

Farm21

User manual

English



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INTRODUCTION

This manual contains all essential information to start with the Farm21 sensor and dashboard.

This includes a description of the system functions, and a step-by-step guide for the sensor installation process.

BOX CONTENT

This box contains:

- Manual*
- Soil peg*
- Farm21 soil sensors (5x)
- CR123A batteries (5x)

** If more than one box is ordered, every additional box contains only sensors and batteries.*

Due to regular upgrades this manual is subjective to change. For the most up-to-data version of this manual go to:

www.farm21.tech/documentation

1 QUICK INSTALLATION GUIDE

Step 1. Place the battery in the sensor and screw the cap onto the sensor.

Step 2. Find a suitable spot to place the sensor. This can be based on your knowledge of the field, previous field scans or most representable area.

Make sure the sensor is not placed on a driving track, but in between crops. Be aware that weeding machines can damage the sensor.

Step 3.

Scan the QR code on the sensor with your smart phone. You are now being redirected to the Farm21 dashboard. Login with your Farm21 account, this will automatically link the sensor to your account.

Step 4. Fill in the required details as presented in the dashboard. The location details of the sensor are based on the current location of the device used for installation.

Step 5. Push the sensor in the ground. Do not use force. If the sensor can not be pushed into the ground use the peg to create a hole in the soil. Slide the sensor in newly created hole.

You have now successfully installed a sensor. The sensor will now establish a connection and start sending data to the Farm21 dashboard.



2 THE SENSOR

The Farm21 sensor is a one-piece device with a removable screw cap at the top. The weatherproof casing protects the electronics against the elements. Apart from the battery, it does not contain any self-serviceable parts.

SENSOR COMPONENTS

For this sensor two parts can be distinguished, a lower part that is inserted into the soil and an upper part that remains above ground level.

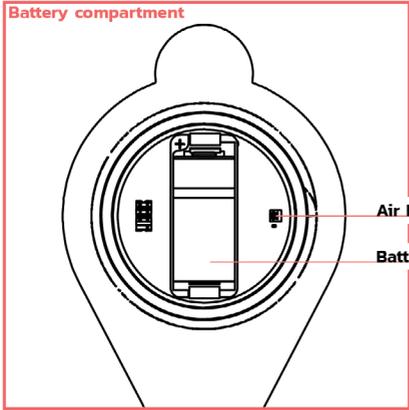
The lower part of the sensor houses three soil moisture sensors (depth -10cm, -20cm and -30cm) and a single soil temperature sensor (depth -5cm).

The upper part of the sensor contains the electronics for data communication, including an antenna. The LED-light is used to indicate start-up codes. A QR-code can be found just below the Farm21 logo. It is used to register the sensor to the dashboard (see chapter "Sensor installation guide"). A duplicate of this code can also be found on the inside of the battery compartment.

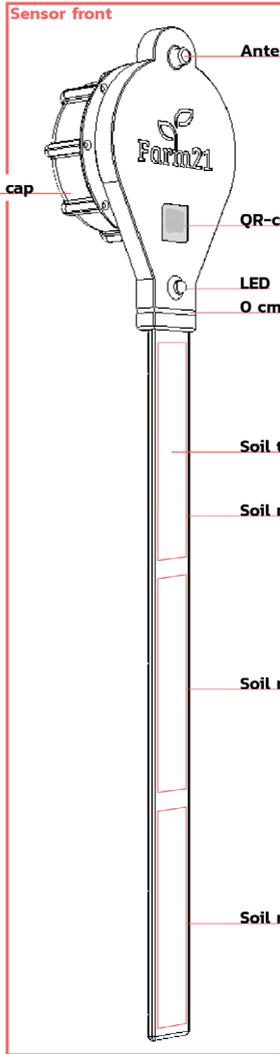
THE BATTERY COMPARTMENT

This compartment houses a CR123A battery. It is closed off using the screw cap. Air moisture is diffused through the membrane in the middle of the screw cap. A sensor in the battery compartment measures air humidity and temperature.

Note: for accurate air humidity measurements it is important to keep the sensor in the battery compartment free of dirt and debris. Also make sure no water enters the battery compartment during battery installation. In case water or dirt does enter the battery compartment, let it dry with the cap off and shake out the dirt.



Air Humidity & Temperature sensor
Battery



Screw cap
Antenna
QR-code
LED
0 cm depth indicator
Soil temperature sensor
Soil moisture sensor -10 cm
Soil moisture sensor -20 cm
Soil moisture sensor -30 cm

Figure 1. Sensor components



3 SENSOR INSTALLATION GUIDE

BATTERY INSTALLATION

This sensor requires a 3.0V CR123A battery (also known under the following names: CR123, 17345 and 16340).

Unscrew the cap at the top of the sensor en place a battery inside the battery holder. Make sure the polarity of the battery matches with the indications of the battery holder. Close battery compartment by screwing the cap back firmly.

CREATE A NEW FARM21 DASHBOARD ACCOUNT

Go to app.farm21.tech/register on your computer or mobile device. Fill in the required fields and press register. You will now automatically log in to your new Farm21 account.

SCAN QR-CODE

Sensors are added to your Farm21 dashboard account by scanning the QR-code at the front of the sensor. In order to scan this code a smart phone or tablet with build in camera and appropriate software is required. Depending on your smart phone/tablet the scanning procedure differs slightly.

In order to read the QR-code it is important that there is enough ambient light for the camera to work. The QR-code has to be in focus and the camera should not be too close or too distant. If this does not improve the reading, try using a different QR-code scanner application.

iOS:

When using iOS 11 or newer a QR-scanner is build-in with the standard camera application. Open the camera application and focus on the QR-code (no need to take a picture). A direct link to the Farm21 dashboard will now appear on the top of your screen.

If you are using an older version of iOS, go to the App Store, search for 'QR code scanner' and install a QR-code scanner. Use this application to scan the Farm21 QR-code.

Android:

When using Android, go to the Play Store, search for 'QR code scanner' and install a QR-code scanner. Use this application to scan the Farm21 QR-code.

Windows:

When using Windows, go to the Microsoft Store, search for 'QR code scanner' and install a QR-code scanner. Use this application to scan the Farm21 QR-code.



Use this example QR-code to test your scanner application.

If functioning correctly it should show the following message:

"Your QR-code scanner is working!"

Light conditions and camera resolution can influence the scanning process. Please make sure the QR-code is well lit.



REGISTER A FARM21 SENSOR TO YOUR ACCOUNT

After scanning the QR-code on the sensor you are automatically redirected towards the Farm21 dashboard. A 'sensor activation page' (Figure 2) will be prompted that allows you to fill in all the details for this particular sensor. Each sensor requires the parameters as shown on the right side of this page.

After having filled in the form, press 'submit' to add this sensor to your account.

Please note that the default sensor location is based on the current location of your mobile device. If you register your sensors before placing, all sensors will have a similar location. This can be adjusted later in the dashboard by selecting the correct sensor location on the map.

Name:

Enter a name for this sensor

Soil type:

Select the soil type this sensor will be placed in.

This setting determines what calibration profile is selected for this sensor.

Crop type:

Enter the crop type

Race type:

Enter the crop race

Cultivation type:

Select a cultivation type

Group:

Select a group or create a new group

Location:

Click 'set my location' or leave as is. The map allows you to check if the location is accurate. The sensor location can be adjusted later.

The screenshot shows a web interface for activating a sensor. At the top, there is a navigation menu with 'HOME', 'GRAPHS', 'GROUPS & SENSORS', and 'MY ACCOUNT'. The main heading is 'ACTIVATE SENSOR: 10'. Below this, there are several input fields: 'Name:' with a text box; 'Soil type:' with a dropdown menu showing 'Select a soil type'; 'Crop type:' with a text box; 'Race type:' with a text box; 'Cultivation type:' with a dropdown menu showing 'Select the cultivation type'; 'Select a group:' with a dropdown menu; and 'Set the location:' with two input boxes containing '0' and a 'Set my location' button. A red 'Submit' button is centered at the bottom of the form.

Figure 2. Sensor activation dashboard page.

PLACING A SENSOR IN THE SOIL

When placing a sensor in the ground it is important to ensure a good physical connection between soil and sensor. Therefore a sensor should be pushed into the soil in a straight line, eliminating side to side movement. Do not apply too much force when pushing the sensor into the soil, the bottom part of the sensor should not flex more than 3cm.

If the soil is too hard to push the sensor in by hand, the included soil peg can be used to create a pilot hole. The soil peg can either be pushed or hammered into the

soil. Adding water helps to soften the soil in case of dry ground.

Make sure the sensor is placed in between the crops, not on a driving track. Be aware that weeding machines can damage the sensor. Marking the location of the sensor using a marking stick is recommended since in most cases the sensors will quickly be overgrown by the crop.

Marking the sensors clearly helps to quickly locate a sensor without referring to the GPS coordinates.



OBTAINING THE DATA

Directly after placing the battery, the sensor will attempt to connect to the network. Once a connection is established the sensor will flash the LED green briefly. After this the data is sent to the Farm21 platform every hour. The Farm21 platform dashboard creates a visual representation of the data points to create a clear overview. Naturally the data is only available for you and is secured by your personal login credentials. For more information about the Farm21 dashboard, see 'Using the dashboard'.

CLEANING AND STORING

If for some reason a sensor is not being used, it is advised to clear any dirt from the sensor using water. This ensures a good soil contact at the next installation round. Remove the battery and store the device in a warm and dry location.

4 WORKING WITH THE DASHBOARD

The dashboard is used to visualize the data from the connected sensors and to set alerts for certain events.

Go to app.farm21.tech and login with your account. Fill in your email address and the password used during registration.

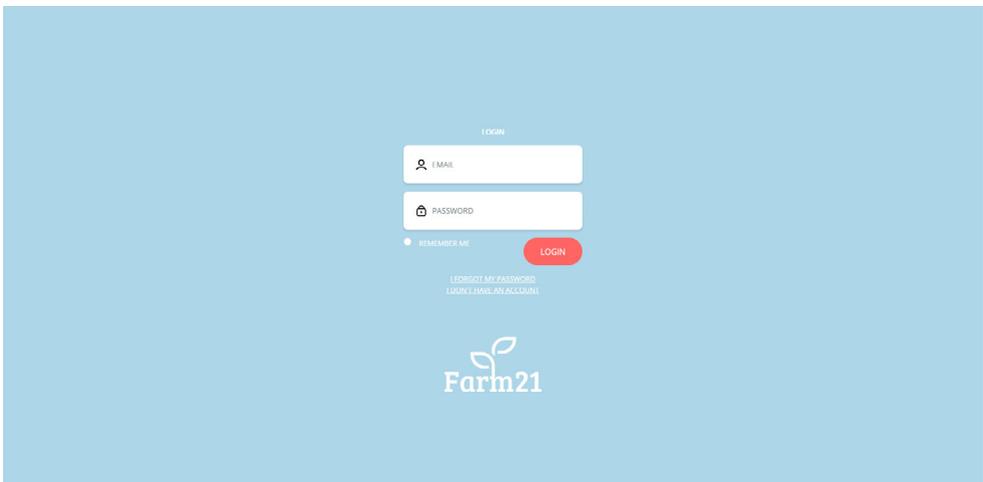


Figure 3. Dashboard login page.



GROUP OVERVIEW

After login you are redirected to the home page, this page shows a quick overview of your sensor groups. For each group the average values for all sensors within that group, are

presented. By clicking a group the data section is extended and also reveals minimum and maximum values. This is useful for determining the spread within this group.

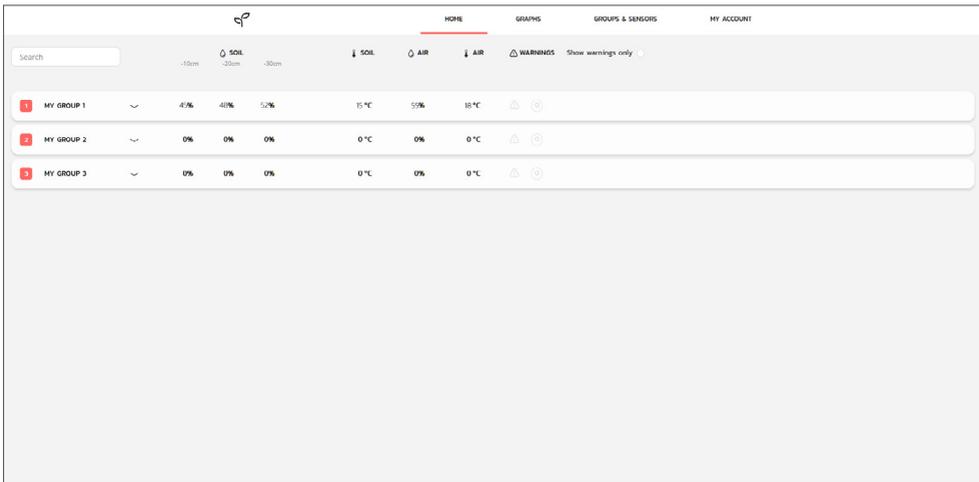


Figure 4. Dashboard home page.

GRAPHS OVERVIEW

Using the graph page a more detailed overview of the data is presented. Again, for each group a 'group average' is shown. By selecting sensors within that

group using the menu on the left, data for this specific sensor is shown.

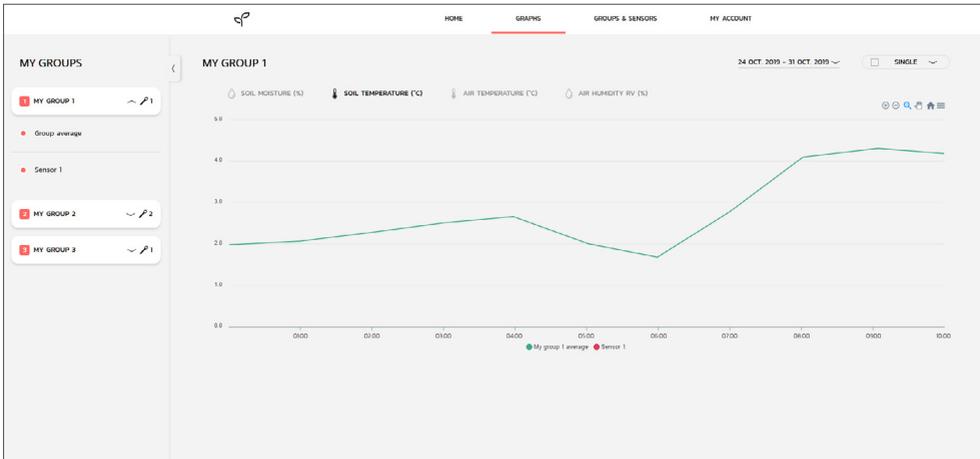


Figure 5. Dashboard graphs page.

SWITCHING FROM SINGLE TO OVERVIEW GRAPH VIEW

Graphs can be either be presented as a single graph or as an overview. In the 'single' view data types (soil moisture, soil temp, air temp, air humidity) can be selected at the top of the graph. Using the toggle switch in the top right of the graphs page, the view can be switched to 'overview'. Now all data types are presented as individual graphs on a single page.

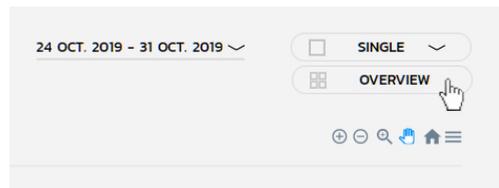


Figure 6. Switching to multi graph view.



SELECTING A TIME RANGE

By clicking the date to the left of the 'single/overview' switch, a date range for the data to display is selected. Click the first day and subsequently the last day of the range, confirm by clicking 'apply'. All graphs are now updated and show the available data within the time range.

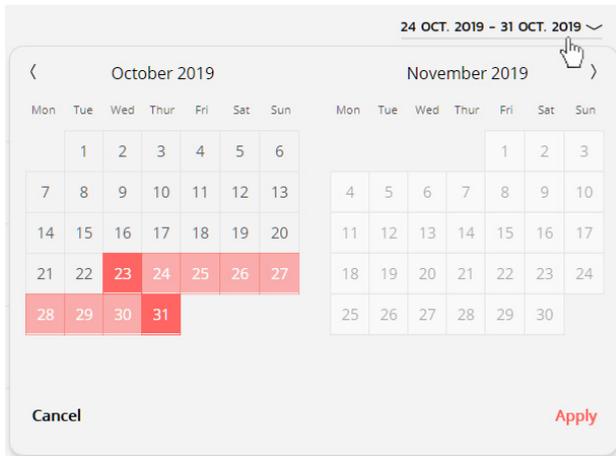


Figure 7. Selecting a time range.

5 GROUPS & SENSORS

The groups and sensors page give an overview of all the activated sensors and their corresponding groups. This page allows for settings changes in both the sensors and the groups.

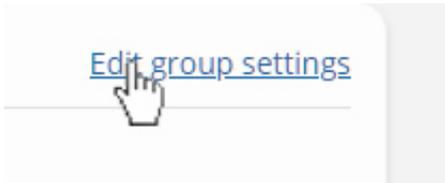


Figure 8. Edit group settings.

CONFIGURING WARNINGS

Using the 'edit group settings' button, group specific settings and the accompanied warning settings can be configured.

After clicking the 'edit group settings', a settings menu appears:

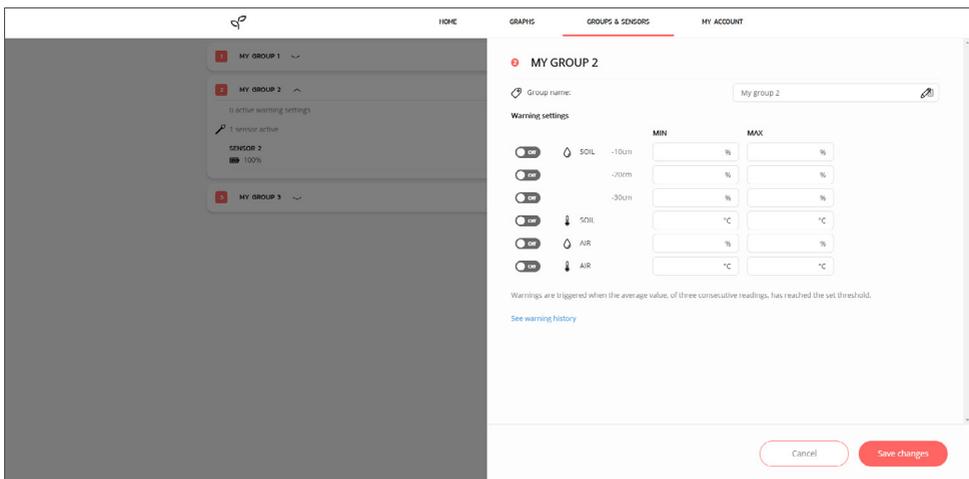


Figure 9. The edit group menu.

Using the 'warning settings', warnings can be activated for this specific group. To do so the on/off switch should be set to 'on' and values for the minimum and the maximum threshold should be set.

If the group average is above or below the set threshold for three consecutive readings, a warning will appear on the home screen. Here an option is available to 'solve' old warnings.



EDIT SENSOR SETTINGS

Clicking the 'edit' button shows the menu for editing the settings for this specific sensor.

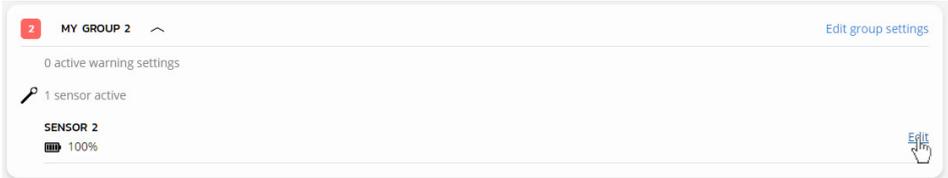


Figure 10. Edit a sensor.

In this menu the values as set during sensor activation can be edited. Using the map changes can be made to stored location

of this sensor by dragging the red pointer to a new location. Press 'save changes' to store the updated settings.

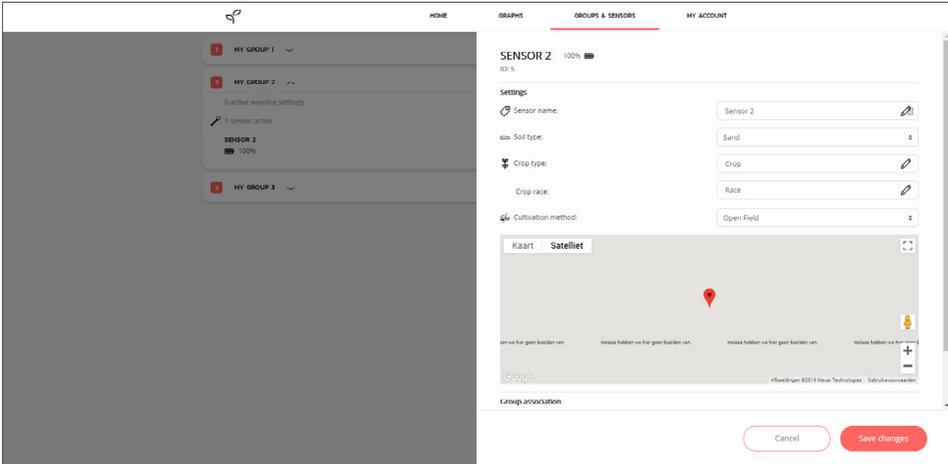


Figure 11. The edit sensor menu.

DEACTIVATING A SENSOR & CHANGING GROUP

By scrolling down in the sensor settings menu, the option *'Unlink sensor from group and deactivate sensor'* appears. This option allows you to deactivate this

sensor for storage. If a sensor is deactivated, it is also unlinked for the group. By re-scanning the sensor's QR-code the sensor can be activated again. This way sensors can be relocated to a different group.

DASHBOARD DEVELOPMENT

This dashboard is being updated regularly to make improvements or add new features. For the newest manual, please visit:

www.farm21.tech/documentation



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