(EN) GROLAB SOFTWARE MANUAL

(ES) MANUAL DEL SOFTWARE GROLAB

(PT) MANUAL DO SOFTWARE GROLAB

(FR) MANUEL DU SOFTWARE GROLAB

GL-MN-0011

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Preface

GroLab is a comprehensive solution for agricultural automation, designed to control and monitor all aspects of a growing environment. This software provides a modular, flexible, and scalable platform suitable for growers of all levels, from hobbyists to professionals. It facilitates precise management of a variety of environmental factors, enabling a more efficient and optimized growing process.

The software integrates seamlessly with the GroLab core module, GroNode, enabling real-time monitoring and control of various devices and sensors. Whether you're managing a small indoor garden or a large-scale agricultural system, GroLab offers the tools needed to automate your grow environment with ease and precision.

If any functionality isn't listed in this guide please enter in contact with us at:

- info@opengrow.pt
- support@opengrow.pt

Print Screens & Images

The details on the print screens may differ depending on the GroLab equipment version, configurations, GroLab Software settings, and even the OS version. The print screens were mostly taken in a simulated environment, which may show erroneous values for some sensors or devices, this is not to be expected in a fully running GroLab System.

Legal Notice

Documentation Feedback

The feedback given by our customers is always important and helps us to improve our GroLab products, services, and software. Suggested improvements, typos, errors, or omissions to the documentation should be reported to:

- info@opengrow.pt

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List of Pictures

1. GroLab Software System Requirements

Before installing the GroLab Software, ensure that your system meets the following minimum requirements:

- CPU: 1.6GHz
- Memory: 1GB
- Disk Space: 1GB
- Operating System: Windows 7, 8, 8.1, 10
- Screen Resolution: 1366 x 768

2. Software Overview

GroLab Software serves as the control hub for your entire system. Its primary purpose is to allow the full customization and configuration of GroLab system according to the specific needs of the cultures being grown. The software offers an intuitive way to automate agricultural tasks, providing easy-to-read data visualizations, historical records, and trends to monitor your culture's progress, real-time control, e-mail notifications, and much more...

2.1. Key Features

- **User-Friendly Interface:** Designed for ease of use, the software provides a simple, intuitive interface with illustrations and wizards to guide users through setup and configuration.

- **Easy Automation:** With a powerful Schedule creation along with highly configurable and intuitive Alarms, the user can achieve high levels of automation with ease. Environment control, automatic irrigation, automatic replenishment and control of feeding solutions, and even security enhancements to avoid floods and others, are some of the centralized automated tasks GroLab can achieve for the user.

- **Security:** Multiple layers of security protect your data. In addition to user credentials, GroLab requires separate credentials for GroNode, the core module, ensuring secure operation. Email notifications are sent via private servers to prevent location tracking.

- **Customization:** Tailor every aspect of your horticultural automated space, from device parameters to sensor configurations. GroLab allows you to export module settings for easy reconfiguration at any time.

• **Remote Control:** When connecting the GroNode to a router with an Internet connection, it allows you to activate the GroLab system's remote control. This feature grants users access from anywhere at any time through an easy-to-use software.

• **Data Logging & Analysis:** Monitor real-time data, export logs, and analyze historical data using the built-in data visualization tools. GroLab makes it easy to track the progress of your plants through their entire lifecycle.

• **Cloud Upload:** GroLab can upload all its data to the cloud for further analysis and long-term storage, allowing the user to gain deeper insights into their cultivation processes.

• **Notifications:** If GroLab has Internet access, the user can receive e-mail notifications for the most various events.

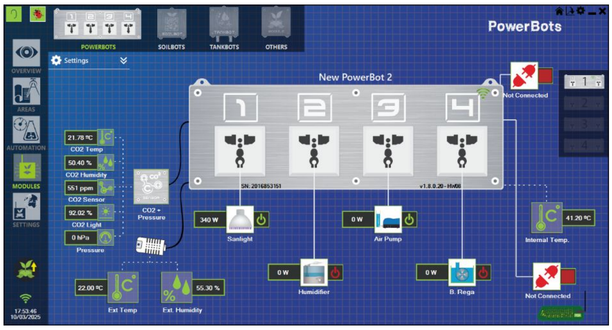


Figure 2-1 – Overview Menu

Figure 2-2 – Modules Menu

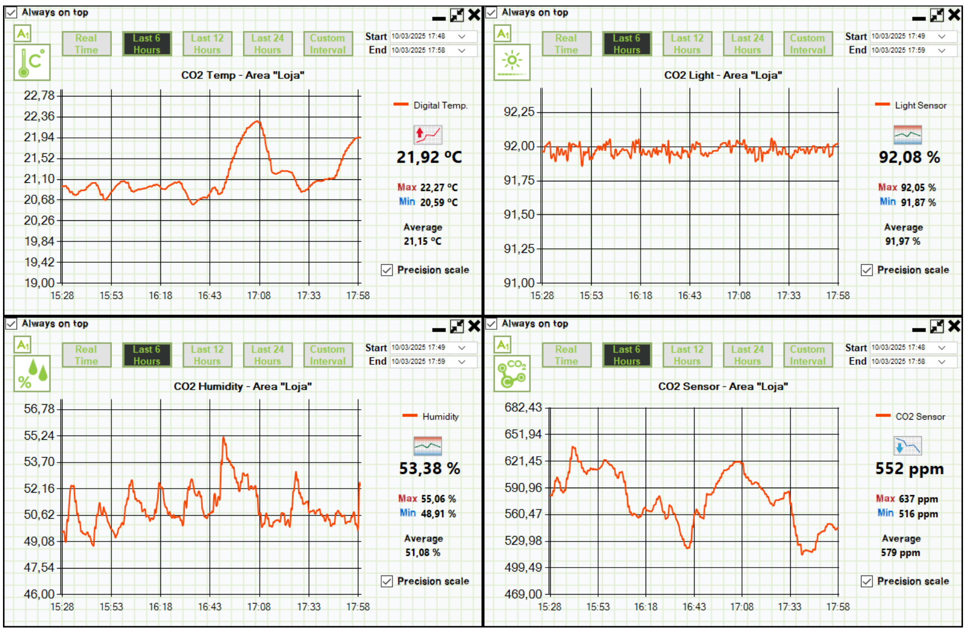


Figure 2-3 – Data Charts

With the use of IP cameras and various data inputs, the user can monitor his horticultural environment through real-time data, such as charts and sensor data exports. GroLab supports integration with third-party devices for cloud data logging, offering a comprehensive solution for advanced data analysis.

The automation tools of GroLab are based on Schedules and Alarms, as the name implies, a Schedule is a timed action, and an Alarm is a conditional action.

With these two tools and their variants, you can achieve high levels of automation for your horticultural system.

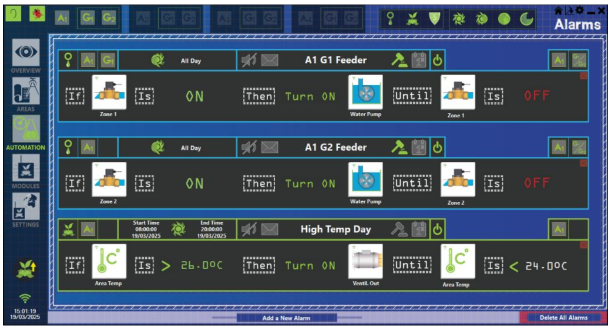


Figure 2-4 – Alarms Menu

Figure 2-5 – Schedules Menu

3. Installation Guide

3.1. Install the GroLab Modules

Before installing the GroLab Software, it is essential to install the required modules. Please consult the installation manual for each module to ensure proper setup and connectivity. These modules may support a wide variety of devices and sensors, such as temperature sensors, lights, pumps, etc. The more modules, sensors, and devices you have, the higher automation level you can achieve.

3.2. Install the GroLab Software

1. **Download** the latest version from: [Open Grow Downloads](). Or use the USB pen provided with your GroLab Kit.
2. **Run the installer** and follow the on-screen instructions.
3. **Launch the software** after installation.

3.3. Automatic Software Updates

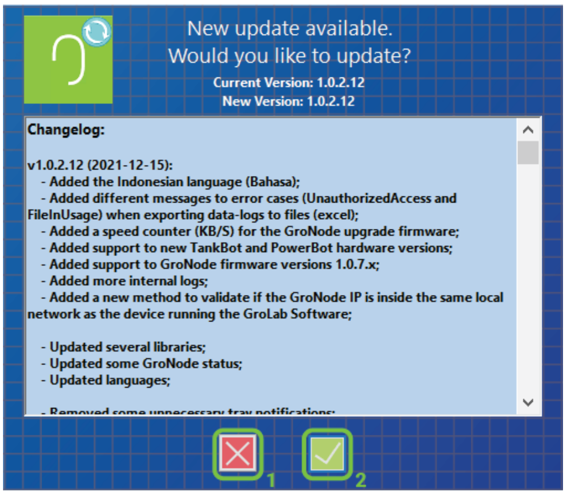


Figure 3-1 – Firmware Update Disclaimer

Upon opening the GroLab Software, it will automatically check for any available updates. If a newer version is found, the user will be presented with an updated disclaimer, along with the change log. The user can choose to accept the update by following the provided steps. If the user decides not to accept the update, they can simply cancel, and the software will proceed to the initial login menu as usual.

Regular updates are essential to keep GroLab secure, stable, and optimized. These updates improve system performance, fix bugs, and apply security patches.

3.4. Initial Configuration

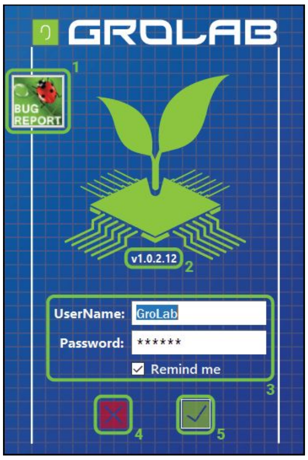


Figure 3-2– Login Window Detail

The initial GroLab Software window can be seen in figure 1. If this is the first run, the software auto-fills the User Name and Password **(3)** with the default ones, **"GroLab"** and **"gogrow"** respectively.

Be aware that all User Name and Password information in the GroLab system are case sensitive. We strongly advise you to change not only the credentials for your GroLab Software, but also for your GroNode.

If you find any type of bug within this software or need any assistance with your hardware modules, just press the "Bug Report" **(1)**, and this will directly send you to our support page.

The software version can be seen on **(2)**, and can also be displayed with a double click in any Open Grow logo you find on the software along with the software disclaimer.

If you don't have any of the GroLab modules, press Ok **(5)**, and then press the "Try Demo Mode", and experience a demo version of our software. You'll be able to create areas, schedules, and alarms for all your horticultural spaces, and understand how the actual system can fit any of your needs.

3.5 Software Settings

At the initial menu, the user can directly access the software configurations. Allowing to change, along with many others of, the software language, the units type, Celsius or Fahrenheit, etc. This button can be found in the top right corner of the Login window **(1)**.

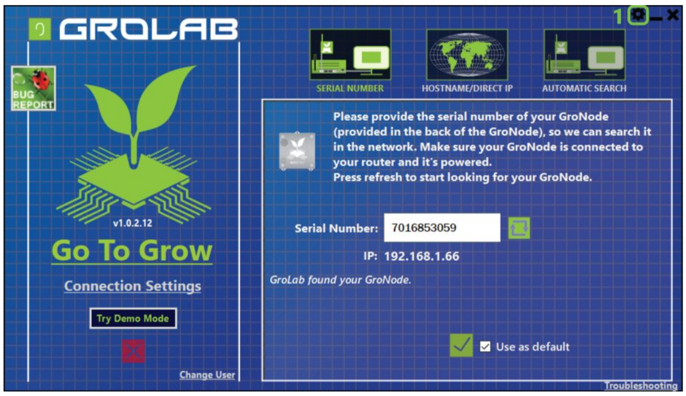


Figure 3-3– Login Window Expanded

Clicking the "Settings" button, **(1)**, will open the GroLab Software settings menu. In this menu, the user can:

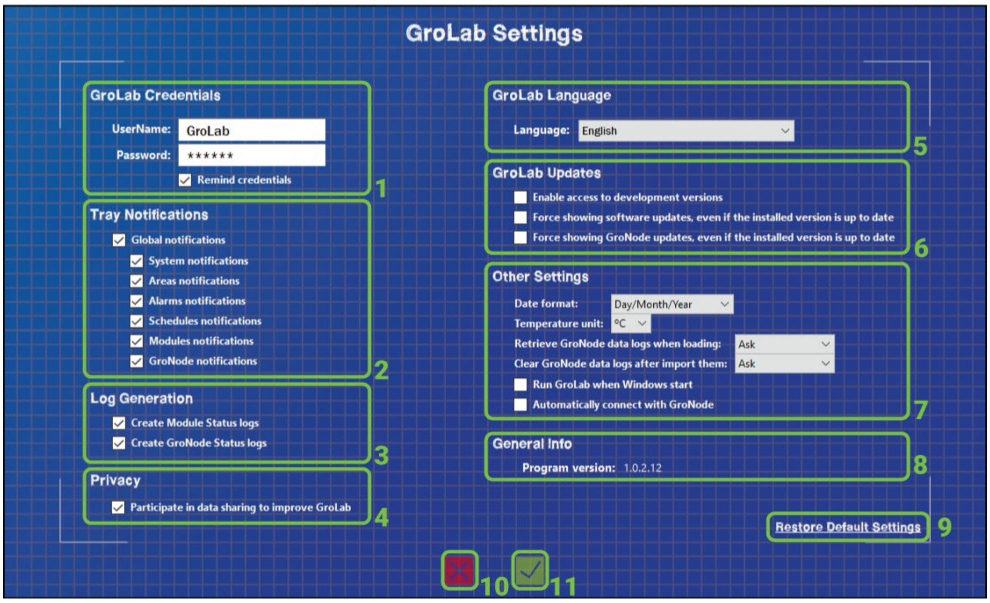


Figure 3-4 – GroLab Settings

- Change GroLab Software Credentials **(1)**
- Configure System Tray Notifications **(2)**
- Enable/Disable Log Generation **(3)**
- Adjust Privacy and Data Sharing Settings (**4)**
- Change Language Settings **(5)**
- Manage Update Settings **(6)**
- Change Date Format and Temperature Units (Celsius/Fahrenheit) **(7)**
- Adjust GroNode Data Log Import Settings **(7)**
- Set GroLab to Automatically start when the Operating System Boots and automatically connect to the predefined GroNode when the software is opened **(7)**
- Current Software Version **(8)**
- Restore Default Settings **(9)**
- Discard changes **(10)**
- Save Changes **(11)**

When operating a real GroLab system, after logging into the software, the first step is to establish a connection with the GroNode module. GroNodes can be discovered through several methods described in the next chapters.

3.6 Search GroNodes

To find a GroNode in a network, the software allows a wide range of connection methods. 3.6.1. Search by Serial Number

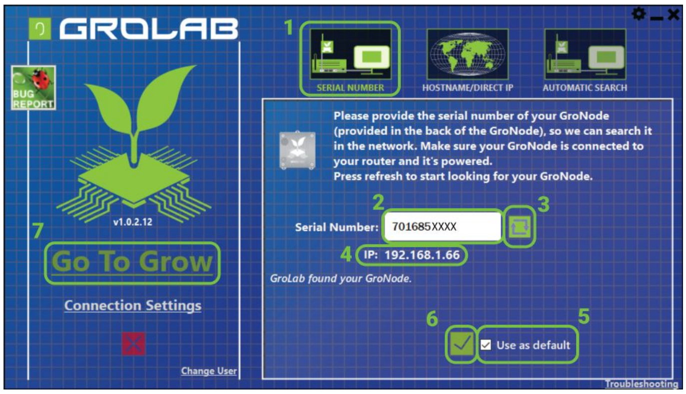


Figure 3-5 – Serial Number Connection

- Select "Serial Number" on the top menu on the right **(1)**
- Insert the Serial Number of the GroNode **(2)**
- Click Refresh to locate the module **(3)**
- If found, the discovered IP will show up here **(4)**
- Tick the checkbox to use as default **(5)**
- Click "Ok" **(6)**
- Click "Go To Grow" **(7)**

3.6.2. Search by Direct IP Address

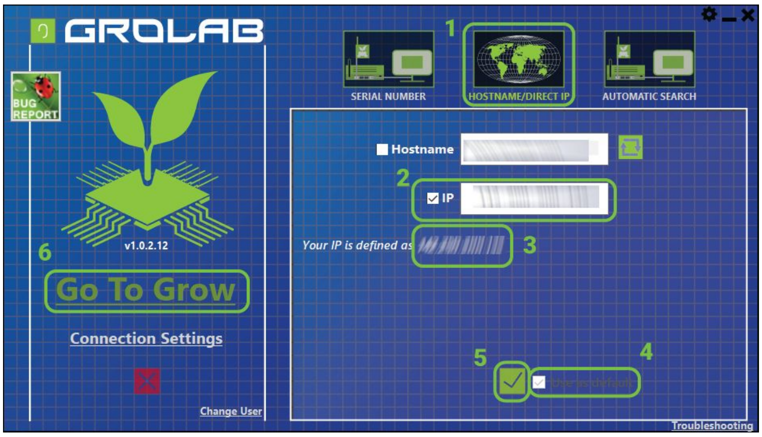


Figure 3-6 – Direct IP Connection

- Select "Hostname/Direct IP" **(1)**

- Select the IP checkbox, **(2)**
- Enter the GroNode local IP address, **(2)**
- Select Set as Default for future connections, **(4)**
- Click “Ok”, **(5)**
- Click “Go To Grow” **(6)**

3.6.3. Search by Hostname

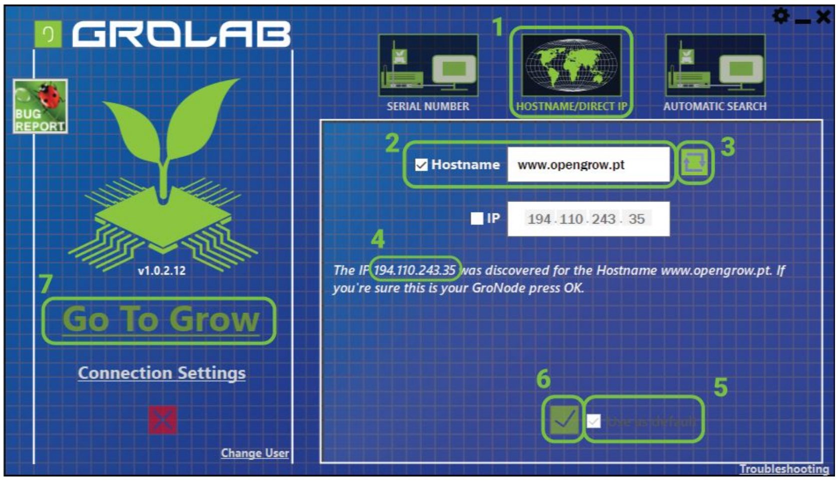


Figure 3-7 – Hostname Connection

- Select “Hostname/Direct IP” **(1)**
- Select the Hostname checkbox **(2)**
- Enter the desired Hostname **(2)**
- Click “Refresh” **(3)**
- Select Set as Default for future connections, **(5)**
- Click “Ok” **(6)**
- Click “Go To Grow” **(7)**

3.6.4. Automatic Search

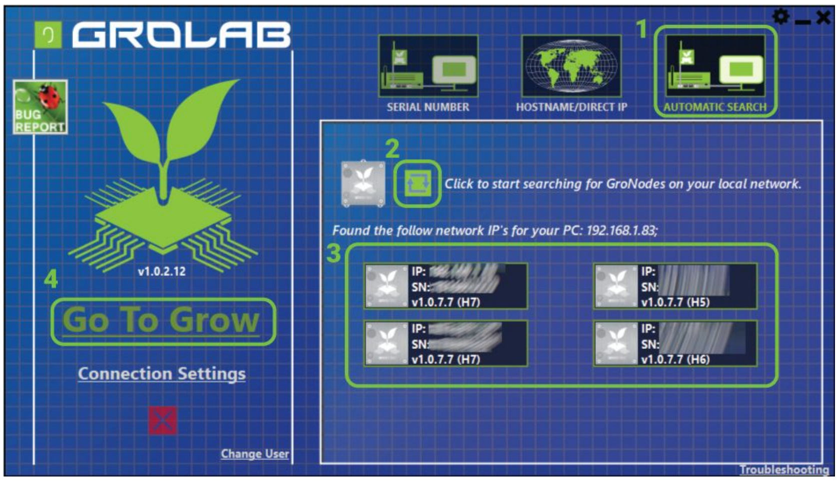


Figure 3-8 – Automatic Search

Ensure GroNode is on the same network as the computer being used, select the Automatic Search menu.

- Select “Automatic Search” **(1)**
- Click Refresh to scan for available GroNode devices **(2)**
- Select your GroNode **(3)**
- Click “Go To Grow” **(4)**

3.7 GroNode Update

After connecting to GroNode, if there’s a firmware upgrade, a disclaimer with the change log will show.

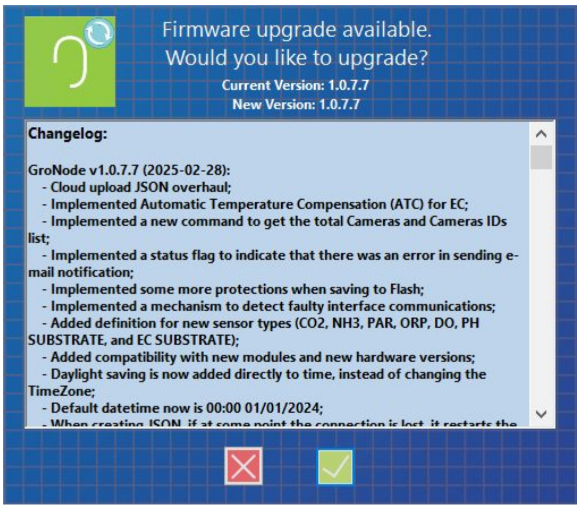


Figure 3-9 – GroNode Change Log

Press Ok to continue with your firmware upgrade, press cancel to skip it. This update should not be performed remotely, as this could lead to connection issues or failures during the update process.

Regular updates are essential to keep GroLab secure, stable, and optimized. These updates improve system performance, fix bugs, and apply security patches.

4. Software Interface Overview

4.1. Top right corner Icons

When connected to GroNode, or using the demo mode, the following buttons are available in the top right corner of both the initial and main menus.

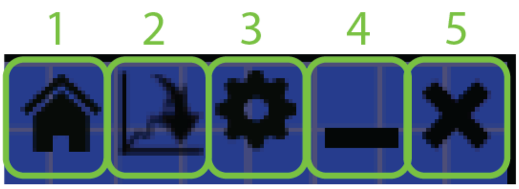


Figure 4-1– Top Right Corner Icons

- Home **(1)** This will revert to the Login Menu of the software, disconnecting from the current GroNode.

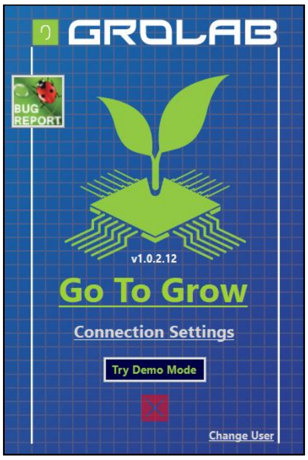


Figure 4-2 – GroLab Home Menu

- XLS Export **(2)** Check the **(2-1)** checkboxes to export only Sensors, Devices, or both. Set the data time span from what you wish to export to XLS in **(2-2)**, and define the name for the file in **(2-3)** and the destination folder in **(2-4)**. Just press ok, and the XLS file will be exported to the destination folder with the defined name.

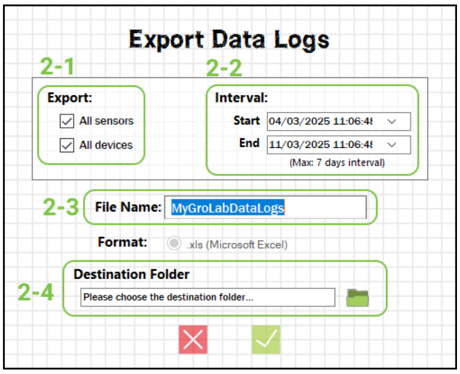


Figure 4-3 – GroLab Export XLS Settings

- Software Settings **(3):** The software settings are described in chapter 3.5.

- Minimize to Tray **(4)**: Minimize the software to the system tray (next to the system clock). This allows the software to continue running in the background.

- Close **(5)**: Closes the software, including all open processes, activities, graphics, and cameras. Everything will be shut down, and the software will be closed.

- Accessing the Software After Minimizing: To reopen the software after minimizing it to the system tray, double-click the GroLab icon in the system tray. If you right-click the icon in the system tray, a menu will appear with the following options:

    - Open – Open the software
    - Settings - Access the software settings
    - About GroLab - Access the software's "About" section,
    - Exit – Closes the Software.

4.2. Main Menu

The main menu can be found on the left lateral of the software. This menu is the main navigator for the GroLab visualization and configuration options.

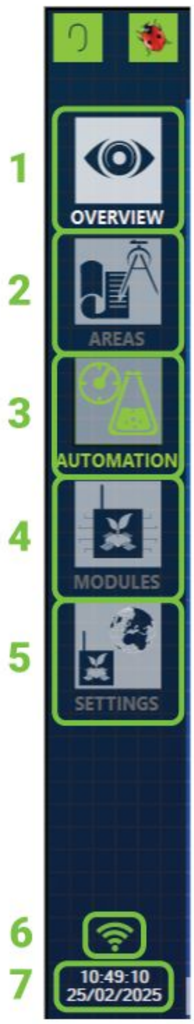


Figure 4-4 – Main Menu

- **Overview (1):** General overview of areas and grows, with access to real-time data of sensors and devices, charts, and IP cameras, as well as information on whether it is day or night in the area, the total number of days for the area and grow, and total power consumption.
- **Areas (2):** Create, delete, or configure areas and grows.
- **Automation (3):** Divided into two parts: Schedules and Alarms. Allows to create, configure, and view both schedules and alarms.
- **Modules (4):** Manage connected devices and sensors for each module. This section offers a realistic representation of modules, making it easier to assign sensors and devices intuitively. Modules are categorized by type: PowerBots, SoilBots, TankBots, and Others. Each type supports up to 4 modules.
- **GroNode Settings (5):** Configure GroNode settings, including the name of the GroNode, credentials, date and time (manual or automatic via the internet), and email notification settings.
- **Connectivity (6)**: Green icon if the software is connected to GroNode. Yellow icon, if there's no communication with GroNode.
- **Date/Time (7)**: The current date time that is set in your GroNode.

5. GroNode Settings

Before setting up areas or any automation, it is essential to first configure the GroNode, access the menu Settings **(5)**.

There is a horizontal tab that gives the user access to the different GroNode Settings.

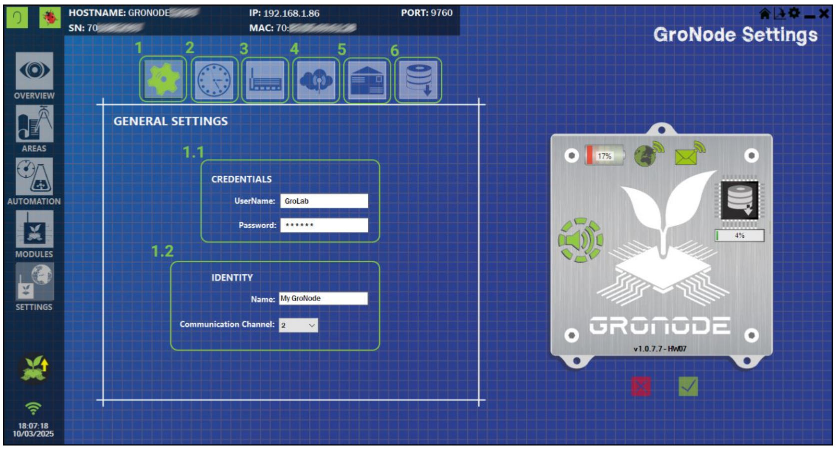


Figure 5-1 – GroNode Settings Menu

- General Settings **(1)**
- Clock **(2)**
- Network **(3)**
- Cloud Upload **(4)**
- E-Mail Notifications **(5)**
- DataLog **(6)**

5.1. GroNode General Settings

The credentials for GroNode can be configured in panel **(1-1)**. Here the user can define the User Name and Password for his GroNode. All GroNodes are shipped with the default credentials User: “GroLab”, Pass: “gogrow”, we advise to changing this password on the first usage.

If the user has several GroNodes in the same network, they can be named differently to help identify them **(1-2)**.

In this menu the user can also change the communication channel, this channel defines what modules register on this GroNode, and only modules in the same communication channel can communicate between them. This means that in the same physical space, the user can have up to 5 different GroNodes running, with 5 different communication islands with no interference.

5.2. Clock Configurations

GroNode has its own internal clock, this clock can operate in two different modes, Manual or Online.

5.2.1. Manual Clock

As the name implies, in Manual, the Date and Time is defined by the user, if the GroNode is powered down in this mode, the clock will be reset to the origin, 01-01-2024-00:00:00. To avoid this, install the coin cell battery provided with your GroNode. Ensuring that even in a power-fail event, the clock will keep running.

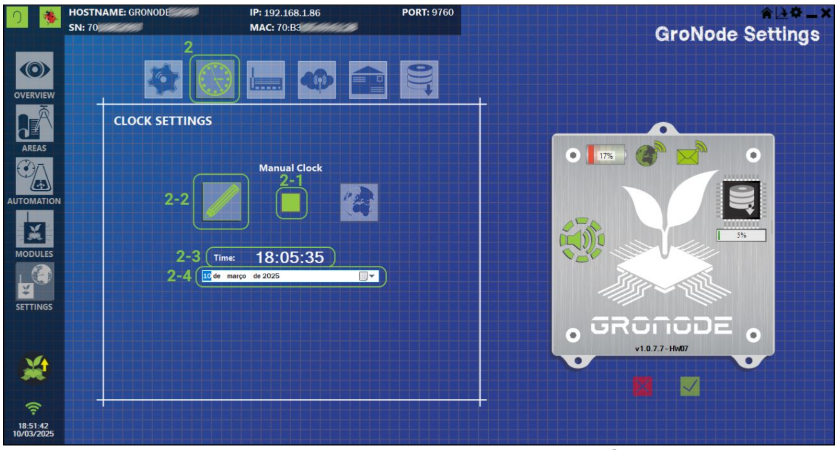


Figure 5-2 – GroNode Manual Clock Configuration

To select the manual mode just press **(2-2)**, then set the correct time by clicking on **(2-3)** and the correct date in **(2-4)**, once you save the configuration, your clock will be set to the date/time defined.

The indicator **(2-1)** provides the status of the clock, green means everything is configured and working, red means some configuration is missing, or the clock is at the default time.

5.2.2. Online Clock

If your GroNode has internet access, it’s best to activate the Online clock configuration.

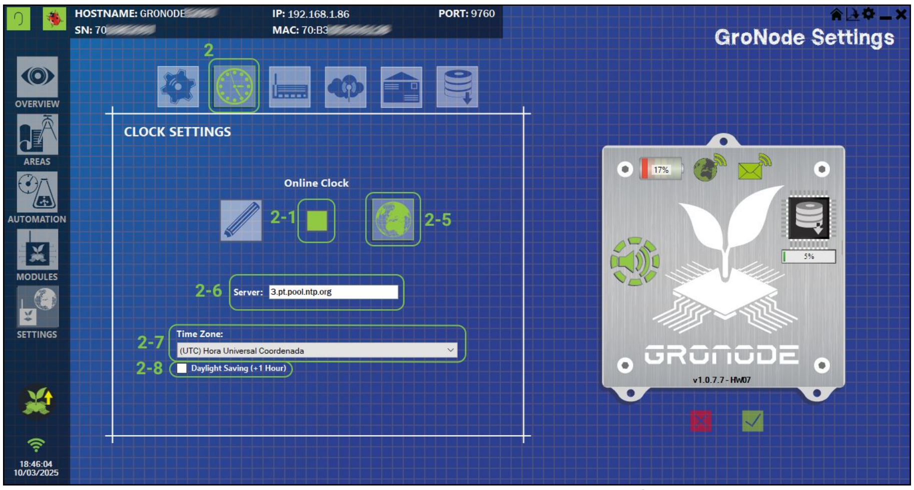


Figure 5-3 – GroNode Online Clock Configuration

To achieve this, press **(2-5)**, set your NTP server on the **(2-6)** field, set your desired Time Zone on **(2-7)** and if the Daylight Saving is active, just tick the box on **(2-8)**, this will add one hour to your current time.

Once you are over, save the new configurations, and if everything is correct, GroNode should fetch the new Date Time from the web and update its own clock. The indicator **(2-1)** will show if all the configurations are correct.

5.3. Network Configurations

GroNode is connected to a Network via an Ethernet cable.

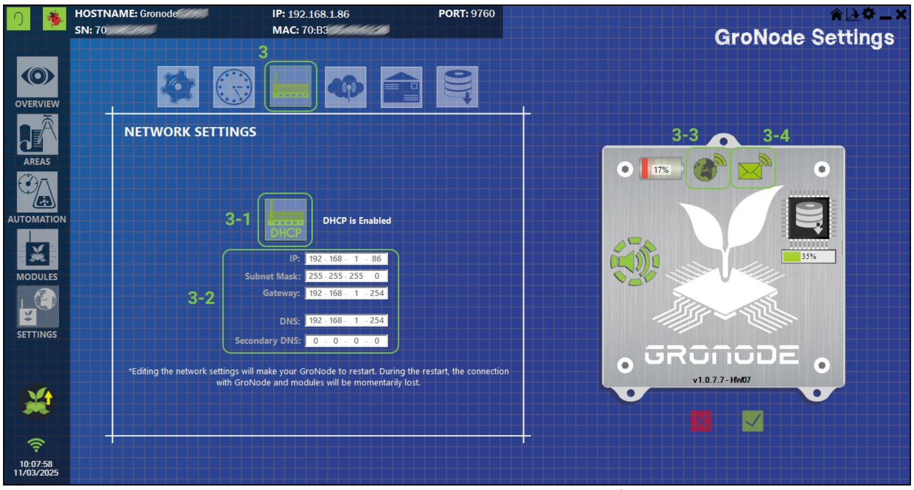


Figure 5-4 – GroNode Network Configuration

5.3.1 DHCP Enable

There are two main ways to configure your network configurations, if DHCP is active **(3-1)**, make sure your GroNode is connected to an equipment capable of assigning network configurations via DHCP, this is the default configuration, and the most common, where you just connect your GroNode to a router, and it will automatically get an IP and all the necessary network configurations. The configurations that were attributed to the GroNode can be seen in (**3-2**).

5.3.2 DHCP Disabled

If DHCP is disabled, this means the user needs to insert all the necessary correct network configurations in all the fields present in **(3-2)**. Make sure you set the correct configurations before saving, otherwise, you might lose connection to your GroNode.

If for some reason the GroNode was saved with incorrect configurations, and you can't access it, you can set its configuration to default by resetting the GroNode, while keeping the "Net Reset" button pressed until the GroNode blinks Purple. GroNode will reboot, local IP is set to 10.0.0.101 and the DHCP is set to active.

The indicator in **(3-3)**, if green, it means GroNode has Internet access, if the **(3-4)** indicator is green it means GroNode has access to the E-mail server and is ready to send E-Mail notifications.

5.4. Cloud Configurations

The GroLab system allows you to periodically upload grow data to the cloud for further analysis. This feature is especially useful for users who want to keep track of their grow environment over time, analyze trends, and make data-driven decisions to optimize plant growth.

To enable this feature, your GroNode must be connected to the internet. Once connected, the system will upload your grow data in **JSON** format, but this must be configured manually in the GroLab Software. **JSON (JavaScript Object Notation)** is a lightweight data-interchange format that is easy to read and write, making it ideal for transferring data between systems. This allows for efficient and accurate data storage in the cloud, where it can later be analyzed for insights. To activate this feature, access the "GroNode Settings" menu, click on the cloud upload tab configuration, **4**. And configure the respective parameters.

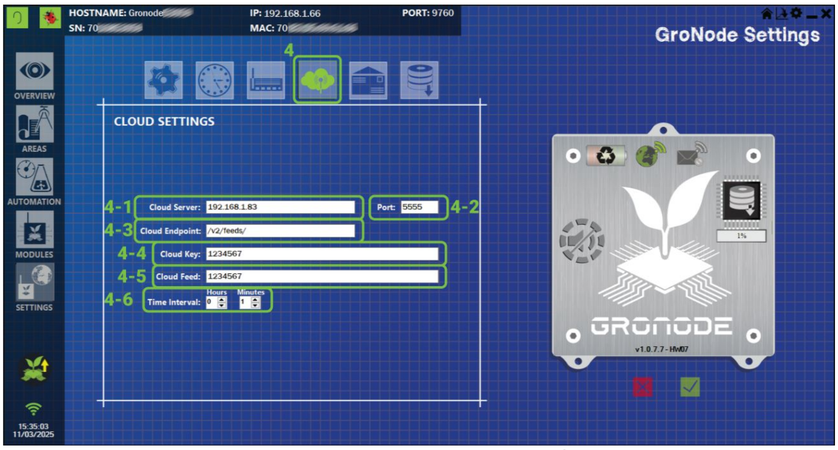


Figure 5-5 – GroNode Cloud Configuration

- Cloud Server the server's IP **(4-1)**
- The server's port **(4-2)**
- The path identifier for the data (feeds path) in the remote server **(4-3)**
- The API key/password; **(4-4)**
- The identifier of the data **(4-5)**
- The time interval between each upload. **(4-6)**

Since these **fields should be configured in accordance with the server** that will be used to receive the data, we can't provide the exact configuration for each scenario. In the case shown above, the remote server resides on IP 192.168.1.83 on port 5555.

For the majority of the cases just filling the Cloud Server and the Port fields with the remote server's IP and port, is enough to start receiving the data on the server.

5.4.1. How Cloud Upload Works

After you have enabled cloud upload and completed the configuration, the GroNode will send data to the cloud at the specified interval. The data uploaded includes:

- **Areas & Grows**: all the information regarding the Areas & Grows configured in GroNode.
- **Modules & Sensors**: all the information from all the available modules in the system.
- **Alarms**: All the alarms configured on GroNode.
- **Schedules**: All the schedules configured in GroNode and their current state.

The uploaded data is formatted in **JSON**, which is easy to parse, store, and analyze for future use. This ensures the data is organized and available for further insights.

Key Terms

- **JSON (JavaScript Object Notation)**: A lightweight data format used for storing and transferring data between systems. It is human-readable, easy to write, and easy for machines to parse, making it ideal for cloud storage and data transfer.
- **Cloud Service Provider**: A company or platform that provides cloud storage services for data management, such as Amazon Web Services (AWS), Google Cloud, or Microsoft Azure. These platforms offer secure and scalable environments for data storage and analysis.
- **Cloud Data Upload**: The process of sending data from your local system (GroNode) to a remote cloud service for storage, analysis, and future use.

For a more detailed description of this functionality please refer to document ***GL-MN-0010-GroLab-Cloud-Upload-Guide.pdf.***

5.5. E-Mail Configurations

GroNode has the ability to send e-mail notifications. The type of E-Mail to send can be defined in the menu presented below.

To enable the general notifications, the user needs to insert a valid e-mail and tick the checkbox "Enable notifications" **(5-1)**.

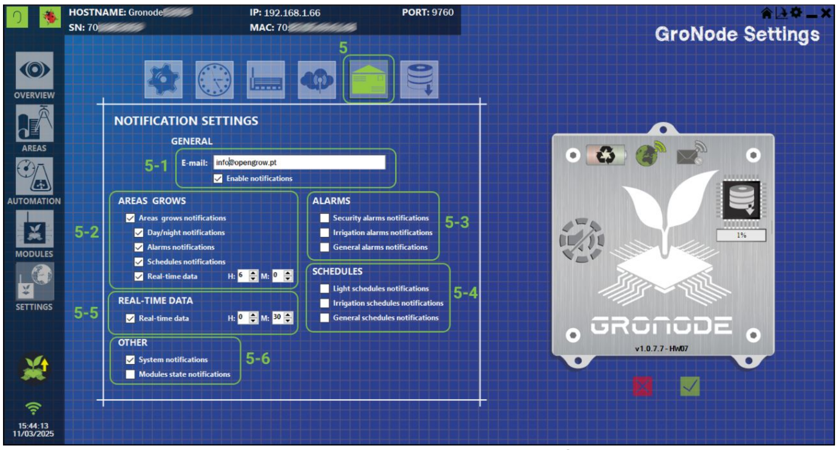


Figure 5-6 – GroNode E-Mail Configuration

If an Alarm or Schedule does not belong to any Area, and you want to receive emails regarding this automation process, you need to tick the correct checkboxes in **(5-3)** and/or

(5-4), along with setting the Green Envelope for each and every Alarm/Schedule you want to receive an email.

Real-time data, **(5-5)**, sends you a periodic email with the status of every module, sensor, and devices present in the system. Tick the checkbox, set the desired time interval, and you should start receiving a recurrent e-mail with this information.

If you wish to receive an e-mail every time the GroNode reboots, just tick the system configurations check box **(5-6)**, this will also send you an email for all modules that are offline after a reboot. If you wish to receive an e-mail every time a module loses communication, reconnects, or connects for the first time just tick the checkbox “Modules State notification” **(5-6)**.

5.7. Data Log Configurations

In order to register all the actions happening in your growing Areas, GroNode is able to create a Data Log register for each of these events. This means you can shut down your software so that GroNode will register any changes that happen in your growing environment.

Once the software is re-opened, all of these registers are downloaded and added to the software database, allowing you access to your data charts.

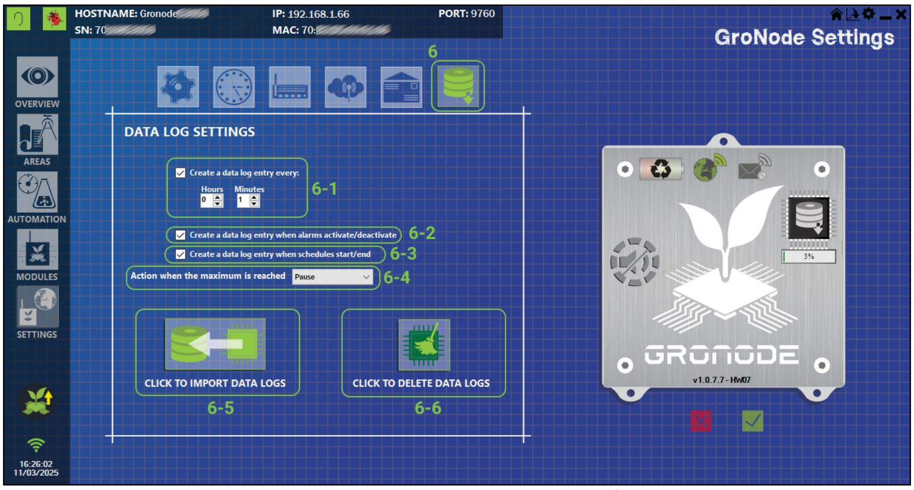


Figure 5-7 – GroNode DataLog Configuration

- Interval time to force a datalog, note that the shorter times of registers, will fill the internal GroNode memory faster, recommended time is 5 minutes **(6-1)**
- Create a datalog when an Alarm changes state **(6-2)**
- Create a datalog when a Schedule changes state **(6-3)**

- Defines what happens when your memory gets full, there are two options, Pause, which stops all new datalogs and waits for the user to download the current data and clear the memory. The option Remove all, which clears the memory every time it gets full, and continues with the normal datalog entry **(6-4)**

- Allows you to download all the current datalogs stored in GroNode **(6-5)**

- Allows you to fully clear the memory, make free space for new datalog registers **(6-6)**

6. Modules Menu

In the Modules menu, you can manage and configure all devices and sensors connected to your GroLab system. Each module is presented visually with a realistic representation of its components, making the configuration process intuitive and easy.

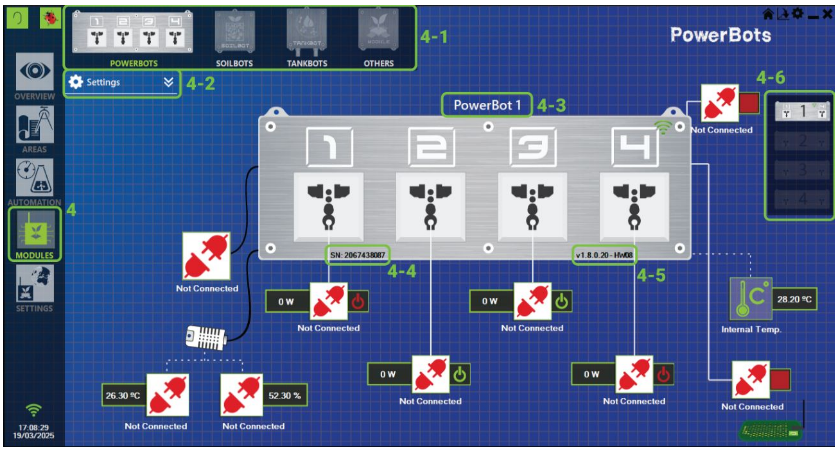


Figure 6-1 – Modules Menu

The top left menu, **(4-1)**, shows you the different types of modules in your GroLab system. For each type, GroNode can support up to 4 different modules, to switch between them use the menu on the right, **(4-6)**.

You can always find the serial number for the respective module, **(4-4)**, along with the firmware and hardware version, **(4-5)**.

There's a drop-down menu related to the module settings, **(4-2)**, that gives you access to details and configurations related to the module in question.

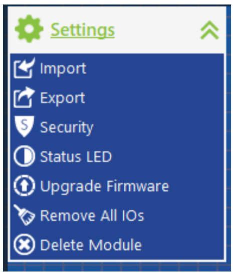


Figure 6-2 – Module Settings Menu

• In this menu, you can **export** the full configuration of the module to a file, you can also **import** a previous configuration file to the module.

• **Security** defines how much time the module waits to shut down all outputs once it loses communication with GroNode. You can define what time is necessary without communications to shut down all outputs, or even define that you don't want to shut down any outputs, leaving the module outputs in the current state when it loses communication.

• **Status LED** defines the blinking time for the module LED when the module is not registered in a GroNode, and it also allows you to fully shutdown the LED on the module if necessary.

• **Upgrade firmware** looks for new updates and allows you to reinstall the current version of firmware or the latest.

• **Remove all IOs** sets all the inputs and outputs on the module to "Not Connected".

• **Delete Module**, deletes the module from the GroNode memory.

6.1. Sensors & Devices

When a module registers in GroNode, all the available sensors and devices are set to "Not Connected", the first step of the User is to define what sensors and devices are connected and in which sockets.

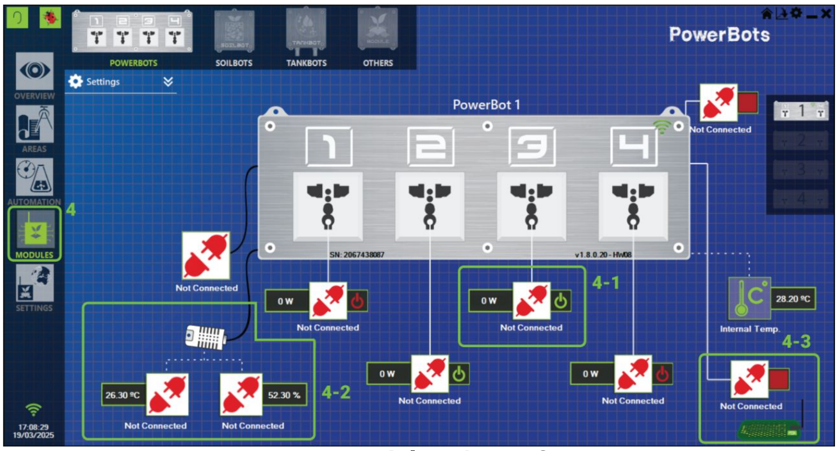


Figure 6-3 – Module IO's Configuration

The outputs are identified by the power icon next to the output icon, along with the power consumption, **(4-1)**.

Figure 6-4– Output Description

- Device type, **(1-1)**
- Manual Control (Red device is OFF, Green Device is ON), **(1-2)**, click to change output state**.**
- Device Power, **(1-3)**
- Device name, **(1-4)**

Inputs, if digital are represented by a green/red square next to the input Icon, **(1-2)**, if numeric, the respective value is displayed next to the sensor icon with the correct unit, **(1-2).**

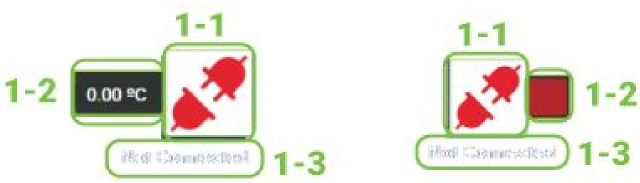


Figure 6-5– Inputs Description

- Sensor type, **(1-1)**
- Sensor Value/State, **(1-2)**
- Device Name, **(1-3)**

6.2. Sensors Configuration

To configure a sensor, the first step is to click the “Not Connected” icon **(1-1)** on the respective input of the respective module, and a new menu is shown.

In the sensor menu press again the “Not connected” icon, **(2)**.

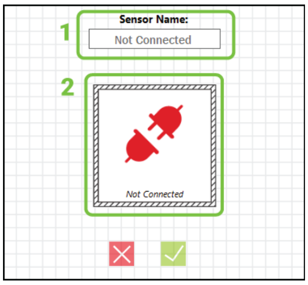


Figure 6-6– Input Initial Menu

The software will automatically show you the possible sensors to connect to the specific input socket your are editing. In the case below on the left it’s the humidity sensor for PowerBot, no other sensors can connect to this specific input. The image on the right, reflects all the possible switch sensors able to connect on the PowerBot switched input.

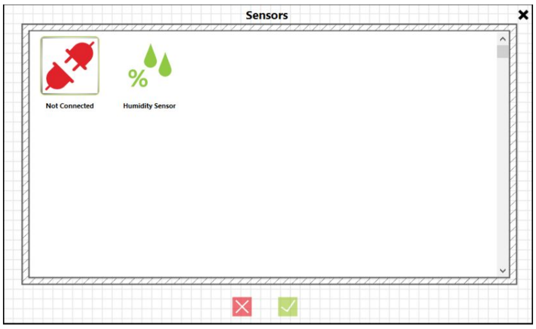


Figure 6-7– Sensor Type Menu

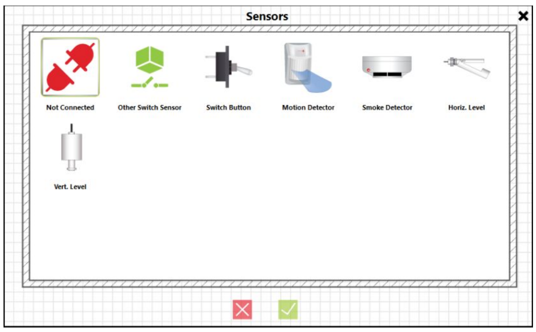


Figure 6-8– Switched Sensor Type Menu

After selecting the correct sensor, the last step is to set its name, **1**. Make sure you give unique names to your sensors, so you can better identify them when building your growing Area.

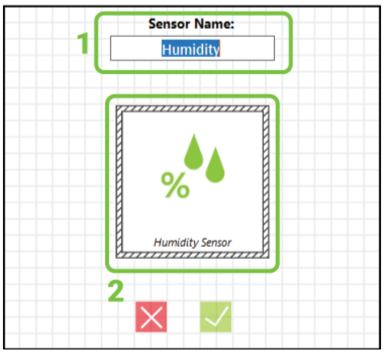


Figure 6-9 – Analog Sensor Configuration

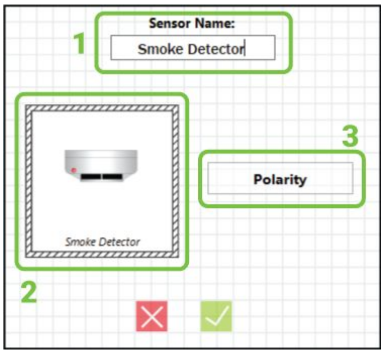


Figure 6-10 – Digital Sensor Configuration

For the Digital Sensor configuration, the user can also change the polarity of the switch. This can be done by pressing the Polarity button, **3**.

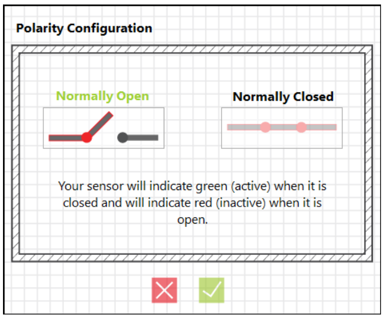


Figure 6-11 – Normally Open Polarity

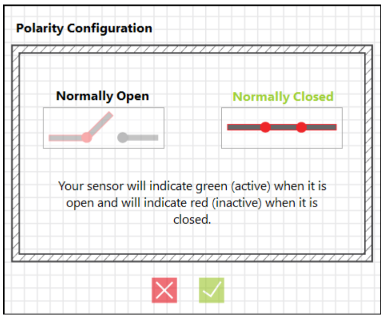


Figure 6-12 – Normally Closed Polarity

As described in the polarity menu, your sensor will indicate green (active) when it's open and red (inactive) when is closed if you are using the Normally Open configuration, the reverse will happen, green (active) when is closed, red (inactive) when is open.

This configuration is always set to Normally Open by default and can be configured for any switched input in any module.

6.3. Sensors Calibration

There are module sensors that require calibration, more specifically the pH and EC probes compatible with TankBot and TankBot Plus, and the substrate moisture probes in SoilBot.

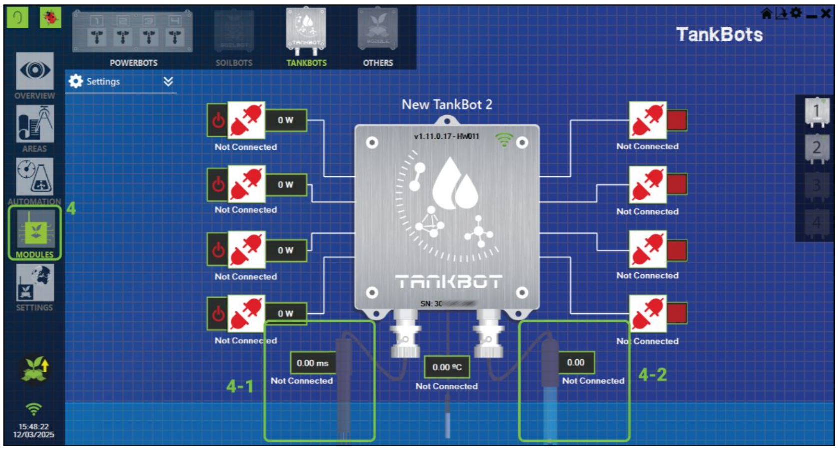
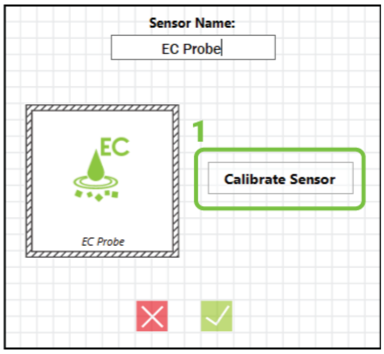


Figure 6-13 – TankBot Modules Menu

To have access to the calibration for these probes, first, you need to configure them with the respective types. Just click on the probe you wish to configure in the Modules menu, **(4-1)** and **(4-2).**

TankBot supports both water or soil probes for pH and EC. The calibration process is the same for both variants. Set the desired type to the respective inputs, with the desired name.



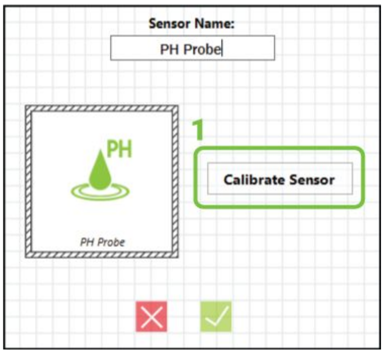


Figure 6-14 – EC Probe Configuration

Figure 6-15 – pH Probe Configuration

Once this is done, press the calibration button, **(1)**.

6.3.1. Calibration EC Probe

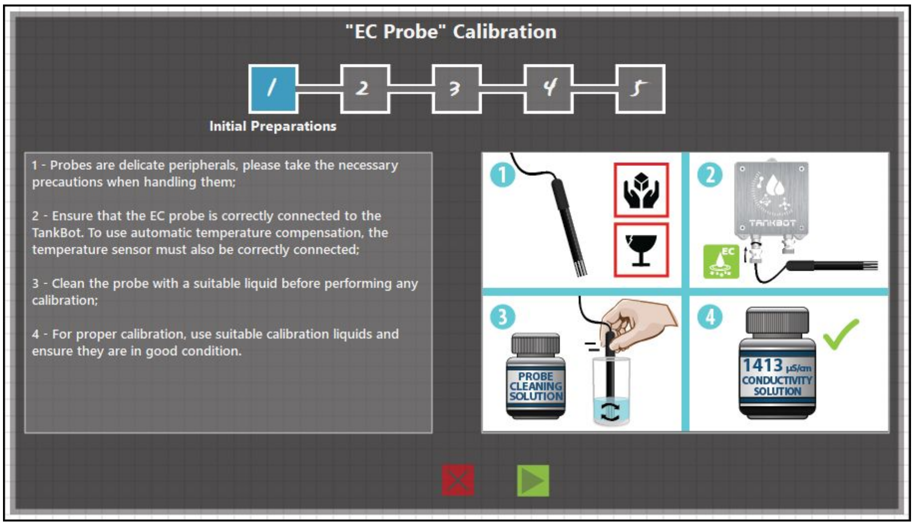


Figure 6-16 – EC Probe Calibration Step 1

The EC probe calibration is presented in the form of a wizard, the first step is to ensure the probe is properly connected to GroNode, clean, and you have the necessary 1413us solution for calibration.

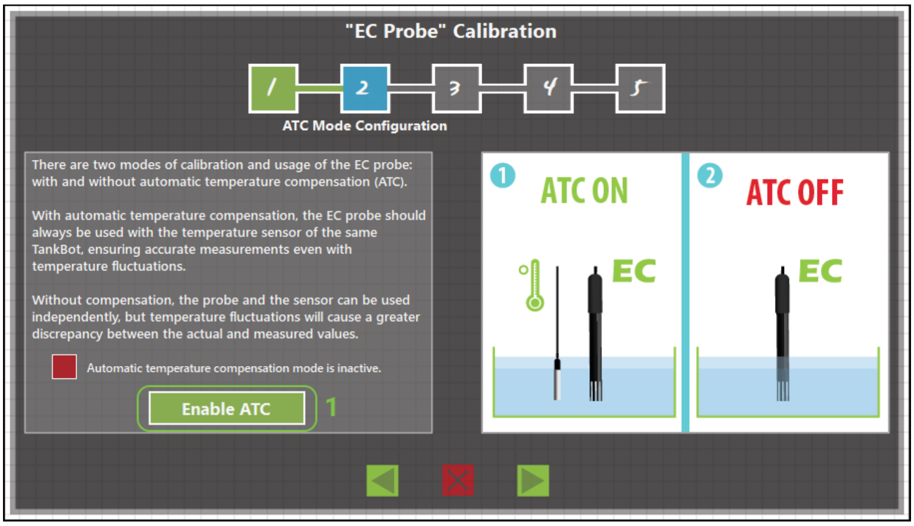


Figure 6-17 – EC Probe Calibration Step 2

EC is highly dependent on the solution temperature, in this way, you can perform the calibration with Automatic Temperature Compensation (ATC) or without.

To activate the ATC, just press the Enable ATC button. From this moment, whenever the wizard asks you to put the probe in the calibration liquid, the temperature probe must be also put in the same solution. If the ATC is disabled, only the EC probe needs to be submerged in the calibration liquid.

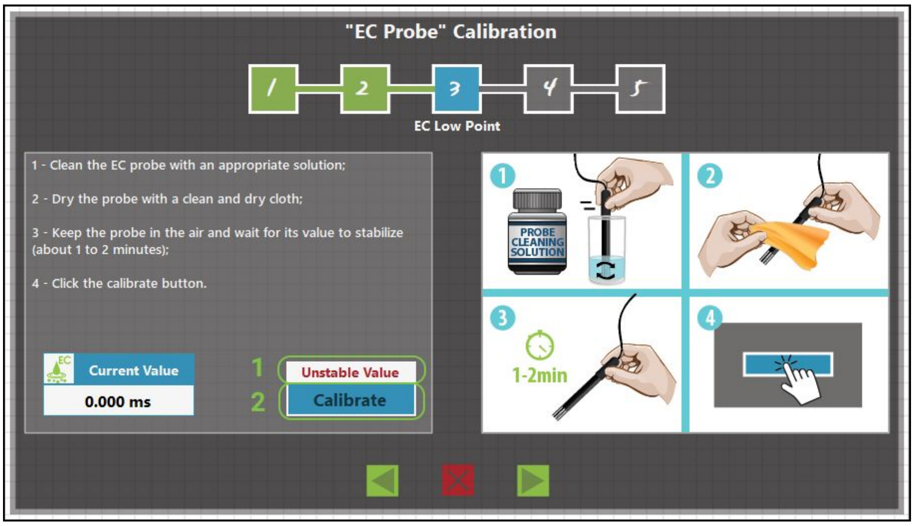


Figure 6-18 – EC Probe Calibration Step 3

The next step is to calibrate the low EC point, 0ms. To achieve this, clean the probe with an appropriate solution, and keep it in open air for around 1 or 2 minutes. Once the value is stable enough the message "Unstable Value" should disappear and the calibrate button gets enabled. Press it to set the low-point calibration.

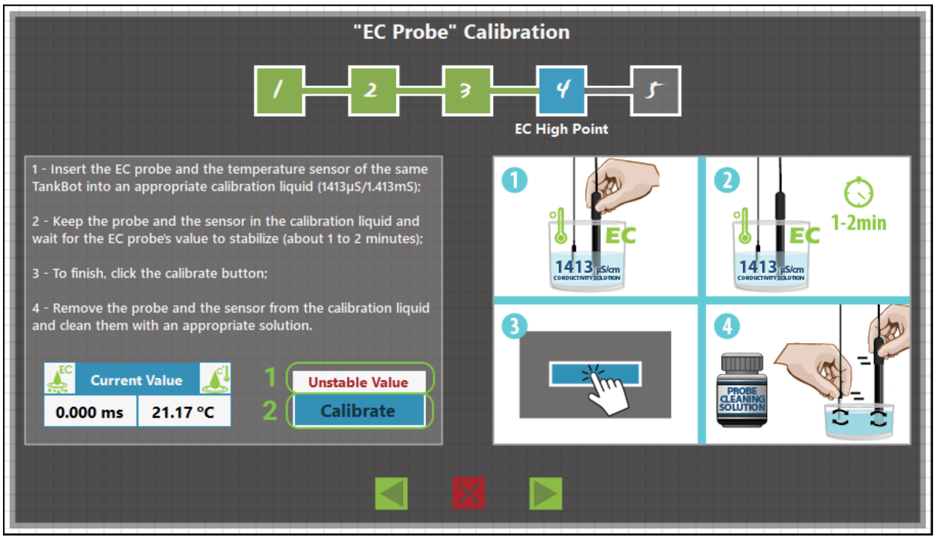


Figure 6-19 – EC Probe Calibration Step 4

The next step is to calibrate the high EC point, 1413µs. To achieve this, insert the probe in the calibration solution of 1413µs. If ATC is active, the TankBot temperature probe needs to be previously configured and submerged in the liquid in the EC probe. Wait one or two minutes for the value to stabilize, once the value is stable, the "Unstable Value" message, **1**, will disappear and the "Calibrate" button, **2**, will be enabled. Press the "Calibrate" button, **2**, and the high EC point will be saved and the calibration finished.

6.3.2. Calibration pH Probe

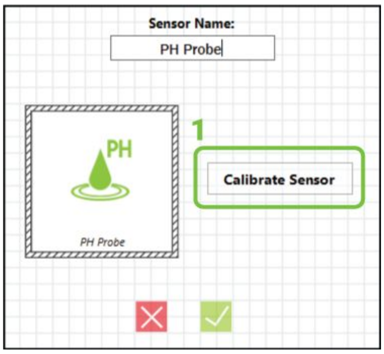


Figure 6-20 – pH Sensor Configurations

pH calibration is made using the buffer solutions of pH 4,01 and pH 7,01. Configure the respective input as a pH Probe and press the "Calibrate Sensor" button, **1**.

Clean the probe and insert it in the buffer solution of pH 4,01, wait one or two minutes for the value to stabilize, and press "PH 4 Calib.", **1**. A successful operation message or error should appear, if it's an error, repeat the process.

With the low point calibrated, clean the probe, and submerge it in the pH 7.01 calibration solution.

Wait again one or two minutes for the value to stabilize, and then press "PH 7 Calib.", **2**.

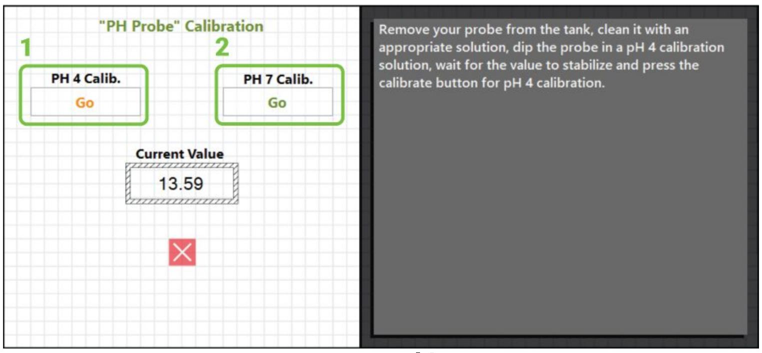


Figure 6-21 – pH Calibration Menu

6.3.3. Calibration Moisture Probe

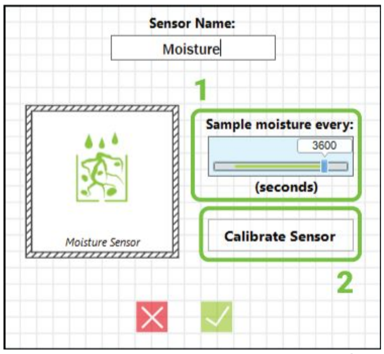


Figure 6-22 – Moisture Probe Input Configurations

The moisture sensors in the SoilBot module also need to be calibrated on the first usage. To achieve this, just define one SoilBot input as the soil moisture, and press the “Calibrate Sensor”, **2**.

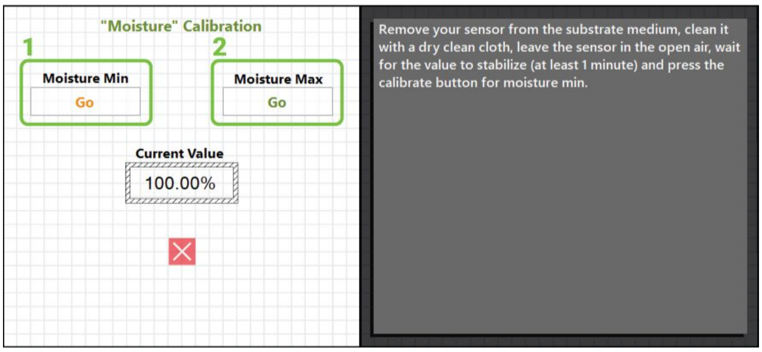


Figure 6-23 – Moisture Probe Calibration Menu

Once the calibration menu is open, clean the sensor and leave it in open air. Press the Moisture Min. button, **1**. To calibrate the high point, insert the probe fully in water, wait a few seconds, and press Moisture Max., **2**.

Your probe should be calibrated and ready to use.

You can also define the sampling time for each probe, by adjusting the value in 1. The minimum sampling interval is 60 seconds, and the maximum is one hour.

6.4. Devices Configuration

To configure the outputs, press the “Not Connected” icon, on the respective output in the modules menu. After the output menu shows up, press the “Not Connected” icon, **2**.

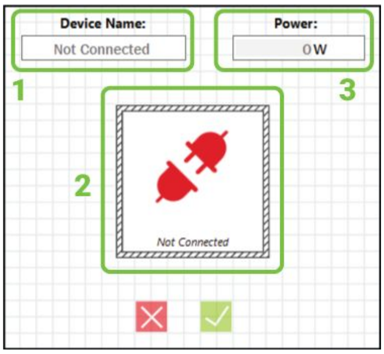


Figure 6-24 – Output Initial Menu

A list of devices will appear, allowing the user to choose one of them.

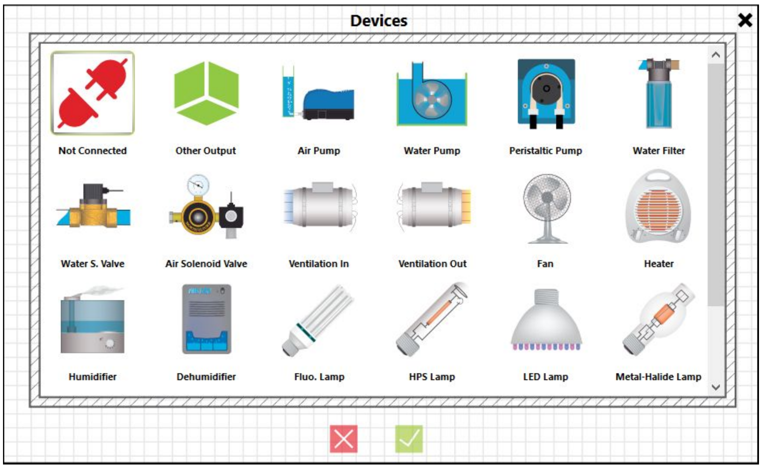


Figure 6-25 – Devices Type Menu

After selecting the device type, it’s time to configure the name of the device, **1**, its power consumption, **2**, and its cooldown time, **3**.

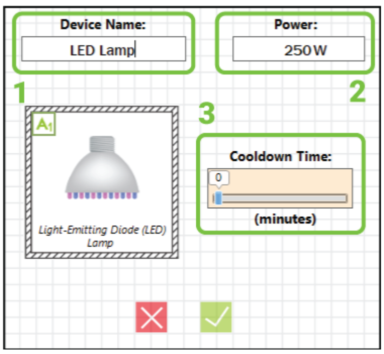


Figure 6-26 – Devices Type Menu

The cooldown Time, **3**, ensures no output is turned ON if it was turned OFF less minutes than the cooldown time defined, useful for devices that cannot turn ON immediately after being turned OFF, HPS ballasts/lamps are an example of this.

6.4.1. Devices Calibration

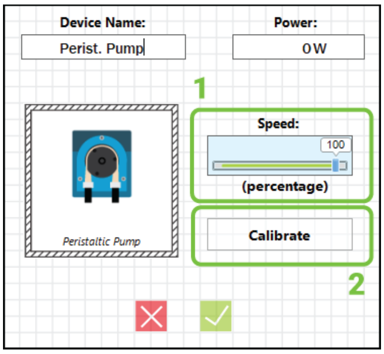


Figure 6-27 – Devices Type Menu

If the module is able to change the speed of the output, for example, the outputs available in TankBot, the user is also able to define a speed for the respective output, **1**.

If the device is a Peristaltic Pump, the user is also able to Calibrate the pump, **2**, this will trigger a wizard that will help the user define the ml/second debit of the pump, making it easier for the feeding automation configuration.

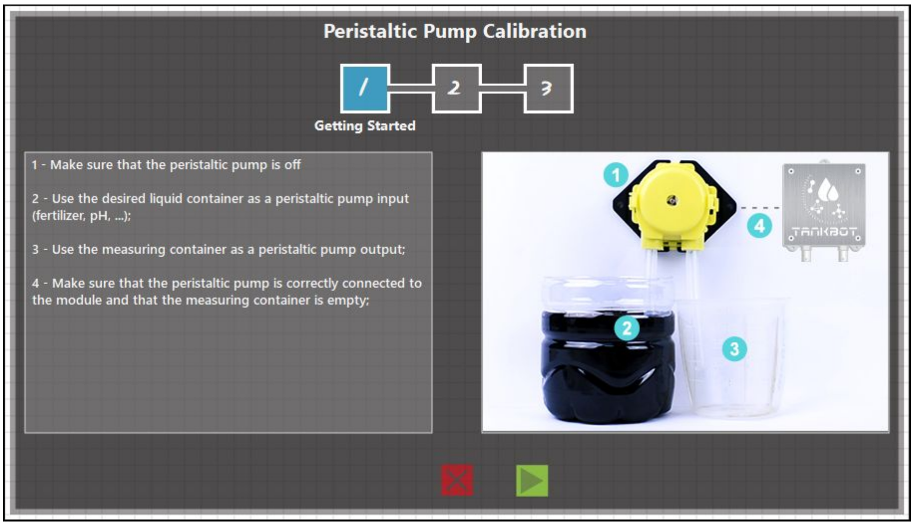


Figure 6-28 – Pump calibration Wizard – Step 1

The first step is to ensure the pump under calibration is turned off.

On the pulling side of the pump, set a container with the liquid that the pump will use, and on the other end set a measuring container like the picture shows. Once this is done, press next.

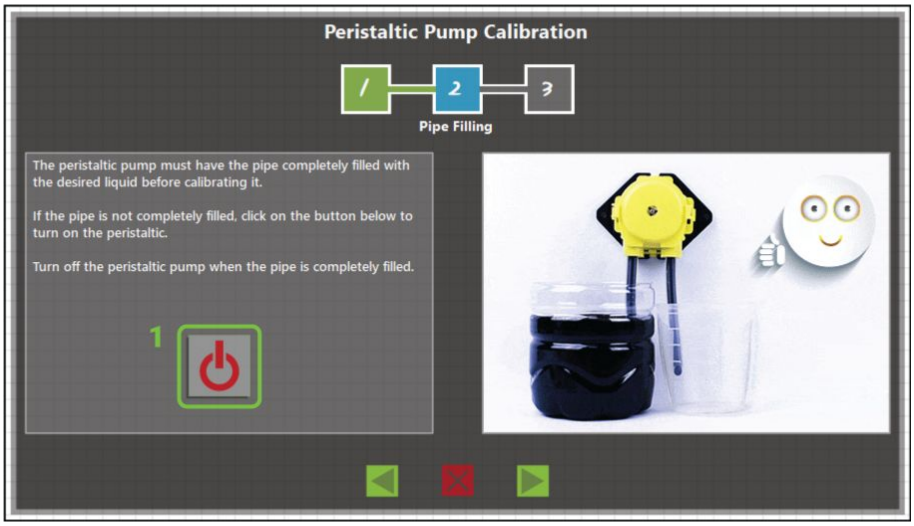


Figure 6-29 – Pump calibration Wizard – Step 2

Using the power button available, **1**, turn on the output until the tube in the pump is full.

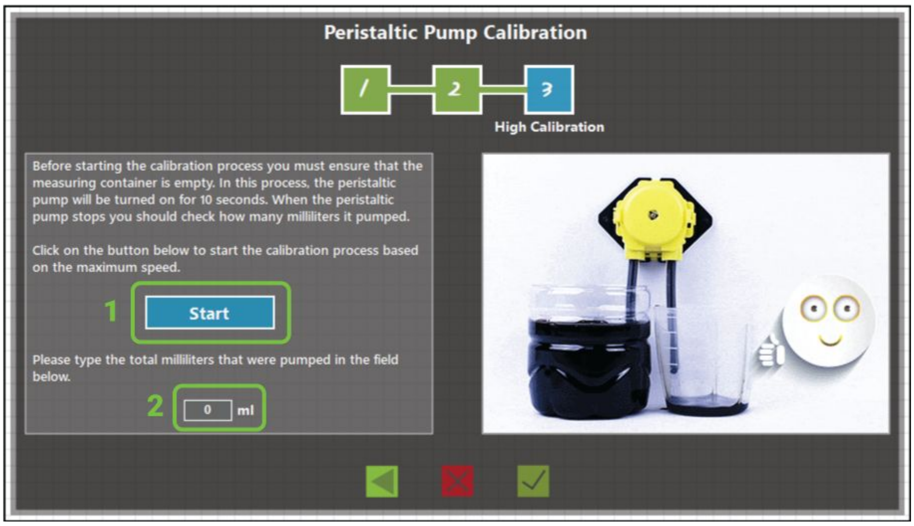


Figure 6-30 – Pump calibration Wizard – Step 3

Before moving to the next step, ensure the measuring container is empty. After that, press start, **2**. The output being calibrated will be turned on for 10 seconds.

When the output is turned off, measure the container liquid, and insert the obtained value in the textbox available, **3**. Press OK to save the calibration.

Now whenever this output is used, it can be turned ON for a certain amount of time, or to debit a certain amount of ml.

6.5. PowerBot Configuration

PowerBot is the GroLab module responsible for climate and power control. It's supplied by default with a Temperature and Humidity sensor, and it's capable of handling 1200W@120VAC or 2300W@230VAC of power. PowerBot is capable of sampling more sensors, you can find the full description below.

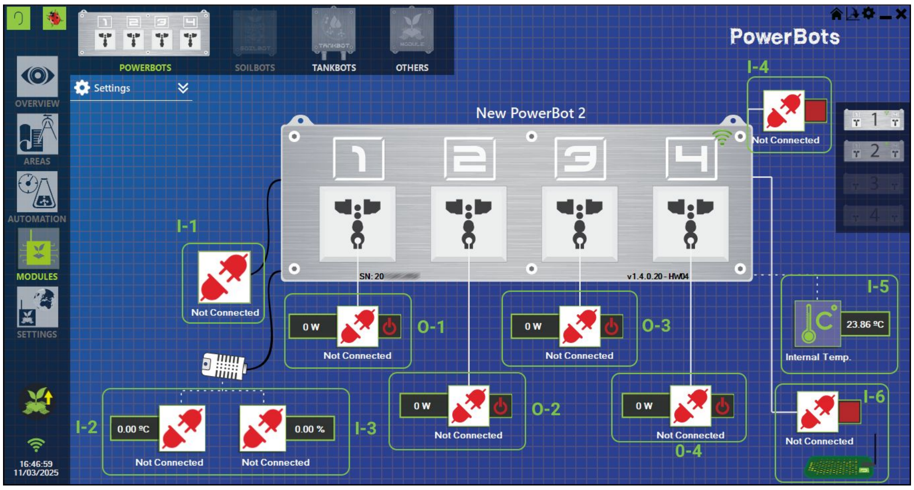


Figure 6-31 – PowerBot Default Configuration

I-1 – Socket for the GroLab CO2 Compact Sensor, this sensor is able to sample Temperature, Humidity, CO2, and Luminosity.

I-2 & I-3 – It's the Temperature and Humidity sensor that comes by default with PowerBot, it's a combined sensor, so configuring one of the I-1 or I-2 will automatically configure the other one.

I-4 – Switched input, allows PowerBot to sample Motion Detectors, Smoke Detectors, Level Sensors, this input is designed to sample any kind of switch.

I-5 – It's the internal temperature of the module, configured by default.

I-6 – Input to sample the GroLab Flood detector, enhancing the security of your grow area.

O-1/O-2/O-3/O-4 – Independent controlled outputs, you can connect any device that operates on mains voltage (120~230VAC).

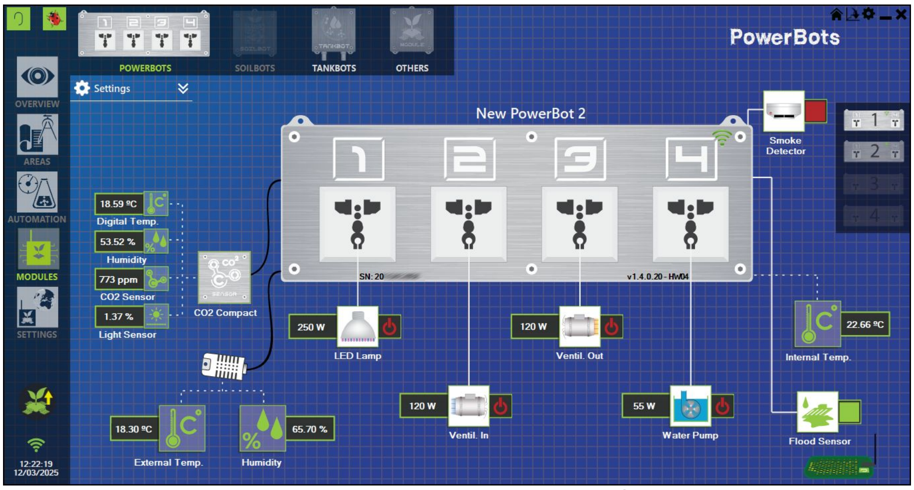


Figure 6-32 – PowerBot Fully Configured

6.6. TankBot Configuration

The module TankBot is specific for managing feeding solutions, in that way, it supports one pH probe, one EC probe, and one Temperature probe, it can also sample 4 different switch sensors and control 4 outputs.

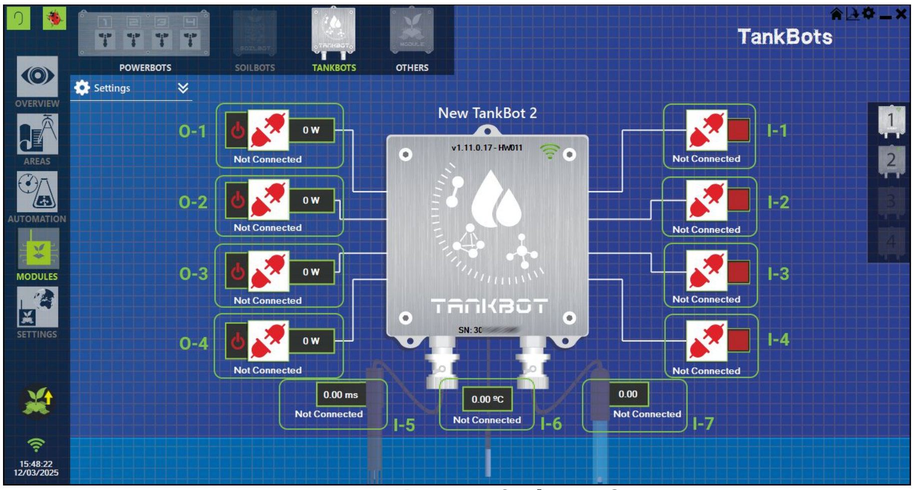


Figure 6-33 – TankBot Default Configuration

I-1 & **I-2 & I-3 & I-4**– Switched sensor inputs.

I-5 – It's the input for the EC probe.

I-6 – It's the input for the Water Temperature Sensor.

I-7 – It's the input for the pH probe.

O-1/O-2/O-3/O-4 – Independent controlled outputs, you can connect any device that operates with 12VDC.

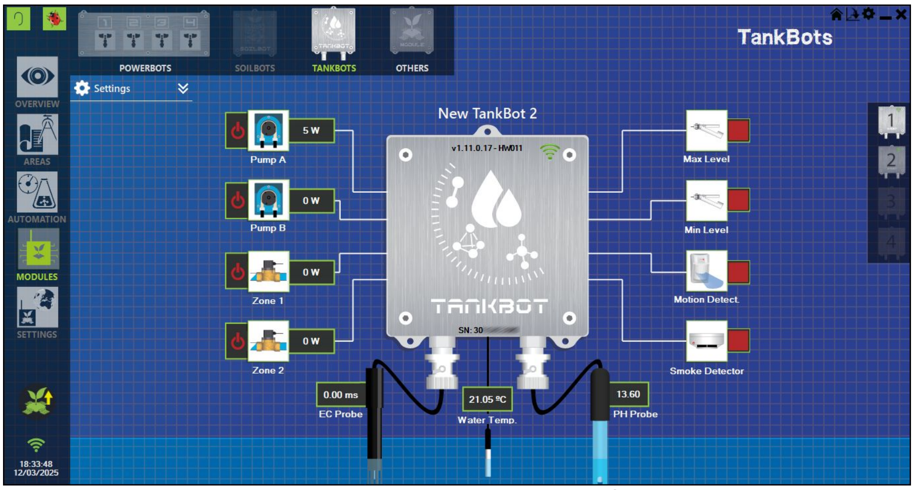


Figure 6-34 – TankBot Fully Configured

6.7. TankBot Plus Configuration

The module TankBot Plus is the enhanced version of TankBot and was also developed for managing feeding solutions, in that way, it supports one pH probe, one EC probe, one Temperature probe, and one Flood Detector, it can also sample 6 different switch sensors and control 6 outputs.

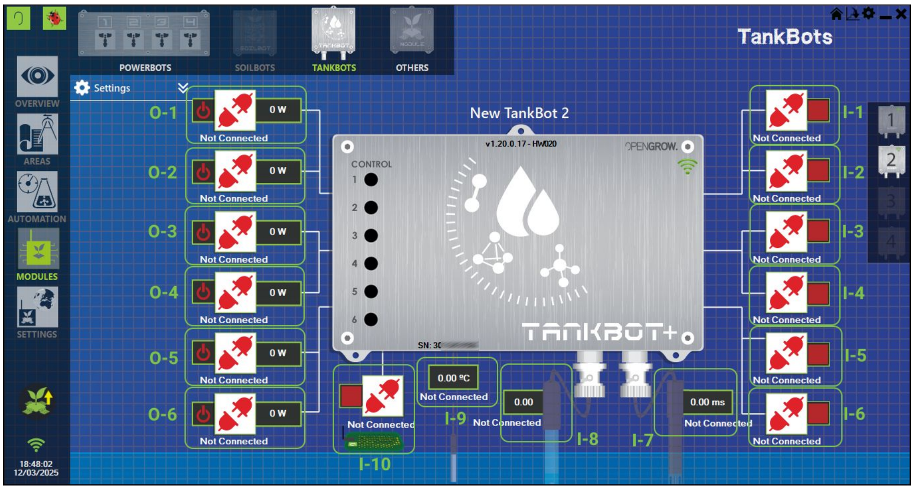


Figure 6-35 – TankBot Plus Default Configuration

I-1 & **I-2 & I-3 & I-4 & I-5 & I-6**– Switched sensor inputs.

I-7 – It's the input for the EC probe.

I-8 – It's the input for the pH probe.

I-9 – It's the input for the Water Temperature Sensor.

I-10 – It's the input for the Flood Detector.

O-1 & O-2 & O-3 & O-4 & O-5 & O-6 – Independent controlled outputs, you can connect any device that operates with 12VDC.

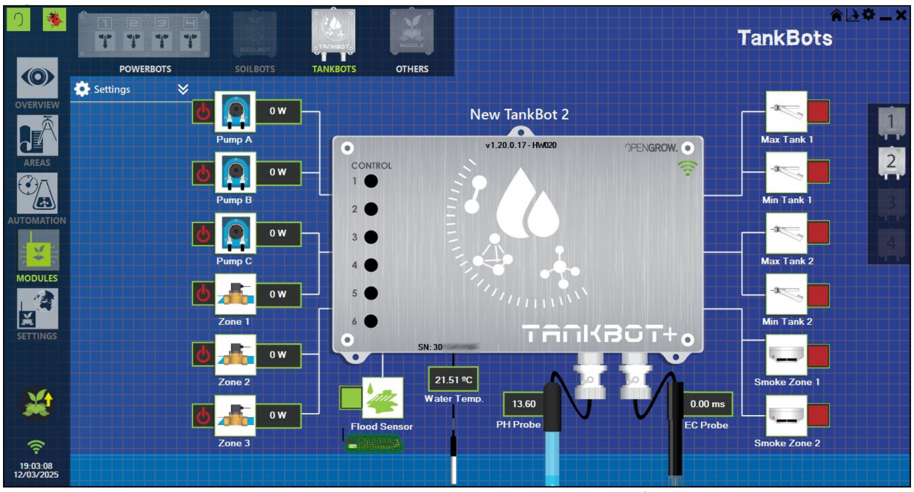


Figure 6-36 – TankBot Plus Fully Configured

6.8. SoilBot Configuration

SoilBot is the GroLab module dedicated to substrate analysis, it can sample the soil moisture along with the soil temperature, and it also provides the ability to detect floods in your growing area.

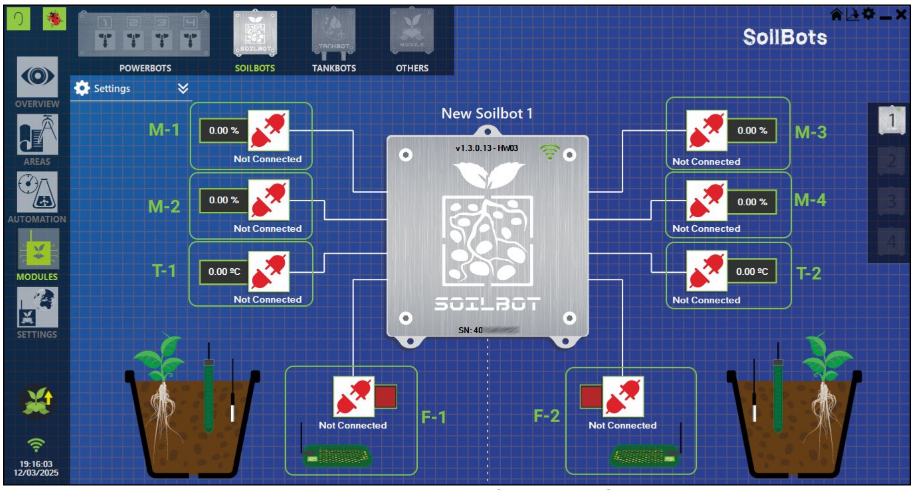


Figure 6-37– SoilBot Default Configuration

M-1 & **M-2 & M-3 & M-4** – Inputs for Moisture Probes

T-1 & **T-2** – Inputs for Temperature Probes

F-1 & **F-2** – It's the input for the Flood Detectors.

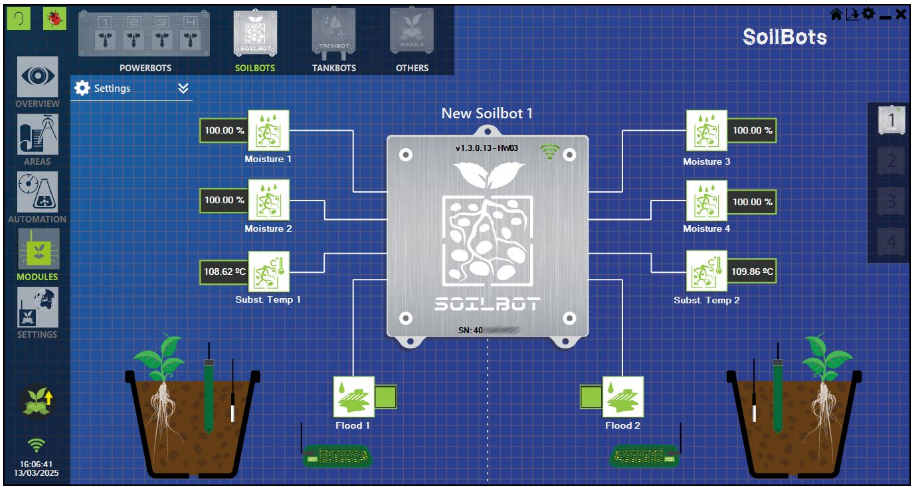


Figure 6-38 – SoilBot Plus Fully Configured

7. Areas & Grows

When setting up areas and grows, the software offers flexibility in configuring the growing environment. GroLab supports up to 4 Areas, with 2 Grows per Area.

7.1. Area Configuration

To add a new Area just click the "Add your First Area" panel, **(2-1)**, in the Areas menu.

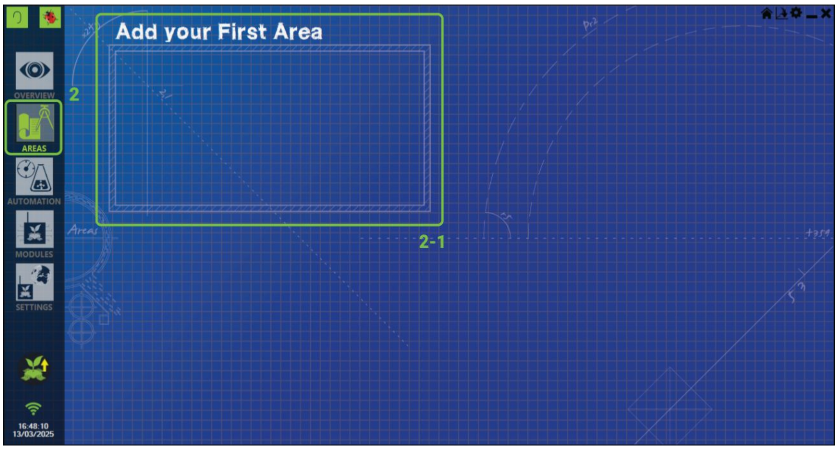


Figure 7-1 – Areas Menu

The first step is to name the Area, **(1)**, select an Area type, **(2)**, and define a start date for the respective Area, **(3)**.

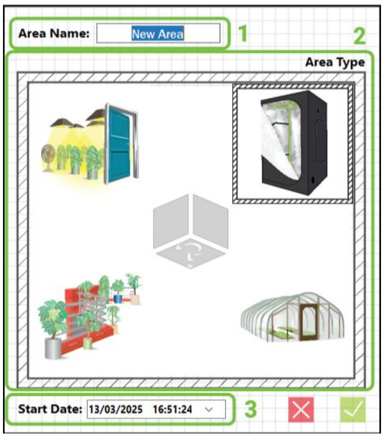


Figure 7-2– Area Basic Settings

Once the basic settings for the Area are defined, press OK.

Now we need to assign the devices and sensors we have available to the correct Areas.

To activate the E-mail notifications for this specific area, press the letter icon, **(1-1)**.

To switch between Sensors or Devices, press the respective buttons **(1-2** or **1-3)**, and panel **(1-4)** should update with the list of Sensors or Devices.

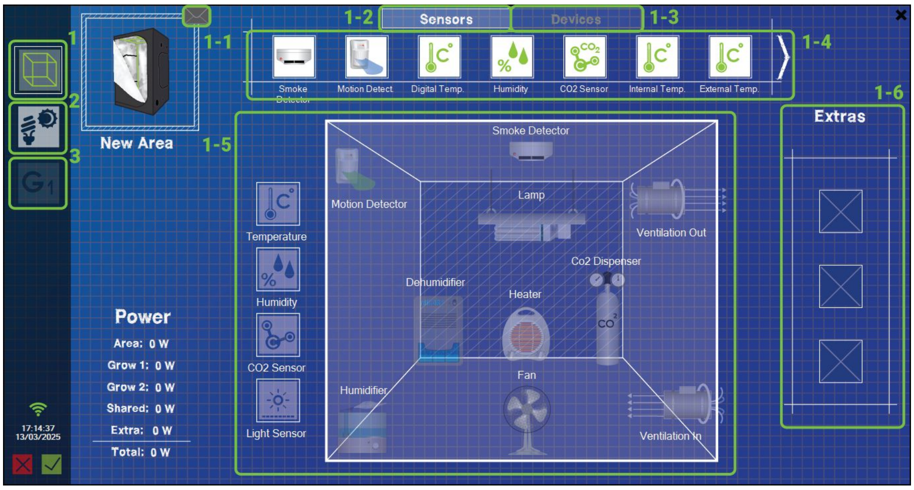


Figure 7-3 – Area Basic Settings

Panel **(1-5)** represents the default devices you can set up inside the Area. If there's no default space for a device or a sensor you need in this Area, just add it to the Extras Panel, **(1-6)**.

To add a Device or Sensor to the Area Panel or the Extras Panel, just drag the respective Sensor or Device, and drop it in where you wish it to be. To remove a previously defined Sensor or Device, just drag it from its current position to any blank space on the menu. After defining all the devices and sensors for the Area, it's time to define the Day and Night for this Area, press the light configuration button menu, **(2)**.

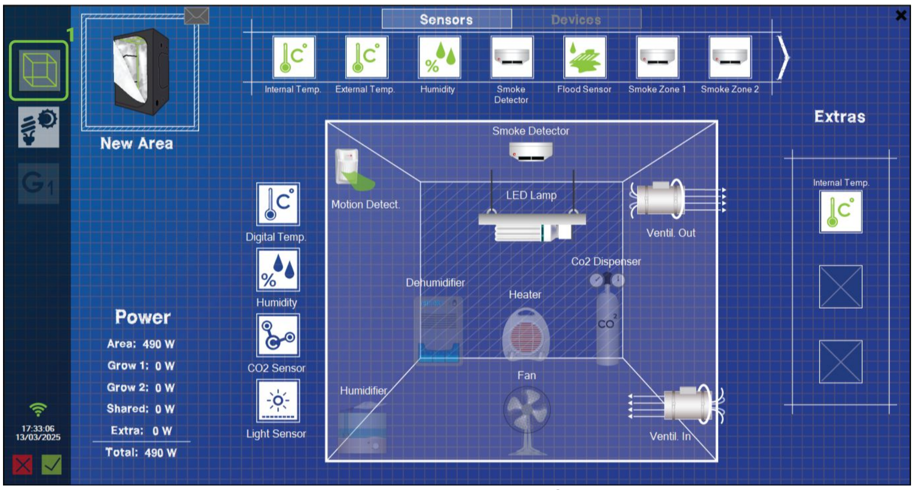


Figure 7-4 – Area Configured

7.2. Area Day/Night Configuration

The first light configuration to do, is to define if the Day/Night cycle is controlled by artificial illumination, **(2-1)**, or by natural sunlight, **(2-2)**, meaning, is the Area Indoor or Outdoor. If a light device is defined in the Area configuration, the Area will automatically switch to indoor.

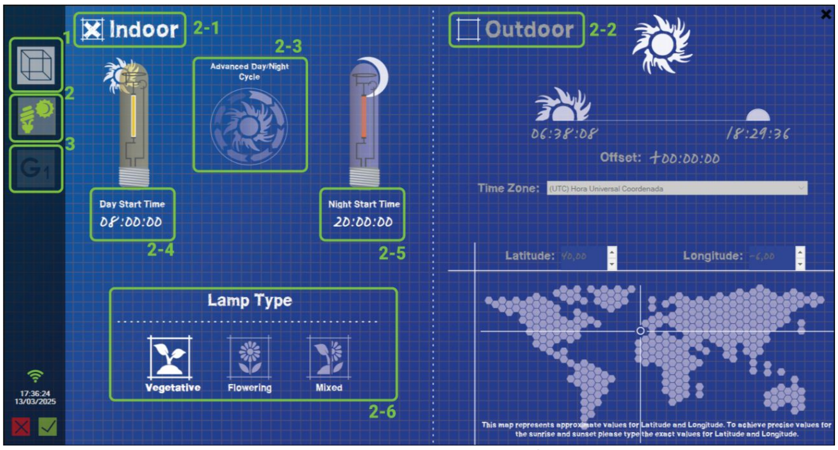


Figure 7-5 – Area Light Configuration

As an Indoor Area, the Day/Night cycle will be controlled by the Light defined by the user. Just set the beginning of the day on timer **(2-4)**, and the end of the day on timer **(2-5)**. The above image points to a 12/12h light cycle. Once you save the Area, GroLab will automatically create a Schedule to handle the light control, using the device you previously defined.

If you wish to base your light schedule on another cycle than the normal 24-hour day, activate the Advanced Day Light, **(2-3)**, and this will allow you to make shorter or longer day/night times than 24H.

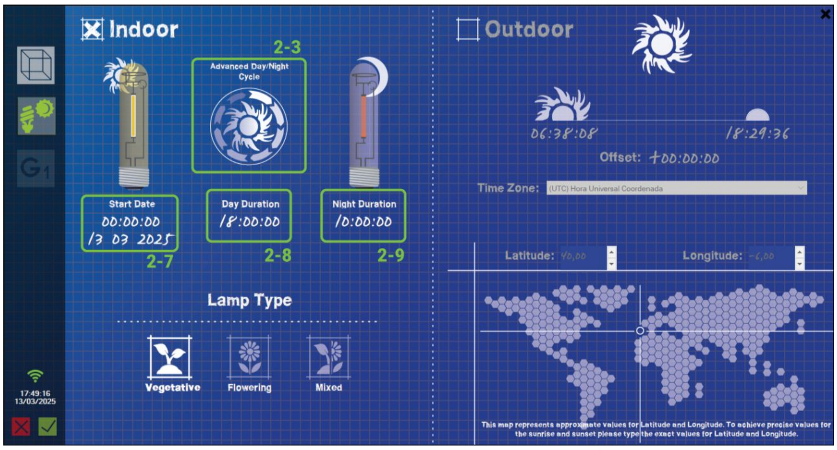


Figure 7-6 – Area Advanced Light Configuration

Since this clock won't be based on the normal 24H, you need to define the Start Date and Time for the Area according to your needs, **(2-7)**, this will be the date used has base to calculate all the following light cycles.

Set the desired Day duration in **(2-8)** and the respective Night duration in **(2-9)**. The example shows a day duration of 18:00:00 with a night duration of 10:00:00

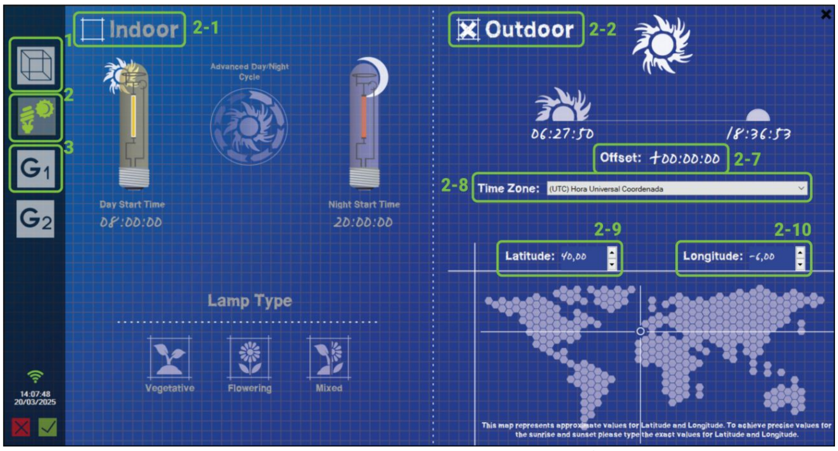


Figure 7-7 – Astronomical Clock Configuration

If GroLab does not control the light, and the light is based on the natural sunlight, just tick the checkbox "Outdoor", **(2-2)**, define your Time Zone, 2-8, and provide your Latitude, **(2-9)**, and Longitude location, **(2-10)**. You also need to make sure the GroNode clock is correct since this method will calculate the Astronomical Clock based on the day/month/year and your latitude and longitude. If you wish to shift the sunrise and sunset dates, just set an offset for your Astronomical clock, **(2-7)**.

7.3. Grow Configuration

Each Area can support a total of two grows, this means you can have two different cultures inside the same growing Area. GroLab allows you to set up independent feeding tanks for these two different grows, with totally different levels of fertilization, different pH levels, and totally different methods of irrigation. The user can also define a single feeding tank for both grows. To add a grow, press the new grow button, **(8)**.

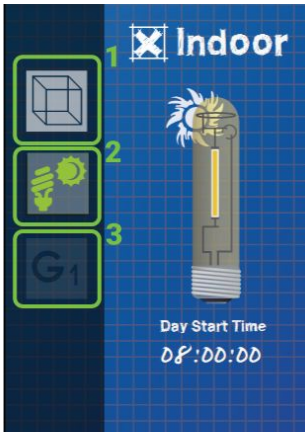


Figure 7-8 – Add a Grow Button

Similar to the Area initial configuration, you need to define a name to your new Grow, 8-1, a type of grow, **(8-2)**, and the start date for this grow, **(8-3)**. If you hover the mouse over the grow types, a simple description for each type is provided.

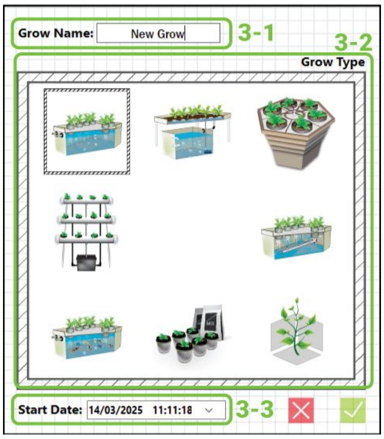


Figure 7-9 – Add a Grow Button

After the basic configurations for the grow are defined, press OK, and similar to the Area configuration, a default view of your grow is shown, presenting all the available Sensors and Devices that can be configured inside a Grow.

7.3.1. Feeding Tank Configuration

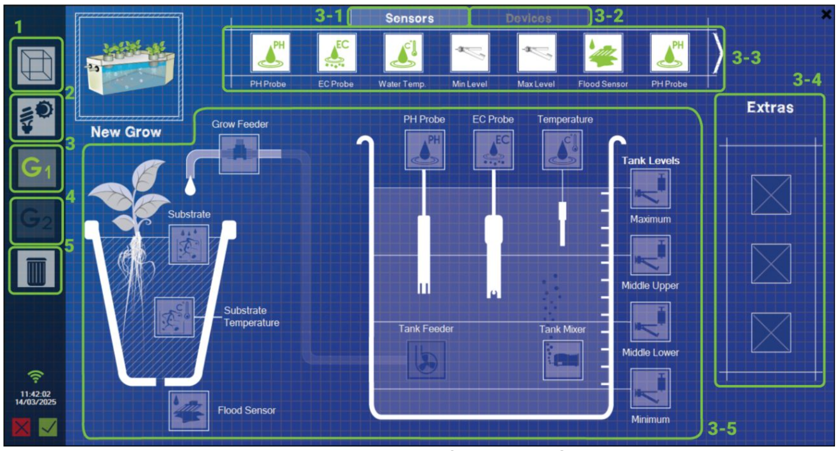


Figure 7-10 – Grow Default Configuration

Similar to the Area, now we need to assign the devices and sensors we have available to the grow.

To switch between Sensors or Devices, press the respective buttons **(3-1** or **3-2),** and panel **(3-3)** should update with the list of Sensors or Devices. Panel **(3-5)** represents the default devices you can set up inside your Grow. If there's no default space for a device or a sensor you need in this Grow, just add it to the Extras Panel, **(3-4)**.

To add a Device or Sensor to the Grow Panel or the Extras Panel, just drag the respective Sensor or Device, and drop it in where you wish it to be, the software should highlight the available positions. To remove a previously defined Sensor or Device, just drag it from its current position to any blank space on the menu.

7.3.2. Dosing Pumps

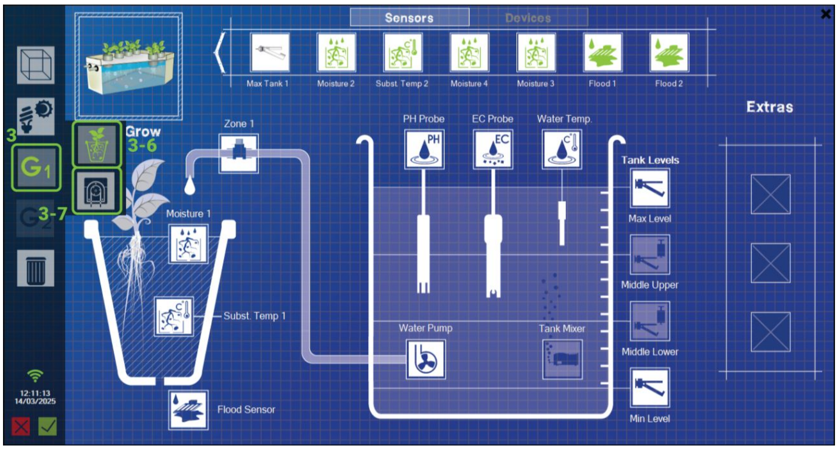


Figure 7-11 – Grow Fully Configured

If you set up a zone valve for irrigation along with a water pump, when the configurations are saved, GroLab will automatically create an Alarm that makes sure that whenever the feeding solenoid is triggered, the water pump will also turn on.

If you have valves for draining and filling your tank, or any type of dosing pump, just hover the mouse over the Grow button, **(3)**, and select the dosing option, **(3-7)**.

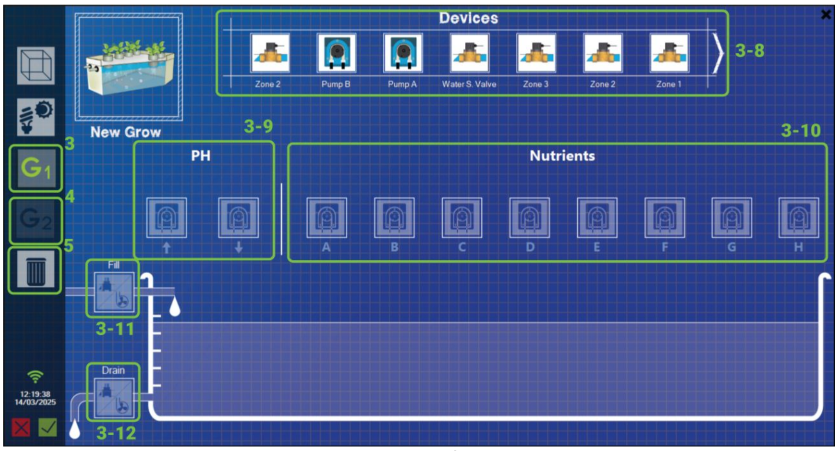


Figure 7-12 – Grow Default Dosing Menu

In this menu, you can set up all the dosing pumps for pH correction, **(3-9-)**, or for fertilization, **(3-10)**. You can add up to 8 different nutrients to the same tank.

Similar to the other configurations, you can find all your devices on the top panel, **(3-10)**, and drag and drop all the devices you want to configure to the respective position.

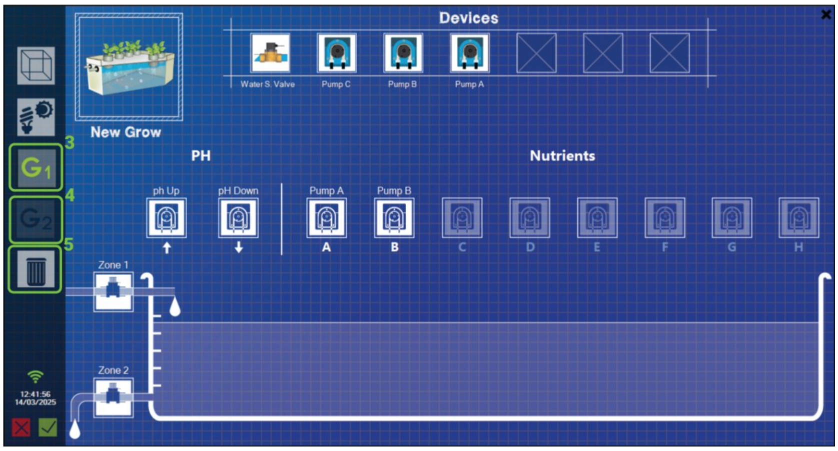


Figure 7-13 – Grow Dosing Configured

If you have a second Grow, just press the add Grow 2 button, **(4)**. This will trigger the addition of a second growing space, and the process is similar to the previous Grow configuration. The only difference is that you need to define if the feeding tank is shared between grows or not, you can do this by ticking the checkbox **(9-1)**. If the feeding tanks are separated you can now set a new range of Sensors and devices to this new tank, along with a new set of dosing pumps.

If the tanks are shared, Grow 2 will base its feeding parameters on the feeding tank for Grow 1.

Grow 2 can still have its own feeding valve, moisture, and temperature sensor, and its own flood detector.

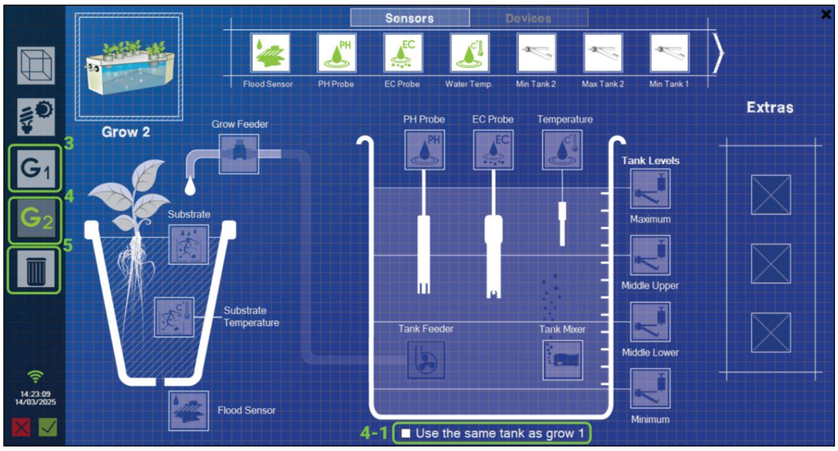


Figure 7-14 – Grow 2 Independent Tanks

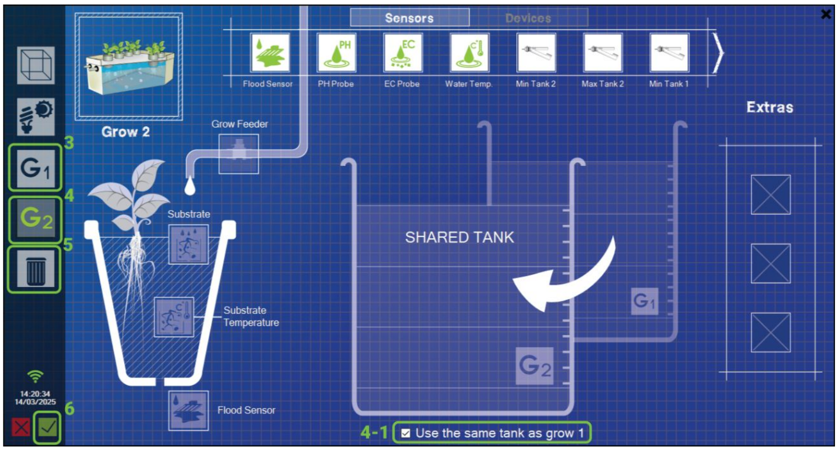


Figure 7-15 – Grow 2 Shared Tank

To delete a Grow, just select the Grow you wish to delete, **(3)** or **(4),** and press the delete button, **(5)**. Once prompt confirm or cancel the action.

Once you are done with all the configurations, just press the OK button in the lower-left corner of the menu, **(6)**.

If there’s a light defined, and the Area is set to Indoor, the schedule for the light will be created automatically.

If there are solenoid valves connected to water pumps in any of the grows, all necessary alarms to trigger the water pump whenever the solenoid is open are created.

8. Overview Menu

After defining all the sensors and available devices, and assigning them to the correct Areas and Grows, you are now able to access the Overview menu. To achieve this, press the Overview button, **(1)**.

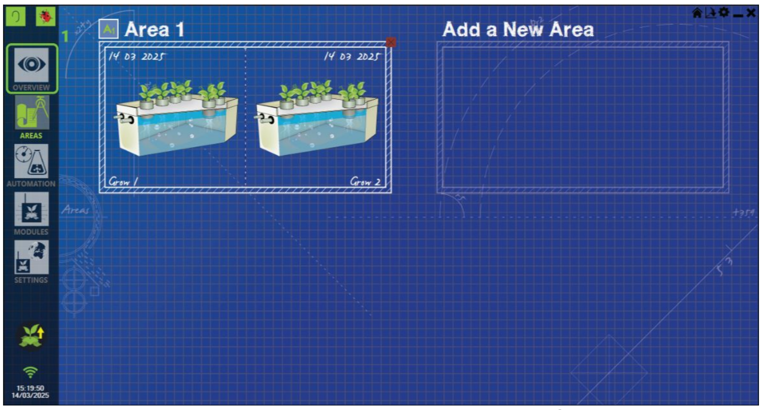


Figure 8-1 – Overview Button Identification

In the Overview panel, the user now has access to all the Sensors and Devices that you previously configured, the more equipments you have, the more populated will Overview show.

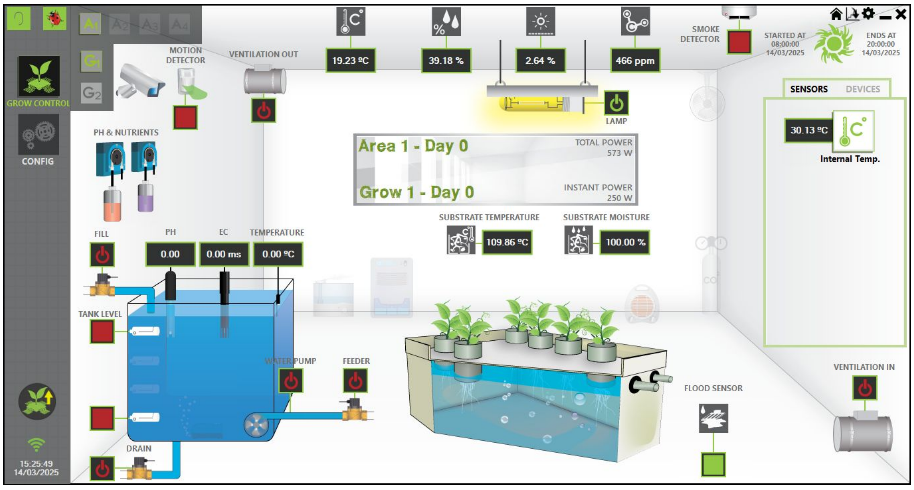


Figure 8-2 – Overview Panel

In this panel, the user has access to all the real-time values of the configured sensors, along with the state of every device, and the ability to manually control it.

Clicking on any Sensor or Device will present a chart with the respective historic.

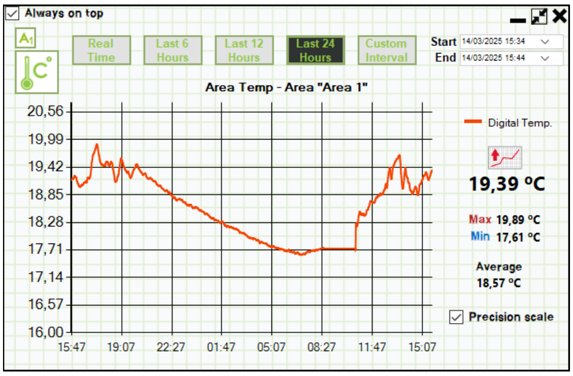


Figure 8-3 – Sensor Example Chart

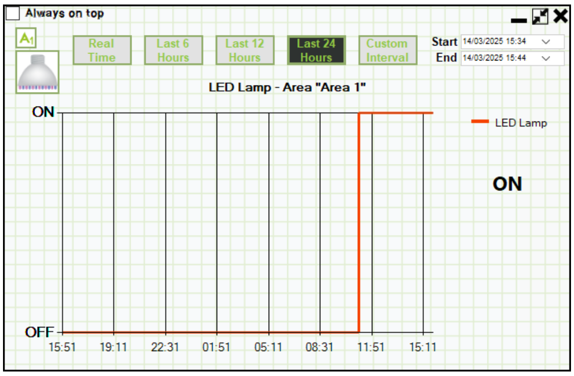


Figure 8-4 – Device Example Chart

To switch between Areas and Grows, a filter can be found on the top left corner of the overview.

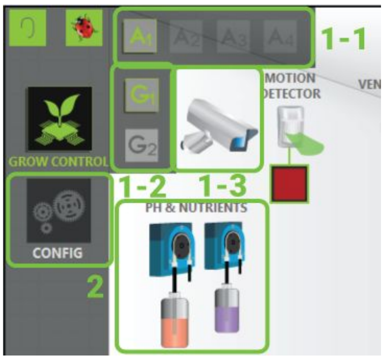


Figure 8-5 – Overview Button Details

Use the horizontal filter to switch between Areas, **(1-1)**. Use the vertical filter to access your Grows, **(1-2)**.

To add an IP Camera to your Area, just click the camera icon, **(1-3)**.

The dosing pumps can also be found by hovering the mouse over the pH and Nutrients, **(1-4)**. A panel with all the available pumps is presented, and the same chart functionality or manual control is also available to these devices.

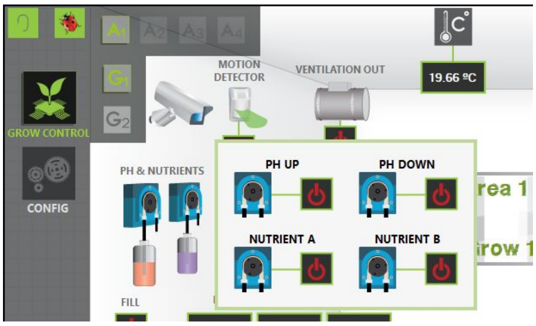


Figure 8-6 – Overview Dosing Panel

In the top right corner, you can find information related to the Day/Night cycle of the Area.

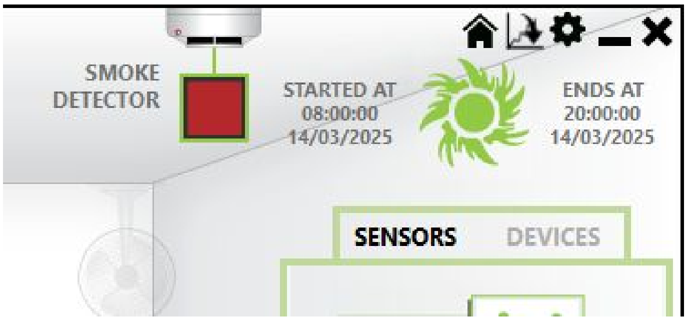


Figure 8-7 – Day/Night Indicator

In the center of the panel, you can find the name for your Area and Grow, along with calculated total power consumption, and the real-time power consumption.

Figure 8-8 – Area Information

9. Schedules Configuration

One of the tools that allow the GroLab system to automate your grow, is the schedule creation. It’s a highly versatility tool to deal with light or irrigation schedules.

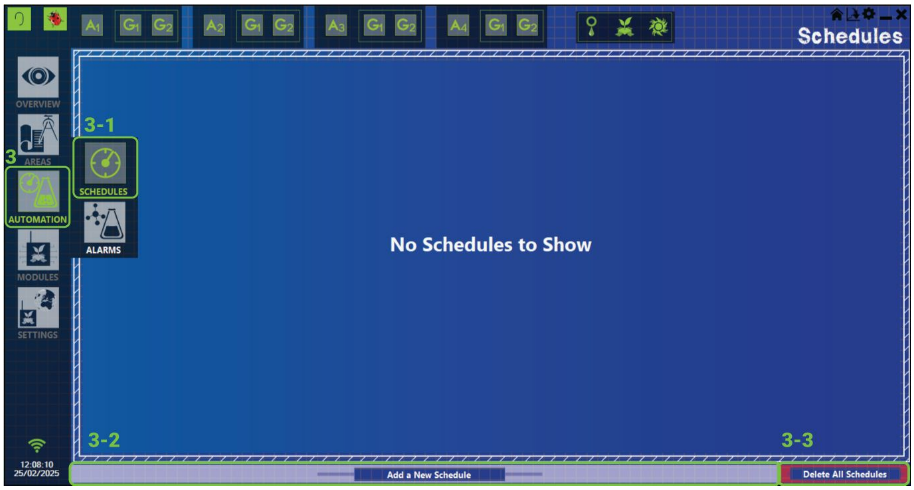


Figure 9-1 – Schedule Main Panel

To add a new schedule, hover your mouse over the Automation Menu, **(3)**, and click on the Schedules button that shows up **(3-1)**.

This will present you with all your configured schedules on the panel, along with some filters for better visualization.

To remove all schedules you can press the “Delete All Schedules” button, **(3-3)**.

To create a new Schedule, press the button “Add a New Schedule”, **(3-2)**.

9.1. Adding a New Schedule

The first step to adding a schedule is to define its name, **(2)**, followed by its type.

There are three main types of schedules:

- Irrigation
- Lighting
- General

These categories help differentiate the purpose of the schedules visually. Not only it will select a set of devices in the device panel **(4)**, showing you only devices related to the specific type, water pumps for irrigation, HPS and LEDs for Light, and all the devices for

General. You can define specific schedules for each type, making it easier to visually manage your grow needs.

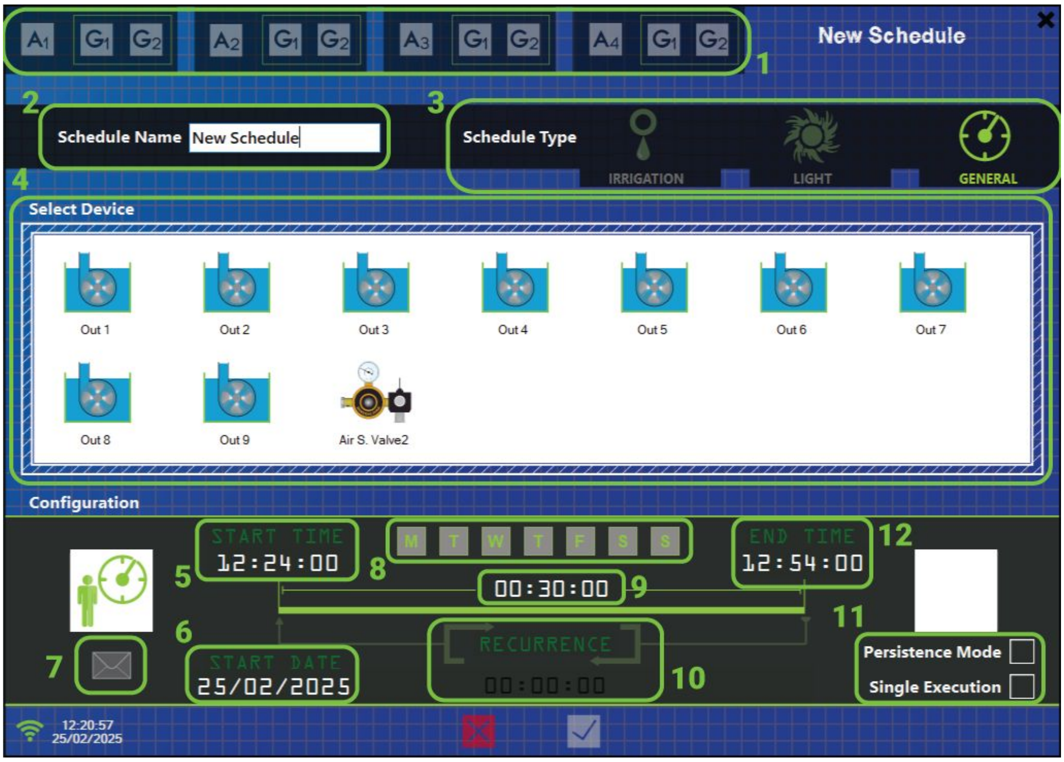


Figure 9-2 – Schedule Configuration

After setting the name for the schedule, **(2)**, select the desired type, **(3)**, you should now define a Start Date, **(6)**, and a Start Time, **(5)**, with these two parameters the user is able to create schedules that will only act in the future. You are also able to create recurrent schedules, meaning the Start date, **(6)**, and a Start Time, **(5)**, parameters will be used as the initial timestamp to re-calculate the recurrence up to the present. You can either set your ON time by pressing the total time on the parameter, **(9)**, or by setting a Start and End Time, **(5)** and **(12)**.

The weekday selection, **(8)**, allows you to set which weekdays the schedule will run.

Persistence mode, **(11)**, means that whenever the schedule is active and running, GroNode will be constantly sending the turn On command to the respective output. This means that even if there's a manual shutdown of the output by the user, the output will turn back on.

Single Execution, **(11)**, means that after the first run and deactivation, the schedule will be automatically disabled. For the schedule to run again, the user needs to re-enable it.

If the general mail notifications are turned on, by pressing the mail notification for this specific schedule, **(7)**, will receive an email every time the schedule runs or stops.

Summarizing, these are all the parameters of a schedule:

- Description/Name **(2):** A name or description for the schedule;
- Start Date and Time **(5,6):** The exact time when the schedule will begin;
- End Time **(12):** The exact time when the schedule should stop;
- Weekdays **(8):** Select the days of the week the schedule will apply;
- Action Time **(9):** Define how long the action should remain active;
- Wait Time/Recurrence **(10):** Set the interval between repeated actions;
- Persistence **(11):** Force output On while running;
- Single Execution **(11):** Set the schedule to disable after execution;
- Mail Notifications **(7:)** Activates the mail notifications for this specific schedule.

9.2. Example Schedules

You can find below some different schedules the user is able to create with GroLab.

A light schedule:

Figure 9-3 – Light Schedule

This schedule runs every day from 08:00 to 20:00.

The schedule visualizer, allows you to have access to the schedule information you need. You can find the state of the schedule, **(1)**, and what Area and Grow it belongs **(2)**. You can also click the icons **(3)**, **(4),** and **(5)**, to activate or deactivate, the E-Mail notifications **(3)**, Persistence **(4)** One-Time schedule, **(5)**.

To disable the schedule, press the power button, **(7)**.

To delete the schedule, press the red cross, **(6)**.

Figure 9-4 – Light Schedule on Hold

If the Schedule is active, but the running bar is yellow, not green, **(8)**, it most probably means that this device has the cool down feature active, not being able to be turned On. Once the cooldown has passed, if the schedule is still to be active, it will turn the device On, and the bar will change to green.

Figure 9-5 – Irrigation Recurrent Schedule

The Schedule presented above was created to perform 5 minutes of irrigation every 12 hours. With just one schedule you are able to create recurrent actions. T

his type of schedule is very useful to control irrigation in hydroponic systems, where the pump usually turns on a few minutes every half hour or so.

The maximum recurrent time is 99:59:59.

10. Alarms Configuration

The Alarm main panel is quite similar to the Schedules main panel. To access it just hover your mouse over the Automation button **(1)**, and select the Alarms **(2)**.

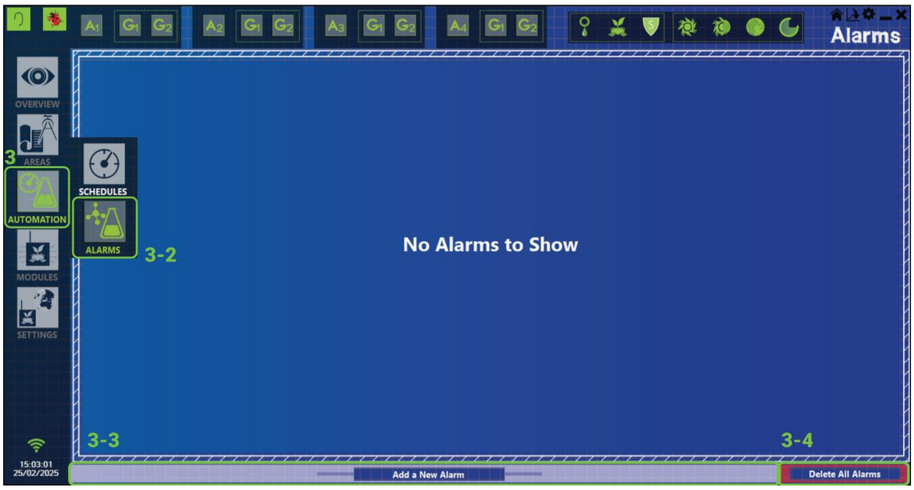


Figure 10-1 – Alarms Main Panel

Similar to schedules, if you wish to delete all schedules just press the "Delete All Alarms", **(3-4)**. To add a new alarm, click the "Add a New Alarm", **(3-3)**, located at the bottom of this panel.

10.1. Adding a New Alarm

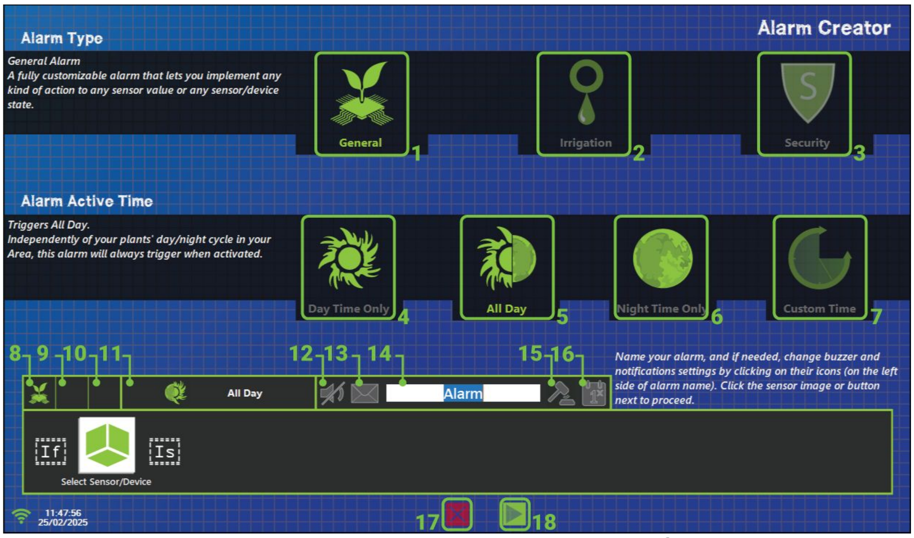


Figure 10-2 – Alarm Type and Time configuration

There are 3 types of Alarms:

- General Alarms **(1)** Have access to all sensors and actuators configured in the system.
- Irrigation Alarms **(2)** Limit access only to sensors and devices related to irrigation, such as water pumps and dosing pumps.
- Security Alarms **(3)** When active, it acts on a set of outputs, grow, or areas. A specific feature of security alarms is that when they become inactive, to revert the actions taken, validation from the user is required.

There are 4 types of activation times for an alarm:

- Only during the day **(4)** This alarm is only verified during the day-time, input condition must be associated with an Area.
- Only during the night **(6)** This alarm is only verified during the night-time, input condition must be associated with an Area.
- During both day and night **(5)** This alarm is constantly verified
- During a user-defined specific period **(7)** This alarm is only verified during the period defined by the user.

- Similar to schedules, if you wish to delete all schedules just press the “Delete All Alarms”, (3-4).
- To add a new alarm, click the “Add a New Alarm”, (3-3), located at the bottom of this panel.

These activation times are useful because, for example, the ambient temperature of a grow area can differ between day and night. Therefore, the user can create distinct temperature alarms for the Day and the Night.

The user-defined period allows the alarm to be triggered and deactivated only during a specific interval of time defined by the user.

Other useful information can be found in this panel:

- Icon for Alarm type **(8)**
- Area it belongs to **(9)**
- Grow it belongs to **(10)**
- Period of activation **(11)**
- Buzzer Notification **(12)**
- Send Mail Notification **(13)**
- Alarm Name **(14)**
- Persistence**, (15)**
- One-Time Alarm**, (16)**
- Discard changes **(17)**
- Save changes **(18)**

After defining the initial parameters, alarm type, activation time, and name, just press next, **(18)**, to start to define the conditions for the alarm.

Figure 10-3 – Alarm Input condition configuration

The next step is to define the alarm entry condition, which will depend on the chosen sensor or actuator:

- analog Value (e.g., co2 value)

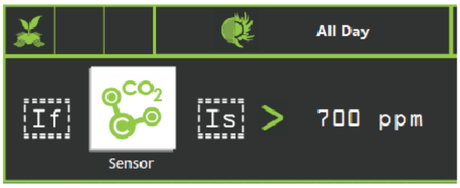


Figure 10-4– Analog Alarm Input Example

- Digital Value (e.g., any of the output devices)

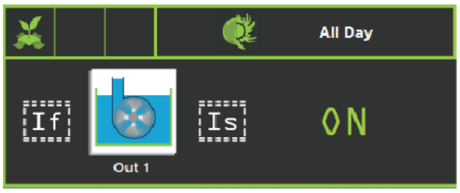


Figure 10-5 – Digital Alarm Input Example

For an analog value, it will be necessary to configure the hysteresis for the alarm. Hysteresis defines the tolerance to avoid continuous activation/deactivation of a device.

If the entry condition is digital, hysteresis is not configurable.

Press the bottom arrows (4)(6) to navigate through the wizard.

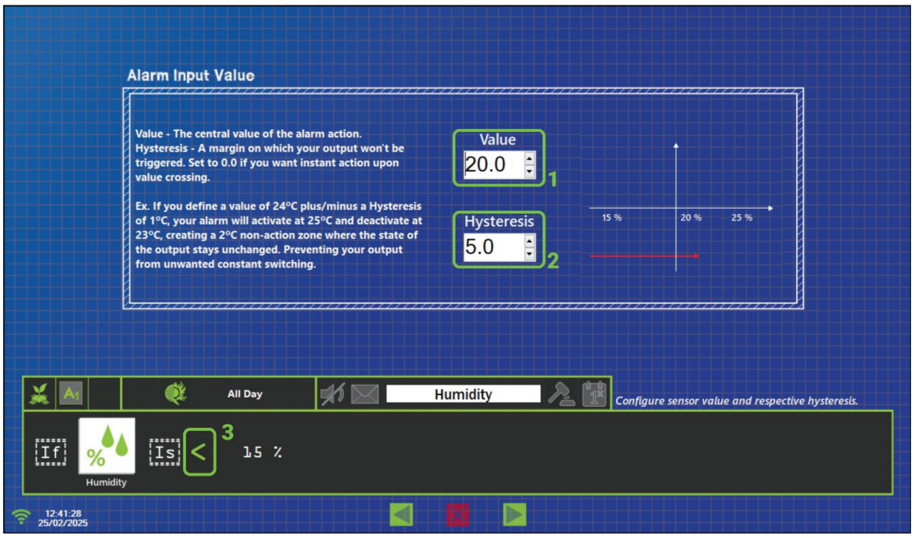


Figure 10-6 – Value and condition configuration

Set the desired value for your alarm, **(1)**, in this case, the value for Humidity. And define the hysteresis value, **(2)**. If you click on the symbol for the condition, **(3)**, you can switch between all available ones.

- Less than (<) (analog)
- Greater than (>) (analog)
- Equal to (=) (Digital)

If your input condition is a digital variable, the condition for the alarm will always be Equal, you'll need to switch between Equal On and Equal Off by clicking on the state, 1.

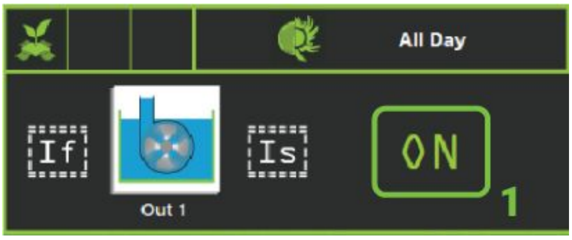


Figure 10-7 – Is On Condition Example

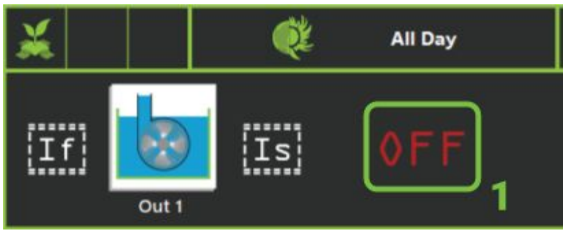


Figure 10-8– Is Off Condition Example

With the input condition of the alarm configured, it's now time to define what action will the alarm take.

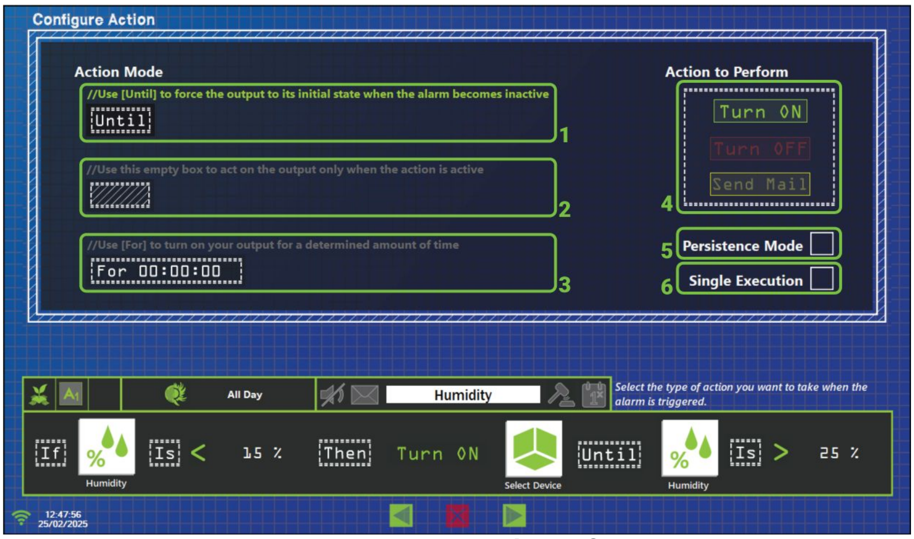


Figure 10-9– Action mode configuration

This action to take is fully configurable by the user, **(4)**, and the alarm will perform the defined action when the entry condition is met. The alarm can,

- Turn on an output
- Turn off an output
- Send Email

The action mode defines the way the alarm behaves, there are 4 ways an alarm can act when it becomes inactive:

- Until **(1):** When the alarm is active, the action (turn on/turn off) is performed. When the alarm becomes inactive, the opposite action is performed (if it was turned on, it turns off; and vice-versa).
- Blank **(2)** When the alarm is active, the action (turn on/turn off) is performed. When the alarm becomes inactive, no action is performed.
- For **(3)** When the alarm is active, the defined output is turned on for the configured time. If there is a wait time, the alarm will respect this interval, and if the Alarm is still active when the waiting time ends, it will perform another timed action.
- Send Mail **(4)** This alarm only sends an email when active. It cannot be used with the "For" action type.

Now we are just missing the definition of the device this alarm will act upon, this can be done in the next menu.

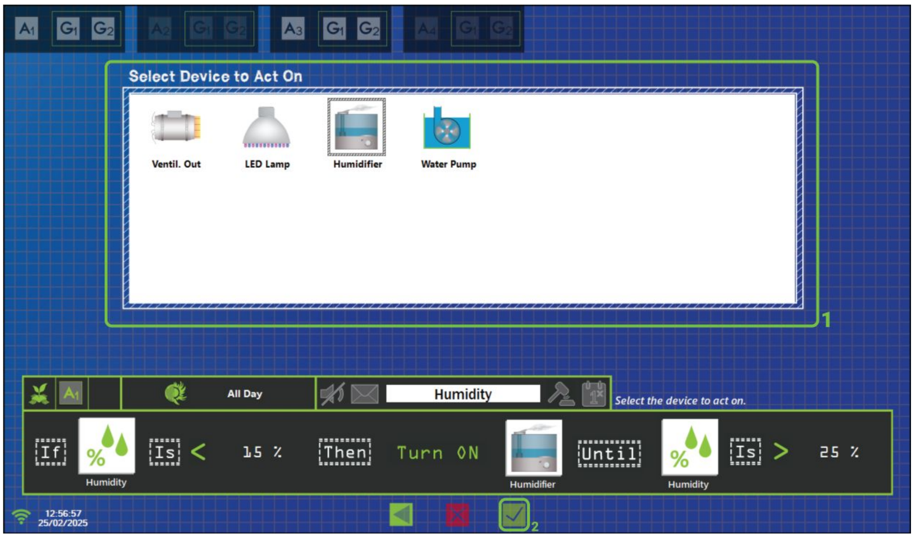


Figure 10-10 – Device selection

Just select the desired output to act on, **(1)**, and press OK, **(2)**. The alarm should start to work immediately.

10.2. Example Alarms

You can find below an example of an environmental Alarm fully configured. This is a low humidity alarm that triggers a humidifier when the humidity gets below 45%. And only shuts it down when the humidity reaches 55%, ensuring the humidity varies around 50%.

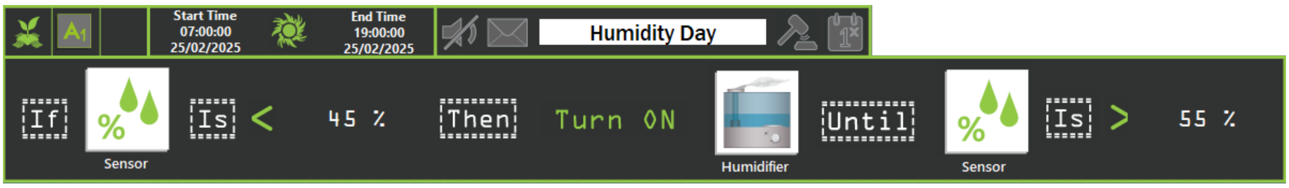


Figure 10-11 – Humidity Control Example Alarm

- **Alarm Type:** General
- **Activation Time:** Only during the day
- **Entry Condition:** Humidity Sensor
- **Trigger Value:** 50%
- **Hysteresis:** 5%
- **Comparison Condition:** Less than (<)
- **Action:** Turn on a humidifier
- **Action Type:** Until (when the alarm becomes inactive, turn off the humidifier)
- **Device for Action:** Humidifier

If you hover the mouse above the Alarm input or output, a tooltip will show the current value of the sensor or device.

Below, you can find a timed Alarm, created to handle high pH corrections.

This alarm is for pH correction, with a value of 6,4 and hysteresis of 0,2. Whenever the pH gets above 6,6, the peristaltic pump with acid will work for 5 seconds, and it will wait 15 minutes, if after these 15 minutes the pH is not below 6,2, the peristaltic pump will turn On again for 5 seconds, and wait the 15 minutes. This will happen while the pH is higher than 6,2.

Figure 10-12 – pH Control Example Alarm

- **Alarm Type:** General
- **Activation Time:** All day
- **Entry Condition:** pH Sensor
- **Trigger Value:** 6,2
- **Hysteresis:** 0,2
- **Comparison Condition:** Higher than (>)
- **Action:** Turn on
- **Action Type:** For 5 seconds every 15 minutes
- **Device for Action:** Peristaltic Pump.

To ensure proper mixing of the acid, we can turn on an air pump to help mix the solution for the entire waiting time.
You can find this Alarm resented below.

Figure 10-13 – Solution Mixer Example Alarm

11. Remote Monitoring and Control

Once GroLab is connected to your network, you can access and control your grow remotely from anywhere in the world, at any time. The system allows you to monitor your devices, check sensor values, and view IP cameras via the GroLab Software interface. To enable remote access to your GroNode and control it from anywhere, follow the steps below to ensure proper configuration.

11.1. External Access to GroNode

It is possible to access your GroNode remotely as long as it is connected to the internet and properly configured. This section will guide you through the necessary steps to set up remote access to your GroNode using GroLab Software.

11.1.1. Preparing GroNode

- **Identify the IP and MAC Address of Your GroNode**:
    - You need to know the **IP address** and **MAC address** of your GroNode. This information is essential for configuring your router. You can find the IP and MAC address by accessing the network settings in the GroLab Software.

11.1.2. Router Configuration

- **Access the Router's Configuration Page**:
    - Open **Network and Sharing Center** on your computer, click on your active network, then click **Details**. Write down the **gateway IP address**.
    - Enter this gateway IP address in your web browser to open your router's configuration page.
- **Configure Port Forwarding**:
    - Once inside the router's configuration page, locate the **Port Forwarding** or **Port Mapping** section (the exact name may vary by router model). This section allows external traffic to reach your device (GroNode) inside your local network.
    - Open the following ports: **9760** and **9761** for **TCP** and **UDP** protocols.
    - You need to associate these ports with the **IP address** or **MAC address** of your GroNode. This ensures that incoming traffic on these ports is forwarded directly to your GroNode. The process may vary depending on the router model.

11.1.3. Discovering Your External IP Address

Your **external IP address** is the address assigned to your network by your internet service provider (ISP). It is the address that other devices on the internet will use to connect to your network.

To find your external IP address, you can use a service like **WhatIsMyIP**. This service will display your public IP address when you visit their website. This is the IP address you will use to access your GroNode remotely.

11.1.4. Testing External Connection

- In GroLab, go to **Connection Settings** and select **Direct IP Connection**. Enter the **external IP address** of your router (the one you discovered in the previous step).
- Click **Go to Grow** to test the connection.
- If everything is configured correctly, GroLab will connect to your GroNode without issues, and the system will begin its initial loading process. You can now control and monitor your GroNode from anywhere in the world.

11.1.5. Configuring Dynamic DNS (Optional)

Since your external IP address can change periodically, it's a good idea to set up **Dynamic DNS (DDNS)**. Dynamic DNS provides a consistent hostname for your remote access, even if your external IP address changes.

- **What is Dynamic DNS (DDNS)?** Dynamic DNS is a service that automatically updates your hostname with your current external IP address. This ensures that you can always access your GroNode remotely using the same domain name, even if your external IP changes.
- To use Dynamic DNS, you must first register with a DDNS provider (e.g., **No-IP**). After registering, create a **hostname** (a name like `mygronode.no-ip.org`) that will point to your current external IP address.
- **How does DDNS work with your router?** Some routers have built-in support for DDNS. If your router supports this, you simply enter your DDNS provider's details into the router's configuration page. The router will automatically update the hostname whenever the external IP address changes.
- If your router doesn't support DDNS, you'll need to install a **Dynamic Update Client** on your computer. This client updates your DDNS hostname with your current external IP address automatically.

- Once DDNS is set up, go to **Connection Settings** in GroLab, select **Hostname** for the connection type, and enter the DDNS hostname you created (e.g., `mygronode.no-ip.org`).

11.1.6. Troubleshooting

If you're unable to connect to your GroNode remotely, check the following:

- **Router not connected to the internet**: Ensure your router has an active internet connection.
- **Port forwarding not correctly configured**: Double-check that ports 9760 and 9761 are open and forwarded to the correct IP address of your GroNode.
- **External IP address has changed**: If you didn't set up DDNS, your external IP may have changed. Update your connection settings with the new IP.

If the issue persists, contact Open Grow support with the details of your network configuration and the troubleshooting steps you've taken. They will assist you in resolving the problem and ensuring remote access to your GroNode.

13. Final Remarks

GroLab Software provides a comprehensive, easy-to-use solution for managing all aspects of your grow. From detailed automation and scheduling to remote monitoring and advanced data analysis, GroLab offers the flexibility and control necessary for both professional and hobbyist growers.

If you encounter any issues, or bugs, or even have suggestions, you can easily report them by clicking the "Report Bug" button within the GroLab Software. This allows for quicker communication with us, and we will address your concerns as soon as possible.

Additionally, you can contact us through various channels, including email, social media, our website, or phone.

For troubleshooting assistance, please consult the Troubleshooting Guide to find solutions to common issues.

Thank you for choosing GroLab!