AEssenseGrows Guardian Grow Manager Version 4.2.12

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ÆssenseGrows Tech Note
GGM Version 4.2.12

Disclaimer:

The information provided in this tech note is accurate as of the date of publication and is subject to change. Users are advised to refer to the official documentation for the most up-to-date information regarding firmware versions and compatibility.

Summary

We are excited to introduce you to the latest Guardian Grow Manager software update, Guardian Grow Manager version 4.2.12.. The 4.2.12 software update focuses on streamlining the user interface, improving upon the existing automated dosing processes, and allowing for more precise control over your AEtrium system.

We believe that this software update represents a significant step forward in our commitment to our grow partners. While you explore the content in each section, we encourage you to make note of anything that might be unclear. Should you come across any elements that seem unclear, we urge you to reach out to a member of our support team. We are ready to assist and provide any supplementary information you may need.

Covered Topics:

In order to utilize all of the new features in GGM version 4.2.12., it is critical that users review the topics listed below, which are explained in further detail in the following pages.

1. **Firmware Requirements for Guardian Grow Manager Version 4.2.12**
2. **EC Dosing Configurations**
3. **Peristaltic Dosing Pump Speed Calibrations**

1. Required Firmware (for use of all GGM 4.2.12 Features)

To ensure optimal performance and compatibility, it is crucial to use the specified firmware versions for the following components:

***Note:** Systems contain either a GcGM board or an ABC board (not both)

Component	Firmware Version
Control Board* (GcGM)	v1.0.19 and later
Control Board* (ABC)	v3.2.6 and later
Water Sensor Module (WSE)	V2.3.9 and later
Stepper Motor Controller (SMC)	V3.2.0 and later

How to Check Firmware Version

Navigate to the Devices page by clicking the "Devices" tab on the left-hand side of the Guardian Grow Manager. Once on the "Devices" page, click the icon next to any online device to view the device information. A window will open displaying the current firmware information for all components contained within the device (Figure 1). This information will include the firmware version for the WSE, SMC, and either the GcGM or ABC Control Board.

SMC, and either the GcGM or ABC Control Board. The icon can also be found at the top of the page when viewing a single device in the GGM.

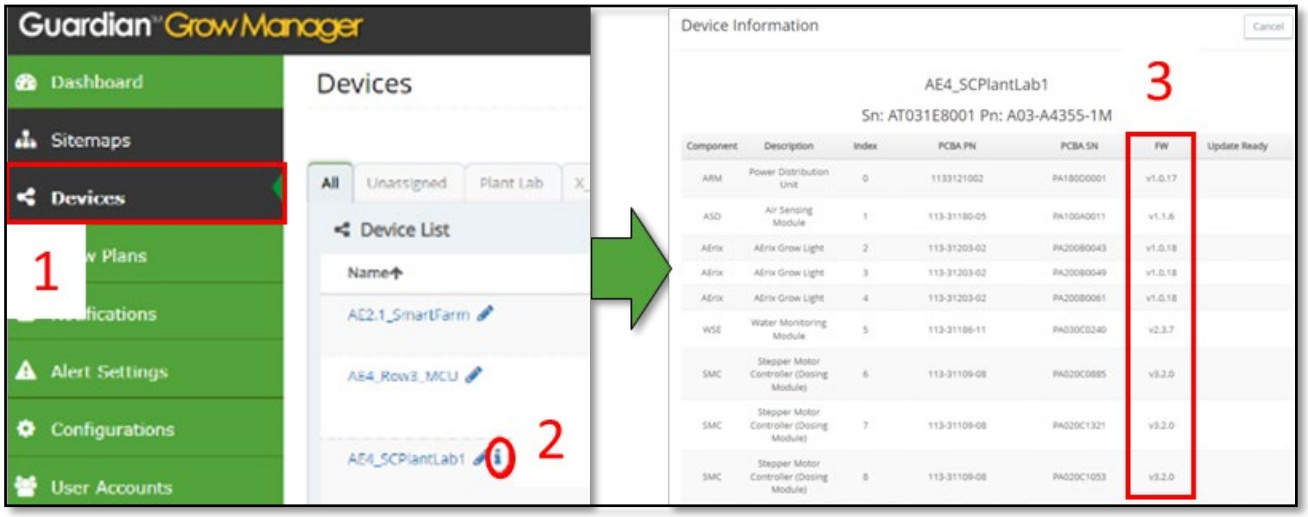


Figure 1. Component Firmware Version Check Process

For assistance with firmware updates, reach out to a member of our technical support team to schedule an update procedure. Firmware updates performed on a specific device require the active grow plan to be paused. Once initiated, the firmware installation process will take about 30 minutes to complete.

How to Check Firmware Version

Navigate to the "Online Help" page by clicking the "Online Help" page on the left-hand side of the Guardian Grow Manager . Once on the "Online Help" page, the current software version can be found at the top of the page (Figure 2).

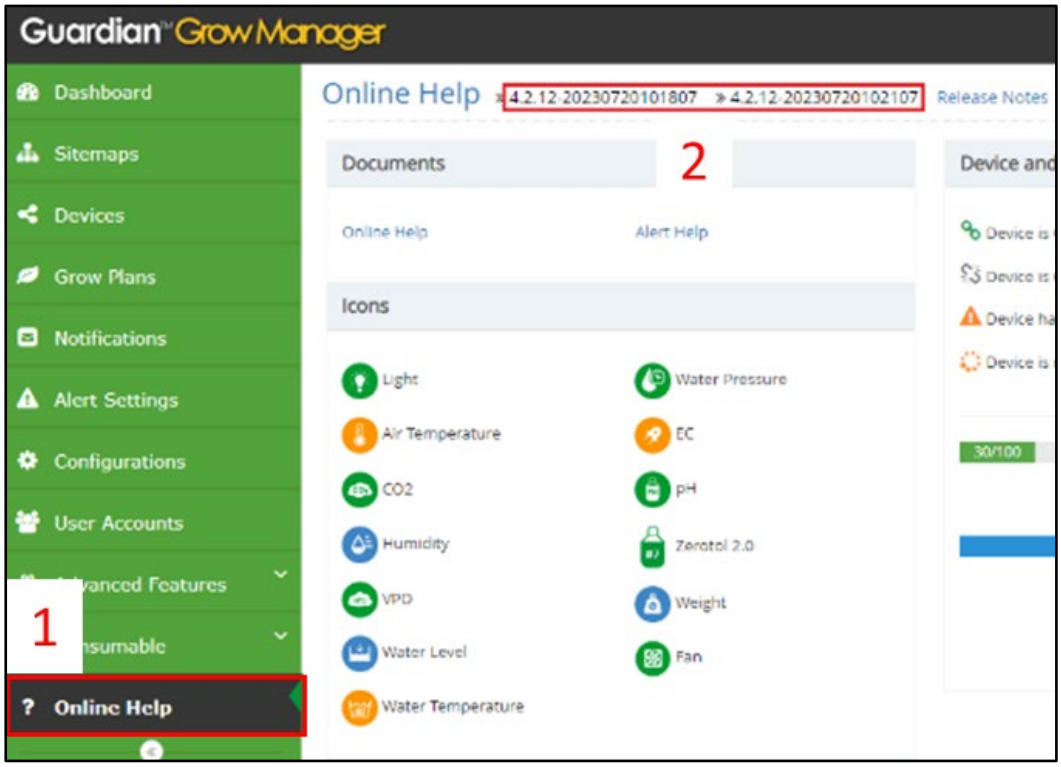


Figure 2. Software Version Check Process

This version information reflects the current iteration of the Guardian Grow Manager software running on the connected devices. To schedule a Guardian Grow Manager software update, reach out to a member of our technical support team. The software update procedure will interrupt any active devices. Once initiated, the software installation process will take about 10 minutes to complete.

2. EC Dosing Configurations

Upon updating the Guardian Grow Manager software to version 4.2.12, three separate automated fertilizer dosing processes will be available for use. These include:

1. **Hybrid Dosing**
2. **EC Feedback Dosing**
3. **Fast Dosing**

The **Hybrid Dosing** and **EC Feedback Dosing** processes each have set of unique configurable "EC Dosing" set points. The "EC Dosing" set points primarily affect the speed at which the **Hybrid Dosing** and **EC Feedback Dosing** processes will reach the target EC.

The AEssense team highly recommends users adjust these default values to better align the selected automated dosing process with the elected growing method and grow plan selection(s) used on site. By dialing in the "EC Dosing" set points, users can optimize dosing speed, improve system performance, and prevent inadvertent dosing malfunctions.

Viewing and Editing EC Dosing Configurations

To access the "EC Dosing" setpoints, navigate to the "Configurations" page by clicking on the "Configurations" menu button located on the left-hand side of the GGM interface. Upon reaching the "Configurations" page, select a device category (Aetrium 4, Aetrium 2.1, Aetrium 2.1 Plus, A4DD) to reveal the respective "EC Dosing" configurations for that category (Figure 3).

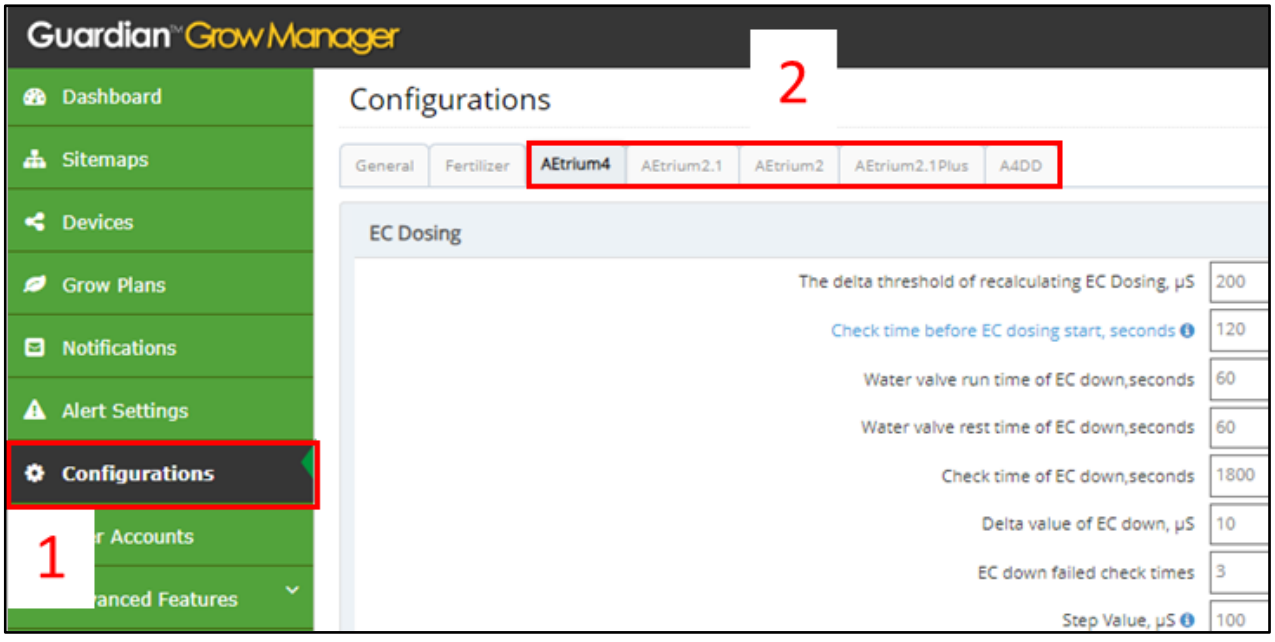


Figure 3. Accessing the EC Dosing Configurations from the Configurations Menu

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Any changes saved to the "EC Dosing" configurations in the "Configurations" page will be stored as the system configurations for the selected device category (AEtrium 4, AEtrium 2.1, AEtrium 2.1Plus, A4DD). The system configurations for a selected device category can be applied to all connected devices in that category by clicking the "Apply to All" button in the top right corner of the "EC Dosing" configurations (Figure 4).

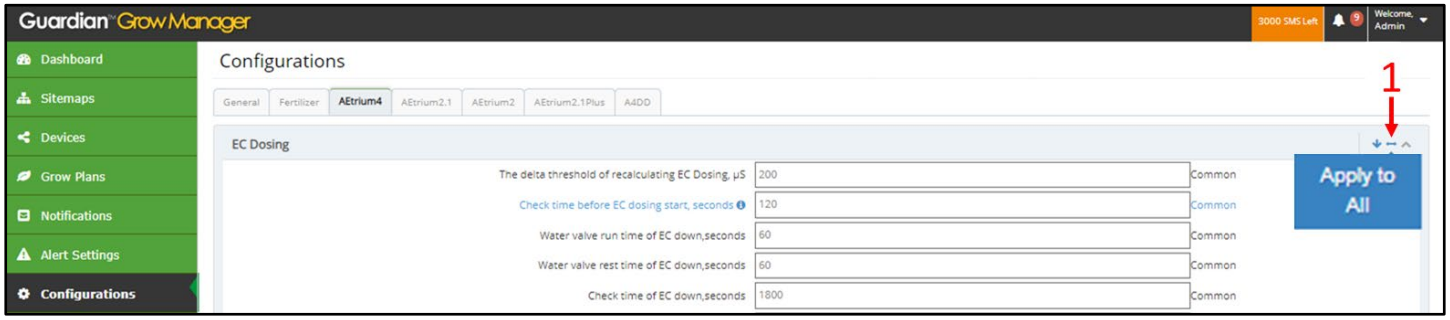


Figure 4. Applying System Configurations to All Devices in a Category

The "EC Dosing" configurations for a single device can be accessed by clicking on the "Configurations" tab at the top the page when viewing a specific device. Additionally, while viewing the configurations tab on a single device, the stored system configurations can be applied by clicking the "Copy System Configure" button on the top right of the page (Figure 5).

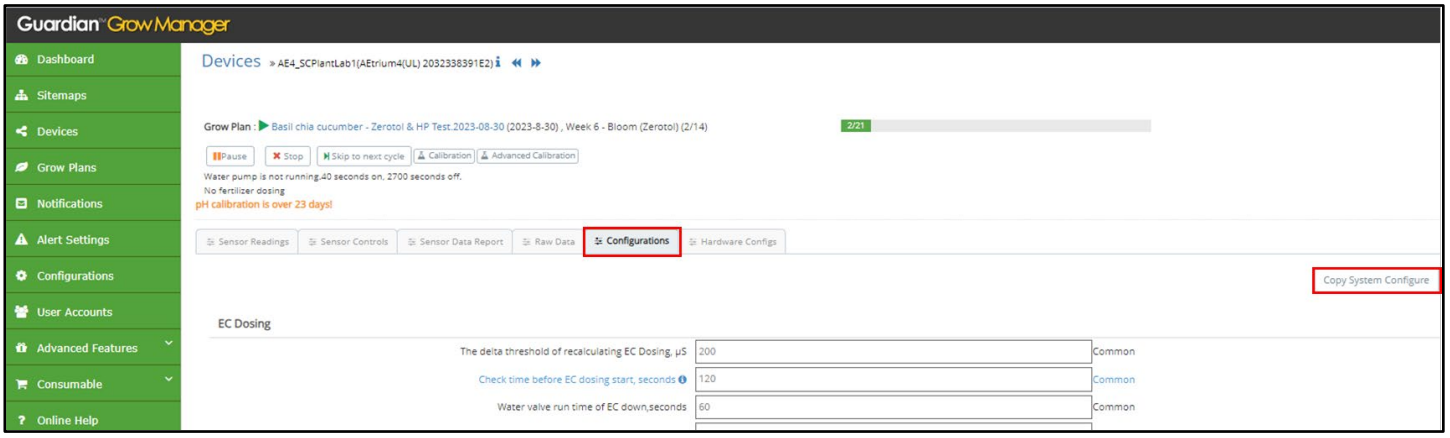


Figure 5. Viewing "EC Dosing" Configurations for a Specific Device and Copying the Stored System Configurations

EC Dosing Configuration Insight

Within the "EC Dosing" configurations, are three separate categories of dosing setpoints: "Common", "EC Feedback", and "Hybrid". When GGM software version 4.2.12 is first installed, all of the "EC Dosing" set points will be prepopulated with default values (Figure 6).

The "Common" setpoints determine when dosing should restart and how long the system should add water to the reservoir to reduce the nutrient concentration. Unless a specific fault arises, the "Common" setpoints can be left at their default values.

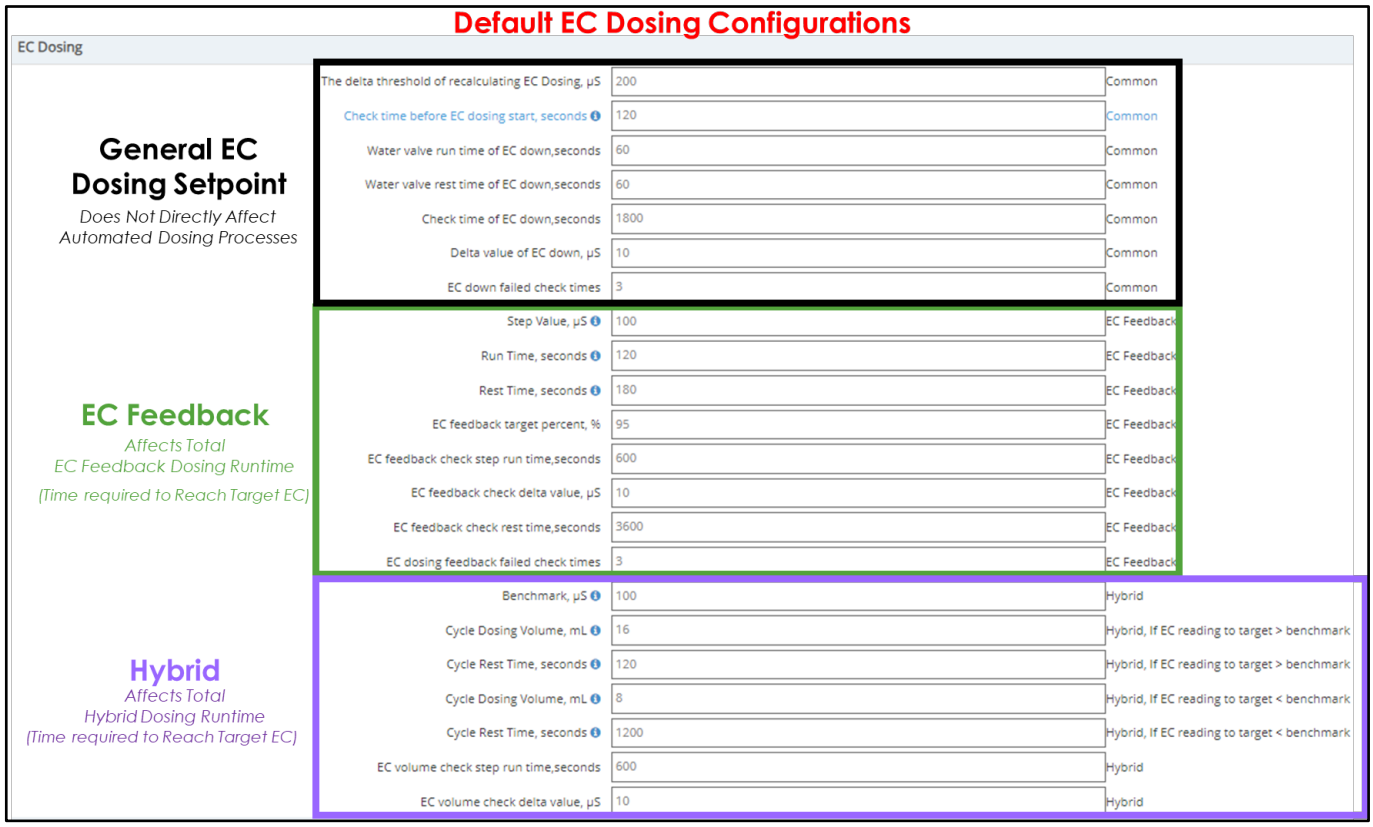


Figure 6. The Default EC Dosing Configuration Set Points for an AEtrium-4

The "EC Feedback" and "Hybrid" setpoints affect the total time required to raise the reservoir EC to the target EC level in the active grow plan using the selected automated dosing process. These default values should be adjusted to increase the speed and reliability of the dosing processes.

As discussed in the Dosing White Paper - the basic structure of both **EC Feedback** dosing and **Hybrid** dosing process is the same. Dosing of the reservoir occurs in cycles, with rests occurring between each dosing cycle (Figure 7).

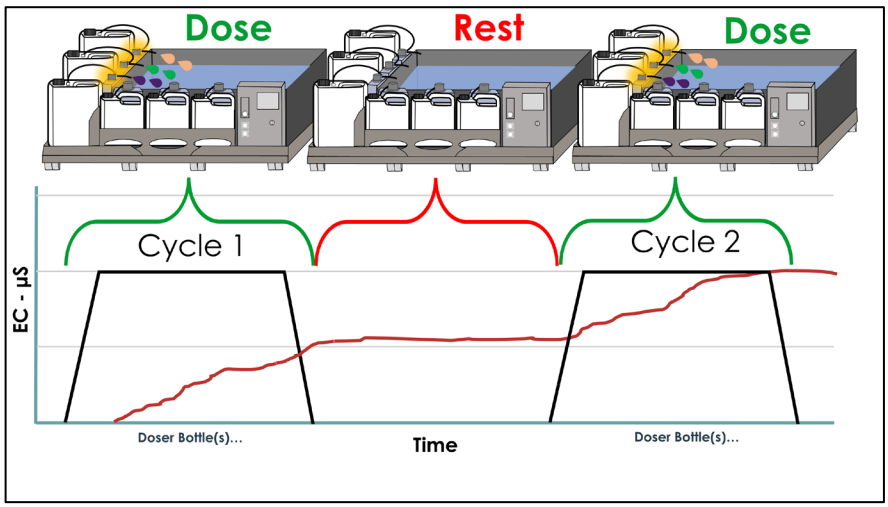


Figure 7. The Basic Structure of All Automated Dosing Processes used by the AEtrium System

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By increasing the duration of each dosing cycle and decreasing the length of each rest cycle, the total dosing time (to reach the target EC) can be dramatically reduced. Moreover, the AEssense team has found that running a peristaltic dosing pump for an extended period (I.E., dosing continuously for 10 minutes instead of 1 minute) enhances the consistency of the dosing speed (mL dosed/minute). Consequently, elongating the dosing cycles not only reduces the total running time but also enhances dosing accuracy.

Recommended EC Dosing Set Points

Presented below is a table outlining the suggested "EC Dosing" setpoints for both the "EC Feedback" and "Hybrid" dosing automated processes. Furthermore, the table provides user equations for calculating more precise maximum "EC Dosing" configuration setpoint values optimized for specific grow plans. The optimization results in more efficient dosing cycles, effectively bringing the reservoir EC to the target EC sooner while maintaining dosing accuracy. EC Dosing Configurations not presented in the table, can retain their default values unless specific issues or faults occur.

EC Feedback

EC Dosing Configuration	Default	Recommended	Equation for Setpoint Optimization
Step Value	100 µS / 50 ppm	500 µS / 250 ppm	$\frac{1}{3} * (\text{Average Target EC in Grow Plan})$
Run Time	120 seconds	600 Seconds	$600 + \left[600 * (Number\ of\ Dosing\ Bottles\ Used) * \left(\frac{Smallest\ Dosing\ Rate\ in\ Grow\ Plan}{Largest\ Dosing\ Rate\ in\ Grow\ Plan}\right)\right]$
Rest Time	180 seconds	30 seconds	N/A

Hybrid

EC Dosing Configuration	Default	Recommended	Equation for Setpoint Optimization
Cycle Dosing Volume if EC reading to target > benchmark	16 mL	90 mL	$[10 * (Average\ Doser\ Pump\ Speed)] + \left[[60 * (Number\ of\ Dosing\ Bottles\ Used)] * \frac{(Smallest\ Dosing\ Rate\ in\ Grow\ Plan)}{(Largest\ Dosing\ Rate\ in\ Grow\ Plan)}\right]$
Rest Time if EC reading to target > benchmark	120 seconds	30 seconds	N/A
Cycle Dosing Volume if EC reading to target < benchmark	8 mL	12 mL	$12 + [[(Average\ Reservoir\ Volume\ (gallons)) - 20)] * 0.4]$
Rest Time if EC reading to target < benchmark	1200 seconds	60 seconds	N/A

3. Peristaltic Dosing Pump Speed Calibrations

The AEtrium Dosing System in the AEtrium-4 contains 7 separate peristaltic dosing pumps (Figure 8). Pumps 1-4 are intended for nutrient (EC) dosing. Pumps 5 and 6 are intended for pH buffer solutions (acid and base). Pump 7 is intended for the dosing of chemical cleaning agents, such as Hydrogen Peroxide.

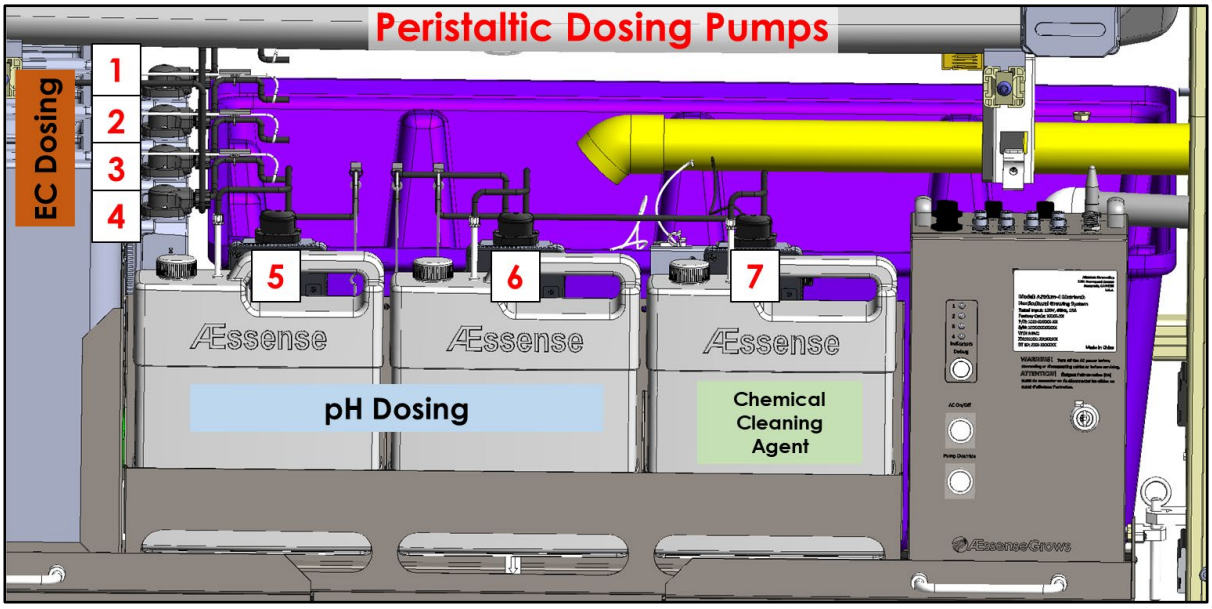


Figure 8. The AEtrium-4 Matriarch with 7 Peristaltic Dosing Pumps

While the peristaltic dosing pumps typically maintain a uniform flowrate, minor deviations due to limitations in the pump hardware can lead to subtle yet significant disruptions. Notably, this issue can become particularly pronounced when a dosing process must maintain specific dosing output ratios between multiple dosing pumps. This can be particularly evident in the case of nutrient bottles 1-4, where minor variations in flow rate can lead to a more noticeable impact on nutrient dosing ratios (Figure 9).

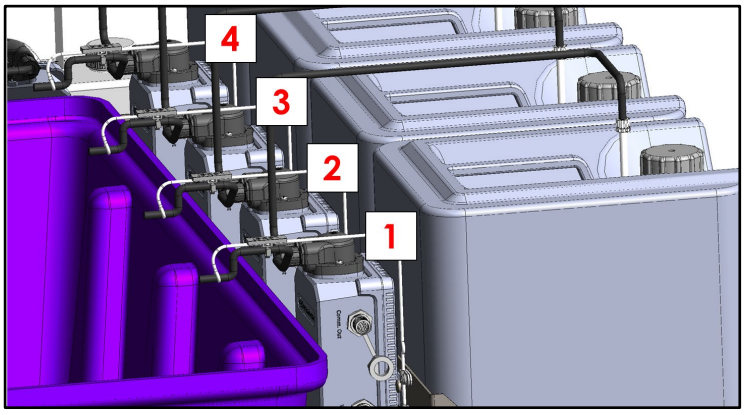


Figure 9. Nutrient Dosing Bottles 1-4 on an AEtrium-4

To address this risk, in Guardian Grow Manager version 4.2.12, a new calibration procedure has been added to increase the accuracy and uniformity of the peristaltic dosing pumps. This procedure allows the Guardian Grow Manager central control software to make adjustments and correct for differences in flow rates between separate peristaltic pumps to improve dosing accuracy. For users who elect to use either the Hybrid or Fast Dosing automated processes, it is necessary to perform this procedure on every active dosing pump, since pump flowrate uniformity affects the function of both processes. Additionally, it is recommended that all users dosing chemical cleaners from bottle 7 perform this calibration to ensure the chosen chemical is accurately delivered into the reservoir at the desired chemical concentration.

How to Perform the Peristaltic Dosing Pump Speed Calibrations

In order to calibrate the dosing pumps, the dosing pump speeds (mL/minute) must be determined. A separate calibration procedure is required for **Hybrid** and **Fast Dosing** since different pump speeds are used in each process.

To determine and set the pump speed for both procedures:

1. Ensure the pump and tubing are primed by manually cycling fertilizer through the pump for at least 60 seconds (dosing pumps can be run manually using the EC/pH/Bottle 7 section of the **Sensor Controls** tab within the device menu)(Figure 10).

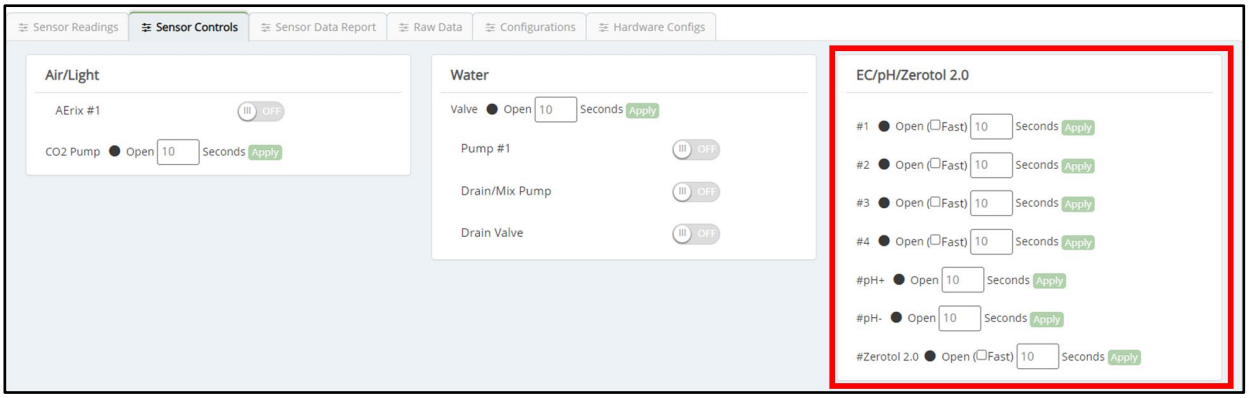


Figure 10. Manual Peristaltic Pump Operation Using the Sensor Controls Tab

2. *While the pump is not running, place a collection container (i.e., graduated cylinder) at the end of the peristatic dosing pump tube to catch the liquid that will be dispensed in the following step. For the **Hybrid** dosing calibration, it is recommended to use a 10 mL graduated cylinder. For the **Fast Dosing** calibration, it is recommended to use a 50 mL graduated cylinder.*

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3a. <u>For Hybrid Dosing Calibrations:</u>

Ensure the pump and tubing are primed by manually cycling fertilizer through the pump for at least 60 seconds (dosing pumps can be run manually using the EC/pH/Bottle 7 section of the **Sensor Controls** tab within the device menu)(Figure 10).

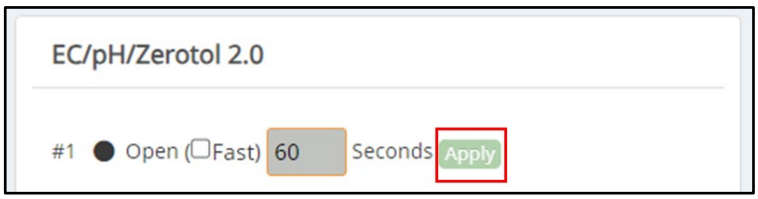


Figure 11. Running the Peristaltic Pump #1 at the Normal Pump Speed for 60 Seconds

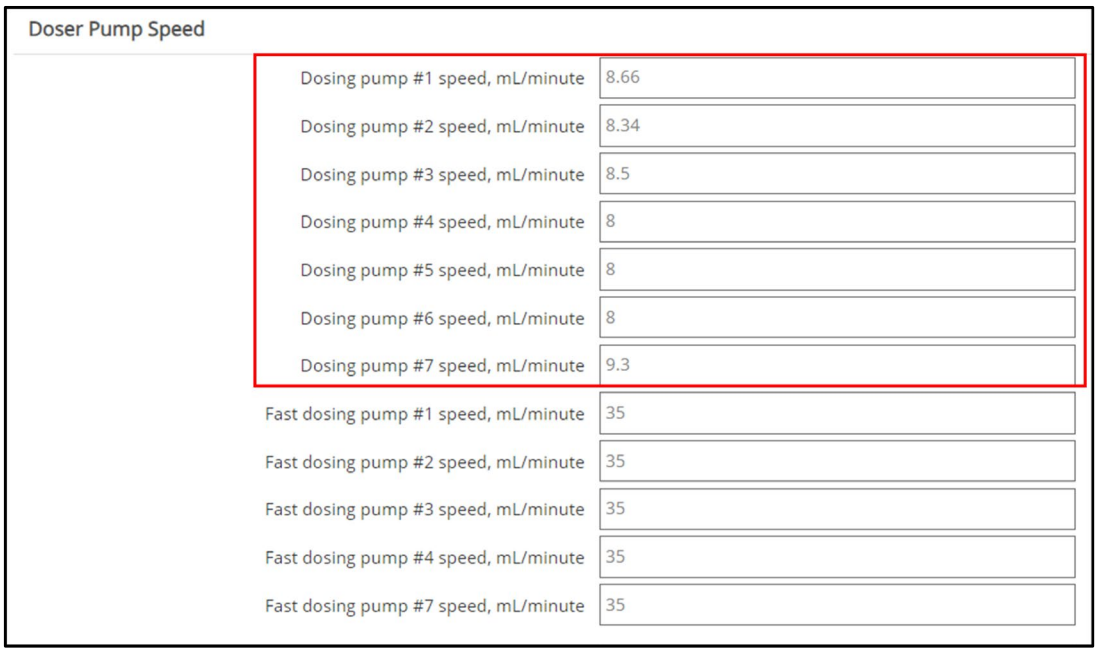


Figure 12. Doser Pump Speed Setpoints for The Normal Pump Speed

3b. For Fast Dosing Calibrations:

Run the pump at the Fast dosing speed (roughly 35 mL/minute) for exactly 60 seconds by checking the box labeled "(□Fast)", inputting "60" into the corresponding peristaltic pump number, then clicking "Apply" (Figure 13). Record the final output volume at the end of the 60 second cycle. Repeat the 60 second dosing speed test for each active dosing pump, then enter the values in the second half of the "Doser Pump Speed" section of the device configurations tab(Figure 14).

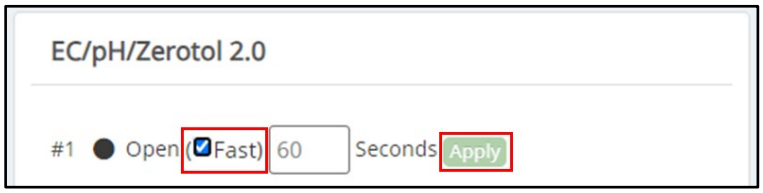


Figure 13. Running the Peristaltic Pump #1 at the Fast Pump Speed for 60 Seconds

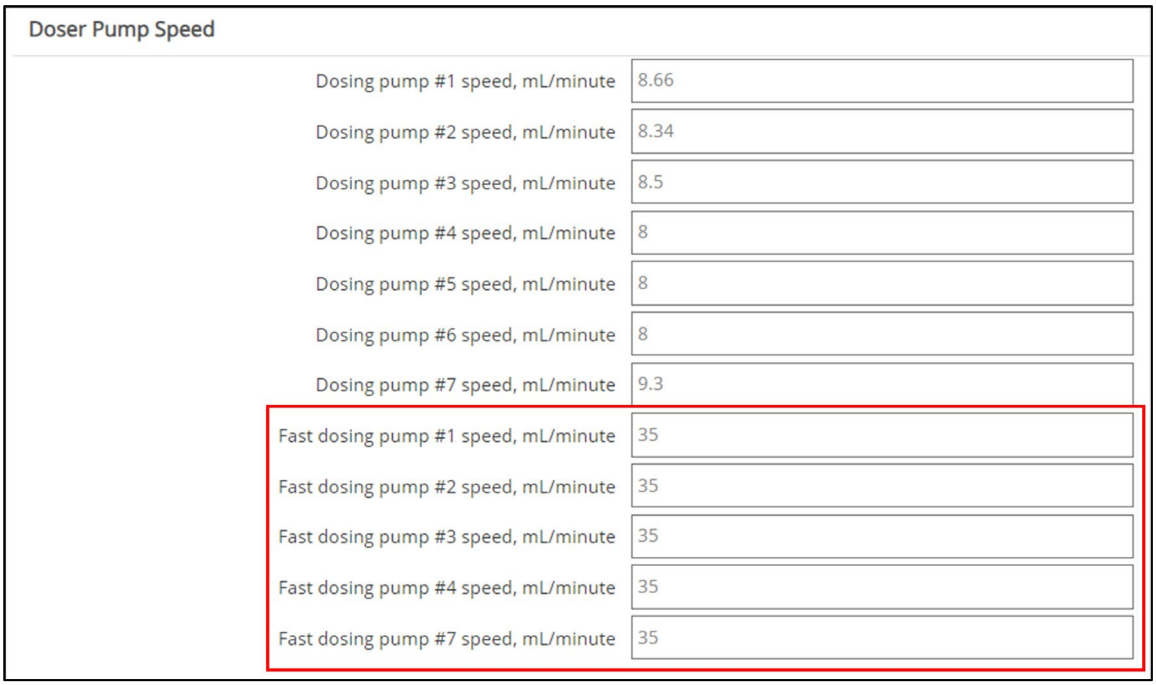


Figure 14. Doser Pump Speed Setpoints for The Fast Pump Speed

When is a Peristaltic Dosing Pump Speed Calibration Necessary

The first peristaltic dosing pump calibration can be performed at any time. Subsequent calibrations are only necessary when the measured pump flowrate deviates from the stored value by +/- 0.3 mL/minute or more. After the initial calibration, we suggest users check pump flow rates after each harvest.

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