



GrowSphere™ MAX

Irrigation & Fertigation Controller

User Manual

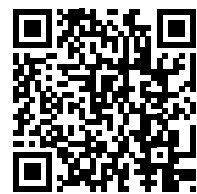


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Technical Specifications



CAUTION:

Read the [Safety](#) instructions before installing or using the GrowSphere™ system.

1. Safety

1.1 Safety Overview

Netafim congratulates you on purchasing the GrowSphere™ system. GrowSphere™ system is a family of hardware, software and cloud products designed and developed for the planning, management and monitoring of irrigation and nutrification.

1.1.1 Intended Audience and How to Use This Manual

This document is the user-manual of the GrowSphere™ system. It describes basic operation and maintenance of the system. Stay updated with the online versions.

1.1.2 Contact for support

This manual offers a full explanation of operation, maintenance and troubleshooting procedures of the GrowSphere™ system. However, in any case you need additional support, contact your Netafim™ local representative.

1.2 Safety Conventions

The symbols used in this manual refer to the following:



WARNING

Contains instructions aimed at preventing bodily injury or direct damage to the crops, the automation system and/or the infrastructure.



CAUTION

Contains instructions aimed at preventing unwanted system operation, installation or conditions that, if not followed, might void the warranty.



ATTENTION

Contains instructions aimed at enhancing the efficiency of usage of the instructions in the manual.



NOTE

Contains instructions aimed at emphasizing certain aspect of the operation of the system or installation.



ACID HAZARD

Contains instructions aimed at preventing bodily injury or direct damage to the crops and/or the irrigation system in the presence of acid.



ELECTRICAL HAZARD

Contains instructions aimed at preventing bodily injury or direct damage to the irrigation system components in the presence of electricity.



SAFETY FOOTWEAR

Contains instructions aimed at preventing foot injury.



WARNING



Contains instructions aimed at preventing damage to health or bodily injury in the presence of nutrients, acid or chemicals.

1.3 Safety Instructions

- All safety regulations must be applied.
- Use only approved accessories specified by Netafim™ for the GrowSphere™ equipment. Failure to do so may result in the system operating in a dangerously unsafe condition.
- Unauthorized modification of the product will negate the approval rating of the product and the warranty.
- Protection provided by the equipment can be impaired if the equipment is used in a manner other than that specified by the manufacturer.



WARNING

In an agricultural environment - always wear protective footwear.

1.3.1 Electrical Safety Precautions

Electrical installation, maintenance and troubleshooting procedures must be performed by an authorized electrician only.

1.3.2 Overhead Power Lines



WARNING

When installing GrowSphere™ units, care must be taken:

- Insure there is always clear space from overhead power lines.
- Do not erect any pole and associated GrowSphere™ unit if power lines are in the vicinity.
- Check with your relevant authority as to the clearances from power lines required in your region.

1.3.3 Batteries

- Use only Netafim™ approved batteries on the GrowSphere™ equipment.
- The GrowSphere™ system uses lithium acid batteries as a power source. Do not puncture the battery. If a battery is found to be punctured take caution in handling the battery and avoid contact with the corrosive material in the battery.
- All batteries can cause property damage and/or bodily injury, such as burns. Prevent contact between the terminals of a battery and objects made of conductive material (jewelry, keys, tools etc.). Failure to do so may cause a short circuit and generate significant heat. Exercise care in handling any charged battery, particularly when placing it inside a container (toolbox) amidst metal objects.
- Always dispose of a used battery in a responsible manner - in the intended places for battery recycling.
- Batteries should never be put in a fire because they could explode.
- It is important not to dispose of large numbers of alkaline batteries in a group. Used batteries are often not completely dead. Grouping used batteries together can bring these live batteries into contact with one another, allowing their charge to be released which could create safety risks.

1.3.4 Wireless radiation/RF radiation

The GrowSphere™ system meets the local RF regulations of every country and state.

The system is supplied with the proper documentation to be submitted to the local authorities, such as Ministry of Communication, Customs, or any other governmental agency.



WARNING

Radio frequency fields near antennas may exceed FCC rules for human exposure.

1.3.5 Thunderstorms

If the area is known to be prone to thunderstorms, GrowSpheres™ installed in the fields, may attract lightning discharge, as they are the highest object in the vicinity.

In such case it is recommended to install a lightning rod in the GrowSpheres™ vicinity.

A lightning rod is a metal rod installed on a pole and grounded.

The lightning rod should be the highest object in the vicinity in order to properly attract the lightning discharge and direct it safely into the ground.

1.3.6 Working at height

To prevent fatalities or major injuries, all safety measures regarding work at height must be observed.

Without limiting the foregoing:

- Avoid work at height whenever possible.
- As much work as possible should be done from the ground (whenever possible: mount the unit on the pole, wire it and then erect the fully equipped pole into position).

 **WARNING**

Mounting the base unit and routers and erecting poles might require working at height.

If work at height cannot be avoided:

- All work at height must be properly planned, supervised and carried out by competent, trained and experienced personnel, authorized by the local safety authority.
- Make sure equipment used for work at height is certified by the local standards authority, well maintained and inspected regularly.
- Avoid standing on fragile surfaces such as shingle or asbestos cement roofs.
- For the entire duration of work at height a person should be present on the ground, constantly keeping eye-contact with the workers at height, ready to assist them when needed.
- When working at height make sure that nobody is standing under you.
- Make sure the surface, scaffold or ladder used are stable and strong enough to support the worker's weight and that of the equipment.
- Always wear a harness and make sure it is correctly anchored to a stable element.
- Always use tools designed for work at height and make sure that they are secured in a basket preventing them from falling.

2. Quick Start

This chapter quickly reviews the common routines of the controller. We will guide you through three major tasks; while in task, you will have a few steps:

1

Configuration



- [Getting Started](#)
- [Defining System Preferences](#)
- [Defining the System Devices](#)
- [Configuring the Valves](#)
- [Configuring the Devices](#)
- [Configuring Local I/O](#)
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Installation



- [Mounting the Controller](#)
- [Connecting the Devices](#)
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3

Operation



- [Configuring Dosing Recipe](#)
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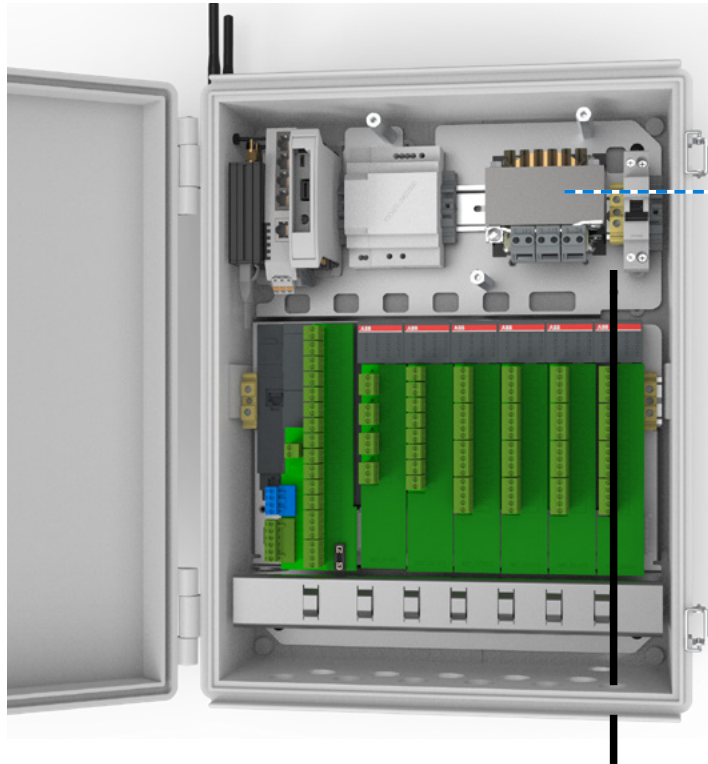
2.1 Configuration

Getting Started

Perform the following steps to power on and login to the controller:

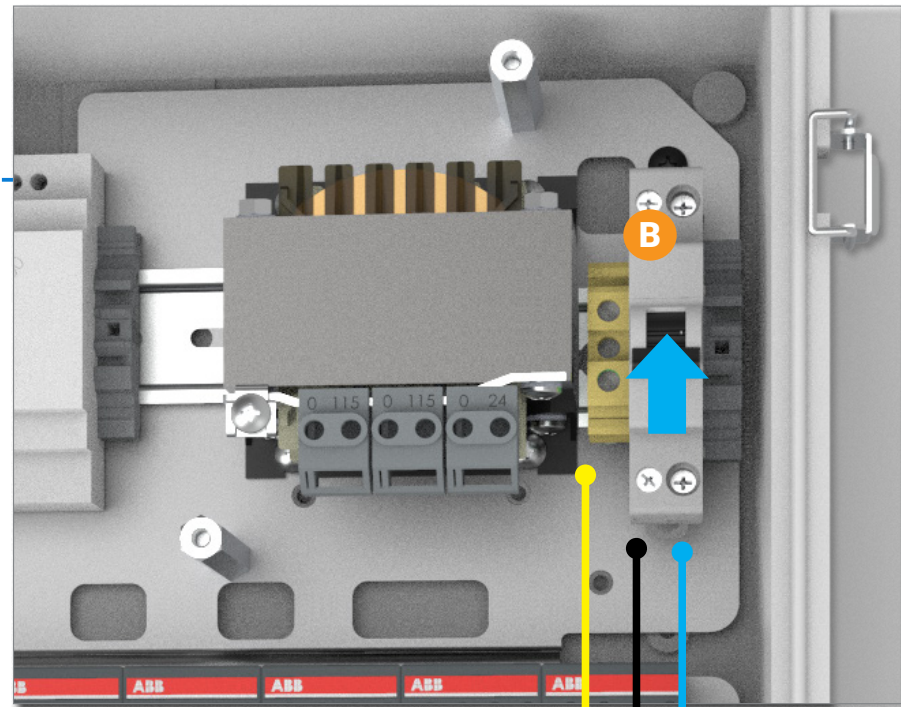
A Power the Controller

Verify that the GrowSphere™ is connected to power.



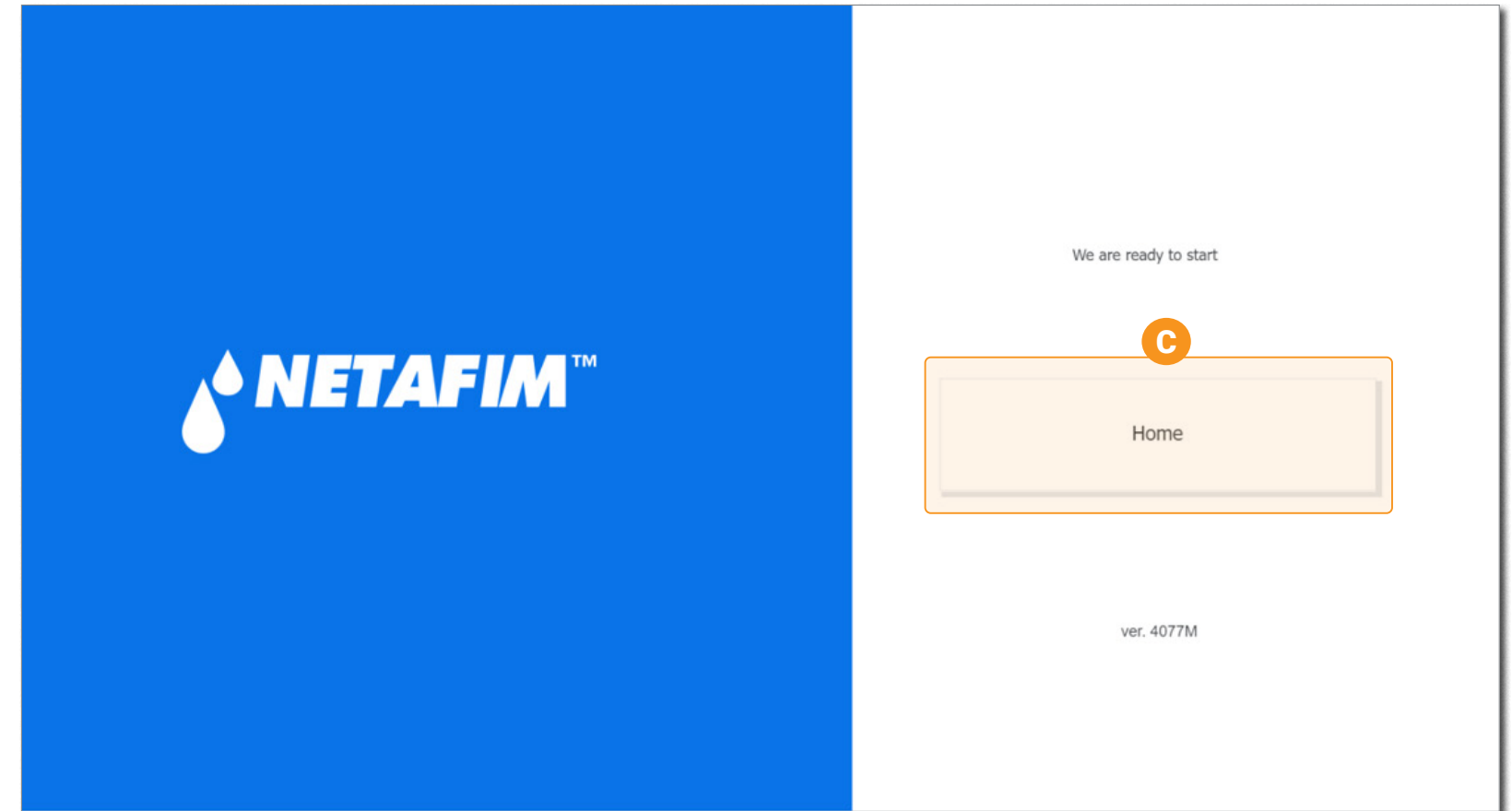
B Switch on the Controller

Turn the main switch to ON.

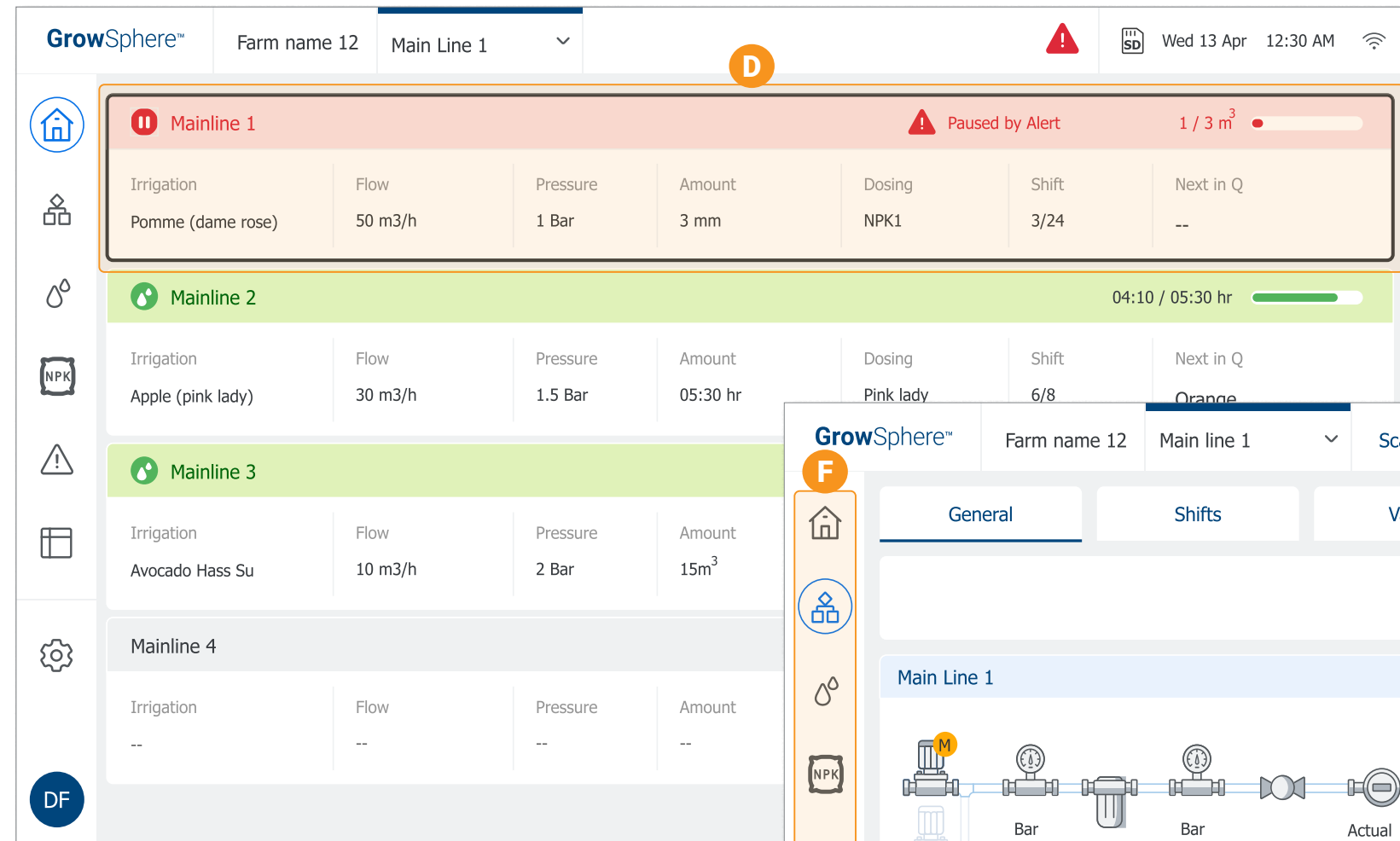


A
GND
N
P

C Tap the **Home** button

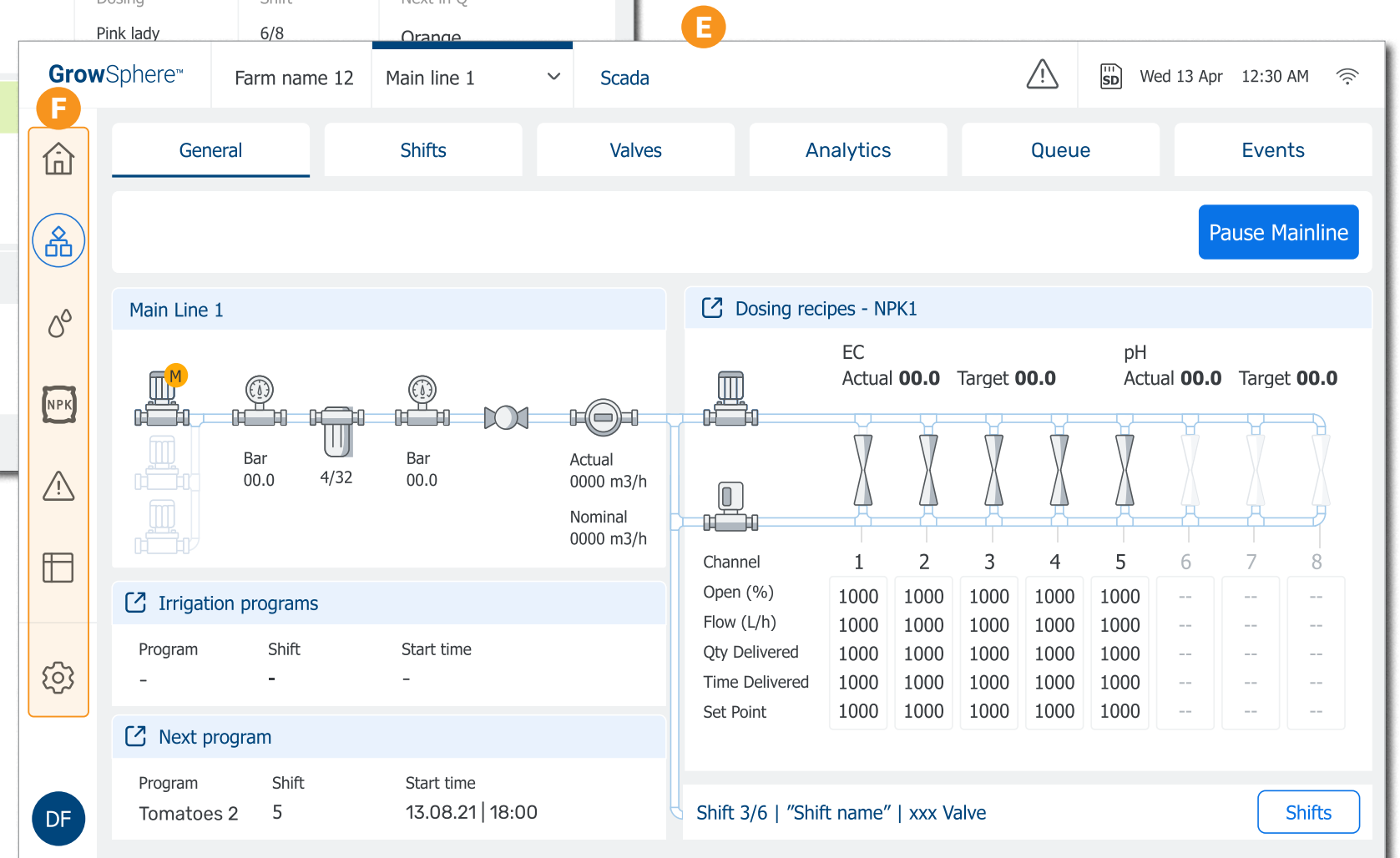


D Tap the relevant Main Line
The controller is initiated and the Home page is displayed.



E The **SCADA** screen opens

F Select the Relevant Section
Use the toolbar to navigate to the relevant section.



Defining System Preferences

Perform the following steps to define the general controller preferences:

A Tap the **Configuration** button

The Sub-menu opens.

B Select **Preferences** and type your credentials

C Type your credentials

D Define the **General** preferences

[More >](#)

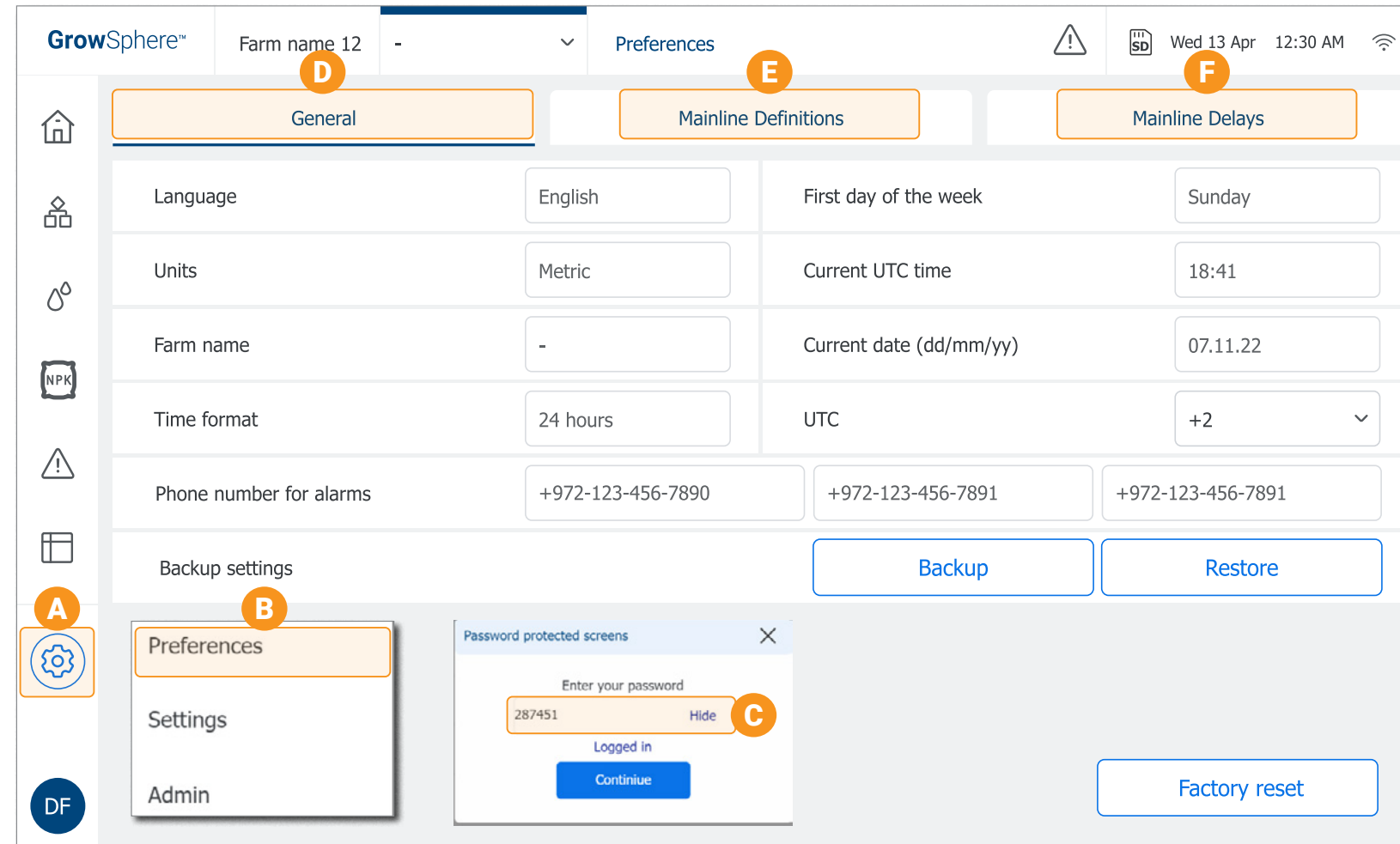
E Define the **Mainline Definitions**

[More >](#)

F Define the **Mainline Delays**

These are optional delay settings for the water.

[More >](#)



Defining the System Devices

Perform the following steps to define the devices that are part of the irrigation system:

A Tap the **Configuration** Button

The Sub-menu opens.

B Select **Settings** and type your credentials

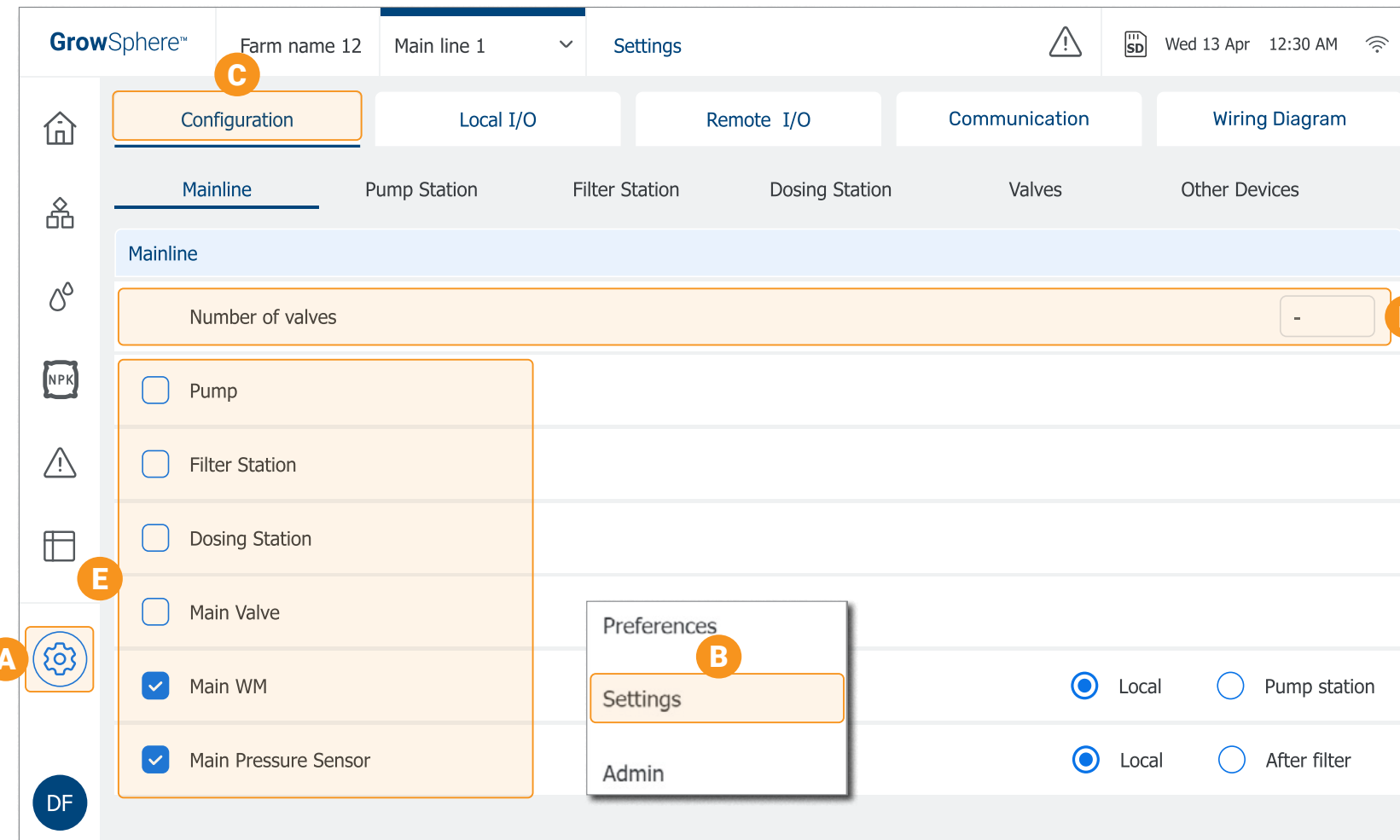
C Select the **Configuration** Tab

D Define the Number of Valves in the System

Type the total amount of valves that will be connected to the controller.

E Define Mainline Devices

Select all the mainline devices that will be connected to the controller.



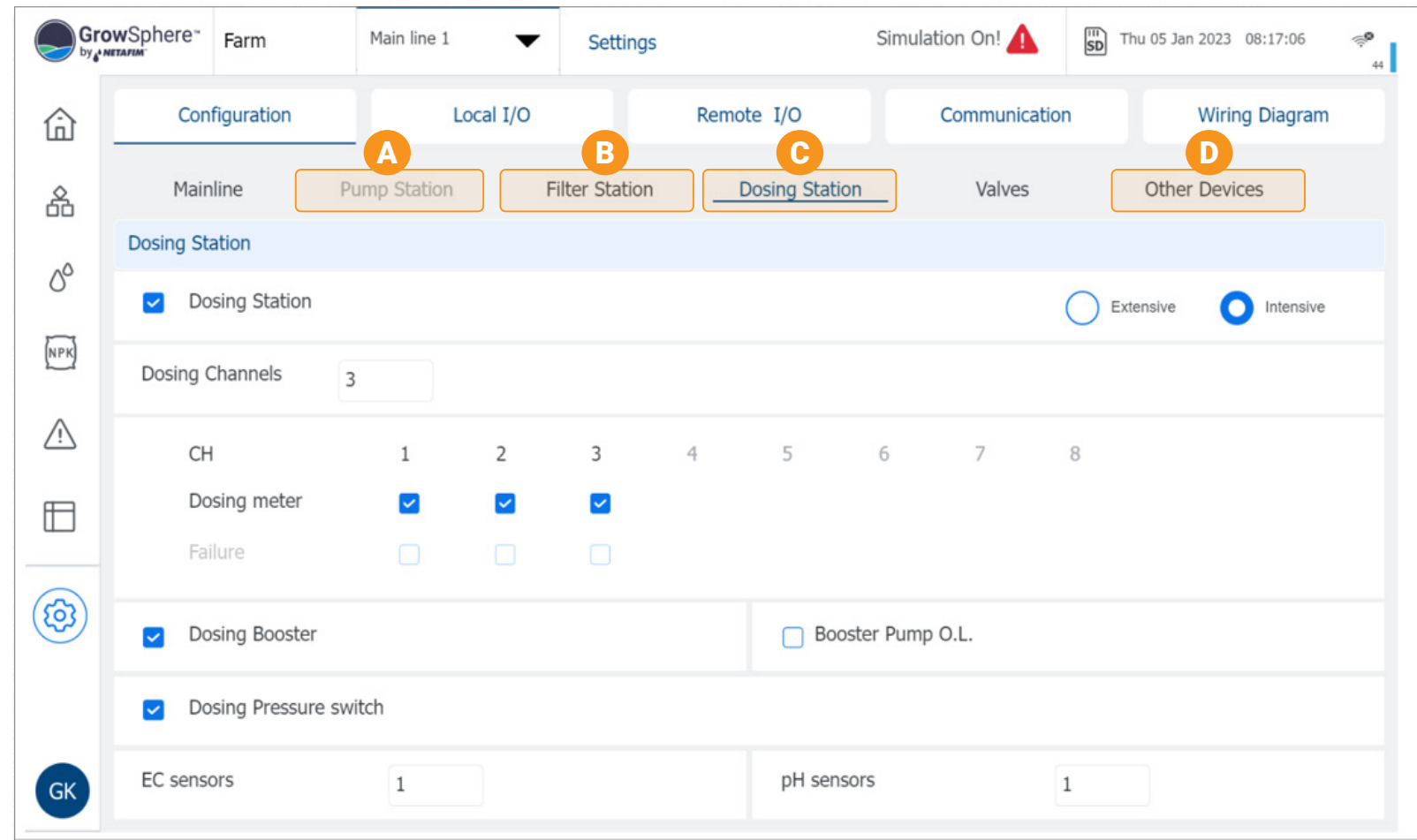
NOTE:

Need to define all the devices that are part of the hydraulic model regardless if they are connected locally or remotely.

Configuring the Devices

Perform the following steps to configure the devices:

- A Define Pump Station**
 Select the **Pump Station** tab and configure the parameters.
[More >](#)
- B Define Filter Station**
 Select the **Filter Station** tab and configure the parameters.
[More >](#)
- C Define Dosing Station**
 Select the **Dosing Station** tab and configure the parameters.
[More >](#)
- D Define Other Devices**
 Select the **Other Devices** tab and configure their parameters.
[More >](#)



NOTE:

- In each tab you will find the relevant device parameters.
- If the system used remote I/O, first configure the remote I/O.

Configuring the Valves

Perform the following steps to configure the valves:

A Select the Valves Tab

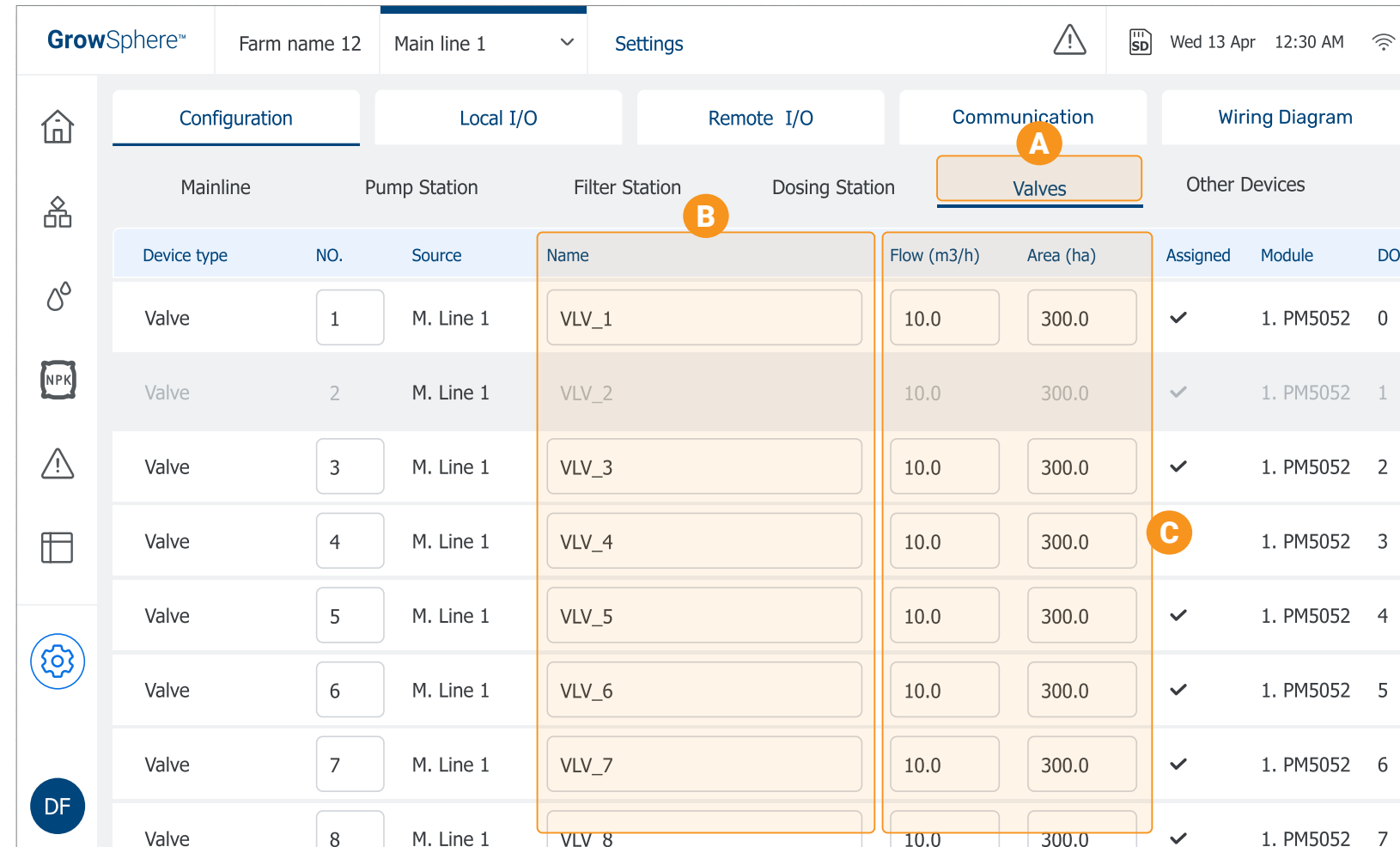
The system displays a row for each of the valves defined in the [Configuration](#) tab.

B Define the Valve Names

The system creates each valve with a default name. You can edit this name to make it more meaningful.

C Define the Valve Parameters

Define the nominal flow rate and the area irrigated by each of the valves.
[More >](#)



Device type	NO.	Source	Name	Flow (m3/h)	Area (ha)	Assigned	Module	DO
Valve	1	M. Line 1	VLV_1	10.0	300.0	✓	1. PM5052	0
Valve	2	M. Line 1	VLV_2	10.0	300.0	✓	1. PM5052	1
Valve	3	M. Line 1	VLV_3	10.0	300.0	✓	1. PM5052	2
Valve	4	M. Line 1	VLV_4	10.0	300.0	✓	1. PM5052	3
Valve	5	M. Line 1	VLV_5	10.0	300.0	✓	1. PM5052	4
Valve	6	M. Line 1	VLV_6	10.0	300.0	✓	1. PM5052	5
Valve	7	M. Line 1	VLV_7	10.0	300.0	✓	1. PM5052	6
Valve	8	M. Line 1	VLV_8	10.0	300.0	✓	1. PM5052	7

Configuring Local I/O

Allocating Digital Outputs and Inputs

The system displays all digital outputs according to the [Controller](#) configuration. Perform the following steps to assign the relevant device to the digital output that it will be connected to:

- A** Tap the **Local I/O** Tab
- B** Tap the **Digital Output** Tab
[More >](#)
- C** Select the Relevant Device Type
The list includes all defined devices that can be connected to this controller module.
- D** Device is Added
The system adds the next available device of the selected type that was not assigned yet.
- E** Continue Allocating Devices
Complete allocating all the devices.
- F** Define **Digital Inputs**
Tap the **Digital Input** tab and define the digital inputs using similar method:
[More >](#)

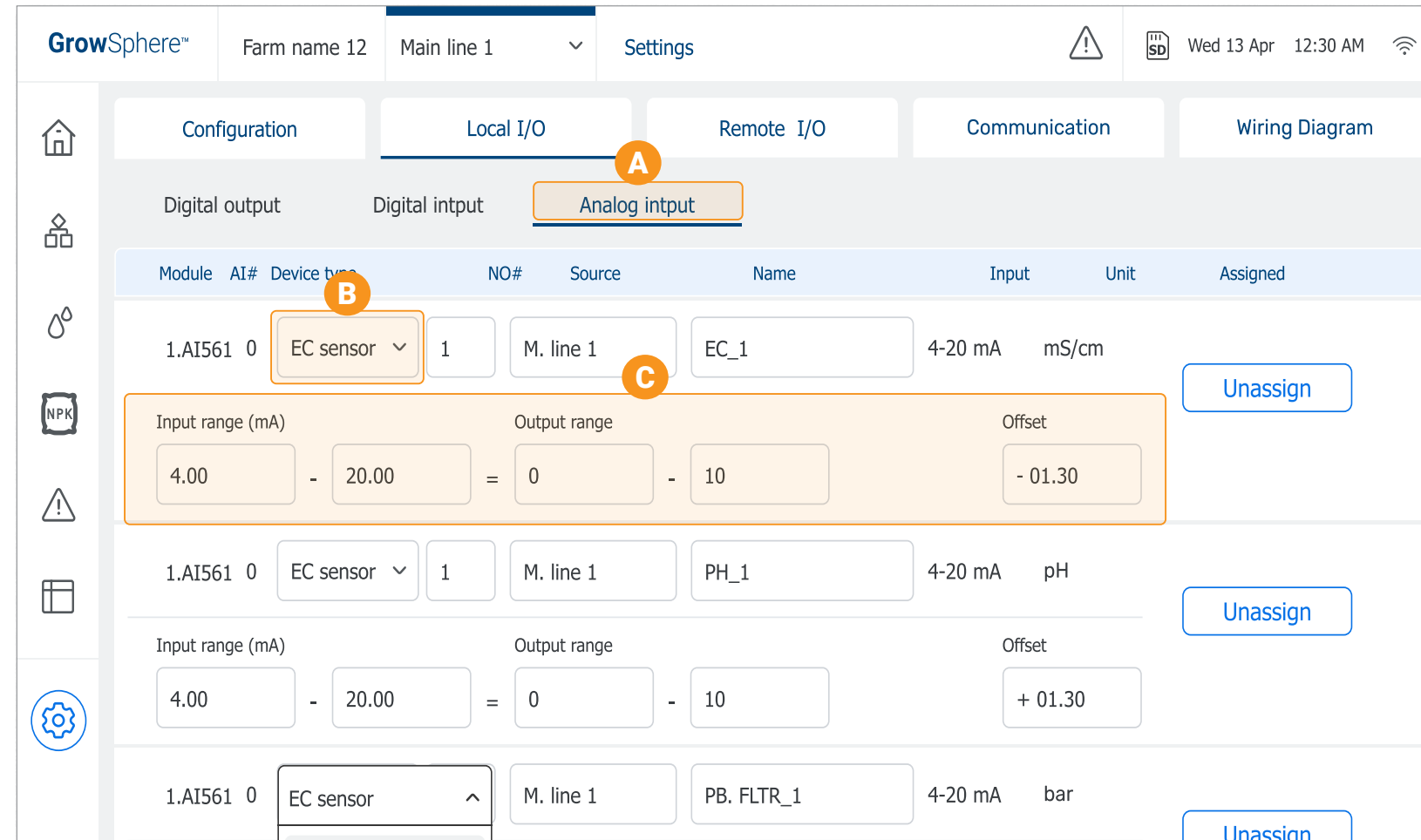
NOTE:
If the system includes remote I/O, first allocate the remote I/O, see [Configuring Remote I/O](#).

Module	DO#	Device type	Device#	Source	Name	Flow	Area (ha)	Assigned
1.PM5052	0	Valve	1	M. line 1	M.VLV_1	10.0 m3/h	300.0	Unassign
1.PM5052	1	Valve	2	M. line 1	VLV_1	10.0 m3/h	-	Unassign
1.PM5052	2	Pump	3	M. line 1	PMP_1	10.0 m3/h	-	Unassign
1.PM5052	3	Pump	4	M. line 1	DCH_1	10.0 m3/h	-	Unassign
1.PM5052	4	M. valve	5	M. line 1	B.PMP_1	10.0 m3/h	-	Unassign
1.PM5052	5	M. valve	6	M. line 1	ALRM_1	10.0 m3/h	-	Unassign
1.PM5052	6	Valve	7	M. line 1	SAME_1	-	-	Unassign
1.PM5052	7	Pump	8	M. line 1	VLV_1	-	-	Unassign
1.PM5052	8	Dosing channel	9	M. line 1	VLV_2	-	-	Unassign
1.PM5052	9	Booster pump	10	M. line 1	VLV_3	-	-	Unassign

Allocating Analog Inputs

Perform the following steps to allocate the relevant sensors to the analog inputs module:

- A** Tap the **Analog Input Tab**
- B** Select the Relevant Sensor Type
The option box displays all defined analog sensor types.
- C** Define the Sensor Parameters
Define the sensor range and its corresponded readings.
- D** Continue Adding the Rest of the Sensors
[More >](#)



The screenshot shows the 'Local I/O' configuration screen in the GrowSphere MAX application. The 'Analog input' tab is selected, and three sensor configurations are listed. The first configuration is highlighted with an orange box, and its parameters are detailed below:

Module	AI#	Device type	NO#	Source	Name	Input	Unit	Assigned
1.AI561	0	EC sensor	1	M. line 1	EC_1	4-20 mA	mS/cm	Unassign
Input range (mA)		Output range		Offset				
4.00 - 20.00		= 0 - 10		- 01.30				
1.AI561	0	EC sensor	1	M. line 1	PH_1	4-20 mA	pH	Unassign
Input range (mA)		Output range		Offset				
4.00 - 20.00		= 0 - 10		+ 01.30				
1.AI561	0	EC sensor		M. line 1	PB. FLTR_1	4-20 mA	bar	Unassign

Configuring Remote I/O

Before allocating the remote I/O, export the hydraulic models to the controller and define the mainline configuration.

Allocating SingleNet and RadioNet

Perform the following steps to allocate the SingleNet or the RadioNet to the devices:

A Tap the **Communication** Tab

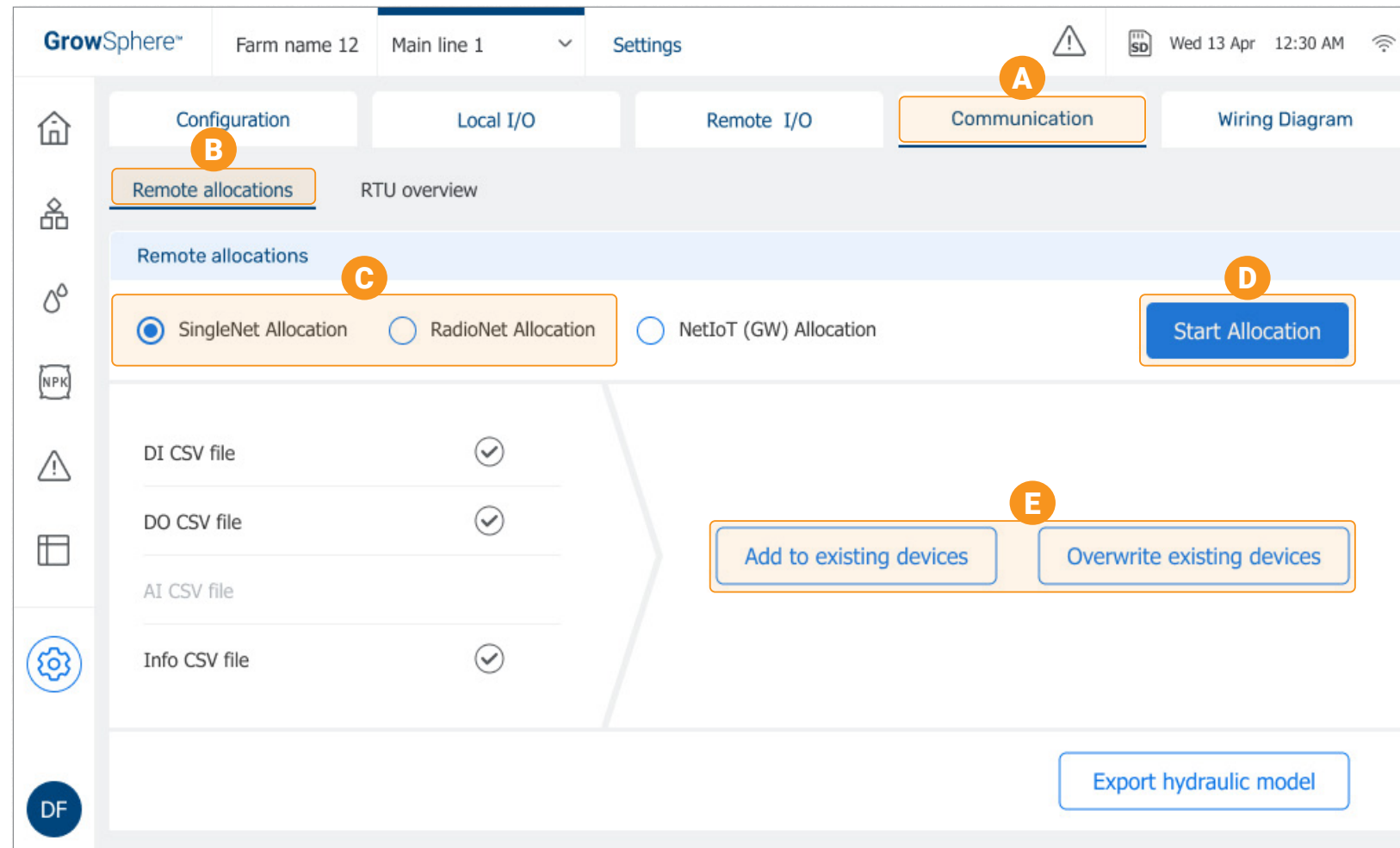
B Tap the **Remote Allocations** Tab

C Select the RTU type

D Tap **Start Allocation**

E Select the method to allocate the devices

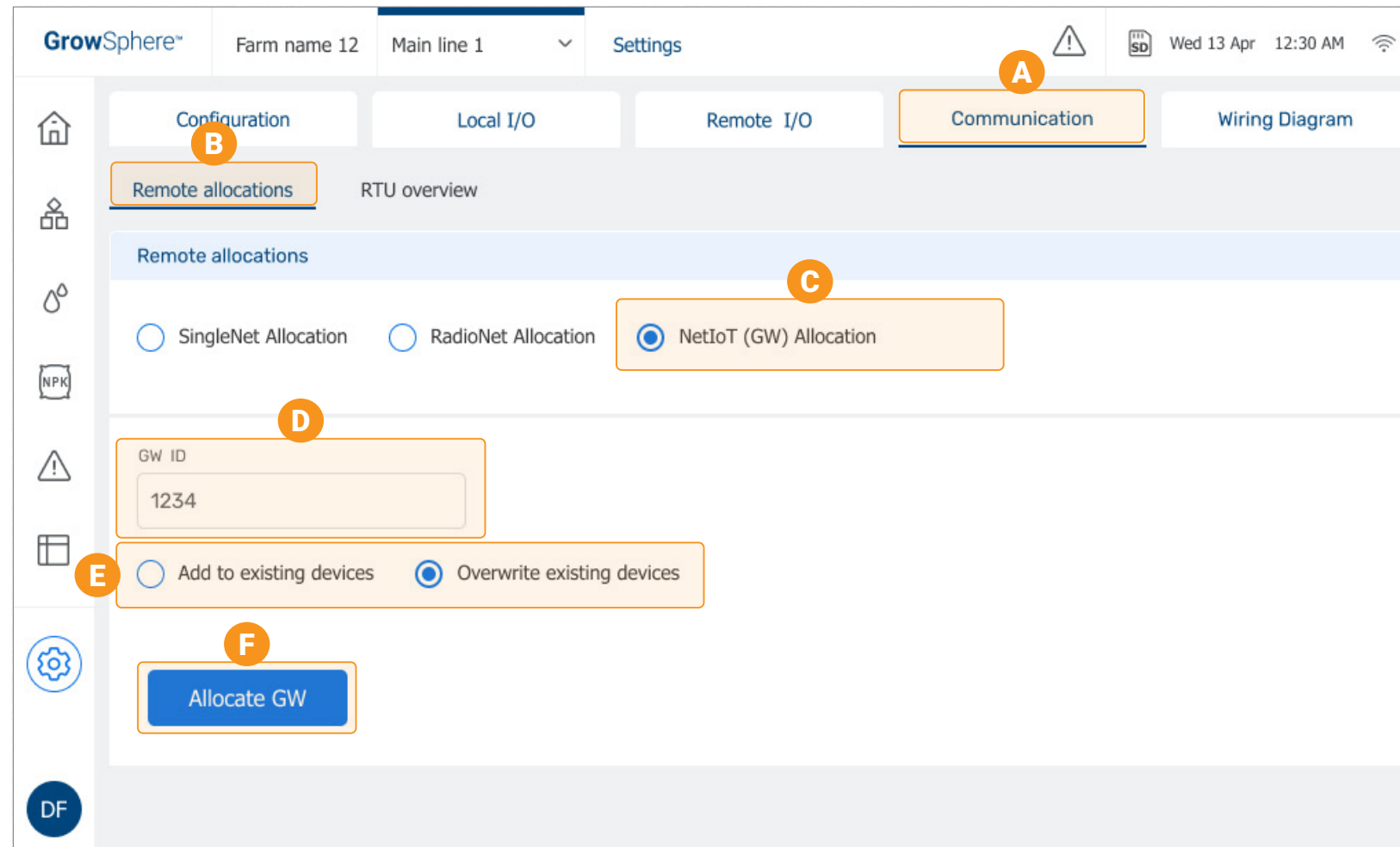
[More >](#)



Allocating NetIoT (Gateway)

Perform the following steps to allocate the NetIoT to the devices:

- A** Tap the **Communication** Tab
 - B** Tap the **Remote Allocations** Tab
 - C** Select **NetIoT (Gateway) Allocation**
 - D** Define Gateway ID
 - E** Select the method to allocate the devices
 - F** Tap **Allocate GW**
- [More >](#)



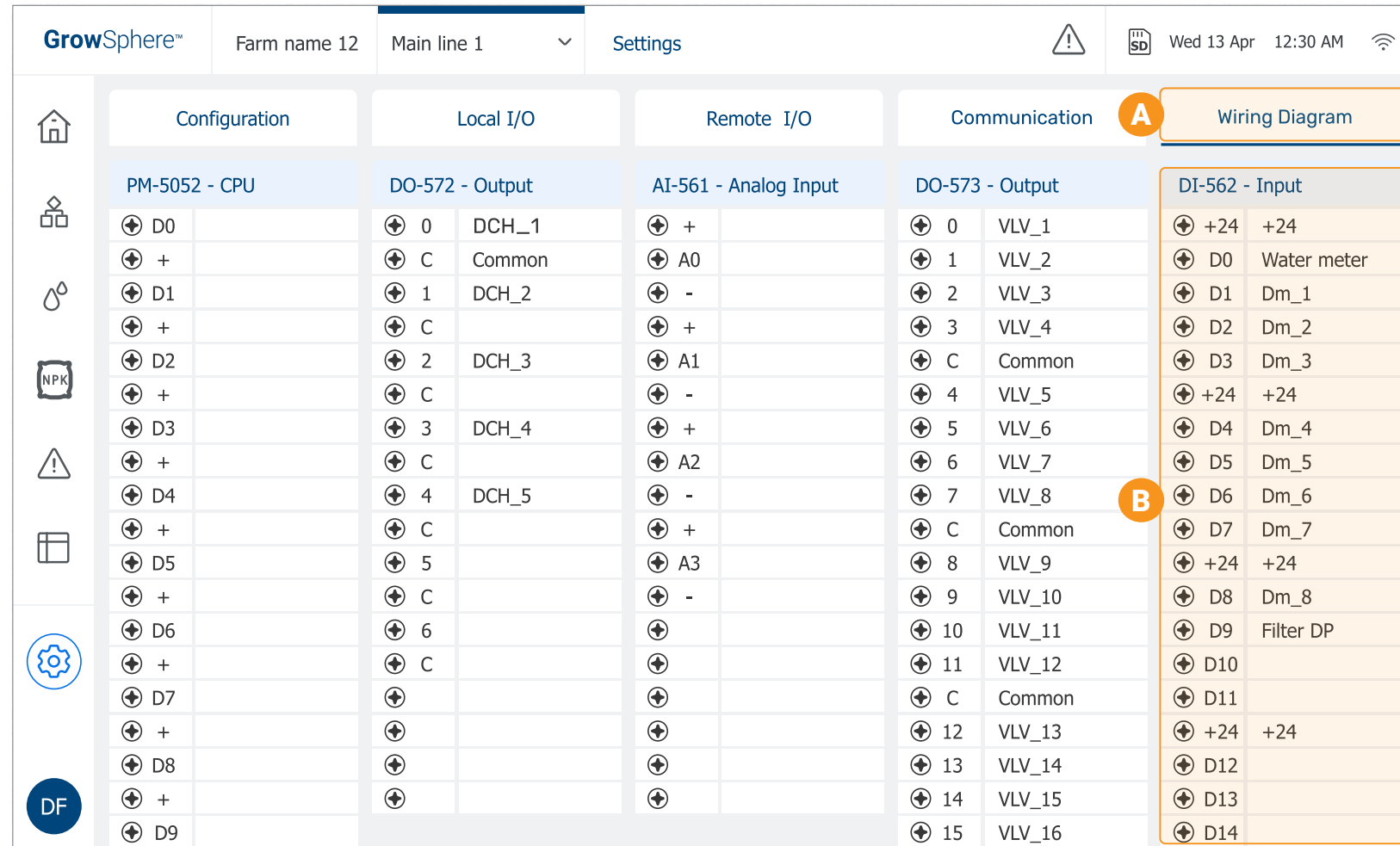
Displaying Wiring Diagram

Perform the following steps to display the wiring diagram that shows what device is connected to which I/O:

A Select Wiring Diagram

B Wiring Information is Displayed

The diagram shows how to connect devices wires to the terminals of the I/O modules.



The screenshot shows the GrowSphere MAX user interface with the 'Wiring Diagram' tab selected. The interface displays a table of I/O modules and their connections. The table is organized into columns for Configuration, Local I/O, Remote I/O, Communication, and Wiring Diagram. The Wiring Diagram column shows the connection of devices to the terminals of the I/O modules.

Configuration	Local I/O	Remote I/O	Communication	Wiring Diagram
PM-5052 - CPU	DO-572 - Output	AI-561 - Analog Input	DO-573 - Output	DI-562 - Input
⊕ D0	⊕ 0 DCH_1	⊕ +	⊕ 0 VLV_1	⊕ +24 +24
⊕ +	⊕ C Common	⊕ A0	⊕ 1 VLV_2	⊕ D0 Water meter
⊕ D1	⊕ 1 DCH_2	⊕ -	⊕ 2 VLV_3	⊕ D1 Dm_1
⊕ +	⊕ C	⊕ +	⊕ 3 VLV_4	⊕ D2 Dm_2
⊕ D2	⊕ 2 DCH_3	⊕ A1	⊕ C Common	⊕ D3 Dm_3
⊕ +	⊕ C	⊕ -	⊕ 4 VLV_5	⊕ +24 +24
⊕ D3	⊕ 3 DCH_4	⊕ +	⊕ 5 VLV_6	⊕ D4 Dm_4
⊕ +	⊕ C	⊕ A2	⊕ 6 VLV_7	⊕ D5 Dm_5
⊕ D4	⊕ 4 DCH_5	⊕ -	⊕ 7 VLV_8	⊕ D6 Dm_6
⊕ +	⊕ C	⊕ +	⊕ C Common	⊕ D7 Dm_7
⊕ D5	⊕ 5	⊕ A3	⊕ 8 VLV_9	⊕ +24 +24
⊕ +	⊕ C	⊕ -	⊕ 9 VLV_10	⊕ D8 Dm_8
⊕ D6	⊕ 6	⊕	⊕ 10 VLV_11	⊕ D9 Filter DP
⊕ +	⊕ C	⊕	⊕ 11 VLV_12	⊕ D10
⊕ D7	⊕	⊕	⊕ C Common	⊕ D11
⊕ +	⊕	⊕	⊕ 12 VLV_13	⊕ +24 +24
⊕ D8	⊕	⊕	⊕ 13 VLV_14	⊕ D12
⊕ +	⊕	⊕	⊕ 14 VLV_15	⊕ D13
⊕ D9	⊕	⊕	⊕ 15 VLV_16	⊕ D14

Defining Dosing Channels Setup

Perform the following steps to define the operation of the dosing channels:

A Tap the **Dosing** Button

B Tap **Channel Settings**

C Enable the Dosing Channel

Select the check-box to enable the relevant dosing channels.

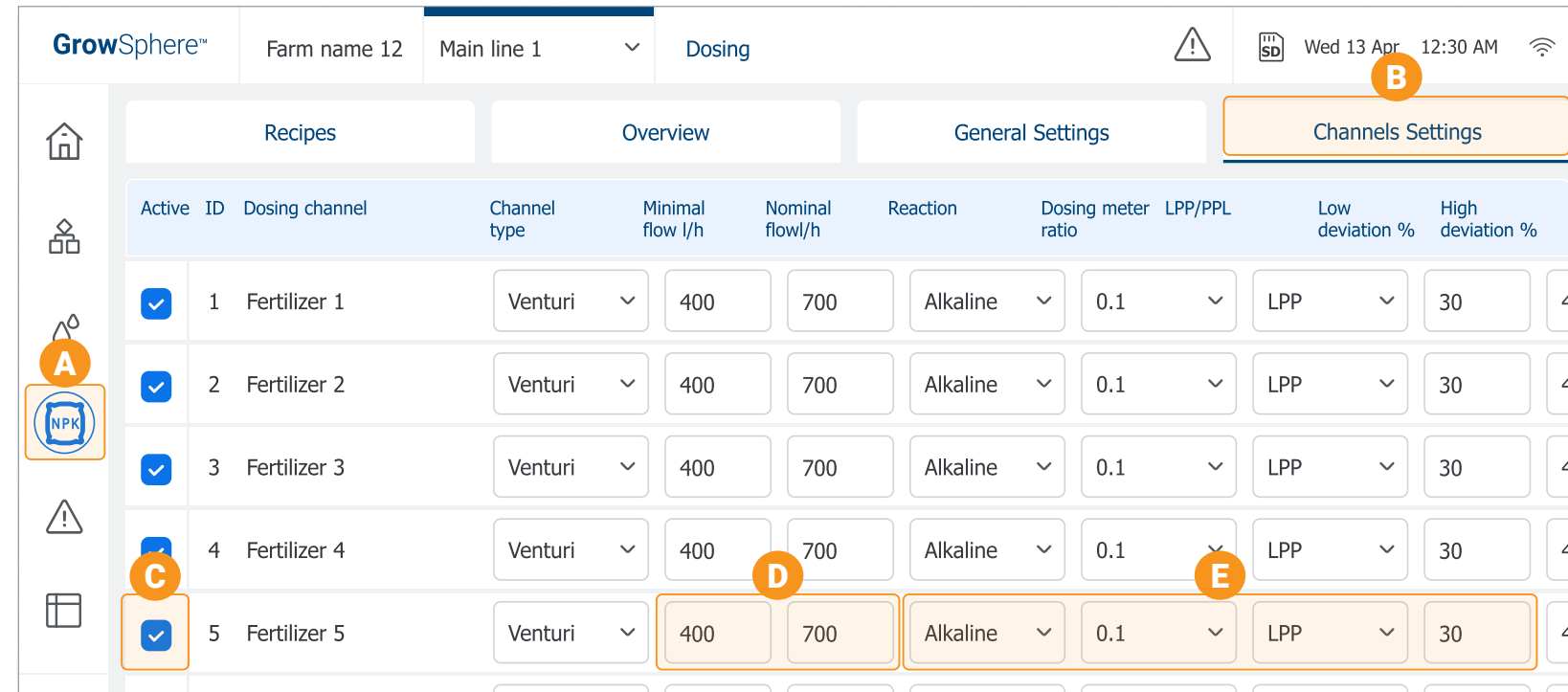
D Define the Dosing Channel

Select the type of pump and define the minimal and nominal channel flow.

E Adjust the Dosing Channel (optional)

It is possible to adjust the parameters used to control the channel.

[More >](#)



Active	ID	Dosing channel	Channel type	Minimal flow l/h	Nominal flow/h	Reaction	Dosing meter ratio	LPP/PPL	Low deviation %	High deviation %
<input checked="" type="checkbox"/>	1	Fertilizer 1	Venturi	400	700	Alkaline	0.1	LPP	30	40
<input checked="" type="checkbox"/>	2	Fertilizer 2	Venturi	400	700	Alkaline	0.1	LPP	30	40
<input checked="" type="checkbox"/>	3	Fertilizer 3	Venturi	400	700	Alkaline	0.1	LPP	30	40
<input checked="" type="checkbox"/>	4	Fertilizer 4	Venturi	400	700	Alkaline	0.1	LPP	30	40
<input checked="" type="checkbox"/>	5	Fertilizer 5	Venturi	400	700	Alkaline	0.1	LPP	30	40

Configuring General Dosing Settings

Perform the following steps to configure dosing settings:

A Tap the **General Settings** tab

B Select Extensive or Intensive

- **Extensive:** When the dosing channels are far away from the field.
- **Intensive:** When fertilizers are injected in to relative short distribution pipes and with more precise control.

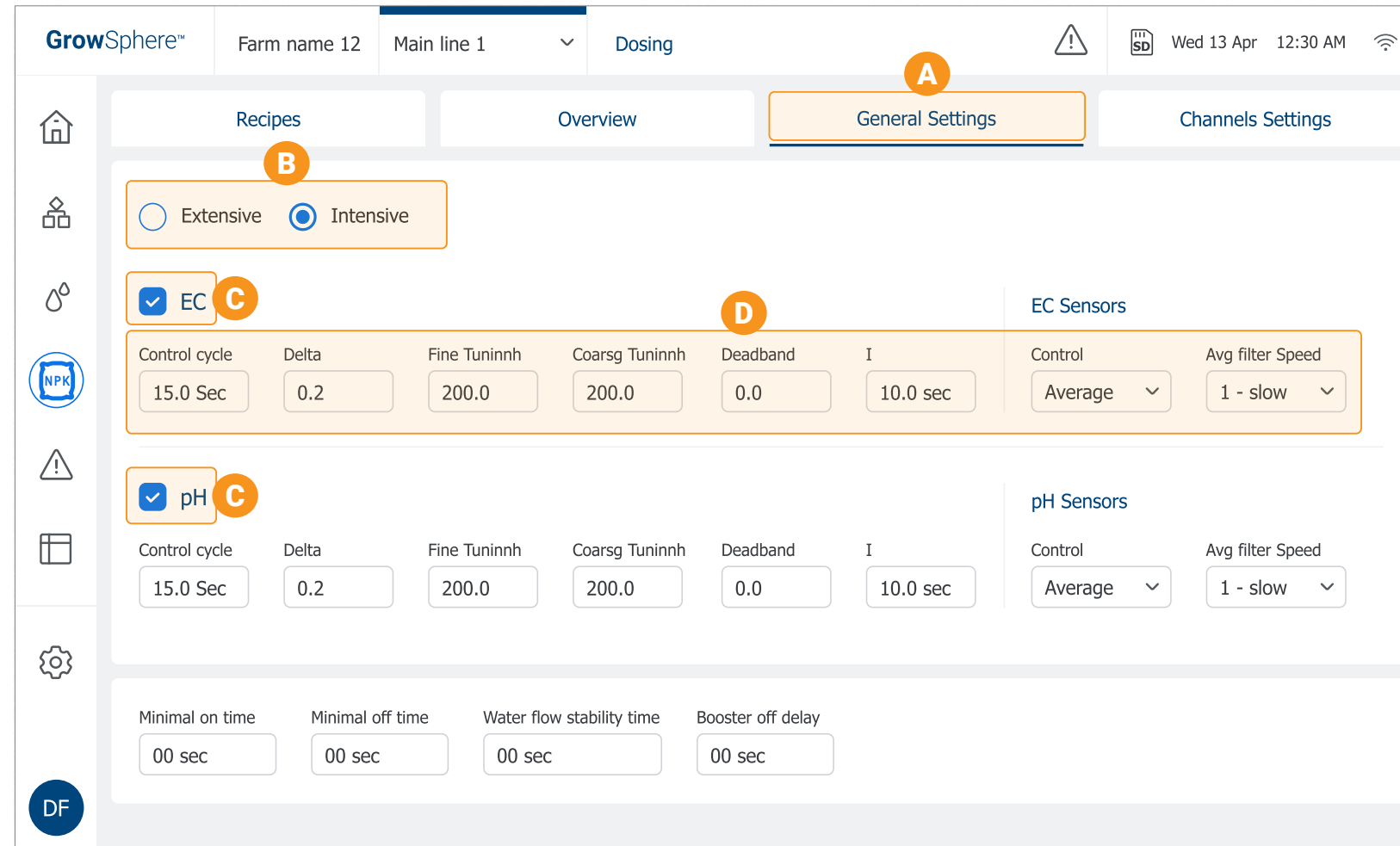
C Select the Control Type

Select if fertilization is controlled by EC/pH.

D Adjust the Control Parameters

These are optional settings.

[More >](#)



The screenshot shows the 'General Settings' tab for dosing. The interface includes a top navigation bar with 'Farm name 12', 'Main line 1', and 'Dosing'. Below this are tabs for 'Recipes', 'Overview', 'General Settings', and 'Channels Settings'. The 'General Settings' tab is active and shows options for 'Extensive' and 'Intensive' dosing, with 'Intensive' selected. There are checkboxes for 'EC' and 'pH' control types, both of which are selected. Below these are two sets of control parameters for EC and pH, including 'Control cycle', 'Delta', 'Fine Tuninnh', 'Coarsg Tuninnh', 'Deadband', and 'I'. At the bottom, there are four optional settings: 'Minimal on time', 'Minimal off time', 'Water flow stability time', and 'Booster off delay', all set to '00 sec'.

2.2 Installation

This section reviews installing GrowSphere™ and connecting the control devices:

Plate Mounting

Mounting the Controller

There are two options to mount GrowSphere™:

Plate Mounting

Perform the following steps to mount GrowSphere™ to a plate:

A Prepare a Plate

Prepare a plate and drill four holes according to the measurements.

[More >](#)

B Attach Controller

Attach Controller to plate using the four screws supplied.

Wall Mounting

Perform the following steps to mount GrowSphere™ to a wall:

A Attach Brackets

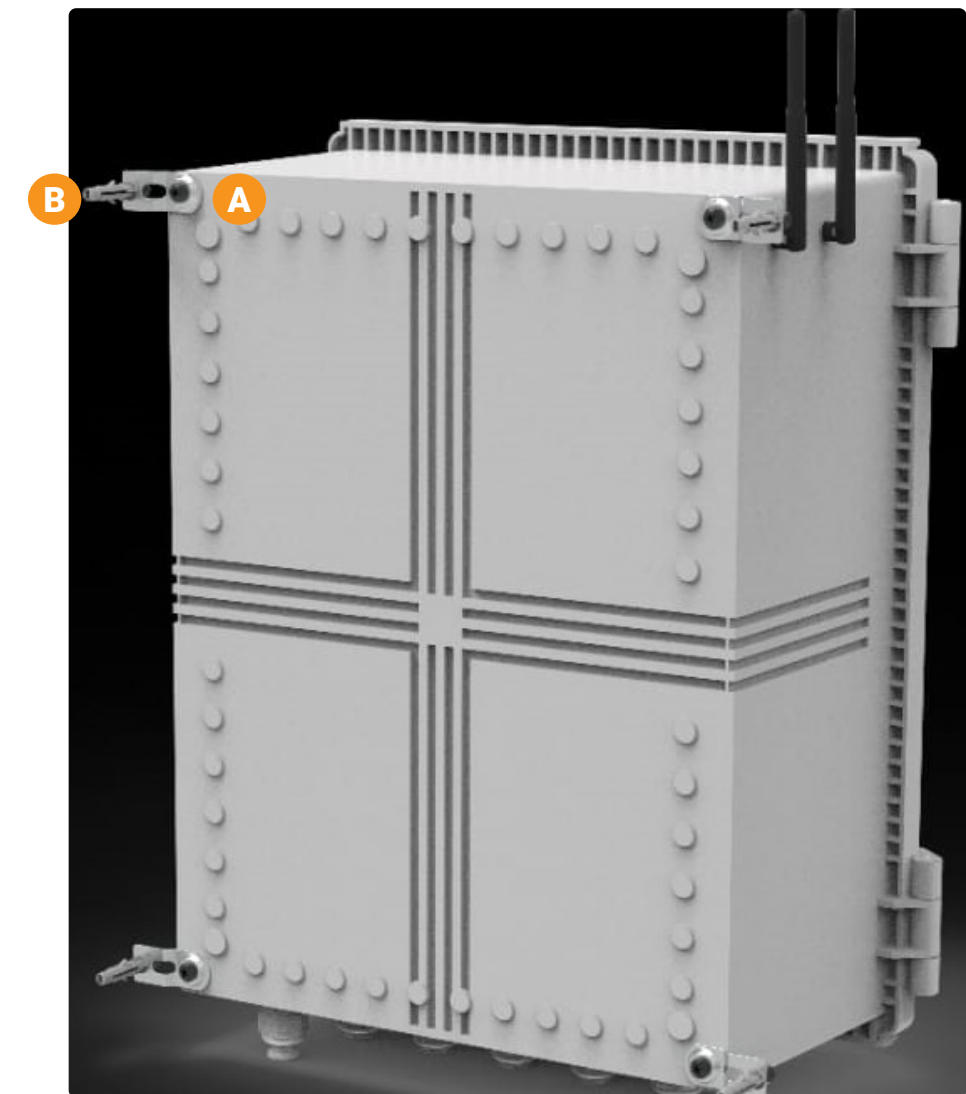
Attach one bracket to each corner of the controller using the screws supplied.

B Drill Anchors

Drill anchors in wall and attach controller to wall using the brackets.



Wall Mounting



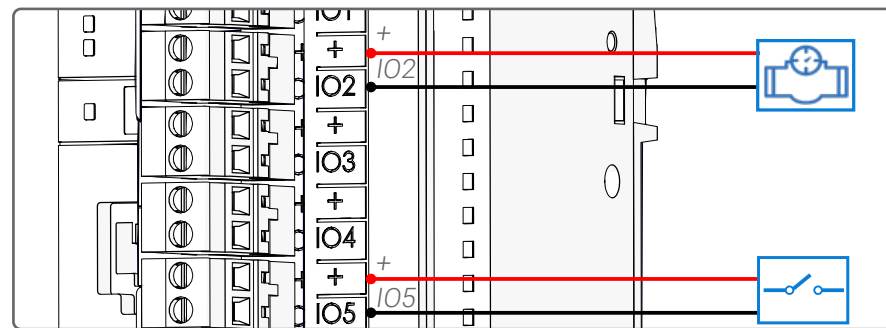
Connecting the Devices

Perform the following steps to connect the control devices:

A Connect Digital Inputs

Connect digital inputs to the CPU module.

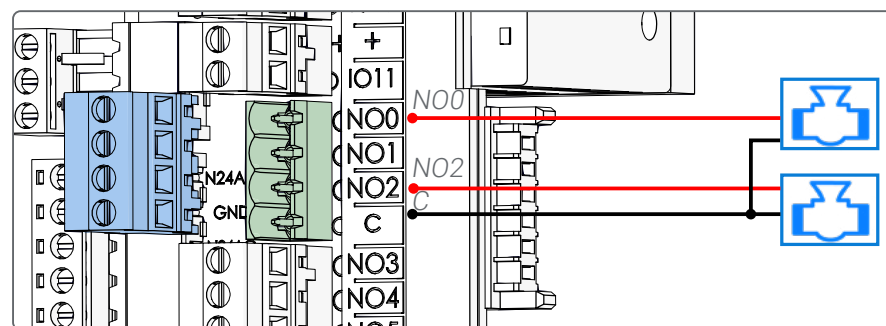
[More >](#)



B Connect Digital Outputs

Connect digital outputs to the CPU module.

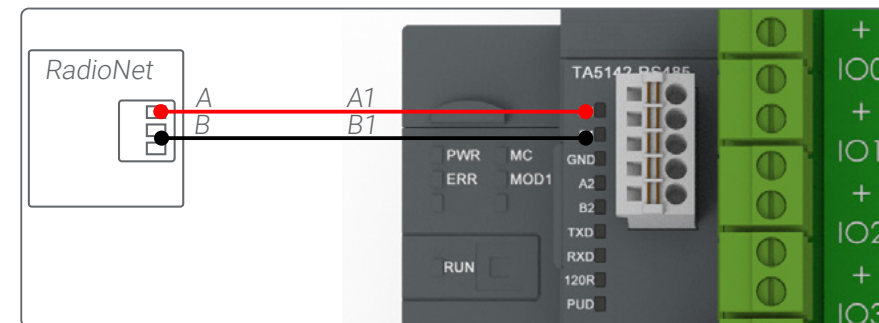
[More >](#)



C Connect SingleNet or RadioNet

A1 in the CPU connects to A in the host.
B1 in the CPU connects to B in the host.

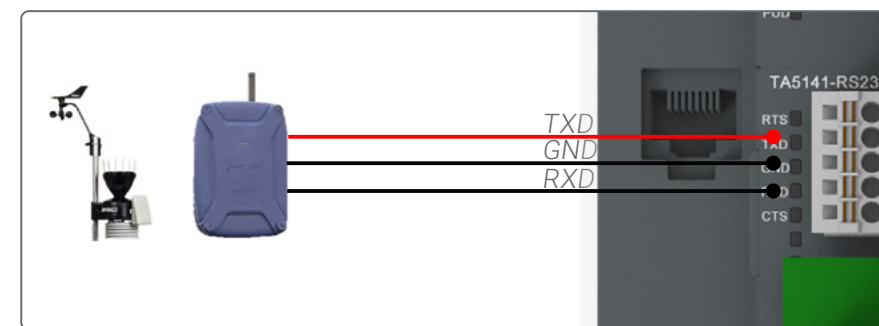
[More >](#)



D Connect NetRTU or Weather Station

The NetRTU or Weather Station connects to the TXD, GND and RXD terminals in the CPU.

[More >](#)

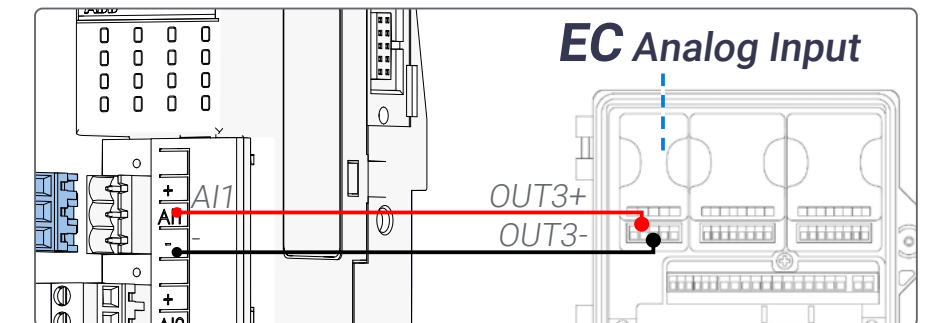


E Connect EC Unit

A11 in the A1-561 module connects to OUT3(+) in the EC unit.

(-) in the A1-561 module connects to OUT3(-) in the EC unit.

[More >](#)

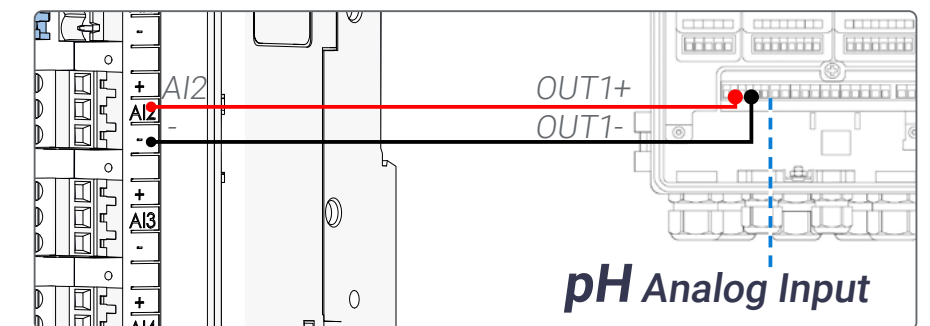


F Connect pH Unit

A12 in the A1-561 module connects to OUT1(+) in the pH unit.

(-) in the A1-561 module connects to OUT1(-) in the pH unit.

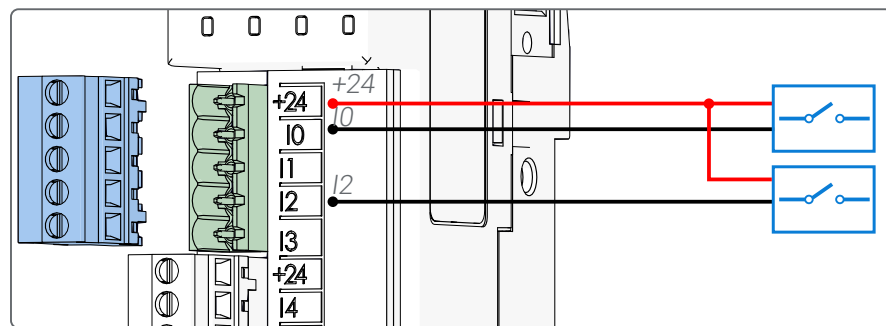
[More >](#)



G Connect Digital Inputs

Connect digital inputs to the DI562 module.

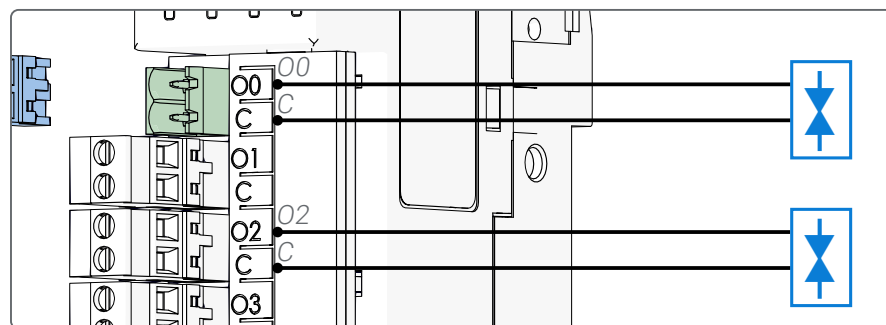
[More >](#)



H Connect Dosing Outputs

Connect dosing valves to the DO572 module.

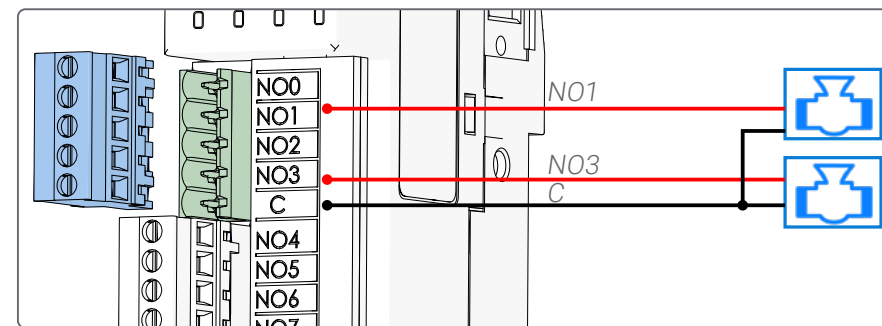
[More >](#)



I Connect Digital Outputs

Connect digital outputs to the DO573 module.

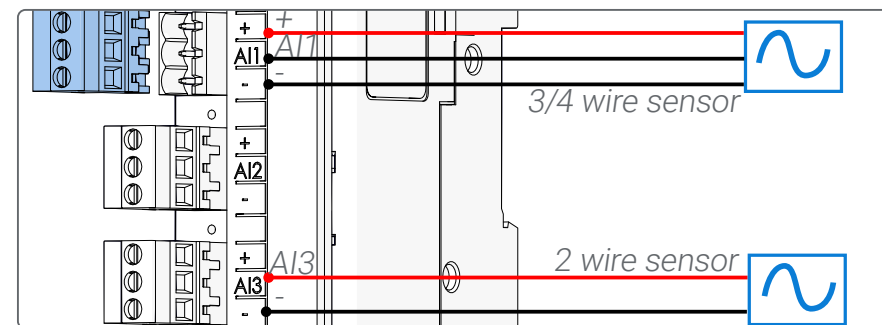
[More >](#)



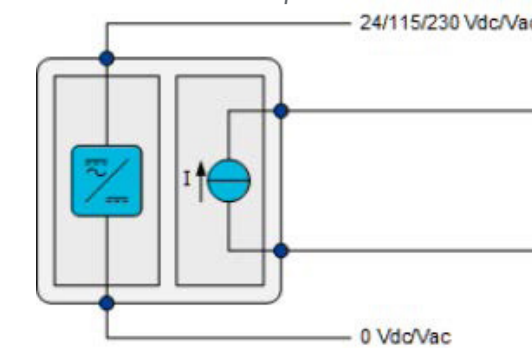
J Connect Analog Inputs

Connect analog inputs to the AI - 561 module.

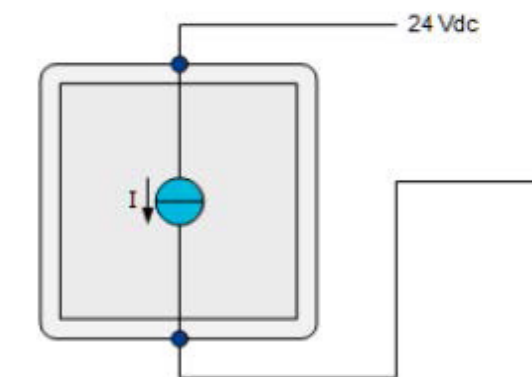
[More >](#)



Connecting isolated sensor with current output



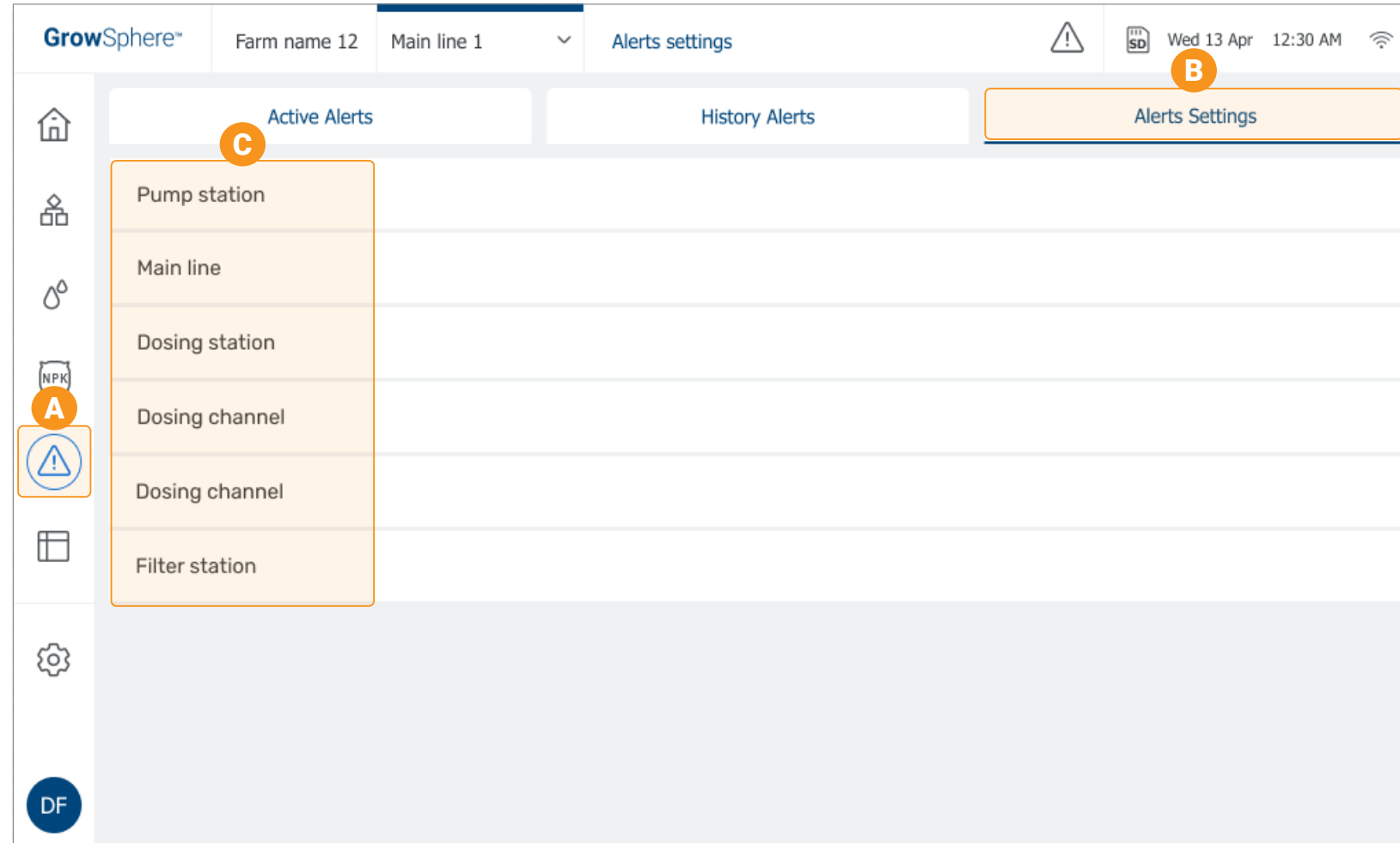
Connecting current transmitter



Configuring the Alarm Settings

Perform the following steps to configure the alarm settings:

- A** Tap the **Alerts** Button
- B** Tap the **Alerts Settings** Tab
- C** Define Device Settings
Define the alert settings for each device.
[More >](#)



Testing the Devices

Perform the following steps to verify that the devices are connected properly to the controller I/Os:

A Tap the **Configuration** Button

The Sub-menu opens.

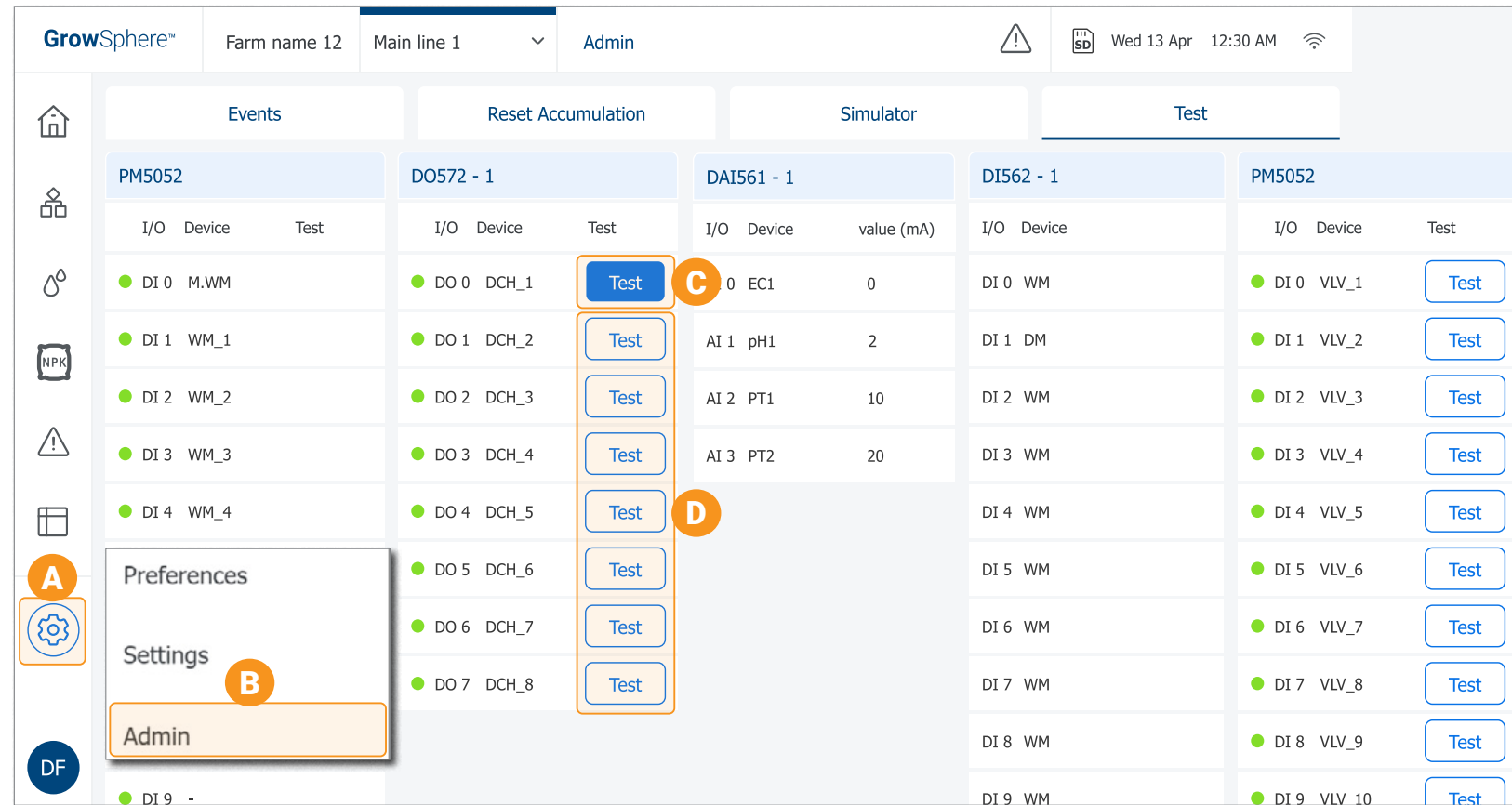
B Select **Admin** and type your credentials

C Test the Device

Tap the **Test** button to manually activate the device and verify that the correct device is activated.

D Test the Other Devices

Continue testing all the devices.



CAUTION

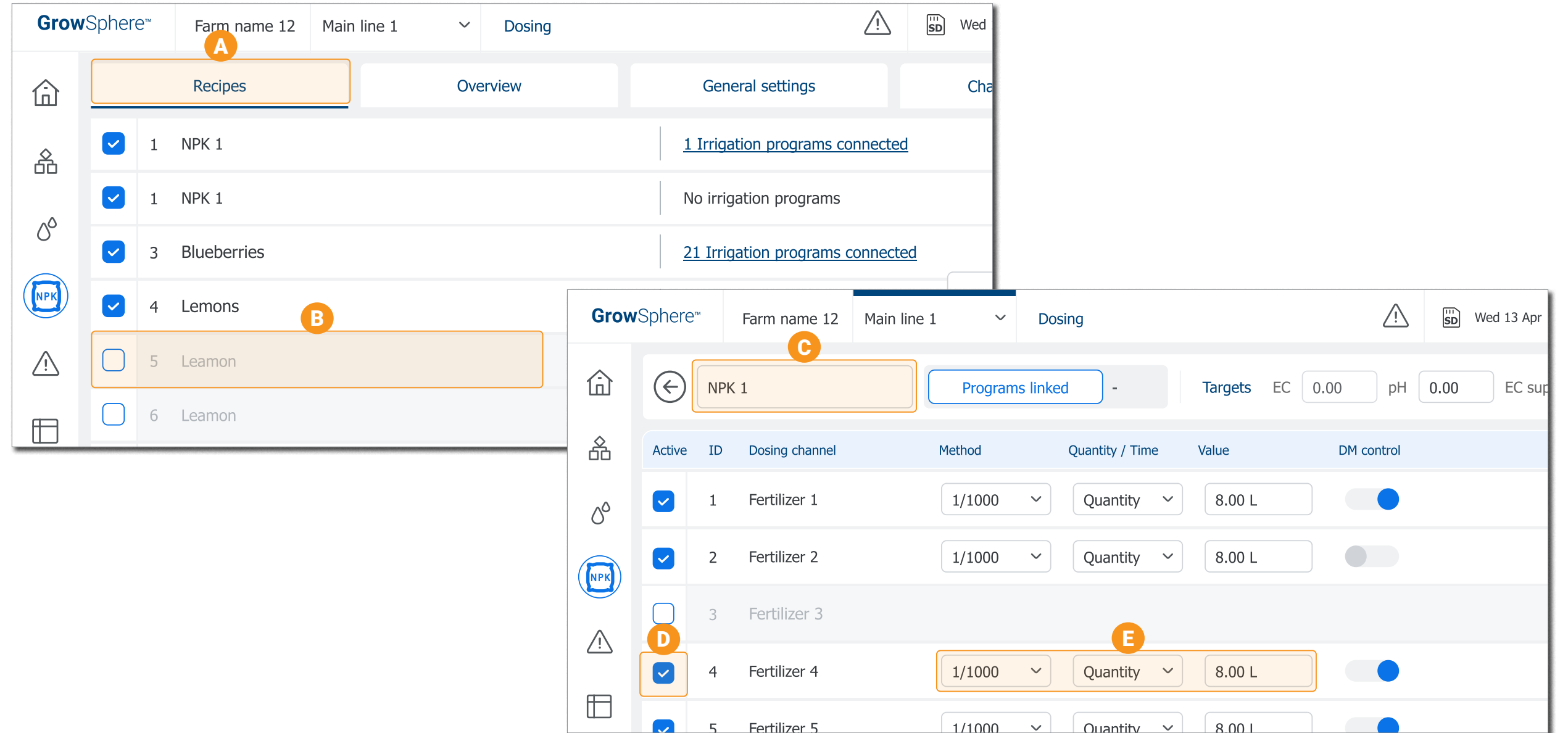
- This operation can be done by system administrator only.
- Before activating a device, verify that the device operation is permitted and will not create any damages.

2.3 Operation

Configuring Dosing Recipe

Perform the following steps to create a new dosing recipe or edit existing one:

- A Tap the Recipes tab**
List of all existing recipes is displayed.
- B Edit Recipe Parameters**
Tap the first undefined row of the list to create a new recipe or tap existing recipe.
- C Dosing Recipe Opens**
List of all the dosing channels is displayed.
- D Activate Relevant Channels**
Select the check box of the channels you wish to activate in this recipe.
- E Set Dosing Method**
Define the method dosing is performed in each of the selected channels.
[More >](#)



The first screenshot shows the 'Dosing' screen for 'Farm name 12' and 'Main line 1'. The 'Recipes' tab is selected, showing a list of recipes:

Recipe ID	Recipe Name	Irrigation Programs
1	NPK 1	1 Irrigation programs connected
1	NPK 1	No irrigation programs
3	Blueberries	21 Irrigation programs connected
4	Lemons	
5	Leamon	
6	Leamon	

The second screenshot shows the configuration for 'NPK 1'. The 'Programs linked' section is empty. The 'Targets' section shows EC 0.00, pH 0.00, and EC sup. The 'Dosing channels' table is as follows:

Active	ID	Dosing channel	Method	Quantity / Time	Value	DM control
<input checked="" type="checkbox"/>	1	Fertilizer 1	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	Fertilizer 2	1/1000	Quantity	8.00 L	<input type="checkbox"/>
<input type="checkbox"/>	3	Fertilizer 3				
<input checked="" type="checkbox"/>	4	Fertilizer 4	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	5	Fertilizer 5	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>

Managing Irrigation Programs

Perform the following steps to create a new irrigation program, or to edit existing one:

- A Tap the Irrigation button**
List of all existing programs is displayed.
- B Create Program**
Tap the first undefined row of the list to create a new irrigation program, or tap existing program to edit its parameters.
- C The Edit Program Screen Opens**
- D Define the Program Name**
The program is created with a default name but it is recommended to give it a meaningful name.
- E Define General Program Parameters**
[More >](#)
- F Define when Program will be Active**
[More >](#)

The image displays two screenshots from the GrowSphere app interface, illustrating the steps to manage irrigation programs.

Left Screenshot (List View): Shows a list of irrigation programs under the 'Irrigation' tab. The list includes columns for program ID, name, type, duration, and shifts. Program 02 is highlighted, and the 'Irrigation' button (A) is visible in the bottom left corner.

ID	Program Name	Type	Duration	Shifts	Next Irrigation
1	Program 01	Routine	01:00:00	1 Shifts	06/01/23 08:00
2	Program 02	Routine	00:00:00	0 Shifts	
3	Program 03	Routine	00:00:00	0 Shifts	
4	Program 04	Routine	00:00:00	0 Shifts	
5	Program 05	Routine	00:00:00	0 Shifts	
6	Program 06	Routine	00:00:00	0 Shifts	
7	Program 07	Routine	00:00:00	0 Shifts	
8	Program 08	Routine	00:00:00	0 Shifts	
9	Program 09	Routine	00:00:00	0 Shifts	
10	Program 10	Routine	00:00:00	0 Shifts	

Right Screenshot (Edit Program View): Shows the 'Edit Program' screen for 'Program 01'. The screen displays various parameters for the program, including Type, Priority, Unit, Date range, and Schedule. The 'Activate' button is visible in the top right corner.

Program Parameters:

- Type: Routine
- Priority: Normal
- Unit: HH:MM
- Amount (shift): 01:00
- Total: 01:00 | 55.00 m³
- Last irrigation: 04.01.23 | 08:00
- Next irrigation: 06.01.23 | 08:00
- Factor: 100%
- Shifts: 1
- Dosing: Dosing 1

Schedule:

- Date range & time: 01.01.23 to 31.01.23
- Schedule: week days, 1 week
- Days: Su, Mo, Tu, We, Th, Fr, Sa
- Water before & after: Apply To: Per shift, Unit: HH:MM, Before: 00:00, After: 00:00

G Schedule days program will be active

Define in which days of the week, or what cycle the irrigation program will run.

[More >](#)

H Define Water Flushing

Set amount of water to be applied before and/or after fertilizer dosing.

[More >](#)

I Define Shifts

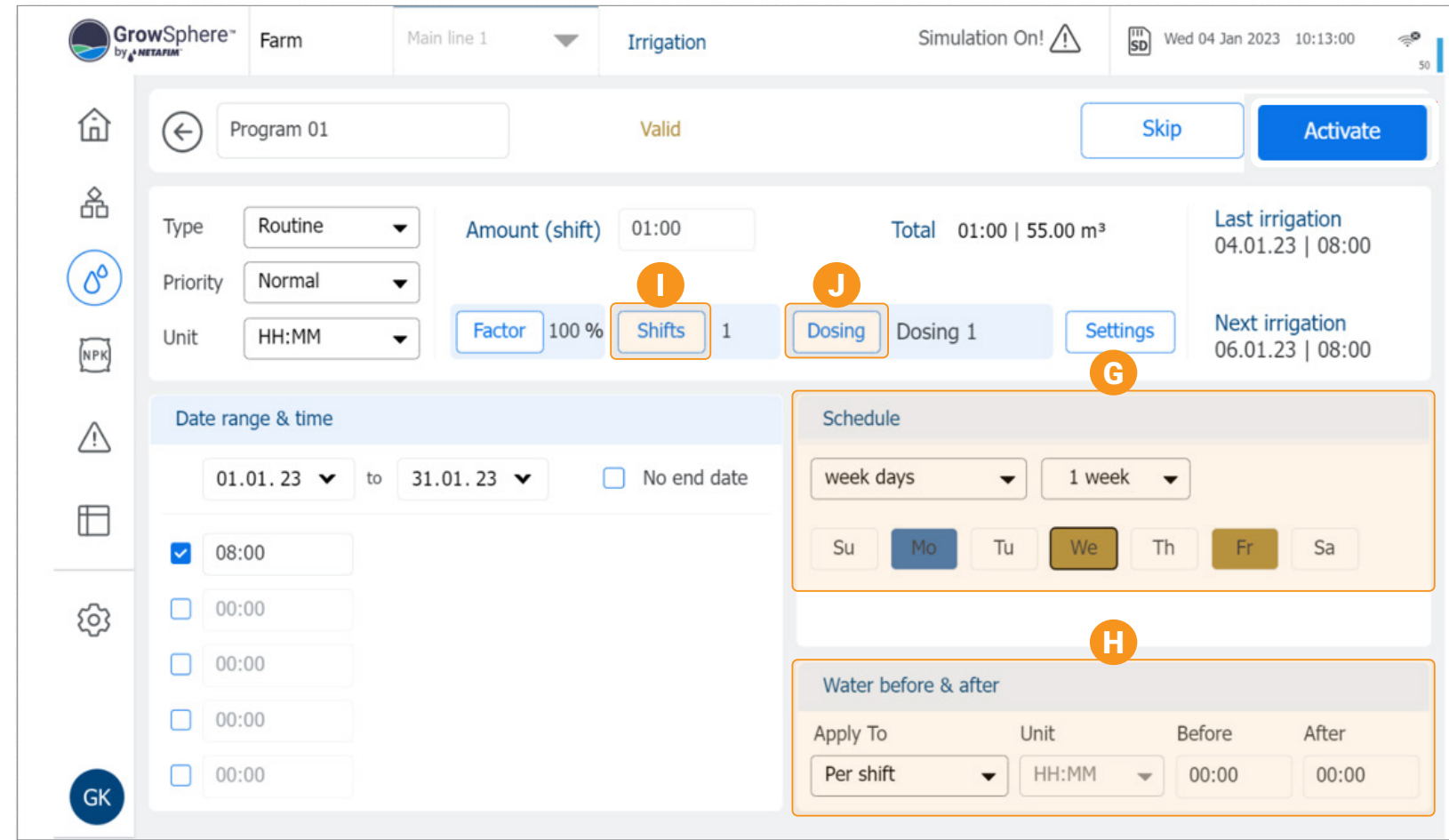
Tap the **Shifts** button to assign shifts for this irrigation program.

[More >](#)

J Define Dosing Recipe

Tap the **Dosing** button to assign a recipe to this irrigation program.

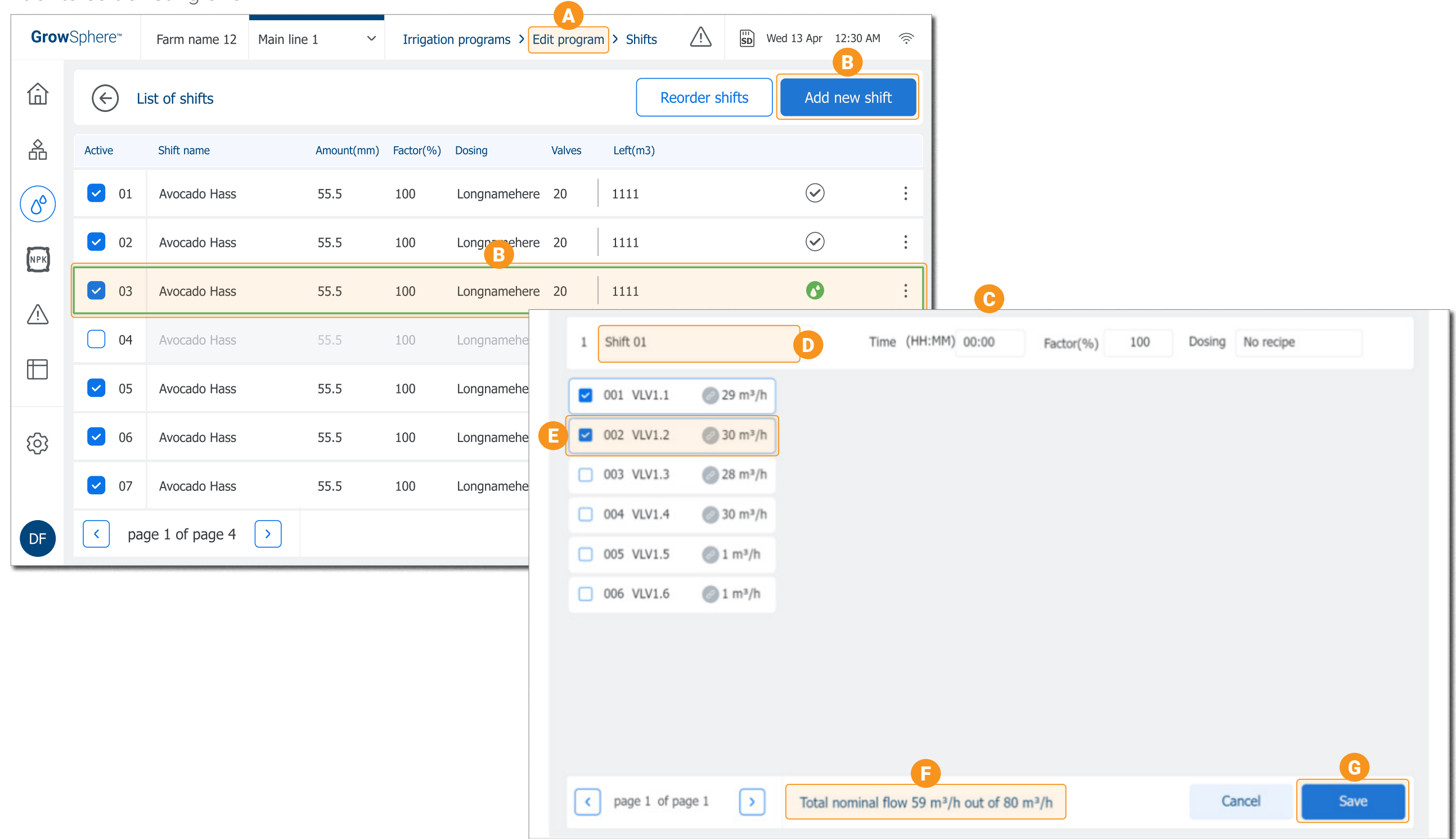
[More >](#)



Defining Shifts

Perform the following steps to create a new shift or to edit existing one:

- A Shift Screen**
The Shift screen is opened from the **Edit Program** screen.
- B Add New Shift**
Tap the **Add New Shift** button to create a new shift, or tap the relevant shift to edit existing shift.
- C The Shift Valves Screen opens**
- D Define the Shift Name**
The shift is created with a default name but it is recommended to give it a meaningful name.
- E Select the Shift Valves**
Select all the valves that will be opened during the shift.
- F Note the Calculated Flow**
The calculated flow of the selected valves is displayed.
- G Tap Save**



The screenshot displays the GrowSphere interface for defining shifts. It is divided into two main sections: the 'List of shifts' screen and the 'Shift Valves' screen.

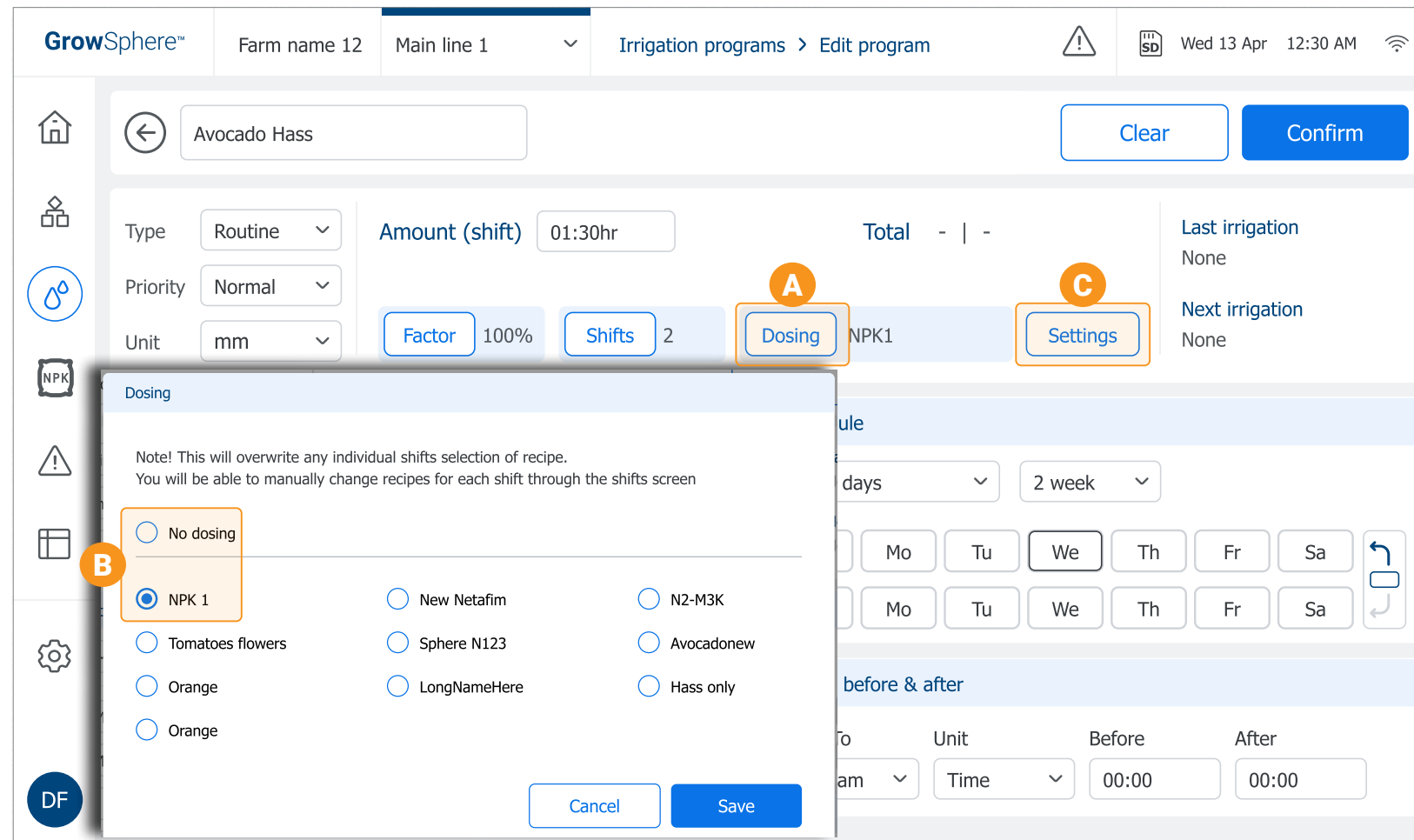
List of shifts screen: This screen shows a table of existing shifts. The columns are: Active, Shift name, Amount(mm), Factor(%), Dosing, Valves, and Left(m3). The table contains 7 rows of shifts, all named 'Avocado Hass' with an amount of 55.5 mm and a factor of 100%. The 'Dosing' column contains the text 'Longnamehere'. The 'Valves' column contains the number '20'. The 'Left(m3)' column contains the number '1111'. The third row (Shift 03) is highlighted in orange, indicating it is selected for editing. A blue 'Add new shift' button is visible in the top right corner.

Shift Valves screen: This screen is used to define the valves for a specific shift. It shows a list of valves with checkboxes and flow rates. The valves are: 001 VLV1.1 (29 m³/h), 002 VLV1.2 (30 m³/h), 003 VLV1.3 (28 m³/h), 004 VLV1.4 (30 m³/h), 005 VLV1.5 (1 m³/h), and 006 VLV1.6 (1 m³/h). The first two valves (001 and 002) are selected. The screen also displays a 'Total nominal flow 59 m³/h out of 80 m³/h' at the bottom. A 'Save' button is visible in the bottom right corner.

Allocating Recipe to Program

Perform the following steps to assign a dosing recipe to the irrigation program:

- A Tap Dosing**
Tap the **Dosing** button to open a list of recipes.
- B Select Recipe**
Select the required **Dosing** recipe, or select **No Dosing**.
- C Modify Dosing Recipe**
If needed, tap the **Settings** button to add or modify the Recipe list.



Allocating Shifts to Program

Perform the following steps to select the shift that will be executed by the irrigation program:

A Tap the **Shifts** Button

B Shift Screen Opens

The screen displays the existing shifts.

C Select Relevant Shift

D Tap **Reorder Shifts** (optional)

If needed, tap this button to change the order of the shifts.

E Tap **Add New Shift** (optional)

If needed, tap this button to add a new shift.

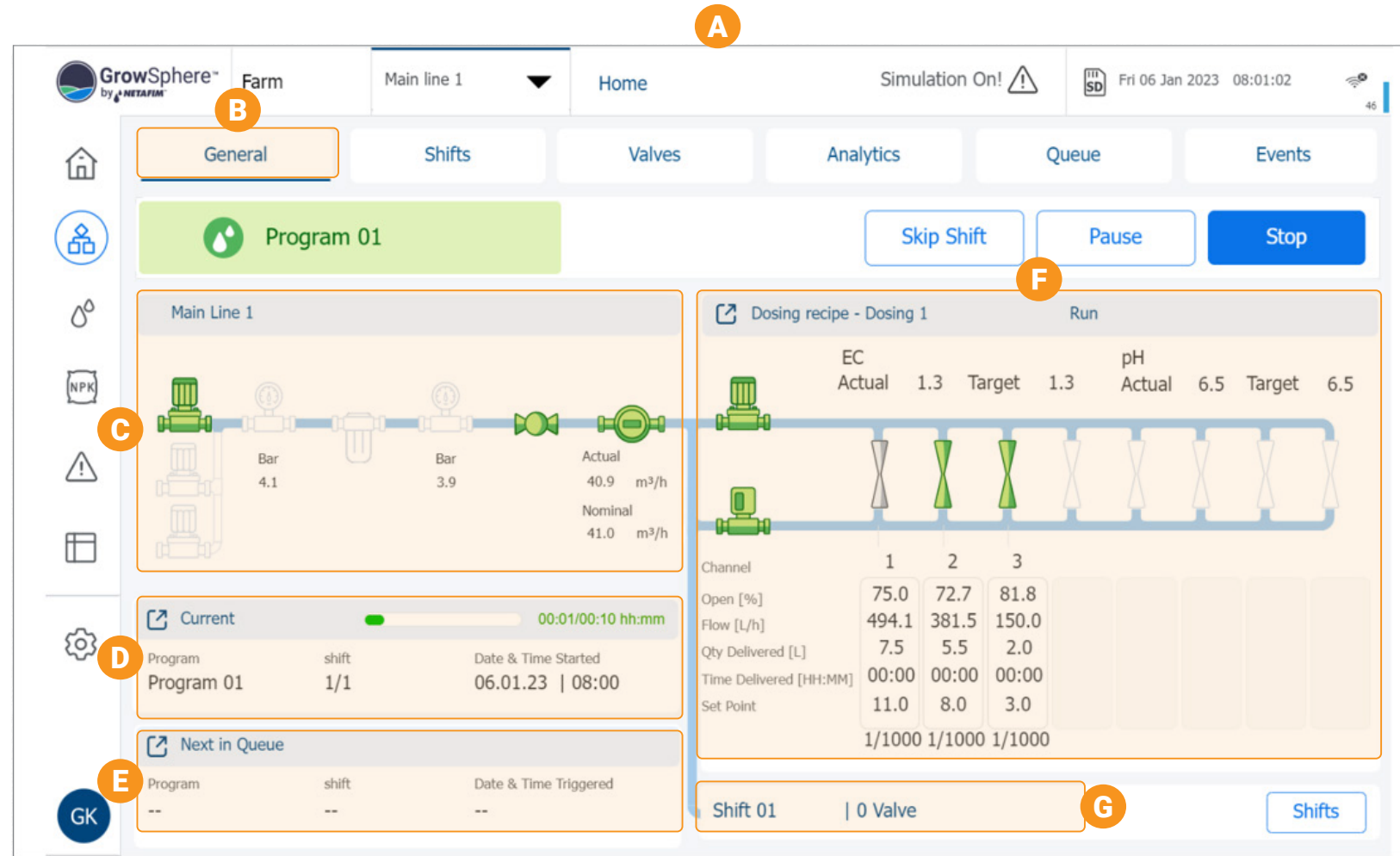
The screenshot shows two overlapping screens from the GrowSphere irrigation management system. The top screen is the 'Edit program' screen for 'Avocado Hass' on 'Main line 1'. It displays various settings like 'Type: Routine', 'Amount (shift): 01:30hr', and 'Unit: mm'. A callout 'A' points to the 'Shifts' button. The bottom screen is the 'List of shifts' screen, showing a table of existing shifts. Callout 'B' points to the top of this screen. Callout 'C' points to a specific shift in the table. Callout 'D' points to the 'Reorder shifts' button, and callout 'E' points to the 'Add new shift' button.

Active	Shift name	Amount(mm)	Factor(%)	Dosing	Valves	Left(m3)	
<input checked="" type="checkbox"/>	01 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> ⋮
<input checked="" type="checkbox"/>	02 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> ⋮
<input checked="" type="checkbox"/>	03 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> ⋮
<input checked="" type="checkbox"/>	04 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> ⚠️ ❌ ⋮
<input checked="" type="checkbox"/>	05 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> 🌱 ⋮
<input type="checkbox"/>	06 Avocado Hass	55.5	100	Longnamehere	20	1111	<input type="checkbox"/> ⋮
<input checked="" type="checkbox"/>	07 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> ⋮

Monitoring the Irrigation

Perform the following steps to monitor the irrigation status:

- A Tap the SCADA Button**
The SCADA screen of the selected mainline is displayed.
- B Tap the General Tab**
- C System Devices**
Indicates the devices status and enables setup/manual activation.
[More >](#)
- D Current Running Program**
Includes live information of the running program.
- E Next Program to Run**
Displays information of the next program to run.
- F Dosing Channels**
Displays the dosing recipe in use, the dosing unit devices, and information regarding the dosing channels.
- G Current Shift**
Displays information about the current running shift.



The screenshot displays the SCADA interface for 'Main line 1'. It includes a top navigation bar with 'Farm', 'Main line 1', and 'Home'. A 'Simulation On!' warning is visible. Below the navigation are tabs for 'General', 'Shifts', 'Valves', 'Analytics', 'Queue', and 'Events'. The 'General' tab is active, showing 'Program 01' with 'Skip Shift', 'Pause', and 'Stop' buttons. A central panel displays 'Main Line 1' with a schematic of valves and flow meters, showing 'Actual' and 'Nominal' flow rates. To the right, a 'Dosing recipe - Dosing 1' panel shows 'Run' status and a table of dosing parameters for three channels. At the bottom, a 'Current' and 'Next in Queue' table shows program details, and a 'Shift 01 | 0 Valve' indicator is present.

Channel	1	2	3
Open [%]	75.0	72.7	81.8
Flow [L/h]	494.1	381.5	150.0
Qty Delivered [L]	7.5	5.5	2.0
Time Delivered [HH:MM]	00:00	00:00	00:00
Set Point	11.0	8.0	3.0
	1/1000	1/1000	1/1000

NOTE:
Tap on the device icons to control and/or monitor the devices.

3. Introduction

This chapter introduces the irrigation and fertigation controller and includes:



3.1 System Overview

The main control unit leverages real-time climate and agronomic data (from weather stations and plant & soil sensors) to optimize irrigation and fertilization decision management, allowing growers to achieve higher quality & quantity yield and best ROI.

GrowSphere™ Standalone

GrowSphere™ is an irrigation and fertigation management system that integrates monitoring, analysis and automation into a single platform, enabling farmers to maximize productivity any time, from anywhere.



GrowSphere™ with screen



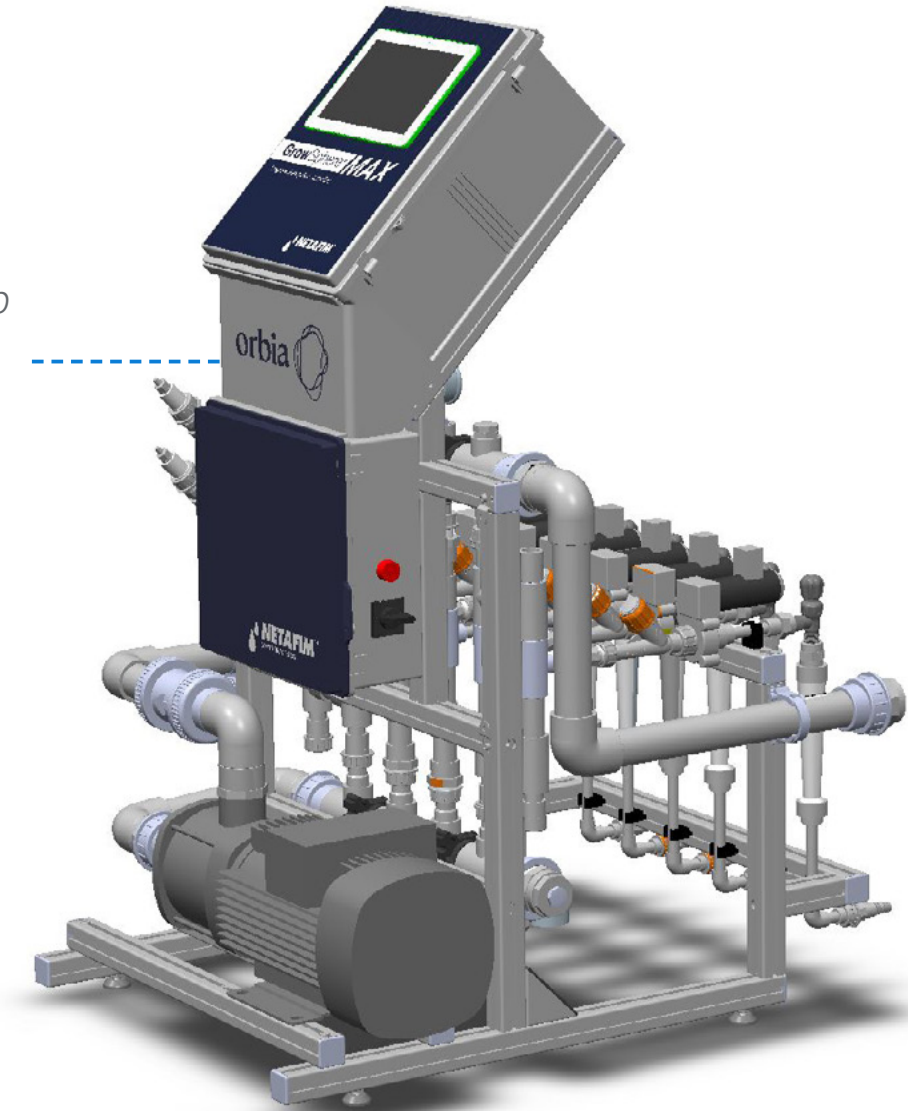
GrowSphere™ without screen



GrowSphere™ Double door with screen

GrowSphere™ as part of Dosing Machines

Puts you in control of plant nutrition, improving both crop yield and quality. With six separate dosing channels, you'll have full control over your entire plant nutrition program



3.2 Typical Connection Layout

GrowSphere™ MAX can be connected in either of the following methods:

GrowSphere™ Cloud

GrowSphere™ can communicate with a cloud based application and digital farming systems via WiFi or cellular communication. Data from the controller and from RTUs is collected and analyzed in a cloud-based application. The controller can be controlled remotely via cloud app.



Wireless Communication

WiFi and cellular modems enables wireless communication with other GrowSphere™ units, such as weather stations, and routers.

Analog Inputs

EC, pH, pressure, and moisture sensors, are connected to GrowSphere™ via analog inputs module or via Remote Terminal Units.



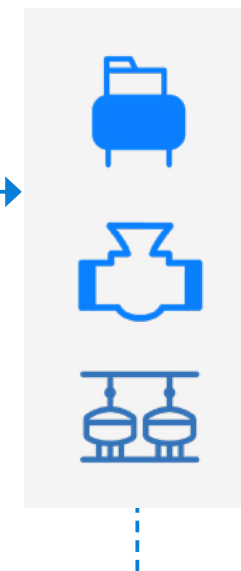
Digital Inputs

Connects to sensors, meters, buttons and other digital controls to receive real time information of the controlled process or via Remote Terminal Units.



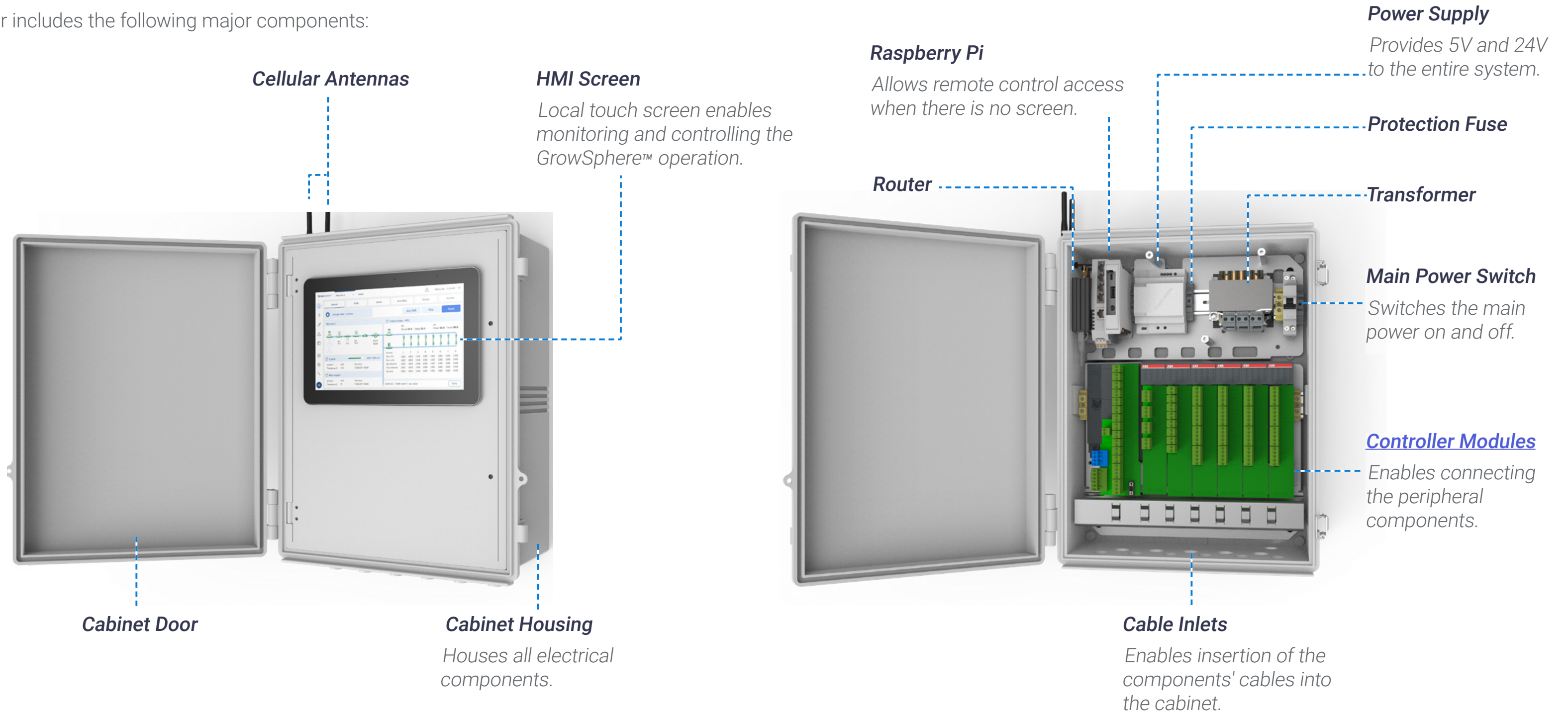
Digital Outputs

GrowSphere™ operates pumps, valves, filters, and other components that are connected to its digital output modules or via Remote Terminal Units.



3.3 Cabinet Review

The Controller includes the following major components:



3.4 Controller Modules

The Controller includes the following modules:

Dosing Module

The **D0572** module contains 8 TRIAC Outputs.

Analog Input Module

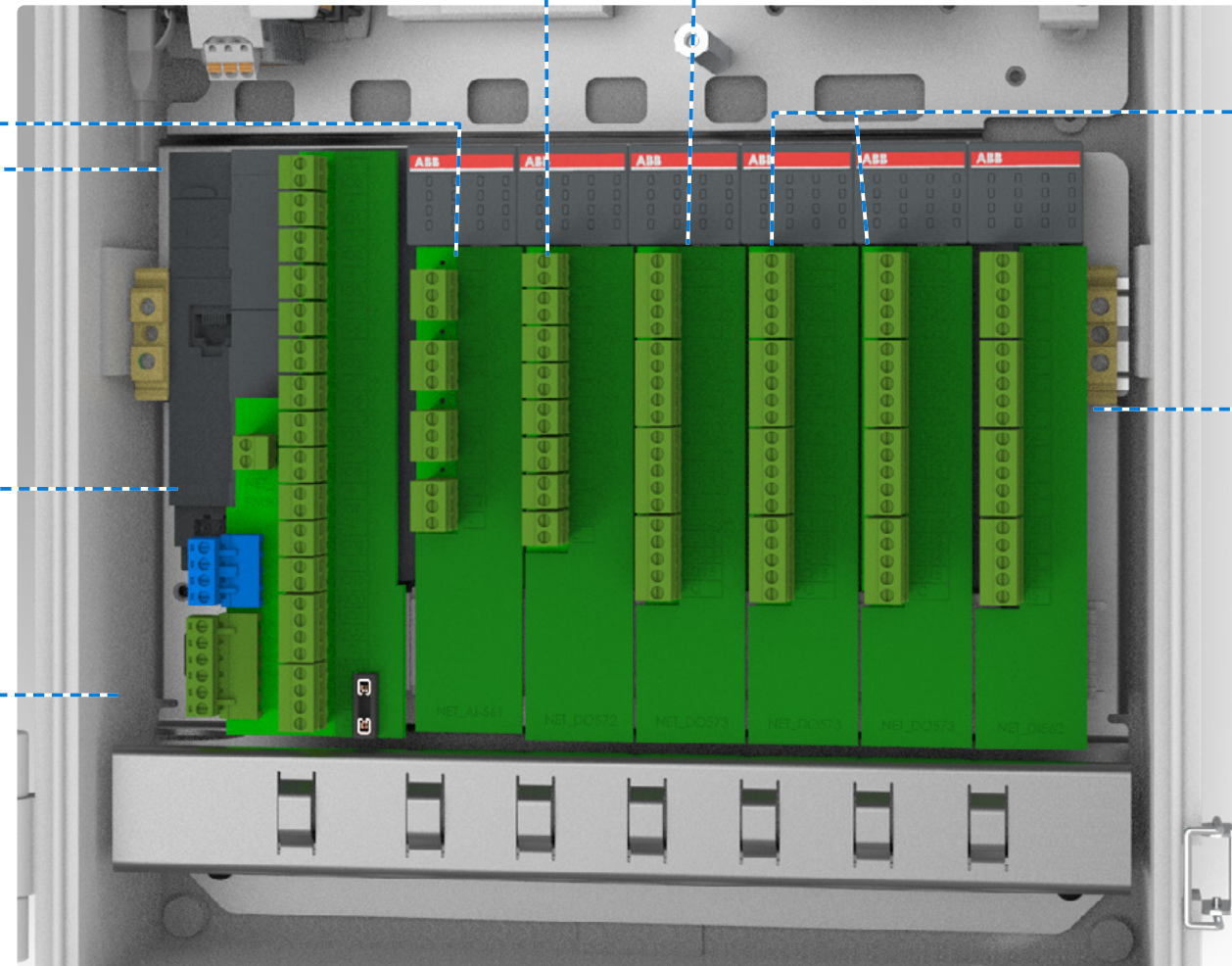
The **AI561** module contains 4 Analog Inputs.

SD card

PLC

CPU

The **CPU** module contains 12 digital inputs and 6 relay outputs.



Digital Output

The **D0573** module contains 16 relay outputs

Digital Output Module

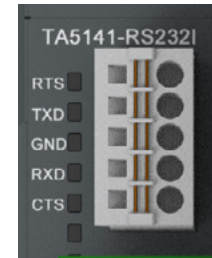
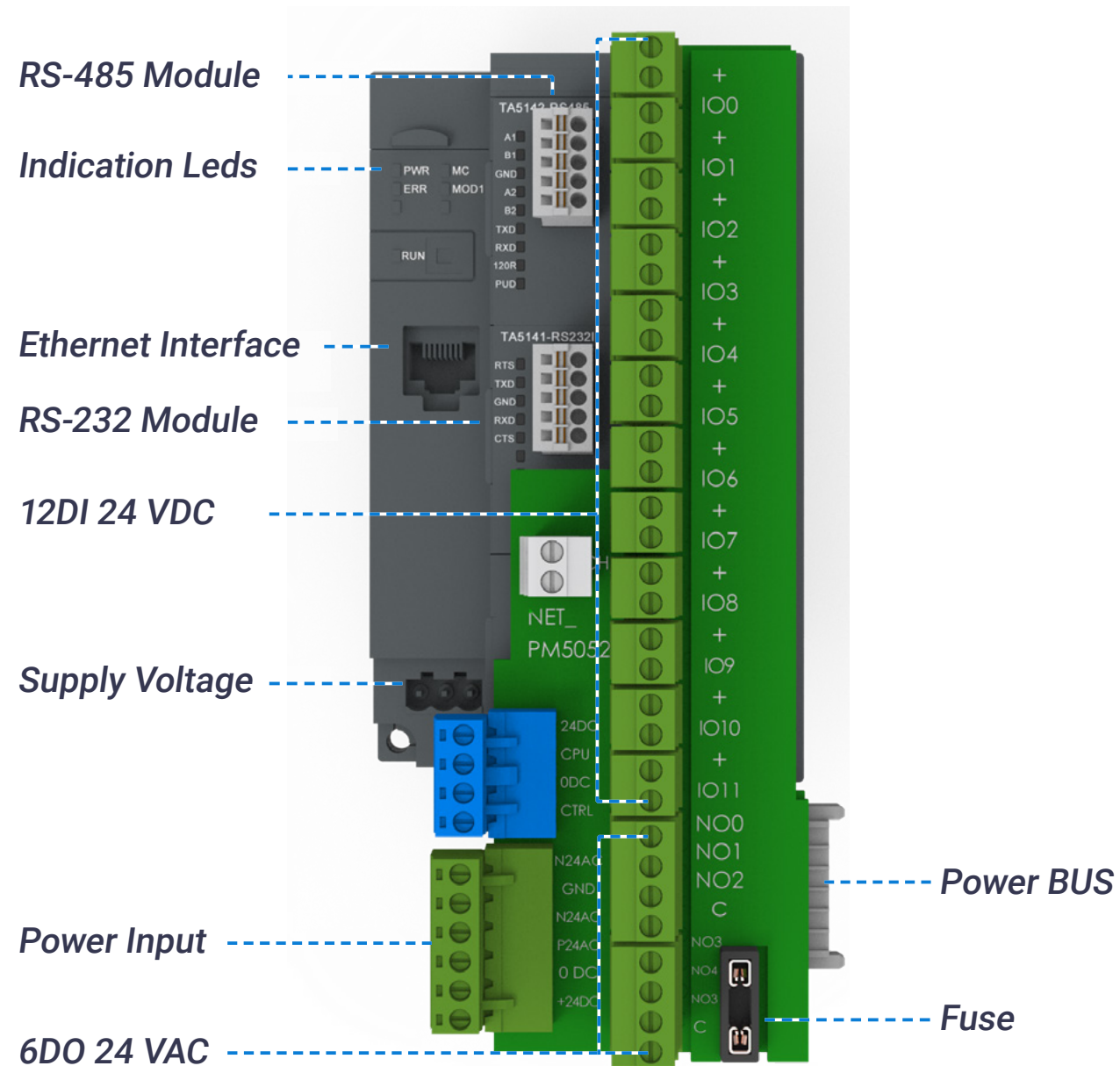
The **D0573** module contains 16 relay outputs.

Digital Input Module

The **DI562** module contains 16 Inputs Dry/Active Contact.

3.5 CPU Module

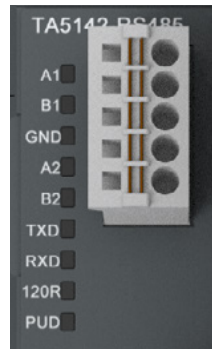
The CPU module includes the following units:



RS-232 Module	
Signal	Description
RTS	Request to Send DCE is ready to accept data from the DTE
TxD	Transmit Data (output)
GRD	Common Ground
RxD	Receive Data (input)
CTS	Clear to Send (input) DCE is ready to accept data from the DTE

State LEDs:

Signal	Color	State	Description
TxD	Yellow	ON (blinking)	Transmitting
RxD	Yellow	ON (blinking)	Receiving

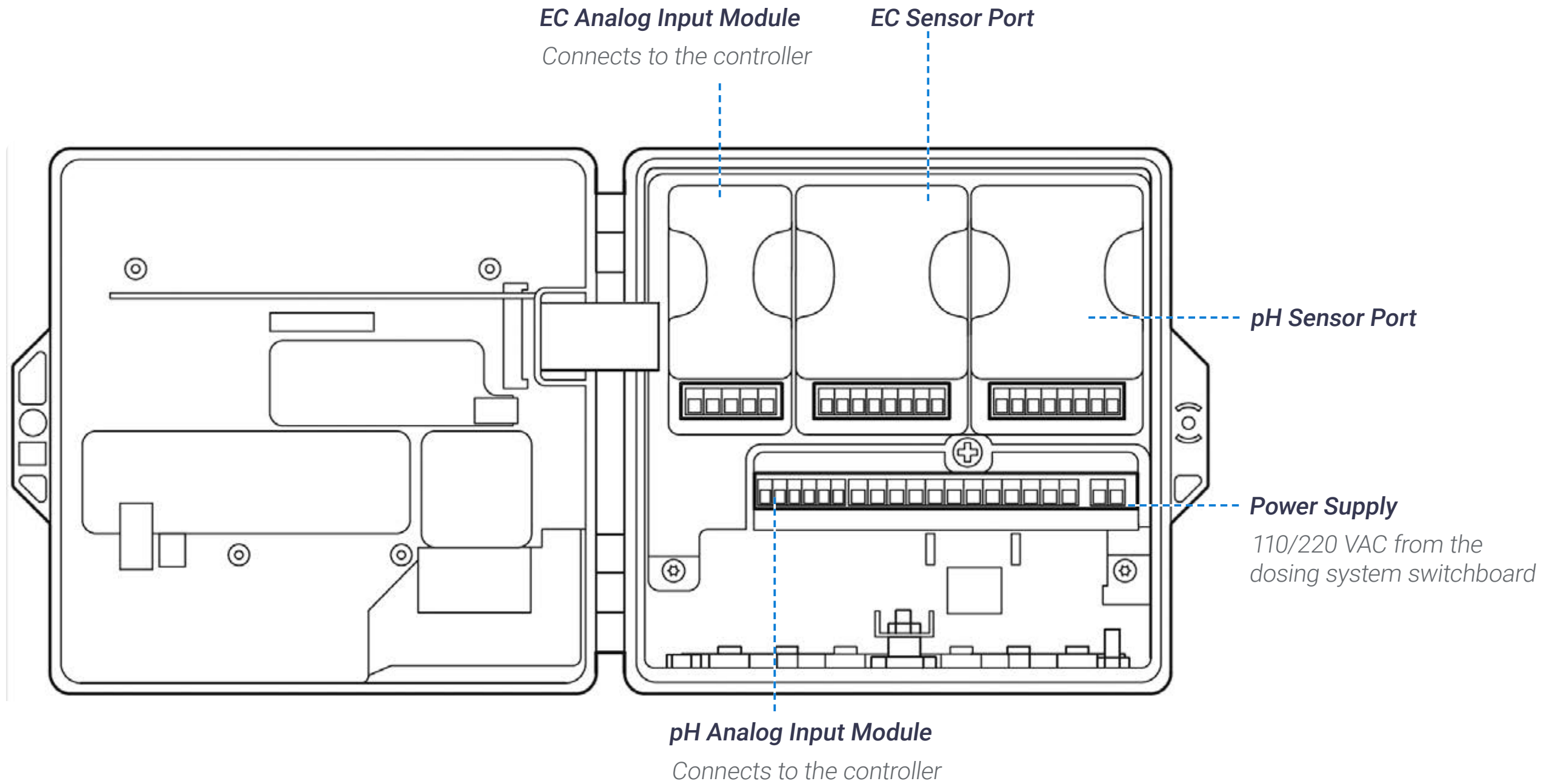


State LEDs:

RS-485 Module			
Signal	Color	State	Description
TxD	Yellow	ON (blinking)	Transmitting
RxD	Yellow	ON (blinking)	Receiving
120R	Yellow	ON	Bus termination
PUD	Yellow	ON	Pull-up/ pull-down

3.6 EC/pH Unit

The EC/pH unit includes the following major components:



4. Installation

This chapter reviews installing the controller and includes:



4.1 Mounting GrowSphere™

4.1.1 Mounting GrowSphere™ to Plate

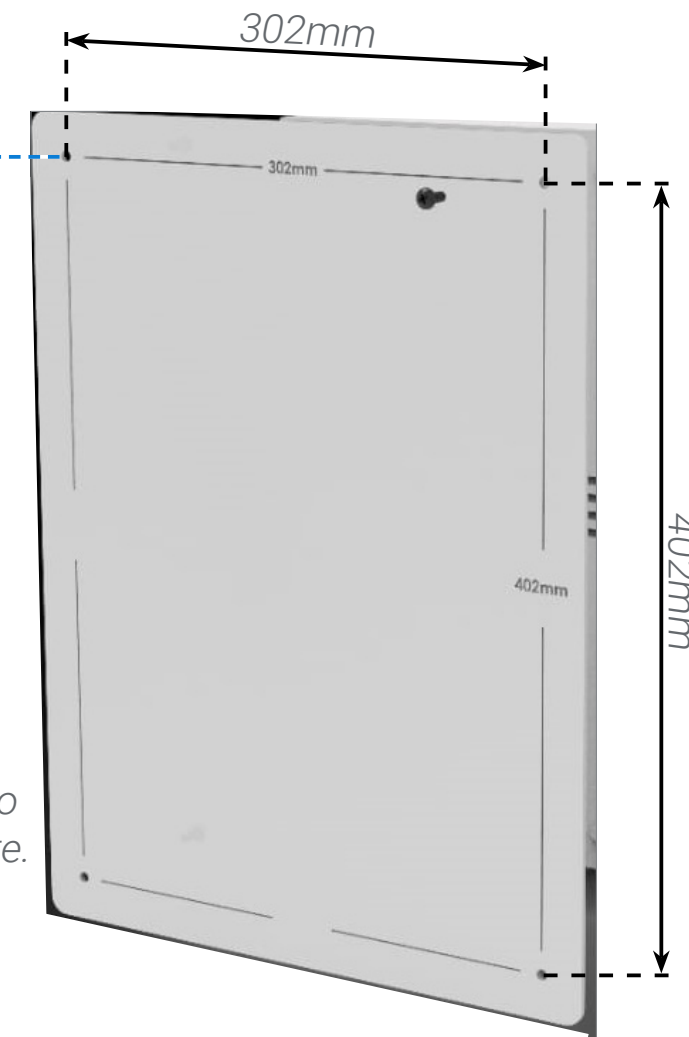
Perform the following steps to mount the controller to a plate:

1. Prepare a plate



2. Drill holes

Drill four holes; one on each corner of the plate according to these measurements.



3. Attach Controller to plate

Use the four screws supplied to attach the controller to the plate.

4.1.2 Mounting GrowSphere™ to wall

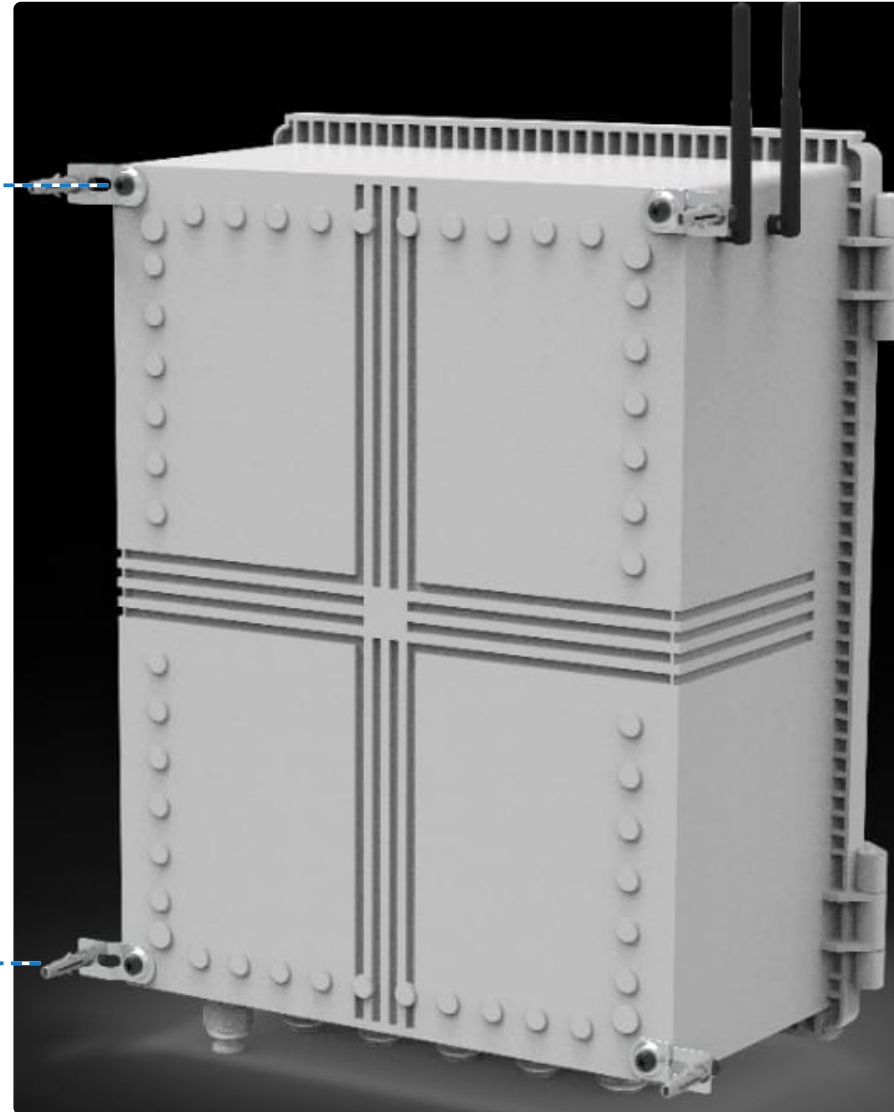
Perform the following steps to mount the controller to a wall:

1. Attach brackets

Attach one bracket to each corner of the controller using the screws supplied.

2. Drill anchors

Drill anchors in wall and attach controller to wall using the brackets.



4.2 Connecting to the CPU

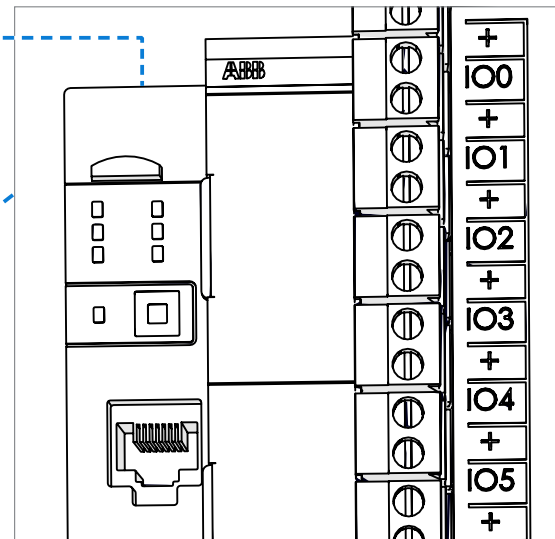
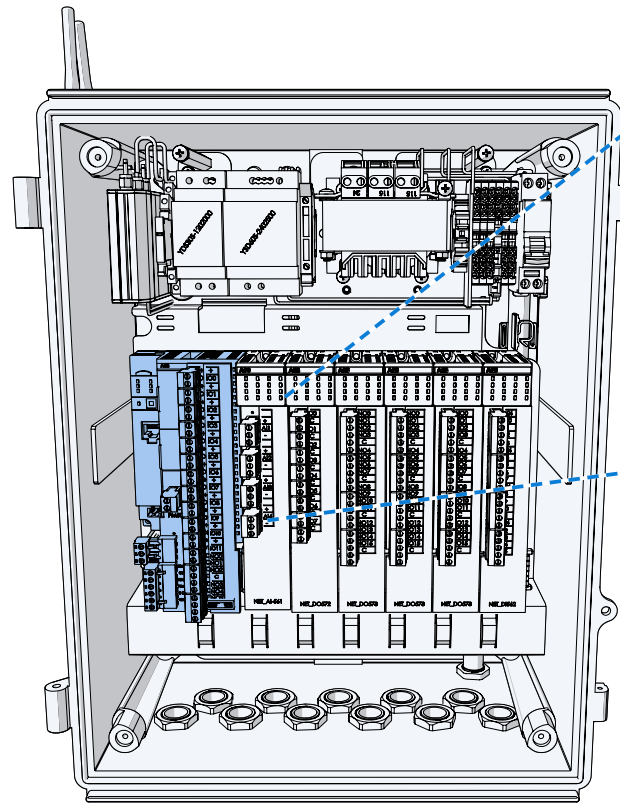
The CPU is the far left module of the controller and it contains the following connections:

- 12 digital inputs (dry/active contacts)
- 6 Outputs- relay outputs with their own common

Perform the following steps:

1. Verify the SD card exists

SD card containing the controller program should be inserted into the card slot.

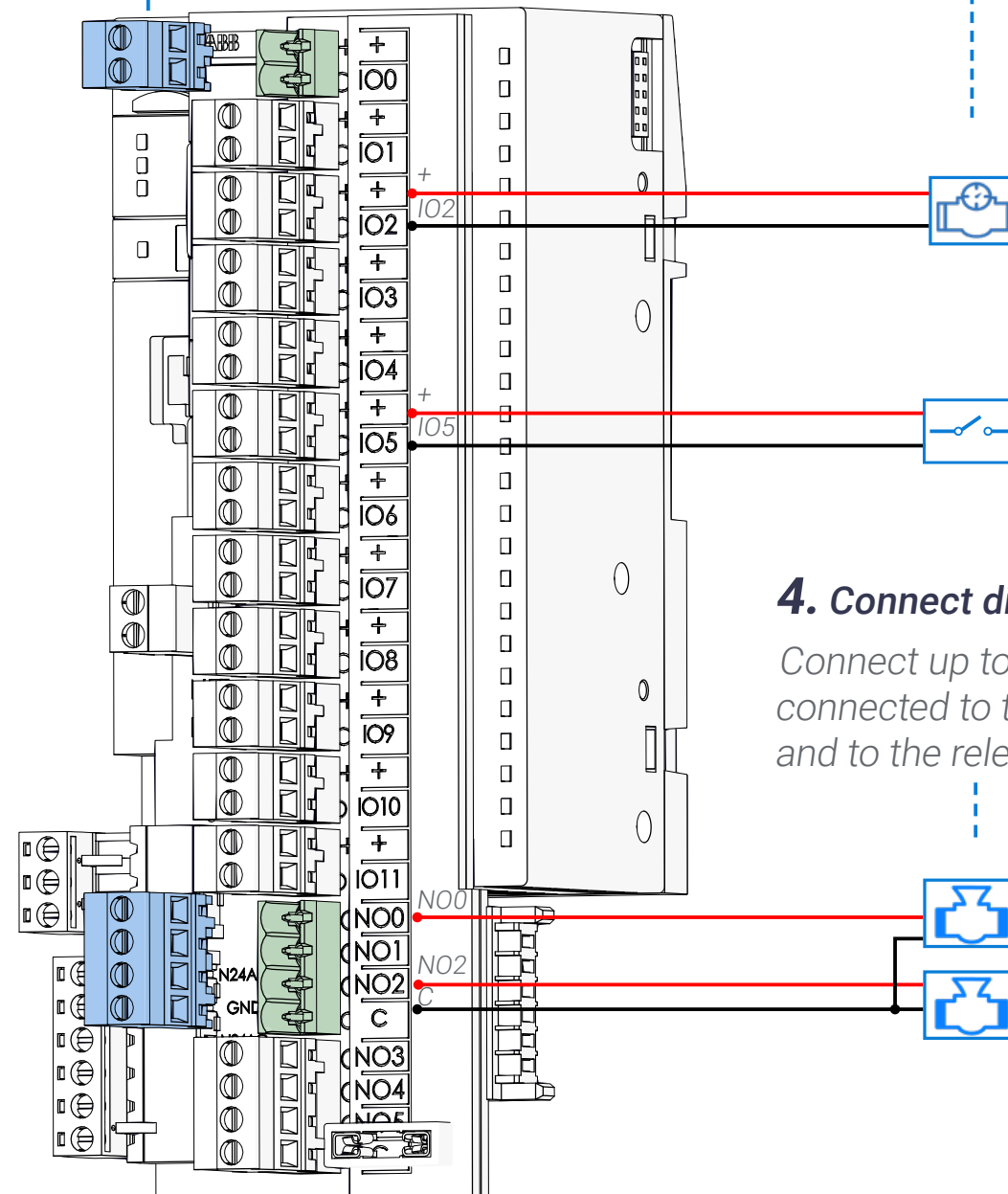


2. Pull the connector

Terminal connectors can be disconnected from the module to ease the connection.

3. Connect digital inputs

Connect up to 12 digital inputs. Each input is connected to the (+, common) terminal, and the relevant input number.



4. Connect digital outputs

Connect up to 6 outputs. Each output is connected to the (C, common) terminal, and to the relevant output number.

4.3 Connecting RTUs

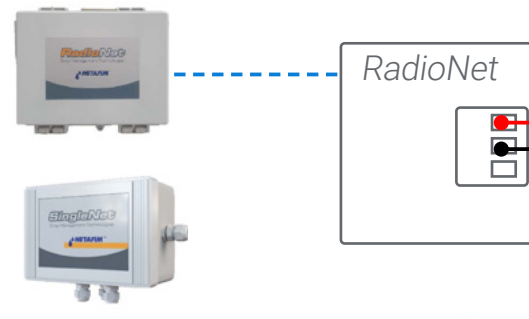
Perform the following steps to connect RTUs and weather stations to the CPU:

1. Connect RadioNet or SingleNet

Connect RadioNet or SingleNet hosts to the CPU.

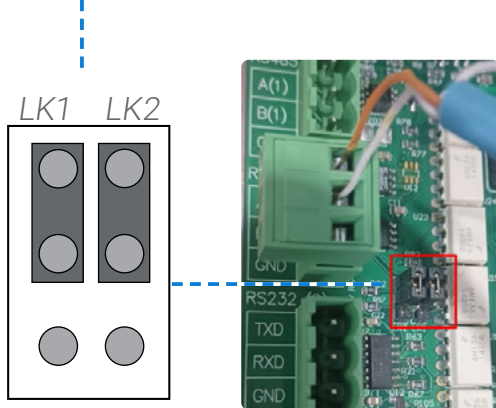
Terminal A on the host connects to A1 on the CPU

Terminal B on the host connects to B1 on the CPU



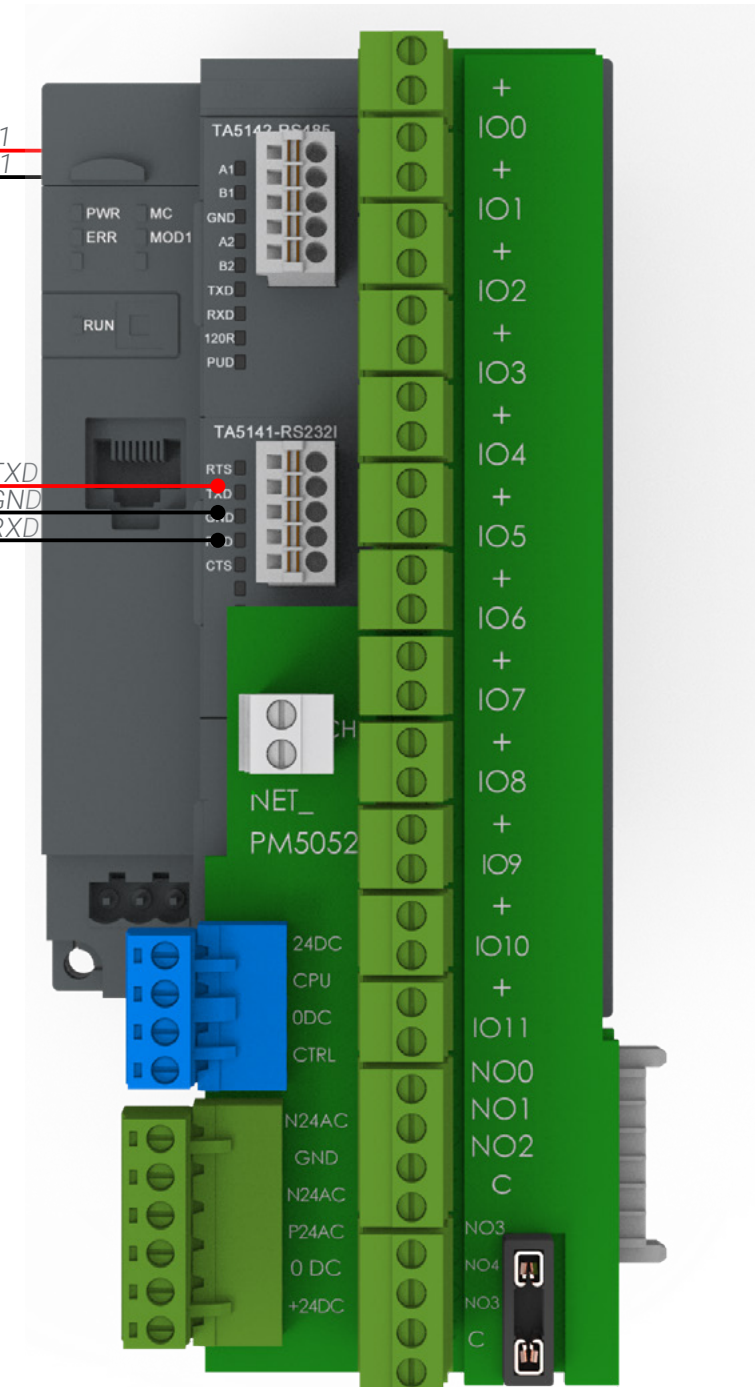
2. Move Jumpers on Host

LK1 and LK2 jumpers on RadioNet or SingleNet hosts should be on upper side.



3. Connect NetRTU or Davis Weather Station

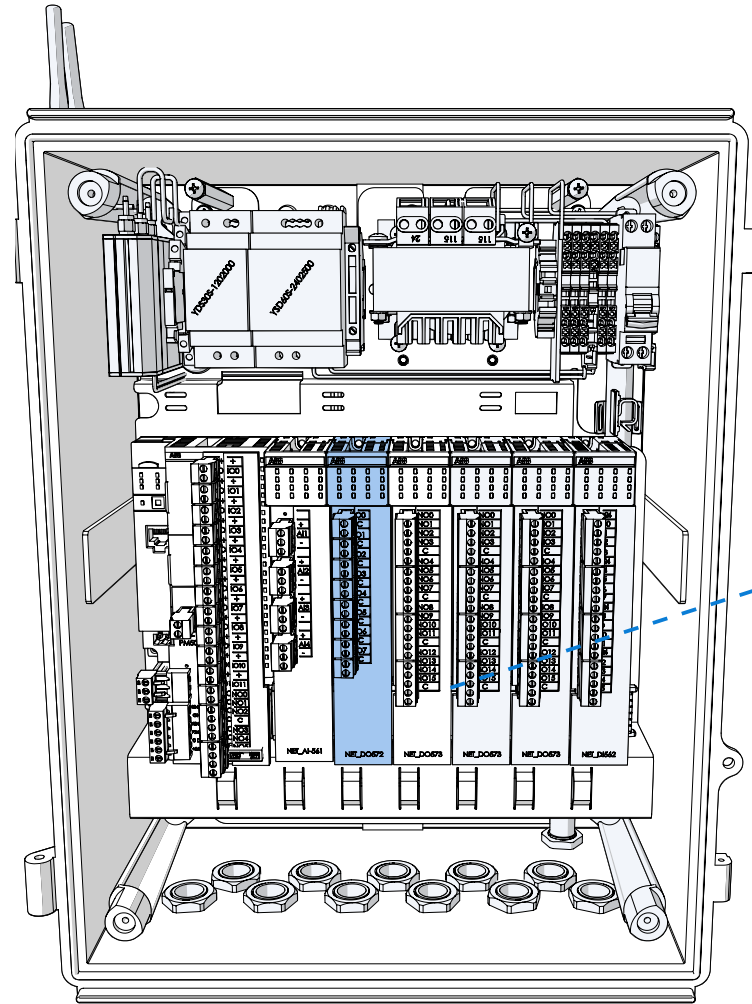
Signal	Description
RTS	Request to Send DCE is ready to accept data from the DTE
TxD	Transmit Data (output)
GRD	Common Ground
RxD	Receive Data (input)
CTS	Clear to Send (input) DCE is ready to accept data from the DTE



4.4 Connecting Digital Inputs

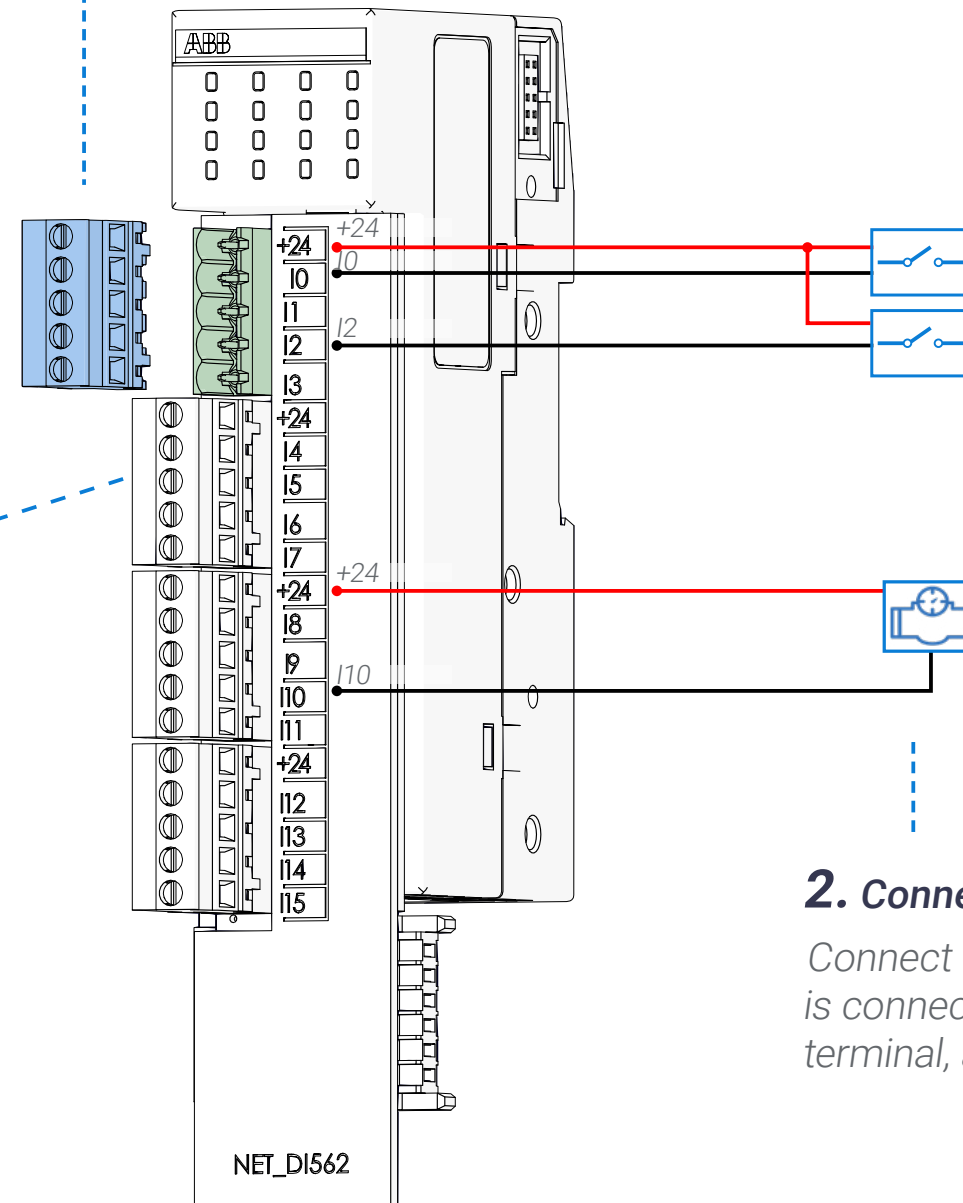
The DI562 module contains 16 digital inputs (dry/active contact).

Perform the following steps to connect digital inputs:



1. Pull the connector

Terminal connectors can be disconnected from the module to ease the wiring connection.



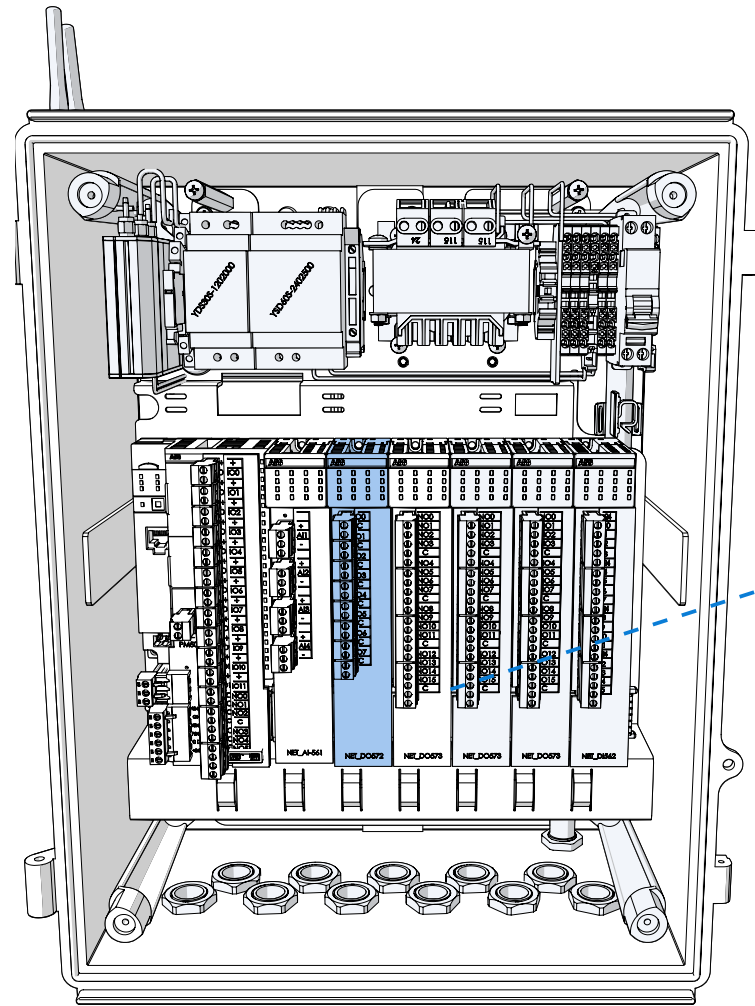
2. Connect digital inputs

Connect up to 16 digital inputs. Each input is connected to the (+24VDC, common) terminal, and the relevant input number.

4.5 Connecting Dosing Outputs

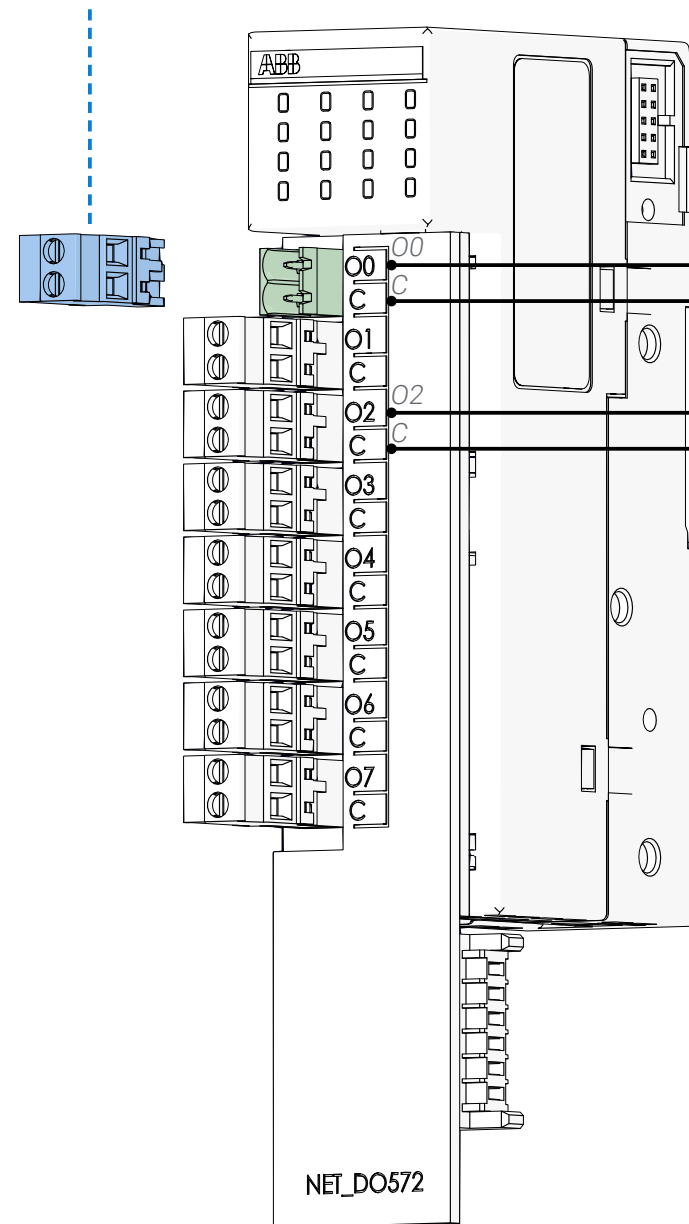
The D0572 module contains 8 TRIAC outputs 24VAC @ 80VA.
This module is dedicated to activate venturi dosing pumps at a high speed.

Perform the following steps to connect dosing outputs:



1. Pull the connector

Terminal connectors can be disconnected from the module to ease the wiring connection.



2. Connect dosing outputs

Connect up to 8 dosing outputs. Each output is connected to the following terminals:

- C - Use the relevant common for each dosing channel (not a shared common)
- The relevant output number (e.g. 00, 01, 02...)



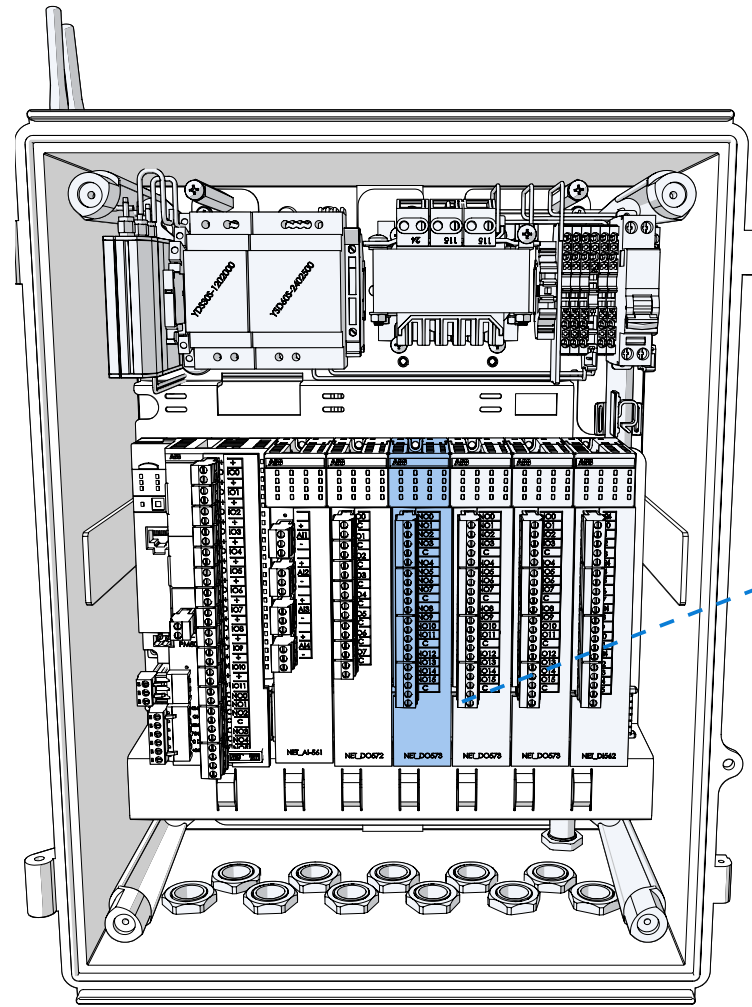
3. Attach the connector

Reconnect the terminals connector to the module.

4.6 Connecting Digital Outputs

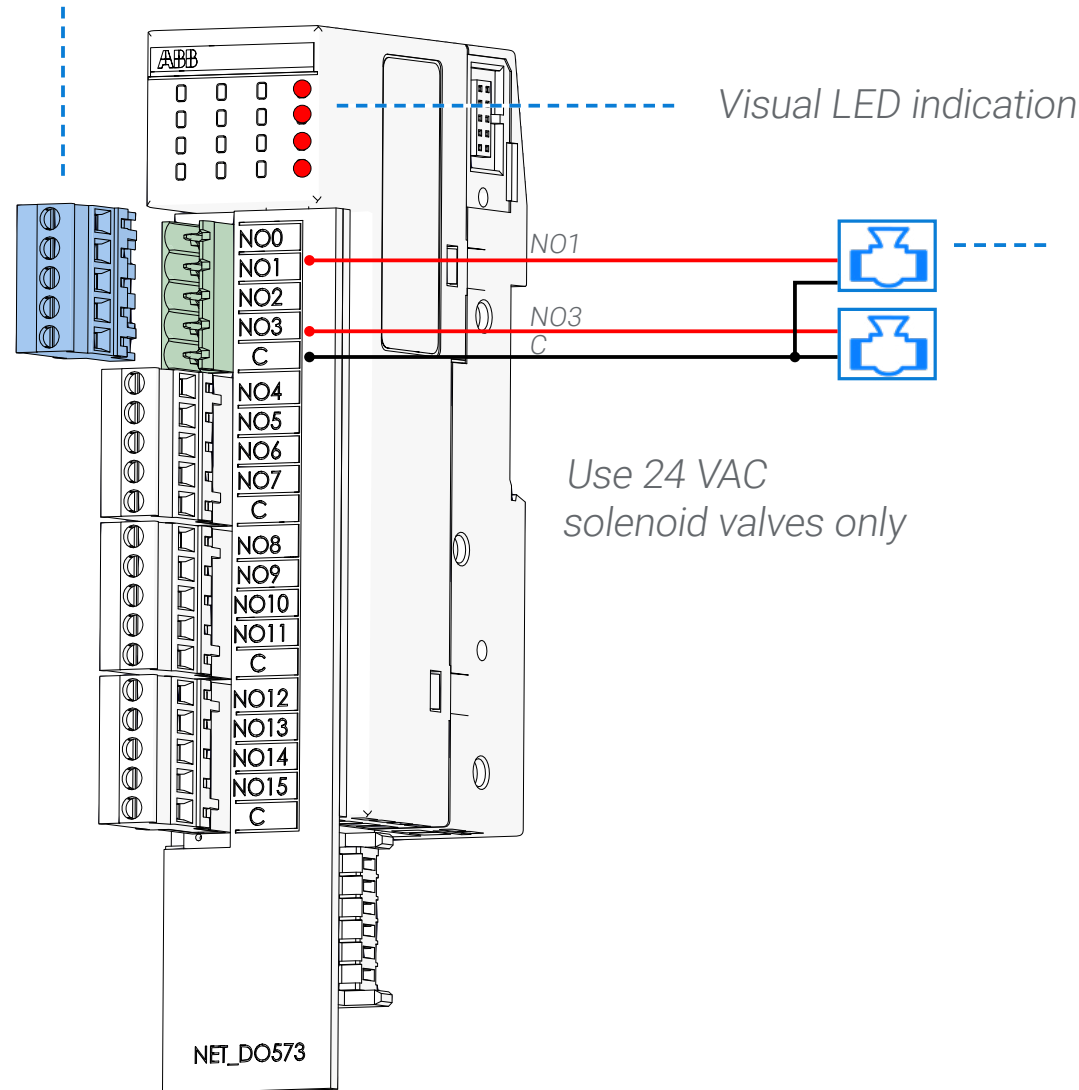
The D0573 module contains 16 digital relay outputs, 24 VAC @ 80 VA, with a separate common for each four outputs.

Perform the following steps to connect digital outputs:



1. Pull the connector

Terminal connectors can be disconnected from the module to ease the wiring connection.



2. Connect digital outputs

Connect up to 16 outputs. Each output is connected to the following terminals:

- C - Use the relevant common for each dosing channel
- The relevant output number (e.g. NO0, NO1..)

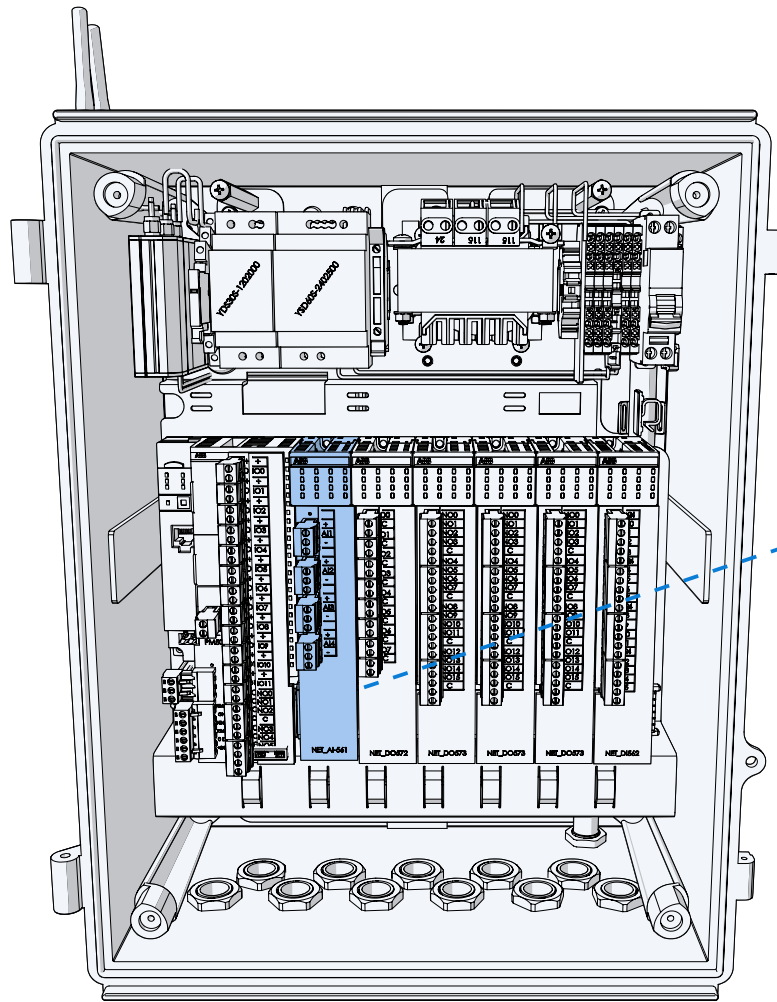
3. Attach the connector

Reconnect the terminals connector to the module.

4.7 Connecting Analog Inputs

The AI-561 module contains 4 analog inputs.

Perform the following steps to connect analog inputs:



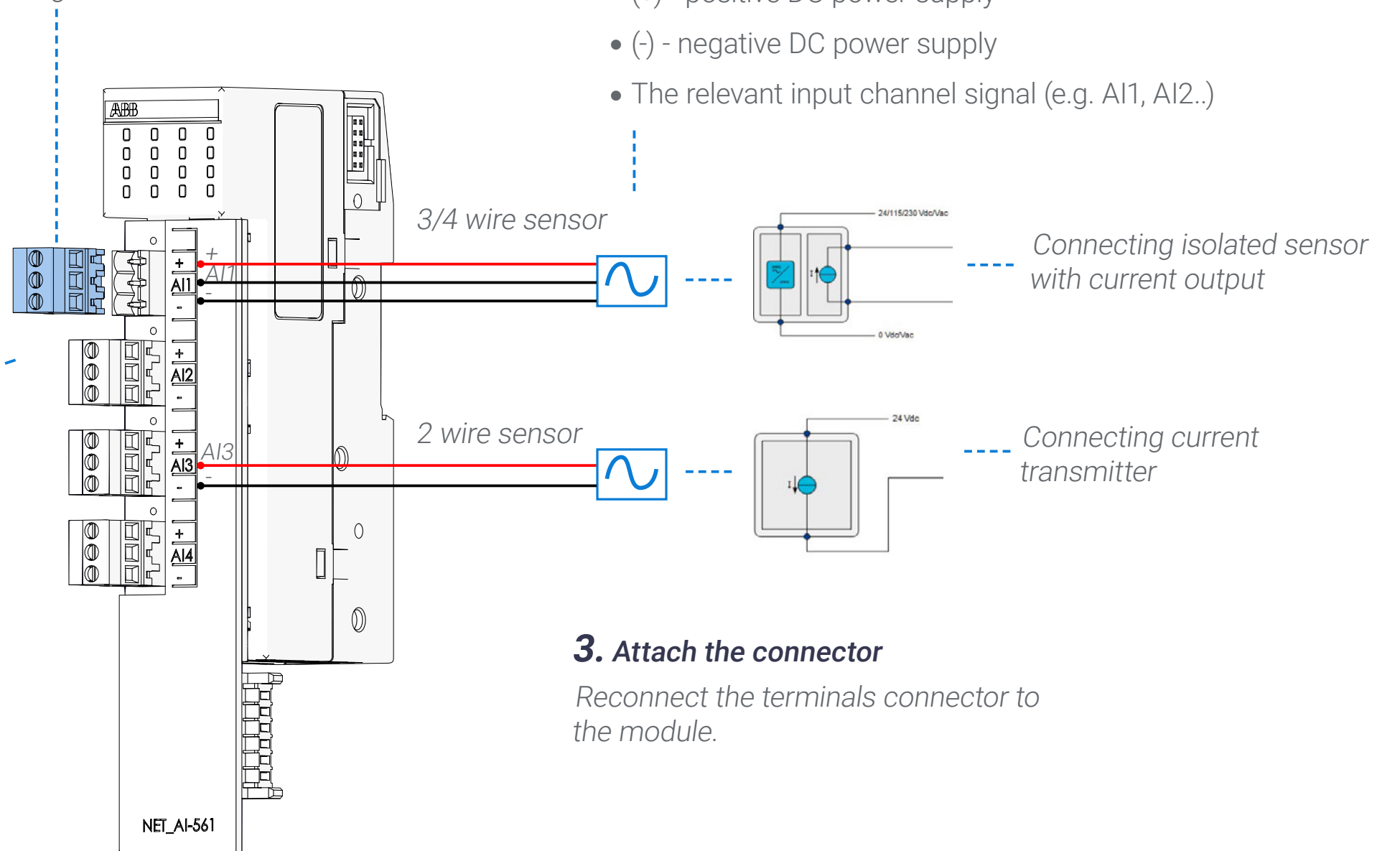
1. Pull the connector

Terminal connectors can be disconnected from the module to ease the wiring connection.

2. Connect analog inputs

Connect up to 4 analog channels. Each analog input is connected to the following terminals:

- (+) - positive DC power supply
- (-) - negative DC power supply
- The relevant input channel signal (e.g. AI1, AI2..)



3. Attach the connector

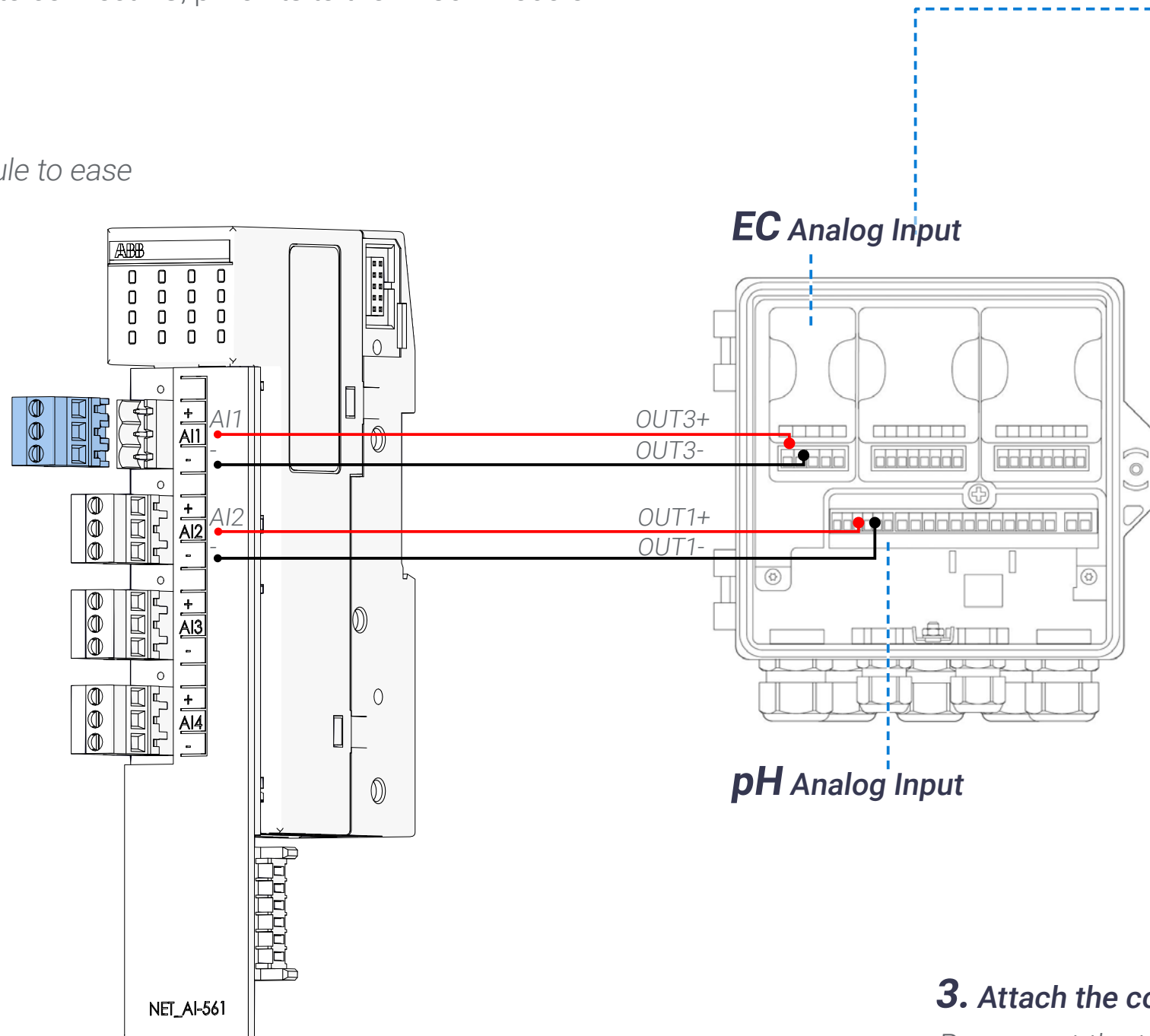
Reconnect the terminals connector to the module.

4.8 Connecting EC/pH Units

Perform the following steps to connect EC, pH units to the AI-561 module:

1. Pull the connector

Terminal connectors can be disconnected from the module to ease the wiring connection.



2. Connect EC,pH modules

Connect up to 4 analog channels. Each analog input is connected to the relevant input channel.

EC:

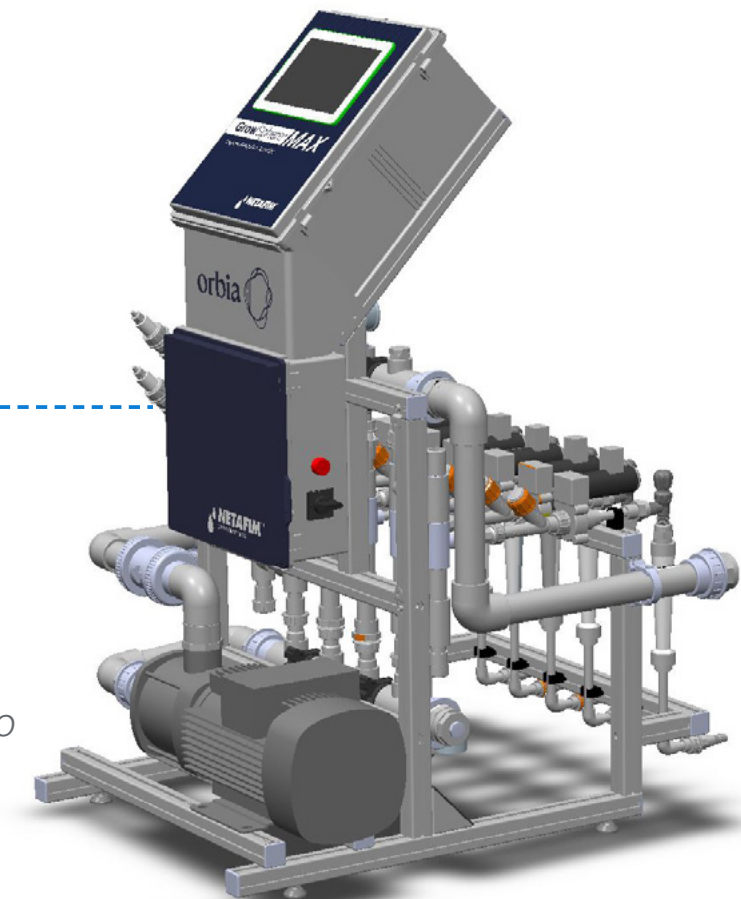
- Terminal AI1 on the module is connected to OUT3(+) on the analog input module.
- Terminal (-) on the module is connected to OUT3(-) on the EC analog input module.

pH:

- Terminal AI2 on the module is connected to OUT1(+) on the pH analog input module.
- Terminal (-) on the module is connected to OUT1(-) on the pH analog input module.

3. Attach the connector

Reconnect the terminals connector to the module.



5. Controller Configuration

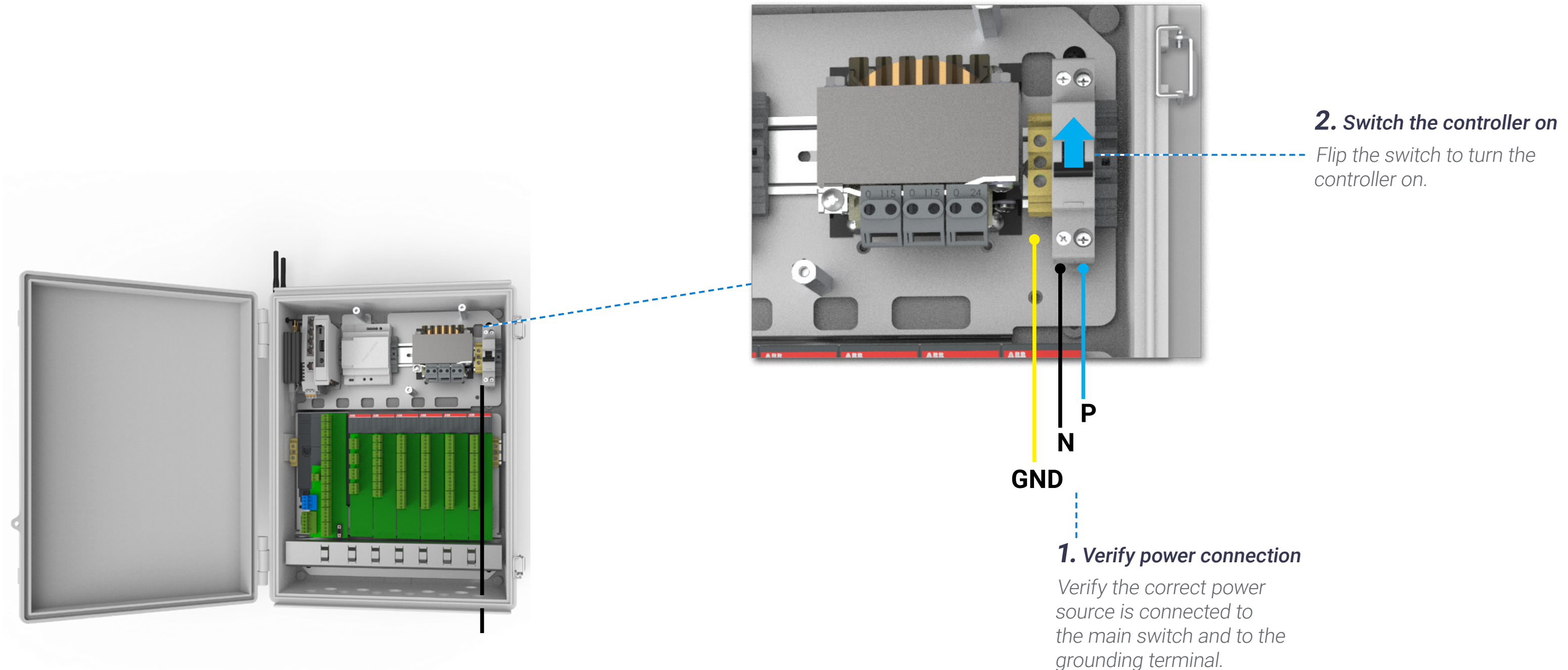
This chapter reviews configuring the controller and includes:



5.1 Getting Started

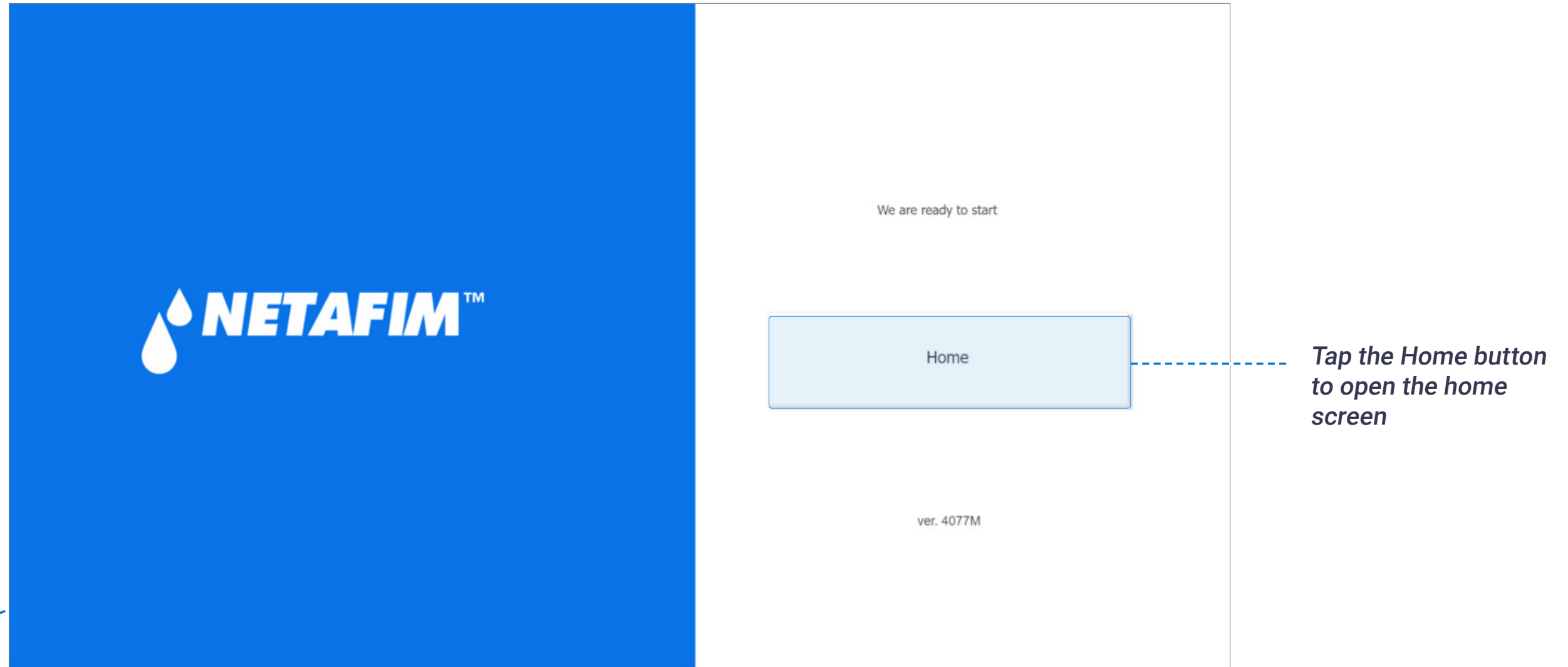
5.1.1 Turning on the Controller Power

Perform the following steps to connect GrowSphere™ to power and turn on the controller:



5.1.2 Welcome Screen

The welcome screen is displayed.

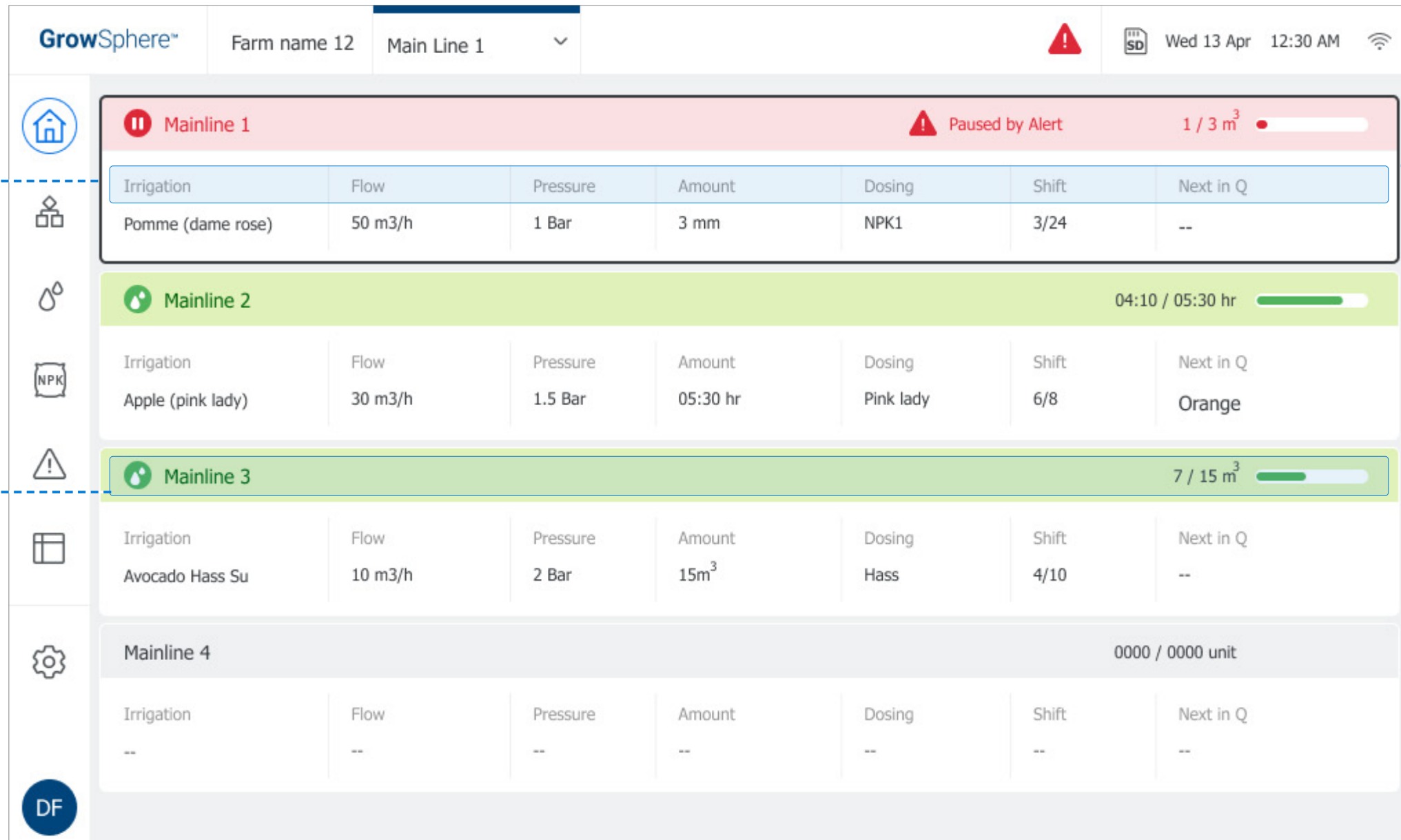


5.1.3 Home Screen

The home screen is displayed with all the mainlines.

Select the Mainline to define its parameters

- **Icons:** Icons indicate mainline status.
- **Name:** The mainlines defined in numerical order.
- **Time / m³:** Amount of run time left or amount of water flowing through the mainline.



The screenshot shows the GrowSphere interface with the following mainlines:

Mainline	Irrigation	Flow	Pressure	Amount	Dosing	Shift	Next in Q
Mainline 1	Pomme (dame rose)	50 m3/h	1 Bar	3 mm	NPK1	3/24	--
Mainline 2	Apple (pink lady)	30 m3/h	1.5 Bar	05:30 hr	Pink lady	6/8	Orange
Mainline 3	Avocado Hass Su	10 m3/h	2 Bar	15m ³	Hass	4/10	--
Mainline 4	--	--	--	--	--	--	--

Displays each mainlines preferences:

- **Irrigation:** Name of the irrigation program.
- **Flow:** The mainline flow rate.
- **Pressure:** The pressure in the mainline.
- **Amount:** Water quantity supplied per shift.
- **Dosing:** Dosing recipe linked to the irrigation program.
- **Shift:** The shift number currently running.
- **Next in Q:** The shift that is next in queue.

5.2 Dashboard Overview

The main dashboard includes the following sections:

Sidebar menu

Displayed on every screen

Home (see [Home Screen](#))

SCADA (see [Monitoring Irrigation](#))

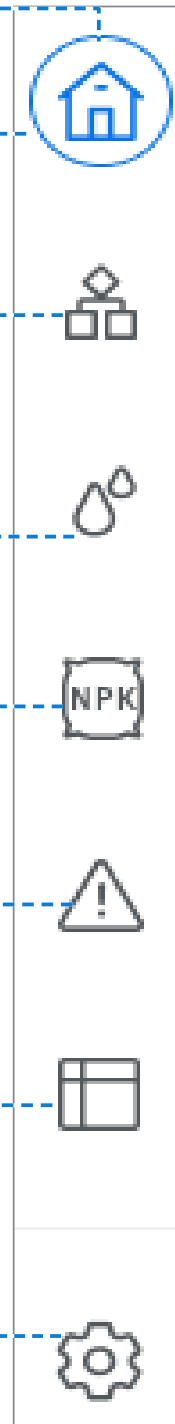
Irrigation Programs (see [Managing Irrigation Programs](#))

Fertilizer Dosing (see [Managing Fertilizer Dosing](#))

Alerts (see [Managing Alerts](#))

Reports (see [Viewing Logs](#))

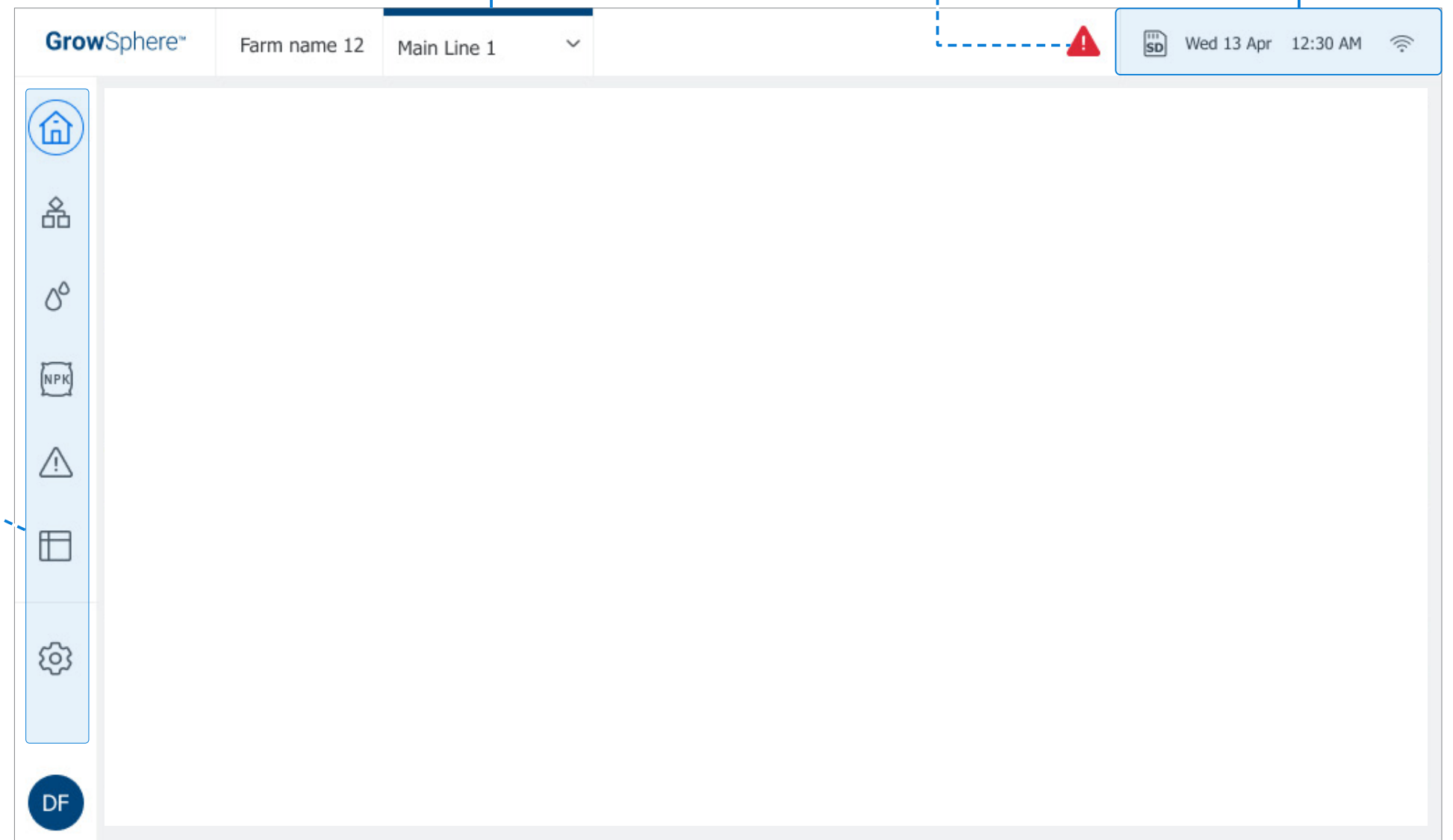
Configuration (see [Defining System Preferences](#), [Configuring Components](#), and [Resetting Accumulation](#))



Dropdown list allowing for selecting a main line

Alert notification (see [Managing Alerts](#))

Current date, time, and connection status



5.3 Defining System Preferences

This section reviews defining the following system preferences:



5.3.1 General Preferences

Perform the following steps to define general controller preferences:

4. Verify the correct main line is selected

5. Verify General tab is selected

6. Select language

7. Select measurement units

8. Enter the farm name

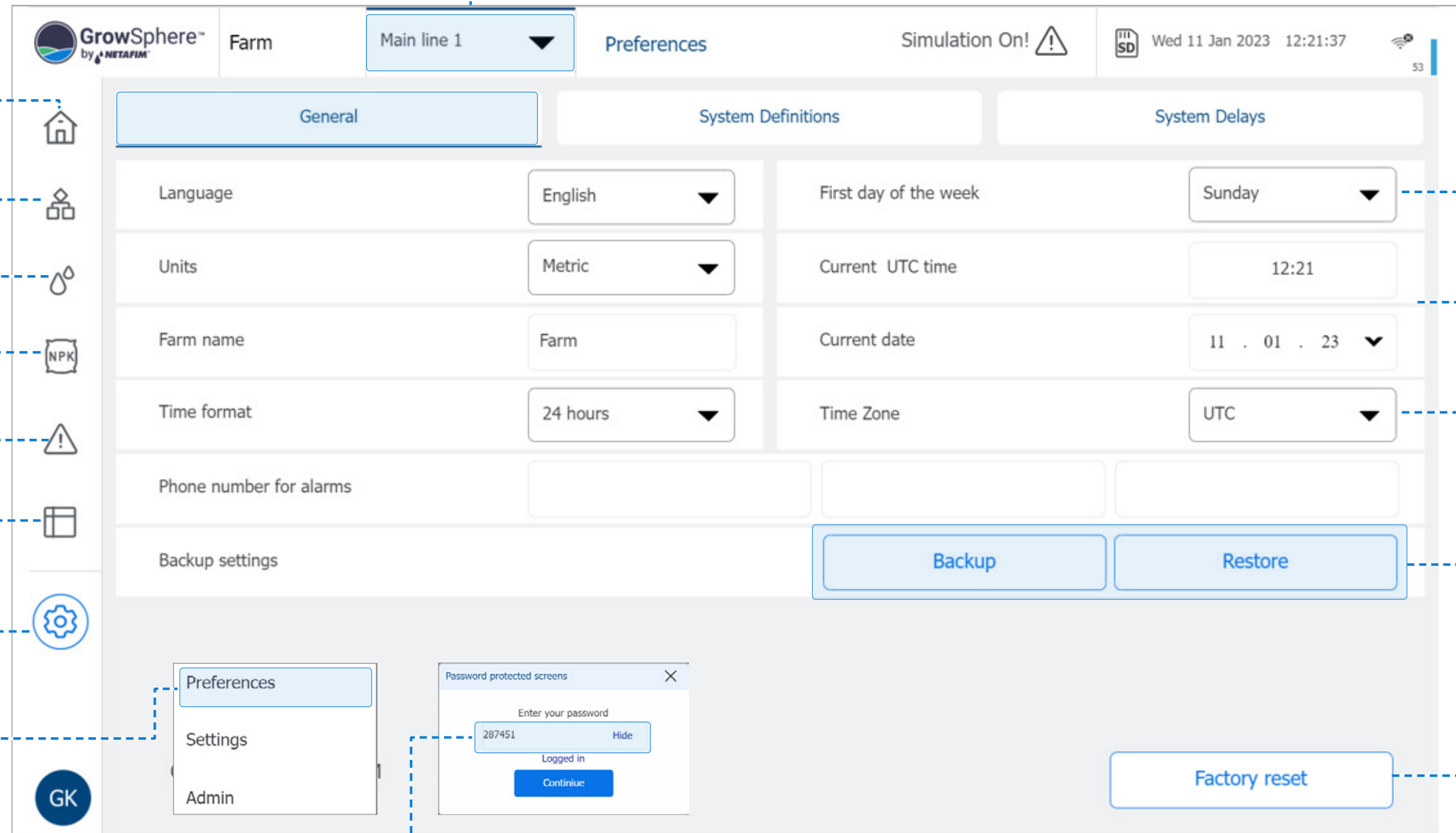
9. Select the time format

10. Enter the phone number where text messages will be sent when there's an alarm

1. Tap the Configuration button

2. Select Preferences

3. Type your credentials



11. Select the first day of the week

12. Set the current time and date

13. Select the UTC

Tap to Restore or Backup settings

Saved to the SD card in the CPU.

Tap Factory reset to delete all the controllers settings and programs

Factory reset is required when it is necessary to reset the controller.

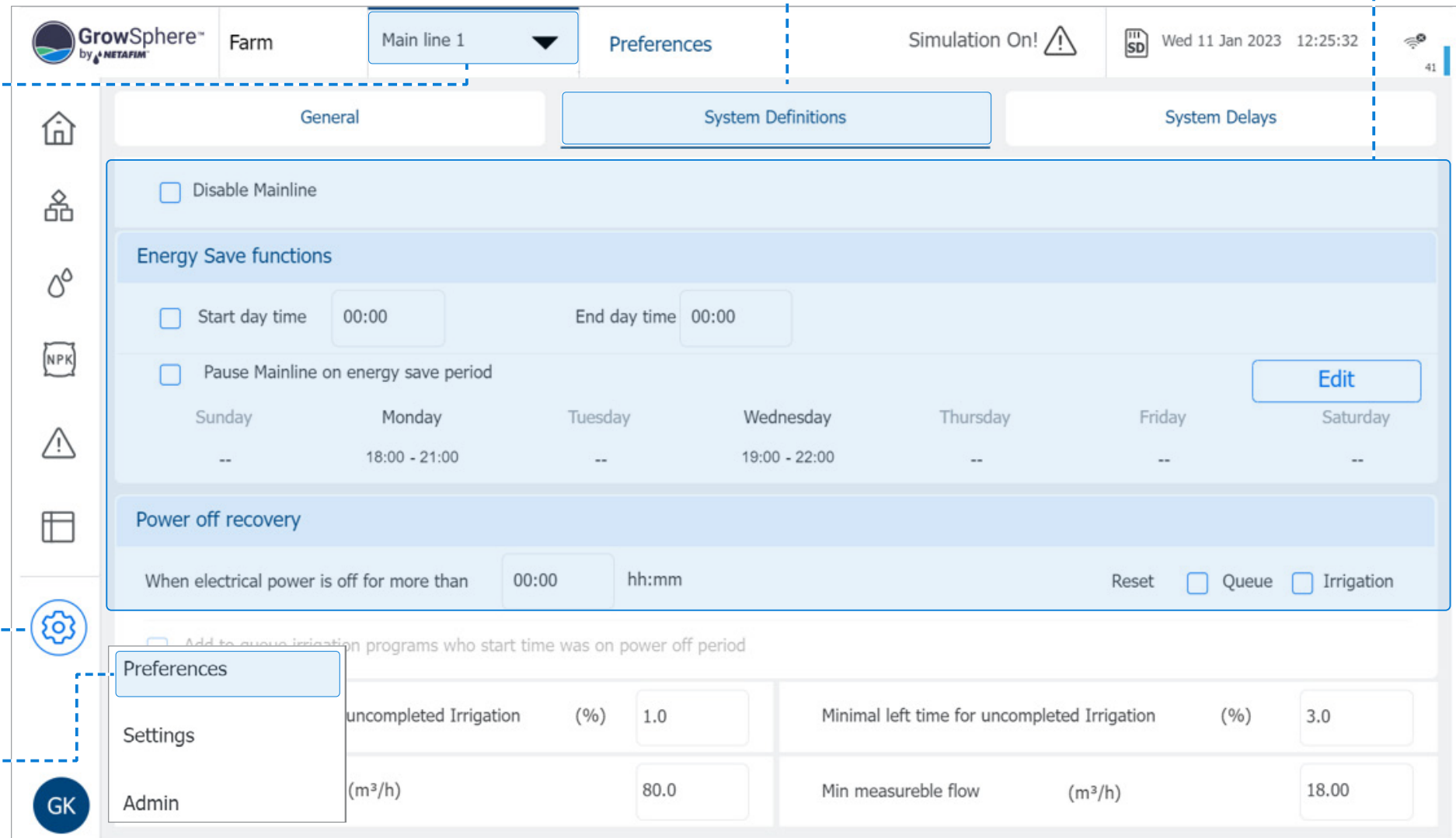
5.3.2 Mainline Preferences

Perform the following steps to define mainline preferences:

3. Verify the correct main line is selected

4. Select the System Definitions tab

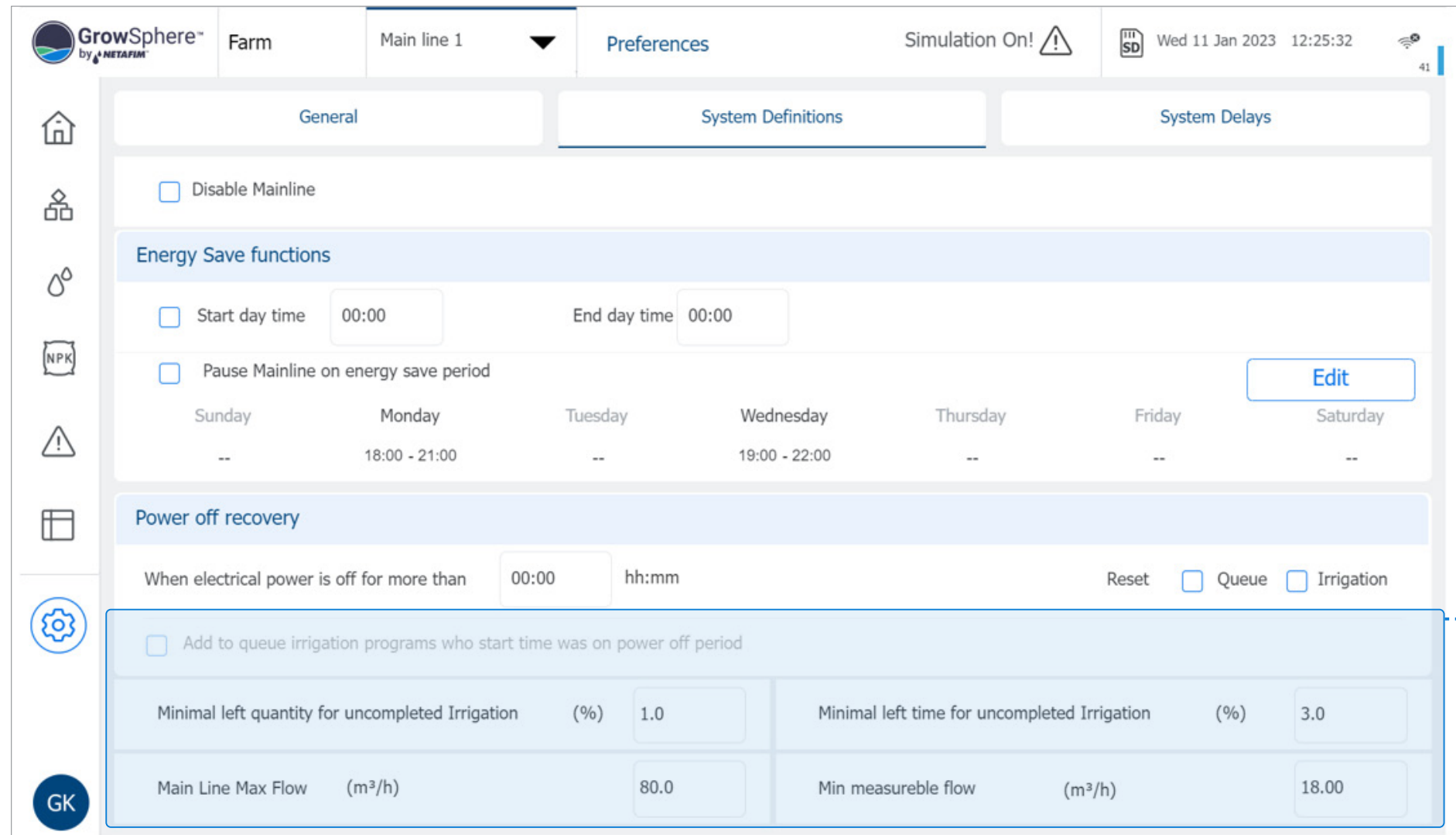
5. Define the relevant system preferences:



1. Tap the Configuration button

2. Select Preferences and type your credentials

- **Disable Mainline:** Enables disabling the mainline operation. An alert stating the main line is disabled will be displayed.
- **Start and end time:** Daily irrigation start and end times.
- **Pause Main Line on energy save period:** Tap **Edit** to define the slot per day for power saving.
- **Power off recovery:** Reset programs that are in queue and programs that were irrigating at the time of power off after power is off for more than the defined amount.



The screenshot shows the 'Preferences' screen for 'Main line 1' in the GrowSphere™ interface. The 'System Definitions' tab is selected, and the 'Energy Save functions' section is expanded. The 'Minimal left quantity for uncompleted Irrigation (%)' is set to 1.0, and the 'Minimal left time for uncompleted Irrigation (%)' is set to 3.0. The 'Main Line Max Flow (m³/h)' is set to 80.0, and the 'Min measurable flow (m³/h)' is set to 18.00. The 'Power off recovery' section is also visible, showing a 'When electrical power is off for more than' setting of 00:00 hh:mm, with 'Reset', 'Queue', and 'Irrigation' options.

6. Define the relevant system preferences:

- Minimal left quantity for uncompleted Irrigation (%):** Irrigation quantity left until completion of the program. If this threshold was not reached at the time of power off and Reset, Queue and Irrigation is unchecked, on power resumption irrigation will continue.
- Minimal left time for uncompleted Irrigation (%):** Irrigation time left until completion of the program. If this threshold was not reached at the time of power off and Reset, Queue and Irrigation is unchecked, on power resumption irrigation will continue.
- Main line max flow (m³/h):** Alert sent after the defined amount of water and after delay time passes.
- Alarms auto reset delay:** Enables automatic reset of alarms after a predefined time from the alerts list.

5.3.3 Delays

System Delays

Perform the following steps to define system delay times:

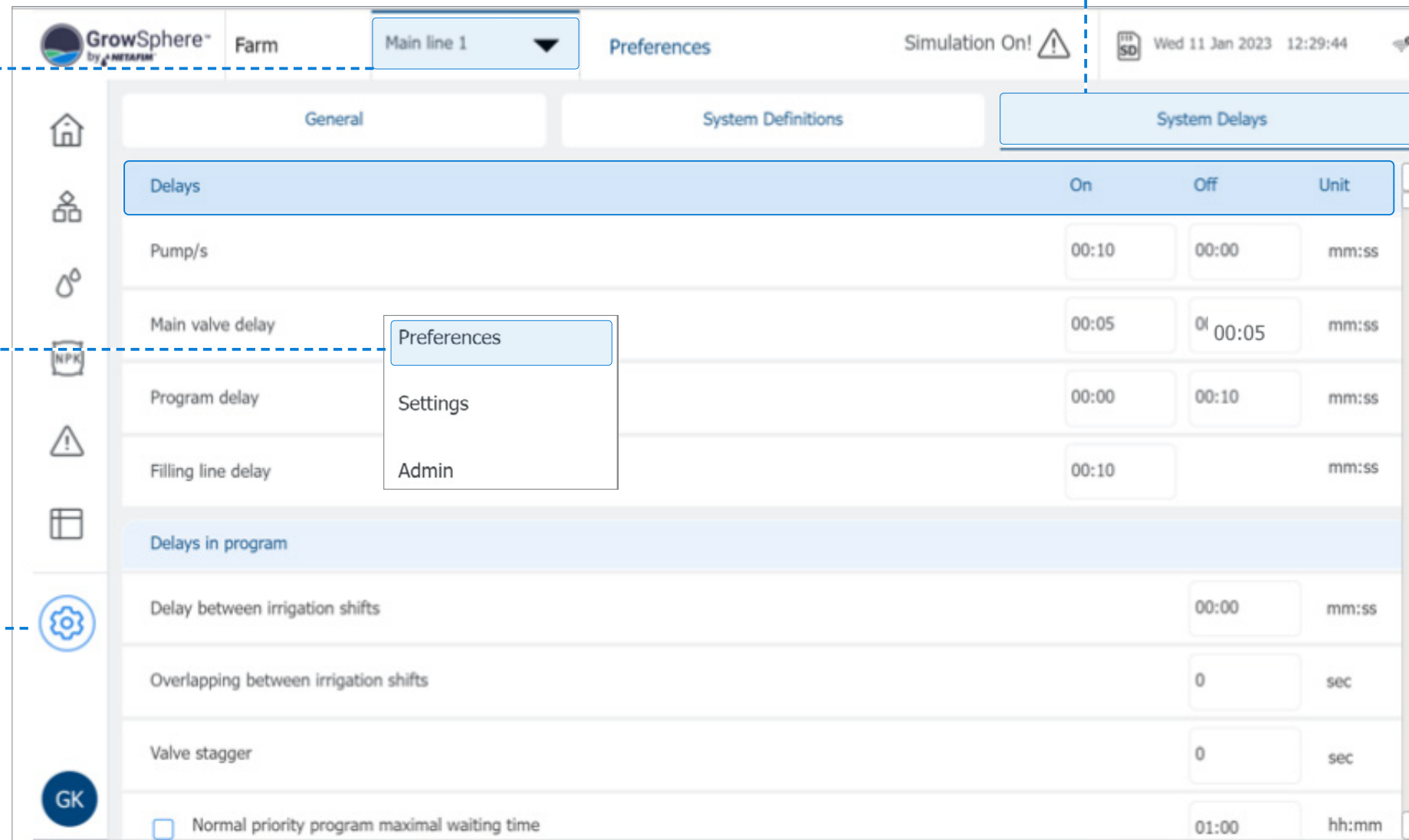
3. Verify the correct main line is selected

2. Select Preferences and type your credentials

1. Tap the Configuration button

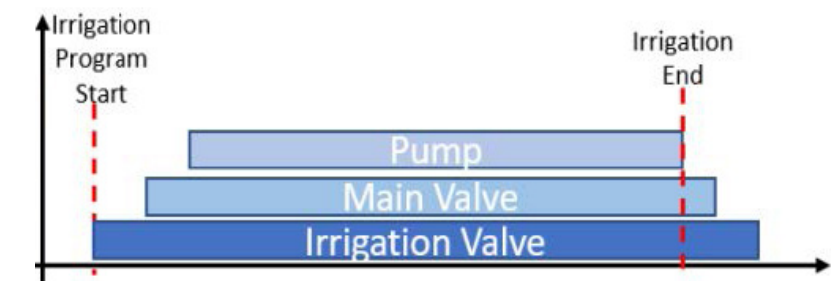
4. Select the System Delays tab

5. Define the system delays times:



- **On Delay:** Amount of time between start of irrigation and when the device starts operating.
- **Off Delay:** Amount of time between end of irrigation and when the device stops operating.
- **Unit:** Unit of measure for the delay time.

The example below illustrates pump and valve on and off delay:



Delays	ON	OFF
Pump/s	10 sec	0 sec
Main Valve Delay	5 sec	5 sec
Irrigation Valves Delay	0 sec	10 sec

Program Delays

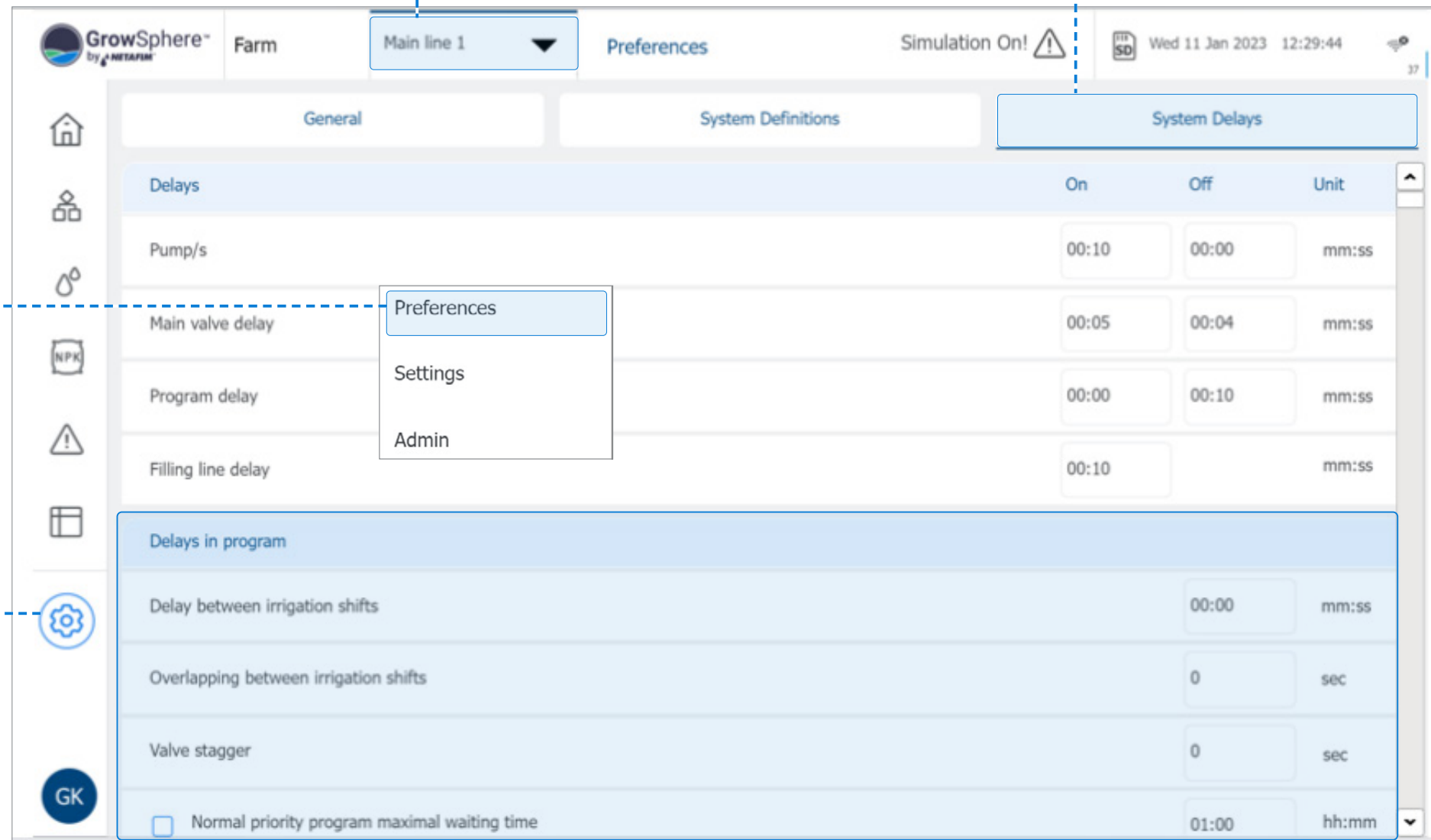
Perform the following steps to define irrigation program delay times:

3. Verify the correct main line is selected

2. Select Preferences and type your credentials

1. Tap the Configuration button

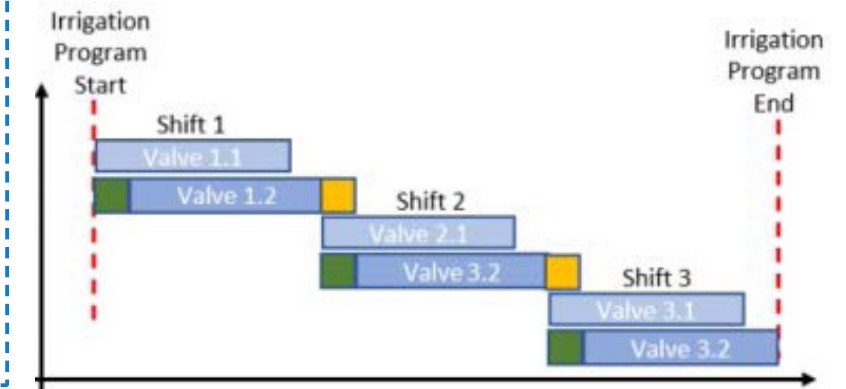
4. Tap the System Delays tab



5. Define the irrigation program delay times:

- **Delay between Irrigation shifts:** Amount of time between when one shift ends and another begins.
- **Shift Overlap:** Amount of time when one shift overlaps the next shift.
- **Valves stagger delay:** Amount of delay time between the activation of successive valves in a given shift.

The example below illustrates delays between irrigation shifts and staggering delays between valves of a given shift:



Delays in Program	ON	OFF
Delay Between Irrigation Shifts		4 Sec
Staggering Delay		6 sec

- **Normal priority program maximal waiting time:** After the defined amount of time, the irrigation program with normal priority that is waiting in the queue, will be moved to high priority and will be executed accordingly.

5.4 Configuring Components

This section reviews the configuration and allocations of the devices connected to the controller and includes:



5.4.1 Defining System Devices

Perform the following in order to define the devices that are part of the irrigation system:

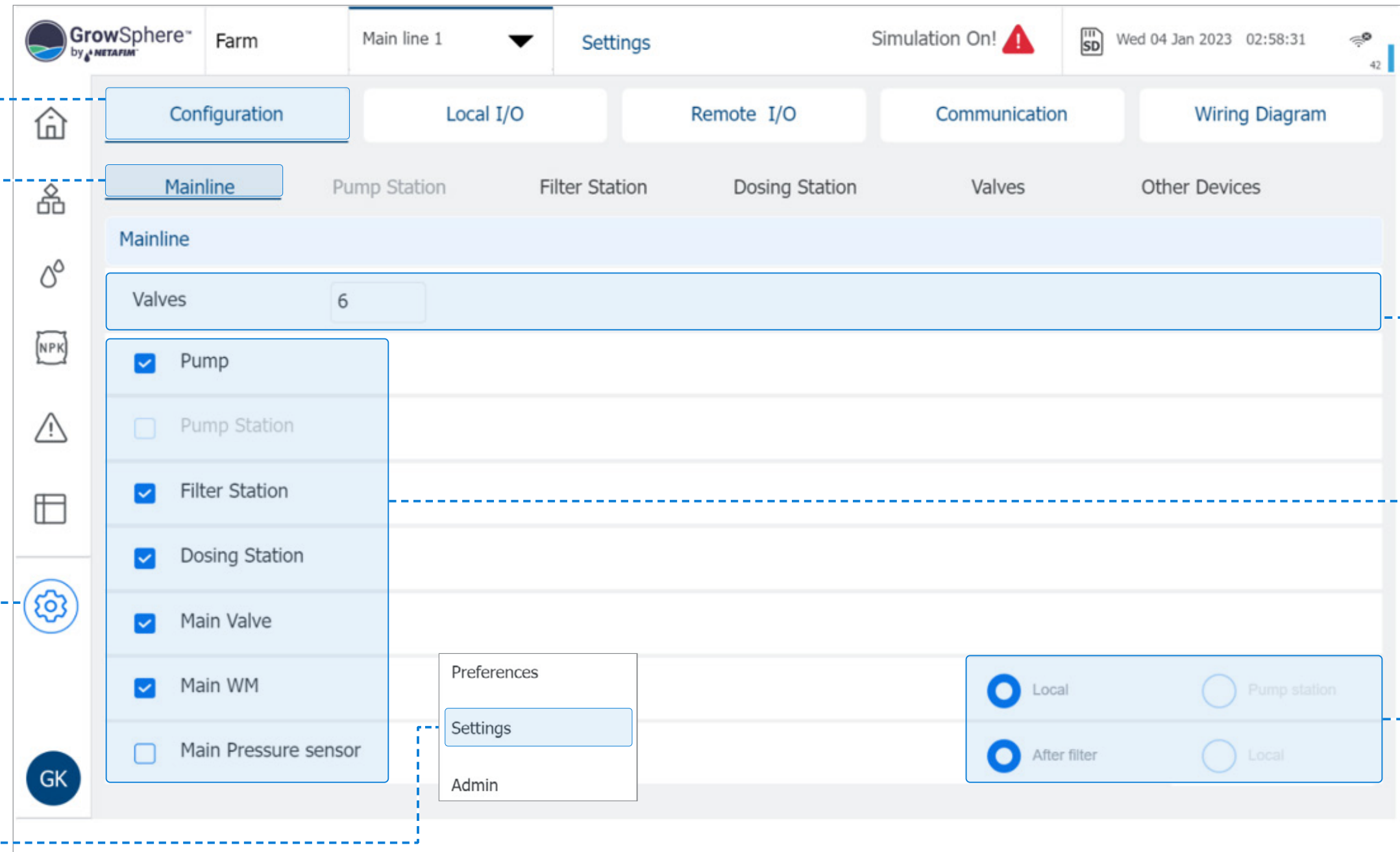
NOTE
Need to define all the devices that are part of the hydraulic model regardless if they are connected locally or remotely.

3. Tap the Configuration tab

4. Tap the Mainline tab

1. Tap the Configuration button

2. Select Settings and type your credentials



5. Enter amount of valves
This value represents the total number of valves to be used in the system.

6. Select each device that is part of the irrigation system
Note that some of the devices require additional parameters to be entered.

7. Select the location
The water meter / pressure sensor can be located at the pump station/after filter or at the main line (local).

5.4.2 Configuring Pump Station

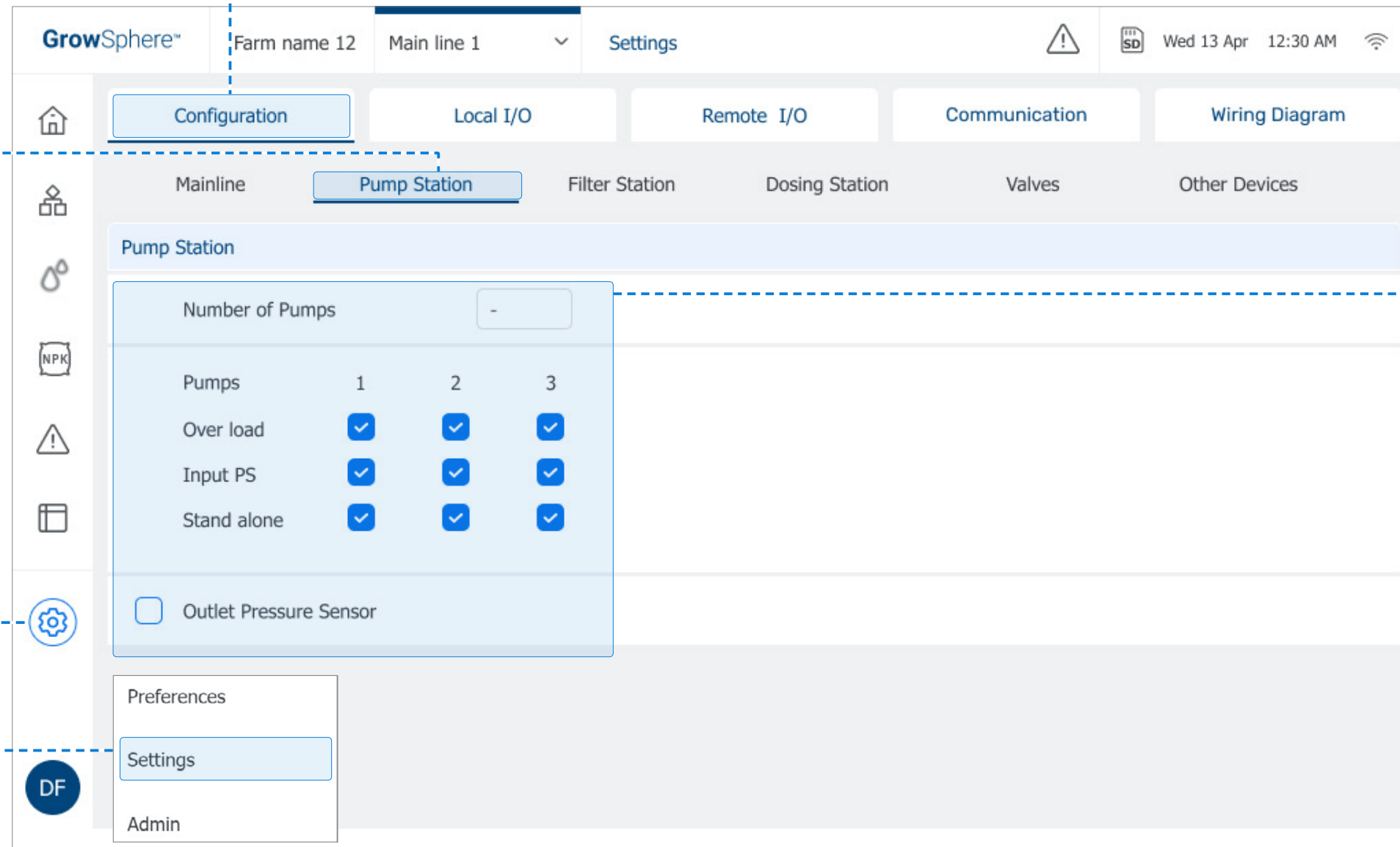
Perform the following steps to configure the pump station parameters:

3. Tap the Configuration tab

4. Tap the Pump Station tab

1. Tap the Configuration button

2. Select Settings and type your credentials



Pumps	1	2	3
Over load	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Input PS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Stand alone	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

5. Define the pump station parameters:

- **Number of Pumps:** Define the amount of pumps in the pump station.
- **Pumps:** Select for each pump applicable;
 - **Over load:** Enables sending an alert if the pump has a fault.
 - **Input PS:** Enables sending an alert when there is no water pressure at the pump inlet.
 - **Stand alone:** Enables a pump not to participate on the pump station function and can be assigned to a number of irrigation valves.
- **Outlet Pressure Sensor:** Select if the pump station has an outlet pressure sensor.

5.4.3 Configuring Filter Station

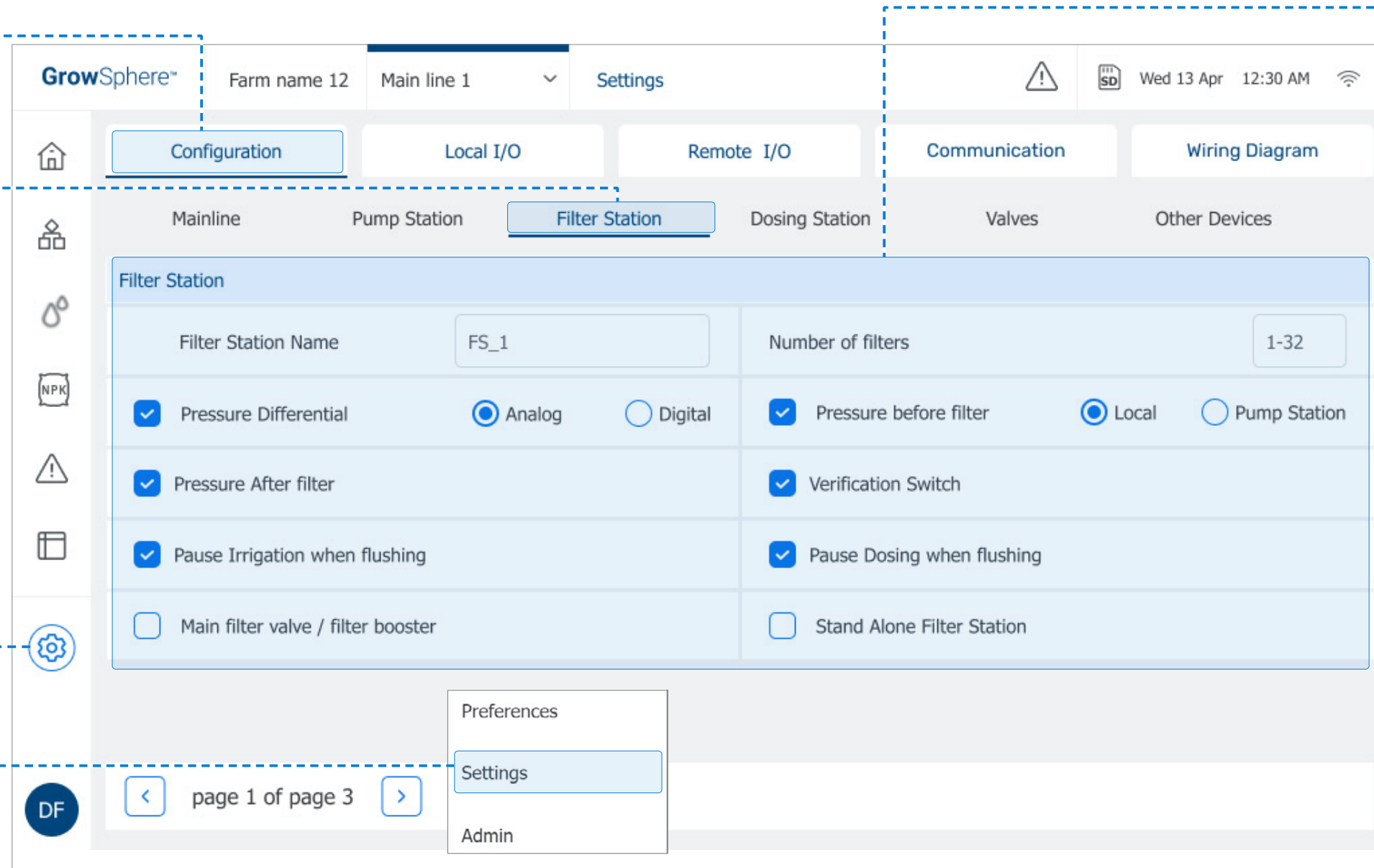
Perform the following steps to configure the filter station parameters:

3. Tap the Configuration tab

4. Tap the Filter Station tab

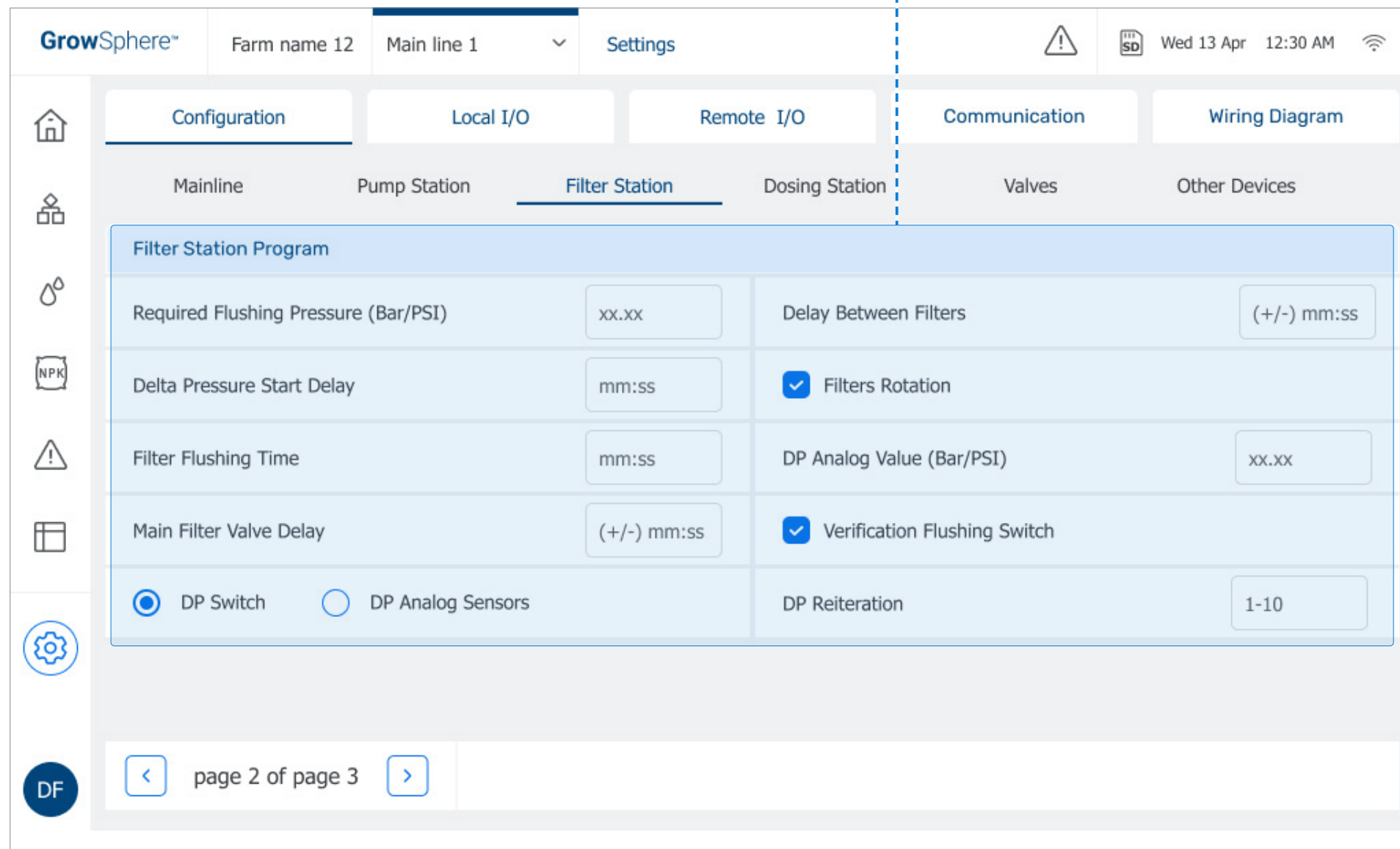
1. Tap the Configuration button

2. Select Settings and type your credentials



5. Define the filter station parameters:

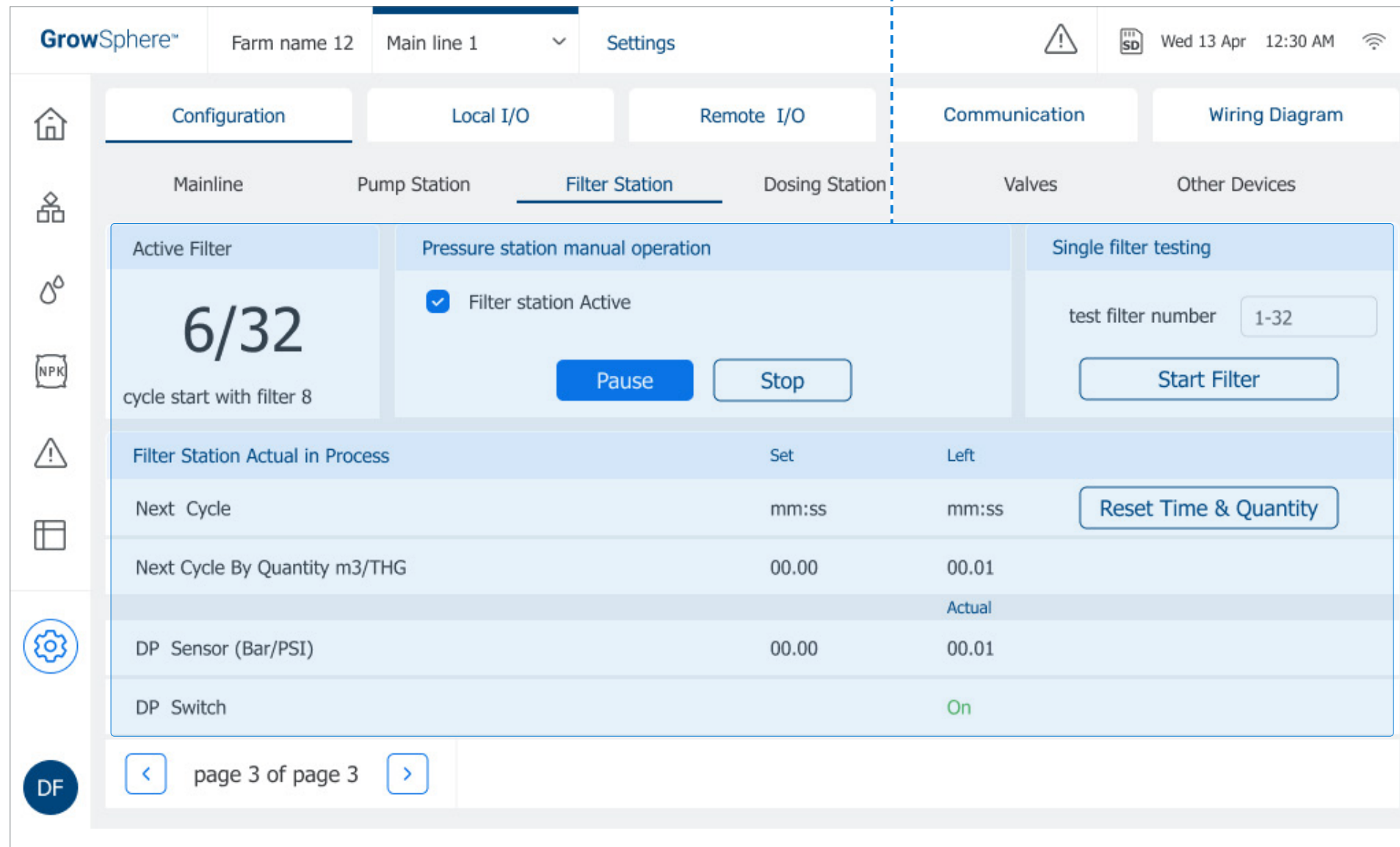
- **Filter Station Name:** Type the name of the filter station.
- **Number of filters:** Enter amount of filters in the filter station.
- **Parameters:** Select each parameter applicable.



Filter Station Program			
Required Flushing Pressure (Bar/PSI)	xx.xx	Delay Between Filters	(+/-) mm:ss
Delta Pressure Start Delay	mm:ss	<input checked="" type="checkbox"/> Filters Rotation	
Filter Flushing Time	mm:ss	DP Analog Value (Bar/PSI)	xx.xx
Main Filter Valve Delay	(+/-) mm:ss	<input checked="" type="checkbox"/> Verification Flushing Switch	
<input checked="" type="radio"/> DP Switch	<input type="radio"/> DP Analog Sensors	DP Reiteration	1-10

6. Define the filter Station parameters:

- **Required Flushing Pressure (Bar/PSI):** Indicates the required flushing pressure.
- **Delta Pressure Start Delay:** Enter amount of delta pressure start delays.
- **Filter Flushing Time:** Enter amount of filter flushing time.
- **Main Filter Valve Delay:** Enter amount of valve delay.
- **DP:** Select DP switch or DP analog sensors.
- **Delay Between Filters:** Enter amount of delay between filters.
- **Filters Rotation:** Select filters rotation.
- **DP Analog Value (Bar/PSI):** Enter the value of DP analog.
- **DP Reiteration:** Enter the DP reiteration.



The screenshot displays the 'Filter Station' configuration page in the GrowSphere™ MAX User Manual. The page is titled 'Filter Station' and includes several sections:

- Active Filter:** Displays '6/32' and 'cycle start with filter 8'.
- Pressure station manual operation:** Includes a checked checkbox for 'Filter station Active' and buttons for 'Pause' and 'Stop'.
- Single filter testing:** Includes a 'test filter number' input field set to '1-32' and a 'Start Filter' button.
- Filter Station Actual in Process:** A table with columns for 'Set' and 'Left'.

Filter Station Actual in Process	Set	Left
Next Cycle	mm:ss	mm:ss
Next Cycle By Quantity m3/THG	00.00	00.01
DP Sensor (Bar/PSI)	00.00	00.01
DP Switch		On

7. Define the filter station parameters:

- **Active Filter:** Displays the active filter.
- **Filter Station Manual Operation:** Check the active filter station.
- **Test Filter Number:** Enter the test filter number.
- **Pause / Stop / Start Filter:** Press pause, stop or start to control the filter station.
- **Reset Time & Quantity:** Press to reset time and quantity.
- **Next Cycle:** Enter the set time and time left for the next cycle.
- **Next Cycle By Quantity m3/THG:** Enter the set time and time left for the next cycle by quantity.
- **DP Sensor (Bar/PSI):** Enter the set time and the time left of the DP sensor.
- **DP Switch:** Displays if the DP switch is turned on.

5.4.4 Configuring Dosing Station

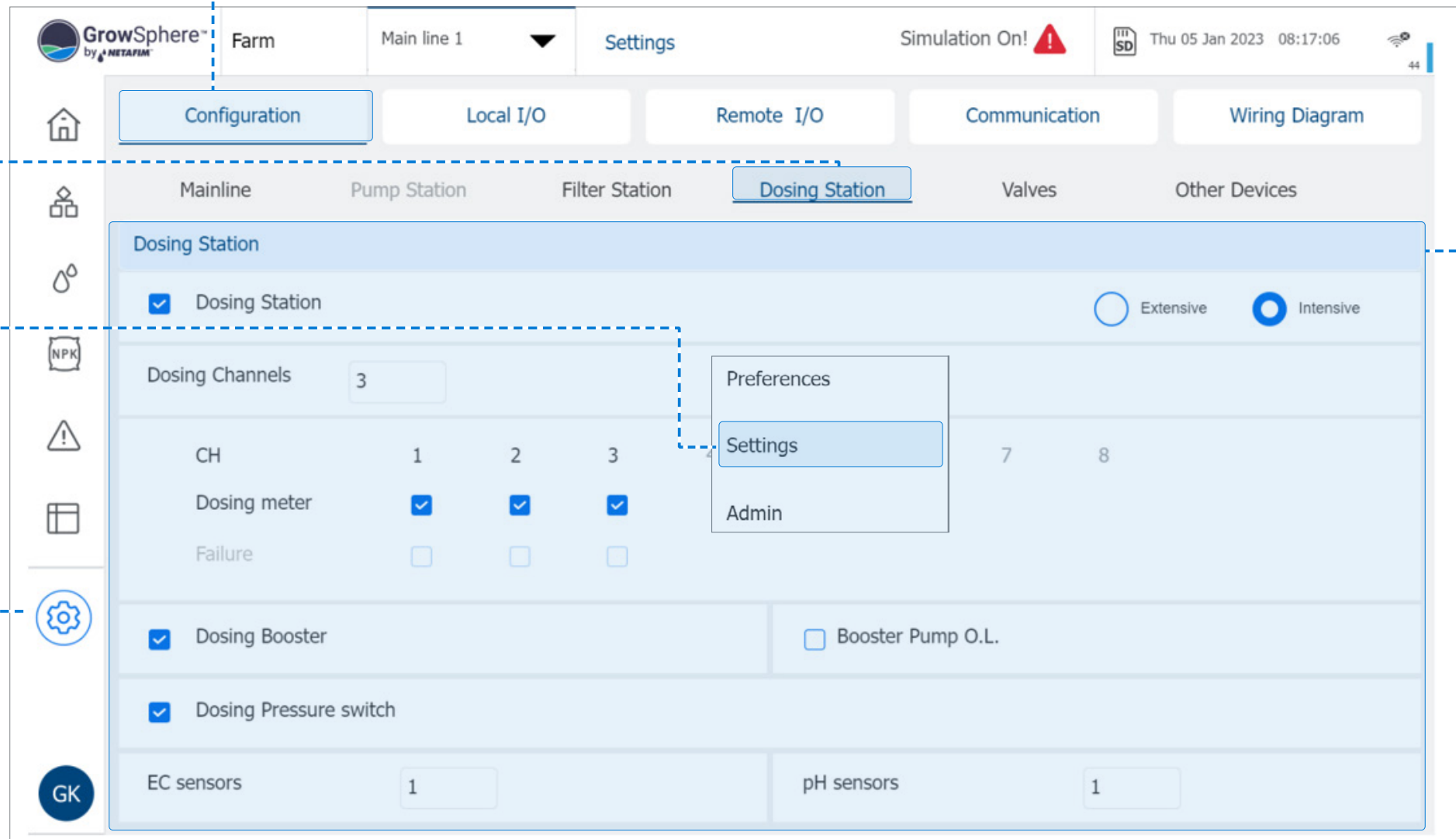
The system displays a row for each of the valves defined in the **Configuration** tab. Perform the following steps to configure the dosing station:

3. Tap the Configuration tab

4. Tap the Dosing Station tab

2. Select Settings and type your credentials

1. Tap the Configuration button



5. Define the dosing station parameters:

- **Dosing Station:** Select the extensive or intensive option.
 - **Extensive:** This option is chosen when the dosing station/dosing channels are far away from the controller. In this case, the dosing channels are activated by remote terminal units.
 - **Intensive:** This option is chosen when it is necessary to inject fertilizers and chemicals with more precise control.
- **Dosing Channels:** Select the desired channels of the dosing station.
- **Booster O.L:** Select when the booster overload protections are connected to the controller.
- **EC Sensor:** Select the amount of EC sensors connected to the dosing station.
- **pH Sensor:** Select the amount of pH sensors connected to the dosing station.

5.4.5 Configuring Valves

The system displays a row for each of the valves defined in the **Mainline** tab. Perform the following steps to configure the valves names and other parameters:

3. Tap the Configuration tab

4. Tap the Valves tab

5. Define the valve parameters:

- **Device Type:** Indicates the device type. In this tab, all devices are defined as valves.
- **Device #:** Indicates the valve number.
- **Source:** Irrigation main line to which the valve is connected.
- **Name:** The system set a default name. It is suggested to type here a descriptive name for the valve.
- **Flow (m³/h):** Set the valve's nominal flow rate.
- **Area (ha):** Define the area (in hectares) of the irrigation block that is allocated to the valve.
- **Assigned:** Indicates if the valve was assigned to an output module. If the valve is disabled the valve line appears gray.
- **Module:** The controller module name and slot number to which the device is connected.
- **DO (Digital Output):** The module's output port number to which the device is connected.

1. Tap the Configuration button

2. Select Settings and type your credentials

Device type	NO.	Source	Name	Flow (m ³ /h)	Area (ha)	Assigned	Module	DO
Valve	1	M.Line1	Valve A	1.0	1.0			
Valve	2	M.Line1	Valve B	1.0	1.0			
Valve	3	M.Line1	Valve C	1.0	1.0			
Valve	4	M.Line1	Valve D	1.0	1.0			
Valve	5	M.Line1	Valve E	1.0	1.0			
Valve	6	M.Line1	Valve F	1.0	1.0			

5.4.6 Configuring Other Devices

The system displays a row for each of the devices defined in the **Configuration** tab. Perform the following steps to configure the devices names and other parameters:

3. Tap the Configuration tab

4. Tap the Other Devices tab

5. Define the device parameters:

1. Tap the Configuration button

2. Select Settings and type your credentials

Device type	NO.	Source	Name	Flow	Assigned	Module	DO
DosingChannel	1	D.Statio1	DCH1.1	600.0	✓	DO572.1	0
DosingChannel	2	D.Statio1	DCH1.2	450.0	✓	DO572.1	1
DosingChannel	3	D.Statio1	DCH1.3	300.0	✓	DO572.1	2
Pump	1	M.Line1	PMP1.1	80.0	✓	PM5052	0
BoostPump	1	M.Line1	BPMP1.1	—	✓	DO572.1	7
MainValve	1	M.Line1	MVLV1.1	—	✓	PM5052	1
	1	M.Line1	WMTR1.1	—	✓	PM5052	1

- **Device Type:** Indicates the device type.
- **Device #:** Indicates the device number.
- **Source:** Define the irrigation main line to which the device is connected.
- **Name:** The system set a default name. It is suggested to type here a descriptive name of the device.
- **Flow:** Device's nominal flow rate.
- **Assigned:** Indicates if the device was assigned to a Controller module. If the device is disabled the device line appears gray.
- **Module:** The controller module name and slot number to which the device is connected.
- **DO (Digital Output):** The module's output port number to which the device is connected.

5.4.7 Allocating Local Digital Outputs

The system displays all local digital outputs according to the controller configuration. Perform the following steps to allocate the relevant device to the digital output that it is connected to:

3. Tap the Local I/O tab

4. Tap the Digital output tab

1. Tap the Configuration button

2. Select Settings and type your credentials

Module	DO	Device type	NO.	Source	Name	Flow	Area (ha)	Assigned
DO572.1	1	Dosing Chε	2	D.Statio1	DCH1.2	450.0 L/h	—	Unassign
DO572.1	2	Dosing Chε	3	D.Statio1	DCH1.3	300.0 L/h	—	Unassign
DO572.1	3	Relay	0			—	—	Unassign
DO572.1	4	Relay	0			—	—	Unassign
DO572.1	5	Relay	0			—	—	Unassign
DO572.1	6	Relay	0			—	—	Unassign
		postPump	1	M.Line1	BPMP1.1	—	—	Unassign

NOTE
If the system contains remote I/O, first configure the remote I/O, see [Configuring Remote I/O](#).

5-. Define the digital output settings:

- **Module:** The controller module name and slot number to which the device is connected.
- **DO (Digital Output):** The module's output port number to which the device is connected.
- **Device Type:** Options include main valve, valve, pump, dosing channel, and booster pump.
- **Device #:** This is the device number as appears under the **Configuration** tab. This field allows reordering the assignment of the devices.
- **Source:** Irrigation line to which the device is connected.
- **Name:** The system set a default name. It is suggested to type here a descriptive name of the device.
- **Flow:** Device's nominal flow rate.
- **Area (ha):** Area (in hectares) of the irrigation block that the valve is irrigating.
- **Assigned:** Indicates if the device was assigned to a Controller module. If the device is disabled the device line appears gray.

NOTE
The module name includes also the slot number where the module is installed. This is helpful when more than one module of the same type are installed in the controller.

5.4.8 Allocating Local Digital Inputs

The system displays all local digital inputs according to the controller configuration. Perform the following steps to allocate the relevant devices to the digital input that it is connected to:

3. Tap the Local I/O tab

4. Tap the Digital input tab

5. Select the relevant device type

The system adds the next device of the selected type that was not assigned yet.

1. Tap the Configuration button

2. Select Settings and type your credentials

Module	DO#	Device type	Device#	Source	Name	Type	Rate	Assigned
1.1.PM5052	0	Water meter	1	M. line 1	M.VLV_1	PPL	300.0	Unassign
2.1.PM5052	1	Water meter	1	M. line 1	M.VLV_1	PPL	300.0	Unassign
3.1.PM5052	0	Water meter	1	M. line 1	M.VLV_1	PPL	300.0	Unassign
4.1.PM5052	1	Dosing meter	1	M. line 1	M.VLV_1	LPP	300.0	Unassign
5.1.PM5052	0	Water meter	1	M. line 1	M.VLV_1	PPL	300.0	Unassign
6.1.PM5052	1	Water meter	1	M. line 1	M.VLV_1	PPL	300.0	Unassign
		Filter DP	1	M. line 1	M.VLV_1	NO	300.0	Unassign
		Water meter	1	M. line 1	M.VLV_1	NO	300.0	Unassign

6. Define the digital input settings:

- **Module:** The controller module to which the device is connected.
- **DO #:** The module's digital input port number to which the device is connected.
- **Device Type:** Options include water meter, dosing meter, and filter dosing pump.
- **Device #:** This is the device number as appear under the **Configuration** tab. This field allows reordering the assignment of the devices.
- **Source:** Indicates the main irrigation line to which the device is connected.
- **Name:** The system set a default name. It is suggested to type here a descriptive name of the device.
- **Type:** Options include PPL (pulses per liter) or LPP (liters per pulse).
- **Rate:** Value corresponding to the **Type** selection.
- **Assigned:** Indicates if the device was assigned to a Controller module. If the device is disabled the device line appears gray.

NOTE

The module name includes also the slot number where the module is installed. This is helpful when more than one module of the same type are installed in the controller.

5.4.9 Configuring Local Analog Inputs

Perform the following steps to configure all local analog inputs (i.e., sensors):

3. Tap the Local I/O tab

4. Tap the Analog input tab

5. Select the relevant device type

6. Select the relevant device name

The system suggest the next device of the selected type that was not assigned yet.

1. Tap the Configuration button

2. Select Settings and type your credentials

Module	AI	Device type	NO.	Source	Name	Input	Unit	Assigned
AI561.1 0		EC	1	M.Line1	EC1.1	4 - 20 mA		
AI561.1 1		pH	1	M.Line1	PH1.1	4 - 20 mA		

7. Define the analog input settings:

- **Module:** The controller module to which the sensor is connected.
- **AI (Analog Input) #:** The module's analog input port number to which the sensor is connected.
- **Device Type:** Options include a variety of sensors (e.g., EC sensor, pH, sensor, etc.).
- **NO.:** Sensor number.
- **Source:** Irrigation line to which the sensor is connected.
- **Name:** The system set a default name. It is suggested to type here a descriptive name of the device.
- **Input:** Automatically defined according to the sensor type.
- **Unit:** The sensor's measurement unit.
- **Assigned:** Indicates if the device was assigned to a Controller module. If the device is disabled the device line appears gray.

NOTE

The module name includes also the slot number where the mudule is installed. This is helpful when more than one module of the same type are installed in the controller.

8. Assign an analog input to the EC sensors

The screenshot shows the 'Local analog input' configuration page for module AI561.1 0. The 'Input Range (mA)' is set to 4. A list of sensors is displayed, including EC, pH, EC Ver, and pH Ver. The 'Assigned' column shows that the EC sensor is currently assigned to the input.

Module	AI	Device type	NO.	Source	Name	Input	Unit	Assigned
AI561.1	0	General 0-20m.	0			4 - 20 mA		
		EC	(1)	Analog Flow Sensor (0)	SM150 (0)	PlantSense (0)	Pressure0_20 (0)	Unassign
		pH	(1)	Out temperature (0)	ECH2O5 (0)	LeafWetness (0)	Pressure0_60 (0)	
		EC Ver	(0)	Out humidity (0)	Irrrometer (0)	General rSense sens(0)	Accumulated Rain (0)	
		pH Ver	(0)	Radiation (0)	Dewpoint (0)	Identification sensor(0)	Solar radiation sum (0)	
		EC Pre-Control	(0)	Wind Speed Max (0)	HygroClip2 (0)	NetaCap water cont(0)	General 0-5V (0)	Unassign
		EC Drain	(0)	Rain Sensor (0)	RTD PT-100 (0)	NetaCap soil temper(0)	Drainage measure s(0)	
		Filter Pressure Befor(0)		ET (0)	Dendrometer (0)	NetaCap ambient te(0)	Wind direction (0)	
		Filter Pressure After(1)		Soil temperature (0)	Pyranometer (0)	Pressure0_2p5 (0)	Brightness (0)	
		Pressure Sensor (0)		Tensiometer (0)	Tensiometer ANT10(0)	Pressure0_5 (0)		
		General 0-20mA (0)		NetaSense (0)	LeafSense (0)	Pressure0_10 (0)		

9. Define the analog input settings:

- **Input range:** Indicates the input signal effective range (lowest and highest value).
- **Output range:** Enables defining the reading range corresponding to the defined **Input range**. For example, temperature sensor 0-70C with 4-20ma, the system will identify the input as 4-20ma and the output range should be set to 0 and 70.
- **Offset:** An option to calibrate the sensor reading by adding a value that will offset the reading range. The offset will increase the reading when the value is positive or will decrease it when a negative value is entered.
- **Unassign button:** Enables removing a sensor that is assigned to the module's analog input port.

5.4.10 Configuring Remote I/O

Perform the following before allocating the RTU type to the devices:

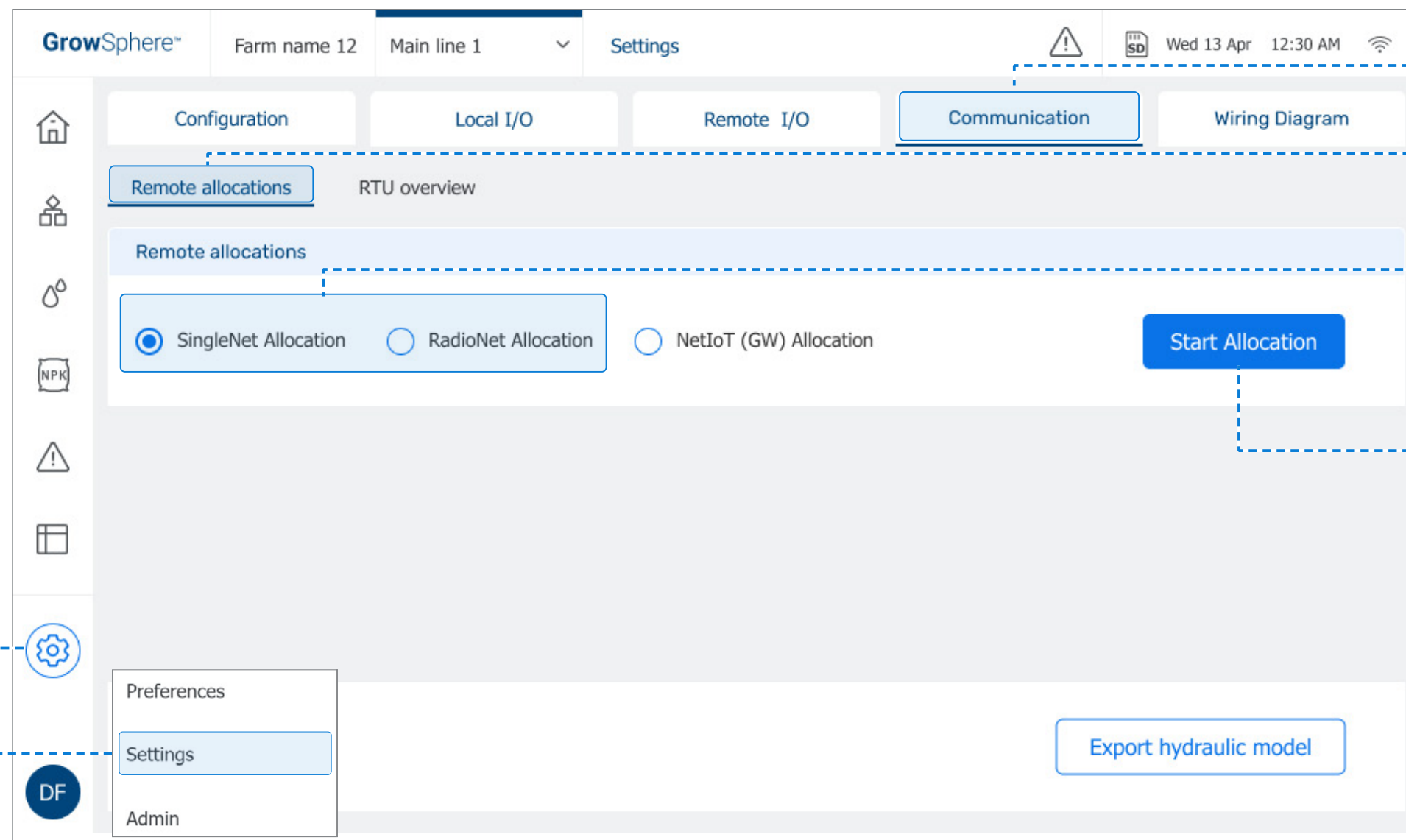
- **Export Hydraulic Model:** Open the Remote I/O app and export the hydraulic models to the controller.
- **Define the Mainline Configuration:** Define the amount of valves and select each device that is part of the irrigation system, see [Defining System Devices](#).

SingleNet and RadioNet Allocations

Perform the following steps to allocate the SingleNet or the RadioNet to the devices.

 **NOTE**

- This section is only relevant if the system contains remote I/O.
- For more information, see Netafim RTUs Installation and Operation Guide



1. Tap the Configuration button

2. Select Settings and type your credentials

3. Tap the Communication tab

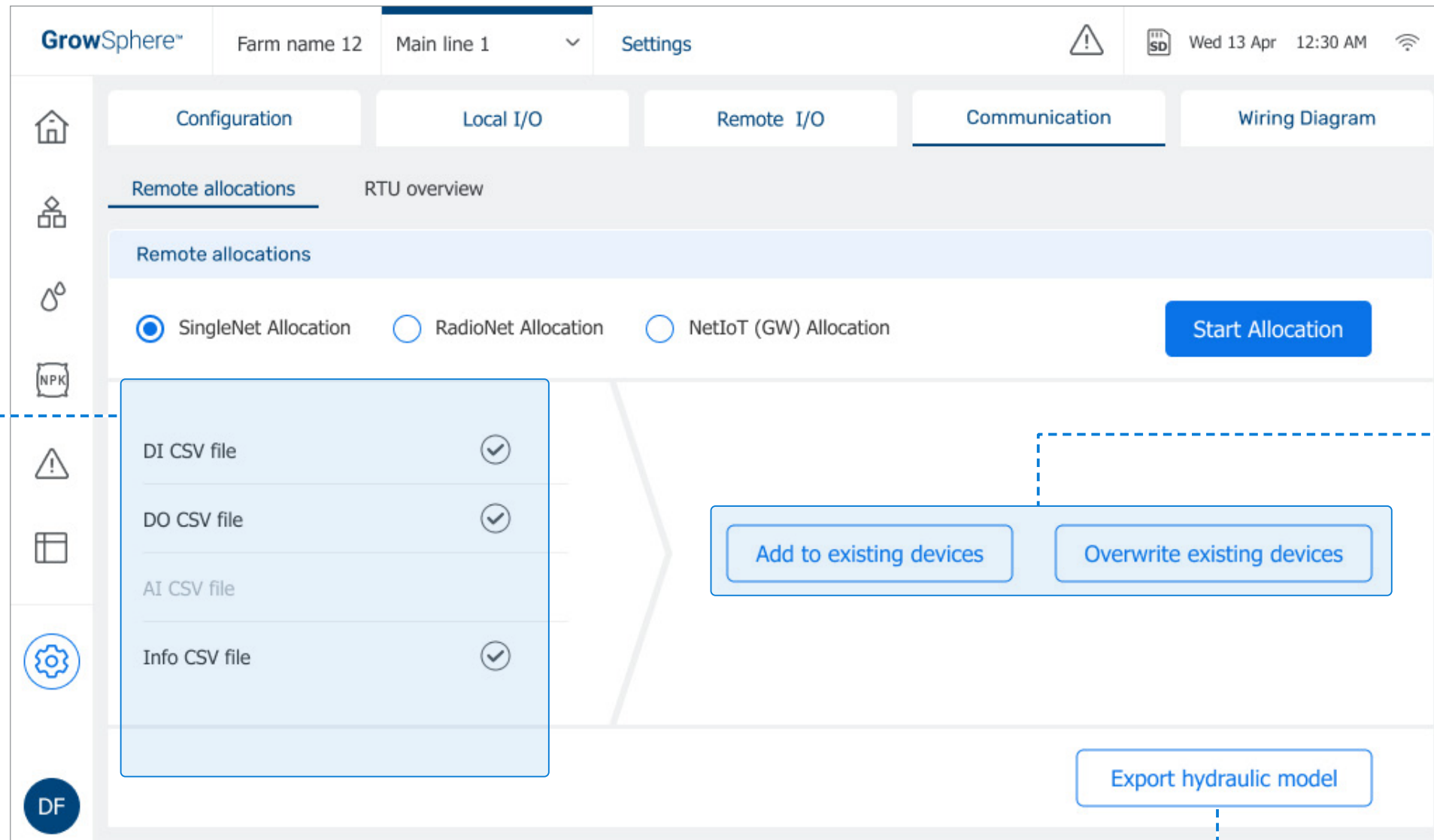
4. Tap the Remote allocations tab

5. Select the RTU type

This process is relevant to the SingleNet or RadioNet devices.

6. Tap Start Allocation

The controller searches for the required CSV files stored in its memory.



7. Verify that the CSV files exist

The exported files are displayed. Icons define if the files with the devices are found on the controller memory:

- ✓ Files found
- ✗ Files not found

8. Select the method to allocate the devices:

- **Add to existing devices:** Adds the devices to the allocated remote I/O list.
- **Overwrite existing devices:** Overwrites the existing devices with the allocated devices.

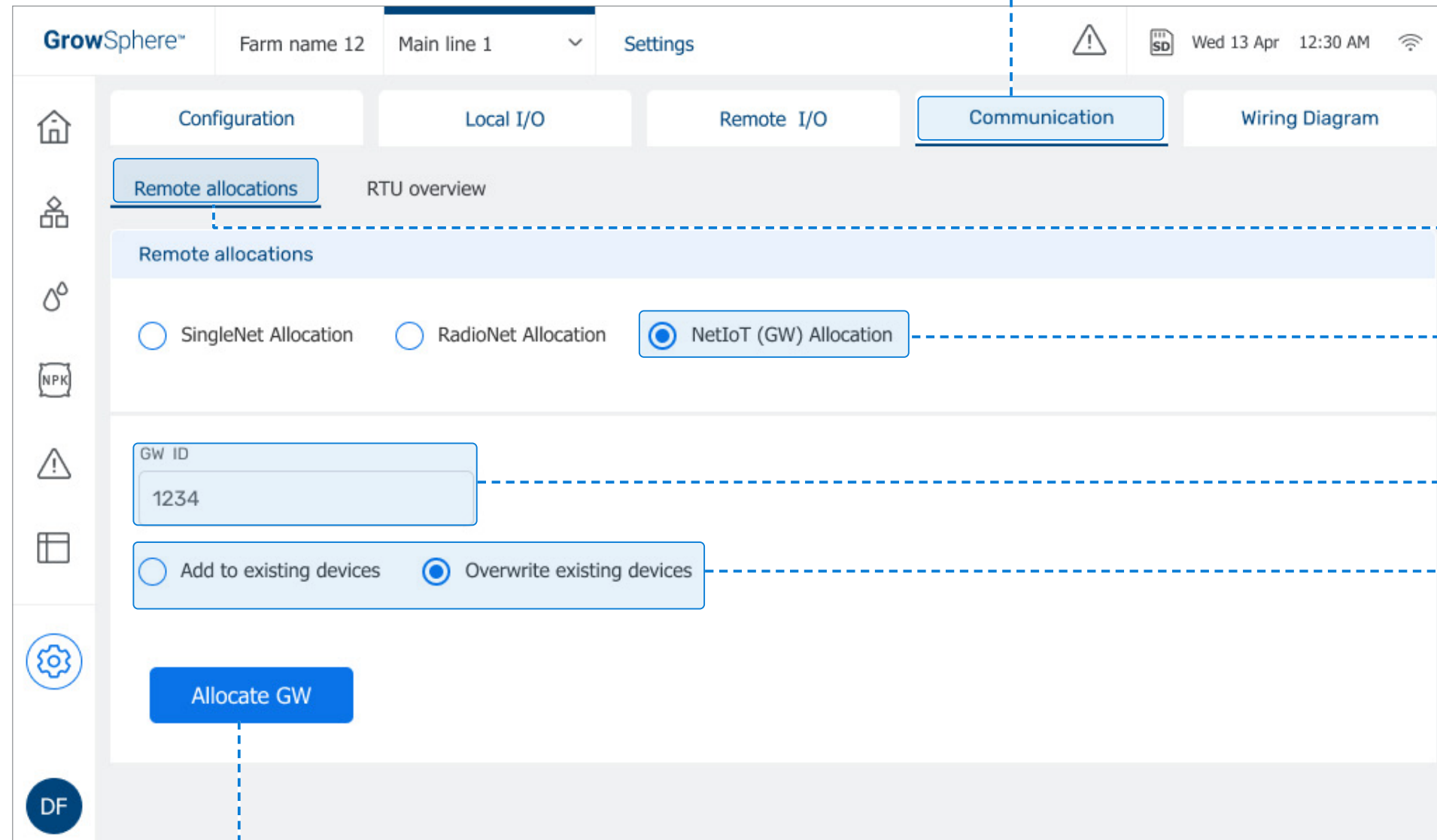
9. The Allocation Process popup window opens, see Allocation Process Status.

Tap the Export hydraulic model button to export a new hydraulic model.

NetIoT (Gateway) Allocation

Perform the following steps to allocate the NetIoT (gateway) to the devices:

1. Tap the *Communication* tab



2. Tap the *Remote allocations* tab

3. Select *NetIoT (Gateway) Allocation*

4. Define *Gateway ID*

5. Select the method to allocate the devices:

- **Add to existing devices:** Adds the devices to the allocated remote I/O list.
- **Overwrite existing devices:** Overwrites the existing devices with the allocated devices.

6. Tap *Allocate GW*

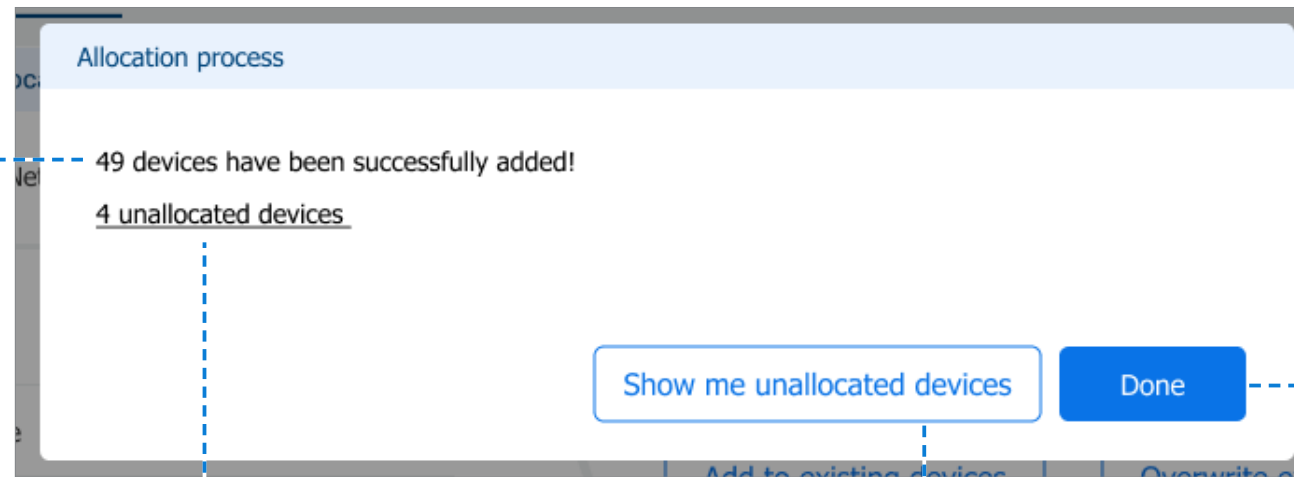
The Allocation Process popup window opens, see [Allocation Process Status](#).

Allocation Process Status

The following popup window is displayed after adding or overwriting files the allocated devices:

1. Verify the devices successfully added

Displays the amount of devices successfully added to the Remote I/O tab, see [Allocating Remote I/O Settings](#).



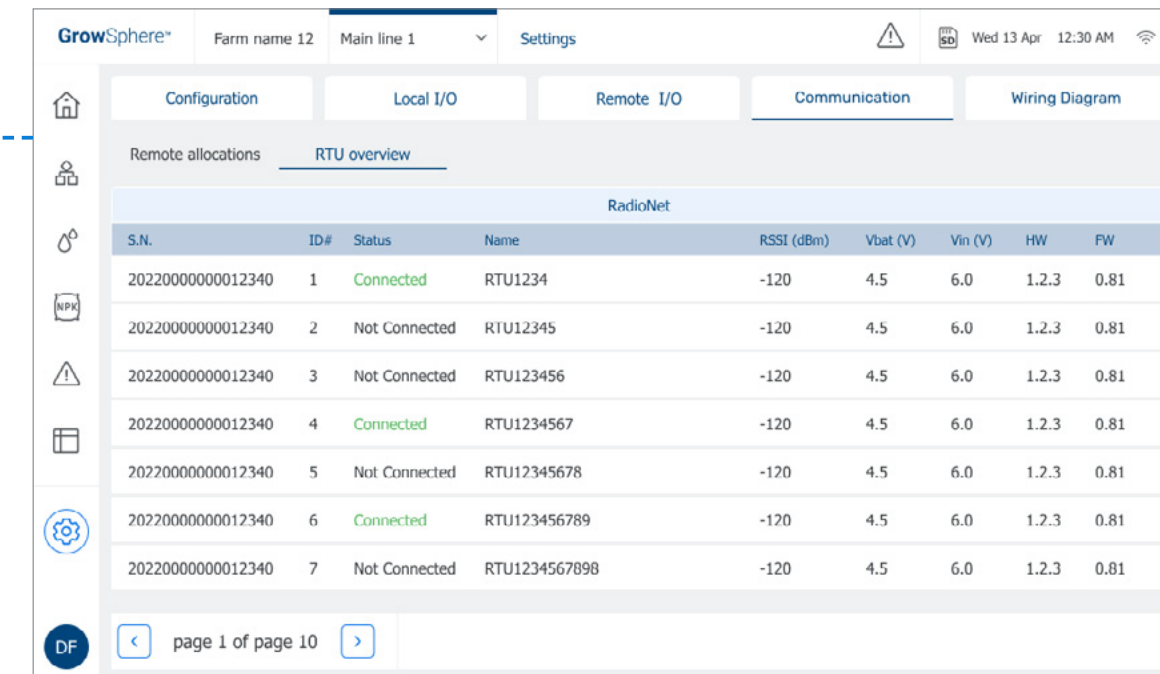
Unallocated devices

Displays the number of unallocated devices that were not successfully allocated.

2. Tap Done

Tap Show me unallocated devices to display the RTU overview screen

The **Status** column indicates if the device was allocated or not.



S.N.	ID#	Status	Name	RSSI (dBm)	Vbat (V)	Vin (V)	HW	FW
2022000000012340	1	Connected	RTU1234	-120	4.5	6.0	1.2.3	0.81
2022000000012340	2	Not Connected	RTU12345	-120	4.5	6.0	1.2.3	0.81
2022000000012340	3	Not Connected	RTU123456	-120	4.5	6.0	1.2.3	0.81
2022000000012340	4	Connected	RTU1234567	-120	4.5	6.0	1.2.3	0.81
2022000000012340	5	Not Connected	RTU12345678	-120	4.5	6.0	1.2.3	0.81
2022000000012340	6	Connected	RTU123456789	-120	4.5	6.0	1.2.3	0.81
2022000000012340	7	Not Connected	RTU1234567898	-120	4.5	6.0	1.2.3	0.81

Allocating Remote I/O Settings

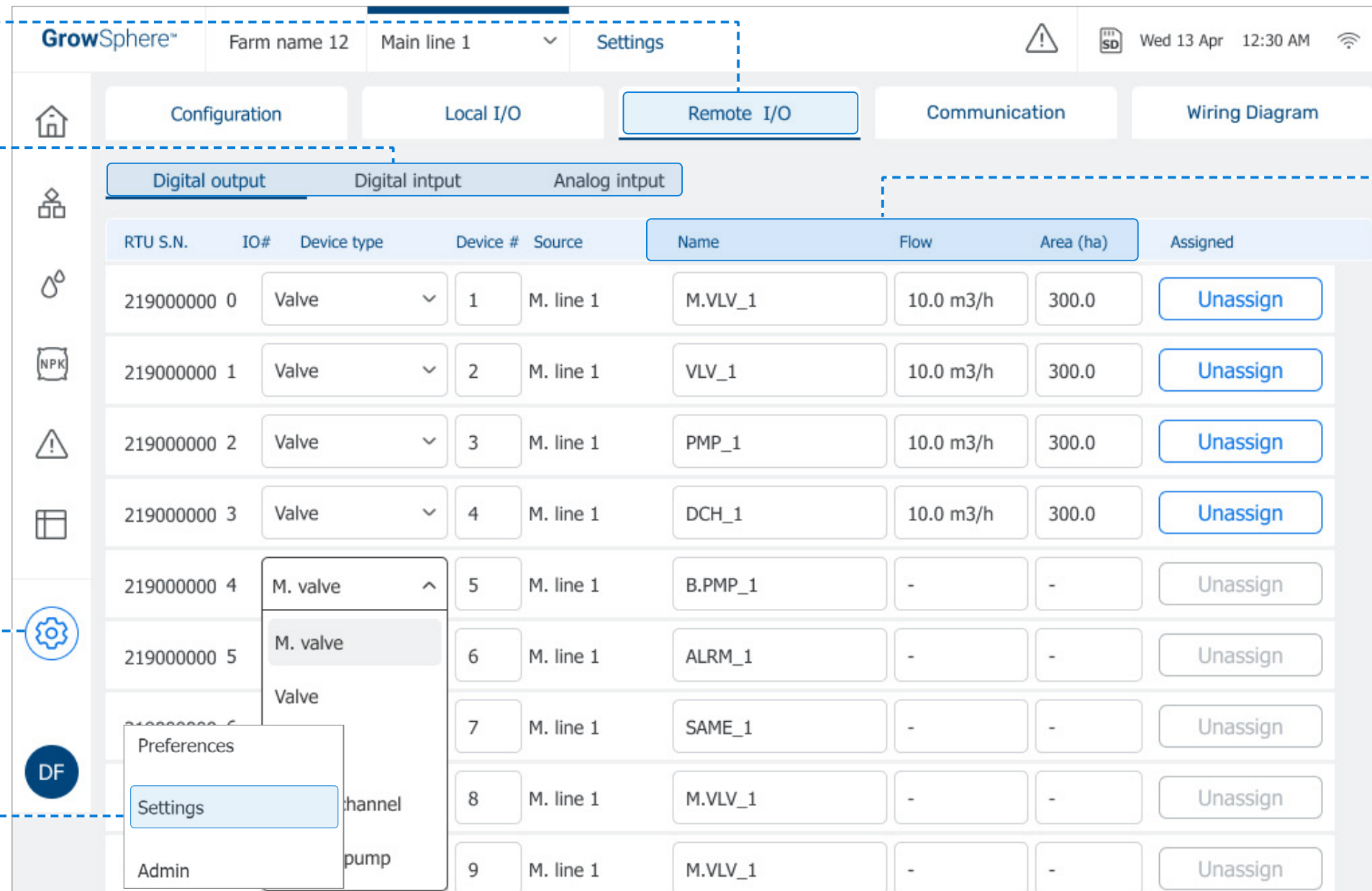
The system displays all the devices that were successfully allocated:

3. Tap the Remote I/O tab

4. Select the tab to define the settings

1. Tap the Configuration button

2. Select Settings and type your credentials



RTU S.N.	IO#	Device type	Device #	Source	Name	Flow	Area (ha)	Assigned
219000000	0	Valve	1	M. line 1	M.VLV_1	10.0 m3/h	300.0	Unassign
219000000	1	Valve	2	M. line 1	VLV_1	10.0 m3/h	300.0	Unassign
219000000	2	Valve	3	M. line 1	PMP_1	10.0 m3/h	300.0	Unassign
219000000	3	Valve	4	M. line 1	DCH_1	10.0 m3/h	300.0	Unassign
219000000	4	M. valve	5	M. line 1	B.PMP_1	-	-	Unassign
219000000	5	M. valve	6	M. line 1	ALRM_1	-	-	Unassign
219000000	6	Valve	7	M. line 1	SAME_1	-	-	Unassign
219000000	8	M. valve	8	M. line 1	M.VLV_1	-	-	Unassign
219000000	9	M. valve	9	M. line 1	M.VLV_1	-	-	Unassign

5. Define the following settings:

- **Name:** The system set a default name. It is suggested to type here a descriptive name of the device.
- **Flow:** Device's nominal flow rate.
- **Area (ha):** Area (in hectares) of the irrigation block that the valve is irrigating.

The devices can be manually revised if needed.

5.5 Configuring Dosing Settings

5.5.1 Configuring Dosing General Settings

Perform the following steps to configure the general dosing settings:

1. Tap the Fertilizer Dosing button

2. Tap the General Settings tab

3. Select Extensive or Intensive

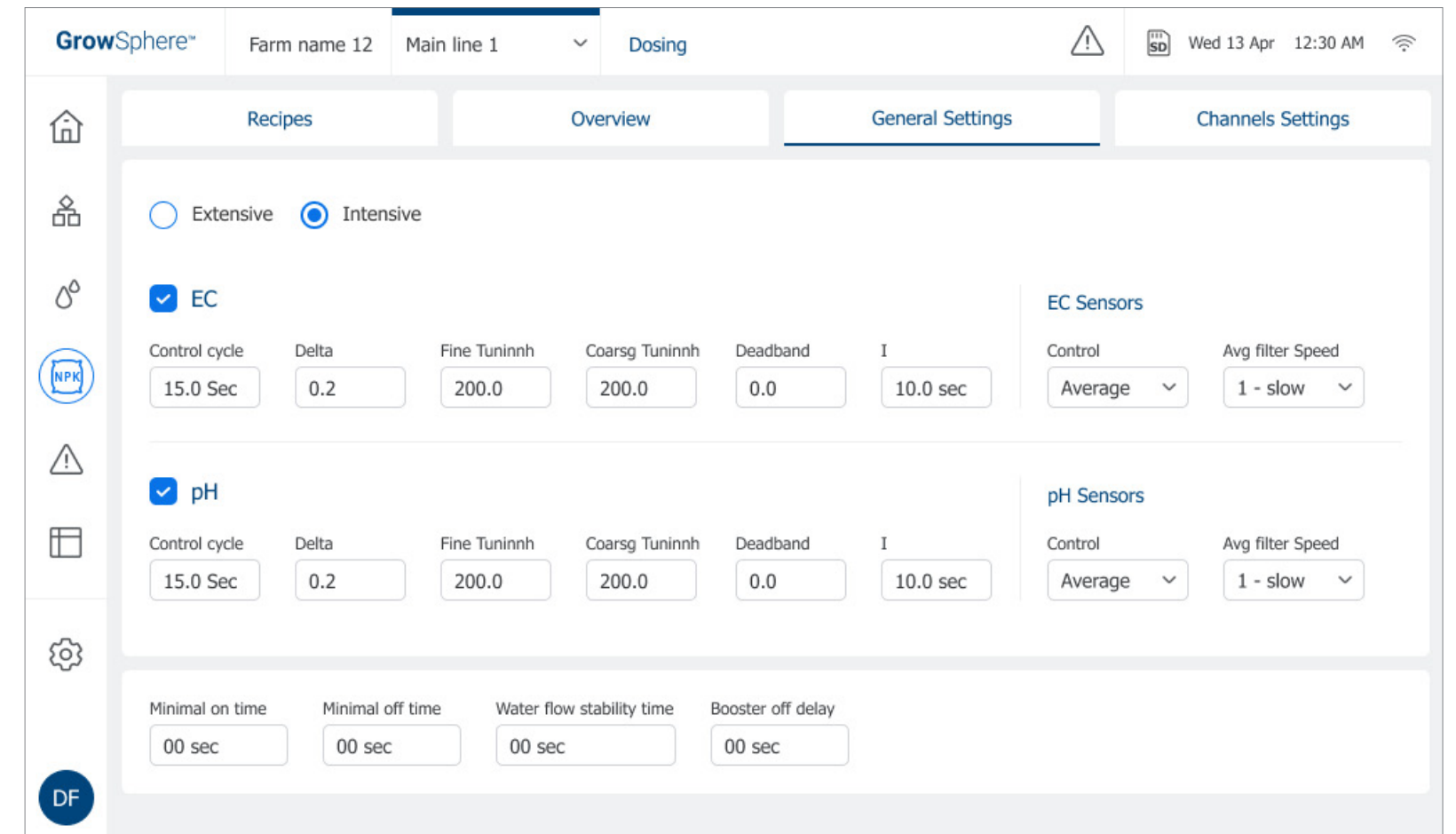
- **Extensive:** This option is chosen when the dosing station/dosing channels are far away from the controller. In this case, the dosing channels are activated by remote terminal units.
- **Intensive:** This option is chosen when it is necessary to inject fertilizers and chemicals with more precise control.

4. Define the parameters
See next page.

Dosing Parameters:

- **Control cycle:** The time it takes the fertilizer to travel from the injection point to the EC sensor. During this time the fertilizer is mixed with the irrigation water. This value is based on the distance between the injection point and the sensor location, the pipe diameter, and the flow rate.
- **Delta:** Defines the maximal deviation allowed between the readings of two EC/pH sensors. If the deviation, exceed this value, an alert will be triggered.
- **Fine Tuning:** Applied when the EC/pH values are close to the target (i.e., 0.6 deviations from the target value). The higher the set number, the faster the EC/pH target will be reached, and the more fertilizer will be injected.
- **Coarse Tuning:** Applied when the EC/pH value is far from the target. The higher the number is set, the more rapid the fertilizer quantities will be increased in order to reach the target values more quickly. It is important to consider that as a result of fast (aggressive) changes, the EC/pH values will overshoot the EC/pH target. If slow (less aggressive) changes are made, it will take longer to reach the EC/pH target, with less deviation as a result.

- **Deadband:** Defines a range around the reading value that the system will ignore changes of the readings.
- **Integ:** Defines how fast the system will correct between high and low deviation.
- **Control:** Enables defining what sensor/s is used to control the process.
- **Avg. Filter Speed:** Defines how often the average of the two sensors readings is calculated. 0- defines a slow update of the calculated average. 10 - the calculated average is calculated often.
- **Minimal On Time:** The minimal amount of time the dosing channel must be on. This should be set based on the minimum activation time of the control valve or dosing channel motor.
- **Minimal Off Time:** The minimal amount of time that the dosing channel can be off. This value is important to ensure good dosing distribution.



- **Water Flow Stability Time:** A delay at the start of the irrigation shift necessary for the water meter to record a stable flow rate. Relevant when using EC/pH dosing control.
- **Booster Off Delay:** Causes the dosing booster to turn off the defined amount of time after the end of the dosing process.

NOTE

When **Extensive** is selected, only the following parameters are available:

- Minimal On Time
- Minimal Off Time
- Water Flow Stability Time
- Booster Off Delay

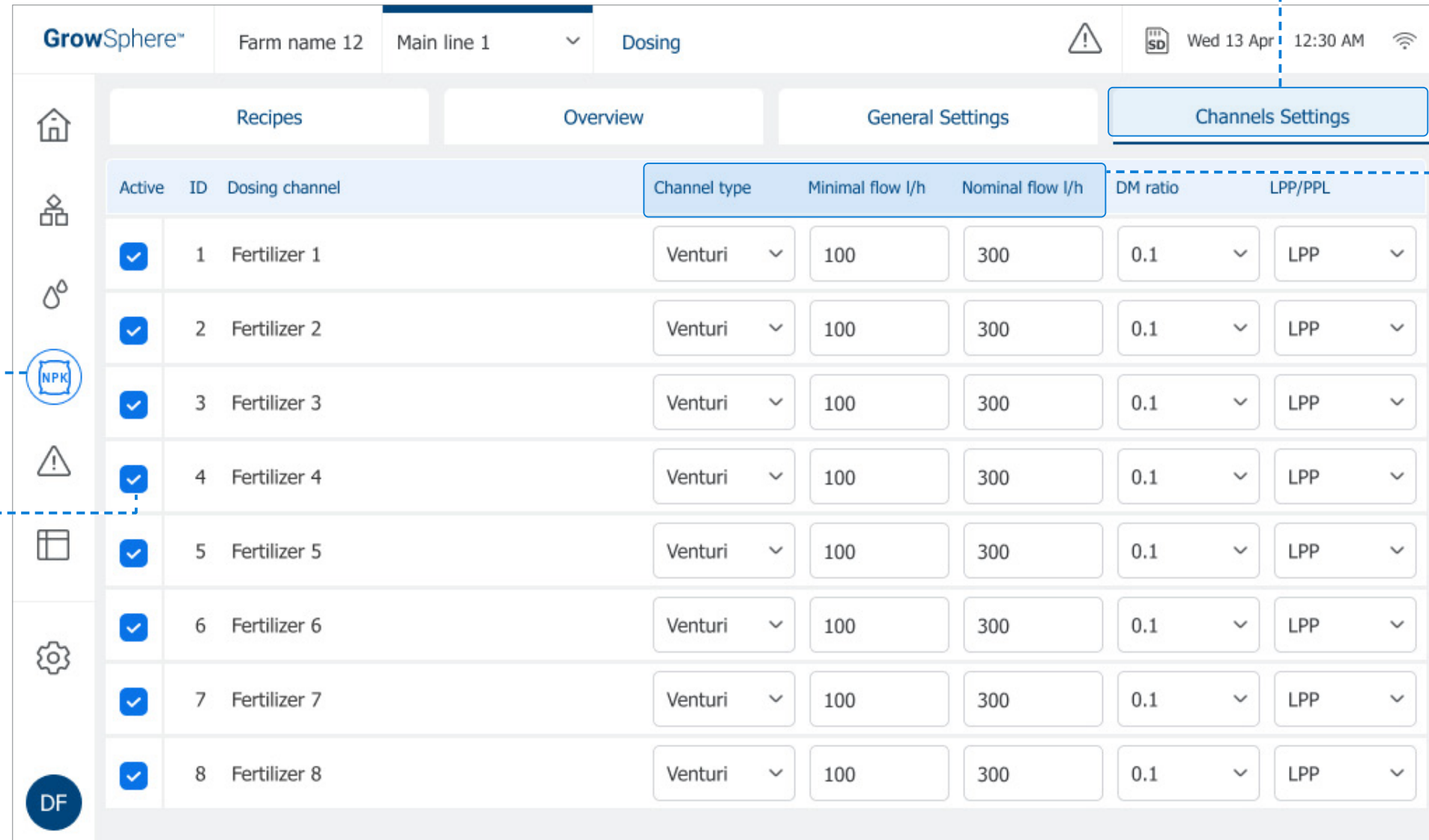
5.5.2 Configuring Dosing Channel Settings

Perform the following steps to configure the dosing channel settings:

1. Tap the **Fertilizer Dosing** button

3. Activate the relevant dosing channels

2. Tap the **Channels Settings** tab



Active	ID	Dosing channel	Channel type	Minimal flow l/h	Nominal flow l/h	DM ratio	LPP/PPL
<input checked="" type="checkbox"/>	1	Fertilizer 1	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	2	Fertilizer 2	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	3	Fertilizer 3	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	4	Fertilizer 4	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	5	Fertilizer 5	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	6	Fertilizer 6	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	7	Fertilizer 7	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	8	Fertilizer 8	Venturi	100	300	0.1	LPP

4. Define the following parameters:

- **Channel types:** Enables defining one of the following dosing pump in use for each channel:
 - **Venturi:** The venturi pump is in use.
 - **Electric:** The electrical dosing pump is in use.
- **Minimal flow l/h:** Minimal flow rate required for the dosing channel to operate.
- **Nominal flow l/h:** Amount of fertilizer or chemicals that the dosing channel can deliver in a period of time.

NOTE

When **Extensive** is selected as the dosing type (see [Configuring Dosing Settings](#)), only the following parameters are available:

- Channel type
- Minimal flow l/h
- Nominal flow l/h
- Dosing meter ratio
- LPP/PPL

Configuring Dosing Channel Settings (continued)

GrowSphere™		Farm name 12	Main line 1	Dosing		Wed 13 Apr 12:30 AM	
Recipes		Overview		General Settings		Channels Settings	
Active	ID	Dosing channel	Channel type	Minimal flow l/h	Nominal flow l/h	DM ratio	LPP/PPL
<input checked="" type="checkbox"/>	1	Fertilizer 1	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	2	Fertilizer 2	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	3	Fertilizer 3	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	4	Fertilizer 4	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	5	Fertilizer 5	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	6	Fertilizer 6	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	7	Fertilizer 7	Venturi	100	300	0.1	LPP
<input checked="" type="checkbox"/>	8	Fertilizer 8	Venturi	100	300	0.1	LPP

4. Define the following parameters (cont.)

- **Dosing Meter Ratio:** Indicates the fertilizer flow rate represented by the channel flow meter. The value is given by the unit of measure defined in the next column.
- **LPP/PPL:** LPP - liters per pulse; PPL - pulses per liter (see previous parameter).

5.6 Defining Alert Settings

Perform the following steps to define alert settings:

The screenshot shows the GrowSphere Alerts Settings interface. At the top, there is a header with the GrowSphere logo, farm name 'Farm name 12', main line 'Main line 1', and the title 'Alerts settings'. The interface is divided into three tabs: 'Active Alerts', 'History Alerts', and 'Alerts Settings'. The 'Alerts Settings' tab is selected and highlighted. Below the tabs, there is a list of sub-systems: 'Pump station', 'Main line', 'Dosing station', 'Dosing channel', 'Dosing channel', and 'Filter station'. A dashed blue line points from the 'Alerts' button in the left sidebar to the first step: '1. Tap the Alerts button'. Another dashed blue line points from the 'Alerts Settings' tab to the second step: '2. Tap the Alerts Settings tab'. A third dashed blue line points from the 'Dosing channel' sub-system to the third step: '3. Select the Sub-system'. Below the third step, there is a note: 'Alerts are grouped by their sub-system. Select the sub-system that the alert is part of.'

1. Tap the Alerts button

2. Tap the Alerts Settings tab

3. Select the Sub-system
Alerts are grouped by their sub-system. Select the sub-system that the alert is part of.

List of all available alerts that are part of the selected sub-system is displayed. The Alert Settings screen is divided into two alert levels: regular and critical.

Regular Alert Settings **Critical Alert Settings**

GrowSphere™ Farm name 12 Main line 1 Alerts settings										
Main line										
Description		Value	Delay (Sec)	Action	sms	Critical value		Delay (Sec)	Action	sms
	Over maximal flow	20%	000	Stop irrigation	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	Under minimal flow	100%	000	Stop irrigation	<input type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	No flow		000	Stop irrigation	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	Uncontrol flow		000	Stop irrigation	<input type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	Over maximal pressure	100%	000	Stop irrigation	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	Under minimal pressure	100%	000	Stop irrigation	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	High flow	X shifts	100%	Skip shift	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>
	Low flow	100%	000	Stop irrigation	<input checked="" type="checkbox"/>	-	000	000	Stop irrigation	<input checked="" type="checkbox"/>

4. Define the following parameters:

- **Description:** The system displays the description/name of the alert.
- **Value/Critical value:** The value that will trigger an alert.
- **Delay:** Defines the amount of time between when a fault is detected and the alert is triggered.
- **Action:** Action to take when an alert is triggered. Options include None, Skip shift, Stop irrigation, or Stop dosing.
- **SMS:** Option to receive an SMS notification when an alert is triggered. The notification includes the description and date/time of the alert.

6. Controller Operation

This chapter reviews the following routine operations:



6.1 Managing Irrigation Programs

This section reviews managing irrigation programs and includes:



6.1.1 Irrigation Program Dashboard

Perform the following steps to display and edit existing irrigation programs:

Irrigation Method

Options include One Time, Routine, and Emergency.

Amount of water to be used per shift, and total number of shifts per program

Date and time of next irrigation session

Irrigation Program Name

1. Tap the **Irrigation Programs** button to access the irrigation programs.

2. Tap the **checkbox** to enable (checked) or disable (unchecked) an irrigation program.

3. Tap the first empty line to define a new program

The Edit Program screen opens (see [Editing Irrigation Program Parameters](#)).

GrowSphere™		Farm name 12	Main line 1	Irrigation programs			Alerts	SD	Wed 13 Apr 12:30 AM	Wi-Fi
<input checked="" type="checkbox"/>	1	Avocado Hass	Routine	20.5mm	24 Shifts	Wed 21 Aug, 10:30 AM				
<input checked="" type="checkbox"/>	2	Apple (pink lady)	Routine	15.5mm	13 Shifts	Fri 2 Aug, 10:30 PM				
<input checked="" type="checkbox"/>	3	Avocado Hass Sum20	Routine	9mm	7 Shifts	Wed 3 Aug, 10:40 AM				
<input checked="" type="checkbox"/>	4	Pomme (dame rose)	Routine	30mm	9 Shifts	Sun 17 Aug, 12:30 AM	Manual program			
<input type="checkbox"/>	5	Leamon	Routine	10mm	15 Shifts	Wed 3 Aug, 08:30 AM				
<input checked="" type="checkbox"/>	6	Orange	Routine	20.5mm	3 Shifts	Fri 27 Aug, 11:00 AM				
<input checked="" type="checkbox"/>	7	Zitrone und Orange	Routine	18.5mm	7 Shifts	Sun 17 Aug, 12:30 AM	Paused by Alert			
<input checked="" type="checkbox"/>	8	Avocado Hass	Routine	13mm	24 Shifts	Wed 21 Aug, 10:30 AM				
	9	Insert program								
	10	Insert program								

Alerts

See [Managing Alerts](#) for more information.

Program Status

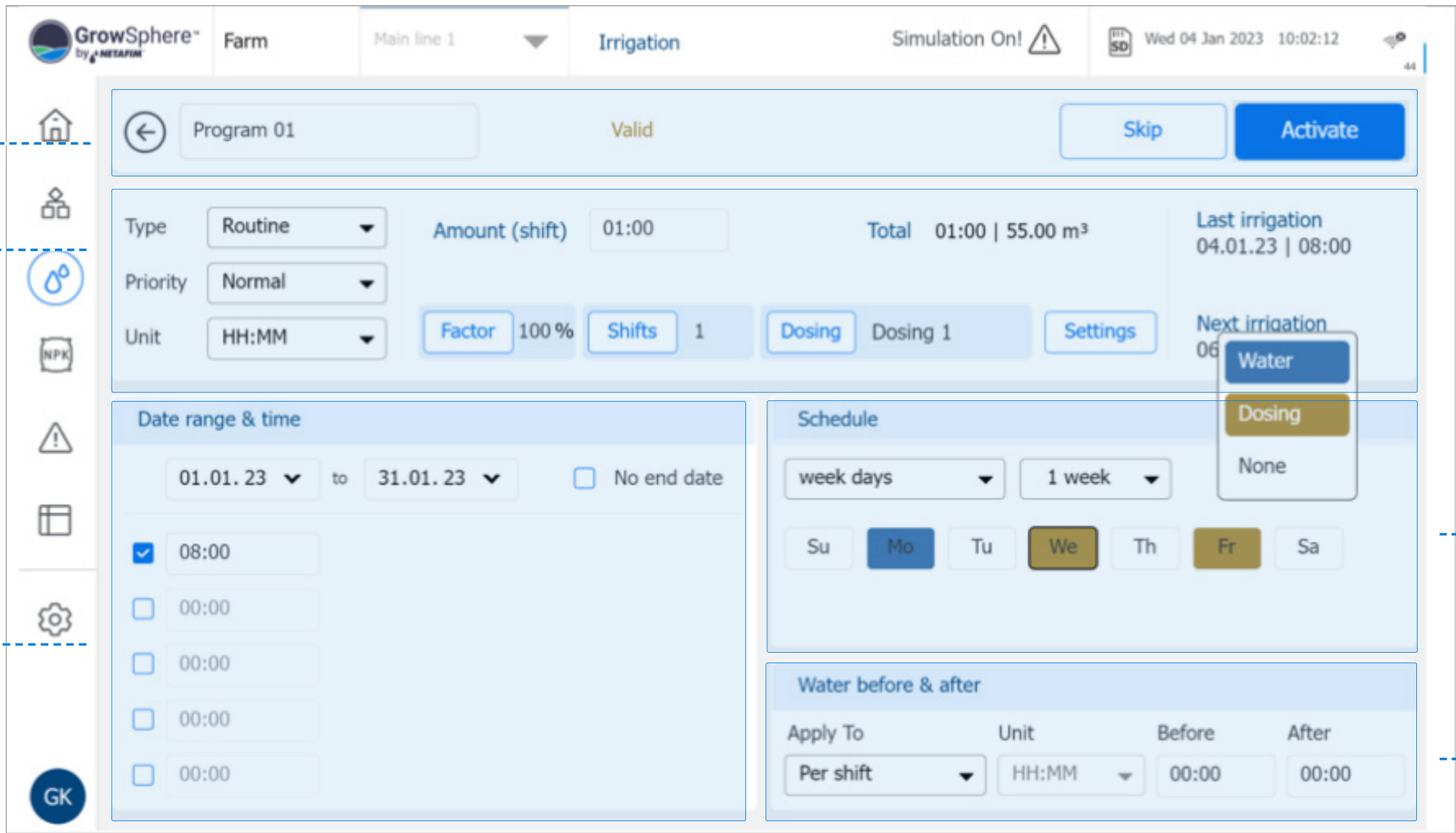
Shows one of the following program statuses:

- Irrigating
- In queue
- Paused by system
- Manually paused

(Optional) Tap the **Menu** button and select **Edit** to change the irrigation program parameters (see [Editing Irrigation Program Parameters](#)).

6.1.2 Editing Irrigation Program Parameters

The **Edit Program** screen opens when creating a new program or editing an existing one. This screen enables defining irrigation program parameters and includes:



The screenshot shows the 'Edit Program' interface for 'Program 01'. The top bar includes the GrowSphere logo, 'Farm', 'Main line 1', 'Irrigation', 'Simulation On!', and the date/time 'Wed 04 Jan 2023 10:02:12'. The program name 'Program 01' is displayed with a 'Valid' status and 'Skip' and 'Activate' buttons.

General Program Settings: This section includes dropdowns for 'Type' (Routine), 'Priority' (Normal), and 'Unit' (HH:MM). It also features input fields for 'Amount (shift)' (01:00), 'Factor' (100%), and 'Shifts' (1). A 'Dosing' section is set to 'Dosing 1'. Summary information shows 'Total 01:00 | 55.00 m³', 'Last irrigation 04.01.23 | 08:00', and 'Next irrigation 06.01.23 | 08:00'. A dropdown menu is open over the 'Next irrigation' area, showing options for 'Water', 'Dosing', and 'None'.

Date and Time Settings: This section allows setting a 'Date range & time' from '01.01.23' to '31.01.23' with a 'No end date' checkbox. Below this, a list of times is shown with checkboxes: 08:00 (checked), 00:00, 00:00, 00:00, and 00:00.

Program Schedule Settings: This section includes a 'Schedule' dropdown set to 'week days' and a duration of '1 week'. A weekly schedule grid shows 'Mo', 'We', and 'Fr' selected. Below this is the 'Water before & after' section.

Flushing Settings: This section includes 'Apply To' (Per shift), 'Unit' (HH:MM), and 'Before' and 'After' time fields, both set to 00:00.

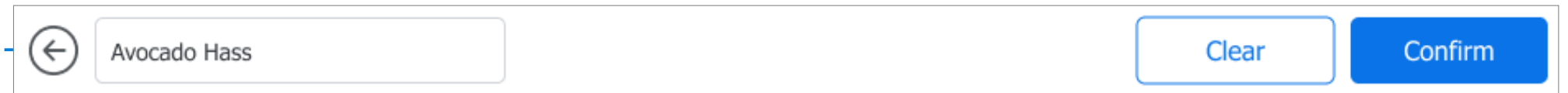
Annotations on the left side of the screenshot point to the 'Irrigation Program Top Bar', 'General Program Settings', and 'Date and Time Settings'. Annotations on the right side point to the 'Program Schedule Settings' and 'Flushing Settings'.

Irrigation Program Top Bar

The irrigation program top bar changes depending on the state of the program as follows:

Irrigation program is being edited

Options include clearing changes made to the program or confirming (i.e., saving) the changes.



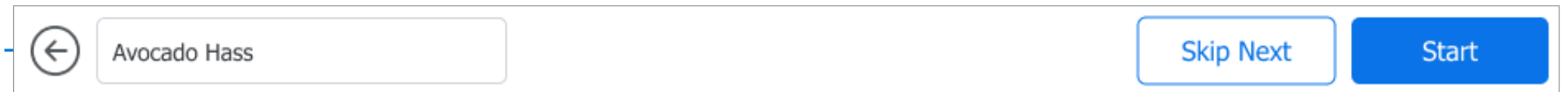
Irrigation program is running

Options include skipping the current shift, stopping the program, or pausing the mainline(see below).



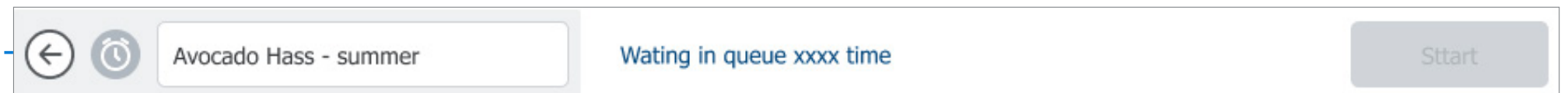
Irrigation program is not running

Options include skipping the program (it will be placed in the queue) or starting the program.



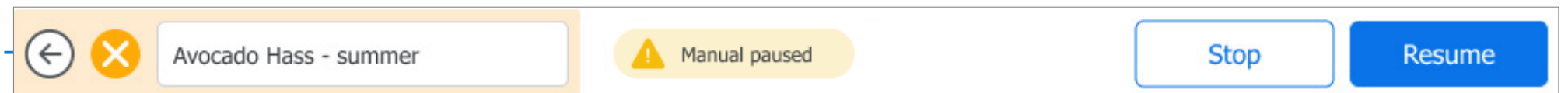
Irrigation program is waiting in queue

These programs become activated according to their order in the queue.



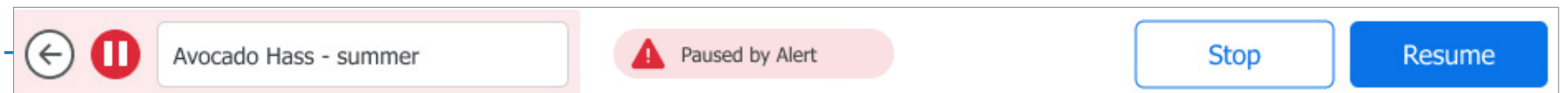
Irrigation program was manually paused

Options include stopping the program or resuming the program.



Irrigation program was paused by the system

Options include stopping the program or resuming the program.



General Program Settings

Perform the following steps to define the irrigation program's general settings:

1. Select the type

Enables defining the irrigation program type.

2. Select the priority

Enables designating the irrigation program's order in the queue. A **High** priority program is placed higher up in the queue and will thus execute before a **Normal** priority program.

3. Select the unit

Enables defining the measurement unit. Options include: mm (millimeter), m3 (cubic meter), and time (HH:MM or MM:SS).

Amount

Displays amount of water used per irrigation shift.

Total

Displays total amount of water to be irrigated and total irrigation time.

The screenshot shows the 'Edit program' form with the following settings: Type: Routine, Priority: Normal, Unit: mm, Amount (shift): 01:30hr, Total: - | -, Factor: 100%, Shifts: 2, Dosing: NPK1, Last irrigation: None, Next irrigation: None. Dashed lines connect the numbered steps to their respective fields: Step 1 to Type, Step 2 to Priority, Step 3 to Unit, Step 4 to Factor, Step 5 to Shifts, and Step 6 to Dosing.

4. Set the water budget factor

See [Setting Water Budget Factor](#)

5. Assign shifts

See [Assigning Irrigation Program Shifts](#)

6. Link a dosing recipe

See [Selecting Dosing](#)

Last/Next Irrigation

Displays the day/time when the last irrigation ended and when the next irrigation will start.

The full screenshot shows the 'Edit program' interface for 'Avocado Hass'. It includes the settings form from the previous image, a 'Date range & time' section with a date range of 27.04.2022 to 27.04.2022, a 'Schedule' section with 'week days' set to '2 week' and a calendar grid, and a 'Water before & after' section with 'Apply To' set to 'Program' and 'Unit' set to 'Time'.

Date and Time Settings

Perform the following steps to define the irrigation program's date and time parameters:

1. Set the date range

The dates range in which the irrigation program will be active.

2. Activate the irrigation start time(s)

A check mark indicates the irrigation start time is active. Up to five starting times can be activated in a 24-hour period.

Date range & time

27.04.2022

to

27.04.2022

No end date

10:00 AM

Radiation

400j/m3

02:30 PM

None

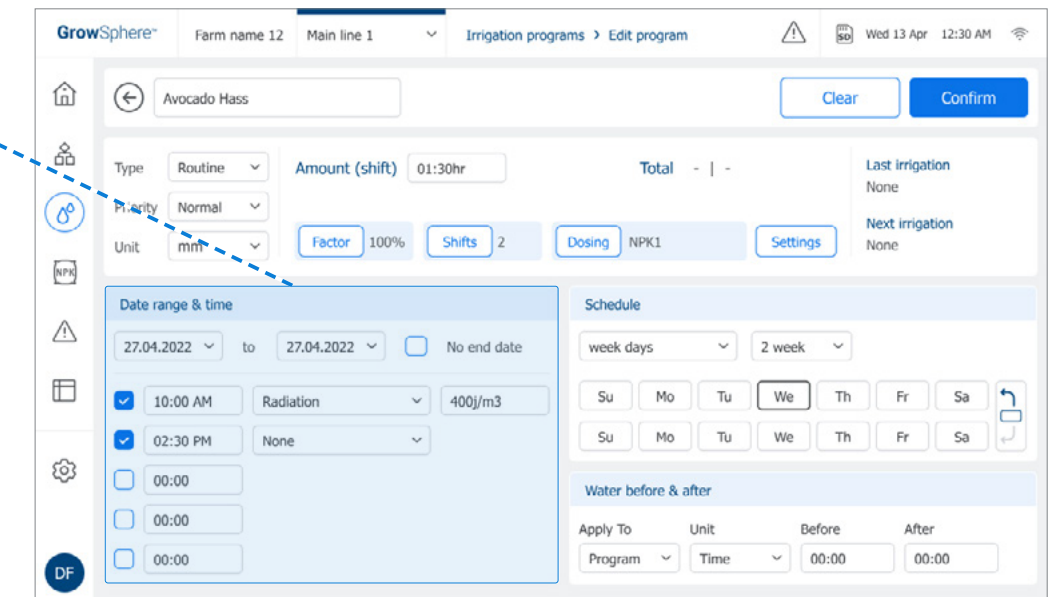
00:00

00:00

00:00

If no end date is needed, select **no end date**.

3. Define the amount of water for the irrigation session.



The screenshot shows the 'Edit program' screen for 'Avocado Hass'. The 'Date range & time' section is highlighted with a dashed blue box, matching the callout above. It shows the date range set to 27.04.2022 to 27.04.2022 with 'No end date' selected. The irrigation schedule is set to 10:00 AM and 02:30 PM. The amount is set to 400j/m3. Other settings include Type: Routine, Priority: Normal, Unit: mm, Factor: 100%, Shifts: 2, and Dosing: NPK1.

Program Schedule Settings

Perform the following steps to define the irrigation program's schedule:

1. Select one of the two scheduling options:

Week days

Irrigation occurs on specified days of the week, and the irrigation cycle can be either 1 or 2 weeks long.

2. Select whether irrigation includes only water (blue) or water and dosing (green).

Tap the relevant day, The following menu appears, enabling selection of irrigation type:

Every (X) days

Irrigation occurs once every set number of days.

Flushing Settings

Perform the following steps to define the additional amount of water used to flush the lines before and/or after the irrigation program session:

NOTE

This flushing option is relevant only for irrigation programs which have a linked dosing recipe.

1. Select Shift or Program

Defines whether flushing occurs before and after the irrigation program or each shift in the irrigation program.

2. Select Time or Quantity

3. Define amount of time or quantity of water

Water before & after

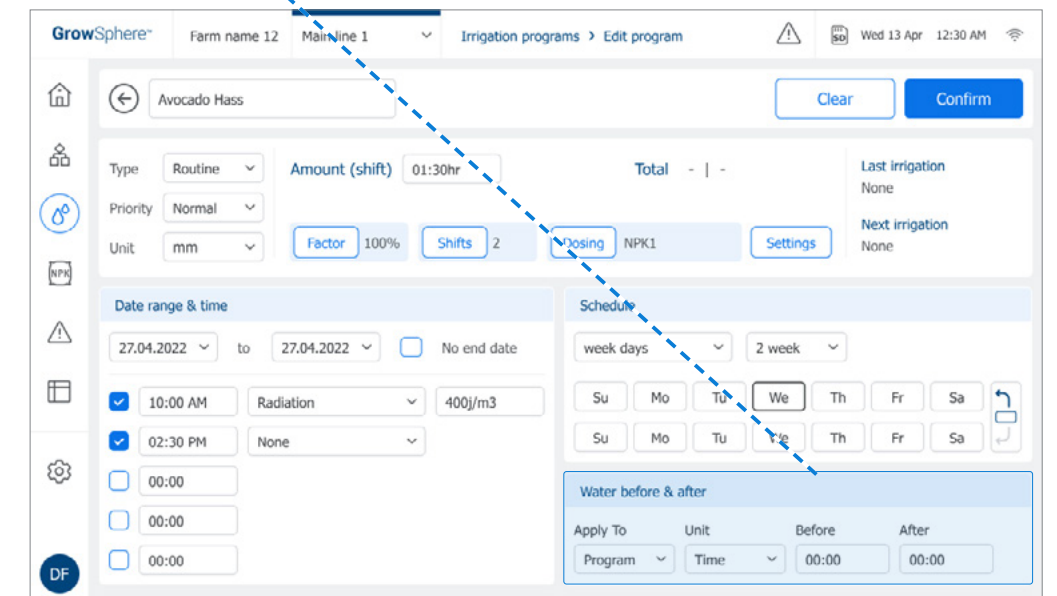
Apply To	Unit	Before	After
Program ▼	Time ▼	00:00	00:00

Before

Dosing recipe starts to operate after the specified period or water quantity has been reached.

After

Irrigation continues without dosing for the set period of time or water quantity.



6.1.3 Setting Water Budget Factor

The water budget factor enables adding or reducing the amount of water defined in the irrigation program for a limited number of irrigation sessions time.

Perform the following steps to define the irrigation program's water budget factor:

1. Tap the Factor button in the irrigation program's general settings section (see [General Program Settings](#))

A screen opens which enables defining the program's water budget factor.

Factor (water budget)

100%

Today - the factor will add only for today irrigation

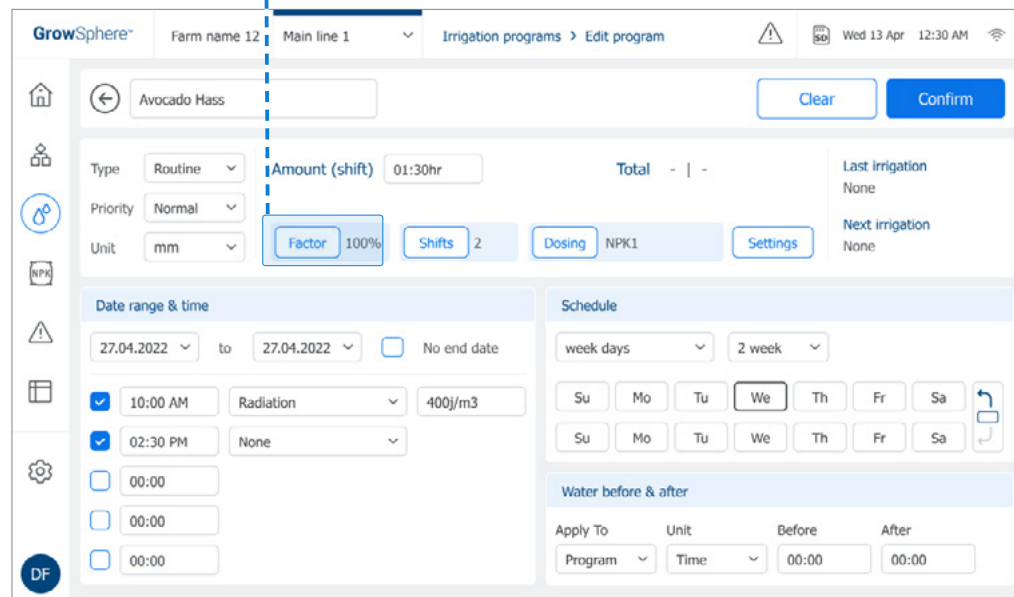
Tomorrow - the factor will add only for tomorrow's irrigation

Continues - the factor will add from now until your next changes

2. Define the factor as a percentage of the amount defined in the irrigation program

3. Select when the factor will be activated

4. Tap Save



6.1.4 Assigning Irrigation Program Shifts

Shifts Overview Screen

Perform the following steps to review, activate, add, edit, or delete shifts which are part of the irrigation program:

1. Tap the Shifts button in the irrigation program's general settings section (see [General Program Settings](#))

A screen opens which enables managing shifts.

2. Select the relevant shift(s)

Select the check box of the shifts to be assigned to the irrigation program.

Shift status icons:

- Irrigation Completed
- Uncompleted Irrigation
- Active Irrigation

To change the order of the shifts, tap the **Reorder shifts** button (see [Reordering Shifts](#)).

Active	Shift name	Amount(mm)	Factor(%)	Dosing	Valves	Left(m3)	
<input checked="" type="checkbox"/>	01 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	02 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	03 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	04 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	05 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>
<input type="checkbox"/>	06 Avocado Hass	55.5	100	Longnamehere	20	1111	<input type="checkbox"/>
<input checked="" type="checkbox"/>	07 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/>

3. Tap the Add new shift button to create a new shift (see [Editing Shift Parameters](#)).

4. Review current shift information:

- **Active:** Check mark indicates shift is active.
- **Shift status:** Icons indicate status.
- **Shift name:** The name of the shift.
- **Amount:** Water quantity to be supplied per shift.
- **Factor:** Percentage to be added or reduced from the irrigation shift (see [Setting Water Budget Factor](#)).
- **Dosing:** Dosing recipe linked to the irrigation shift (see [Selecting Dosing](#)).
- **Valves:** Number of valves assigned to each shift.
- **Left (m3):** Amount of water until completion of a shift.
- **Alerts:** Displayed only as icons, which indicate the severity of the alert.

Tap the **Menu** button to edit or delete a shift.

Editing Shift Parameters

This screen opens when editing a shift or creating a new one. Perform the following steps to edit the shift parameters:

1. Name the shift

4. Select checkboxes of valves to be added to the shift

NOTE
The list of valves includes all valves which were set in the remote D/O.

5. Tap arrow buttons to view additional valves

2. Enter the amount of water used in the shift and the water budget factor

3. Link a dosing recipe

NOTE
If a dosing recipe is selected for the entire irrigation program (see [Selecting Dosing](#)), it will override the dosing recipe selected here.

Valves assigned to a different shift are marked with a link icon.

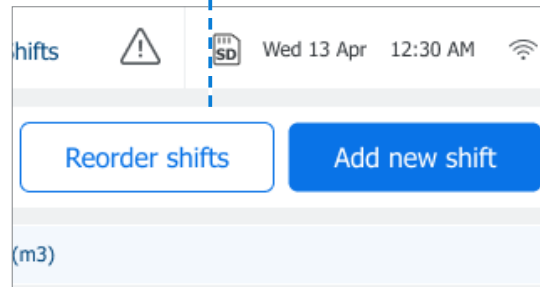
Total nominal flow rate
The nominal flow of the selected valves and the nominal flow of the main line. If the total flow rate of all selected valves exceeds the flow rate of the main line, the text becomes red.

6. Tap Save

Reordering Shifts

The order of the shifts represents the sequence in which shifts are executed during an irrigation session. Perform the following steps to reorder shifts:

1. Tap the Reorder shifts button in the Shifts Overview Screen



GrowSphere™
Farm name 12
Main line 1
Irrigation programs > Edit program > Shifts
Wed 13 Apr 12:30 AM

Reorder shifts
Confirm

Active	Shift name	Amount(mm)	Factor(%)	Dosing	Valves	Left(m3)	
<input checked="" type="checkbox"/>	01 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input checked="" type="checkbox"/>	02 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input checked="" type="checkbox"/>	03 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input type="checkbox"/>	04 Avocado Hass	55.5	100	Longnamehere	20	1111	<input type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input checked="" type="checkbox"/>	05 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input checked="" type="checkbox"/>	06 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>
<input checked="" type="checkbox"/>	07 Avocado Hass	55.5	100	Longnamehere	20	1111	<input checked="" type="checkbox"/> <input type="button" value="v"/> <input type="button" value="^"/>

DF
< page 1 of page 4 >

3. Tap Confirm to save changes

2. Tap the arrows to move shifts up and down

NOTE
Irrigation proceeds according to the order of shifts in the list, starting from the top.

6.1.5 Selecting Dosing

Perform the following steps to link a dosing recipe to the irrigation program:

1. Tap the **Dosing** button in the irrigation's general settings section

A screen opens which enables the selection of a dosing recipe.

Type: Routine | Amount (shift): 01:30hr | Total: - | -
 Priority: Normal
 Unit: mm | Factor: 100% | Shifts: 2 | **Dosing: NPK1**

Farm name: Avocado Hass | Irrigation programs > Edit program
 Type: Routine | Amount (shift): 01:30hr | Total: - | -
 Priority: Normal | Unit: mm | Factor: 100% | Shifts: 2 | **Dosing: NPK1** | Settings
 Date range & time: 27.04.2022 to 27.04.2022 | No end date
 Schedule: week days | 2 week | Su Mo Tu We Th Fr Sa
 Water before & after: Apply To: Program | Unit: Time | Before: 00:00 | After: 00:00

3. If no dosing is necessary, select **No dosing**

NOTES

- The dosing recipe selected here overrides the dosing recipe selected when creating a shift.
- For more information about dosing recipes, see [Managing Fertilizer Dosing](#).

2. The **Dosing** screen opens

Enables the selection of a dosing recipe.

Dosing
 Note! This will overwrite any individual shifts selection of recipe. You will be able to manually change recipes for each shift through the shifts screen
 No dosing
 NPK 1 | New Netafim | N2-M3K
 Tomatoes flowers | Sphere N123 | Avacadonew
 Orange | LongNameHere | Hass only
 Orange

4. Select a dosing recipe

5. Tap **Save**

6.2 Managing Fertilizer Dosing

This section reviews managing fertilizer dosing and includes:



6.2.1 Fertilizer Dosing Overview

Technician Overview Screen

When logged in as a technician, the Overview tab includes the following:

Verify the **Fertilizer Dosing** button is selected.

Water Meter

Displays the water flow in either of the following:

- **Nominal:** The expected flow according to the opened valves.
- **Actual:** The water flow as measured by the water meter.

Verify the **Overview** tab is selected.

Target pH and Target EC

Enables defining the dosing control method pH or EC (or both).

Dosing Channel Parameters

- **Tank Level (%):** Indicates the amount of fertilizer in the storage tank.
- **Reaction:** Defines the kind of reaction effecting the EC/pH control expect from the fertilizer in the tank.
 - **Passive:** Fluid that does not affects the EC/pH control.
 - **EC:** Fertilizer that will increase the EC value.
 - **Acid:** Lowers the pH.
 - **Alkaline:** Increases the pH.
- **Nominal Flow:** Dosing channel flow capacity.
- **Calculated Flow:** Actual dosing channel flow rate, as calculated by the controller.
- **DM Flow:** Flow rate measured by the dosing flow meter.
- **DCH On:** Amount of time that the dosing channel's dosing valve is on, as calculated by the controller.
- **DCH Off:** Amount of time that the dosing channel's dosing valve is off, as calculated by the controller.

ID	Dosing channel	Tank level(%)	Reaction	Nominal flow(l/h)	Calculated flow(l/h)	DM flow (l/h)	DCH on (sec)	DCH off (sec)	Act deviation(%)	Low deviation(%)	High deviation(%)	Program (%)
1	Fertilizer 1	50	EC	600	550	520	3.20	1.62	-	-	-	15%
2	Fertilizer 2	50	Passive	600	550	520	3.20	1.62	20	10	25	15%
3	Fertilizer 3	50	Passive	600	550	520	3.20	1.62	20	10	25	15%
4	Fertilizer 4	50	EC	600	550	520	3.20	1.62	20	10	25	15%
5	Fertilizer 5	50	EC	600	550	520	3.20	1.62	20	10	25	15%
6	Fertilizer 6	50	EC	600	550	520	3.20	1.62	20	10	25	15%

pH Channel Parameters

- **pH:** Enables dosing control based on pH level.
- **pH #1:** Reading of pH sensor #1.
- **pH #2:** Reading of pH sensor #2.
- **Average:** The calculated pH level based on the average of pH sensors #1 and #2.
- **pH target:** Enables defining the pH set point.
- **Control:** Enables selecting the reading will be used to control the pH level (can be one of the two sensors or the average of the two).

The screenshot shows the 'Dosing Overview' page in the GrowSphere MAX interface. At the top, it displays 'Farm name 12', 'Main line 1', and 'Dosing'. Below this are tabs for 'Recipes', 'Overview', 'General Settings', and 'Channels Settings'. The 'Overview' tab is active, showing 'pH' and 'EC' control panels. The 'pH' panel has a 'Control' dropdown set to 'Average' and a 'pH target' input field set to '0.00'. The 'EC' panel also has a 'Control' dropdown set to 'Average' and a 'pH target' input field set to '0.00'. Below these panels is a table with 13 columns: ID, Dosing channel, Tank level(%), Reaction, Nominal flow(l/h), Calculated flow(l/h), DM flow (l/h), DCH on (sec), DCH off (sec), Act deviation(%), Low deviation(%), High deviation(%), and Program (%). The table contains 6 rows of data for different fertilizer channels.

ID	Dosing channel	Tank level(%)	Reaction	Nominal flow(l/h)	Calculated flow(l/h)	DM flow (l/h)	DCH on (sec)	DCH off (sec)	Act deviation(%)	Low deviation(%)	High deviation(%)	Program (%)
1	Fertilizer 1	50	EC	600	550	520	3.20	1.62	-	-	-	15%
2	Fertilizer 2	50	Passive	600	550	520	3.20	1.62	20	10	25	15%
3	Fertilizer 3	50	Passive	600	550	520	3.20	1.62	20	10	25	15%
4	Fertilizer 4	50	EC	600	550	520	3.20	1.62	20	10	25	15%
5	Fertilizer 5	50	EC	600	550	520	3.20	1.62	20	10	25	15%
6	Fertilizer 6	50	EC	600	550	520	3.20	1.62	20	10	25	15%

EC Channel Parameters

- **EC:** Fertilizer that will increase the EC value.
- **pH #1:** Reading of pH sensor #1.
- **pH #2:** Reading of pH sensor #2.
- **Average:** The calculated pH level based on the average of pH sensors #1 and #2.
- **pH target:** Enables defining the pH set point.
- **Control:** Enables selecting the reading will be used to control the pH level (can be one of the two sensors or the average of the two).

Dosing Channel Parameters

- **Act Deviation (%):** Correction of the calculated dosing channel cycle time (On/Off) and programmed cycle time. It is a dynamic value calculated by the Controller.
- **Low and High Deviation (%):** Define the low and high deviation allowed during EC/pH control. In this case, the dosing ratio (proportion) can be adjusted to reach a stable value within the defined thresholds.
- **Program %:** Percentage that the valve was programmed to be open on its dosing recipe for each dosing channel.

User Overview Screen

When logged in as a user, the Overview tab includes the following:

Target pH and Target EC

The screenshot shows the 'Overview' tab of the GrowSphere interface. At the top, it displays 'Farm name 12', 'Main line 1', and 'Dosing' mode. The interface is divided into four main sections: 'Water Meter', 'pH/EC Control', 'Dosing Channel Parameters', and a 'Channels Settings' tab.

Water Meter: Shows 'Delivered Quantity (m3)', 'Nominal (m3/h)' (0.00), and 'Actual (m3/h)' (0.00).

pH/EC Control: Features checkboxes for 'pH' and 'EC'. Each has three input fields for 'pH #1', 'pH #2', and 'Average', all set to 0.00. Below these are 'Control' dropdown menus (set to 'Average') and 'pH target' input fields (set to 0.00).

Dosing Channel Parameters Table:

ID	Dosing channel	On/Off	Reaction	Level	Method	Time left	Quantity left	Flow rate
1	Fertilizer 1	On	EC	Low	Spread time	0.0 min	0.0 L	0.0 L/H
2	Fertilizer 2	Off	pH	Low	Spread time	0.0 min	0.0 L	0.0 L/H
3	Fertilizer 3	On	Passive	Low	Spread time	0.0 min	0.0 L	0.0 L/H
4	Fertilizer 4	Off	Passive	Low	Spread time	0.0 min	0.0 L	0.0 L/H
5	Fertilizer 5	Off	EC	Low	Spread time	0.0 min	0.0 L	0.0 L/H
6	Fertilizer 6	On	EC	Low	Spread time	0.0 min	0.0 L	0.0 L/H

Water Meter

Displays the water flow in either of the following:

- **Nominal:** The expected flow according to the opened valves.
- **Actual:** The water flow as measured by the water meter.

Dosing Channel Parameters

- **On/Off:** Dosing channel is activated (On) or deactivated (Off).
- **Reaction:** Defines the kind of reaction effecting the EC/pH control expect from the fertilizer in the tank.
- **Level:** Fertilizer storage tank level.
- **Method:** Displays the selected method of the channel as defined in the recipe
- **Time left:** Amount of time left until dosing is completed.
- **Quantity left:** Amount of fertilizer left to be used until dosing is completed.
- **Flow rate:** Displays the dosing channel nominal flow rate (the maximal dosing channel flow rate).

6.2.2 Managing Dosing Recipes

Dosing Recipe Overview Screen

This screen displays all existing dosing recipes. Perform the following steps to manage dosing recipes:

2. Tap the Recipes tab

Recipe ID	Recipe Name	Irrigation Programs Connected
1	NPK 1	1 Irrigation programs connected
2	NPK 1	No irrigation programs
3	Blueberries	2 Irrigation programs connected
4	Lemons	9 Irrigation programs connected
5	Leamon	3 irrigation programs connected
6	Leamon	No irrigation programs
7	NPK 1	No irrigation programs
8	New Netafim	1 Irrigation programs connected
9	Leamon	Irrigation programs connected
10	NPK 1	Irrigation programs

1. Tap the Fertilizer Dosing button

3. Activate the relevant dosing recipes

Inactive recipes are grayed out.

4. Create a new dosing recipe

Tap the empty row to add a new dosing recipe (see [Configuring Dosing Recipes](#)).

Linked Irrigation Programs

The number of irrigation programs a dosing recipe is connected to. An icon is displayed when a recipe is connected to at least one irrigation program.

5. Edit Existing Dosing Recipe

Tap the relevant recipe to edit its parameters, or tap the **Menu** button and select **Edit** (see [Configuring Dosing Recipes](#)).

NOTE

To create a new dosing recipe, tap the **Menu** button on the empty row and select **Edit**.

Configuring Dosing Recipes

This screen opens when creating a new dosing recipe or editing existing one. Perform the following steps to configure dosing recipes:

1. Name the dosing recipe

The system provides a default name, but you can edit it and provide a more meaningful name.

2. Activate the relevant dosing channels

Tap the **Programs linked** button to navigate to the Irrigation Dashboard.

3. Target EC, target pH

Displays the defined target EC/pH values.

4. Define the following parameters:

For each dosing channel, the following parameters can be defined.

• **Method:** Options include:

- **1/1000:** The fertilizer is injected in proportion to the water flowing in the main line. The proportion is defined using a ratio of 1 liter of fertilizer for 1000 liters of water (useful when irrigation room is very close to field).
- **Spread:** Determines amount of fertilizer to be injected during the predefined time of the irrigation.
- **Bulk:** Amount of fertilizer that will be injected constitutently during an irrigation shift. The amount can be set by time or quantity. Selected when irrigation room is far away from the field and the fertilizers are mixed with large amount of water in the distribution pipes.

Active	ID	Dosing channel	Method	Quantity / Time	Value	DM control
<input checked="" type="checkbox"/>	1	Fertilizer 1	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	Fertilizer 2	1/1000	Quantity	8.00 L	<input type="checkbox"/>
<input type="checkbox"/>	3	Fertilizer 3				<input type="checkbox"/>
<input checked="" type="checkbox"/>	4	Fertilizer 4	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	5	Fertilizer 5	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input type="checkbox"/>	6	Fertilizer 6				<input type="checkbox"/>
<input type="checkbox"/>	7	Fertilizer 7				<input type="checkbox"/>
<input type="checkbox"/>	8	Fertilizer 8				<input type="checkbox"/>

GrowSphere™ Farm name 12 Main line 1 Dosing ⚠ SD Wed 13 Apr 12:30 AM 📶

← NPK 1 Programs linked - Targets EC 0.00 pH 0.00 EC suply 0.00

Active	ID	Dosing channel	Method	Quantity / Time	Value	DM control
<input checked="" type="checkbox"/>	1	Fertilizer 1	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	2	Fertilizer 2	1/1000	Quantity	8.00 L	<input type="checkbox"/>
<input type="checkbox"/>	3	Fertilizer 3				
<input checked="" type="checkbox"/>	4	Fertilizer 4	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	5	Fertilizer 5	1/1000	Quantity	8.00 L	<input checked="" type="checkbox"/>
<input type="checkbox"/>	6	Fertilizer 6				
<input type="checkbox"/>	7	Fertilizer 7				
<input type="checkbox"/>	8	Fertilizer 8				

5. Continue defining the following parameters:

- **Quantity / Time:** Options include:
 - **Quantity:** Calculates fertilizer quantity to be distributed within a specified amount of water during an irrigation shift. The Controller calculates how to spread fertilizer quantity, specified in the active dosing recipe in the amount of water of the irrigation shift.
 - **Time:** Calculates the fertilizer quantity to be distributed during an irrigation shift. The 'ON' time and 'OFF' time between pulses are calculated, and takes into account minimal ON delay-time of the dosing channel.
- **Value:** The irrigation quantity according to the selected Method.
- **DM Control:** Defines the following alert options:
 - **On:** Provides alert of both dosing quantity and dosing flow.
 - **Off:** Provides alert of dosing flow only.

6.3 Managing Alerts

This section reviews managing system alerts and includes:



6.3.1 Viewing Active Alerts

Active alerts includes all alerts that are currently active and alerts that were activated and were not reset. Perform the following steps to view information about currently active alerts:

Active alert icon
The Active Alerts tab can be accessed from any screen by clicking the Alert button at the top of the screen.

1. Tap the Alerts button

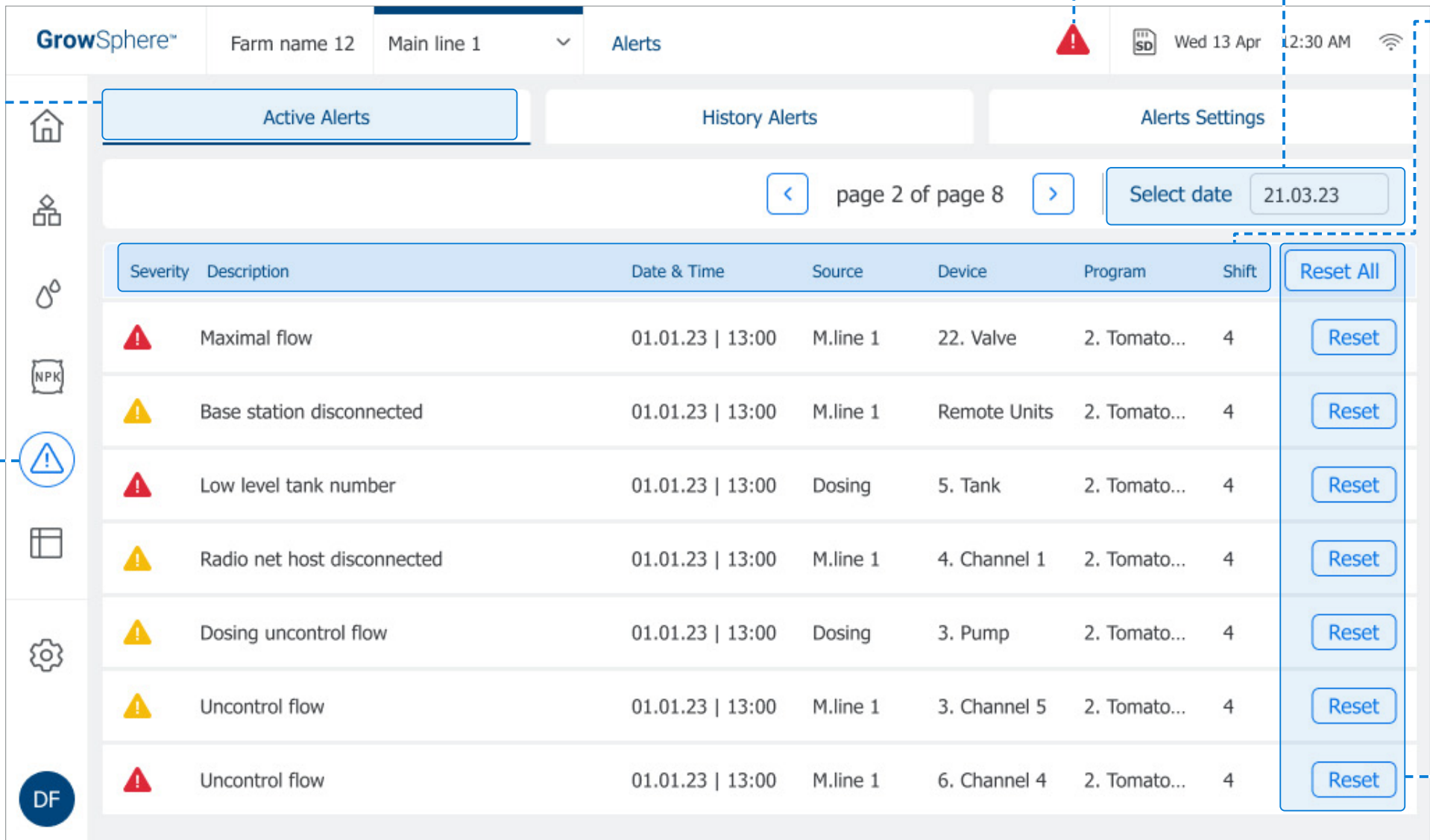
2. Tap the Active Alerts tab

3. Select a date

4. View information about the alerts on the selected date

- **Severity:**
 - Critical
 - Not critical
- **Description:** Cause of the alert.
- **Date & Time:** When the alert was triggered.
- **Source:** The source of the alert.
- **Device:** The specific device which triggered the alert.
- **Program:** The name and number of the irrigation program which was running when the alert was triggered.
- **Shift:** The shift number at the time the alert was triggered.

Reset buttons
Tap the **Reset** button to reset a specific alert, or tap the **Reset All** button to reset all active alerts. Once reset, these alerts are displayed in the **History Alerts** tab (see [Viewing Alert History](#)).



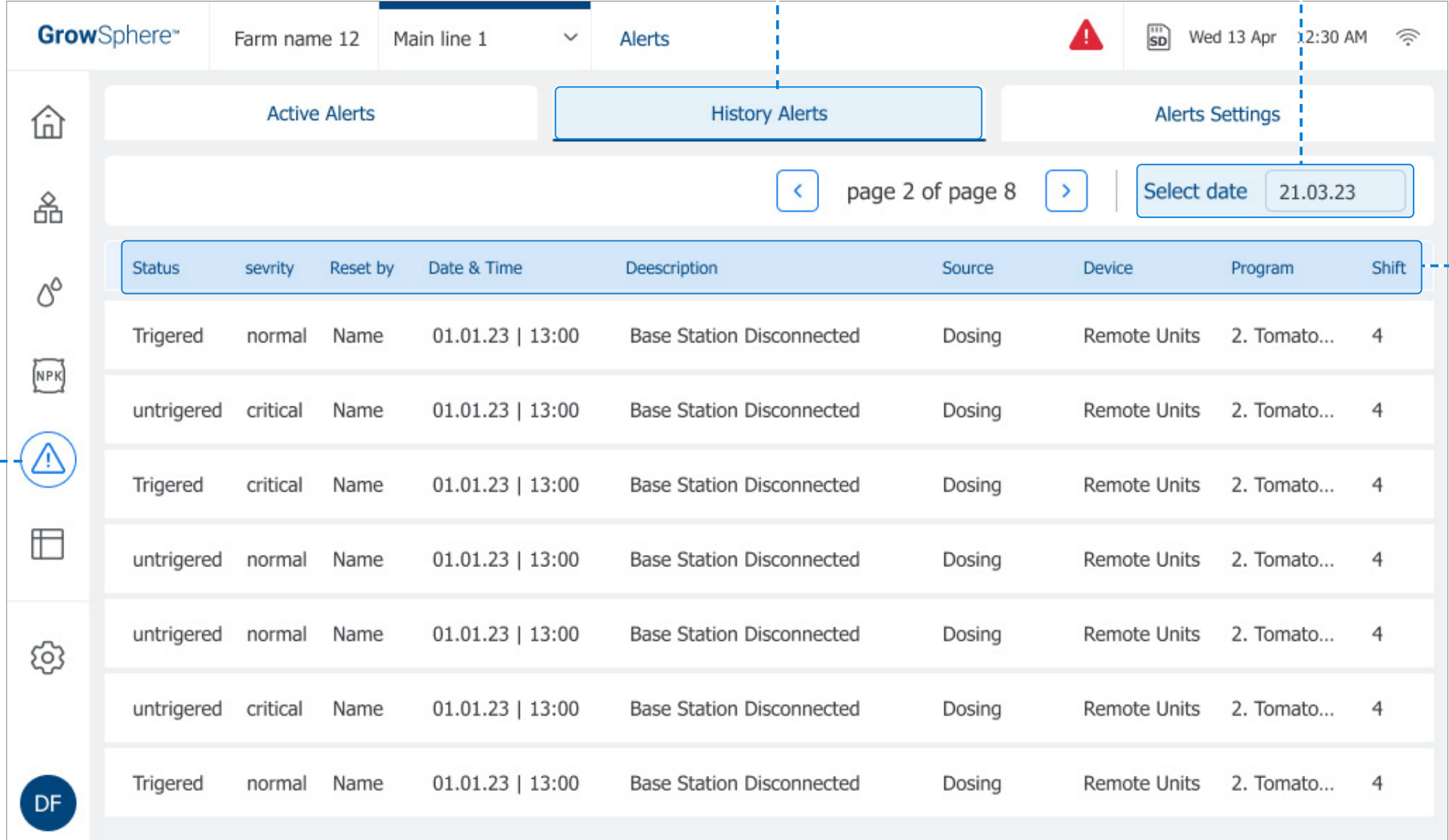
Severity	Description	Date & Time	Source	Device	Program	Shift	Reset All
	Maximal flow	01.01.23 13:00	M.line 1	22. Valve	2. Tomato...	4	Reset
	Base station disconnected	01.01.23 13:00	M.line 1	Remote Units	2. Tomato...	4	Reset
	Low level tank number	01.01.23 13:00	Dosing	5. Tank	2. Tomato...	4	Reset
	Radio net host disconnected	01.01.23 13:00	M.line 1	4. Channel 1	2. Tomato...	4	Reset
	Dosing uncontrol flow	01.01.23 13:00	Dosing	3. Pump	2. Tomato...	4	Reset
	Uncontrol flow	01.01.23 13:00	M.line 1	3. Channel 5	2. Tomato...	4	Reset
	Uncontrol flow	01.01.23 13:00	M.line 1	6. Channel 4	2. Tomato...	4	Reset

6.3.2 Viewing Alert History

History alerts displays a log of all alerts occurred in the past. Perform the following steps to view information about history alerts:

1. Tap the Alerts button
2. Tap the History Alerts tab
3. Select a date range

Filter the display alerts for a specific date, see [Selecting Date Range](#).
4. View information about the alerts on the selected date
 - **Status:** Options include:
 - Triggered:
 - Untriggered:
 - **Severity:** Whether the alert is critical or not.
 - **Reset By:** Name of the logged in user who reset the alert.
 - **Date & Time:** When the alert was triggered.
 - **Description:** Cause of the alert.
 - **Source:** The source of the alert.
 - **Device:** The specific device which triggered the alert.
 - **Program:** The name and number of the irrigation program which was running when the alert was triggered.
 - **Shift:** The shift number at the time the alert was triggered.



Status	sevirty	Reset by	Date & Time	Deescription	Source	Device	Program	Shift
Trigered	normal	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
untriggered	critical	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
Trigered	critical	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
untriggered	normal	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
untriggered	normal	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
untriggered	critical	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4
Trigered	normal	Name	01.01.23 13:00	Base Station Disconnected	Dosing	Remote Units	2. Tomato...	4

6.4 Viewing Logs

This section reviews system event logs and includes:



6.4.1 Accessing Logs

Perform the following steps to view a log:

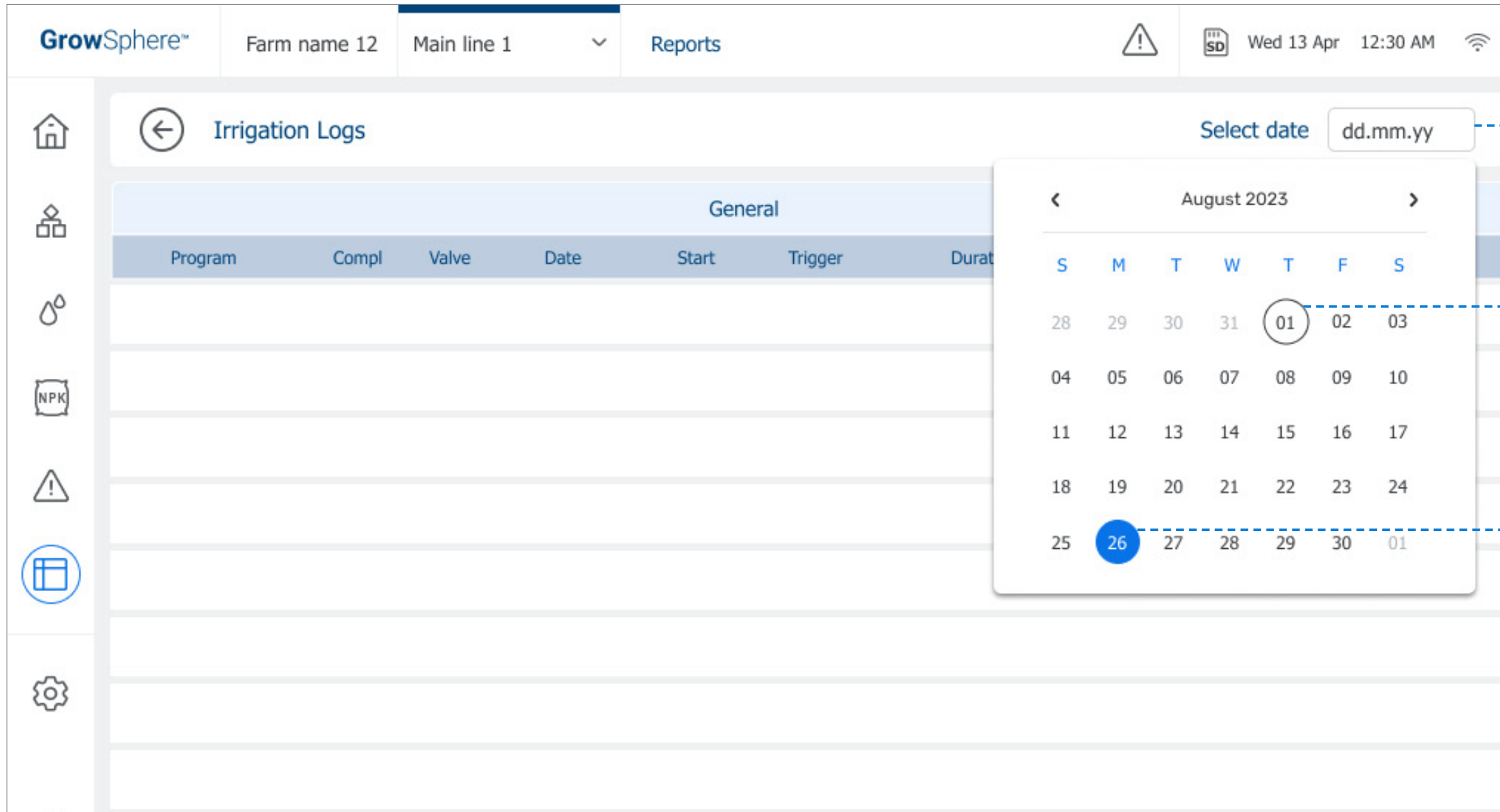
1. Tap the Reports button ———

2. Select a log from the list
Select the relevant type of log report you wish to view.

The screenshot shows the GrowSphere MAX interface. At the top, there is a header bar with the GrowSphere logo, 'Farm name 12', 'Main line 1', and a 'Reports' button. To the right of the header are icons for a warning, SD card, date/time (Wed 13 Apr 12:30 AM), and a Wi-Fi signal. Below the header is a sidebar menu with icons for Home, Farm, Water, NPK, Alarms, Reports, Settings, and a user profile icon labeled 'DF'. The 'Reports' icon is circled in blue, and a dashed line points to it from the first step. A second dashed line points from the second step to a list of log types that appears when the Reports button is tapped. The list includes: Irrigation Logs, Uncompleted Irrigation Logs, Filter Logs, Accumulation Events, Pumps Accumulation Events, Meters Accumulation Events, Weather Station Logs, Sensor Log, and Alarms Events.

Selecting Date Range

Perform the following steps to select a date range:



The screenshot shows the GrowSphere interface with the following elements:

- Top bar: GrowSphere™, Farm name 12, Main line 1, Reports, and system status (Wed 13 Apr 12:30 AM).
- Navigation sidebar: Home, Farm, NPK, Alerts, Calendar, and Settings.
- Main screen: Irrigation Logs with a 'General' tab and a table with columns: Program, Compl, Valve, Date, Start, Trigger, and Durat.
- Calendar overlay: Shows August 2023. The date '01' is circled in white, and '26' is circled in blue.

1. Tap Select Date

A calendar opens.

2. Tap to select a start date

The start date is represented by white circle.

3. Tap to select an end date

The end date is represented by a blue circle.

 **NOTE**

All log screens offer the ability to selecting a date range.

6.4.2 Irrigation Log

Perform the following steps to view a log of irrigation shifts which completed successfully:

2. Select Irrigation Logs from the list of logs (see [Accessing Logs](#))

1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#).

4. Review irrigation log details:

Program	Compl	Valve	Date	Start	Trigger	Duration	Qty/m3	mm	m ³ /h	Recipe
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	No	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	No	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...
1. Tomato...	Yes	Valve 1	21.03.23	20:30	Time	01:45	25	1.10	35.10	1.Mornin...

- **Irrigation status icon:** Indicates a valve's irrigation status. Options include:
 - ✓ Set irrigation amount was attained
 - ✗ Set irrigation amount was not attained
- **Program:** Irrigation program to which the shift belongs.
- **Completed:** Irrigation was completed (Yes) or not (No).
- **Valve:** Irrigation valve number.
- **Date:** The date when the irrigation shift occurred.
- **Start:** Start time of the irrigation shift.
- **Trigger:** The trigger which started the irrigation shift.
- **Duration:** Total irrigation shift time.
- **Qty/m3:** Water quantity delivered by the valve.
- **mm:** Water quantity set for the irrigation program or shift. This quantity is the same for all valves in the shift.
- **m3/h:** Average flow rate during irrigation shift as measured by the main line water meter. If the main line doesn't have a water meter, this value will be the sum of the flow rate of all valves in the shift.

NOTE

A new record is added to the irrigation log when an irrigation shift ends.

Irrigation Log (continued)

Wed 13 Apr 12:30 AM

Select date: 21.03.23

m ³ /h	Recipe	pH Avg	EC Avg	1.<CH>		2.<CH>		3.<CH>		4.<CH>	
				Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
35.10	1.Mornin...	6.0	1.8	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55

4. Review irrigation log details (cont.):

- **Recipe:** The dosing recipe linked to the irrigation shift.
- **pH Avg:** The average pH measured during the shift.
- **EC Avg:** The average EC measured during the shift.

Dosing Channels:

The amount of fertilizer injected during the shift relevant for each dosing channel:

- **Planned:** The planned amount calculated according to the recipe.
- **Actual:** The actual metered amount.

6.4.3 Uncompleted Irrigation Log

Perform the following steps to view a log of irrigation events which were not completed:

2. Select Uncompleted Irrigation Logs from the list of logs (see [Accessing Logs](#))

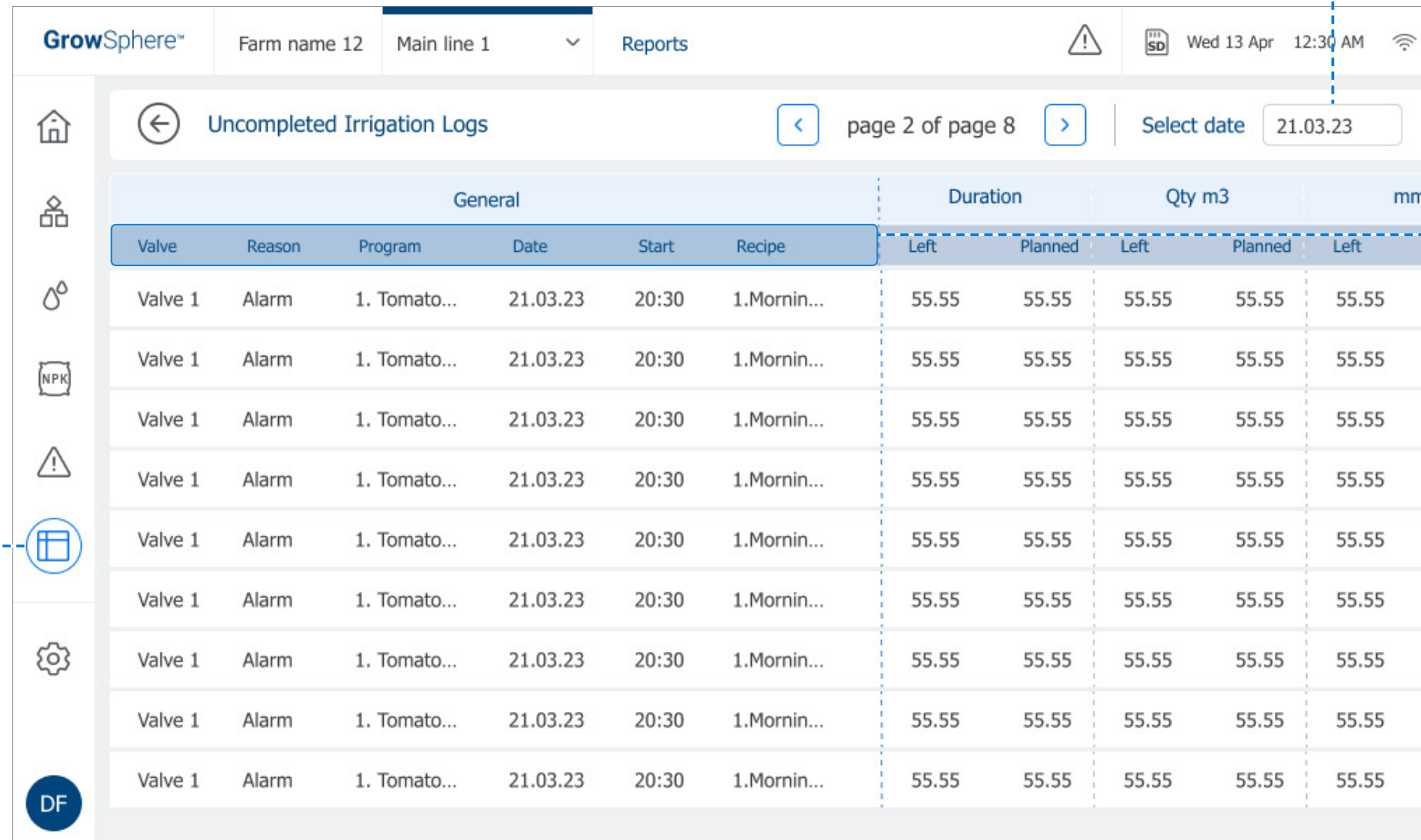
1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review uncompleted irrigation log details:

- **Valve:** Valve number.
- **Reason:** The reason why the irrigation shift was not completed.
- **Program:** Irrigation program to which the shift belongs.
- **Date:** The date when the irrigation shift occurred.
- **Start:** Irrigation event start time.
- **Recipe:** The dosing recipe linked to the irrigation shift.



General						Duration		Qty m3		mm
Valve	Reason	Program	Date	Start	Recipe	Left	Planned	Left	Planned	Left
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55
Valve 1	Alarm	1. Tomato...	21.03.23	20:30	1.Mornin...	55.55	55.55	55.55	55.55	55.55

Uncompleted Irrigation Log (continued)

Duration		Qty m3		mm		m3/h		1.<CH>		2.<CH>		3.<CH>		4.<CH>	
Left	Planned	Left	Planned	Left	Planned	Left	Planned	Left	Planned	Left	Planned	Left	Planned	Left	Planned
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55
55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55	55.55

4. Review uncompleted irrigation log details (cont.):

Each of the following parameters includes two values: amount left and amount planned.

- **Duration:** Irrigation shift time.
- **Qty/m3:** Water quantity delivered by the valve.
- **mm:** Water quantity set for the irrigation program or shift. This quantity is the same for all valves in the shift.
- **m3/h:** Average flow rate during irrigation shift as measured by the main line water meter. If the main line doesn't have a water meter, this value will be the sum of the flow rate of all valves in the shift.

Dosing Channels:

The amount of fertilizer injected during the shift relevant for each dosing channel:

- **Planned:** The planned amount calculated according to the recipe.
- **Actual:** The actual metered amount.

6.4.4 Dosing Log

Perform the following steps to view a log of dosing events:

2. Select Irrigation Logs from the list of logs (see [Accessing Logs](#))

1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review dosing log details:

Valve	Compl	Recipe	Date	Start	Date	Duration	Qty/m3	mm	m ³ /h	Planned
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	No	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	No	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55
1. Tomato...	Yes	Morning fert	21.03.23	20:30	21.03.23	01:45	25	1.10	35.10	55.55

- **Irrigation status icon:** Indicates a valve's irrigation status. Options include:
 - Set irrigation amount was attained.
 - Set irrigation amount was not attained.
- **Valve:** Irrigation valve number.
- **Completed:** The irrigation was completed (Yes) or not (No).
- **Recipe:** The dosing recipe linked to the shift.
- **Date:** The date when the irrigation shift occurred.
- **Start:** Start time of the irrigation shift.
- **Duration:** Total irrigation shift time.
- **Qty/m3:** Water quantity delivered by the valve.
- **mm:** Water quantity set for the irrigation program or shift. This quantity is the same for all valves in the shift.
- **m3/h:** Average flow rate during irrigation shift as measured by the main line water meter. If the main line doesn't have a water meter, this value will be the sum of the flow rate of all valves in the shift.

6.4.5 Filter Log

Perform the following steps to view a log of the filter flushing:

2. Select Filter Logs
from the list of logs (see [Accessing Logs](#))

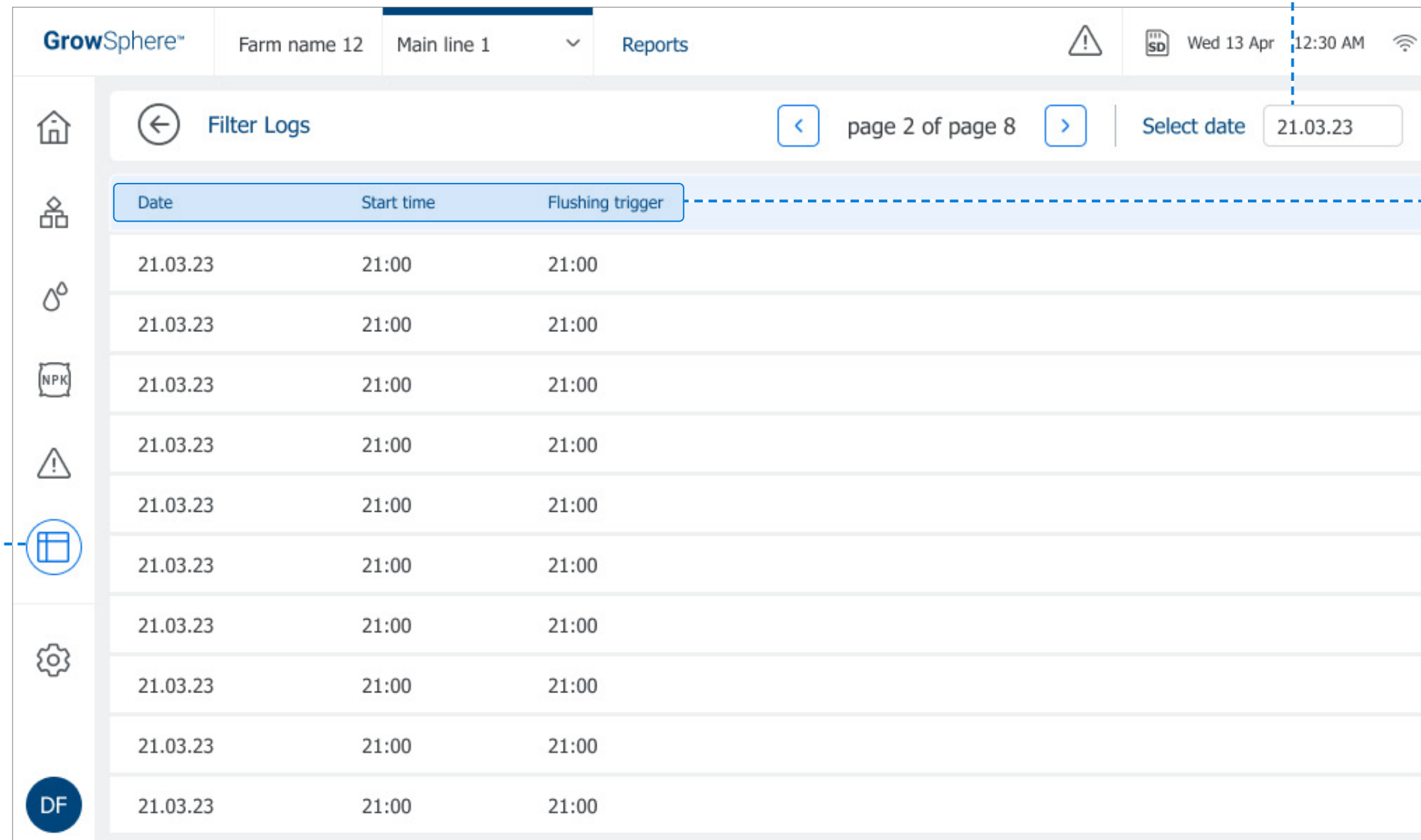
1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review filter log details

- **Date:** Date irrigation occurred.
- **Start time:** Time irrigation started.
- **Flushing trigger:** The time when the filter flushing was triggered.



Date	Start time	Flushing trigger
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00
21.03.23	21:00	21:00

6.4.6 Pump Accumulation Events Log

Perform the following steps to view the amount of water that was pumped:

2. Select Pumps Accumulation Events from the list of logs (see [Accessing Logs](#))

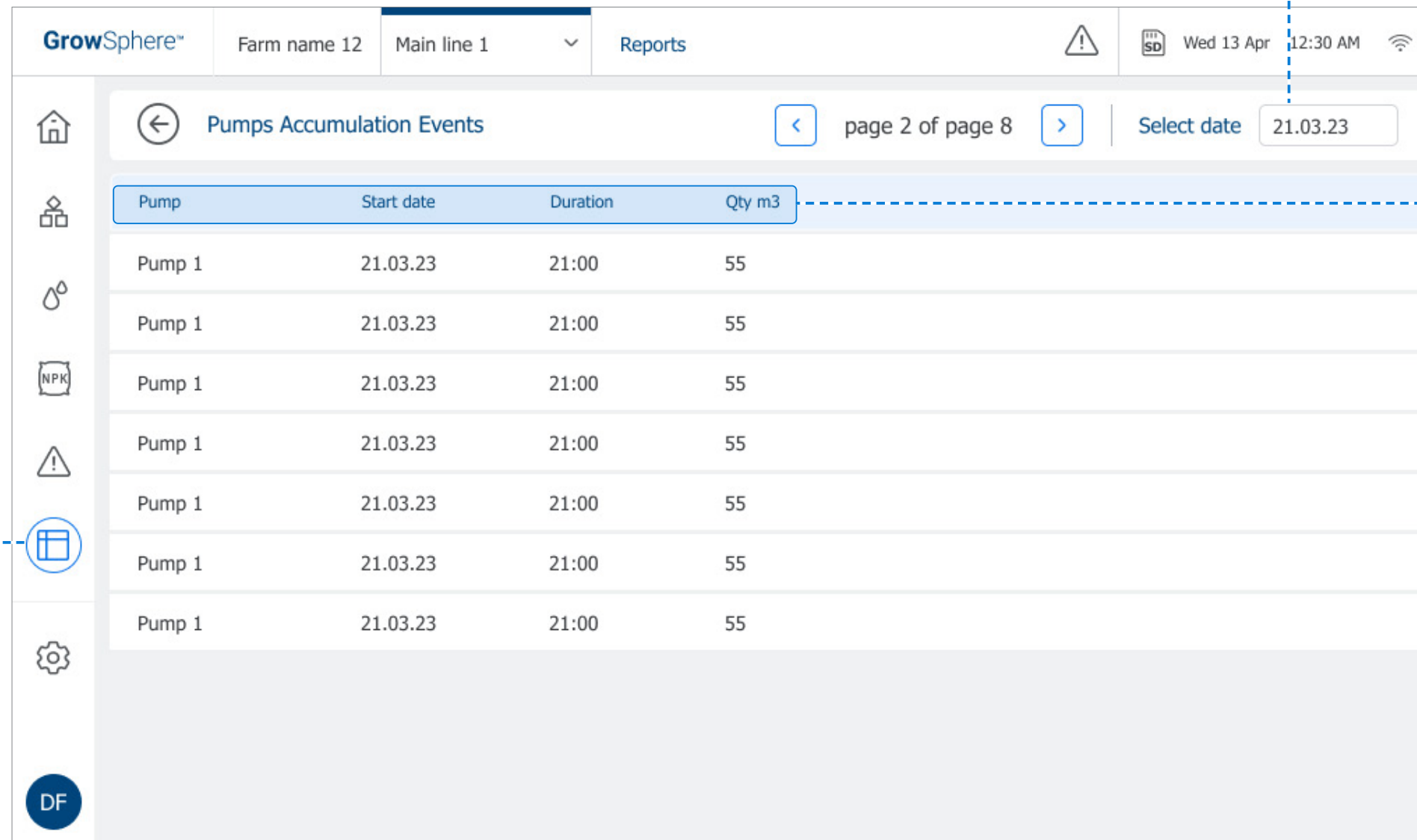
1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review pump accumulation log details:

- **Pump:** Name of the pump.
- **Start Date:** The date when the irrigation shift occurred.
- **Duration:** Total amount of time the pump was in operation.
- **Qty/m3:** Amount of water that the pump delivered. This quantity can be measured by the pump station/main line water meters or calculated according to the shift nominal flow.



Pump	Start date	Duration	Qty m3
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55
Pump 1	21.03.23	21:00	55

6.4.7 Meters Accumulation Events Log

Perform the following steps to view the amount of water that was flowing through the water meter:

2. Select Meters Accumulation Events from the list of logs (see [Accessing Logs](#))

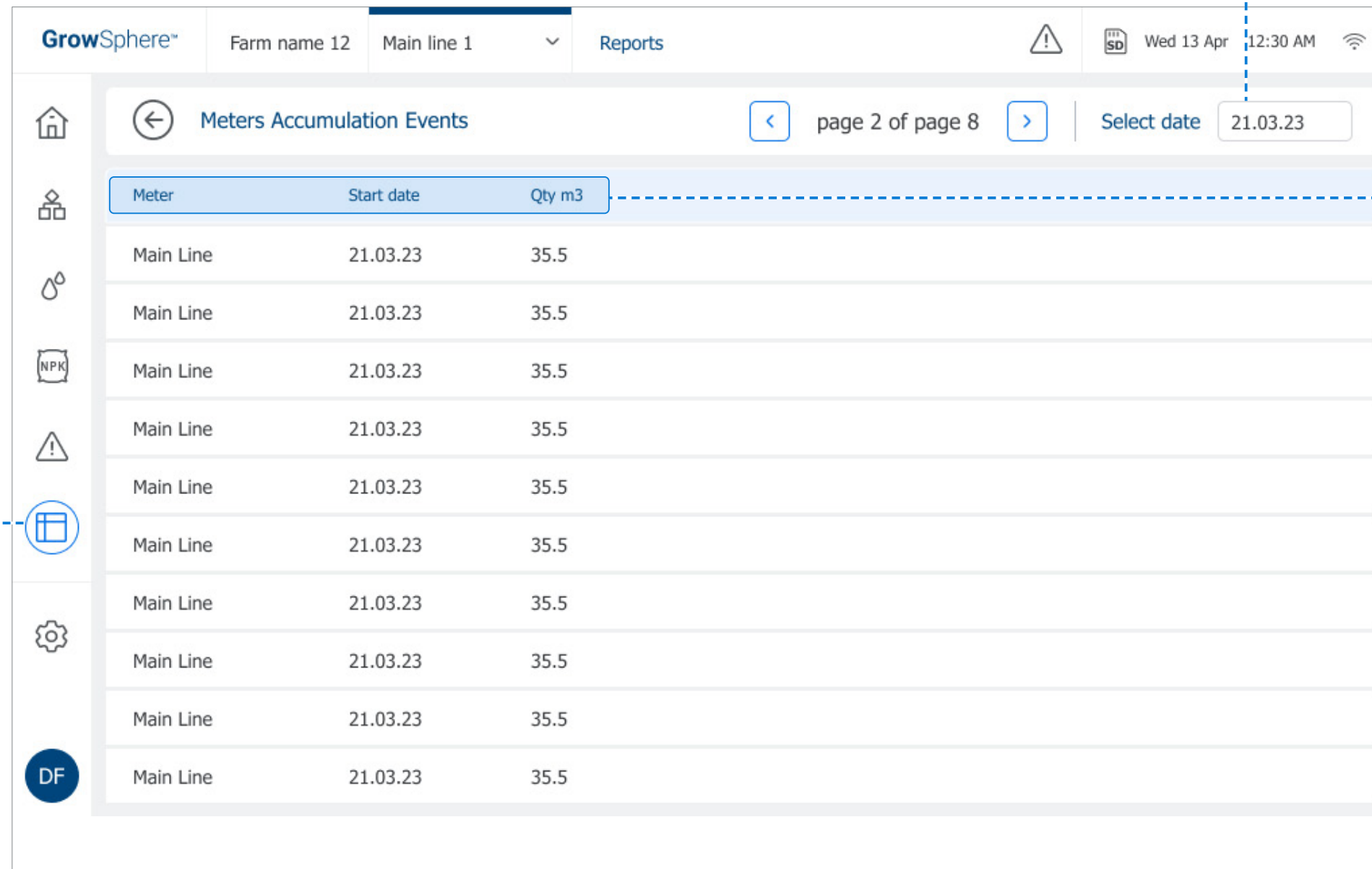
1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review meter accumulation log details:

- **Meter:** Name of the meter.
- **Start Date:** The date when the irrigation shift occurred.
- **Qty/m3:** The amount of water (M3) irrigated.



Meter	Start date	Qty m3
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5
Main Line	21.03.23	35.5

NOTE

The system accumulates the amounts of water/fertilizers on a daily basis and resets its counters at midnight.

6.4.8 Alarm Log

This log displays alarm log reports, as selected by date.

2. Select Alarms Report from the list of logs (see [Accessing Logs](#))

1. Tap the Reports button

3. Select a date range

See [Selecting Date Range](#)

4. Review alarm log details:

- **Number:** Alarm number.
- **Date:** The date when the irrigation shift occurred.
- **Time:** Start time of the irrigation shift.
- **Device:** The specific device which triggered the alert.
- **Program:** The name and number of the irrigation program which was running when the alert was triggered.
- **Description:** Description of the alert.
- **Type:** Alert severity. Options include:
 - Critical
 - Not critical
- **Reset By:** Name of the logged in user who reset the alert.
- **Time:** The time when the alert was reset.
- **Date:** The date when the alert was reset.

Number	Date	Time	Device	Program	Description	Type	Reset by	Time	Date
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23
001	21.03.23	22:22	Water meter	1.Tomato...	PD Sensor malfunction		Name	22:22	21.03.23

6.5 Resetting Accumulation

Perform the following steps to reset accumulation counters:

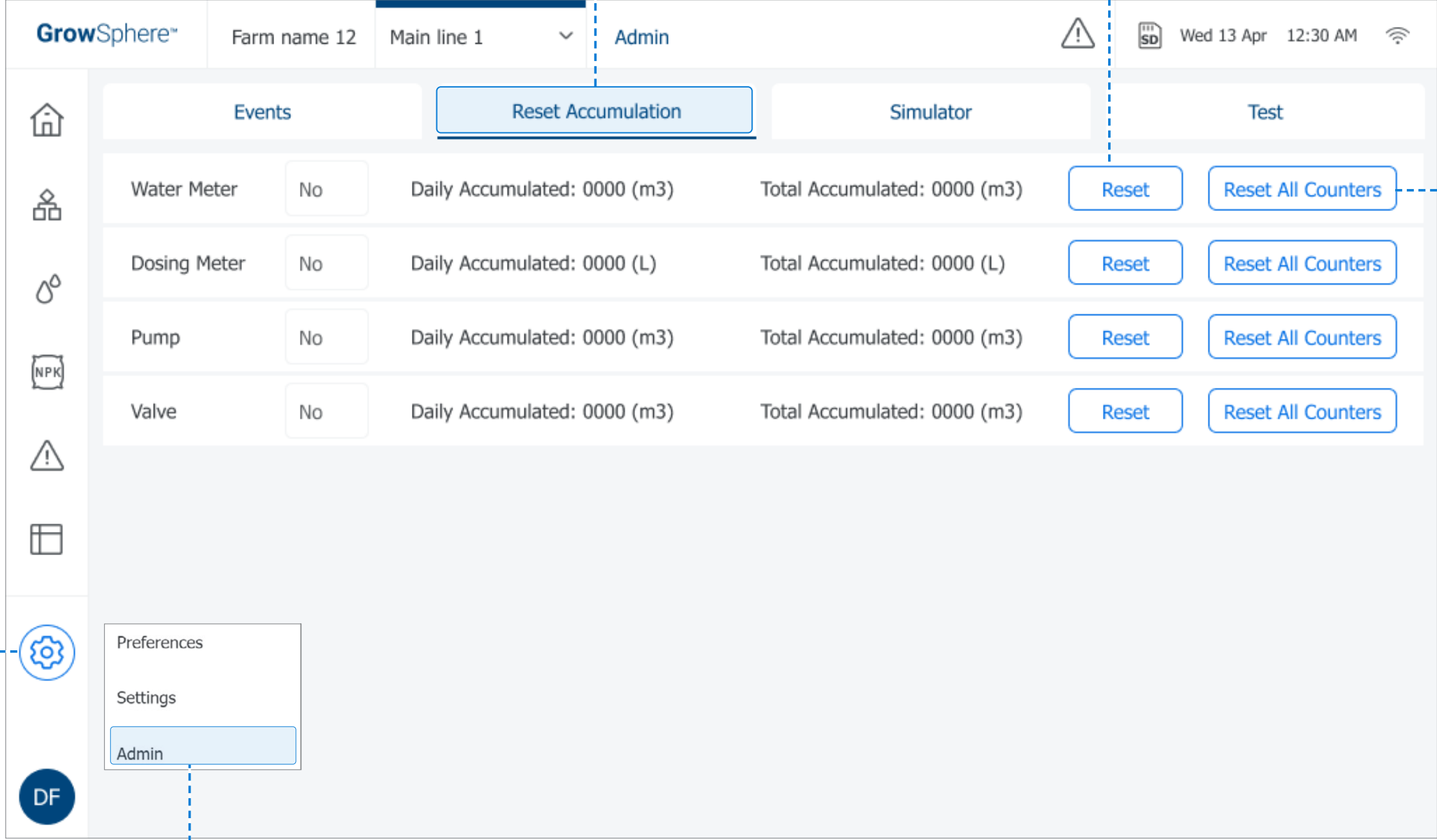
3. Tap the Reset Accumulation tab

4. Tap Reset
The specific counter will be reset.

5. Tap Reset All Counters
All counters will be reset.

1. Tap the Configuration button

2. Select Admin



Counter Type	Status	Daily Accumulated	Total Accumulated	Reset	Reset All Counters
Water Meter	No	0000 (m3)	0000 (m3)	Reset	Reset All Counters
Dosing Meter	No	0000 (L)	0000 (L)	Reset	Reset All Counters
Pump	No	0000 (m3)	0000 (m3)	Reset	Reset All Counters
Valve	No	0000 (m3)	0000 (m3)	Reset	Reset All Counters

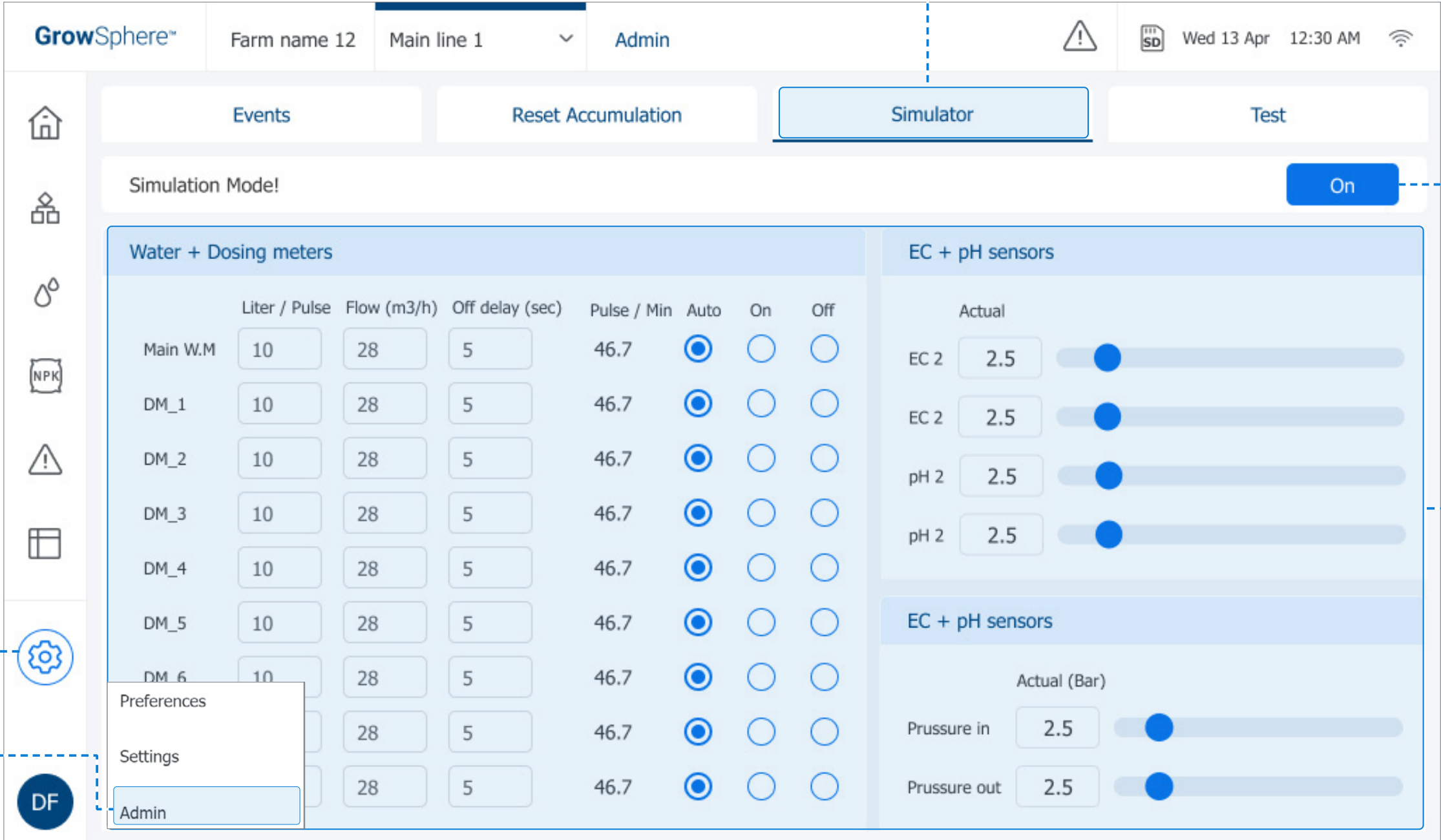
6.6 System Testing

This section reviews testing of the system and includes:



6.6.1 Simulating Flow Rates and Sensor Values

Perform the following steps to perform a simulation of valves/pumps operation, sensors indications, and flow rates:



1. Tap the Configuration button

2. Select Admin and type your credentials

3. Tap the Simulator tab

4. Tap On

5. Adjust the parameters

The screenshot shows the GrowSphere MAX interface with the following components:

- Header:** GrowSphere™, Farm name 12, Main line 1, Admin, and system status (Wed 13 Apr 12:30 AM).
- Navigation:** Home, Events, Reset Accumulation, Simulator (selected), and Test.
- Simulation Mode:** A toggle switch set to "On".
- Water + Dosing meters:** A table with columns: Liter / Pulse, Flow (m3/h), Off delay (sec), Pulse / Min, Auto, On, and Off.

	Liter / Pulse	Flow (m3/h)	Off delay (sec)	Pulse / Min	Auto	On	Off
Main W.M	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_1	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_2	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_3	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_4	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_5	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
DM_6	10	28	5	46.7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
- EC + pH sensors:** Two sections showing sensor values and sliders.
 - Section 1: EC 2 (2.5), pH 2 (2.5).
 - Section 2: EC + pH sensors, Prussure in (2.5), Prussure out (2.5).

6.6.2 Testing Devices

This screen is useful to manually operate or test the devices connected to the output modules and read the indications received from sensors and other devices connected to the inputs modules. Verify the following to manually test the system devices:

C. Tap the Test tab

B. Select Admin and type your credentials

A. Tap the Configuration button

PM5052	DO572 - 1	DAI561 - 1	DI562 - 1	PM5052
I/O Device Test	I/O Device Test	I/O Device value (mA)	I/O Device	I/O Device Test
● DI 0 M.WM	● DO 0 DCH_1 Test	AI 0 EC1 0	DI 0 WM	● DI 0 VLV_1 Test
Preferences	● DO 1 DCH_2 Test	AI 1 pH1 2	DI 1 DM	● DI 1 VLV_2 Test
Settings	● DO 2 DCH_3 Test	AI 2 PT1 10	DI 2 WM	● DI 2 VLV_3 Test
Admin	● DO 3 DCH_4 Test	AI 3 PT2 20	DI 3 WM	● DI 3 VLV_4 Test
● DI 4 WM_4	● DO 4 DCH_5 Test		DI 4 WM	● DI 4 VLV_5 Test
● DI 5 WM_5	● DO 5 DCH_6 Test		DI 5 WM	● DI 5 VLV_6 Test
● DI 6 WM_6	● DO 6 DCH_7 Test		DI 6 WM	● DI 6 VLV_7 Test
● DI 7 DM_1	● DO 7 DCH_8 Test		DI 7 WM	● DI 7 VLV_8 Test
● DI 8 B.OL			DI 8 WM	● DI 8 VLV_9 Test
● DI 9 -			DI 9 WM	● DI 9 VLV_10 Test

D. Tap the Test button
Tap the **Test** button of the relevant output to activate it. When the output is on, the Test button turns blue. Verify that the device is functioning correctly.

6.7 Monitoring Irrigation

This section reviews monitoring irrigation and includes:

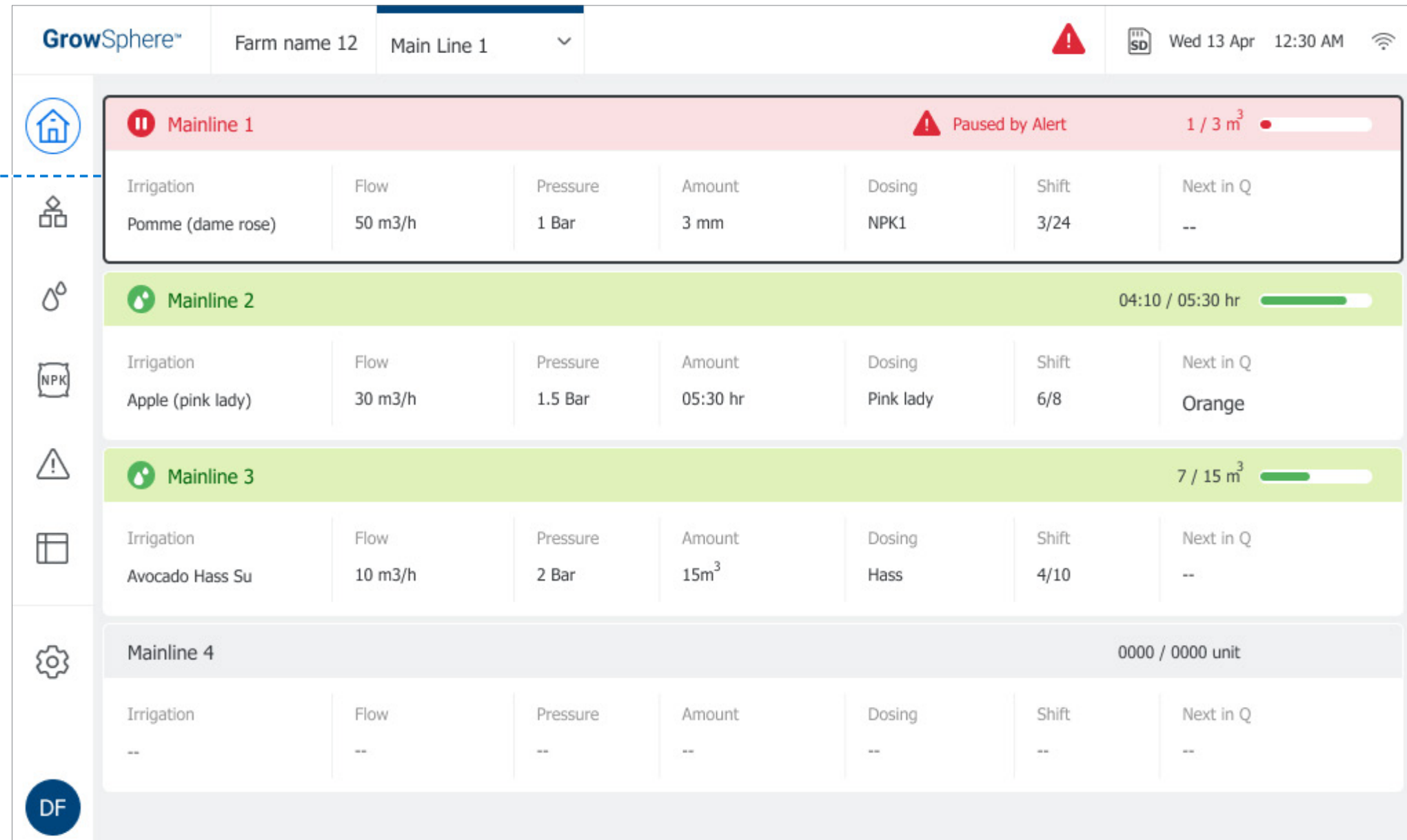


6.7.1 Selecting the Mainline

Perform the following to select the relevant mainline to open the SCADA screen:

1. Select the relevant mainline

Select the relevant mainline to open the SCADA screen.



The screenshot shows the GrowSphere SCADA interface for 'Farm name 12' with 'Main Line 1' selected in the dropdown menu. The interface displays four mainlines with their respective irrigation details and status.

Mainline	Irrigation	Flow	Pressure	Amount	Dosing	Shift	Next in Q
Mainline 1	Pomme (dame rose)	50 m3/h	1 Bar	3 mm	NPK1	3/24	--
Mainline 2	Apple (pink lady)	30 m3/h	1.5 Bar	05:30 hr	Pink lady	6/8	Orange
Mainline 3	Avocado Hass Su	10 m3/h	2 Bar	15m ³	Hass	4/10	--
Mainline 4	--	--	--	--	--	--	--

6.7.2 Irrigation Dashboard

The irrigation dashboard includes the following:

Tap the General tab

Display the Dashboard

To access the irrigation dashboard, verify the SCADA button is selected.

System devices

Indicates the devices statuses and enables setup/manual activation.

Current running program

Includes live information of the running program.

Next program to run

Displays information of the next program to run.

Top bar

When an irrigation program is running, buttons enable pausing the program, skipping the current shift, or stopping the program.

The screenshot shows the GrowSphere irrigation dashboard. At the top, there's a navigation bar with 'Farm', 'Main line 1', and 'Home'. A status bar indicates 'Simulation On!' with a warning icon, the date 'Fri, 06 Jan 2023', and time '08:01:02'. Below this is a tabbed interface with 'General', 'Shifts', 'Valves', 'Analytics', 'Queue', and 'Events'. The 'General' tab is active, showing 'Program 01' with 'Skip Shift', 'Pause', and 'Stop' buttons. The main area is divided into two panels: 'Main Line 1' and 'Dosing recipe - Dosing 1'. The 'Main Line 1' panel shows a schematic of the main line with two pressure bars (4.1 and 3.9) and flow meters (Actual: 40.9 m³/h, Nominal: 41.0 m³/h). The 'Dosing recipe' panel shows a schematic of the dosing system with three channels. Below the schematic is a table of dosing parameters:

	1	2	3
Open [%]	75.0	72.7	81.8
Flow [L/h]	494.1	381.5	150.0
Qty Delivered [L]	7.5	5.5	2.0
Time Delivered [HH:MM]	00:00	00:00	00:00
Set Point	11.0	8.0	3.0
	1/1000	1/1000	1/1000

At the bottom, there's a 'Current' section showing 'Program 01', 'shift 1/1', and 'Date & Time Started 06.01.23 | 08:00'. Below that is a 'Next in Queue' section. A 'Shifts' button is located at the bottom right of the dashboard.

Dosing recipes

Displays the dosing recipe in use, the dosing unit devices, and information regarding the dosing channels.

NOTE

The active devices are in green.

Current shift

Displays information about the current shift. Tap the Shifts button to open the Shifts tab.

Manual Operation

Perform the following steps to enable manual operation of the pump, main valve, booster pump, and dosing channel:

1. Tap the relevant device

A dropdown menu is displayed.

2. Select the device state

Output device can be set to: **Auto** - Device is activated according to the irrigation program.

Manual On - Device is activated.

Manual Off - Device is turned off.

3. Verify device state

The **M** icon indicates that the device is in Manual mode.

Pause Mainline - Tap to pause the program.

Channel	1	2	3	4	5	6	7	8
Open (%)	1000	1000	1000	1000	1000	--	--	--
Flow (L/h)	1000	1000	1000	1000	1000	--	--	--
Qty Delivered	1000	1000	1000	1000	1000	--	--	--
Time Delivered	1000	1000	1000	1000	1000	--	--	--
Set Point	1000	1000	1000	1000	1000	--	--	--

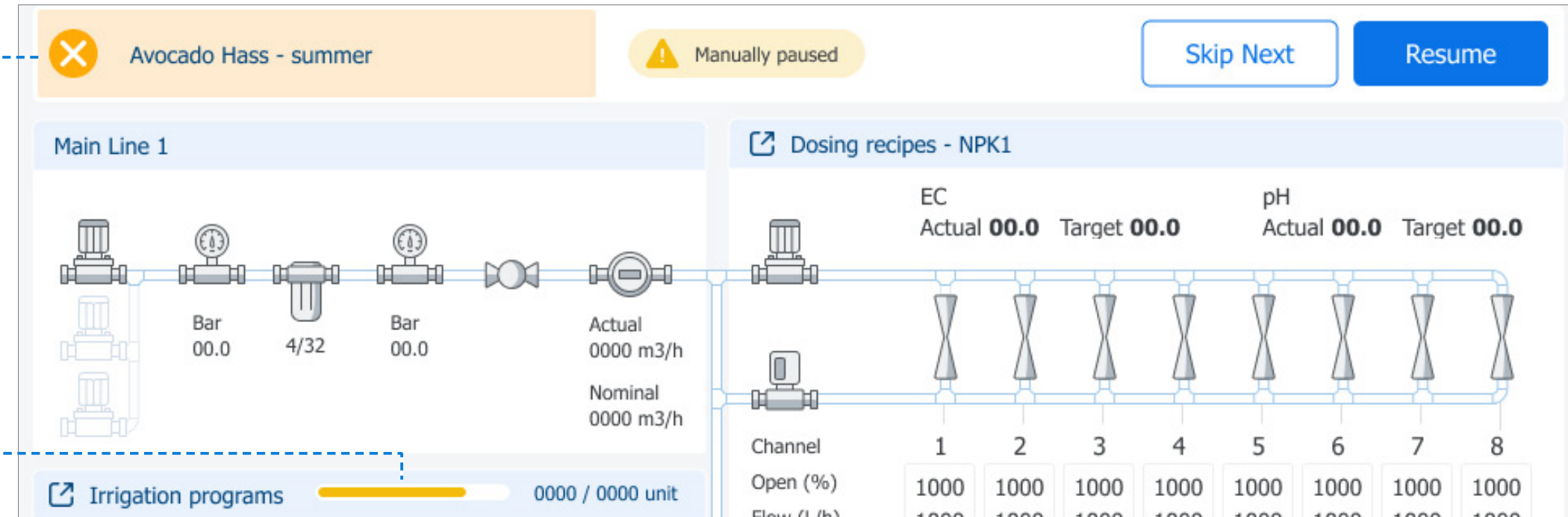
NOTE
The device remains in manual mode until it is set back to automatic.

Irrigation Program Paused

A running irrigation program can be paused for one of the following two reasons:

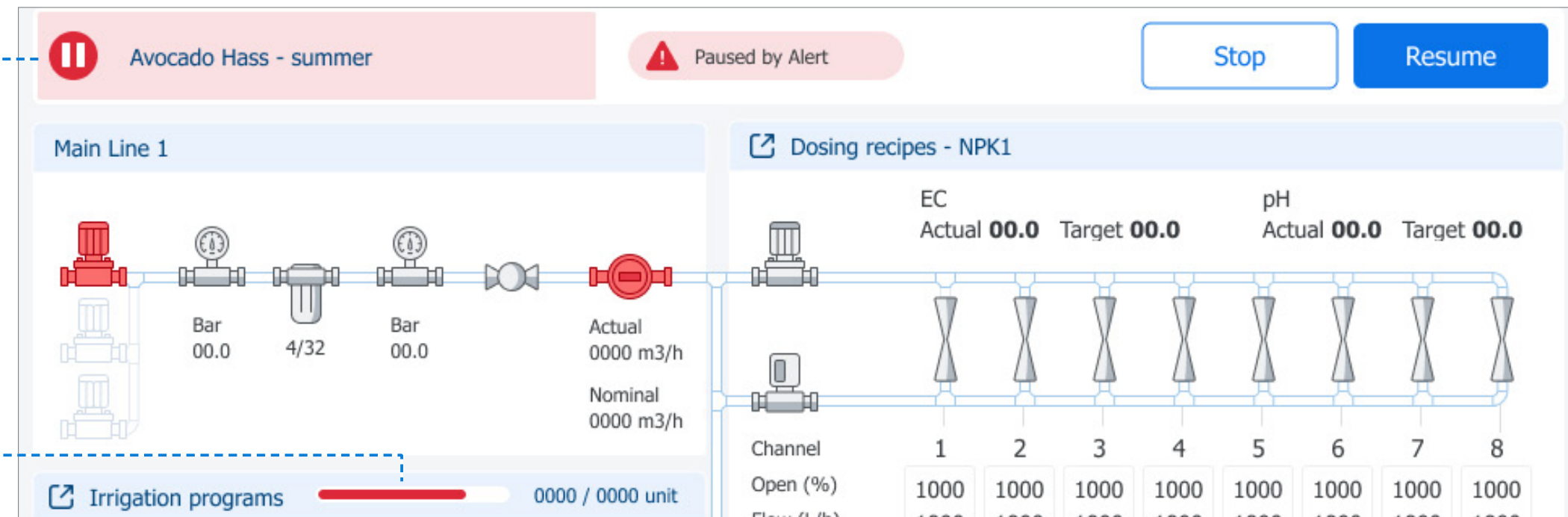
Program manually paused

When the irrigation program is manually paused by the user, the top bar and progress bar turn orange. Top bar buttons enable skipping to the next shift or resuming the program.



Program paused by system

When the irrigation program is automatically paused by the system (due to a high severity alert), the top bar and progress bar turn red. The top bar buttons enable stopping the program or resuming the program.



6.7.3 Monitoring Irrigation Shifts

The **Shifts** tab displays all shifts and valves of the current running irrigation program. This tab is useful to monitor the status of the running shift, the state of each of the shift valves. Perform the following steps to view the shifts:

1. Tap the SCADA button — [SCADA icon]

2. Tap the Shifts tab — [Shifts tab]

3. Tap the arrows to view all shifts — [Navigation arrows]

The screenshot shows the GrowSphere interface with the following elements:

- Header: Farm name 12, Main line 1, Scada, Wed 13 Apr 12:30 AM
- Navigation tabs: General, Shifts, Valves, Analytics, Queue, Events
- Shifts list:
 - Shift 1** (checked): All valves (Tomatoes 43) are grey, indicating completion.
 - Shift 2** (crossed out): All valves (Tomatoes 43) are grey, indicating it is uncompleted.
 - Shift 3** (water drop icon): All valves (Tomatoes 43) are green, indicating it is the current running shift. A progress bar shows 0000 / 0000 unit.
- Bottom navigation: DF button, page 1 of page 2, navigation arrows.

NOTES

- An irrigation program can have a maximum of 32 shifts, and each shift can contain 32 valves.
- All valves assigned to a shift run simultaneously.

✓ **Irrigation shift completed**

✗ **Uncompleted shift**
See [Uncompleted Irrigation Log](#) for the reason why this shift did not complete.

💧 **Current running shift**
A status bar indicates how much time is left until the shift is complete.

6.7.4 Monitoring Valves

The **Valves** tab displays all of the valves which are linked with the main line. This screen is useful to view the status of valves. Perform the following steps to view the valves:

1. Tap the SCADA button - Points to the SCADA button in the top navigation bar.

2. Tap the Valves tab - Points to the Valves tab in the main navigation bar.

3. Select which valves are displayed - Points to the filter buttons (All, Alert, Manual, Not assigned) above the valve list.

Valve status indication:

- Alert (Red dot)
- Irrigating (Green dot)
- Not Assigned (Black dot)
- Off/Not Active (Grey dot)
- Manual On (Yellow M dot)

Updating valve activation method

To update how a valve is activated (i.e., automatically or manually), tap the valve and select the relevant option from the menu.

NOTE
Each main valve can have up to 100 irrigation valves.

6.7.5 Irrigation Analytics

The Analytics tab displays a live graph representing the measurements of the sensors connected to the analog inputs module. Perform the following steps to view and update the graph:

1. Tap the SCADA button

3. Select the graph type

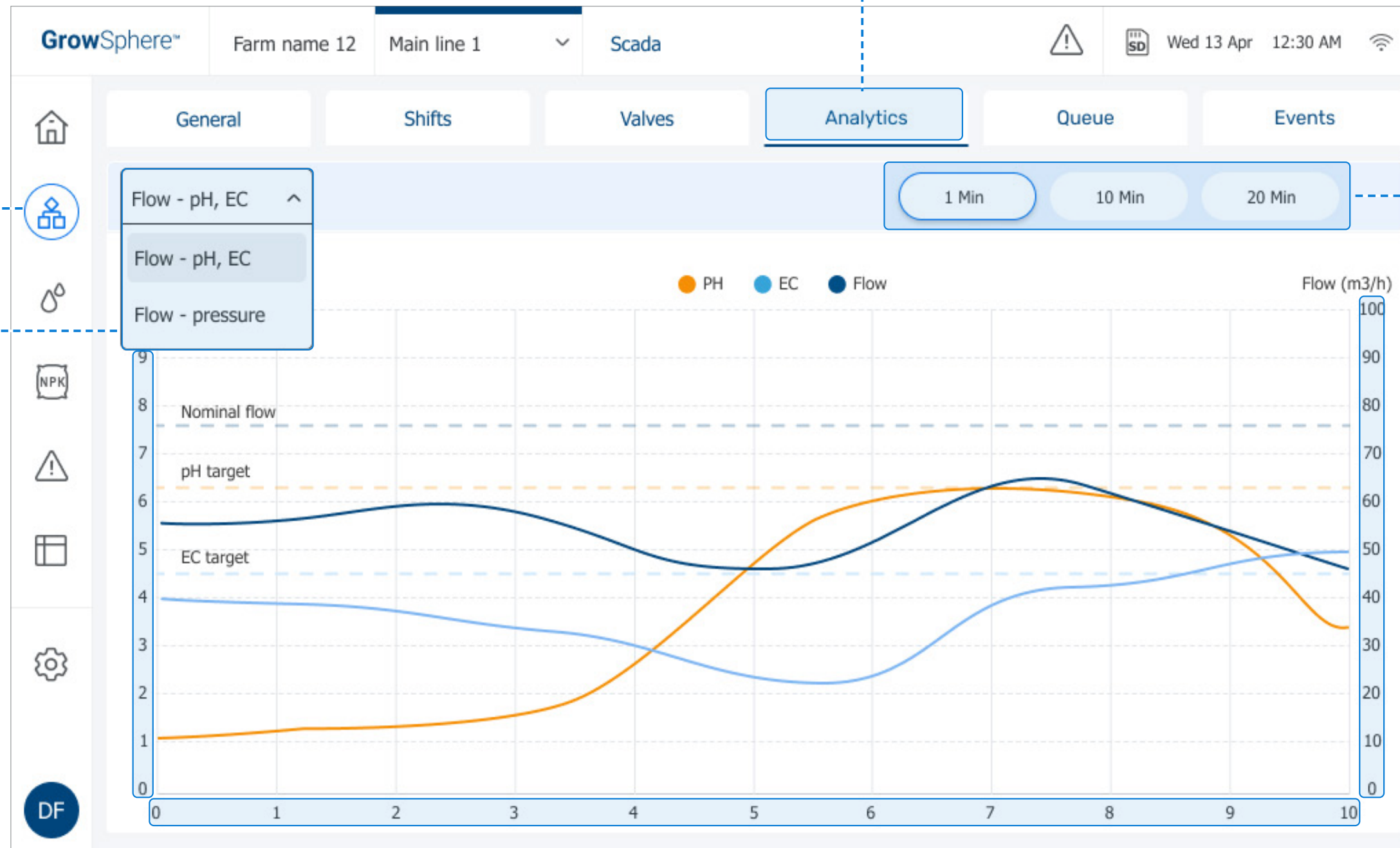
EC and pH measurements can be displayed in relation to the water flow.

Pressure can be displayed in relation to the flow.

2. Tap the Analytics tab

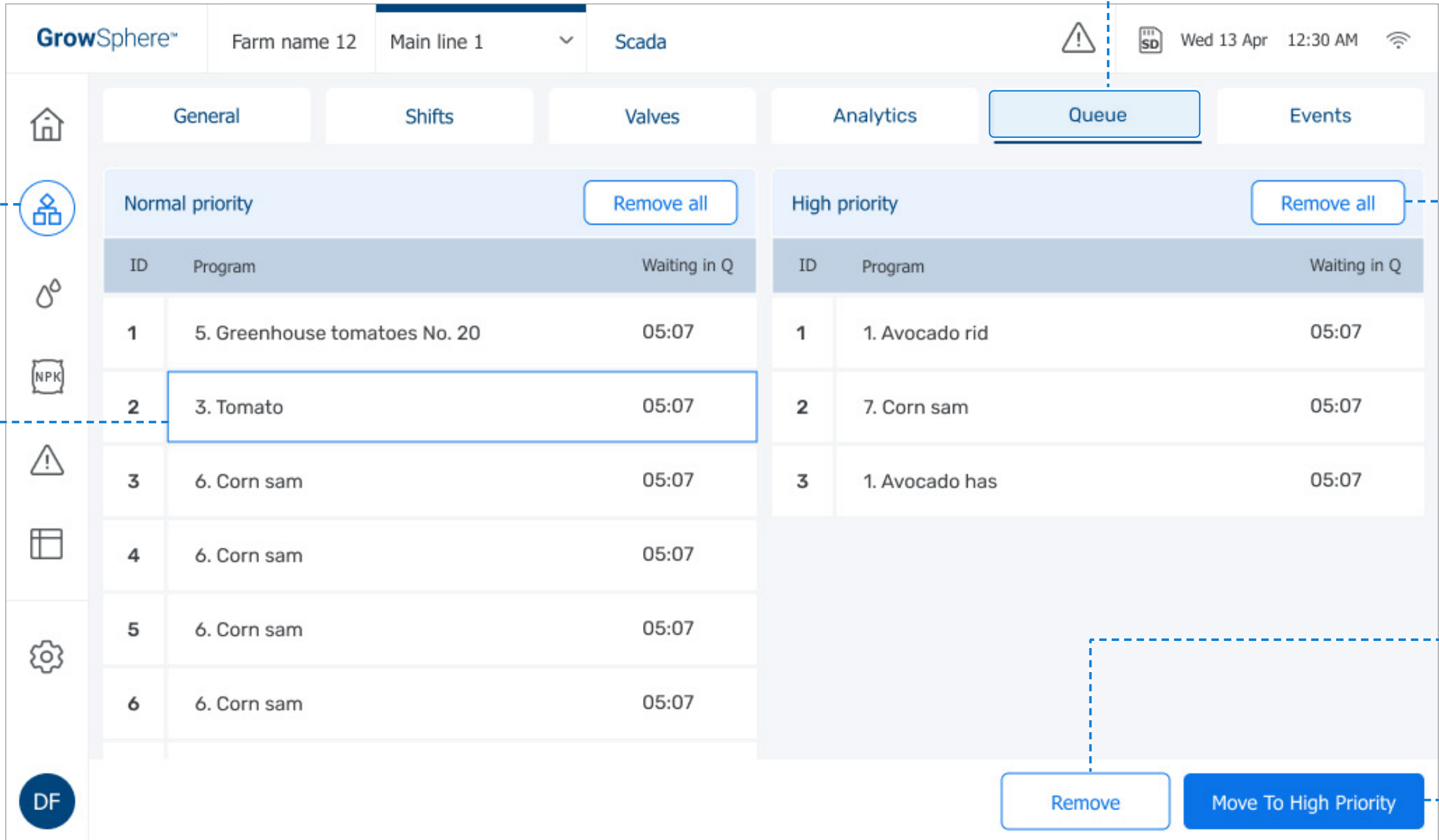
4. Select the timeline scale

Change the X-axis to display the relevant time-line scale.



6.7.6 Managing Irrigation Program Queue

The **Queue** tab displays the irrigation programs waiting to be executed, sorted by Normal priority and High priority. Perform the following steps to manage the queued programs:



1. Tap the SCADA button - Tap the SCADA button in the left sidebar.

2. Tap the Queue tab - Tap the Queue tab in the top navigation bar.

3. Select the relevant program
Tap the program name to select it.

4a. Tap Remove to remove the selected program from the list.

4b. Tap Move to High Priority to move a selected program to the High Priority list.

Remove all button
Tap to remove all programs from the queue.

NOTES

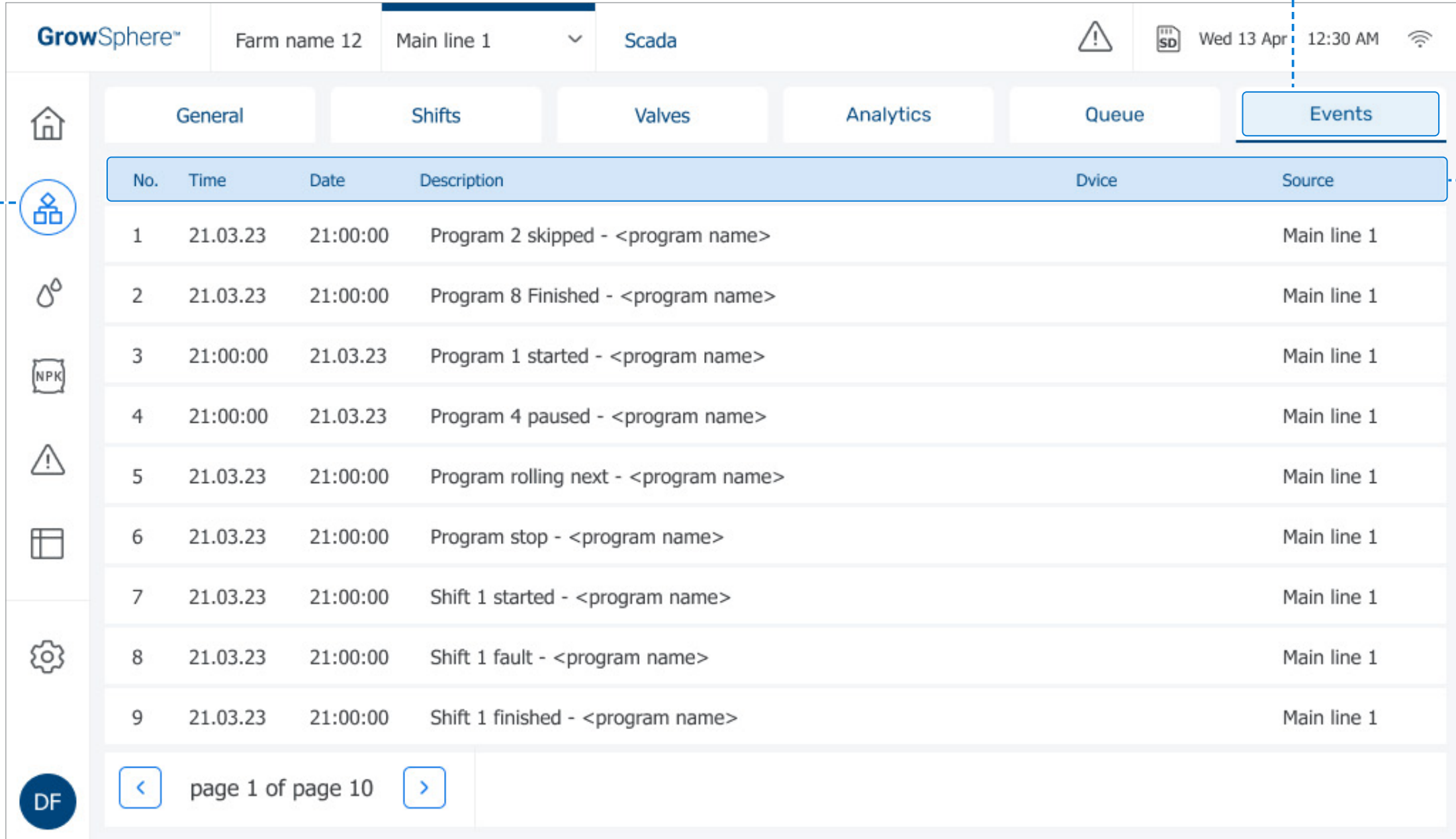
- The **ID** column represents the order in which the programs are to be executed.
- The **Waiting in Q** column represents the amount of time the program has been waiting in the queue.

Normal priority			High priority		
ID	Program	Waiting in Q	ID	Program	Waiting in Q
1	5. Greenhouse tomatoes No. 20	05:07	1	1. Avocado rid	05:07
2	3. Tomato	05:07	2	7. Corn sam	05:07
3	6. Corn sam	05:07	3	1. Avocado has	05:07
4	6. Corn sam	05:07			
5	6. Corn sam	05:07			
6	6. Corn sam	05:07			

6.7.7 Monitoring Irrigation Events

The **Events** tab displays all controller events. Perform the following steps to view the events:

1. Tap the **SCADA** button
2. Tap the **Events** tab
3. Review the following event information:
 - **Time:** Time the event occurred.
 - **Date:** Date the event occurred.
 - **Description:** Description of what occurred, including the irrigation program running at the time of the event.
 - **Device:** Device involved with the event.
 - **Source:** Main line on which the event occurred.



No.	Time	Date	Description	Dvice	Source
1	21.03.23	21:00:00	Program 2 skipped - <program name>		Main line 1
2	21.03.23	21:00:00	Program 8 Finished - <program name>		Main line 1
3	21:00:00	21.03.23	Program 1 started - <program name>		Main line 1
4	21:00:00	21.03.23	Program 4 paused - <program name>		Main line 1
5	21.03.23	21:00:00	Program rolling next - <program name>		Main line 1
6	21.03.23	21:00:00	Program stop - <program name>		Main line 1
7	21.03.23	21:00:00	Shift 1 started - <program name>		Main line 1
8	21.03.23	21:00:00	Shift 1 fault - <program name>		Main line 1
9	21.03.23	21:00:00	Shift 1 finished - <program name>		Main line 1

7. Technical Specifications

TBD

Thank you!

