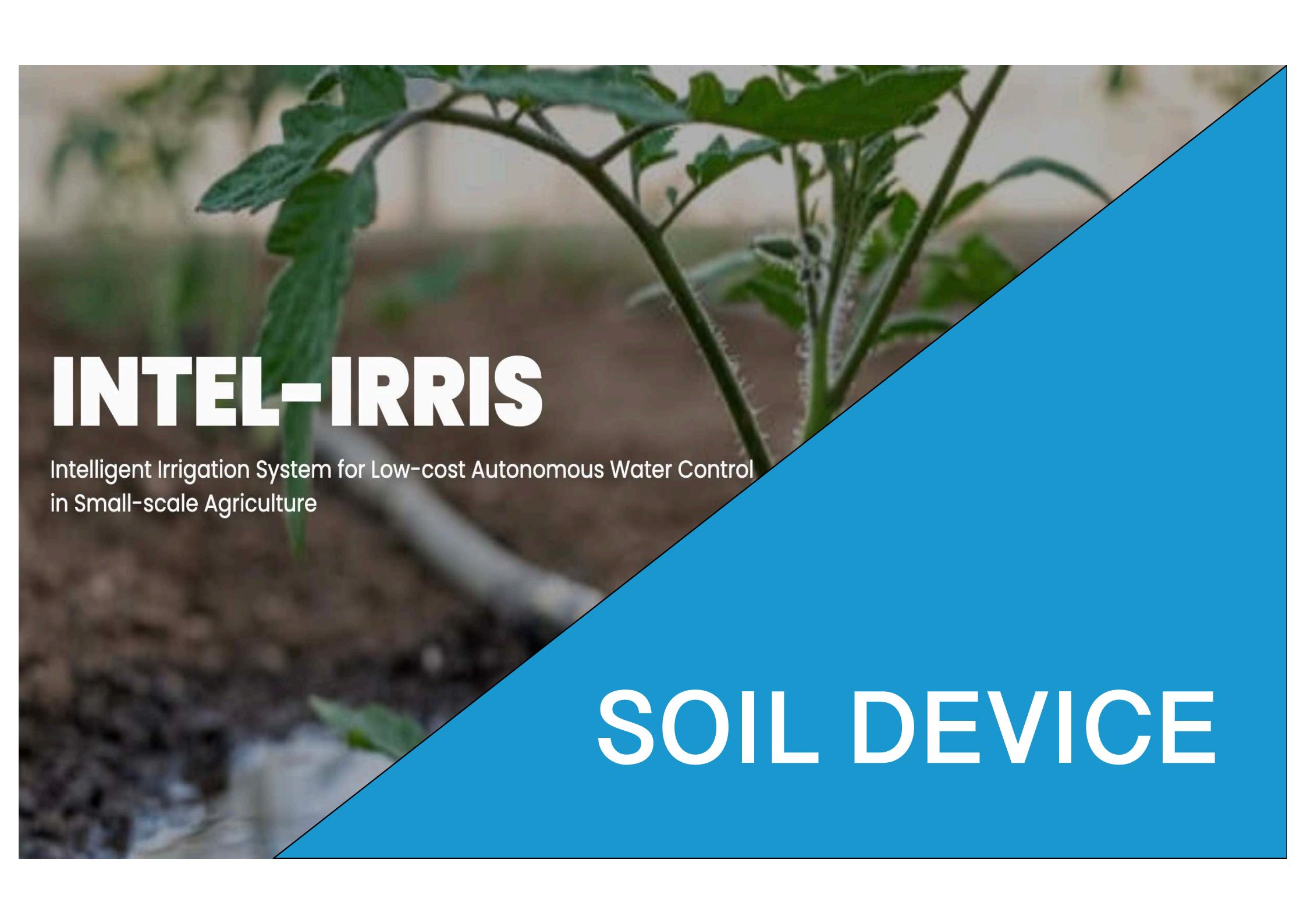
**Default values for the WM200 tensiometer sensor**



# QR code for connecting to WiFi

- The WaziGate WiFi is WAZIGATE\_XXXXXXXXXXXX where XXXXXXXXXXXX is the MAC address of the RPI
- For instance WAZIGATE\_B827EBD1B236
- With the OLED, a QR code for joining the WiFi network is dynamically generated at boot time and displayed for 10s before the main screen so that users can automatically join with a smartphone
- Then, users can scan the static QR code on the WaziGate sticker to connect to the WaziGate's dashboard or the INTEL-IRRIS IIWA App



A close-up photograph of a young green plant with serrated leaves growing in dark brown soil. The plant has a thin stem and several leaves. The background is slightly blurred.

# INTEL-IRRIS

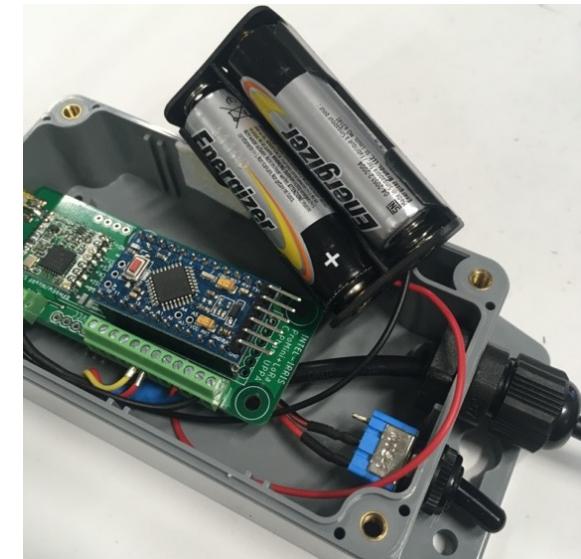
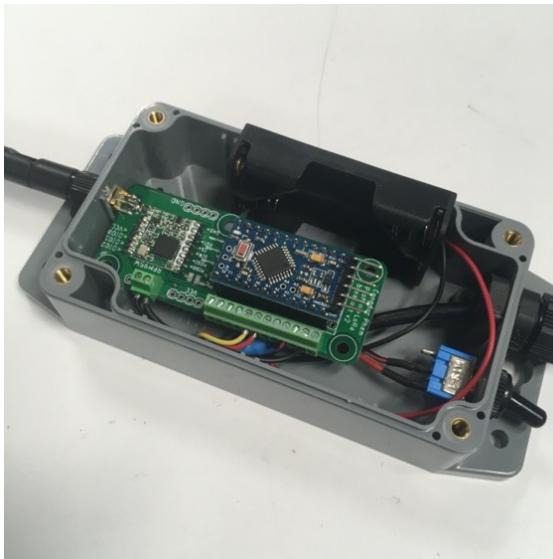
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# SOIL DEVICE

# Preparing soil sensor device

## install batteries

- Remove cover & install 2-AA batteries in battery holder
- Best way is to pull out the battery holder



- Put back cover and be sure to tighten the cover
- Procedure is the same if you need to replace the batteries



# Take good AA batteries

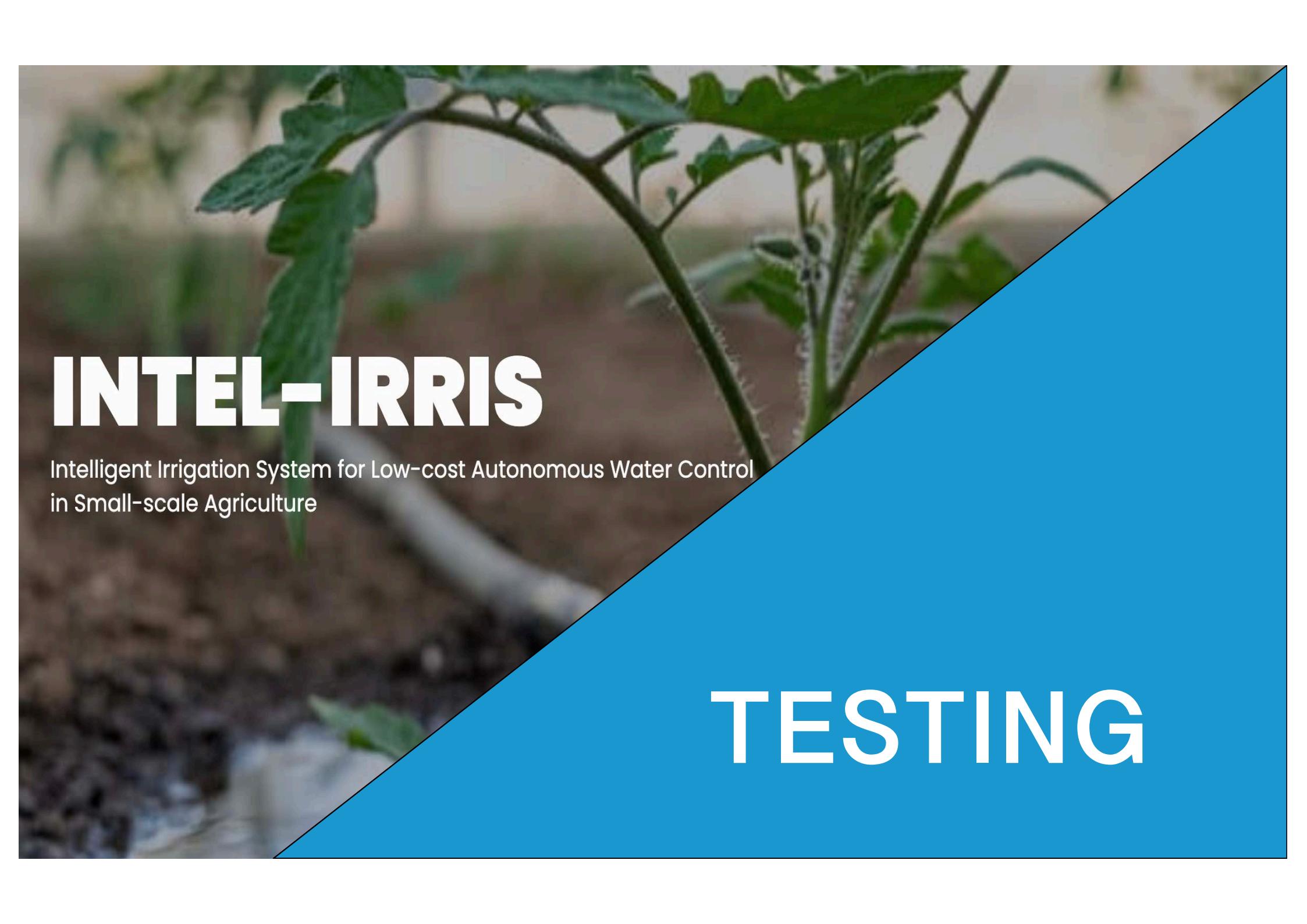
- Install new & high-grade alkaline AA batteries to allow for at least 2 years of autonomy
- Take a well-known brand





# Never transmit without antenna

- NEVER, NEVER transmit without an antenna
- Doing so can damage the radio module
- If you deploy a device, make sure that the antenna is correctly connected before powering on the device and realizing any transmission test

A close-up photograph of a young green plant with several leaves and a thin stem, growing in dark brown soil. The background is slightly blurred.

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# TESTING

# Testing transmission to WaziGate

- Test with the fully assembled & configured soil sensor device
  - Check that antenna is connected
  - Switch ON the soil sensor device to get data transmission
  - Wait for about 10s, then switch OFF the soil sensor device
  - Check reception of data on WaziGate's dashboard
  - You need to refresh the web page on the web navigator



Look at [Video n°4 at t=331s](#)  
<https://youtu.be/j-1Nk0tv0xM?t=331>

# Transmission to WaziGate



Parameters for  
INTEL-IRRIS WaziGate  
(default in red)

LoRaWAN™  
SF12BW125  
868.1MHz | **433.175MHz**  
Node id is **26011DAA**  
1 msg/60mins  
1 sensor  
XLPP data



This dedicated video will show all these steps, from connecting the SEN0308 to testing transmission to the WaziGate  
 Video n°4: <https://youtu.be/j-1Nk0tv0xM>

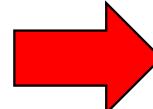


# Check data reception on OLED

YOU CAN ALSO VIEW ON DASHBOARD

Default values for the  
SEN0308 capacitive sensor

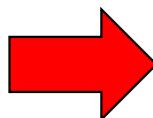
Testing with  
capacitive device



Default values for the WM200  
tensiometer sensor

VALUES ARE ONLY INDICATIVE

Testing with  
tensiometer device

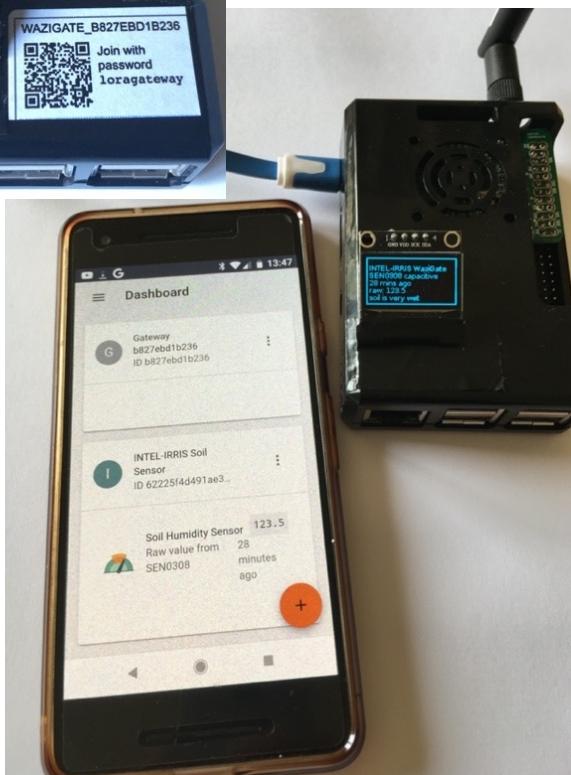
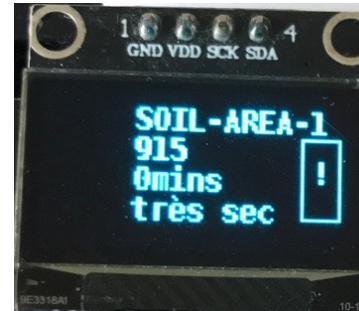


# Soil sensor information on OLED

- The OLED displays the latest received sensor data for the end-user: the device name, the time of last received data, the sensor raw value and the soil condition
- The main screen is displayed for 6s every 30s. Then a screen saver display will show a shorter version of these information with a 5-bar visual
- 5 bars: saturated | 4 bars: wet
- 3 bars: wet | 2 bars: dry
- 1 bar: dry | 0 bar: very dry



# Summary of INTEL-IRRIS WaziGate various User Interfaces



 **Intel-Irris**

## Intel-Irris Irrigation WaziApp (IIWA)

**SOIL-AREA-1**

Soil condition : wet capacitive

Value : 123






**SOIL-AREA-2**

Soil condition : saturated tensiometer\_cbar

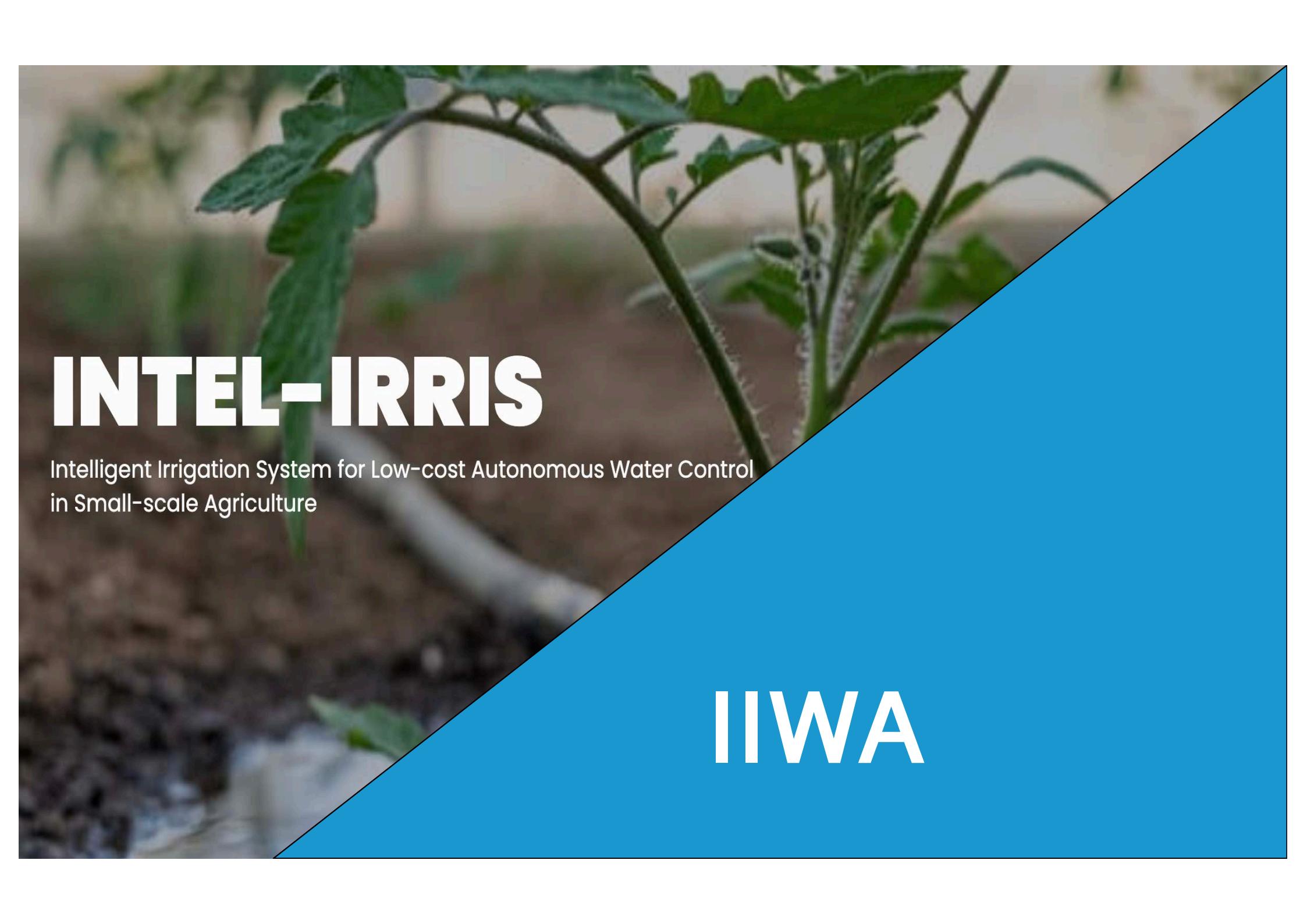
Value : 5






# Deploying the starter-kit

- Install the soil sensor device in the field
  - See dedicated slides/videos [to come]
- Install the INTEL-IRRIS WaziGate in the farmer's office/home
  - Just power the WaziGate, no Internet is required
  - Test access to WaziGate's dashboard with farmer's smartphone
- **NEVER TRANSMIT WITHOUT AN ANTENNA**
- Test correct data reception on INTEL-IRRIS WaziGate
  - Switch ON the soil sensor device to get data transmission
  - Check reception of data on WaziGate's dashboard or OLED screen

A close-up photograph of a young green plant with several leaves. In the background, a white, ribbed irrigation tube lies on the dark brown soil. The top right corner of the slide features a solid blue diagonal band.

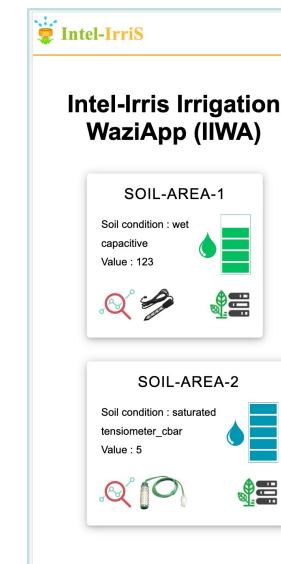
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IIWA

# INTEL-IRRIS Irrigation WaziApp

- The INTEL-IRRIS Irrigation WaziApp (IIWA) is an embedded application running on the INTEL-IRRIS WaziGate itself
- It is included in the starter-kit to implement the "**intelligent Irrigation in-the-box**" & "**plug-&-sense**" approach
- Its objective is to enhance the irrigation indication by applying sensor calibration models with soil/plant/weather parameters



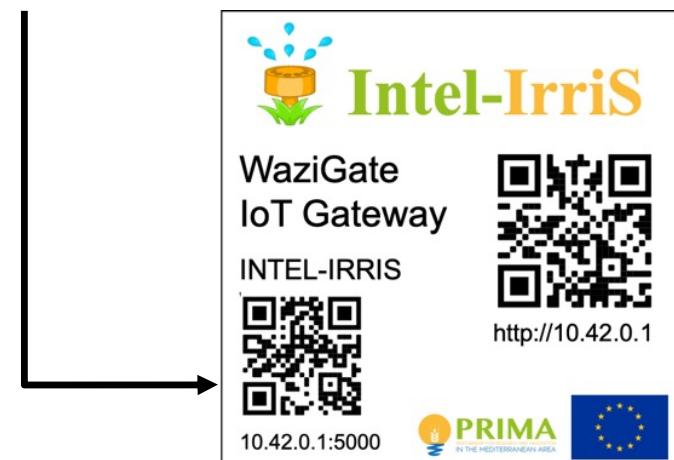
# Connect to IIWA

- First, connect to INTEL-IRRIS WaziGate WiFi which should look like WAZIGATE\_XXXXXXXXXXXX
  - Password is loragateway
- Otherwise, with the OLED screen, a QR code for automatically joining the WiFi network is periodically displayed for 10s
  - scan the displayed QR code with a smartphone to connect to WaziGate's WiFi
- Then, scan the static QR code on the WaziGate sticker to connect to the INTEL-IRRIS Irrigation WaziApp on : <http://10.42.0.1:5000>



EXAMPLE:

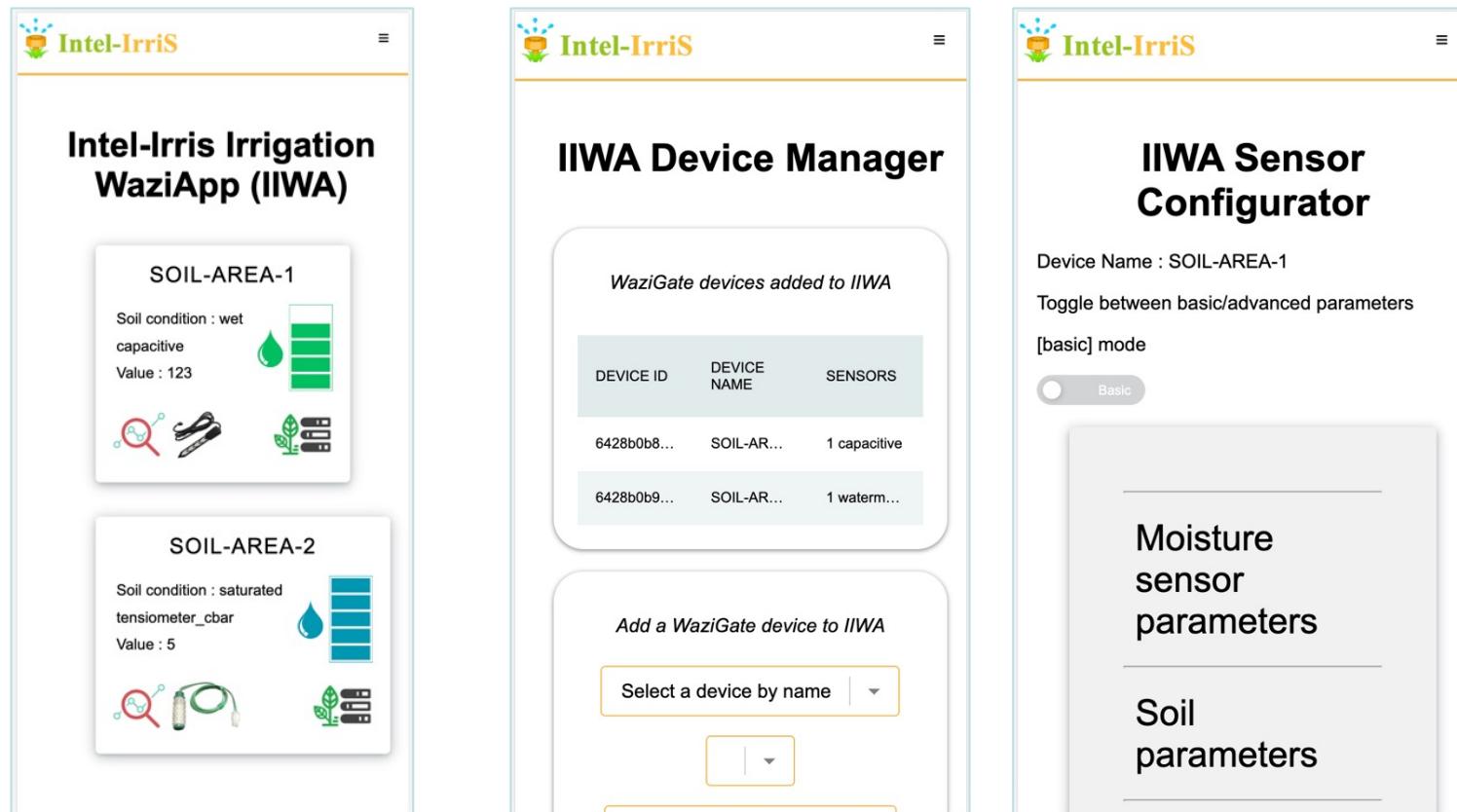
WAZIGATE\_DCA6325C2A7A



# Get the IIWA presentation slides

- Part 4: the INTEL-IRRIS Irrigation WaziApp

- Tutorial slides on the INTEL-IRRIS Irrigation WaziApp



The image displays three screenshots of the Intel-Irris Irrigation WaziApp (IIWA) interface, showing different features of the system:

- Intel-Irris Irrigation WaziApp (IIWA)**: This screen shows two soil monitoring areas.   
  - SOIL-AREA-1**: Soil condition: wet, capacitive; Value: 123. It includes icons for a magnifying glass, a pair of shears, and a plant.
  - SOIL-AREA-2**: Soil condition: saturated, tensiometer\_cbar; Value: 5. It includes icons for a magnifying glass, a tensiometer probe, and a plant.
- IIWA Device Manager**: This screen lists WaziGate devices added to IIWA.   

DEVICE ID	DEVICE NAME	SENSORS
6428b0b8...	SOIL-AR...	1 capacitive
6428b0b9...	SOIL-AR...	1 waterm...

Below this, there is a section to "Add a WaziGate device to IIWA" with a dropdown menu labeled "Select a device by name".
- IIWA Sensor Configurator**: This screen is for configuring sensors.   

Device Name : SOIL-AREA-1  
 Toggle between basic/advanced parameters  
 [basic] mode

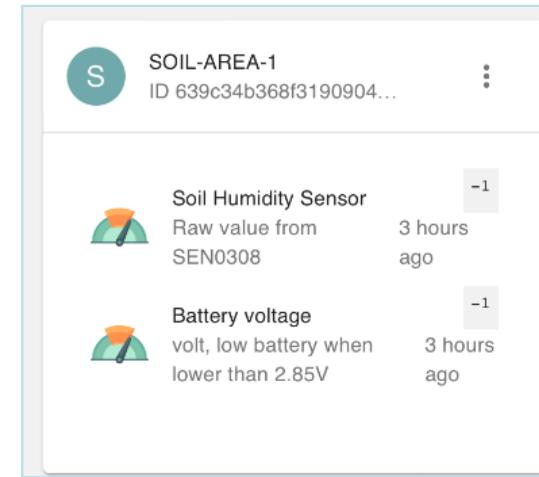
Basic

**Moisture sensor parameters**

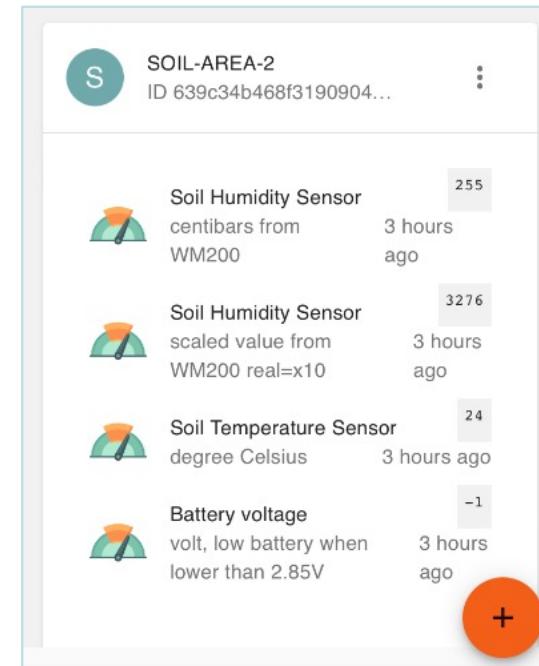
**Soil parameters**

# Default WaziGate configuration & IIWA

- For the starter-kit, the INTEL-IRRIS WaziGate will be ready for
  - 1 capacitive sensor named SOIL-AREA-1 with address 26011DAA
  - 1 tensiometer sensor named SOIL-AREA-2 with address 26011DB1
- IIWA default configuration
  - Both SOIL-AREA-1 & SOIL-AREA-2 are added to IIWA
  - Soil condition will be determined for both devices, if relevant data are received



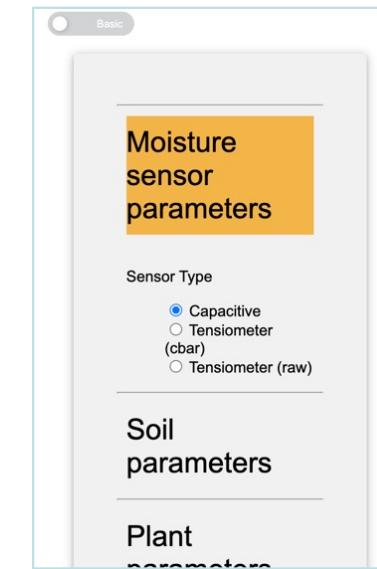
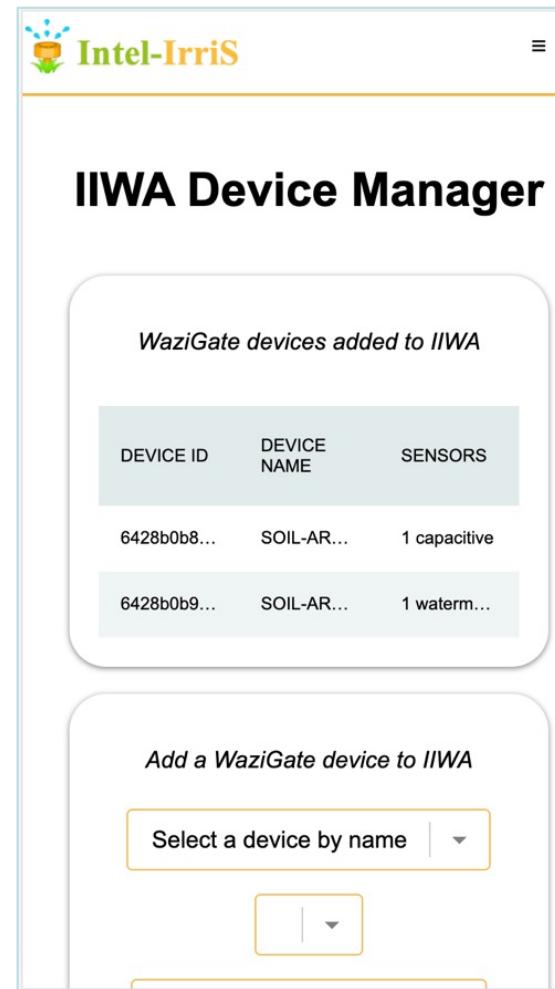
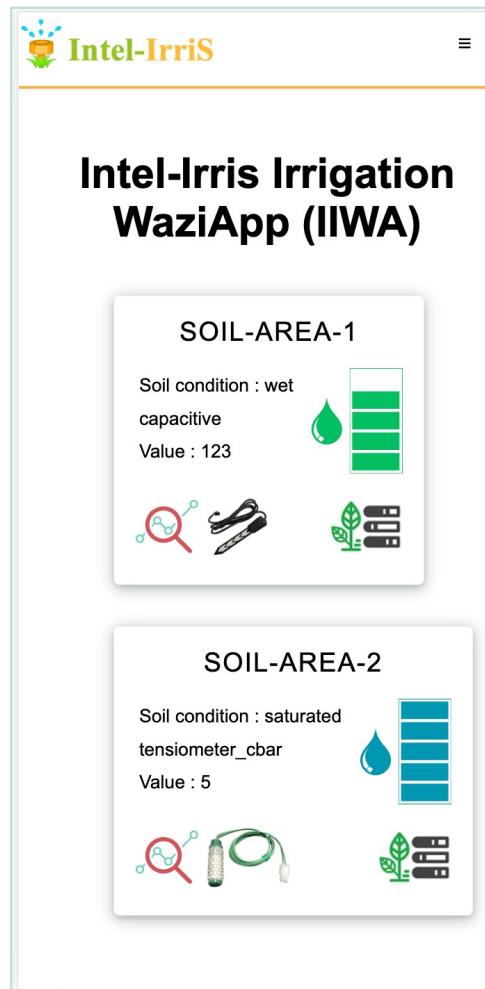
Default values for the SEN0308 capacitive sensor



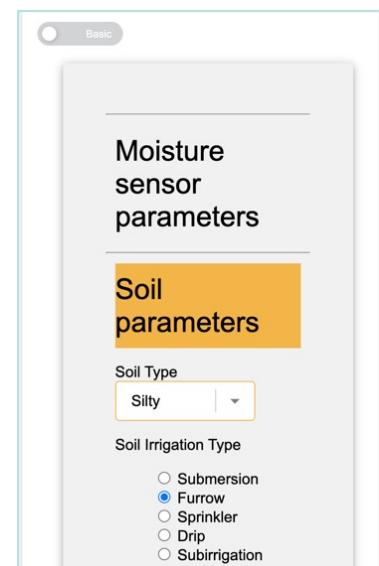
Default values for the WM200 tensiometer sensor



# Default IIWA screens & configuration



**It is OK to use  
the IIWA default  
configuration**





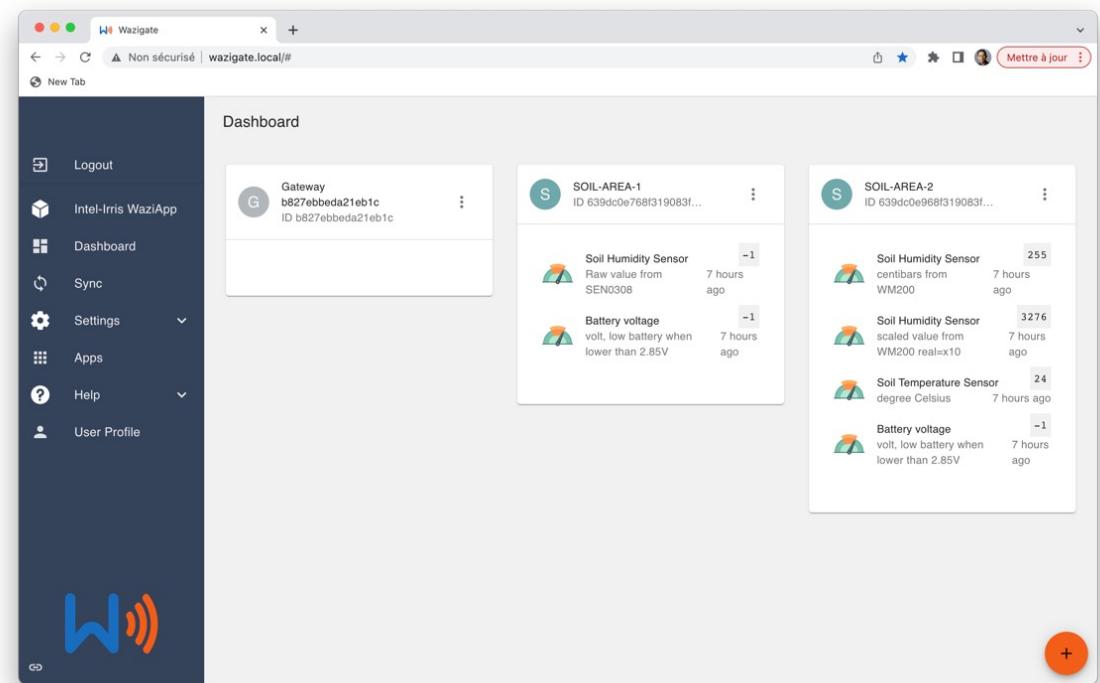
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# PRE- CONFIGURATION

# Default WaziGate configuration

- For the starter-kit, the INTEL-IRRIS WaziGate will be ready for
  - **1 capacitive sensor named SOIL-AREA-1 with address 26011DAA**
  - **1 tensiometer sensor named SOIL-AREA-2 with address 26011DB1**
- Capacitive device will show humidity and battery values
- Tensiometer device will show centibar, raw resistance, soil temperature and battery values

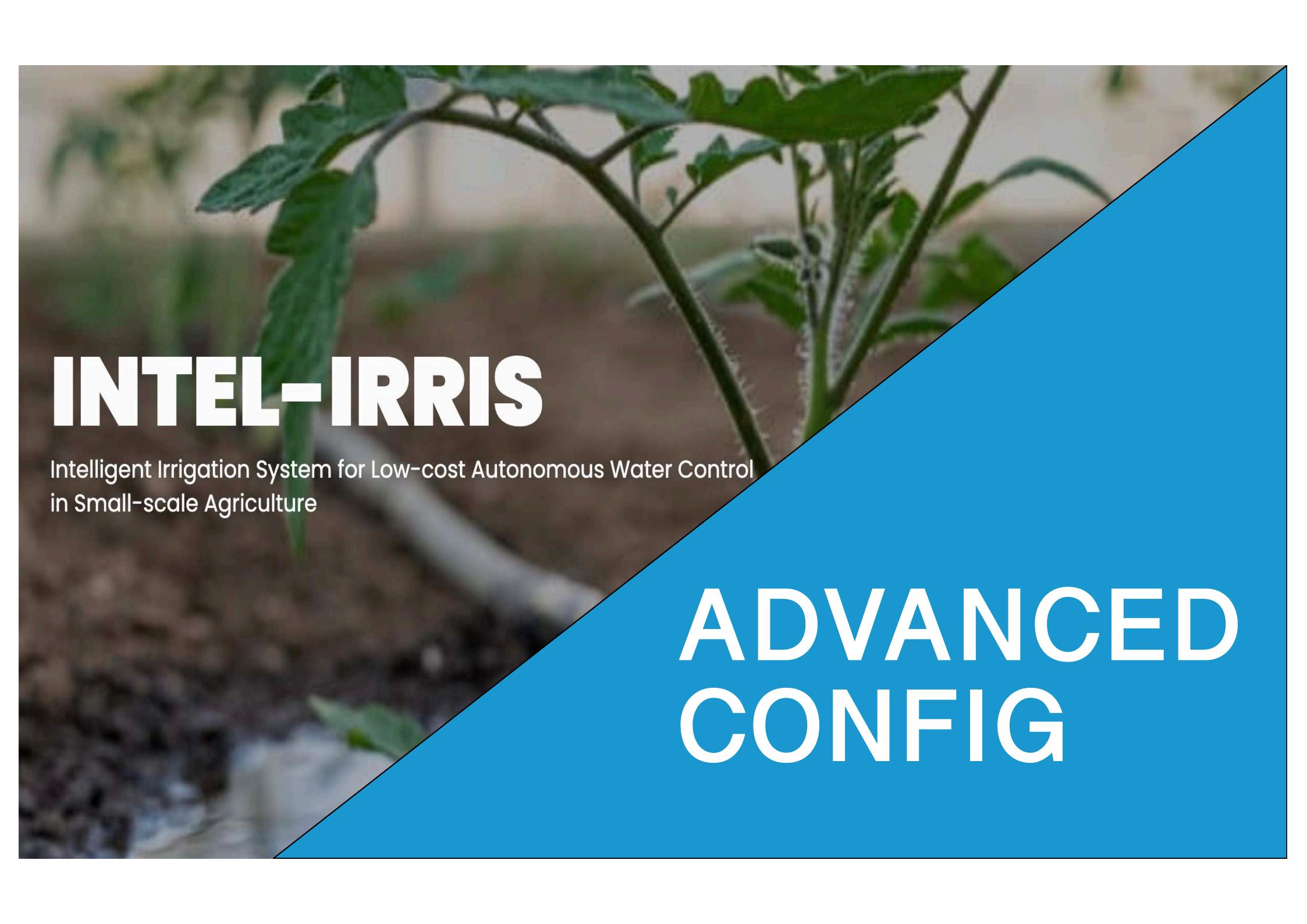


# Other configuration

- Your iNTEL-IRRIS WaziGate may be already pre-configured for a specific setting
  - A number C of capacitives devices
  - A number T of tensiometer devices
- The general rule is as follows
  - Name of devices are SOIL-AREA-X
    - X increasing from 1 to C+T
    - Capacitive devices are listed first, then tensiometer devices
      - SOIL-AREA-1, ..., SOIL-AREA-C: for the C capacitive sensors
      - SOIL-AREA-[C+1], ..., SOIL-AREA-[C+T]: for the T tensiometer sensors
  - Capacitive devices have addresses in the form
    - 26011D**AA**, 26011D**AB**, 26011D**AC**, ...
  - Tensiometer devices have addresses in the form
    - 26011D**B1**, 26011D**B2**, 26011D**B3**, ...

# Ex: 1 capacitive & 3 tensiometer

- SOIL-AREA-1
  - Capacitive, address is 26011D**AA**
- SOIL-AREA-2
  - Tensiometer, address is 26011D**B1**
- SOIL-AREA-3
  - Tensiometer, address is 26011D**B2**
- SOIL-AREA-4
  - Tensiometer, address is 26011D**B3**



# INTEL-IRRIS

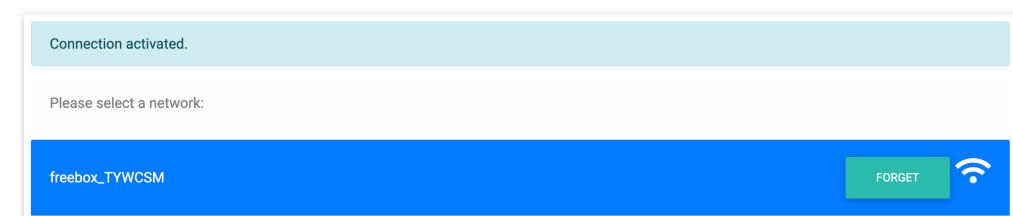
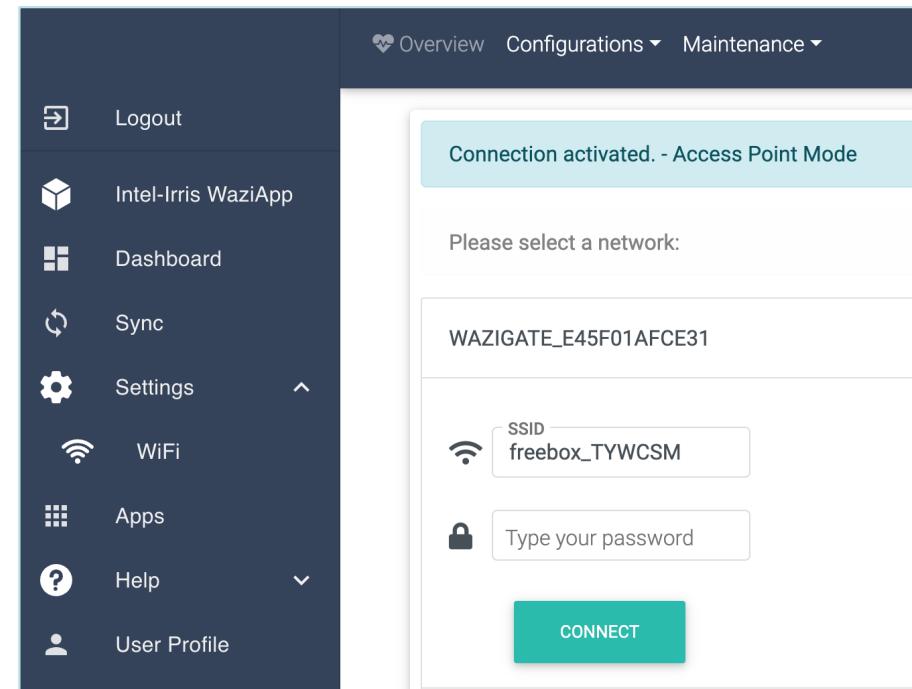
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## ADVANCED CONFIG

# Advanced configuration

## connect WaziGate to a WiFi network

- By default, the WaziGate acts as a WiFi Access Point
- To connect the WaziGate to a WiFi network, go to Setting/WiFi to list all available WiFi networks
- Then select the one you want in order to provide the WiFi password
- Ex: connect to freebox\_TYWCSM
- Once connected, WaziGate is in WiFi Client mode



# Advanced configuration

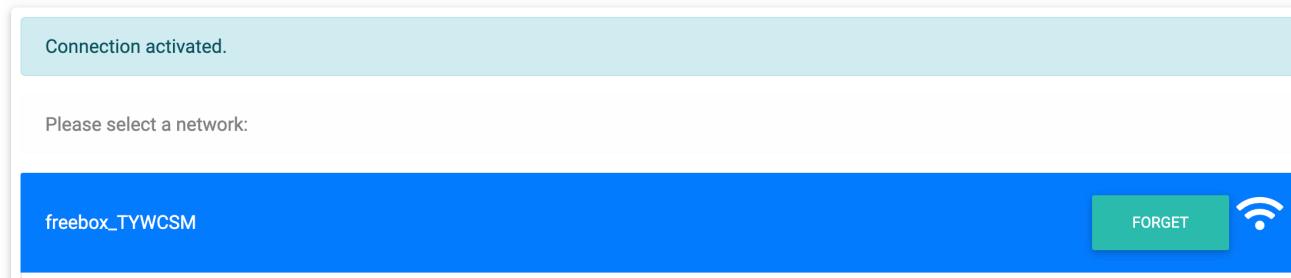
## connect WaziGate to a WiFi network, con't

- You can connect to several WiFi networks, one after another, to have a list of known WiFi networks
- They will be memorized and if the current WiFi network is not available, another available network in the list of known WiFi networks will be selected
- If there are no available WiFi networks in the list of known WiFi networks anymore, then the WaziGate switches back to Access Point mode

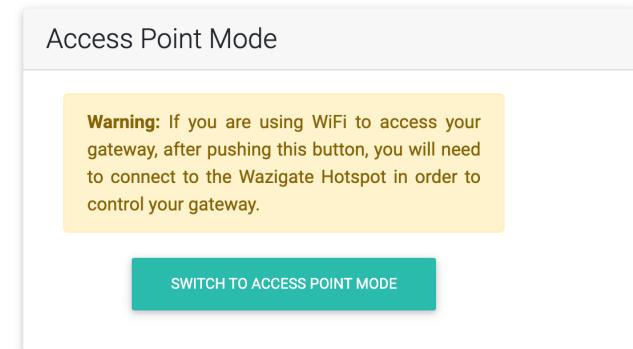
# Advanced configuration

## switch WaziGate back to WiFi access point mode

- To get back to Access Point mode, go to Setting/WiFi and simply click on "Forget" for the current WiFi network



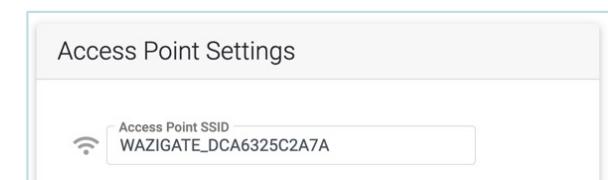
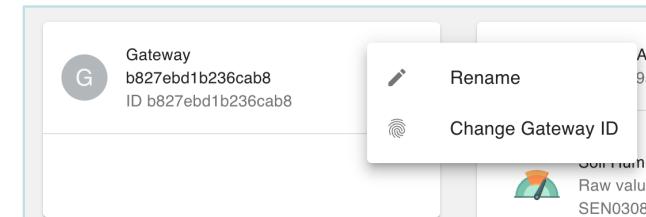
- If you previously added several WiFi networks, click on "Forget" for **ALL** known & memorized WiFi networks
- **DO NOT USE** the "SWITCH TO ACCESS POINT MODE" option
- **IT IS NOT STABLE!**



# Advanced configuration

## sync WaziGate and its devices to the cloud

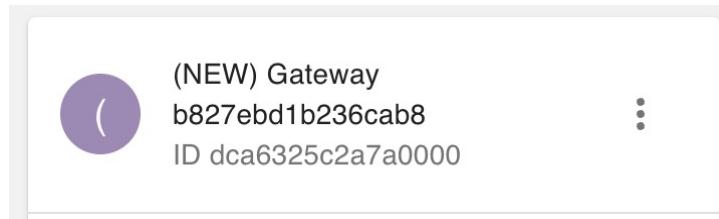
- To sync your WaziGate to the Waziup Cloud, look at this tutorial
  - <https://www.waziup.io/documentation/wazigate/v2/install/#registration-with-the-cloud>
- You will need an account on Waziup Cloud dashboard
  - If you don't have one, you need to create one first
  - <https://dashboard.waziup.io/>
- Then, you NEED to change your gateway id
  - Use the unique MAC address of your gateway that appears in Settings/Configuration (it is used as your gateway's WiFi hotspot)
  - Here: DCA6325C2A7A
  - Add 0000 at the end to have 16 digits
  - -> DCA6325C2A7A0000



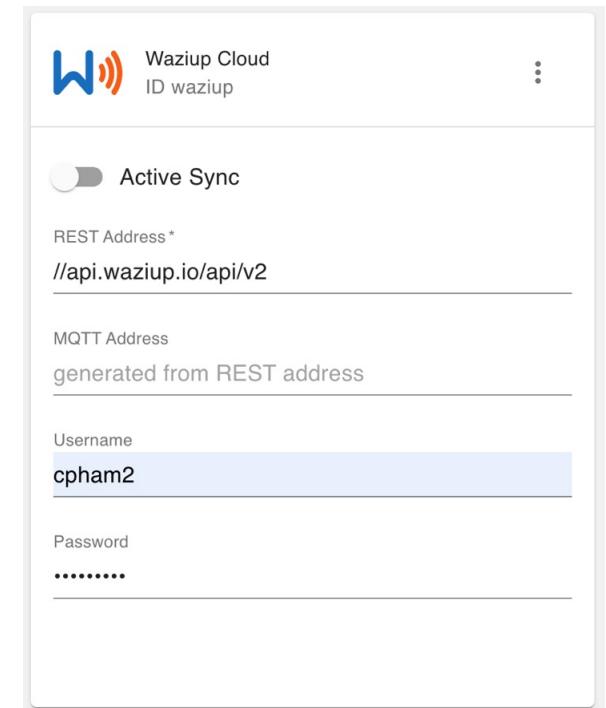
# Advanced configuration

sync WaziGate and its devices to the cloud, con't

- You should have a new gateway on your dashboard with the new ID



- Enter your Waziup Cloud credentials in the Sync menu
- Then, just activate sync on your WaziGate which needs to be connected to Internet
- Log in the Waziup Cloud dashboard and check that you see your gateway and your device
- You can activate/deactivate synchronization at anytime



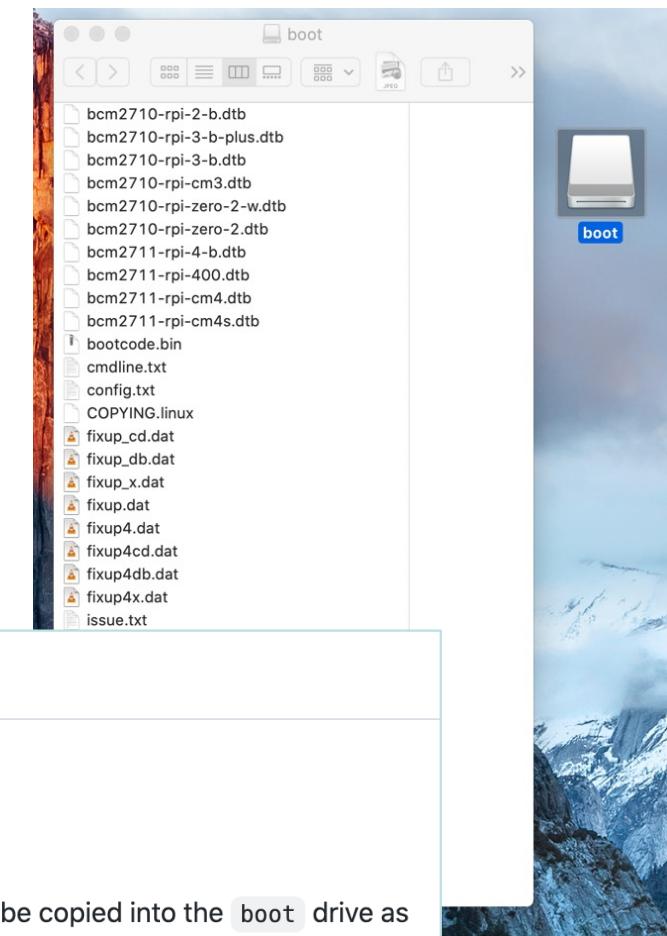
# Advanced configuration

## use 868MHz frequency band

- The default SD card image uses EU433 frequency band
- To set to 868MHz, read carefully & use the auto-configuration mechanism
  - <https://github.com/CongducPham/PRIMA-Intel-Irris/tree/main/Gateway/boot#auto-configuration-on-boot-for-the-intel-irris-wazigate>

### Example 1: set INTEL-IRRIS WaziGate in 868MHz version

- flash the INTEL-IRRIS WaziGate SD card image
- insert the SD card in any computer (Windows, Linux, MacOS)
- open the `boot` drive that should appear on your computer
- download from INTEL-IRRIS GitHub ( `Gateway/boot` ) `intel-irris-band-868.txt` to be copied into the `boot` drive as `intel-irris-band.txt`
- be sure that there is no `intel-irris-auto-config.done` file in the `boot` drive, otherwise delete the file
- safely eject the `boot` drive
- insert the SD card in the RPI and power the RPI



**ex 1:** have several capacitive soil sensor devices

- Only to have several capacitive soil devices on 1 Wazigate – change the device address in the soil device Arduino code

```
Intelirris_Soil_Sensor | Arduino 1.8.13

Intelirris_Soil_Sensor DS18B20.cpp DS18B20.h RadioSettings.h SK128X_RadioSettings.h SK127X_RadioSettings.h SK128X_RadioSettings.h
181 //*****
182 //-----[----]----[----]----[----]
183 //-----[----]----[----]----[----]
184 //-----[----]----[----]----[----]
185 //-----[----]----[----]----[----]
186 ****
187
188 /////////////////
189 // LORAWAN OR EXTENDED DEVICE ADDRESS FOR LORAWAN CLOUD
190 #if defined LORAWAN || defined EXTDEVADDR
191 //////////////////
192 //ENTER HERE your Device Address from the TTN device info (same order, i.e. msb). Example for 0x12345678
193 //unsigned char DevAddr[4] = { 0x12, 0x34, 0x56, 0x78 };
194 //////////////////
195
196 #if defined WITH_WATERMARK && !defined WMLAS_PRIMARY_SENSOR
197 //Watermark soil sensor device has a different address from the default address 26011DAA
198 //26011DB1
199 //if you need another address for tensiometer sensor device, use B1, B2, B3,..., BF
200 unsigned char DevAddr[4] = {0x26, 0x01, 0x1D, 0xAA};
201 #else
202 //default device address for WaziGate configuration, mainly for SEN0308 capacitive soil sensor device
203 //26011DAA
204 //if you need another address for capacitive sensor device, use AA, AB, AC,..., AF
205 unsigned char DevAddr[4] = {0x26, 0x01, 0x1D, 0xAA};
206 #endif
207
208 #else
209 //////////////////
210 // DO NOT CHANGE HERE
211 unsigned char DevAddr[4] = { 0x00, 0x00, 0x00, node_addr };
212 //////////////////
213 #endif
214
215 ///////////////
216
```

**Default address for capacitive sensor is**

```
{ 0x26, 0x01, 0x1D, 0xAA };
```

**Just increase the last byte**

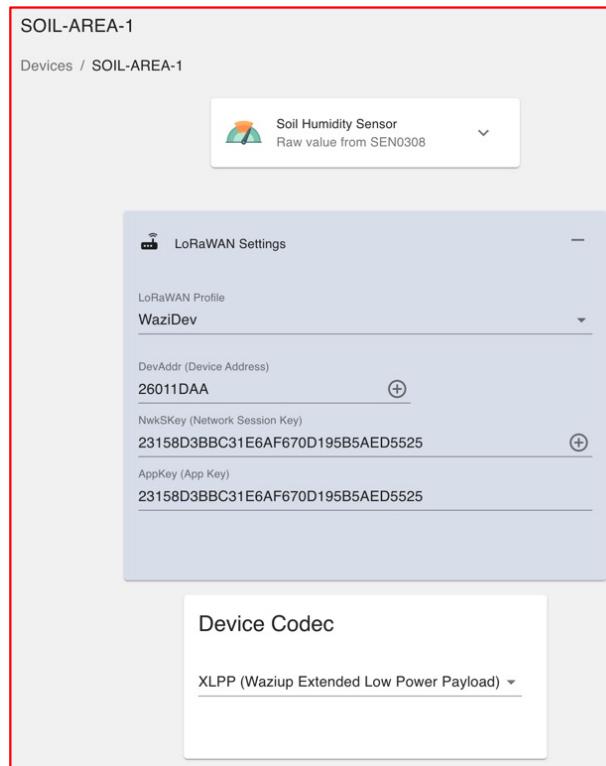
```
{ 0x26, 0x01, 0x1D, 0xAB };
```

**Compile and upload the code to the additional soil sensor device**

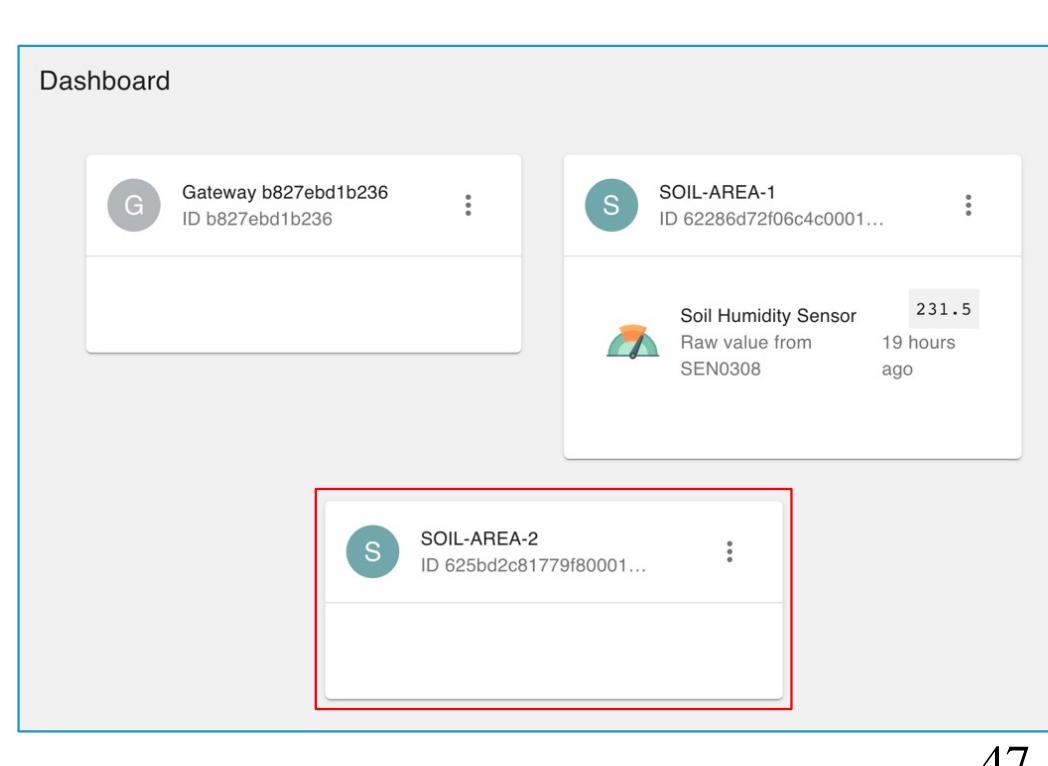
# Advanced configuration

ex 1: have several capacitive soil sensor devices, con't

- Left figure shows WaziGate config with 1 soil sensor device
- Create a new device, e.g. device name SOIL-AREA-2
- Avoid space, limit to 12 characters for correct display on OLED



The screenshot shows the WaziGate configuration interface for a device named "SOIL-AREA-1". It includes sections for "LoRaWAN Settings" (with fields for DevAddr, NwkKey, and AppKey), "Device Codec" (set to XLPP), and a summary card for a "Soil Humidity Sensor" from "SEN0308".



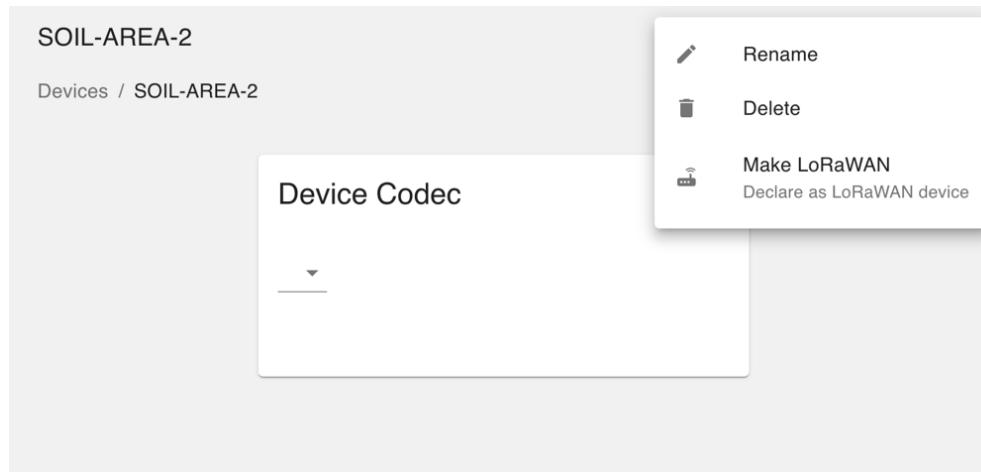
The screenshot shows the WaziGate dashboard with three entries: a gateway and two soil sensor devices. The second device, "SOIL-AREA-2", is highlighted with a red box.

Device Type	Device ID	Sensor Type	Value	Last Update
Gateway	b827ebd1b236			
SOIL-AREA-1	62286d72f06c4c0001...	Soil Humidity Sensor	231.5	19 hours ago
SOIL-AREA-2	625bd2c81779f80001...	Soil Humidity Sensor	231.5	19 hours ago

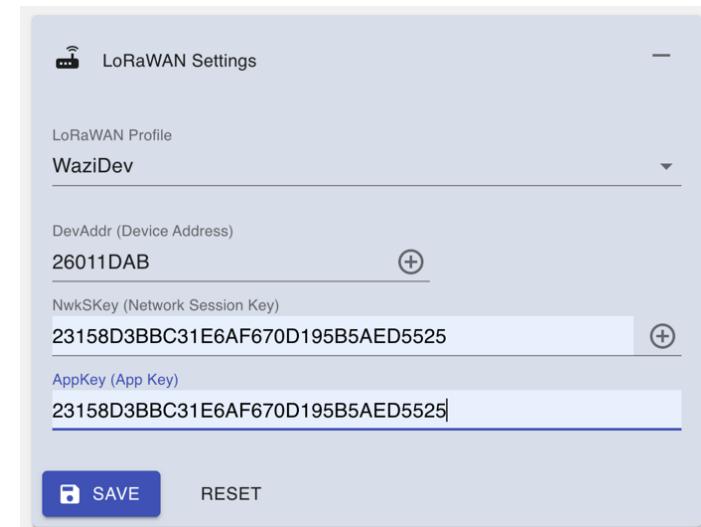
# Advanced configuration

ex 1: have several capacitive soil sensor devices, con't

- Select the new device and make it as LoRaWAN device



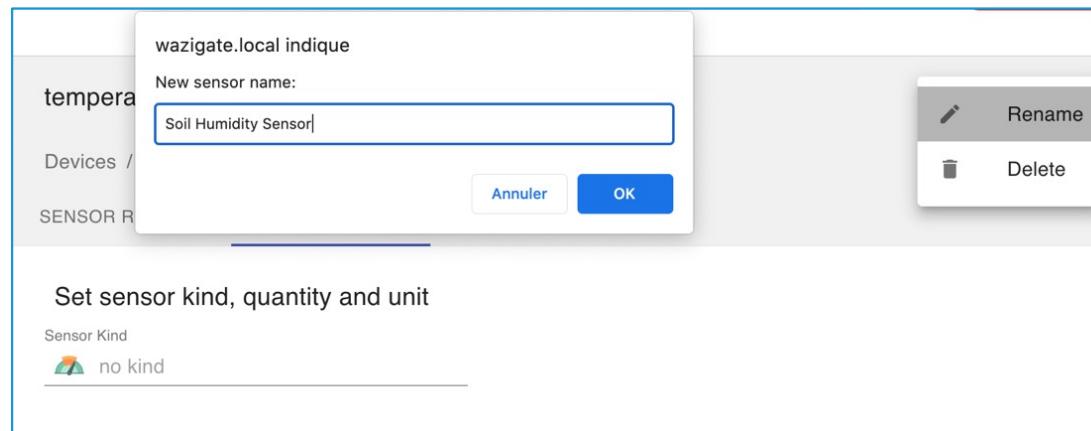
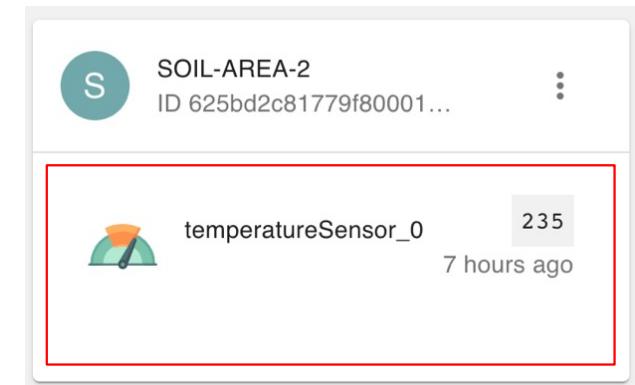
- Set the new address, matching the one of the Arduino code: 26011DAB
- keep same encryption keys
- Select XLPP as codec



# Advanced configuration

ex 1: have several capacitive soil sensor devices, con't

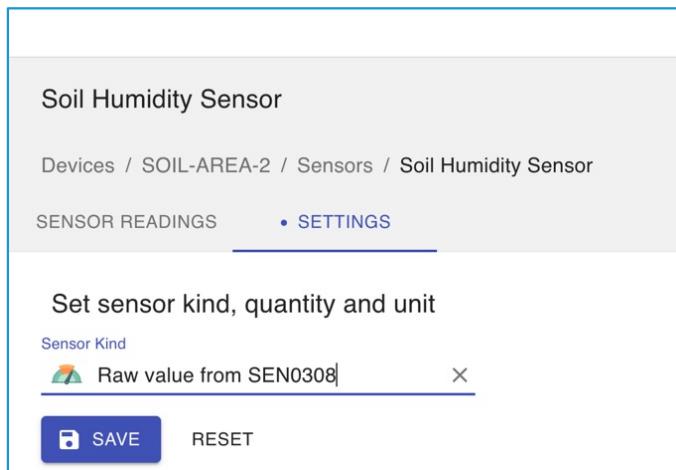
- DO NOT manually create a sensor. Instead,...
- ... power on the new soil sensor device for data transmission
- Refresh the WaziGate dashboard, the new data should appear
- New sensor name is "temperatureSensor\_0"
- Click on "temperatureSensor\_0" and then rename it, e.g. "Soil Humidity Sensor"



# Advanced configuration

ex 1: have several capacitive soil sensor devices, con't

- Change Sensor kind to "Raw value from SEN0308"



Soil Humidity Sensor

Devices / SOIL-AREA-2 / Sensors / Soil Humidity Sensor

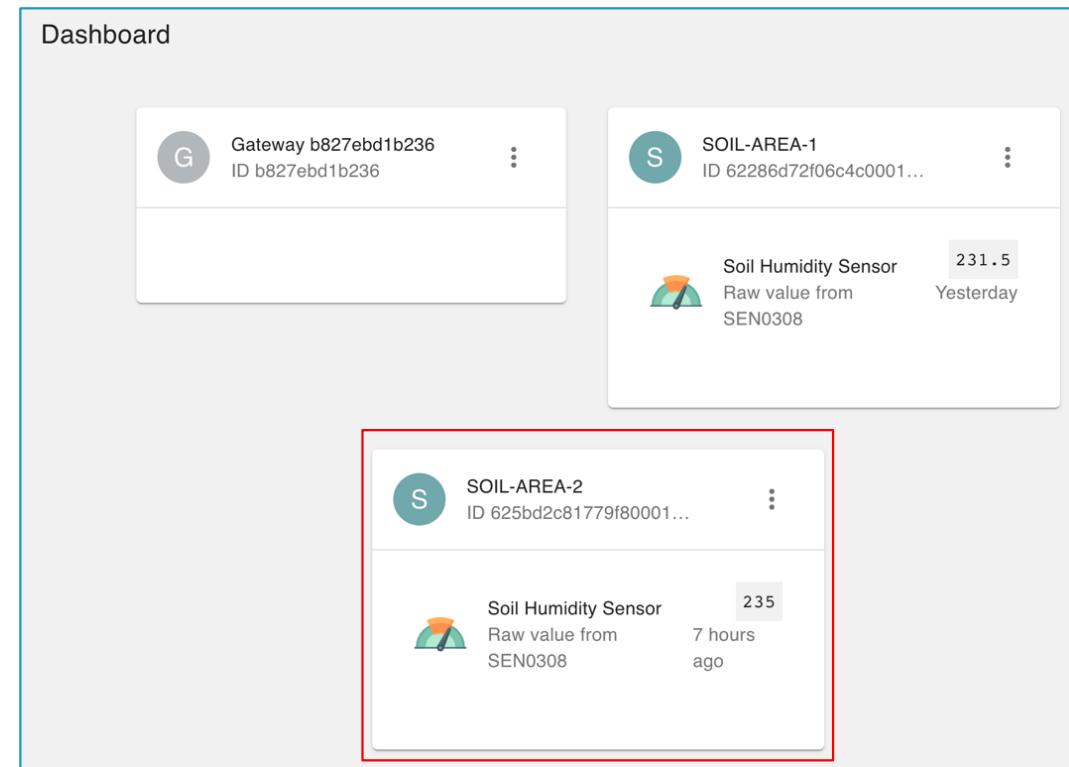
SENSOR READINGS • SETTINGS

Set sensor kind, quantity and unit

Sensor Kind

Raw value from SEN0308

SAVE RESET



Dashboard

G Gateway b827ebd1b236 ID b827ebd1b236 ...

S SOIL-AREA-1 ID 62286d72f06c4c0001... ...

Soil Humidity Sensor Raw value from SEN0308 231.5 Yesterday

S SOIL-AREA-2 ID 625bd2c81779f80001... ...

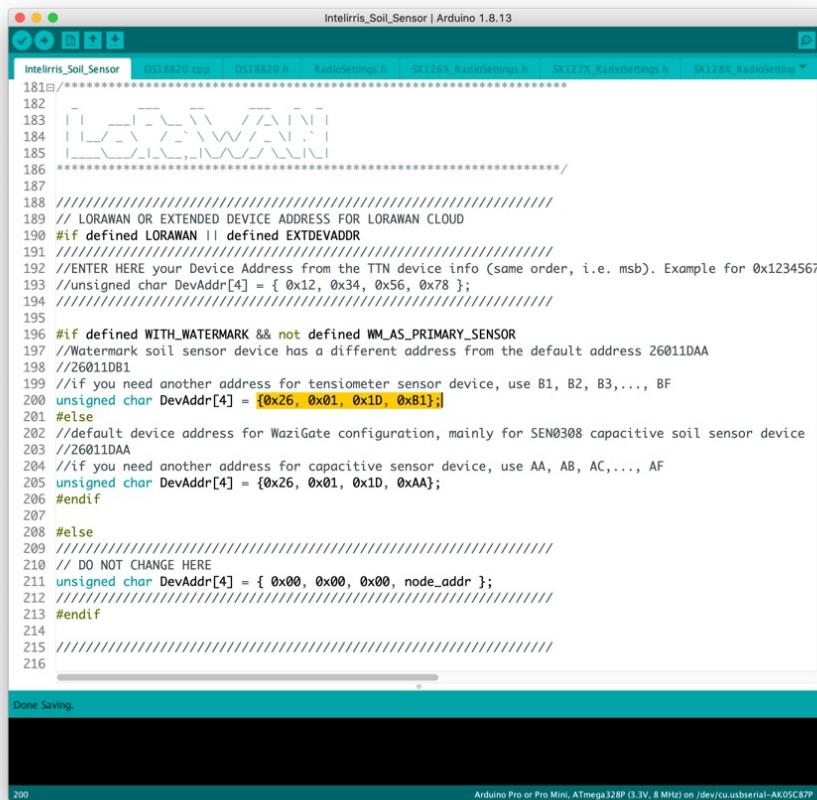
Soil Humidity Sensor Raw value from SEN0308 235 7 hours ago

- The dashboard now displays correctly the new device with its sensor

# Advanced configuration

ex 2: have several tensiometer soil sensor devices

- Only to have several tensiometer soil devices on 1 Wazigate – change the device address in the soil device Arduino code



```

 181 //*****
 182 // WAZIGATE
 183 // WAZIGATE
 184 // WAZIGATE
 185 //*****
 186 *****/
 187
 188 //////////////// LORAWAN OR EXTENDED DEVICE ADDRESS FOR LORAWAN CLOUD
 189 #if defined LORAWAN || defined EXTDEVADDR
 190 //ENTER HERE your Device Address from the TTN device info (same order, i.e. msb). Example for 0x1234567
 191 //unsigned char DevAddr[4] = { 0x12, 0x34, 0x56, 0x78 };
 192 ///////////////
 193 #if defined WITH_WATERMARK && not defined WM_AS_PRIMARY_SENSOR
 194 //Watermark soil sensor device has a different address from the default address 26011DAA
 195 //26011DB1
 196 //if you need another address for tensiometer sensor device, use B1, B2, B3,..., BF
 197 unsigned char DevAddr[4] = {0x26, 0x01, 0x1D, 0xB1};
 198 #else
 199 //default device address for WaziGate configuration, mainly for SEN0308 capacitive soil sensor device
 200 //26011DA
 201 //if you need another address for capacitive sensor device, use AA, AB, AC,..., AF
 202 unsigned char DevAddr[4] = {0x26, 0x01, 0x1D, 0xAA};
 203 #endif
 204 //DO NOT CHANGE HERE
 205 #ifndef node_addr
 206 unsigned char DevAddr[4] = { 0x00, 0x00, 0x00, node_addr };
 207 #endif
 208 //*****
 209 // DO NOT CHANGE HERE
 210 #endif
 211 //*****
 212
 213
 214
 215
 216

```

Done Saving.

Arduino Pro or Pro Mini, ATmega328P (3.3V, 8 MHz) on /dev/cu.usbserial-AK05C87P

**Default address for tensiometer sensor is**

{ 0x26, 0x01, 0x1D, 0xB1 };

**Just increase the last byte**

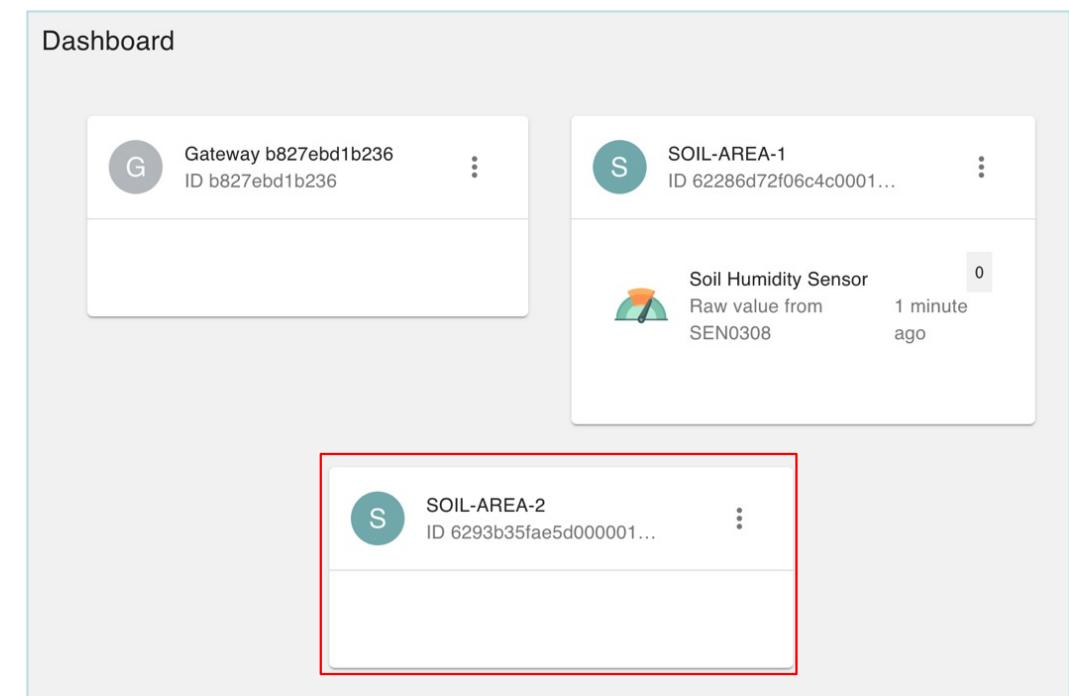
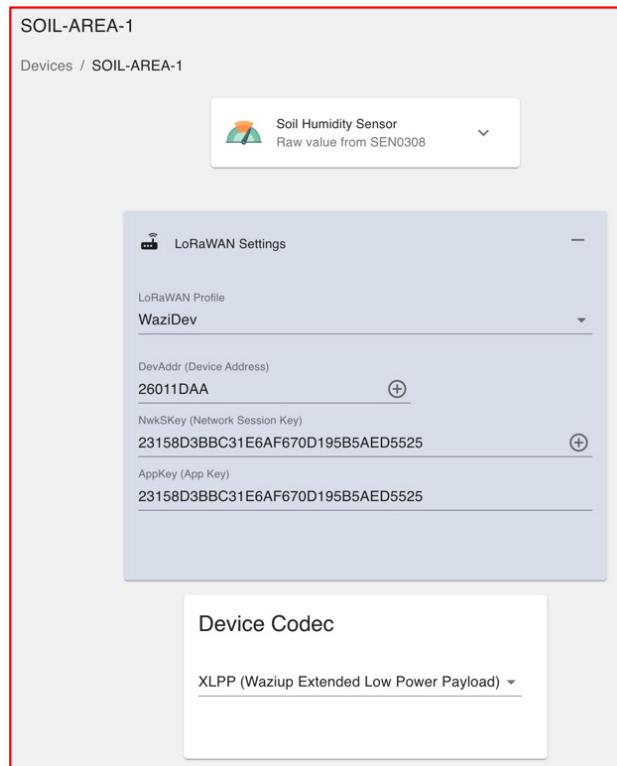
{ 0x26, 0x01, 0x1D, 0xB2 };

**Compile and upload the code to the soil sensor device**

# Advanced configuration

ex 2: have several tensiometer soil sensor devices, con't

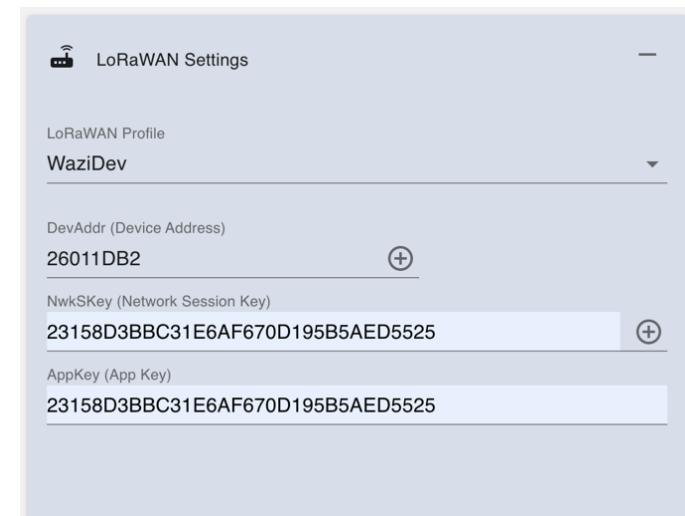
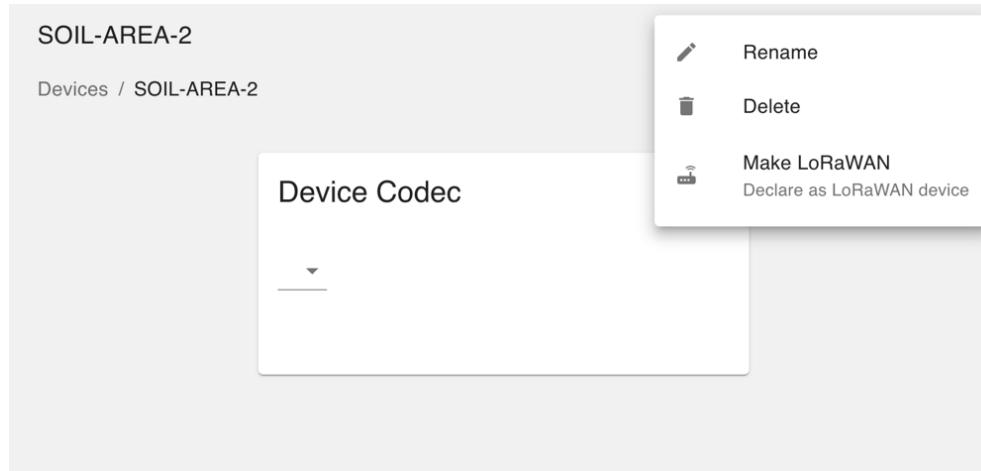
- Left figure shows WaziGate config with 1 soil sensor device
- Create a new device, e.g. device name SOIL-AREA-2
- Avoid space, limit to 12 characters for correct display on OLED



# Advanced configuration

ex 2: have several tensiometer soil sensor devices, con't

- Select the new device and make it as LoRaWAN device

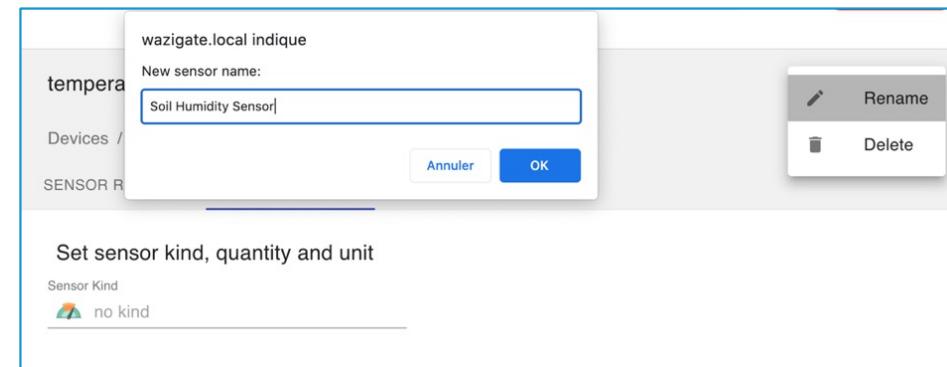
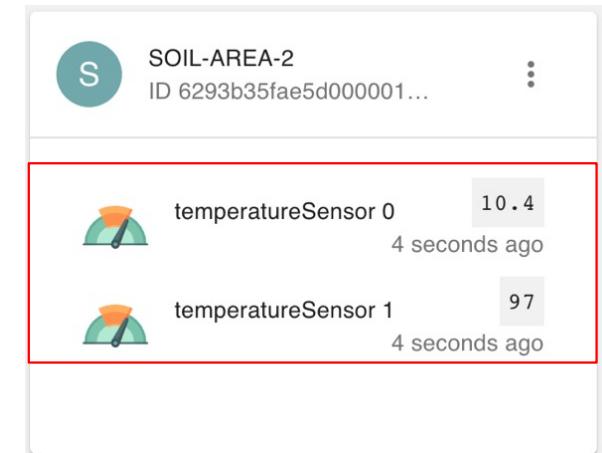


- Set the new address, matching the one of the Arduino code: 26011DB2
- keep same encryption keys
- Select XLPP as codec

# Advanced configuration

ex 2: have several tensiometer soil sensor devices, con't

- DO NOT manually create a sensor. Instead,...
- ... power on the new soil sensor device for data transmission
- Refresh the WaziGate dashboard, the new data should appear
- There should be 2 new sensor names
  - "temperatureSensor\_0" & "temperatureSensor\_1"
- Click on "temperatureSensor\_0" and then rename it, e.g. "Soil Humidity Sensor"
- Do the same for "temperatureSensor\_1"



# Advanced configuration

ex 2: have several tensiometer soil sensor devices, con't

- For first sensor, change Sensor kind to "centibars from WM200"
- For second sensor, use "scaled value from WM200 real=x10"

Soil Humidity Sensor

Devices / SOIL-AREA-2 / Sensors / Soil Humidity Sensor

SENSOR READINGS • SETTINGS

Set sensor kind, quantity and unit

Sensor Kind

 centibars from WM200 ×

SAVE RESET

Dashboard

G Gateway b827ebd1b236 ID b827ebd1b236 ...

S SOIL-AREA-1 ID 62286d72f06c4c0001... ...

 Soil Humidity Sensor Raw value from SEN0308 0 12 minutes ago

S SOIL-AREA-2 ID 6293b35fae5d000001... ...

 Soil Humidity Sensor centibars from WM200 10.4 3 minutes ago

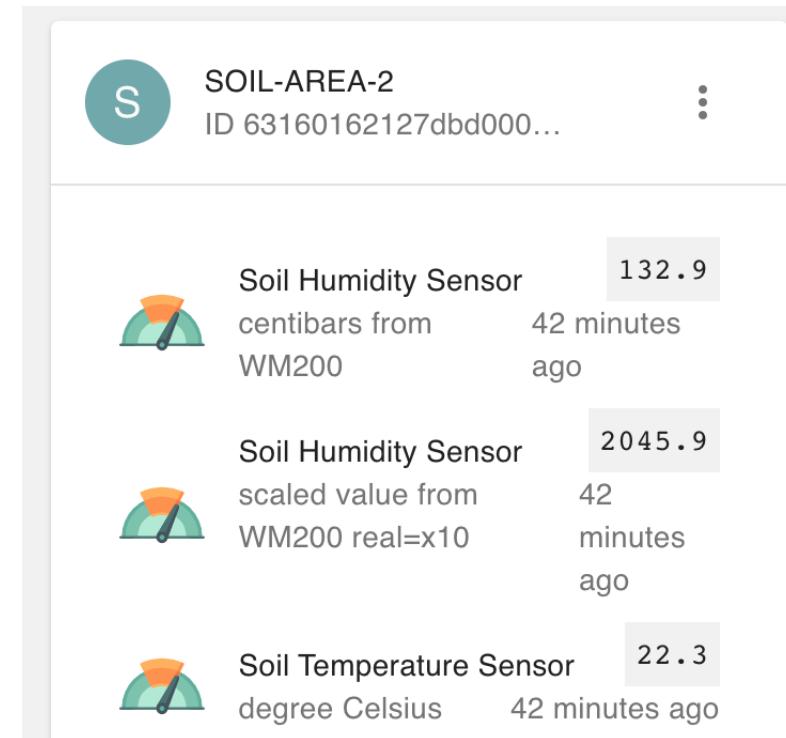
 Soil Humidity Sensor Scaled value from WM200 real=x10 97 3 minutes ago

- The dashboard now displays correctly the new device with its sensors

# Advanced configuration

## ex 1 & 2: with a soil temperature sensor

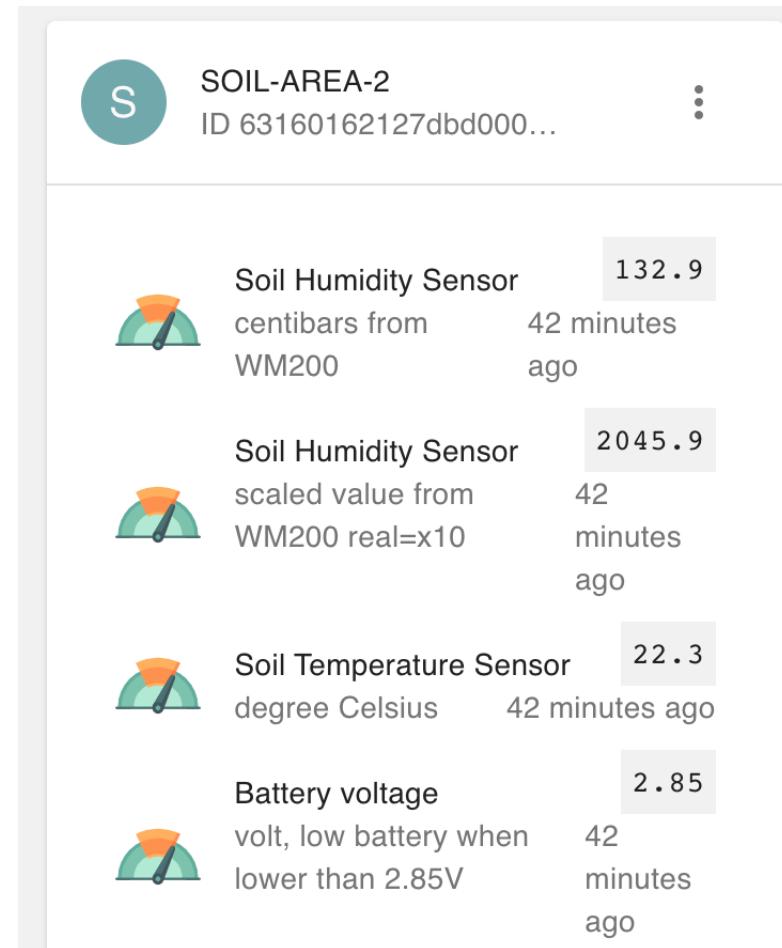
- If there is a soil temperature sensor attached, a sensor named "temperatureSensor\_5" will also appear
- Click on "temperatureSensor\_5" and then rename it, e.g. "Soil Temperature Sensor"
- Change Sensor kind to "degree Celsius"
- Reload dashboard which should now displays correctly the new device with its sensors



# Advanced configuration

## ex 1 & 2: with battery voltage monitor

- With battery voltage monitor, a sensor named "analogSensor\_6" will also appear
- Click on "analogSensor\_6" and then rename it, e.g. "Battery voltage"
- Change Sensor kind to "volt, low battery when lower than 2.85V"
- Reload dashboard which should now displays correctly the new device with its sensors



# Advanced configuration

## execute automatic custom configuration

- Default SD card image defines
  - 1 capacitive sensor SOIL-AREA-1
  - 1 tensiometer sensor SOIL-AREA-2
- To change configuration, read carefully & use the auto-configuration mechanism
  - <https://github.com/CongducPham/PRIMA-Intel-Irris/tree/main/Gateway/boot#auto-configuration-on-boot-for-the-intel-irris-wazigate>
- Default auto-configuration (GitHub: Gateway/boot)
  - create-starter-kit-demo-capacitive-watermark-st-iiwa-ha  
default capacitive: SOIL-AREA-1, 26011DAA  
default tensiometer + 1 soil temperature: SOIL-AREA-2, 26011DB1  
Home Assistant included  
these 2 devices are added to IIWA and HA

# Advanced configuration

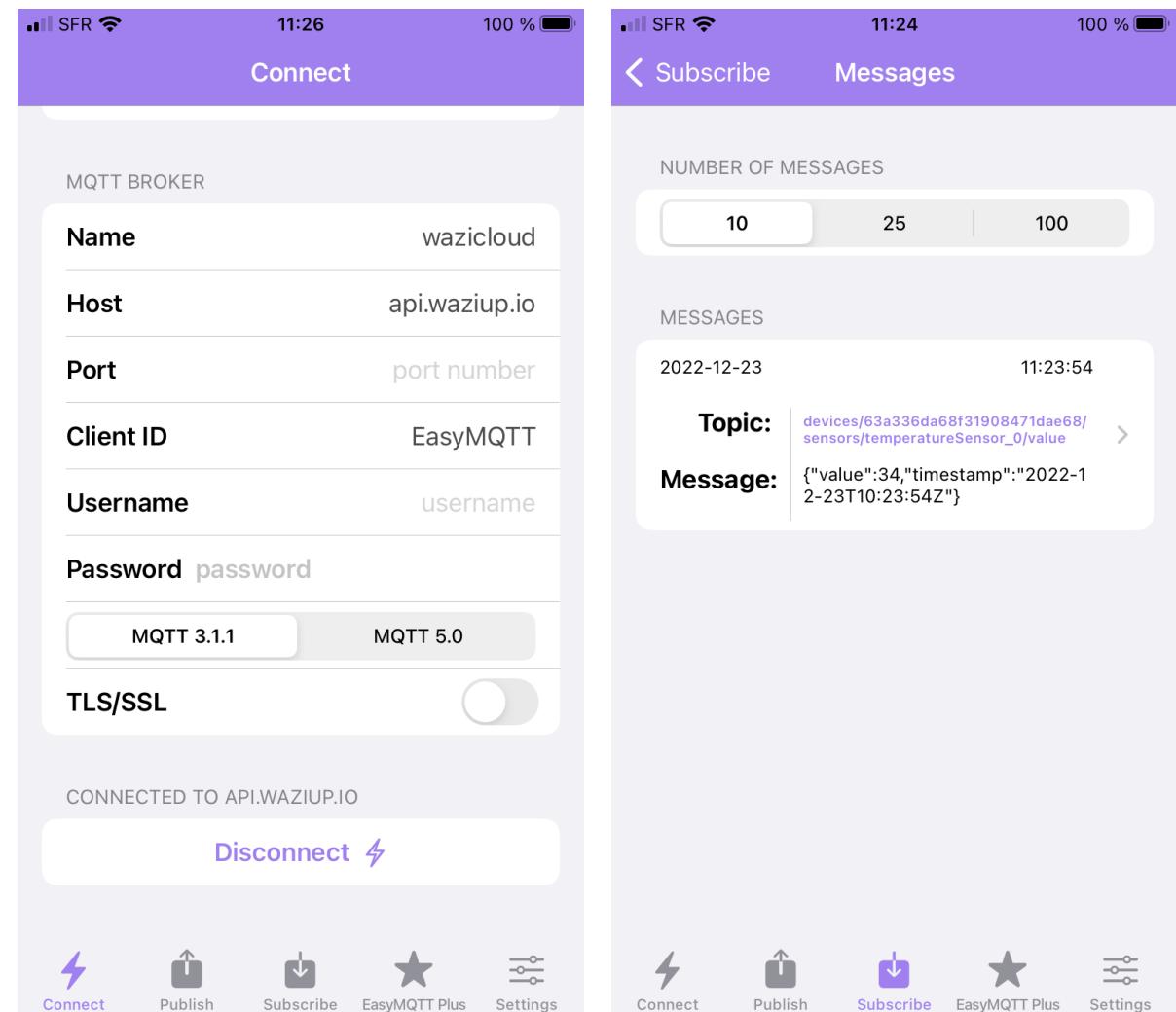
## MQTT integration

- With sensor data on WaziCloud, it is possible to subscribe to those data with MQTT protocol
- With command line mosquitto\_sub
  - mosquitto\_sub  
-L "mqtt://api.waziup.io/devices/<deviceID>/sensors/<sensorID>/value"
  - mosquitto\_sub  
-h api.waziup.io -t devices/<deviceID>/sensors/<sensorID>/value
- With other MQTT integration client/platform
  - Host: api.waziup.io
  - Topic: devices/<deviceID>/sensors/<sensorID>/value
- Output
  - { "value": 34, "timestamp": "2022-12-23T10:23:54Z" }

# Advanced configuration

## MQTT integration, con't

- Example with an MQTT client (EasyMQTT) on an iPhone7



# NOTICE ON THE STARTER-KIT



- NEVER TRANSMIT WITHOUT AN ANTENNA
- 1 FULLY ASSEMBLED & CONFIGURED SOIL SENSOR
  - NEED TO INSTALL 2-AA BATTERIES
  - TAKE HIGH-GRADE BATTERIES
  - DO NOT SWITCH ON WITHOUT ANTENNA ATTACHED
  - ALREADY CONFIGURED FOR WAZIGATE
- STARTER-KIT= 1 SOIL SENSOR + 1 WAZIGATE
- INTEL-IRRIS WAZIGATE IMAGE TO BE DOWNLOADED FROM <https://intel-irris.eu/results>
- FLASH IMAGE ON 8GB SD CARD (OR 16GB OR 32GB)
- THE WAZIGATE IS ONLY PRE-CONFIGURED FOR 1 SOIL SENSOR PER FARM
- STARTER-KIT TUTORIAL : <https://intel-irris.eu/tutorials-slides>

