



GrowDirector 3 PRO

Intelligent Climate Control System
for Indoor and Greenhouse Horticulture.
Powered by Machine Learning

User Guide

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The GrowDirector 3 PRO App is a powerful tool that empowers gardeners and horticulturists with the control and data they need to effectively manage and optimize their greenhouse or grow room operations. Use the GrowDirector 3 PRO App to control all equipment, devices and sensors that are integrated into the GrowDirector 3 PRO system to handle various stages of the plant growing process, from seedling to harvest
Android version of GrowDirector 3 PRO available using QR code below:

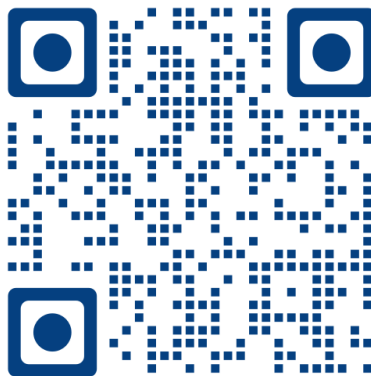


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Chapter 1: About this Document

The chapters and sections of this manual follow the features on a typical iOS / Android mobile device. Unless stated otherwise, the instructions assume you are starting from the Dashboard.

1.1. Glossary Items, Marks, and Symbols

Grow Director Ltd. – Israeli manufacturer and supplier of GrowDirector 3 PRO.

GrowDirector 3 PRO – Intelligent climate control system for indoor and greenhouse horticulture. It comes as a fully scalable and modular package of wireless Modules, Sensors and AI-driven software designed to simplify growing by automating and enhancing operations, leading to reduced labor costs, and minimized errors, while improving yields and profits.

GrowDirector – Either GrowDirector 3 PRO or Grow Director Ltd., depending on the context.

Module(s) – HydroDirector, SensorDirector, DryContactDirector, SocketDirector, DimmerDirector and ServerDirector wireless Modules (controllers) manufactured by GrowDirector. These Modules manage all the Sensors and greenhouse Devices on site.

Sensor(s) – All the Sensors for growing supplied by GrowDirector, such as: pH; EC & Water Temperature; DO; ORP; Air Temperature, Humidity & VPD; Soil Moisture; CO2; PAR; LUX; Flow Meter. These Sensors provide data about the climate on site.

Device(s) – All the greenhouse Devices and Equipment for growing you may have on site (NOT supplied by GrowDirector), such as: Irrigation Pumps, Water Pumps, Circulation Fans, Inline Fans, Outline Fans, Lights, Shade Systems, Heaters, CO2 Valves, Humidifiers, Dehumidifiers, Dosing Pumps, Irrigation Valves, Water Chillers, Misting Systems, Foggers, Air Conditioners, Solenoid Valves, Chillers, Heating Mats, Compressors, and more.

App – Mobile application available on iOS / Android mobile devices and tablets and web version available on PC.

System – Module(s), Sensor(s), Device(s), and App separately or together, depending on the context.

Note – This symbol indicates information that is useful or important to know but is not critical to the operation of the System. Notes can provide helpful tips, explanations of features or functions, or other additional reference material and further information.

Important – This symbol highlights information that must be read and fully understood and that is essential for the proper use of the System and / or its settings. This may include warnings, reminders, or instructions that must be followed to ensure the System operates as intended. Please ensure that you comprehend the instructions thoroughly before proceeding with any actions.

Warning – This symbol indicates potential dangers or hazards associated with using the System. Warnings may include instructions on how to avoid harm or damage to the System and / or users, or other important information related to safety.

Caution – This symbol indicates the possibility of damage to the System if instructions are not followed properly. Cautionary information may include recommendations on how to prevent damage or reduce the risk of unintended consequence.

1.2. Safety Precautions

To ensure the safe use of the System, please, carefully read and follow these instructions.

Instructions – Read carefully all the instructions in this manual before using the System. All documentation, including this manual, must be stored safely for future reference.

Cleaning – Always unplug the System from electrical sockets before cleaning. To clean, use a damp cloth. Don't use any type of aerosol or liquid cleaning product or organic solvent products.

Items – Only use Sensors, Devices and Equipment provided and / or recommended by GrowDirector to ensure safety and avoid damaging of the System.

Location – Modules should be mounted on a stable, flat surface to prevent them from being damaged.

Foreign Objects – Never insert metal objects into the System. This could cause personal injury.

Heat – Do not use or store the System close to a source of heat. This includes direct sunlight as well as stoves, radiators, heat registers, or anything else that generates heat.

Warning – Do not use the System close to flammable or explosive gasses, keep out of reach of children. Do not block or cover the System. Do not use or store the System in dusty or humid places. Never disassemble, modify, or attempt to repair the System yourself. Ensure the System is positioned close to an electrical socket so it's easy to unplug. Do not plug the System into electrical sockets with automatic timers or those controlled by wall switches.

Caution – Immediately stop using the System if you notice unusual noises, smells, or if you see smoke. Do not operate or hold the System with wet hands. Do not leave the System in places where the temperature can be extremely high. GrowDirector uses a lithium-ion battery, charge the Modules only with the supplied charger. The System is not waterproof or dust-proof. Do not hit or shake your the System.

Chapter 2: Introduction

Meet GrowDirector! Intelligent climate control system for indoor and greenhouse horticulture. Powered by Machine Learning.

Using the Internet of Things (IoT) and Machine Learning, GrowDirector automates plant cultivation. With the ability to be used wirelessly standalone or on a Wi-Fi network, you can manage all your growing needs remotely with GrowDirector. It is highly modular and scalable, able to control up to 16,000 Modules, and makes it easy to control the entire greenhouse or grow room environment and equipment. GrowDirector Modules communicate with each other through Wi-Fi or, if none is available, through their own wireless protocol. They include:

- **HydroDirector** – Automate up to 48,000 pumps, collect data from pH, EC and Water Temperature, DO/ORP sensors. Ideal for hydroponics.
- **SensorDirector** – Connect up to 64,000 IoT sensors to obtain limitless plant data and valuable insights.
- **DryContactDirector** – Automate up to 64,000 dry contacts and enjoy complete remote control capabilities.
- **SocketDirector** – Automate up to 32,000 electrical devices for seamless operation without any need for manual input.
- **DimmerDirector** – Tailor the schedule and brightness of 100 LED lights per controller to achieve ideal lighting conditions.
- **ServerDirector** – Create a local server for offline/off-grid backup and continuity. Enjoy secure, uninterrupted system access.

Sensors play an important role in the GrowDirector System. The Sensors receive valuable data from your farms and send it to the central Module where it is collated and displayed on a screen. You will need the following Sensor in your farms:

- pH Sensor,
- EC & Water Temperature Sensor,
- DO Sensor,
- ORP Sensor,
- Air Temperature, Humidity & VPD Sensor,
- Soil Moisture Sensor,
- CO2 Sensor,
- PAR Sensor,
- LUX Sensor,
- Flow Meter Sensor.

Devices also play an important role in the GrowDirector System. Devices are used to create specific conditions at your farms. Devices you may have on site are as follows, but not limited to:

- Irrigation Pumps,
- Water Pumps,
- Circulation Fans,
- Inline Fans,
- Outline Fans,
- Lights,
- Shade Systems,
- Heaters,
- CO2 Valves,
- Humidifiers,
- Dehumidifiers,
- Dosing Pumps,
- Irrigation Valves,
- Water Chillers,
- Misting Systems,
- Foggers,
- Air Conditioners,
- Solenoid Valves,
- Chillers,
- Heating Mats,
- Compressors.

2.1. HydroDirector Module

2.1.1. About the Product



HydroDirector is an advanced automation and data management solution that has been designed to optimize hydroponic systems. It has the capacity to automate up to 48,000 pumps, thereby streamlining the entire hydroponic process and making it more efficient

than ever before. With HydroDirector, you can collect data from pH, EC and Water Temperature, DO/ORP Sensors with ease, and have complete control over your hydroponic system, and set up alerts to notify you when certain conditions are met, or something goes wrong. This enables you to make informed decisions and adjust your system accordingly to achieve optimal growing conditions for your plants.

Whether you are an experienced hydroponic grower or just starting out, HydroDirector is the ideal tool to help you achieve maximum yields and optimal plant growth. Its advanced features and ease of use make it a must-have for anyone looking to take their hydroponic system to the next level.

What HydroDirector can do:

- Control up to 48,000 dosing pumps in one system by adding extra Modules. Single Module can handle 3 pumps and 3 hydroponic Sensors.
- Regulate and maintain perfect water quality and balance by controlling your levels of pH, EC, Water Temperature, DO, ORP necessary to your plants' health.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.
- Machine Learning: Leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes, and maintain the perfect water balance with proactive and reactive incremental changes.
- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.
- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.
- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.

2.2. SensorDirector Module

2.2.1. About the Product



SensorDirector is an advanced automation and data management solution allowing to connect up to 64,000 IoT Sensors to obtain limitless plant data and valuable insights. With SensorDirector, you can collect data from Air Temperature, Humidity and VPD, Soil Moisture, CO₂, PAR, LUX, Flow Meter Sensors with ease. With SensorDirector, you can gain unprecedented visibility into the health and performance of your plants, allowing you to make informed decisions and optimize your growing conditions. By connecting up to 64,000 IoT Sensors, you can collect a vast amount of data on your plants, and set up alerts to notify you when certain conditions are met or something goes wrong. This allows you to take proactive measures to prevent issues and ensure optimal plant growth.

By using SensorDirector, you can gain valuable insights into your plants' behavior, which can help you optimize your growing conditions and achieve greater yields. Whether you're a professional grower or a hobbyist, SensorDirector is the perfect tool to help you take your plant growth to the next level.

What SensorDirector can do:

- Receive and analyze data from up to 64,000 Sensors by adding expandable Modules. Single Module can handle 4 Sensors.
- Create separate finely tuned climate zones by configuring your climate control devices using precise Sensor data.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.
- Machine Learning: leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes and maintain the perfect climate balance with proactive and reactive incremental changes.
- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.

- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.
- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.

2.3. DryContactDirector Module

2.3.1. About the Product



DryContactDirector is an advanced automation and data management solution that allows you to seamlessly operate up to 64,000 dry contacts without any need for manual input. With DryContactDirector in place, you can automate your devices and enjoy uninterrupted functionality. Its advanced features and ease of use make it an ideal choice for anyone looking to simplify their operations and save time, energy, and money.

Whether you're managing a large industrial operation or a complex network of Devices, DryContactDirector is the perfect choice for you, since it can help you optimize your workflow, allowing you to focus on other important tasks. With its advanced capabilities, you can streamline your operations, improve productivity, and ultimately achieve greater success in your growing business.

What DryContactDirector can do:

- Control up to 64,000 electrical Devices in one system by adding extra Modules. Single Module can handle 4 dry contacts.
- Automate and control multiple high-power or low-voltage equipment with one controller.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.

- Machine Learning: leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes and maintain the perfect climate balance with proactive and reactive incremental changes.
- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.
- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.
- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.



2.3.2. Installation Guideline






2.3.1.1. Handling and Safety Instructions

During installation, operation, testing and inspection, adherence to all the handling and safety instructions is mandatory. When used in 120Vac/60Hz or 230Vac/50Hz (Hazardous Live) circuits, the installation must be performed by authorized and certified electricians. **Failure to do so may result in injury or loss of life and damage to the equipment.**

Safety and Environmental Symbols Information

The following safety symbols are used in this document and marked on the DryContactDirector Module label. Familiarize yourself with the symbols and their meaning before installing or operating the system.

	<p>Danger of electric shock when operated in 120Vac/60Hz or 230Vac/50Hz circuits. Hazardous live voltage is present on connector terminals. The Module must be installed in a standard electrical enclosure (box or cabinet).</p>
	<p>Caution, when operated in 120Vac/60Hz or 230Vac/50Hz circuits the Module must be externally protected by 10A circuit breaker for mains disconnect in overcurrent situation.</p>

	cTUVus certified compliance. IEC 61010-1: 2010 (3rd Edition) + A1:2016 / EN 61010-1: 2010 + A1:2019. CAN/CSA – C22.2 No. 61010-1-12 / UL61010-1: (3rd Edition) SI 61010-1: 2013.
	The product is assembled using components that have been separately certified to have an electromagnetic radiation below the limits specified by the Federal Communications Commission (FCC).
	CE mark. The product meets the requirements of the applicable EU directives.
	Waste Electrical and Electronic Equipment directive mark. The product must not be disposed of in household waste; dispose of it through environmentally friendly collection centers.
	The product complies with the requirements of Restriction of the Use of Certain Hazardous Substances in Electronic and Electrical Equipment (2011/65/EU Directive).

2.3.1.2. Overview

A dry contact is a volt-free passive contact having no energy applied to its contacts internally. From the user perspective the dry contact simply operates like an ordinary switch that opens or closes the circuit. The DryContactDirector Module uses internal relays operating as fully isolated switches allowing the user to connect them to various independent circuits.

The DryContactDirector Module is a Wi-Fi wireless load management device. It switches loads on and off according to system configuration. It supports a wide input voltage range of up to 230V and a wide input current range of up to 10A.

Please refer to the “DryContactDirector Use Cases” Application Note for detailed examples of various usage scenarios.

2.3.1.3. Installation

Caution!

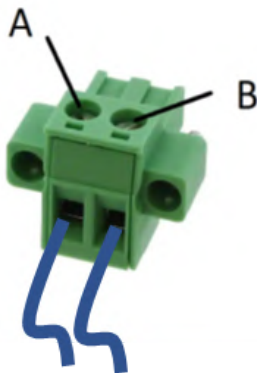
- This product must be operated under the specified operating specifications, as described in the latest **technical specification datasheet**.

- Configure the product so that the load connected is not switched on or off more frequently than specified by the load manufacturer.
- Do not use the product if it is damaged or malfunctioning.
- Do not let the product come into contact with water or other liquids.
- This product contains no user-serviceable parts. Do not attempt to open, modify, disassemble or repair any component of the device.
- The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein.

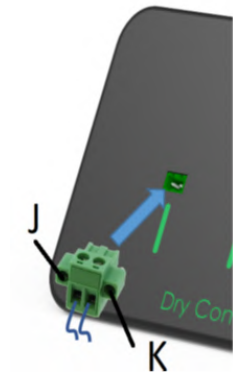
1. Use the provided terminal block plug to connect the DryContact to the controlled load:



2. Use the wire fixing screws (A and B) to affix the load wires (AWG 12-26, 0.13-3.31mm², according to current capacity required by applicable standard and application needs):



3. Insert the terminal block plug into the DryContactDirector terminal socket and tighten it using screws J and K:



4. Caution!



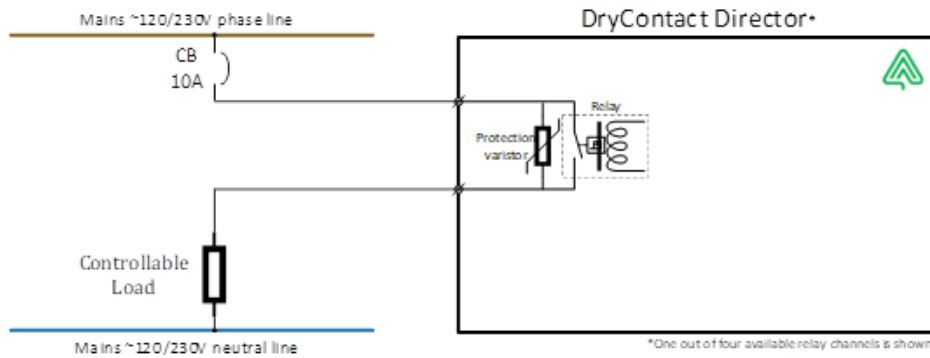
When the DryContactDirector is used to control equipment powered by 120Vac/60Hz or 230Vac/50Hz circuits, it must be installed in standard electrical enclosure (electrical cabinet or box) to prevent access to hazardous live exposed parts of the terminal block!

5. Caution!



Due to the fact the DryContactDirector has no internal fuse protection, when it is used in 120Vac/60Hz or 230Vac/50Hz circuits, an external 1-Pole circuit breaker rated 10A and certified in accordance with IEC 60947-2 (in US/Canada a Listed branch circuit protective circuit breaker) shall be used for overcurrent protection and mains disconnection.

The following figure illustrates an example of such circuit connection:



2.3.1.4. Ambient Operating Conditions

Environment	Indoor use
Temperature	0-50°C or 32-122°F
Max. rel. humidity	90%, non-condensing
Permissible installation altitude	2,000 m above sea level

2.4. SocketDirector Module

2.4.1. About the Product





SocketDirector is an advanced automation and data management solution that allows you to seamlessly operate up to 32,000 electrical Devices without any need for manual input. With SocketDirector in place, you can automate your Devices and enjoy uninterrupted functionality. Its advanced features and ease of use make it an ideal choice for anyone looking to simplify their operations and save time, energy, and money.

Whether you're managing a large industrial operation or a complex network of Devices, SocketDirector is the perfect choice for you, since it can help you optimize your workflow, allowing you to focus on other important tasks. With its advanced capabilities, you can streamline your operations, improve productivity, and ultimately achieve greater success in your growing business.

What SocketDirector can do:

- Control up to 32,000 electrical Devices in one system by adding extra Modules. Single Module can handle 2 sockets.
- Automate and control multiple appliances like Irrigation and Dosing Pumps, Fans, LED lights, Chillers and Heaters, and any electrical equipment with one controller.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.
- Machine Learning: leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes, and maintain the perfect climate balance with proactive and reactive incremental changes.
- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.
- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.

- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.

2.5. DimmerDirector Module

2.5.1. About the Product



DimmerDirector is an advanced automation and data management solution for customizing LED lights per controller to achieve ideal lighting conditions. With DimmerDirector, you have complete control over the lighting in your environment, allowing you to tailor the brightness and schedule of up to 100 LED lights per controller to meet your specific needs.

By using DimmerDirector, you can achieve optimal lighting conditions, which can have a significant impact on growing business. DimmerDirector is the perfect tool to help you create the perfect lighting environment.

What DimmerDirector can do:

- Control up to 16,000 individual or daisy chain LEDs in one system by adding extra Modules. Single Module can handle up to 100 lights.
- Adapt your lighting to natural daytime lighting conditions to prevent electricity waste and/or plants overheating.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.
- Machine Learning: leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes and maintain the perfect climate balance with proactive and reactive incremental changes.
- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.

- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.
- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.

2.6. ServerDirector Module

2.6.1. About the Product



ServerDirector is an advanced solution for creating a local server for offline/off-grid backup and continuity, with secure and uninterrupted system access. With ServerDirector, you can ensure the continuity of your operations, even in the event of an Internet outage or disruption. By creating a local server, you can store your data offline, without the need for an Internet connection, and enjoy secure and uninterrupted access to your systems, ensuring that your business operations remain smooth and uninterrupted.

What ServerDirector can do:

- Create a secure local virtual cloud for all your Modules and equipment, even when the Internet is slow or unavailable.
- Ensure redundancy and stability of your entire operation regardless of Internet status, ideal in remote areas with unstable or non-existent Internet.
- Set up in minutes, decrease labor costs, reduce grower errors, increase yields, reduce resource consumption.
- Machine Learning: leverage the power of AI to improve predictions and outcomes, while configuring automated routines in innovative ways that were previously unattainable.
- Predictions: Prevent grower errors, predict changes and maintain the perfect climate balance with proactive and reactive incremental changes.

- User-Friendly Interface: Enhance your crop yield and quality, our intuitive design and easy-to-read display make system operation and monitoring a breeze.
- Customizable Alerts: Set notifications for critical parameter changes, ensuring prompt action when needed to maintain ideal growing conditions.
- Remote Monitor & Control: Stay connected with your greenhouse using our App, allowing you to monitor and control your system from anywhere.
- Data Logging & Analysis: Track your system's performance over time with detailed data logging and analytics, helping you optimize your greenhouse's productivity.

2.7. pH Sensor



A pH Sensor measures the acidity or alkalinity of the nutrient solution used to grow plants. It helps maintain the proper pH levels required for optimal plant growth and health. pH Sensors for hydroponics are essential tools for hydroponic gardeners, as they allow for accurate and precise monitoring of pH levels, which can directly affect plant growth and yield. With a pH Sensor, hydroponic gardeners can ensure their plants are receiving the right nutrients at the right time, leading to healthier and more productive plants.

Specification:

- pH range: 0-14 pH,
- Temperature range: 0-100°C (32-212°F),
- Industrial grade electrode cable length: 3m (10ft).

2.8. EC & Water Temperature Sensor



An EC & Water Temperature Sensor measures the electrical conductivity of the nutrient solution used to grow plants. It helps ensure that the solution contains the correct amount of dissolved salts and minerals required for optimal plant growth and health. EC Sensors for hydroponics are essential tools for hydroponic gardeners as they allow for accurate and precise monitoring of the nutrient solution's conductivity levels, which can directly affect plant growth and yield. With an EC Sensor, hydroponic gardeners can adjust the nutrient solution's composition and ensure their plants are receiving the right nutrients at the right time, leading to healthier and more productive plants.

Specification:

- EC range: 0-10 ms/cm (0-10 EC),
- Temperature range: 0-70°C (32-158°F),
- Industrial grade electrode cable length: 3m (10ft).

2.9. DO Sensor



A DO Sensor ensures that plants are receiving the right amount of oxygen required for optimal growth and health. DO Sensors allow for accurate and precise monitoring of dissolved oxygen levels, which can directly affect plant growth and yield. With a DO Sensor, you can adjust the oxygen levels in your irrigation systems and ensure plants are receiving the right amount of oxygen, leading to healthier and more productive plants.

Specification:

- DO range: 0-20 mg/L,
- Temperature range: 0-50°C (32-122°F),
- Saturation output: HDPE = 47mV +/- 9mV, PTFE = 33mV +/- 9mV,
- Industrial grade electrode cable length: 3m (10ft).

2.10. ORP Sensor



An ORP Sensor measures the oxidation-reduction potential (ORP) of the nutrient solution used to grow plants. It helps ensure that the solution has the correct balance of oxidizing and reducing agents required for optimal plant growth and health. ORP Sensors are essential tools for hydroponic gardeners as they allow for accurate and precise monitoring of the nutrient solution's ORP levels, which can directly affect plant growth and yield. With an ORP Sensor, you can adjust the nutrient solution's composition and ensure your plants are receiving the right balance of oxidizing and reducing agents, leading to healthier and more productive plants.

Specification:

- pH range: 0-14 pH,
- ORP range: $\pm 2000\text{mV}$,
- Temperature range: 0-100°C (32-212°F),
- Industrial grade electrode cable length: 3m (10ft).

2.11. Air Temperature, Humidity & VPD Sensor



An Air Temperature, Humidity & VPD Sensor monitors the temperature, humidity and VPD levels in the growing environment. It provides accurate and up-to-date information on the conditions inside the grow room, greenhouse, or indoor farm. Professional growers use Air Temperature, Humidity & VPD Sensors to ensure that the conditions in the growing environment are optimal for plant growth and health. With an Air Temperature, Humidity & VPD Sensor, you can adjust temperature, humidity and VPD levels, identify potential issues such as high humidity or temperature fluctuations, and

take corrective actions as needed. This helps ensure the highest quality of crop yield and consistency in plant growth.

Specification:

- Temperature range: -40 - $+80^{\circ}\text{C}$ (-40 - $+180^{\circ}\text{F}$),
- Temperature accuracy: $\pm 0.3^{\circ}\text{C}$ ($\pm 32^{\circ}\text{F}$),
- Humidity range: 0-100% RH,
- Humidity accuracy: $\pm 2\%$ RH ($+25^{\circ}\text{C}$ ($+77^{\circ}\text{F}$)),
- Cable length: 2m (6.5ft).

2.12. Soil Moisture Sensor



A Soil Moisture Sensor measures the amount of water content in soil. Soil Moisture Sensors are critical in ensuring that plants receive the optimal amount of water, as over or under watering can harm plant growth and development. Soil Moisture Sensors work by measuring the electrical conductivity or resistance of soil, which changes depending on the amount of moisture present. The Sensor data can be used to trigger automated irrigation systems or to guide manual watering decisions. Overall, Soil Moisture Sensors are an essential tool for horticulturists to maintain healthy plant growth and maximize crop yield.

Specification:

- Temperature range: -30 - $+70^{\circ}\text{C}$ (-22 - $+158^{\circ}\text{F}$),
- Moisture range: 0-100%,
- Accuracy: $\pm 2\%$ for 0-50%, $\pm 3\%$ for 51-100%,
- Cable length: 2m (6.5ft).

2.13. CO2 Sensor



A CO₂ Sensor monitors the levels of carbon dioxide (CO₂) within the growing environment. CO₂ is essential for photosynthesis, and maintaining optimal levels can improve plant growth, development, and yield. CO₂ Sensors work by detecting changes in the amount of CO₂ in the air surrounding the plants, typically by measuring changes in the infrared light absorption or conductivity. The Sensor data can be used to adjust ventilation or CO₂ injection systems to maintain optimal growing conditions. Overall, CO₂ Sensors are an important tool for horticulturists to optimize plant growth and yield in controlled environments.

Specification:

- Temperature range: -40-+80°C (-40-+180°F),
- Temperature accuracy: ±0.3°C (±32°F),
- Humidity range: 0-100% RH,
- Humidity accuracy: ±2% RH (+25°C (+77°F)),
- Cable length: 2m (6.5ft).

2.14. PAR Sensor



A PAR Sensor measures the quantity and quality of light available to plants within a growing environment. PAR stands for photosynthetically active radiation, and these Sensors can provide valuable data on the intensity and spectrum of light that plants require for optimal growth and development. PAR Sensors work by detecting the number of photons in the range of 400-700 nm, which is the range of light that plants use for photosynthesis. The Sensor data can be used to adjust artificial lighting systems or to optimize plant positioning within the greenhouse to maximize light exposure. If you're interested in optimizing your greenhouse for plant growth and yield, consider adding a PAR Sensor to your collection of horticulture tools today.

Specification:

- Temperature range: 0-60°C (32-140°F),
- Humidity range: 0-99% (RH),
- Spectral range: 400-750 nm ±5 nm,
- Cable length: 2m (6.5ft).

2.15. LUX Sensor



A LUX Sensor measures the intensity of light available to plants within a growing environment. LUX Sensors can provide valuable data on the amount of light that plants require for optimal growth and development. LUX Sensors work by detecting the level of luminance in a given area, which is measured in lux. The Sensor data can be used to adjust artificial lighting systems or to optimize plant positioning within the greenhouse to maximize light exposure. If you're interested in optimizing your greenhouse for plant growth and yield, consider adding a LUX Sensor to your collection of horticulture tools today.

Specification:

- LUX range: 0-200k lux,
- Spectral range: 380-780 nm,
- Cable length: 2m (6.5ft).

2.16. Flow Meter Sensor



A Flow Meter Sensor measures the rate of water or nutrient flow within irrigation systems. Flow Meter Sensors are critical in ensuring that plants receive the optimal amount of water and nutrients, as over or under watering can harm plant growth and development. Flow Meter Sensors work by measuring the volume of liquid passing through the system per unit of time, typically using a paddle wheel, turbine, or electromagnetic measurement mechanism. The Sensor data can be used to adjust irrigation flow rates to maintain optimal growing conditions. Overall, Flow Meter Sensors

are an essential tool for horticulturists to maintain healthy plant growth and maximize crop yield.

Specification:

- Temperature range: 0-60°C (32-140°F),
- Humidity range: 0-99% (RH),
- Flow rate range: 1-30 l / min,
- Allowing pressure: ≤ 1.75 MPa,
- Cable length: 2m (6.5ft).

Chapter 3: Configuring GrowDirector

GrowDirector lets you automate and remotely control all your growing activities. The features include:

- Get real-time information from the Sensors in your greenhouse.
- Stay up-to-date with push notifications.
- Maintain full automation and control over the growing process by setting and editing rules remotely.

3.1. System Requirements

GrowDirector is available on mobile devices and via web [browsers](#). The System Requirements are as follows:

- Android: Android 8 and later.
- iOS: iOS 13 and later.
- Browser: Apple Safari, Google Chrome, and Mozilla Firefox.

3.2. Downloading the GrowDirector App

For Android 8 and later mobile devices, download the GrowDirector App from the Google Play Store.

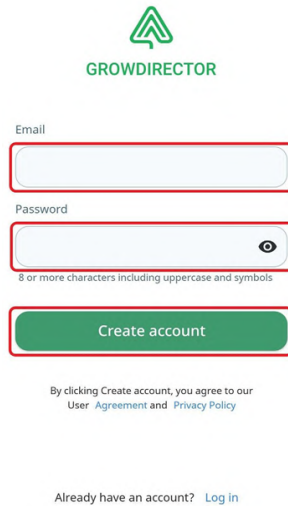
For iOS 13 and later mobile devices, download the GrowDirector App from the App Store.

You can use a Web Application and access the system through your PC as well. To do so, first, a Mobile App must be installed, and, second, Modules, Devices and Sensors must be connected.

3.3. Creating a New Account

To create a new GrowDirector account, please, follow these steps:

1. Install the GrowDirector App on your mobile device.
2. Open the App. Tap the Create account button, the following screen appears:

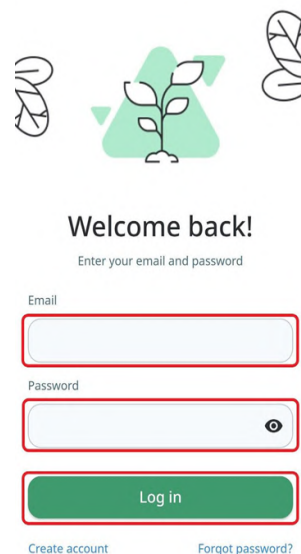


3. In the **Email** field, enter your email address.
4. In the **Password** field, enter your password. Your password should be a combination of 8 or more characters, including letters with at least one uppercase, numbers and symbols.
5. Tap the **Create account** button to complete your registration.
6. Now you have your account!

3.4. Logging In

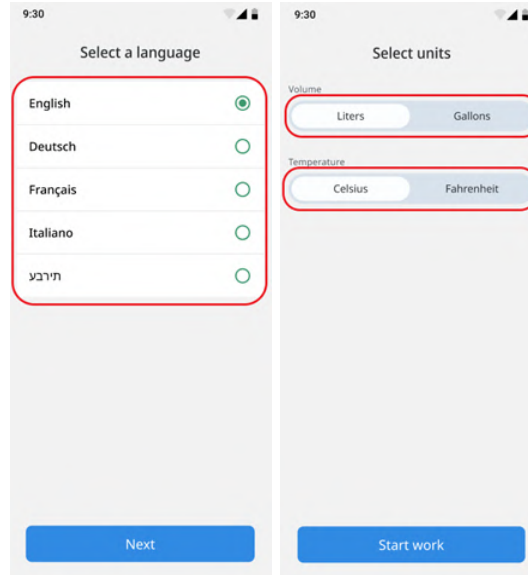
To log in using an existing GrowDirector account, please, follow these steps:

1. Open the App. The following screen appears:



2. In the **Email** field, enter the email address you used to create your account.

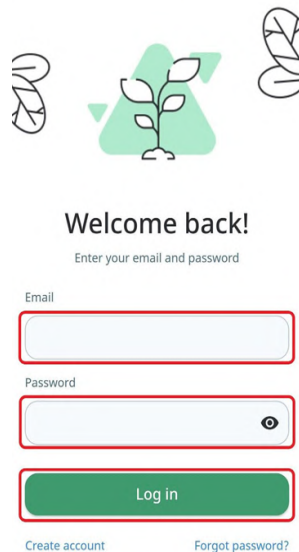
3. In the **Password** field, enter the password you used to create your account.
4. Tap the **Log in** button.
5. When you log in for the first time, you are prompted to set your preferred language and units of measurements:



3.5. Recovering Your Password

To recover your password, please, follow these steps:

1. Tap the **Forgot password?** option at the bottom of the Log in screen:



2. The following screen appears:

Password recovery

Enter the email specified during registration

Email

johnsmith@growdirector.com

Continue

Log in

3. In the **Email** field, enter the email address you used to create your account and tap the **Continue** button.
4. A six-digit code will be sent to your registered email ID. If you do not receive the code on time (you will have 60 seconds to enter the code), tap the **Send New Code** option to generate a new code. After entering the six-digit code, you will be redirected to the next screen where you can securely enter a new password:

Password recovery

Enter code sent to
joh***@growdirector.com

Send New Code

1	2	3
4	5	6
7	8	9
C	0	⊗

5. Enter your new password 2 times in the **New password** field and the **Confirm new password** field. Your password should be a combination of 8 or more characters, including letters with at least one uppercase, numbers and symbols. Tap the **Set password** button:

<

Password recovery

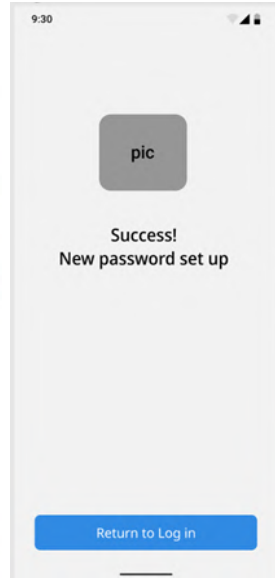
Type new password

New password

8 or more characters including uppercase and symbols

Confirm new password

Set password



Chapter 4: Managing Modules

When you open the GrowDirector App for the very first time, there are no Modules in the System yet. Therefore, you must first add (connect) the first Module to proceed.

4.1. Connecting a New Module

Note: Ensure your Wi-Fi is switched on. Make sure your router is compatible with the 2.4 GHz frequency, as Modules require this frequency for connection:

- Check the router's label: Look for a label or sticker on your router that lists the supported frequencies. Most routers will have either "2.4 GHz" or "Dual-Band" (which means it supports both 2.4 GHz and 5 GHz) mentioned on the label.
- Router's user manual: Refer to the user manual or product documentation that came with your router. Look for information on supported frequencies. If you don't have the physical copy, you can search online for your router's make and model to find a digital version of the manual.
- Router's web interface: Access your router's web interface by typing the router's IP address into a web browser. The IP address is typically found on the router's label or in the user manual. It often looks like "192.168.1.1" or "192.168.0.1". Once you've logged in to the web interface, navigate to the wireless settings and check if the 2.4 GHz frequency band is available.
- Manufacturer's website: Visit the manufacturer's website and search for your router's model number. Check the product specifications for information about supported frequency bands.
- If your router supports the 2.4 GHz frequency, you should be able to connect devices that require this frequency for operation.

To connect a Module, please, follow these steps:

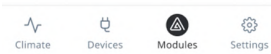
1. Ensure your phone is connected to the same Wi-Fi network as the one you plan to use for the Module.
2. Stay within 10 meters (30 feet) from the Module during setup.
3. Connect the Module to a power source, then locate the 'sync' button on its back panel. Press and hold the button for 10 seconds.
4. Wait for a blinking green light.
5. In the App, tap on the **Module** tab, and then on the **Plus** button (⊕ icon) on the top-right corner of the screen.

Modules +



You haven't added modules yet

To connect new module press "Plus" button on the right top corner of this screen



6. The App should automatically detect your Wi-Fi network. Verify that it matches the network you want to connect the Module to.
7. When prompted, input your **Wi-Fi network password** and tap **Save** to proceed.

← Add module



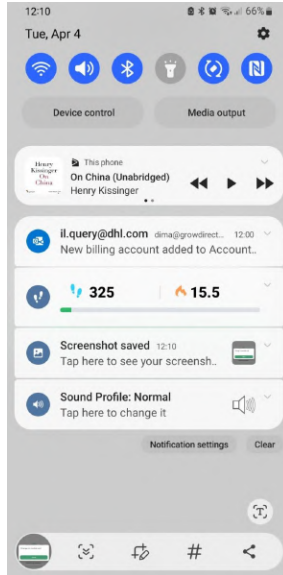
Enter WiFi ssid

Enter WiFi password

Save

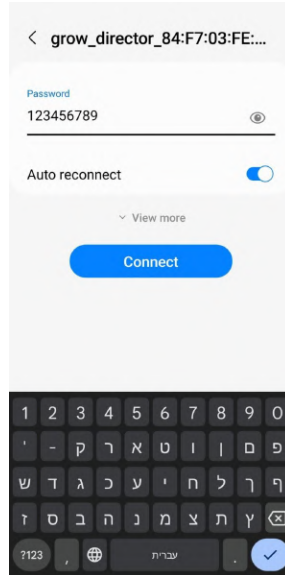
8. Access your phone's Wi-Fi settings through the settings menu, under 'Connections' or a similar category.



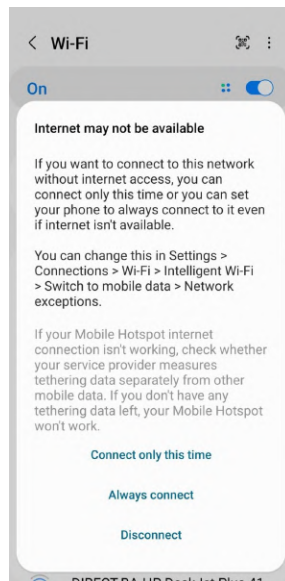
9. Browse the list of available Wi-Fi networks tap and select your module's name (e.g., HydroDirector, SensorDirector).



10. Only if it's your first connection to this module.: You'll be prompted to enter a password for your module. Use the default password (123456789) for the first-time setup and tap 'Connect'.



11. If this is NOT your first connection to THIS module please skip to step 13
12. If a message appears stating 'Internet may not be available', select the 'Always connect' option to bypass this warning.



13. The App will begin connecting the module to your Wi-Fi network. Wait for up to 2 minutes, for the 'Module successfully connected!' screen to appear, signaling that the process is complete.

Module successfully
connected!

module_84:F7:03:FE:86:FA

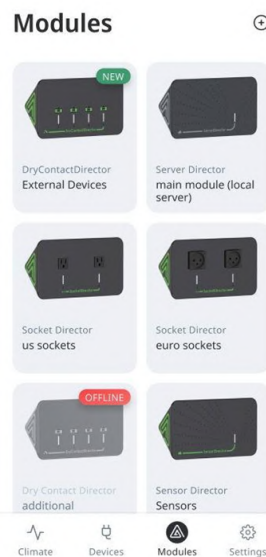


DryContactDirector
84:F7:03:FE:86:FA

Connect another one

Finish

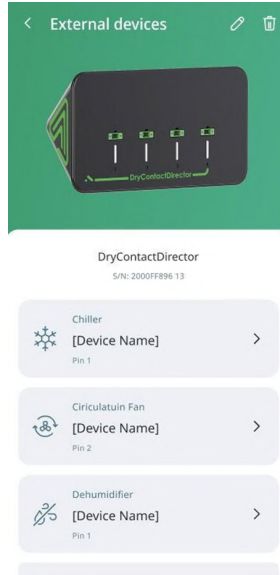
14. Tap the **Connect another one** button to connect one more Module.
15. Tap the **Finish** button to complete the process. The Module is added to the Modules screen, and marked with a green sign **New**:



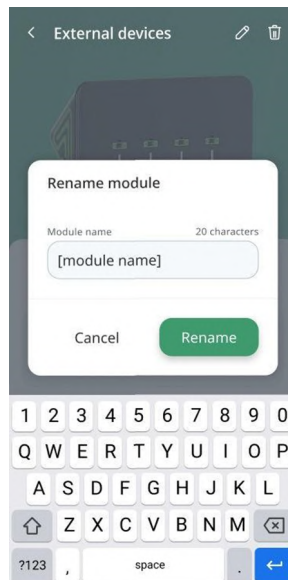
4.2. Renaming a Module

To rename a Module, please, follow these steps:

1. Tap the **Module** that you want to rename. The following screen appears:



2. Tap the **Edit** button (✎ icon) on the top-right corner of the screen. The following screen appears:

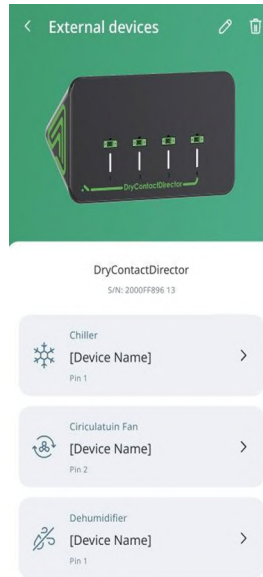


3. Enter the new name of the Module in the **Module name** field and tap the **Rename** button.
4. If you do not want to proceed with renaming, tap the **Cancel** button.

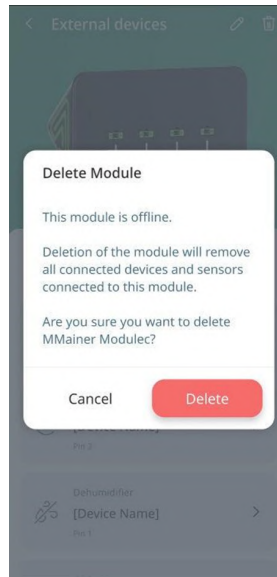
4.3. Deleting a Module

In order to delete a Module, you need to delete Devices and/or Sensors connected to a Module first. If there are Rules associated with Devices, you need to delete the Rules as well. This is made in order not to delete a Module occasionally. To delete a Module, please, follow these steps:

1. Tap the **Module** that you want to delete. The following screen appears:



2. Tap the **Delete** button (🗑 icon) on the top-right corner of the screen. The following screen appears:



5. Tap the **Delete** button.
6. If you do not want to proceed with deleting, tap the **Cancel** button.

Chapter 5: Managing Devices

When you open the GrowDirector App for the very first time, there are no Modules and Devices in the System yet. Therefore, you must first add (connect) the required specific Modules, and to connect to the Modules Devices to proceed. There can be 2 scenarios on the Devices screen:

- **No Module detected** – When the Modules have not been connected yet,
- **No Device detected** – When the Modules are connected, but the Devices have not been connected.

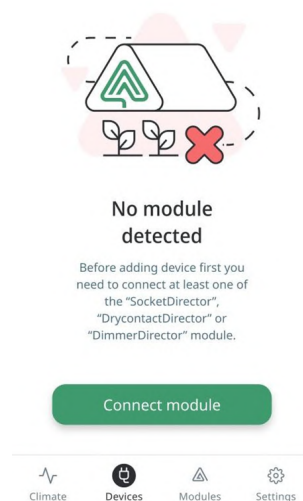
It is possible to connect Devices only to the required specific Modules. Devices can not be present in the System without being connected to the required specific Modules.

Message **No Module detected** is shown if the required specific Modules have not been connected for this account yet.

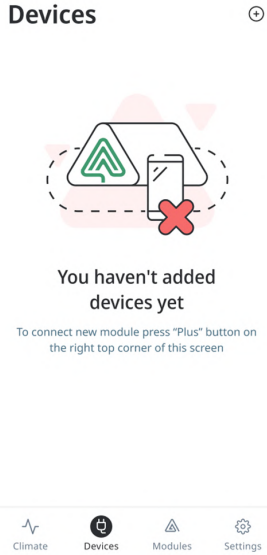
The following Modules allow connection of Devices:

- SocketDirector,
- DryContactDirector,
- DimmerDirector,
- HydroDirector.

On the Devices screen, tap the **Connect module** button. You will see a screen with an option to make a connection:

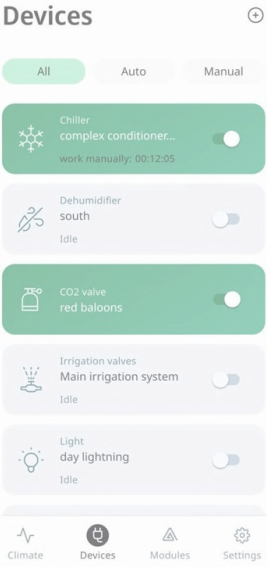


Message **You haven't added Devices yet** is shown if the Modules are connected, however, no Devices have been connected yet. To connect a new Device, tap the **Plus** button (+ icon) on the top-right corner of the Devices screen:



5.1. Viewing Device List

Devices screen contains main information about all connected Devices available for the user:



The Devices on this screen are displayed as tiles with their key information, and are sorted according to the date when they were connected. The most recently connected Devices are displayed first.

You can see the following on the Device screen:

- Name of the screen on the top-left corner,
- Action to connect new Device on the top-right corner,
- Filter to see All Devices or based on the Auto / Manual mode:
 - All – displays all Devices currently configured in the System regardless type, working mode, etc.,
 - Auto – displays all Devices that are running in automatic mode based on the rules configured,
 - Manual – displays all Devices that are running in manual mode based on the rules configured.
- List of all available devices,
- TabBar or the main menu of the App.

There are several states of the Device, depending on which Device card will have different elements on it:

- Auto (mode) – working (turned on now),
- Auto (mode) – idle (turned off now, waiting for the rule),
- Auto (mode) – offline (turned off now or broken),
- Manual (mode) – working (turned on now),
- Manual (mode) – idle (turned off now),
- Manual (mode) – offline (turned off now or broken).

Tap any of the Device tiles and you will be redirected to the screen with this specific Device where you can view detailed information.

5.2. Adding a Device to the Devices List

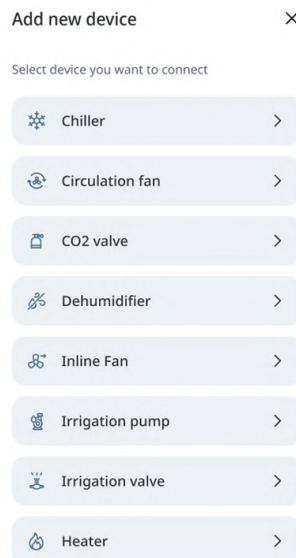
You can add the following types of Devices:

- Irrigation Pumps,
- Water Pumps,
- Circulation Fans,
- Inline Fans,
- Outline Fans,
- Lights,
- Shade Systems,
- Heaters,
- CO2 Valves,
- Humidifiers,
- Dehumidifiers,

- Dosing Pumps,
- Irrigation Valves,
- Water Chillers,
- Misting Systems,
- Foggers,
- Air Conditioners,
- Solenoid Valves,
- Chillers,
- Heating Mats,
- Compressors.

To add a new Device, please, follow these steps:

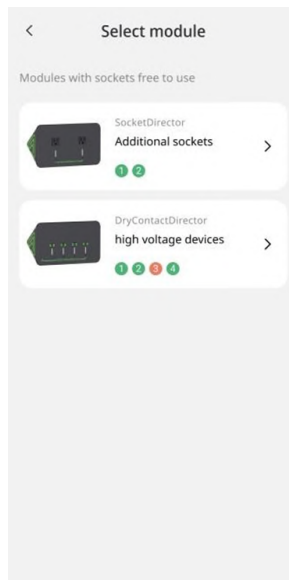
1. Tap the **Plus** button (⊕ icon) on the top-right corner of the Devices screen. The following screen appears:



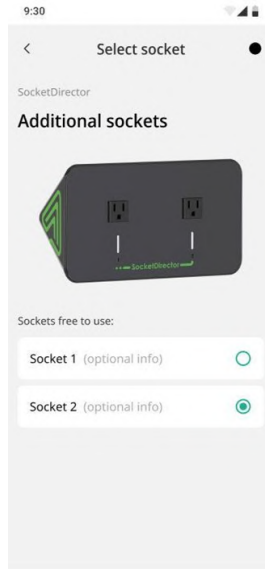
2. The system will offer you a connection to the specific Modules that handle the Devices chosen. Tap the **Type of Device** you want to add. The following screen appears:



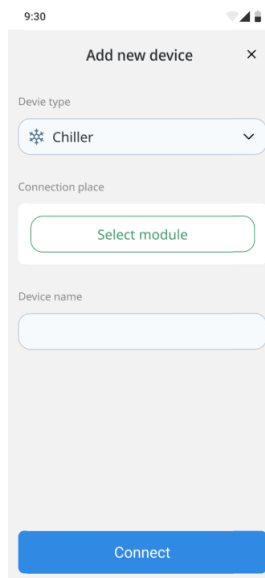
3. Enter the name of the Device in the **Device name** field.
4. Tap the **Select module** button. The following screen appears:



5. Tap a **Module** to which you want to add a Device. The following screen appears:



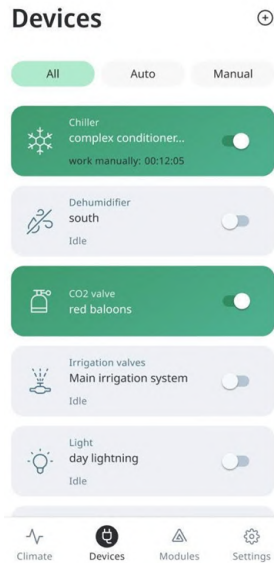
6. Select the Socket to which you want to connect your Device. Then, return to the first screen and tap the **Connect** button:



Note: When there are no Modules left for connecting additional Devices, you can reach out to us to purchase additional Modules.

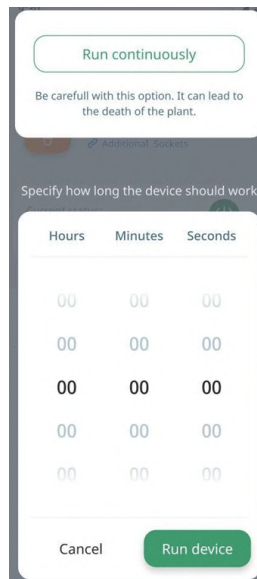
5.3. Switching On a Device

After adding a Device, you need to switch it on physically so that it can start functioning. You can enable the Device to run continuously or specify a duration for the Device to run:



To switch on a Device, please, follow these steps:

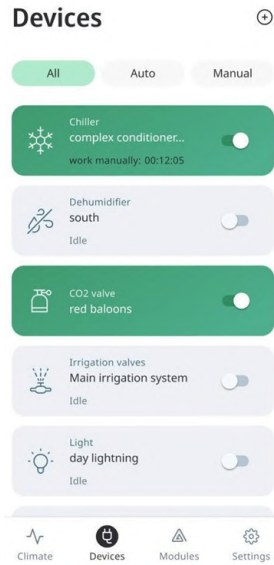
1. On the Devices screen, tap the **On** button corresponding to the Device you want to switch on. The following screen appears:



- To run the Device continuously, tap the **Run continuously** button.
- To specify how long the Device should run, select the hours, minutes, and seconds. Then, tap the **Run device** button.

5.4. Switching Off a Device

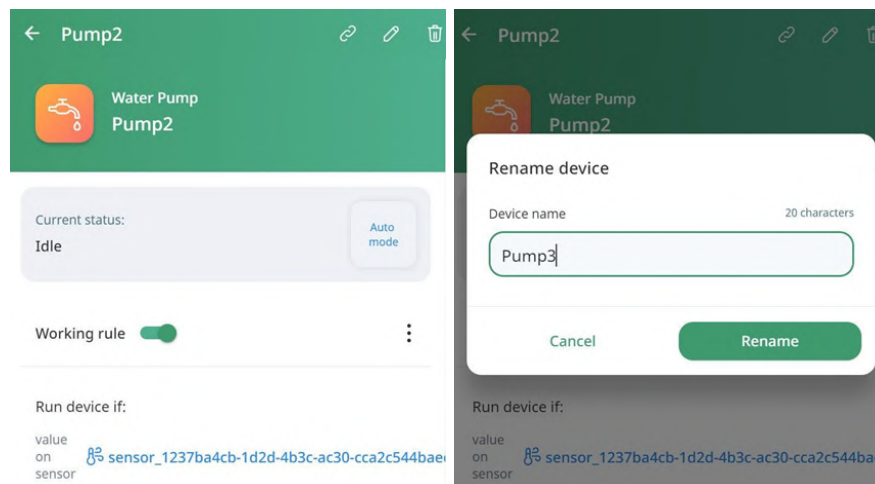
To switch off a Device, tap the **Off** button corresponding to the Device you want to switch off:



5.5. Renaming a Device

To rename a Device that you have added, please, follow these steps:

1. Tap on **Device name** on the Devices screen. Tap the **Edit** button (✎ icon) on the top-right corner of the screen. The following screen appears:



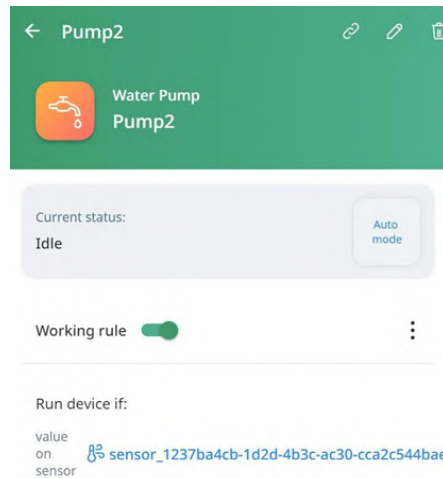
2. Enter the new name in the **Device name** field and tap the **Rename** button.

5.6. Deleting a Device

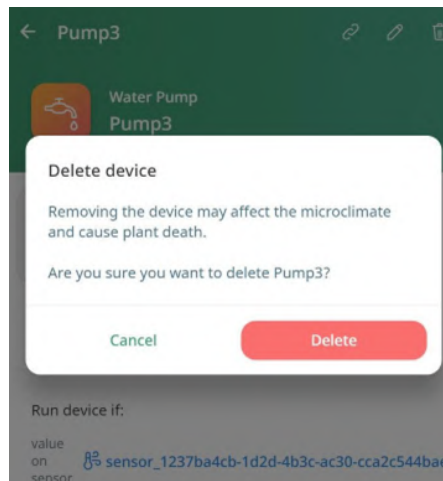
To delete a Device that you added, please, follow these steps:

1. On the **Device** list screen, you need to select the required device. Click on it, and the Device page opens. You need to delete all the rules (if any), and in order to

delete the rules, you need to deactivate them, and tap the **Delete** button (🗑 icon) on the top-right corner of the screen. The following screen appears:



3. Tap the **Delete** button:



5.7. Device Rules

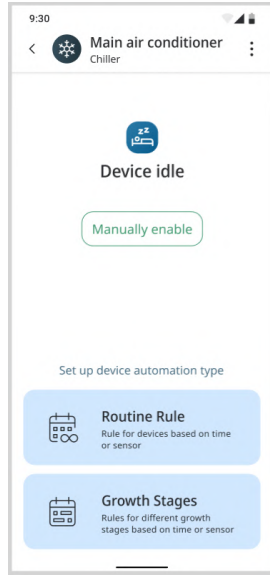
You can also set custom rules based on which you want to manage your Device operations. You can set rules to make your Devices run based on the following:

- Daily rules - one rule for each further day
- Growth stages - rules for configured amount of days from one date to another.

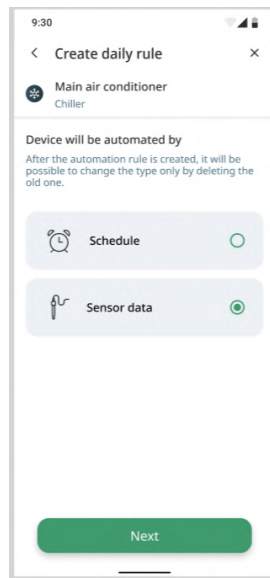
5.7.1 . Set a Daily rules

To set a Device rules you need to follow steps:

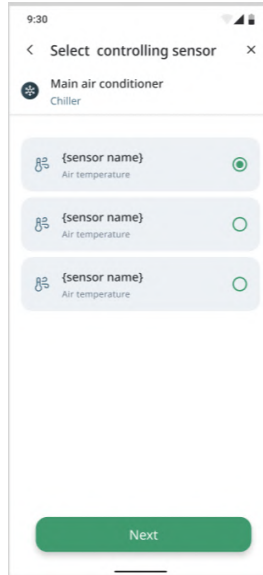
1. Tap the **Device** tile for which you want to set a rule. The following screen appears:



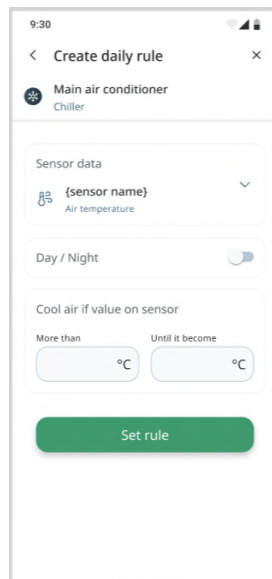
2. Tap the **Routine Rule** tile.
3. Choose rules by Schedule or Sensor data.



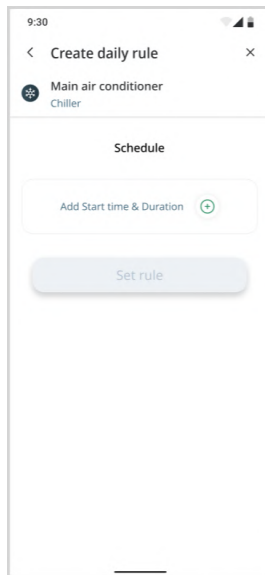
4. Rules for sensor data are configured based on sensor values. System will show a list of available sensors for this device. Select one sensor to continue configurations.



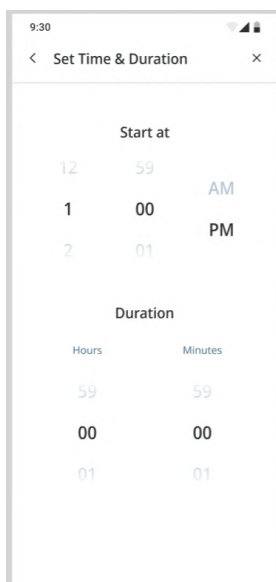
5. On the next step you may change the selected sensor, set up day and night min max values or just set up full day min max values.



6. To set up the **Schedule rule** button you may click on the correspondent tile from the 2nd step. The system will open the Rule by schedule screen.



7. Click on **Add start time & Duration** button to choose time when rule starts and its duration.

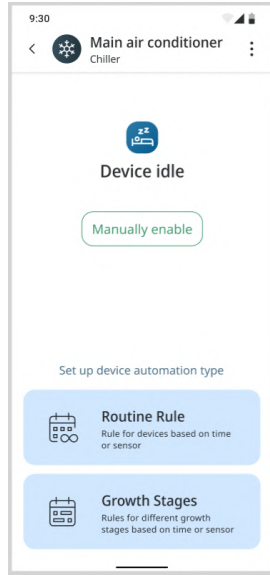


8. After choosing at least one rule, the **Set rule** button becomes available. You can create more rules or save daily rules.

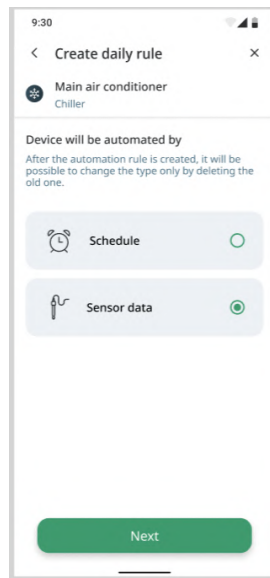
5.7.2. Setting a Device Rule Based on Growing stages

To set a device rule by **Growing Stages** please proceed with following steps:

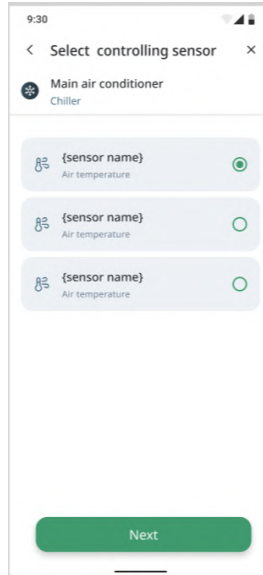
1. Tap the **Device** tile for which you want to set a rule. The following screen appears:



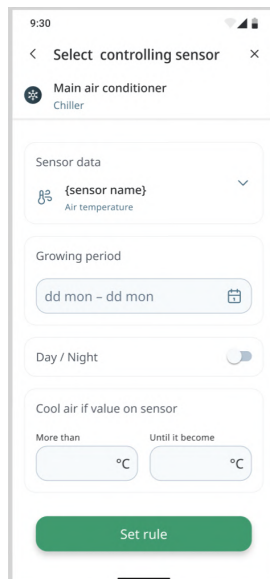
2. Tap the **Growth Stages** tile, Growth stages configuration screen will appear.
3. Choose rule by Schedule or Sensor data



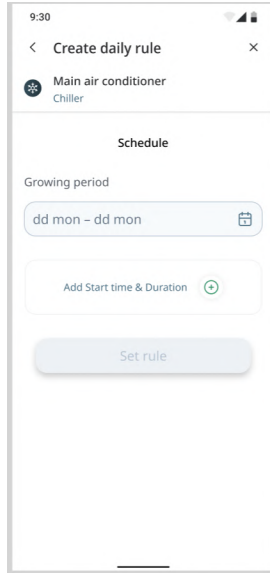
4. Rules for sensor data are configured based on sensor values. System will show a list of available sensors for this device. Select one sensor to continue configurations.



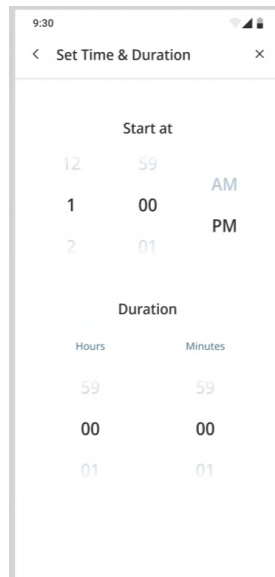
5. On the next step you may change the selected sensor, set up day and night min max values or just set up full day min max values.



6. To set up the Schedule rule you may click on the correspondent tile from the 11th step. System will open the Rule by schedule screen.



7. Click on the **Add start time & Duration** button to choose the time when the rule starts and its duration. Choose Growing period dates when correspondent rule will work.

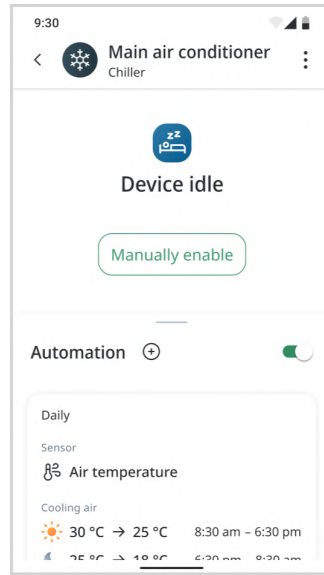


8. After choosing at least one rule, the **Set rule** button becomes available. You can create more rules or save daily rules.

5.7.3. Editing / Deleting a Rule

To edit a rule that you have created earlier, please, follow these steps:

1. Tap the **Device** for which you want to edit a rule. The following screen appears:



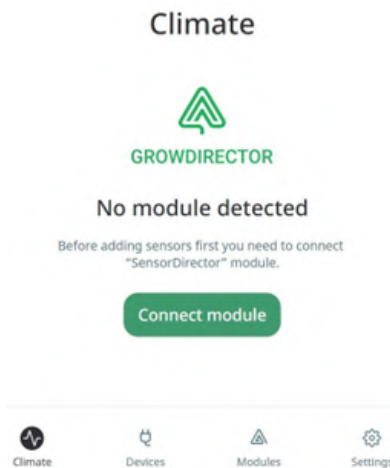
2. Choose a rule you want to edit
3. Edit Rule configuration or just delete rule

Chapter 6: Managing Climate

The Climate screen displays all the readings and measurements from your Sensors. If you have multiple rooms, you can name each Sensor differently. For example, room 1, room 2, and so on. After that if you only want to see some room, you can use filter and those see only room 1, room 2, and so on.

When you open the GrowDirector App for the very first time, there are no Modules and Sensors in the System yet. Therefore, you must first add (connect) the required specific Modules and Sensors to proceed. There can be 2 scenarios on the Climate screen:

- **No Module detected** – When the Modules have not been connected yet,
- **No Sensor detected** – When the Modules are connected, but the Sensors have not been not connected yet.



It is possible to connect Sensors only to the required specific Modules. Sensors can not be present in the System without being connected to the required specific Modules.

The following Modules allow connection of Sensors:

- SensorDirector,
- HydroDirector.

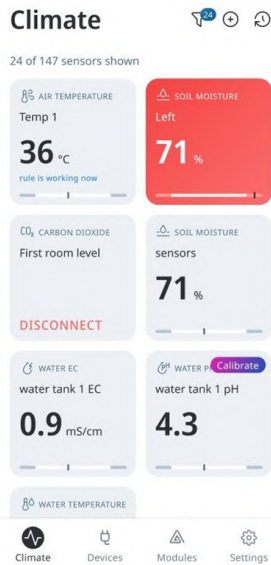
Important: After connecting a sensor to a Module, the Module must be rebooted. Sensors appear as soon as you plug them to the corresponding Module.

The Climate screen in the GrowDirector App displays detailed information about all the connected Sensors after they have been added. You can customize the order and visibility of the Sensors on the main screen by using the filter icon to select which ones you want to display. The Sensors are sorted according to the date when they were

added, with the most recent appearing at the top. Each Sensor is presented as a tile with its key information.

The following elements are available on the main Climate screen:

- Name of the screen on the top-left corner,
- Action to filter Sensors on the top-right corner,
- Action to connect new Sensors on the top-right corner,
- Action to open Climate history on the top-right corner,
- List of all available Sensors,
- TabBar or the main menu of the App.



Tap the **Sensor** tile and you will be redirected to the Sensor screen where you can view detailed information and history graph of the Sensor.

6.1. Types of Sensor Information

The various supported Sensors provide the following information:

Table 1. Sensor Information

Sensor Type	Units of Measurements
Air Temperature	°C or °F
Water Temperature	°C or °F
Air Humidity	%

Soil Moisture	%
VPD	kPa
LUX	lx
Flow Meter	L or Gal per minute
Carbon Dioxide	ppm
pH Hydro	pH
EC Hydro	mS/cm
DO	mg/L
ORP	mV
Exclusion (has different tile format)	
PAR	$\mu\text{mol}/(\text{m}^2/\text{sec})$

6.2. Sensor States

There are several states of Sensor as well, depending on which, the Sensor tiles will display different elements on it. The Sensor states are shown on the following Sensor tiles:

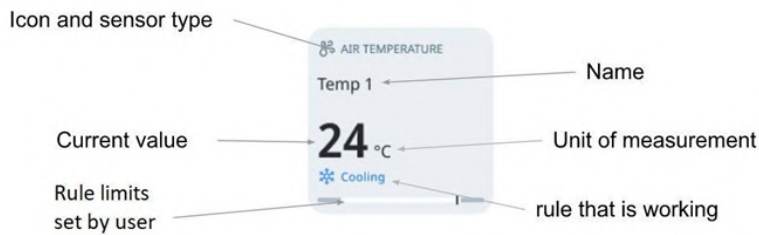
- Regular,
- Disconnected,
- Offline,
- Need first calibration,
- Need scheduled calibration,
- Critical value (highlighted in red).

6.2.1. Regular Sensor Tile

A regular Sensor tile contains the following information (all Sensors types except PAR):

- Sensor icon,
- Sensor type,
- Sensor name,
- Current value,
- Units of measurement,
- Limit values,
- Impact of the rule.

Figure 1. Regular Sensor Tile Elements



Note: Impact of the rule will appear only if linked Devices that have defined rules, based on Sensor data, are currently running. These impacts are predefined according to the types of Devices. We created the impact of the rule so that the user does not make a mistake, for example, by using a heater for cooling purposes.

Table 2. Types of Device

Device Type	Impact of the Rule on Sensor Tile
Irrigation Pump	Irrigation / Watering
Water Pump	Irrigation / Watering
Humidifier	Increase Humidity
Dehumidifier	Decrease Humidity
Lights	On / Off Lights
Inline Fan	Air Circulation / Decrease CO2 / Increase CO2
Outline Fan	Air Circulation / Decrease CO2 / Increase CO2
Circulation Fan	Air Circulation / Decrease CO2 / Increase CO2
Irrigation Valves	Irrigation
CO2 Valves	Increase CO2
Chiller	Cooling
Heater	Heating
Dosing Pumps	Increase / Decrease pH, EC, DO, ORP
Shade Systems	Light Control / Shade Management

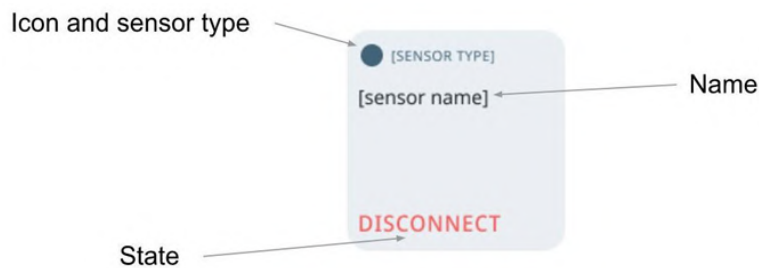
Water Chillers	Cooling / Water Temperature Management
Misting Systems	Increase Humidity / Cooling
Foggers	Increase Humidity / Cooling
Air Conditioners	Cooling / Heating / Humidity Control
Solenoid Valves	Water / Nutrient / Gas Flow Control
Heating Mats	Heating / Root Zone Temperature Control
Compressors	Air / Gas Compression / Pressure Management

6.2.2. Disconnected Sensor Tile

Disconnected state is shown for a Module that is currently plugged in, but no Sensors are connected to it. Disconnected Sensor tile contains the following information:

- Sensor icon,
- Sensor type,
- Sensor name,
- Current state.

Figure 2. Disconnected Sensor Tile Elements



Note: Sensor is considered Disconnected when there is no connection to the Sensor, it is not responding, or not sending measurements because of the following issues:

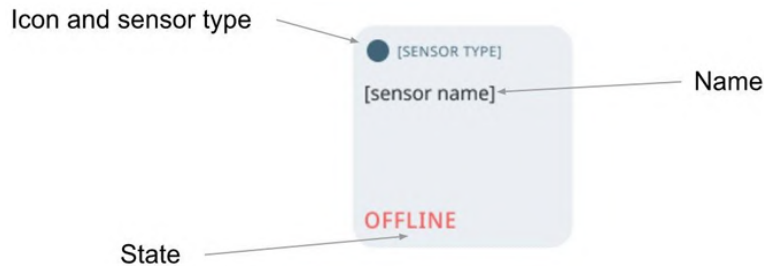
- Broken wire,
- Disconnected wire,
- Sensor is broken.

6.2.3. Offline Sensor Tile

Offline state is shown for a Module that was connected, but is now plugged off. Offline Sensor tile contains the following information:

- Sensor icon,
- Sensor type,
- Sensor name,
- Current state.

Figure 3. Offline Sensor Tile Elements



Note: Sensor is considered Offline when there is no connection to the Sensor. It may become unresponsive or stop sending measurements because of the following issues:

- Broken wire,
- Disconnected wire,
- Sensor is disconnected.

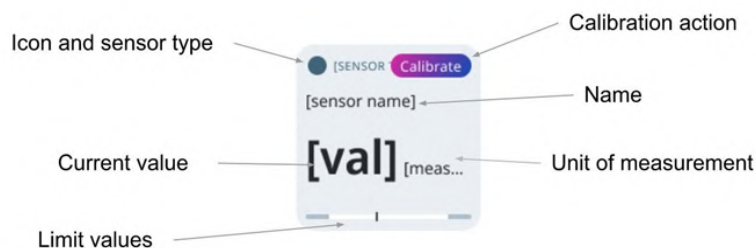
6.2.4. Need First Calibration Sensor Tile

Need First Calibration is shown when a Sensor was added and needs calibration for the very first time to provide accurate measurements.

Need First Calibration sensor tile contains the following information:

- Sensor icon,
- Sensor type,
- Sensor name,
- Current state.

Figure 4. Need Calibration Sensor Tile Elements



Note: There are some Sensors that need calibration, and some do not.

After the calibration is completed, this tile changes to the Regular Sensor Tile.

Example:

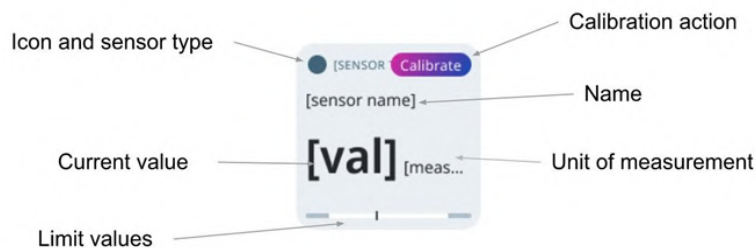
Some Sensors need to be calibrated to show correct data. Also, such Sensors have calibration frequencies that can be from 1 month to 1 year. System will notify the user about the Sensor calibration routine and how many days left till the next calibration.

6.2.5. Need Scheduled Calibration Sensor Tile

Need Scheduled Calibration Sensor tile contains the following information:

- Icon,
- Sensor type,
- Sensor name,
- Current value,
- Units of measurement,
- Impact of the rule,
- Calibration action.

Figure 5. Need Scheduled Calibration Sensor Tile Elements



This tile is shown when the Sensor needs calibration based on schedule to provide accurate measurements.

Note: There are some Sensors that need calibration, and some do not.

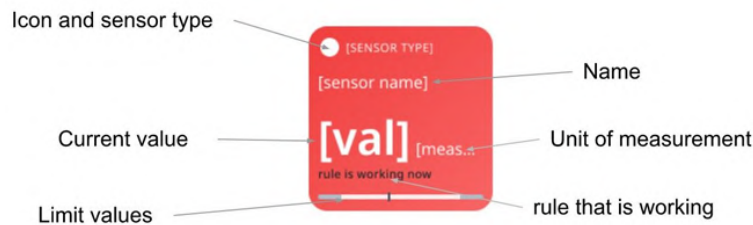
After the calibration is completed, this tile changes to the Regular Sensor Tile.

6.2.6. Critical Value Sensor Tile

Critical Value Sensor tile contains the following information:

- Icon,
- Sensor type,
- Sensor name,
- Current value,
- Units of measurement,
- Limit values,
- Impact of the rule.

Figure 6. Critical Value Sensor Tile Elements



This tile is displayed when limits are breached:

- Current value is less than the minimum limit,
- Current value is more than the maximum limit.

In this case, regular section tiles are highlighted with red color, that is changes to Critical value sensor tile. As soon as Sensor measurement returns to the required limits, the Sensor tile changes to the Regular Sensor Tile.

6.3. Adding a New Sensor

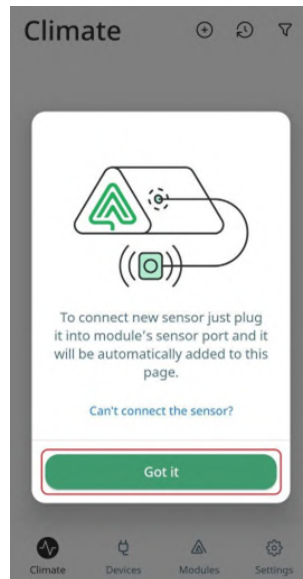
To add a new Sensor in the System, plug in it to the turned on Module. After a new Sensor has been connected to the Module, it is necessary to disconnect the Module from the power supply and turn it back on.

Note: The pH, EC and Water Temperature, DO, and ORP Sensors are plugged into HydroDirector.

Newly added Sensors are shown on the top of the list:

- If the added Sensor requires calibration, the Sensor tile displays **Need calibration**.
- If the added Sensor does not require calibration, the Sensor tile appears in the Regular view. After a Sensor appears in the list, you can check its details by opening the Sensor page.

1. Tap the button on the Climate screen to proceed. The following screen appears with the following message:



2. Tap the **Got it** button. You will be redirected back to the Climate screen.

Note: If it is still unclear on how to connect the Sensor or if you have any issues with connecting it manually, tap the **Can't connect the sensor?** button. You will be redirected to a guide with detailed instructions.

If a Sensor was plugged out, it will not be removed from the main Climate screen, but will be marked as Disconnected.

6.4. Understanding Sensor Page

The Sensor screen displays the detailed information that it receives from the connected Sensors. The section at the bottom shows the data in a graphical and tabular format. You can check the readings for a particular day, week, or make a custom selection of the dates:



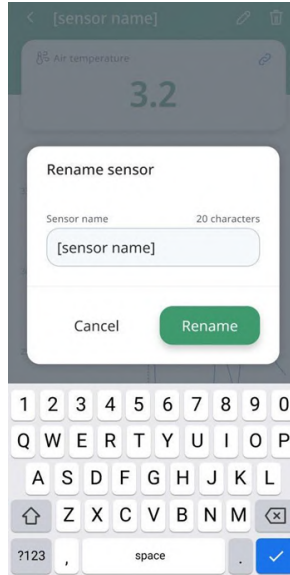
6.4.1. Changing Sensor Page Name

To change the name of the Sensor, please, following these steps:

1. On the Climate screen, tap the **Sensor** tile that you want to rename. The detailed Sensor screen appears:



2. Tap the **Edit** button (✎ icon) on the top-right corner of the screen. The **Rename sensor** screen appears:



3. Enter the new name in the **Sensor name** field and tap the **Rename** button.

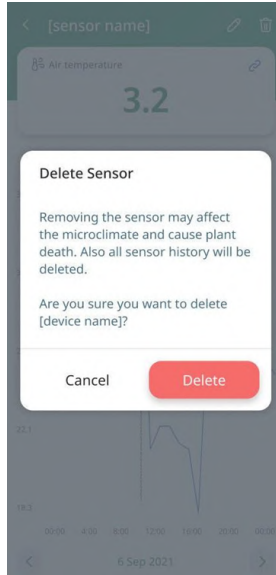
6.4.2. Deleting a Sensor from the Sensor Page

If a Sensor was plugged out, it will not be removed from the main Climate screen. It is marked as Disconnected. To delete a Sensor from the Climate screen, please, follow these steps:

1. Tap the **Sensor** tile. The detailed Sensor screen appears:



2. Tap the Delete button (🗑 icon) on the top-right corner of the screen. The **Delete sensor** page appears:



3. Tap the **Delete** button. The Sensor is removed from the Climate screen and all Sensor data, rules, and its history is removed from the System.

Note: Deleted Sensors can be re-added to the System again, but no history will be restored, and the Sensor is treated as a new one.

6.4.3. Viewing Sensor Page Status

The Sensor page might show different statuses at different times:

- **Offline** – Offline state is shown for the Modules that have been connected, but are plugged off now.
- **Disconnected** – Disconnected state is shown for the Modules that are currently plugged in, but the Sensors have not been connected yet.

6.4.4. Viewing Sensor History

Climate history shows Sensor's daily, weekly, and custom data for all the connected Sensors. Tap the **Graph** to view the exact value at the chosen period of time:



6.5. Calibration Types

There are two types of calibration needed for the Sensors:

- **First calibration** – When the Sensor was added for the very first time.
- **Periodic calibration.**

The **Recalibrate** button appears on the screens of the Sensors that need periodic calibration. Tap the **Recalibrate** button to start the recalibration process:



6.6. Calibrating Sensors

Some Sensors do not require calibration, while others need to be calibrated periodically. The GrowDirector App will alert you when a Sensor needs to be calibrated, and the number of days remaining until calibration is due. When it is time to calibrate a Sensor, the Recalibrate button will become active. To start the calibration process, simply tap the **Recalibrate** button.

The following table lists the sensors that need calibrating:

Table 3. Sensors Needing Calibration

Name of the Sensor	Description	Frequency
pH	Two step calibration with pH 7 and pH 4 buffers	2 weeks
EC	One step calibration	3 months
DO	One step calibration	3 months
ORP	One step calibration with ORP buffer +475 mV	3 months
Soil Moisture	Two step calibration 100% moisture and 0%	3 months

6.6.1. pH Calibration

pH calibration is done in two steps. First, you calibrate pH 4, and then calibrate pH 7. Prepare the following before Sensor calibration:

- Paper towel,
- Distilled water,
- Buffer with pH 4 liquid,
- Buffer with pH 7 liquid,
- pH Sensor.

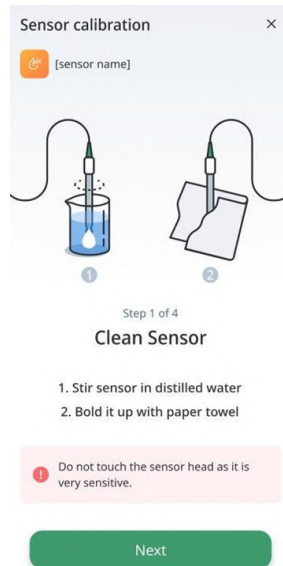
Note: Do not touch the Sensor head because it is very sensitive.

To start pH calibration, please, follow these steps:

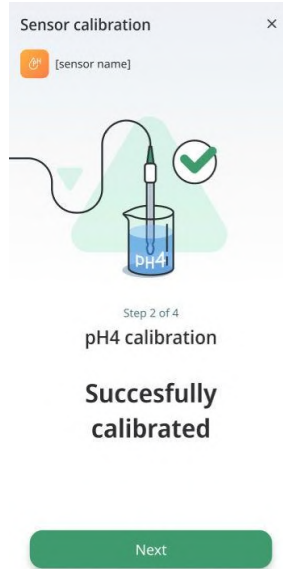
1. Tap the **Recalibrate** button. The Sensor calibration screen appears, which shows Sensor name and Sensor image:



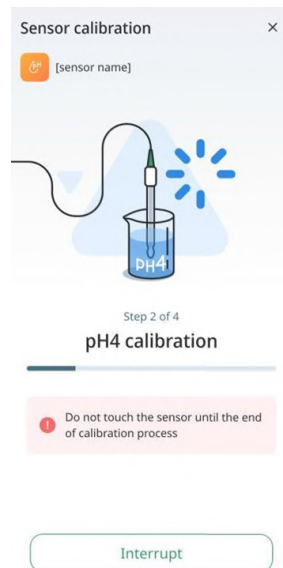
2. Tap the **Start calibration** button. The following screen appears:



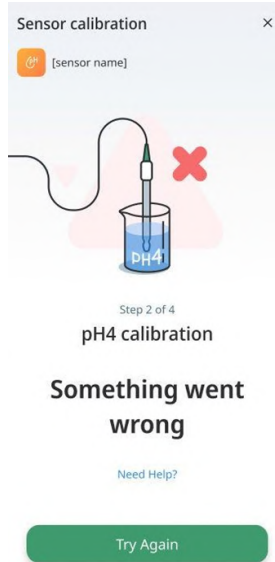
3. Immerse your Sensor in distilled water and stir it several times. Pull it out and shake it to drain water drops. Use an absorbent paper towel to clean it up. Then, tap the **Next** button. The following screen appears:



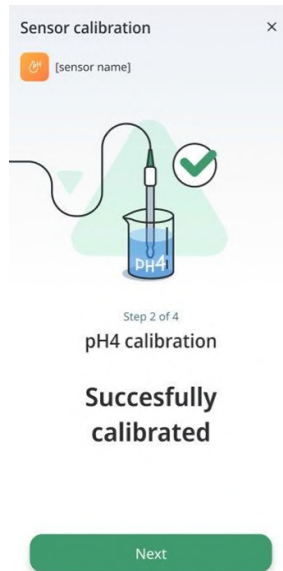
4. Dip the Sensor into a pH 4 buffer and tap the **Calibrate pH 4** button:
 - There might be cases when you may want to interrupt the calibration process. To do so, tap the **Interrupt** button:



- If the calibration does not complete because of any reason, you will be prompted to retry. To do so, tap the **Try Again** button:



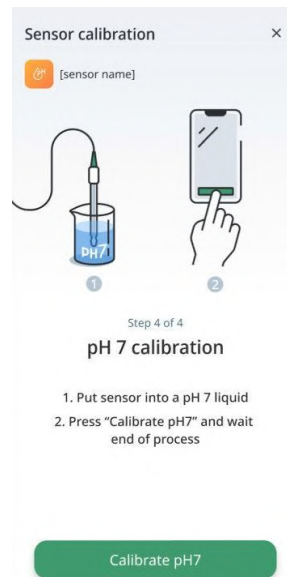
5. The calibration loader with progress bar appears. When the progress bar moves to the end of the right side, calibration gets completed and the message **Successfully calibrated** appears:



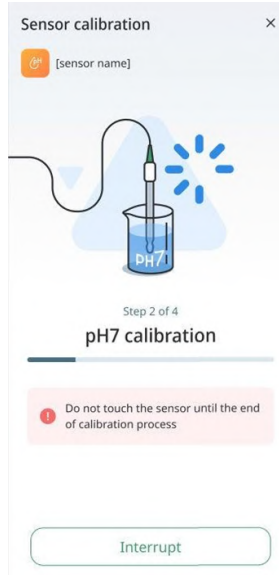
6. Tap the **Next button** to start calibrating pH 7. The following screen appears:



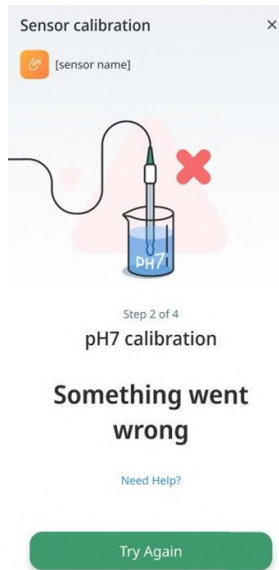
7. Immerse your Sensor in distilled water and stir it several times. Pull it out and shake it to drain water drops. Use an absorbent paper towel to clean it up. Tap the **Next** button. The following screen appears:



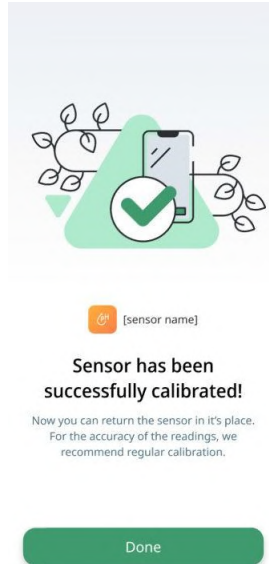
8. Dip the cleaned sensor into the pH7 buffer and tap the **Calibrate pH 7** button:
 - There might be cases when you may want to interrupt the calibration process. To do so, tap on the Interrupt button:



- If the calibration does not complete because of any reason, you will be prompted to retry. To do so, tap the **Try Again** button:



9. When the calibration is over, the following message appears: **Sensor has been successfully calibrated!**



10. Now you can use your Sensor.

Note: For the accuracy of readings, we recommend Sensor calibration at least once every two weeks.

6.6.2. ORP Calibration

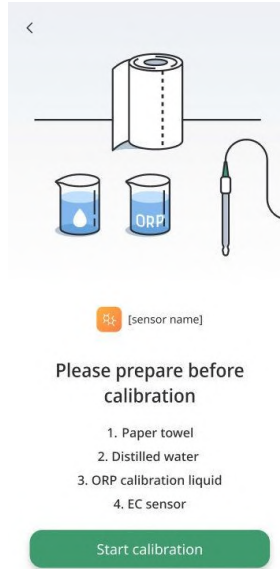
Prepare the following items before Sensor calibration:

- Paper towel,
- Distilled water,
- ORP calibration liquid,
- ORP Sensor,
- EC Sensor.

Note: Do not touch the Sensor head because it is very sensitive.

To start ORP calibration, please, follow these steps:

1. Tap the **Recalibrate** button. The Sensor calibration screen appears:



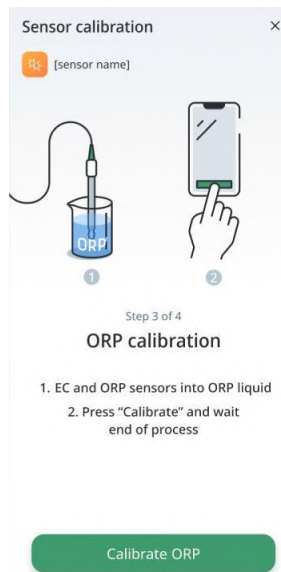
2. Tap the **Start calibration** button. The following screen appears:



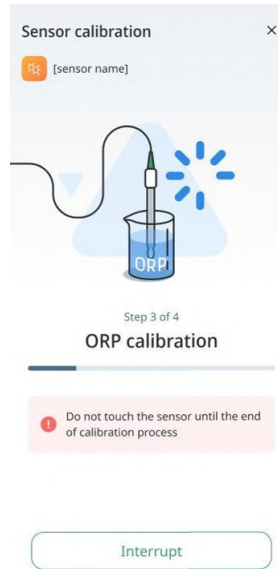
3. Prepare ORP and EC Sensors. Make sure that Sensors are clean:
 - a. Stir the Sensors in distilled water.
 - b. Pull them out and shake them to remove excess water.
 - c. Use an absorbent paper towel to clean it up. Do not touch the Sensor head because it is very sensitive.
4. Tap the **Next** button. The following screen appears:



5. Enter buffer value in the **mV** field. Then, tap the **Next** button. The following screen appears:



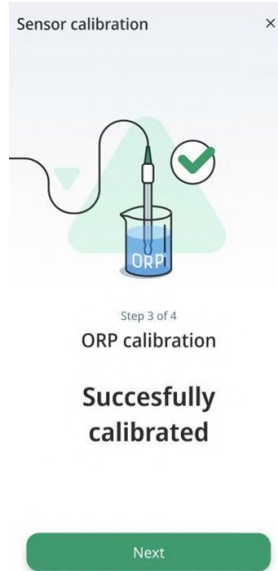
6. Prepare ORP buffer and dip the EC and ORP Sensors into it. Then, tap the **Calibrate ORP** button:
 - There might be cases when you may want to interrupt the calibration process. To do so, tap the **Interrupt** button:



- If the calibration does not complete because of any reason, you will be prompted to retry. To do so, tap the **Try Again** button:



7. When the calibration is over, the following message appears: **Sensor has been successfully calibrated!**



8. Now you can use your Sensor.

6.6.3. EC Calibration

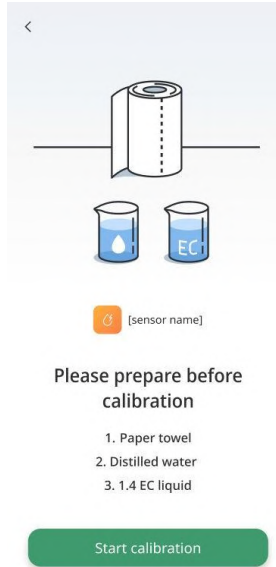
Prepare the following before Sensor calibration:

- Paper towel,
- Distilled water,
- 1413 $\mu\text{S}/\text{cm}$ calibration buffer (1.4 EC),
- EC Sensor.

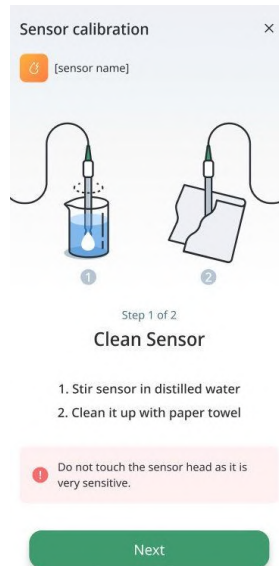
Note: Do not touch the Sensor head because it is very sensitive.

To perform EC calibration, please, follow these steps:

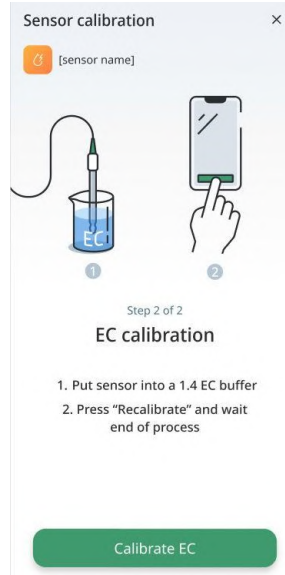
1. Tap the **Recalibrate** button. The following screen appears:



2. Tap the **Start calibration** button. The following screen appears:



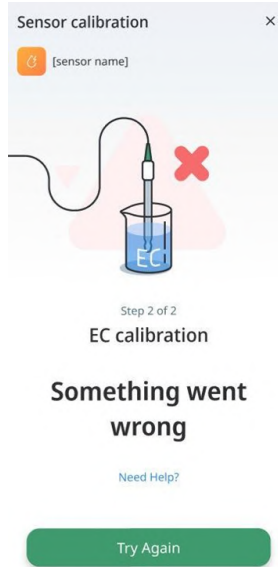
3. Prepare EC Sensor. Make sure that the Sensor is clean.
- Dip your Sensor in distilled water.
 - Pull it out and shake to move out water drops.
 - Use an absorbent paper towel to clean it up. Do not touch the Sensor head because it is very sensitive.
4. Tap the **Next** button. The following screen appears:



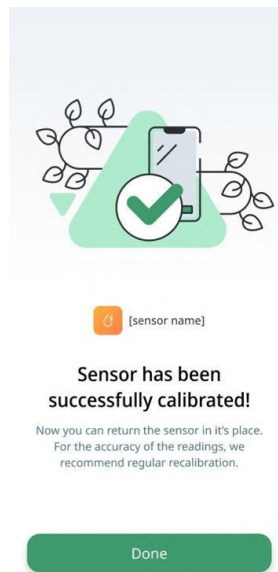
5. Prepare 1.4 EC buffer and dip EC Sensor into it and tap the **Calibrate EC** button.
 - There might be cases when you may want to interrupt the calibration process. To do so, tap the **Interrupt** button:



- If the calibration does not complete because of any reason, you will be prompted to retry. To do so, tap the **Try Again** button:



6. When the calibration is over, the following message appears: **Sensor has been successfully calibrated!**



7. Now you can use your Sensor.

6.6.4. DO Calibration

Prepare before Sensor calibration:

- Paper towel,
- Distilled water,
- DO Sensor.

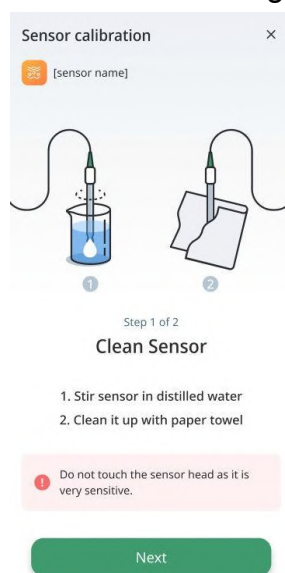
Note: Do not touch the Sensor head because it is very sensitive.

To start DO calibration, please, follow these steps:

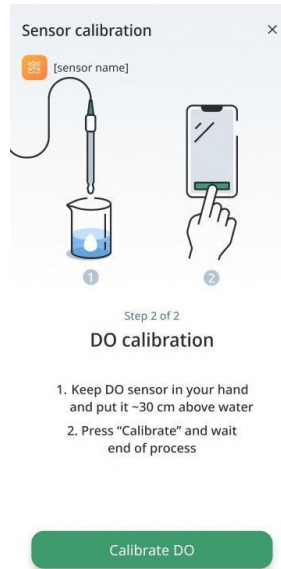
1. Tap the **Recalibrate** button. The following screen appears:



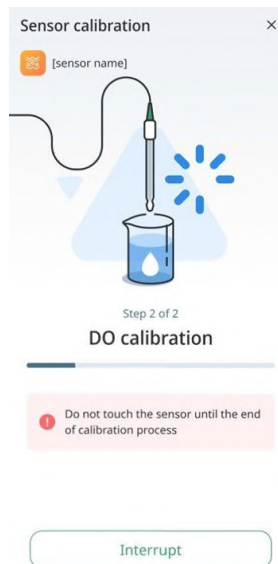
2. Tap the **Start calibration** button. The following screen appears:



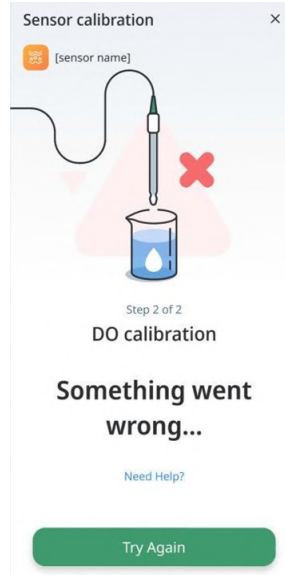
3. Prepare the DO Sensor. Make sure that the Sensor is clean.
 - Stir your Sensor in distilled water.
 - Pull it out and shake it well to remove water drops.
 - Use an absorbent paper towel to clean it up. Do not touch the sensor head because it is very sensitive.
4. Tap the **Next** button. The following screen appears:



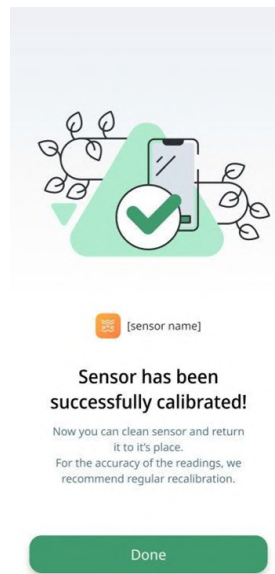
5. Hold the DO sensor in your hand and hold it 30cm above water.
6. Tap the **Calibrate DO** button:
 - There might be cases when you may want to interrupt the calibration process. To do so, tap the **Interrupt** button:



- If the calibration does not complete because of any reason. You will be prompted to retry. To do so, tap the **Try Again** button:



7. When the calibration is over, the following message appears: **Sensor has been successfully calibrated!**

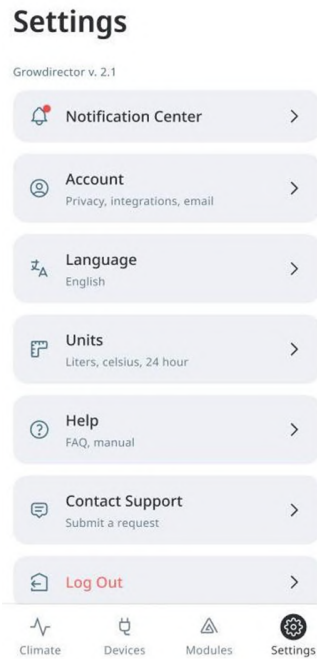


8. Now you can use your Sensor.

Note: Usually the calibration process takes 2-5 minutes. In case User will switch between applications on his phone, calibration may be stopped. We recommend restarting the whole process from the beginning and pass all steps one more time to make the correct calibration.

Chapter 7: Managing Settings

GrowDirector lets you manage your common account settings. To access the settings page, tap the **Settings** button on the right corner of the TabBar. The following **Settings** screen appears:

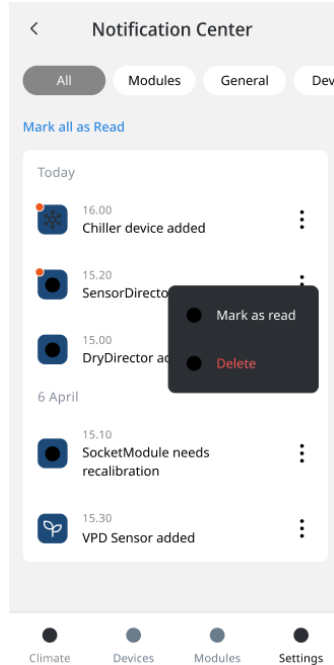


Tap the options on the **Settings** page to manage the respective settings.

7.1. Managing Notifications

To view notifications, please, follow these steps:

1. Tap the **Notification Center** option on the **Settings** screen. The following screen appears:



2. Tap the **Action menu** button (: icon) and select one of the proposed options to **Mark as read** or to **Delete** the Notification.

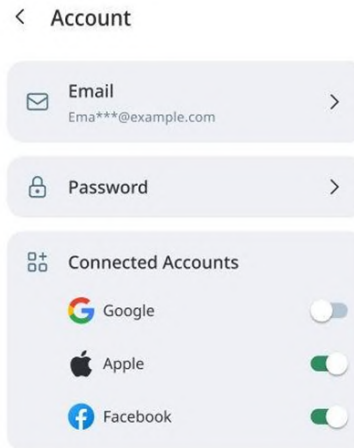
Your mobile device must have open notification access to receive notifications from GrowDirector. If you are experiencing issues with receiving notifications, we advise to check the following:

- Make sure your mobile device is connected to the Internet.
- Try a different Internet connection. For example, if you are connected to Wi-Fi, try mobile data, and vice versa.
- Check your mobile device's settings.
- Restart your mobile device.

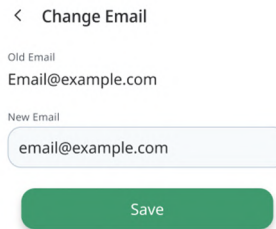
7.2. Changing Your Registered Email

To change your registered email, please, follow these steps:

1. Tap the **Account** option on the **Settings** screen. The following screen appears:



2. Tap the **Email** option. The following screen appears:



3. Enter your new email address and tap the **Save** button.

7.3. Changing Your Password

To change your password, please, follow these steps:

1. Tap the **Account** option on the **Settings** screen.
2. Tap the **Password** option. The following screen appears:

< Change Password

Old password

New password

8 or more characters including uppercase and symbols

Confirm new password

Update password

3. Enter your old password and new password in the respective fields.
4. Tap the **Update password** button.

7.4. Changing Language

To change your language, please, follow these steps:

1. Tap the **Language** option on the **Settings** screen. The following screen appears:

< Language

English

Deutsch

Français

Italiano

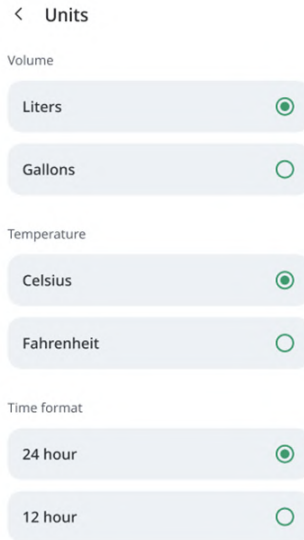
עברית

2. Select your desired language.

7.5. Changing Units of Measurement

To change your units of measurement, please, follow these steps:

1. Tap the **Units** option on the **Settings** screen. The following screen appears:

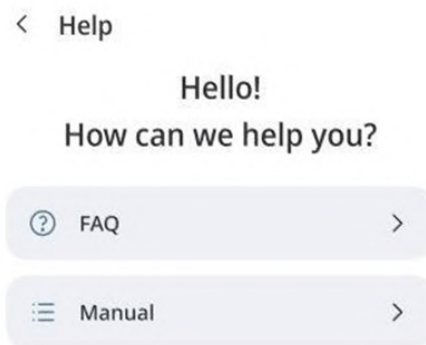


2. Select your desired units of measurement for the following:
 - Volume,
 - Temperature,
 - Time format.

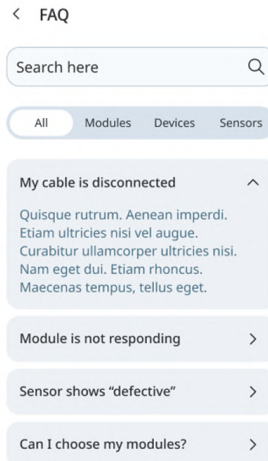
7.6. Viewing Help Content

You can view FAQs and the manual for the help content. To view them, please, follow these steps:

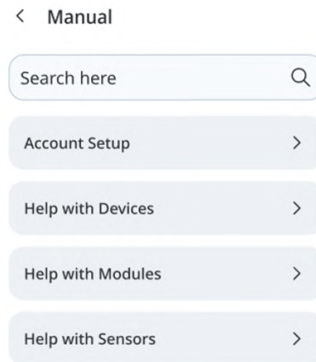
1. Tap the **Help** option on the **Settings** screen. The following screen appears:



- Tap the **FAQ** option. The following screen appears where you can get answers to the frequently asked questions:



- Tap the **Manual** option. The following screen appears where you can read instructions on performing various operations:



7.7. Contacting Support

To contact support for help, please, follow these steps:

1. Tap the **Contact Support** option on the **Settings** screen. The following screen appears:

< Contact Support

Email

email@example.com

Choose category

Security Request

Issue Description 250 characters

|

Send Request

2. Enter your email, choose a category, and enter the issue description.
3. Tap the **Send Request** button.

For all the questions related to the System's operation, you can also contact us through contact@growdirector.com or WhatsApp +972556875750 .