NETAFIM™
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GrowSphere™ Max

Irrigation & Fertigation Controller

/ User Manual

Scan to GrowSphere™ website

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Controller Version 2.0

Table of Contents

Warranty & Safety

- Warranty
- Safety Overview
- Safety Conventions
- Safety Instructions

Quick Start

- Internal Design
- Local and remote cotrol
- System Preferences
- System Settings
- Wiring Instructions & Expantion Modules
- Connect to Remote Units
- Dosing settings
- Create Irrigation Program

Introduction

- System Overview
- Configurations
- Summary of System
- Connected Devices and Fertigation Functionalities
- Controller Sticker
- EC/pH Unit
- Screen and Visualization

Installation

- Mounting GrowSphere
- Connecting to the CPU
- Connecting Digital Inputs
- Connecting Dosing Outputs
- Connecting Digital Outputs
- Connecting Analog Inputs
- Connecting EC/pH Units

Controller Configuration

- Getting Started
- Dashboard Overview
- Defining System Preferences
- Configuring Components
- Configuring Dosing Settings
- Defining Alert Settings

Controller Operation

- Managing Irrigation Programs
- Managing Fertilizer Dosing
- Managing Alerts
- Viewing Logs
- Resetting Accumulation
- System Testing
- Monitoring Irrigation

Misting, Cooling and Humidification

- Settings
- Program
- Misting Program
- Cooling Program
- Humidification Program
- View Programs

Dosing Tanks and Agitator Program

- Agitator Settings
- Set Agitators Peration
- Set Tanks parameters

Conditions & Triggers

- Conditions to start the Irrigation Program by external triggers
- Triggers definition
- Settings of Analog trigger Sensors
- Type Only if ON

Mixing Valves + PRE-EC

- Mixing valves and Pre-EC-Diagram
- Scada diagram with Pre-EC control
- Mixing Valve Selection for Pre-EC Control

Appendix

- Configuring Remote I/O
- RadioNet to **Grow**Sphere™ MAX
- NetRTU to **Grow**Sphere™ MAX

CAUTION:

Read the Safety instructions before installing or using the GrowSphere system.

1. Warranty

Netafim's products are warranted to be free from defects in material and workmanship under normal use and service, for a period of twelve (12) months from the date of purchase of the products by the customer (the "Warranty Period"), provided however, that with respect to items procured by Netafim from a third party, such warranty period shall be the shorter of (i) the Warranty Period; or (ii) the warranty period granted to Netafim by the third party from which it acquired such item.

This limited warranty shall be considered as null and void and shall not apply in any of the following events:

1. Where equipment is not used or has not been installed in accordance with Netafim's specifications and installation instructions for the recommended purpose. This warranty does not extend to repair or replacement of a Netafim product or part that results from misuse, negligence, alteration, tampering, use in conjunction with parts, products or service which have not been approved by Netafim, improper or inadequate storage, installation or maintenance of the product, or any use not in accordance with the applicable user manual provided by Netafim.
2. Where chemical concentrates are used or applied internally or externally to the product not according to Netafim's instructions, and cause harm to the product or its components.
3. If operating pressures are not within the limits specified by Netafim individual components.
4. Where damage, plugging or clogging is caused by insects, rodents or other animals.
5. External causes such as accident, abuse, misuse, or problems with electrical power.
5. Normal wear and tear.
6. Any part normally consumed in operation, or which has a normal life, inherently shorter than the specified warranty period, shall not be considered defective merely due to its consumption or failure prior to the end of the warranty period.
7. Loss or damage in transit.
8. Any alterations or repairs (or attempts to make alterations or repairs) made by a party other than Netafim.
9. Any acts or omissions which exposes the products to any environment not suitable for it, with the respective specifications, including without limitation, use of toxic, corrosive, or caustic liquids and/or gases, exposure to severe weather conditions and water.
10. Any defect or problem caused by any defect in any 3rd party product used in combination with the Netafim products;
11. Any usage that is not in accordance with the provisions of section 4 to Netafim's End User License Agreement available at: _____;
12. If failures are caused by any act or event beyond the reasonable control of Netafim, natural calamities and/or force majeure, which may include, but are not limited to, war, invasion, act of foreign enemy, terrorism, hostilities (whether war be declared or not), civil war or strike, rebellion, lockouts or other industrial disputes or actions, acts of God, acts of government or other prevailing authorities or defaults of third parties, storms, temperatures, flooding, gales, snow, landslides, fire, hailstorm, lightning, earthquakes, electrical or power failures or outages or power surges or electrical spikes, or damage due to freezing or mechanical damage, failure of energy or water supply.

If a customer of Netafim identifies a defect in a Netafim product and informs Netafim of that defect during the applicable Warranty Period, Netafim will repair, replace or refund a part or the full cost of the product's purchase price, at its sole discretion, either the product or the defective part.

To receive warranty benefits, customers should return the defective product or part to the nearest Netafim™ distributor.

Netafim's warranty does not cover transit damages or spare parts required for routine maintenance. Netafim cannot and does not assume liability for defective parts, or damage caused by products not manufactured or supplied by Netafim, even though such products may be used in conjunction with Netafim™ products and the customer assumes risk of use of such third-party products.

Netafim's obligation to repair, replace or refund the cost of its products as set forth above is the sole and exclusive warranty given by Netafim. Netafim disclaims any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose and/ or warranty of non-infringement. Netafim will not be liable to any party in strict liability, tort, contract, or any other manner for damages caused or claimed to be caused as a result of any design or defect in Netafim's products. In addition, Netafim shall not be liable, and a customer and/or any third party shall not be entitled to recover from Netafim, any, general, special, incidental, consequential, indirect, punitive, or exemplary damages of whatsoever nature and type (including, without derogating from the generality of the foregoing, damages to crops or equipment causes by product malfunction, losses or damages caused by shutdowns or service interruptions, loss of use, non-operation of the products or any equipment, loss of information, loss of power or cost of replacement power, loss of profits or revenue, loss of contracts, loss of capital inventory or use charges, cost of purchased or replacement power, interest charges or cost of capital or claims of customer's clients or any third party) even if Netafim is aware or should have been aware of the possibility of such damages. In no event shall Netafim's liability exceed the purchase price of the Netafim products.

This warranty extends only to the customer of the Netafim product. The Netafim Warranty Period commences upon the purchase date to the customer.

Netafim reserves the right to alter, modify or redesign its products, pricing and this warranty at all times without creating any liability for the obsolescence of customer inventory or such parts or products.

2. Safety

2.1 Safety Overview

Netafim congratulates you on purchasing the **Grow**Sphere™ **MAX** system. **Grow**Sphere™ **MAX** system is a family of hardware, software, and cloud products designed and developed for the planning, managing, and monitoring irrigation and Nutrigation.

2.1.1 Intended Audience and How to Use This Manual

This document is the user manual of the **Grow**Sphere™ **MAX** system. It describes the essential operation and maintenance of the system.

2.2 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.

2.3 Safety Instructions

- All safety regulations must be applied
- Use only approved accessories specified by Netafim™ for the **Grow**Sphere™ 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.

2.3.1 Electrical Safety Precautions

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

2.3.2 Overhead Power Lines

WARNING

When installing **Grow**Sphere™ units, care must be taken:

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

2.3.3 Batteries

- Use only Netafim™ approved batteries on the **Grow**Sphere™ equipment
- Do not puncture the battery
- Avoid contact with the corrosive material in the battery
- Exercise care in handling any charged battery, particularly when placing it inside a container (toolbox) amidst metal objects
- Always responsibly dispose of a used battery - in the intended places for battery recycling
- It is important not to dispose of large numbers of alkaline batteries in a group

2.3.4 RF remote units

- The **Grow**Sphere™ 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 the Ministry of Communication, Customs, or any other governmental agency

2.3.5 Environmental conditions

It is recommended to install the **Grow**Sphere™ **MAX** in the conditions as below:

- Placed in a roofed building
- Protected from direct sunlight
- Properly ventilated
- Protected from dust
- Protected from splashes or direct spraying with water or chemicals

According to the manufacture data sheet, The GS Max maximal temperature for the following components are:

- CPU: 60 degrees Celsius
- Teltonika modem: 75 degrees Celsius
- Screen: 60 degrees Celsius

2.3.6 Thunderstorms

If the area is known to be prone to thunderstorms, **Grow**Sphere™ 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 **Grow**Sphere™ 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.

2.3.7 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)

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

⚠ WARNING

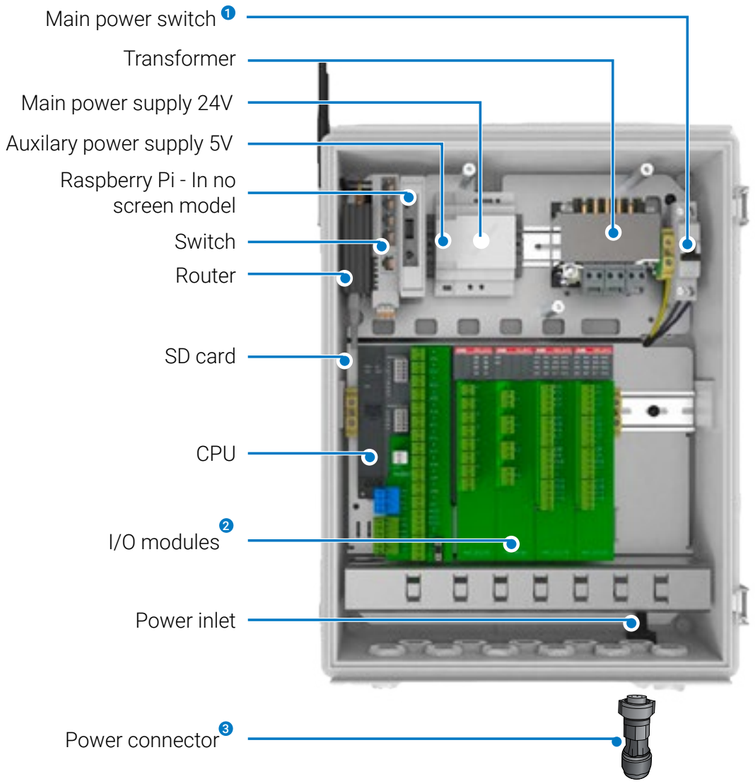
Mounting the base unit and routers and erecting poles might require working at height.

3. Quick Start Guide

1 Internal Design
2 Local & remote control
3 System Prefrences
4 System Settings
5 Wiring & Expantions
6 Connect to Remote Unit
7 Dosing Settings
8 Create Irrigation Program

Internal design

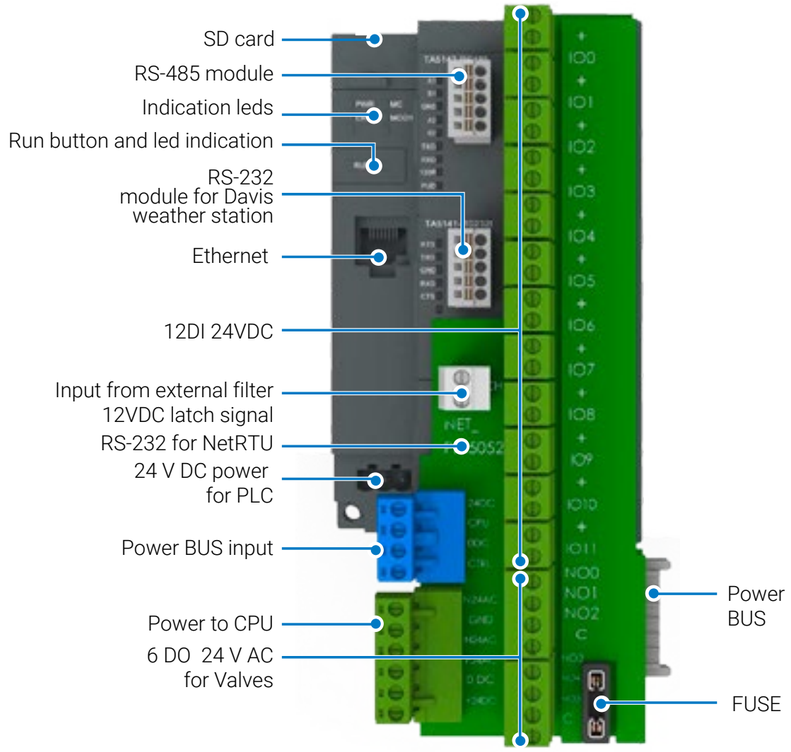
/ GrowSphere™ MAX - Internal design



1. Switches the main power on and off
2. Enable connecting the peripheral components
3. You can find the connector in the accessories box

* Subject to product configuration

/ GrowSphere™ MAX - CPU



CPU Adaptor features

- AC protection Fuse
- CPU remote reset
- Controlled by modem remotely
- Easy visual indication
- 24AC LED
- 24DC LED
- CPU reset

Custom ABB controller

- Memory 80MB

Main functionalities of the internal components

Main Power Switch - Switch the main power on and off.

Transformer - Transform AC to DC. CPU gets its power before the transformer.

Main power supply 24V - Provides the power to the CPU, screen, and Modem.

Auxiliary power supply 5V - Provides the power to the Gateway and for Davis weather station.

Raspberry Pi - Contains the Anydesk - for remote control through Anydesk. Supplied with the screen-less models only.

Switch - Connect to the controller locally via LAN or to the internet. Also, it improves modem stabilization.

Router - Contains the SIM card and enables communication to the internet.

SD Card - Back up of data and version upgrade.

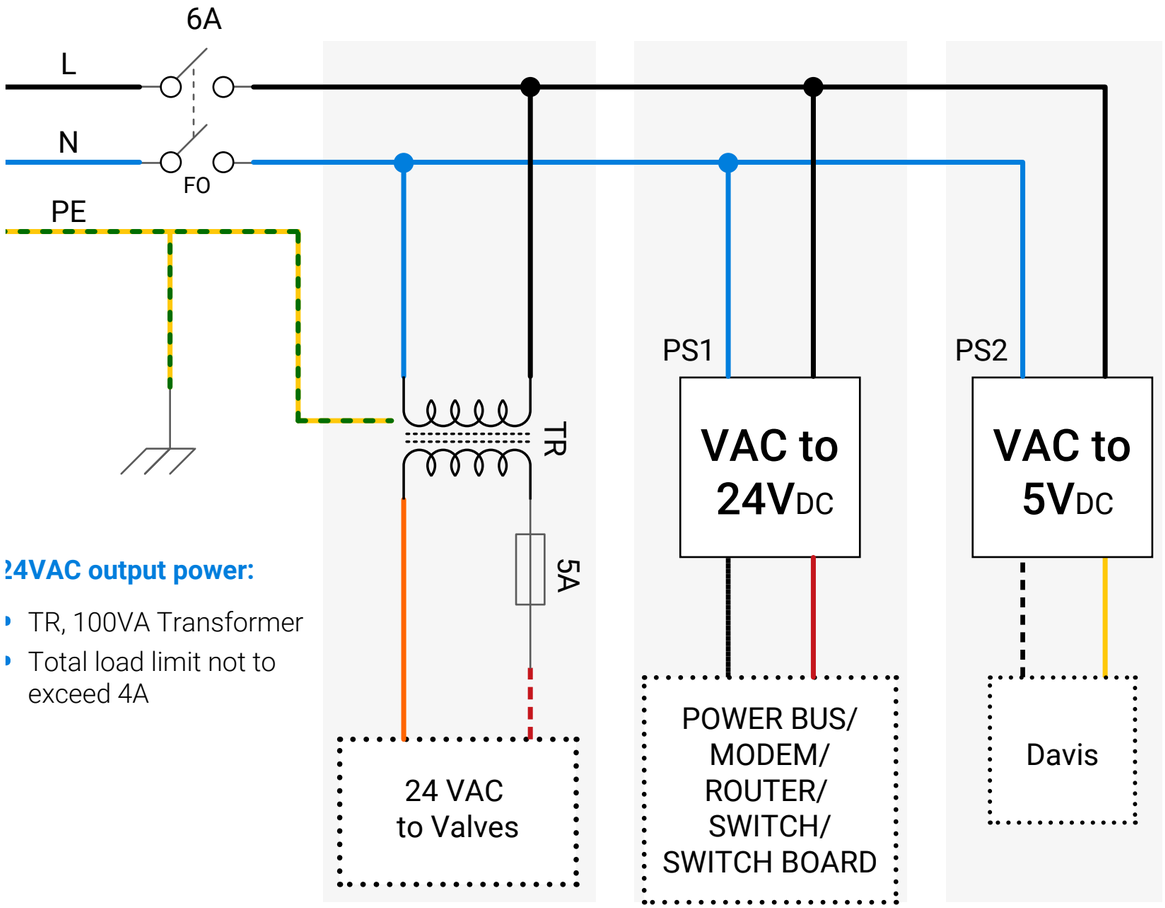
I/O Modules - Enables connection of the peripheral components. Up to six modules can be connected to the MAX simultaneously.

Power connector - The connector can be found in the accessories box.

Expansion modules

Four types of expansion modules can be connected to the **Grow**Sphere™ **MAX**

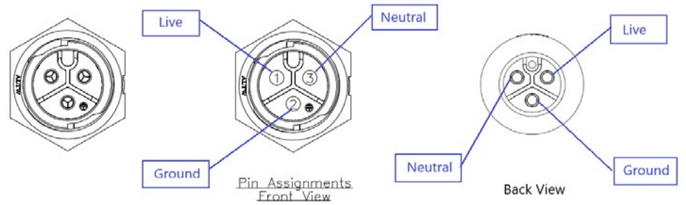
/ GrowSphere™ MAX Power



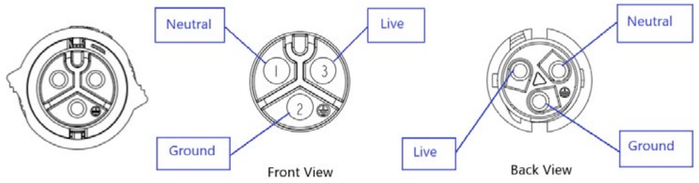
24VAC output power:

- TR, 100VA Transformer
- Total load limit not to exceed 4A

/ GrowSphere™ MAX Power connector



/ GrowSphere™ MAX Cable connector



/ Product technical specifications

	Per Main Line	Total
Main Line	1	4
Main Valve	1	4
Main Water Meter	1	4
Pumps	3	12
Filter Station	1	4
External filter (flushing control + indication)	32	128
Dosing Stations	1	4
Dosing Channel (venturies)	8	32*
Valves	256	256

Irrigation Programs	10
Shifts per program	32
Valves Per Shift	32
Dosing Recipes	10

* To operate more than 8 channels together, please connect with your contact person

Local and remote control

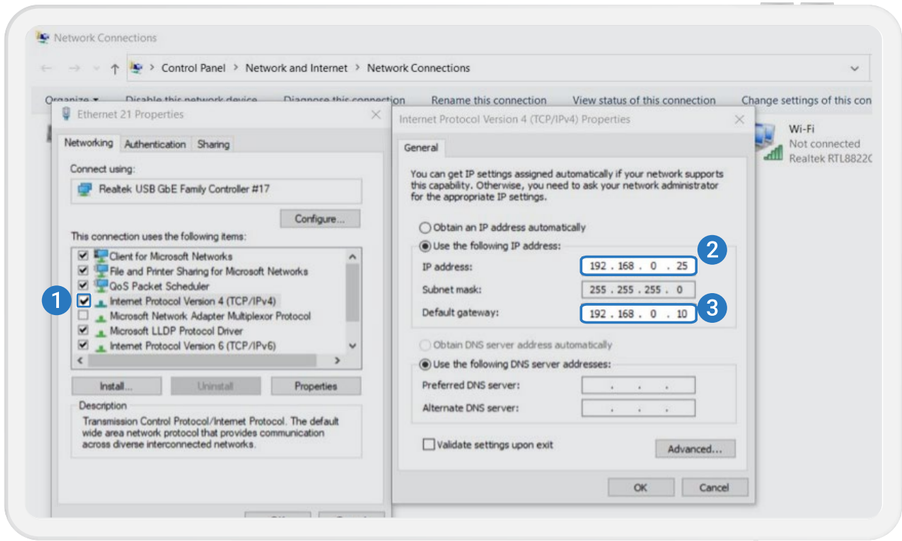
For local access, you can connect to the controller' Wi-Fi by scanning the QR code on the controller or connect via LAN. To access remotely, you can use **Grow**Sphere™ Cloud by clicking on the link icon or use Anydesk from any device by entering the username and password provided with the controller.

/ Local access via LAN

1. Create static IP address – for example: the address range of the system is 192.168.0.4
2. Ensure the Default gateway address is: 192.168.0.10
3. Connect a LAN cable to the switch and type the IP address 192.168.0.10 in the URL

Navigate to your ethernet port properties and set the TCP/IPv4 option, as demonstrated below

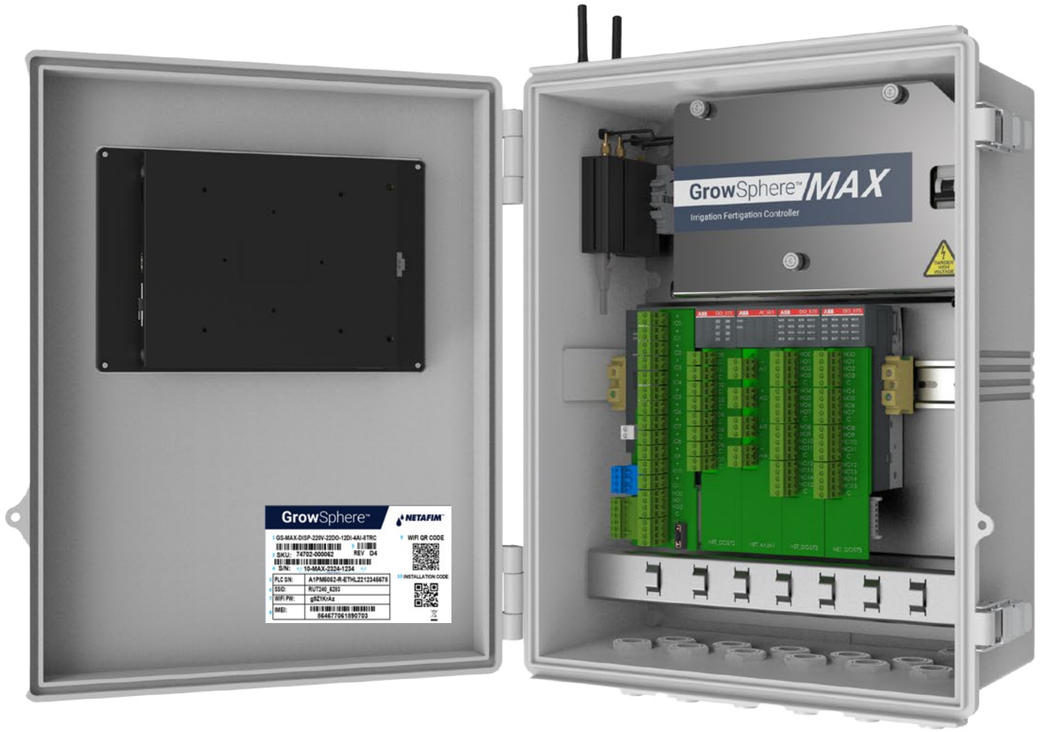
To easily find your Ethernet port, navigate to the Control Panel > Network and Sharing Center > Change adapter settings



/ Local access via WIFI

Scan QR Code
to get Password of router

Select the router's SSID on your device's wireless connections and enter the password. Then enter the URL: 192.168.0.10 in your browser

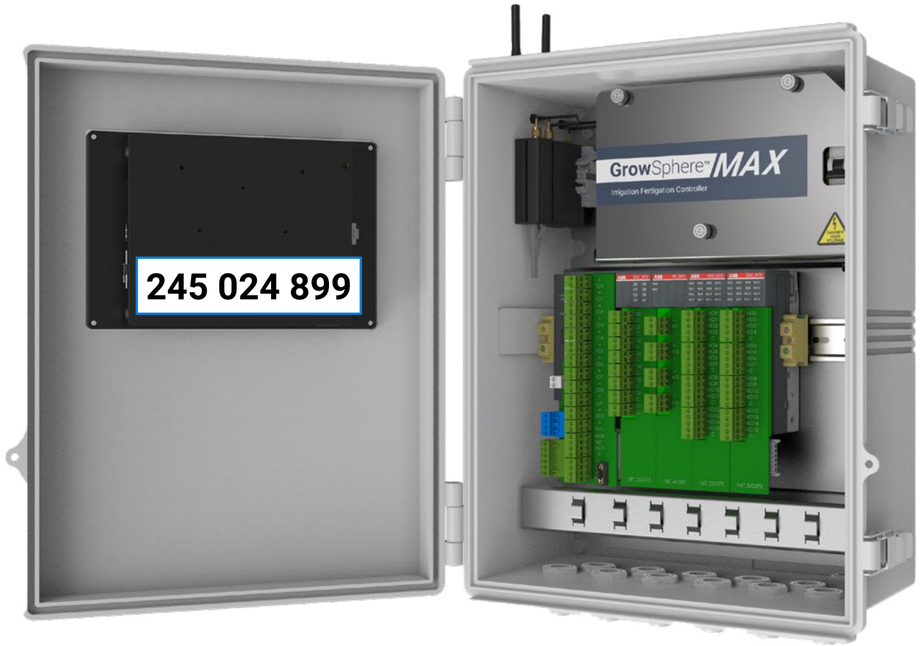


- By typing 192.168.0.10 in the URL line, you will be able to access to the controller dashboard.
- By scanning the QR code on the controller you will get the Wi-Fi address and password for the controller's modem.

/ Remote access - Using Anydesk

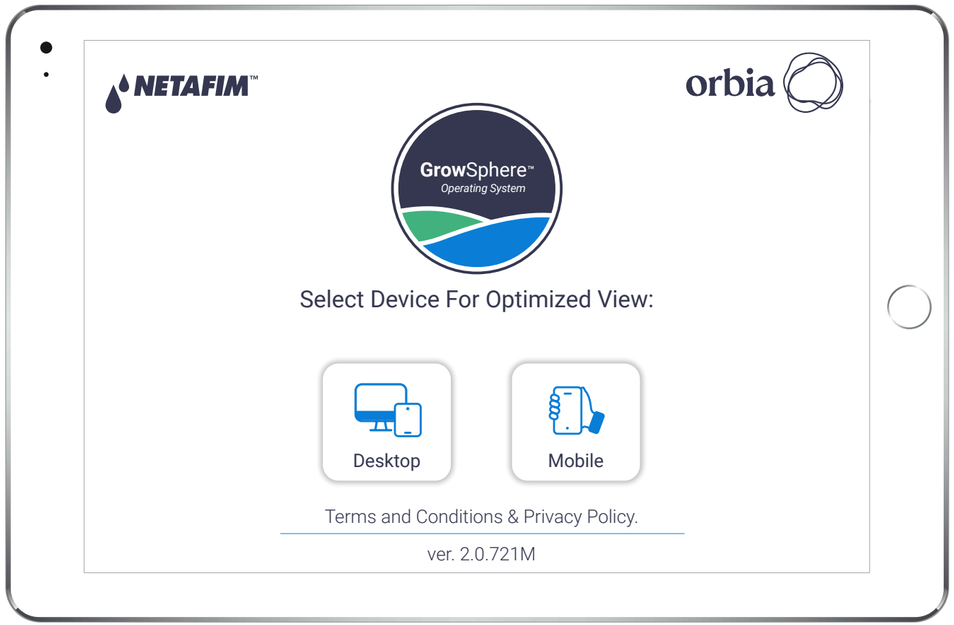
The controller comes with a SIM card and can be accessed through the **Grow**Sphere™ Cloud. However, you can also access it through AnyDesk by following these two steps:

To get started, you'll need to install Anydesk on your computer, tablet, or mobile device. Once you have it installed, you can use the AnyDesk ID found on the controller's internal door. The passwords for anydesk is **GrowSphere01**.



GrowSphere™ MAX - Basic Settings / Getting started

Select the Desktop or Mobile view.
In the case of Tablet, it is recommended to select Desktop.
Mobile view is recommended when connecting to the controller from **Grow**Sphere™ Mobile app.

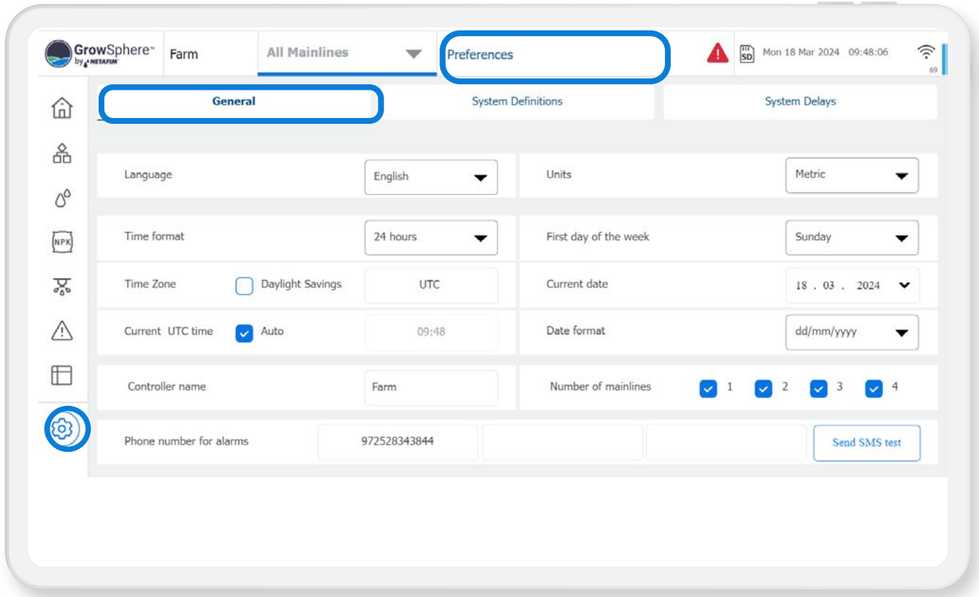


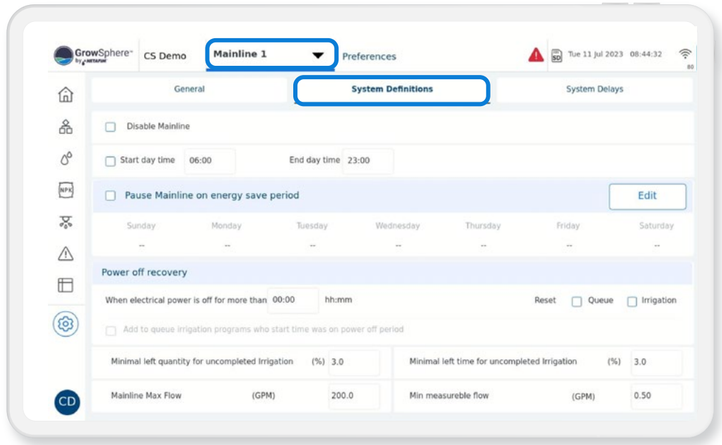
* For more information of the available functions in the Mobile view, please see chapter 5.1.2

System preferences

/ Remote access - Using Anydesk

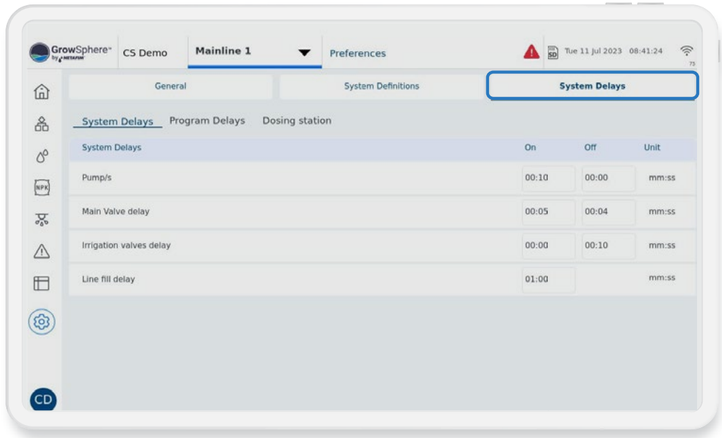
Set your preferences and continue to the next step, your settings will be saved automatically





/ Set definitions for operation time and flow

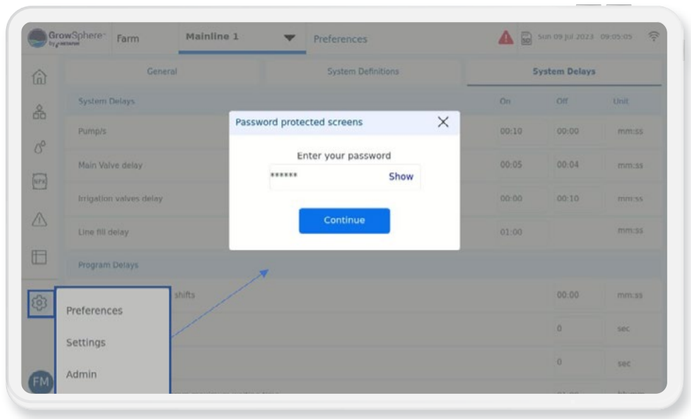
Select the relevant mainline – From this stage, all the settings will be per mainline.



/ Define system delays

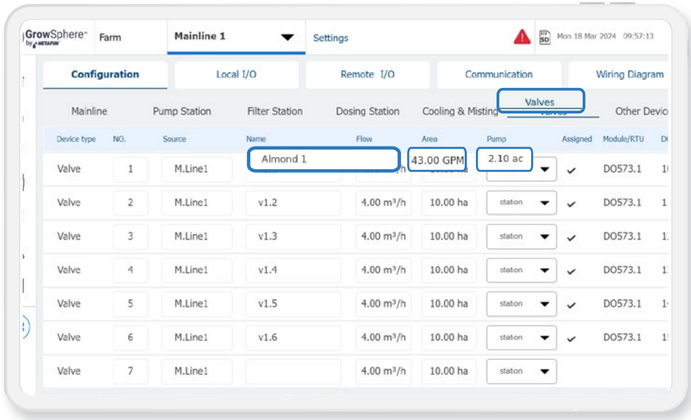
Set the delays for the mainline components

System settings



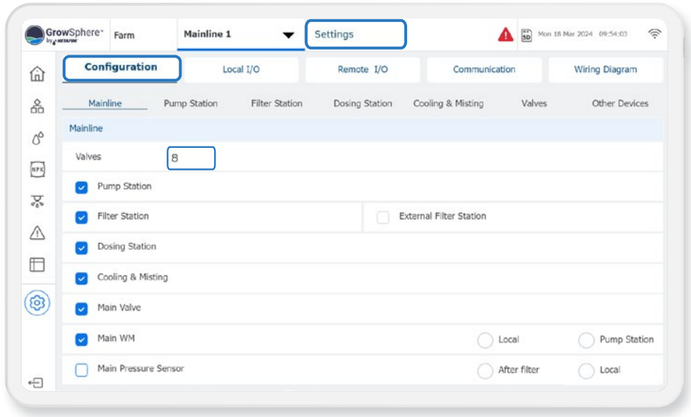
/ Navigate to settings

Enter the password 287451



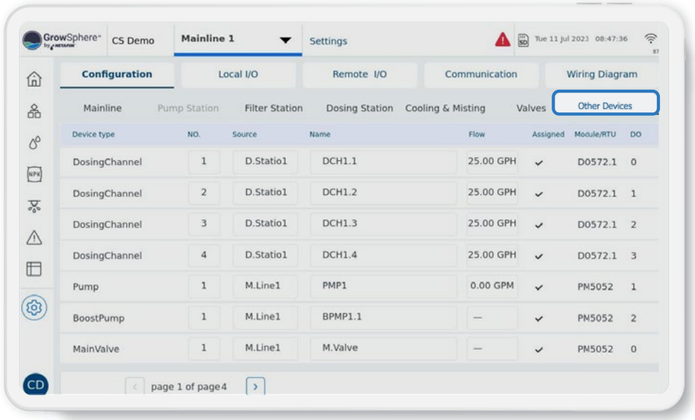
/ Set valves configurations

- Set name, flow rate, and irrigated area for each valve
- The Flow and Area are used to manage and monitor the irrigation in the **Grow**Sphere™ cloud, therefore, must reflect the real size of each irrigation plot (field)



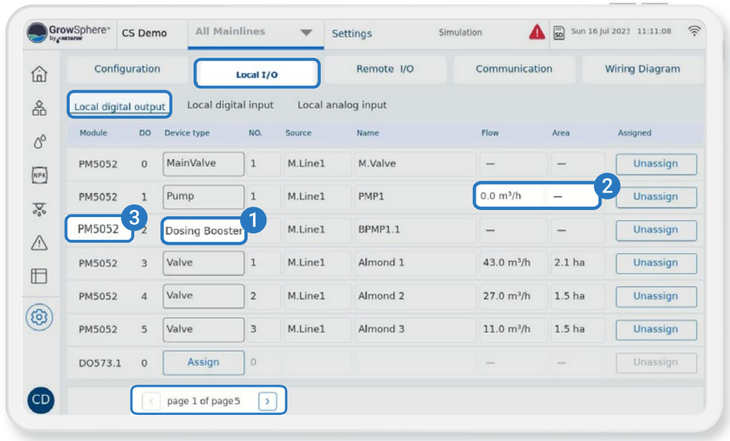
/ Set mainlines configuration

Define the number of valves and the devices that connected to each mainlines



/ Define other devices configurations

Set the parameters for each device

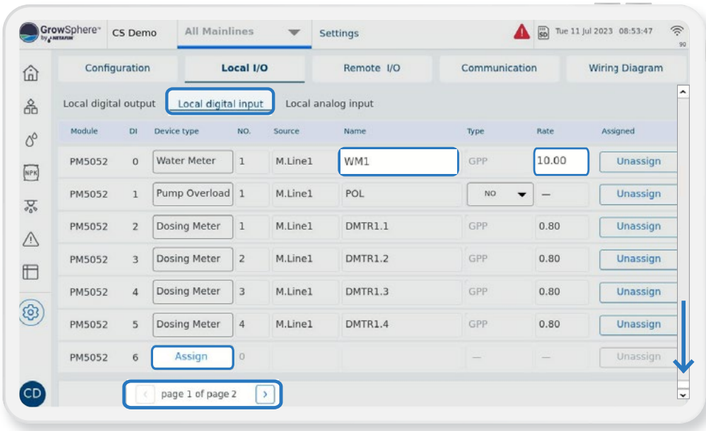


/ Assign digital outputs to I/O modules

1. Click assign for each row to assign the device to the available port in each module

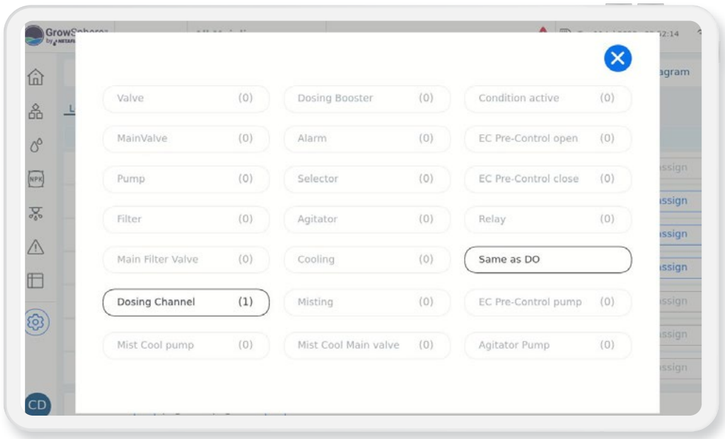
2. Define the Flow and irrigated area for each valve

3. The I/O module to which the device has been assigned to can be selected by skip between pages 1-5



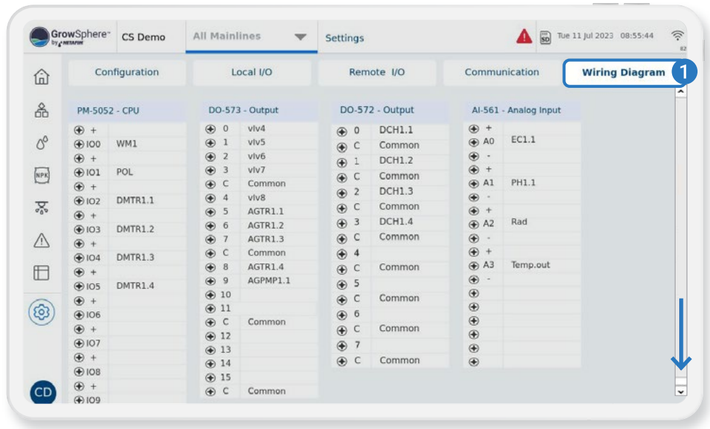
/ Assign digital inputs to I/O module

- Assign each device to I/O Module and port
- Provide the name, flow rate, and irrigated area for each input
- You can select the I/O module to which the device has been assigned by navigating between pages 1-5



/ Assign digital outputs to I/O modules

By clicking Assign, the system will indicate how many devices are not yet assigned, and will automatically assign it to the next available port

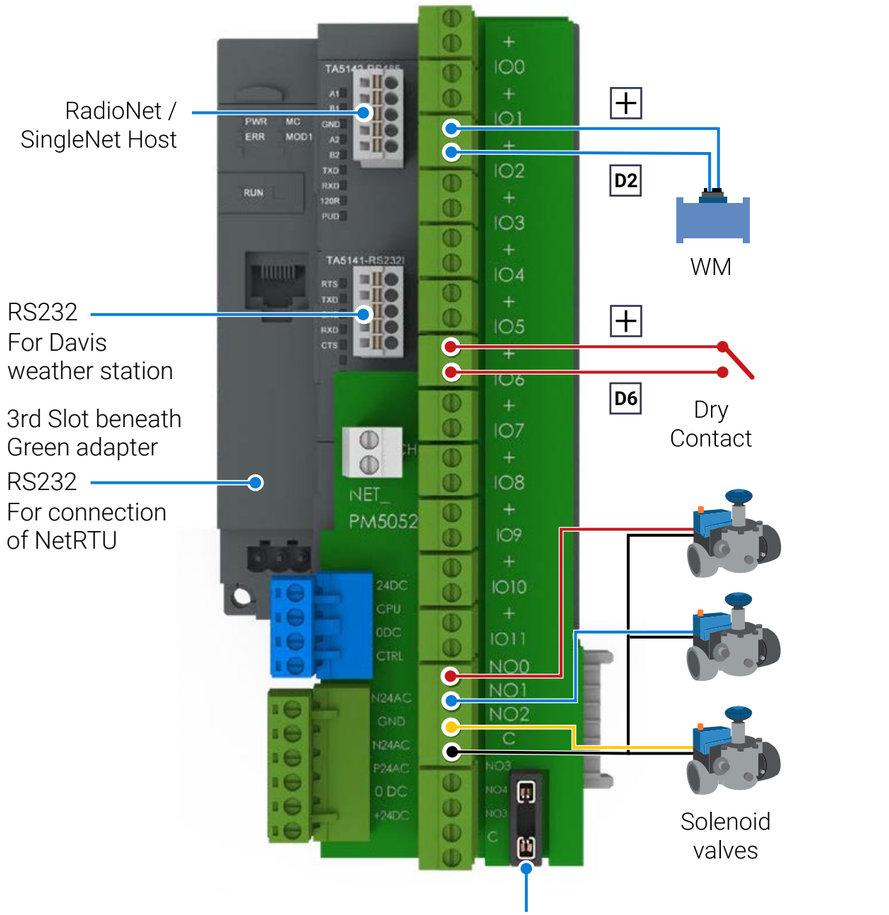


/ View the wiring diagram

The wiring diagram shows the module and port for each device that has been assigned. You can follow the diagram to properly wire the local devices

Wiring instructions

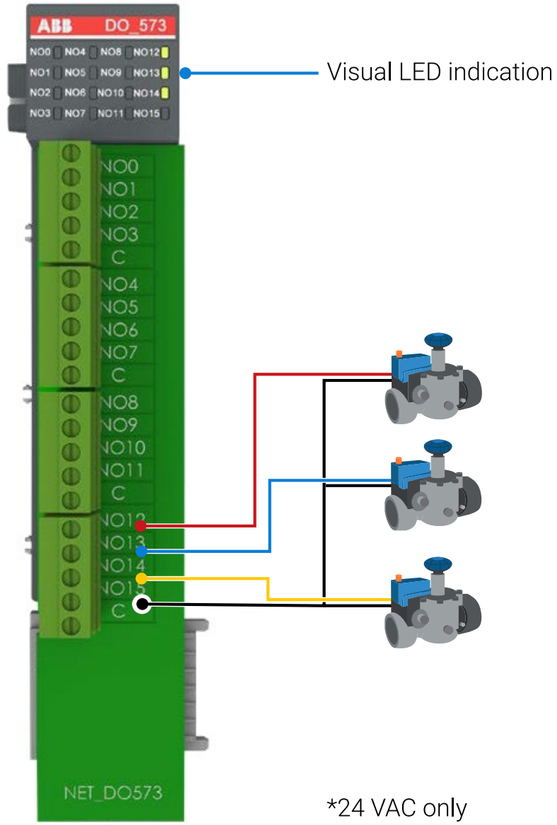
/ GrowSphere™ MAX - CPU



Expansion modules

/ DO573 module

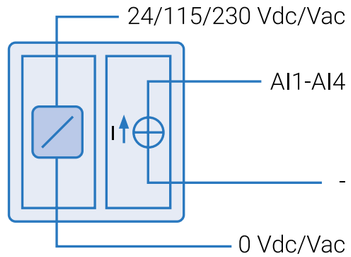
- 16 normally open relay outputs
- Output current per channel = 2 A
- Indication of output signals – 1 yellow LED per ch.



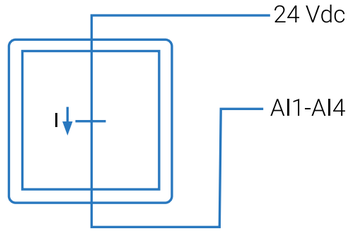
*24 VAC only

/ AI561 Module

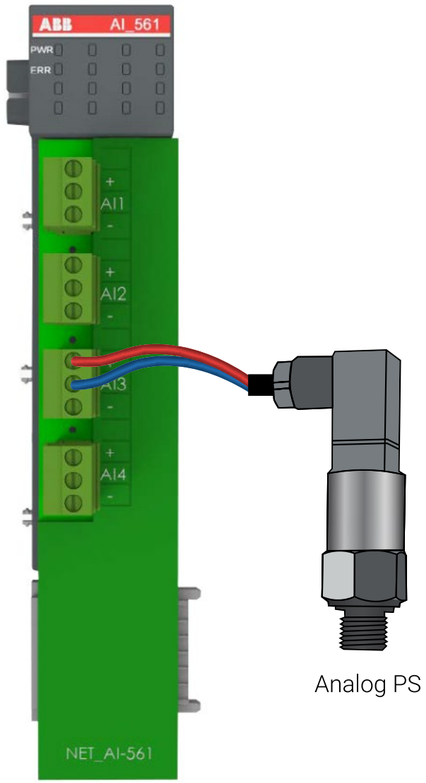
- 4 analog inputs
- Feed (Sourcing) voltage – 24 VDC
- Resolution – 0-20mA; 4 -20mA; 12 bit
- Channel input resistance – 250 ohm
- General Purpose of only EC, pH
- Pressure sensor
- General sensor 4-20mA



Connecting isolated sensor with current output



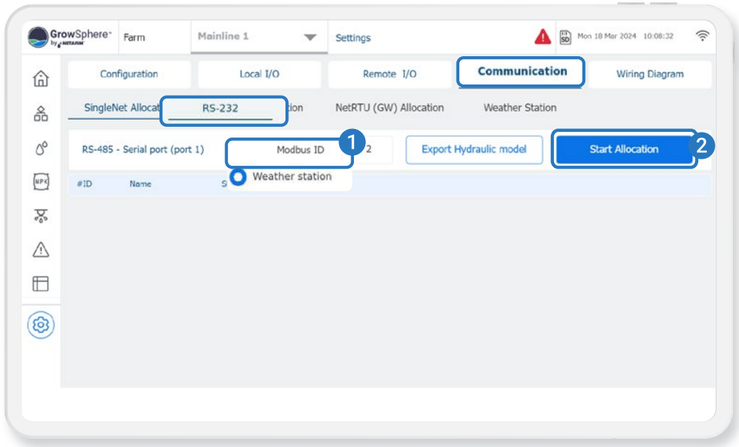
Connecting current transmitter



Analog PS

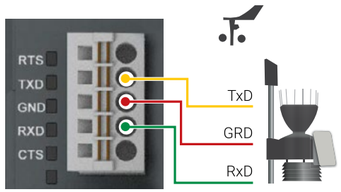
Connect to remote units

/ Connection of weather station – RS232



For Remote-units instructions - Please see the Appendix

/ RS232 Module



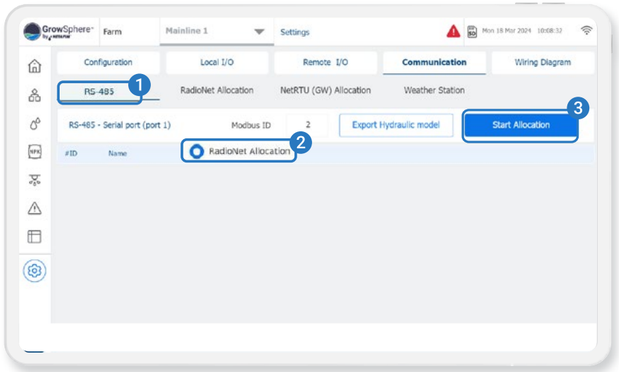
State LEDs

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

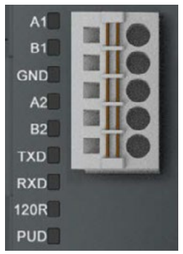
Signal	Description
RTS	Request To Send DCE is ready to accept data from the DTE
TxD	Transmit Data (output)
GRD	Common Ground
RxD	Receive Data (input)
CTS	Clear To Send (input) DCE is ready to accept data from the DTE

/ Connect to RadioNet / SingleNet – Serial module RS485

- Before starting this process, please ensure you have the latest version of PoleNet & Polenet2Max Apps.
- In order to set up the Remote units, kindly get in touch with our Global support team via email at cmt.support@netafim.com
- Both RadioNet & SingleNet can be connected simultaneously



/ RS485 module

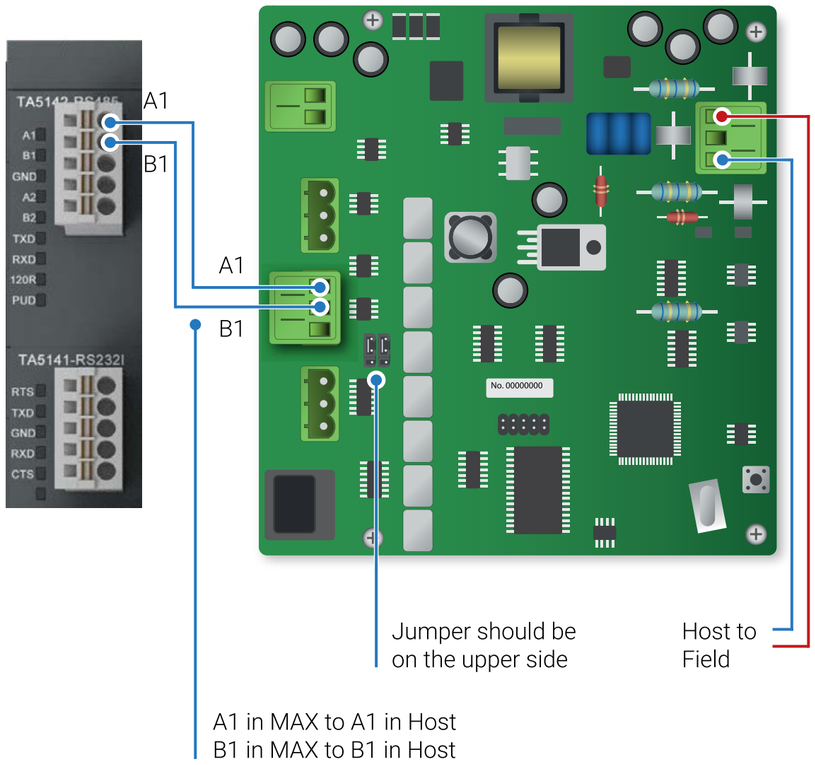


State LEDs

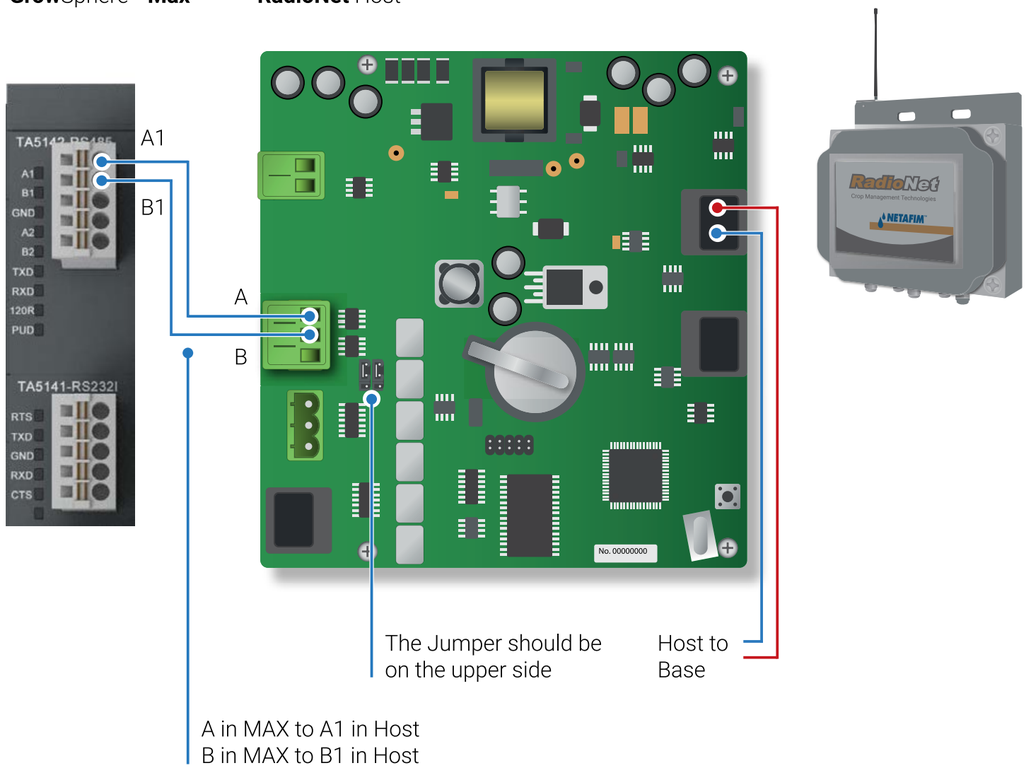
Signal	Color	State	Description
TxD	Yellow	ON (blinking)	Transmitting
RxD	Yellow	ON (blinking)	Receiving
12OR	Yellow	ON	Bus termination
PUD	Yellow	ON	Pull-up / Pull-down

/ Wiring SingleNet host & GrowSphere™ MAX

GrowSphere™ Max **SingleNet** Host



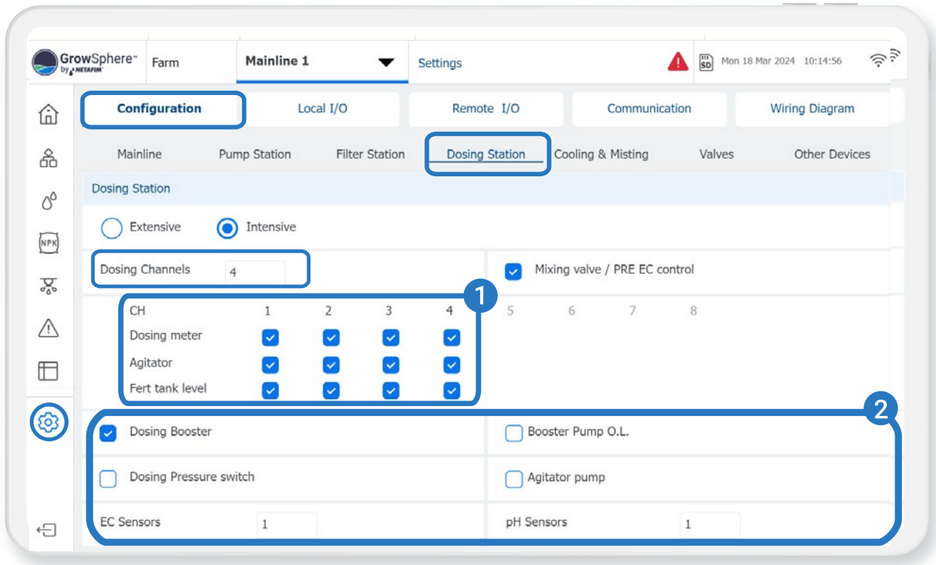
/ Wiring RadioNet host & GrowSphere™ MAX



Dosing settings

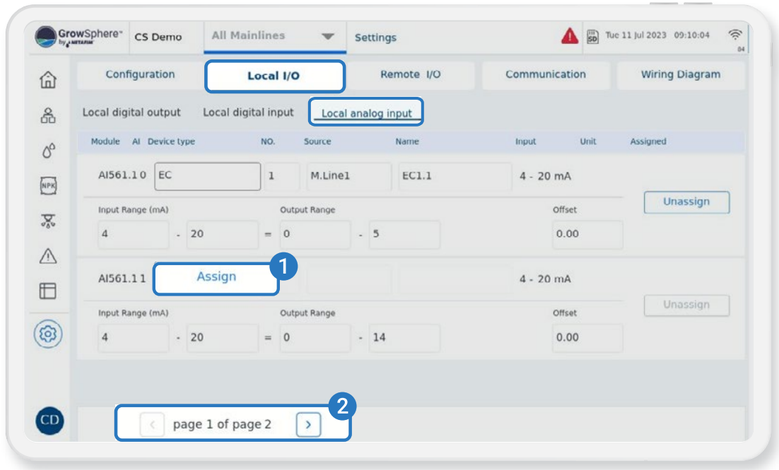
/ Set dosing station configuration

- Define the numbers of dosing channels and agitators and activate them
- Select the connected devices that are part of the dosing station



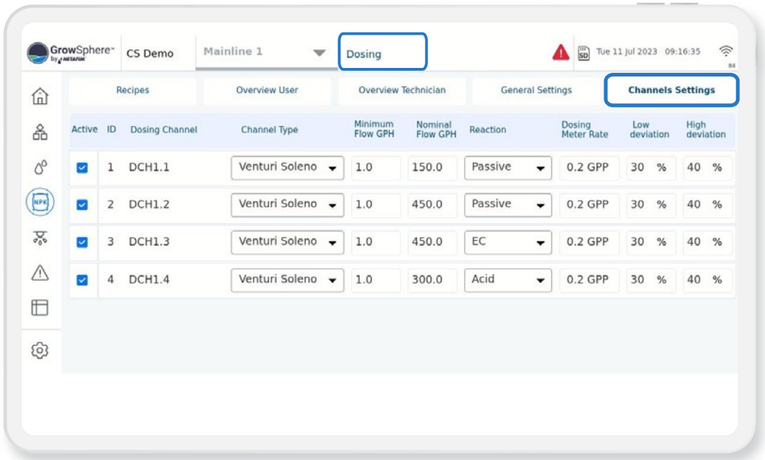
/ Define analog inputs

- When you click on Assign, a list of devices that have been allocated will appear.
- From there, you can choose the sensor you want to work with and set the input ranges, name, and offset for each sensor
- To assign additional analog sensors, simply navigate between the pages



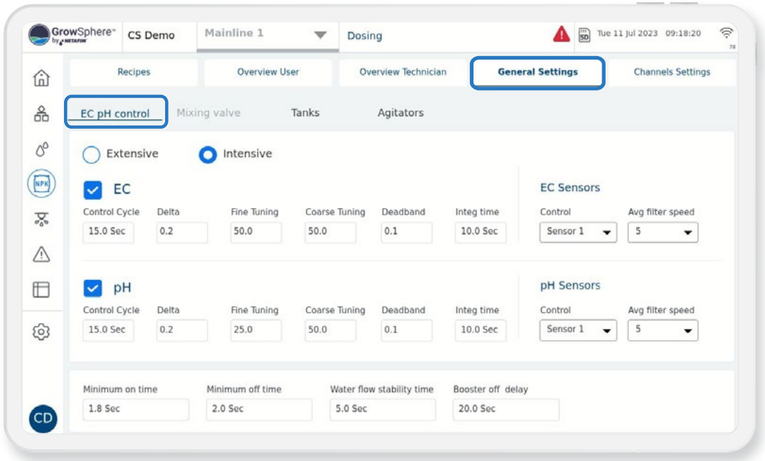
By clicking on Assign, the list below will be opened.

The allocated devices are presented in the list



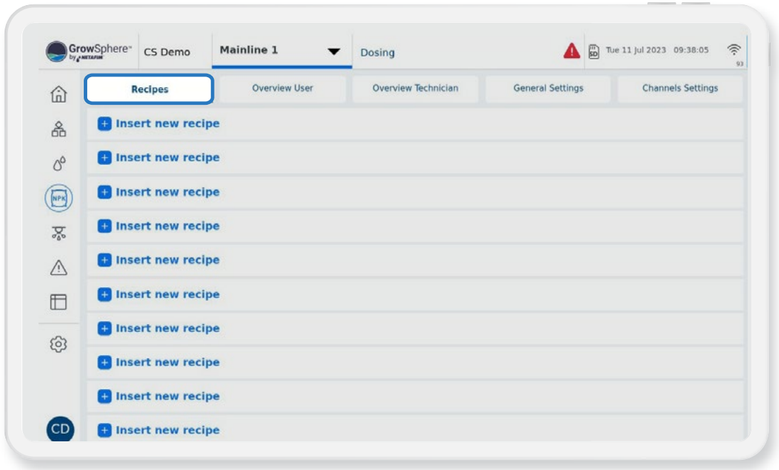
/ Set Dosing channels

- Activate the connected channels.
- Define the Type, Minimum and Nominal flow, Reaction, DM rate and deviations for each of the channels.



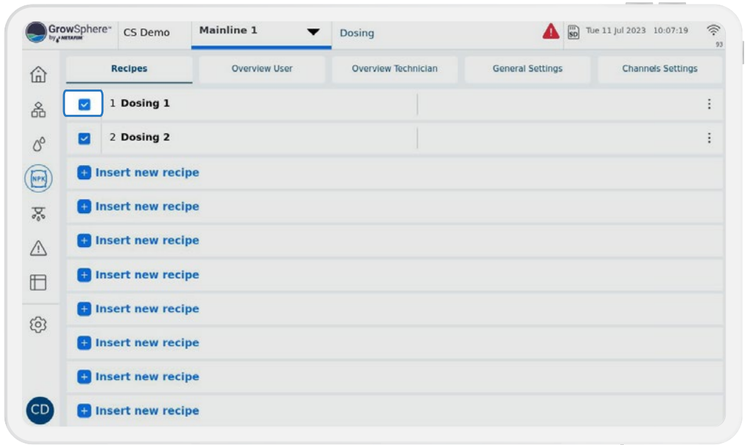
/ Set EC and pH reaction methods

1. Select " Intensive" only for Local Dosing Channel control & EC-pH control is required.
2. Select "Extensive" only when Dosing Channels are operated by Remote Units .In this case Only Bulk or Spread methods are available.



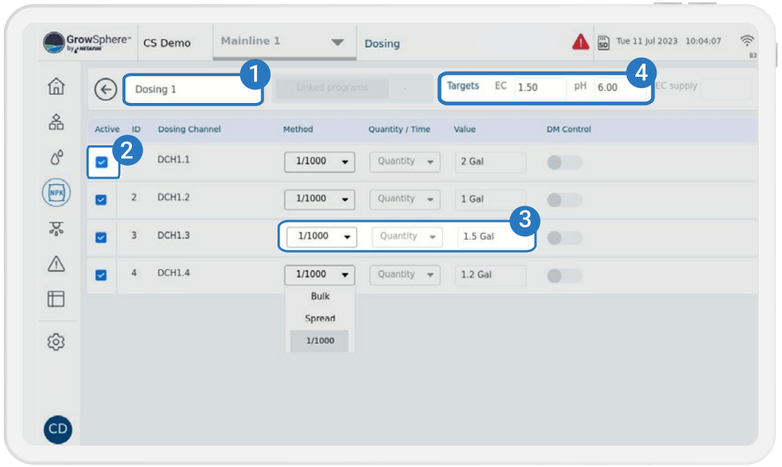
/ Create new dosing recipe

Click on the Insert new recipe to create a new dosing program.



/ Activate the recipe

Activate the recipe, and repeat this action for other dosing recipes as required.

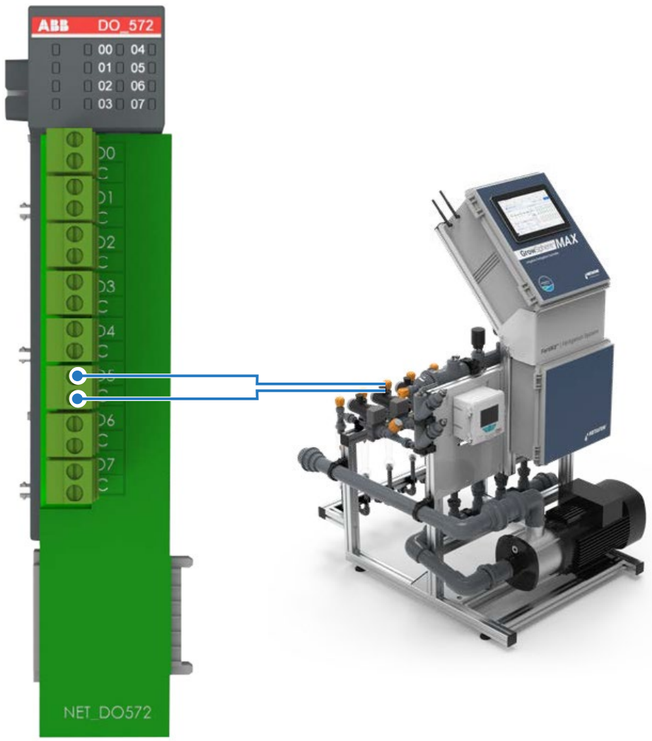


/ Define the dosing recipe' channels

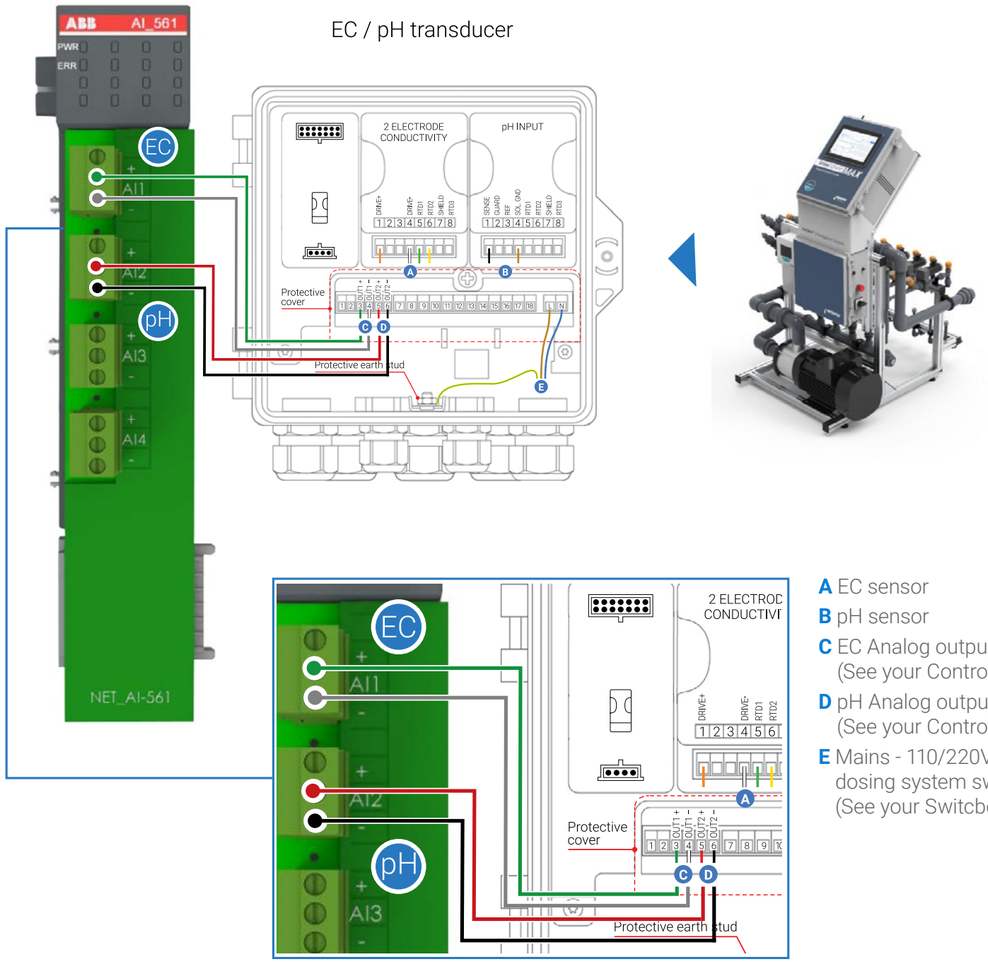
1. Name the recipe
2. Activate the recipe's dosing channels.
3. Select the methods and quantities and the Value for each channel. DM Control can be activated if required.
4. Set the target EC & PH Can be set only for 1/1000 Dosing Method.

/ Connection of DO572 module

- 8 triac outputs – 24 VAC
- 'C' – Shared common
- Output current per channel = 2 A
- 2A Thermal Fuse on each channel. Not removable
- Indication of output signals – 1 yellow LED per channel
- The LED is on when output signal is high



/ Connection of analog inputs module EC, pH - A1561

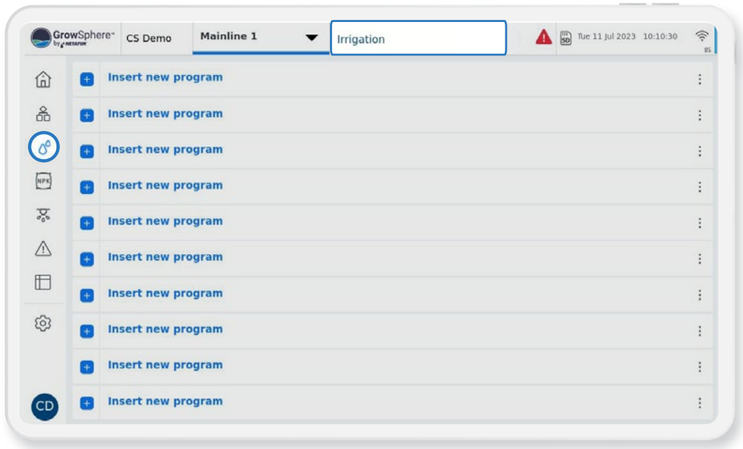


A EC sensor
B pH sensor
C EC Analog output to controller (See your Controller User Manual).
D pH Analog output to controller (See your Controller User Manual).
E Mains - 110/220VAC, from your dosing system switchboard (See your Switchboard User Manual).

Create irrigation program

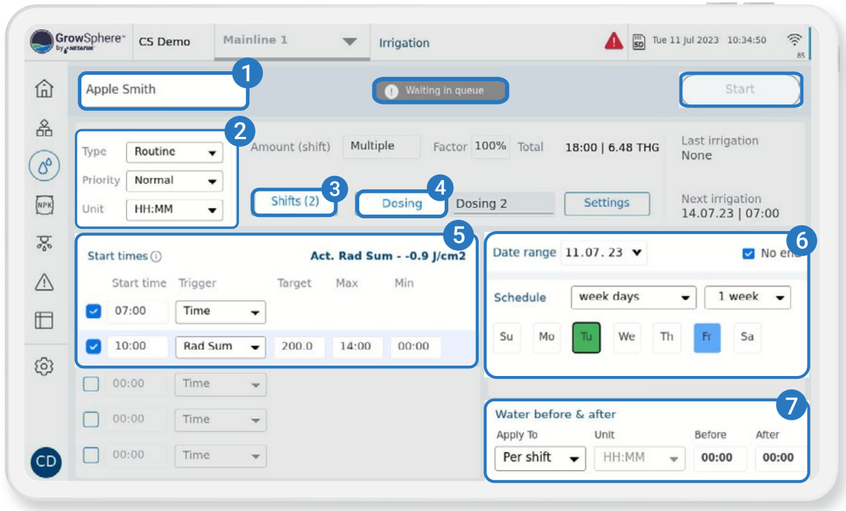
/ Create new irrigation program

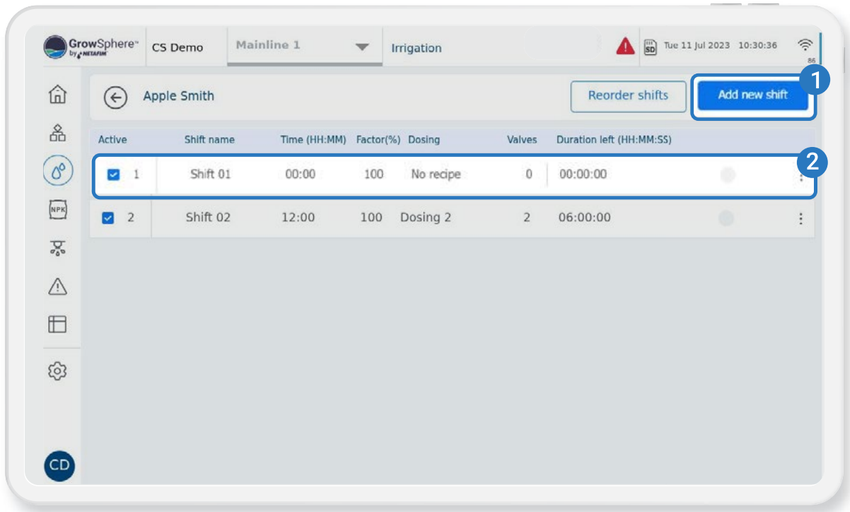
Click on Insert new program



/ Set irrigation program

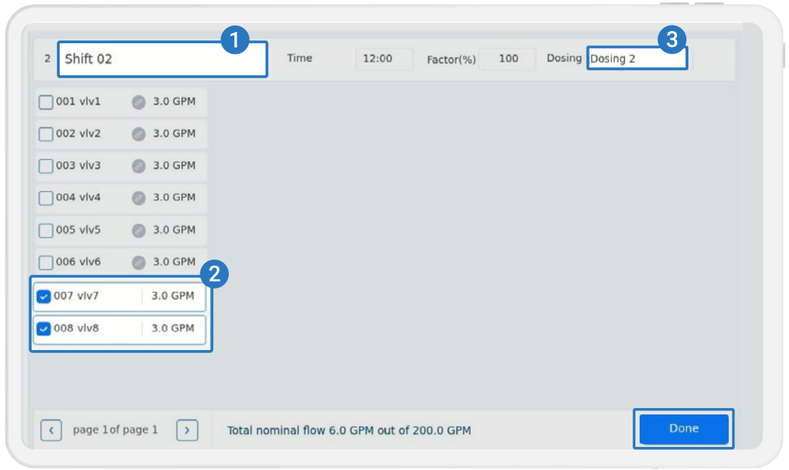
1. Name the irrigation program.
2. Specify the type of irrigation program, its priority, and the units to be used.
3. Click on Shifts to create shifts (see next page)
4. Click Dosing to select the Dosing program.
5. Set start times and triggers for irrigation.
6. Choose the days for irrigation and specify whether you want to use water only (indicated by blue) or dosing plus irrigation (indicated by green) for each selected day
7. Provide definitions for water before and after for a shift or program.





/ Edit and/or add a new shift

1. Click to add a new Shift
2. Click to edit an existing Shift

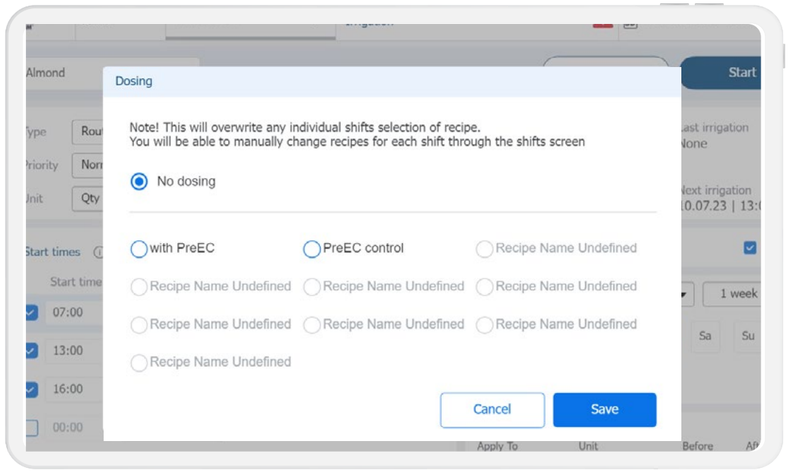


/ Edit and/or add irrigation shifts

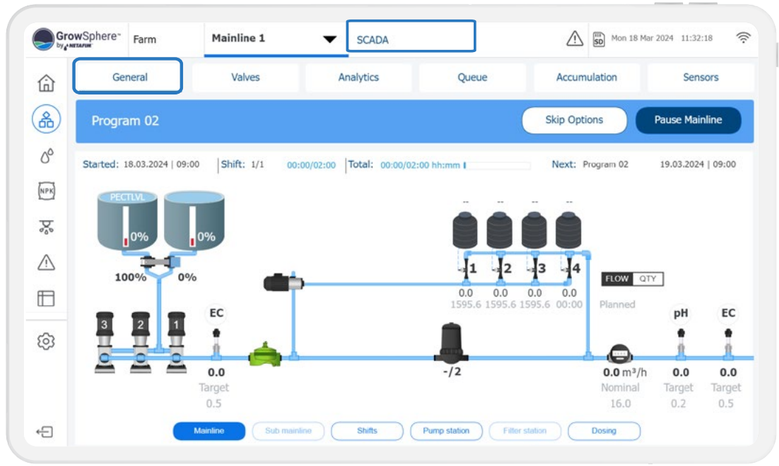
To assign valves to a shift, follow these three steps:

1. Give the shift a name
2. Choose the valves you want to assign to the shift
3. Assign the shift to a dosing recipe
4. Assign "Run Time" for shift here

- Mention Max. No. of Valves in a shift : 32
- Mention Max. No. of shifts in a program : 32



/ Assign dosing recipe to irrigation program



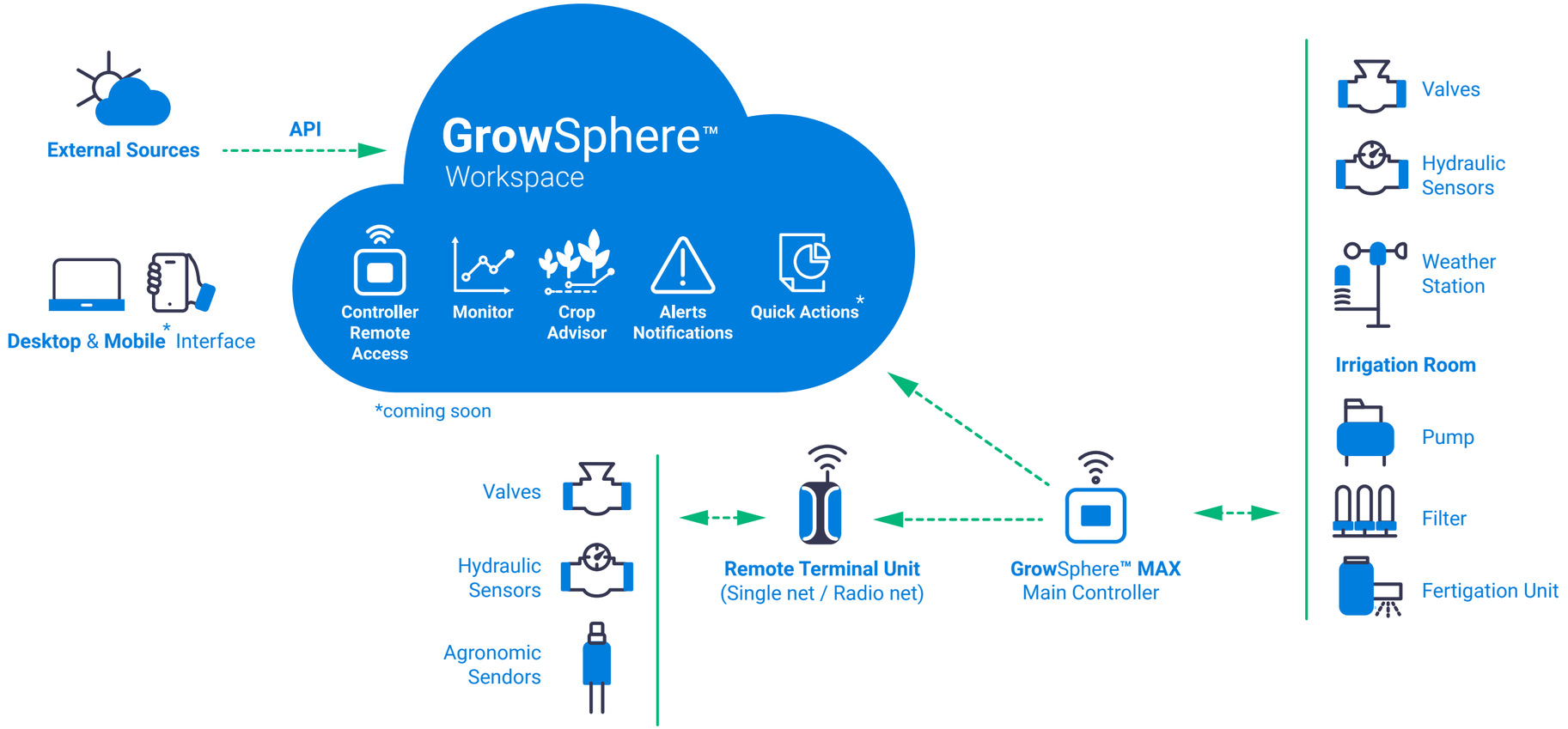
/ Quick view of your irrigation operation status

4. Introduction

This chapter introduces the irrigation and fertigation controller and includes:

1/ GrowSphere™ MAX Overview
2/ Configurations
3/ Summary of GrowSphere™ MAX main features
4/ List of Connected devices
5/ Controller Sticker
6/ EC/pH Unit
7/ Screen and Visualization
8/ Technical specification rev.2

4.1 GrowSphere™ MAX Overview - Architecture



4.2 Configurations

GrowSphere™ **MAX** irrigation controllers is designed to cater to the diverse needs of growers, providing maximum adaptability and flexibility across indoor and outdoor agricultural settings. With four different configurations, a versatile range of controllers empowers agricultural endeavors to achieve optimal performance.

GrowSphere™ **MAX** with Screen

GrowSphere™ **MAX** (Touch Screen):
This controller comes with a user-friendly 10.1-inch touch screen interface and 6 digital outputs and 12 digital inputs by default, that make it easy to operate in agricultural environments. It can be operated on both 110V and 220V power supplies.

GrowSphere™ **MAX** Screenless model

GrowSphere™ **MAX** (No Display):
The controller provides reliable functionality without a display and can be accessed remotely. It is suitable for indoor and outdoor cultivation and ensures precise control without compromising simplicity. This controller can operate on both 110V and 220V power supplies.

GrowSphere™ **MAX** with Double Door

GrowSphere™ **MAX** Double Door:
Designed for outdoor agricultural installations, the double-door design ensures easy accessibility, making it suitable for outdoor farming settings. This 110V or 220V controller maintains 6 Digital Outputs and 12 Digital Inputs by default.

GrowSphere™ **MAX** with **Fertikit**

Fertikit™ 5G with **Grow**Sphere™ **MAX**:
This integration is designed specifically for open field nutrigation application. It combines the specialized capabilities of **Fertikit™ 5G** with the robust functionality of **Grow**Sphere™ **MAX**. The controller comes with 14 digital outputs and 12 digital inputs by default, offering precise and efficient nutrient management tailored explicitly for precise dosing management. This optimized crop growth and yield.

4.3 Summary of GrowSphere™ MAX's main features

The Controller includes the following major components:

Outputs & Inputs*	Per Mainline	Total
Mainline	1	4
Main valve	1	4
Main water meter	1	4
Pump	3	12
Filter (flushing control + indication)	32	128
Dosing station**	1	4
Dosing channel (venturies)	8	32
Valves	256	256

*Subject to I/O modules configuration and a maximum capacity of 6 modules per controller
Capacity is including Remote Units

**Above 8 dosing channels it is required to check the controller power capacity use and if needed more then 100VAT, it is required to use an external power supply to increase capacity

4.4 List of Connected Devices and Fertigation Functionalities

The table below demonstrates the options for connecting the **Grow**Sphere™ **MAX** to a different device:

MAX

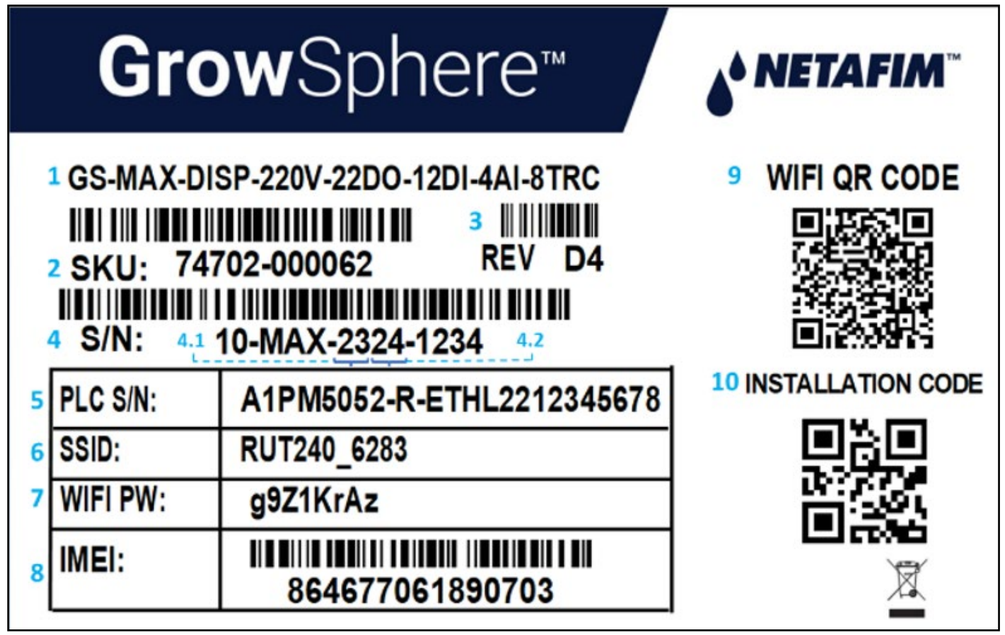
	Digital output	Davis WS	Analog sensors	Serial soil sensors	Digital hydraulic sensors	EC/pH sensors	Filter flushing and indication	Dosing by bulk/spread	Proportional dosing	Dosing with EC / pH control	Pre EC control
MAX	✓	✓	4-20mA	—	✓	✓	✓	✓	✓	✓	✓

Remote Units

	Digital output	Davis WS	Analog sensors	Serial soil sensors	Digital hydraulic sensors	EC/pH sensors	Filter flushing and indication	Dosing by bulk/spread	Proportional dosing	Dosing with EC / pH control
RadioNet	✓	—	✓	✓	✓	✓	—	✓	—	—
SingleNet	✓	—	—	—	✓	—	—	✓	—	—

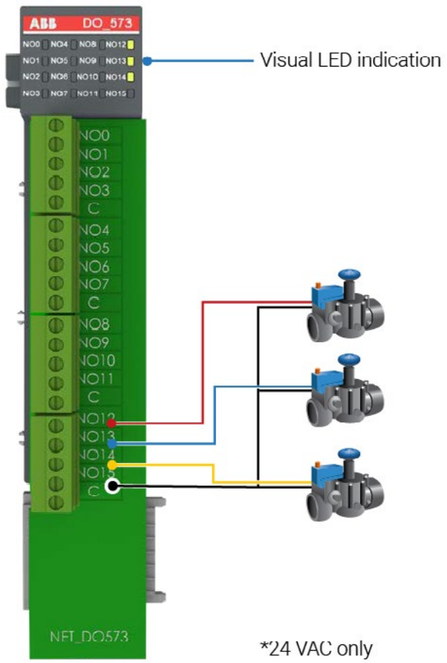
4.5 Controller Sticker

1. **Product description**
2. **Netafim SKU**
3. **Hardware revision**
4. **Ordinal production number**
   - 4.1 Production year
   - 4.2 Production week
5. **Identification number (use for Add device)**
6. **Modem SSID (Wi-Fi address)**
7. **Wi-Fi Password (to connect through Wi-Fi)**
8. **Modem IMEI**
9. **Wi-Fi username and password QR code**
10. **PLC S/N – Scan for add device**



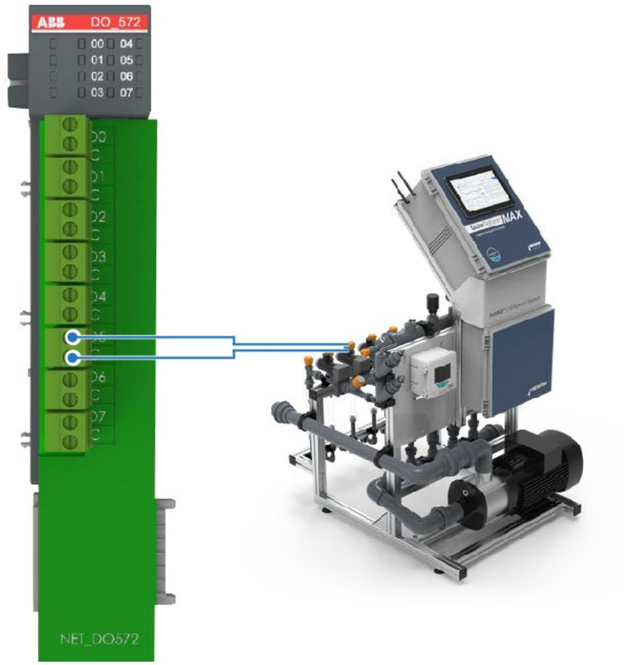
Relay output – 16 OUT

- 16 Outputs - Relay
- Shared Common
- Kickback protection
- 24 VAC 80 VA



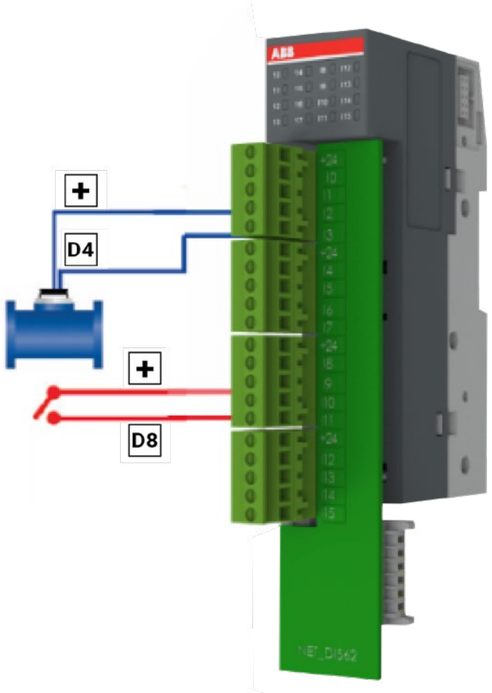
Dosing Module – Triac

- 8 Outputs - TRIAC
- Shared Common-for each valve
- Over Current Protection
- 24 VAC @ 80 VA



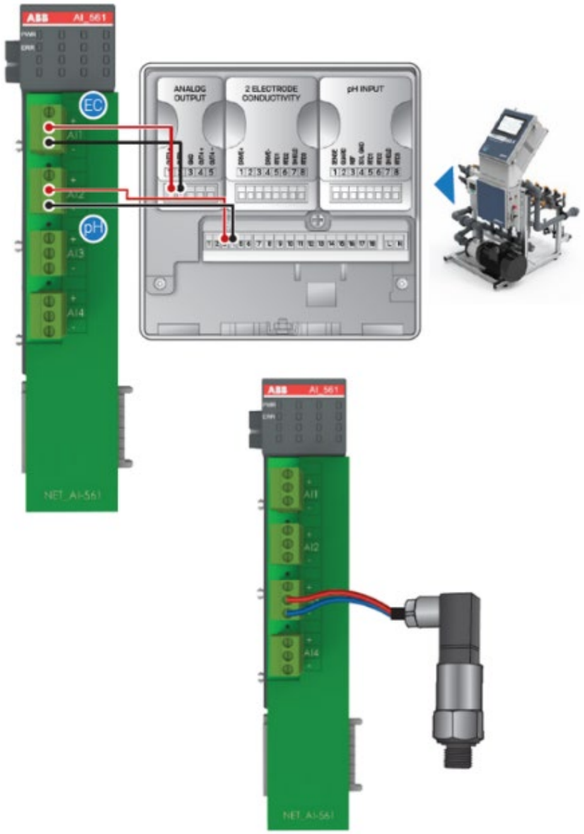
Digital Inputs Module

- 16 Inputs
- Dry/ Active Contact
- Feed voltage - 24 DC



Analog Inputs Module

- 4 Analog Inputs
- 0-20 mA
- Feed Voltage 24 DC



4.6 EC & pH connection

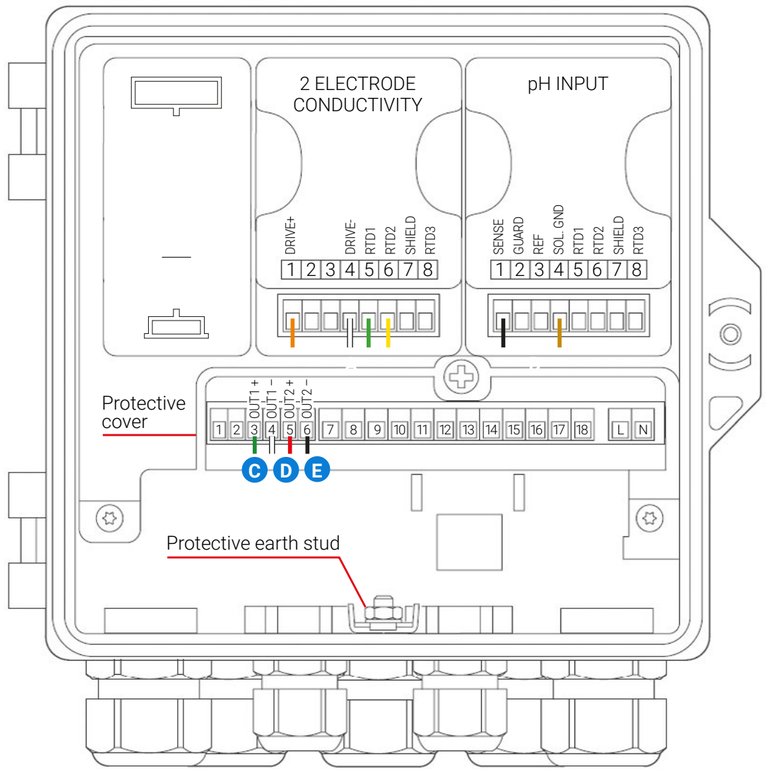
Only the connections relevant to EC and pH sensing configuration are described. For more details, please go to the ABB AWT420 EC pH transmitter manual

WARNING

The main board connections are located under the protective cover. The transmitter AC version runs high current. To avoid electrocution make sure you put the protective cover back in place after wiring the transmitter.

ABB EC/pH Tranducer

- **A** EC sensor
- **B** pH sensor
- **C** EC Analog output to controller (See your EC/pH module User Manual).
- **D** pH Analog output to controller (See your EC/pH module User Manual).
- **E** Common
- **F** Mains - 110/220VAC, from your dosing system switchboard (See your Switchboard User Manual).



4.7 Screen and Visualization

- **Color touch 10.1" LCD screen** (in the **Grow**Sphere™ **MAX** screen configuration).
- **Built-in multilingual software.** Switch languages with a single keystroke. To check the supported languages go to the app settings --> preferences.
- **Real-time operational status screen** (SCADA).

4.8 Environmental conditions

CAUTION

The GrowSphere™ MAX should be:

- Placed in a roofed building protected from direct sunlight
- Kept at an ambient temperature between 10°C and 50°C (50°F and 104°F)
- Kept at a maximum relative air humidity of 90%
- Properly ventilated
- Protected from dust
- Protected from splashes or direct spraying with water or chemicals

Communication

Wi-Fi	IEEE 802.11b/g/n
Mobile Module	4G (LTE) – Cat 4 up to 150 Mbps

Specifications

Power supply	Mains Power 110/220 VAC, 50/60 Hz	
Input current	0.8A /220VAC 1.6A /110VAC	
Touch Screen	Optional	
Output 24VAC	Max. total output current (A/VA)	4A/100VA
	Max. output current per one line (A)	2A
Output 24VDC	Max. total output current (A/W) 2.5A/60W Max. output current per one line(A)	2.5A/60W
	Max. total output current (A/W) 2.5A/60W Max. output current per one line(A)	250 mA

Operation Temperature	0-50 °C
Operation Humidity	20-90 %
Storage Temperature	-10-70 °C
Storage Humidity	20-95 %
Max. operational altitude (m)	2000
IP Rating	IP65

5. Installation

This chapter reviews installing the controller and includes:

1 Mounting GrowSphere™
2 Connecting to the CPU
3 Connecting Digital Inputs
4 Connecting Dosing Outputs
5 Connecting Digital Outputs
6 Connecting Analog Inputs
7 Connecting EC/ pH Units

5.1 Mounting GrowSphere™

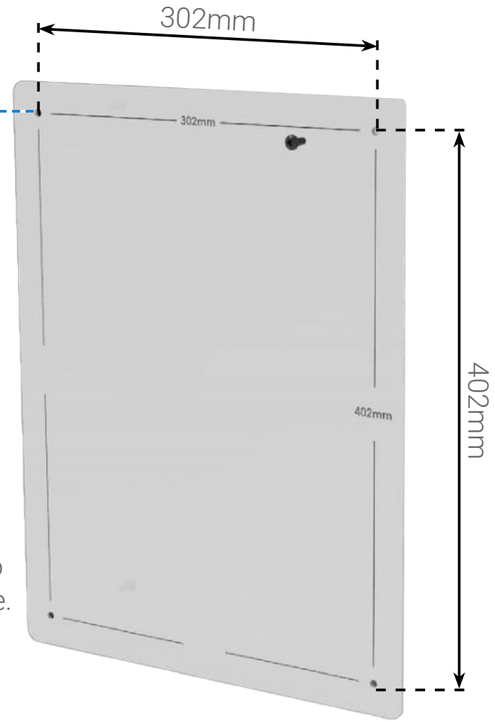
5.1.1 Mounting GrowSphere™ to Plate

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

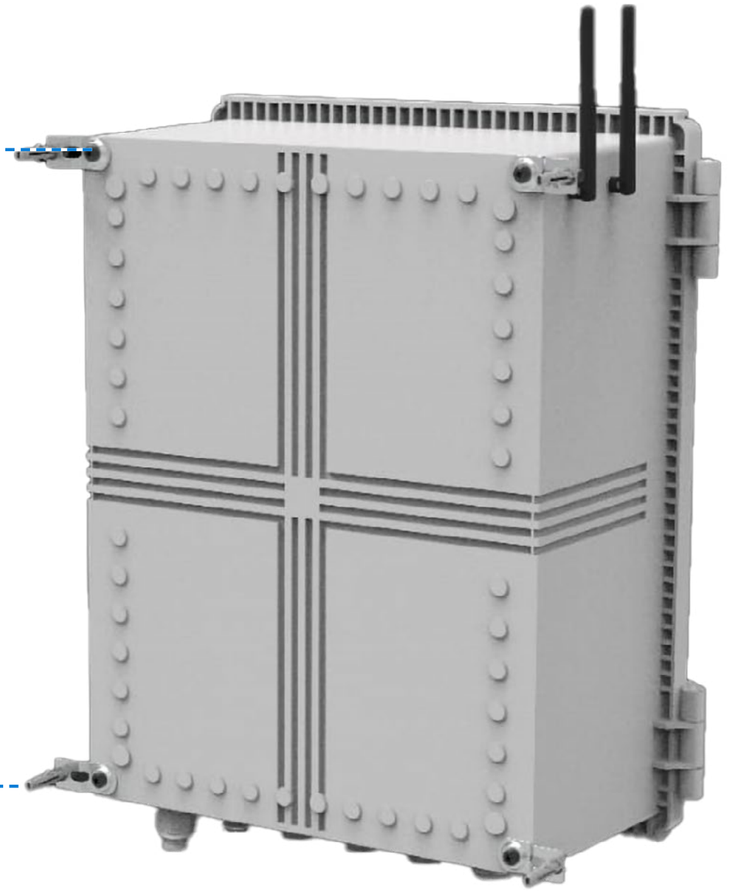
Use the four screws supplied to attach the controller to the plate.

5.1.2 Mounting **Grow**Sphere™ 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.

5.2 Connecting to the CPU

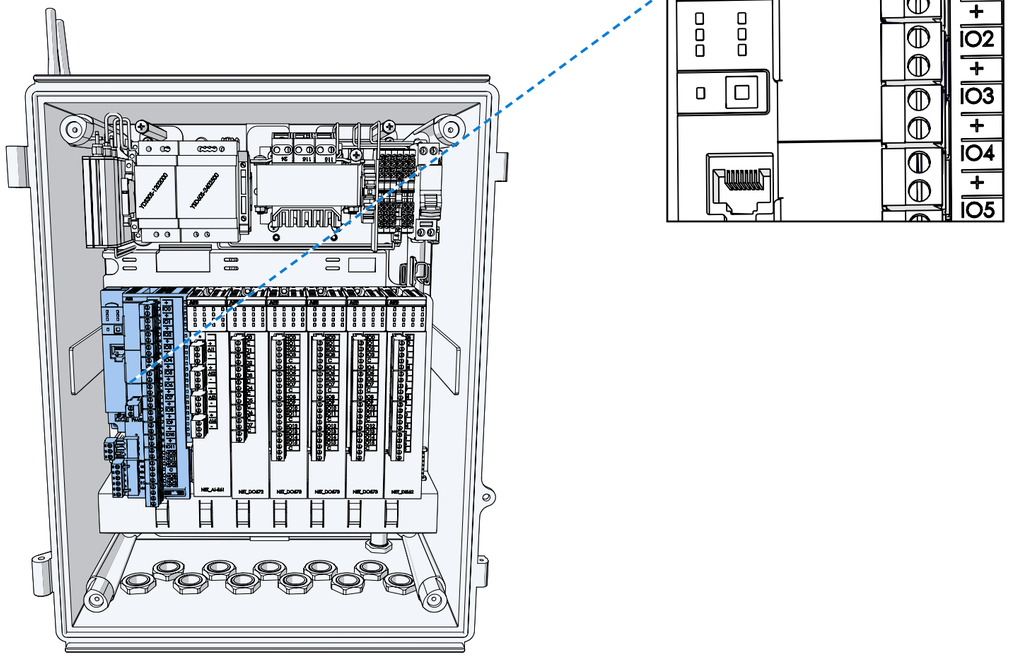
The CPU is the far left module of the controller and it contains the following connections:

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

Perform the following steps:

1. Verify the SD card exists

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

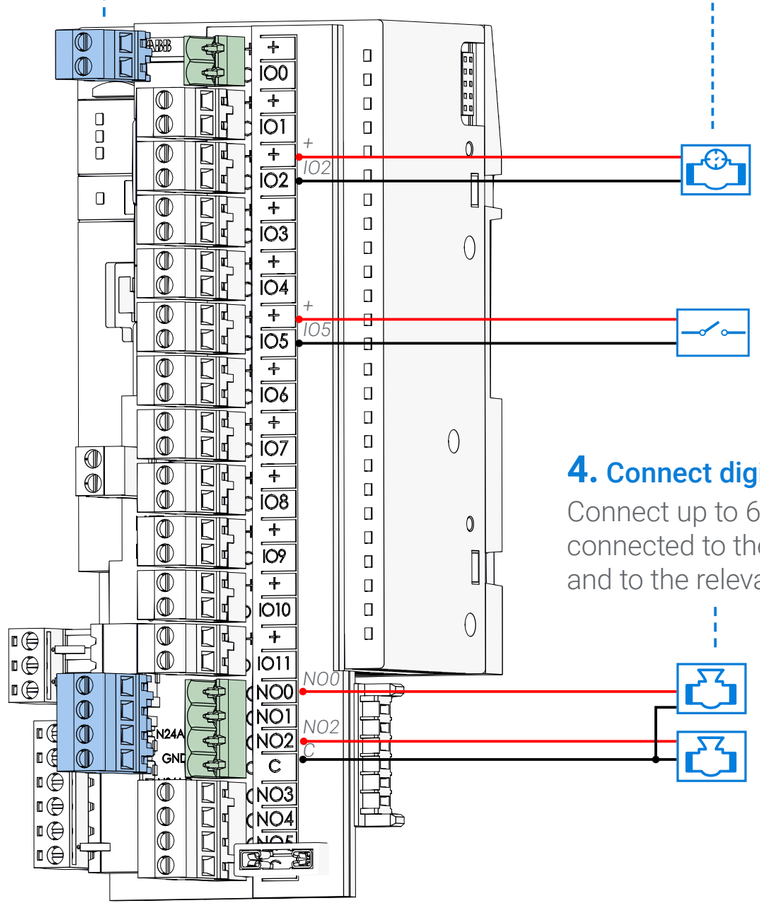


2. Pull the connector

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.



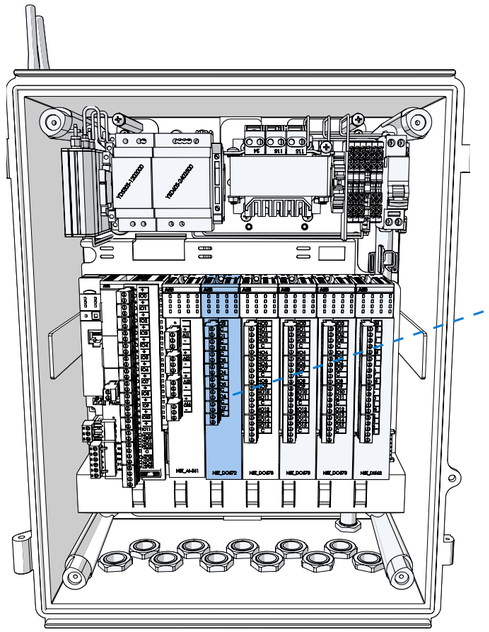
4. Connect digital outputs

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

5.3 Connecting Digital Inputs

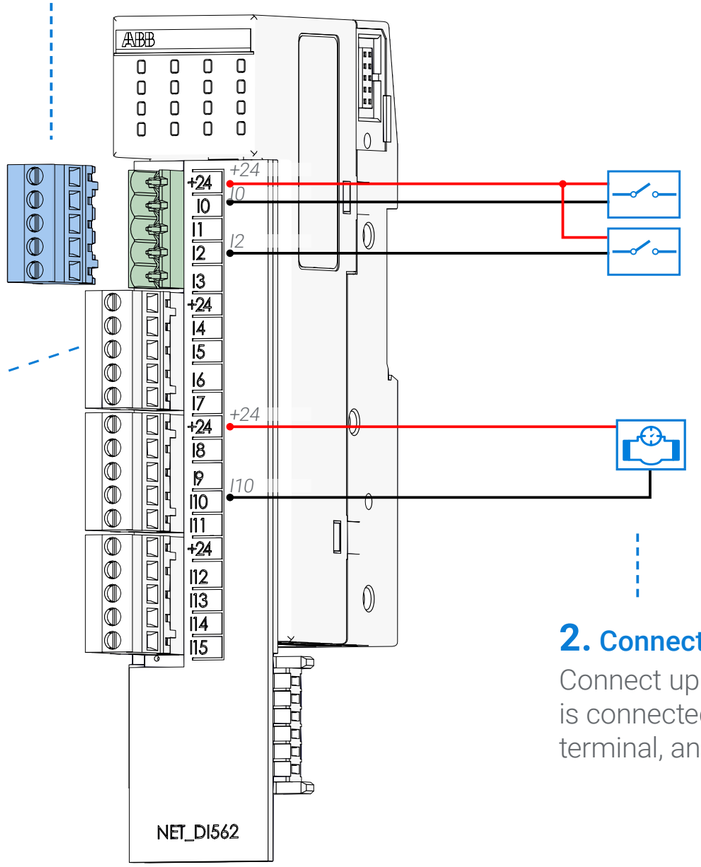
The DI562 module contains 16 digital inputs (dry/active contact).

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.



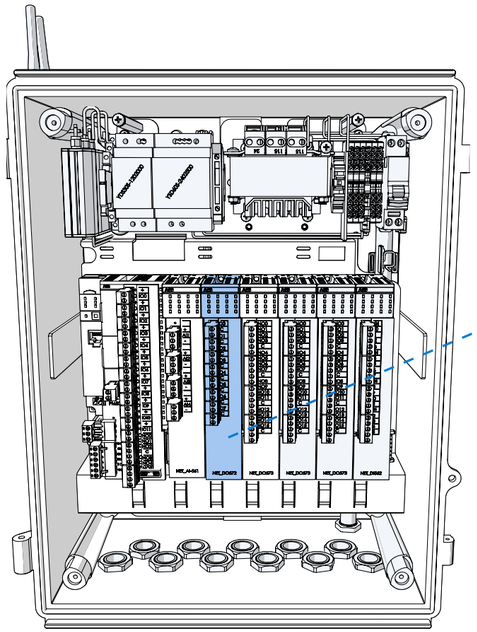
2. Connect digital inputs

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

5.4 Connecting Dosing Outputs

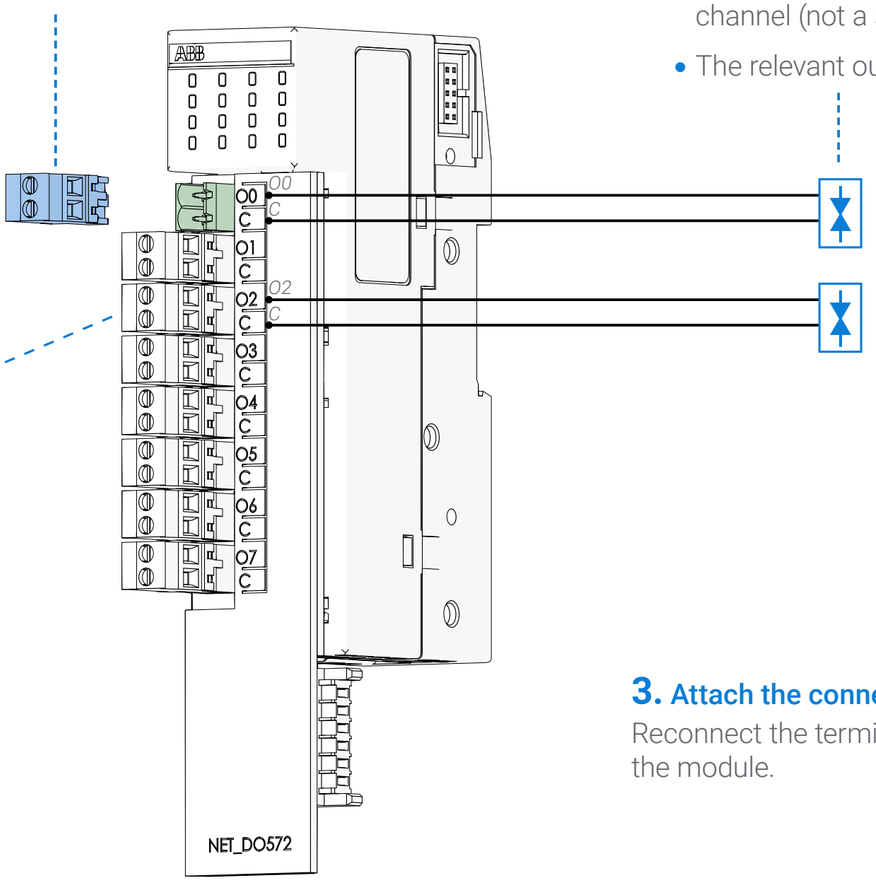
The DO572 module contains 8 TRIAC outputs 24VAC @ 80VA. This module is dedicated to activate venturi dosing pumps at a high speed.

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. O0, O1, O2...)

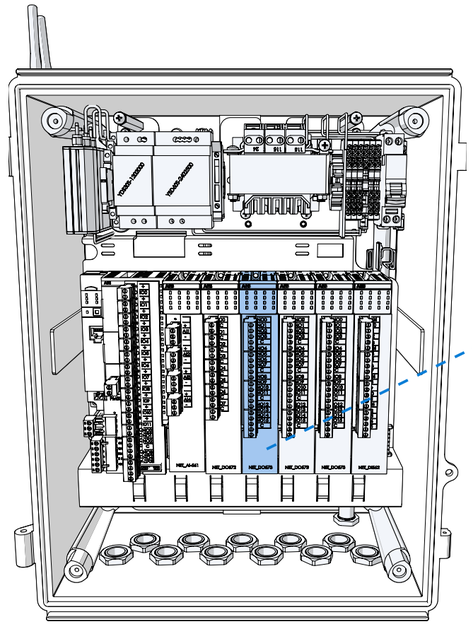
3. Attach the connector

Reconnect the terminals connector to the module.

5.5 Connecting Digital Outputs

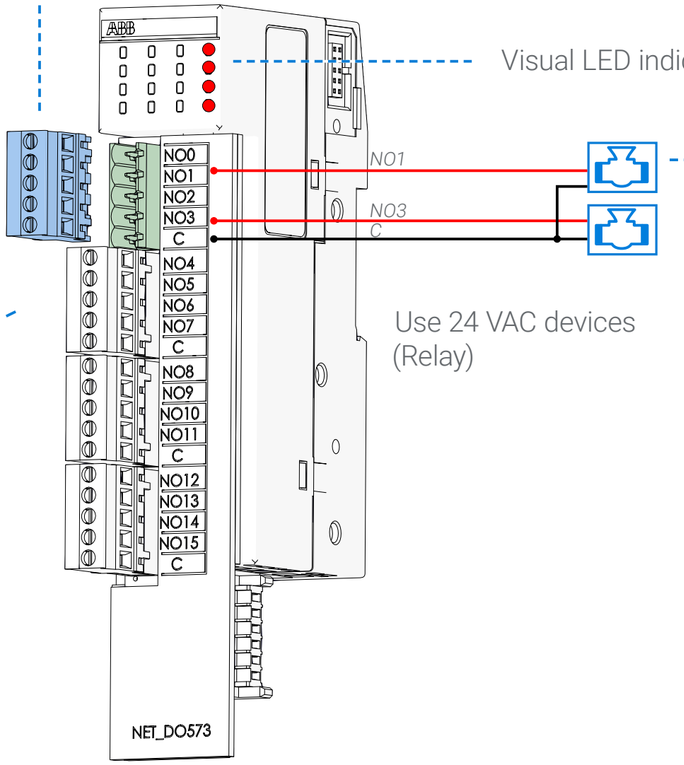
The DO573 module contains 16 digital relay outputs, 24 VAC @ 80 VA, with a separate common for each four outputs.

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 output
- The relevant output number (e.g. NO0, NO1..)

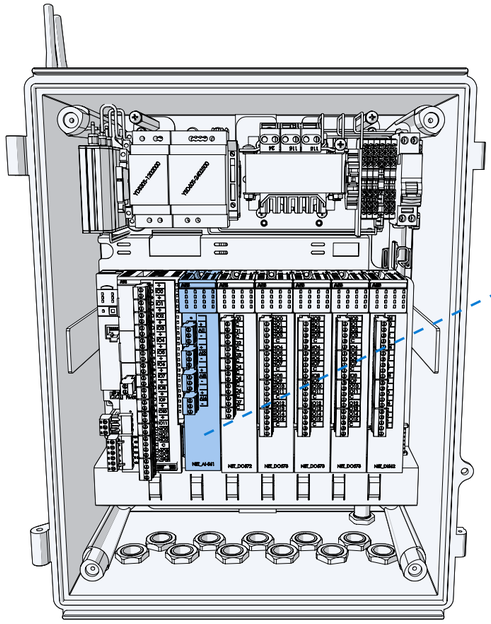
3. Attach the connector

Reconnect the terminals connector to the module.

5.6 Connecting Analog Inputs

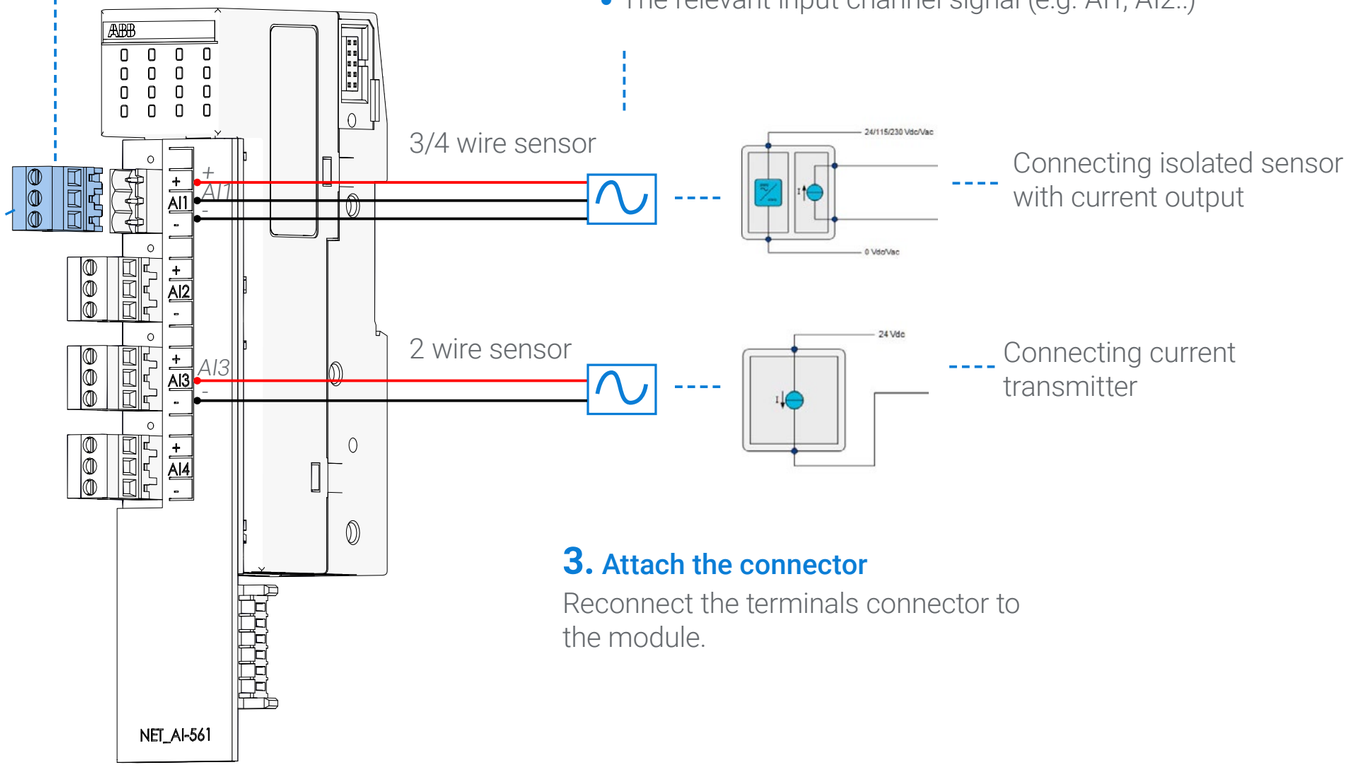
The AI-561 module contains 4 analog inputs.

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..)

Connecting isolated sensor with current output

Connecting current transmitter

3. Attach the connector

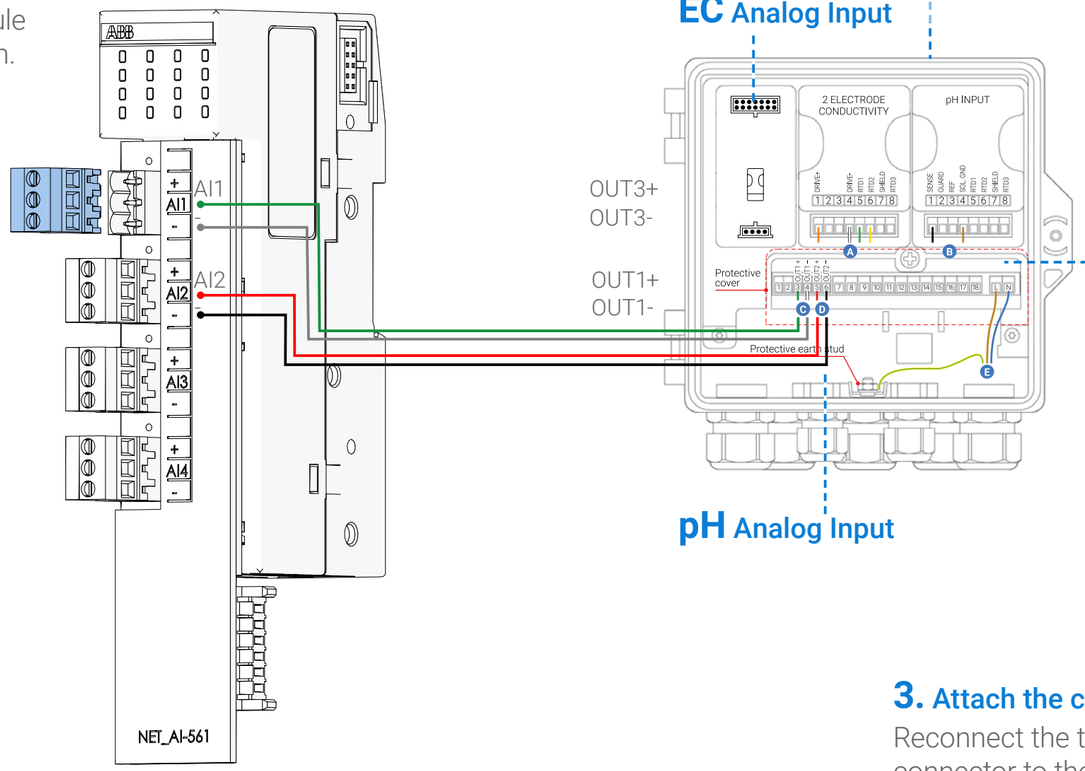
Reconnect the terminals connector to the module.

5.7 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

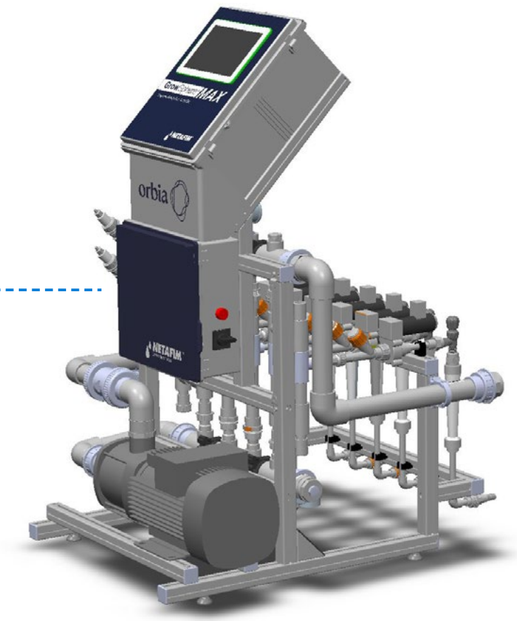
Connect up to 4 analog channels. Each analog input is connected to the relevant input channel.

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.

6. Controller Configuration

This chapter reviews configuring the controller and includes:

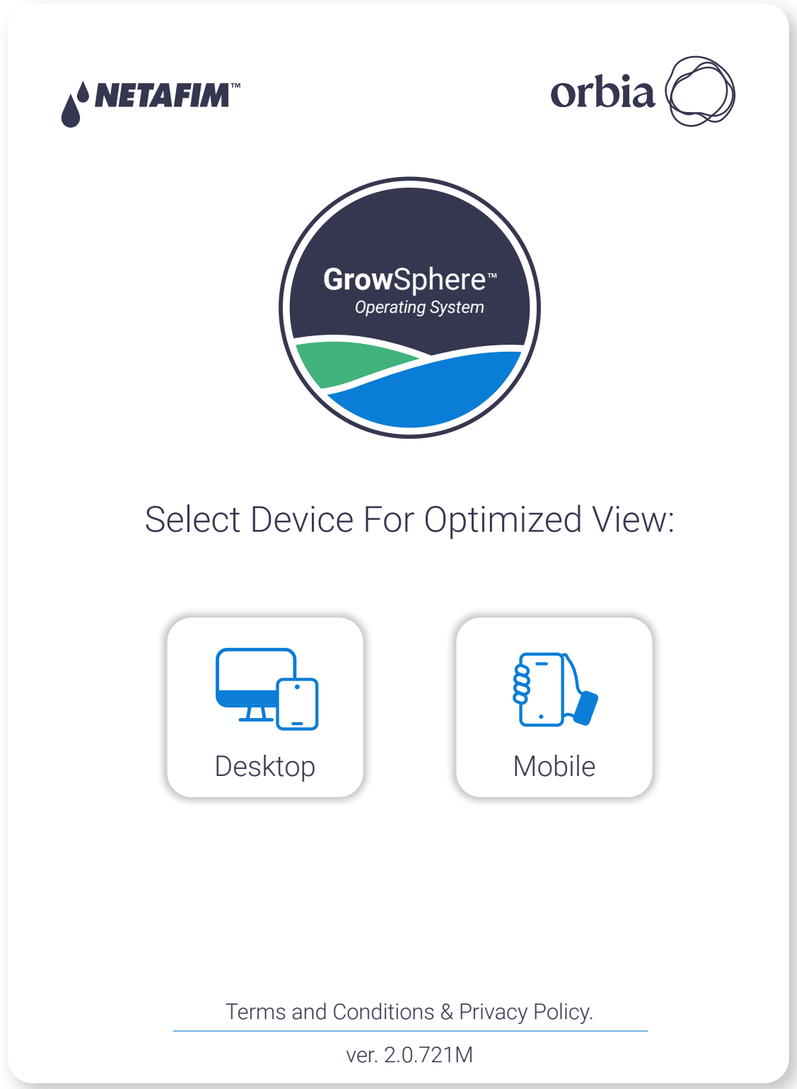
1 Getting Started
2 Dashboard Overview
3 Defining System Preferences
4 Configuring Components
5 Configuring Dosing Settings
6 Defining System Preferences

6.1 Getting Started

6.1.1 Preferences and settings

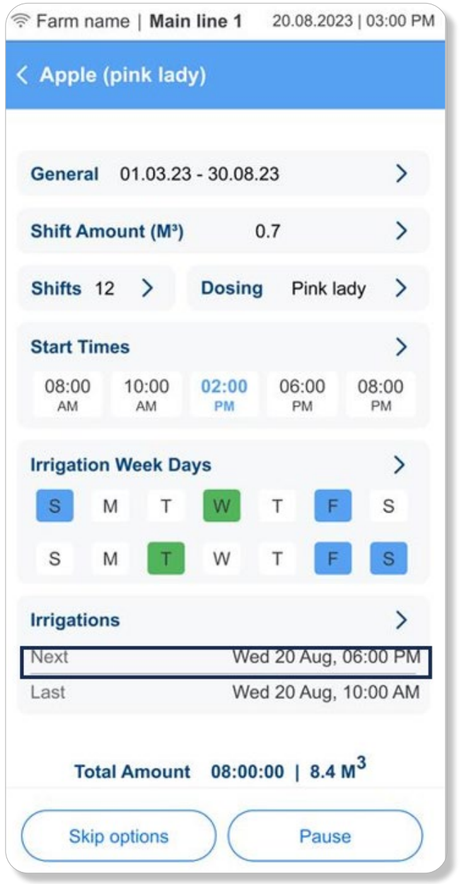
Select the Desktop/Mobile view. In the case of Tablet, select Desktop.
For Mobile view, Please note:

- This view differs slightly from the PC view and consists of basic settings functionalities.
- The initial settings should be done through the PC view (through PC / Laptop).
- For the main functionalities in the Mobile view, please see next page.

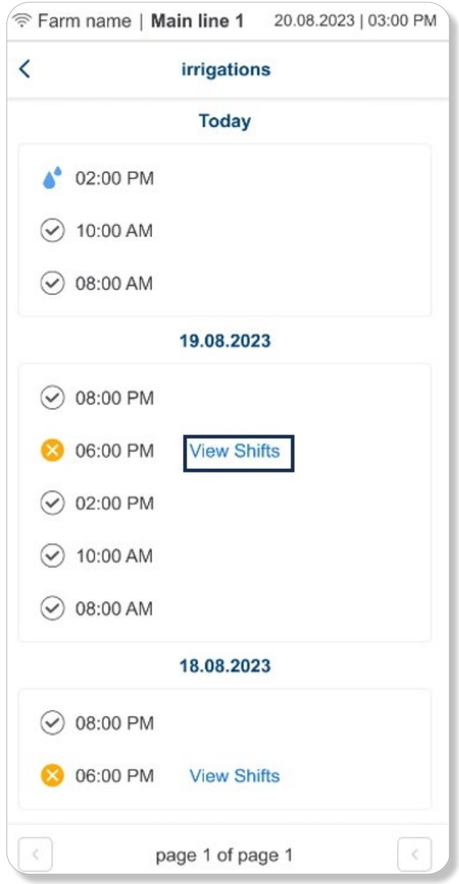


6.1.2 Mobile view

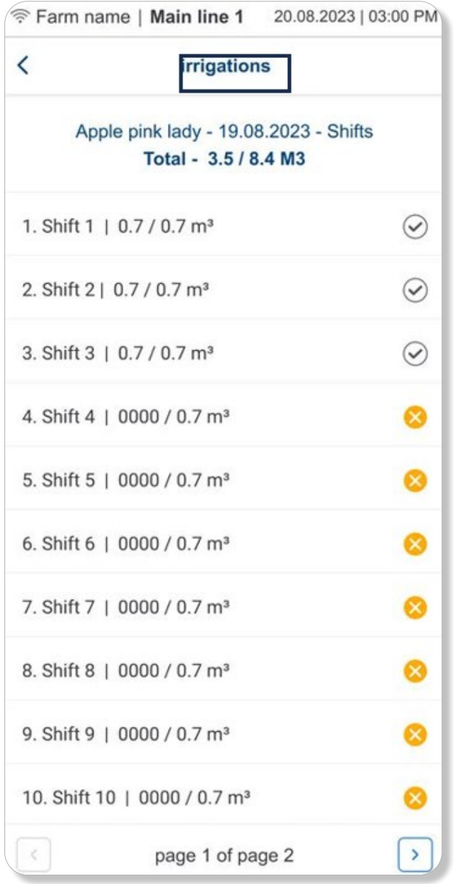
- The Mobile view can be selected from the home screen in the **Grow**Sphere™ **MAX** dashboard.
- The main functionalities in the Mobile view are:
  - Mainlines and SCADA view.
  - Irrigation, Dosing, Cooling, and Misting programs - Add, edit, and remove programs.
  - Alerts - View and reset alerts.
  - Weather station – Current status.
  - Irrigation logs.
  - Settings – Disables mainline, disable and reset alerts and change mobile numbers for alerts.
- Unique feature that was added to the Mobile view – Ability to see the ten last cycles of the irrigation program, including the Shifts view (completed and uncompleted):



View of the Irrigation program



View of the last ten cycles of the irrigation program



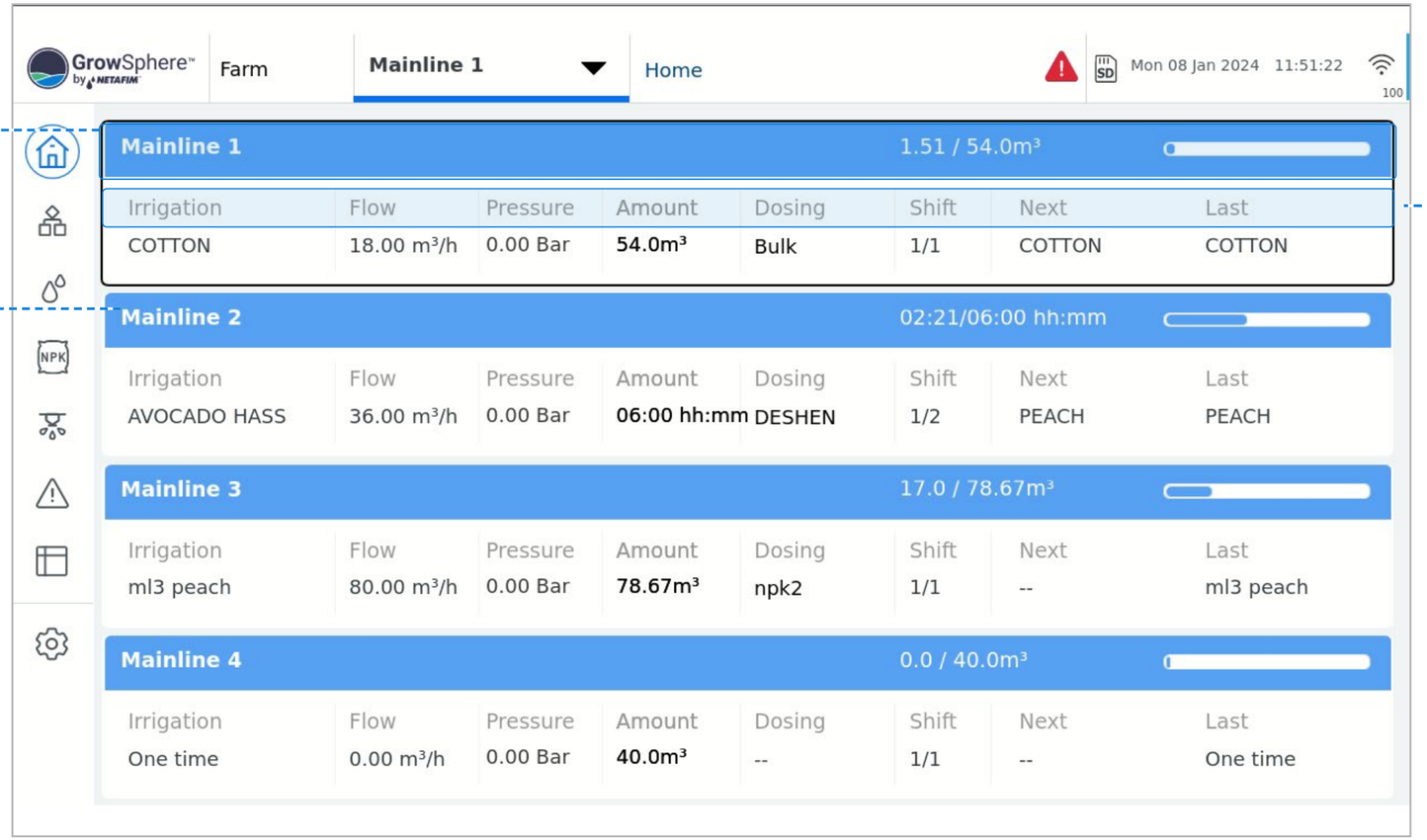
View the Shifts ('explore more) of the desired Irrigation cycle

6.1.3 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.



Displays each mainlines preferences:

- **Irrigation:** Running irrigation program.
- **Flow:** Irrigation Shift Flow Rate.
- **Pressure:** The pressure in the mainline.
- **Amount:** Shift water Quantity, It can show multiple in case different quantities in shifts.
- **Dosing:** Dosing recipe linked to the irrigation program.
- **Shift:** The shift number currently running.
- **Next in Q:** The shift that is next in queue.

6.2 Dashboard Overview

The main dashboard includes the following sections:

Sidebar menu
Displayed on every screen

Home
(see Home Screen)

SCADA

Irrigation Programs

Dosing programs and recipes

Cooling and Misting

Alerts
(see Managing Alerts)

Reports
(see Viewing Logs)

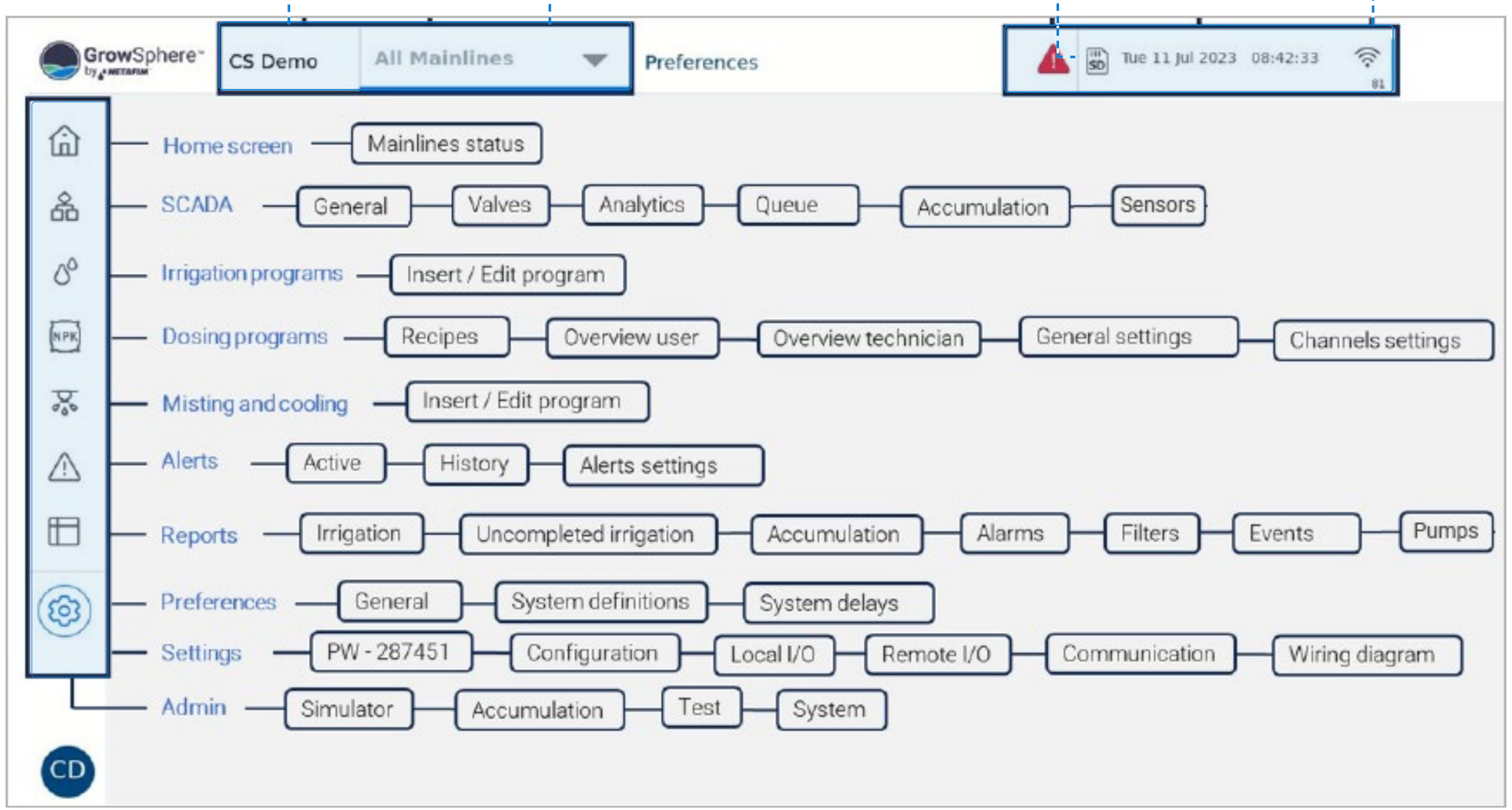
Configuration
(see Defining System Preferences, Configuring Components, and Resetting Accumulation)

Farm Name

Dropdown list allowing for selecting a mainline

Alert notification (see Managing Alerts)

Current date, time, and connection status



6.3 Defining System Preferences

This section reviews defining the following system preferences:

1. **General Preferences**
2. **Delays**

6.3.1 General Preferences

Structure changed for screen. Rearranged options or added new.

3. Verify **General** tab is selected

4. Select language

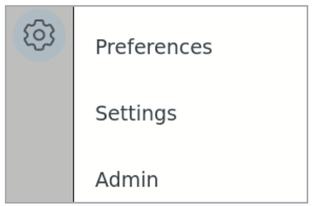
6. Select the time format

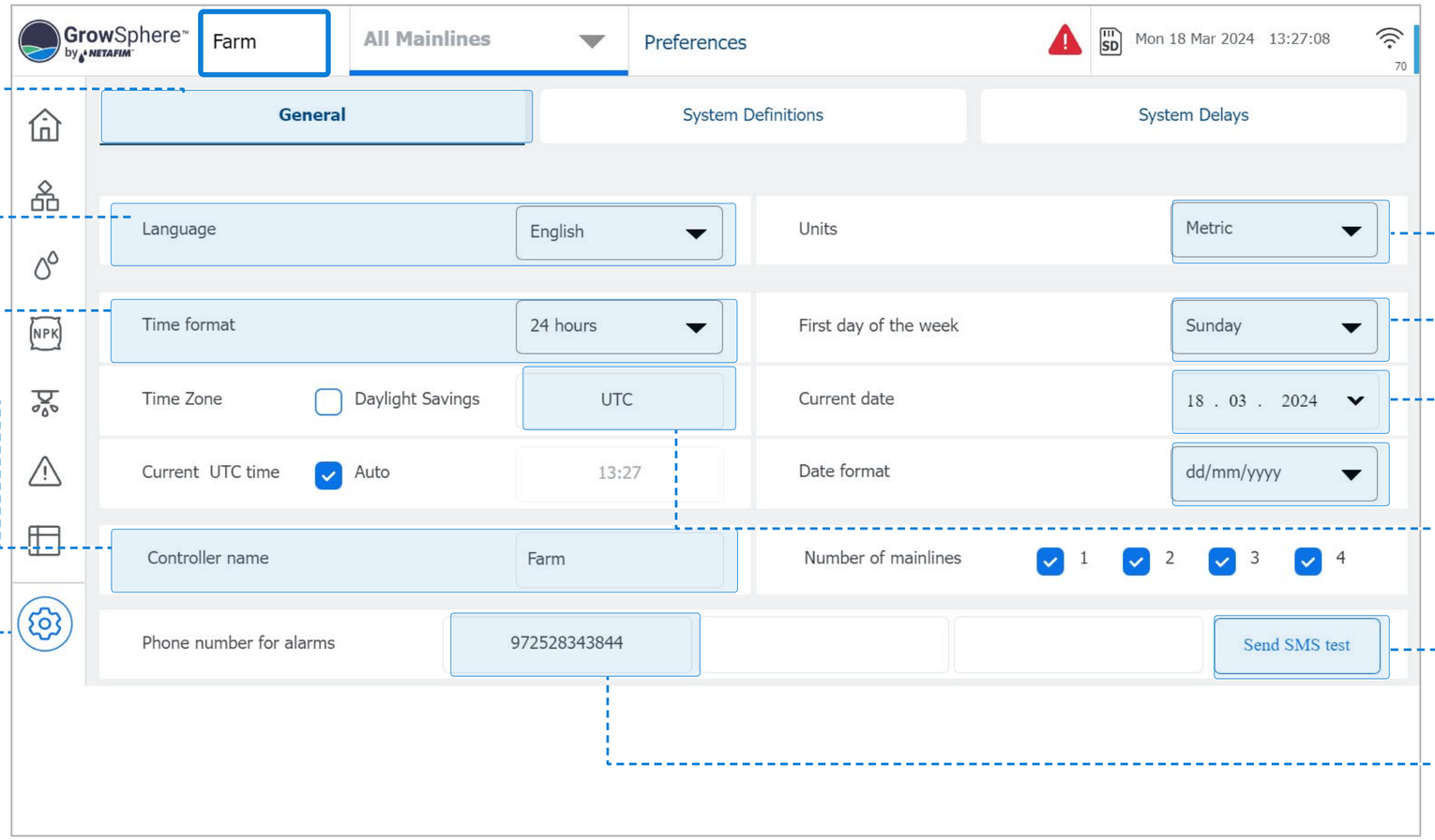
5. Enter the farm name

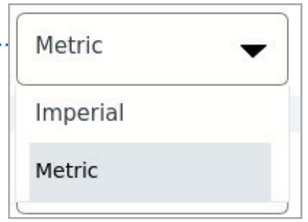
(the farm name will appear on the header)

1. Tap the **Configuration** button

2. Select **Preferences**







8. Select the first day of the week

9. Set the current date and format

11. Select the UTC (Coordinated Universal Time) from the drop-list

12. SMS Test Button

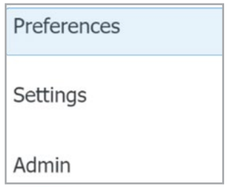
7. Enter the phone number where text messages will be sent when there's an alarm

6.3.2 Set system definitions

Perform the following steps to define mainline preferences:

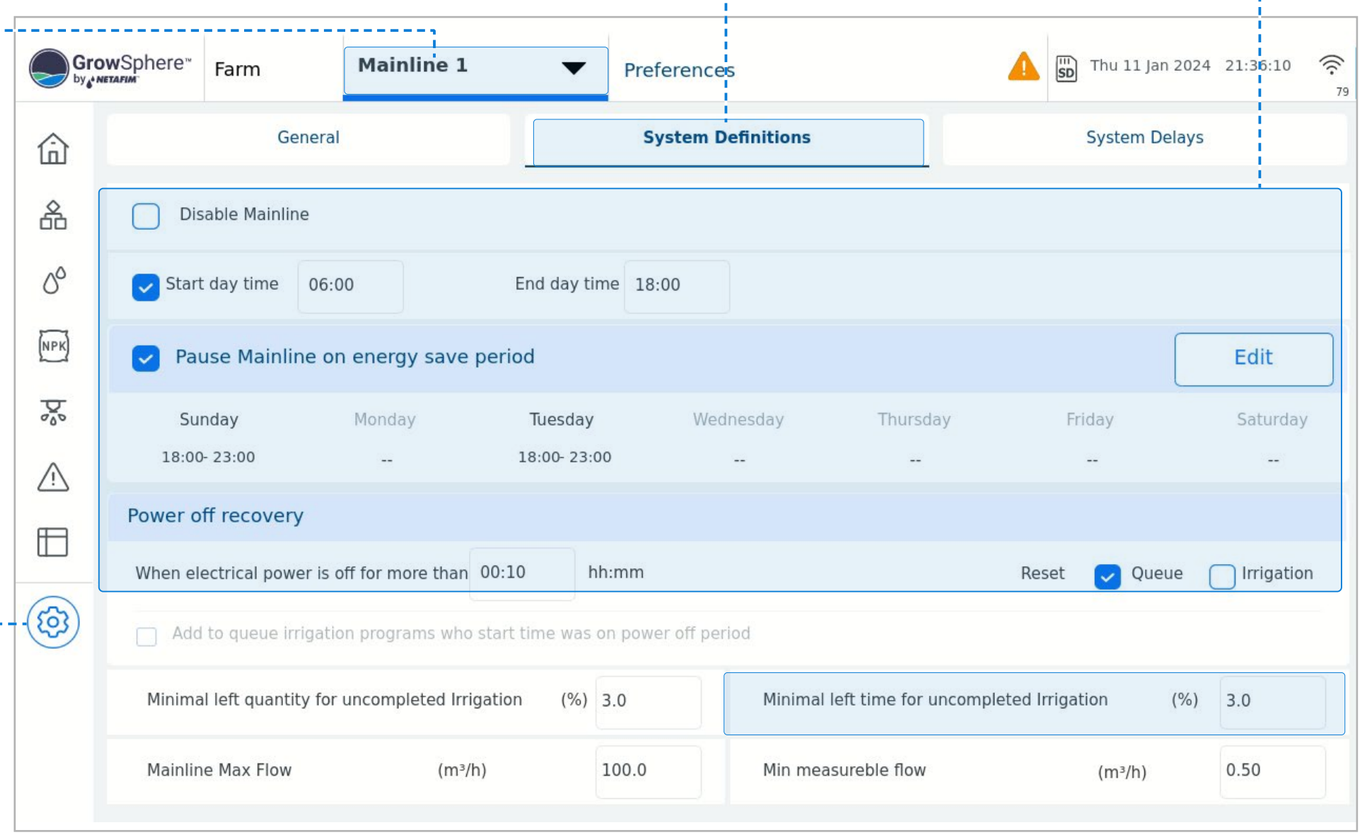
1. Tap the **Configuration button**

2. Select **Preferences** and type your credentials



3. Verify the correct mainline is selected

4. Select the **System Definitions tab**



5. Define the relevant system preferences:

- **Disable Mainline:** This disabling the mainline operation.
- **Start and end time:** Daily irrigation start and end times.
- **Pause Mainline on energy save period:** Tap Edit to define the slot per day for power saving.
- **Power off recovery:** Reset programs in the queue and those irrigating during power off.

Incomplete Irrigation Settings. The settings that define if an irrigation shift is categorized as an Incomplete Irrigation are:

- **Minimal Time Left:** The minimal irrigation time left to completion above which this irrigation shift will be categorized as having incomplete irrigation.
- **Minimal Quantity Left:** The Irrigation amount in m3 left to be completed is greater than 1% of the total irrigation amount required.

Example: The minimal irrigation time left to completion is set at 4 minutes. This means that if a program has less than 4 minutes left to complete the irrigation, this shift will not be categorized as having incomplete irrigation.
* Important: The minimal time is a highly critical setting.

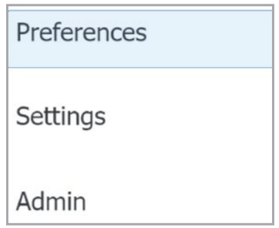
Note: The values for Incomplete Irrigation, Amount Percentage and Time are defined by the Technician on the General Settings screen.
The main purpose of these settings is to prevent the irrigation pumps from starting operation for a short period of time to irrigate an incomplete irrigation shift for less than the minimal time.

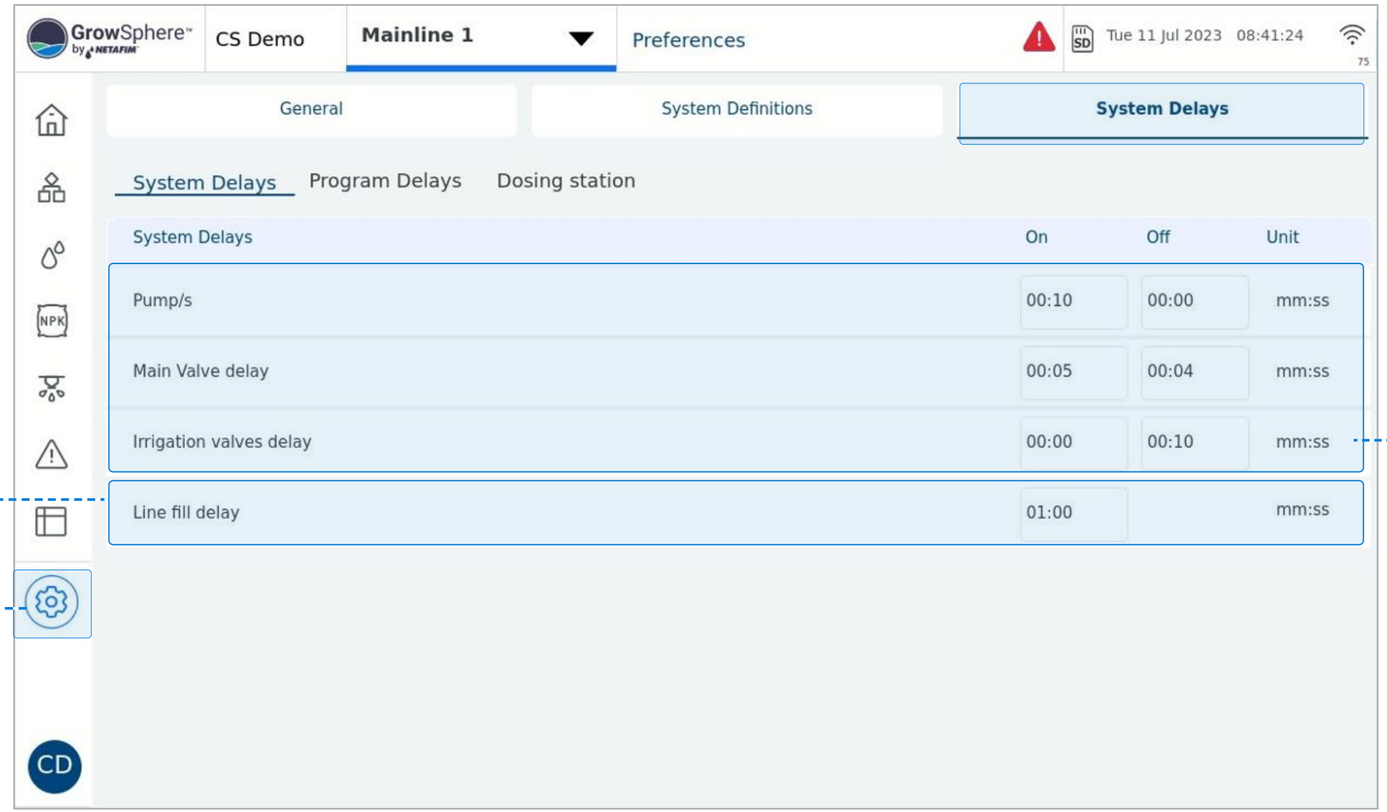
Set system delays

Filling line delay

The time it takes for water to fill the lines before an irrigation event starts. When the irrigation event begins, and the pumping station is activated, the Filling Time delay is triggered at the start of the irrigation. During this period, the primary line flow rate may be higher than the nominal flow rate of the active irrigation shift. To avoid adding excessive amounts of dosing during this period, the PLC controller compares the Filling Time delay with the Water Before delay values and chooses the longer of the two to delay the dosing.

2. Select Preferences and type your credentials

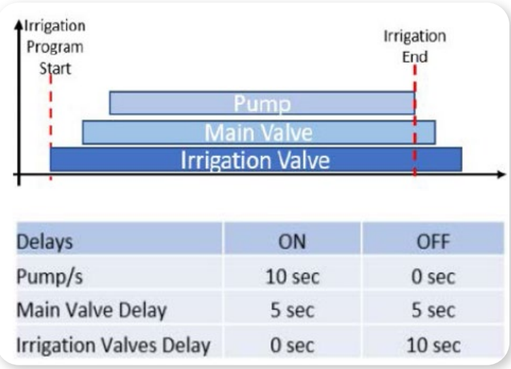




1. Define the relevant system preferences:

- **On Delay:** Time between the start of irrigation and when the device starts operating.
- **Off Delay:** Time between the end of irrigation and when the device stops operating.

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



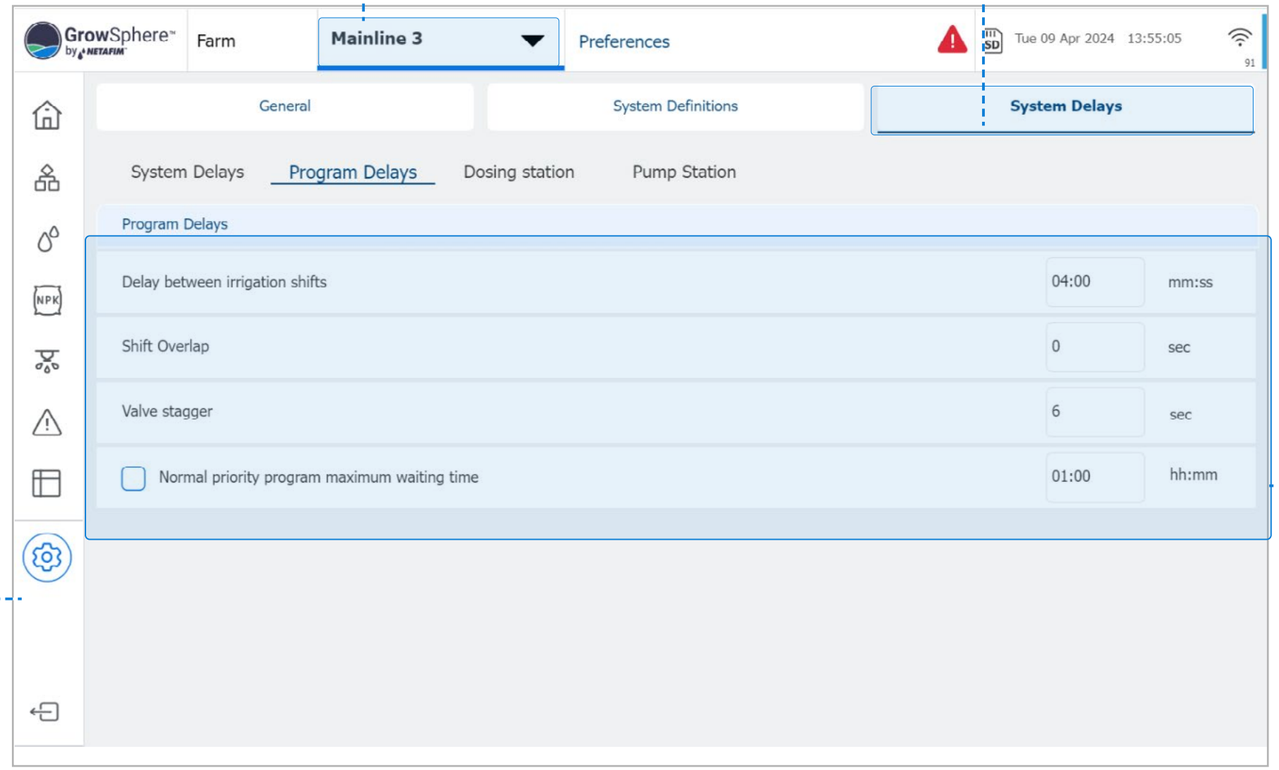
Delays	ON	OFF
Pump/s	10 sec	0 sec
Main Valve Delay	5 sec	5 sec
Irrigation Valves Delay	0 sec	10 sec

Set Program Delays

Perform the following steps to define irrigation program delay times:

3. Verify the correct mainline is selected

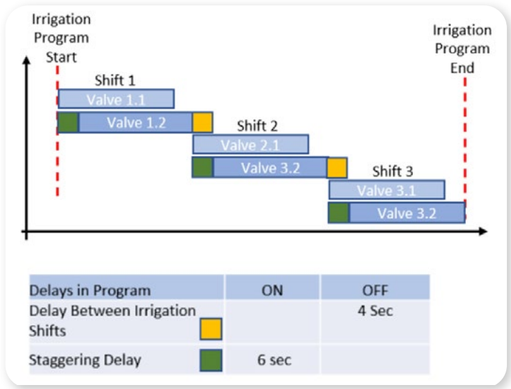
4. Tap the System Delays tab



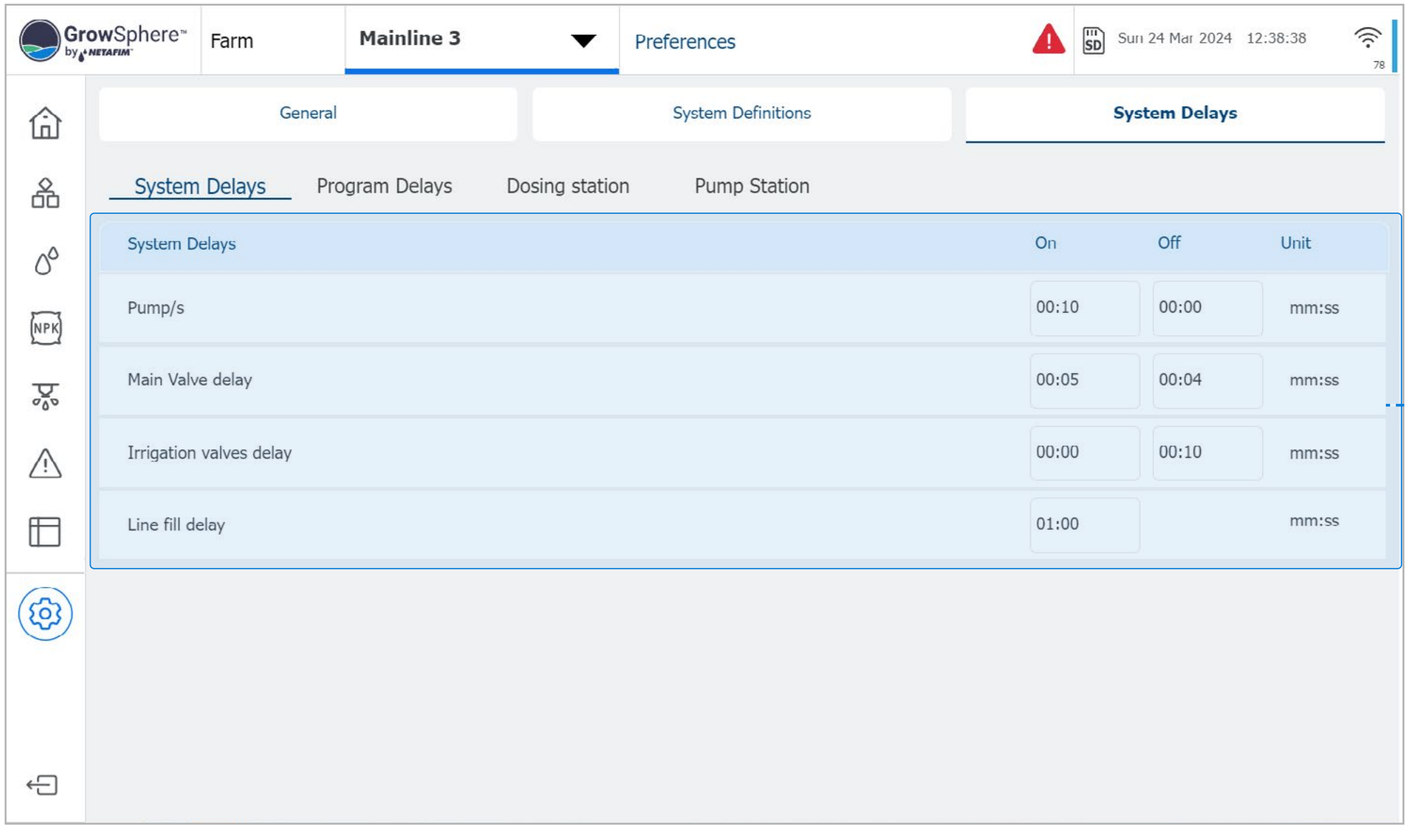
1. Tap the Configuration button

5. Define the irrigation program delay times:

- **Delay between Irrigation shifts:** Amount of time between when one shift ends and another begins.
- **Shift Overlap:** 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.
- **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.



Dosing station delays



1. Define dosing station delays

- **Minimal On Time:** The minimal amount of time the dosing channel must be ON.
- **Minimal Off Time:** The minimal amount of time that the dosing channel can be off.
- **EC control cycle:** The time it takes the fertilizer to travel from the injection point and reach the EC sensor, during which it reacts with the irrigation water. This value changes according to the distance between the injection point and the sensor location, the diameter of the pipe and the flow rate of the active irrigation shift.
- **pH control cycle:** This time takes the acid to travel from the injection point to the pH sensor, during this time it reacts with the irrigation water.
- **Stability delay** is relevant if the active dosing recipe has an EC/pH target set for control. It is a delay at the start of the irrigation shift necessary to attain a stable flow rate. During the stability delay, the nominal flow rate will be used by the PLC controller for the calculation of the proportional amount of fertilizer/chemical injected. After the stability delay the actual flow rate.
- **recorded by the water meter will be used.Booster pump-off delay:** Causes the dosing booster to turn off the defined amount of time after the end of the dosing process.

6.4 Configuring Components

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

1. Defining System Devices
2. Configuring Filter Station
3. Configuring Dosing Station
4. Pump Station Configuration
5. Configuring Valves
6. Configuring Other Devices
7. Allocating Local Digital Outputs
8. Allocating Local Digital Inputs
9. Configuring Local Analog Inputs

6.4.1 Defining System Devices

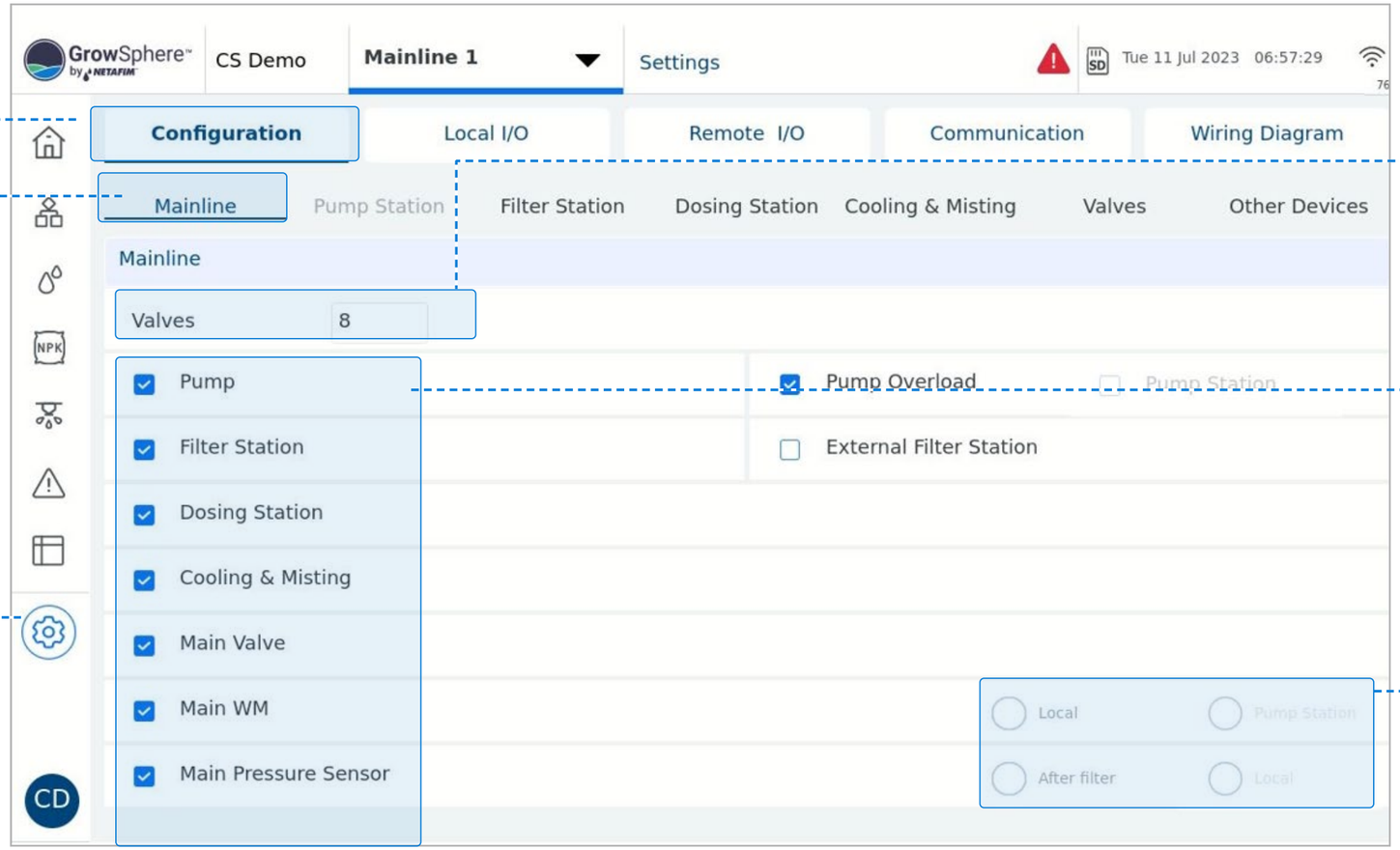
Define the number of valves and the devices that are connected to each mainline.

NOTE

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

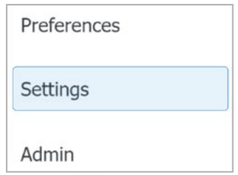
3. Tap the Configuration tab

4. Tap the Mainline tab



1. Tap the Configuration tab

2. Select Settings and type your credentials



5. Enter the number of valves

This value represents the total number of valves used in the system.

6. Select each device that is part of the irrigation system

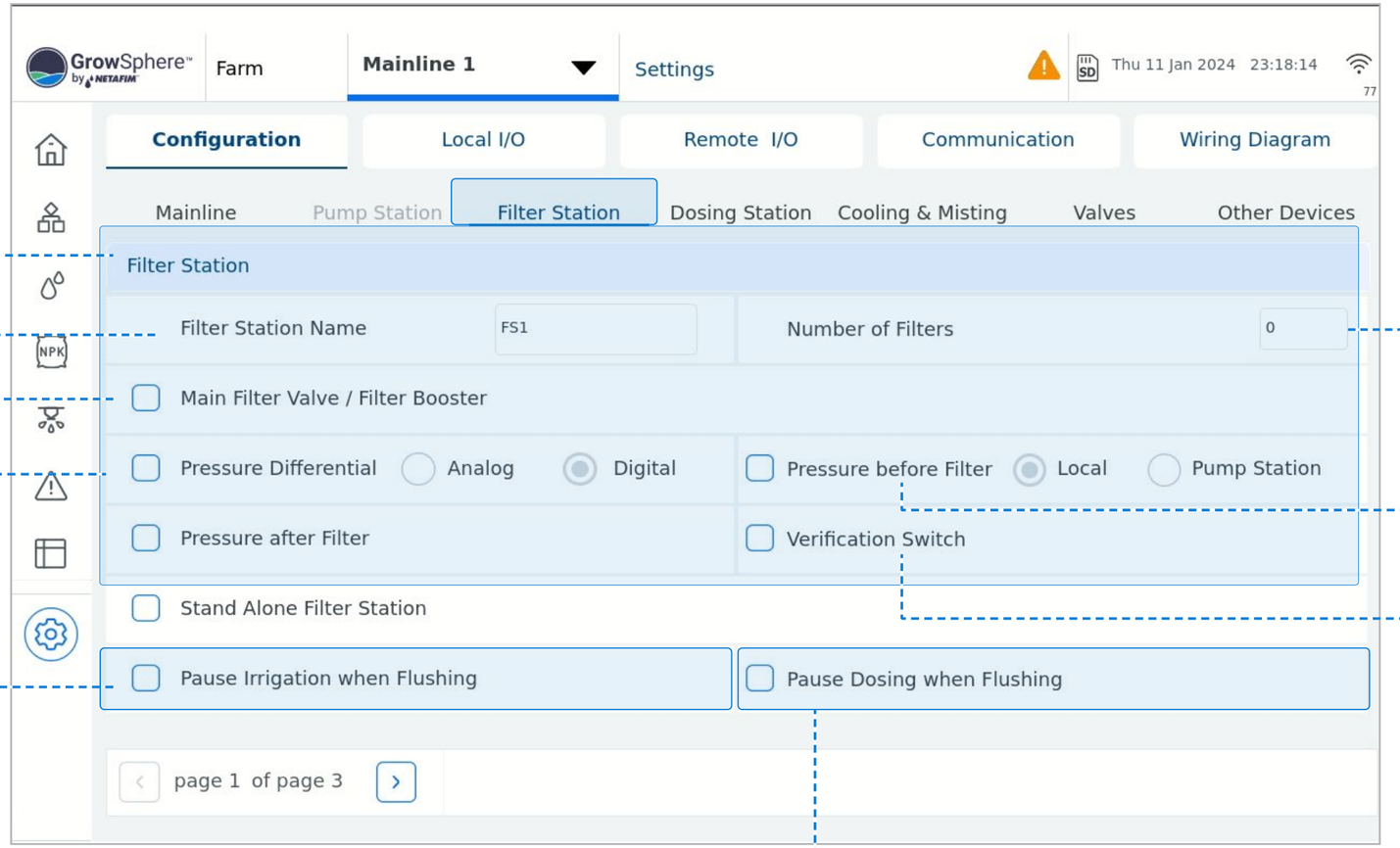
Note that some devices require additional parameters to be entered..

7. Select the location

The water meter / pressure sensor can be located at the pump station/after filter or at the mainline (local).

6.4.2 Configuring Filter Station

Perform the following steps to configure the filter station parameters:



4. Works independently of irrigation. If not selected, flushing only occurs during active irrigation

1. Defined by the user

2. Located upstream of the filters for increasing water pressure on the filter station units

3. The **Differential Pressure Switch** measures the water pressure differential between the filter inlet and outlet

5. The irrigation shift pauses until flushing is done

6. Number of Filter Units: The number of filters that belong to the filter station. The maximal number is 32

7. This can be measured locally or at the measurement point in the pump station.

8. An alert is generated if flow switch pulses don't match filter activation pulses

9. The current dosing recipe in the irrigation shift will be paused during the filter flushing process and resumed afterward.

6.4.3 Configuring Filter Station

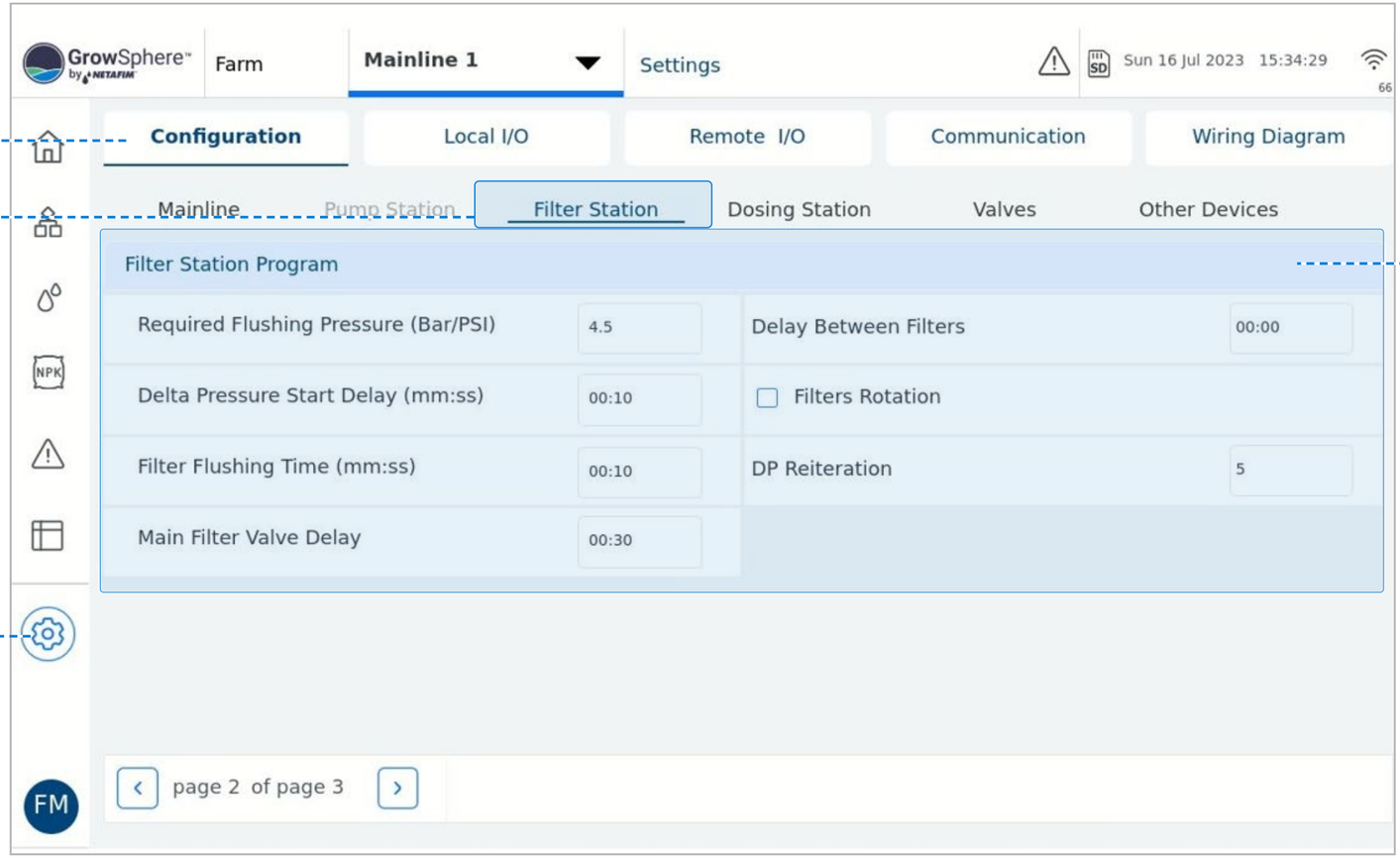
Perform the following steps to configure the filter station parameters:

2. Tap the Configuration tab

3. Tap the Filter Station tab

For Pump Station configuration, please go to chapter: Mainline Pump Station

1. Enter settings

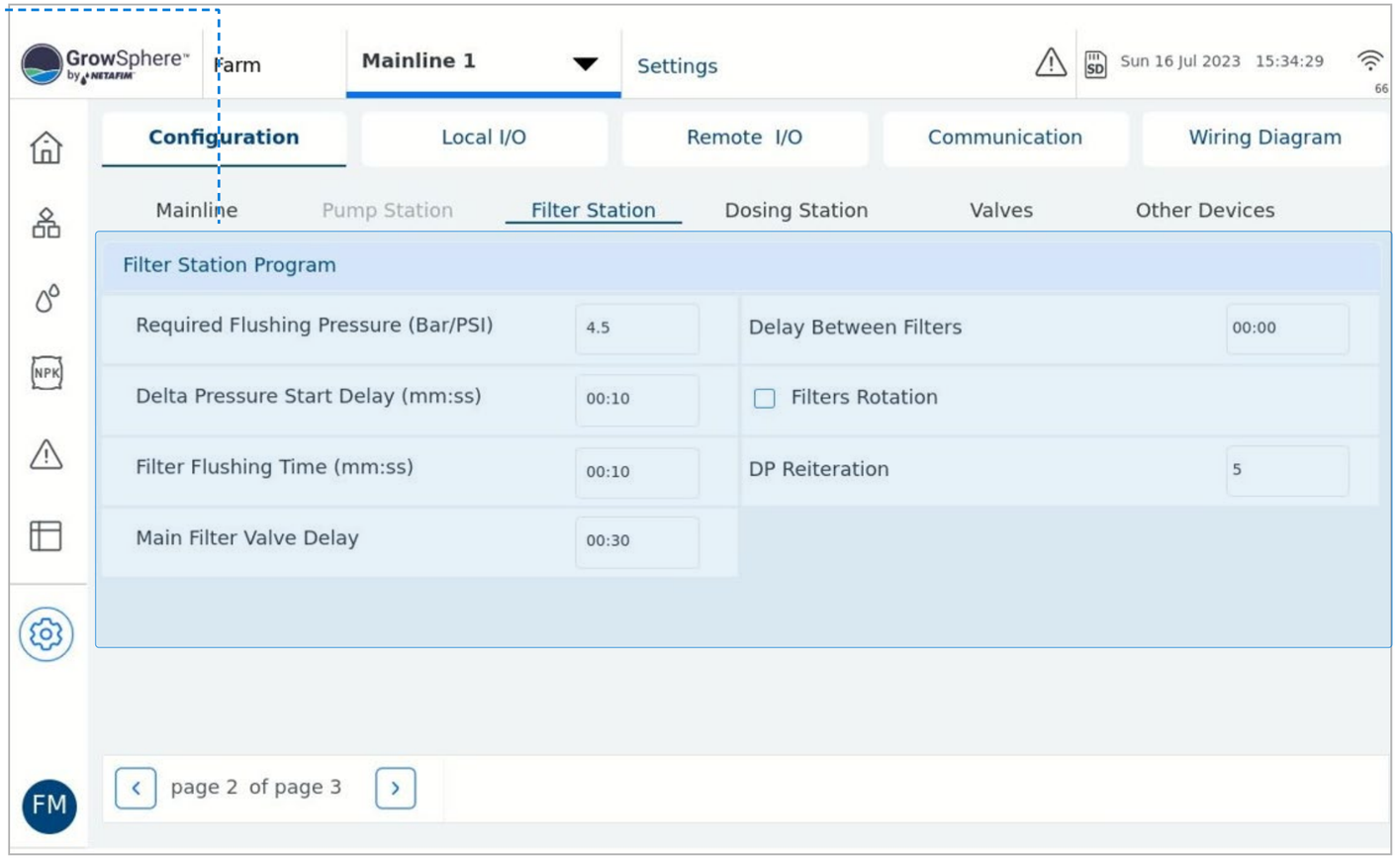


5. Define the filter station parameters:

- **Required Flushing Pressure:** The minimum pressure needed to run the flushing process, to achieve effective flushing of the filters.
- **Delta Pressure Start Delay:** This parameter sets a delay in mm:ss and starts counting down when a signal from the DP device is received. If the signal remains on, the filter flushing process is triggered.
- **Filter Flushing Time:** The duration of flushing for each filter unit (mm:ss). Filter units flush one at the time.
- **Range: 00:01 to 60:00.**
- **Main Filter Valve Delay:** A delay (mm:ss) to activate the Main Valve or Filter Booster Pump before flushing the first filter unit in the sequence.
- **Delay Between Filter:** The time (mm:ss) between the end of flushing of one filter unit and the beginning of flushing of the next unit.
- **Filter Rotation:** If activated, each flushing process starts with the next filter unit in the sequence.
- **DP Reiteration:** No. of consecutive flushing cycle signals from DP Switch. Range: 1-10. Alert issued if exceeded. Default: 3.

Define the filter station parameters:

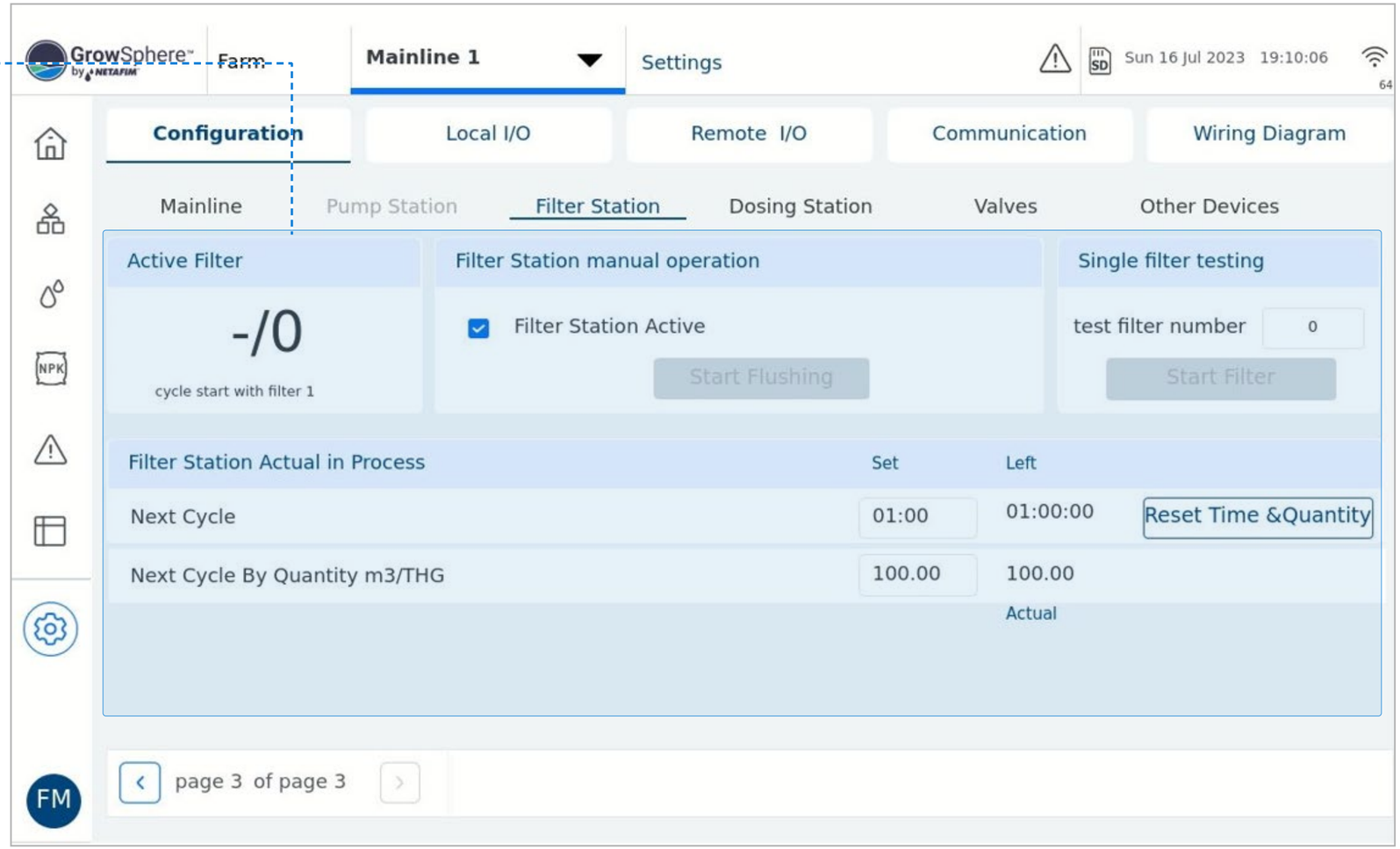
- **Required Flushing Pressure (Bar/PSI):** Indicates the required flushing pressure.
- **Delta Pressure Start Delay:** Enter amount of delta pressure start delays.
- **Filter Flushing Time:** Enter amount of filter flushing time.
- **Main Filter Valve Delay:** Enter amount of valve delay.
- **Delay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



Define the filter station parameters:

This screen display the currently status of the Filter Station

- **Active Filter:** Displays the active filter.
- **Filter Station Manual Operation:** Check the active filter station.
- **Test Filter Number:** Enter Filter number to test.
- **Pause / Stop / Start Filter:** Press pause, stop or start to control the filter station.
- **Reset Time & Quantity:** Press to reset time and quantity.



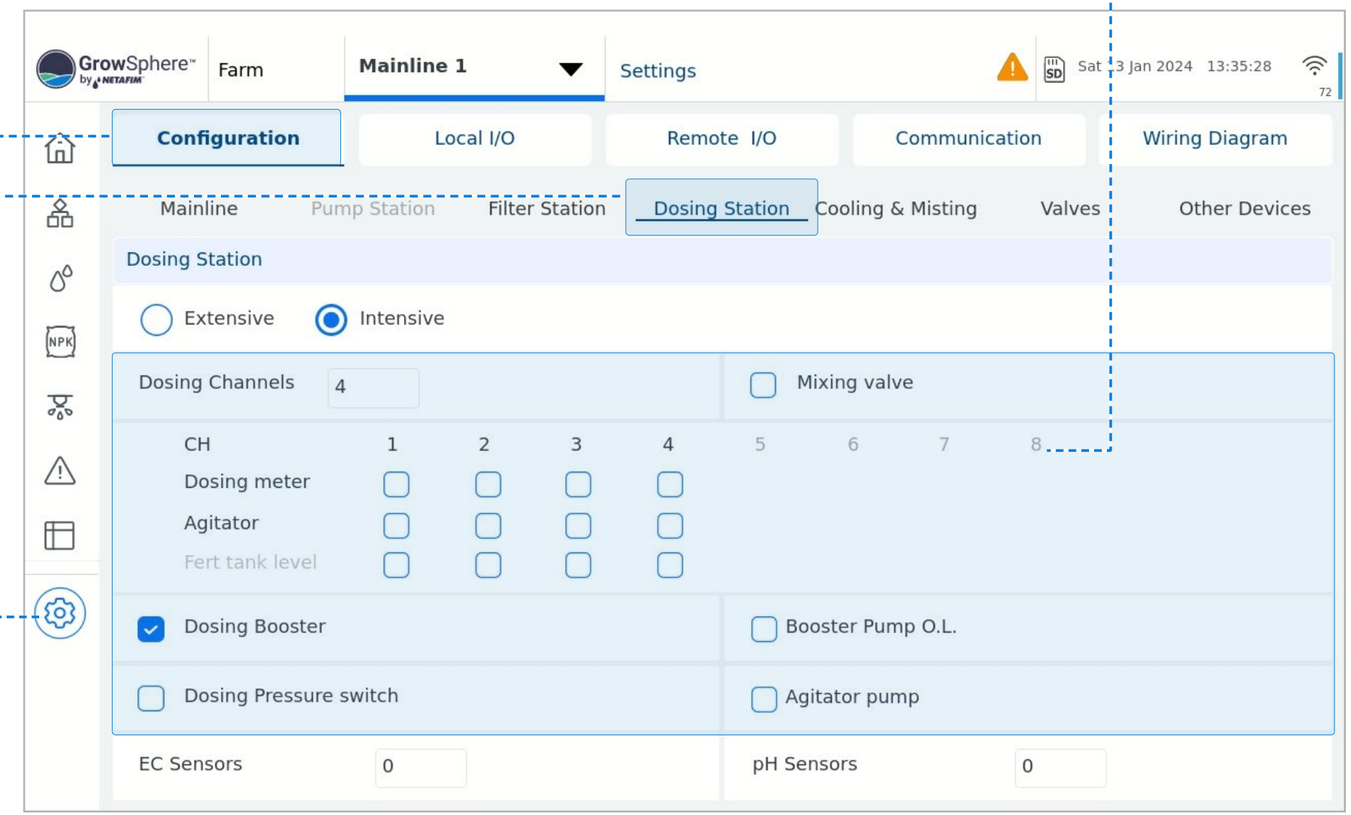
6.4.4 Set dosing station configuration

- Define the numbers of dosing channels and agitators and activate them
- Select the connected devices that related to the dosing station:

2. Tap the Configuration tab

3. Tap the Dosing Station tab

1. Enter settings



5. Define the dosing station parameters:

- **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 typically chosen when precise control over the injection of fertilizers and chemicals, including EC and PH control, is required.
- **Dosing Channels:** The fertilizer meter measures and calculates the dosing channel flow rate. In the proportional method, the dosing meter reading is used as a flow reference only.
- **Booster pump OL (overload):** If the dosing booster is selected, the option to check the correct checkbox for pump overload will be enabled.

Sensor connections

Dosing station name/number				
Sensor type	**Sensor**	**Range**	**Local input number**	**Remote input number**
4-20 mA	EC1	0 – 10mS		
4-20 mA	EC2	0 – 10mS		
4-20 mA	pH1	0 – 14		
4-20 mA	pH2	0 – 14		
Dry	Press switch	ON/OFF		
0-5 Volts	Pressure	0-10 bar		

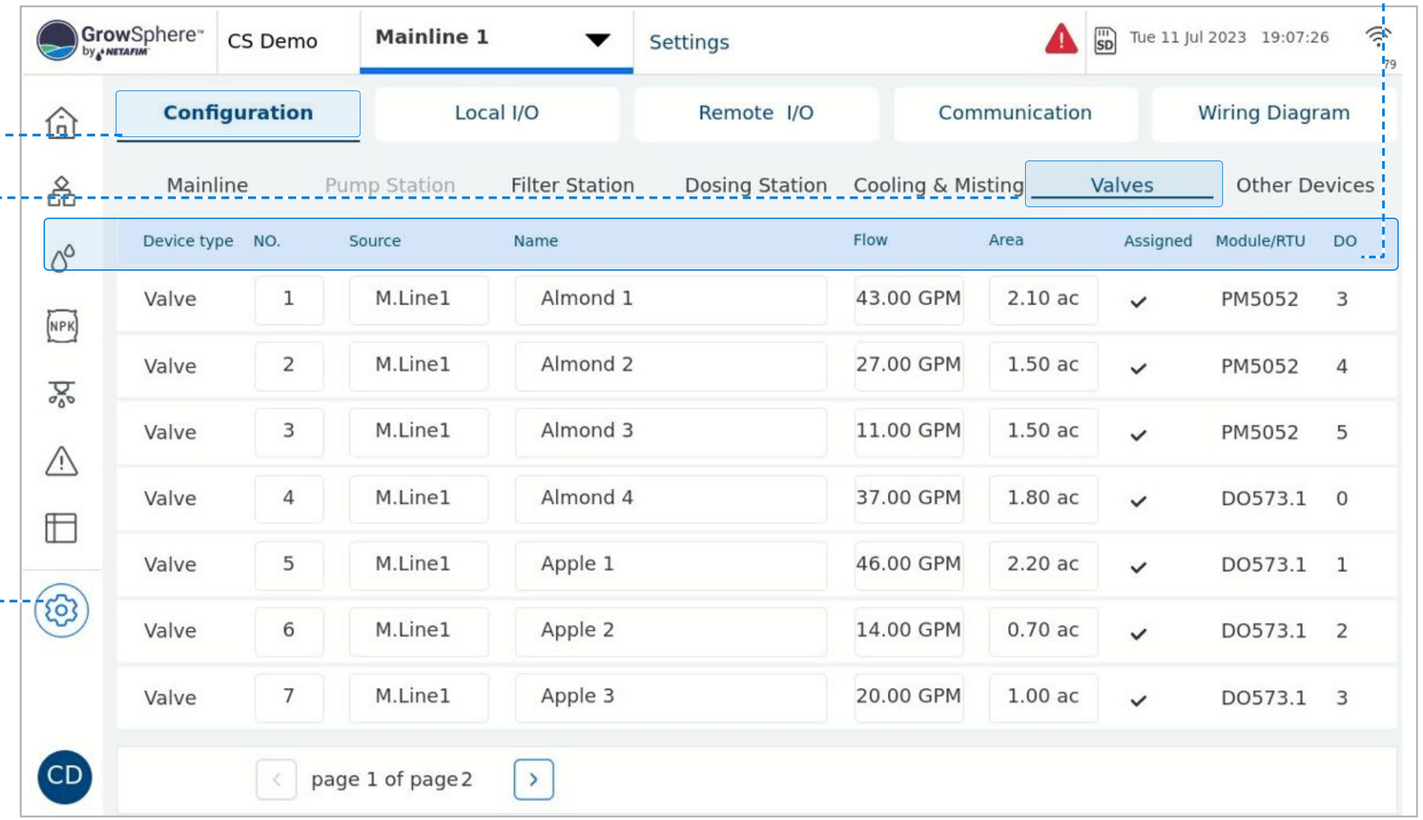
6.4.5 Set valves configurations

This tab shows all the Valves of this system, (up to 100 valves per mainline) for the parameters setup of each valve.

1. Enter settings

2. Tap the Configuration tab

3. Tap the Valves tab



5. Define the valve parameters:

- **Device #:** Indicates the valve number.
- **Source:** Irrigation mainline to which the valve is connected.
- **Name:** Provide 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 allocated to the valve.
- **Assigned:** IIndicates if the valve was assigned to an output module.
- **Module:** The controller module and port to which the device is connected. .

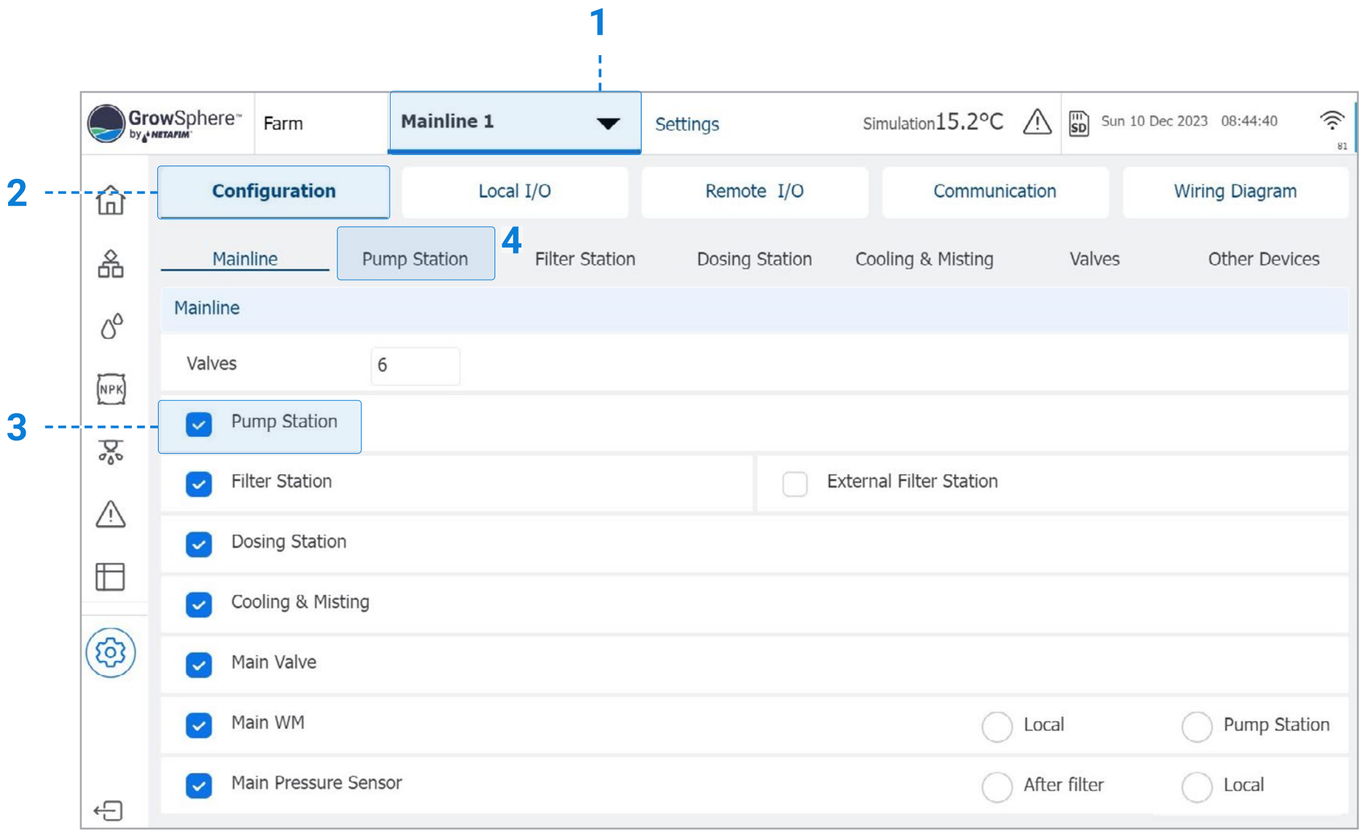
Please note: The parameters defined in this section will be presented in your virtual farm in the Cloud and will influence the Farm management, Irrigation recommendation, and alerts accordingly.

6.4.6 Pump Station Configuration

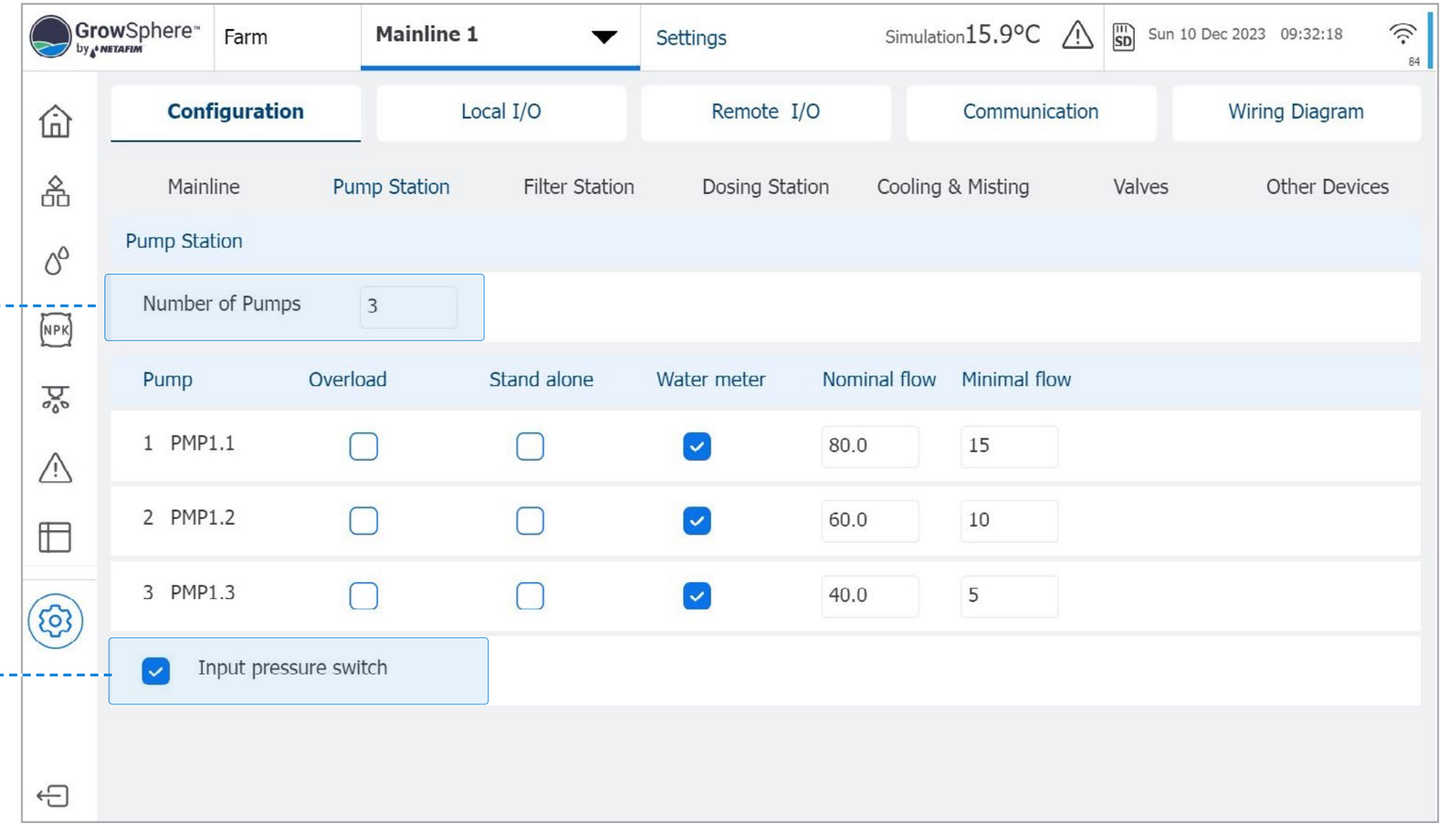
Pump Station Start Setting

The pump station is in charge of delivering the required amount of water for the active Shift with the required nominal flow. Pump Stations provide the mainline the required flow rate for the running shift. The users may define only one pump station per mainline. The maximal number of pumps per station is 3.

- **Pumps Belong to a Station:** In this case, the group of pumps selected for the Station, operate together to deliver the flow rate required by the Hydraulic Manager for the current irrigation shift (valves) in progress. The pump station activates the pump/s in the right combination, in order to supply the required flow rate. The pumps are activated and deactivated according to the pump/s delays setup.
- **Pumps Belong to a valve or number of valves:** In this case a valve or valves are linked to a specific pump in the Pump Station. When one of these valve/s is active (running), then the pump that belongs to them is activated. This pump is activated and deactivated according to the pump delays setup.



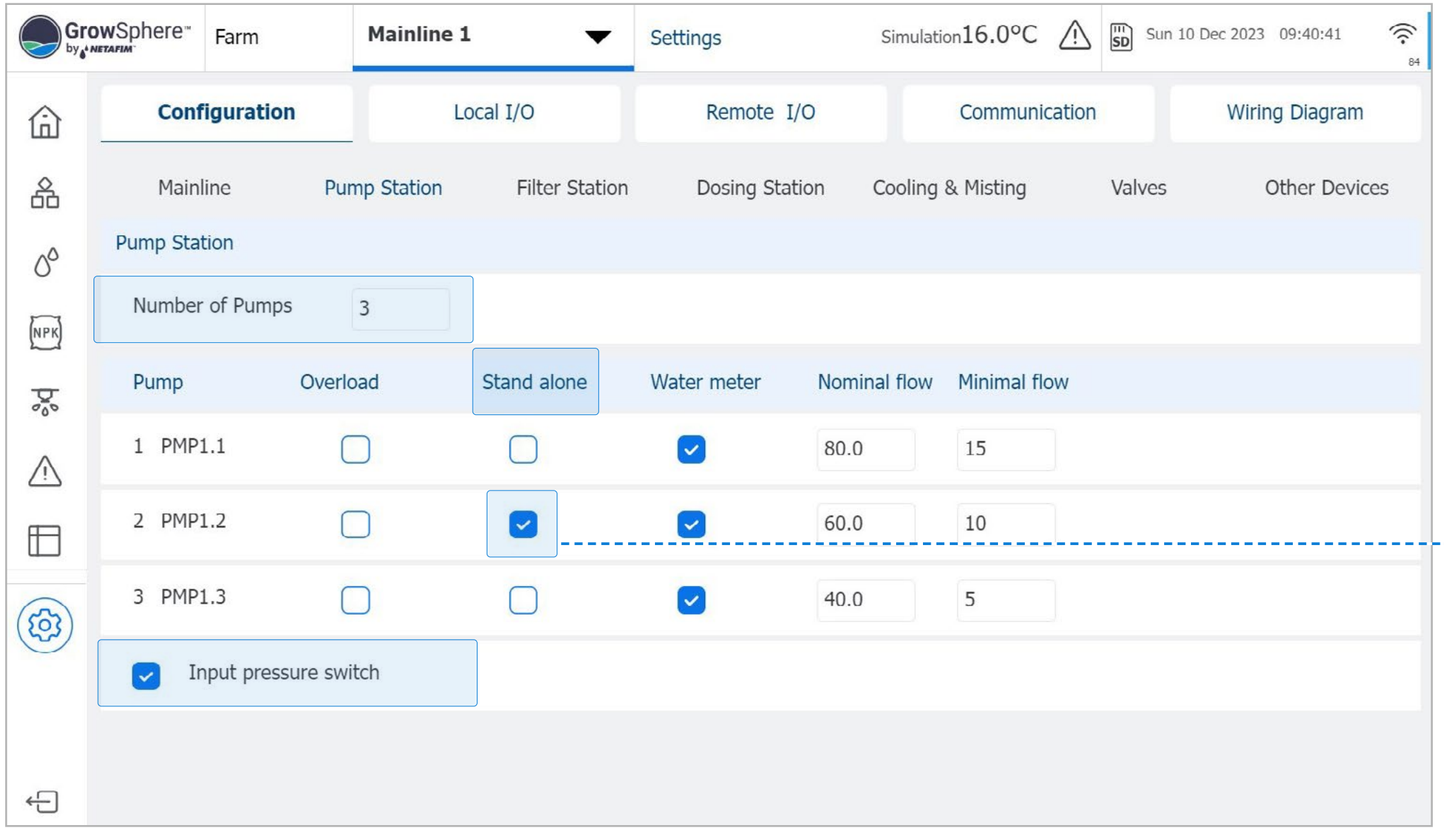
Setting for 3 Pumps in Pump Station



5. Select the number of Pumps for this station

6. Water source low pressure switch or minimal water source level

Setting for 2 Pumps in Pump Station and one Pump Stand Alone



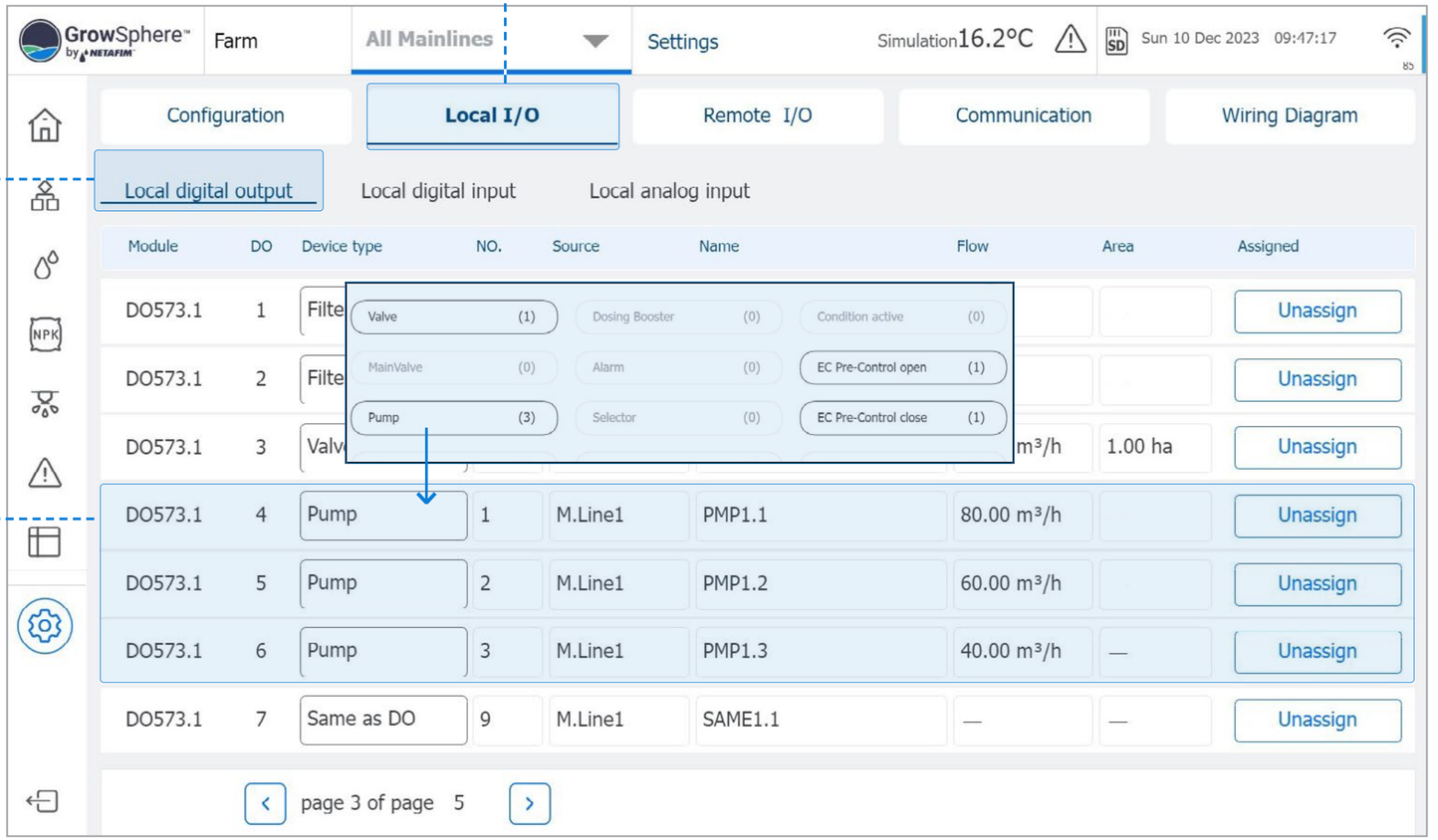
7. Pump 2 is set to Stand Alone, to be linked to specific irrigation valves.

Pumps Outputs Selection

8

9

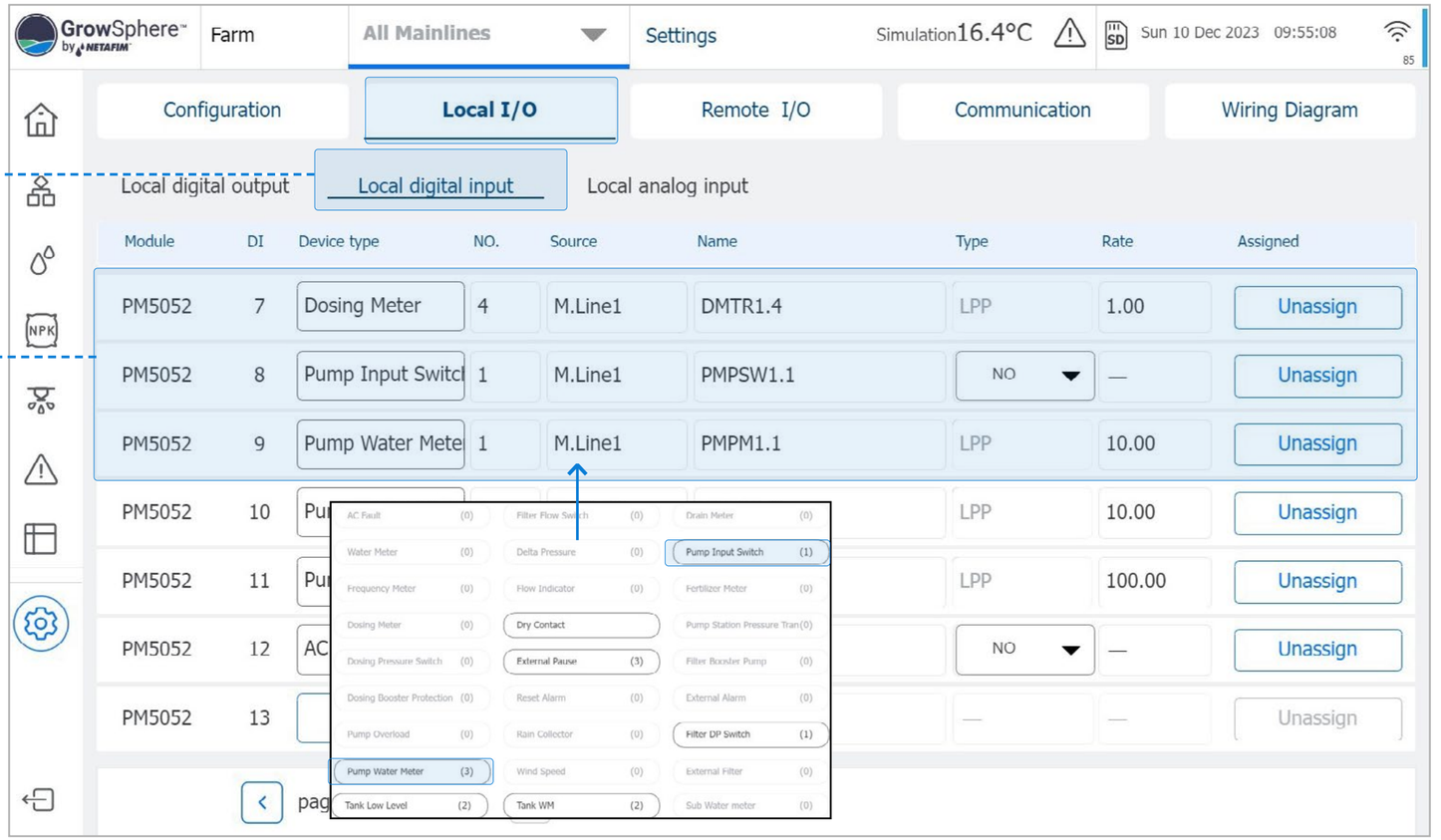
10. Select the pumps on the system.



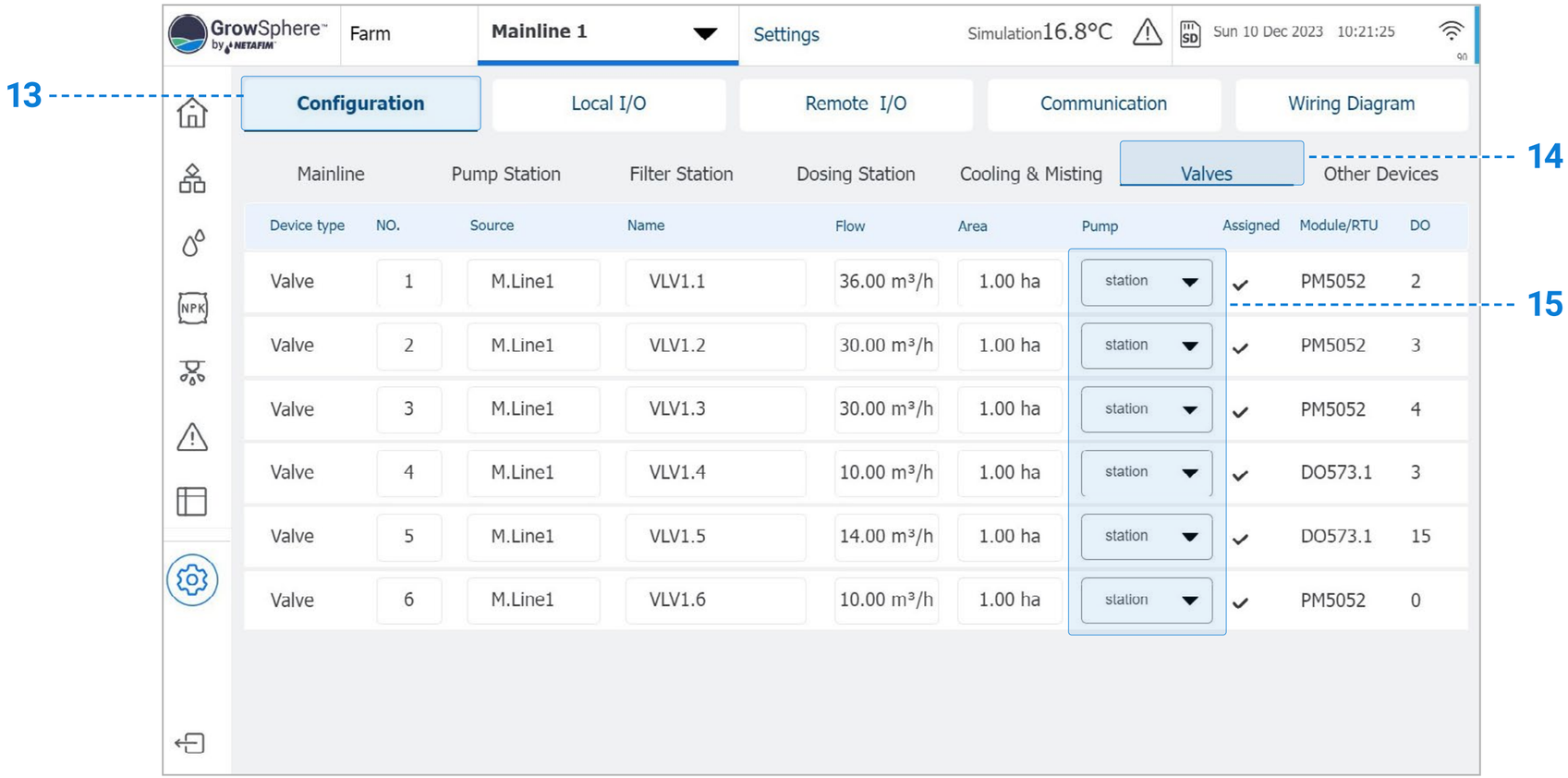
Pumps Intputs Selection

11

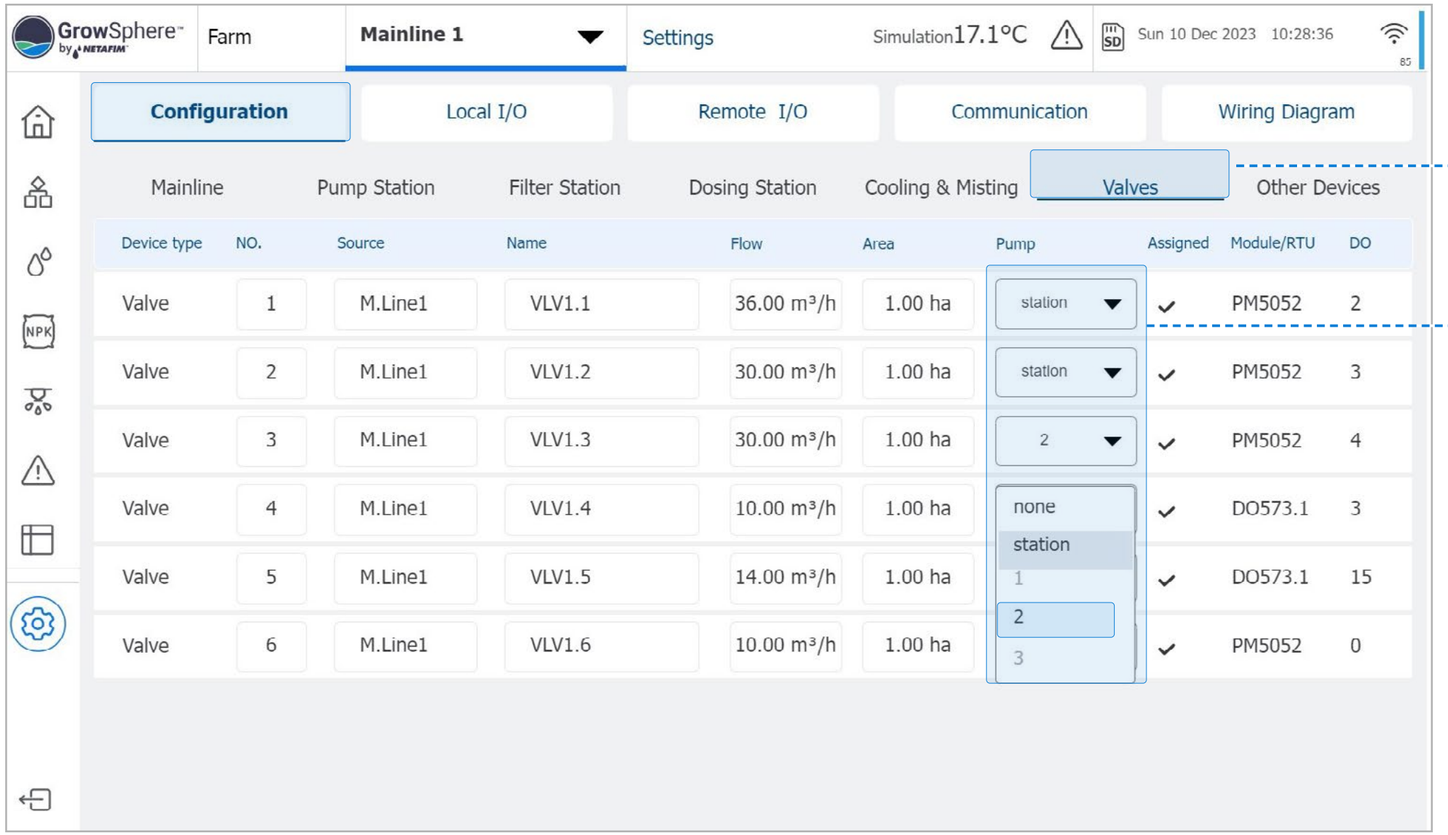
12. Select the pumps water meters and input pressure switch according to the elements on the system.



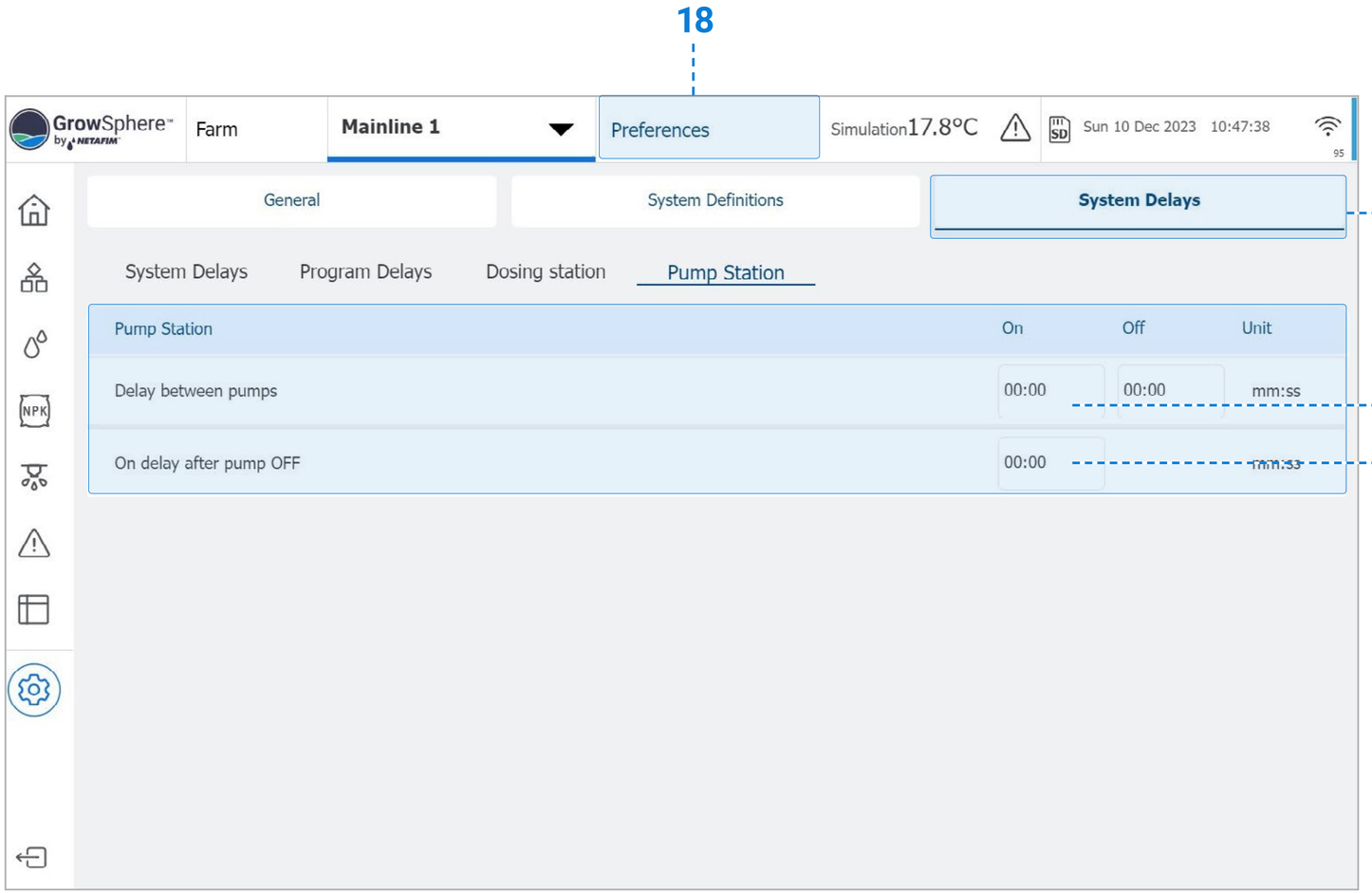
Valves Selection to the Pump Station



Valves Selection to the Pump Station and Stand Alone Pump



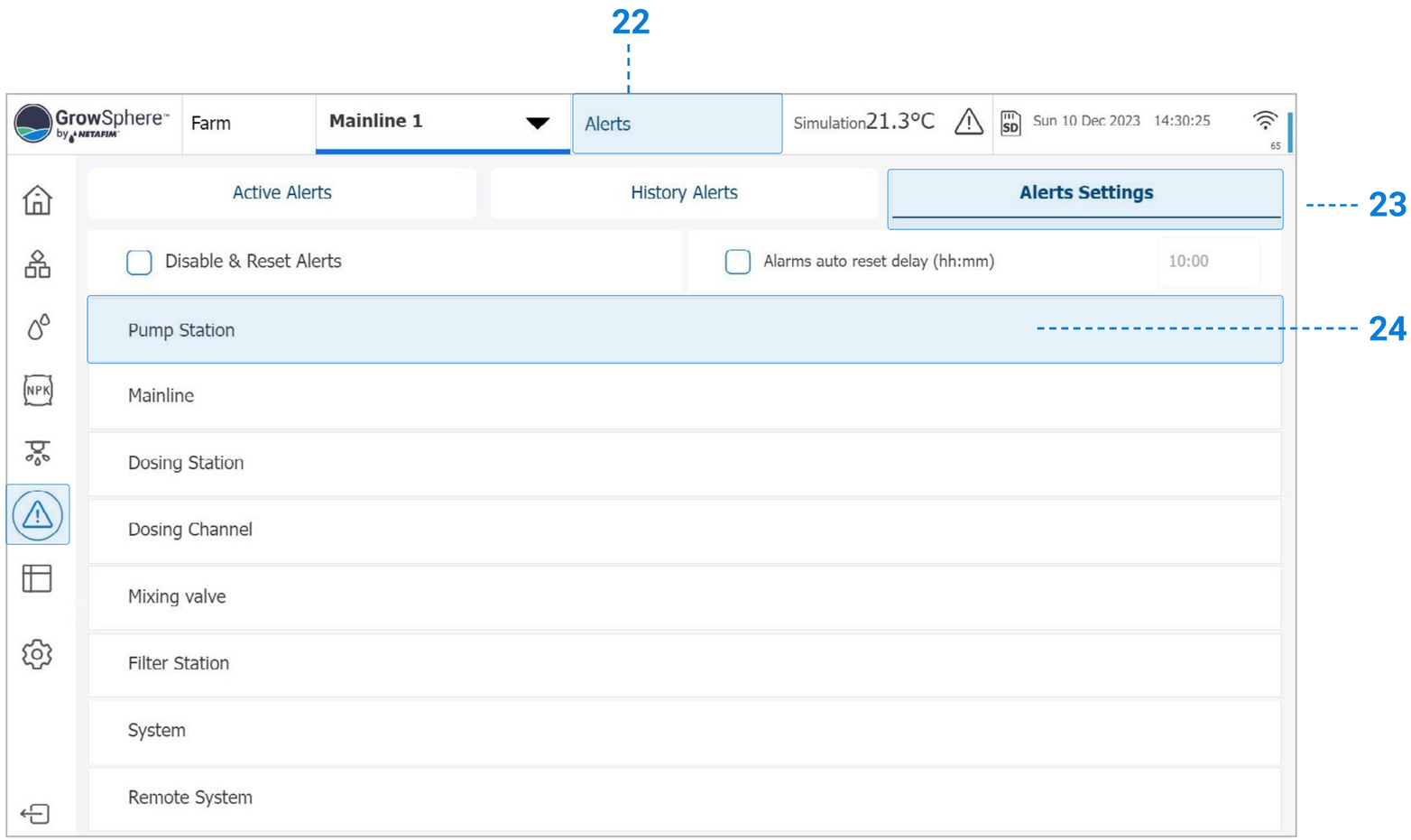
Pump Station Delays



20. ON and OFF delays between pumps activation and desactivation

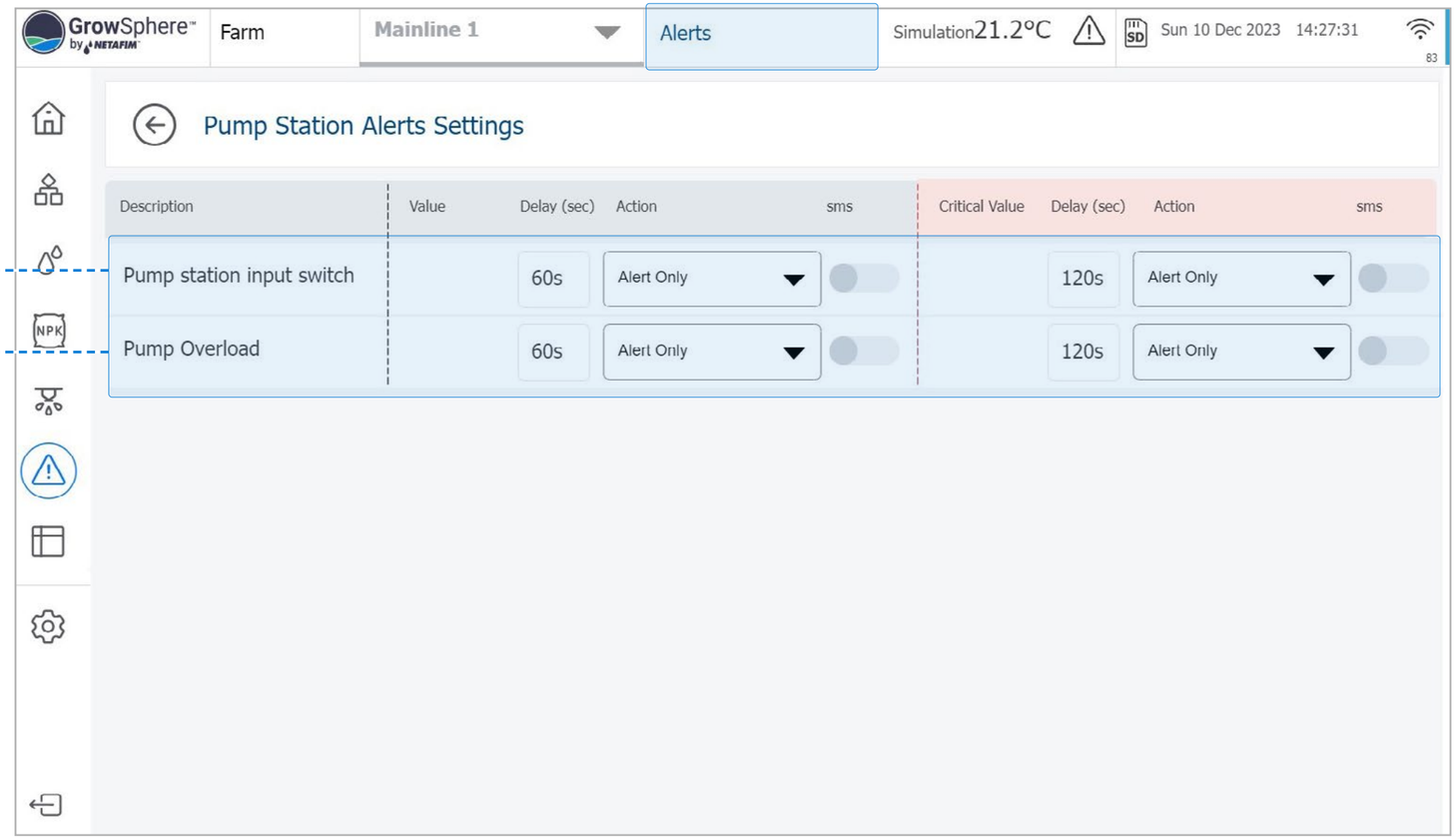
21. Delays for the pump that was turns OFF to be turn ON again

Pump Station Alerts Setting



Pump Station Alerts Setting

* Pump Station input pressure switch to indicate if pressure exist or not.



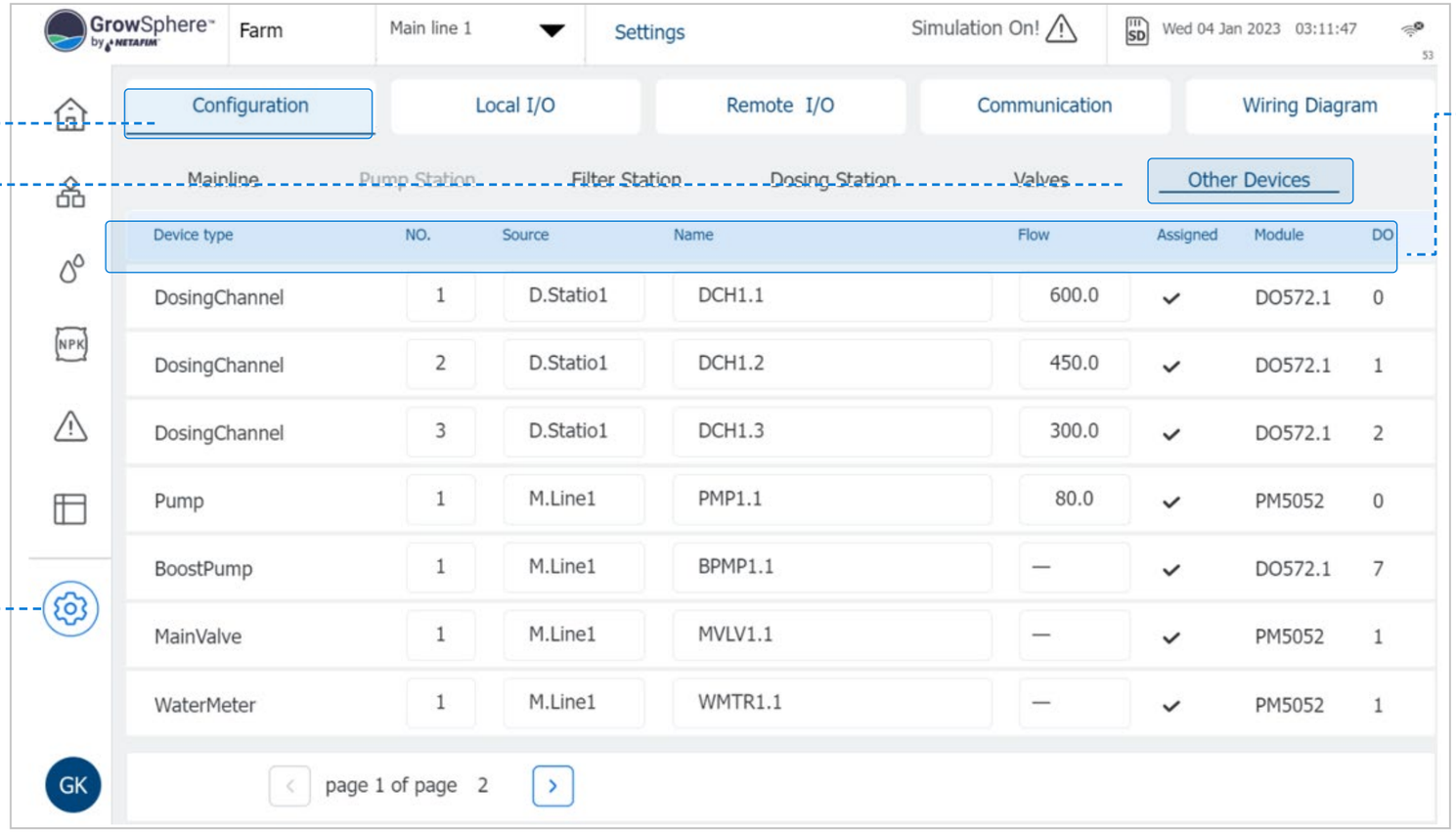
6.4.7 Configuring Other Devices

This tab shows all the Valves of this system, (up to 256 valves per mainline) for the parameters setup of each valve.

1. Tap the Configuration tab

2. Tap the Configuration tab

3. Tap the Other devices tab



5. Define the device parameters:

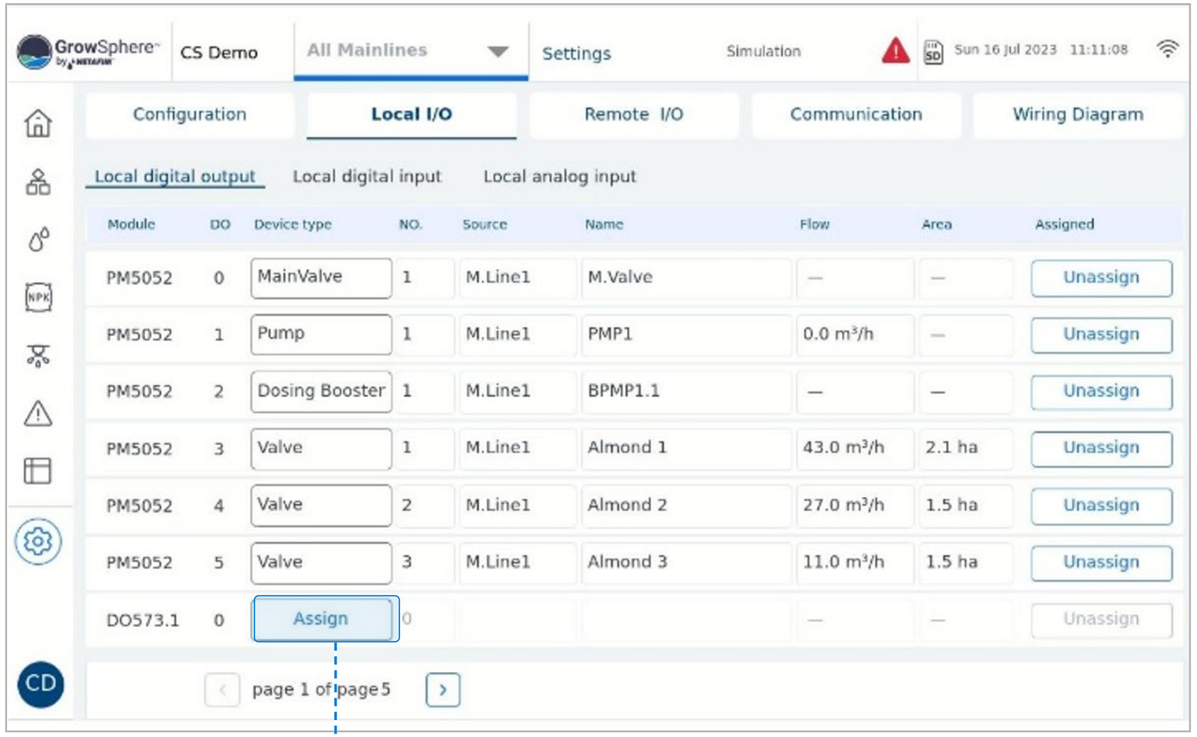
- **Device Type:** Indicates the device type.
- **Device #:** Indicates the device number.
- **Source:** The source to which the device is connected.
- **Name:** Provide a descriptive name for the valve.
- **Flow:** Device's nominal flow rate.
- **Module and DO:** The controller module and port to which the device is connected.

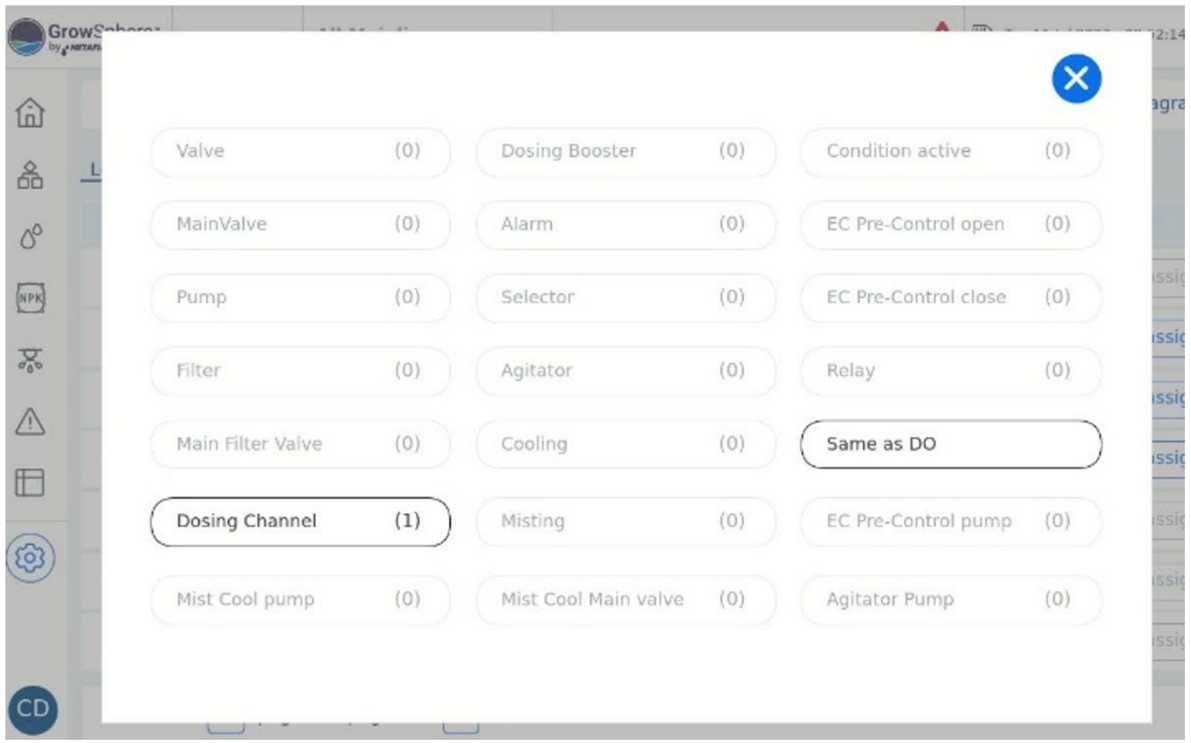
This field is not editable here. "V" means the valve is active and has an output assigned. Gray indicates it's inactive. Use this to set valves that will be added later physically.

6.4.8 Allocating Local Digital Outputs

1. Click assign for each row to assign
2. From the pop up window select the desired output
3. Define the Flow and irrigated area for each valve
4. The I/O module to which the device has been assigned to can be selected by skip between pages 1-5

Dosing valves should be assigned on the DO572 Module





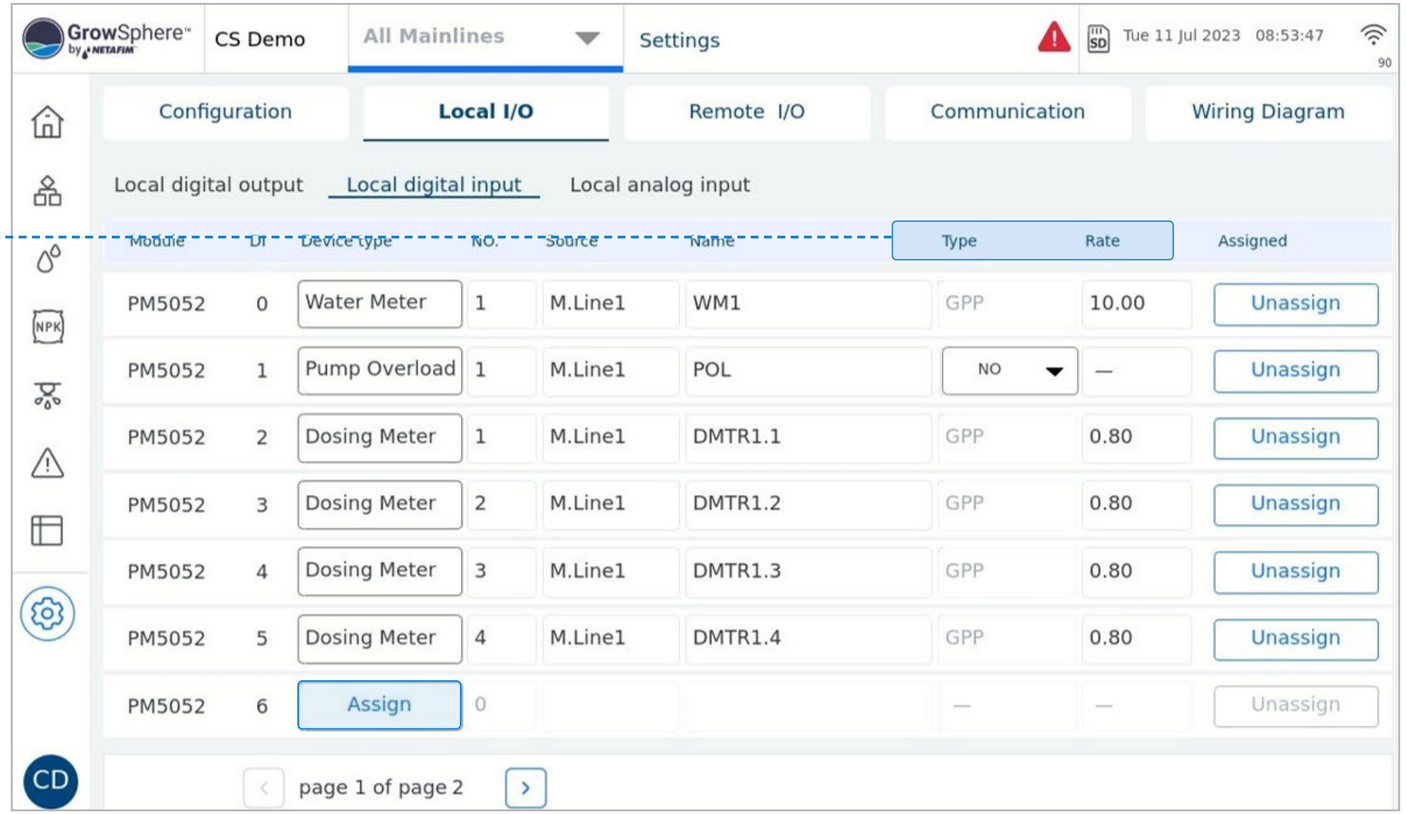
Assign: By clicking Assign, the system will indicate how many devices are not yet assigned, and will automatically assign it to the next available port

6.4.9 Allocating Local Digital Inputs

The system displays all local digital inputs according to the controller configuration

1. Assign each device to the I/O Module and port.
2. Provide each input's name, type and rate. For Digital Input no need to put Irrigated area.
3. You can select the I/O module the device has been assigned by navigating between pages 1-5.

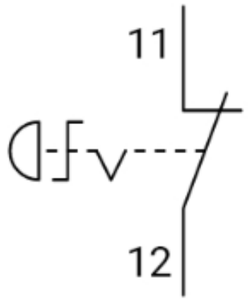
- **Type:** Options include PPL (pulses per liter) or LPP (liters per pulse), or NO for Normally Open or NC for Normally closed.
- **Rate:** Value corresponding to the Type selection.



6.4.10 Mainline External Pause

/ Definition

The mainline external pause is command to pause the mainline when the Digital Input is active. Each mainline has its own external pause Digital Input. The purpose of the mainline external pause is to permit the user to pause the mainline by an emergency push switch when it is an emergency and need to pause immediately the mainline operation. The mainline will be paused all the time that the switch (DI) is active.

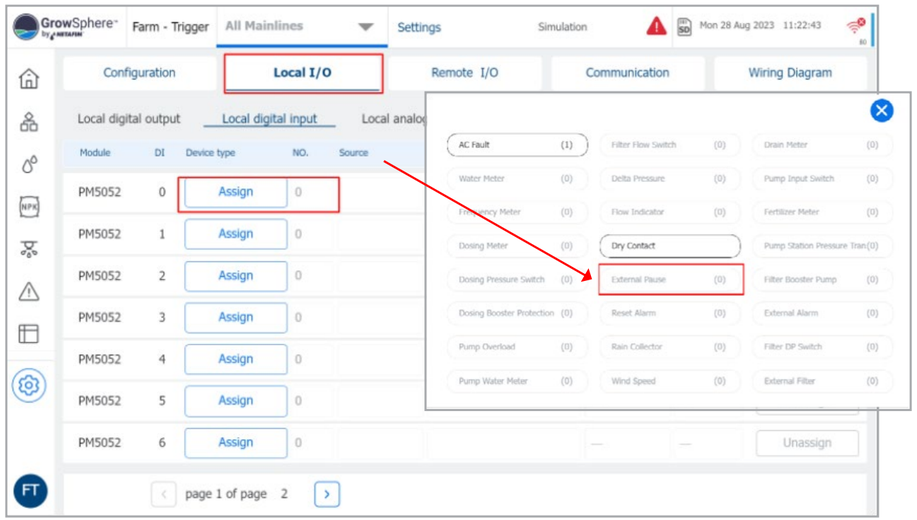


/ Digital input

The **Grow**Sphere™ **Max** has an option to select a digital input named:

- ML1 External pause
- ML2 External pause
- ML3 External pause
- ML4 External pause

Each mainline will have an option to select a mainline external pause.

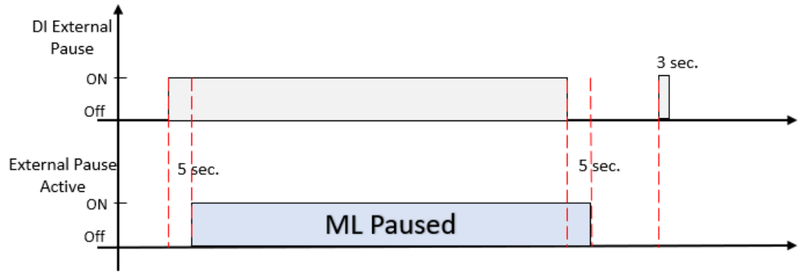


6.4.11 Mainline External Pause

/ External pause logic

The mainline external pause is active when:

- When the digital input is selected N.O. then when the input is close then will be active.
- When the digital input is selected N.C. then when the input is open then will be active.
- Fix delay: the External pause digital input have a fix delay of 5 seconds for ON and Off delay. See the following graph.



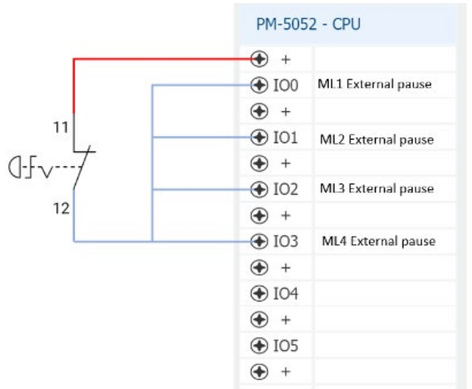
Pause Mainline

The action of this active mainline pause is similar to the manual pause mainline command.

External pause

The Scada will show the message External pause when it is paused by the external pause switch. “External pause”.

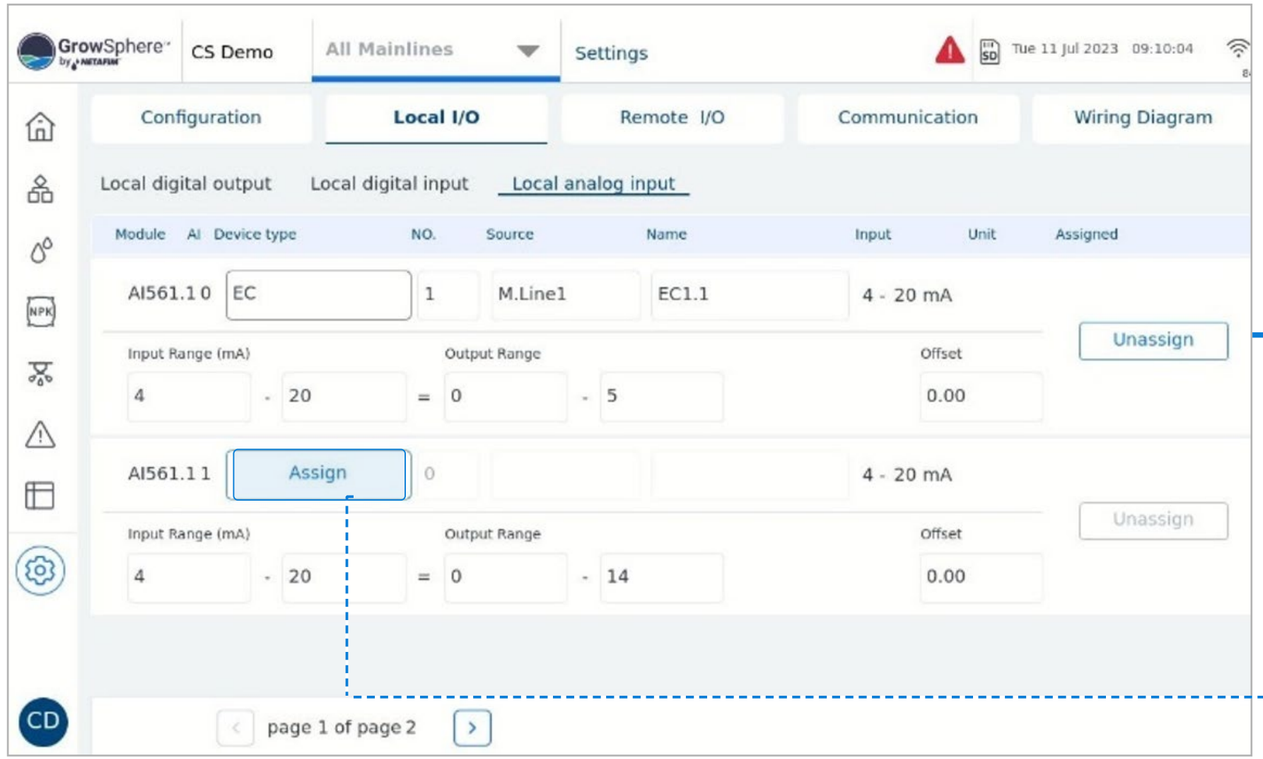
- When the mainline it is paused by the External it can be canceled only by an unactive DI.
- When the user would like to use only one External pause switch to pause all the mainlines, then will wire the Switch in parallel to the mainline Di selected for each mainline.
- Example of connection one External pause switch to 4 Mainlines.

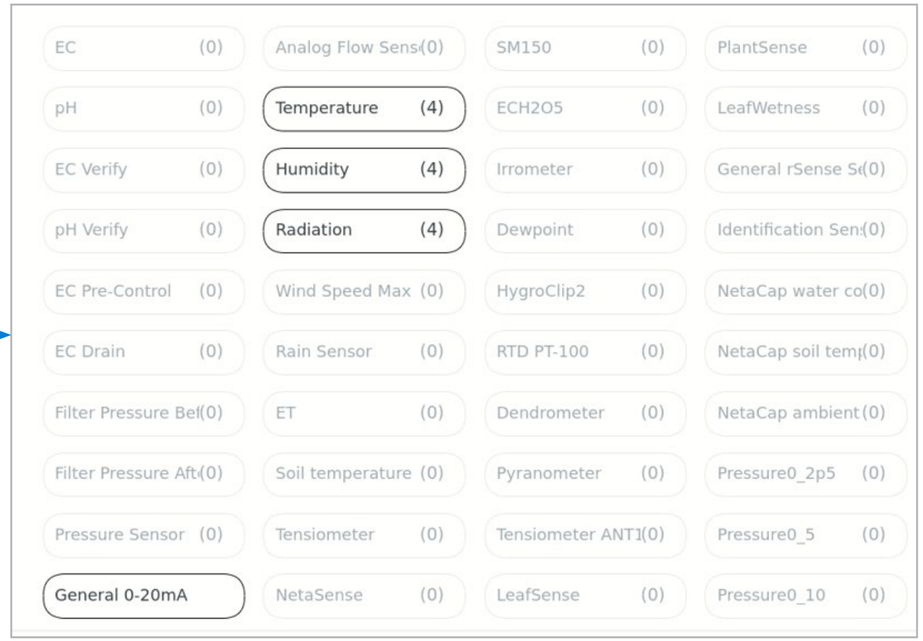


6.4.12 Configuring Local Analog Inputs

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

1. When you click on Assign, a list of devices that have been allocated will appear.
   From there, you can choose the sensor you want to work with and set the input ranges, name, and offset for each sensor
2. To assign additional analog sensors, navigate between the pages





Assign: By clicking on Assign, a pop up window open with the available options. The allocated devices are presented in there.

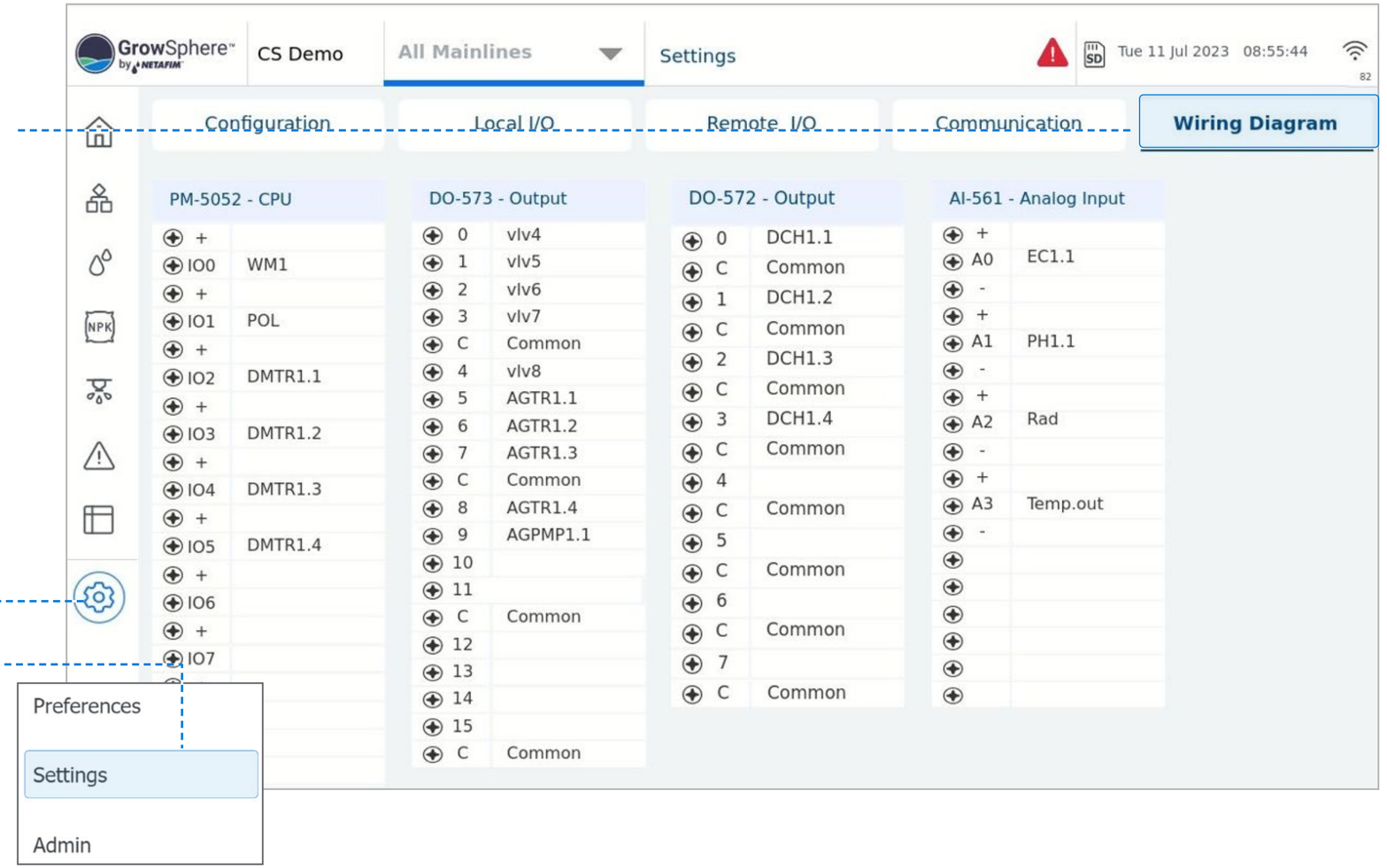
6.4.13 View the wiring diagram

The wiring diagram shows the module and port for each device that has been assigned. You can follow the diagram to connect the devices properly.

3. Tap the Wiring Diagram tab

1. Tap the Configuration tab

2. Select Settings and type your credentials



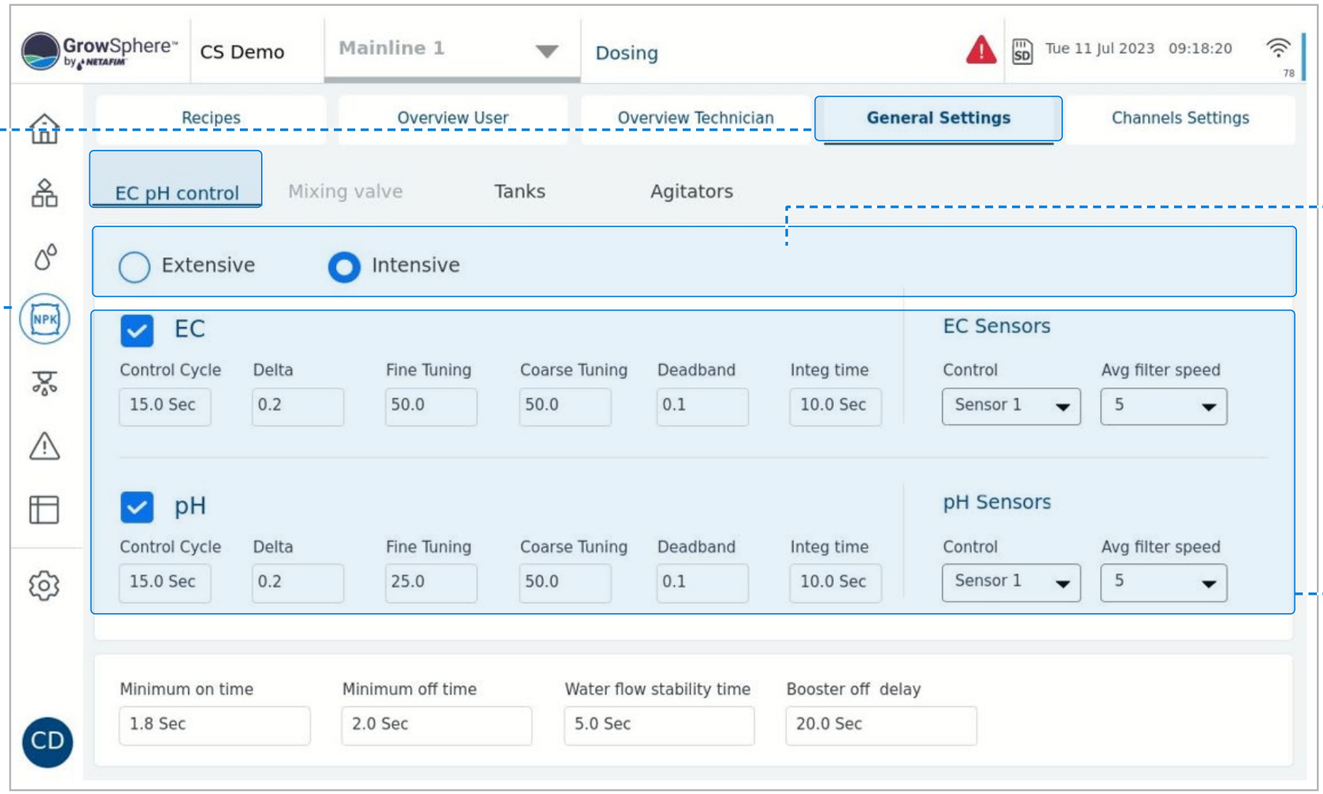
6.5 Configuring Dosing Settings

6.5.1 Configuring Dosing General Settings

When the dosing recipe defines target values for EC and pH, the proportional 1:1000 dosing method must be used.
In this case, the PLC controller adjusts the proportional quantities in the dosing recipe to ensure a constant EC/pH value is delivered based on the set EC/pH target values.
The parameters included in the calculations for the EC/pH control are explained in the next two pages:

2. Tap the General Settings tab

1. Tap the Fertilizer Dosing button



3. Select Extensive or Intensive

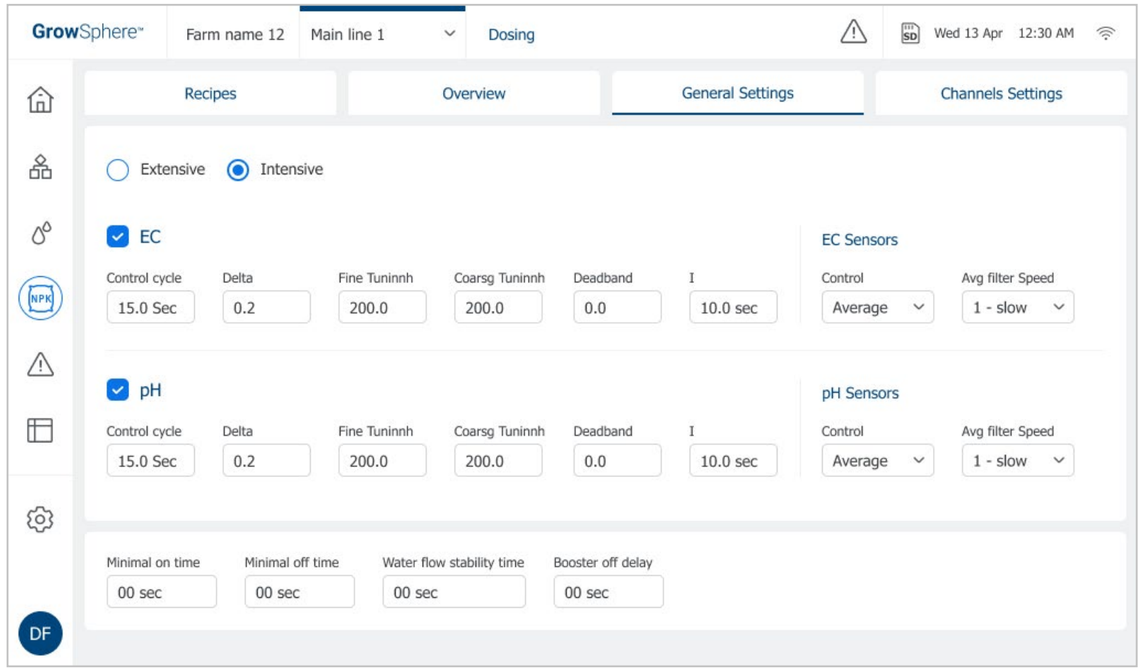
For an intensive and Extensive description:
See page 67. If extensively selected, the EC/pH reaction settings will be disabled.

4. Define the parameters

See next page.

Dosing Parameters:

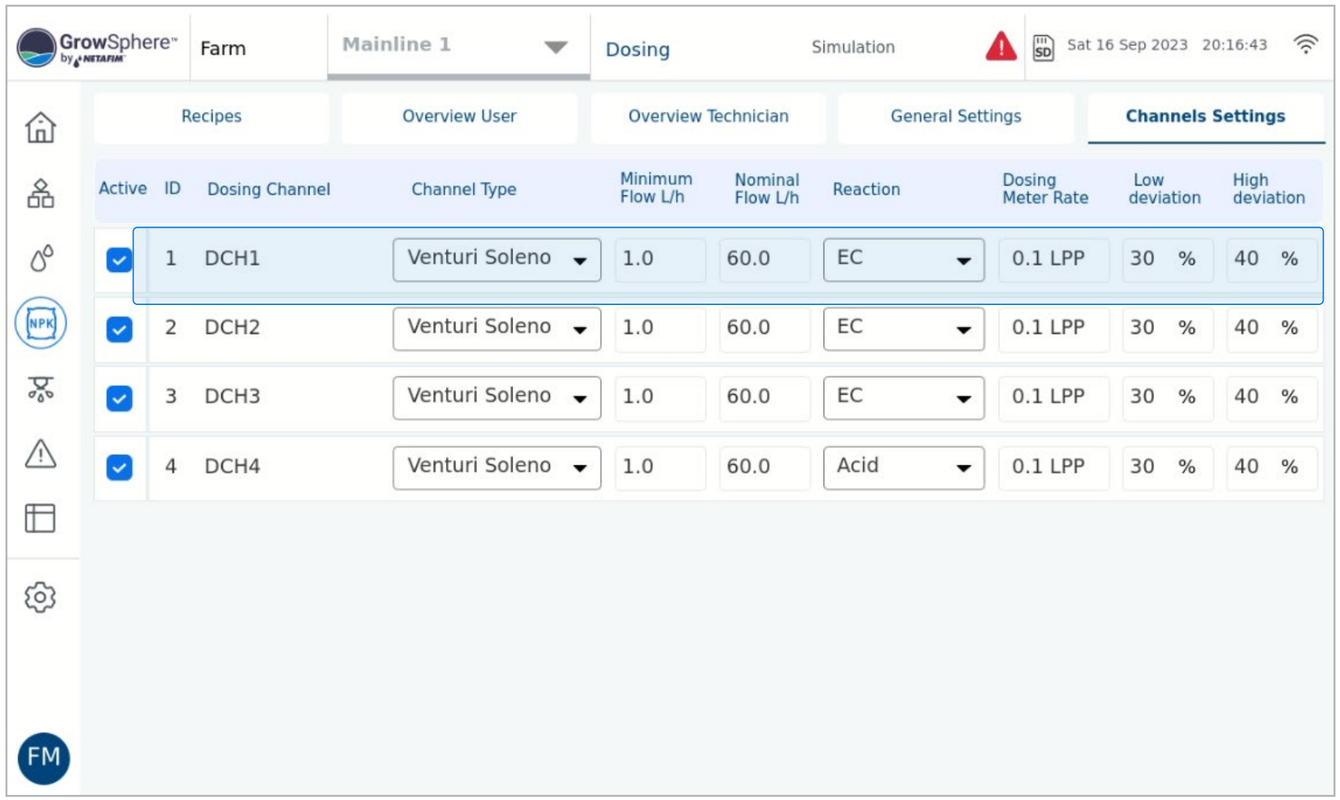
- **Control cycle:** The duration that the fertilizer needs to travel from where it is injected to where the EC sensor is located. During this duration, the fertilizer mixes with the irrigation water. The value of this cycle depends on several factors such as the distance between the injection point and the sensor location, the diameter of the pipe used, and the flow rate.
- **Delta:** 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.



6.5.2 Configuring Dosing Channel Settings

Perform the following steps to configure the dosing channel settings:

1. Activate the connected channels.
2. Define each channel's Type, Minimum and Nominal flow, Reaction, DM rate, and deviations.



- **Channel Type -** The options are Venturi, Electric, Hydraulic. The Default is Venturi Solenoid
- **Minimal Flow -** The minimal flow rate that the dosing channel can work. The units are l/h and g/h. Default is: 1.0
- **Nominal Flow:** it is a nominal flow rate that the dosing channel was set manually at the channel. Sometimes it is known as a maximal dosing channel flow rate. The units are l/h and g/h. Default is 1.0
- **Reaction -** the type of fertilizer or chemical that has an influence on the EC/pH Control The options are: Passive, EC, Acid, and Alkaline The default is Passive.
- **Dosing Meter Ratio -** When was set a Dosing Mater then the user will set the pulse rate for each Dosing Meter. The units are PPL (pulses per liter), LPP (liter per pulse). Imperial Units: PPG (pulses per gallon), GPP (gallons per pulse). The Default is LPP.
- **Low Deviation -** the calculated minimal percentage that the dosing valve can be open compared to minimal deviation % settings
- **High Deviation -** The calculated maximal percentage that dosing valve can be open compare maximal deviation % settings

6.6 Defining Alert Settings

Online alerts

The online Alerts icon is displayed on dashboard screens as either Active or Not active. Its color varies according to the severity of the alert.

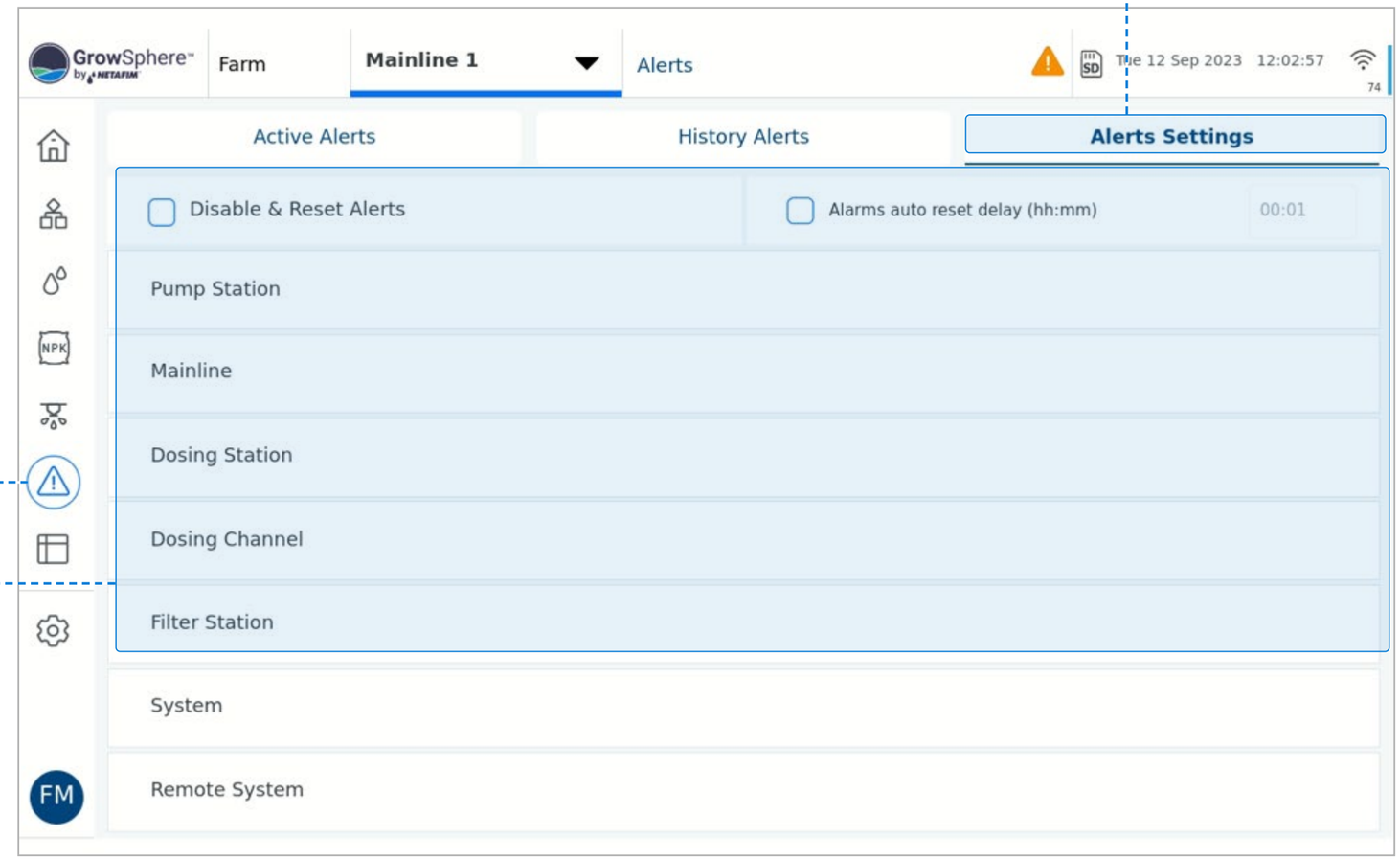
SMS – Active alerts can be sent via SMS to Three phone numbers (see System preferences).

Clicking on each parameter leads to a dedicated screen, with all the functions for alerts.

Disable & Reset Alerts – Disable all alerts to be inactive.

Alarms auto reset delay – Specific time in which all alerts will be reset.

2. Tap the Alerts Settings tab

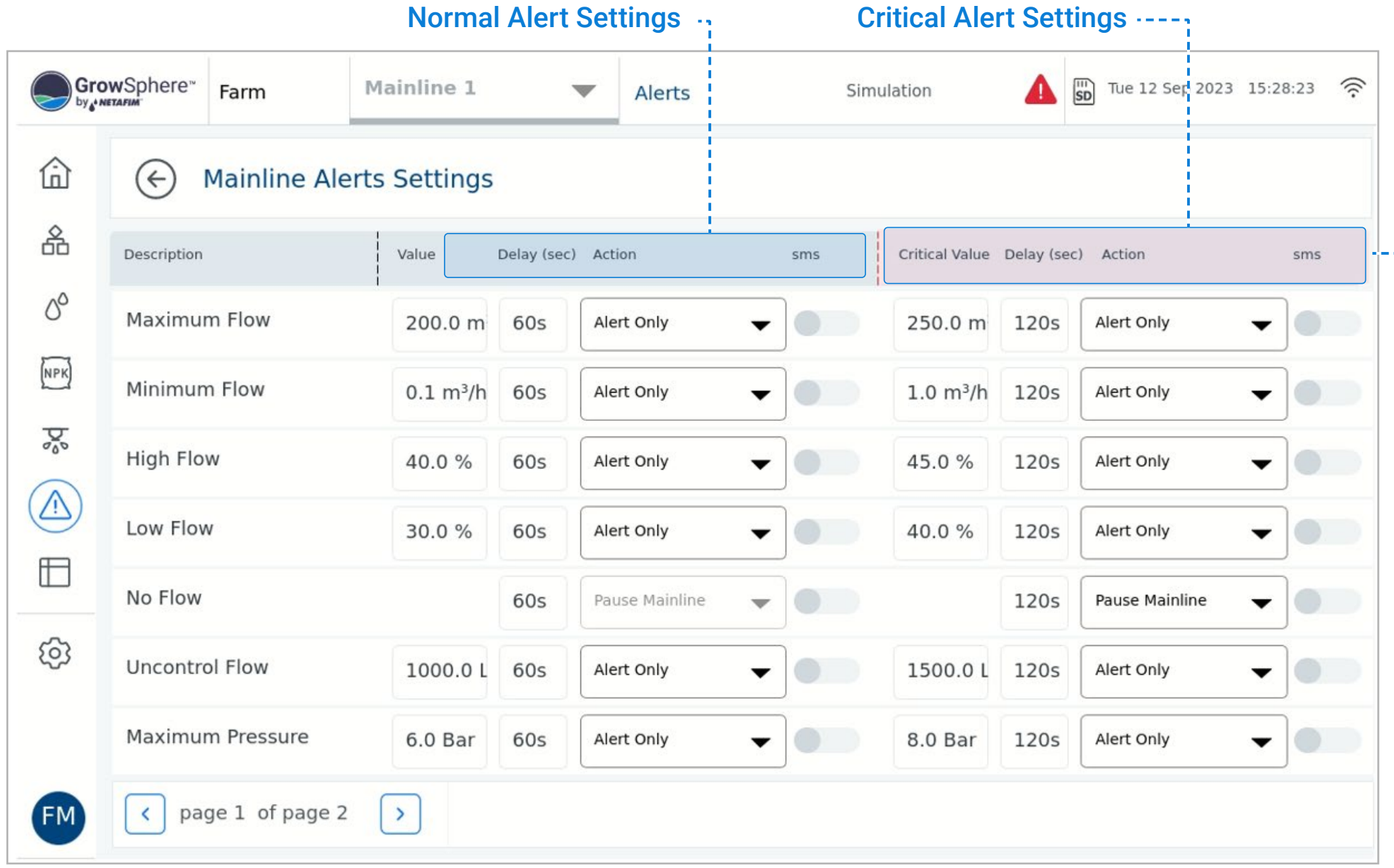


1. Tap the Alerts button

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: normal and critical.



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: Alert only, Pause Mainline, Stop dosing, Skip program.
- **SMS:** Option to receive an SMS notification when an alert is triggered.

7. Controller Operation

This chapter reviews the following routine operations:

1. Managing Irrigation Programs
2. Managing Fertilizer Dosing
3. Managing Alerts
4. Connecting Dosing Outputs
5. Resetting Accumulation
6. Connecting Analog Inputs
7. Monitoring Irrigation

7.1 Managing Irrigation Programs

This section reviews managing irrigation programs and includes:

1/ **Irrigation Program Dashboard**

2/ **Editing Irrigation Program Parameters**

3/ **Assigning Irrigation Program Shifts**

4/ **Editing Existing Irrigation Program**

7.1.1 Irrigation Program Dashboard

To create a new irrigation program, click on 'Insert new program'.
To edit an existing program – Click on the three dots of any program

Irrigation Method
Explained in chapter: General Program Settings.

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

Date and time of next irrigation session

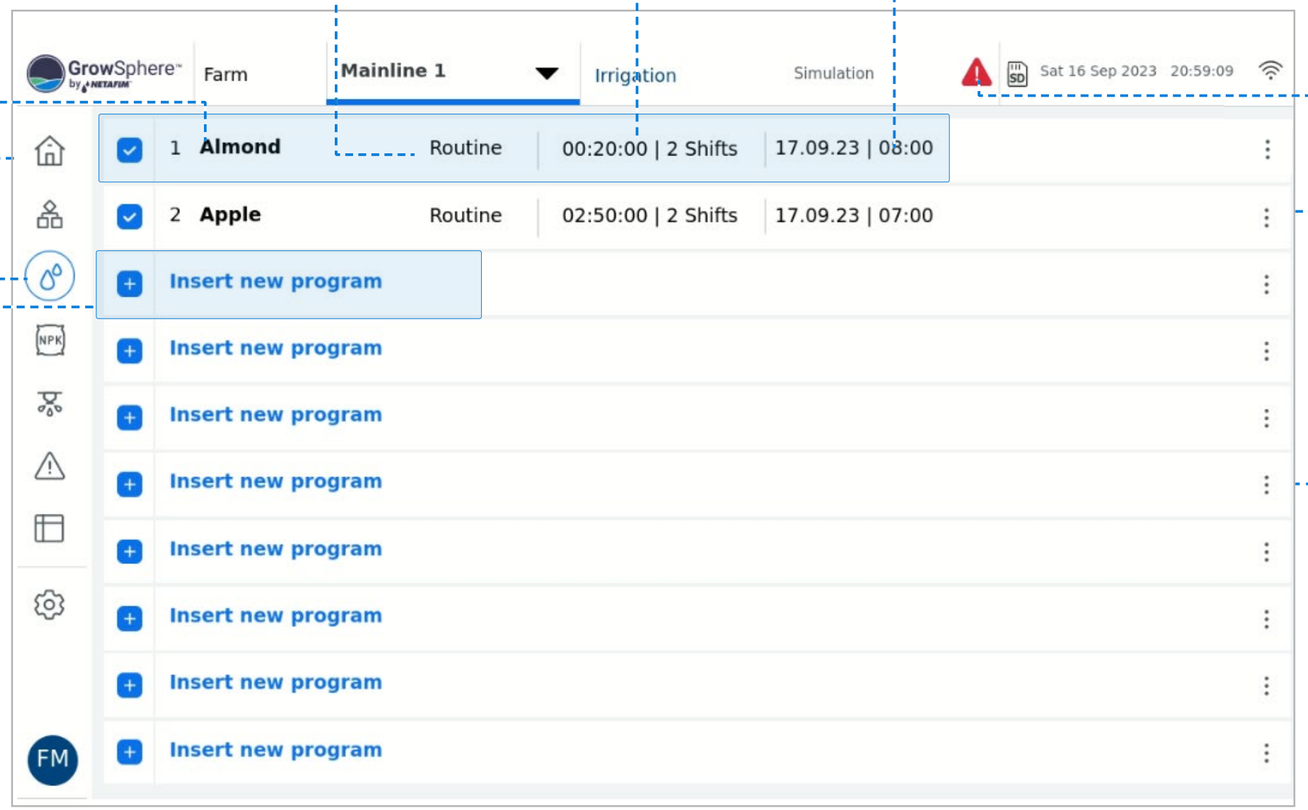
Irrigation Program Name

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

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

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

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



Alerts
See Managing Alerts for more information.

Program Status
Shows one of the following program statuses:

Waiting in queue
In queue

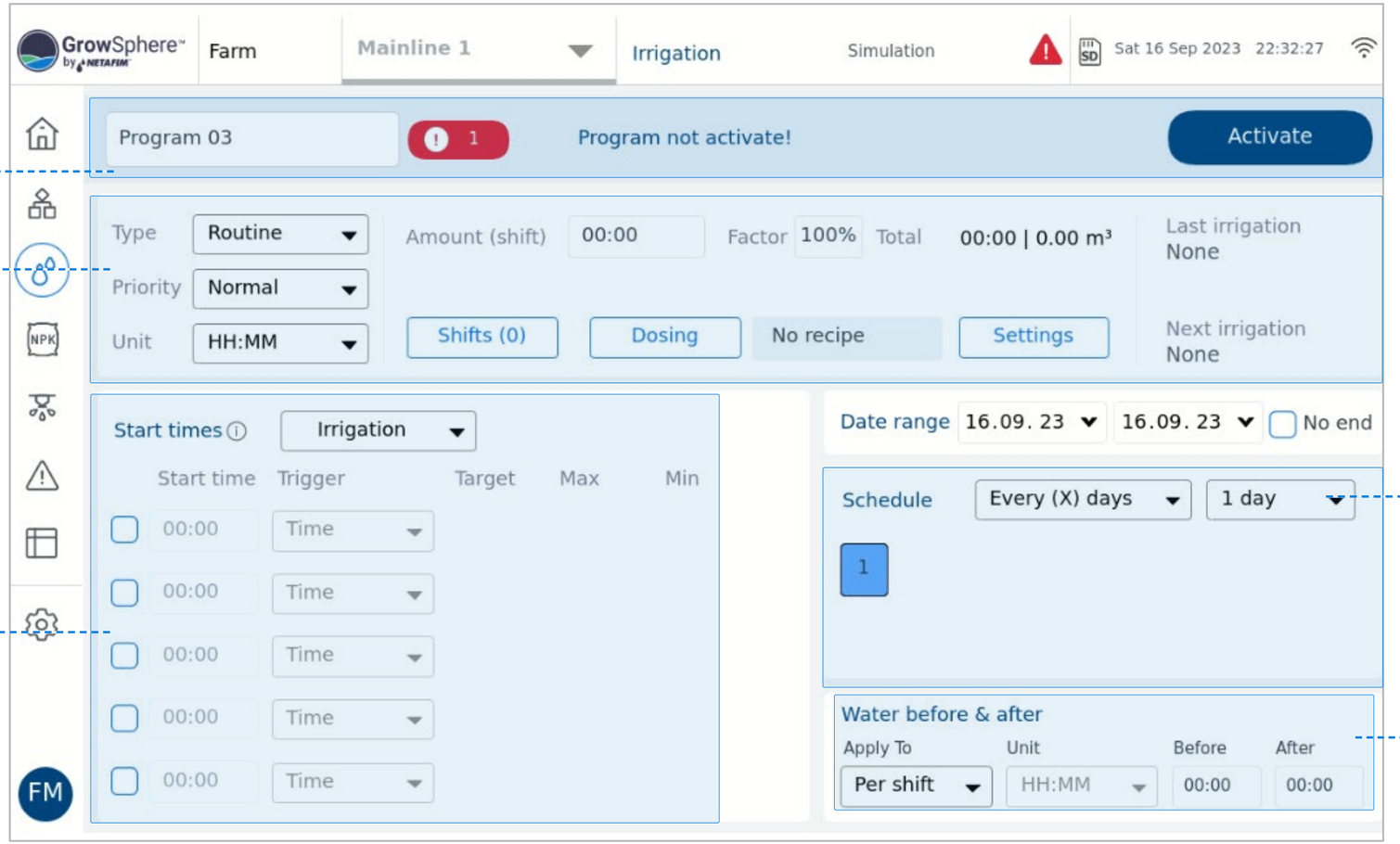
Paused by Alarm
Paused by alarm

Manual paused
Manually paused

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

7.1.2 Editing Irrigation Program Parameters

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



Irrigation Program Top Bar

General Program Settings

Date and Time Settings

Program Schedule Settings

Water before and after

Irrigation Program Top Bar

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

Program is not running

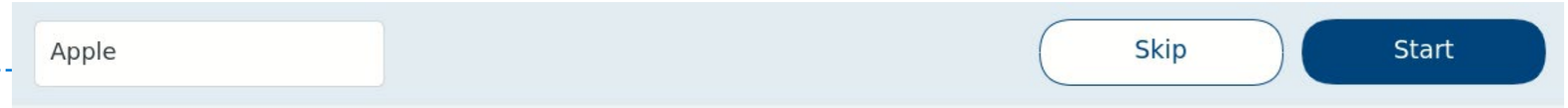
Program can be activated following the initial settings by clicking Activate.

Irrigation program is running

Options include Skip Options (Skip shift, Stop & Skip current irrigation, Skip next irrigation start time), or pausing the mainline.

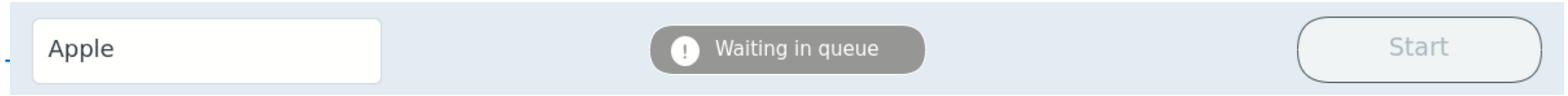
Irrigation program is not running

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



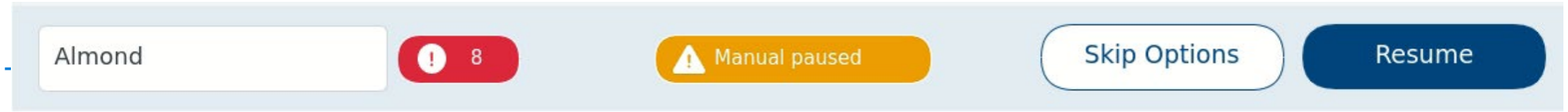
Irrigation program is waiting in queue

The program become activated according to their order in the queue



Irrigation program was manually paused

Options include Skip Options (skipping on the current or next program) and resume the program.



The Controller will generate alerts for the following conflicts when generating an irrigation program:

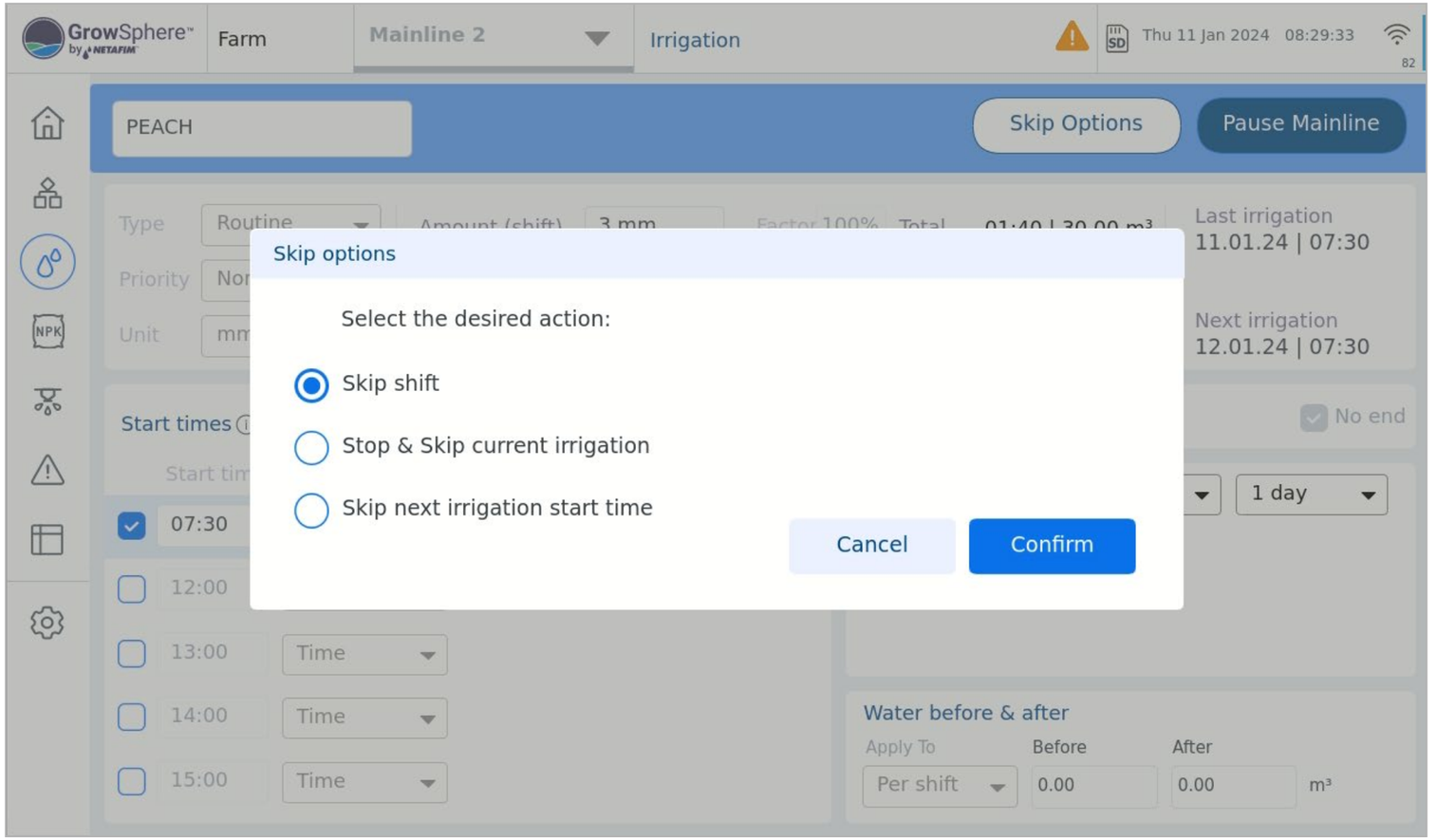
1. The program exceeds the Day End Time.
2. The total flow rate of an irrigation shift exceeds the maximal flow rate of the main line.
3. The total flow rate of an irrigation shift is below the minimal primary line flow rate.
4. An irrigation valve selected corresponds to a different main line.
5. The linked dosing recipe cannot be executed properly

Manual Activation Start/Stop of Program

An irrigation program may be started manually by a user. If this program has a future start time and date, then the user must choose whether the program will run immediately instead of at the initially programmed start time or in addition to it. The user can select to skip the next start time. When the Irrigation program has more than one start time, only the next start time waiting to be activated will be skipped.

- The user selects whether the program runs now or at the set time and date. If the program runs now, it will wait until the current program is completed. If the user decides to cancel the irrigation program that is running, then the manual program will be executed.
- If the user wants to pause, skip a program or shift, or stop the program that is running, it keeps running until one of the following options is selected and confirmed:

1. Continue running, no change, and return to the previous screen
2. Pause the entire program, then confirm
3. End the entire program, then confirm
4. End the current irrigation shift and skip to the next shift in the sequence, then confirm. This happens when one or more shifts are in the sequence after the current shift (irrigation Vales). If it is the last shift in the irrigation program, then the program ends.



NOTE

A shift can contain a single irrigation valve or a group of valves. A Shift can contain up to 16 irrigation valves. All the vales in a shift run simultaneously.

General Program Settings

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

1. Select the type

Options include One Time, Routine, Rolling and Emergency

One-time Program - The user can create a one-time program only for a one-time run. This program runs only on the specified day and time. Once execution is completed, it becomes inactive.

Emergency Program - The one with the highest priority, higher than any other programs designated with high priority. This program is executed immediately. Once completed, the Hydraulic Manager will resume the irrigation program that was paused.

Rolling Program - A regular program that has a Start Time, Start Date, and End Date, and it runs constantly in consecutive cycles. Once the last shift-irrigation ends, the sequence starts again.

Routine program - Operated routinly by date and time, and consists of Up to 5 start-times per day.

2. Select the priority

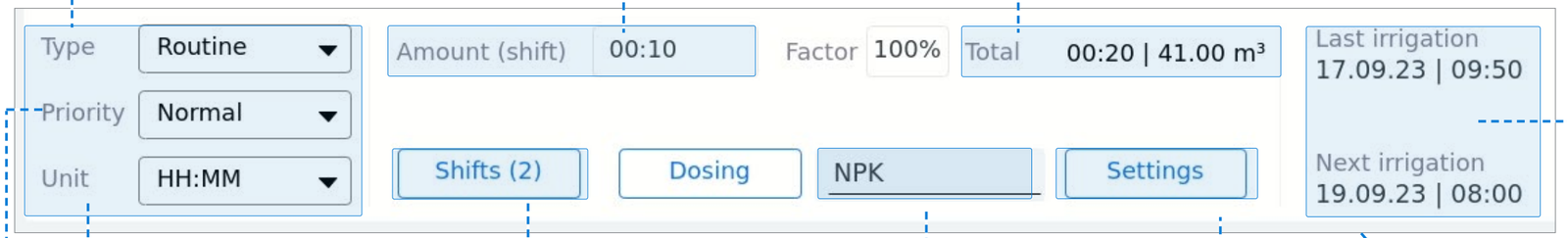
Enables designating the irrigation program's order in the queue. A **High** priority program is placed higher up in the queue and will thus execute before a **Normal** priority program.

Amount

Displays amount of water used per irrigation shift (HH:MM).

Total

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



Last/Next Irrigation

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

3. Select the unit

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

4. Assign shifts

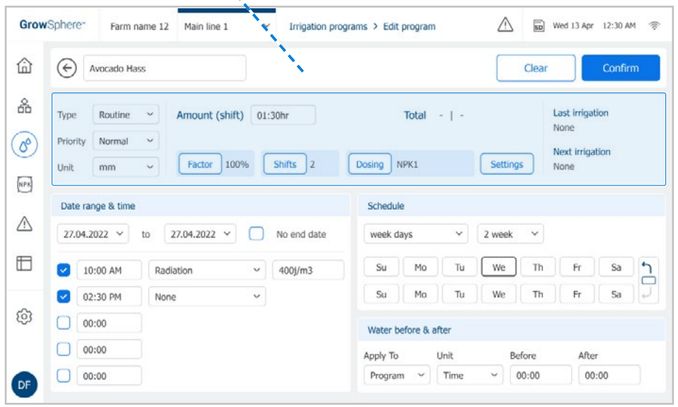
See Assigning Irrigation Program Shifts

5. Link a dosing recipe

See Selecting Dosing

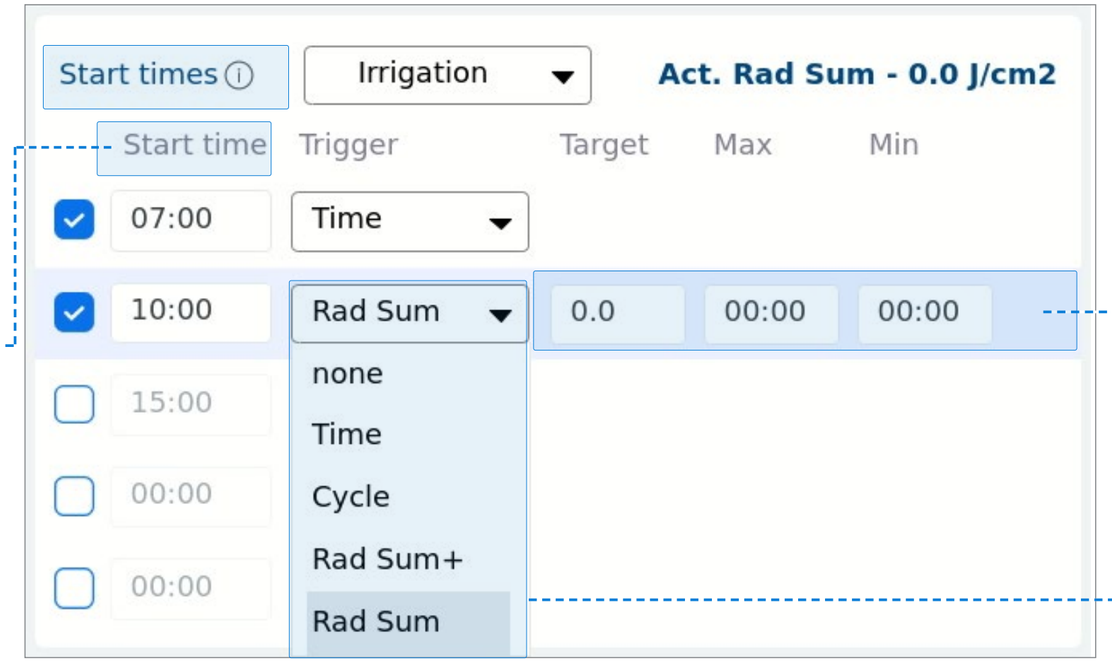
6. Set start/end time,

Triggers delays and radiation sensor (if directly wiring or weather station connected)



Date and Time Settings

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



3. 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.

2. Additional Settings

- **Target** – Target of radiation intensity to activate the irrigation cycle
- **Max** – Maximum radiation intensity beyond it irrigation will not be provided
- **Min** – Minimum radiation intensity under it irrigation will not be provided

1. Trigger

- **None** – Will use as an end to the previous start time without irrigation
- **Time** – By time
- **Cycle** – Every X time (set as a target)
- **Rad Sum +** - Start with irrigation and continue according to Rad sum thresholds
- **Rad Sum** – According to Radiation sum thresholds

4. Condition

To use Conditions – Please see the chapter:
Irrigation Programs – Conditions & Triggers

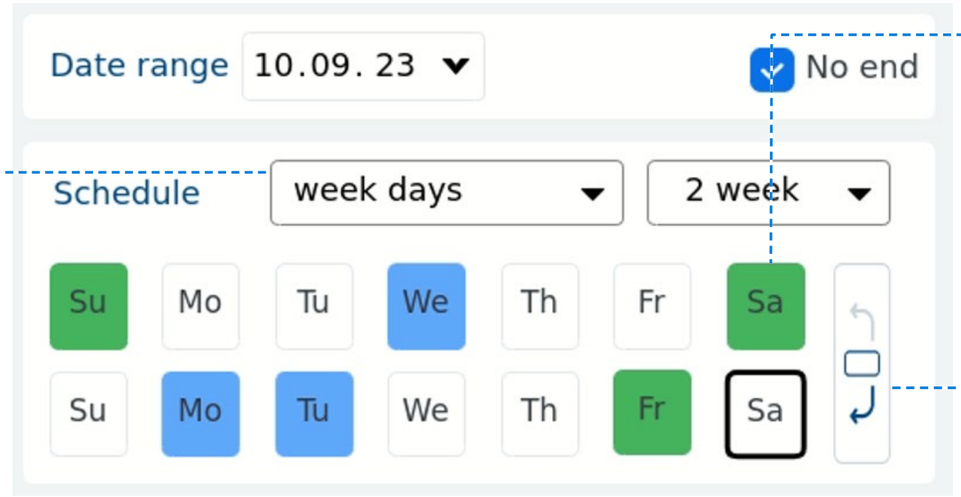
Program Schedule Settings

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

1. Select one of the two scheduling options:

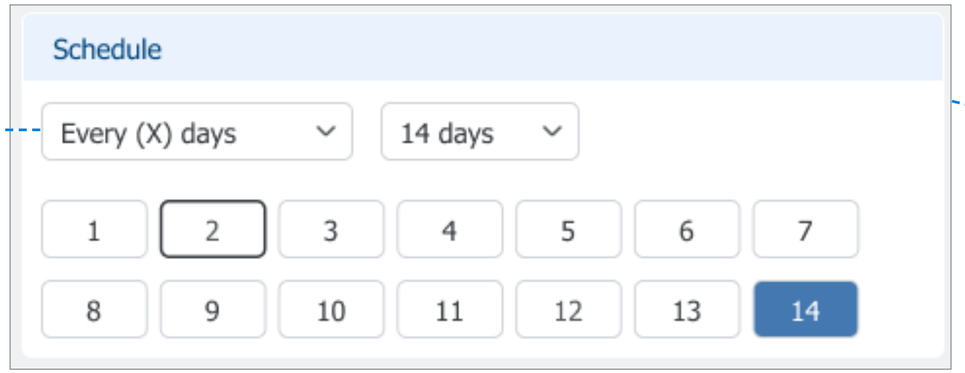
Week days

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



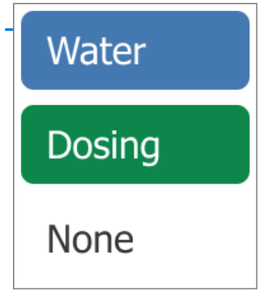
Every (X) days

Irrigation occurs once every set number of days.

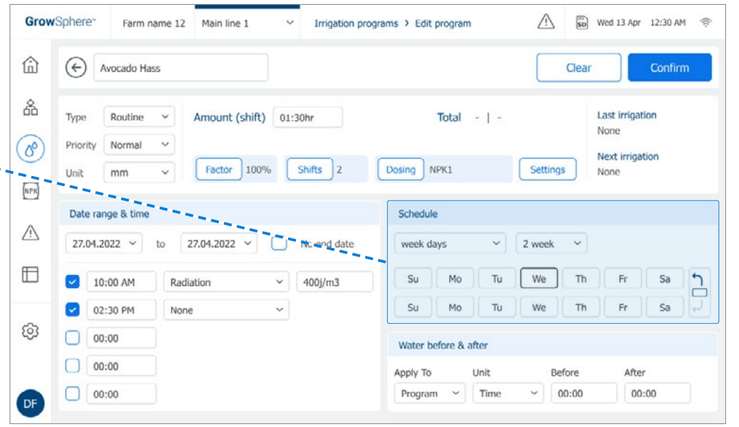


2. Select whether irrigation includes only water (blue) or water and dosing (green), or no irrigation at all (None).

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



Click on the icon to skip between the next or previous week scheduling



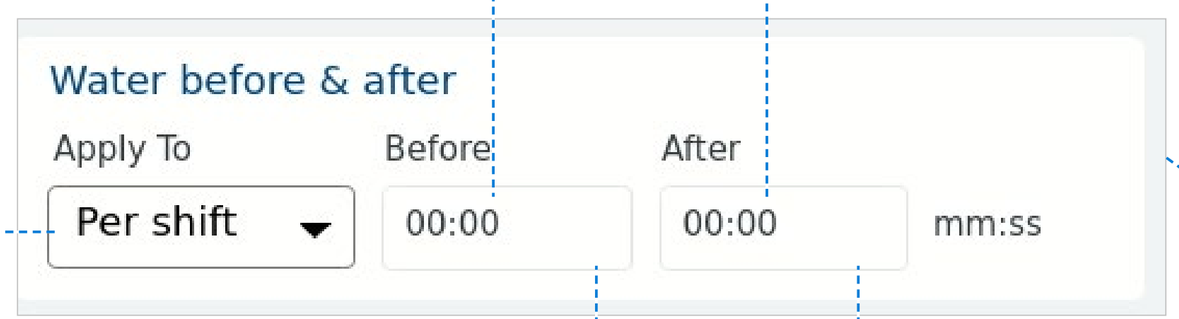
Water before and after

Water before and after:

When a dosing recipe is linked to a shift, users can set delay options for Water Before and Water After using hh:mm:ss, m3, or THG units.

2. Select Time or Quantity

3. Define amount of time or quantity of water



1. Select Shift or Program

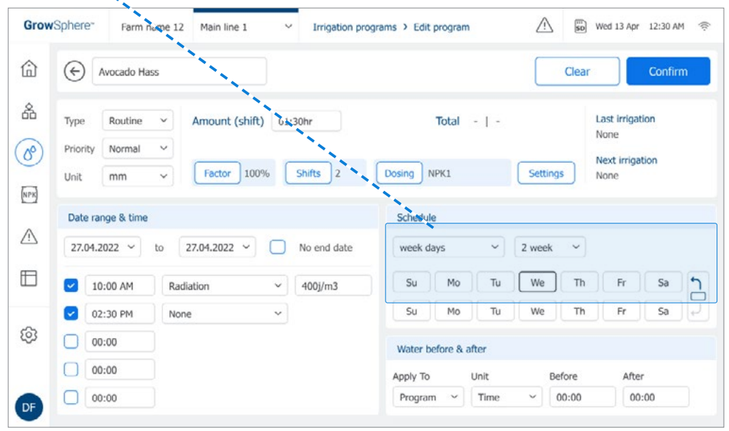
Defines whether water before and after delivery of fertilizer occurs before and after the irrigation program or for the shifts in the irrigation program.

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.



7.1.3 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:

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

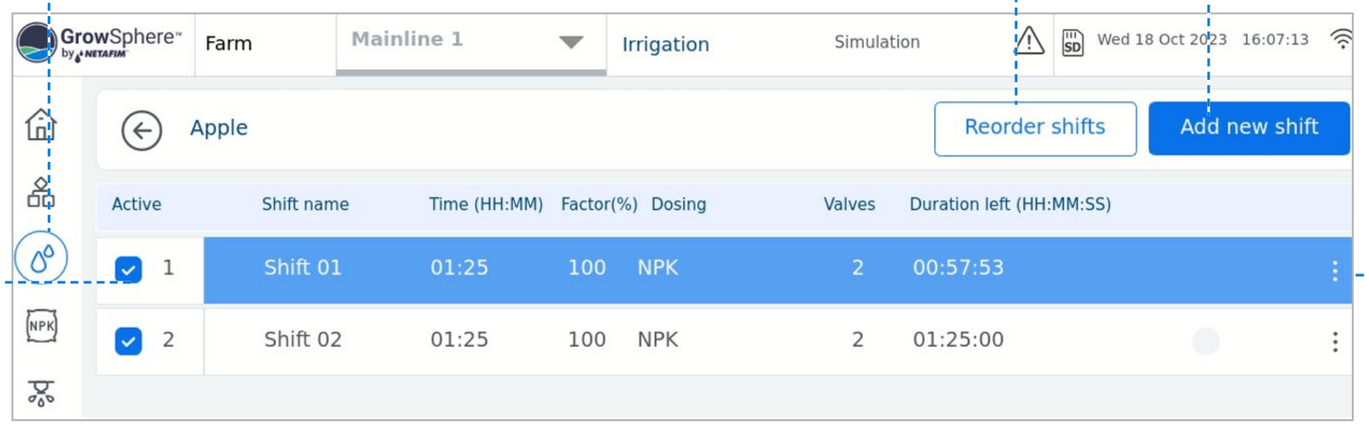
3. Tap the Add new shift button to create a new shift (see Editing Shift Parameters).

1. Tap the Irrigation programs 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.

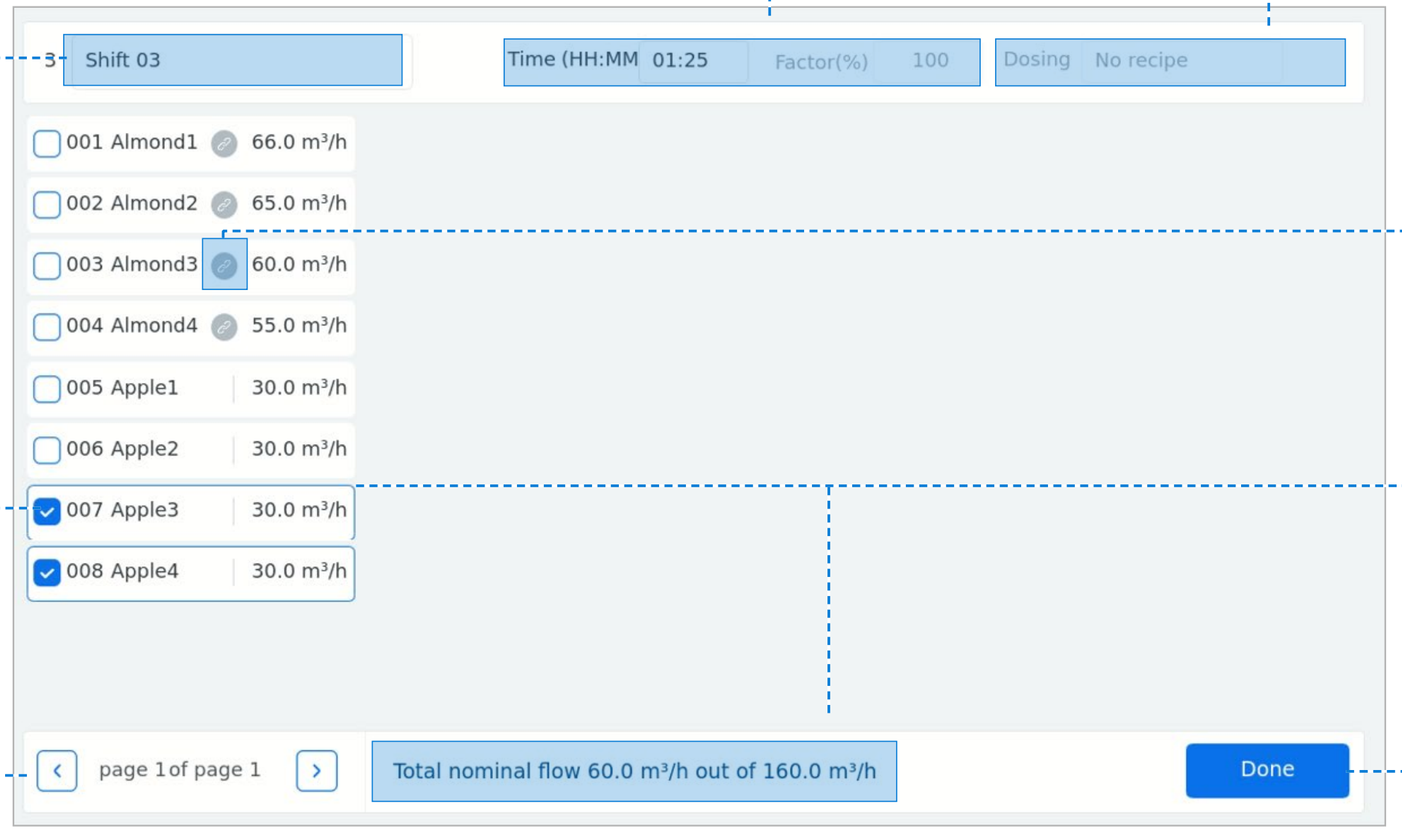


4. Review current shift information:

- **Active:** Check mark indicates shift is active.
- **Shift status:** Colored bar indicates an active status of a shift.
- **Shift name:** The name of the shift.
- **Amount:** Water to be supplied per shift. Can be in mm, quantity, HH:MM or MM:SS (according to predefine units).
- **Factor:** Percentage to be added or reduced from the irrigation shift (100% is the predefined shift time or quantity).
- **Dosing:** Dosing recipe linked to the irrigation shift (see Selecting Dosing).
- **Valves:** Number of valves assigned to each shift.
- **Duration left (m3):** Amount of water until completion of 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

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

3. Link a dosing recipe

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

5. Tap arrow buttons to view additional valves

6. Tap Done

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.

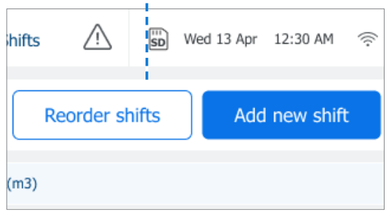
Total nominal flow rate

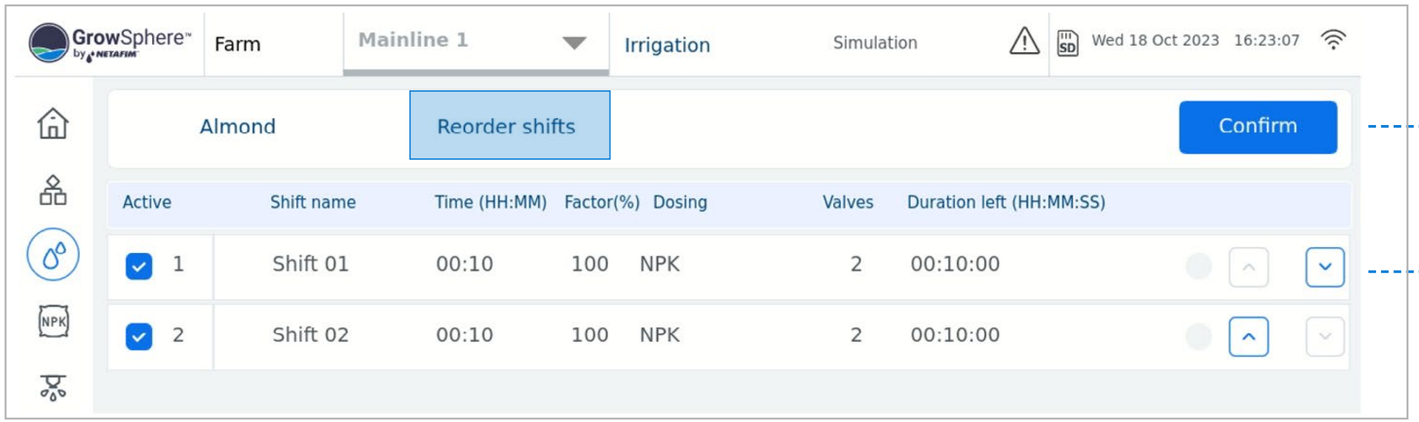
The nominal flow of the selected valves and the nominal flow of the main line. If the total flow rate of all selected valves exceeds the flow rate of the main line, the text becomes red.

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





3. Tap **Confirm** to save changes

2. Tap the arrows to move shifts up and down

NOTE

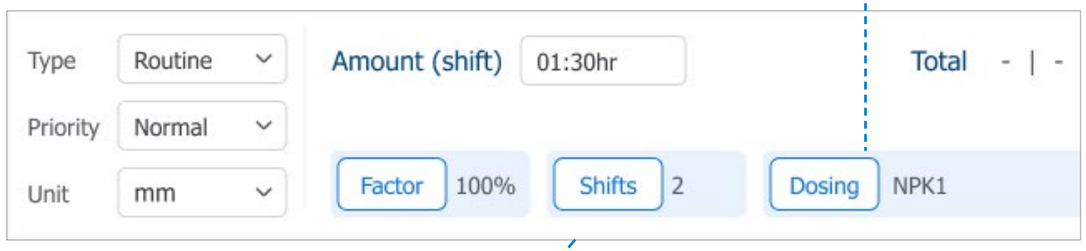
Irrigation proceeds according to the order of shifts in the list, starting from the top.

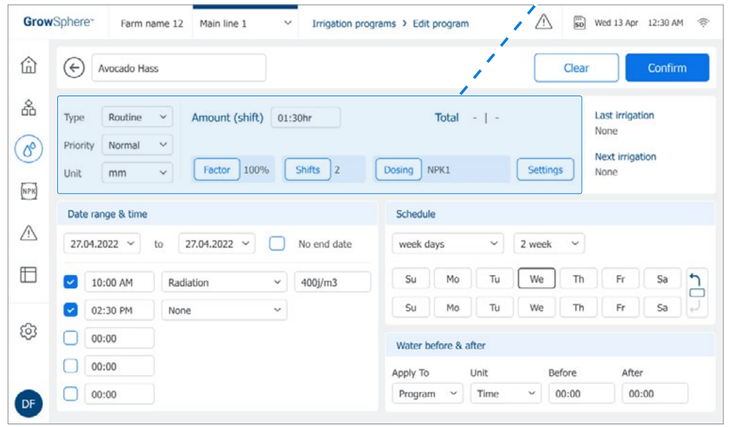
7.1.4 Selecting Dosing

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.





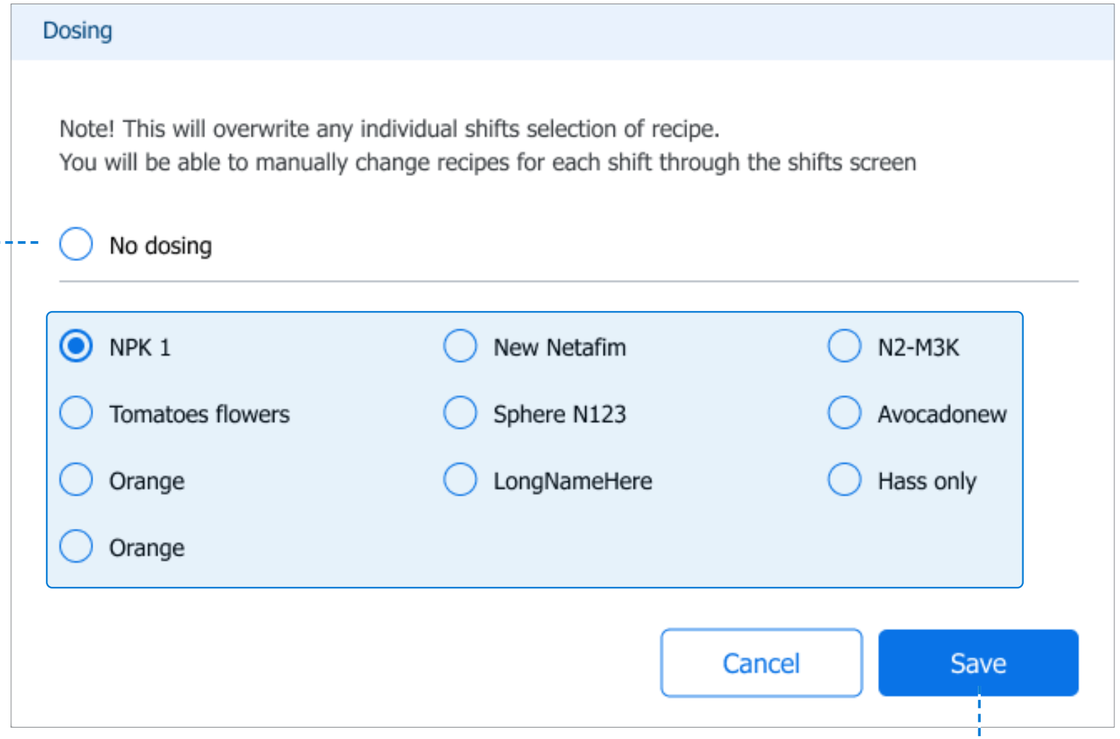
NOTES

- 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.

3. If no dosing is necessary, select No dosing



4. Select a dosing recipe

5. Tap Save

7.2 Managing Fertilizer Dosing

This section reviews managing fertilizer dosing and includes:

1 **Overview User Screen**

2 **Managing Dosing Recipes**

7.2.1 Overview User Screen

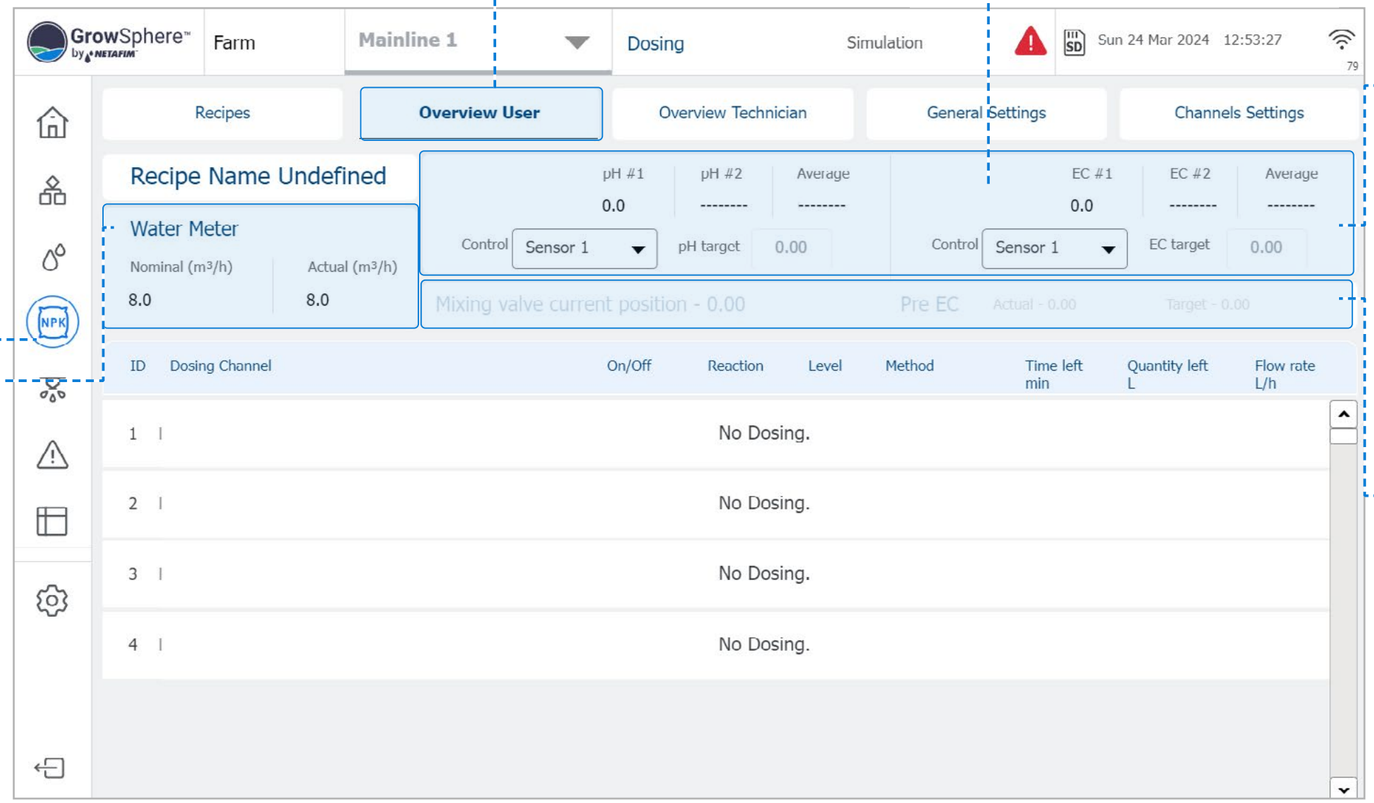
When logged in as a technician, the Overview tab includes the following:

Verify the **Overview User** tab is selected.

Target pH and Target EC

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

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.

EC/pH Channel Parameters

- **Sensor #1:** Reading of sensor #1.
- **Sensor #2:** Reading of sensor #2.
- **Average:** The average of pH sensors #1 and #2.
- **Target:** Enables defining the pH set point.
- **Control:** Enables selecting the reading will be used to control the EC/pH (can be one of the two sensors or the average of the two).

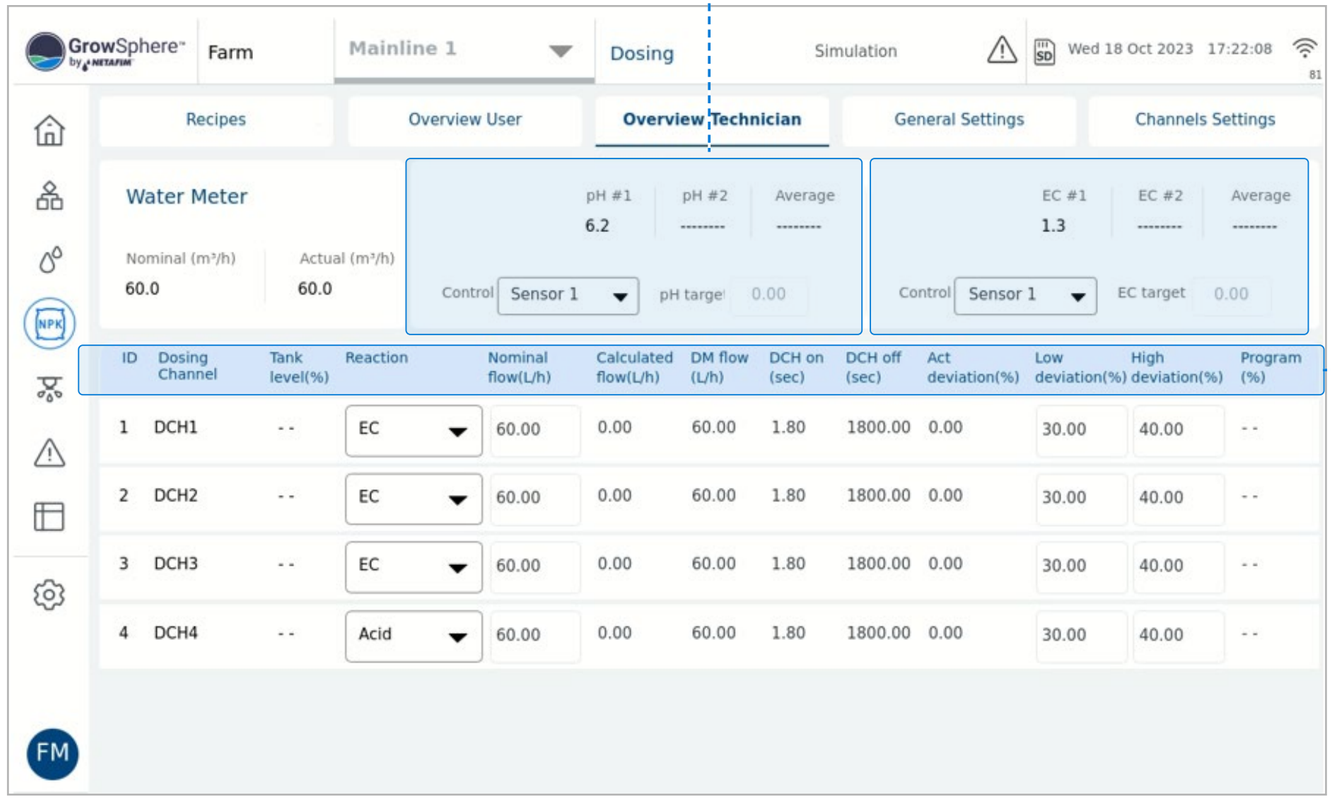
Mixing Valve and Pre-EC

Overview Technician Screen

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

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).



Dosing Channel Parameters

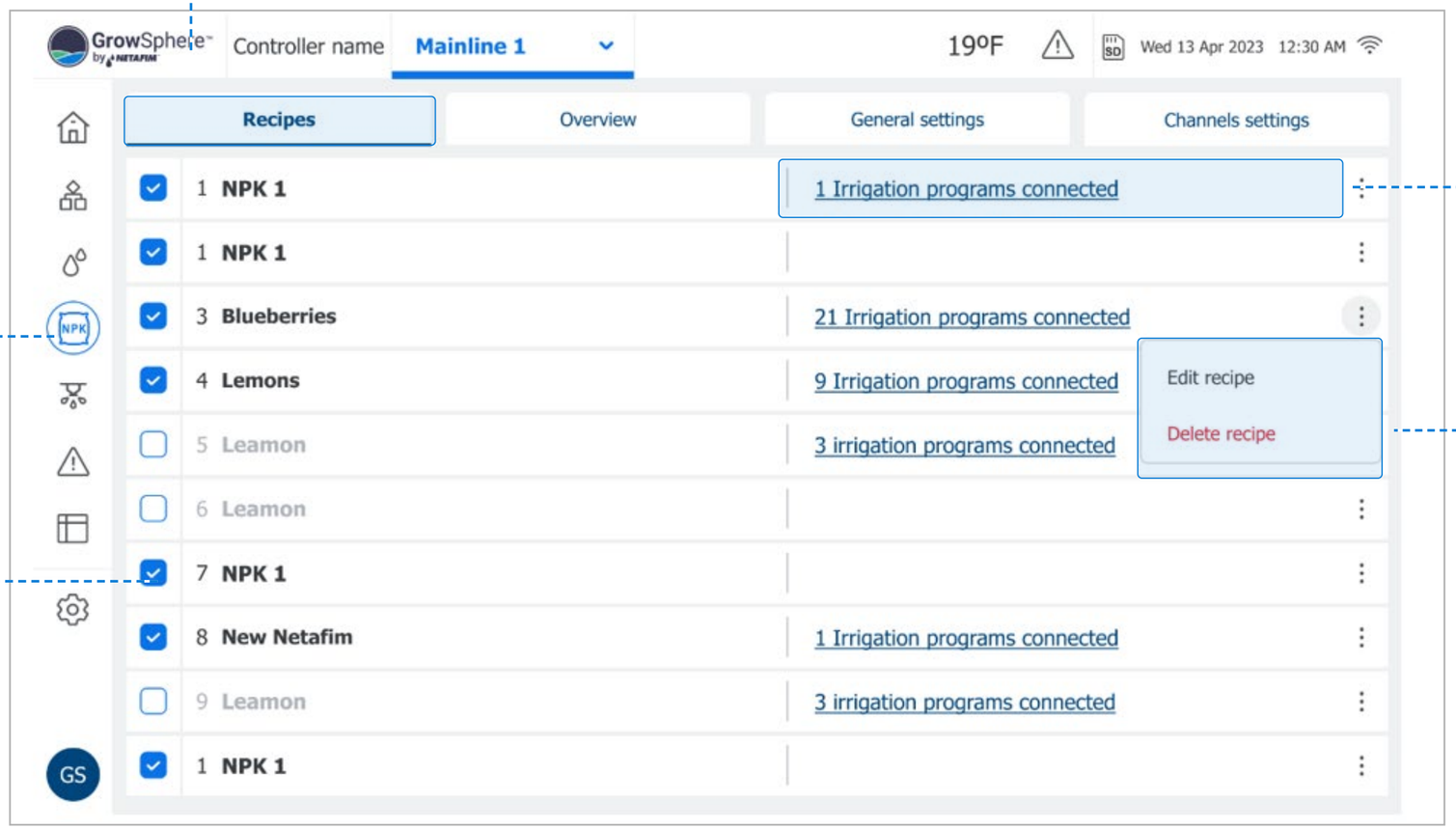
- **Tank Level (%):** Indicates the amount of fertilizer in the storage tank.
- **Reaction:** Defines the kind of reaction effecting the EC/pH control expect from the fertilizer in the tank.
  - **Passive:** Fluid that does not affects the EC/pH control.
  - **EC:** Fertilizer that will increase the 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.
- **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.

7.2.2 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



1. Tap the Fertilizer Dosing button

3. Activate the relevant dosing recipes

Inactive recipes are grayed out.

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:

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

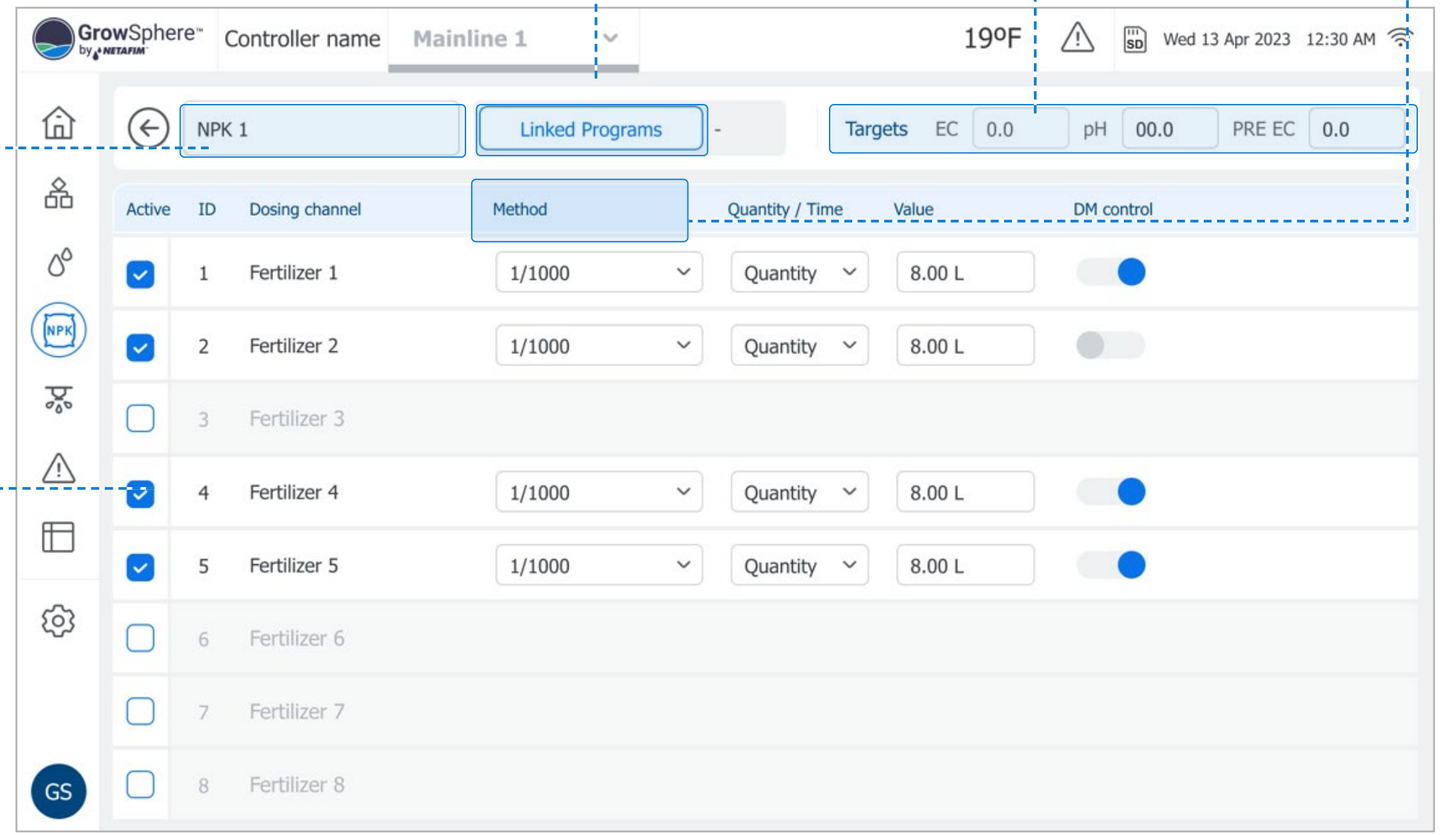
1. Name the dosing recipe

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

2. Activate the relevant dosing channels

3. Target EC, target pH

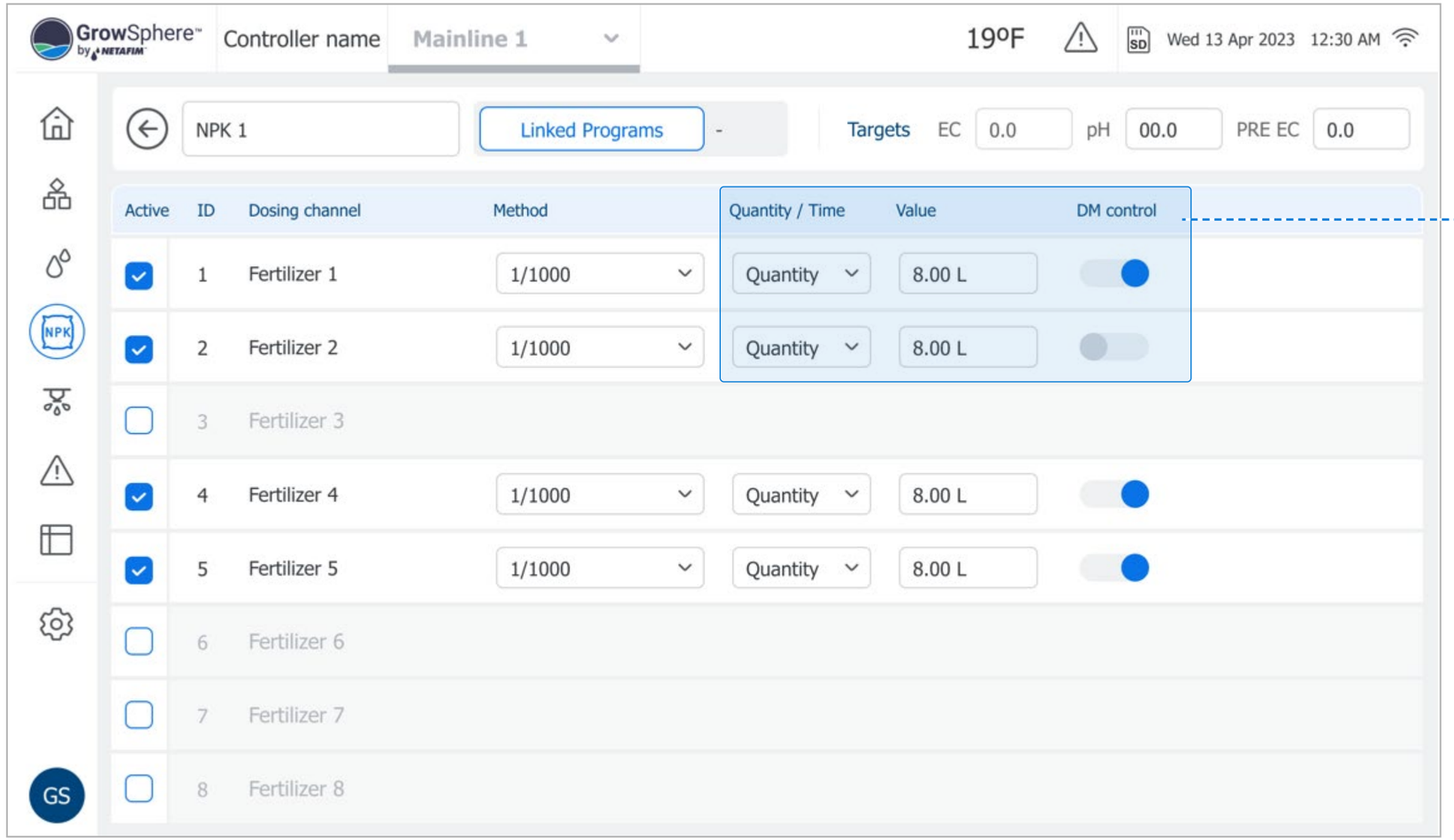
Displays the defined target EC/pH values.



4. Define the following parameters:

For each dosing channel, the folowing 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 litter of fertilizer for 1000 litters 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 constituently 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.



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.

7.3 Managing Alerts

This section reviews managing system alerts and includes:

1. **Viewing Active Alerts**
2. **Viewing Alert History**

7.3.1 Viewing Active Alerts

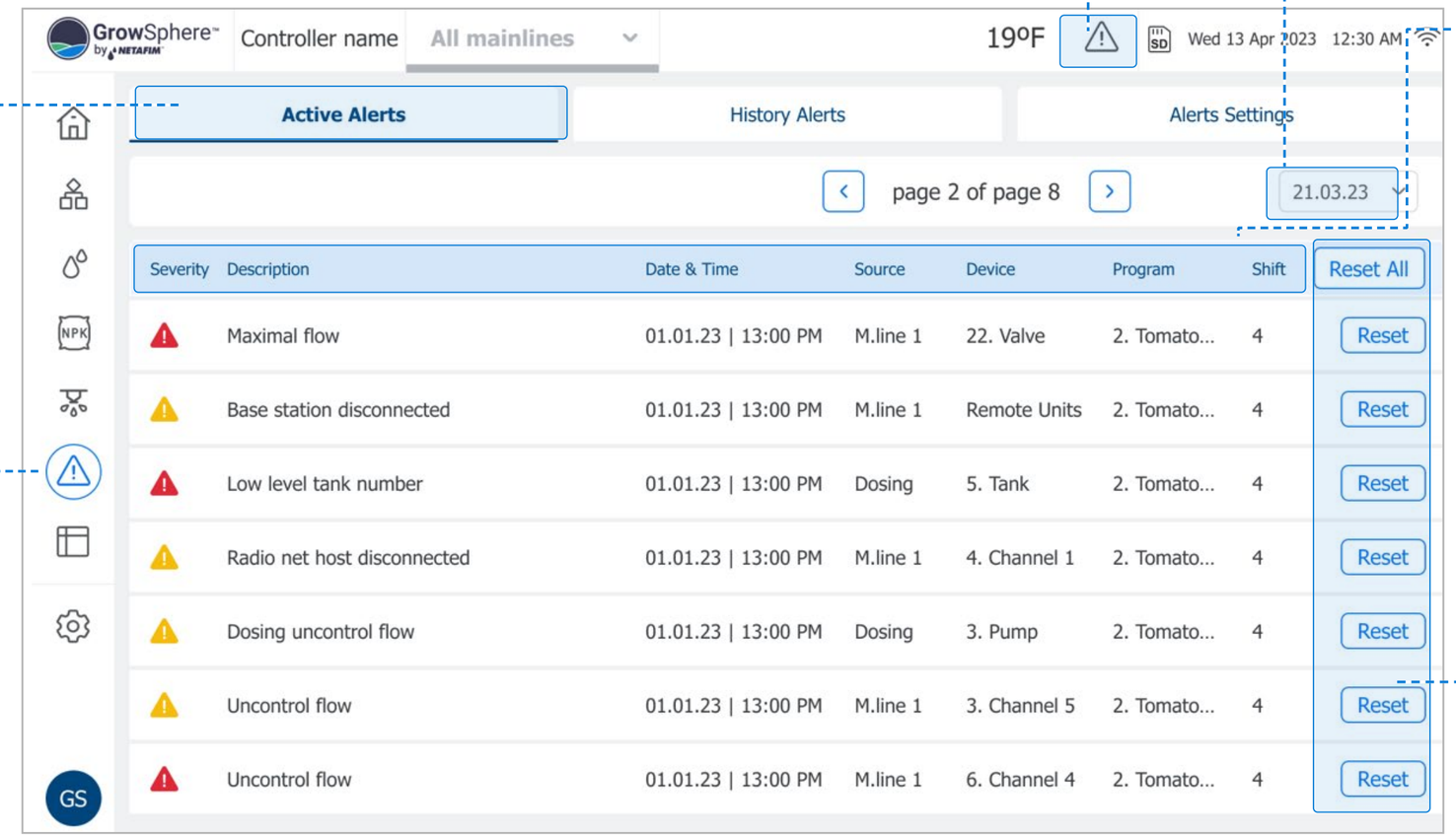
Active alerts includes all alerts that are currently active and alerts that were activated and were not reseted. Perform the following steps to view information about currently active alerts:

Active alert icon

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

2. Tap the Active Alerts tab

1. Tap the Alerts button



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

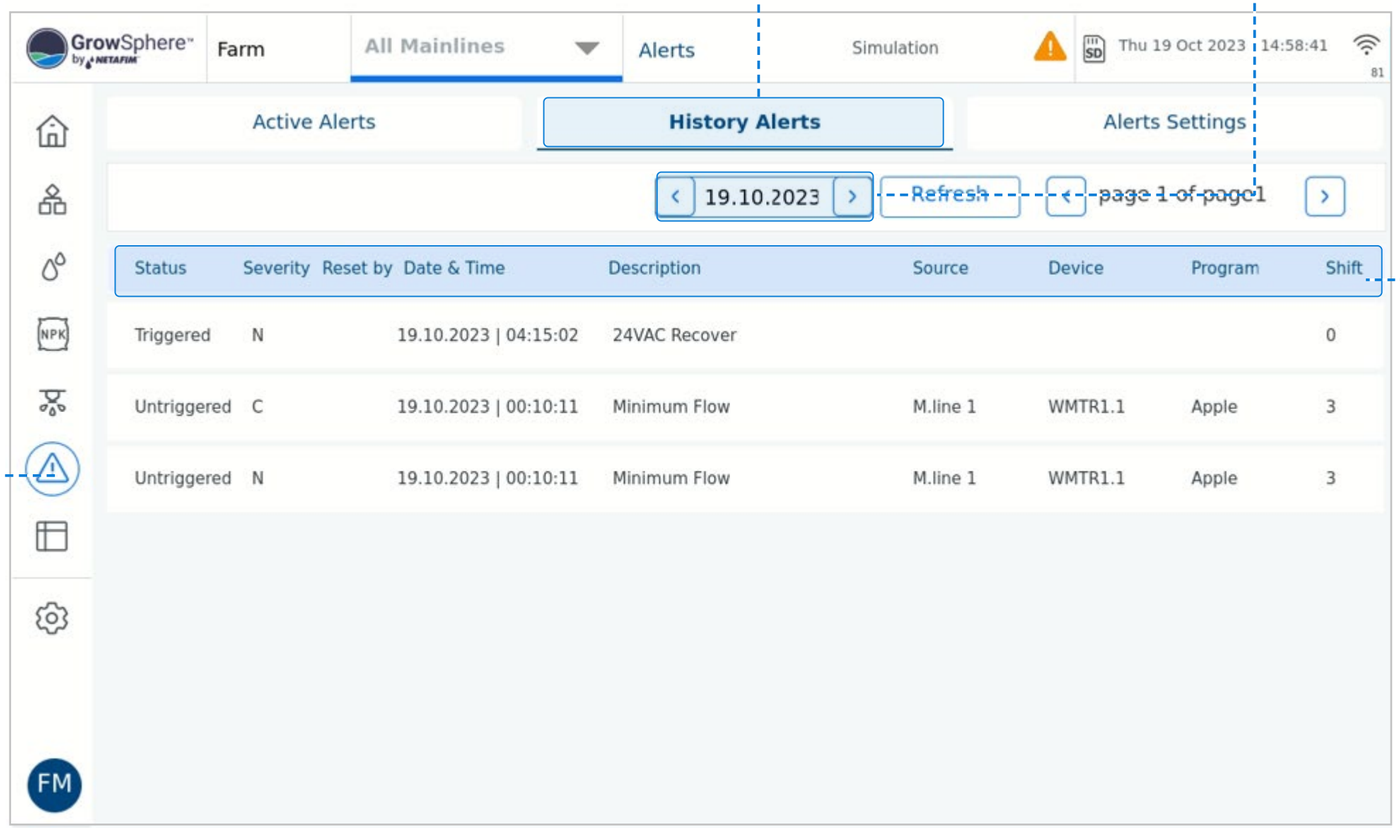
Tap the **Reset** button to reset a specific alert, or tap the **Reset All** button to reset all active alerts. Once reset, these alerts are displayed in the **History Alerts** tab (see Viewing Alert History).

7.3.2 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 date

Filter the display alerts for a specific date, see Selecting Date.

4. View information about the alerts on the selected date

- **Status:** Options include:
  - **Triggered:**
  - **Untriggered:**
- **Severity:**
  - **N:** Normal
  - **C:** Critical
- **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.

7.4 Viewing Logs

This section reviews system event logs and includes:

1/ **Irrigation Logss**

2/ **Uncompleted Irrigation Log**

3/ **Accumulation events**

4/ **Meters Accumulation Events Logs**

5/ **Alarm Logsevents**

6/ **Filter Logs**

7/ **Events Logs**

8/ **Pumps Alarm Logss**

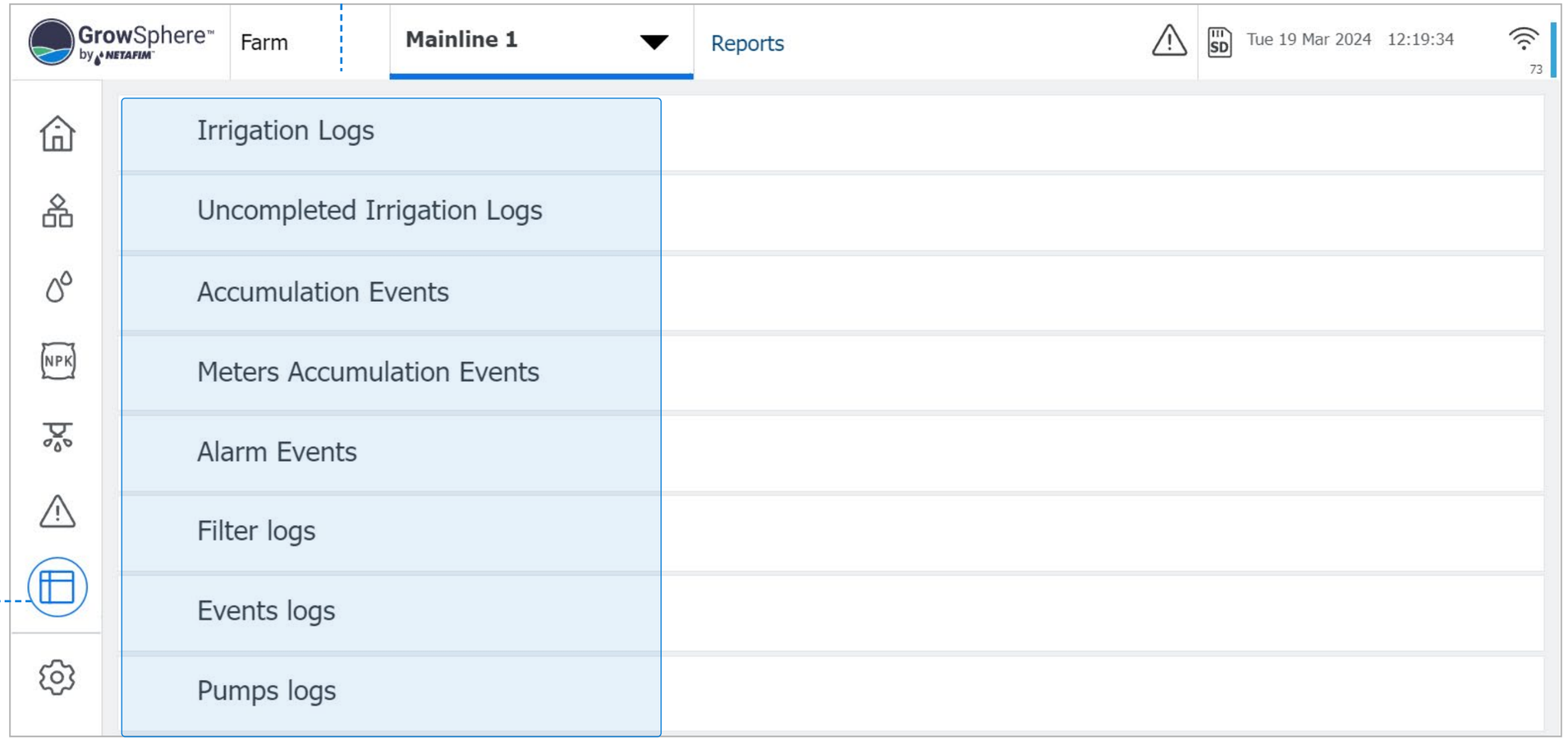
Logs are generated for different events, presented on a dedicated Logs screen, and saved on the SD card. The main logs are:
- *Irrigation events and uncompleted irrigation events*
- *Accumulation of water and dosing amounts for all irrigation valves*
- *Meters accumulation, such as water meter or fertilizer meter, etc.*
- *Filter flushing events*
- *Irrigation events include when a valve closes, a pump stops, dosing starts, etc.*
- *Using multiple filter options, such as Between, Equals, Greater / less than, and Reorder and sorting columns is optional.*

7.4.1 Accessing Logs

Perform the following steps to view a log:

2. Select a log from the list

Select the relevant type of log report you wish to view.



1. Tap the Reports button

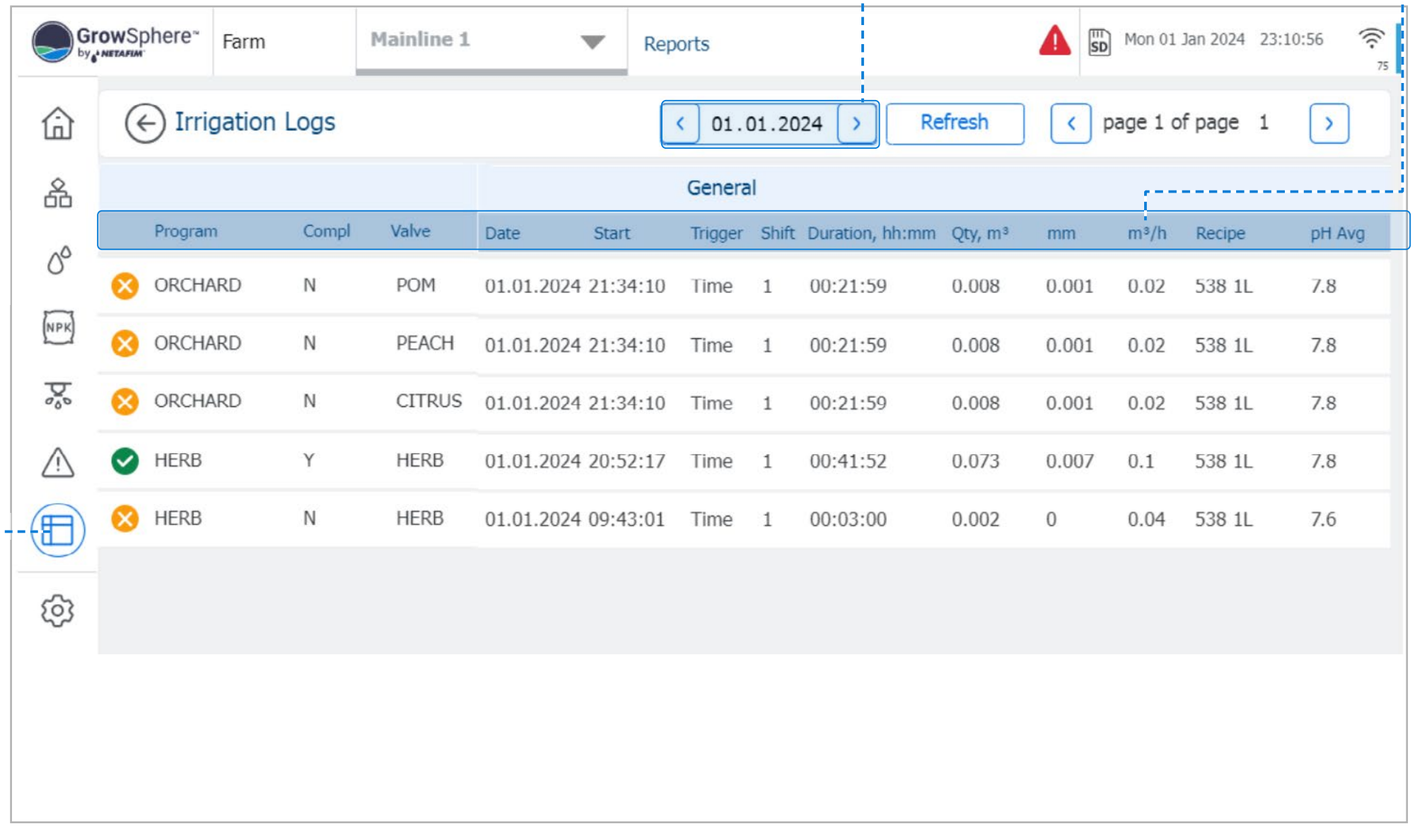
7.4.2 Irrigation Logs

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

3. Select date
See Selecting Date.

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

1. Tap the Reports button



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

4. Review irrigation log details:

- **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 name.
- **Date:** The date when the irrigation shift occurred.
- **Start:** Start time of the irrigation shift.
- **Trigger:** The trigger which started the irrigation shift.
- **Shift:** Shift number.
- **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.

Irrigation Logs

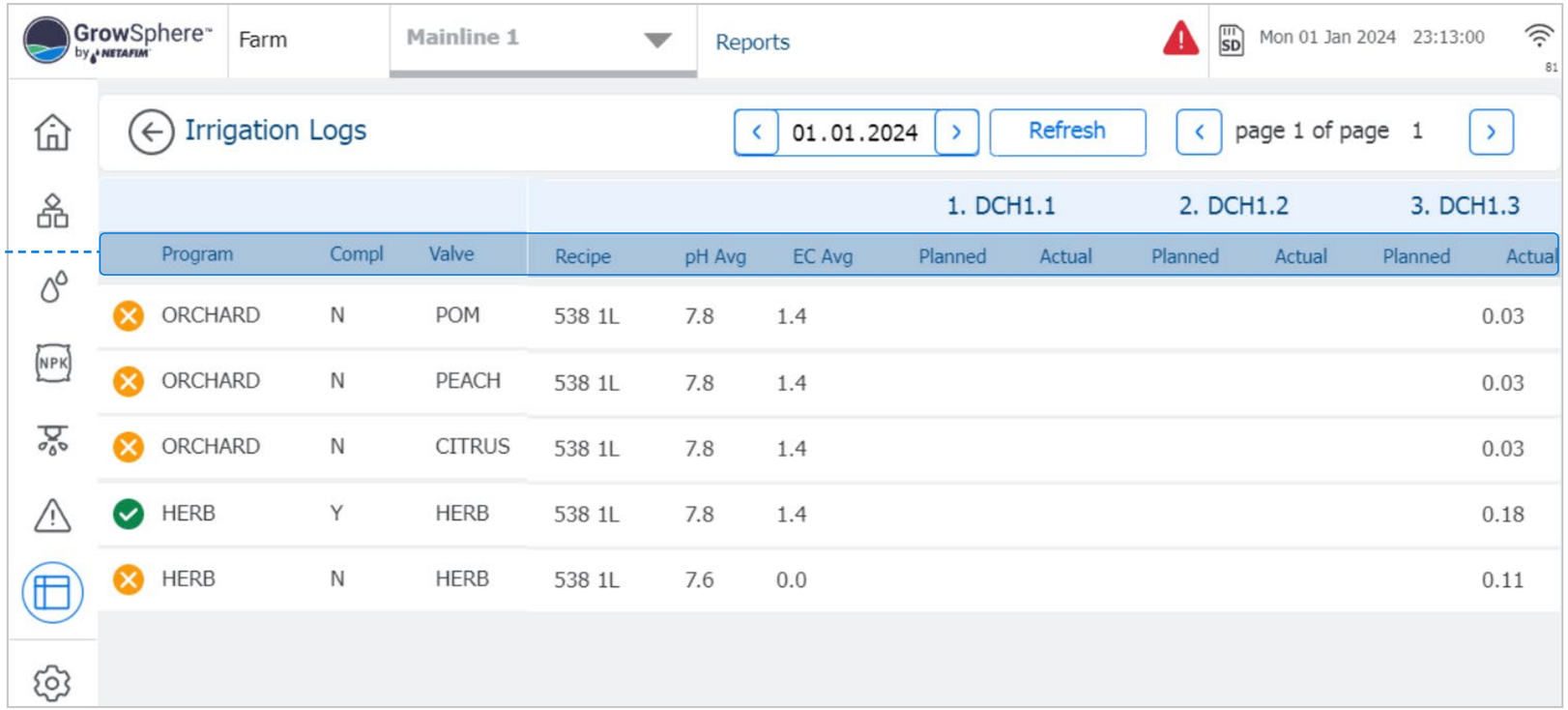
4. Review irrigation log details (cont.):

- **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.

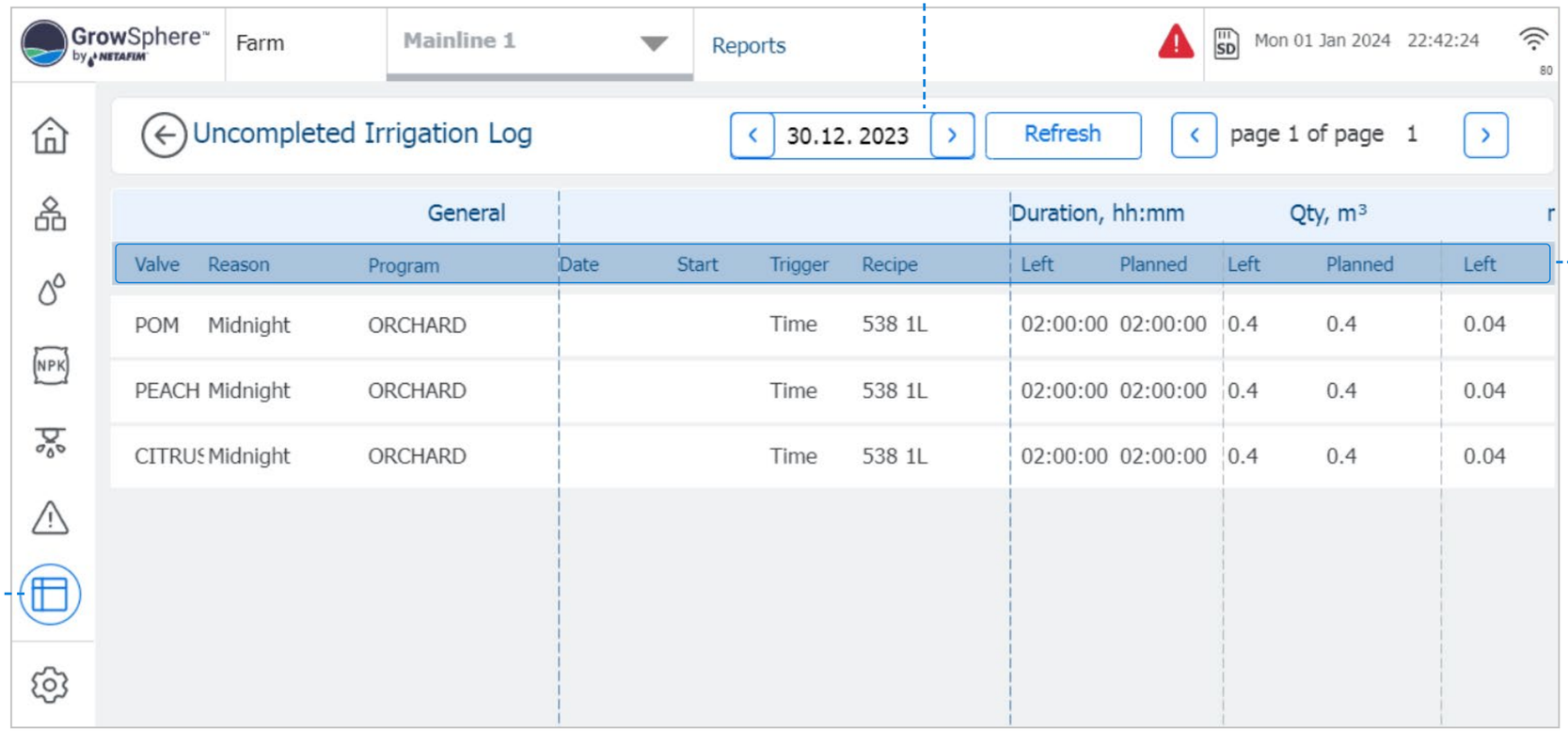


7.4.3 Uncompleted Irrigation Logs

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

3. Select date
See Selecting Date.

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

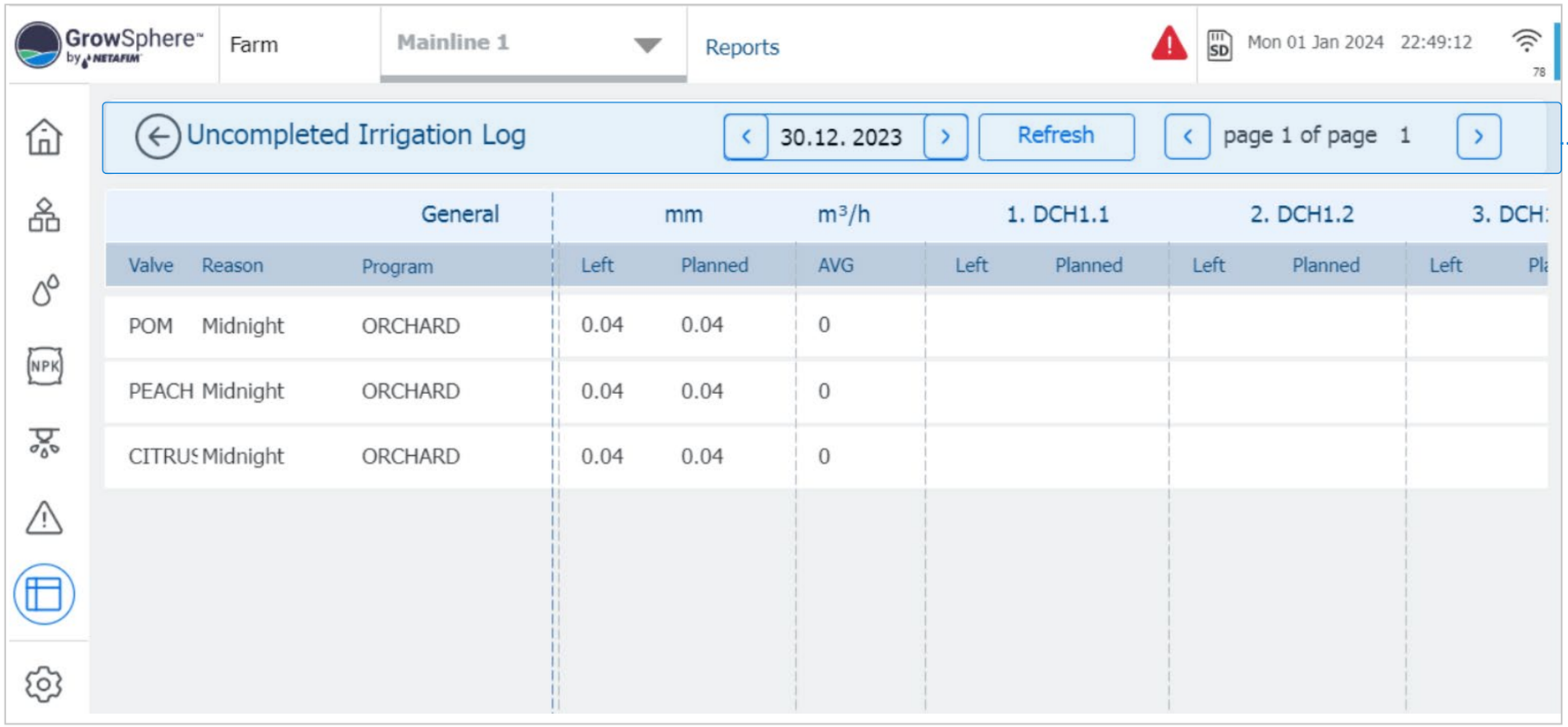


1. Tap the Reports button

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.

Uncompleted Irrigation Logs



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:

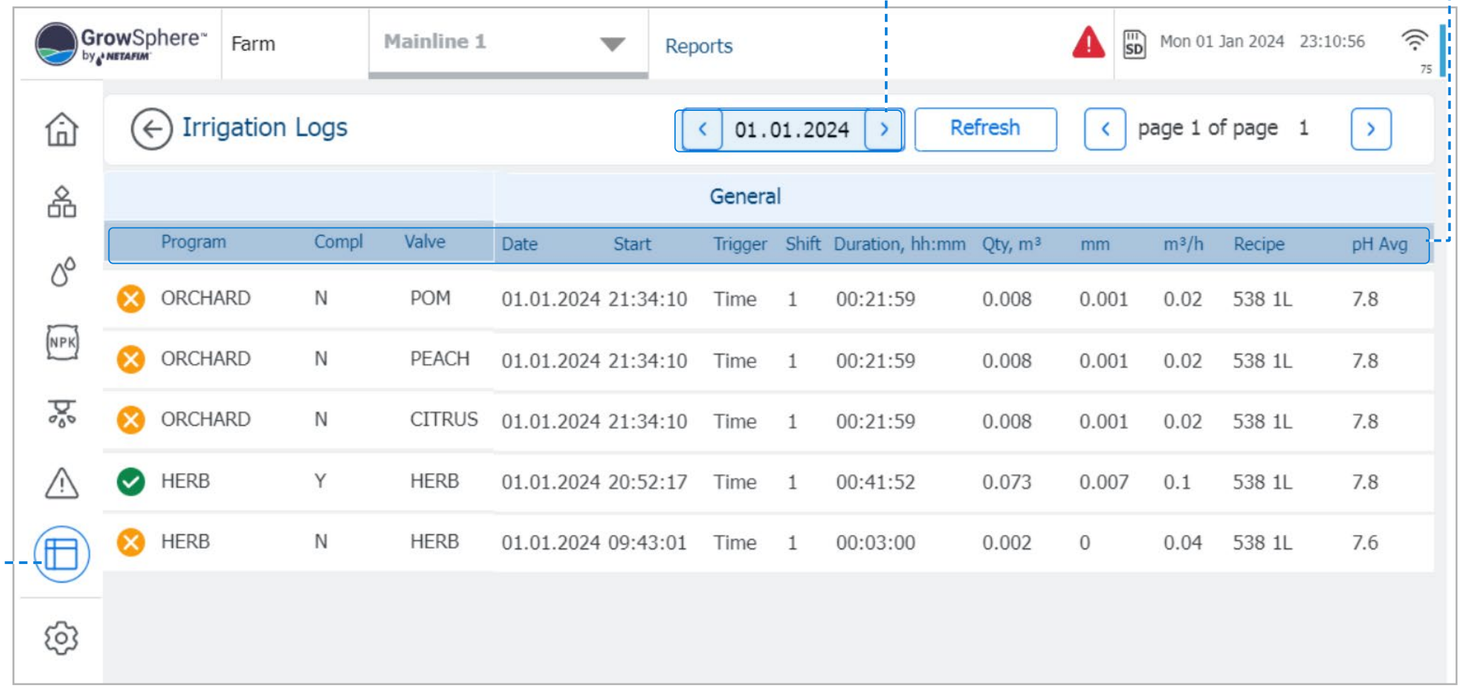
- **Planned:** The planned amount calculated according to the recipe.
- **Actual:** The actual metered amount.

7.4.4 Dosing Logs

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

3. Select date
See Selecting Date.

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



1. Tap the Reports button

4. Review dosing log details:

- **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.

7.4.5 Filter Logs

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

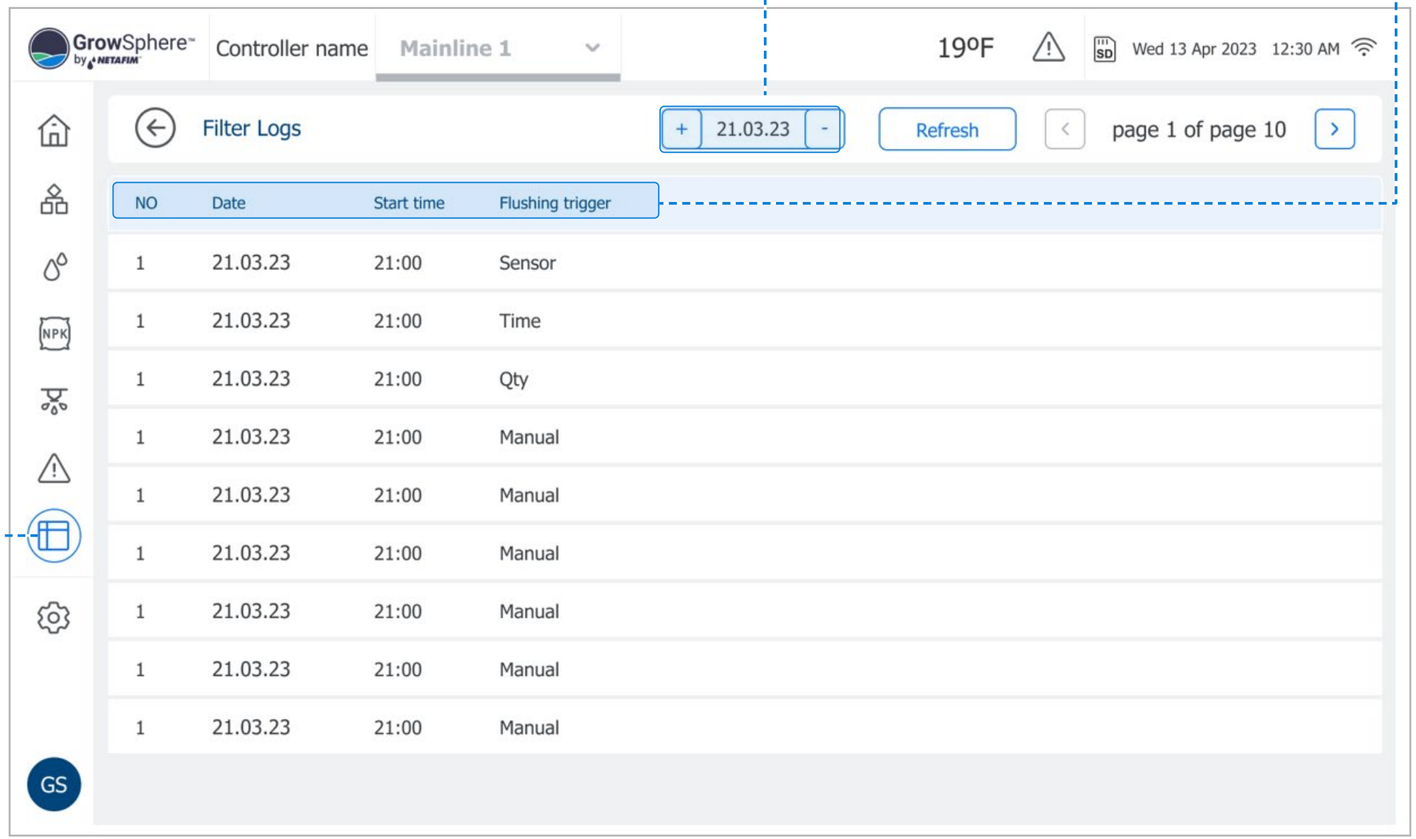
3. Select date
See Selecting Date.

4. Review filter log details

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

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

1. Tap the Reports button

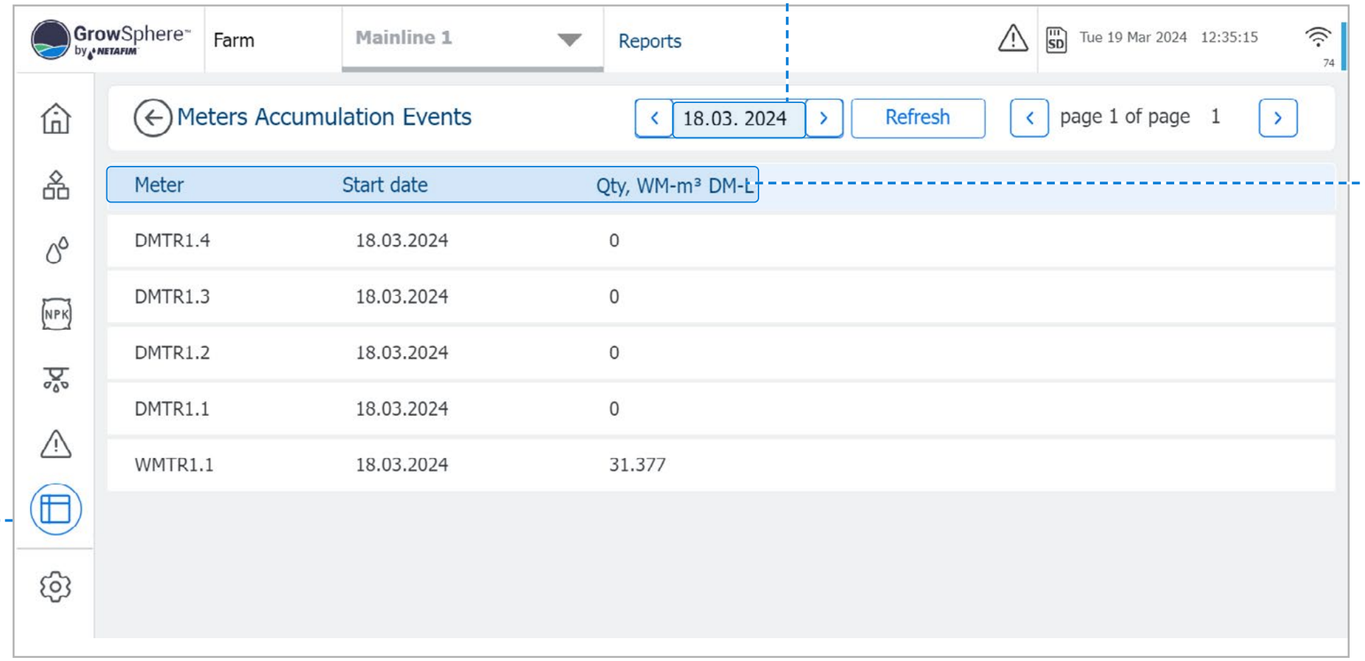


7.4.6 Meters Accumulation Events Logs

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

3. Select date
See Selecting Date.

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



1. Tap the Reports button

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.

NOTE

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

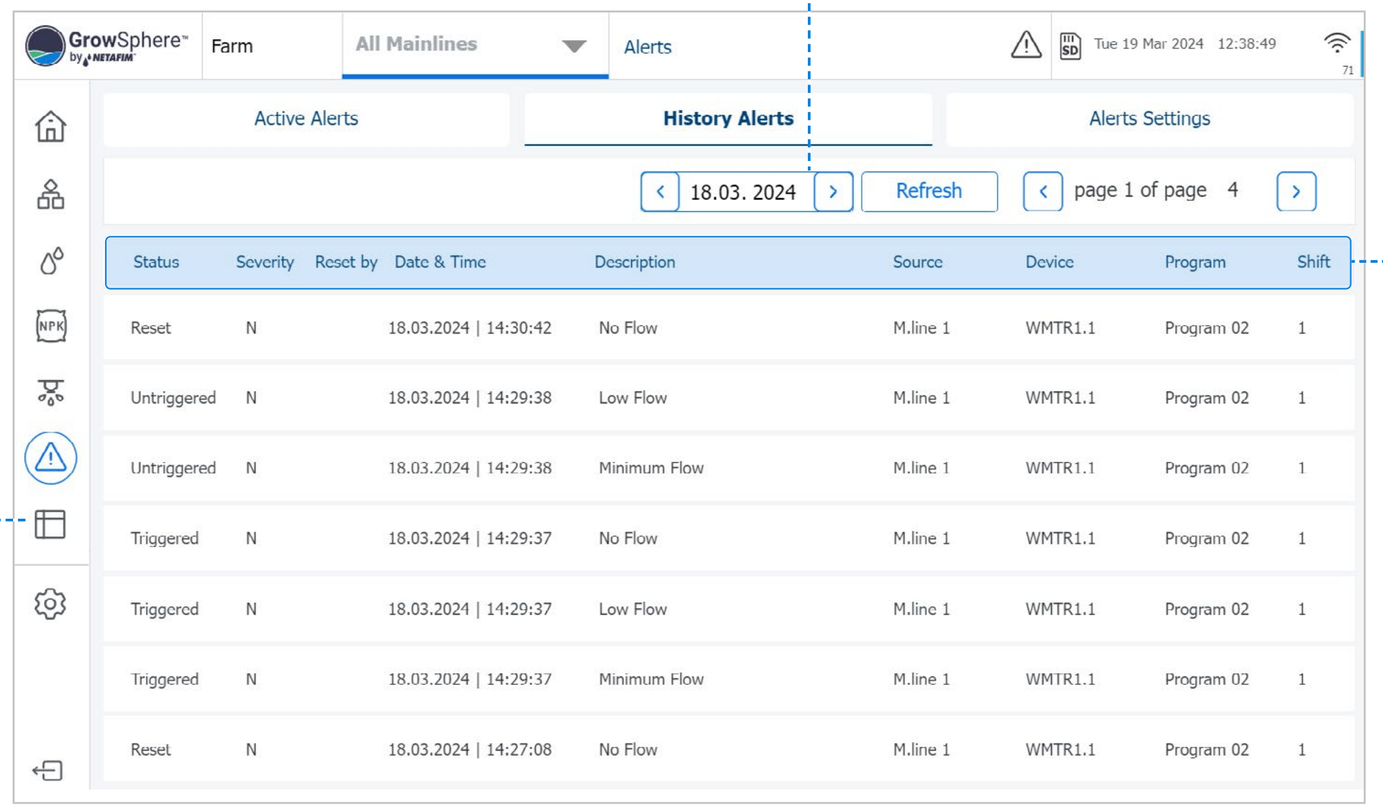
7.4.7 Alarm Logs

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

3. Select date
See Selecting Date.

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

1. Tap the Reports button



4. Review alarm log details:

- **Status:** Alerts status
- **Number:** Alarm number.
- **Severity:** Alert severity. Options include:
  - Critical
  - Not critical
- **Reset By:** Name of the logged in user who
- **Date & Time:** The date & time when the irrigation shift occurred.
- **Description:** Description of the alert.
- reset the alert.
- **Source:** the mainline.
- **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:** shift number inside the program.

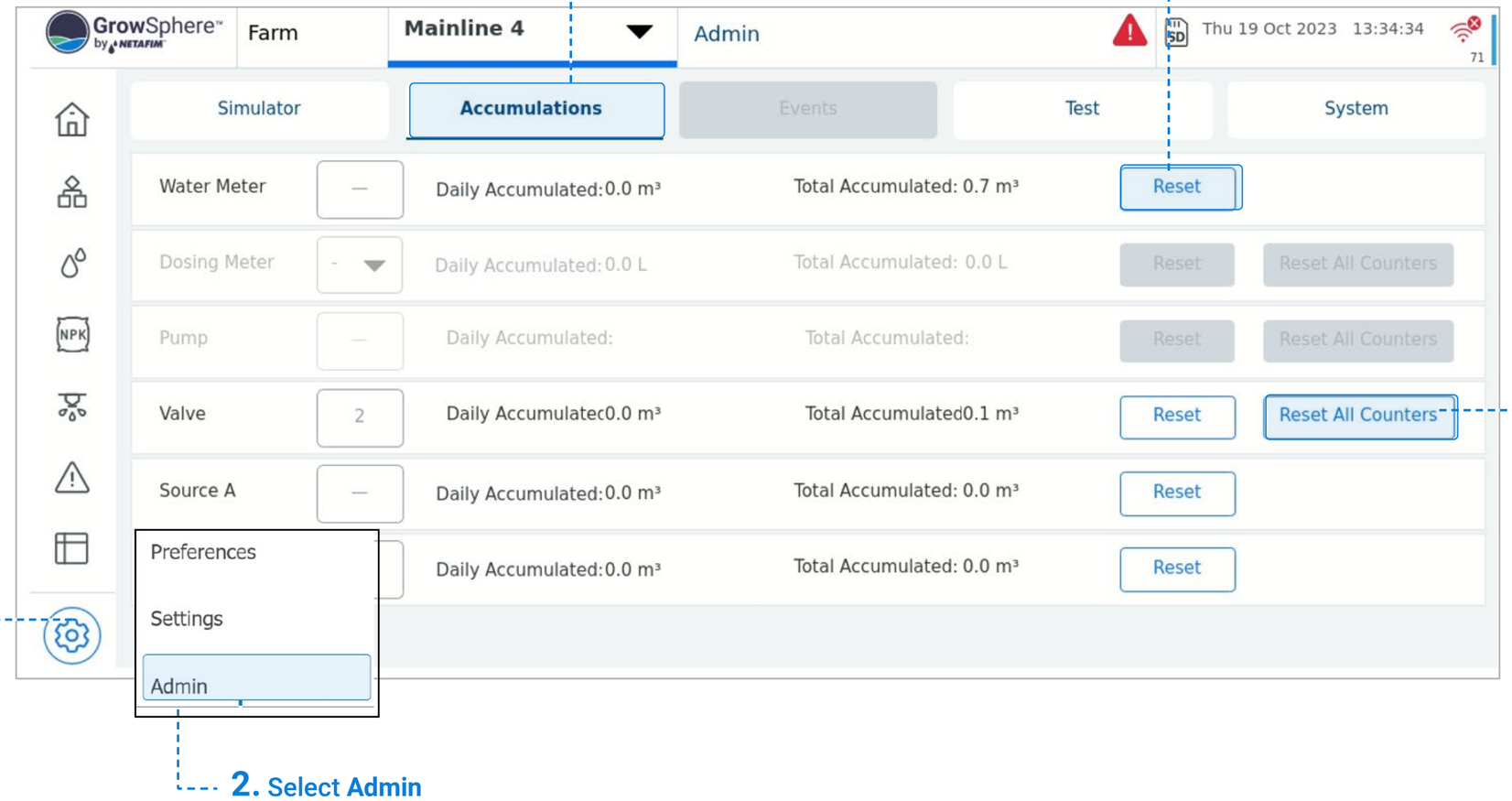
7.5 Resetting Accumulation

Perform the following steps to reset accumulation counters:

3. **Tap the Reset Accumulation tab**

4. **Tap Reset**

The specific counter will be reset.



1. **Tap the Configuration button**

2. **Select Admin**

5. **Tap Reset All Counters**

All counters will be reset.

7.6 System Testing

This section reviews testing of the system and includes:

1/ **Simulating Flow Rates and Sensor Values**

2/ **Testing Devices**

7.6.1 Simulating Flow Rates and Sensor Values

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

When testing without hydraulic components (valves, water/dosing meters, EC/pH & Pressure sensors) in order to properly run the system without alarm, you would require to set-up simulation mode:

This tab is separated to 3 main parts:

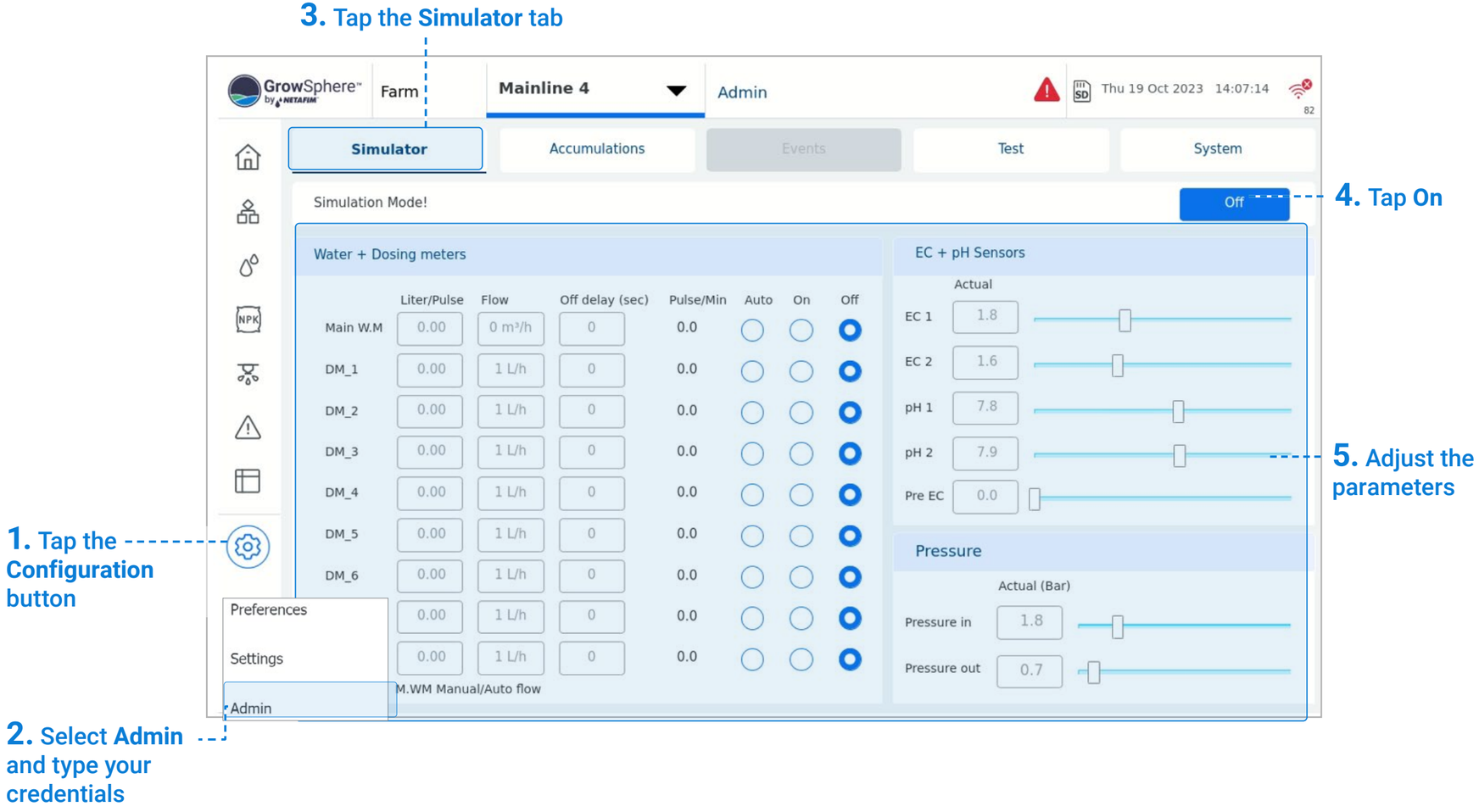
1. Water + Dosing meters

   In this section you can configure your main water meter as well as dosing meters parameters:

   - **Liter/Pulse:** automatically pulled from settings
   - **Flow:** the required flow
     - M.WM Manual/Auto Flow
     - Unchecked – manually input main flow
     - Checked – automatically pulls the nominal flow for each shift according to the shift's valves

2. Off delay: a time delay in which pulses will be generated after the valve is off (designed to simulate dosing meter inertia)
3. Auto/On/Off
   - Auto – pulses will be generated when the respected valve/ channel is open
   - On – pulses will be generated all the time
   - Off – no pulses will be generated
4. EC + pH Sensors: configure you EC/pH levels
5. Pressure: configure you pressure sensors levels (in Bar)

Finally, turn the simulator on by pressing the On Button, an indication for working in simulation mode will appear in the top bar



7.6.2 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:

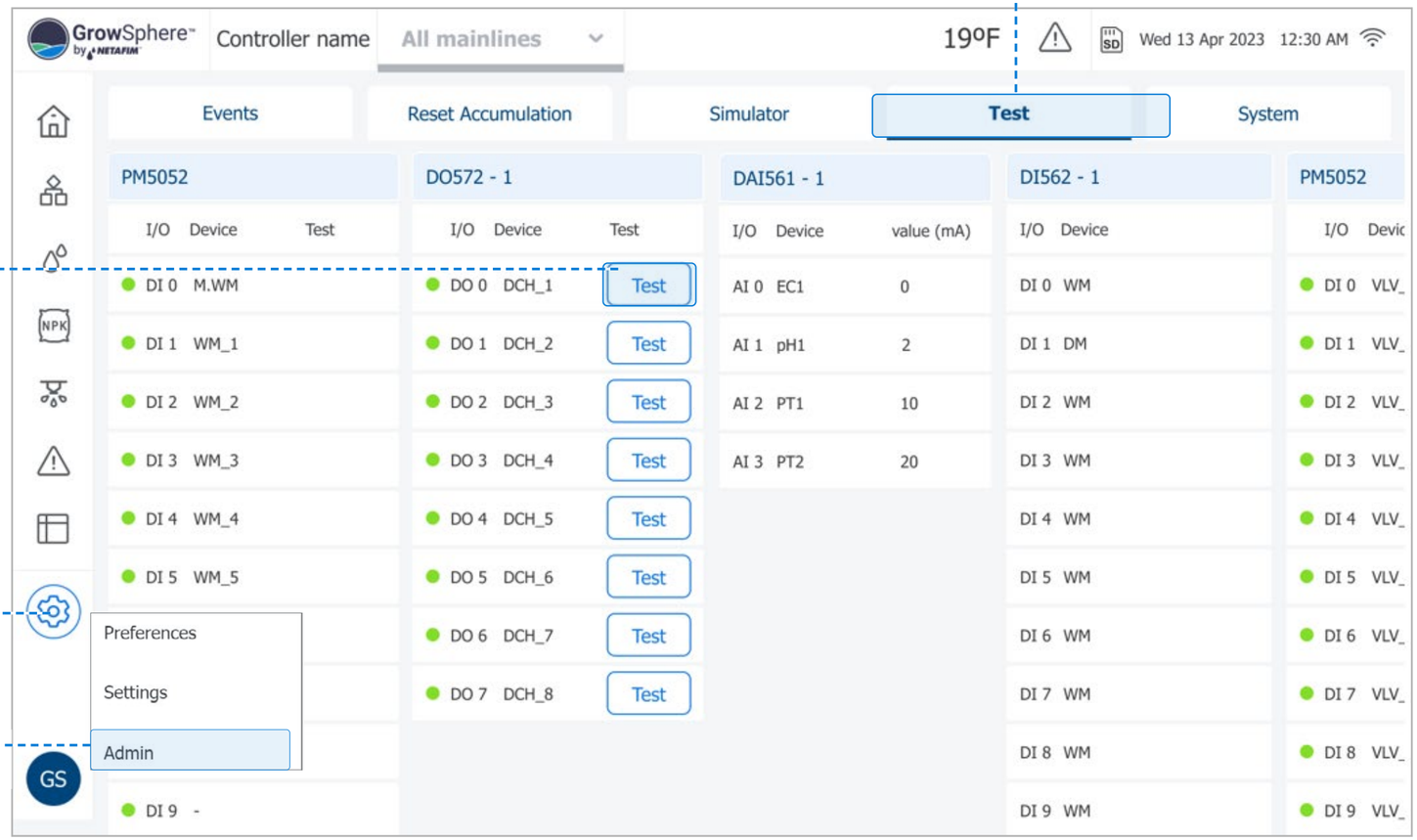
C. Tap the Test tab

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 funtioning correctly.

A. Tap the **Configuration button**

B. Select Admin and type your credentials



7.7 Monitoring Irrigation

This section reviews monitoring irrigation and includes:

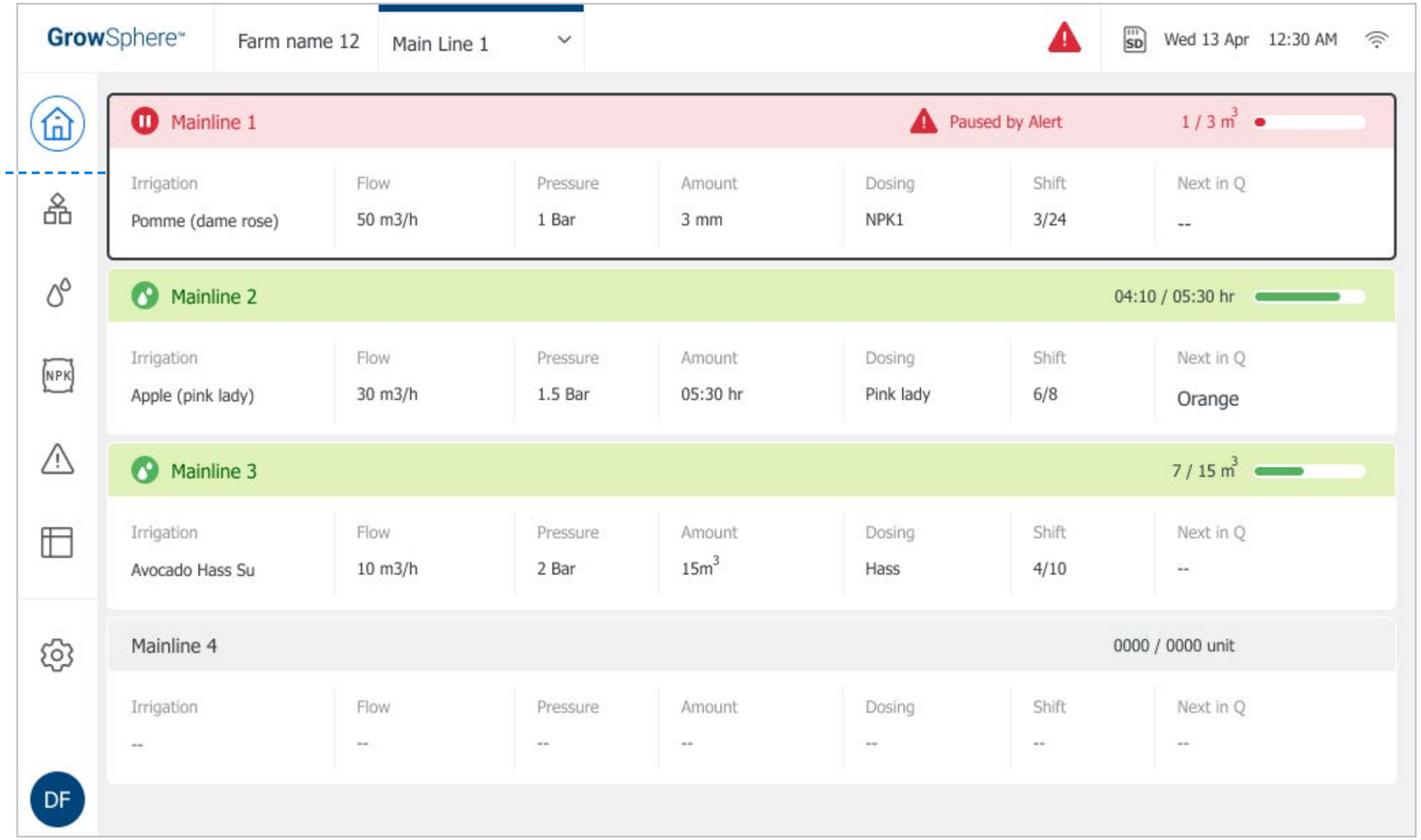
1. Selecting the Mainline
2. Irrigation Dashboard
3. Monitoring Irrigation Shifts
4. Monitoring Valves
5. Irrigation Analytics
6. Managing Irrigation Program Queue

7.7.1 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.



7.7.2 Irrigation Dashboard

The irrigation dashboard includes the following:

Current running program

Includes live information of the running program.

Top bar

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

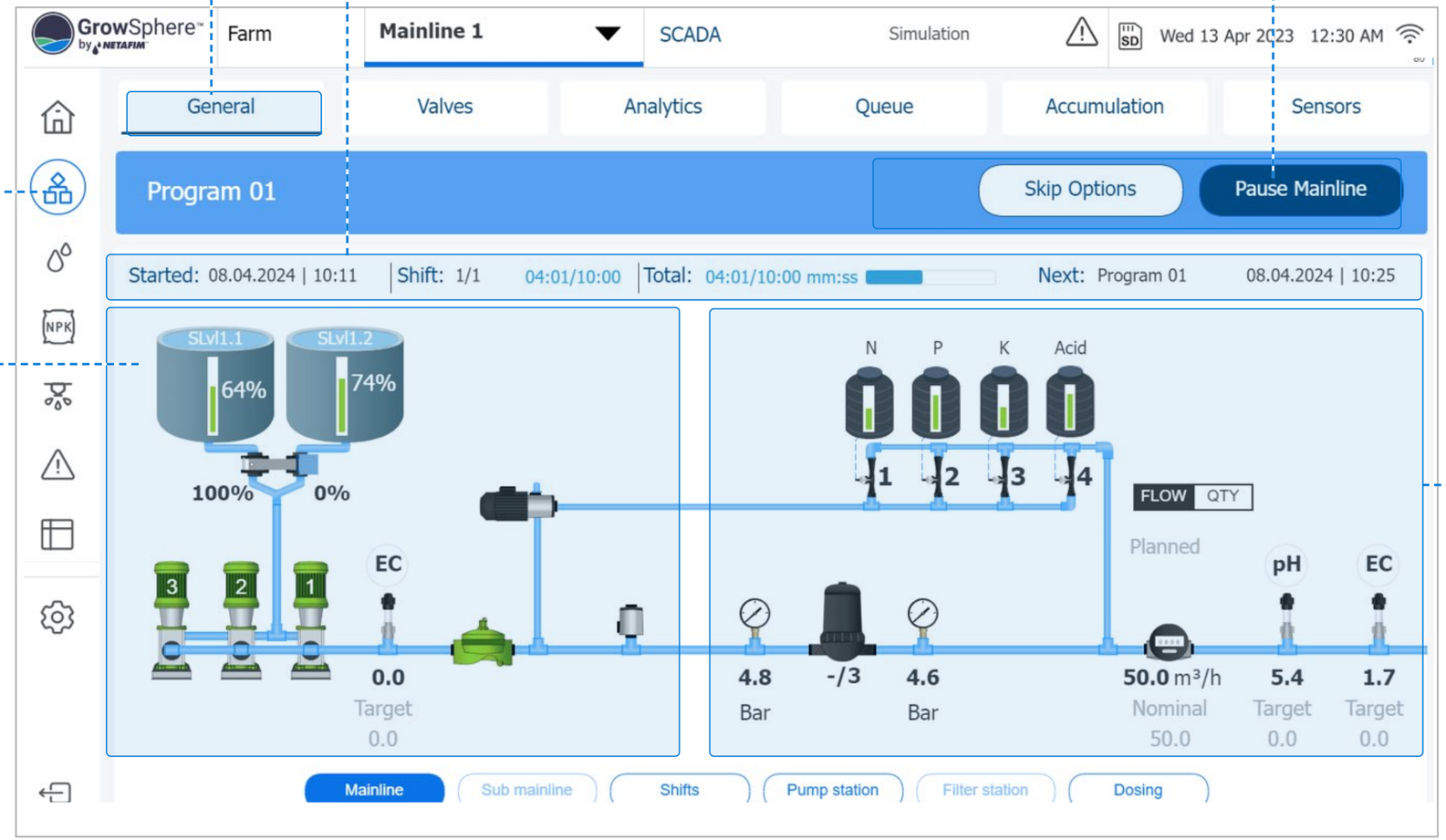
Tap the General tab

Display the SCADA

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

System devices

Indicates the devices statuses and enables setup/manual activation.



Dosing recipes

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

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

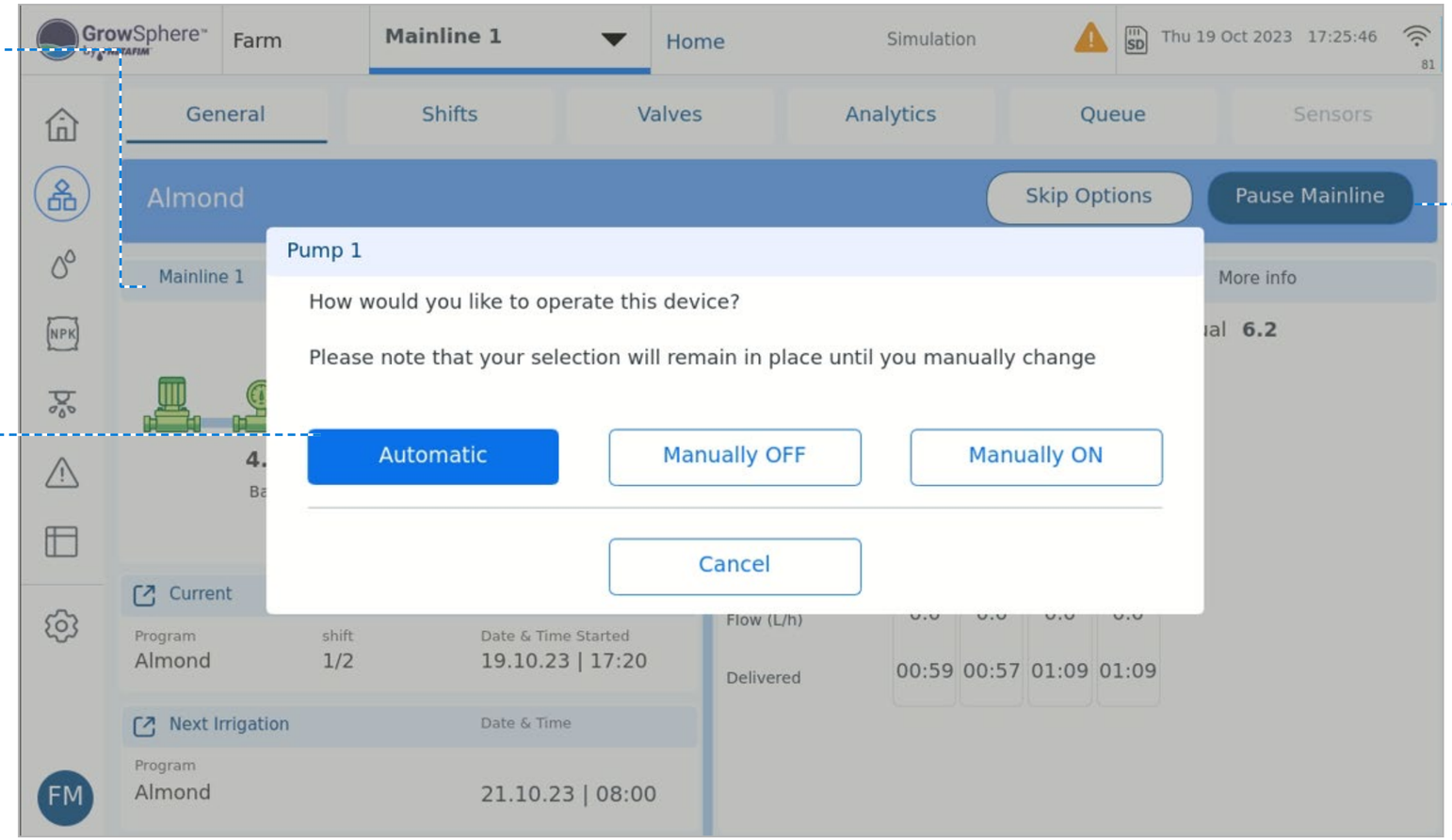
A dropdown menu is displayed.

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.

NOTE

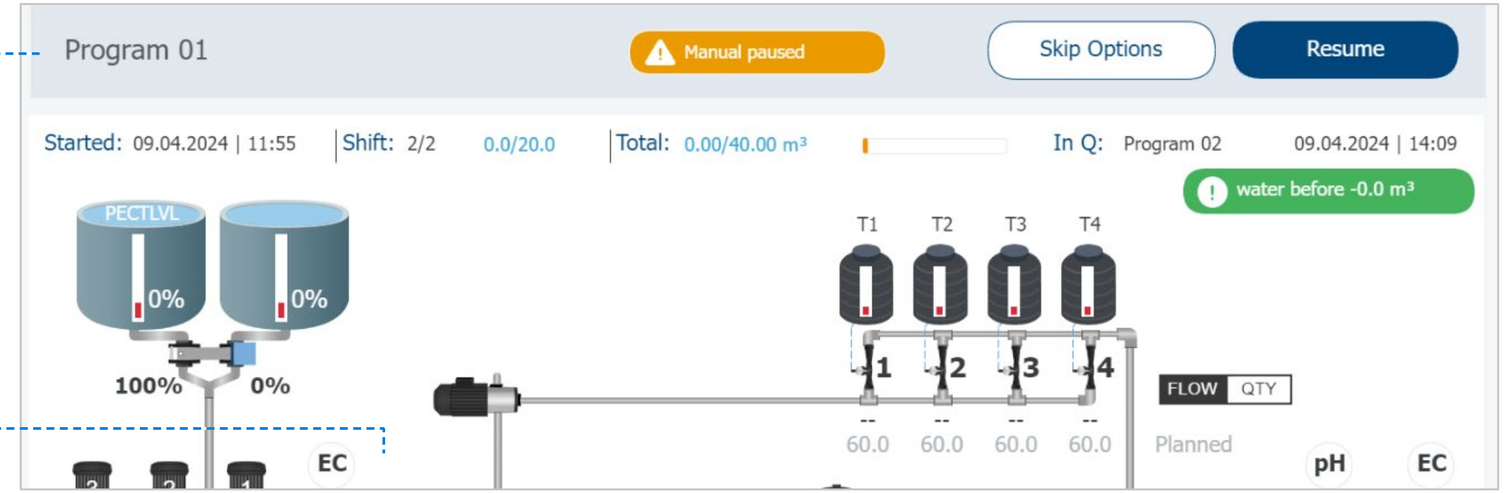
The device remains in manual mode until it is set back to automatic.

Irrigation Program Paused

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

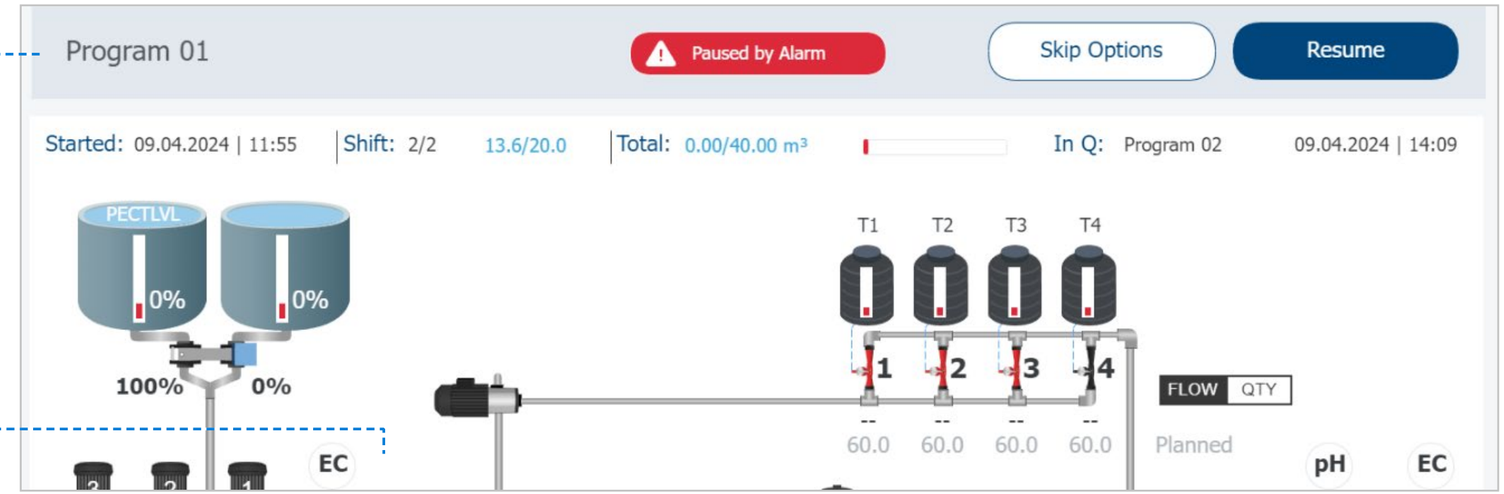
Program manually paused

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.

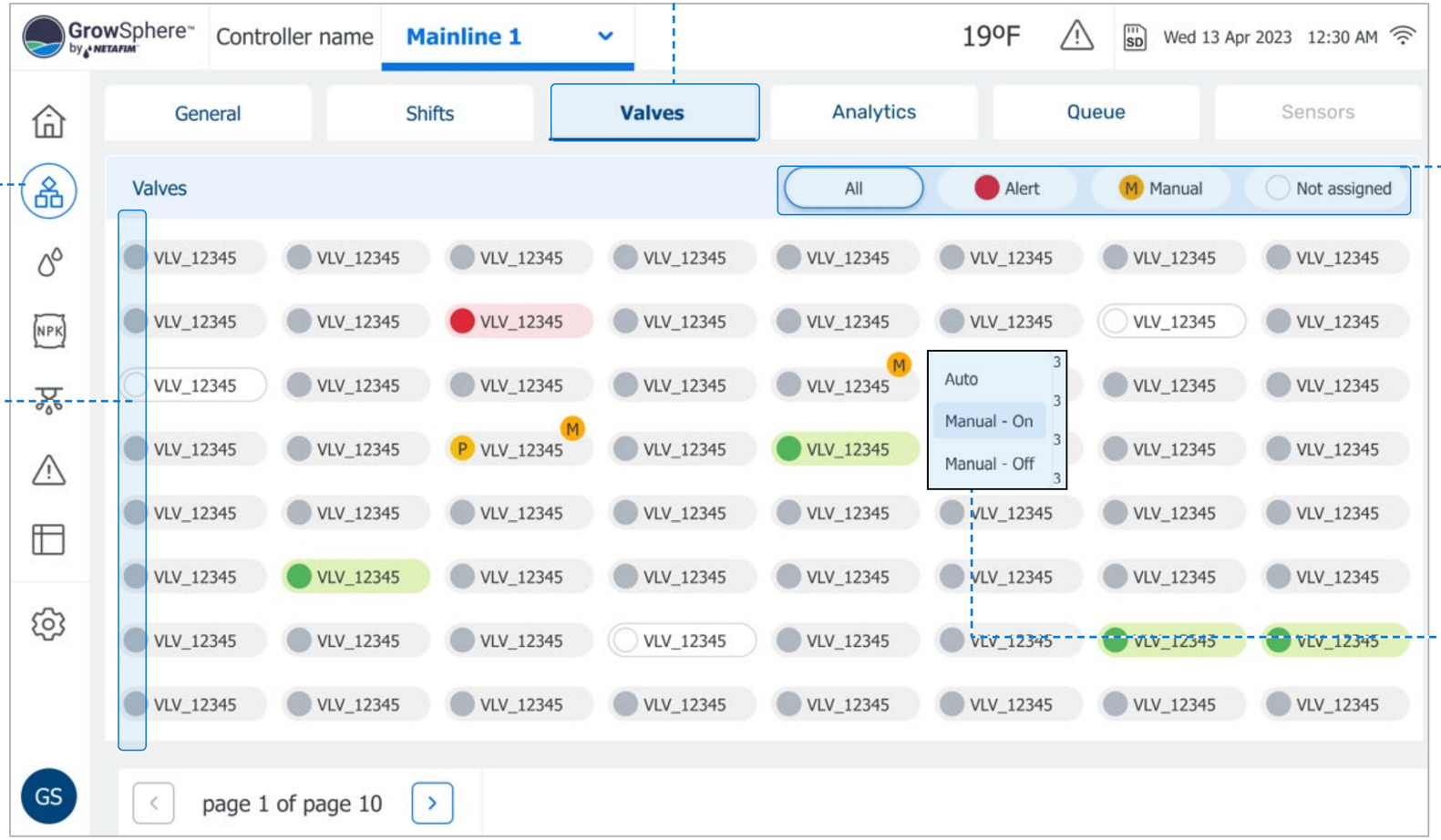


7.7.3 Monitoring Valves

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

2. Tap the Valves tab



Valve status indication:

- Alert
- Irrigating
- Not Assigned
- Off/Not Active
- Manual On

NOTE

Each main valve can have up to 100 irrigation valves.

3. Select which valves are displayed

Options include:

- **All:** Display all valves.
- **Alert:** Display only the valves which have triggered an alert.
- **Manual:** Display only the valves which are manually operated.
- **Not Assigned:** Display only the valves which are not assigned to a shift.

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.

7.7.4 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:

2. Tap the Analytics tab

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.

4. Select the timeline scale

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

7.7.5 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 mange the queued programs:

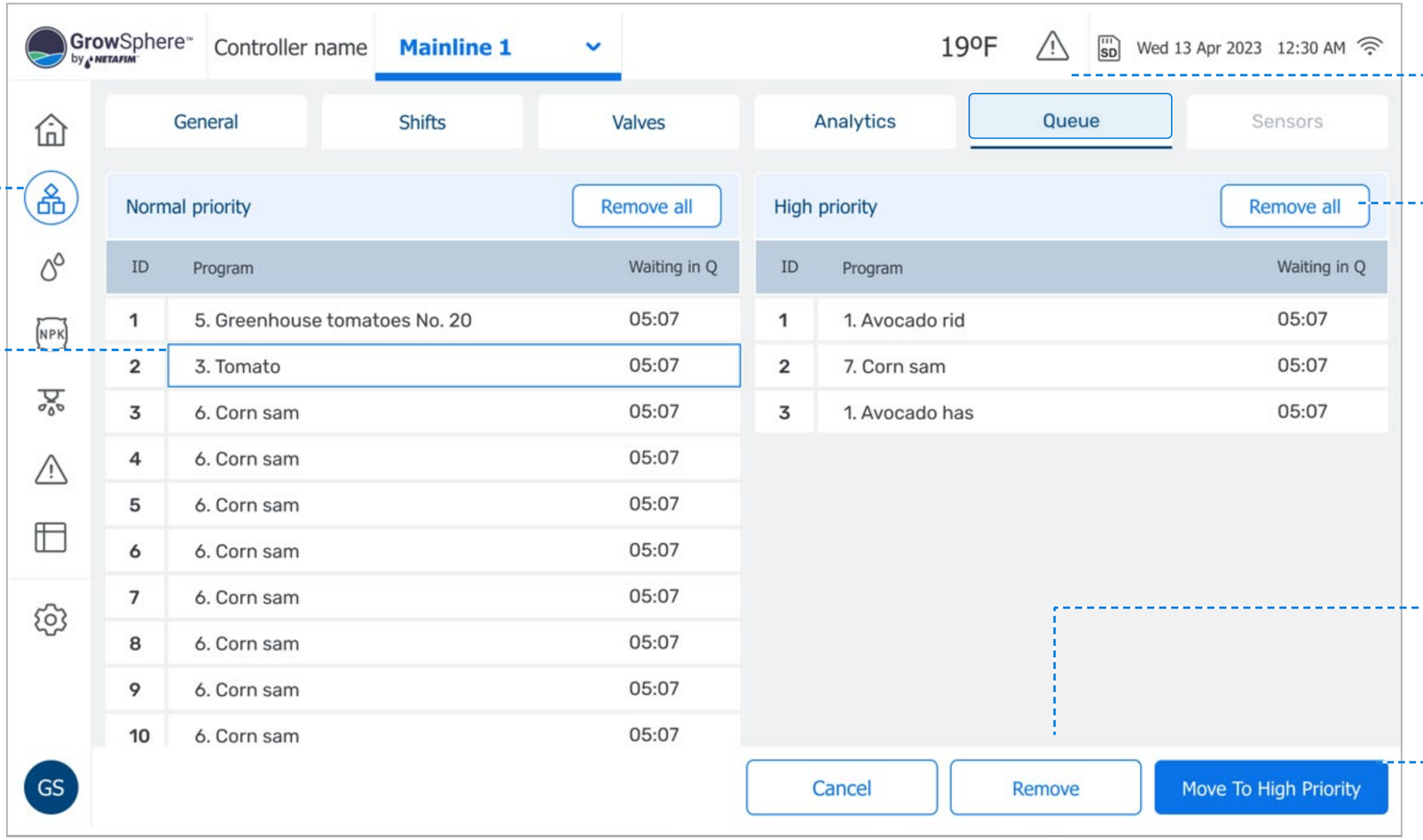
1. Tap the SCADA button

3. Select the relevant program

Tap the program name to select it.

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.



2. Tap the Queue tab

Remove all button

Tap to remove all programs from the queue.

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

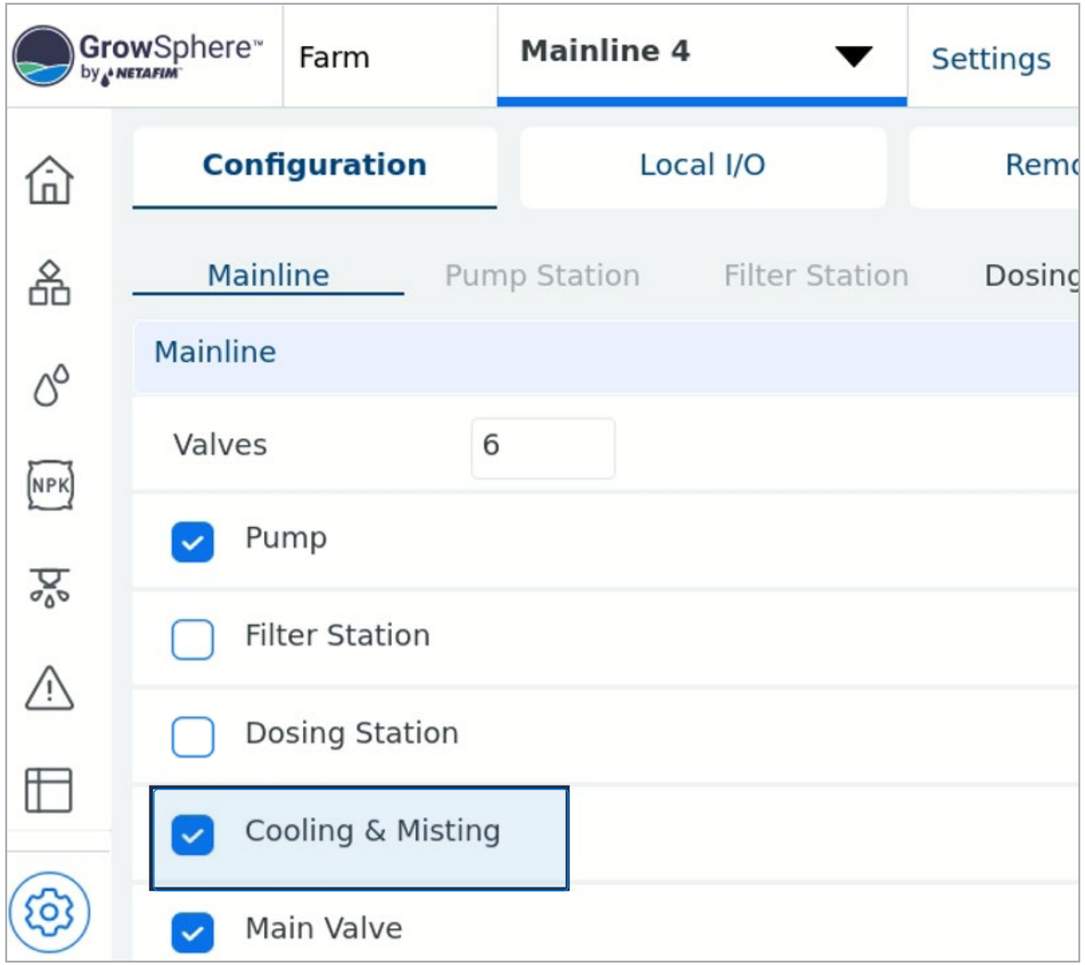
4b. Tap Move to High Priority to move a selected program to the High Priority list.

8. Misting, Cooling and Humidification

1 Misting, Cooling and Humidification settings
2 Misting, Cooling and Humidification Program
3 Misting Program
4 Cooling Program
5 Humidification Program
6 View programs

The Misting program allows the operation of misting valves (foggers and or sprinklers) in dedicated settings and operation screens. The main parameters of the misting program are:

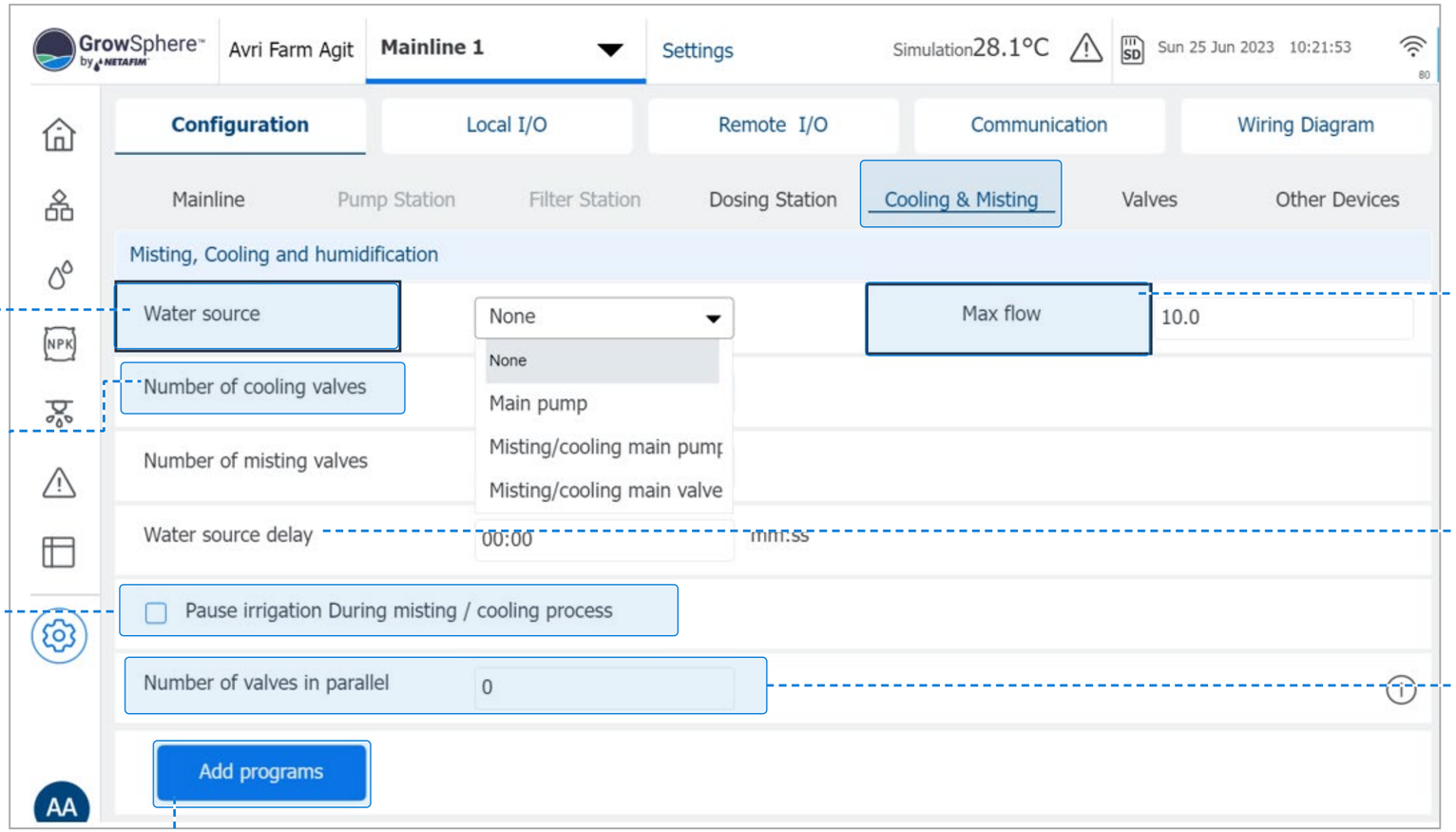
- Name of the program, Start, End, and On and Off times (cycles).
- The valves participating in this program can be selected from a pre-defined list.
- The valves will be activated according to the number of parallel vales settings: For example, if the parallel valves were set to 2, valves 1 and 2 will run together; after that, valves 3 and 4, etc. Then will be off for a defined time and will start a new cycle.
- There is an option to Start and Stop the program manually.



8.1 Misting, Cooling and Humidification settings

Select cooling and misting in the Mainline configuration screen.

I In the Cooling and Misting configuration tab:



1. Choose the water Source

2. Set the maximal flow rate
(currently not active for alerts)

3. Select Number of Cooling
(humidification valves) and misting valves, If don't have leave it "0"

4. Pause irrigation during misting / cooling process – Select if needed

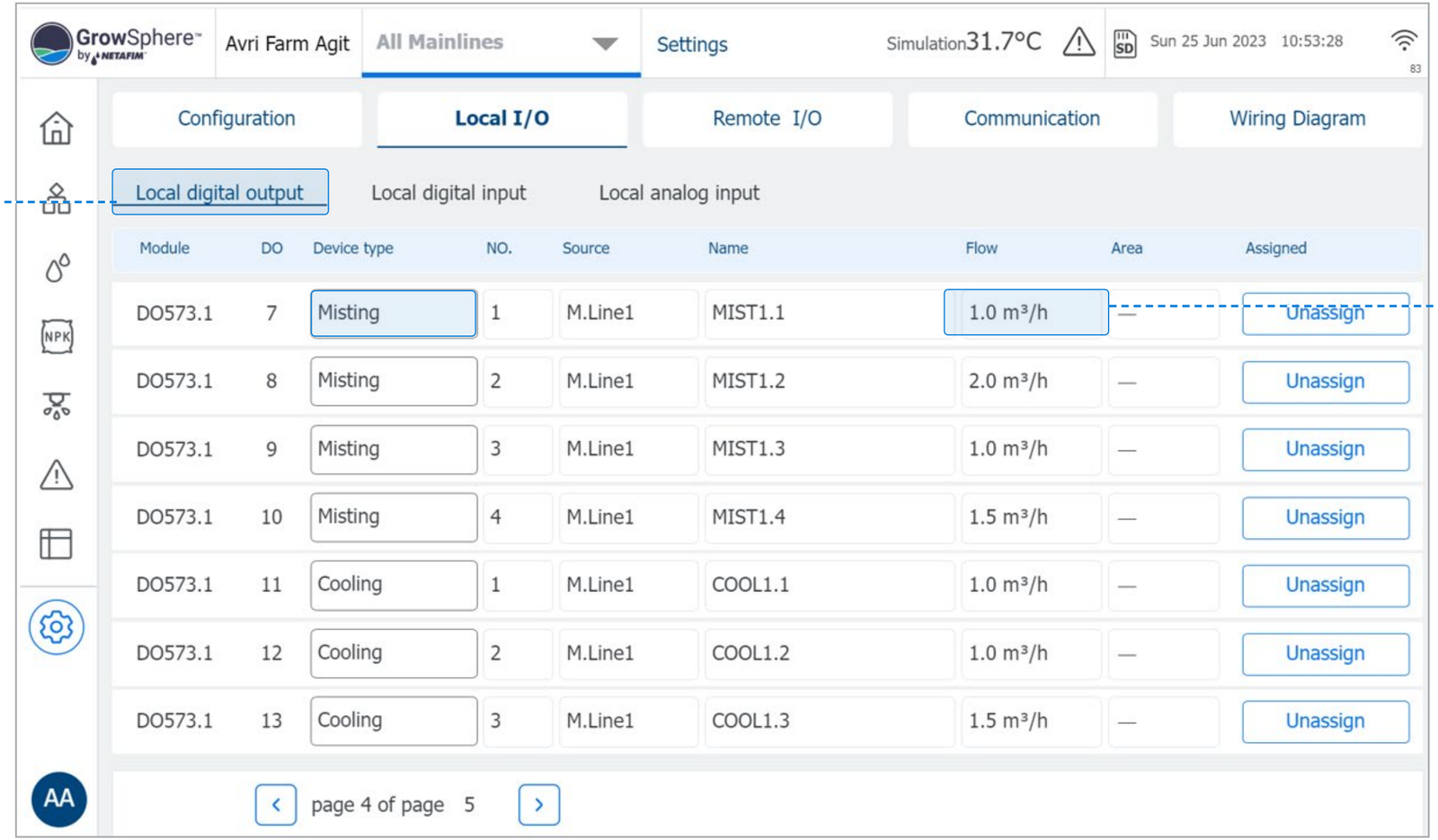
5. Water source delay
It is the Off delay for the water source

6. Number of valves in parallel
Set the number of valves to run together

7. Add program
Direct to Programs dashboard

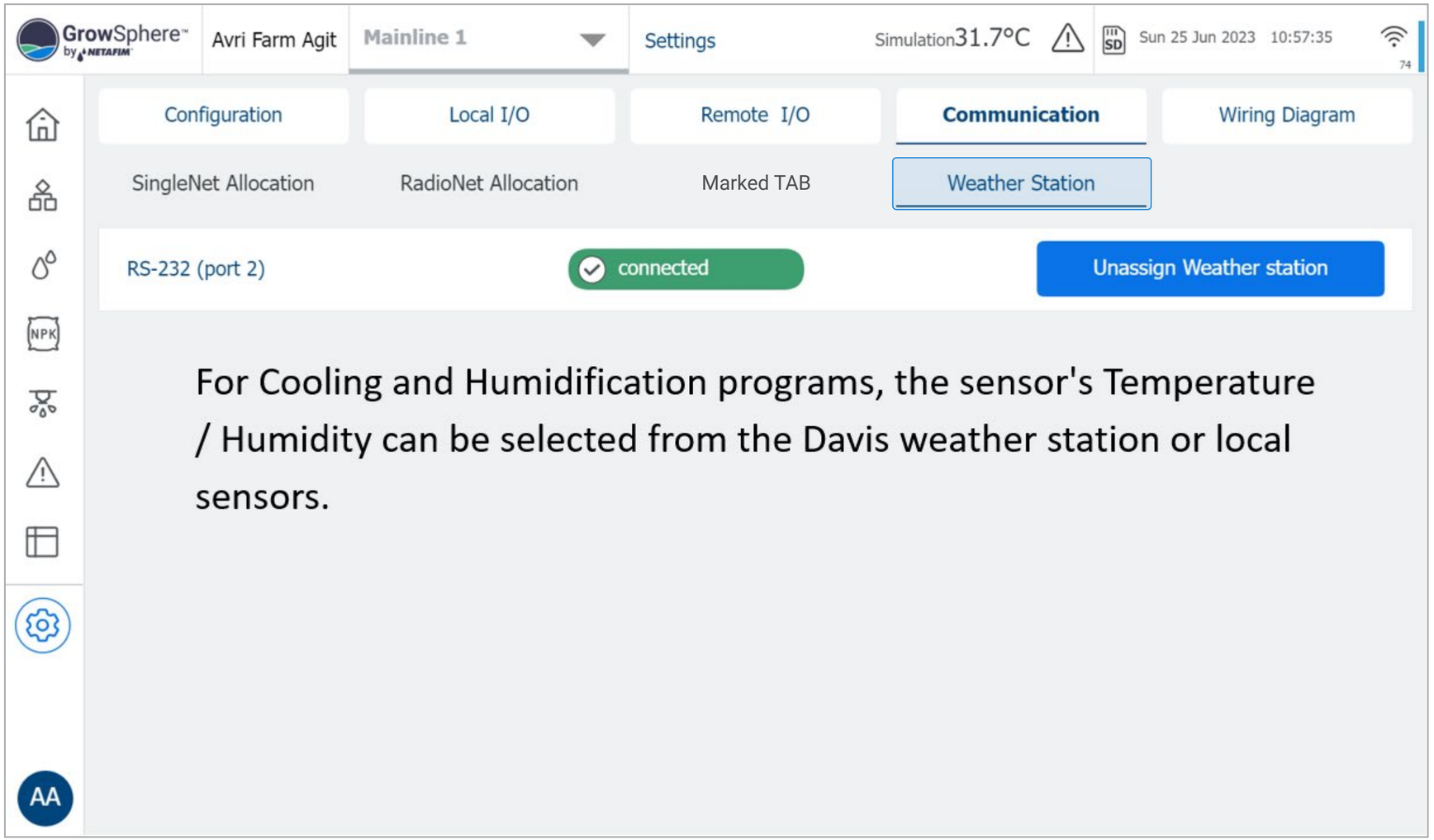
I In the Local digital output screen -

1. Allocate the outputs for the misting and /or cooling valves (They can be allocated to Remote I/O).



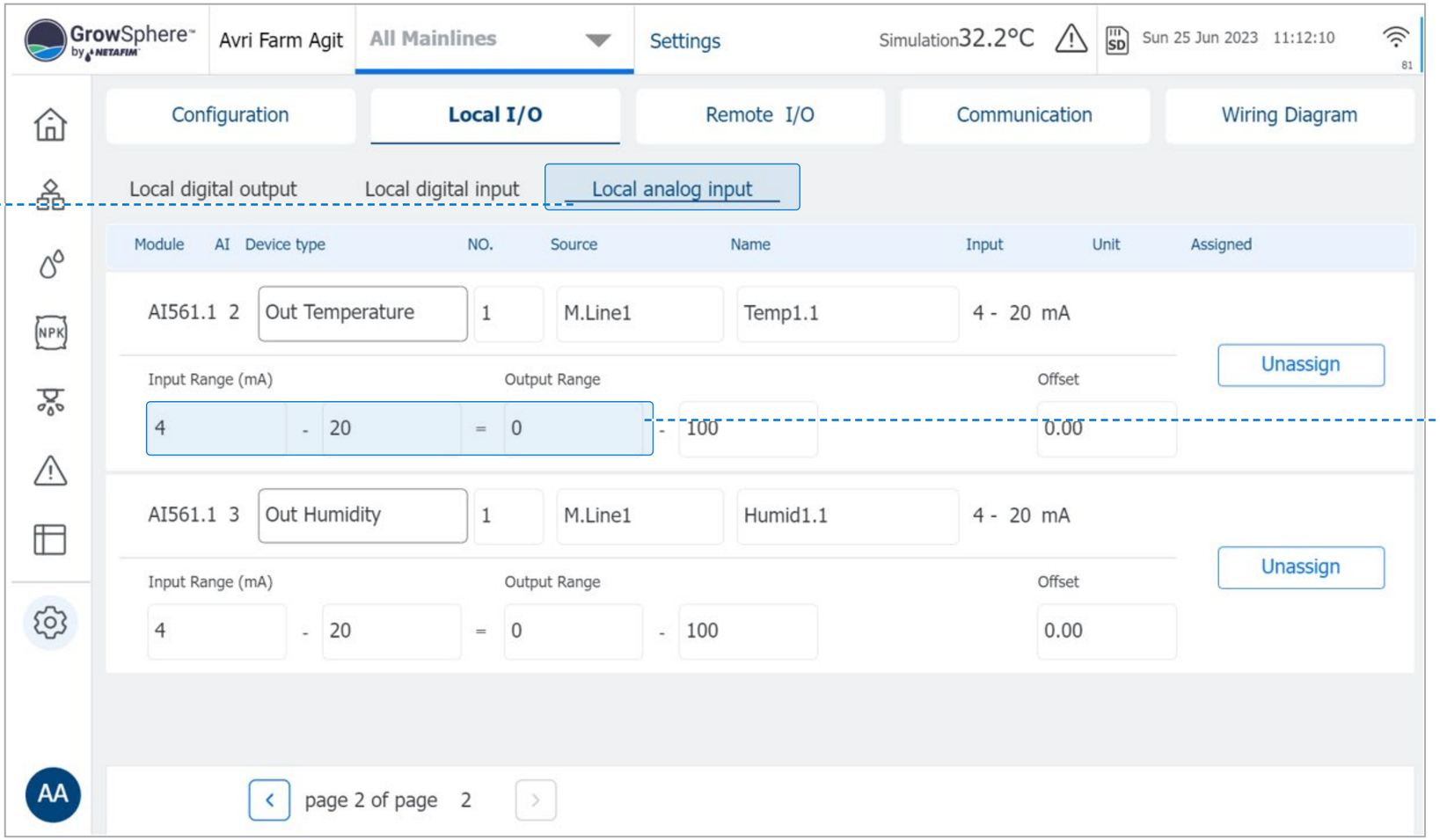
2. Set the Flow rate as required.

I Select the sensor for trigger:



I Set the analog sensor parameters

1. In the local analog input

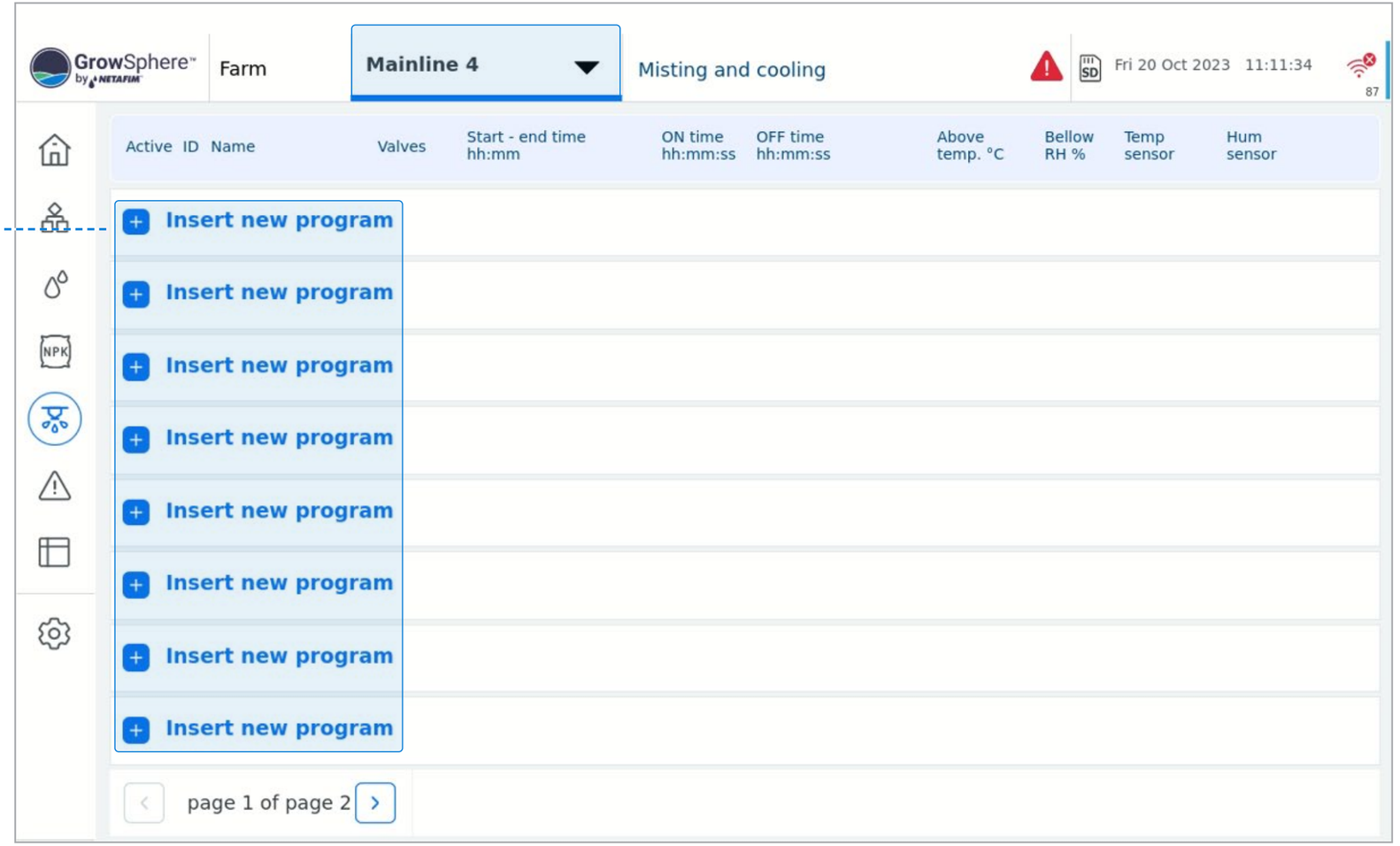


2. Set the analog input and the sensor range.

8.2 Misting, Cooling and Humidification Program

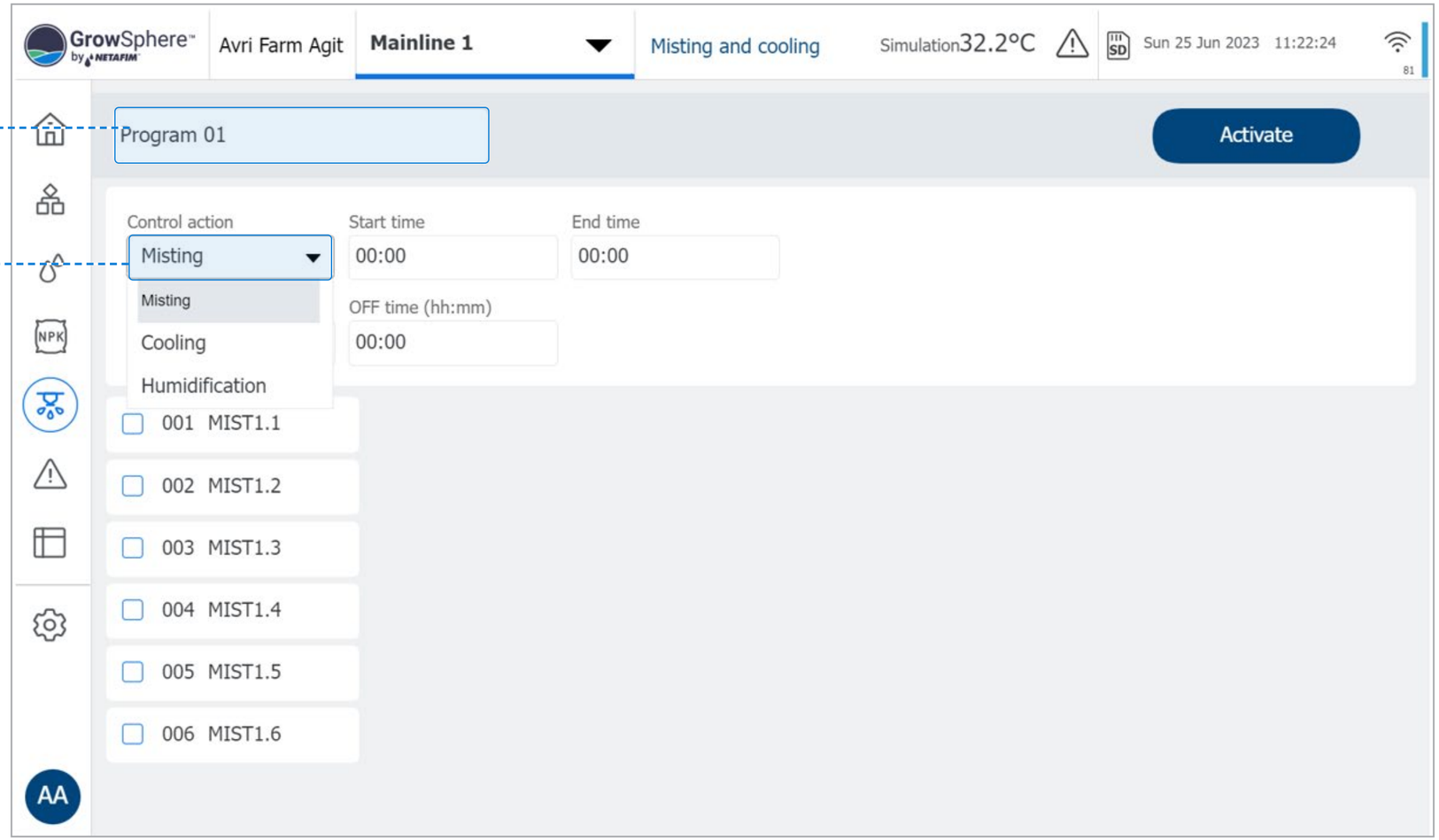
8.2.1 Create a new Cooling and misting program

1. Select a program to edit or create a new program. The total number of programs is 10 per mainline

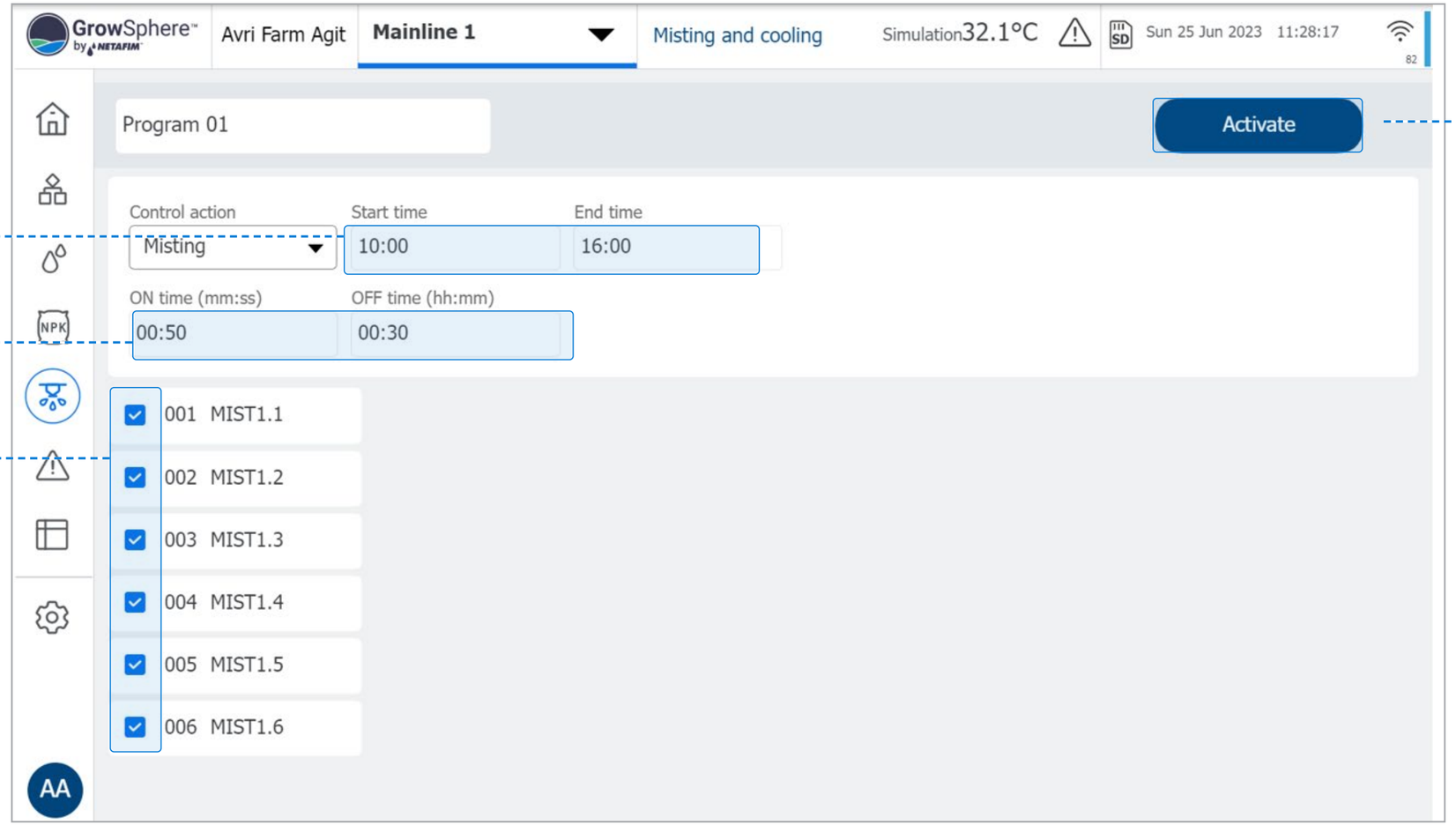


1. Set the program Name

2. Select the control action



8.3 Misting Program



1. Set the program active period Start time and End time

2. Set the vales On time and Off time cycle

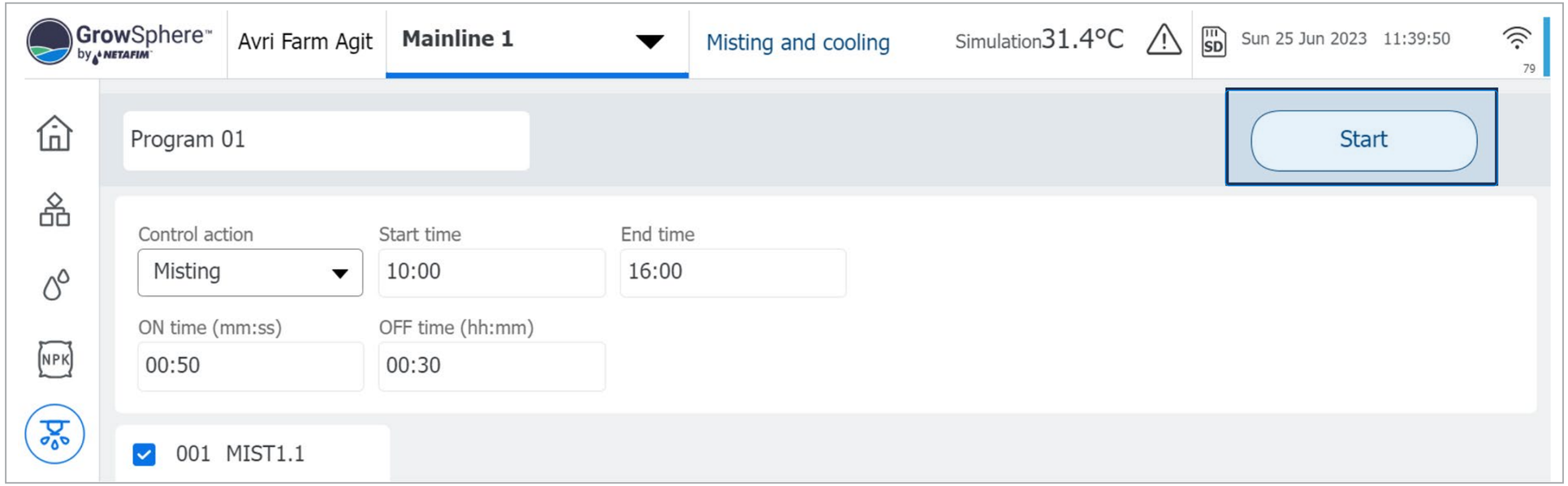
3. Set the vales that participate on this program

The vales will be activating according to the number of parallel vales settings. For example, if the parallel valves was set to 2, the valves 1 and 2 will run together for 50 seconds, after that valves 3 and 4 and followed by 5 and 6. Then will be off for 30 minutes. After 30 minutes will start a new cycle.

4. Click 'Activate' to activate the program

When the program is active then it is an option to Start the program manually!

When a cycle is running then will be an option to Stop it.



8.4 Cooling Program

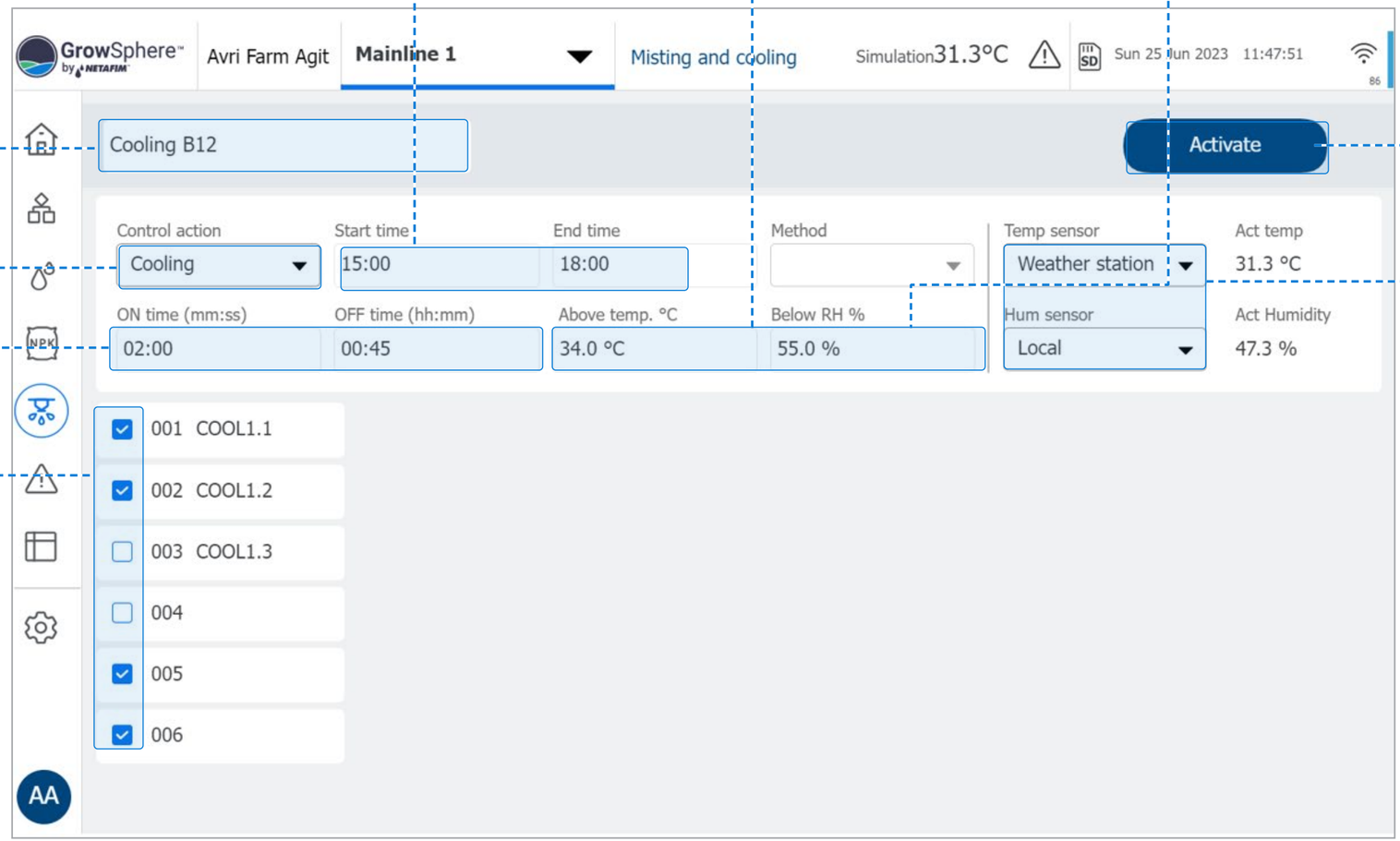
3. Select the control period

6. Set the temperature to start the cycle.

The cycle will run when the temperature is above this value and the RH is below the RH set value.

7. Set the RH (Relative Humidity) value.

When the RH is bellow this value, the cycle will be permitted to start. When the RH is higher than this value will stop the cycle (also if the temperature is above the set value.



1. Set the program Name

2. Select the control action

5. Set the ON and Off time

8. Set the vales that participate on this program

9. Click 'Active' to activate the program

4. Select the control sensors

For example, the temperature Sensor is from the Davis WS and the Humidity is local

8.5 Humidification Program

3. Select the control period

6. Set the temperature to start the cycle.

The cycle will run when the temperature is above this value and the RH is below the RH set value.

7. Set the RH (Relative Humidity) value.

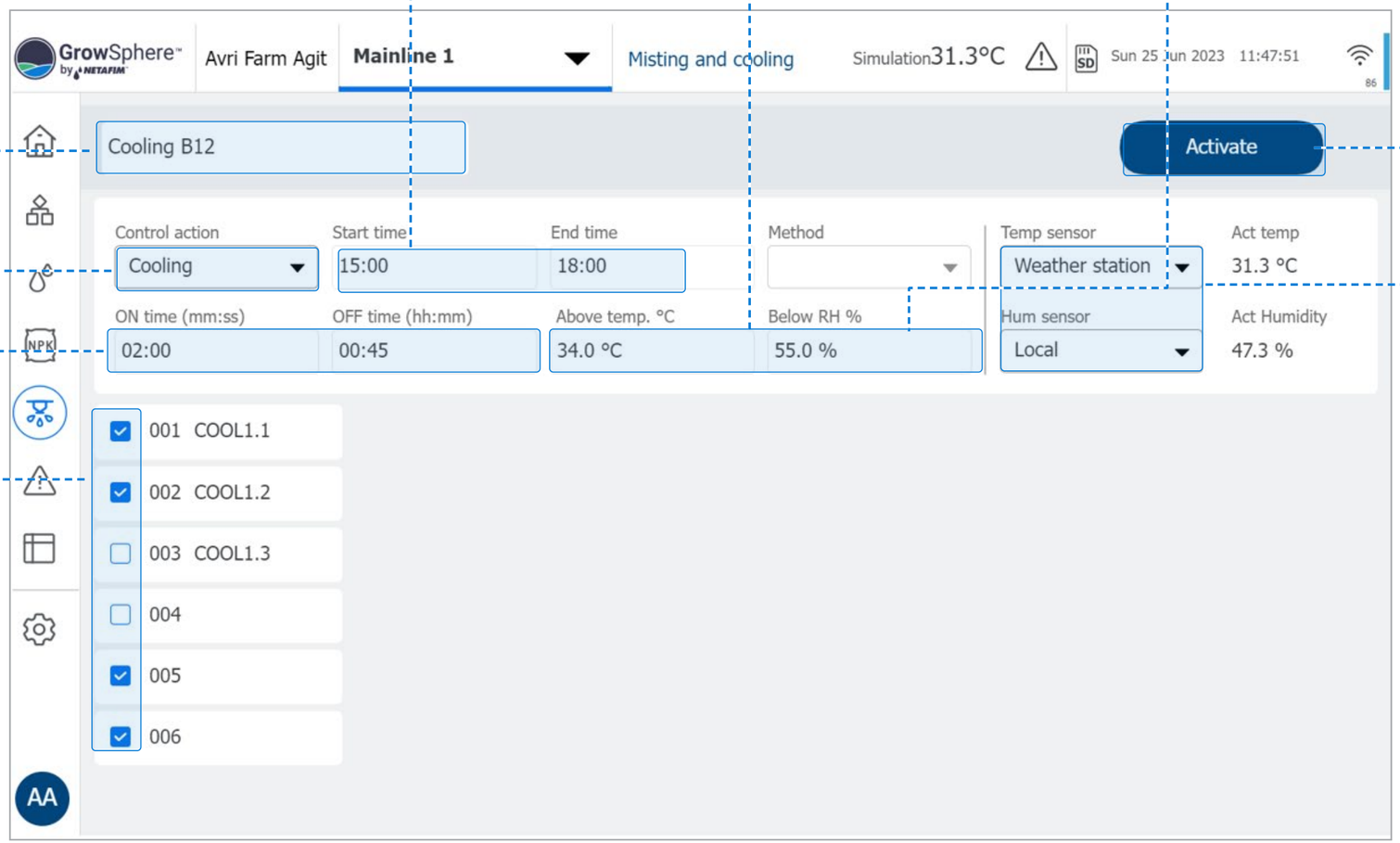
When the RH is bellow this value, the cycle will be permitted to start. When the RH is higher than this value will stop the cycle (also if the temperature is above the set value.

1. Set the program Name

2. Select the control action

5. Set the ON and Off time

8. Set the vales that participate on this program



9. Click 'Active' to activate the program

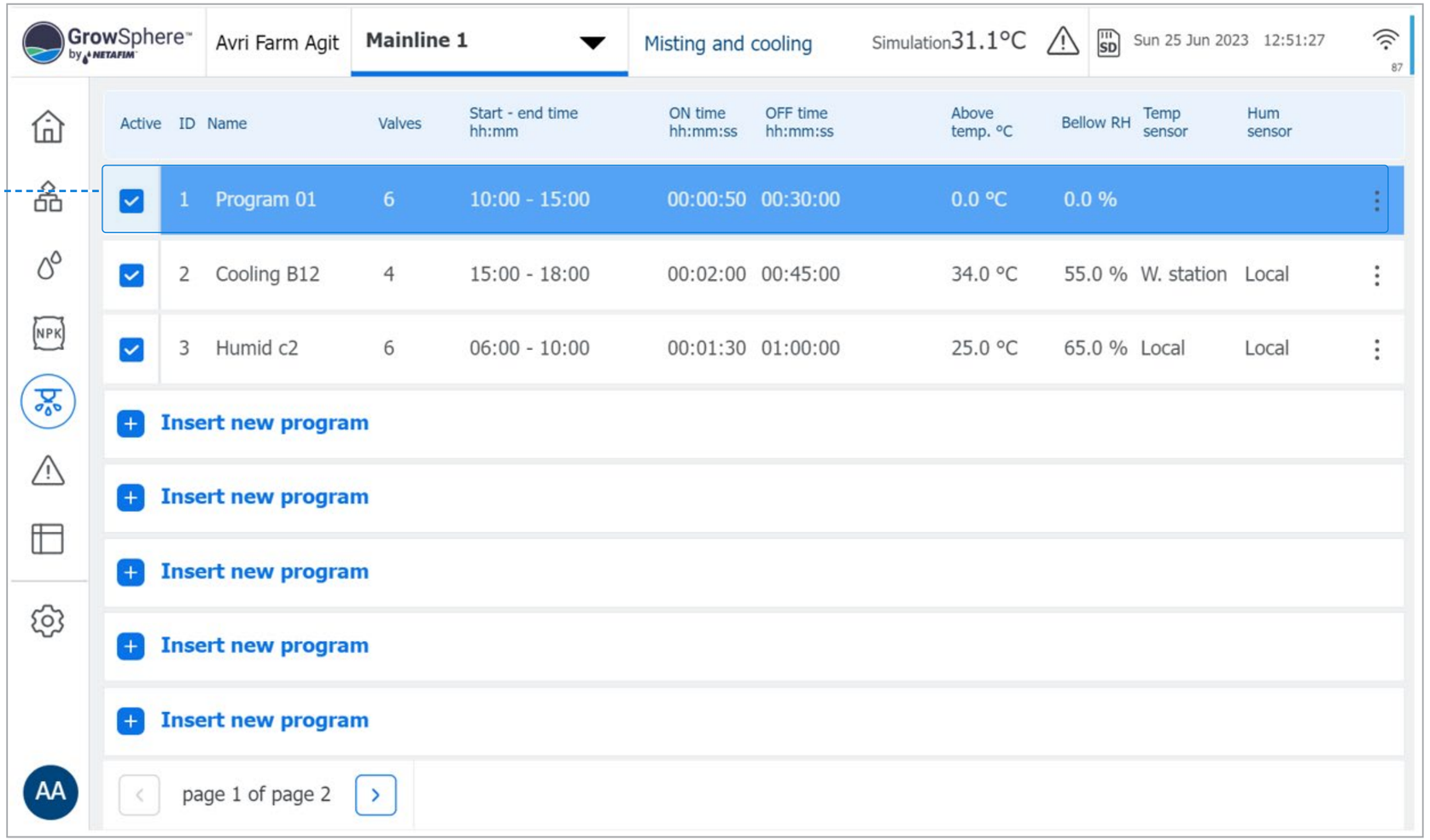
4. Select the control sensors

For example, the temperature Sensor is from the Davis WS and the Humidity is local

8.6 View programs

The Programs screen shows the active programs and the settings.

When one of the programs is running (valves are open) then will be uplighter to blue



When one of the programs is running, at the Scada Screen will show that the valves are ON

9. Dosing Tanks and Agitator Program

1 **Agitator Settings**

2 **Set agitators operation**

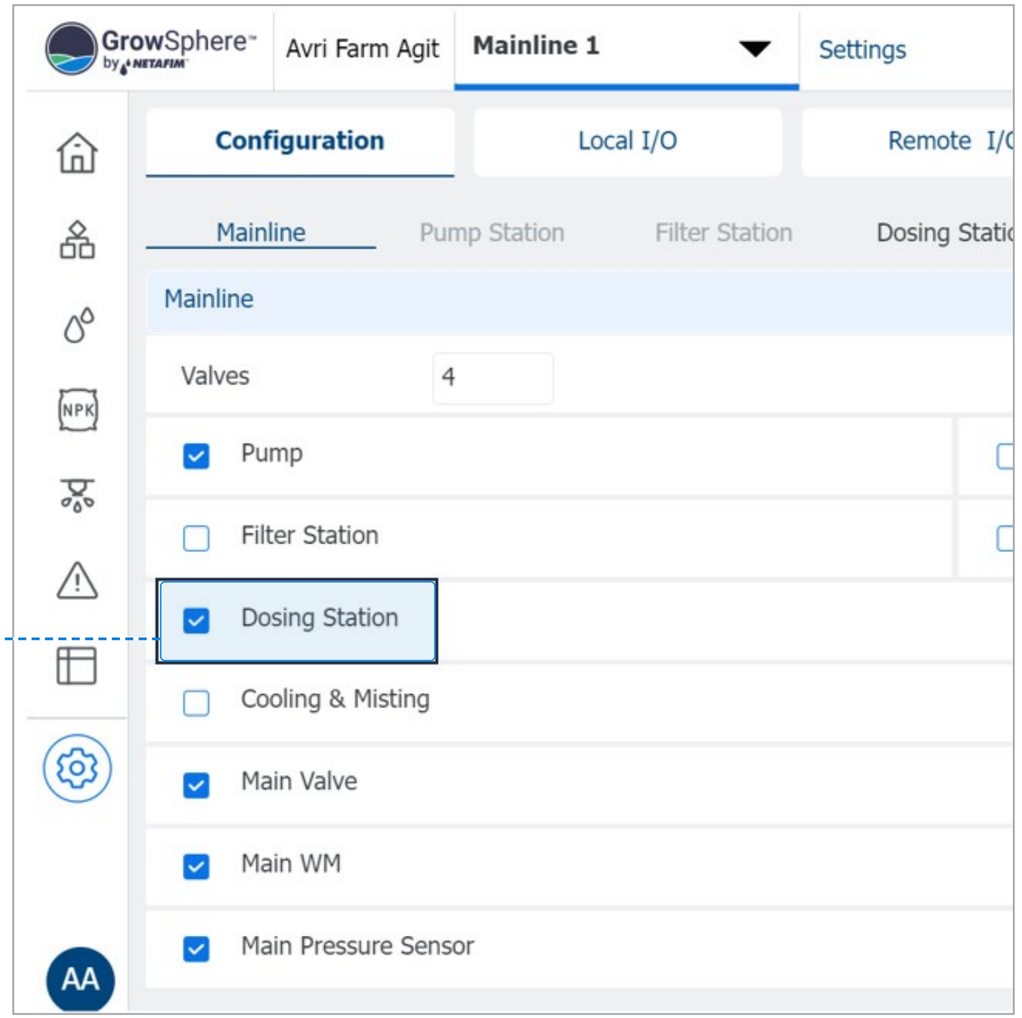
3 **Set Tanks parameters**

Agitators are devices that mix the media to be metered homogeneously, especially in the case of powdery additives or liquids that are challenging to dilute. The main features of the Agitators program are:

- Automatically defined Dosing Tanks according to the number of Dosing channels in the system.
- Each dosing channel has a Dosing tank that can be selectively activated or deactivated.
- Agitator can be signed to the I/O module and port in the controller and allocated to RTU.
- Number of agitators can be activated simultaneously.
- Day and night operation times for the agitator's activity can be set.
- ON and Off time for agitators can be set During Fertigation and not delays.

9.1 Agitator Settings

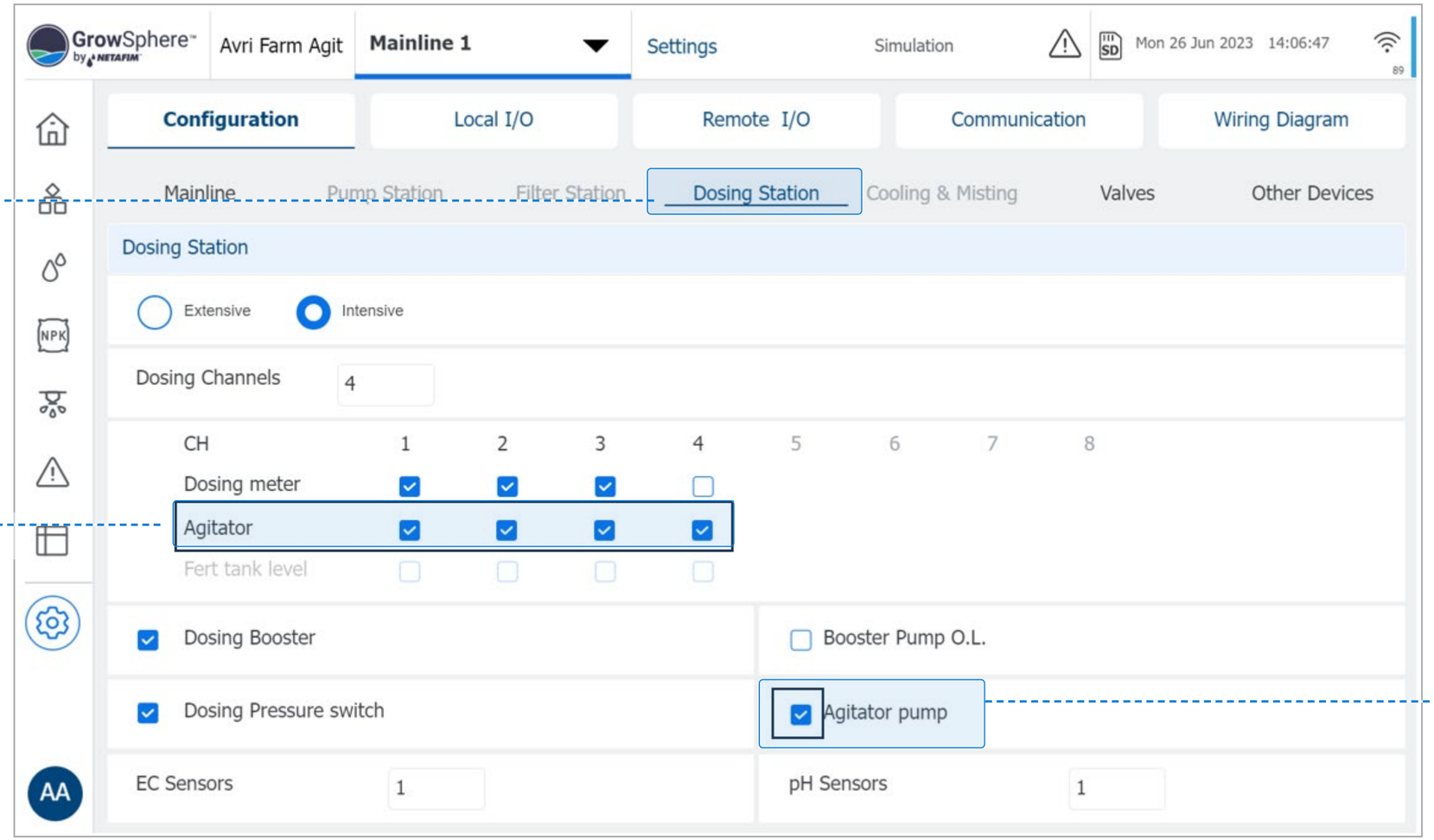
In the Mainline configuration screen – Ensure the Dosing station is selected.



I Assign dosing channels and agitators

1. In the Dosing station configuration screen

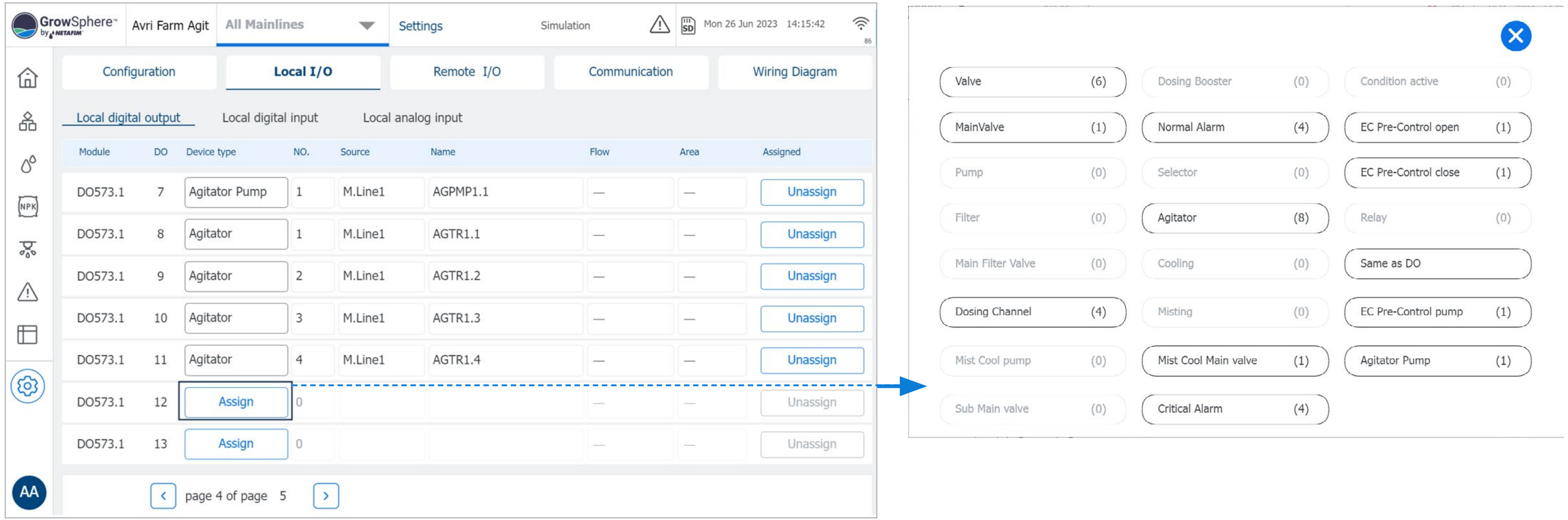
Select the Dosing Channels (tanks) that have Agitator



2. Select when there is a Main Agitator Pump

I Allocate agitator outputs

Agitator can not be assigned to RTU.



9.2 Set Tanks parameters

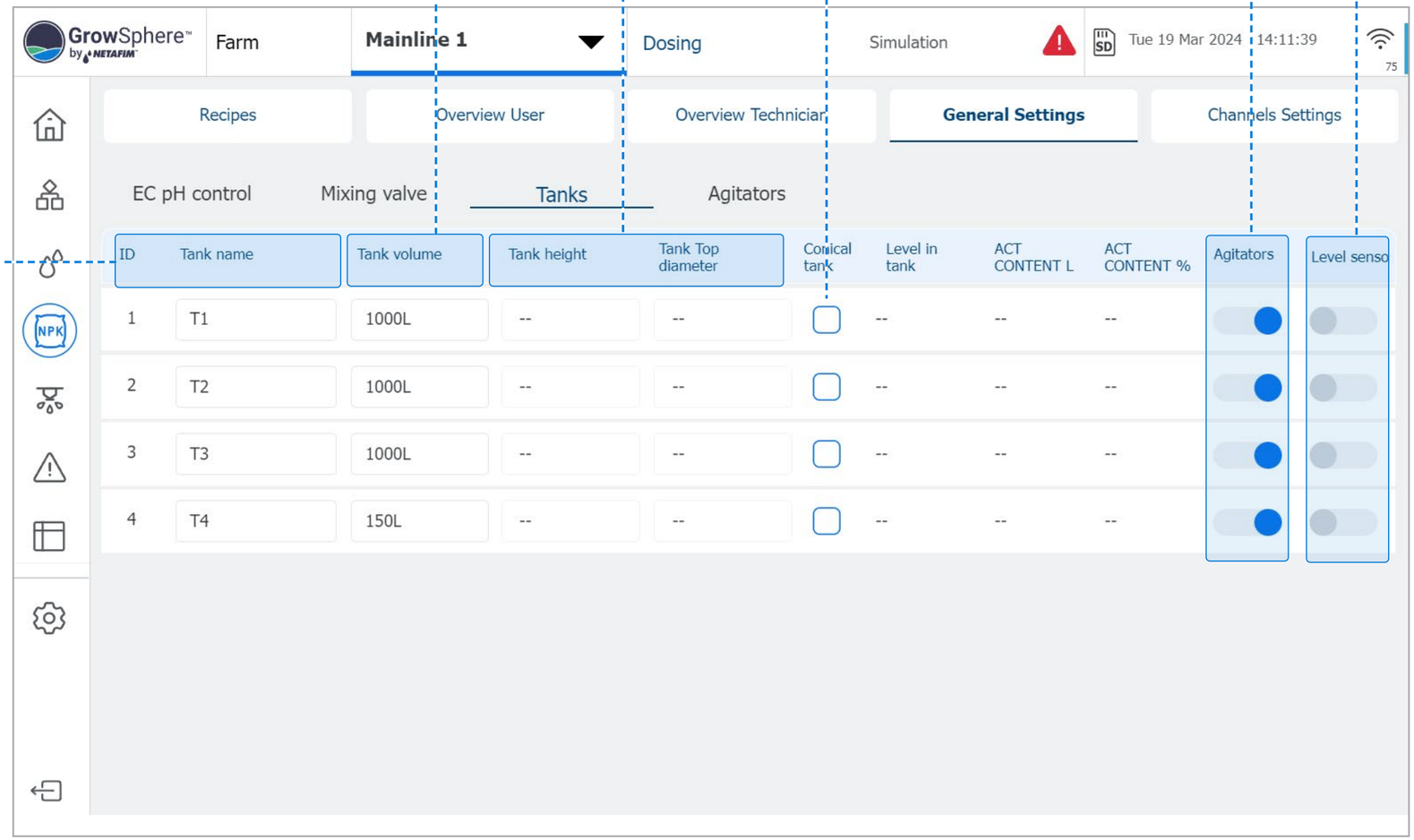
1. Write the Tank's names/ Chemical type

2. Set the tanks volume or dimensions

3. When the Tanks shape is conical, then set the factor

4. Select agitator Active or Not

5. Select Tanks Level Sensor if there is a connected sensor.

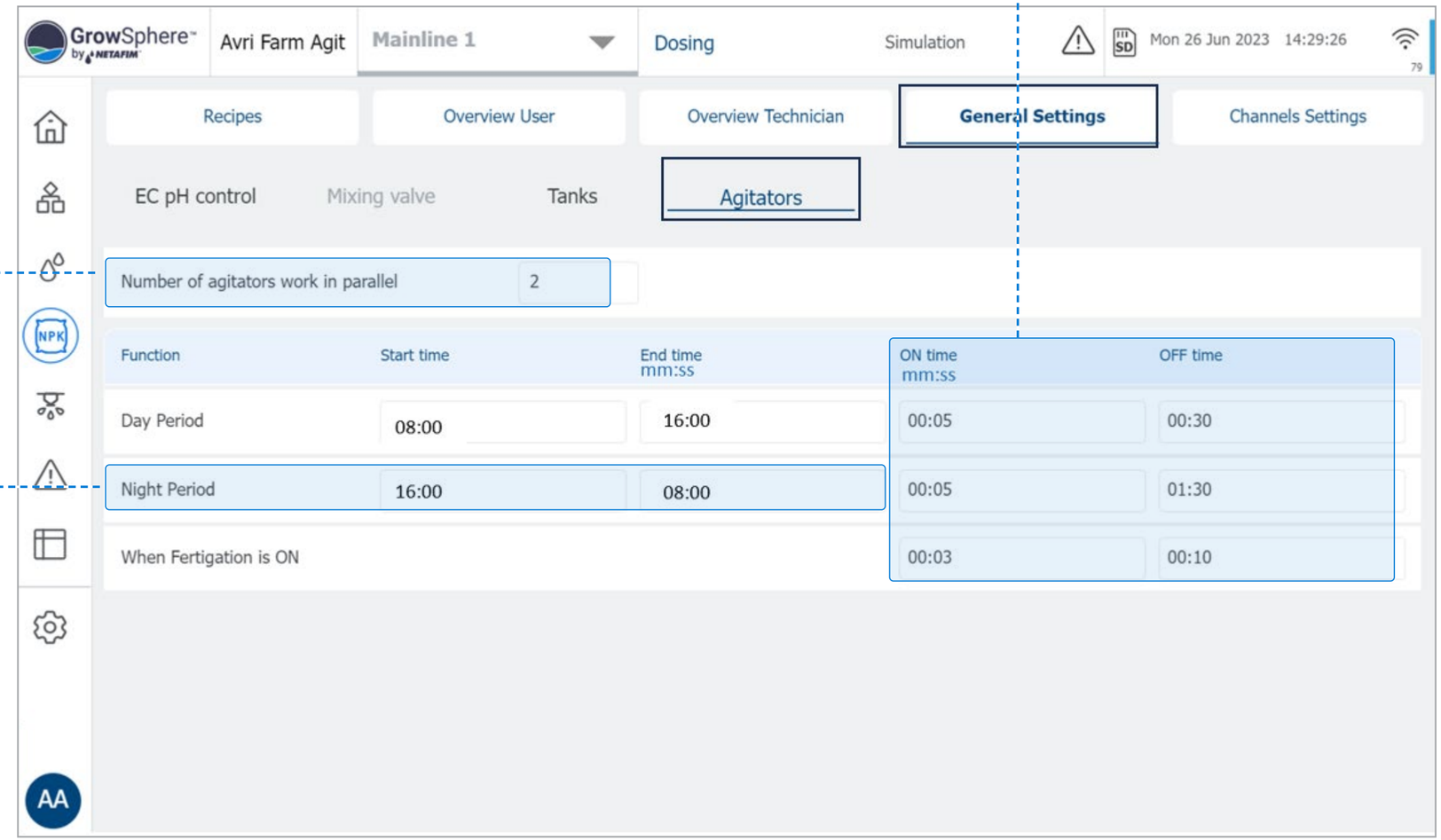


9.3 Set agitators operation

3. Set the ON and Off time for the mixing period

1. Define the number of agitators work in parallel

2. Set the parameters for the Night activity



10. Conditions & Triggers

1 **Conditions to start the Irrigation Program by external triggers.**

2 **Triggers definition**

3 **Settings of Analog trigger - Sensors**

4 **Remove title 4**

10.1 Conditions to start the Irrigation Program by external triggers.

To activate the irrigation program, external triggers need to be identified. The user can select the trigger type, which could be a dry contact or an analog sensor, and specify a condition to start the program.

The conditions can be of type and value, which determine when to start or stop the program.

The program types available are Only if ON, One Shot, and Multi Shot.

In all options, an emergency switch (DI dry contact) can be used to stop the program if needed.

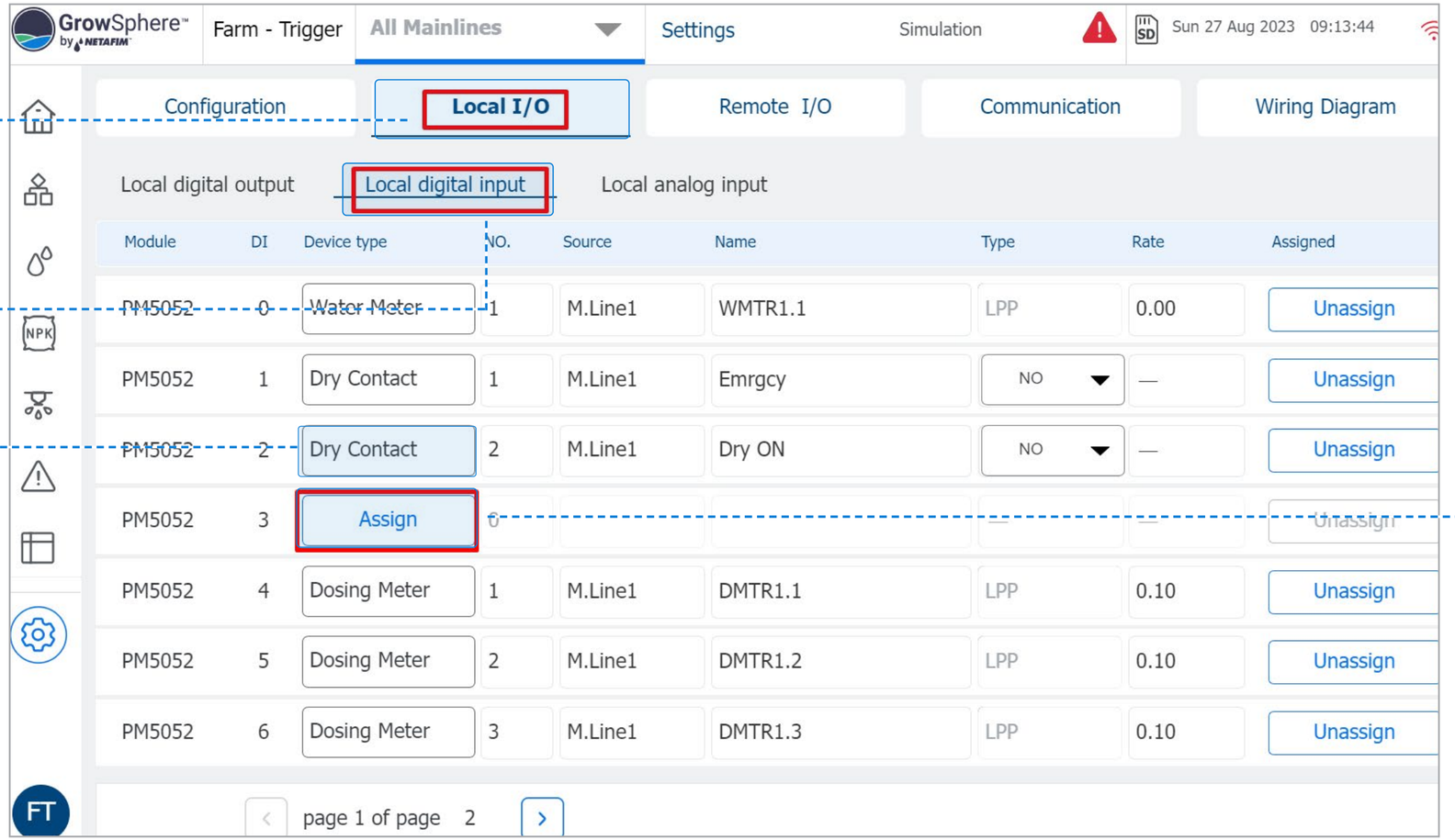
A general sensor, such as a tank-level sensor, can also be selected. The sensor must be 0-20mA.

10.2 Triggers definition.

1. The user / technician will define the triggers that have on his system.

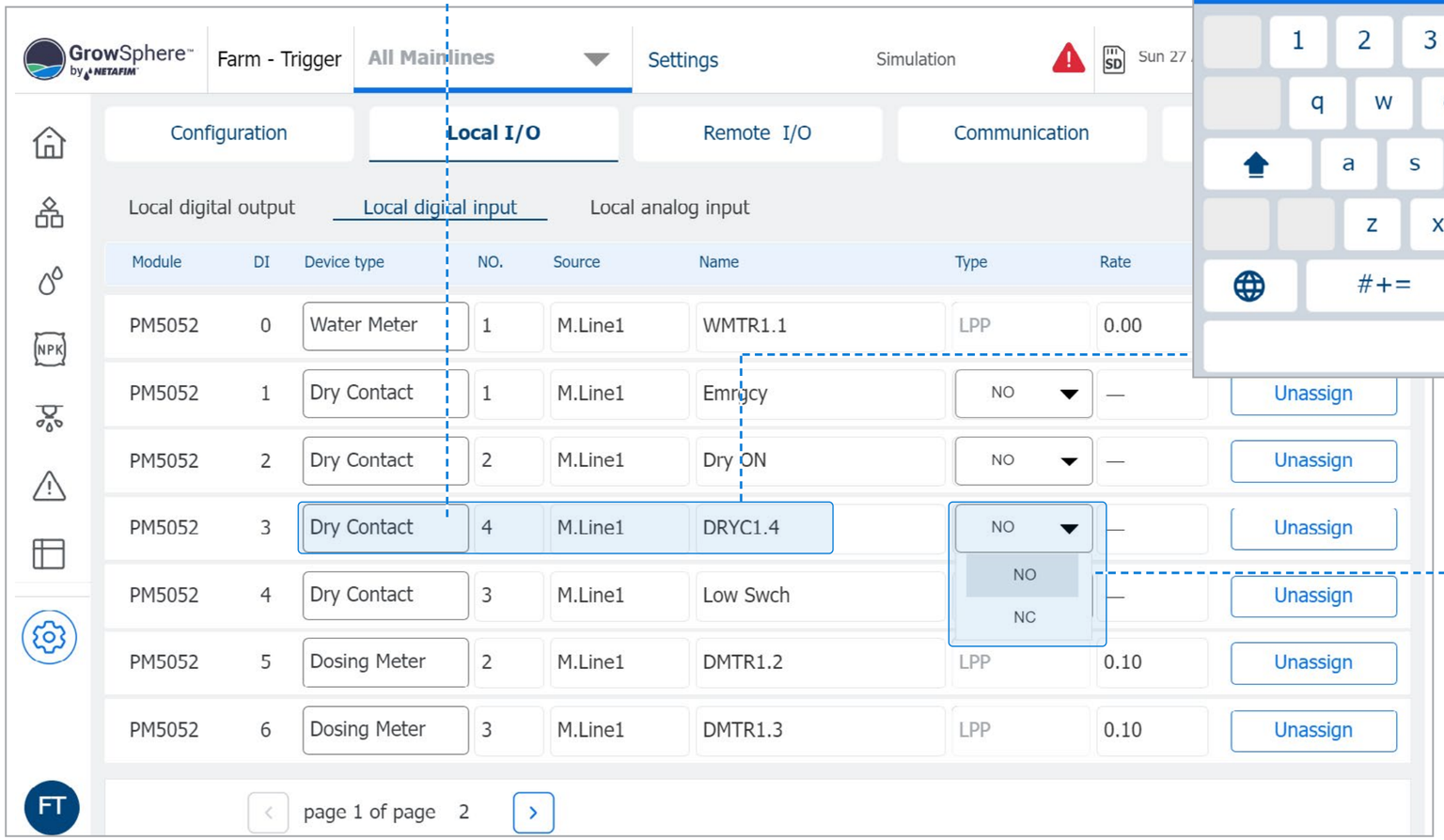
2. The triggers can be digital or analog. Select and set the following steps.

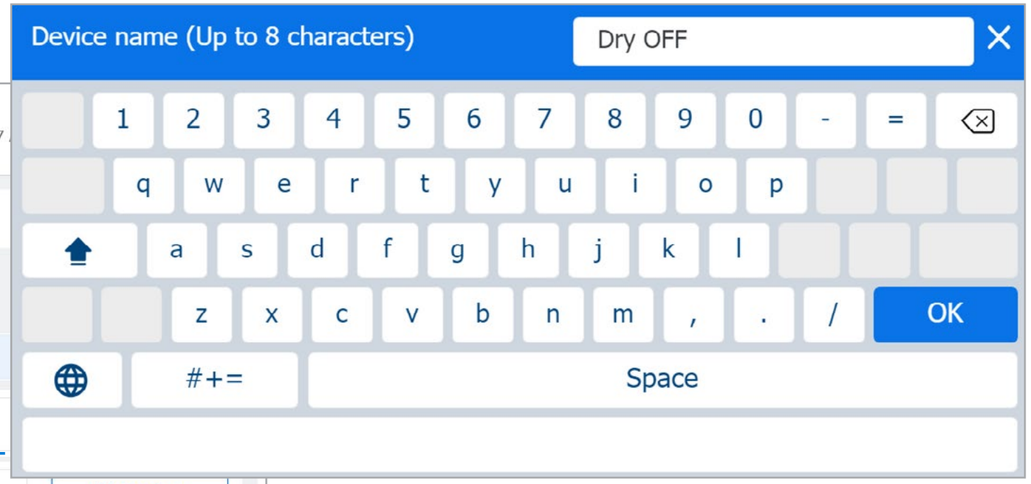
4. Choose Dry contact



3. Choose the digital input where the Dry Contact is connected.

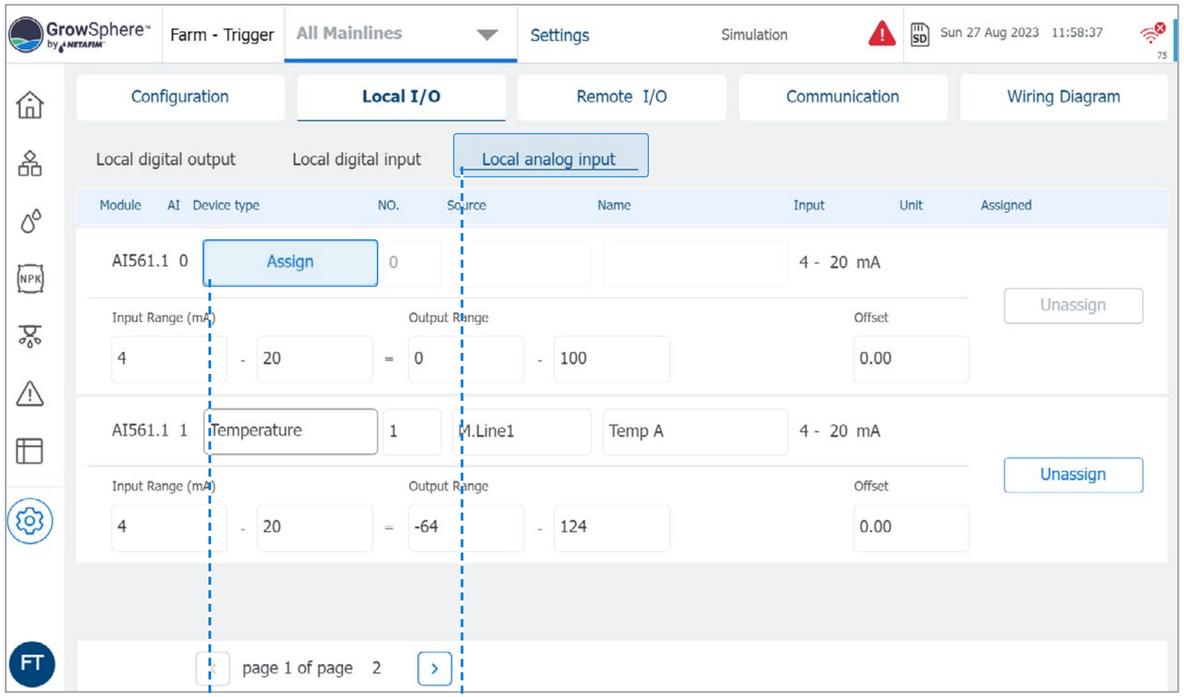
1. Click to edit the name of the Dry contact, example Dry OFF





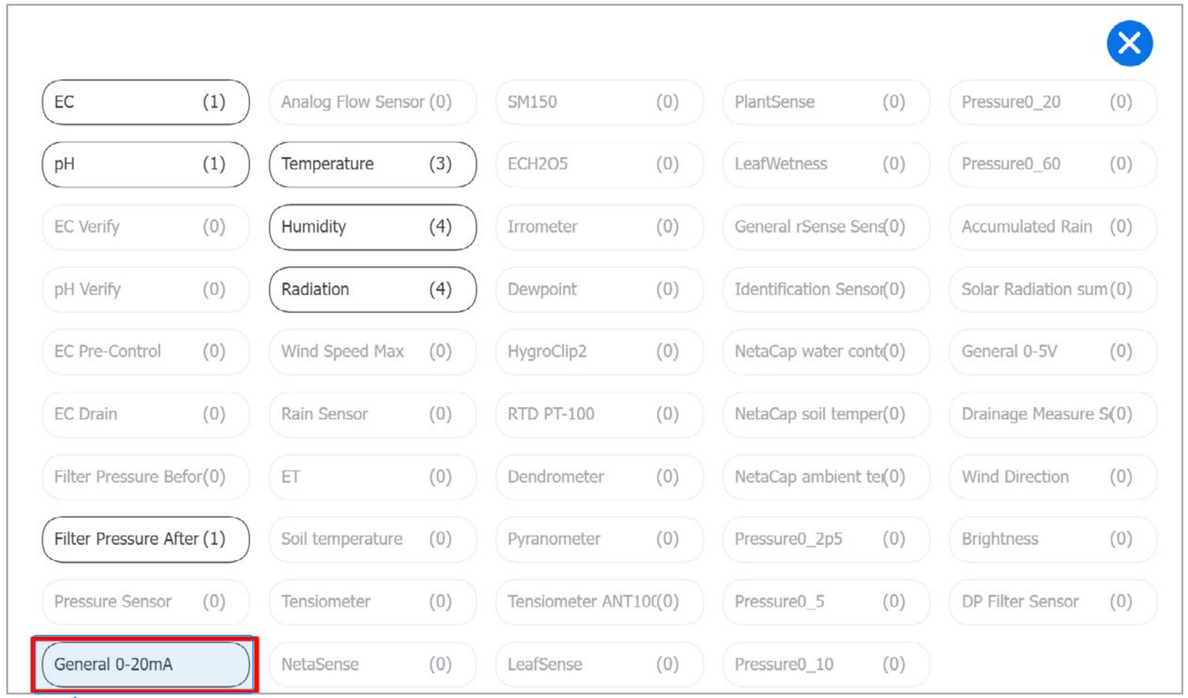
2. Select the DI type normally open or normally close.

10.3 Settings of Analog sensors



1. Select Local analog Inputs

2. Select the AI where the sensor is connected



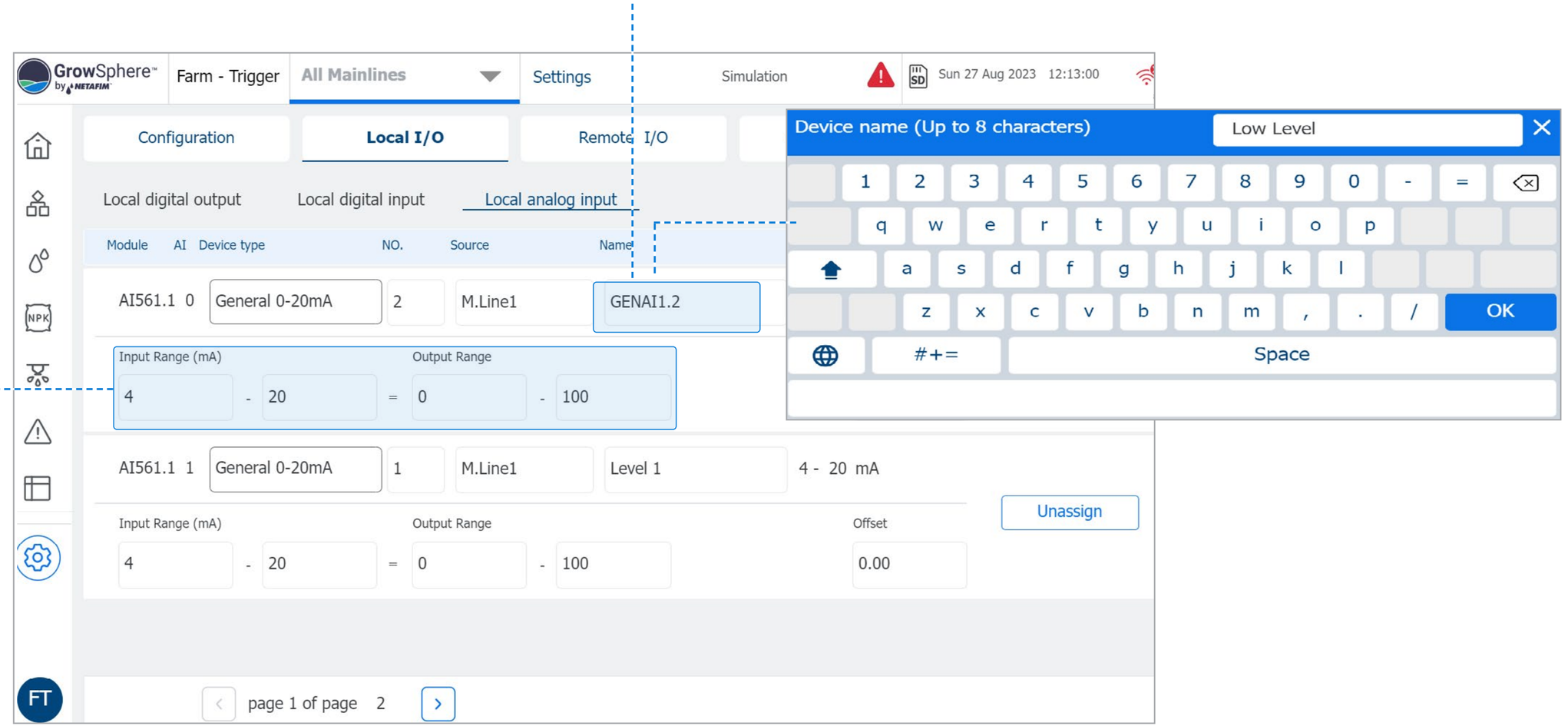
3. Choose the sensor type. For example, if it is a sensor level, choose General

For example, if it is a sensor level, choose General 0-20 mA

Settings of Analog triggers – Sensors

4. Edit the sensor Name. For example, Low Level

5. Set the sensor range

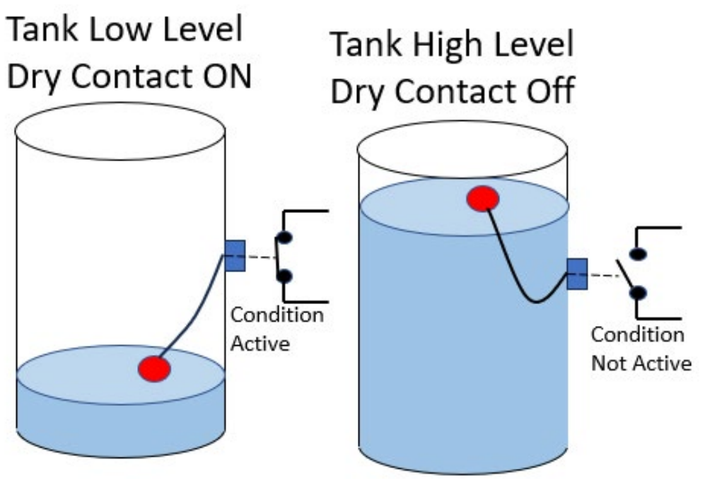


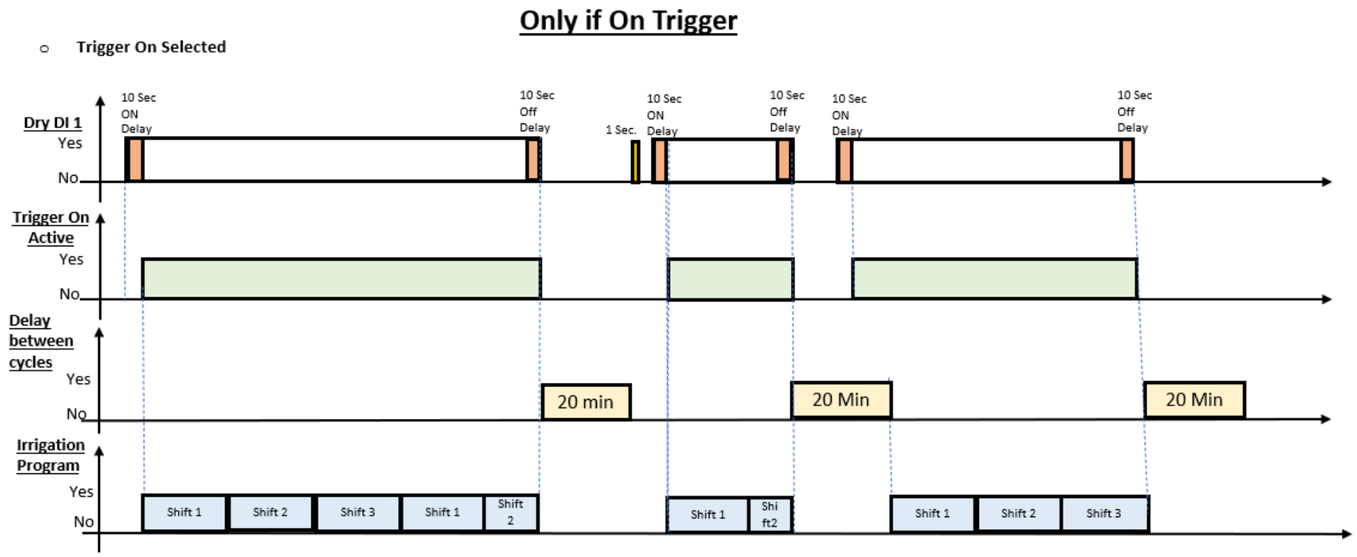
10.4 Type - Only if ON

1. The program types are: Only if ON , One Shot and Multi Shot.•
2. The external triggers are set as a condition to activate the irrigation program.
3. The user will choose the trigger type, dry contact or analog sensor, and the condition to start the program.
4. The conditions are type and trigger to start or stop the program.
5. The program has two periods, each period has an independent Start time, End time and triggers.
6. For Only if ON condition can be selected Trigger ON.
7. Emergency switch (DI dry contact) is a DI switch to stop the program when it is active or prevent it from being activated.

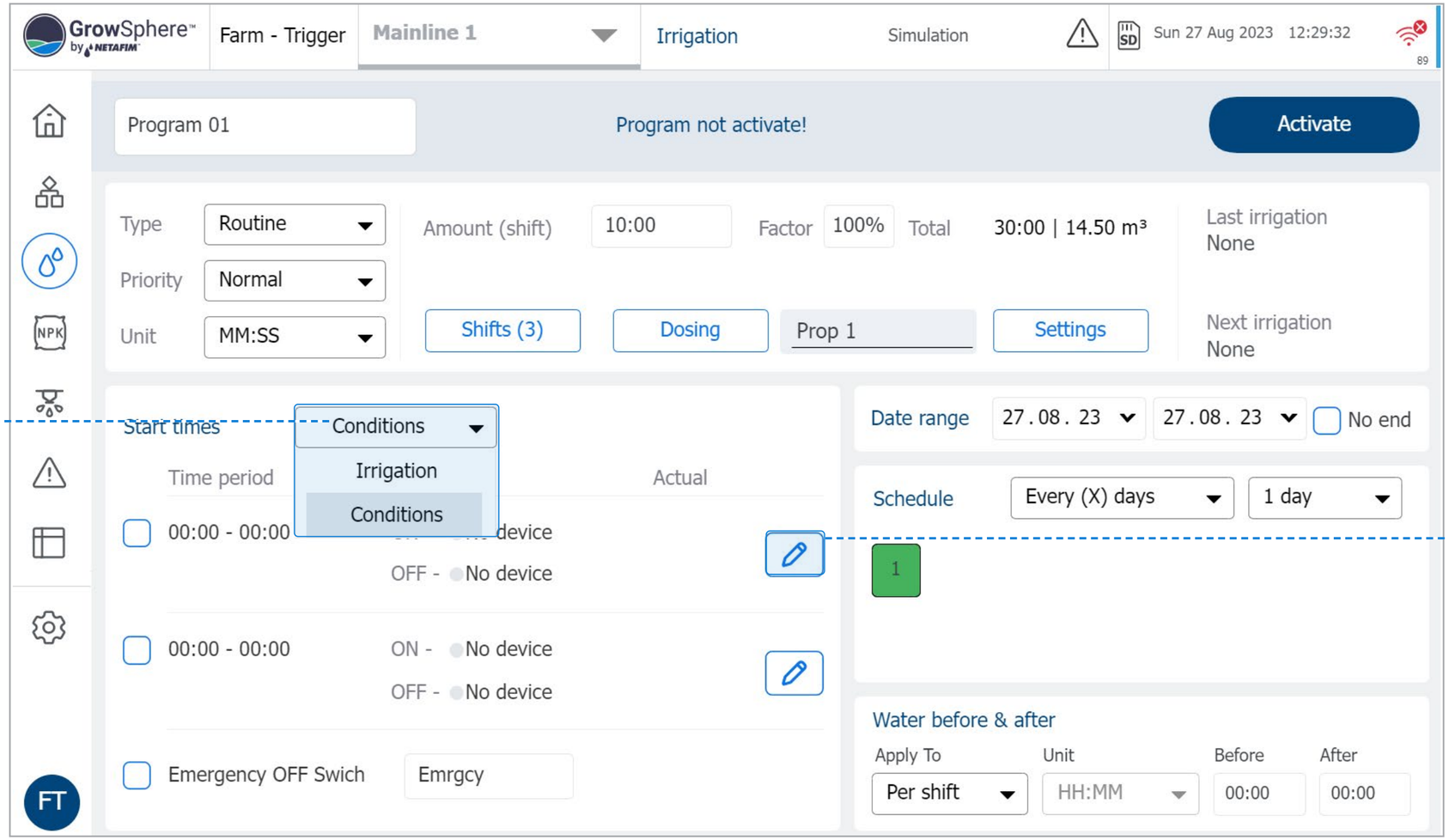
Example of Condition Only If On

With storage tank and One float (N.O. Switch)





I Digital Input (Dry Contact)



1. Select Conditions

2. Select the Edit icon to edit the 1st Time Period.

The same settings are for the 2nd Time Period.

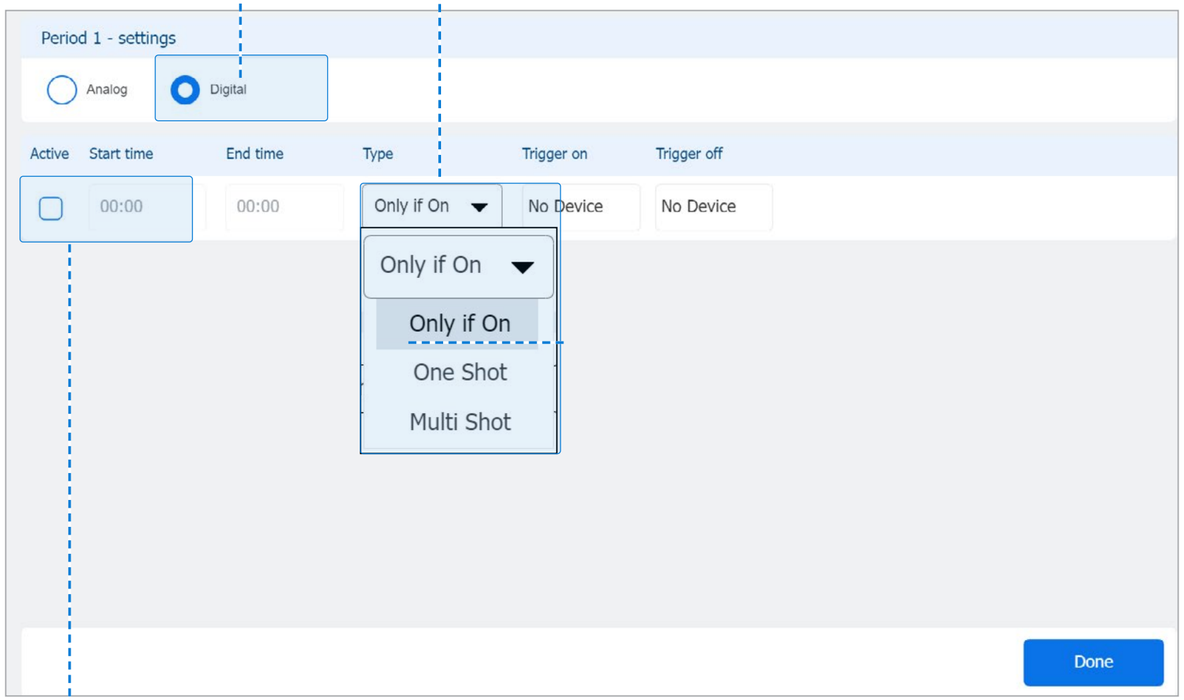
The start and end times can not be overlapping between periods.

The same settings are for Period Two.
The start and end times can not be overlapping between periods.

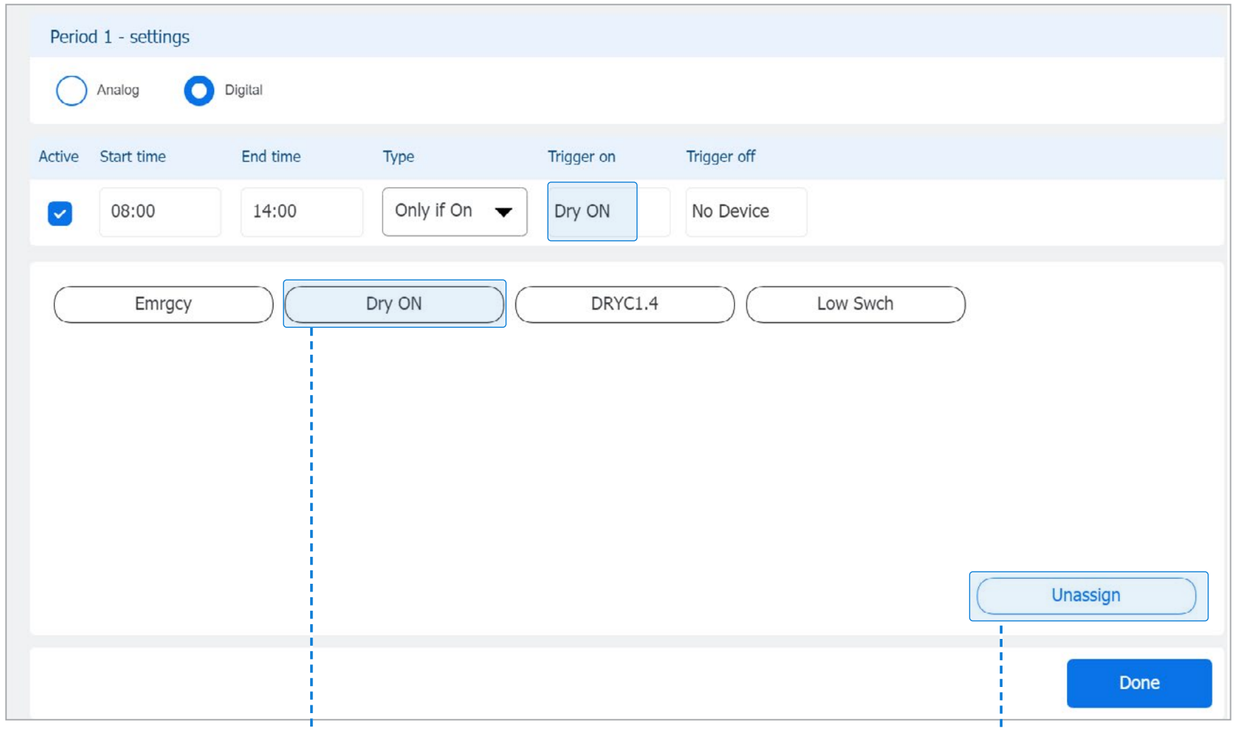
I Digital Trigger

1. Select Digital (for dry contact DI)

3. Choose the type Only if ON



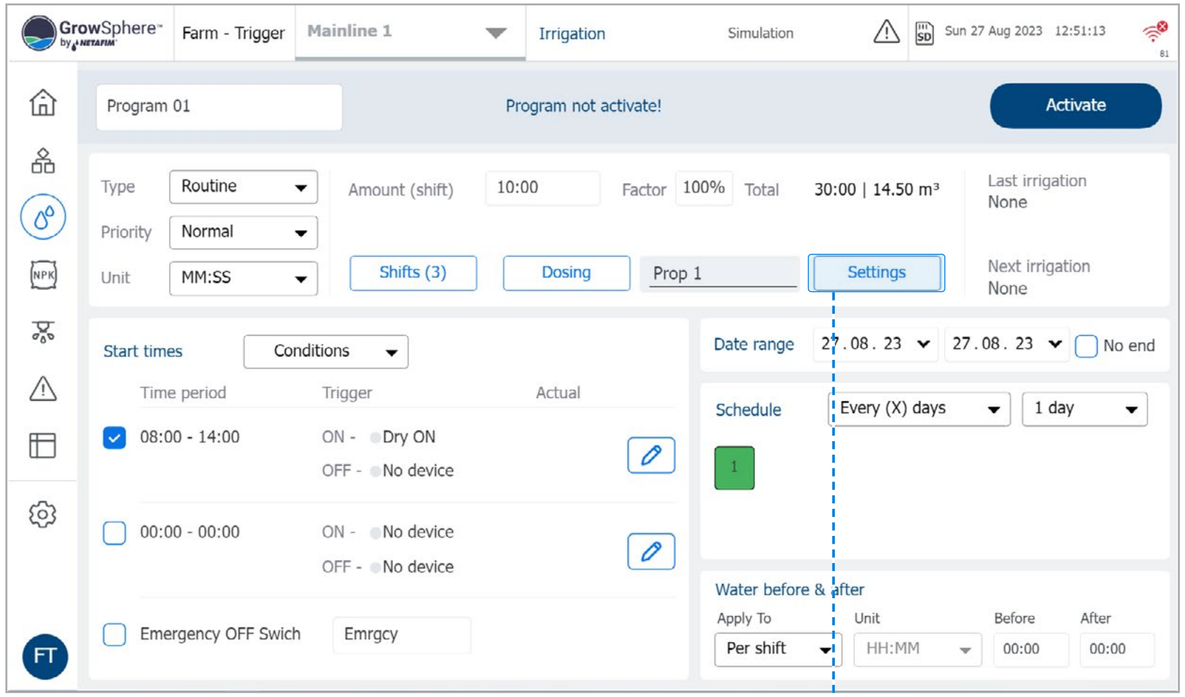
2. Select the checkbox for activating the condition

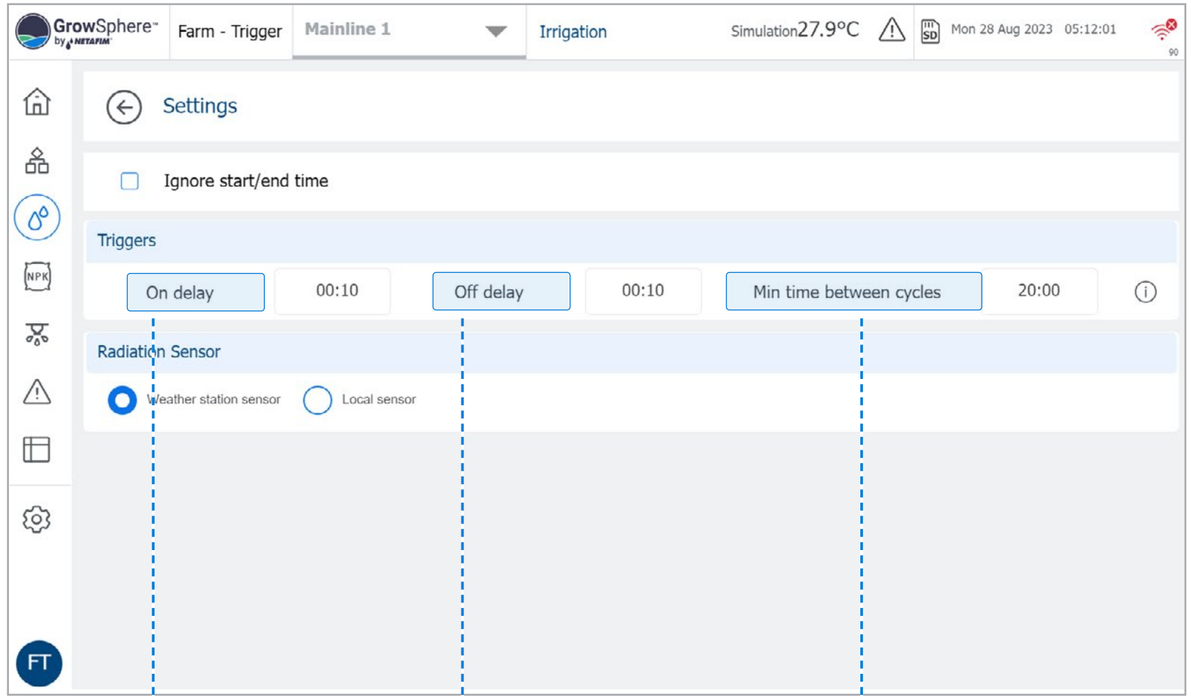


4. Select the trigger, In this example Dry ON

5. To unassigns the trigger that was selected

I Only if ON - Digital Trigger





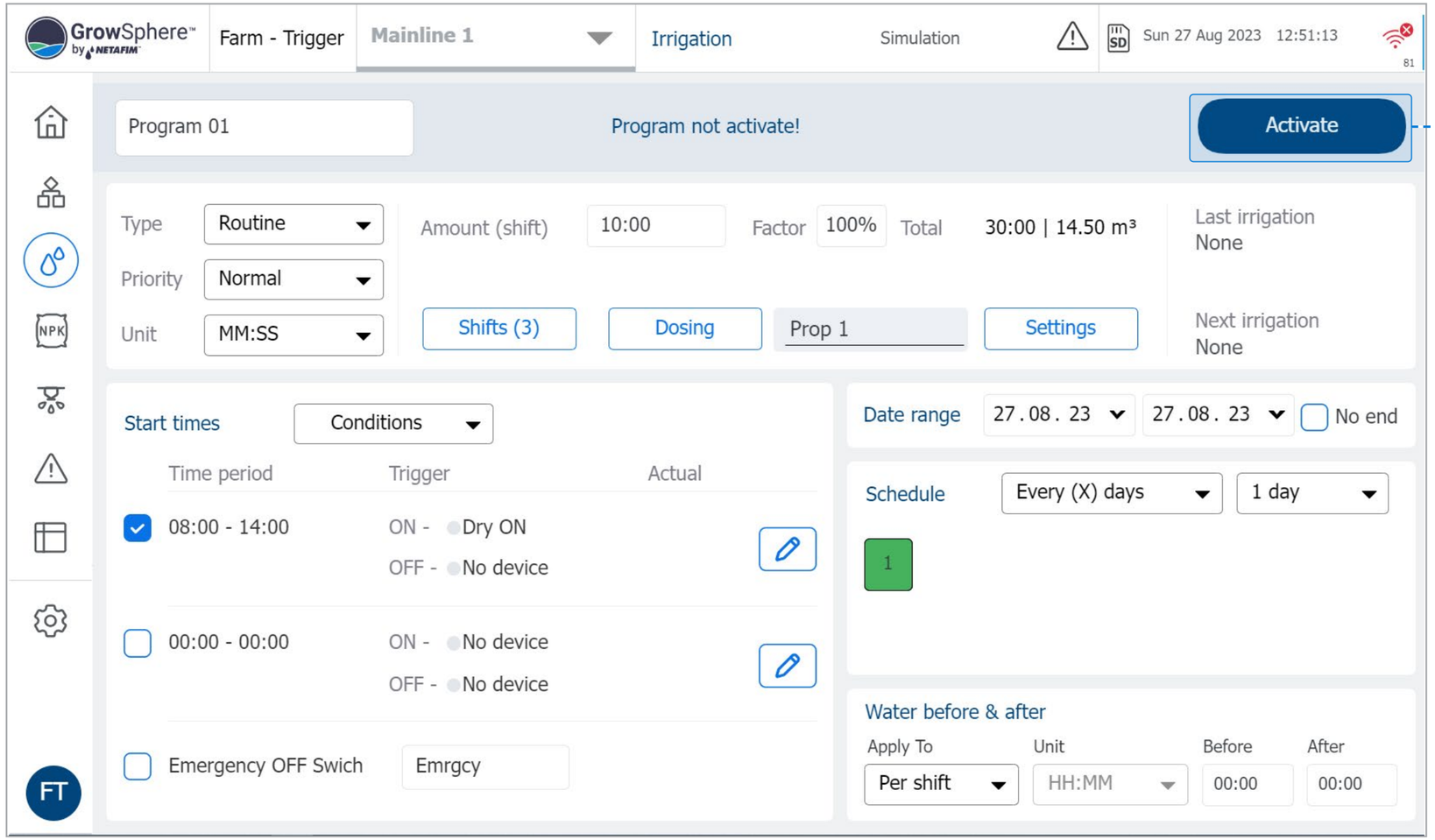
1. Click on Settings

2. ON delay: it is a time that the DI must be ON to be an active trigger (mm ss)

3. Off delay: it is a time that the DI must be Off to be a not active trigger (mm ss)

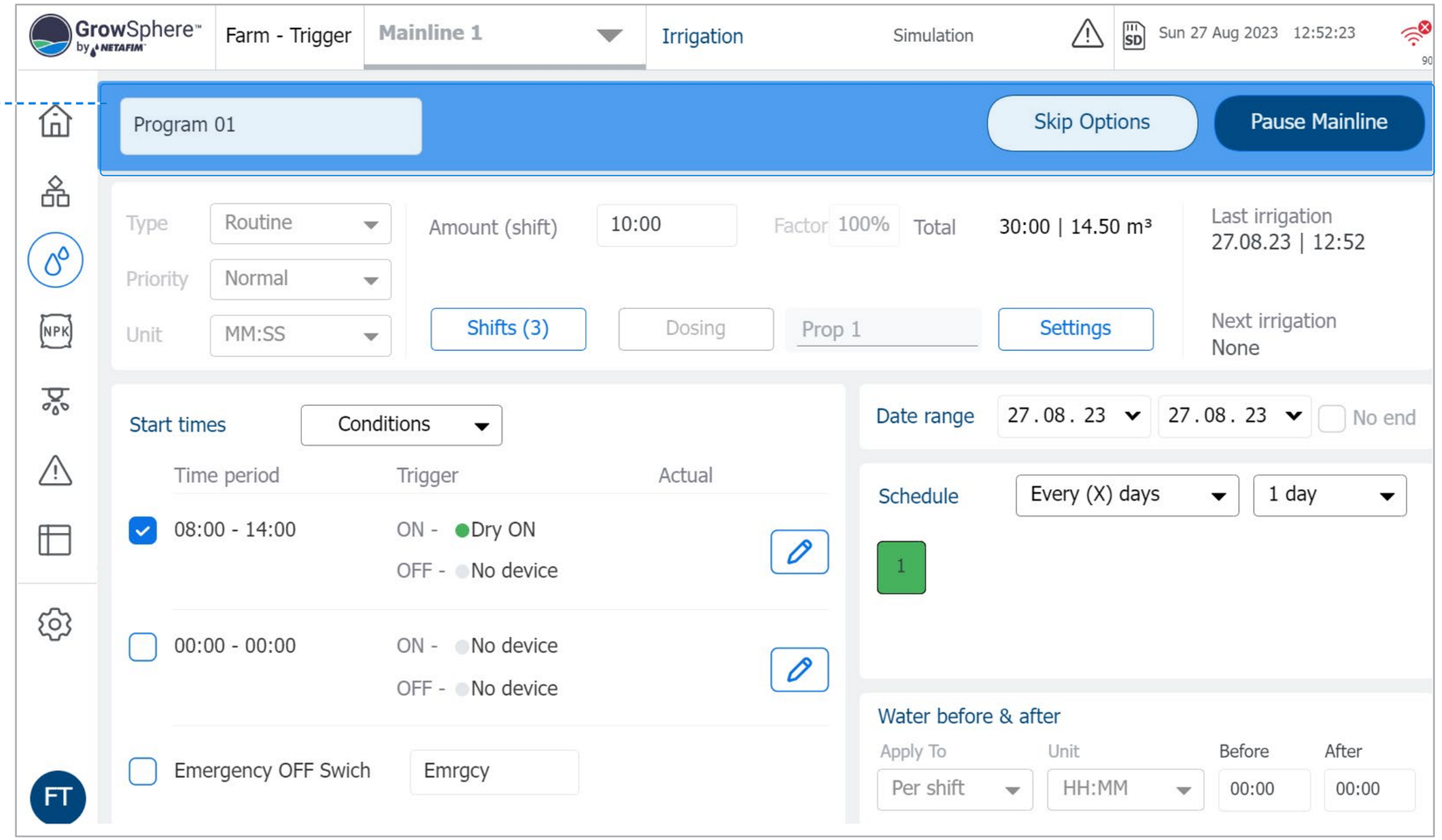
4. It is a minimal time between cycles ; when the trigger turns OFF and ON again the program will start after this delay. (mm:ss)

I Only if ON - Digital Trigger



1. Activate the program

2. When the condition is ON, and it is on the period window the program will be posted to the Queue to be activated.

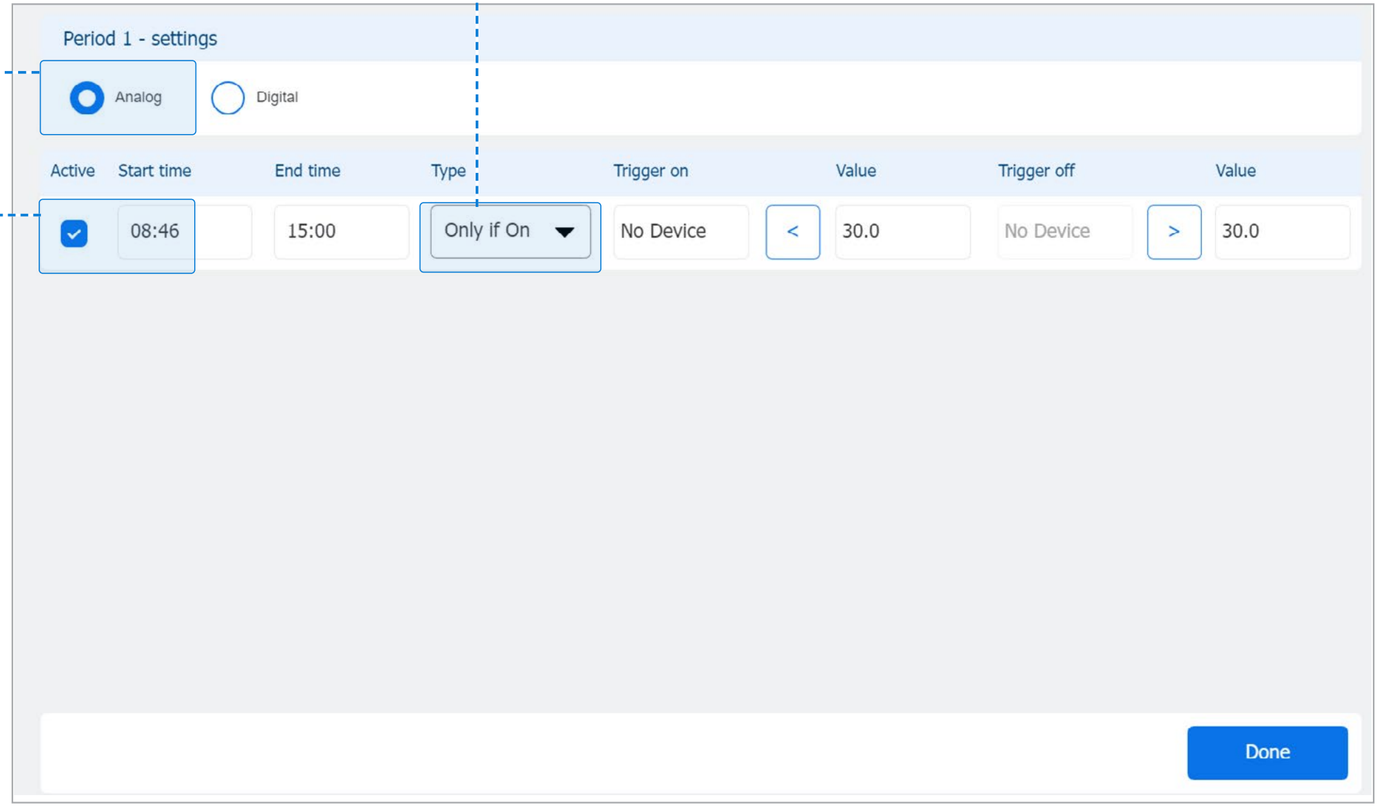


I Only if ON - Analog Input

3. Choose the type Only if ON

1. Select Analog (Highlighted button for Analog and written as Digital)

2. Select the start and End times for the period the condition will be active

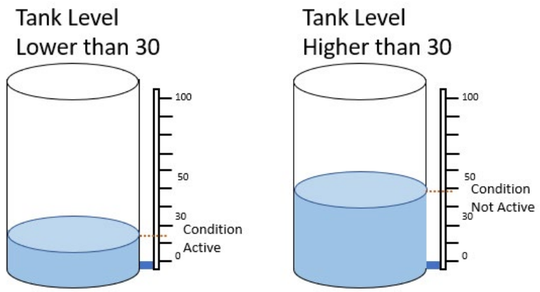


Example: Condition Only If On with Analog Sensor Level

The set point is 30

When the Tank level is lower than 30 then the Irrigation program will run.

When the thank level is higher than 30, the irrigation program will stop.

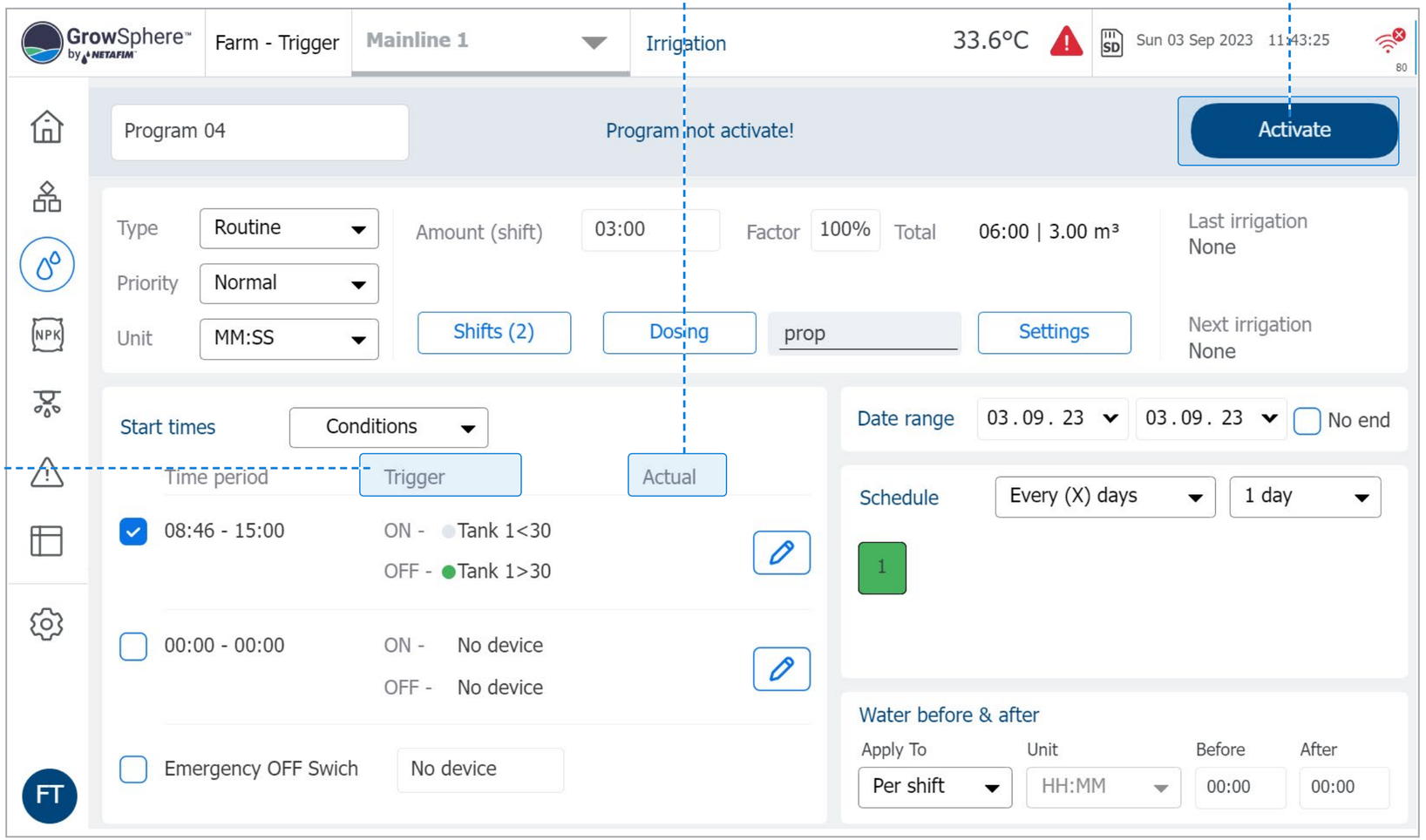


I Only if ON Digital Trigger.

2. Actual is the actual value of the sensor.

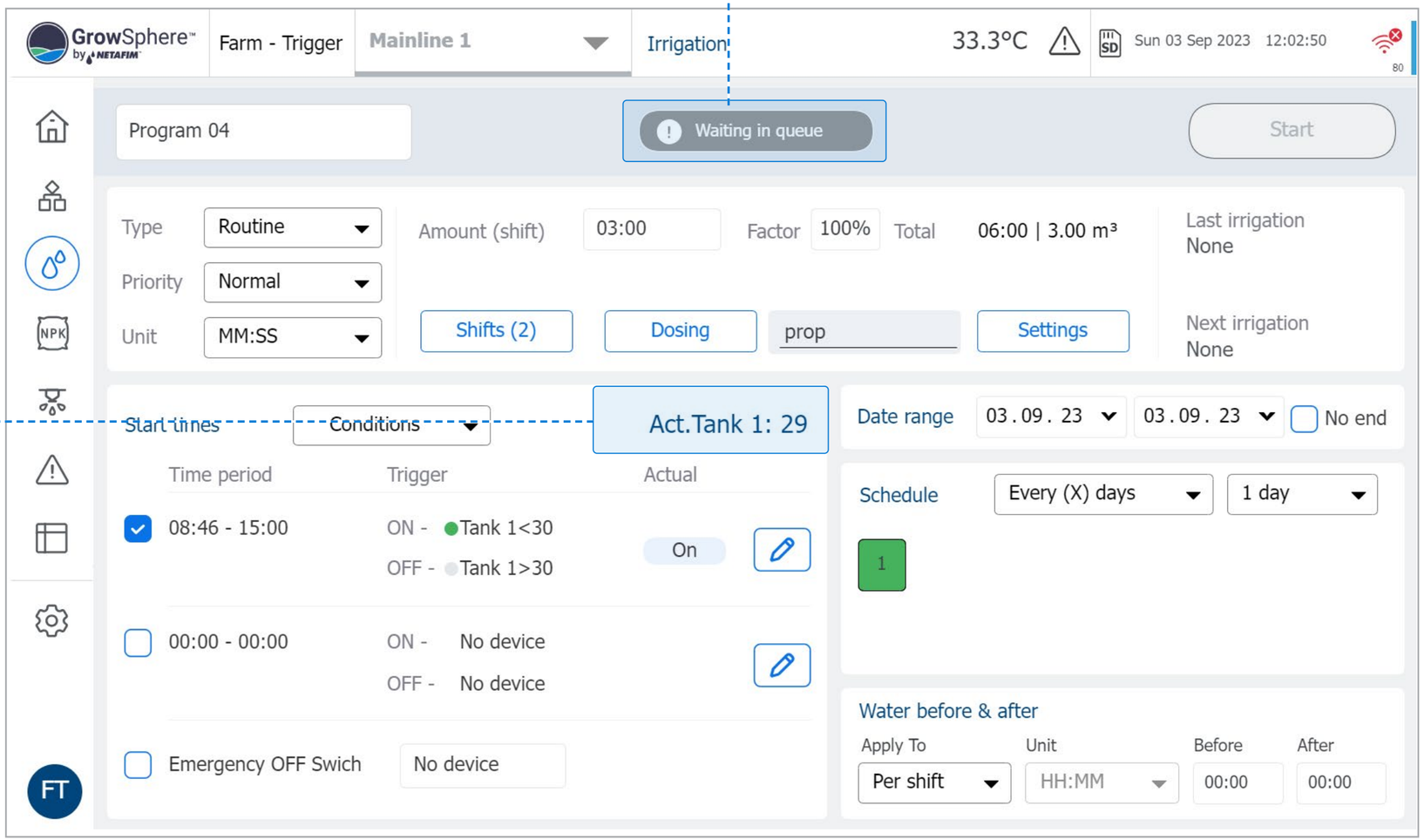
3. Select Activate to make the program activate.

1. These value is the target trigger to activate the irrigation program



5. When the sensor value is lower than the target, the program will be posted in the Queue.

4. When it is a running program then will wait to be send to the hydraulic manager to run this program.

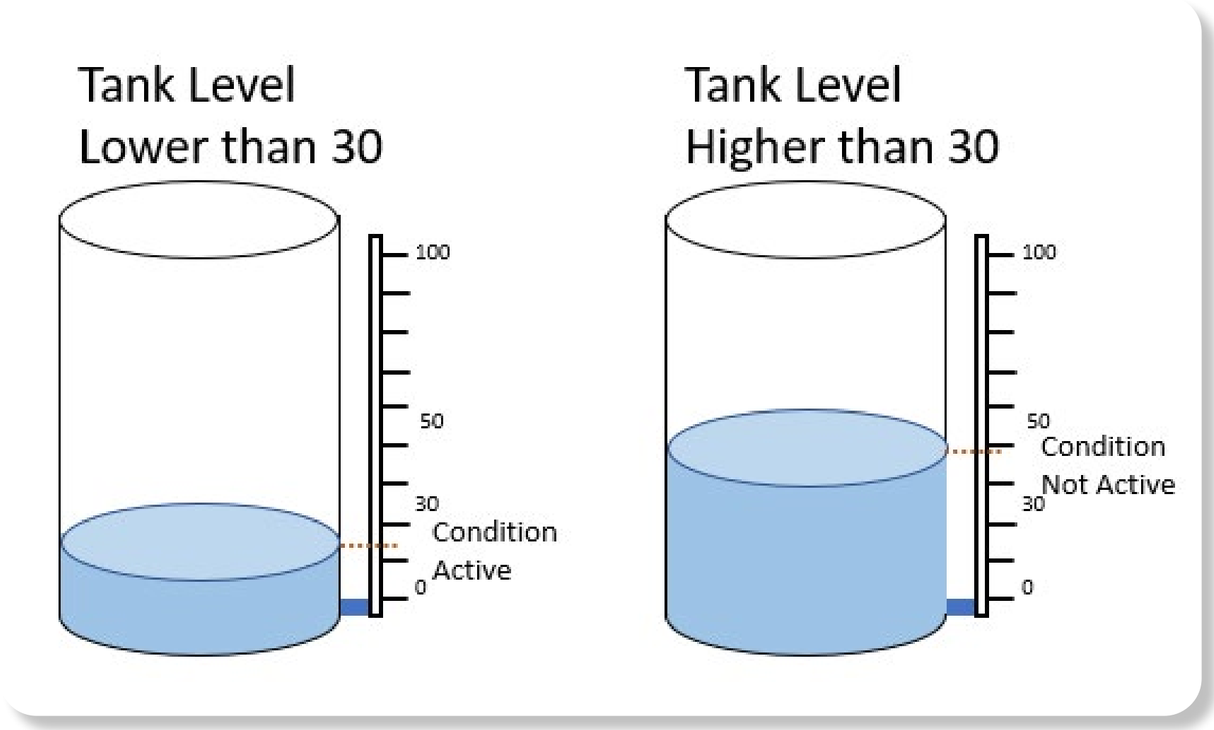


Example: Condition Only If On with Analog Sensor Level

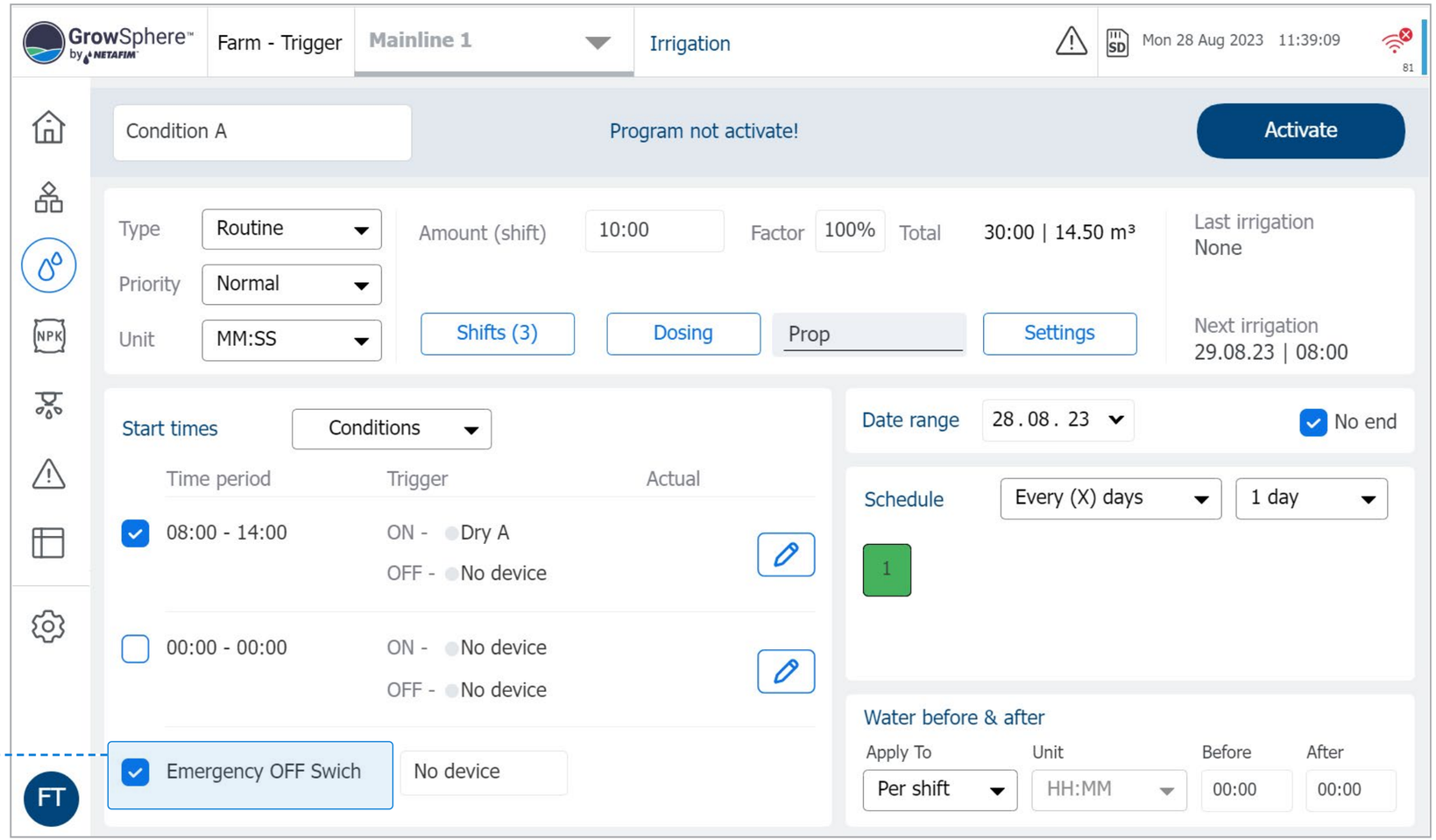
The set point is 30

When the Tank level is lower than 30 then the Irrigation program will run.

When the thank level is higher than 30 , the irrigation program will stop.



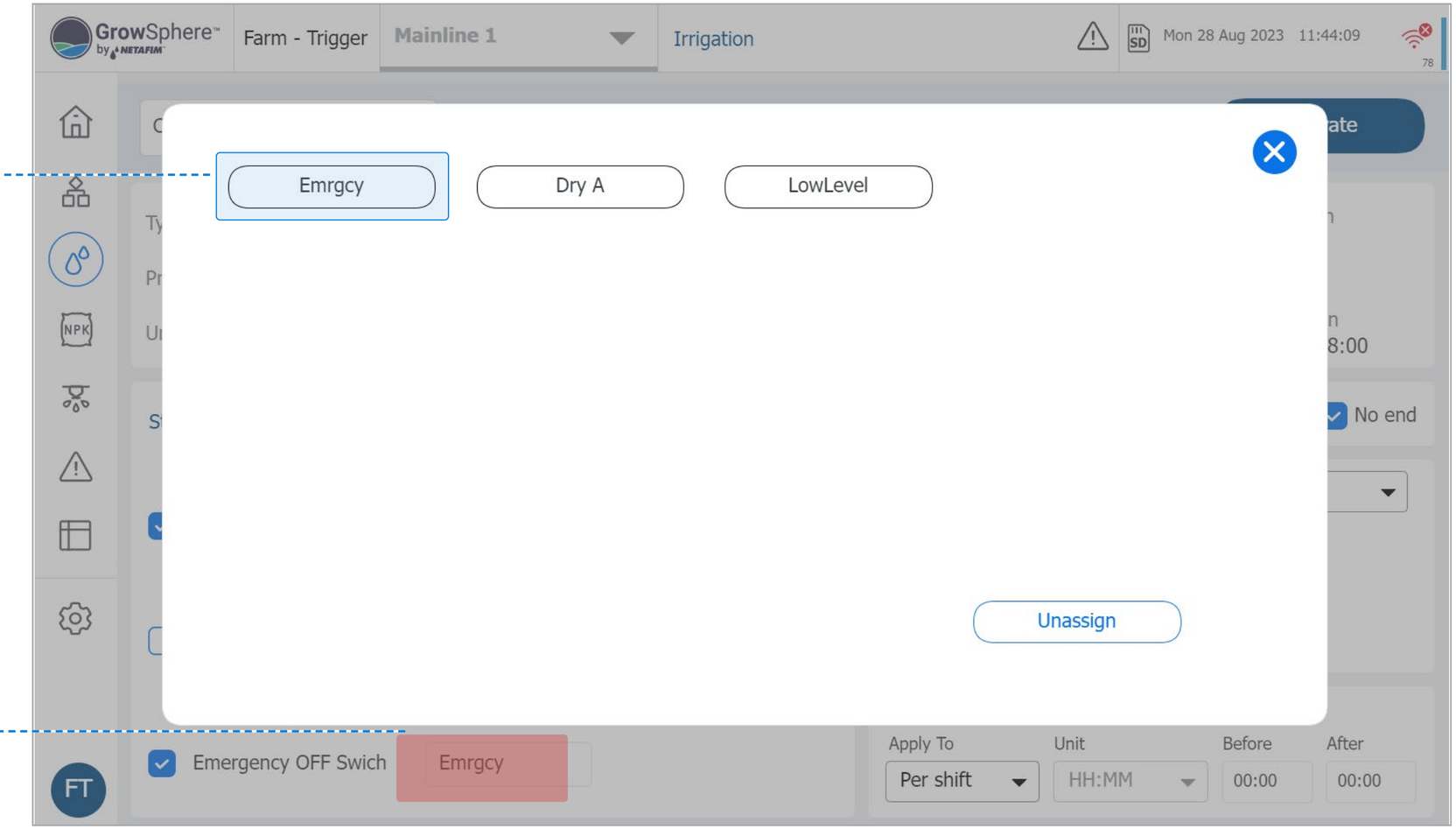
I Emergency Off Switch

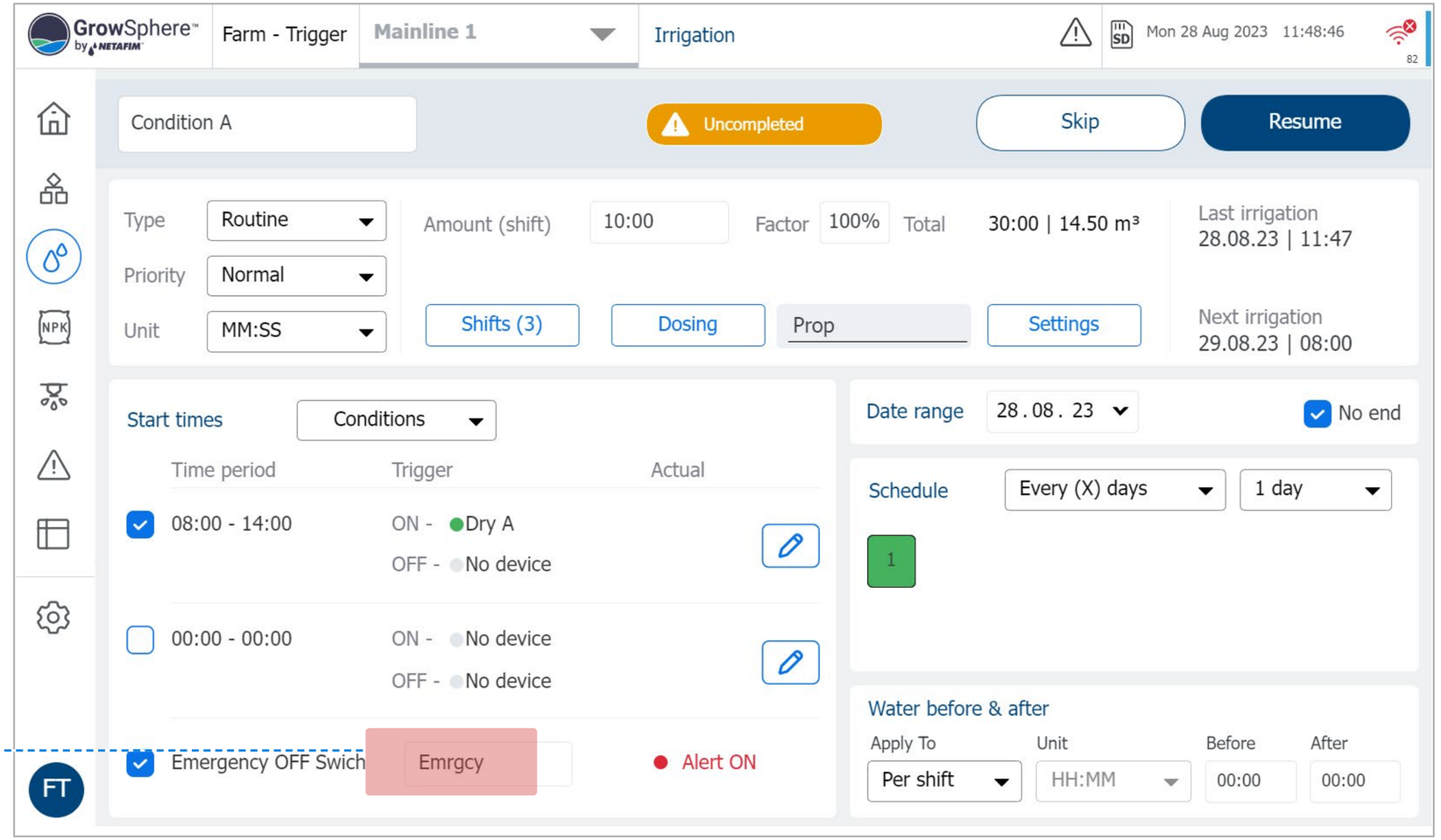


It is a Digital input that can be selected to stop the running program or prevent a program from running when this switch is active. Select the DI for Emergency stop

2. The emergency switch has priority of the Trigger ON and Trigger Off.

3. When the emergency Off switch is active, it will be shown Red

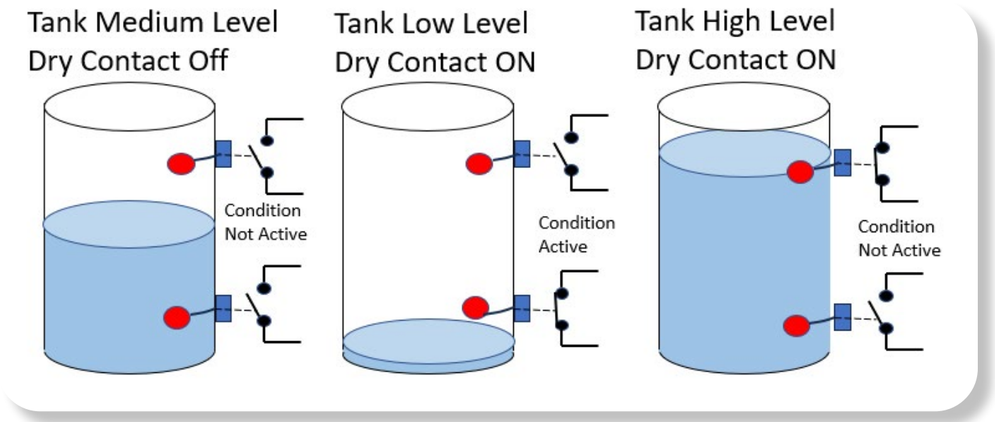




3. When the emergency Off switch is active, it will be shown Red

I Type One Shot Digital Input Dry Contact / Analog Input Sensor

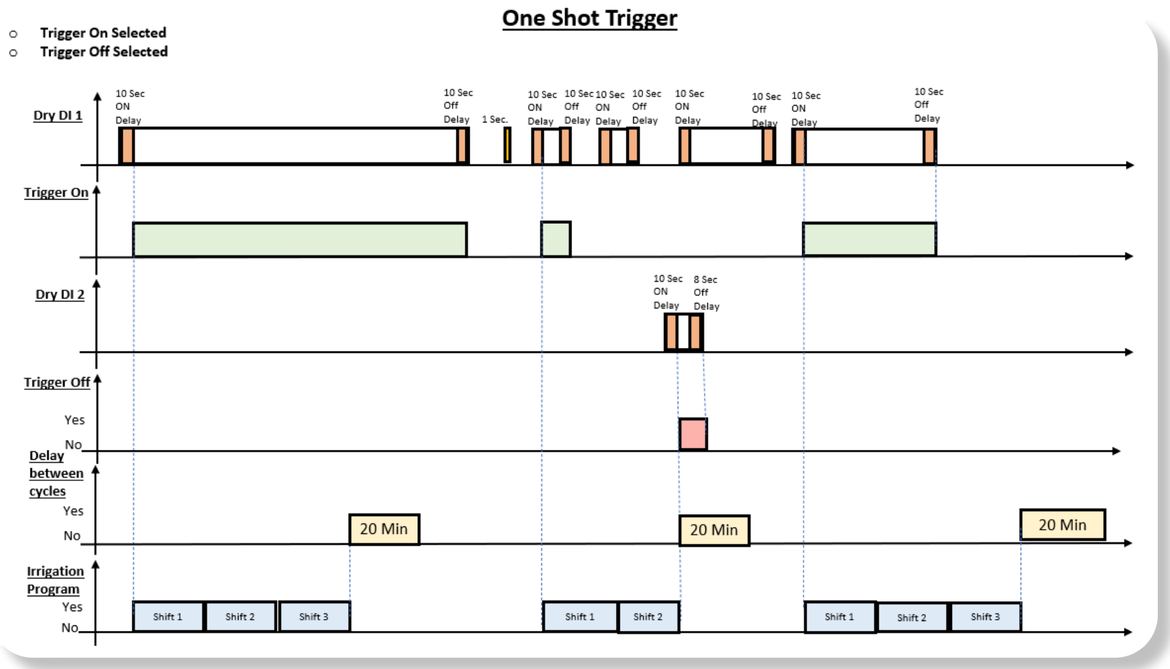
- This irrigation program will only run a single cycle when the Trigger is ON. If the Dry Contact trigger or sensor trigger is ON, the program will be queued for execution, but it will only be activated if the Trigger remains ON for the specified On delay time.
- If the Trigger is still ON after the program has completed its cycle, the irrigation program will not start again until the Trigger changes from ON to OFF, and then back to ON again.
- All the program settings are the same for all types, including Only if On, One Shot, and Multi Shots. However, One Shot and Multi-Shot programs have an additional setting for Trigger Off.
- If the Trigger Off (dry contact or sensor) is selected, it will stop the running irrigation program immediately after the Off Delay.
- The Trigger Off has a higher priority than the Trigger ON. When both are active together, the program will not start.



I One Shot Trigger

Example of Condition One Shot

With storage tank and Two float (N.O. Switch)

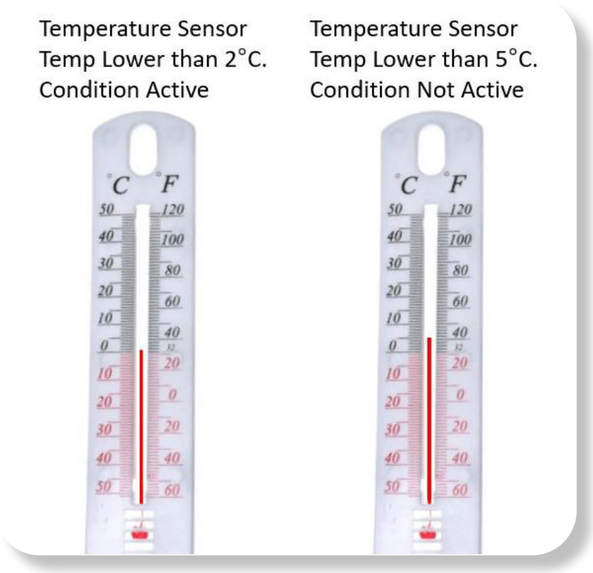


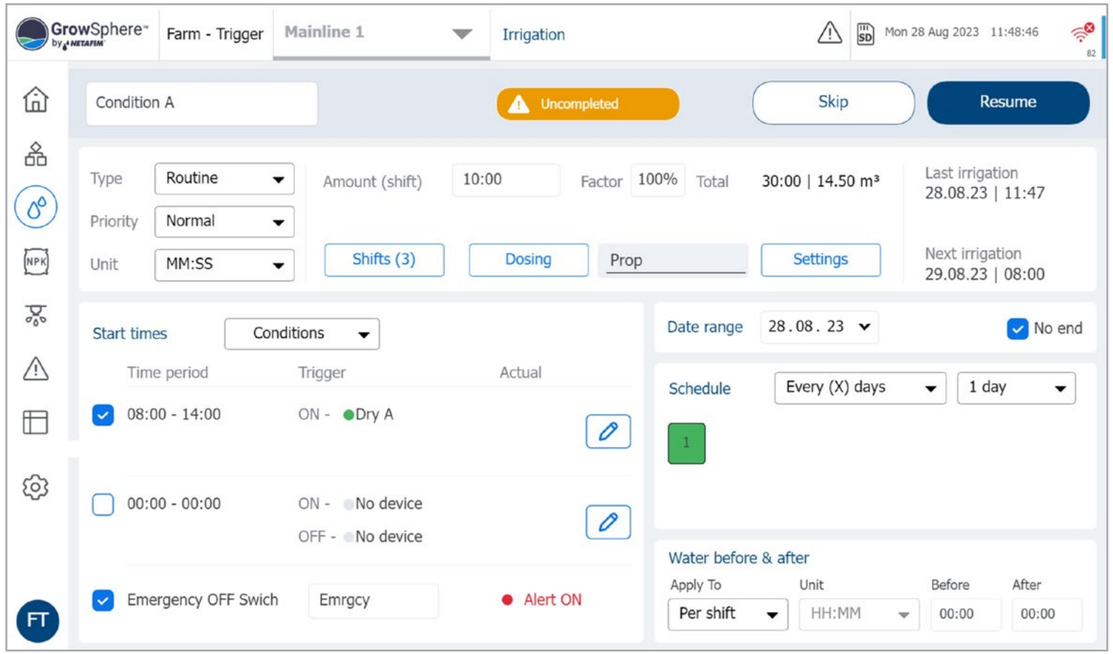
I Type - Multi Shots

- When using this function, the irrigation program will only run multiple cycles if the Trigger is ON.
- Once the Trigger is ON, the program will be posted in the Queue manager to be executed. The Trigger must remain ON for the On delay time that has been set by the user in the Settings section. If the Trigger stays ON when the program has finished running all the shifts, the irrigation program will start again.
- The program will only stop running when the Trigger changes from active to inactive, allowing the running program to complete all the shifts. The next time the Trigger is ON, the program will be triggered to start again.
- If the Trigger is turned Off, the program will end immediately after the set Off delay.

Example: when the temperature is lower than 2 C then the condition is Active

When the temperature is higher than 5 C then the condition is Not Active





11. Mixing Valves + Pre-Ec

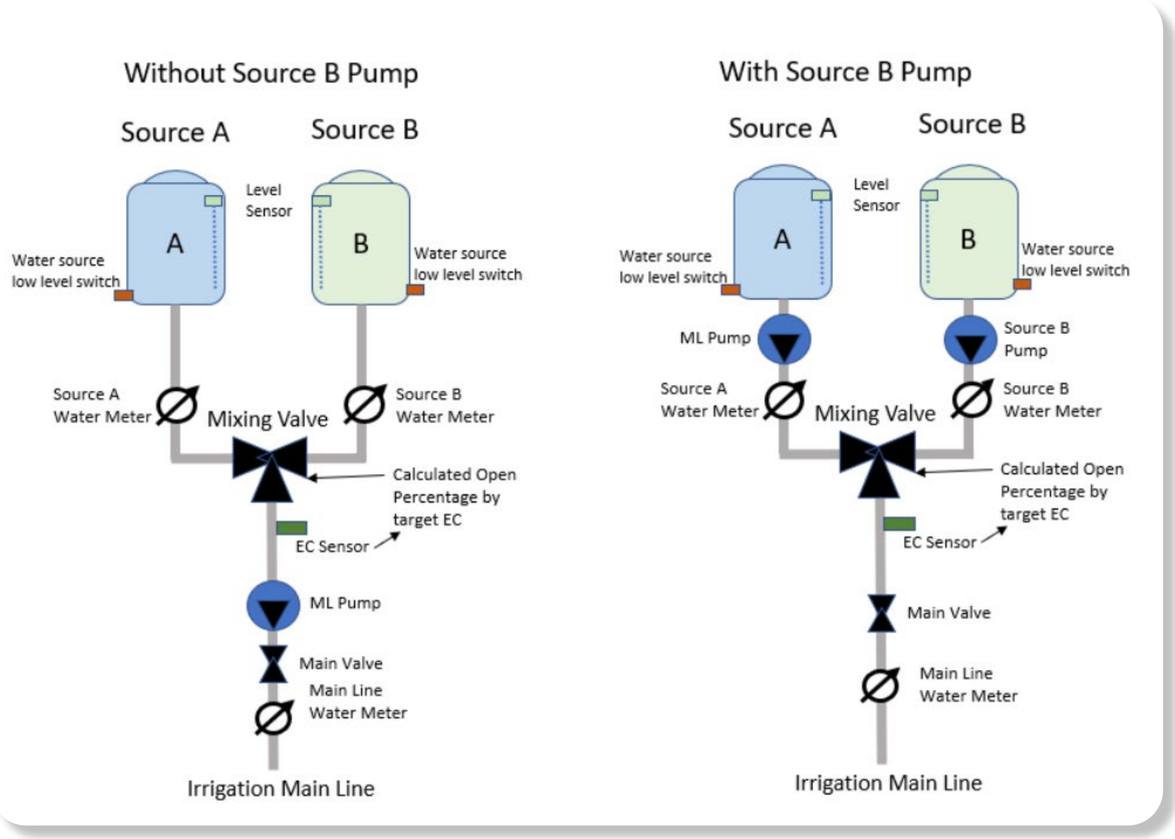
1 Mixing valves and Pre-EC - Diagram

2 Scada diagram with Pre-EC control

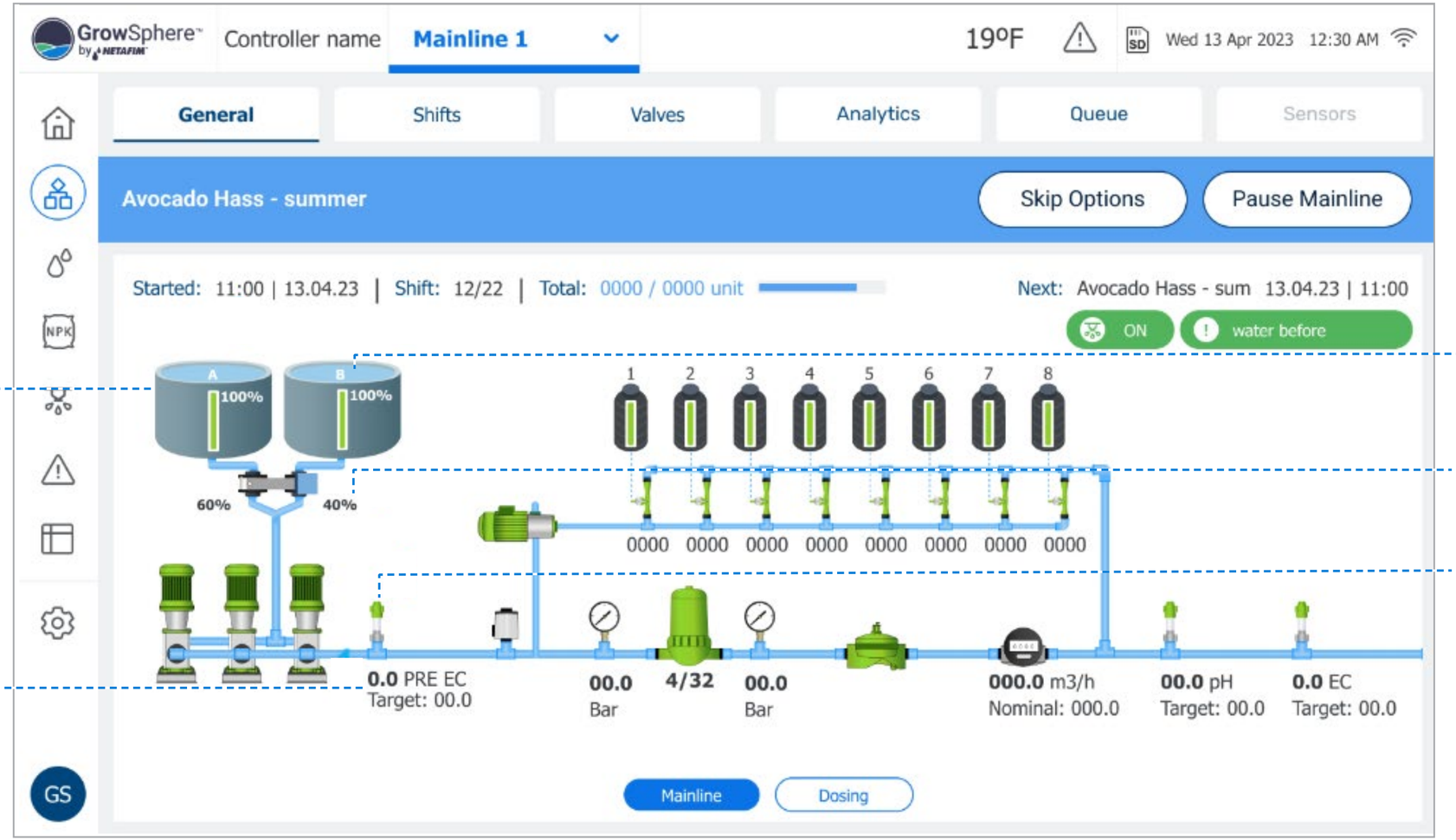
3 Mixing Valve Selection for Pre-EC Control

- The Pre-EC control module controls the two sources of water quantities via a 3-way mixing valve to reach a target Pre-EC value.
- The mixing valve is a motorized 3-way valve with two Inlets, Source A and Source B, and one outlet C.
- The mixing valve will control the Pre EC (Electrical Conductivity) value of the mixing of the Fresh Water Source A with Drained/Maneuver Water Source B; the system has an EC sensor located at the C outlet of the mixing valve.
- The required EC Pre-Control Value can be set in the Dosing Program. The mixing valve will change the opening percentage of water sources A and B to obtain the required pre-EC value measured by the pre-EC sensor.
- Source A will always be with fresh water.
- Source B will always be with drained (maneuver) water. The water Source Low-Level Switch is a digital input from a low-level/low-flout switch. This device will send a signal when there is low-level water from each water source. When the signal is active, it will pause the irrigation process and raise a fault alert.
- The level sensor is an analog sensor that measures the tank level of each water source tank. At the Alerts settings, there will be an option to select the tank level for alerts and alert type.

11.1 Mixing valves and Pre-EC - Diagram



11.2 Scada diagram with Pre-EC control



Source A Fresh Water and tank level

Pre EC actual value and target

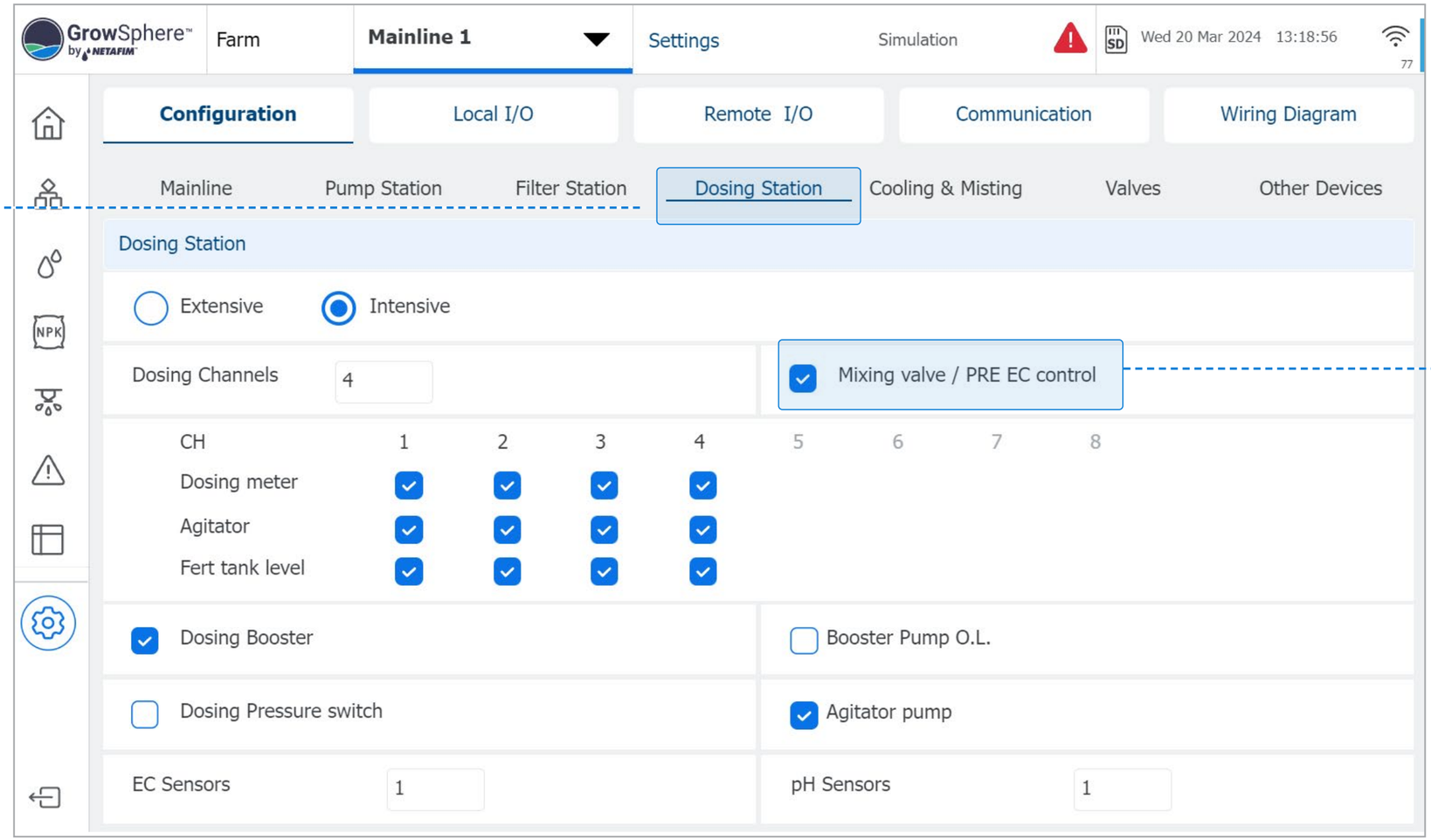
Source B Recycle Water and tank level

Source B actual percentage

Pre EC sensor

11.3 Mixing Valve Selection for Pre-EC Control

In the Dosing Station configuration screen



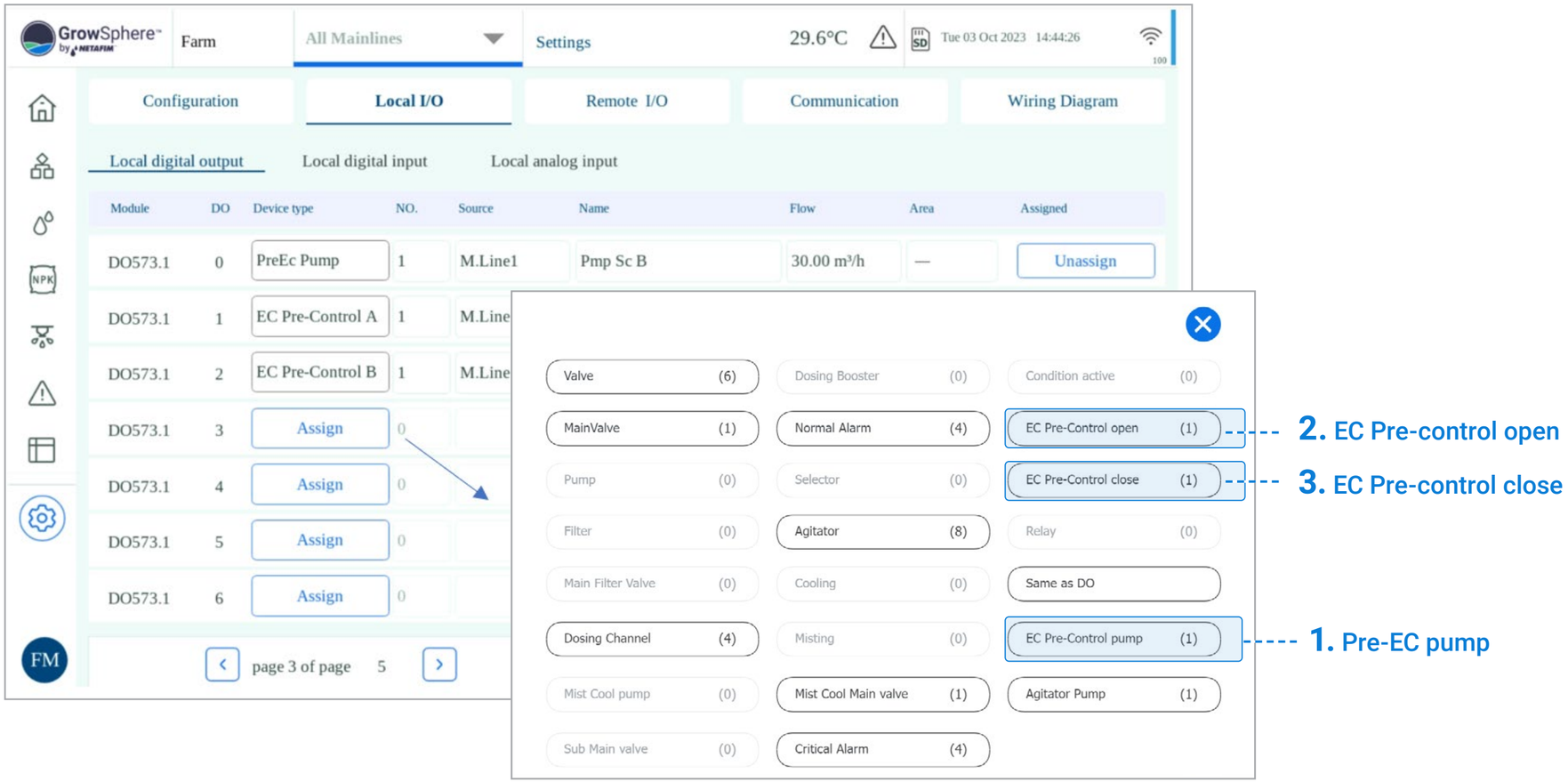
Sign the Mixing valve indication

I Pre-EC control Mixing Valve – outputs settings

Under Local I/O tab, click on Assign to select the outputs that are related to the EC Pre control

Once clicking Assign, a list of related outputs will be presented

Ensure that the devices below are selected:

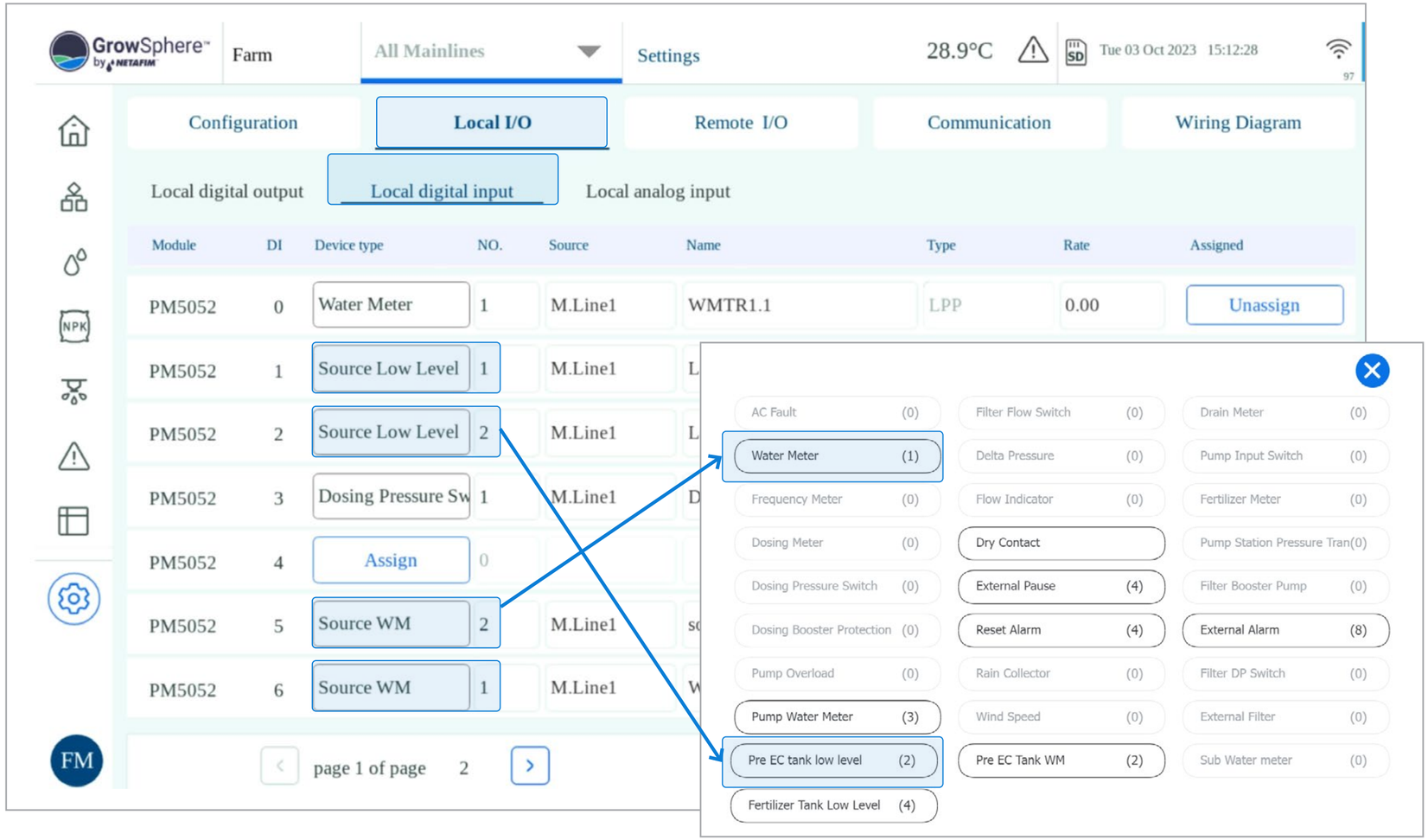


I Pre-EC control Mixing Valve – Digital Inputs settings

Under Local I/O tab, click on Assign to select the inputs that are related to the EC Pre-control

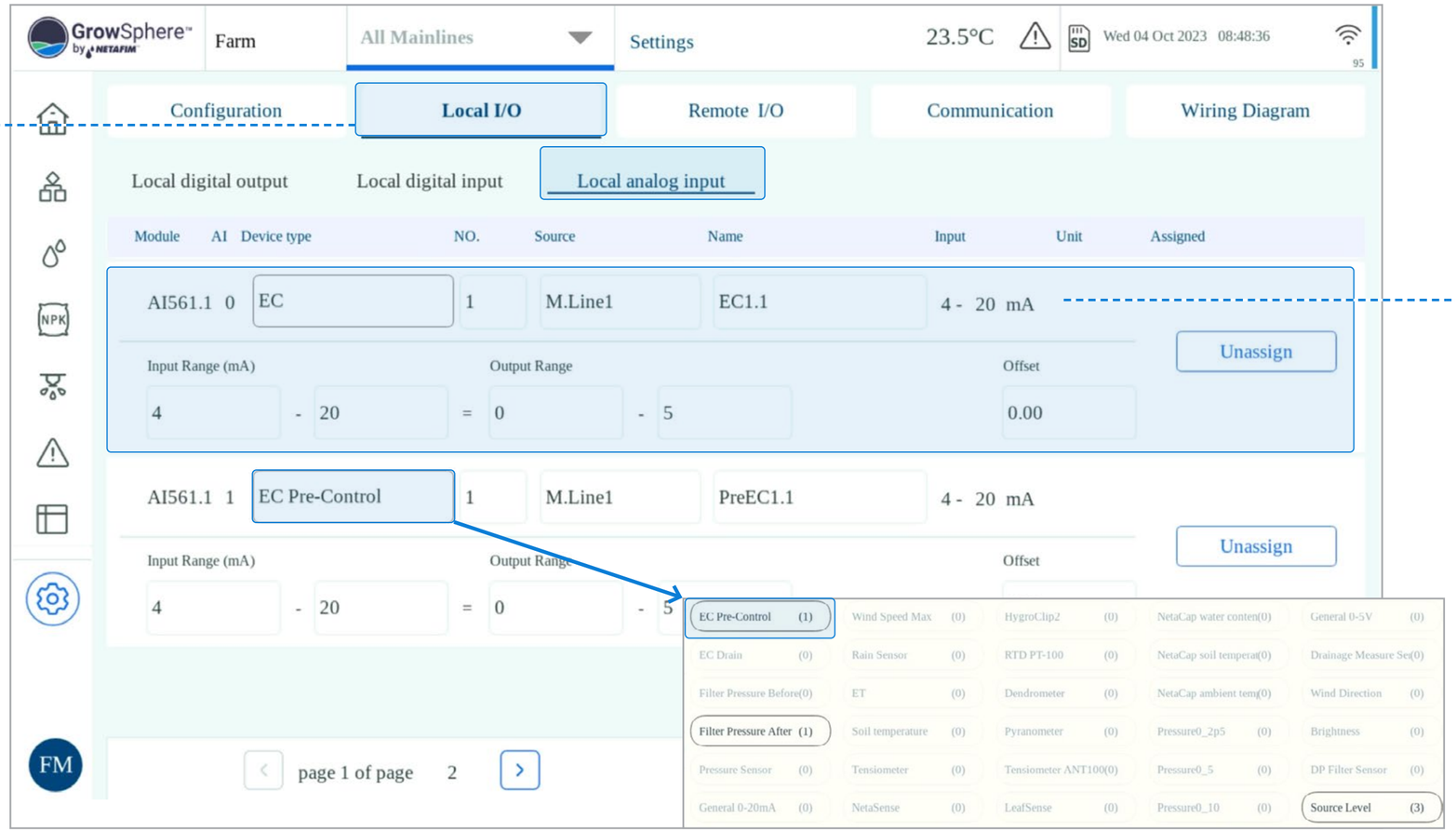
Ensure you assign the below devices, if are connected:

- Source Low Level (sensor 1)
- Source Low Level (sensor 2)
- Source WM 1(sensor 1)
- Source WM 1(sensor 2)
- Dosing pressure swich



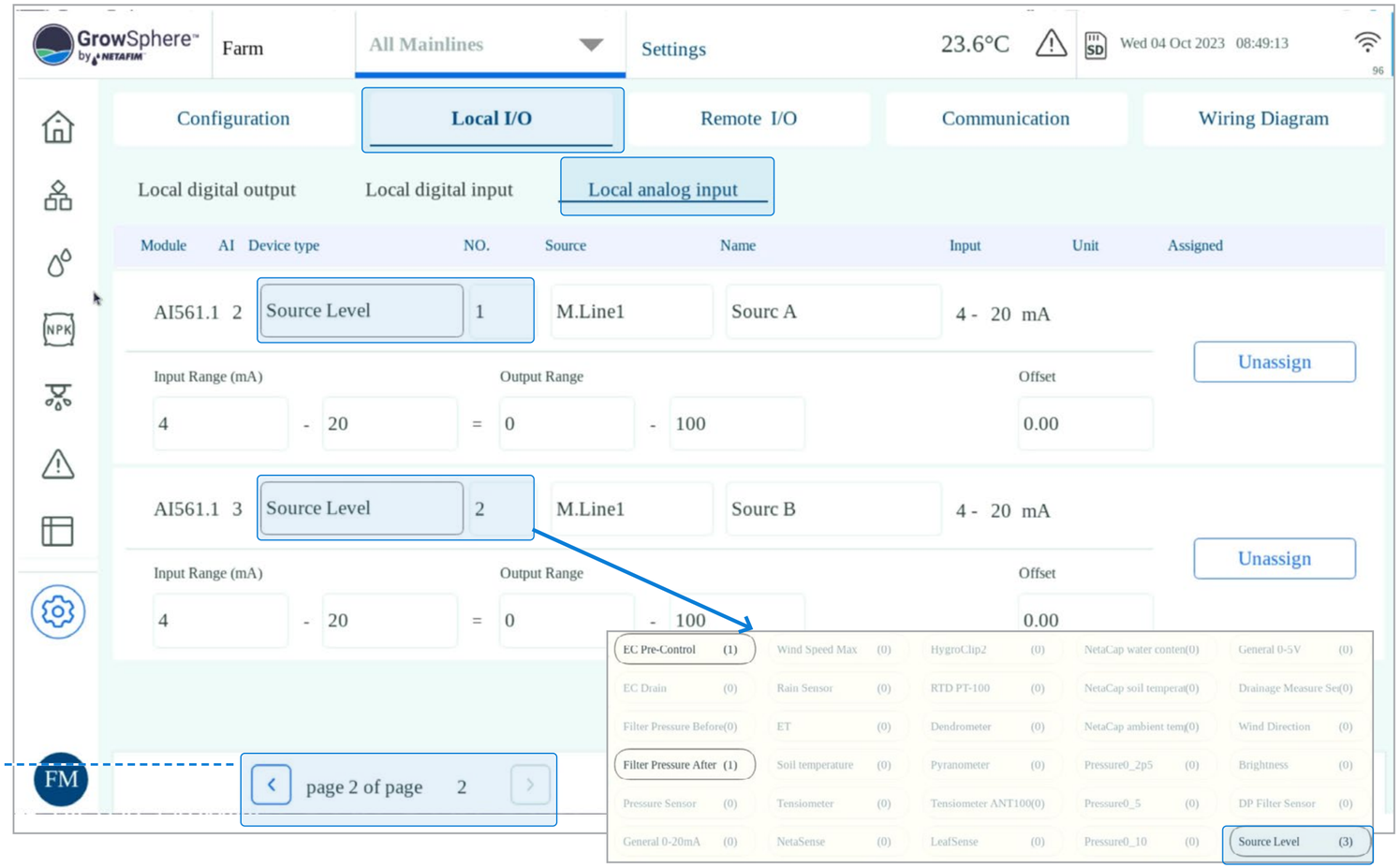
I Pre-EC control Mixing Valve – Analogs Inputs settings

1. Under Local I/O tab, Assign the analog sensors that are related to the EC Pre-control



2. Set the output and input range, name of the sensor and offset

I Pre-EC control Mixing Valve – Analogs Inputs settings



By skip between the pages, the source Level sensors can Assigned as well

I Pre-EC control Mixing Valve – Settings

1. Mixing Valve Travel control Time: it is the time that takes the mixing valve to change from Home Position to full open; travel time from source A full open to source B full open. This value is described on the mixing valve data sheet. Other option is to measure with a stoper the travel time.

2. Return to Home Position: When this option is selected, at the end of the process the mixing valve will return to Home Position, Source A (fresh water) fully open to outlet C.

3. EC Pre Control activation.

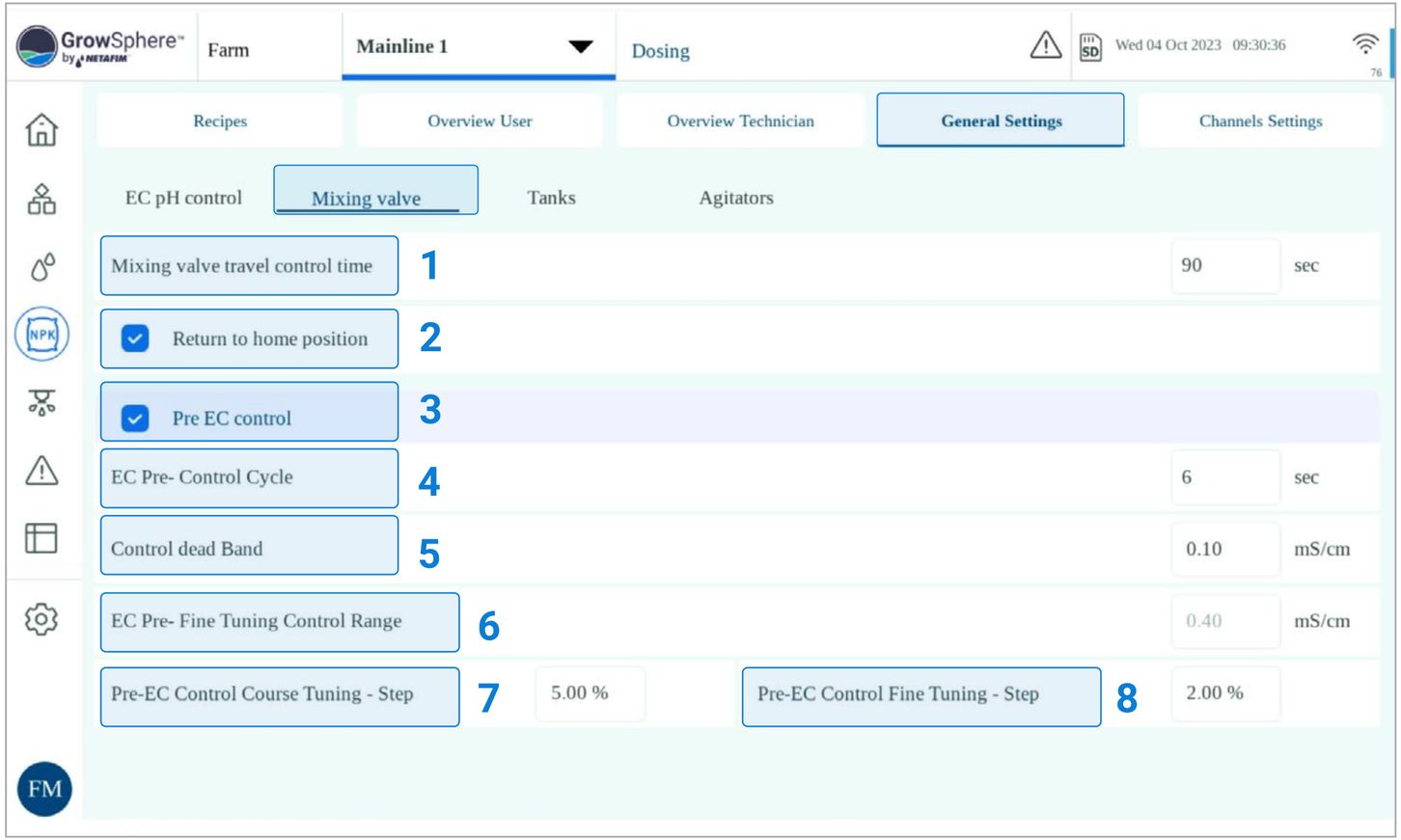
4. Pre EC-Control cycle, it is a travel time from the valve last position change time to the EC Sensor reaction. The units are Second, the default value is 8 Sec.

5. Dead Band, it is the delta value, set by the user, from the Pre EC target. When the actual value reaches these limits, the valve will stay at this position. No corrections will be made. The default value is 0.1mS/cm.

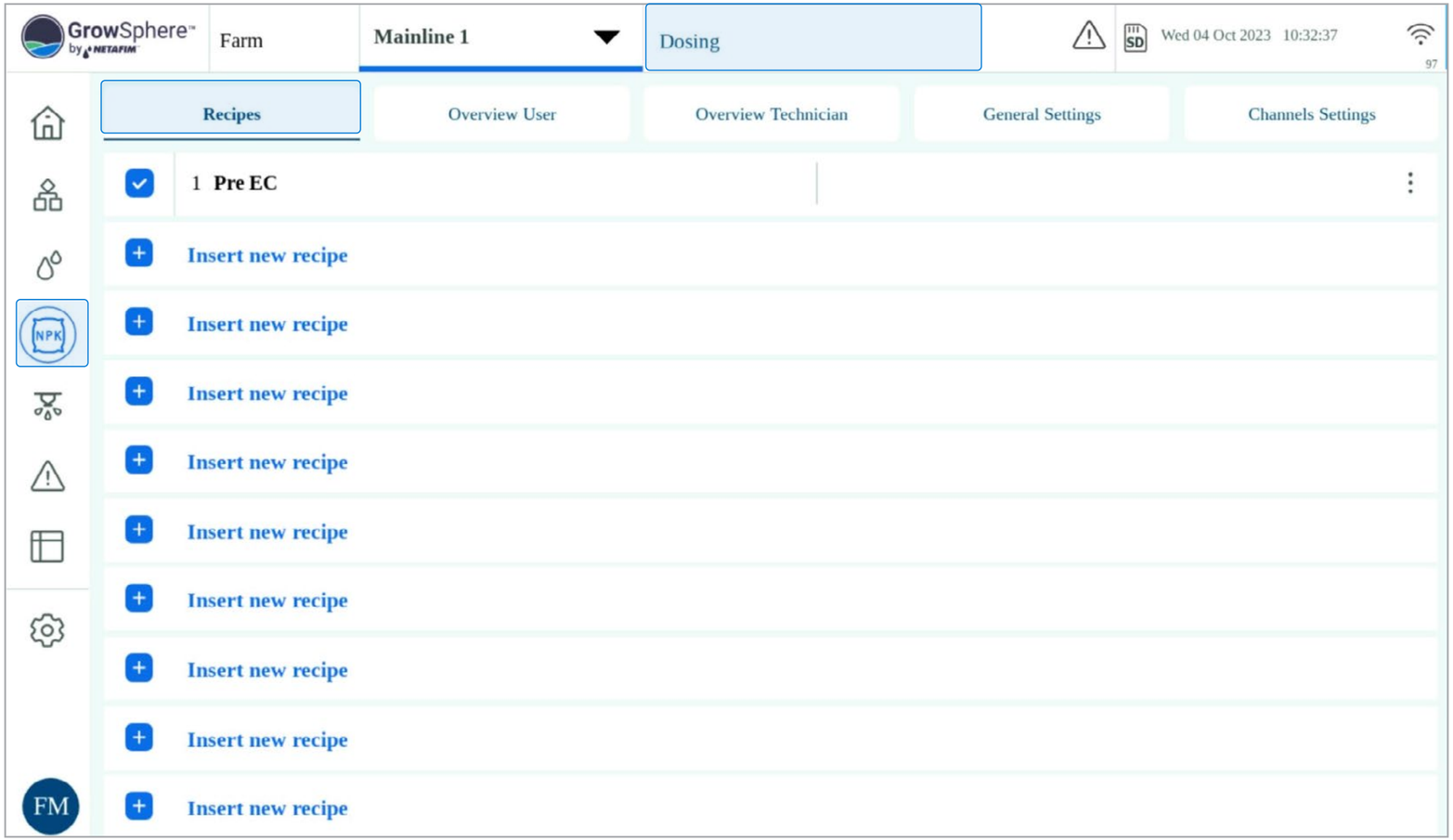
6. EC Pre- Fine Tuning Control Range, it is a control range for fine-tuning adjusting. The value is a delta value from the target Pre EC value. The default is 0.4, it is a fixed value.

7. Pre-EC Control Course Tuning: Step It is a calculated time for the length of the time that the valve will be activated for a correction of the course tuning. This value is the percentage of the total Valve control time.

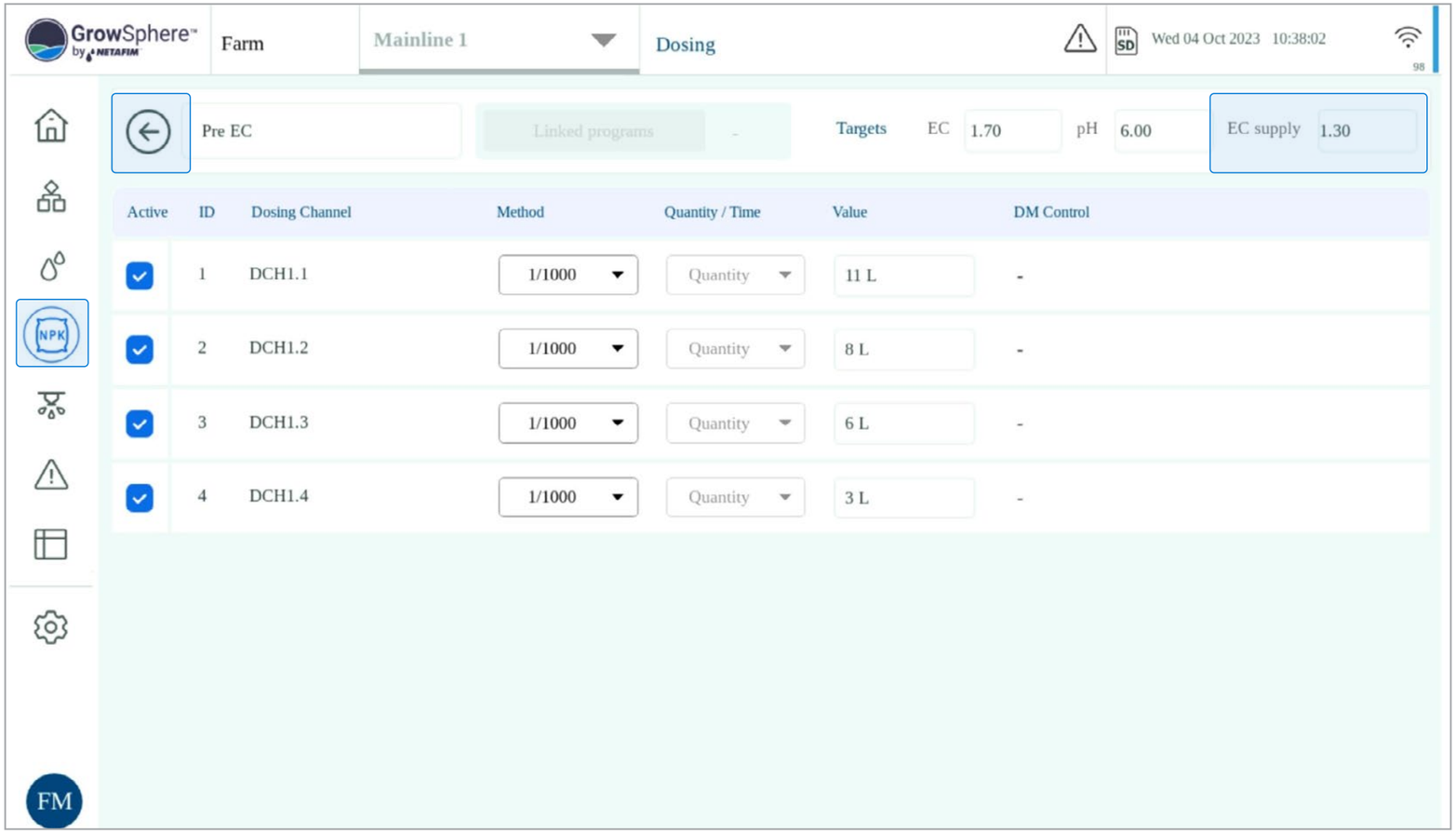
8. Pre-EC Control Fine Tuning: Step It is a calculated time for the length of the time that the valve will be activated for a correction of the fine tuning. This value is the percentage of the total Valve control time.



I Pre-EC control Mixing Valve – Dosing Recipe



I Pre-EC control Mixing Valve – Dosing Recipe



12. Remote Units

1/ **Weather station**

2/ **RadioNet to GrowSphere™ MAX**

3/ **NetRTU to GrowSphere™ MAX**

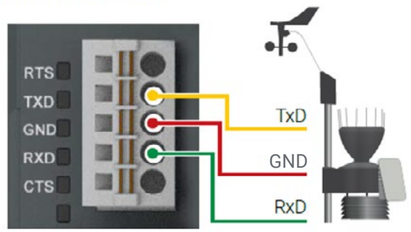
4/ **SingleNet to GrowSphere™ MAX**

12.1 Weather Station

The controller Supports RadioNet, SingleNet, NetRTU & Davis WS.

- SingleNet and RadioNet - RS485
- Davis Weather Station - RS232
- NetRTU - RS232, 2nd module/ The module for the NetRTU should be ordered and connected separately.

/RS232 Module



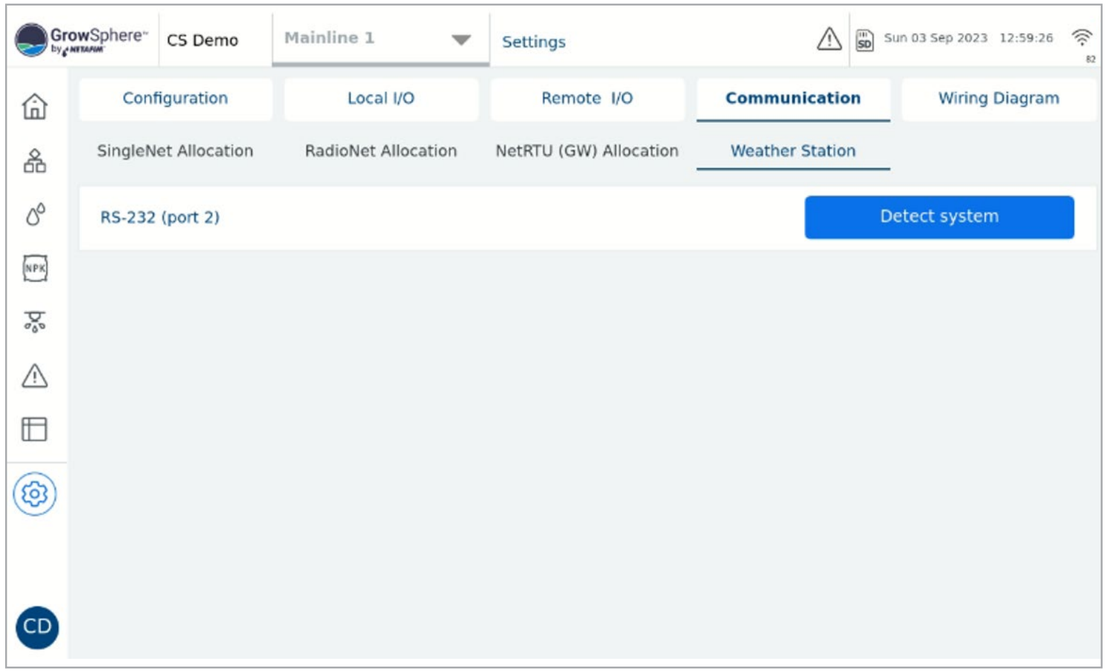
Signal	Descrition
RTS	Request To Send DCE is ready to accept data from the DTE
TxD	Transmit Data (output)
GND	Common Ground
RxD	Receive Data (input)
CTS	Clear To Send (input) DCE is ready to accept data from the DTE

State LEDs

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

Connect to Davis Weather station.

The data has been collected and will be presented on the GrowSphere(TM) Cloud.

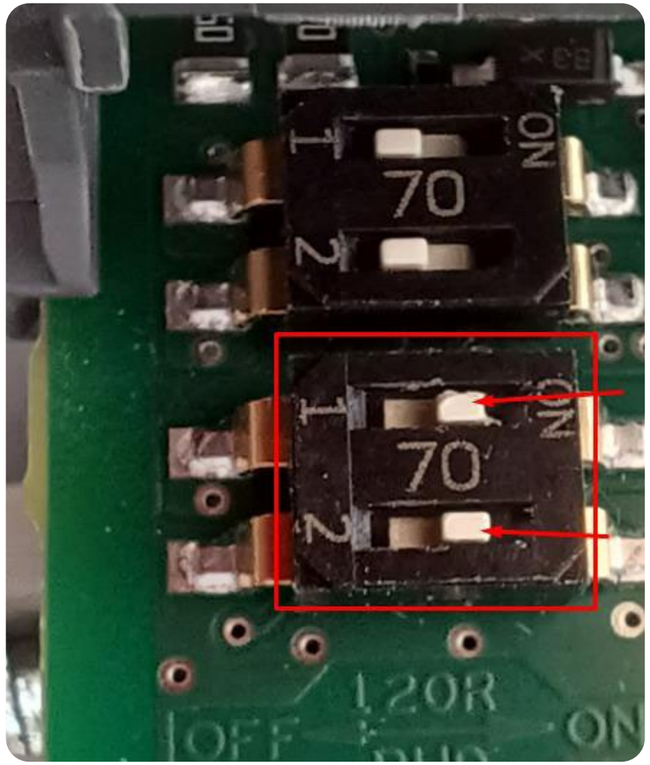


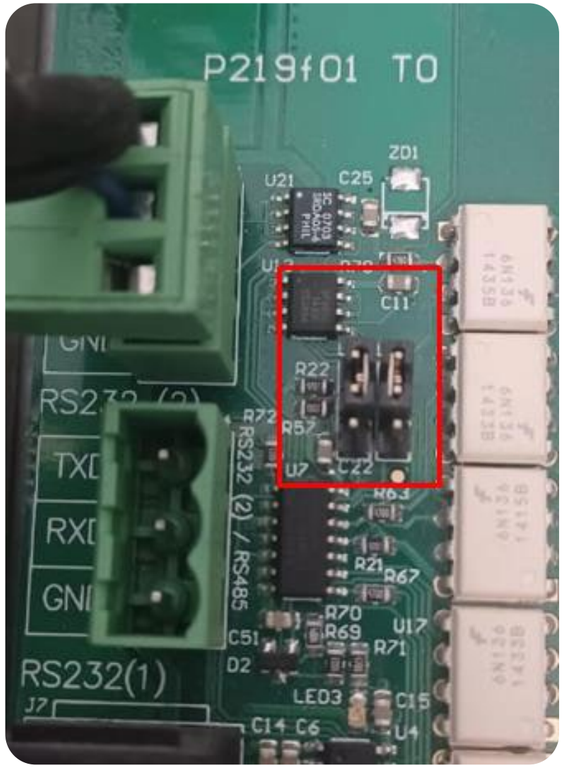
12.2 RadioNet to GrowSphere™ MAX

RadioNet interface with GS is currently only via RS485. RS485 Module must be installed on Upper Port. Note the “DIP Switch” position on the RS 485 module marked in RED Must be towards the “ON” Side

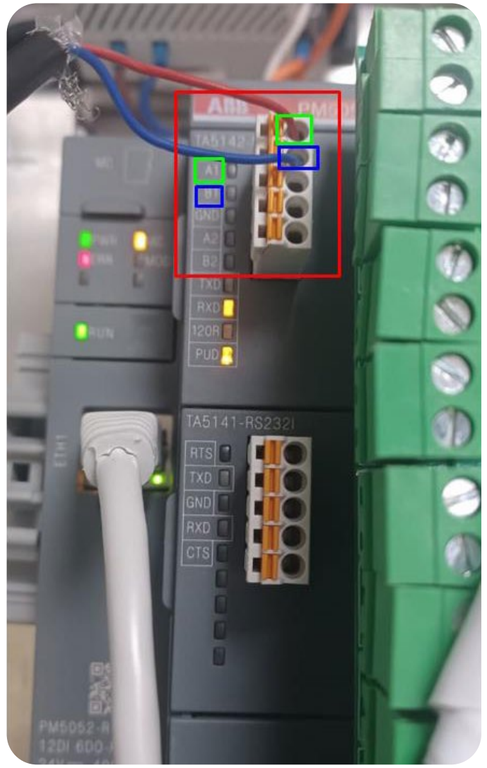
I Wiring Between Host & GS max Controller

A to A & B To B. LK1 & LK2 Jumper on the RadioNet Host should be on Upper side





RadioNet host

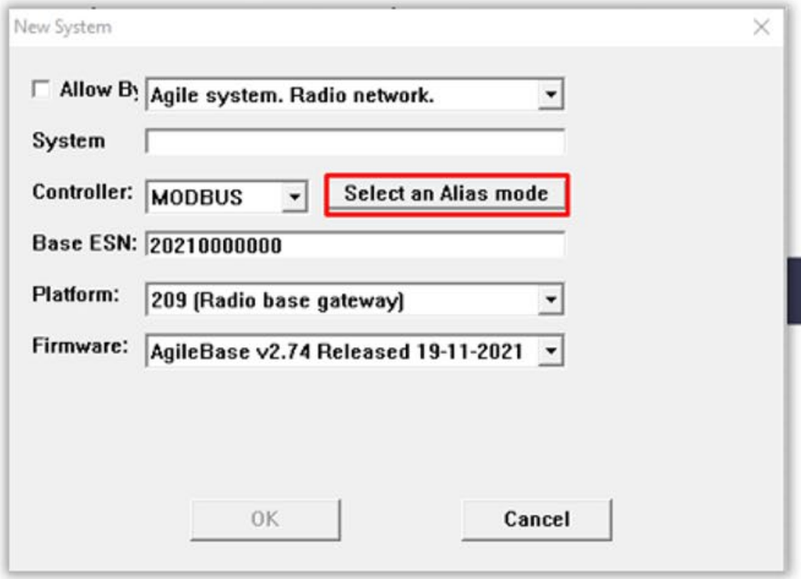


GrowSphere™ Max

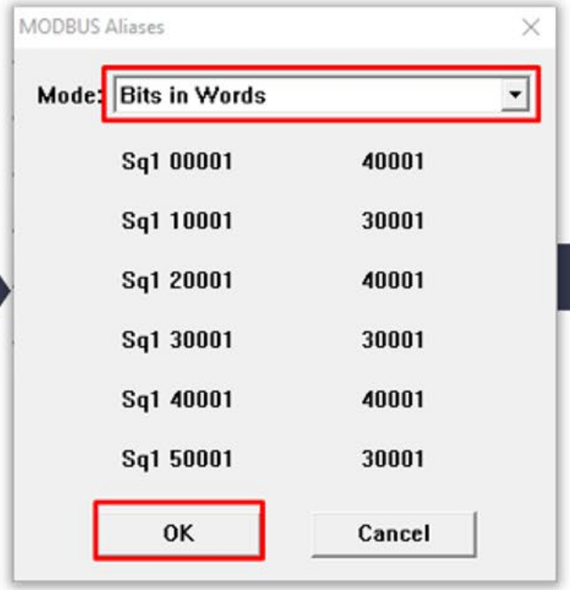
Required Polenet Version - Always Check for Latest & Recommended Versions of PoleNet & Polenet2Max App. Use PoleNet Version: 3.26.42 Or latest Version.

- Use Host Firmware Version: 3.29.24 Or the latest Version
- Use Base Firmware Version: 2.74 Or the latest Version

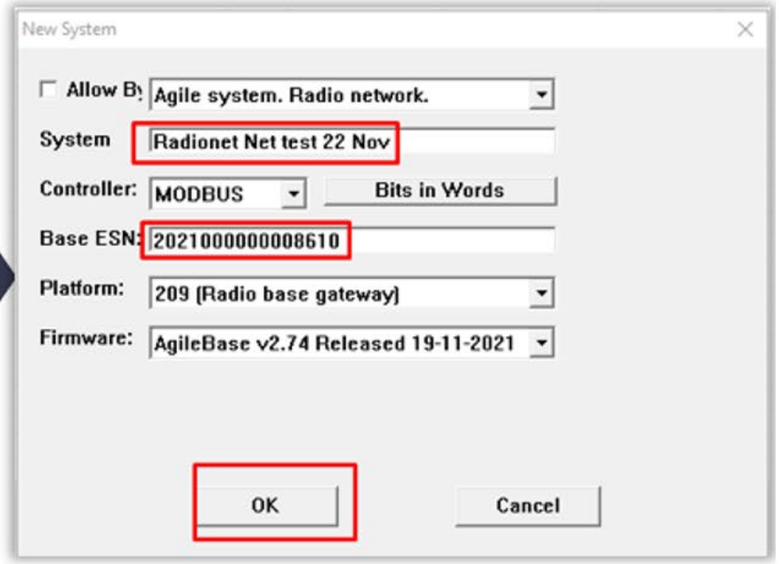
Create a new System in PoleNet



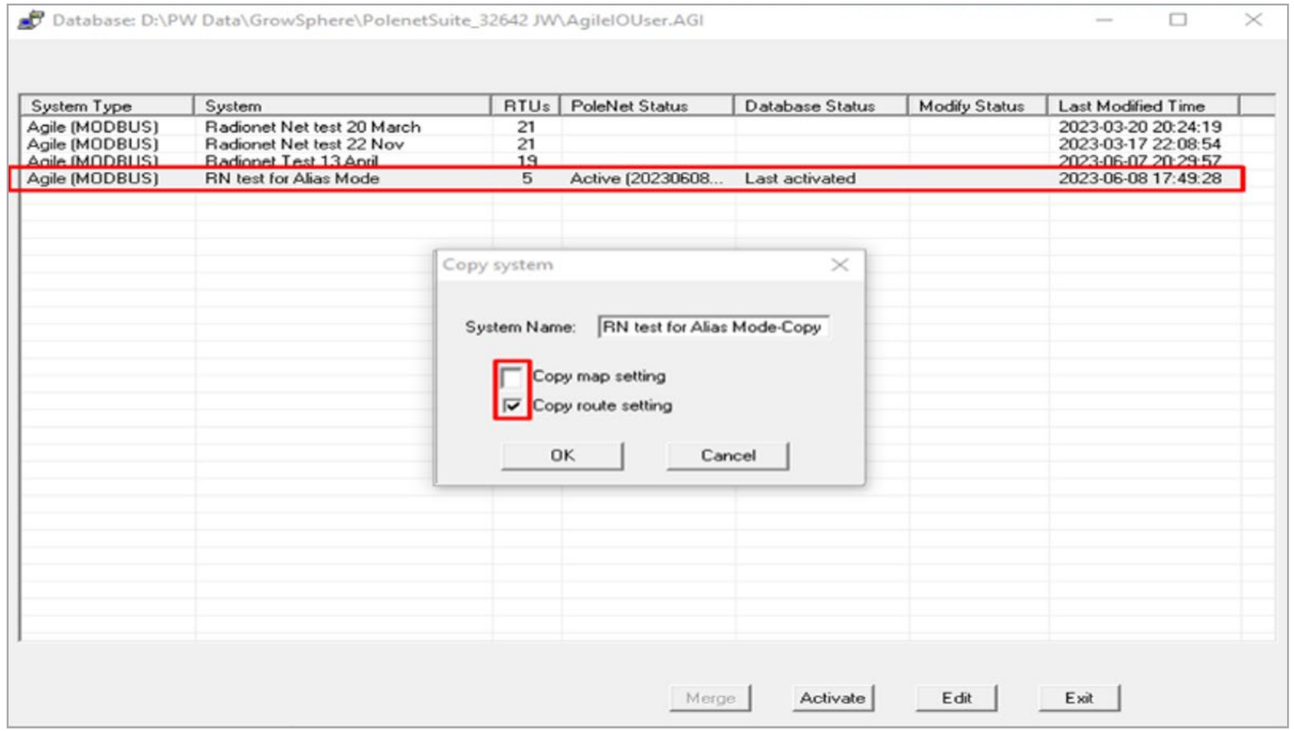
Select Bits in Words



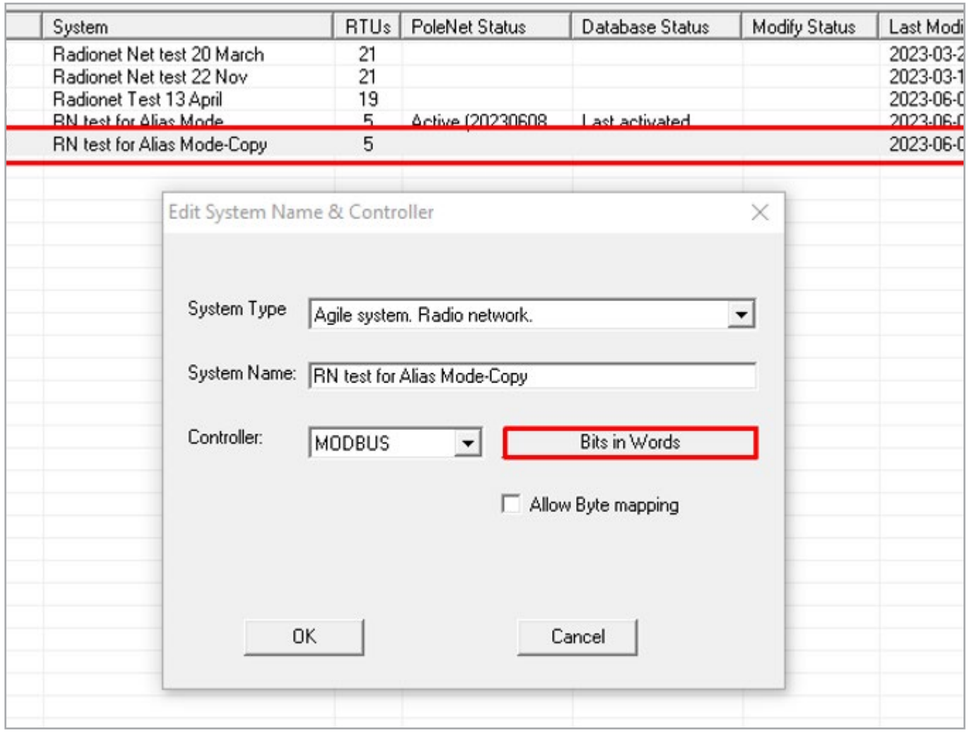
Enter the System Name and Base ESN No.



If you want to connect the existing “RadioNet from NetBeat to GS Max,” then you need to make some Changes in Polenet:

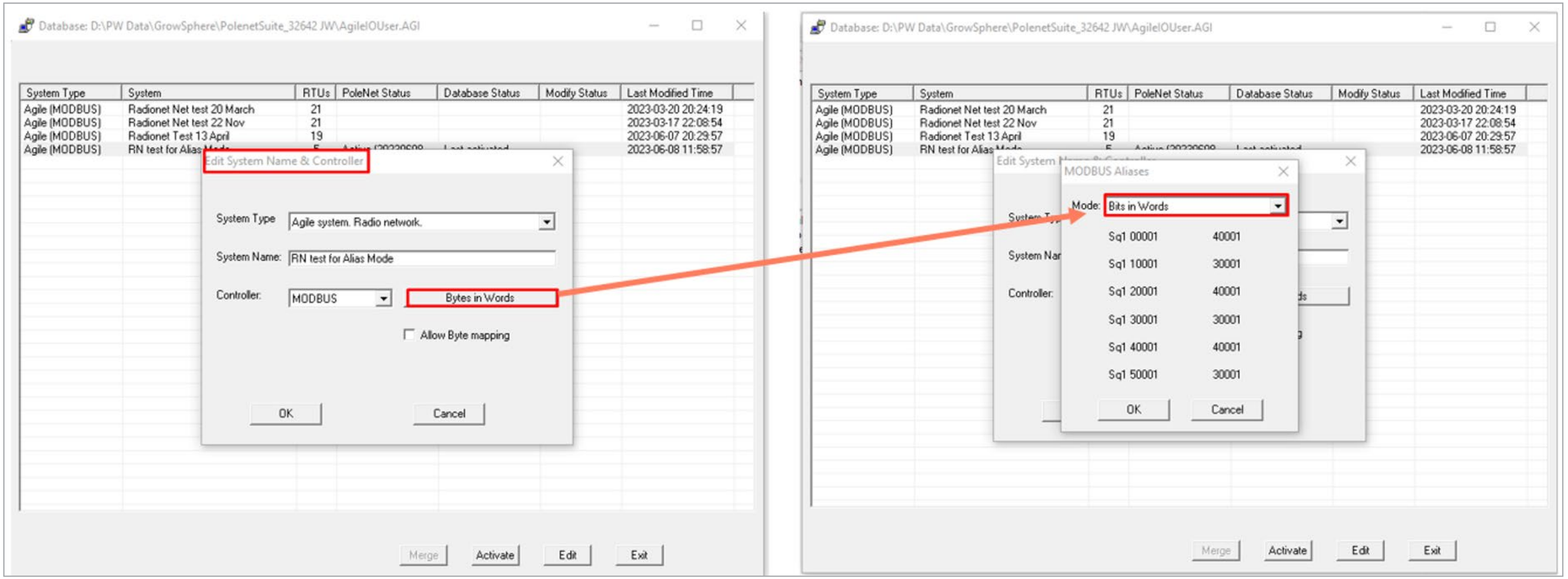


Right-click on Activated File and Copy Radionet System. Uncheck Map & Route Setting & Click “ OK”

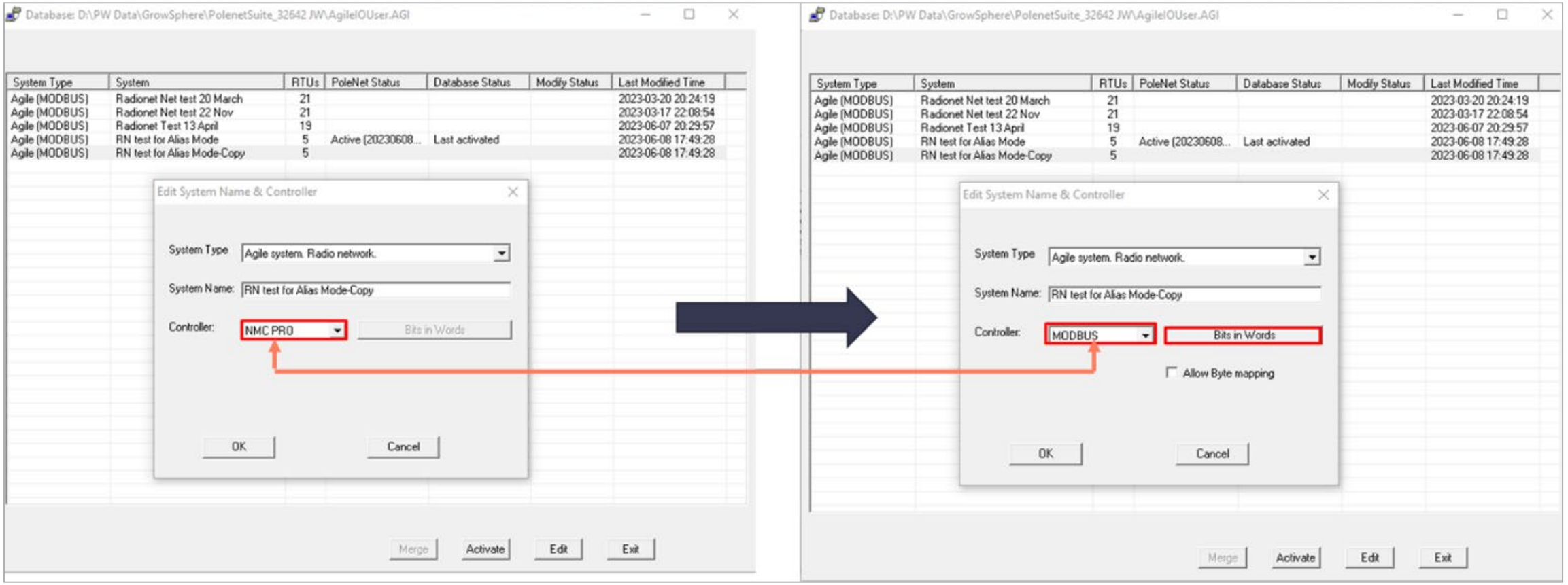


Right Click on Copied System and Select “ Edit System name & Controller” and Change Alias Mode to “Bits in Words”

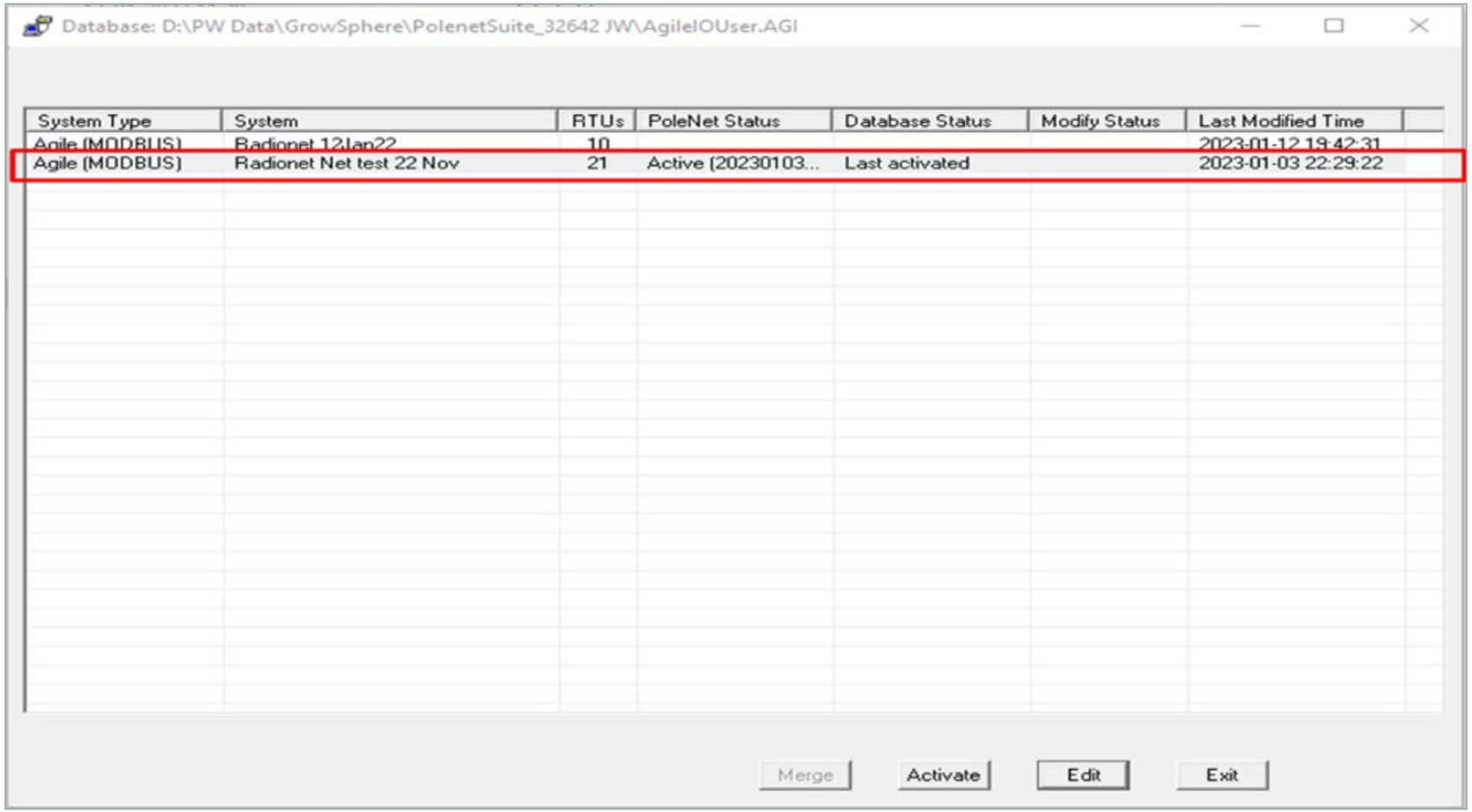
Earlier System Alias Mode was " Bytes in Words." for GS Max, we Need to Change to " Bits in Words".



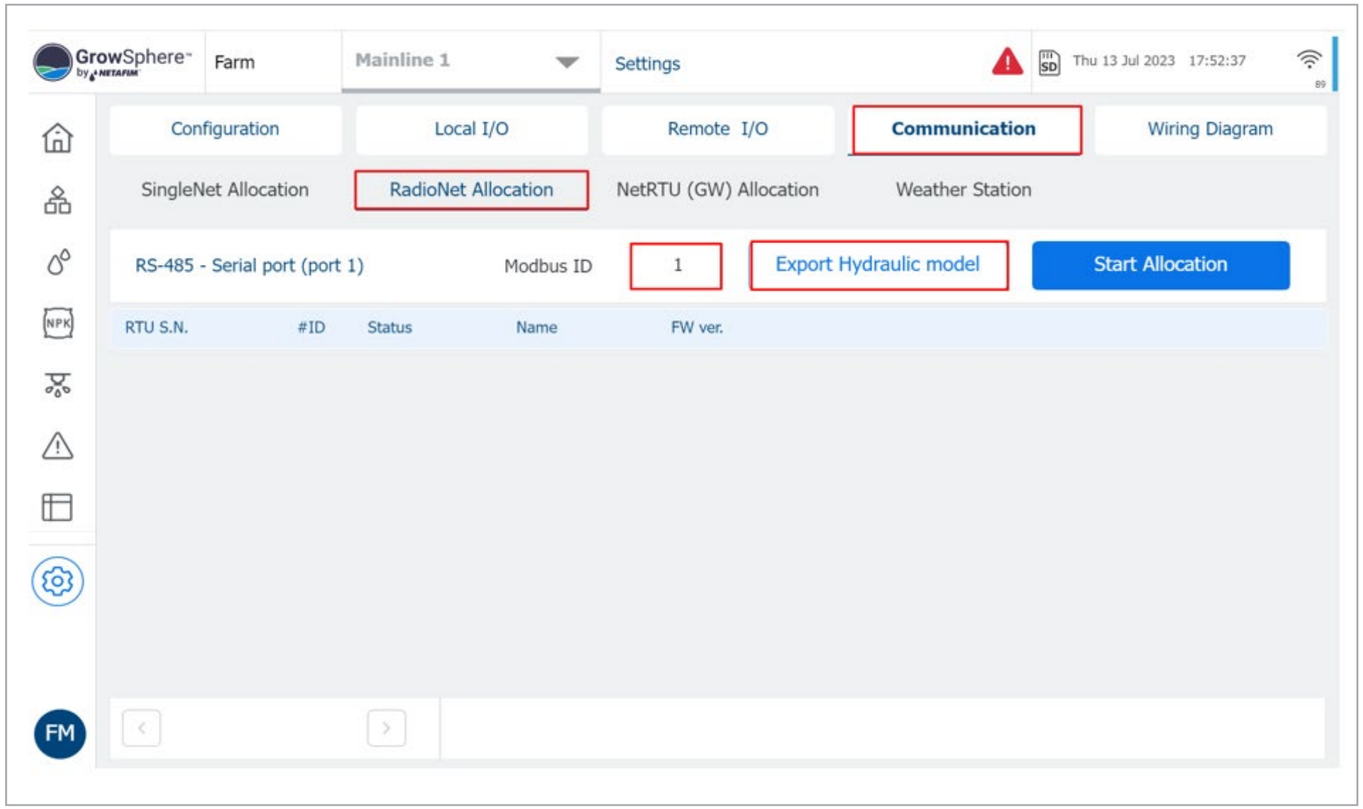
If your Radionet System Connected with NMC, then you need to Change Controller Type to “ModBus” & Alias Mode “Bits in Words” for GS Max .

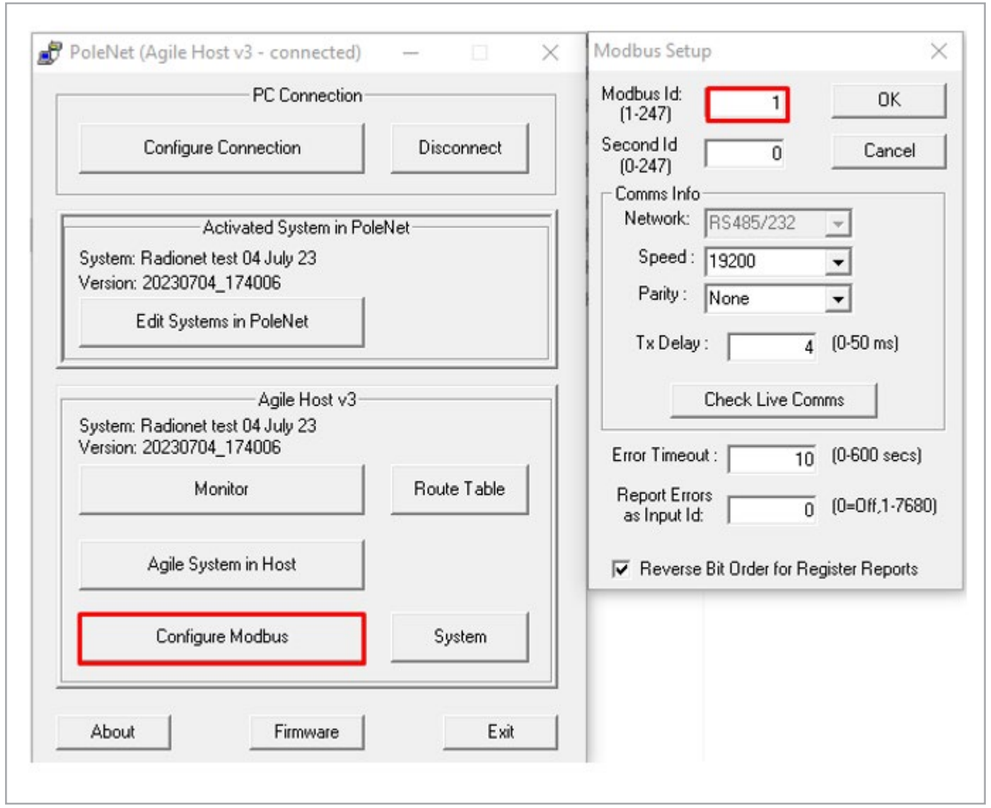


Make sure that all RTUs with expansion cards are added & Activate the System.

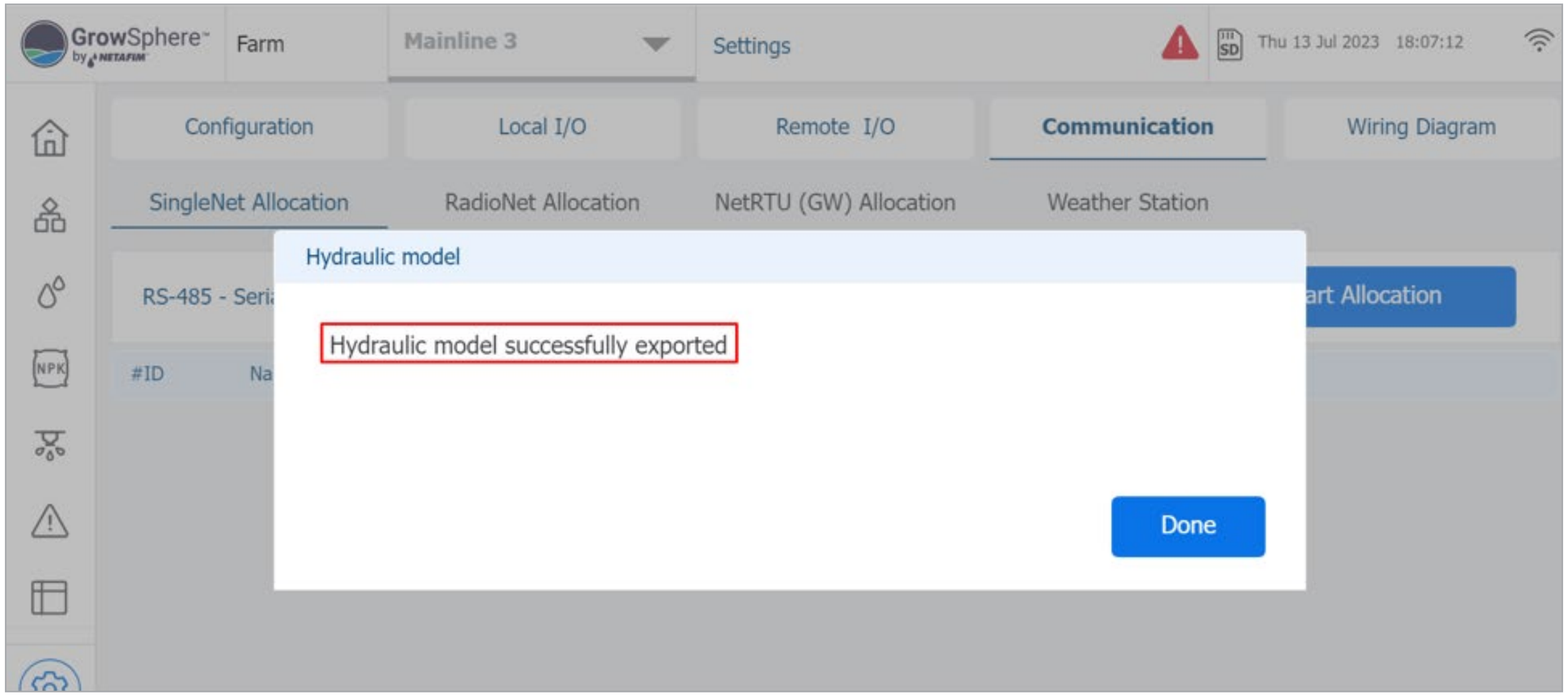


Navigate to Settings >> Communication >> Select RadioNet >>Export Hydraulic Model. Also Check Modbus ID is same on Modbus Setup & Allocation Screen.

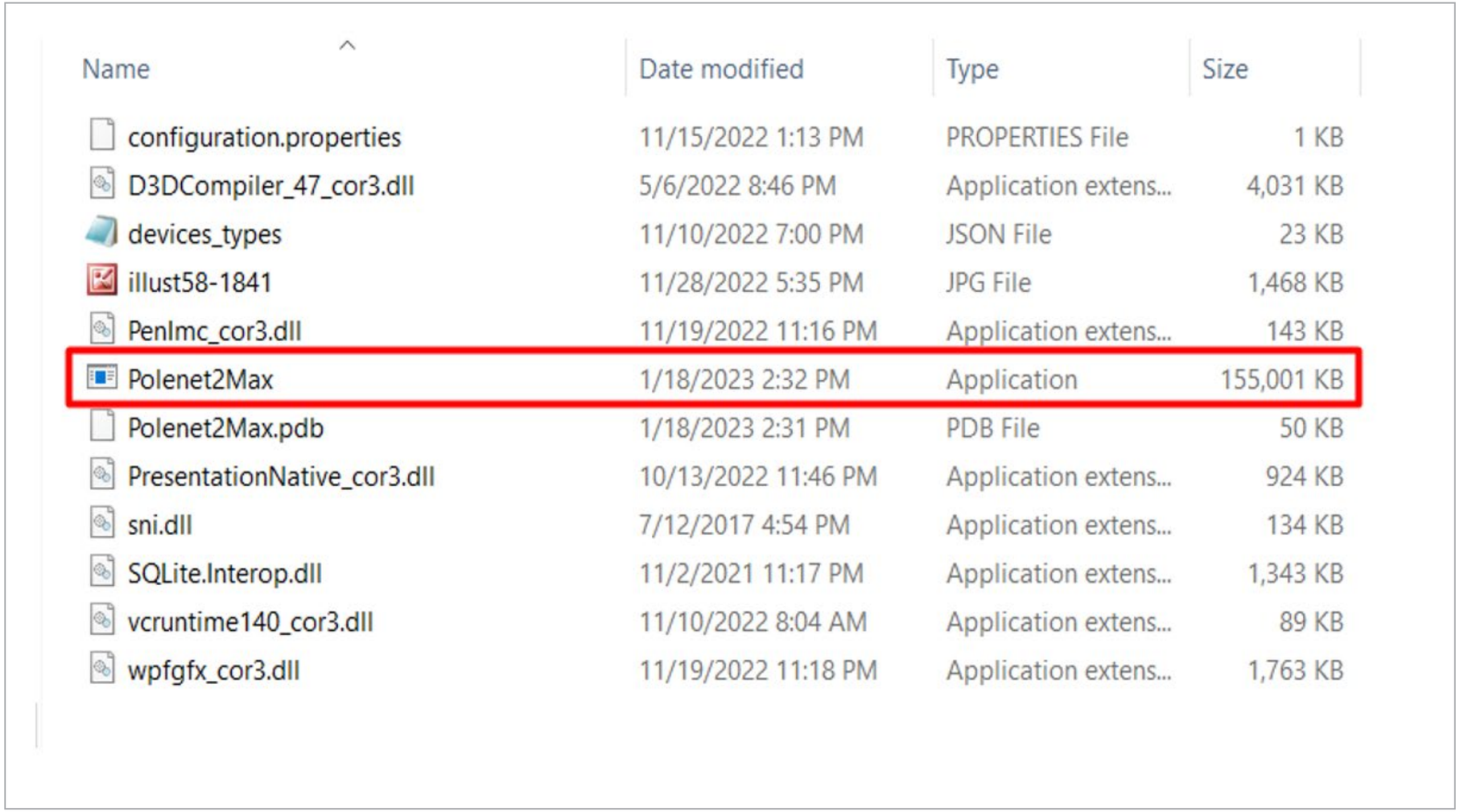




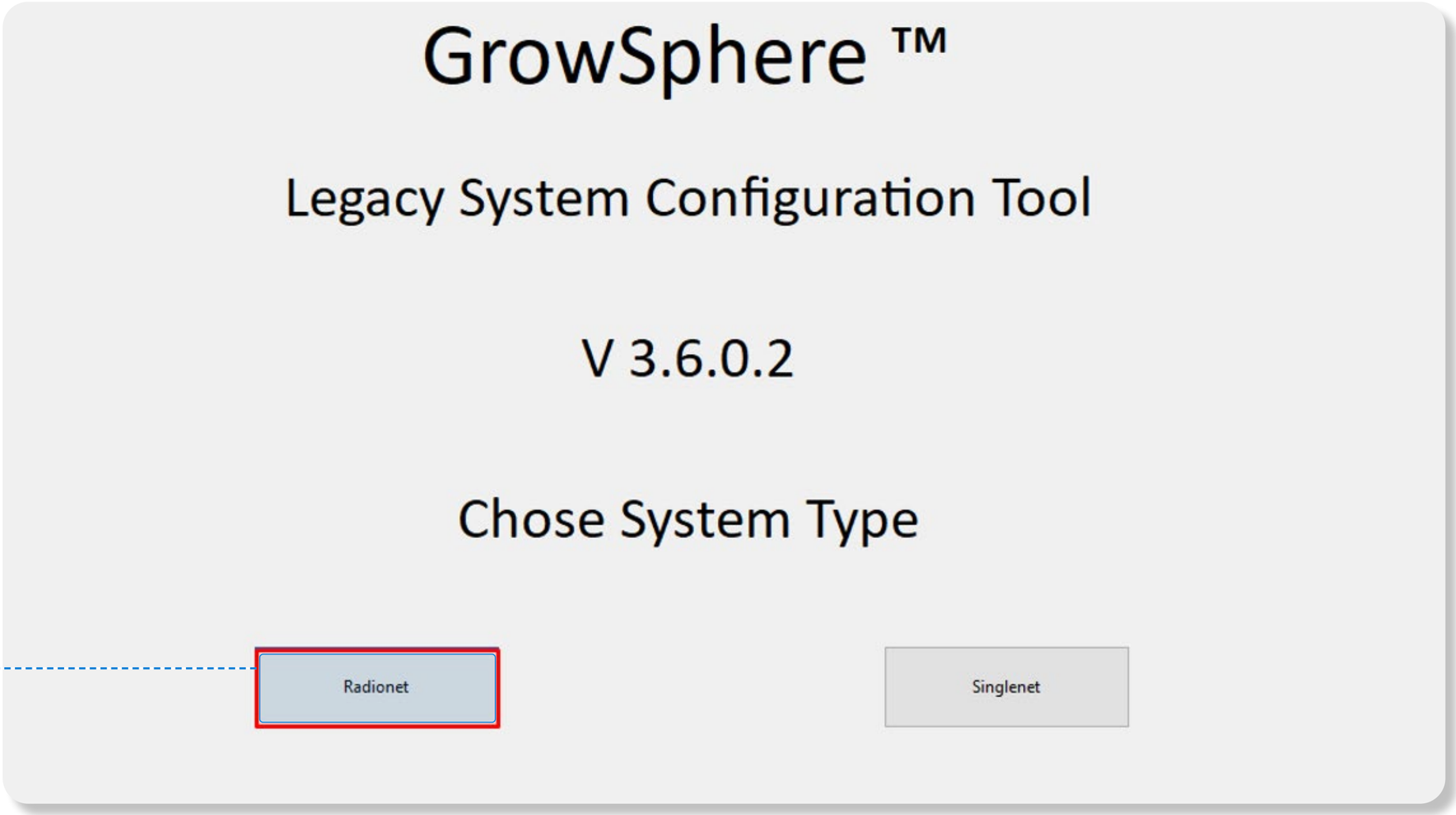
After Successful “Export”, Click on Done



Open “Polenet2Max” Application



Name	Date modified	Type	Size
configuration.properties	11/15/2022 1:13 PM	PROPERTIES File	1 KB
D3DCompiler_47_cor3.dll	5/6/2022 8:46 PM	Application extens...	4,031 KB
devices_types	11/10/2022 7:00 PM	JSON File	23 KB
illust58-1841	11/28/2022 5:35 PM	JPG File	1,468 KB
PenImc_cor3.dll	11/19/2022 11:16 PM	Application extens...	143 KB
Polenet2Max	1/18/2023 2:32 PM	Application	155,001 KB
Polenet2Max.pdb	1/18/2023 2:31 PM	PDB File	50 KB
PresentationNative_cor3.dll	10/13/2022 11:46 PM	Application extens...	924 KB
sni.dll	7/12/2017 4:54 PM	Application extens...	134 KB
SQLite.Interop.dll	11/2/2021 11:17 PM	Application extens...	1,343 KB
vcruntime140_cor3.dll	11/10/2022 8:04 AM	Application extens...	89 KB
wpfgfx_cor3.dll	11/19/2022 11:18 PM	Application extens...	1,763 KB

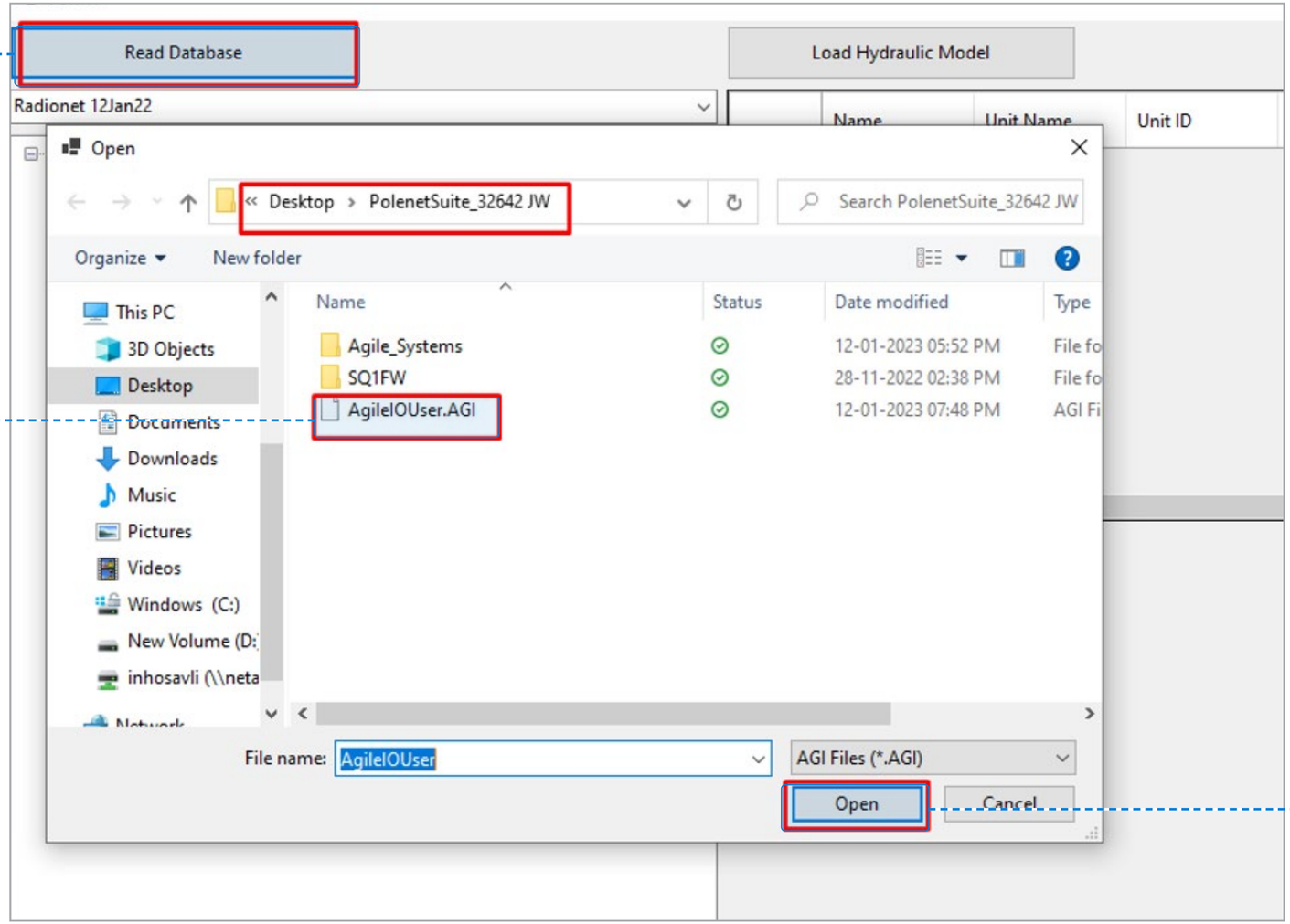


Select RadioNet

Select Read Database, Select AgileIoUser.AGI file from the PoleNet folder, click Open

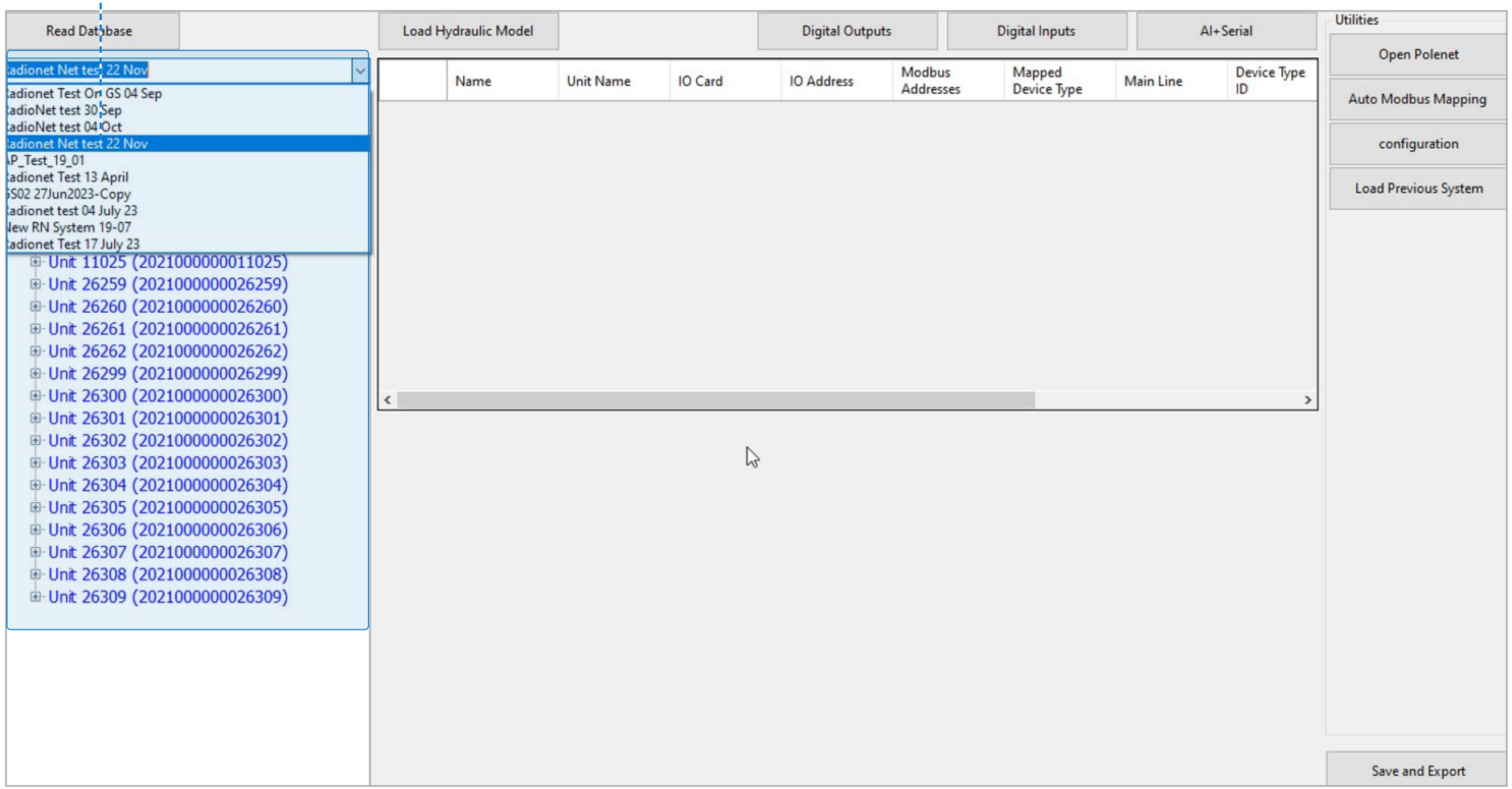
Select Read Database

Select AgileIoUser.AGI file from the PoleNet folder

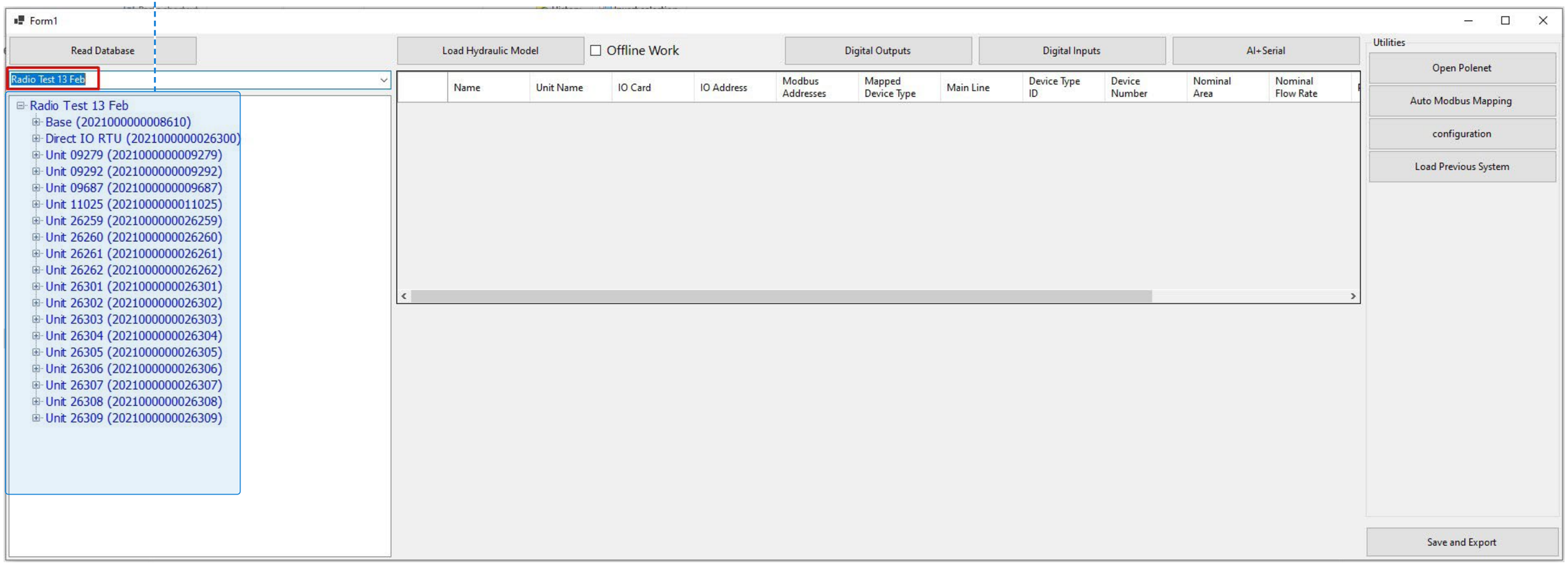


Click open

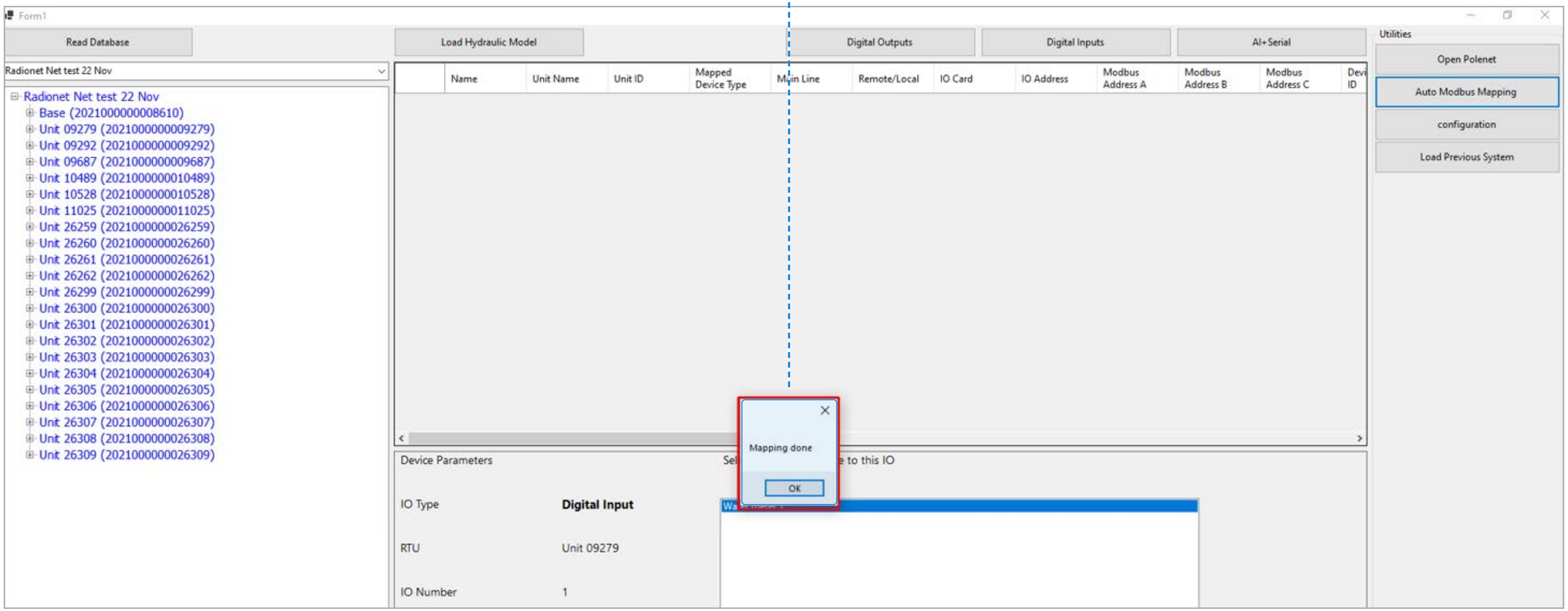
Chose correct file from list after Read Database.



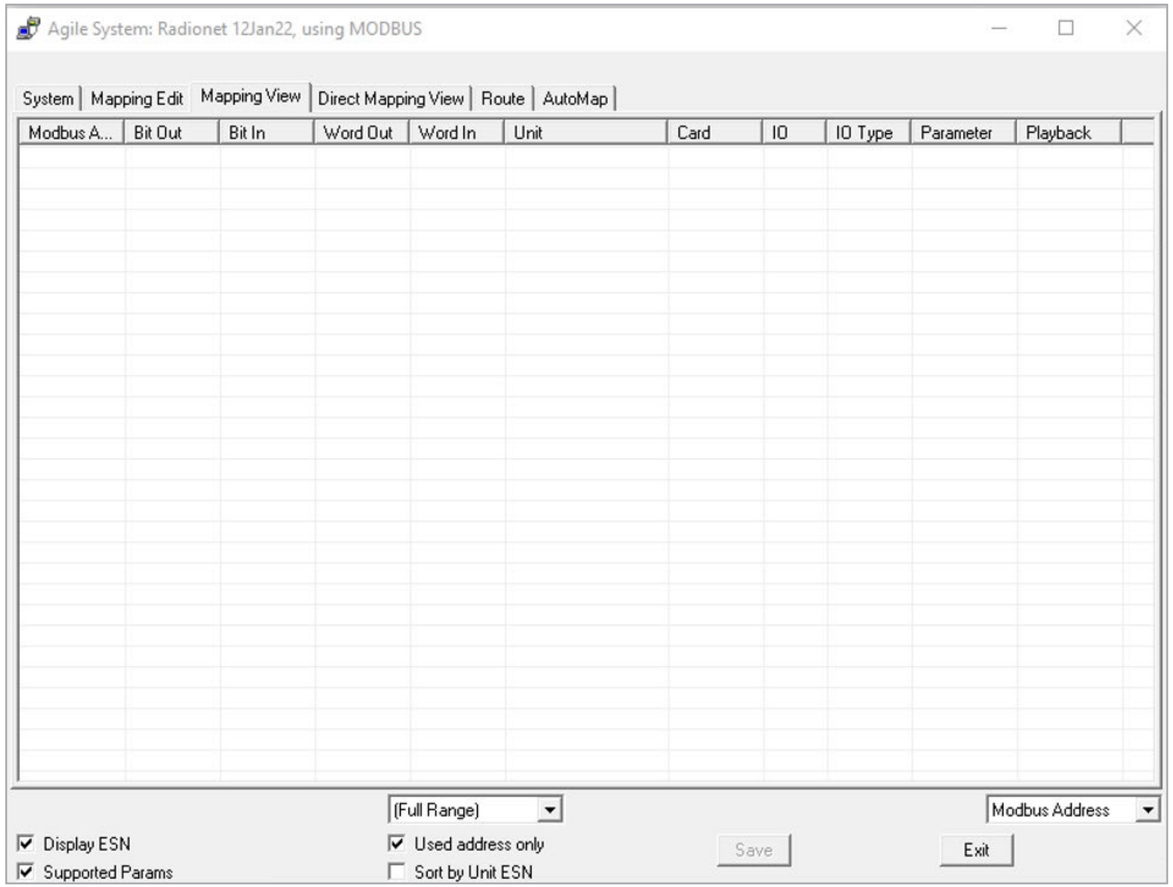
PoleNet File and list of RTUs will be displayed



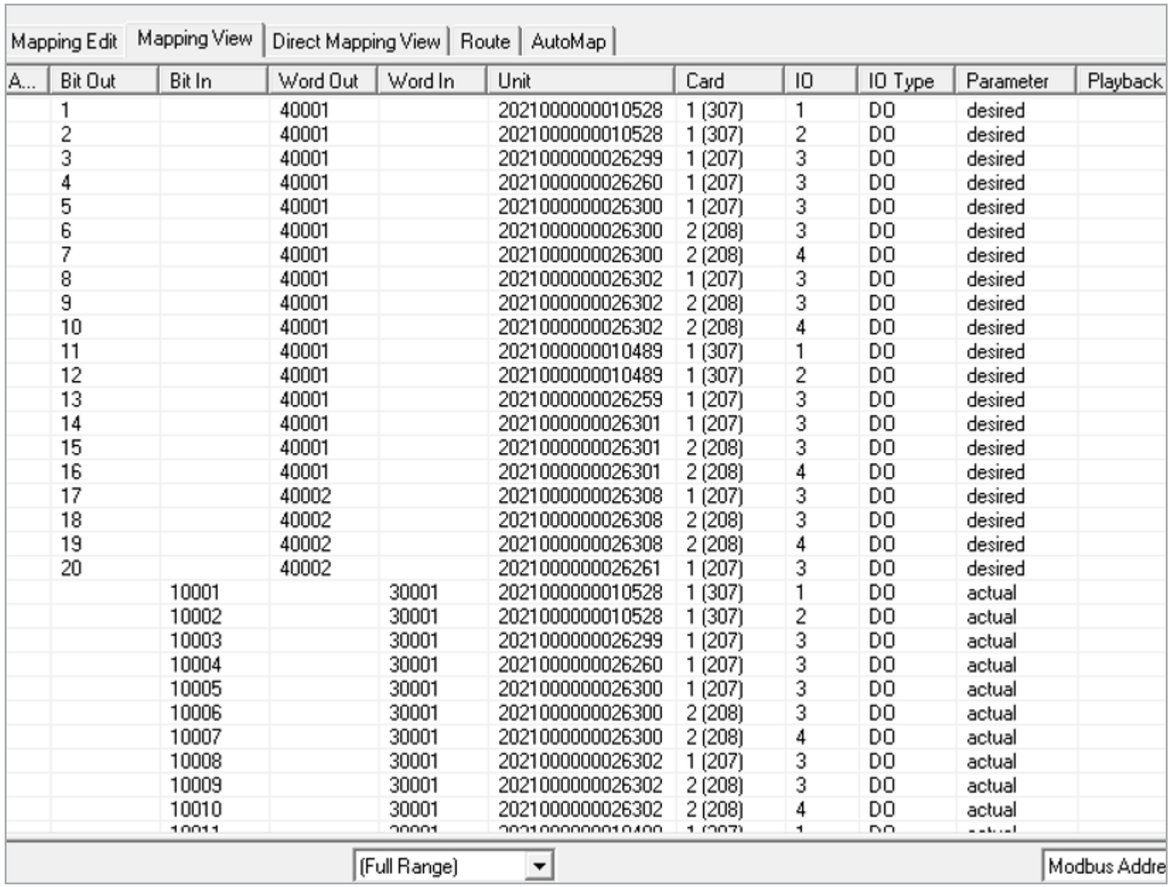
Click Auto Modbus Mapping and wait for message “Mapping Done”, click Ok



Below screen shots shows “Before Mapping” and “After Mapping view on PoleNet Mapping View Tab.



Before Mapping

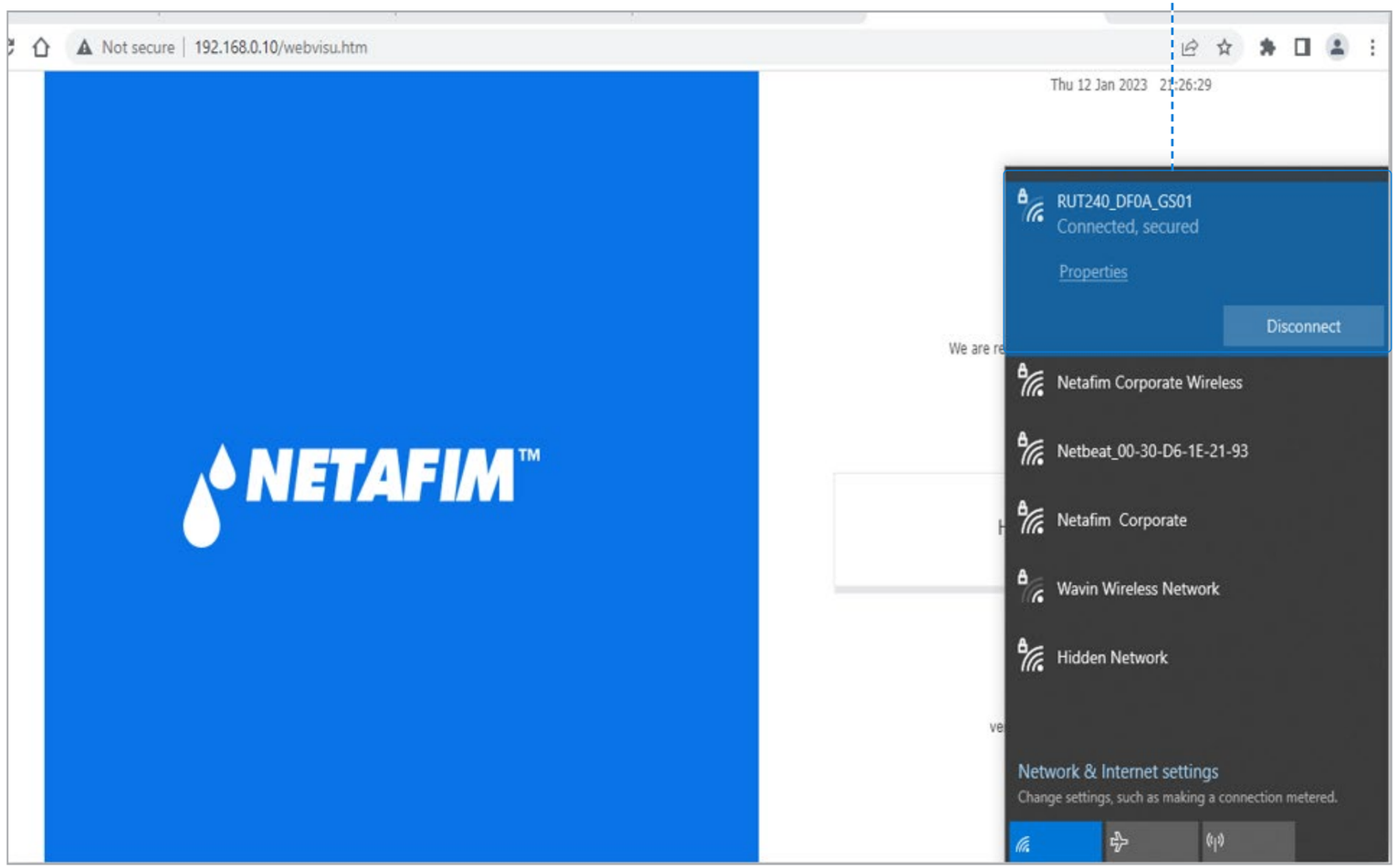


A...	Bit Out	Bit In	Word Out	Word In	Unit	Card	IO	IO Type	Parameter	Playback
	1		40001		2021000000010528	1 (307)	1	DO	desired	
	2		40001		2021000000010528	1 (307)	2	DO	desired	
	3		40001		2021000000026299	1 (207)	3	DO	desired	
	4		40001		2021000000026260	1 (207)	3	DO	desired	
	5		40001		2021000000026300	1 (207)	3	DO	desired	
	6		40001		2021000000026300	2 (208)	3	DO	desired	
	7		40001		2021000000026300	2 (208)	4	DO	desired	
	8		40001		2021000000026302	1 (207)	3	DO	desired	
	9		40001		2021000000026302	2 (208)	3	DO	desired	
	10		40001		2021000000026302	2 (208)	4	DO	desired	
	11		40001		2021000000010489	1 (307)	1	DO	desired	
	12		40001		2021000000010489	1 (307)	2	DO	desired	
	13		40001		2021000000026259	1 (207)	3	DO	desired	
	14		40001		2021000000026301	1 (207)	3	DO	desired	
	15		40001		2021000000026301	2 (208)	3	DO	desired	
	16		40001		2021000000026301	2 (208)	4	DO	desired	
	17		40002		2021000000026308	1 (207)	3	DO	desired	
	18		40002		2021000000026308	2 (208)	3	DO	desired	
	19		40002		2021000000026308	2 (208)	4	DO	desired	
	20		40002		2021000000026261	1 (207)	3	DO	desired	
		10001		30001	2021000000010528	1 (307)	1	DO	actual	
		10002		30001	2021000000010528	1 (307)	2	DO	actual	
		10003		30001	2021000000026299	1 (207)	3	DO	actual	
		10004		30001	2021000000026260	1 (207)	3	DO	actual	
		10005		30001	2021000000026300	1 (207)	3	DO	actual	
		10006		30001	2021000000026300	2 (208)	3	DO	actual	
		10007		30001	2021000000026300	2 (208)	4	DO	actual	
		10008		30001	2021000000026302	1 (207)	3	DO	actual	
		10009		30001	2021000000026302	2 (208)	3	DO	actual	
		10010		30001	2021000000026302	2 (208)	4	DO	actual	

(Full Range) Modbus Addre

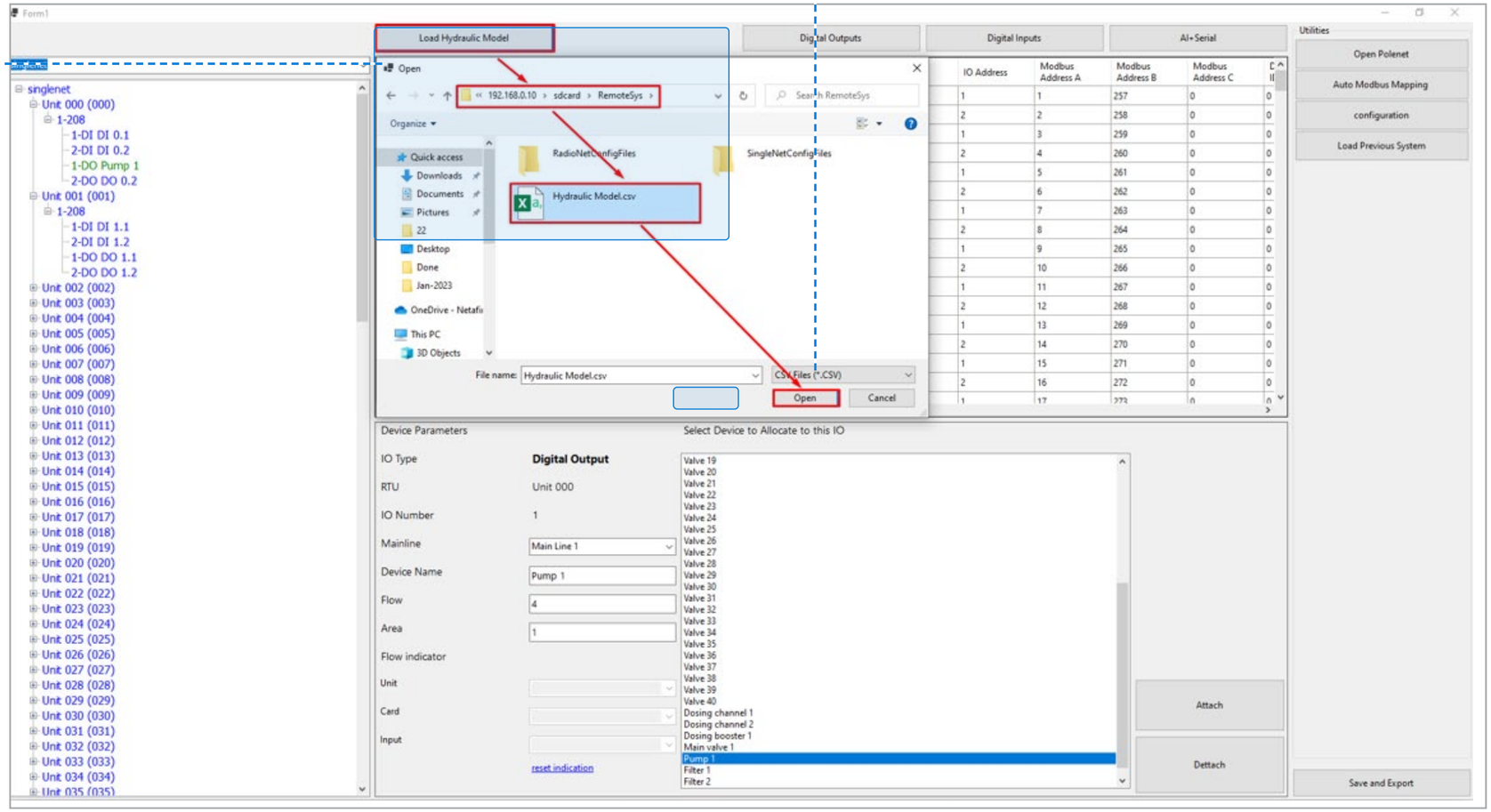
After Mapping

Connect to GS (in pic it is via RUT240 xx Modem)

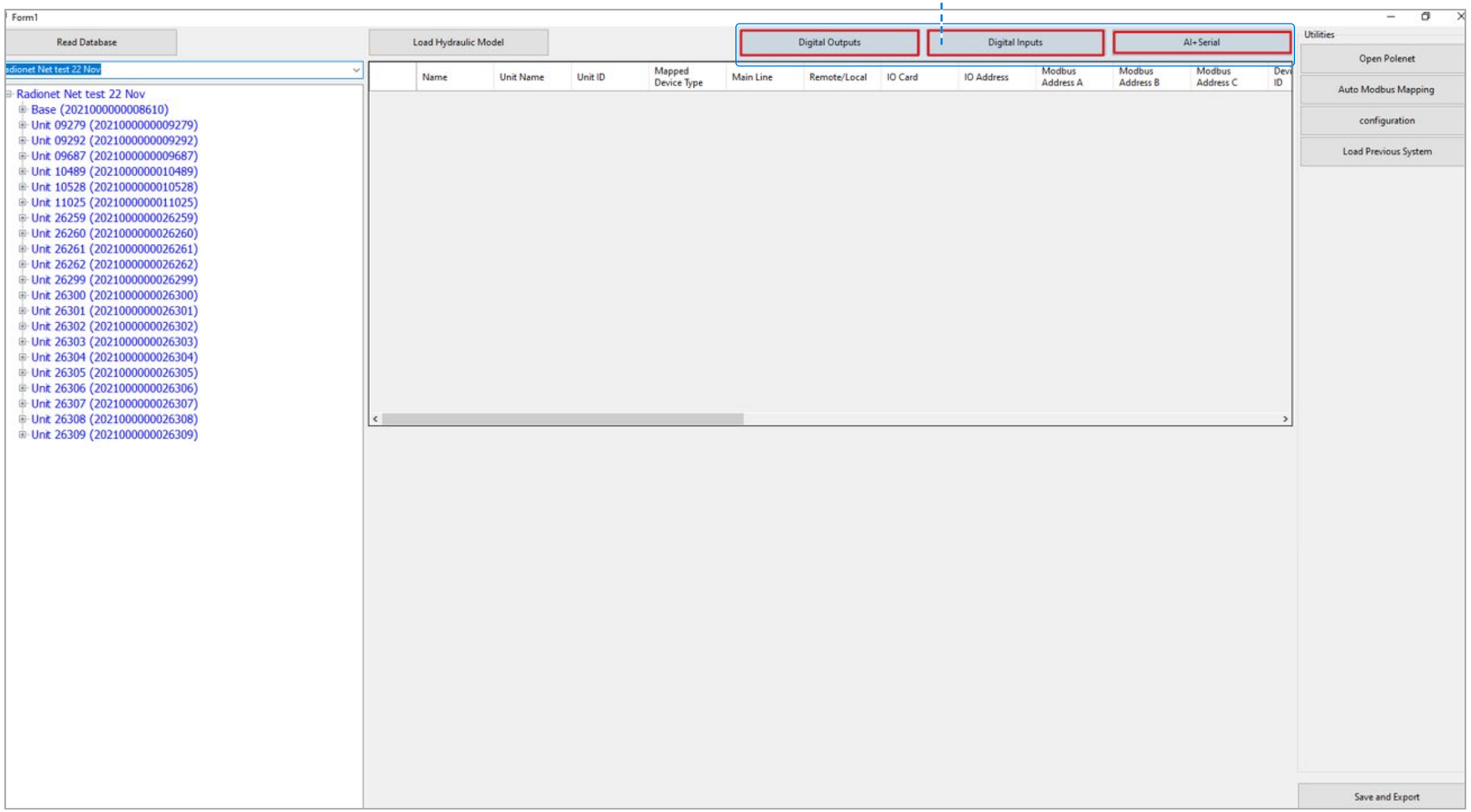


Wait for Message “File loaded successfully”, Click OK

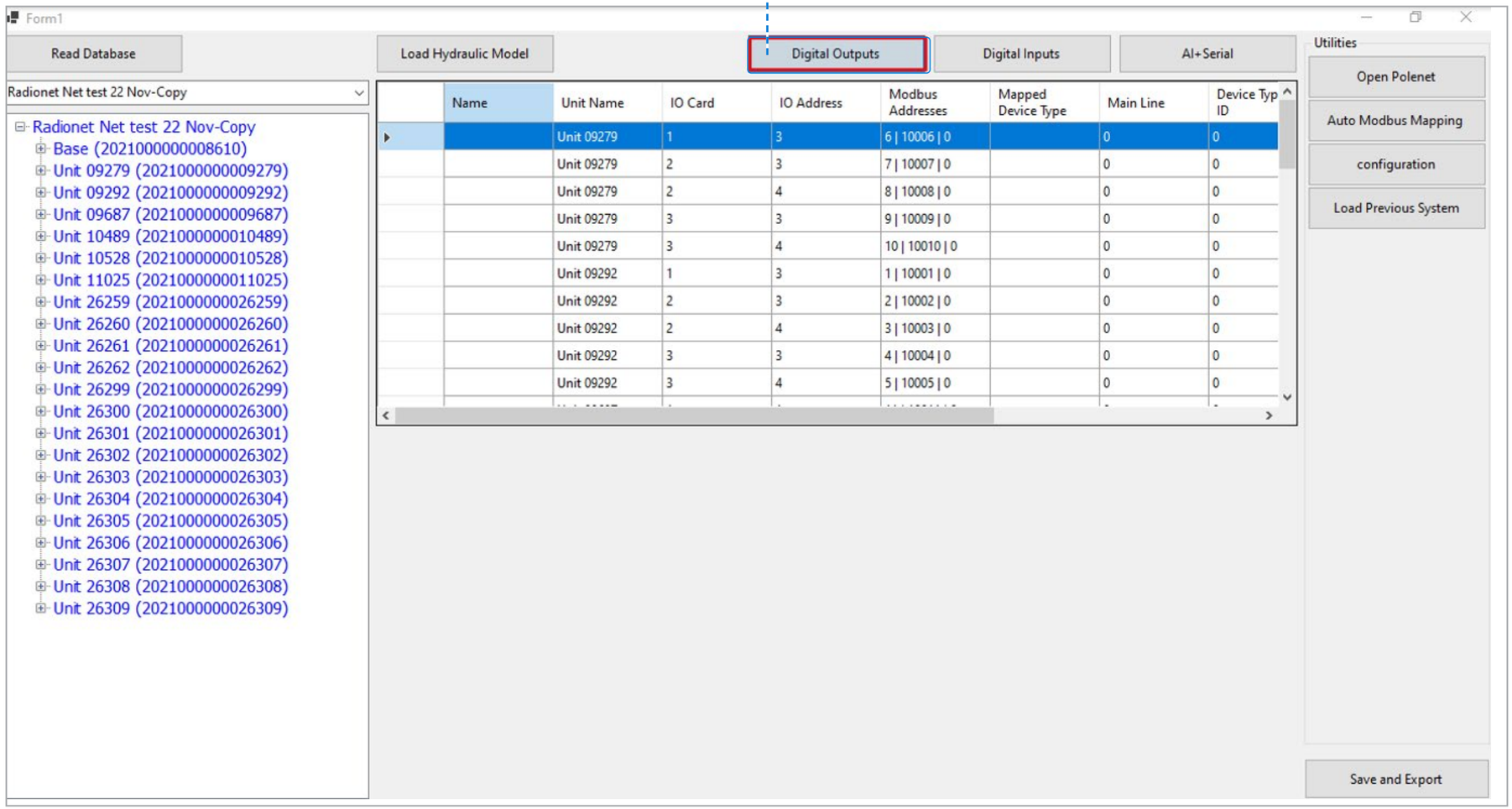
Click on “Load Hydraulic Model”, Select Path sdcard >> RemoteSys >> Hydraulic Model.csv & Click on Open



Digital Outputs / Inputs / AI+Serial can be assigned by selecting relevant Tabs

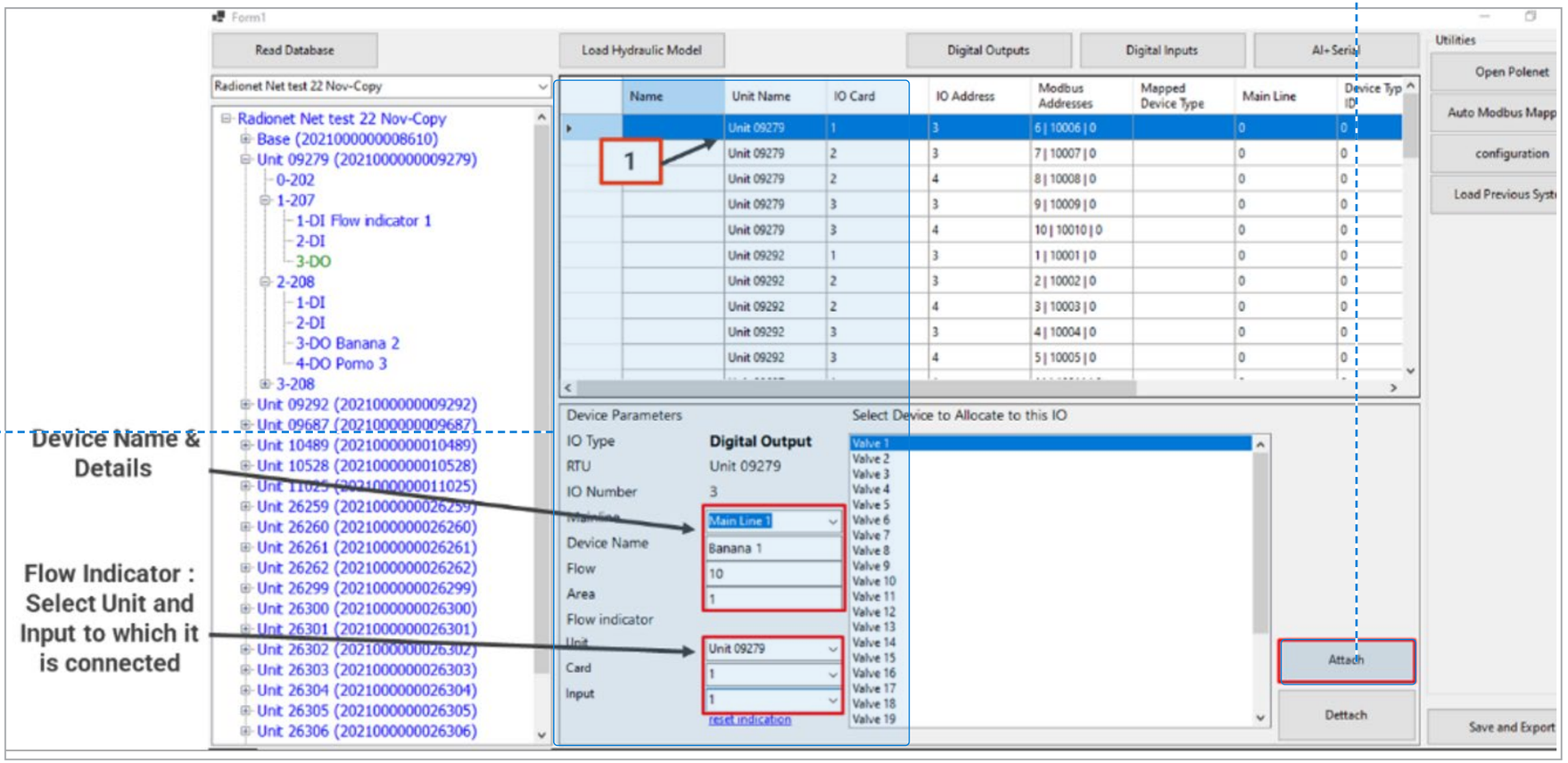


Click on “Digital Outputs” Tab, this will show DOs available on all RTUs

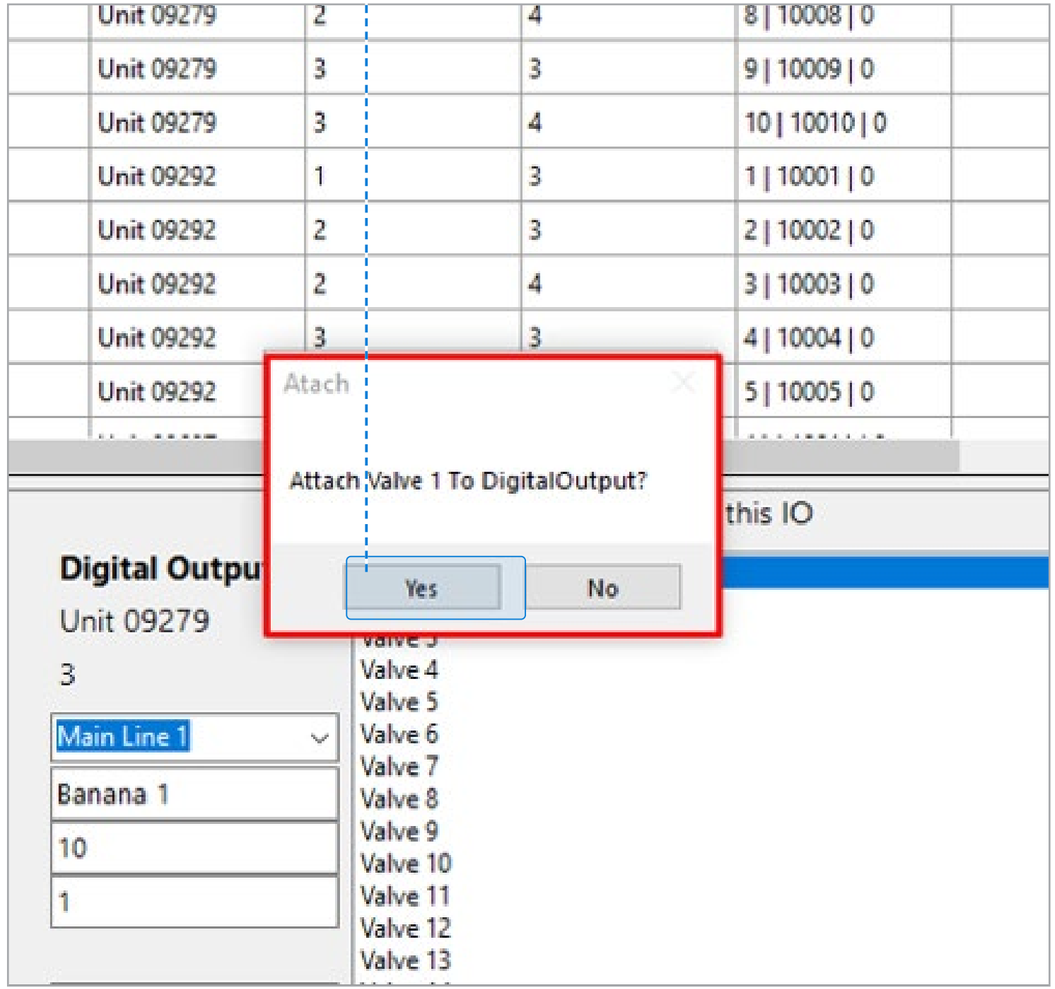


2. Select Device to Allocate IO . Enter Details Device Name , Flow and Area Click Attach

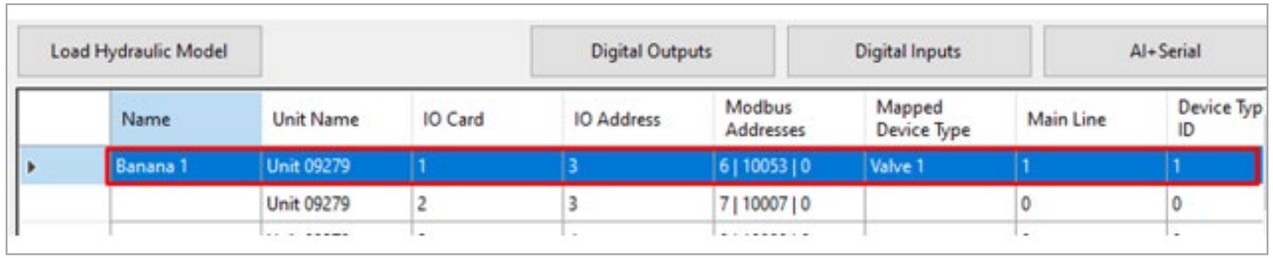
1. Click on any DO. This will open the window below, enter details such as Mainline, Device Name, flow, Area & Flow indicator



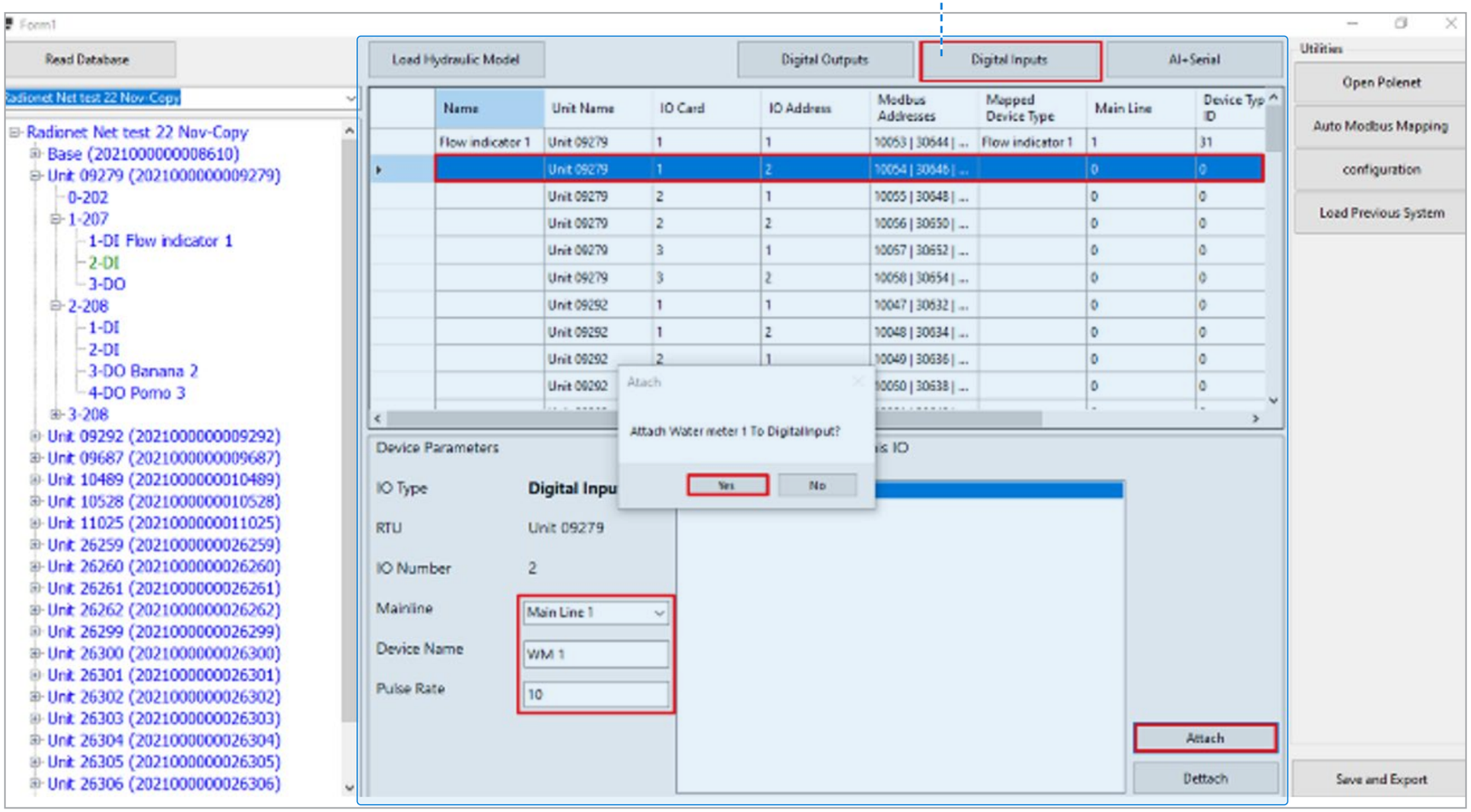
A Prompt message will appear, click Yes



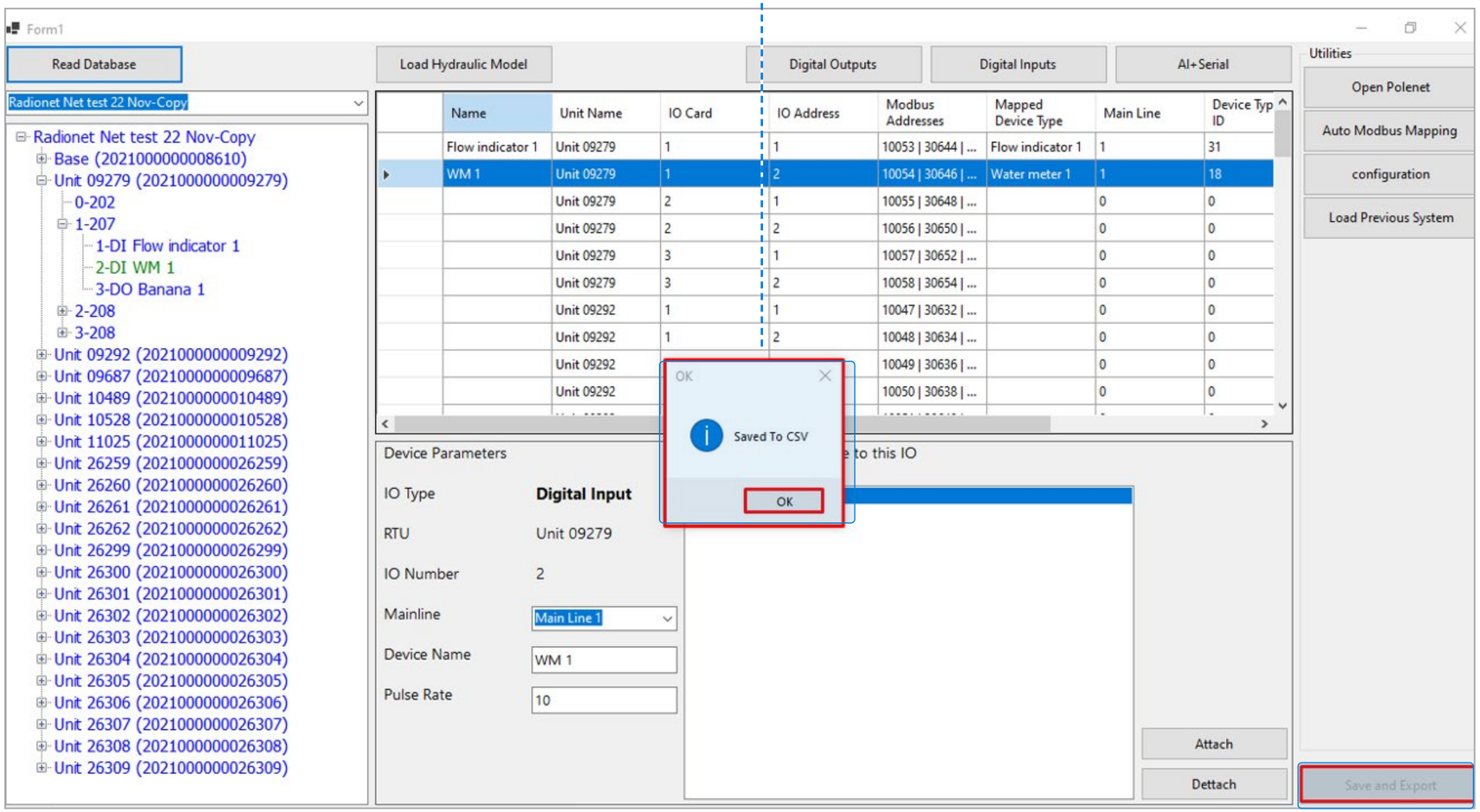
Device will be mapped to Output on RTU
& will be displayed in table



Click Digital Inputs Tab and Proceed to add Digital Input, select Mainline, Enter Device name etc, and click Attach Device Name (WM 1 here and associated with DI)

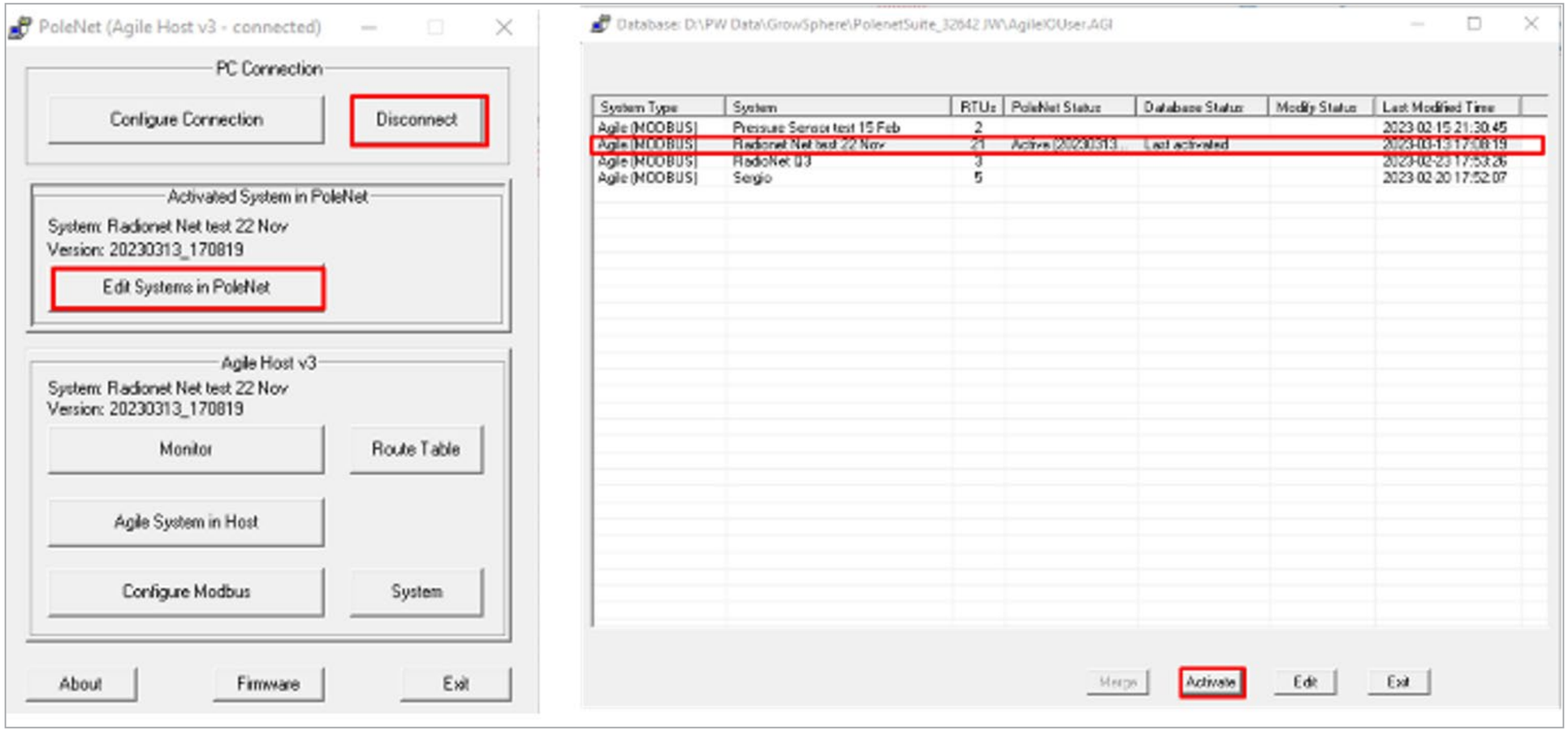


After all I/Os devices are assigned ,
Click “Save and Export “.

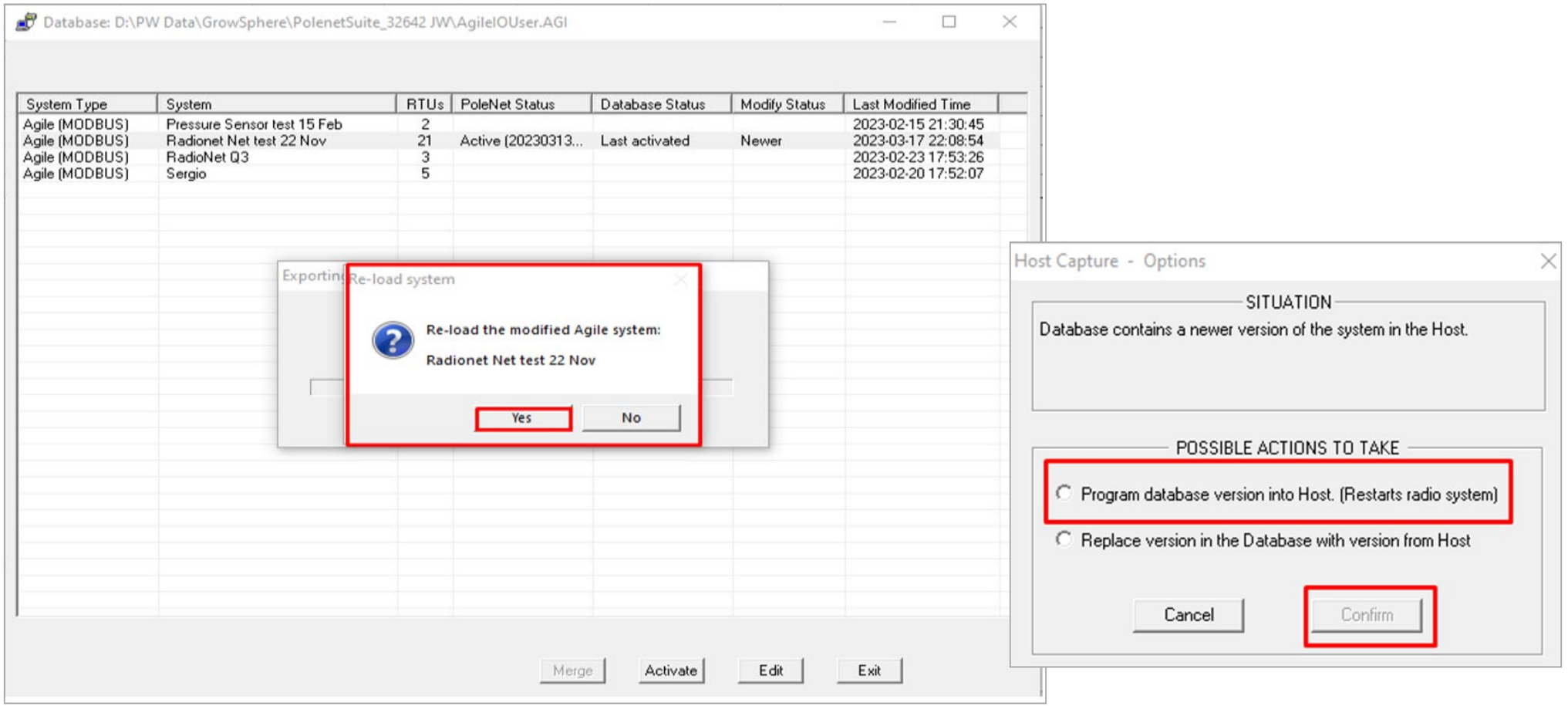


------ A message will Appear “Saved to CSV”. Click OK

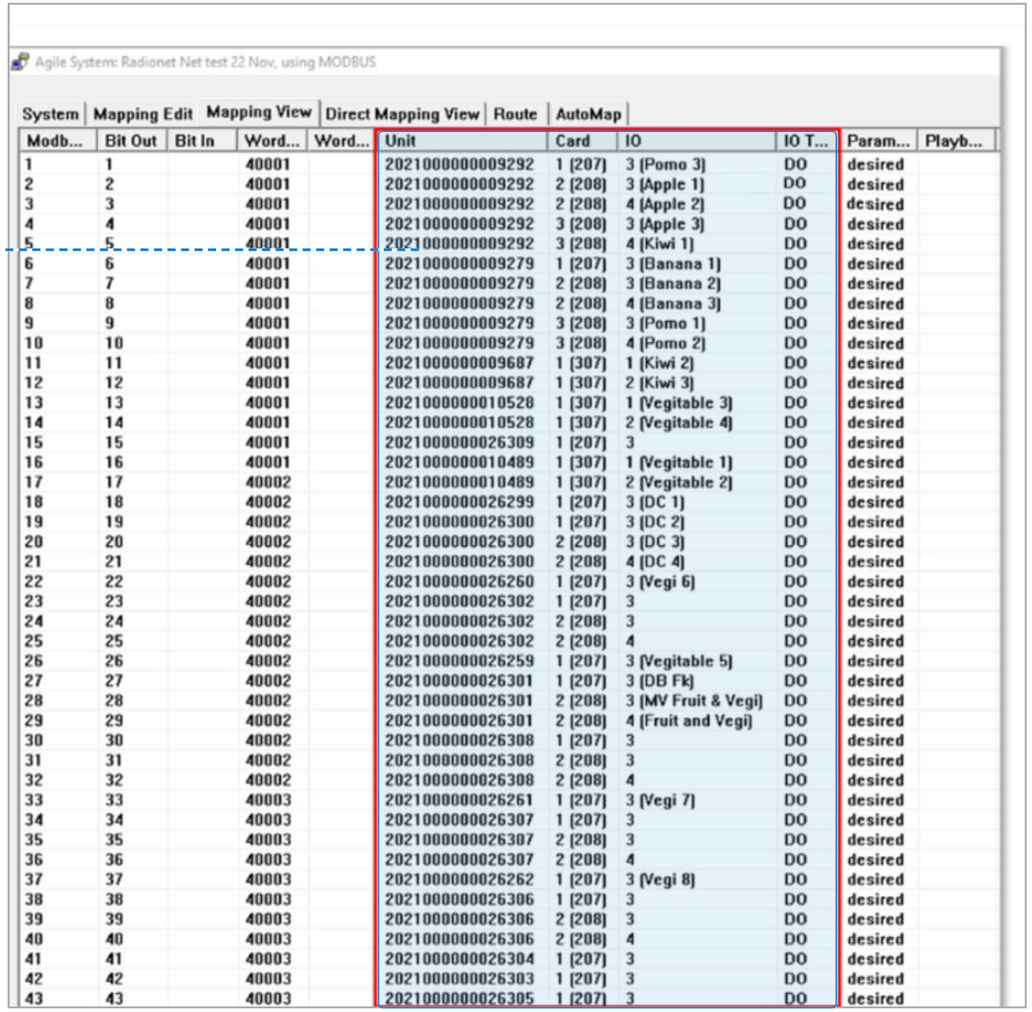
After saving CSV, Go to the PoleNet Application and disconnect the system. Click on “Edit System in PoleNet” and select the last activated system & Activate again and connect PoleNet.



The system will ask to Re-load the modified system. Click " Yes". The system will ask to Select " Program database version into Host" and Confirm



After a CSV upload, you can view the details in the "Mapping View" section of the PoleNet system.

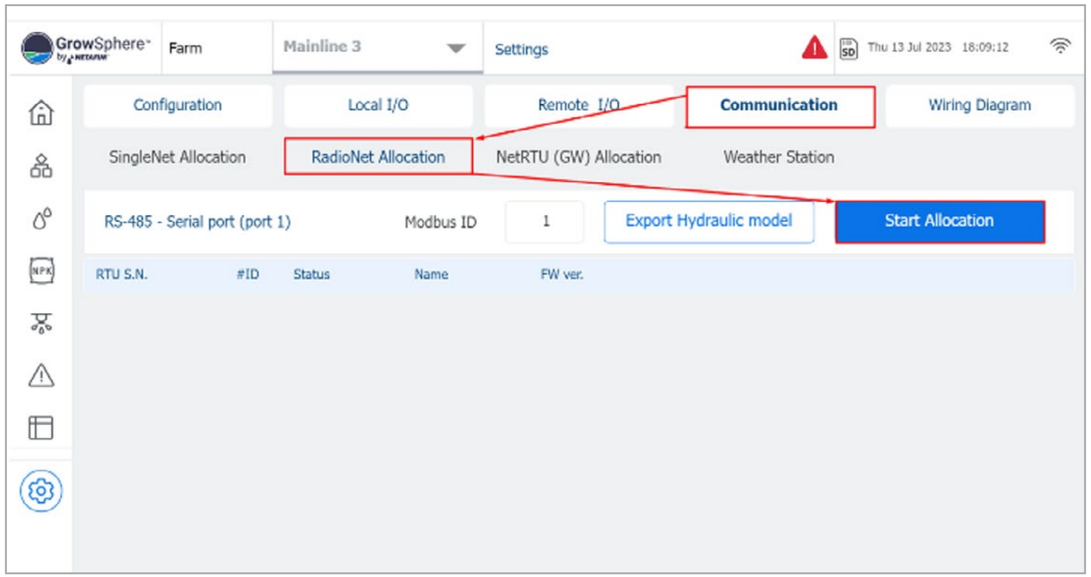


Agile System: Radionet Net test 22 Nov, using MODBUS

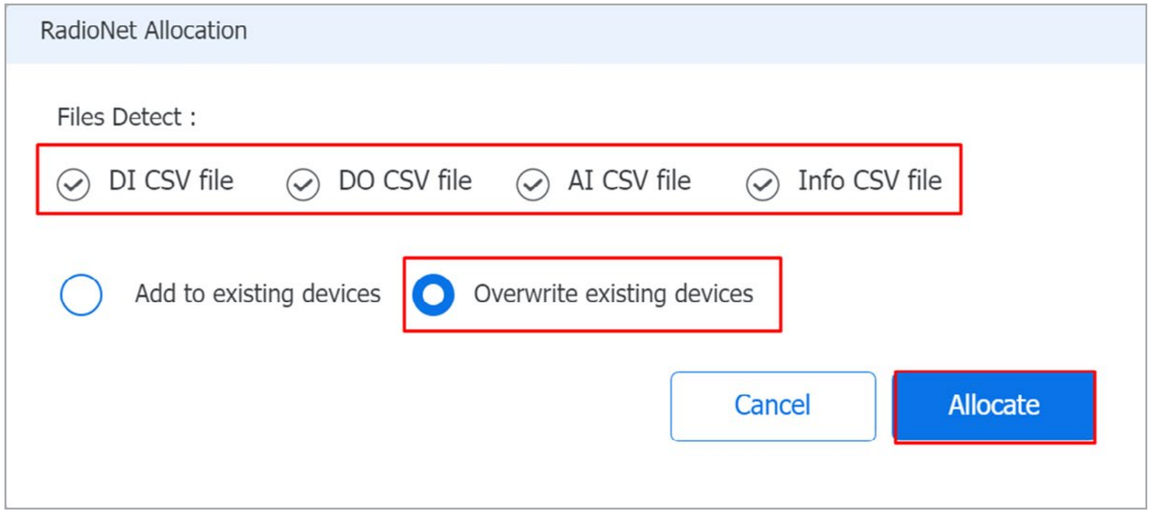
System | Mapping Edit | Mapping View | Direct Mapping View | Route | AutoMap

Modb...	Bit Out	Bit In	Word...	Word...	Unit	Card	IO	IO T...	Param...	Playb...
1	1		40001		2021000000009292	1 [207]	3 [Pomo 3]	DO	desired	
2	2		40001		2021000000009292	2 [208]	3 [Apple 1]	DO	desired	
3	3		40001		2021000000009292	2 [208]	4 [Apple 2]	DO	desired	
4	4		40001		2021000000009292	3 [208]	3 [Apple 3]	DO	desired	
5	5		40001		2021000000009292	3 [208]	4 [Kiwi 1]	DO	desired	
6	6		40001		2021000000009279	1 [207]	3 [Banana 1]	DO	desired	
7	7		40001		2021000000009279	2 [208]	3 [Banana 2]	DO	desired	
8	8		40001		2021000000009279	2 [208]	4 [Banana 3]	DO	desired	
9	9		40001		2021000000009279	3 [208]	3 [Pomo 1]	DO	desired	
10	10		40001		2021000000009279	3 [208]	4 [Pomo 2]	DO	desired	
11	11		40001		2021000000009687	1 [307]	1 [Kiwi 2]	DO	desired	
12	12		40001		2021000000009687	1 [307]	2 [Kiwi 3]	DO	desired	
13	13		40001		2021000000010528	1 [307]	1 [Vegitable 3]	DO	desired	
14	14		40001		2021000000010528	1 [307]	2 [Vegitable 4]	DO	desired	
15	15		40001		2021000000026309	1 [207]	3	DO	desired	
16	16		40001		2021000000010489	1 [307]	1 [Vegitable 1]	DO	desired	
17	17		40002		2021000000010489	1 [307]	2 [Vegitable 2]	DO	desired	
18	18		40002		2021000000026299	1 [207]	3 [DC 1]	DO	desired	
19	19		40002		2021000000026300	1 [207]	3 [DC 2]	DO	desired	
20	20		40002		2021000000026300	2 [208]	3 [DC 3]	DO	desired	
21	21		40002		2021000000026300	2 [208]	4 [DC 4]	DO	desired	
22	22		40002		2021000000026260	1 [207]	3 [Vegi 6]	DO	desired	
23	23		40002		2021000000026302	1 [207]	3	DO	desired	
24	24		40002		2021000000026302	2 [208]	3	DO	desired	
25	25		40002		2021000000026302	2 [208]	4	DO	desired	
26	26		40002		2021000000026259	1 [207]	3 [Vegitable 5]	DO	desired	
27	27		40002		2021000000026301	1 [207]	3 [DB Fk]	DO	desired	
28	28		40002		2021000000026301	2 [208]	3 [MV Fruit & Vegi]	DO	desired	
29	29		40002		2021000000026301	2 [208]	4 [Fruit and Vegi]	DO	desired	
30	30		40002		2021000000026308	1 [207]	3	DO	desired	
31	31		40002		2021000000026308	2 [208]	3	DO	desired	
32	32		40002		2021000000026308	2 [208]	4	DO	desired	
33	33		40003		2021000000026261	1 [207]	3 [Vegi 7]	DO	desired	
34	34		40003		2021000000026307	1 [207]	3	DO	desired	
35	35		40003		2021000000026307	2 [208]	3	DO	desired	
36	36		40003		2021000000026307	2 [208]	4	DO	desired	
37	37		40003		2021000000026262	1 [207]	3 [Vegi 8]	DO	desired	
38	38		40003		2021000000026306	1 [207]	3	DO	desired	
39	39		40003		2021000000026306	2 [208]	3	DO	desired	
40	40		40003		2021000000026306	2 [208]	4	DO	desired	
41	41		40003		2021000000026304	1 [207]	3	DO	desired	
42	42		40003		2021000000026303	1 [207]	3	DO	desired	
43	43		40003		2021000000026305	1 [207]	3	DO	desired	

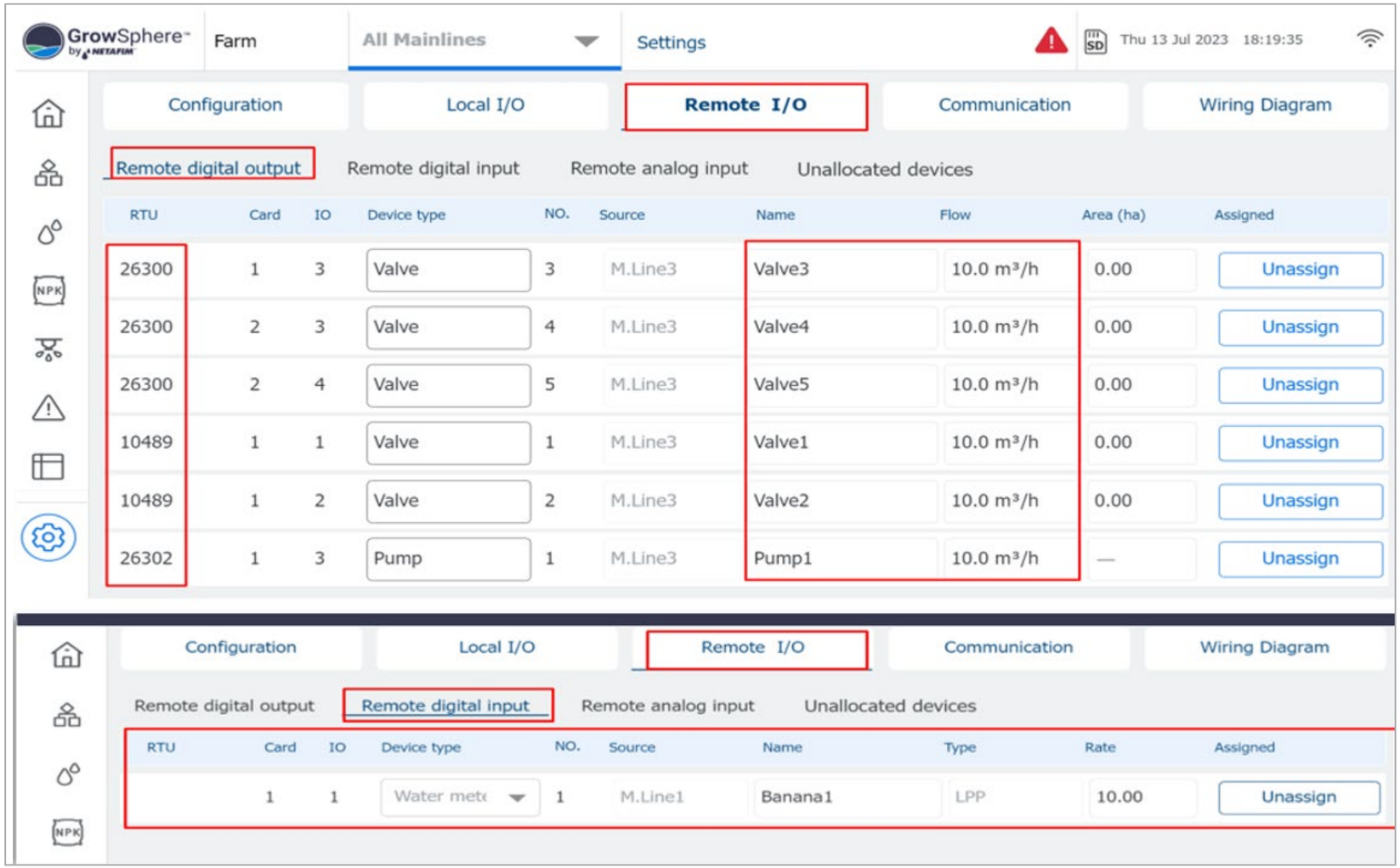
Go to GrowSphere Screen , Under “Communication” select “RadioNet Allocation” and click on “Start Allocation”



Confirm all CSV files are detected. Click on “ Overwrite existing devices if already system have definition for SingleNet or NetRTU

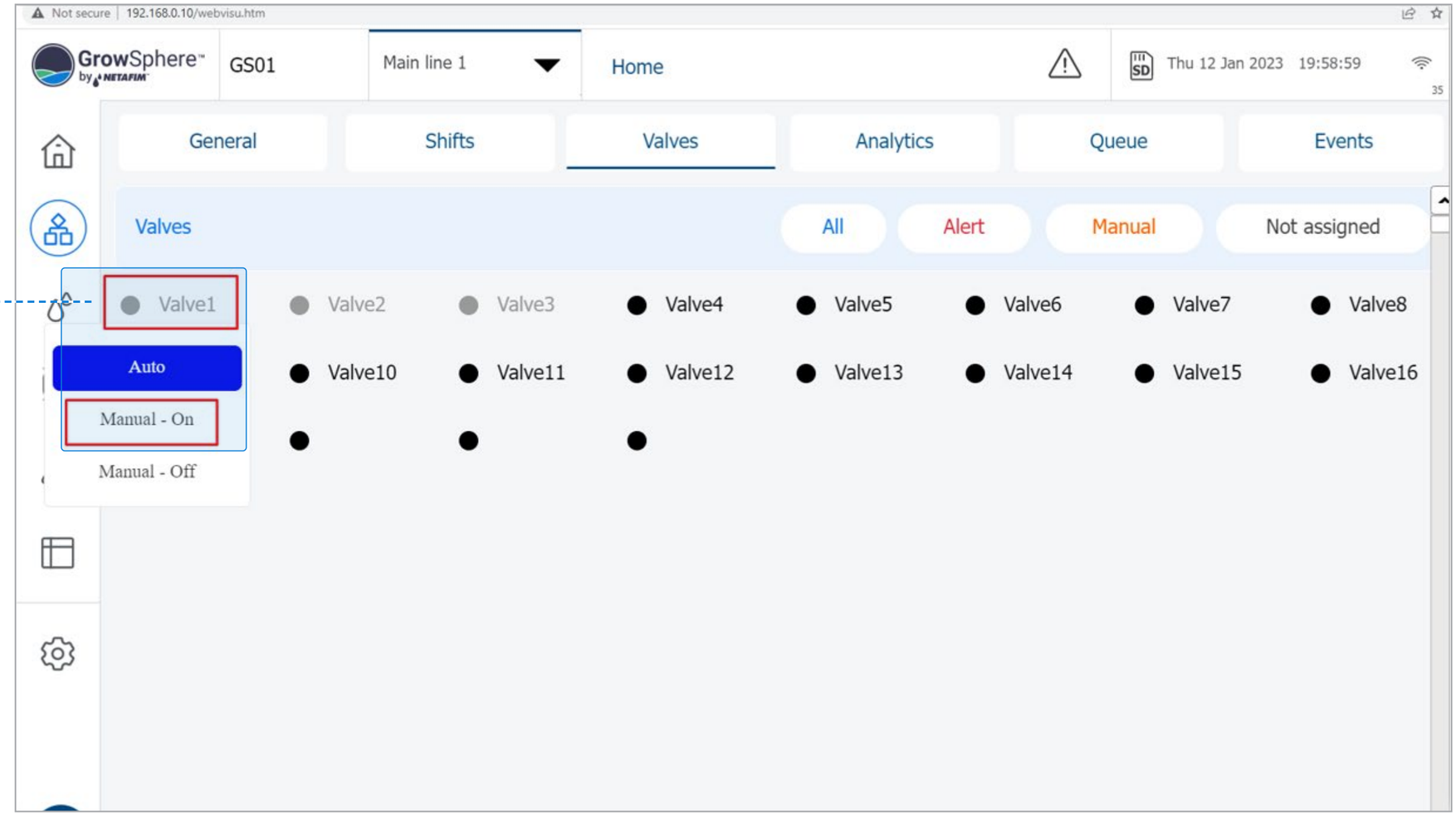


Check all I/O s are appeared.



→ To test Valve operations from UI.

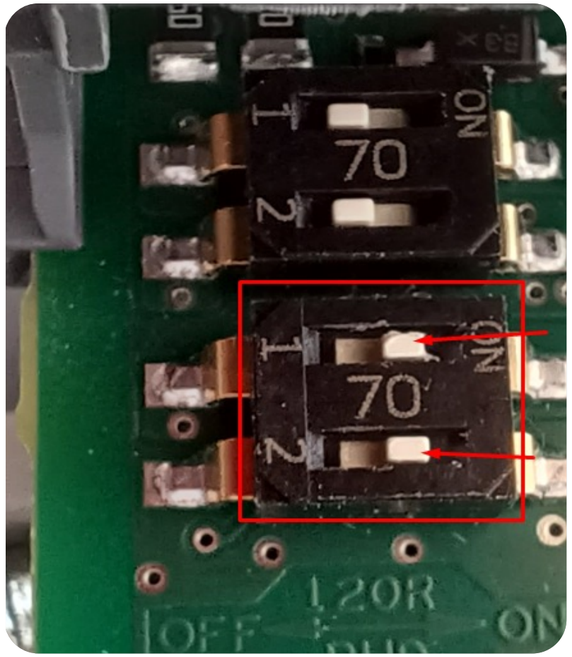
Click on any Valve and
Click on “Manual On”

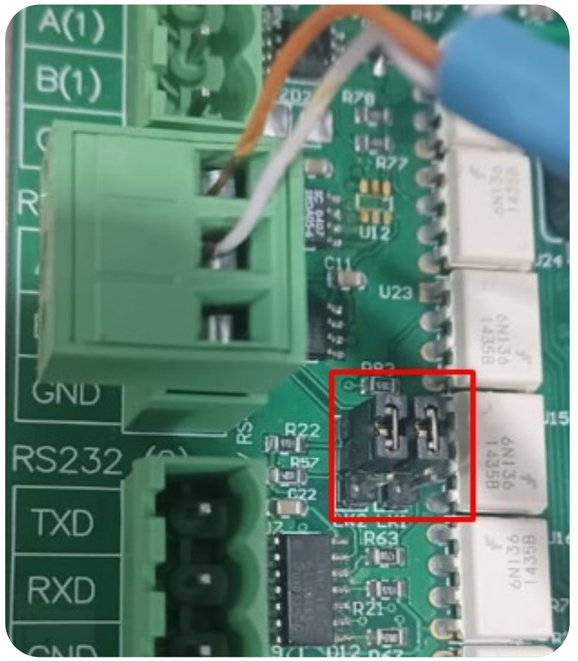


12.3 SingleNet to GrowSphere™ MAX

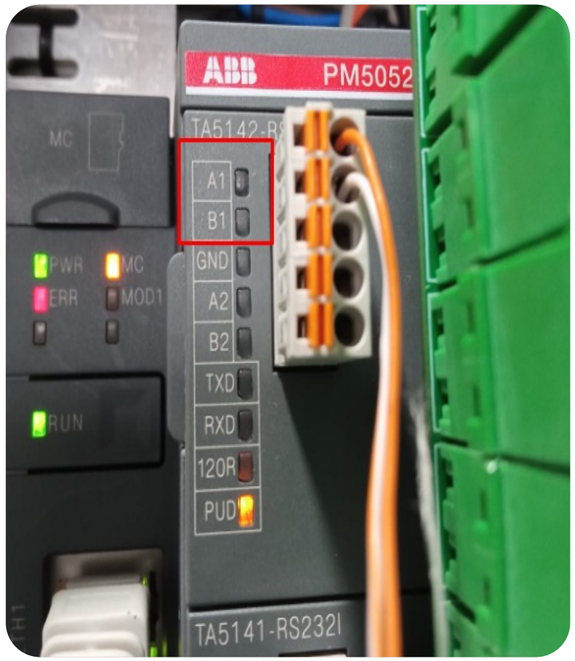
SingleNet interface with GS is only via RS485. RS485 Module must be installed on Upper Port. Note the “DIP Switch” position on the RS 485 Module marked in RED must be towards the “ON” Side

Wiring Between Host & GS max Controller A to A & B To B. also LK1 & LK2 Jumper on the SingleNet Host should be Upper side





Singlenet Host

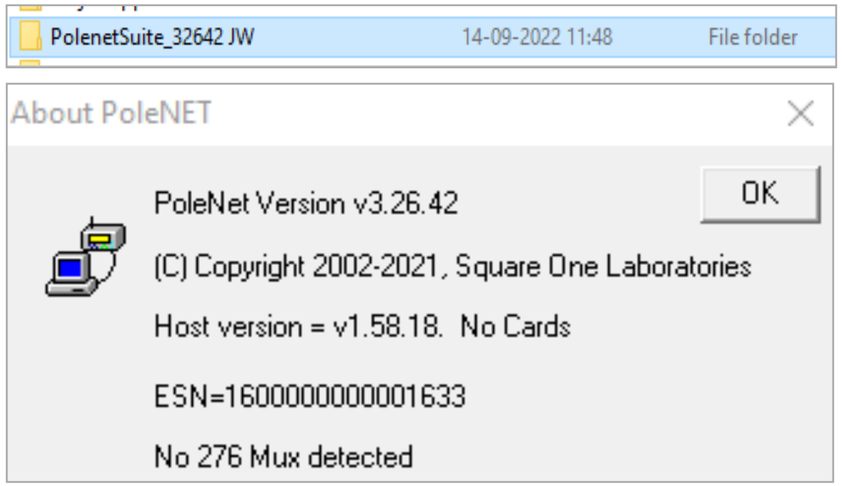


GrowSphere™ Max Controller

/ Required Polenet Version

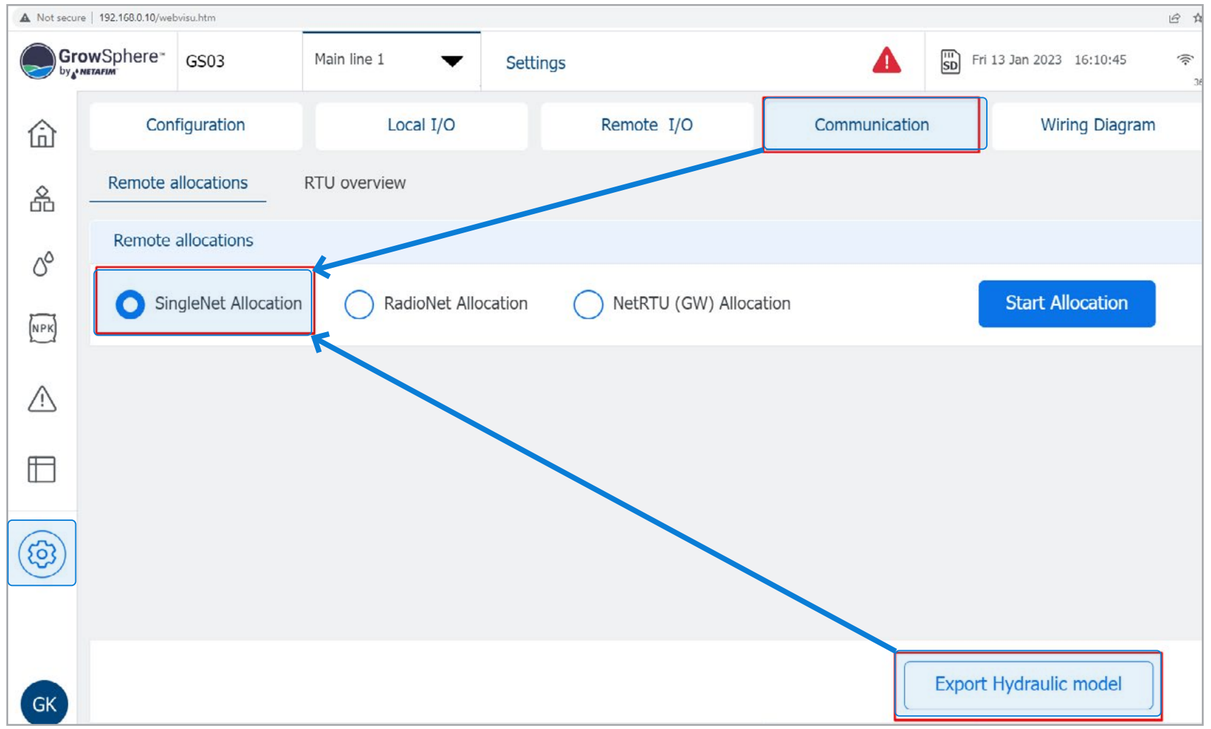
Always Check for Latest & Recommended Versions of PoleNet & Polenet2Max App.

- **Use Polenet Version:** 3.26.42 Or Newer Version

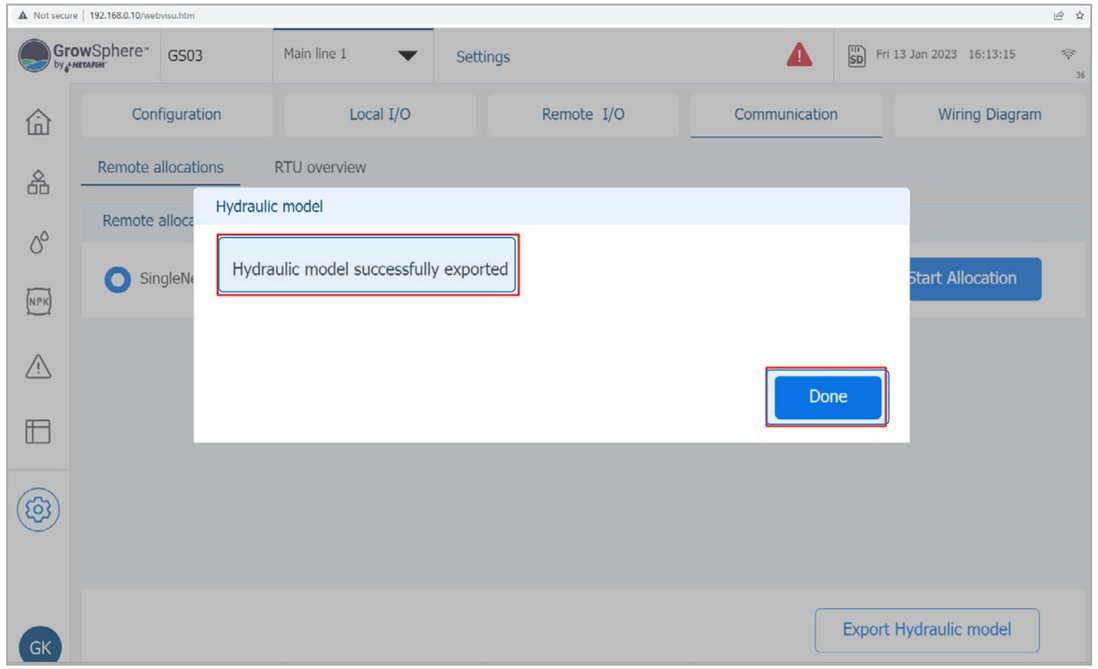


- **Use Host Firmware Version:** 1.58.18 Or Newer
- **Use RTU Firmware Version :** 1.66 Or Newer

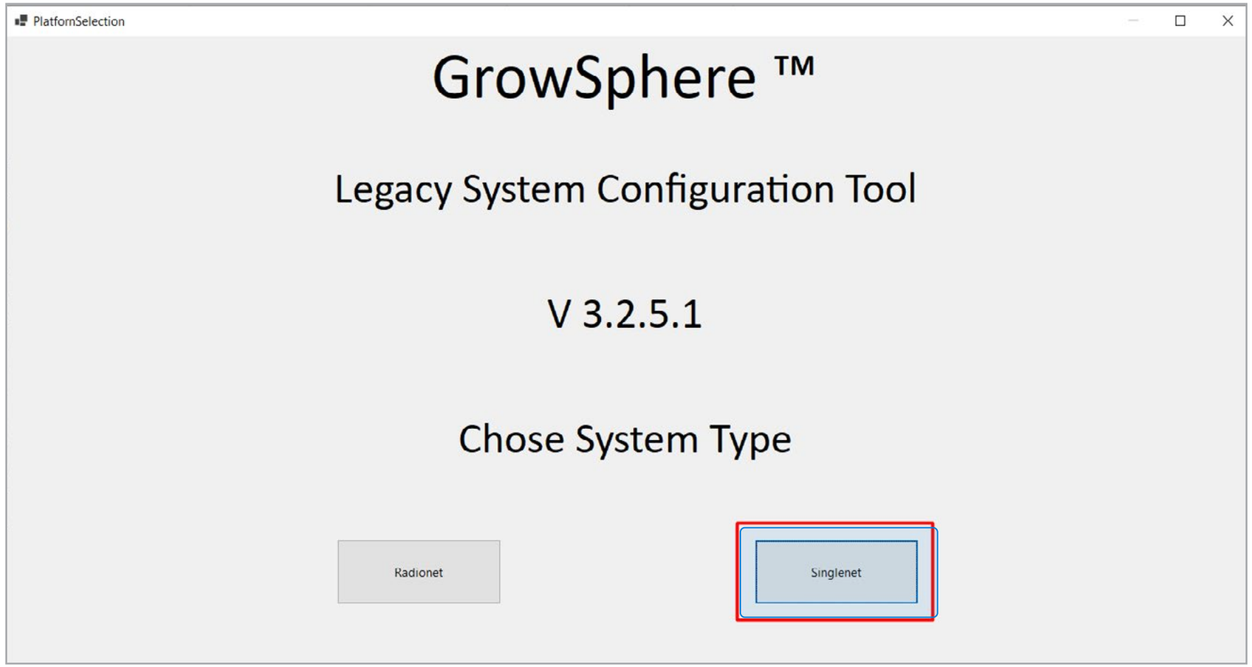
/ Navigate to Settings >> Communication >> Select SingleNet >> Export Hydraulic Model



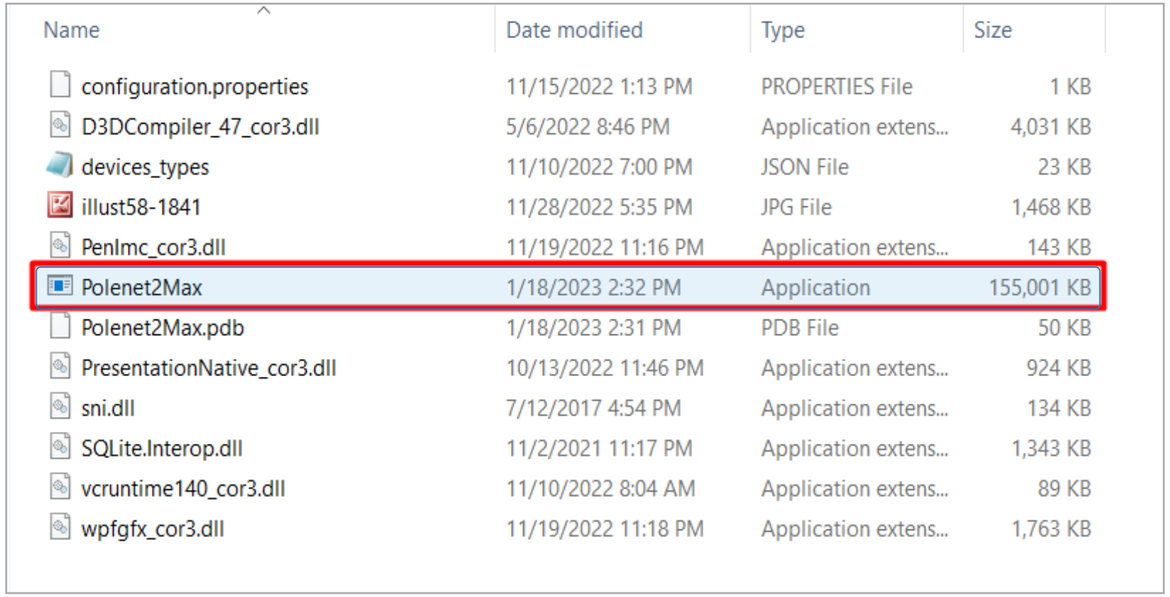
/ After Successful " Export", Click Done



/ Select SingleNet

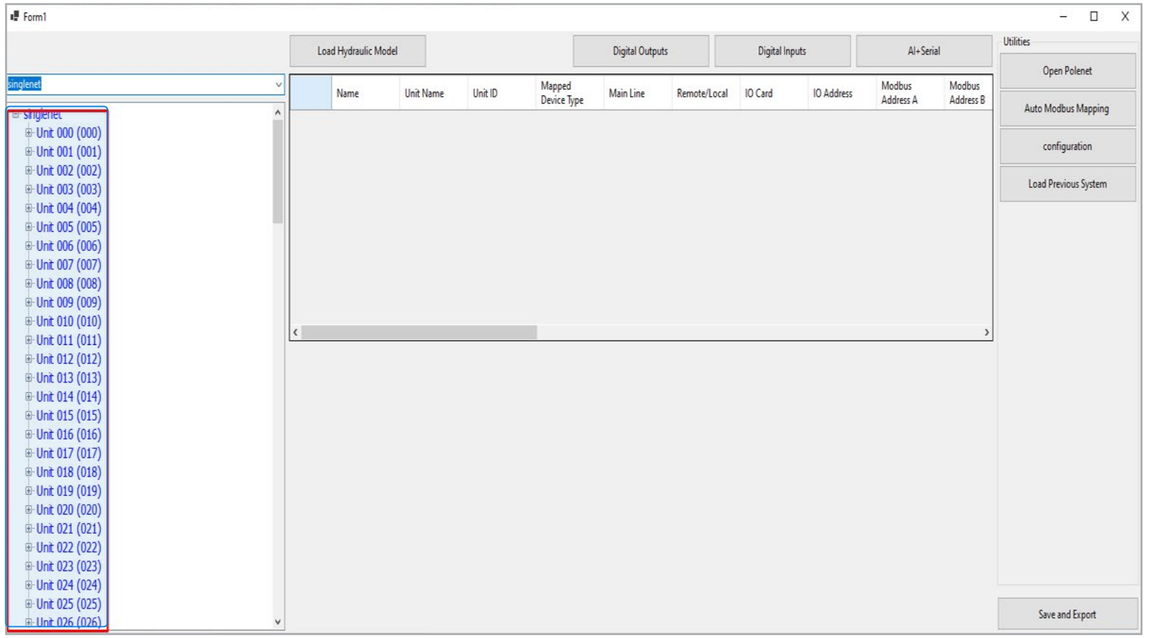


/ Open “Polenet2Max” Application

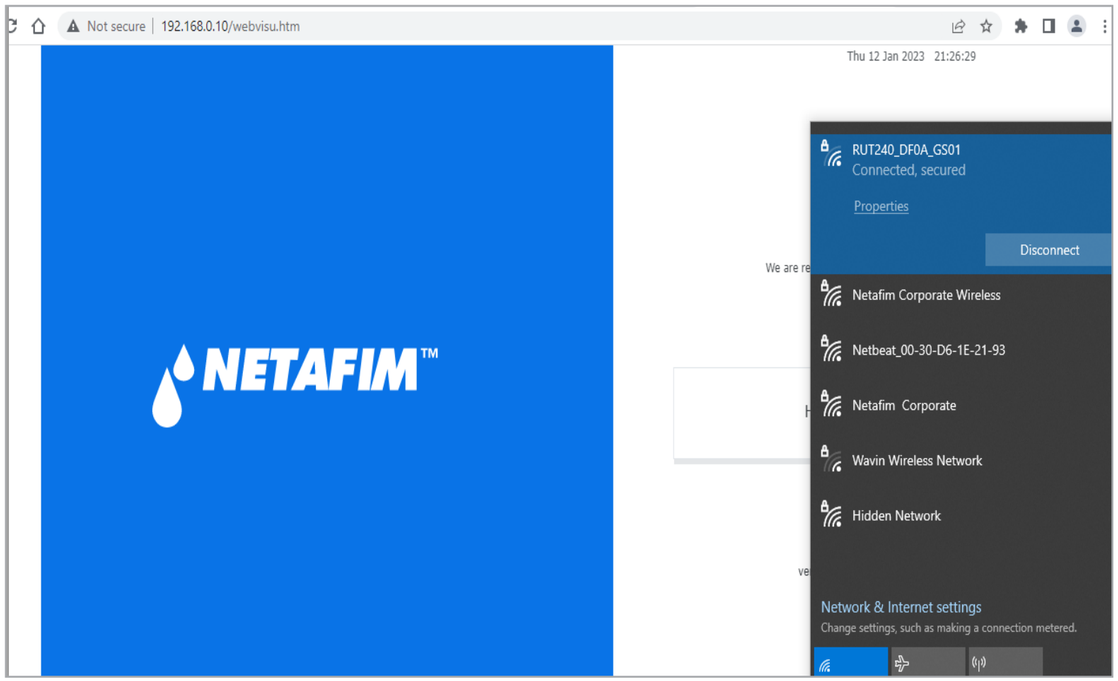


Name	Date modified	Type	Size
configuration.properties	11/15/2022 1:13 PM	PROPERTIES File	1 KB
D3DCompiler_47_cor3.dll	5/6/2022 8:46 PM	Application extens...	4,031 KB
devices_types	11/10/2022 7:00 PM	JSON File	23 KB
illust58-1841	11/28/2022 5:35 PM	JPG File	1,468 KB
PenImc_cor3.dll	11/19/2022 11:16 PM	Application extens...	143 KB
Polenet2Max	1/18/2023 2:32 PM	Application	155,001 KB
Polenet2Max.pdb	1/18/2023 2:31 PM	PDB File	50 KB
PresentationNative_cor3.dll	10/13/2022 11:46 PM	Application extens...	924 KB
sni.dll	7/12/2017 4:54 PM	Application extens...	134 KB
SQLite.Interop.dll	11/2/2021 11:17 PM	Application extens...	1,343 KB
vcruntime140_cor3.dll	11/10/2022 8:04 AM	Application extens...	89 KB
wpfgfx_cor3.dll	11/19/2022 11:18 PM	Application extens...	1,763 KB

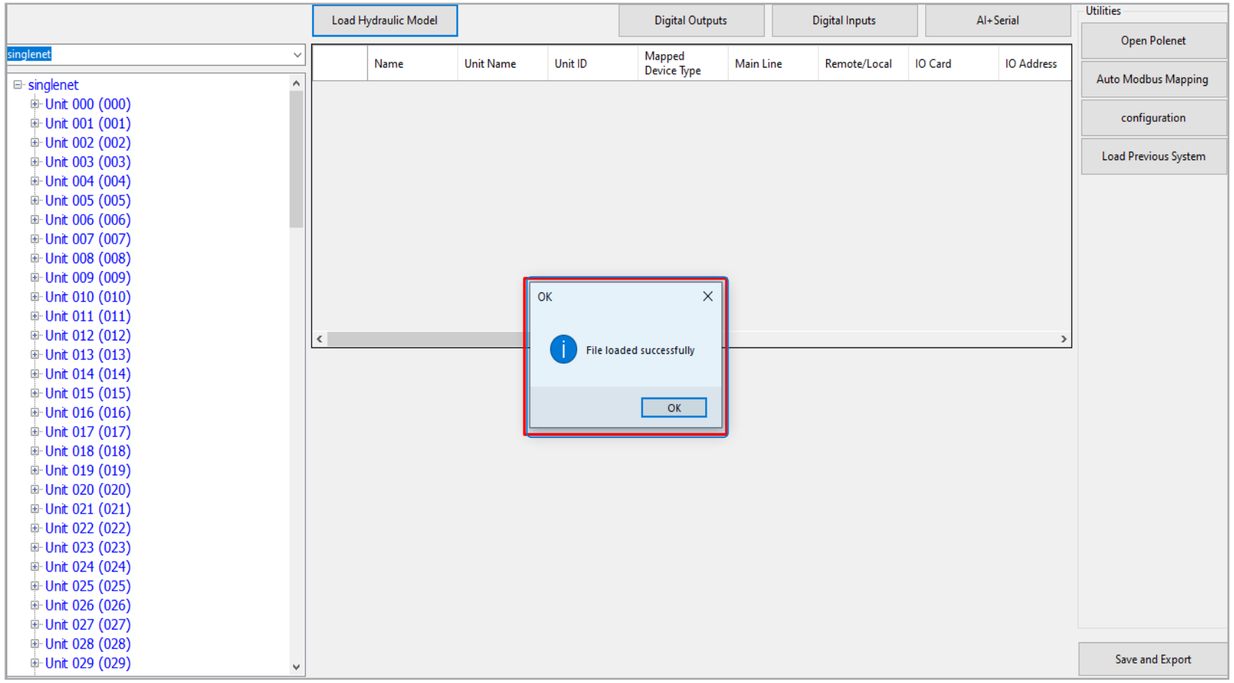
/ Total 128 Units 0 to 127, will be listed by default



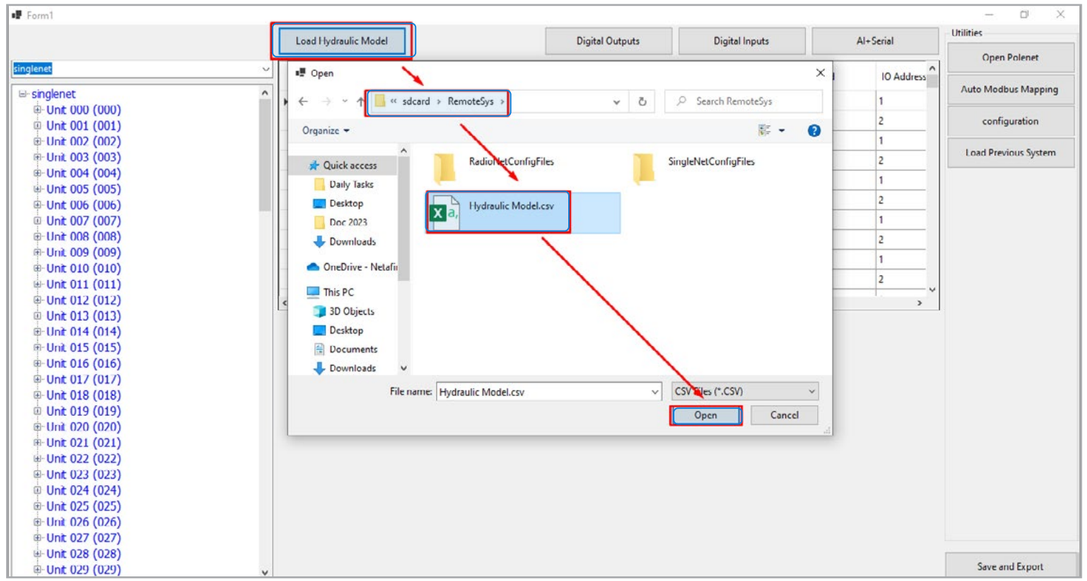
/ Connect to MAX (in pic it is via RUT240 xx Modem)



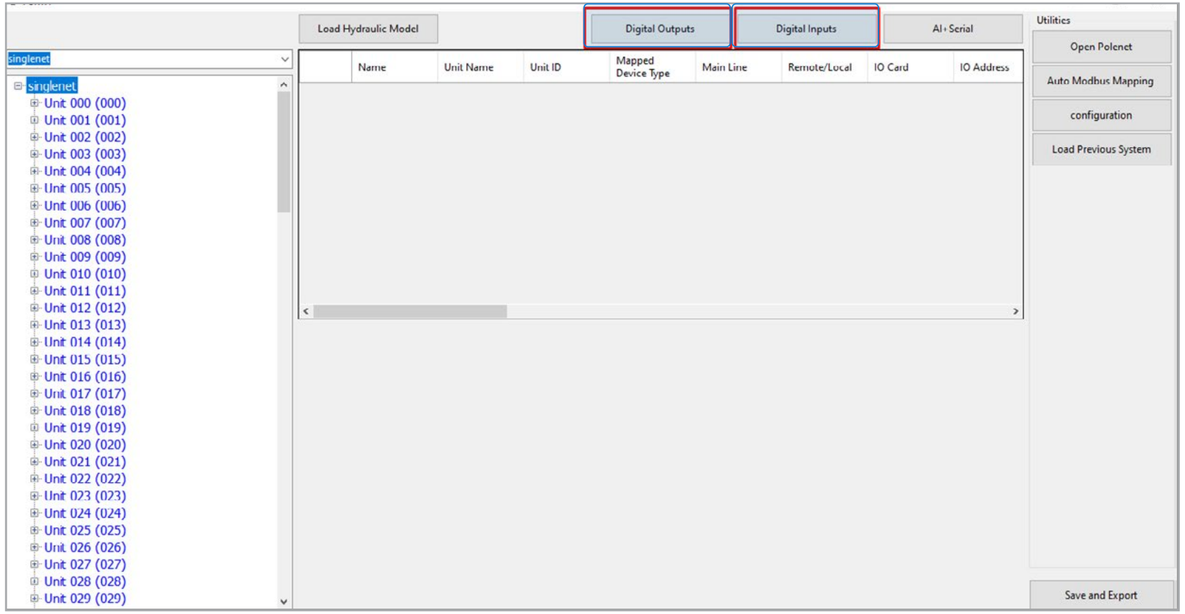
/ Wait for Message "File loaded successfully", Click OK



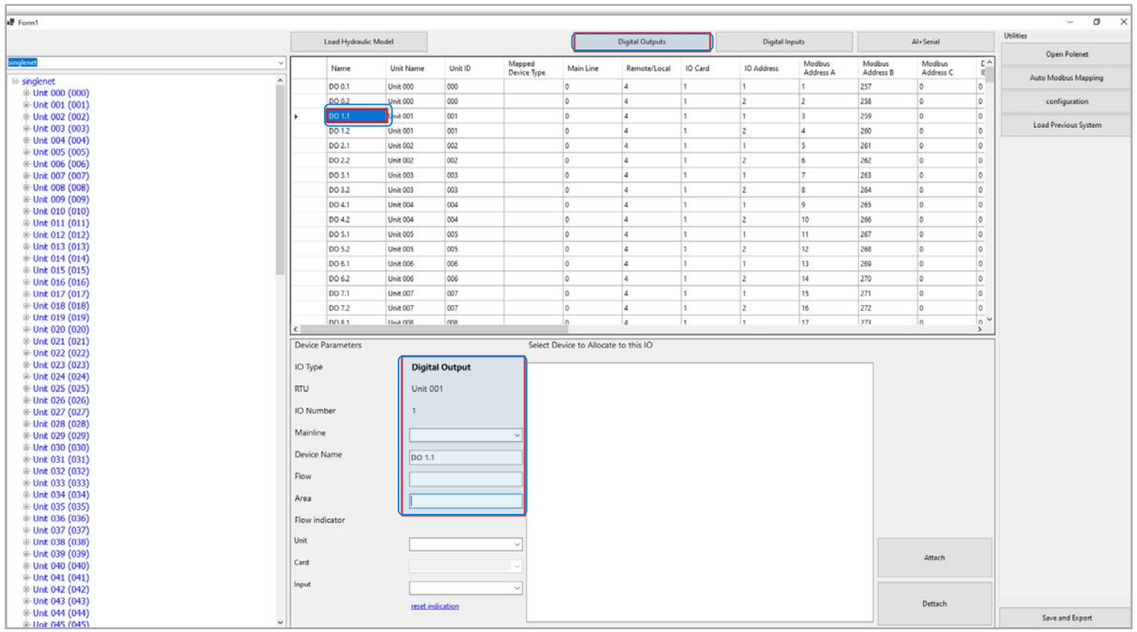
/ Click on “Load Hydraulic Model”, Select Path sdcard >> RemoteSys >> Hydraulic Model.csv & Click on Open



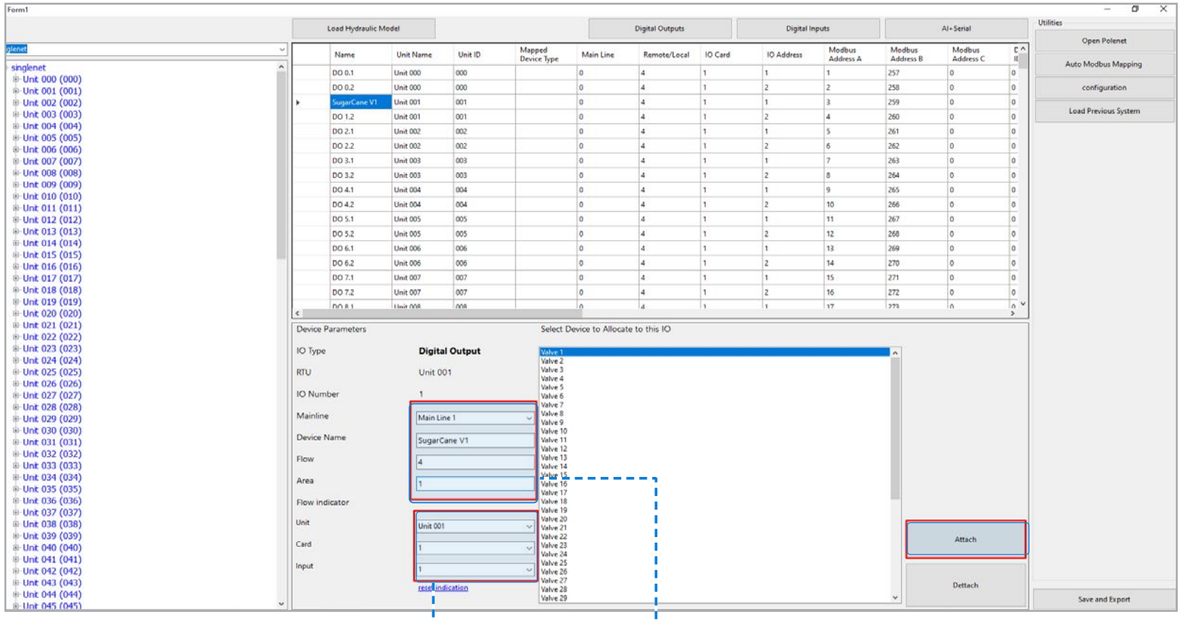
/ Digital Outputs / Inputs can be assigned by selecting relevant Tabs



/ Click on “Digital Outputs” Tab, this will show DOs available on all RTUs



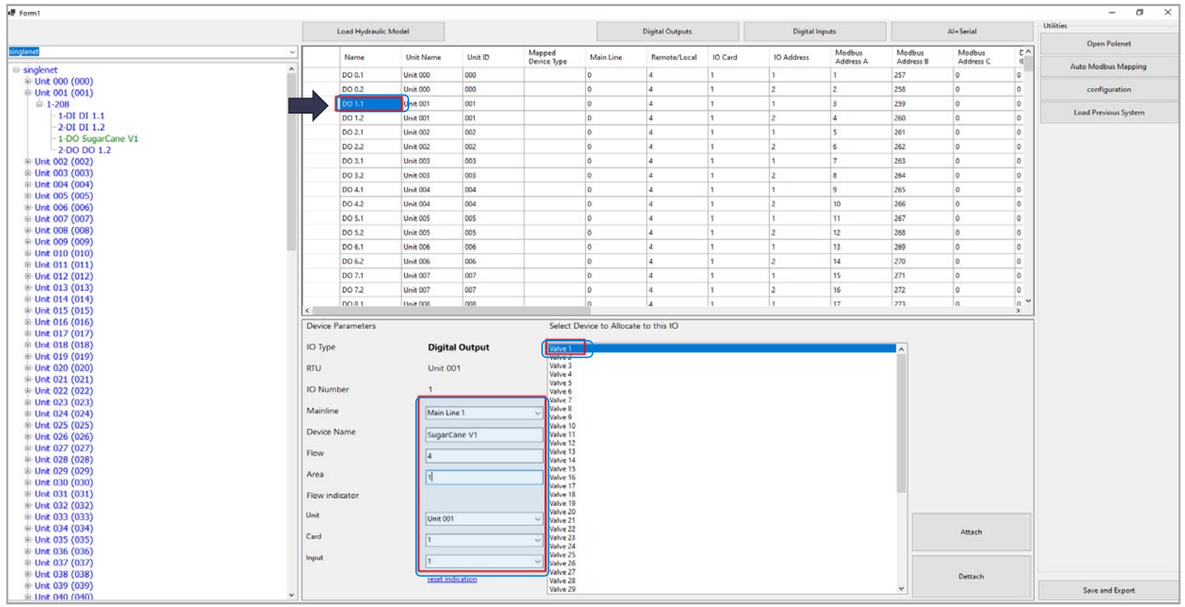
/ Select Device to Allocate IO. Enter Details Device Name , Flow and Area Click Attach



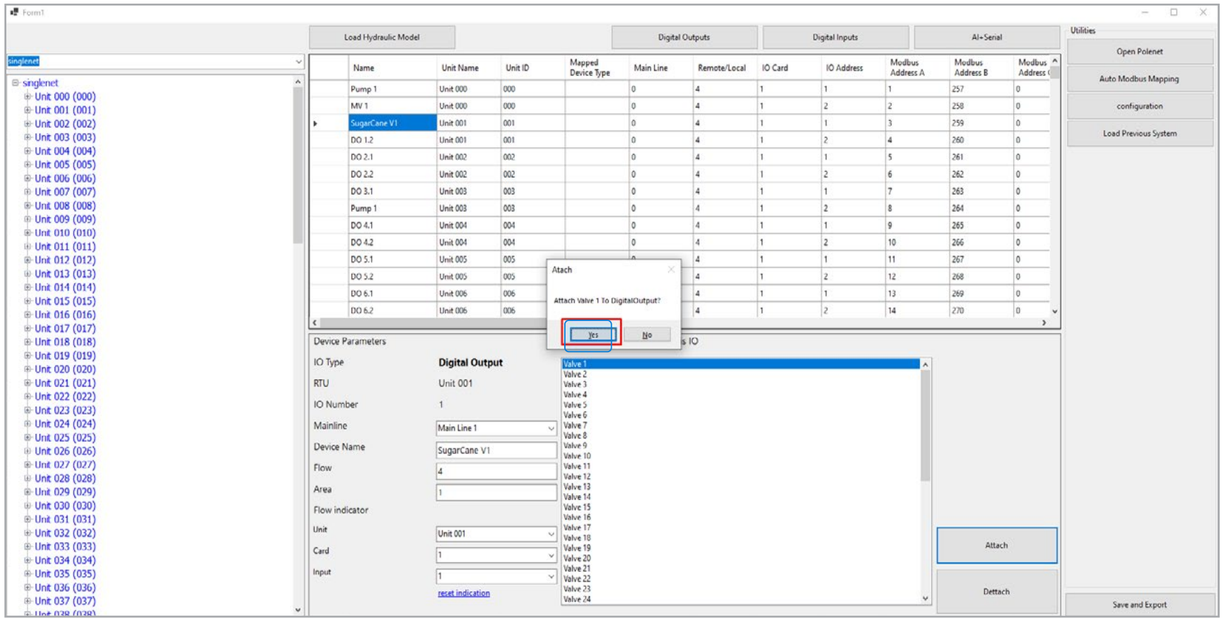
Flow Indicator: Select Unit and Input to which it is connected

Device Name & Details

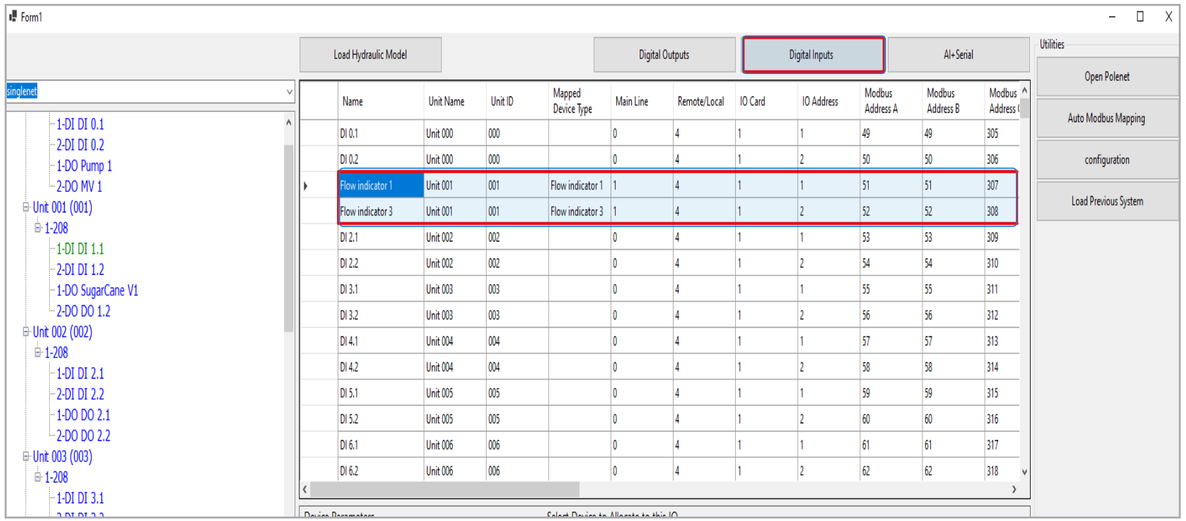
/ Click on any DO. This will open the window below, enter details such as Mainline, Device Name, flow, Area & Flow indicator



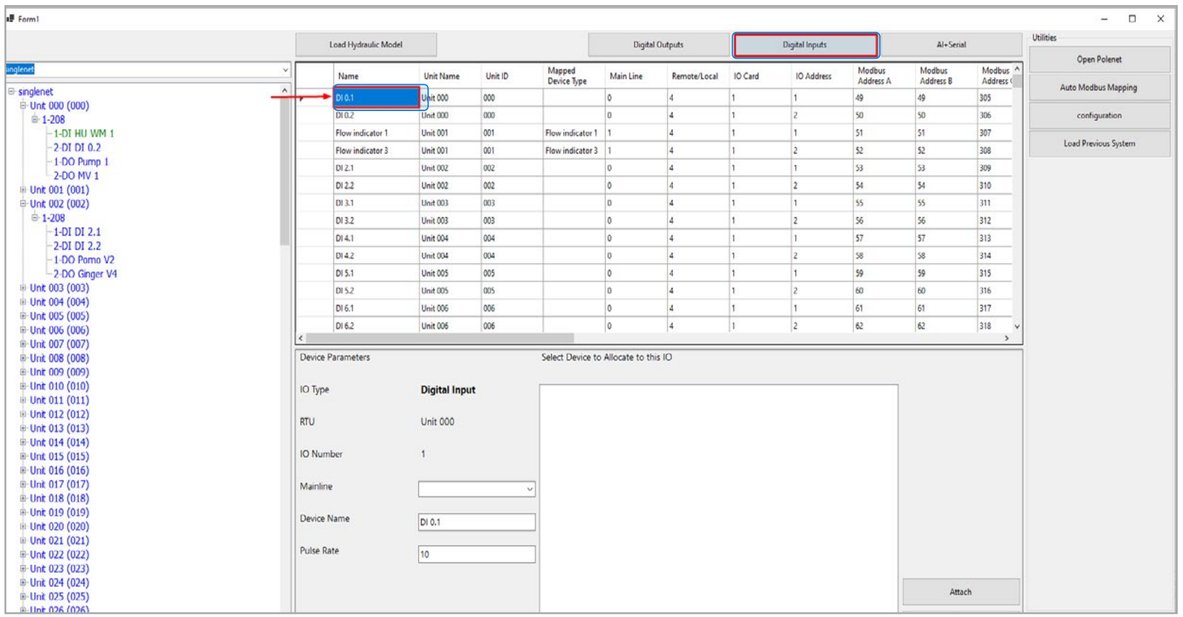
/ A Prompt message will appear, click Yes



/ In Digital Inputs Details of flow Indicator assigned to DO can be seen here

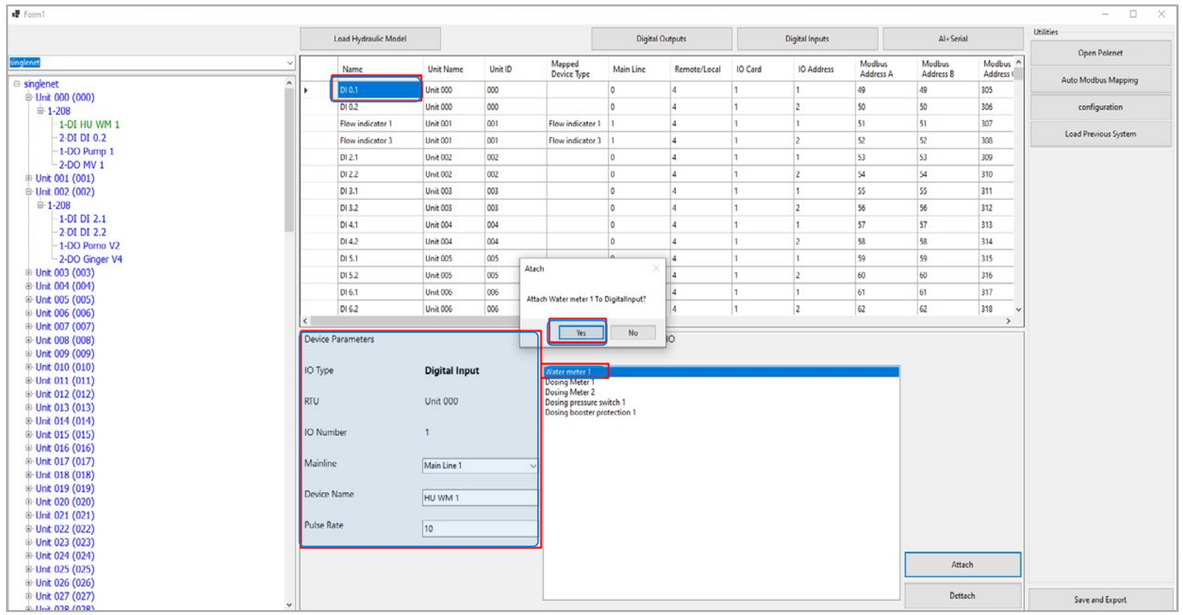


/ If there are Digital Input on RTU, Click on relevant Tab to assign it.

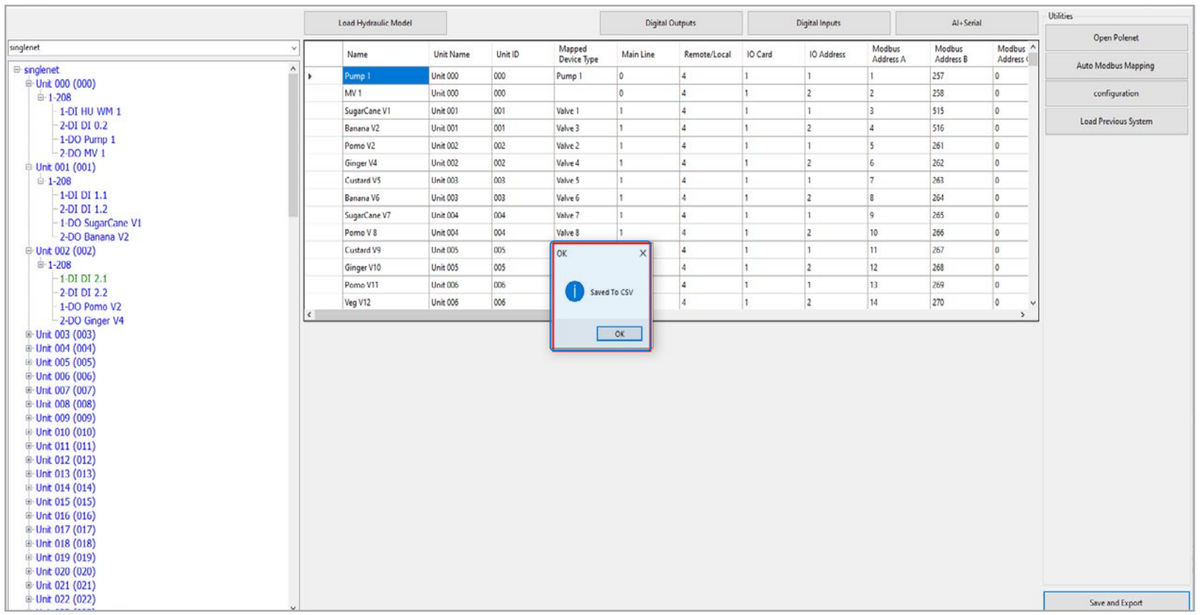


Note:
Flow Indicator Input is not to be defined in Growsphere Hydraulic Configuration anywhere. It is only to "confirm" the Valve is OPEN & there is flow. On Growsphere >> Remote Valves, it will show "P". This facility is only for Valves on RTU

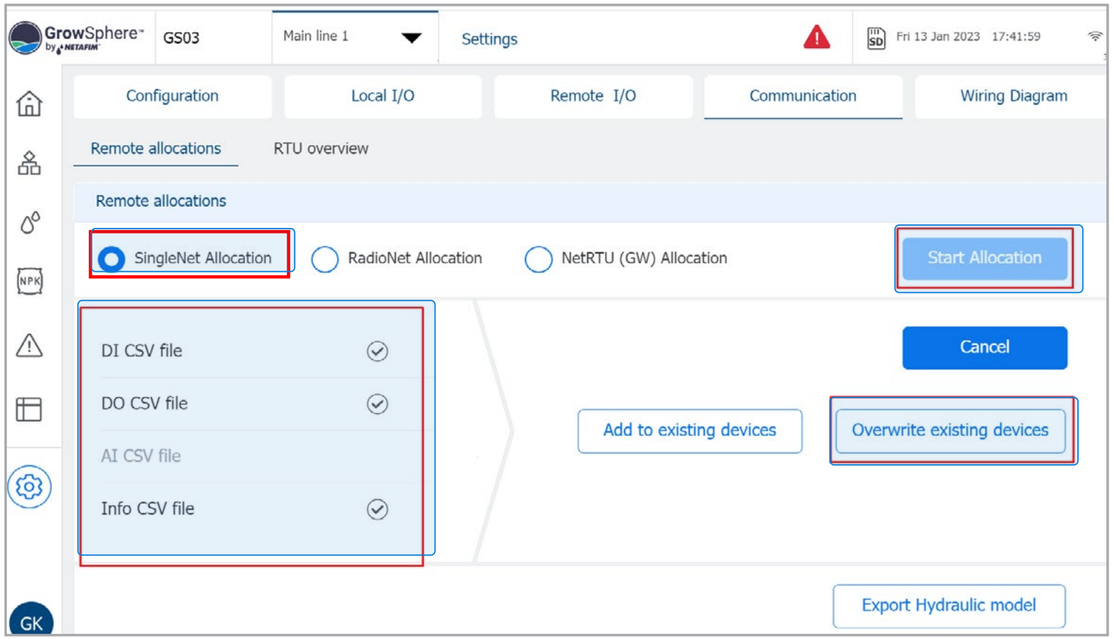
/ Click Digital Inputs Tab and Proceed to add Digital Input, select Mainline, Enter Device name etc, and click Attach Device Name (HU WM 1 here and associated with DI)



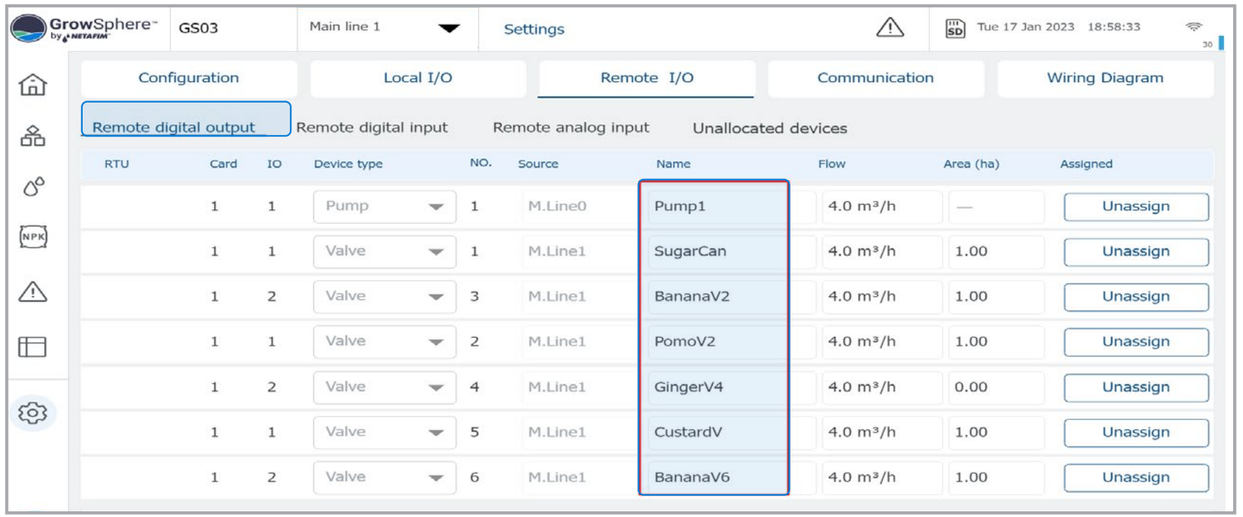
/ After all I/Os devices are assigned, Click “Save and Export “. A message will Appear “Saved to CSV”. Click OK

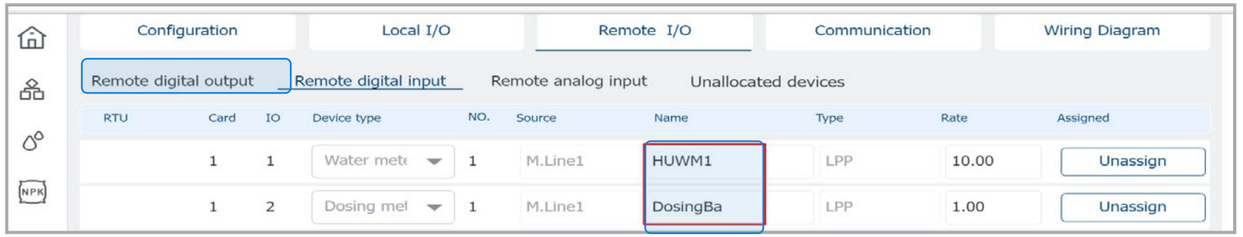


/ Confirm all CSV files are detected. Click on " Overwrite existing devices

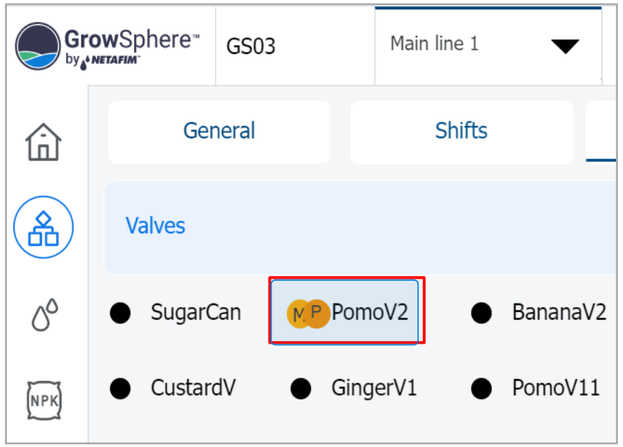


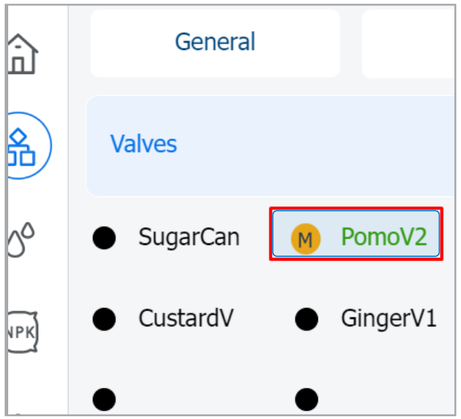
/ Check that all I/O appear

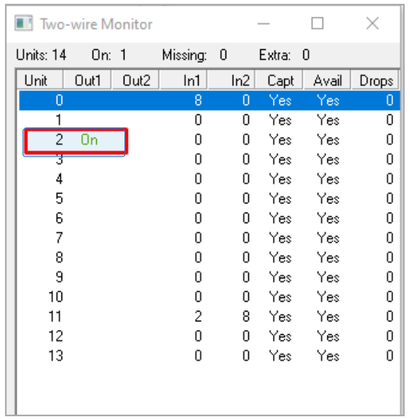




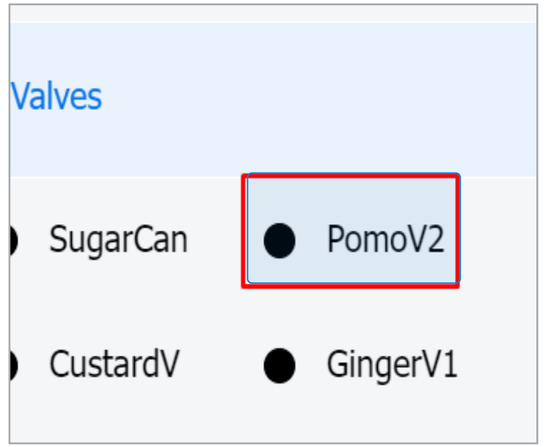
/ To test, Click on Valve, Select Manual-On >>" M"(Manual) & "P"(Pending) will appear. "P" will disappear and Valve will turn Green when Status Changes to ON in PoleNet

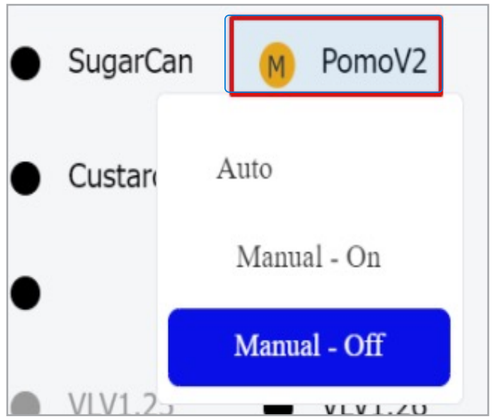






/ To close Valve from UI, click the Valve & Select Auto >> You can see the Valve Status disappears in Polenet and Valve In UI turns Black





Note:

If "Manual –OFF" is chosen, Valve will not open in AUTO mode. Need to Select " AUTO " to make it active. "M" against the Valve is the indication of Manual OFF

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Thank you!