AGROWTEK
Technology to Help You Grow

GrowControl™ GC-Pro/XL

Cultivation Control Systems

Installation & User Operation Manual

⚠ *WARNING*

Read these requirements, installation and operating instructions very carefully.
Failure to follow the instructions could result in a controller malfunction.
A malfunction could result in serious equipment damage, property damage, bodily injury or death.

REV04-19

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GrowControl™ GC-Pro Platform

GrowControl™ GC-Pro/XL is a modular control system designed to be fully customizable to nearly any growing control requirements. The core of the system is the GrowControl™ controller itself; this is where all of the controls functions and operations take place. The controller obtains information about the environment from climate sensors, hydroponics sensors, switch sensors and more. The controller uses this information, and based on the settings you enter into the *controls functions*, it will turn equipment on or off via the controller's *outputs*. The controller and its outputs are low-voltage (24Vdc) so they are connected to Agrowtek's RX, CX or RD relays to switch AC mains power to equipment.

24Vdc power supply operates controller, sensors and relays.

~AC Mains Power

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Overview

The GC-Pro cultivation controller is an advanced micro-processor based controller utilizing precision electronic climate sensors to offer intricate control of your environment. GrowControl™ is equipped with a broad array of flexible features, modes and options to suit nearly any climate controlled environment. Settings can be entered easily on the controller screen or with the GrowControl™ PC software.

The GC-Pro is capable of monitoring and controlling up to two different environments (zones) from one control unit.

Most controls settings have separate day and night set points which allow you to operate equipment differently during these respective periods to obtain optimal crop response.

The PC software can be used to completely control and monitor the controller locally or from afar. Data can be logged indefinitely to standard .csv files and live charting displays historical graphical data for up to two days.

Typical Applications

GrowControl™ controllers are designed for the discerning horticulturalist and can be tailored to any use from hobby applications to mid and large-sized commercial environments.

GrowControl™ contains many features for use in both greenhouses with sun-light as well as indoor environments that do not have the benefit of natural sun light.

Terminology

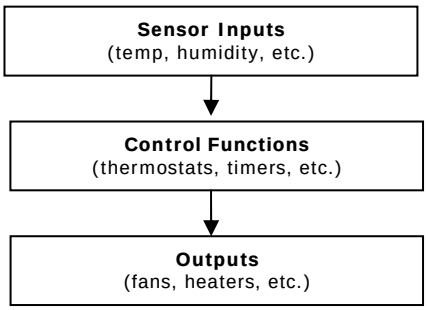
GrowControl™ takes information from its sensors and clock, and compares the readings with the settings entered by the operator. The controller then decides whether to turn equipment (outputs) on or off.

Analog sensors are those that have a variable value such as temperature, humidity, etc.

Digital Input sensors are those that act like a switch and are either on or off such as a float switch.

Controls Functions are the functions built into the controller such as timers, thermostats, humiditats, CO2 injection, nutrient dosing, etc.

Outputs are what equipment is connected to on the controller such as lights, fans, pumps, etc.

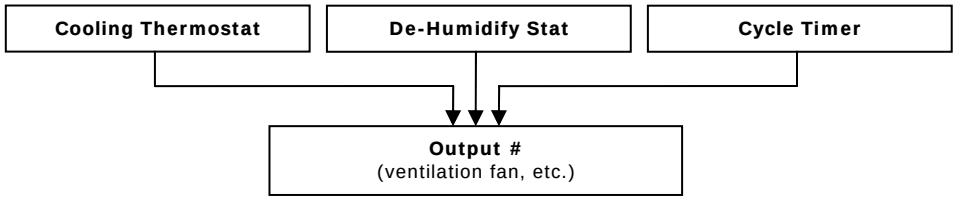


Zones are separate environments that are independently monitored and controlled with sensors in each zone.

Flexnology™

Multiple controls functions can be assigned to a single output for maximum control flexibility.

For example: a ventilation fan can be controlled by a cooling thermostat and a de-humidify humidistat at the same time. A timer could also be setup on the same fan output during the night, for example, to bring in fresh air on a time schedule.



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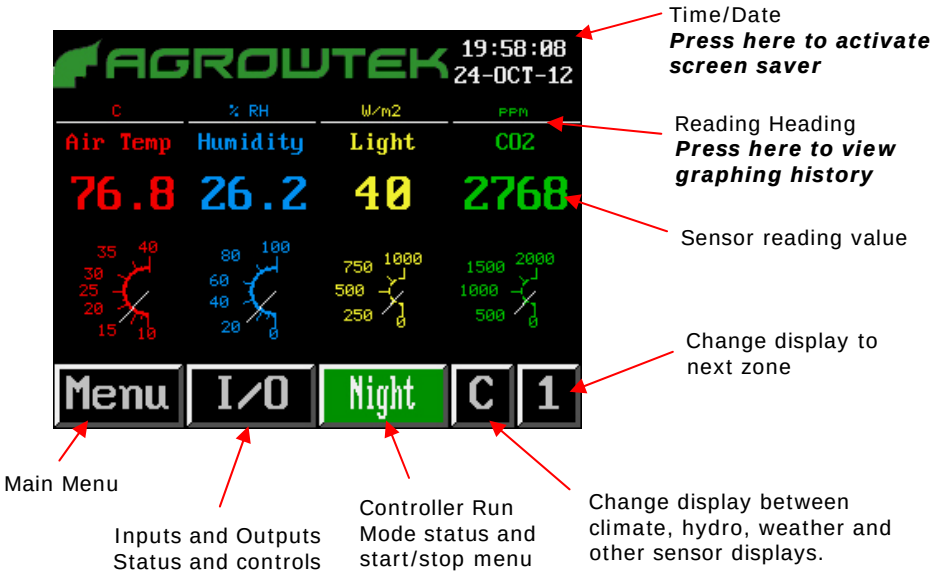
AgrowTouch™ Touch Screen

Home Screen

The home screen displays the sensor readings, time and date, controller run status, and several menu buttons.

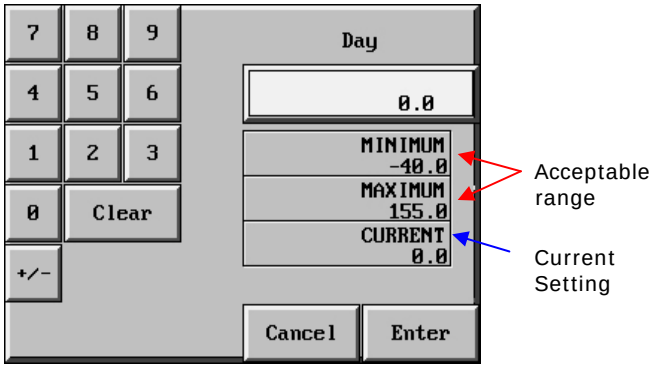
If the controller is in multi-zone mode, the bottom right corner will display a button to toggle between zone displays.



Key Pads

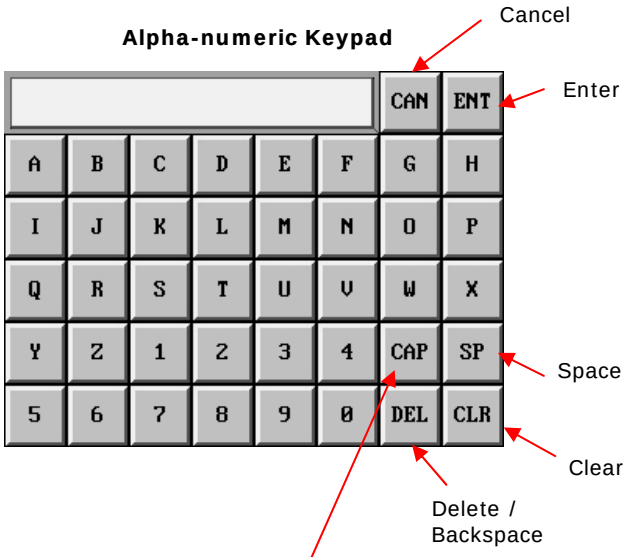
When entering a number, a numeric key-pad will be displayed.

Numeric Keypad



When entering a name, an alpha-numeric key-pad will be displayed.

Alpha-numeric Keypad



Decimal Values

For fields that have a decimal place, enter the number as follows:

72.5 would be entered as: **7 2 5 Enter**

75.0 would be entered as: **7 5 0 Enter**

There is no decimal point key on the touch screen.

Screen Saver

The touch screen has a built-in screen saver which turns off the back light after 30 minutes.
To re-activate the screen, simply touch any where on the screen.

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Setting up the Software

The controller can be ordered with or without a touch-screen interface. The PC software can connect to the controller whether there is a touch screen or not and can take the place of a touch screen if the controller will never be accessed locally or to save cost and use a PC as the sole interface.

Communication Connection

GrowControl™ can be linked to a PC for complete remote control, monitoring, setup and data logging.

The GC-Pro is equipped standard with a RS-232 serial port for local connection to a PC via the PC's serial port (or a USB port with USB converter.) Optionally, the GC-Pro can be equipped with an Ethernet port for connection to your local area network. When connected to a LAN, the controller can be accessed via IP address locally or remotely via the internet (with proper port forwarding; see Port Forwarding.)

Simultaneous Connections
When equipped with an Ethernet port, the controller may be accessed simultaneously by multiple PC's locally or remotely. The controller can also connect via its serial port and Ethernet port simultaneously.

Notes:
1. Serial communication cables can be extended up to 50ft with a male-female extension cable available from Agrowtek.
2. A USB-to-Serial converter is available from Agrowtek to connect the controller's serial port to a USB port on your PC.
3. A "Wireless Bridge" (or a router in bridge mode) can be used to connect the Ethernet port to a wireless router.

Minimum PC Requirements

- Windows® XP, Vista, 7, 8 (32 or 64 bit)
- Microsoft .Net 4.0 Client Run Time Environment (installer provides download link from Microsoft if not installed)
- RS-232 DB-9 Serial Com Port, or USB port (with USB-Serial converter)
- 1 GHz processor
- 1 GB Ram
- 6Mb HDD space for program
- Additional HDD space for data logging files or camera images

Installing the Software

Download the installer file from the Agrowtek website:

http://agrowtek.com/download/GrowControlSetup.exe

Open the installer and follow the prompts to install the program.

Running the Software

:o the program should automatically be placed on your desktop and in your start-menu.

the desktop icon or navigate to "Agrowtek Inc > GrowControl" in the start-menu to open the program.

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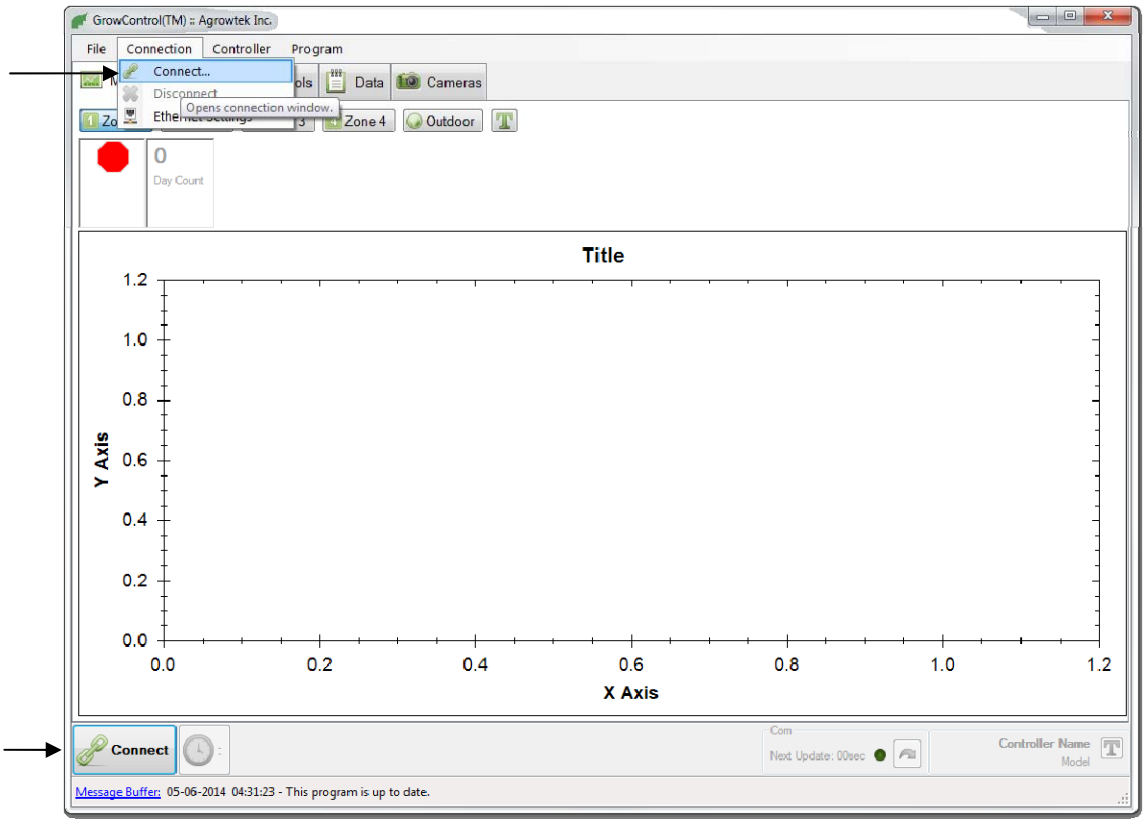
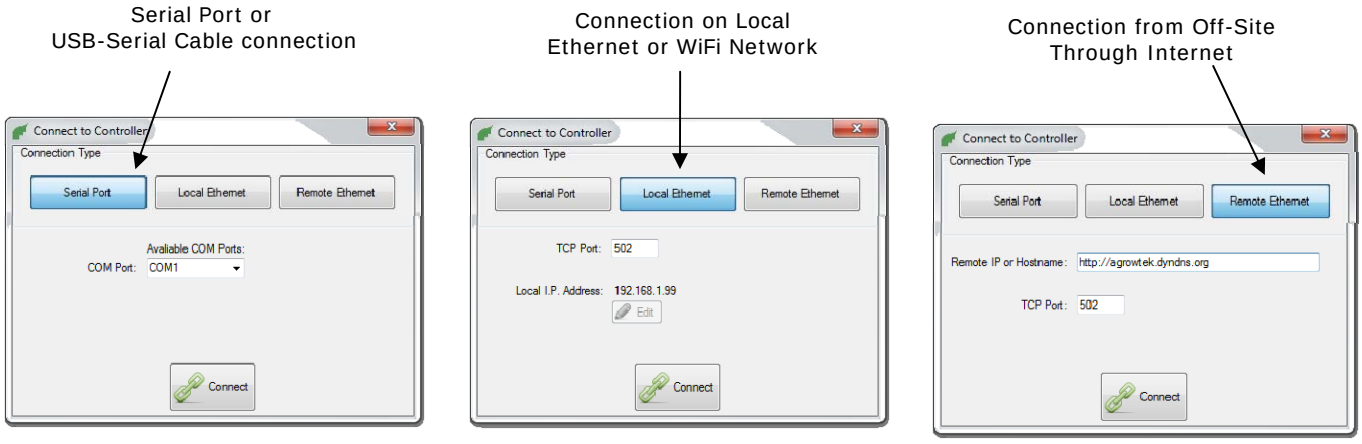
Connecting to the controller

1. Press the “Monitor” button OR from the top menu, select “Connection -> Connect…”



2. The connection dialog appears; select the connection type.

3. Check the connection settings (COM Port or Address, etc.) and press “Connect.”



TCP Port: *If using port forwarding on a port other than the controller’s standard port 502, enter it in the TCP port text box.*

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4. If the controller has an operator password set, you will be prompted to enter your operator (or system) password.

5. The software will perform an initial read of the settings in the controller.
6. If you connected via the “Connection” menu, you will be asked if you want to start monitoring; press yes to begin monitoring the controller or press no to remain connected but not monitoring.

7. If monitoring, the sensor readings, I/O status and control functions status will be updated.

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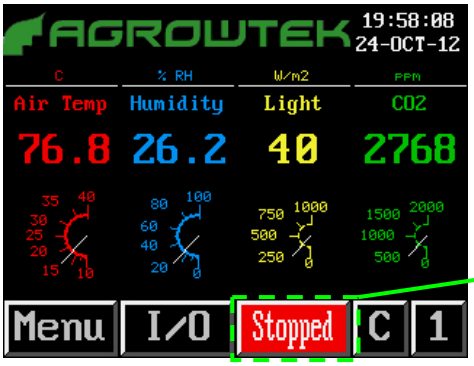
Run / Stop

The controller will automatically turn the equipment outputs on and off depending on how they are programmed to operate when the system is in “Run” mode. All of the outputs can be stopped simultaneously by placing the controller into “Stop” mode. Placing the controller back into “Run” mode by pressing Start will allow the outputs to operate as the controller requires.

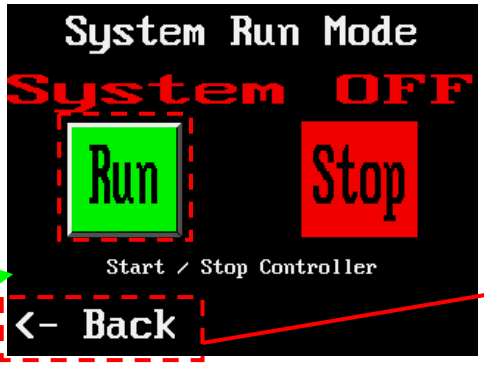
> ***IMPORTANT***
> **Before any outputs will activate, the system must be placed into “Run” mode.**
> When the system is in “Run” mode, the outputs can be turned on. When in “Stop” mode, all outputs will be disabled.

Touch Panel

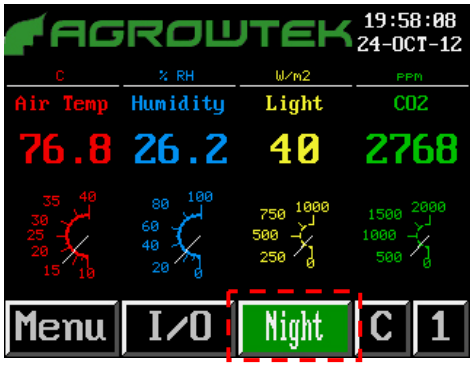
From the Home screen press the Status button to access the run mode menu. When the controller is stopped, “System OFF” will be displayed in red. When the controller is running, “System ON” will be flashing in green.



1.The home screen; press “Stopped” button to enter run mode screen.



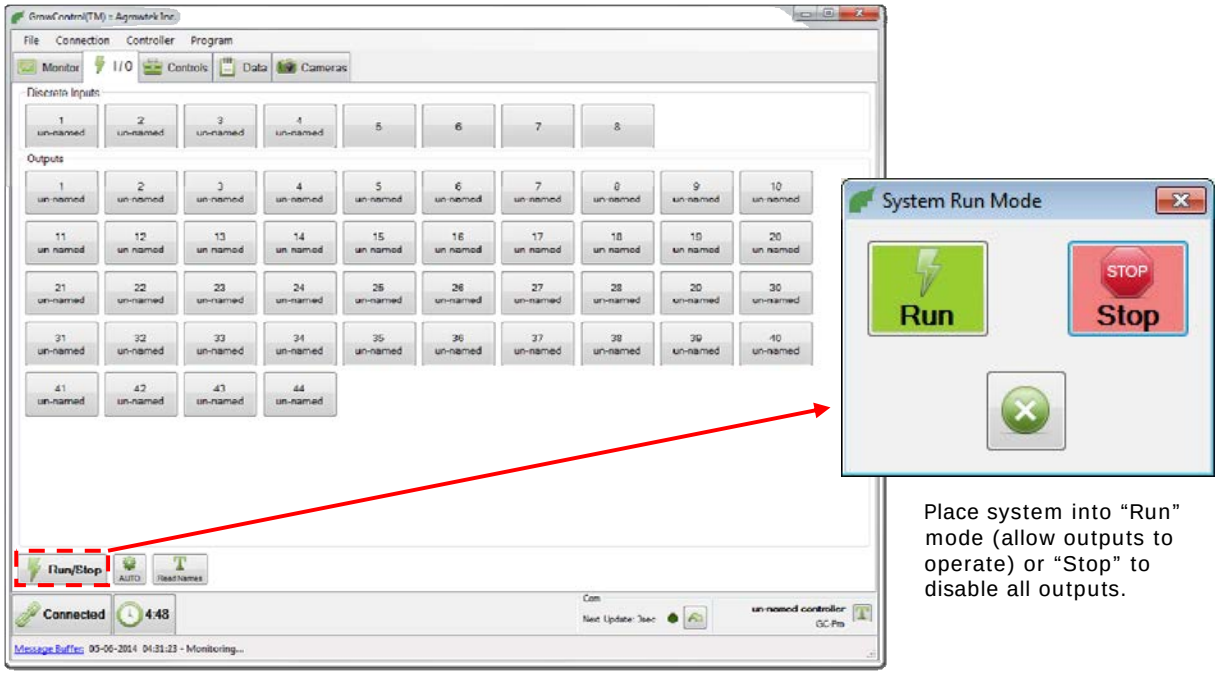
2. Press “Run” to place the system into ‘run’ mode or “Stop” to stop the controller. Press “Back” to return to the previous screen.



3. The home screen will show green for run and the current zone’s day or night mode.

Software

The controller can be started or stopped from the PC software by pressing the “Run/Stop” button on the I/O tab when connected to the controller.



Place system into “Run” mode (allow outputs to operate) or “Stop” to disable all outputs.

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Inputs & Outputs (I/O)

Outputs

The controller turns equipment on and off by controlling **outputs.** Each control function (thermostats, timers, etc.) is programmed to one of the available outputs as desired.

The controller comes with twelve (12) programmable outputs (GC-Pro-xD is equipped with 20 outputs.) The user names each output for reference then assigns control functions to the outputs as required.

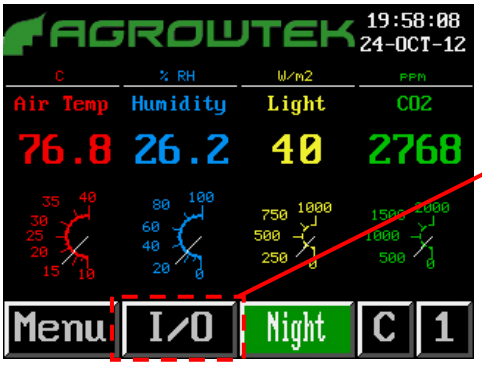
Note: "Output Sequence Delay Timer" may delay the activation of any output by the delay time. This prevents multiple outputs from activating simultaneously thereby reducing electrical load spikes.

Inputs

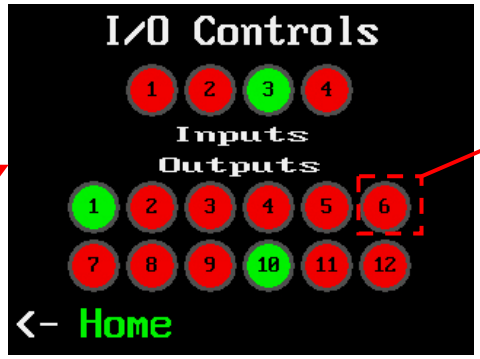
Four (4) "Digital" inputs are available to connect switch type sensors (float switches, door switches, leak sensors, smoke detectors, etc.) Digital inputs can be programmed to act in a variety of different ways including turning an output device on or off when the input it tripped.

Touch Panel

The I/O controls menu displays the current status of all the digital inputs and outputs. An input or output will be **green** when activated, and **red** when inactive. Touching any of the input or output numbers will display the settings for that input or output.



Status button indicates run or stopped, and day or night (if in run mode.)

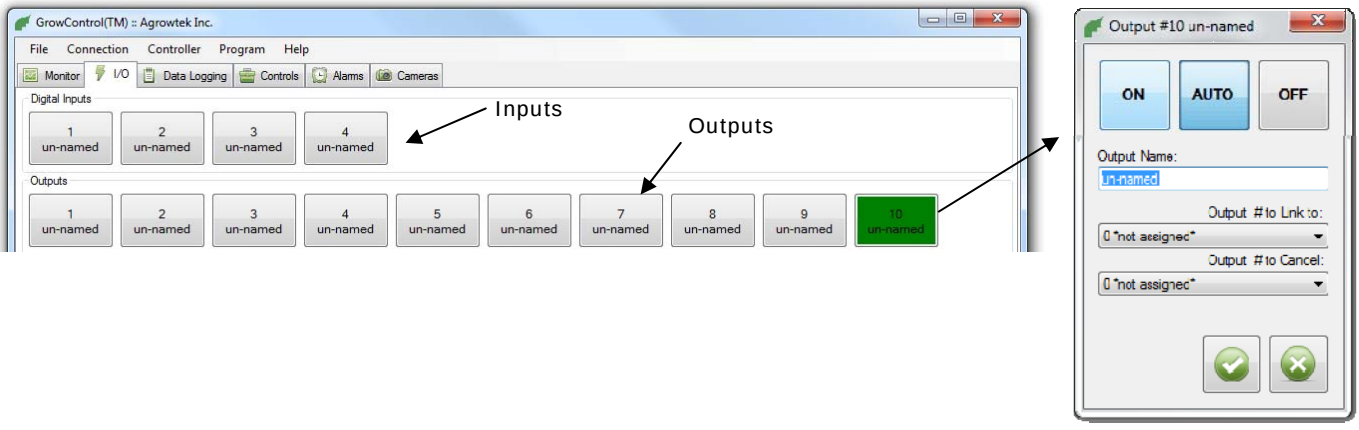


Inputs and outputs that are on are shown in **green**; off are shown in **red**. Pressing an input or output number displays the control functions for the input or output.

Output can be named for reference, manually operated or disabled, and be programmed to disable another output when on (advanced settings.)

Software

The PC software contains the I/O controls on the 'IO' tab. If an input or output is activated, it will be shown in **green.** Click an input or output button to start, stop or set to automatic mode, change the name or set the interlock/interrupt output#.



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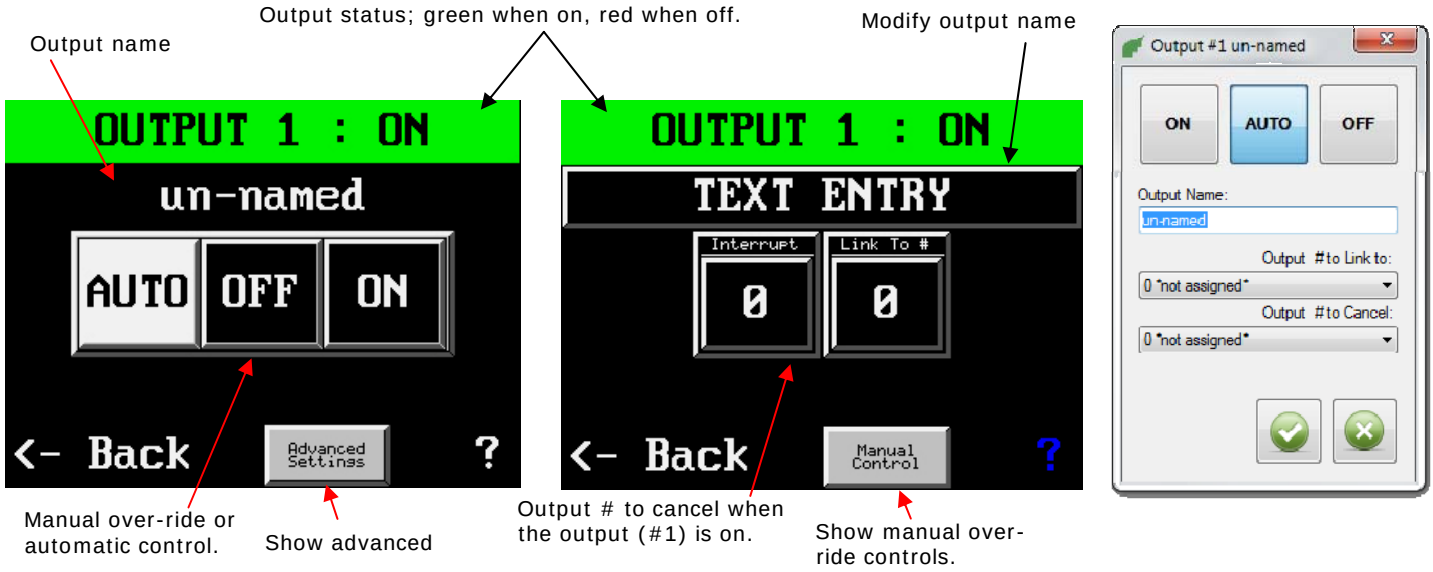
Output Settings

Outputs are devices that the controller turn on or off as required (such as lights, fans, pumps, etc.) Each output has its operation designated by the controls functions, (described later) but the output can be manually operated or disabled, and can utilize an 'interrupt' function.



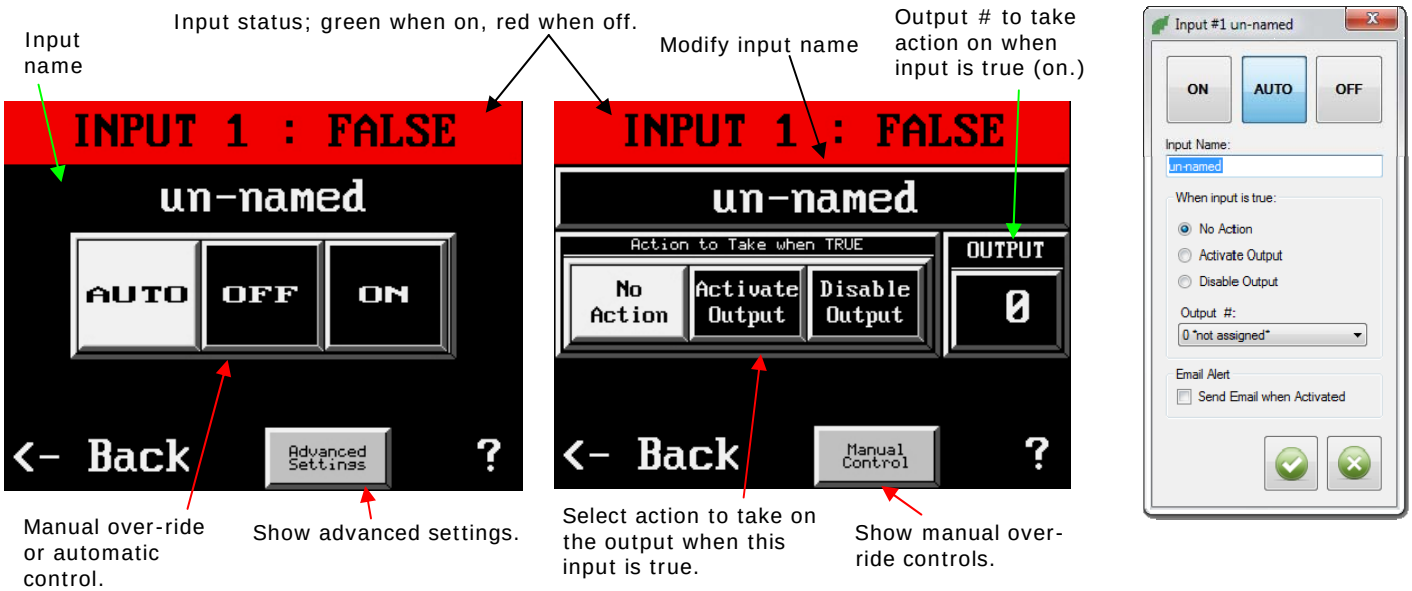
Output Link/Cancel

The **Link-To** function causes a selected output number to be activated any time the parent output is activated. This function is most typically used to link multiple lighting banks or connect an AC fan and cool control. For example: if output #2 were selected in the output #1 box above, then #2 would be activated any time #1 is on.

The **Cancel** function causes a selected output number to be disabled any time the parent output is activated. This function is most typically used to prevent CO2 outputs from activating when ventilation stages are active. For example: if output #2 were selected in the output #1 box above, then #2 would be disabled any time #1 is on.

Input Settings

Digital **Inputs** are those that act like switches (float switches, leak sensors, motion sensors, smoke detectors, etc.) Digital inputs can be assigned to perform specific tasks when activated such as activate or disable an output.



Controls Functions

"Controls" are functions such as thermostats, timers, etc. that the controller uses to operate the "outputs" (greenhouse equipment.) The grower decides which of the controls functions the controller will use to control the equipment in the environment(s.)

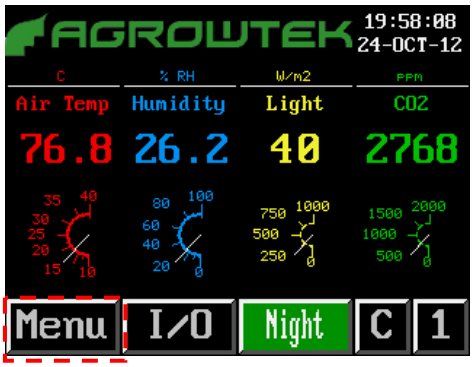
Any control function that is used must be assigned to an output (or VSC channel # if applicable.)
Any control function can be disabled by setting the output number (and VSC channel) to 0.

Multiple controls functions can be assigned to the same output.
For example; a cooling thermostat and a de-humidistat can both be assigned to an output connected to a ventilation fan in order to turn the fan on for either high temperature or high humidity.

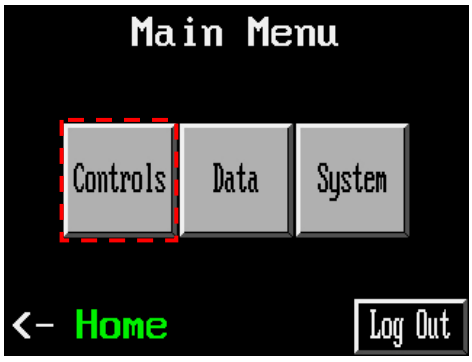
Controls functions can be assigned to a zone.
The controller can monitor up to two sensor zones and the control you set up needs to know if it should respond to the sensor readings for zone 1 or zone 2. *(A zone number of 0 defaults to zone 1.)*

Touch Panel

The controls functions are accessed via the main menu.



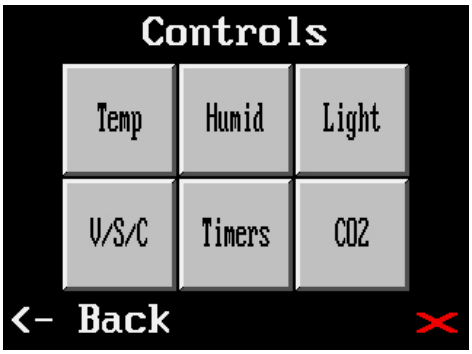
Press "Menu" button to enter main menu.



Press "Controls" to enter controls menu.

Standard Controllers (with Hydroponics)

Greenhouse "C" Models



Controls are broken down into basic categories.

Software

The controls functions are accessed on the "Controls" tab page when connected to a controller. Click on the controls buttons to modify the settings.

- Active controls are highlighted green.
- Clicking on a control button will display the settings for that control function.

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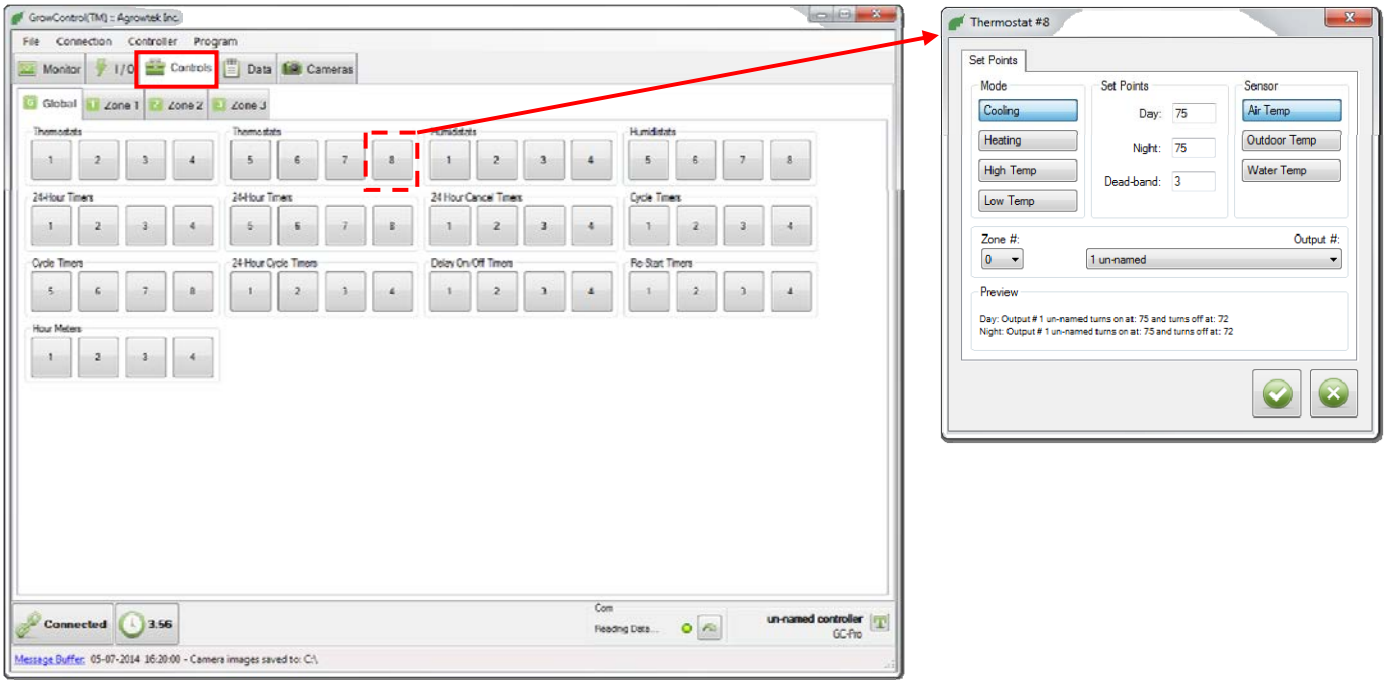


Lights, Day & Night Mode Controls

The day and night modes controls determine how the controller will decide when to switch between the day and night settings that are entered in controls functions.

Day / Night Mode

"Synchronize with Lights" mode synchronizes with the lighting timer; day when lights are on, and night when off.

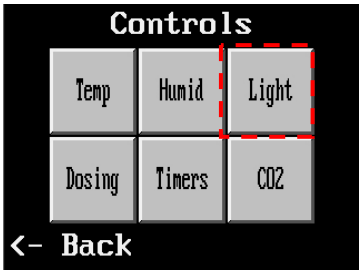
"Light Irradiance Sensor" mode activates day mode when the light level reaches the "W/m2 Day" set point and activates night mode when the light level falls to the "W/m2 Night" set point. *This mode is intended to be used in environments with sunlight.*

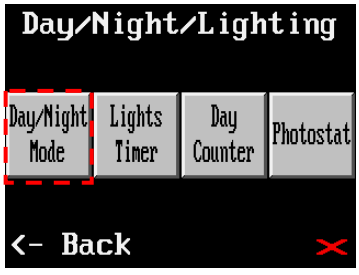
"Flip-Box Mode" is designed to be used with dual zone environments. When in flip-mode the controller will assume zone 1 is in day mode when the flip trigger is off and zone 2 is in night mode. When 'flipped' zone 1 will be in night mode and zone 2 will be in day mode. Use the light flip timer to set the flip time, change delay and trigger outputs.

Day / Night Outputs: Output number to activate continuously during the day or night period. For example, if you want air circulation fans to run all day but not at night, enter the fans output number into the "day" output.

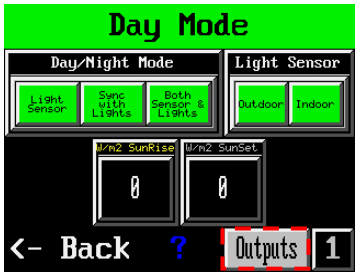
W / m2 Day / Night: Light intensity levels which determine day and night when using the light sensor mode, and which will activate light alarms (see alarms.)

The day and night modes are accessed via the "Controls" menu.
System administrator password is required to access the day/night mode menu if set.





The day and night mode settings are accessed on the first page of the controls menu by pressing the "Light" controls button then "Day/Night Mode" button.



Each zone can detect day/night from the lighting timer, light sensor or flip box position. Also, an output can be activated during the day or night period.

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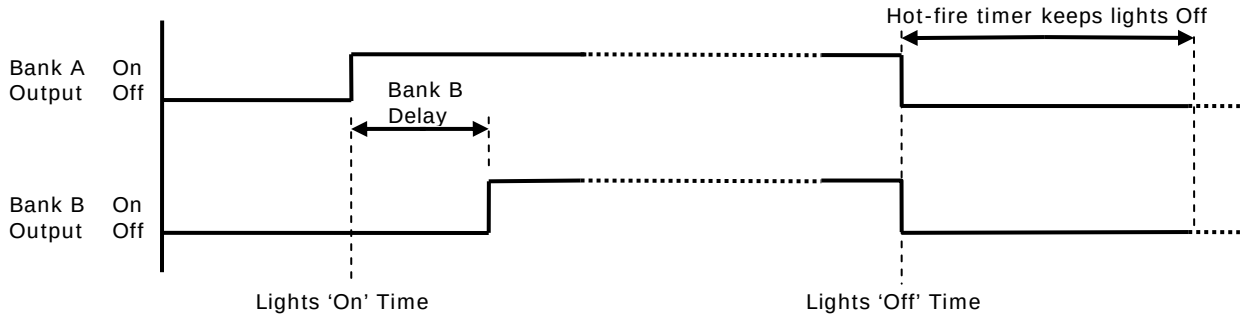
Lights Timers

The controller has special timer controls for lighting equipment including two 24-hour lighting timers (one for each zone,) each with their own secondary 'B' bank. The 'B' bank can be delayed to activate after the 'A' bank for reduced electrical load on start-up.

Each lighting stage has its own hot-fire prevention timer which will prevent the lighting outputs from re-activating for a set duration once turned off. The hot fire prevention timer ensures lamp bulbs and ballasts will not be damaged due to hot-firing. *See 'System Settings' for hot-fire timer configuration.*

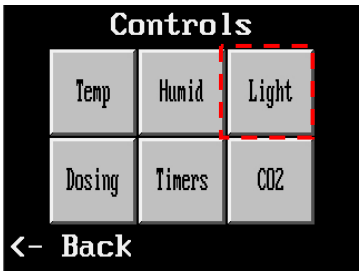


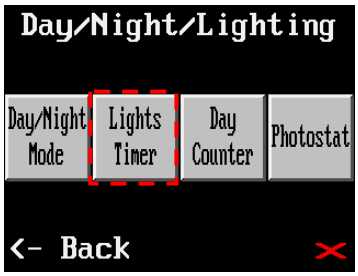
Lighting Timer: Enter the time of day (in 24-hour format 0:00-23:59) when the lights should turn on and off.

Output: Enter the output(s) for the primary (A) and secondary (B) lighting banks as connected to the controller. If B is not used, leave it assigned to 0.

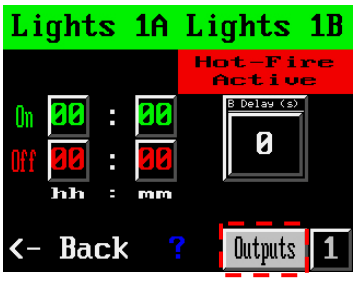
Delay (B Bank): Delay time (seconds) to start bank 'B' after bank 'A.'

The lighting menu is accessed from the "Controls" menu under the "Lights" button.

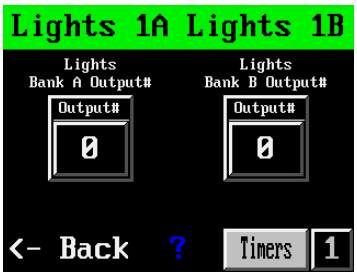




The lights timer settings are accessed on the first page of the controls menu by pressing the "Light" controls button then "Light Timer" button.



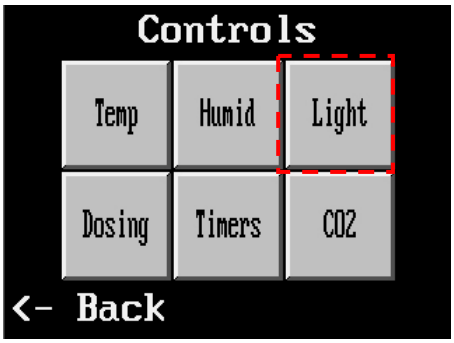
Lights can be operated by a 24-hour on/off timer. Enter the on and off times, and a delay for a second bank ('B' bank) if desired.

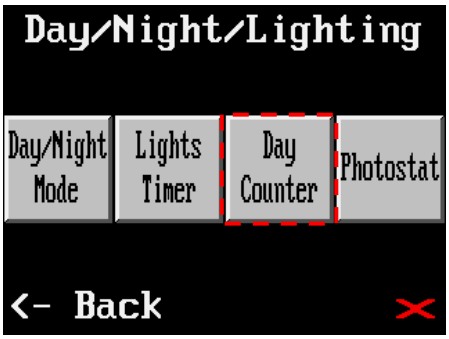


The 24-hour light timer can be divided into two banks with a on-delay to reduce electrical load spikes when the lighting timer activates.

Day Counter

GrowControl™ keeps a count of the days by incrementing the day count at midnight (0:00.) The day counter is used by some functions including the irrigation timer and hydroponics dosing scheduler. The day count can be reset to zero or any other value by simply adjusting the count.





The day counter settings are accessed on the first page of the controls menu by pressing the "Light" controls button then "Day Counter" button.

View or adjust the day count by pressing the count number.

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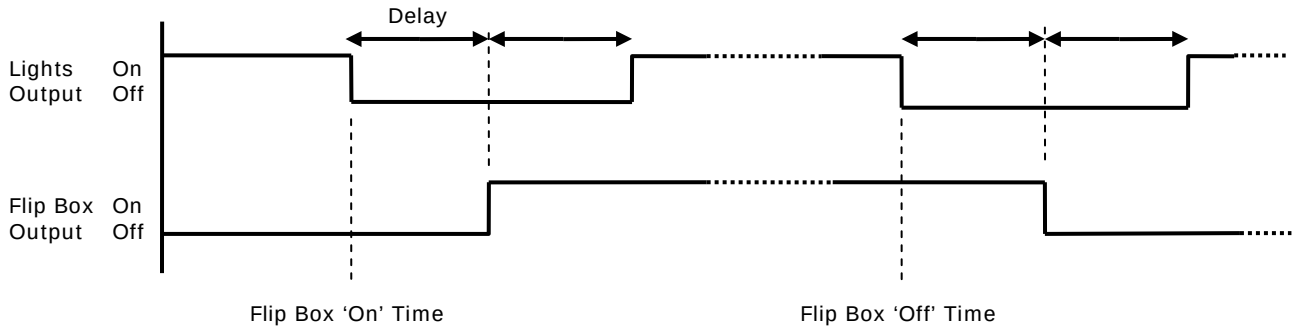
Light-Flip Box Control

GrowControl™ is designed to safely and properly switch over lights on a light flip box. For extended light flip box contactor life, ballasts should be turned off prior to switching the flip box trigger position. This prevents arcing and burning of the contacts and also ensures the ballasts fire the bulbs properly after being switched.

Simply set the time of day to turn the flip trigger on and off and enter a delay time for switching. The delay time (seconds) will be applied after turning off the lighting output before changing the state of the flip trigger, and after the trigger has been flipped before re-starting the lights.

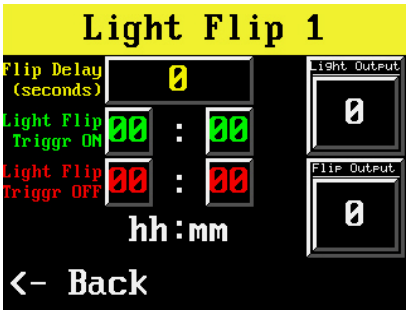


Flip Delay: Seconds to delay before and after switching flip box trigger.

Light Flip Trigger ON/OFF time: Time of day (hh:mm) to turn flip trigger on and off.

Light Output: Output which operates the lighting contactor(s) to turn the ballasts on and off.

Flip Output: Output which operates the light-flip trigger cord.



The light flip timer controls the ballast contactors and the flip box for integrated smart control.

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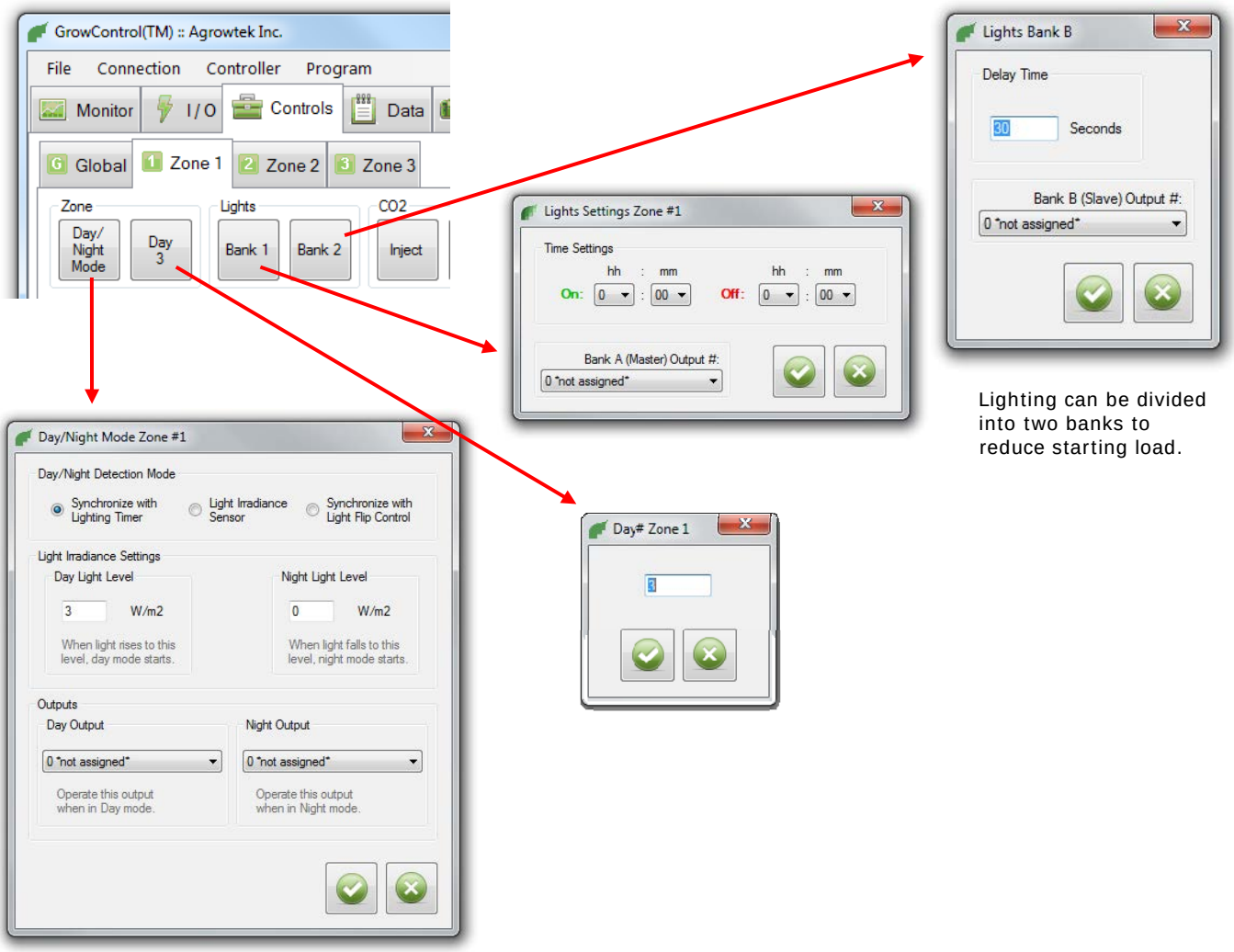
Lighting Controls in Software

The day/night mode and lighting controls are located at the top of the controls tab. Click on the controls buttons to modify the settings.



Lighting can be divided into two banks to reduce starting load.

Enter a Day or Night Output# ONLY if it is desired to have those output(s) operate constantly during the day or night mode.

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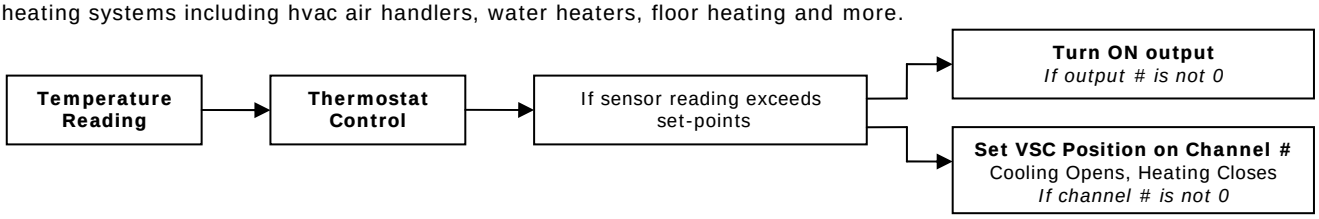
Basic Thermostats

Basic thermostats can be set to operate in four different modes and can be operated from air temperature, water temperature or outdoor temperature.

Cooling & Heating Modes

Cooling Mode turns an output **on** or opens VSC's when the temperature is too hot. Cooling thermostats are used to operate ventilation fans, curtains, windows, chillers, evaporative coolers and more.

Heating Mode turns an output **on** or closes VSC's when the temperature is too cool. Use heating thermostats to operate heating systems including hvac air handlers, water heaters, floor heating and more.

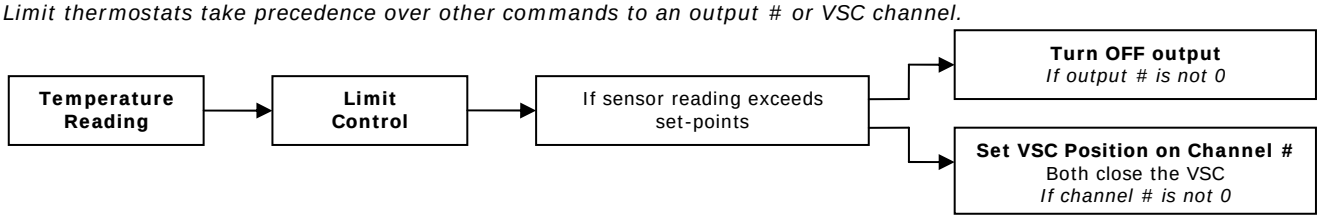


Hi/Lo Limit Mode

Lo-Temp Mode turns an output **off** or closes VSC's when the temperature is too cool. Low temperature limits can be used to close down vents and curtains or stop ventilation fan outputs from operating if the outdoor temperature is too low.

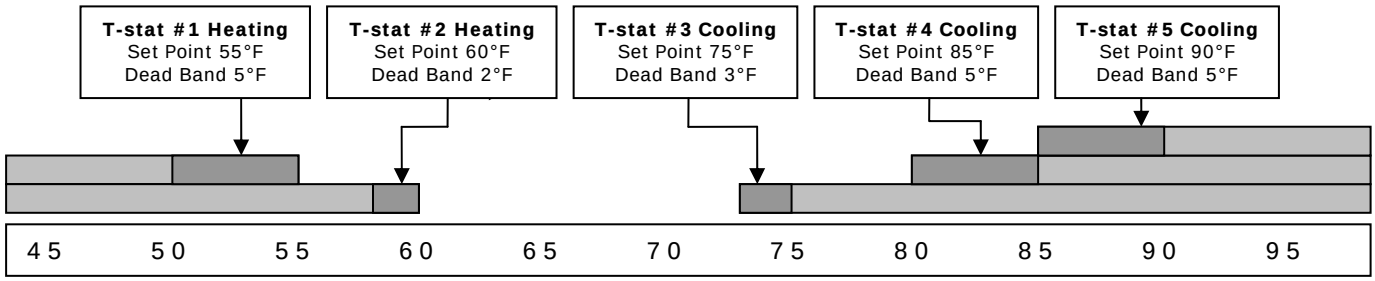
Hi-Temp Mode turns an output **off** or closes VSC's when the temperature is too hot. High temperature limits can turn off CO2 combustion generators, light banks, and other equipment if a room is too hot, or to disable heating systems if the outdoor temperature is above a minimum.

Limit thermostats take precedence over other commands to an output # or VSC channel.



Staging Manual Thermostats

Thermostats can be staged for multiple levels of heating and cooling.
**"C" models have multi-stage temperature and humidity controls built-in.*



In the example above:

Thermostat #1 will operate any time the temperature drops below 58 and will continue to heat until 60.
Thermostat #2 will operate any time the temperature drops below 50 and will continue to heat until 55.

Thermostat #3 will operate any time the temperature rises above 75 and will continue to cool until 72.
Thermostat #4 will operate any time the temperature rises above 85 and will continue to cool until 80.
Thermostat #5 will operate any time the temperature rises above 90 and will continue to cool until 85.

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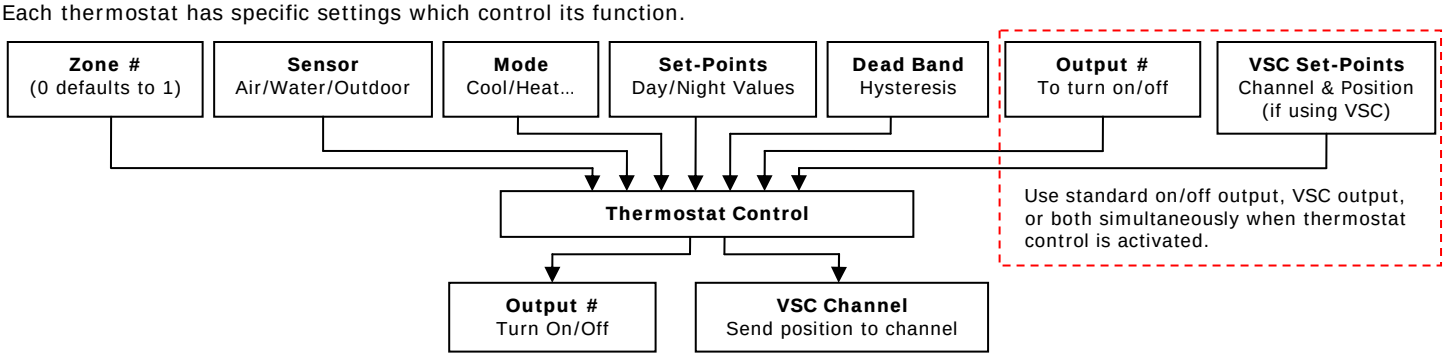
Thermostat Settings

Each thermostat has specific settings which control its function.



Zone#: The zone that the thermostat will take sensor readings from.

Sensor: The sensor type from the selected zone (air temperature, water temperature or outdoor temperature.)

Mode: Cool / Heat modes will turn on an output, Hi/Lo Temp modes will turn off an output.

Day/Night Set Points: Temperature values for the day and night which will activate the thermostat.

Dead-band: Temperature drop from set-point before turning on heat or turning off cooling (see dead-band below.)

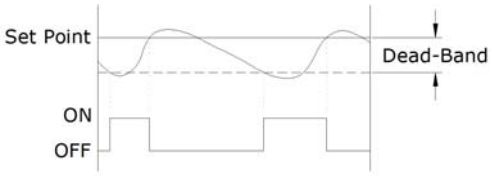
Output#: Enter an output number to turn on (or off if limit control) when the thermostat is active.

VSC#: Enter a VSC channel # to send the target positions to when the thermostat is active.

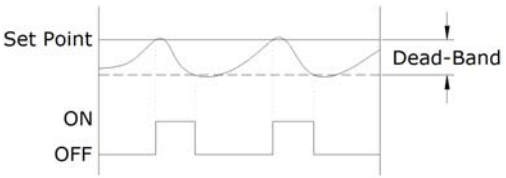
Dead-Band

The "Deadband" setting determines how tightly a thermostat tries to keep the temperature to the set-point. It is necessary to have some dead-band: generally 2.0-5.0°F or 1.0 – 3.0°C.

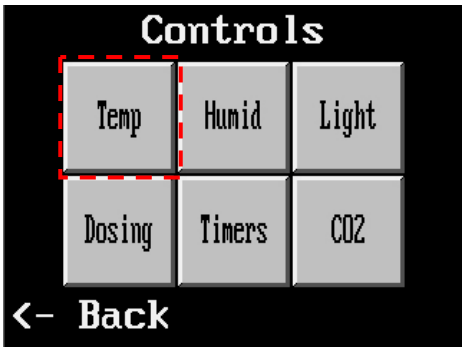
Heating



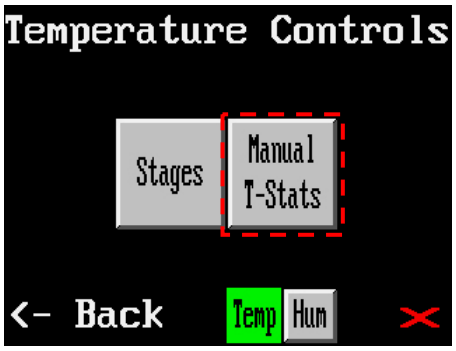
Cooling



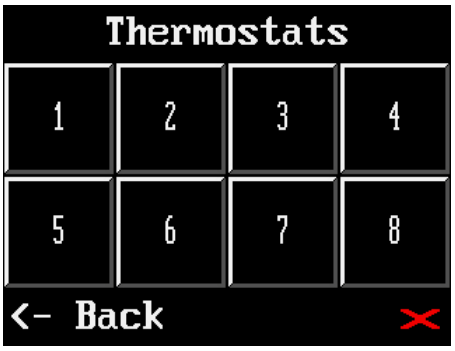
Touch Panel



Press "Temp" from the controls menu.



If a greenhouse "C" model, select "Manual T-Stats."



Eight manual thermostats are available for heating, cooling, etc.

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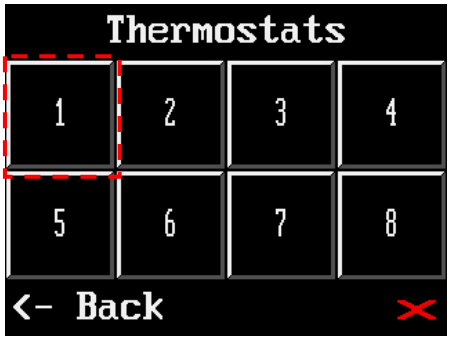
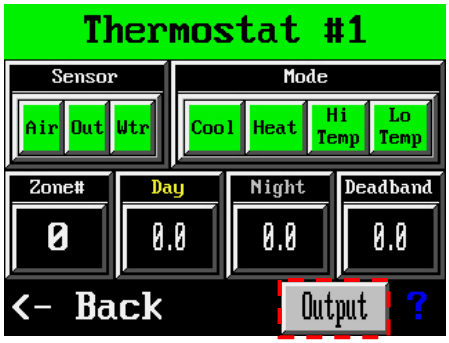
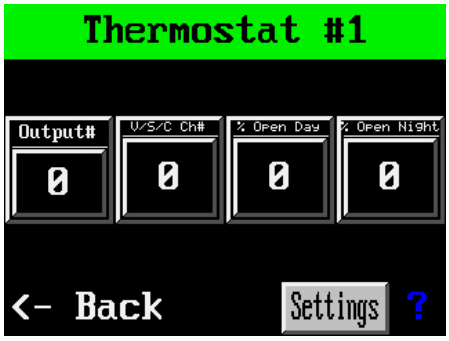


Select a thermostat to view its settings. Active controls will be highlighted.



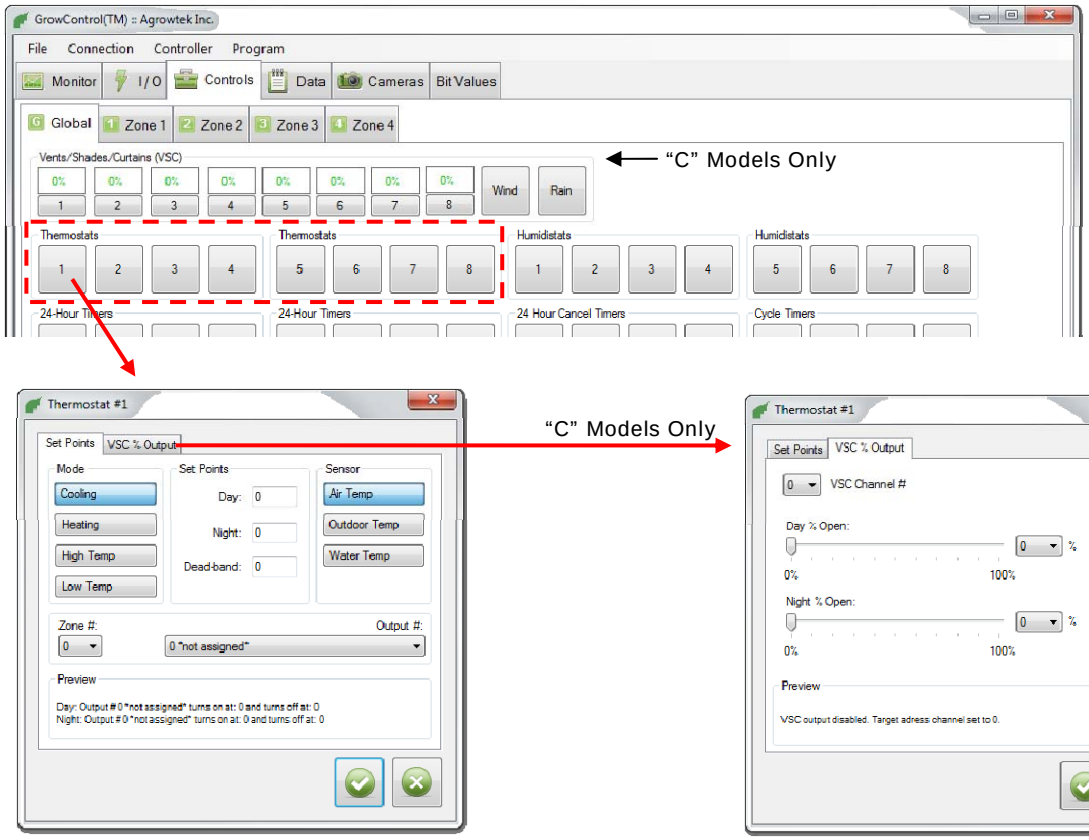
Select the modes and enter the set-points and dead-band settings. Press "Output" button for output settings.



Enter a output number to operate, or if VSC controls are used, enter a channel and position settings ("C" model only.)

Software

The temperature controls are grouped into cooling thermostats, heating thermostats and temperature limits. Click on the controls buttons to modify the settings.



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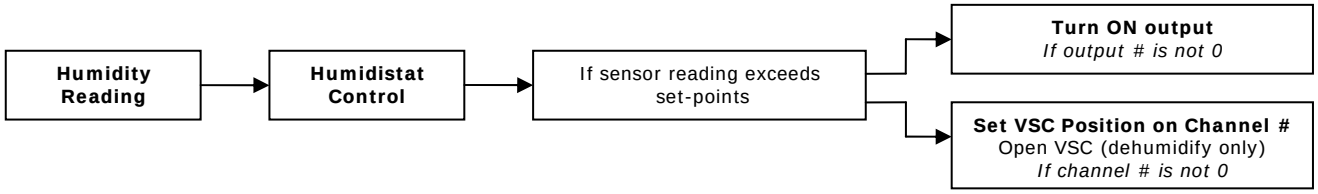
Basic Humidistats

Basic thermostats can be set to operate in three different modes and can be operated from the indoor humidity sensors.

Humidify / Dehumidify Modes

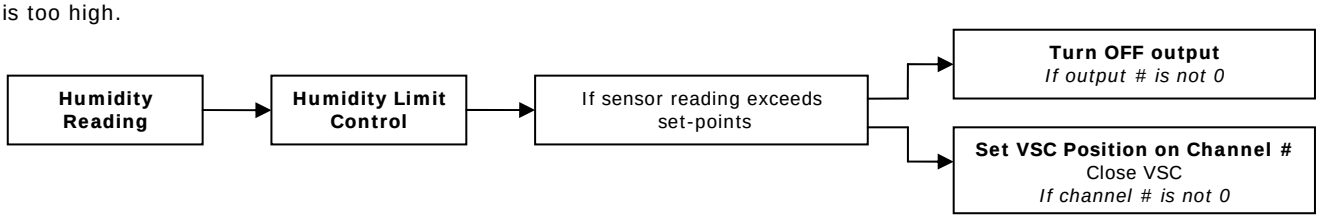
Humidification Mode turns an output on when the humidity is too low. Humidification is used to operate humidifiers.

De-Humidification Mode turns an output on or set a VSC open position when the humidity is too high. Dehumidification can operate ventilation fans, VSC (vents, shades or curtains) and more to reduce humidity.

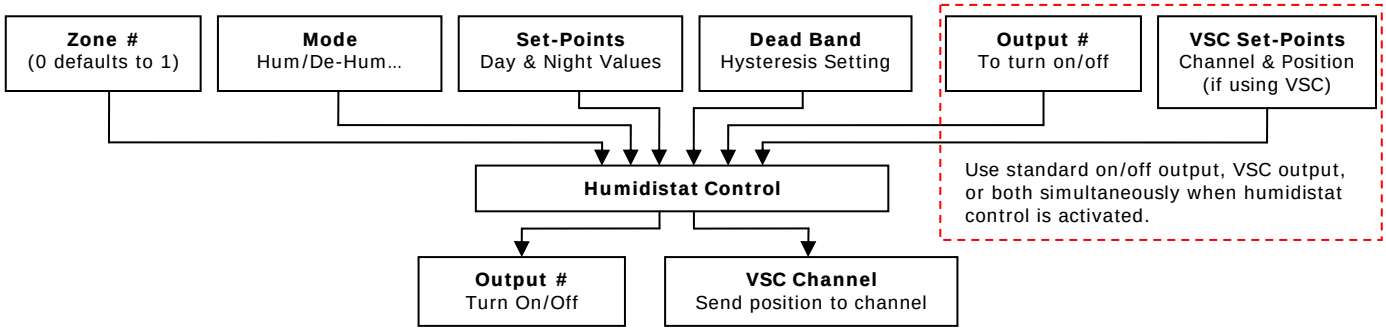


Hi-Humidity Mode

Hi-Humidity Mode turns an output off when the humidity is too high. Turn evaporative cooler water valves off if the humidity is too high.



Control Settings



Zone#: The zone that the humidistat will take sensor readings from.

Mode: Humidify / De-Humidify modes will turn on an output, Hi-Humidity mode will turn off an output.

Day / Night Set Points: humidity values for the day and night which will activate the humidistat.

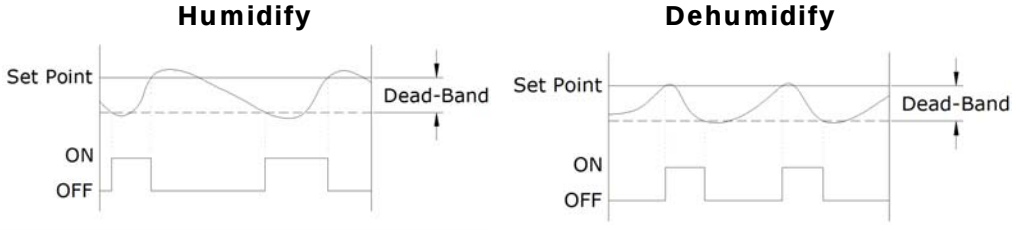
Dead-band: Humidity drop from set-point before turning on humidification or turning off de-humidification.

Output#: Enter an output number to turn on (or off if limit control) when the humidistat is active.

VSC#: Enter a VSC channel # to send the target positions to when the humidistat is active.

Dead-Band

The "Dead-band" setting determines how tightly a humidistat tries to keep the humidity to the set-point. It is necessary to have some dead-band: generally 3-10%RH.



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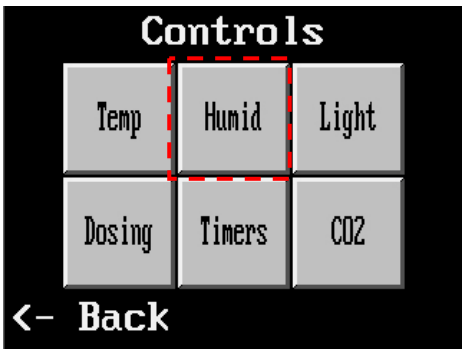
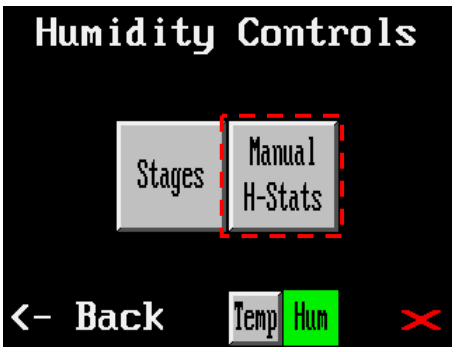
Touch Panel

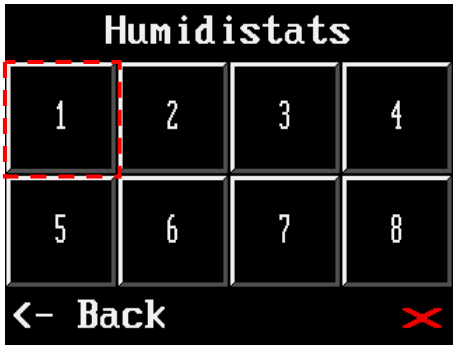


Press “Humid” from the controls menu.

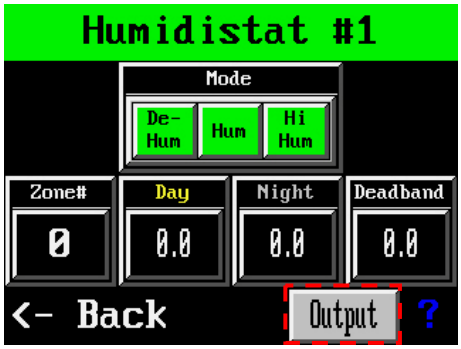


If a greenhouse “C” model, select “Manual H-Stats.”

Eight manual humidistats are available for heating, cooling, etc.



Select a control modify its settings. Active controls will be highlighted.

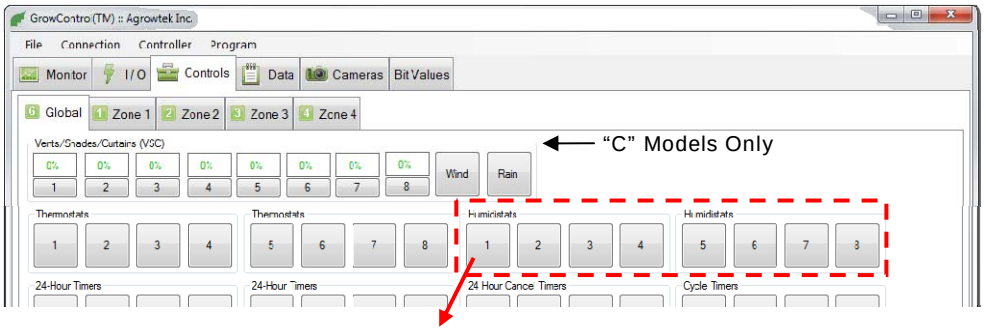


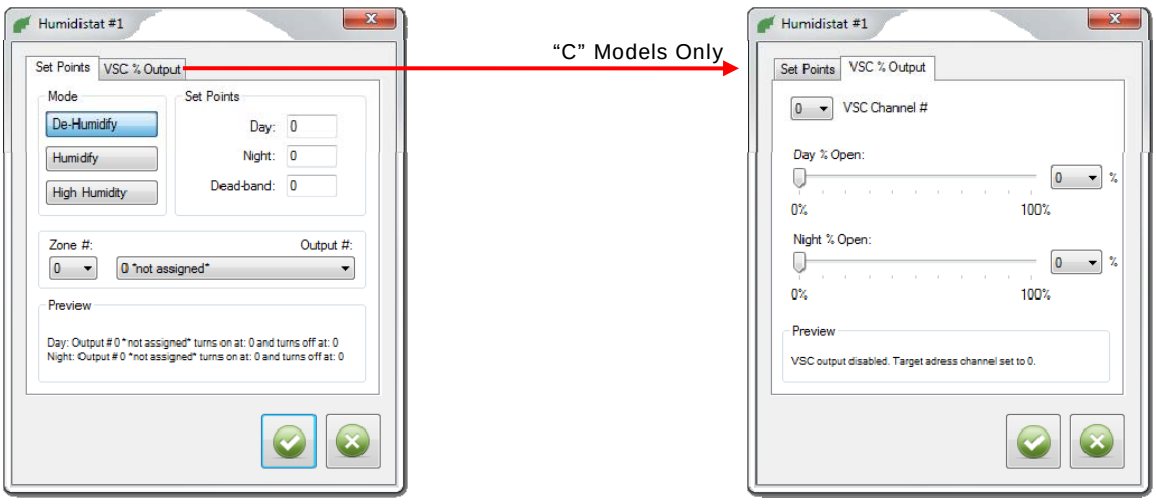
Select the modes and enter the set-points and dead-band settings. Press “Output” button for output settings.

Enter an output number to operate, or if VSC controls are used, enter a channel and position settings (“C” model only.)

Software

The humidity controls are grouped into humidistats, de-humidistats, and humidity limits.





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Multi-Stage Climate Control

Greenhouse "C" Models only

Temperature Stages

Greenhouse climate models ("C" Models) have multi-stage temperature controls that operate greenhouse climate control equipment such as exhaust fans, cooling pads, heaters, humidifiers, etc. VSC controls can set vent positions (% open) based on the active cooling stage (see VSC controls section.)

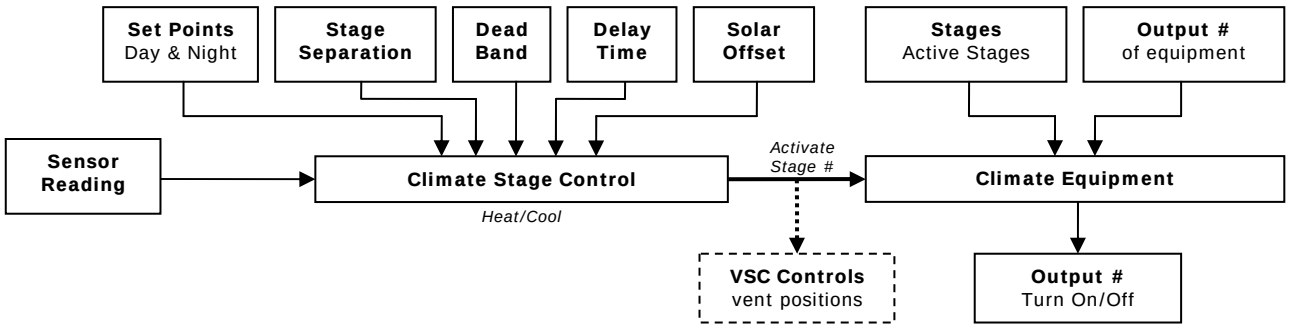
Stages
Six (6) cooling stages (temperature stages +1 to +6,) two heating stages (temperature stages -1 to -2.)

Only one temperature stage may be active at any given time.

Temperature stages are controlled with heating and cooling set points. The range between the heat and cool set points is called the "normal" range and this is where the controller will not require any stages to be active (stage 0.) A stage separation value determines how stage escalation occurs from the set-point, and a dead-band determines how de-escalation occurs. A solar offset can adjust the set-points based on the solar level if desired.

Equipment
A selection of standard equipment controls are available to be operated based on the active stage(s.) Simply select which stages that the equipment should be active under, and the output number of the equipment. Some equipment controls may have additional settings such as time delays or multiple outputs.

Control Settings



Sensor Reading: Reading from the applicable temperature or humidity sensor.

Set Points: The temperature value at which the stage will switch from 0 (normal mode) to the first active mode.

Stage Separation: Degrees between escalating stages.

Dead Band: Degrees change before de-escalating stages.

Delay Time: Time delay before escalating or de-escalating stages. This prevents short-cycling of climate stages and equipment from momentary changes in sensor readings from events such as an opened door.

Solar Offset: When the light level is above the solar irradiance level set point, adjust the set points by the offset amount. *For example, it may be desired to raise the heating set point if there is ample sun light available and it is anticipated that the greenhouse will warm naturally.*

Equipment Stages: Stages which will activate the particular equipment that is being configured. Any combination of stages may be selected.

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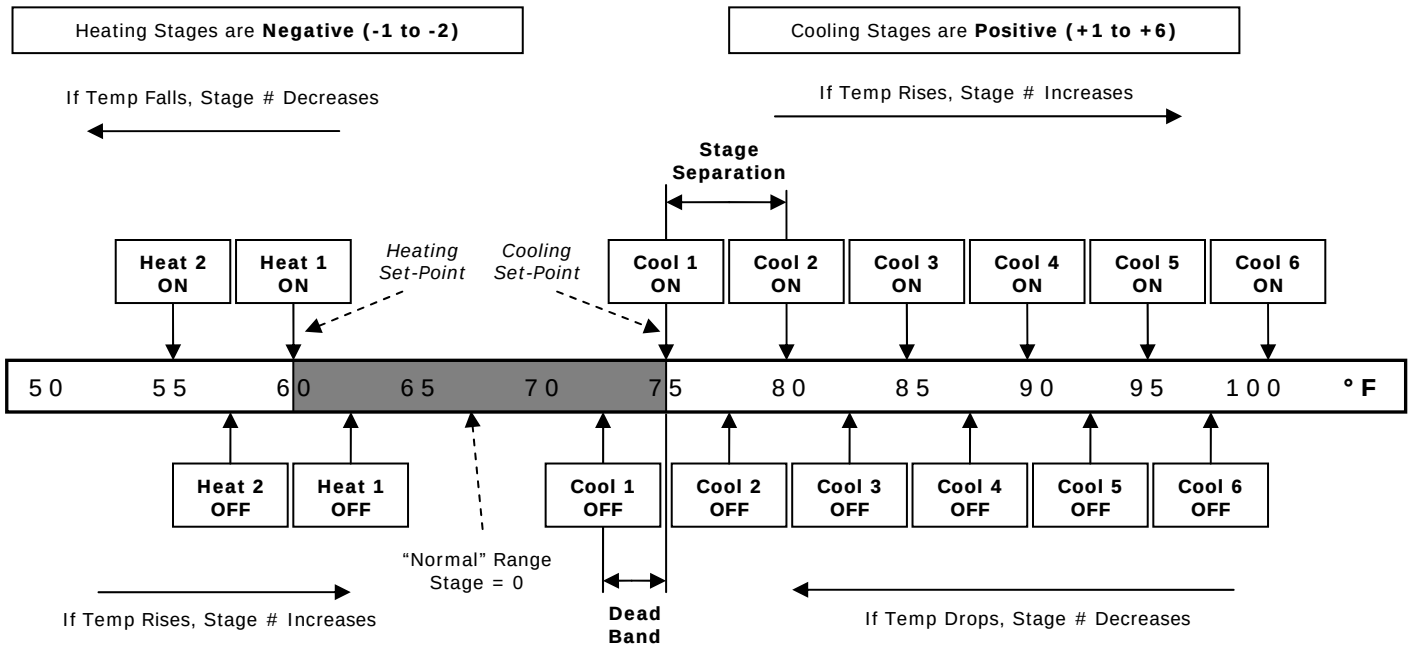
Example Temperature Stages Configuration

Desired Temperature Range: 60 – 75 degrees
Heat Set Point: 60 degrees (day & night)
Cool Set Point: 75 degrees (day & night)
Stage Separation: 5 degrees
Dead Band: 2.5 degrees

Stage separation and dead band may be configured differently for heating and cooling.



Quick Setup Guide for Multi-Stage Temperature Controls
Navigate to Controls -> Temp -> Stages

1. Set day and night cooling and heating set points for the control stages to start at. For example, a cooling set-point of 80 will cause stage 1 cooling to start at 80 degrees.
2. Enter a dead band value; this tells the controller how much to change from the set point before stopping. In the previous example, a dead-band of 5 degrees will cause the cooling stage to operate from 80 until 75 degrees.
3. Enter a Stage Separation value; this tells the controller when to escalate to the next stage of control to counter the temperature rise (or drop.)
4. Configure VSC controls "stage positions" to coordinate the vents positions to temperature/humidity stages (optional.)
5. Select "Temp Auto" and "Hum Auto" from the stage display (see below) to operate the multi-stage controls automatically.

Humidity Override
The de-humidification stages can be configured to force a cooling stage in order to operate vents or fans for humidity reduction.

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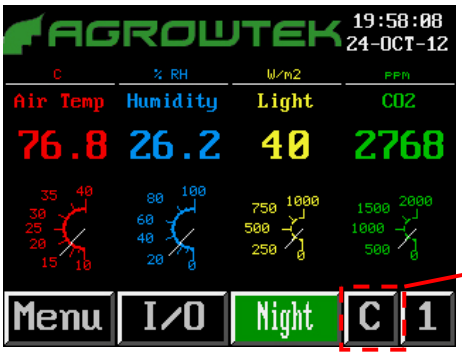
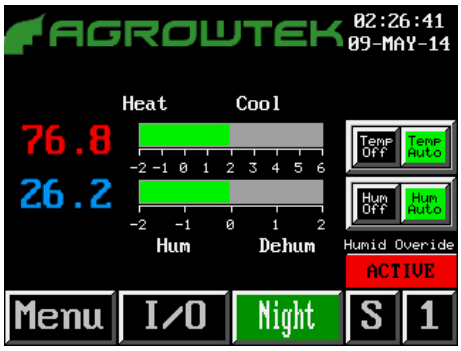
Multi-Stage Controls

Stage Display is shown by pressing the **"C"** button on the home screen. *The "C" will turn to "S" indicating stage display.*



Press the "C" button to change the display.



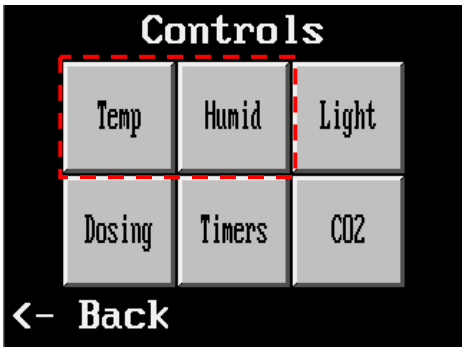
Stage display show active stages, humid override and auto/off modes.

"Off" will set the respective stage control to stage 0.

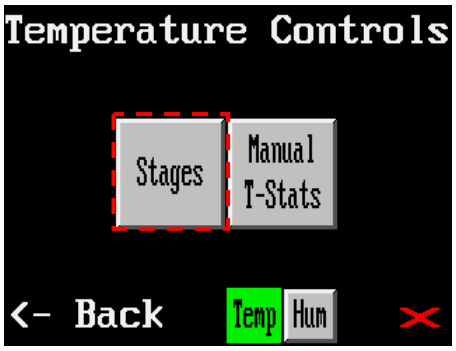
"Auto" will operate based on the settings entered in the stage controls.

Shown with stage 2 heat and stage 2 humidify active. If no stages are active, only a thin green line at 0 is shown.

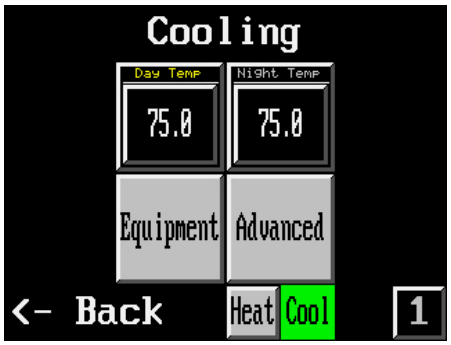
Stage Settings are accessed from the control menu under "Temp" or "Humid" (Menu -> Controls -> Temp -> Stages)



Press "Temp" or "Humid" from the controls menu to access multi-stage settings.



If a greenhouse "C" model, select "Stages."



Select "Heat" or "Cool" settings from the buttons at the bottom of the screen.

Multi-Stage Temperature Controls

Advanced settings

These settings tell the controller how to operate the different stages when the heat/cool or humidify/dehumidify set points are take effect. These settings include:

Stage Separation: Degrees (or %RH) separating each stage such that as the deviation from the normal range grows the stages are incremented (see previous examples.)

Dead Band: Degrees (or %RH) change in the corrected direction (towards the normal range) before de-activating a the stage.

Delay (s): (optional) Time delay before the control will activate a change in the stage, both up and down.
For example: if the cooling set point is reached, then the time delay will start. Once elapsed the cooling control will set the active temperature stage to 1. Once the temperature drops by the dead-band amount, the time delay will begin again. Once the time is elapsed, the temperature stage will return to 0 (normal.)

Light Intensity Adjustments (optional)

Solar Offset: Positive or Negative set point offset which can be activated if the selected light sensors detects levels above the Solar Level set point (below.) *Use to reduce heating set point on sunny days in anticipation of the sun warming the crop, or lower the cooling set point on bright days.*

Solar Level: Light level at which to activate the solar offset.

Light Sensor: Select indoor climate sensor or outdoor light sensor to monitor solar level and activate solar offset.

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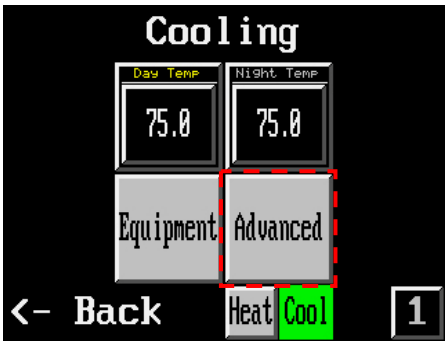
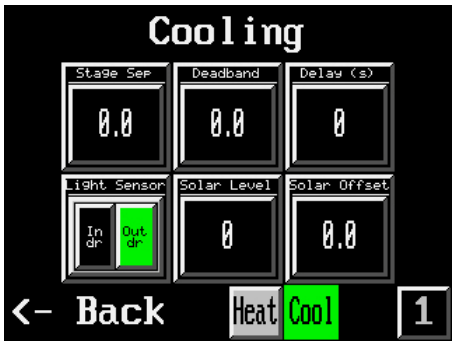




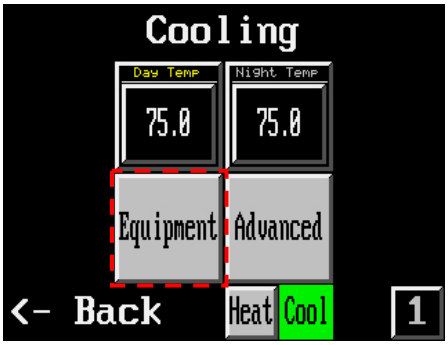
Press “Advanced” from heat/cool or stages menus.

Exhaust/Intake Fans

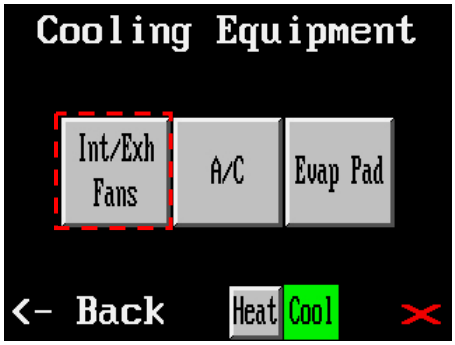
Two stages of exhaust fans are provided for each climate zone. Exhaust fans can be operated on any of the six cooling stages and include their own on-delay timer. An on-delay timer allows VSC controls to open vents before starting the fan stages.

Fan Output#: Output# to operate fan stage.

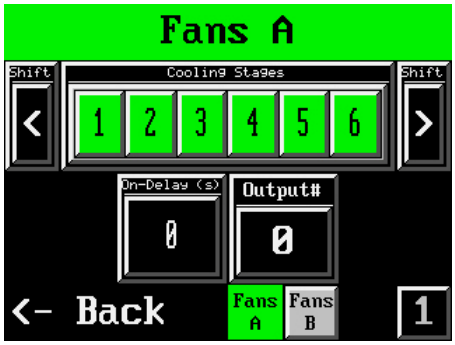
Fan On- Delay: Time (seconds) to delay fan turn-on (optional, to allow vents time to open before fans turn on.)



Press “Equipment” to configure climate equipment.



Select Intake/Exhaust Fans button.



Use the “Shift” keys to select multiple stages. The output# will only be ON when the selected stages are active.

Air Conditioning (A/C)

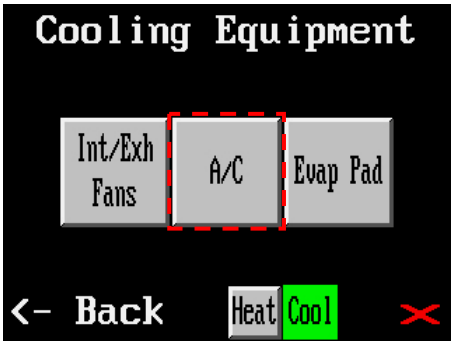
Air conditioning equipment controls include separate outputs for the compressor and fan controls and a fan off-delay and re-start delay for proper operation of A/C systems.

Compressor Output#: Output# of the A/C compressor or “cool” signal.

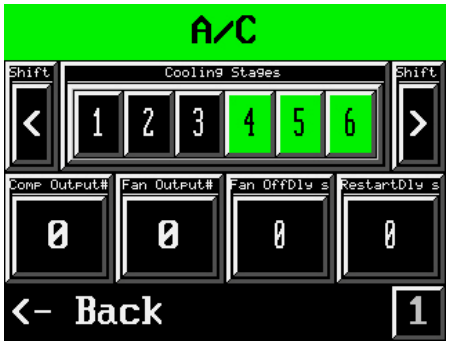
Fan Output#: Output# of the A/C fan (optional.)

Fan Off Delay: Time (seconds) to keep fan on after compressor output turns off (optional.)

Restart Delay: Time (seconds) to keep A/C off after it has turned off (optional, to prevent short-cycling the compressor.)



Select A/C to adjust air conditioning equipment settings.



Use the “Shift” keys to select multiple stages. A/C includes separate outputs for fan and compressor with fan delay.

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Evaporative Cooling Pads

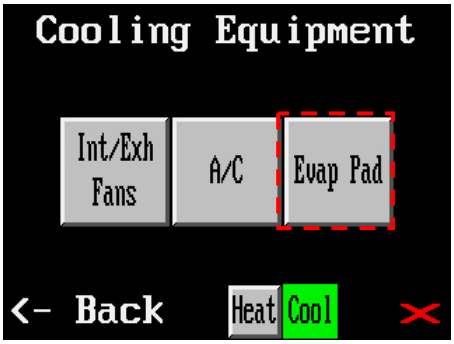
Evaporative cooling equipment controls include separate outputs for the pad pump/water valve and the pad fans as well as an off-delay timer for the fans to help dry out pads, and a max RH limit.

Pad Output#: Output# of the pad pump.

Fan Output#: Output# of pad/exhaust fan (optional.)

Fan Off Delay: Time (seconds) to keep fan on after pump output turns off (optional, for drying evap pad.)

Max RH Limit: Prevents the pad output from operating if humidity is above the max %RH set point.



Select “Evap Pad” to adjust evaporative cooling settings.

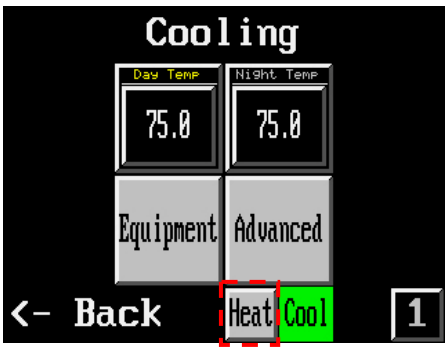
Use the “Shift” keys to select multiple stages.

Heating Stages

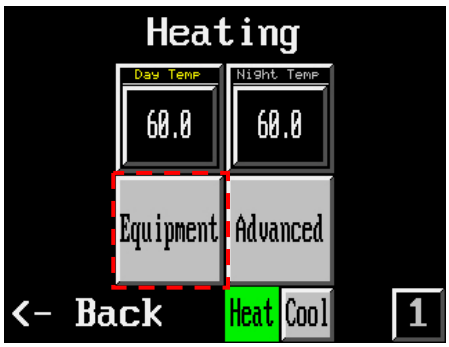
Two stages of heat are provided for each climate zone. Press “Heat” from the Temp Stages controls menu.

Heat Stages: Select which stages will activate the heater output. Multiple stages can be selected using the shift key.

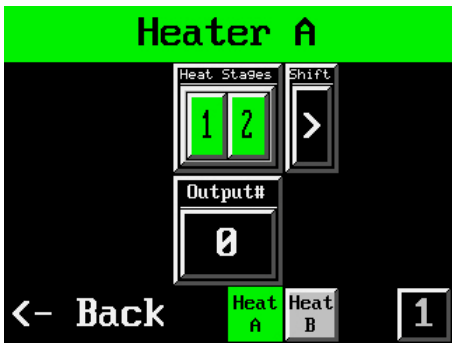
Output#: Enter the output number that the controller will use to turn the heat signal on and off.



Press “Heat” to configure heating stages.



Adjust the heating set points by pressing them. Press “Equipment” to setup heaters.



Select which stages and enter the output number where the heater is connected.

Humidity Stages

Humidity stages are similar to temperature stages, except they do not operate VSC controls. Humidity stages can operate temperature stages (and thus VSC controls) via the dehumidification temperature stage control.

Stages
Two (2) de-humidification stages (humidity stages +1 to +2,) two humidification stages (humidity stages -1 to -2.)

Only humidity stage may be active at any given time.

Humidity stages are controlled with humidify and de-humidify set points. The range between the humidify/de-humidify set points is called the “normal” range and this is where the controller will not require any stages to be active (stage 0.) A stage separation value determines how stage escalation occurs from the set-point, and a dead-band determines how de-escalation occurs. A solar offset can adjust the set-points based on the solar level if desired.

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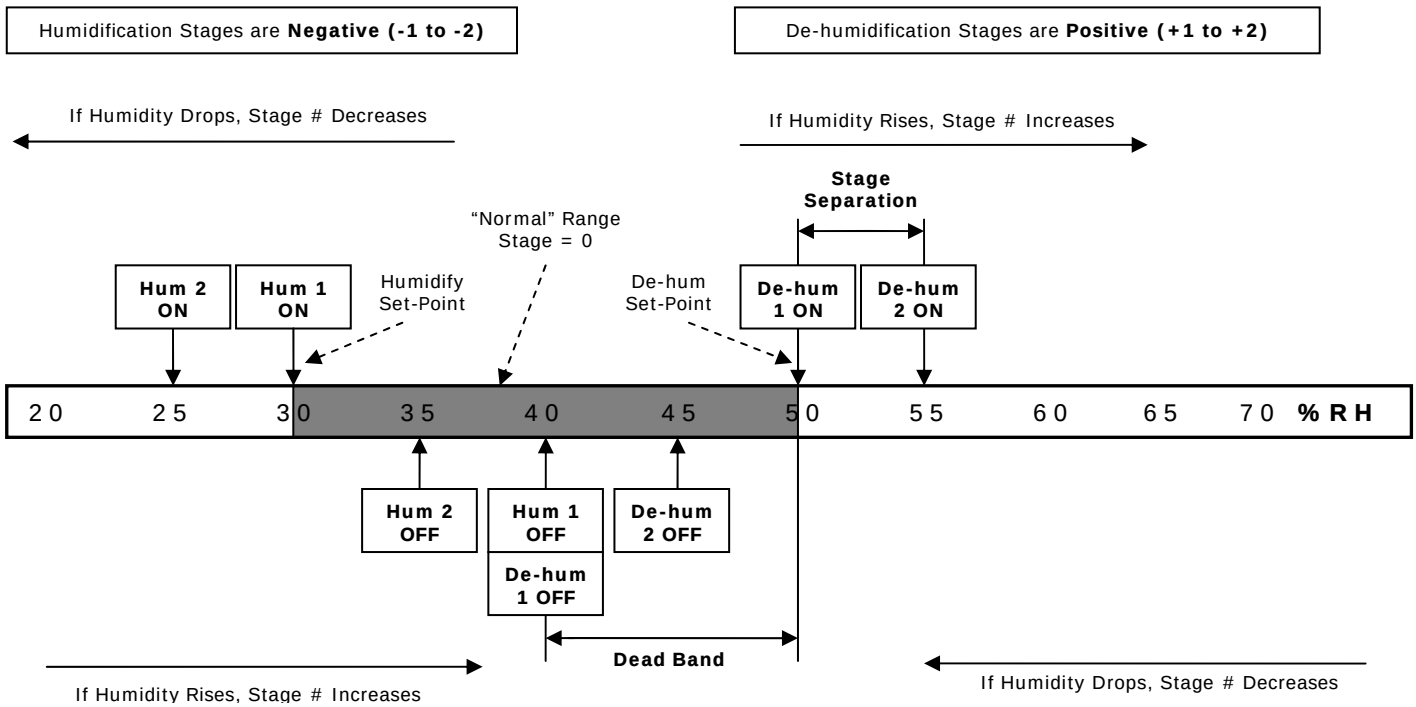
Equipment
A selection of standard equipment controls are available to be operated based on the active stage(s.) Simply select which stages that the equipment should be active under, and the output number of the equipment. Some equipment controls may have additional settings such as time delays or multiple outputs.

Select "Humid" from the controls menu then "Stages" to access the multi-stage humidity controls.

Example Humidity Stages Configuration

Desired Humidity Range: 30 – 50 %RH
Humidify Set Point: 30% (day & night)
De-humidify Set Point: 50% (day & night)
Stage Separation: 5%
Dead Band: 10%

Stage separation and dead band may be configured differently for humidification and dehumidification.



Advanced settings

These settings tell the controller how to operate the different stages when the humidify/dehumidify set points are take effect. These settings include:

Stage Separation: %RH separating each stage such that as the deviation from the normal range grows the stages are incremented (see previous examples.)

Dead Band: %RH change in the corrected direction (towards the normal range) before de-activating a the stage.

Delay (s): (optional) Time delay before the control will activate a change in the stage, both up and down.
For example: if the cooling set point is reached, then the time delay will start. Once elapsed the cooling control will set the active temperature stage to 1. Once the temperature drops by the dead-band amount, the time delay will begin again. Once the time is elapsed, the temperature stage will return to 0 (normal.)

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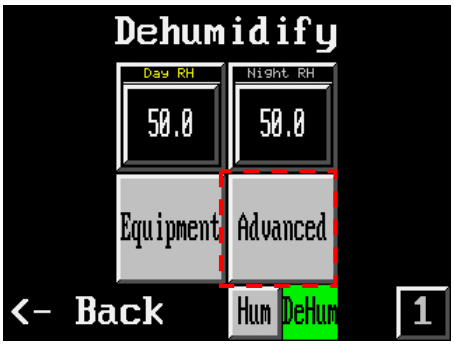
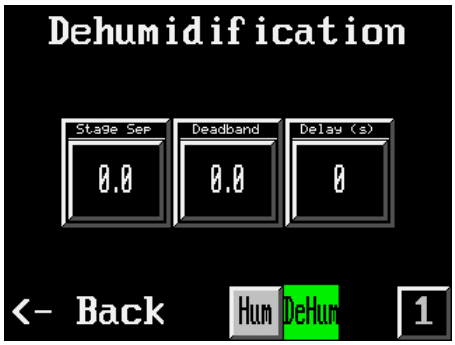


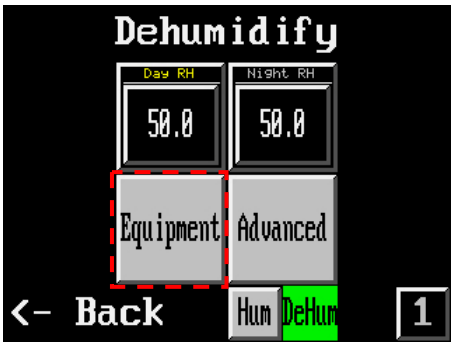
Press “Advanced” from hum/dehum stages menus.



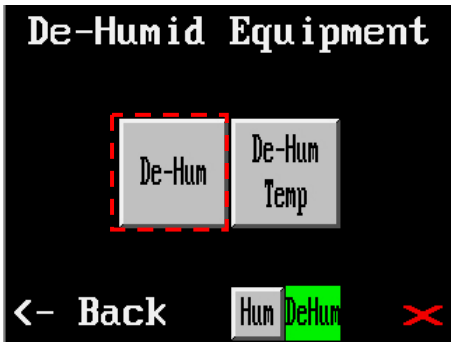
Adjust stage separation, deadband and stage change delay.

Dehumidifier

The dehumidification stages include a standard dehumidifier output control to operate dehumidifiers or fans.



Press “Equipment” from dehumidify stages menus.

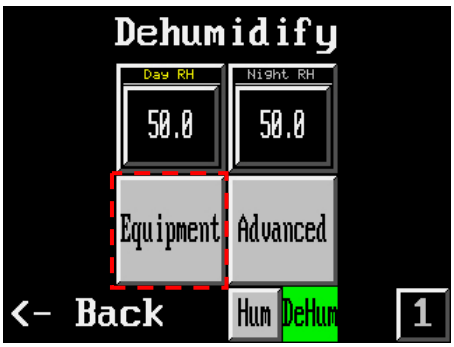


Press “De-Hum” button to access stage dehumidifier settings.

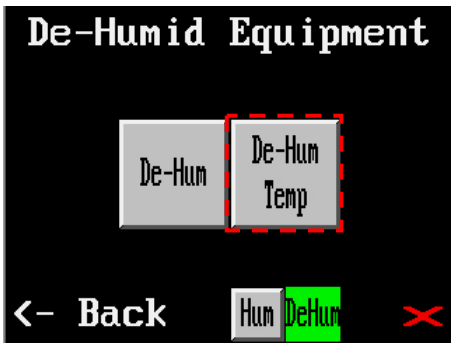
Select the stages for the dehumidifier to be active. Use the “shift” key to select multiple stages. Enter a output number to operate.

Dehumidify Temperature Stage Override

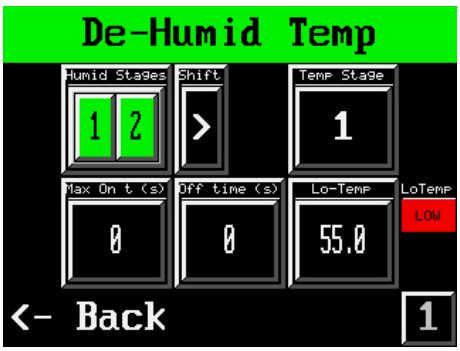
A temperature stage (-2 - +6) can be activated to mitigate humidity. The temperature stage override has a low-temperature limit to prevent activation if the temperature is too low, and has a timer which can be used to limit the maximum override time and a wait time before operating again for the limit time.



Press “Equipment” from dehumidify stages menus.



Press “De-Hum Temp” button to access stage temperature stage override settings.



Select the stages for the dehumidifier to be active. Use the “shift” key to select multiple stages. Enter a output number to operate & other settings.

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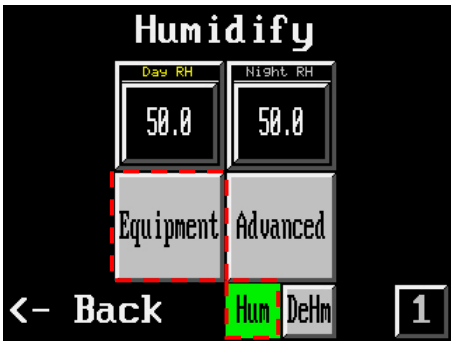
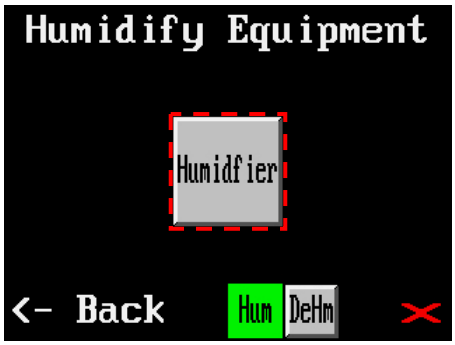
Humidifier

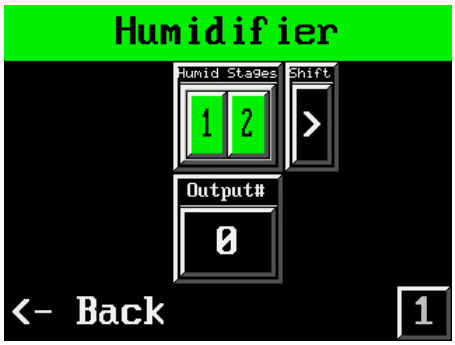
Humidification stages include a standard humidifier output control to operate humidifiers or foggers.



Press “Equipment” from humidify stages menus.



Press “Humidifier” button to access stage dehumidifier settings.



Select the stages for the dehumidifier to be active. Use the “shift” key to select multiple stages. Enter a output number to operate.

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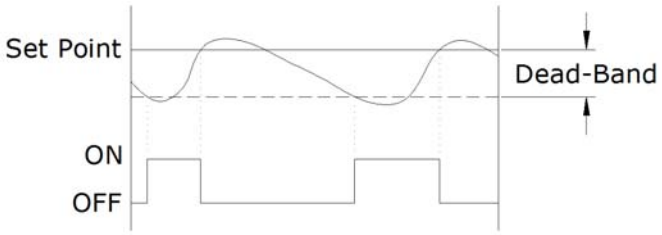
CO_2 Injection

CO_2 augmentation is controlled via a day-time ppm concentration set-point and the readings from the CO_2 sensor. Carbon dioxide is not injected during the night time.

Day ppm: Enter the target CO_2 concentration for the day time.

Dead-band: CO2 ppm drop below ppm set-point before re-activating CO_2.
Example: Set point = 1000ppm, dead-band = 100ppm; Controller activates CO_2 output at or below 900 and turns off at 1000.

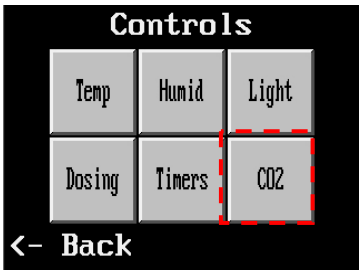


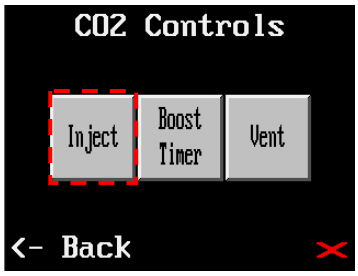
Output#: Enter the output number that the CO_2 device being controlled is connected to.

See "Interrupts" under "Output Controls" (pg.10) for disabling CO_2 output when ventilation output(s) turn on. Also see temperature and humidity limit functions to cancel CO2 in anticipation of ventilation or to prevent combustion generators from operating above a set limit temperature or humidity.

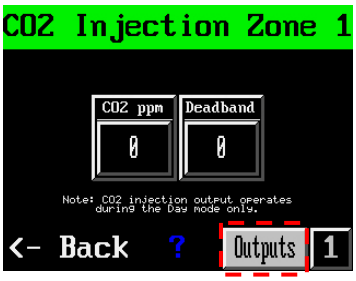
Touch Panel

The CO_2 controls are accessed from the "Controls" menu by touching the "CO2" button.





The CO2 injection settings are accessed on the first page of the controls menu by pressing the "CO2" controls button then "Inject" button.



Set the set-point and allowed dead-band. Press "Outputs" button to set the CO2 output.

Output number to operate when CO2 is needed. *If output does not operate, ensure the zone is in day mode.*

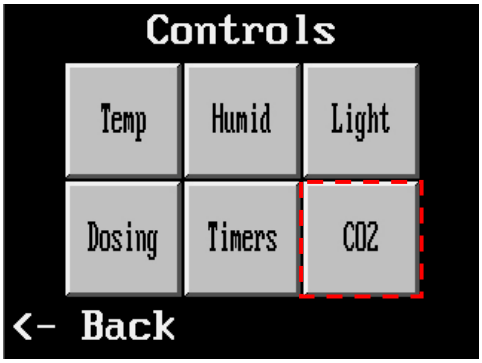
CO_2 Boost Timer

CO_2 Boost Timer allows the standard ppm set-point to be over-ridden by a "boost" (or starvation) set-point for a period of time. Simply set the time band in which the over-ride should take place and the desired ppm set-point during that period.

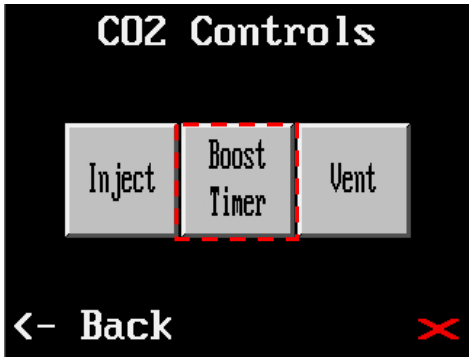
Boost ppm: Enter the target CO_2 concentration during the boost timer duration. Note: the boost value may also be lower than the standard set-point. When the boost timer period has ended, the CO2 set point will return to the standard set point.

Touch Panel

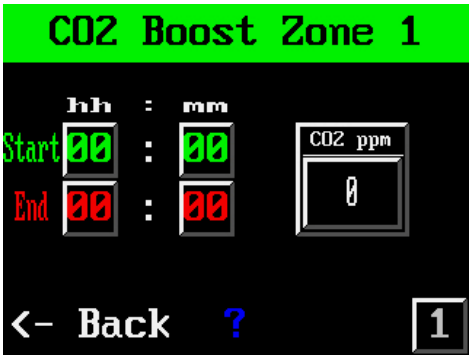
The CO_2 boost controls are accessed from the CO2 injection controls settings by pressing the "boost timer" button.



Access the CO2 injection settings from the controls menu.



Press the "boost timer" button to access the boost over-ride settings.



Enter start and end time of over-ride period and the ppm value.

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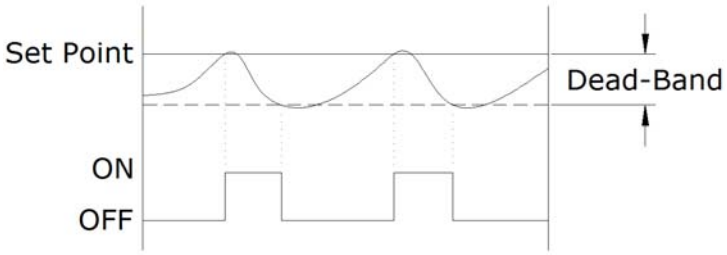
CO_2 Ventilation

CO_2 can be reduced by activating an output (such as a ventilation fan) and/or setting a VSC to open.

Day/Night ppm: Enter the maximum CO_2 concentration for the day/night which will activate the ventilation control.

Dead-band: CO2 ppm drop below ppm set-point before de-activating the control. Example: Set point = 2500ppm, dead-band = 1000ppm; Controller activates ventilation output(s) at or above 2500ppm and turns off at 1500ppm.



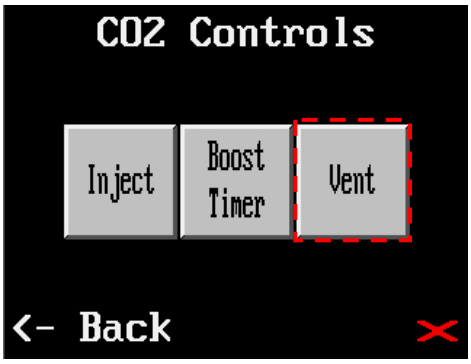
Output#: Enter the output number that the CO_2 device being controlled is connected to.

VSC# VSC Channel to send minimum open command to.

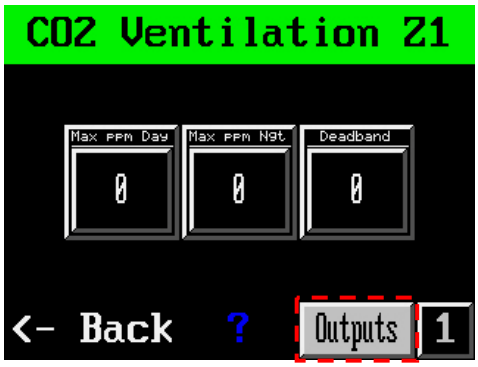
% Open Minimum desired VSC open position day or night when CO2 level exceeds set-points.

Touch Panel

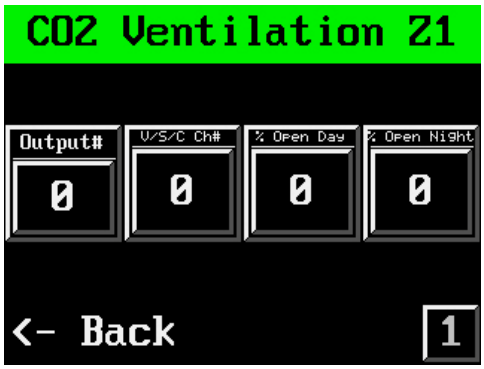
The CO_2 controls are accessed from the "Controls" menu by touching the "CO2" button. Select between injection and ventilation controls.



Press "Vent" button to access the CO_2 ventilation controls.



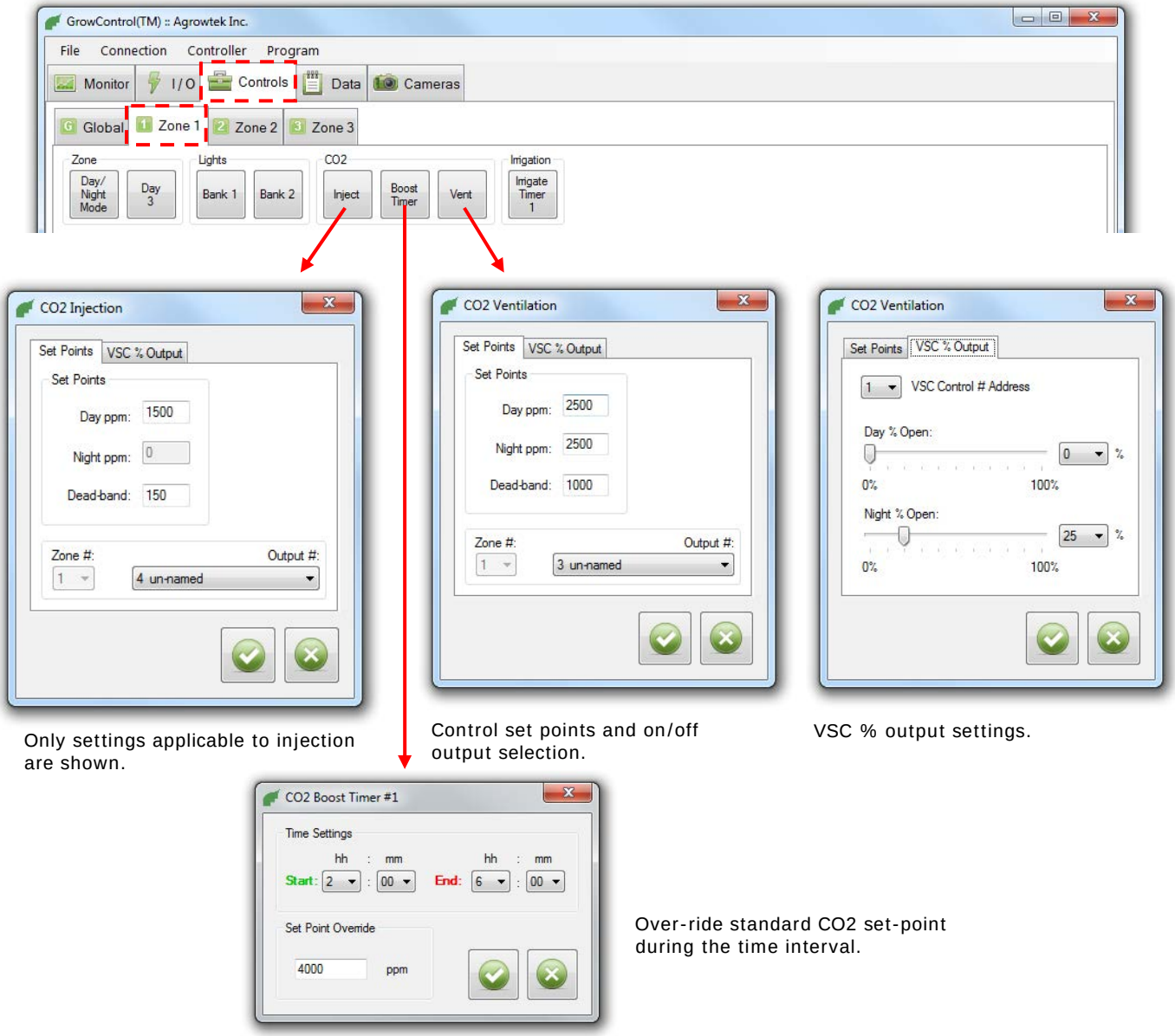
Enter set points to operate CO2 ventilation. Press "Outputs" button to modify output assignment.



Enter a output number to operate, or if VSC controls are used, enter a channel and position settings ("C" model only.)

Software

The CO_2 ventilation controls are accessed from the “CO2” controls group on the “Controls” tab. Select the appropriate zone tab.



Only settings applicable to injection are shown.

Control set points and on/off output selection.

VSC % output settings.

Over-ride standard CO2 set-point during the time interval.

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Timer Controls

The GC-Pro is equipped with an array of different timers which can control all types of equipment including fans, pumps, irrigation equipment, lights, and much more.

24 Hour Timers operate like a standard wall timer with an on and off time of day.

Cycle Timers operate in a repeating on/off cycle.

24 Hour Cycle Timers are cycle timers that only operate within a specified 24-hour on/off time slot.

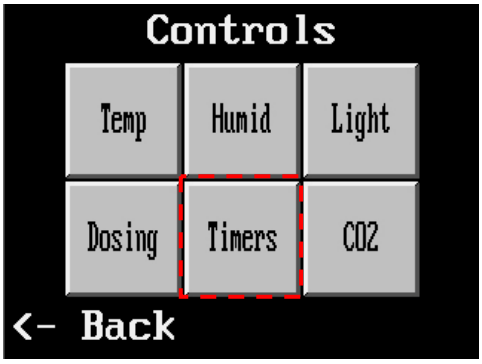
Delayed Off Timers continue to operate an output for a delay after it (or another output) has been turned off.

Band Timers allow an output to operate only within a specified 24-hour on/off time slot.

Re-Start Delay Timers disable an output for a delay time after the output has shut off.

Touch Panel

The timers are accessed from the control menu.

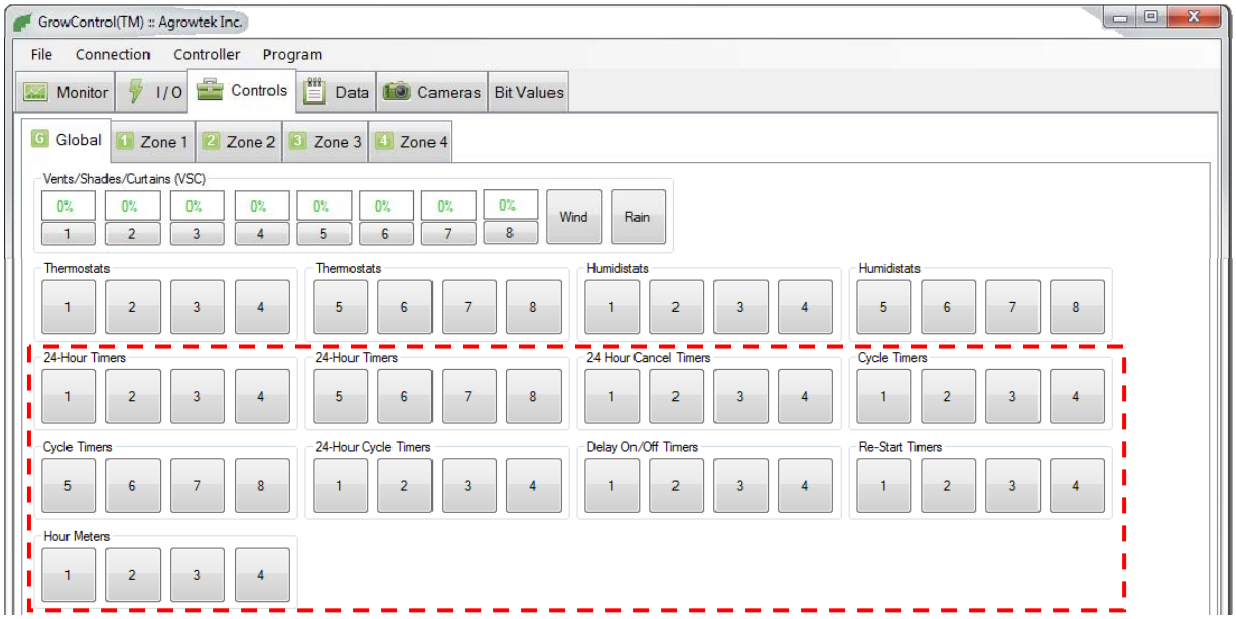


Press “Timers” button to access the timers sub-menu.

Select a timer type to view and modify the available timer controls.

Software

The timer settings are accessed via the controls tab on the Global tab.



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24-Hour Timers

24-Hour timers operate like a standard wall timer and can activate an output or set a VSC control to a % open target.

On Time: Time of day to turn on timer control.

Off Time: Time of day to turn off timer control.

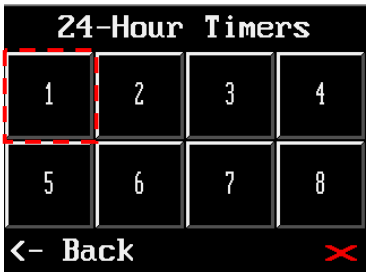
VSC #: VSC control to send minimum % open value to when timer control is on.

Note: 24 hour timers operate in 24-hour time format: 0:00 – 23:59.

Touch Panel

The 24-hour timer menu is accessed from the timers menu.

Press "24 Hr Timers" button to access the 24 hour timers.



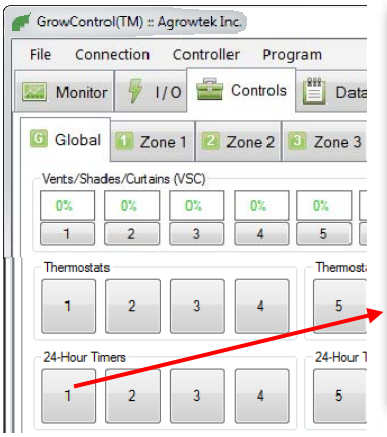
Select a timer to view settings.

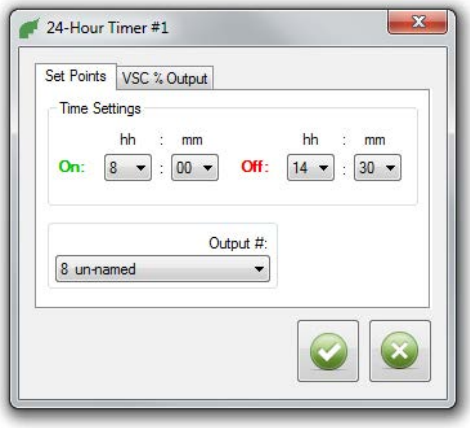
Enter the on & off times and output number to activate (if desired.) Press 'output' button to toggle to VSC output settings.

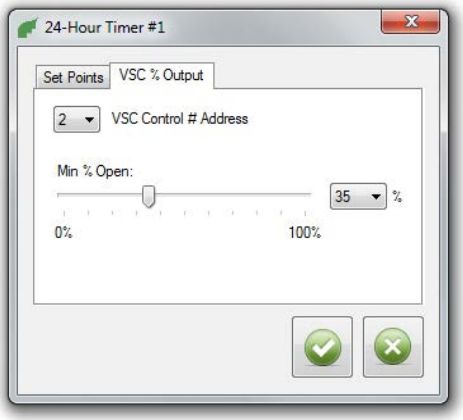
Enter a VSC control address and minimum % open target (if desired.)

Software

The 24-hour timer settings are accessed via the controls tab under the "24-Hour Timers" group.







VSC controls on "C" Models Only

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24-Hour Cancel Timers

24-hour cancel timers operate like a 24-hour timer, except instead of turning an output on, they will allow it to operate only during a specified time band, and disable it outside of the allowed time band.

Example uses include:

- Disabling equipment prior to 'lights out' or 'lights on' times.
- Operating CO2 output(s) only during a preferred period.

Start Time: The time of day that the output becomes disabled.

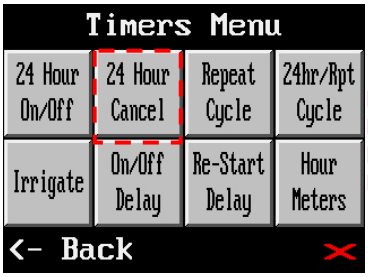
End Time: The time of day that the output is allowed to start operating.

Output: The output which will be canceled when cancel timer is active.

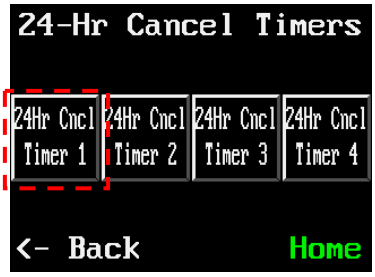
VSC #: VSC control to limit to maximum % open value when cancel timer is active.

Touch Panel

The 24-hour cancel timer menu is accessed from the timers menu.



Press "24 Hr Timers" button to access the 24 hour timers.



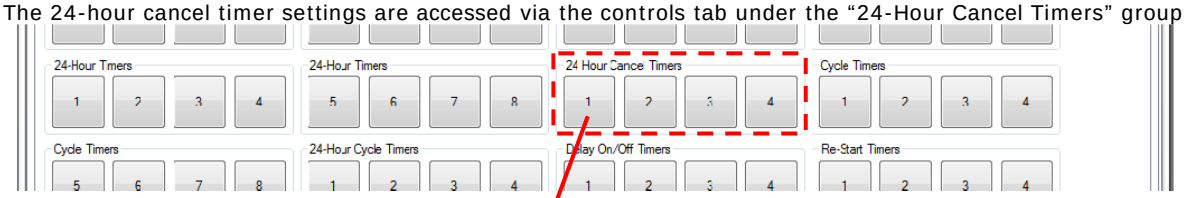
Select a timer to view settings.

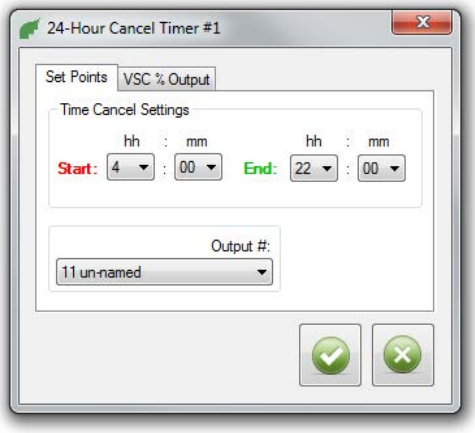
Enter the start and end times and output number to disable (if desired.) Press 'output' button to toggle to VSC settings.

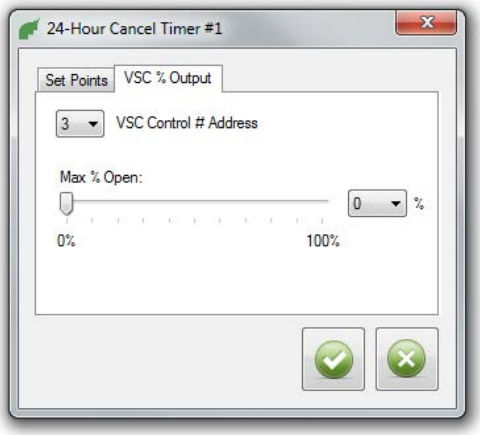
Enter a VSC control address and maximum % open target (if desired.)

Software

The 24-hour cancel timer settings are accessed via the controls tab under the "24-Hour Cancel Timers" group.







VSC controls on "C" Models Only

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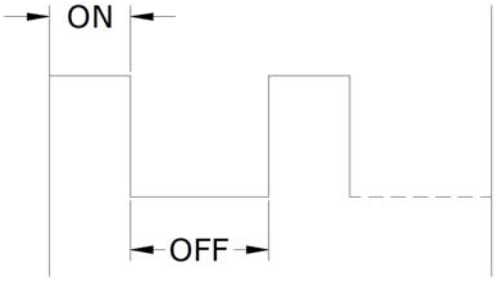
Cycle Timers

Cycle timers operate in a continuously repeating on-off-on-off… loop. Cycle timers can be operated during the day & night, day only, or night only.

Example uses include:

- Timing water pumps for hydroponics systems.
- Intermittent operation of circulation fans or ventilation fans
- Other timed, cycled equipment.



On/Off Time: Specify the on and off durations for the cycle.

Timer Units: Select units of minutes, seconds or hours.

When to Operate Timer: Choose when this timer should operate; day only, night only or both.

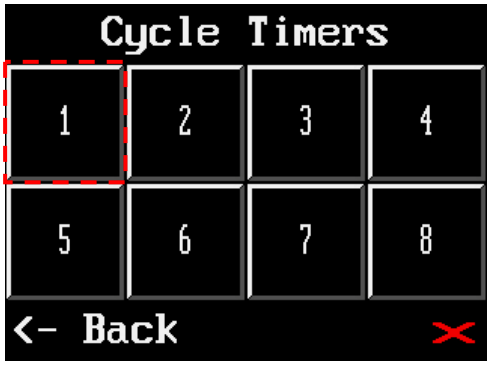
Zone: Zone to detect day and night from.

Output: Output to operate with the cycle timer.

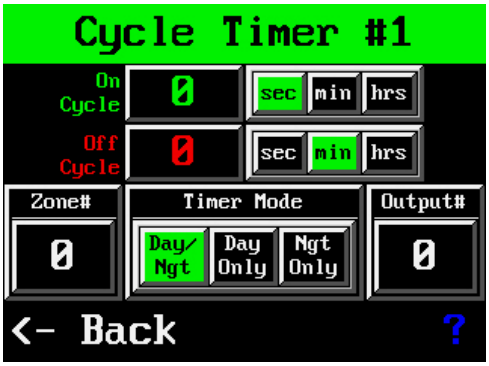
Touch Panel

The cycle timer menu is accessed from the timers menu.

Press “Cycle Timers” button to access the cycle timers menu.



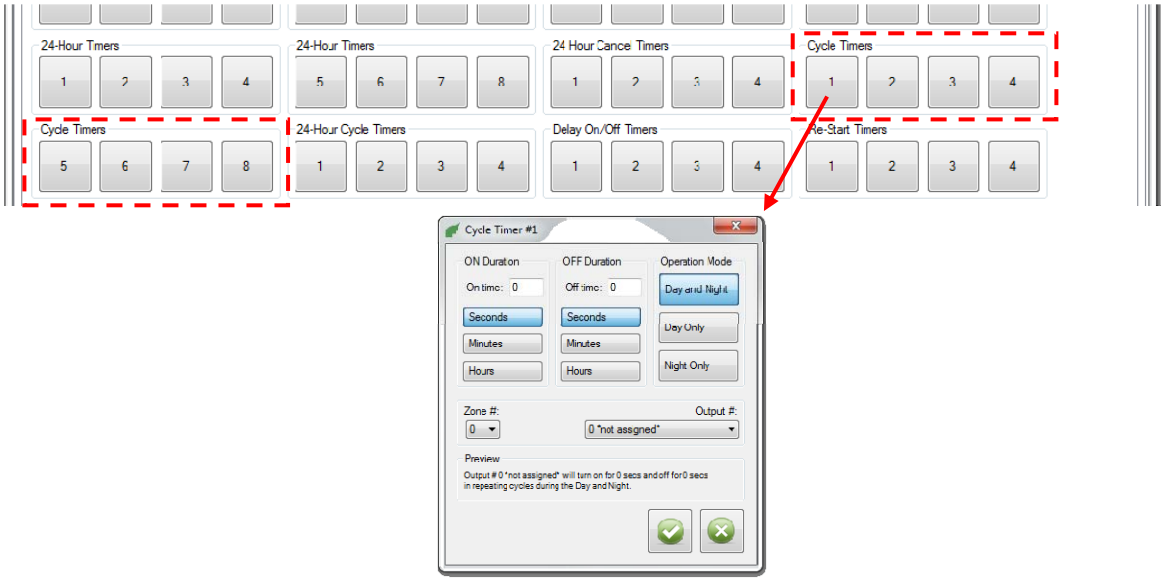
Select a timer to view its settings.



Press the buttons to change the values with a numeric key pad.

Software

The cycle timer settings are accessed via the controls tab under the “Cycle Timers” group.



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24-Hour Cycle Timers

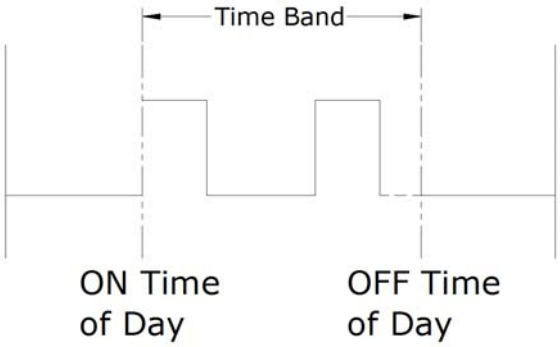
24-hour cycle timers are cycle timers which operate only within a specified time of day. (See previous page for a description of cycle timers.)

Time Band: Specify the time band that the output should be allowed to operate in.

On/Off Time: Specify the on and off durations for the cycle timer.

Timer Units: Select units of minutes or seconds for the cycle timer.

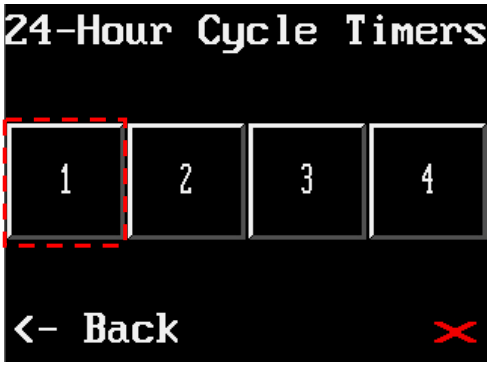
Output: Output to operate with the cycle timer.



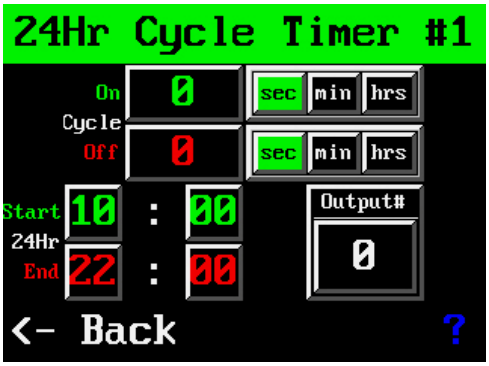
Touch Panel

The cycle timer menu is accessed from the timers menu.

Press "24/Cycle Timers" button to access the 24-hour cycle timers menu.



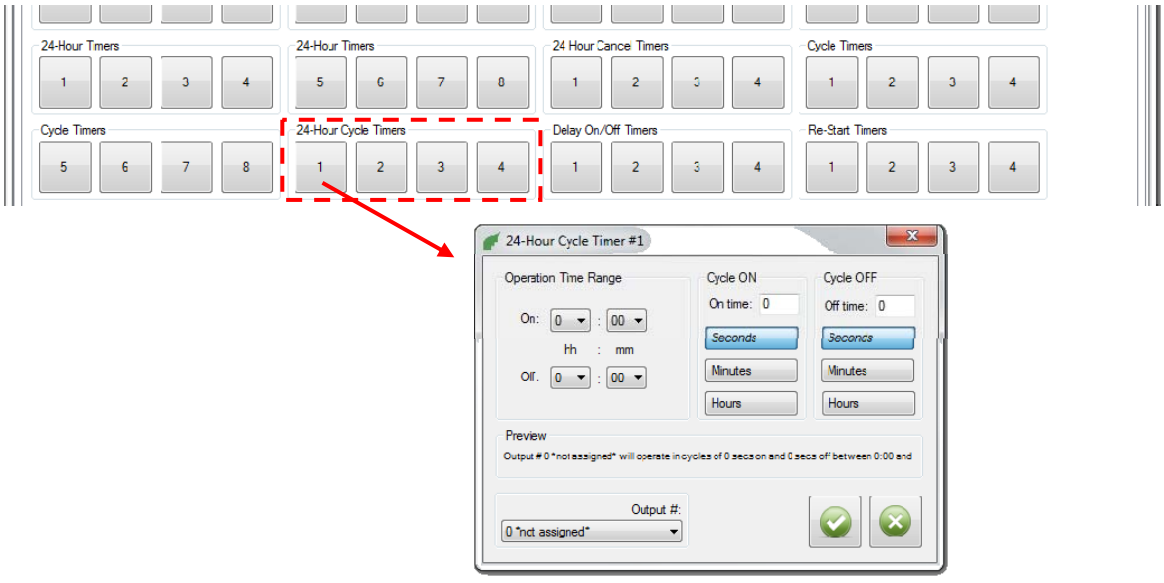
Select a timer to view its settings.



Press the buttons to change the values with a numeric key pad.

Software

The 24-hour cycle timer settings are accessed via the controls tab under the "24-Hour Cycle Timers" group.



Delay Timers

Delay timers have an on-delay and off-delay function which can be used to operate another output with an on-delay, off-delay or both based on the operation of another output.

When the “trigger output” is activated, the on-delay time will start. When this time has elapsed, the Delay Timer’s output will be activated. When the trigger output turns off, the delay timer output will remain activated for the off-delay time.

Example uses include:

- Operating a heater fan so that it is synchronized with the heater’s thermostat but delays on to allow pre-heat time, and remains on after the thermostat has turned off to cool down the plenum and duct work.
- Operating a return tank [or similar] pump that must remain on a set time after a main feed pump.
- Prevent a fill valve or pump from short cycling due to a ‘bouncing’ float switch.

Trigger Output: Enter the output that should trigger the activation of the off-delay timer output.

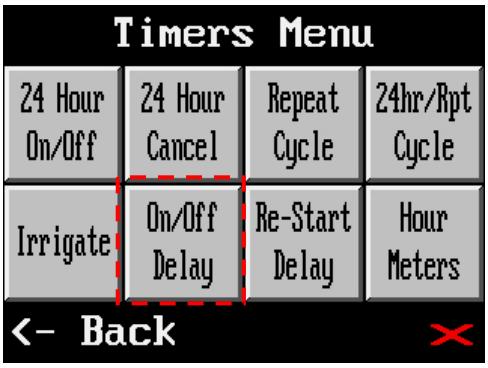
Delay Time: Time (seconds) that the off-delay timer output should remain on after the trigger output turns off.

Output: Output to turn on when the trigger activates and remain on for the delay time when the trigger turns off.

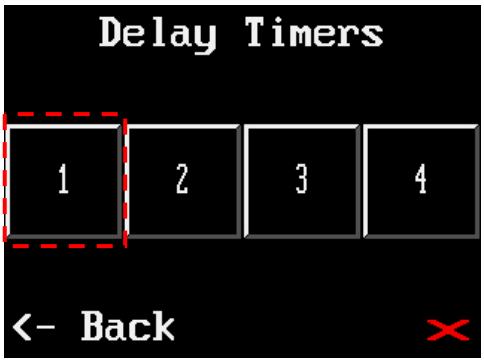
Note: The trigger and timer outputs can be set to the same output.

Touch Panel

The off-delay timer menu is accessed from the timers menu.



Press “Off Delay Timers” button to access the off-delay timers menu.

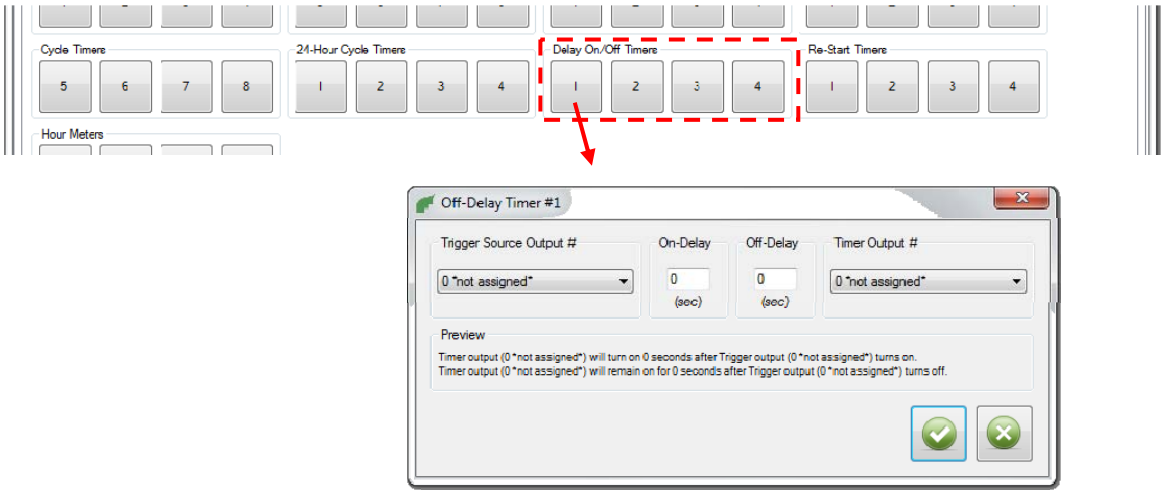


Select a timer to view its settings.

Press the buttons to change the values with a numeric key pad.

Software

The off-delay timer settings are accessed via the controls tab under the “Delay Timers” group.



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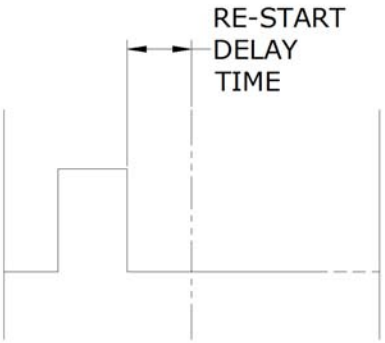
Re-Start Delay Timers

Re-start delay timers sense when an output has just turned off, then disables the output for the re-start delay time.

This timer is designed to prevent short-cycling of equipment.
Example uses include:

- Prevent a compressor motor from short-cycling.
- Prevent a heating system from short-cycling.

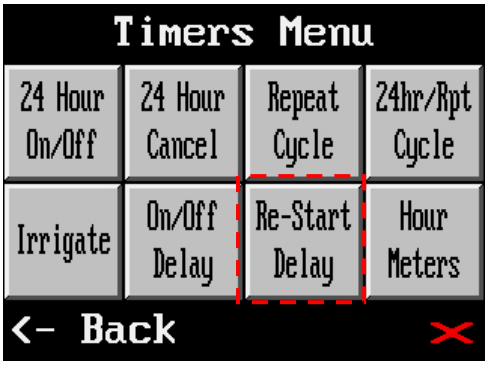


Delay Time: The amount of time that the output will be disabled for once it has turned off.

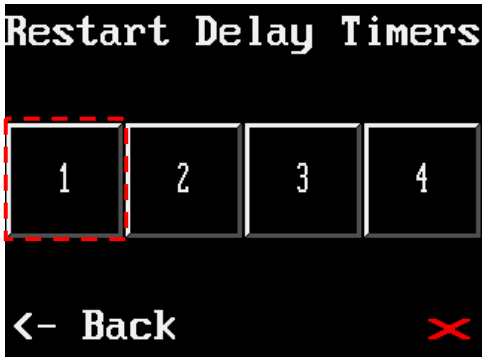
Output: The output which is being managed by this timer.

Touch Panel

The band timer menu is accessed from the timers menu.



Press "Re-Start Timers" button to access the re-start delay timers menu.

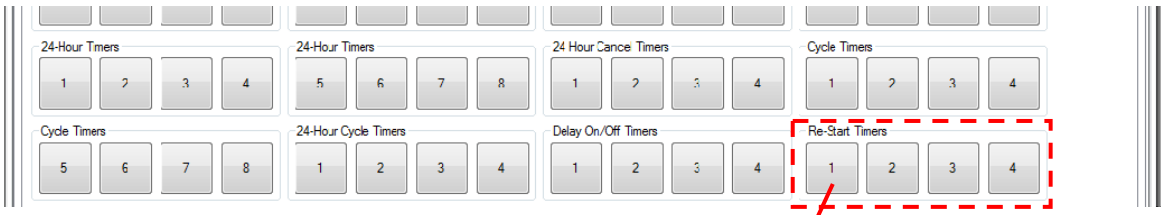


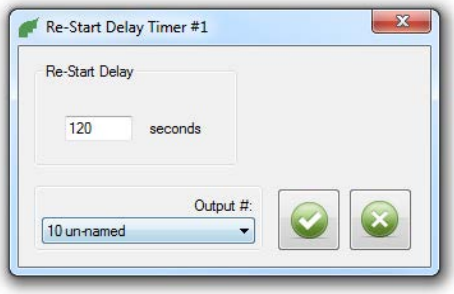
Select a timer to view its settings.

Press the buttons to change the values with a numeric key pad.

Software

The re-start delay settings are accessed via the controls tab under the "Re-Start Timers" group.





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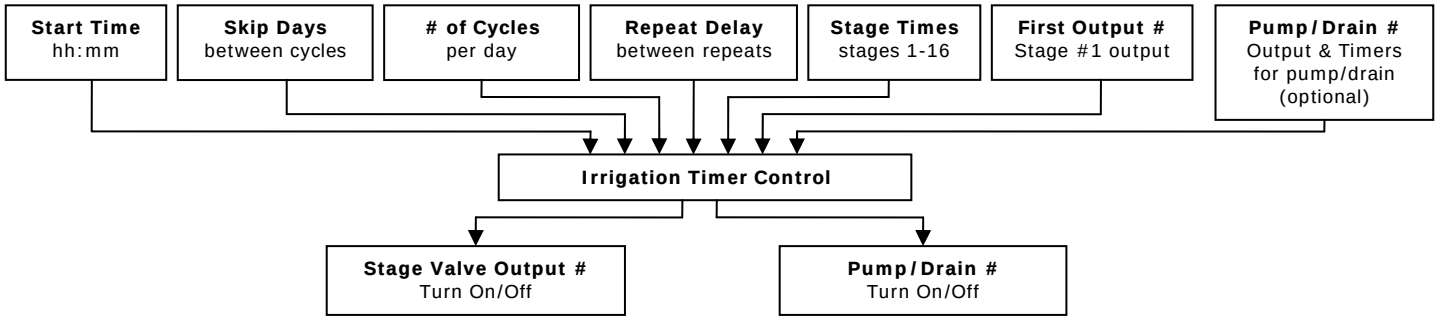
Irrigation Timers

Irrigation timers allow up to 16 stages of irrigation control each with unique time values. Irrigate up to 16 different zones with solenoid manifolds and a single pump with integrated pump management to turn off the irrigation pump while valves close and open. Irrigation cycles can be initiated by time of day and can be scheduled to skip days.



Start Time: Time of day to begin the irrigation operation.

Skip Days: Number of days not to operate irrigation timer after the timer has operated.

# of Cycles: Number of irrigation cycles to complete in a single day. Once the irrigation timer has completed the stages 1-16 that have time values, the stages can be repeated.

Repeat Delay: Time to allow between cycles if greater than 1. This allows waterings to be spaced out though out the day and to allow time to soak into media.

Stage Timers: Enter time values (seconds) for each stage. Stages operate outputs starting with stage 1 at the output (first output) entered. Each sequential output is assumed to be at the outputs following the first output. As many as 16 time values can be entered; timers with a 0 value will be skipped.

1st Output#: The first stage valve output; subsequent stages are sequential after the first output.

Pump Output#: Output number for an irrigation pump. The pump will be operated after the appropriate stage valve has been activated.

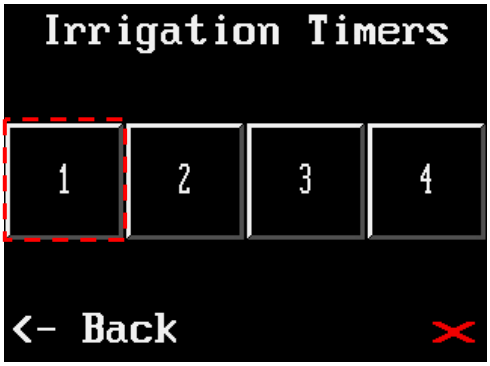
Pump Delay: Delay time when activating pump output to allow time for valves to open before operating.

Drain Output#: If using flood/drain systems, this output allows a drain valve to operate after each stage is complete.

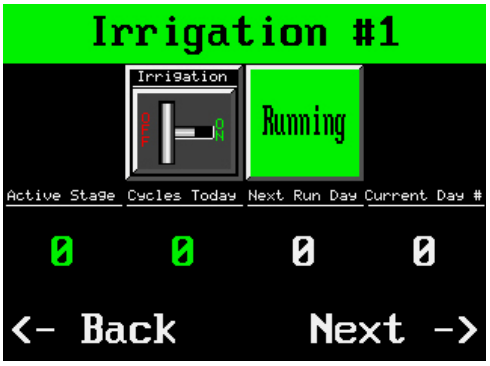
Touch Panel

The Irrigation timer menu is accessed from the timers menu.

Press “Irrigate” button to access the irrigation timers menu.



Select a timer to view its settings.



Press the switch to turn the irrigation to auto (on) or off modes. Press “Next” to access settings.

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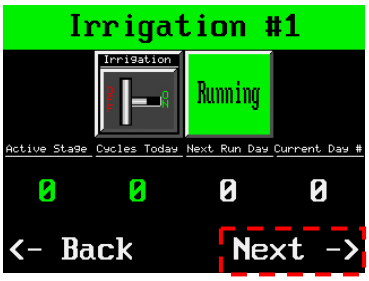
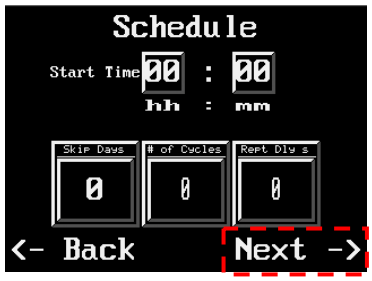
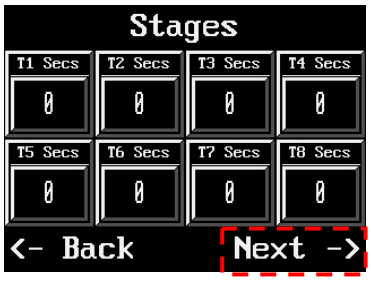


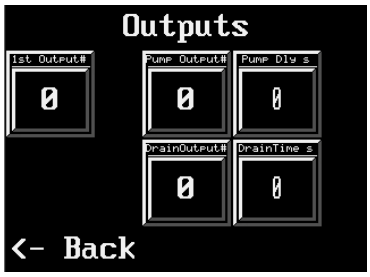
Press “Next” button to access the irrigation settings.



Schedule sets when irrigation should begin each day and how many cycles per day.



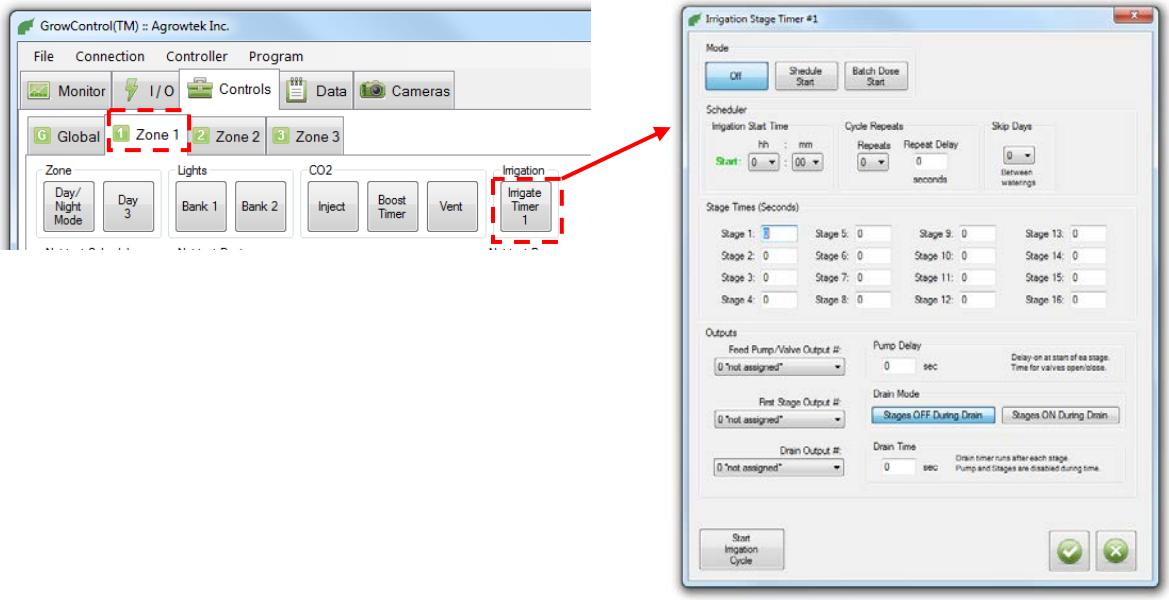
Enter a timer value for each irrigation valve to remain open. T1 must have a time value; all others are optional.



First output# corresponds to T1 first stage valve. Pump and Drain are optional.

Software

The irrigation timer settings are accessed via each zone under the Controls tab.



Vent, Shade & Curtain (VSC) Controls

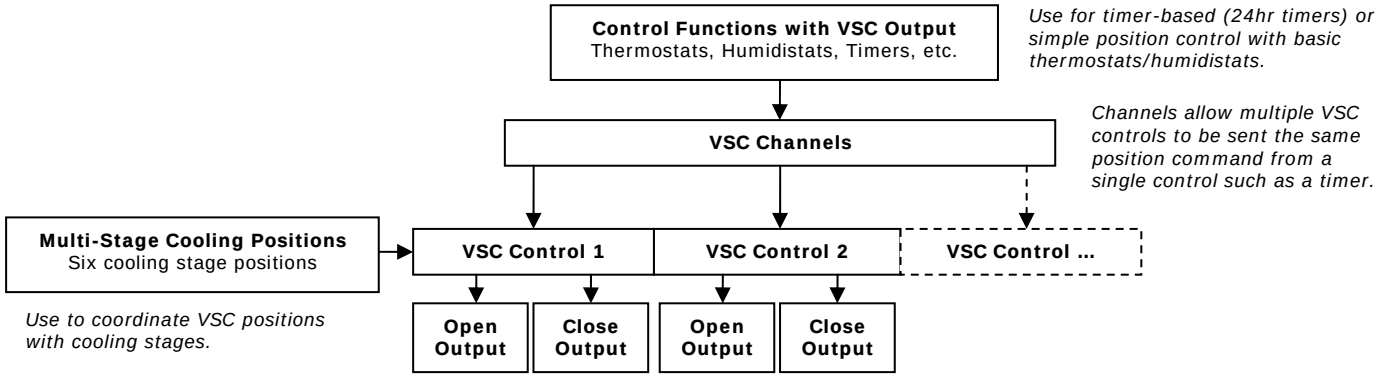
Greenhouse "C" Models Only

GrowControl™ has eight (8) VSC controls which can control roof vents, side wall curtains, sun shades and more. VSC controls manage a vent, shade or curtain proportionally from **0-100% open**.

The default position is closed (0% open) and VSC controls are told to open in two ways:

1) by any control with a "VSC output option" (such as thermostats, humidistats, 24-hr timers, etc.) or,
2) by the multi-stage cooling positions (cool 1 through cool 6.)

VSC Limits will limit the maximum target position of any VSC control regardless of other position commands for weather alarms and a "link" function (see below.)



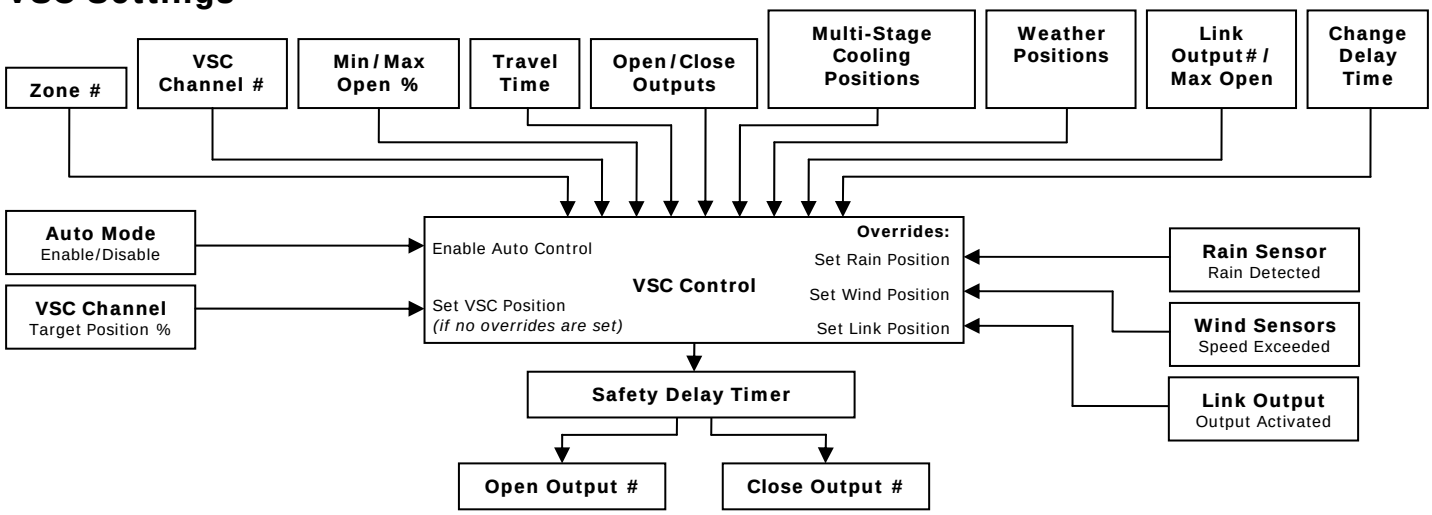
How VSC Works with "Control Functions" & "Channels:"

1) Controls functions such as a thermostat, humidistat or timer are configured and addressed to the VSC "channel" of choice (#1-16.)
2) A VSC control is configured with a matching channel number.
Multiple VSC controls may be set on the same channel to be controlled by the same position commands.
3) The VSC control is placed into "Auto" mode. *(Ensure the maximum position is set to a number greater than 0%.)*
4) The VSC control will open to the maximum position called for by the controls functions *(unless a limit control or manual maximum setting sets the VSC to a reduced position.)*

Observe the "target position" value; this is the target position dictated by the VSC's channel or stage position settings. The "actual position" should change if the open or close outputs are active and a travel time is configured.

Note: "Limit controls" and "24-hour cancel timers" will set a maximum open position for a VSC control (instead of target minimum open position.)

VSC Settings



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Zone#: The zone that the VSC is operating in.

VSC Channel: The channel that the VSC control will take position commands from. Multiple VSC controls can be on the same channel and will open and close to the same target positions (assuming the VSC controls have the same limit and over-ride settings.)

Min/Max Open: The limits that the VSC should operate within. Typical values are minimum = 0 and maximum = 100%. The min/max position can be used to manually operate the vent or curtain, or set different limits of each vent/curtain while maintaining the same target from a single channel.

IMPORTANT: VSC functions will not operate if the maximum open% is set to 0.

Travel Time: The time (seconds) to operate the vent, shade or curtain from fully closed to fully open.

Open/Close Output #'s: The outputs which drive the open and close inputs on the motor controller.

Multi-Stage Cooling Positions: Positions for the VSC to move to when the respective zone is active in a cooling stage.

Weather Settings:

Wind Max Open: Maximum allowed open position during wind speed alarm.

Rain Max Open: Maximum allowed open position during rain alarm.

Lo-Temp Max Open: Maximum allowed open position during outdoor low-temperature alarm.

Link Output / Max Open Position: When a selected output is activated (link output #) the VSC control will set the maximum allowed open position to the Link Position. This is typically used to close a vent or curtain down to a minimum position when a ventilation fan is active in order to draw air in evenly through the vent or wall rather than through the area nearest the ventilation fan(s.)

Change Delay Time: After the VSC completes a move and turns off the Open or Close output, the change delay timer will disable automatic operation of the Open or Close outputs for a set duration. This prevents short cycling of vents (and also keeps vents closed down for a minimum period after weather overrides have been set.)

Safety Delay Time: This timer compensates for any time-delays in motor controllers. If the motor controller has a time delay between when the GrowControl™ controller activates the open/close output and when the motor controller actually starts the motor, enter this time value here.

Manual Operation

VSC controls can be manually operated in two ways; by adjusting the maximum and minimum positions, or by disabling the automatic control and manually turning the open or close output on until the desired position is reached. The controller will continue the position.

- To manually open a vent or curtain (while still allowing the system to open further automatically in Auto mode) simply set the "minimum open position" to the desired position. To Close and override the automatic control of the vent or curtain, set the "maximum open position" to 0.
- When auto mode is off the controller will continue to track the VSC position even if manually operated via the controller's manual over-rides. When auto mode is turned back on, the vent will attempt to return to the target position.

Note: The GrowControl™ controller can NOT track position changes if operated manually by the motor controller.

Calibration

If the motor controller has been operated manually, the position will most likely need to re-calibrated. Simply close the vent or curtain fully and set the position to 0 (.)

Position can also be calibrated at 100% (fully open) via the touch screen by entering 100 as the calibrated position, or set the calibration position to match the actual measured position.

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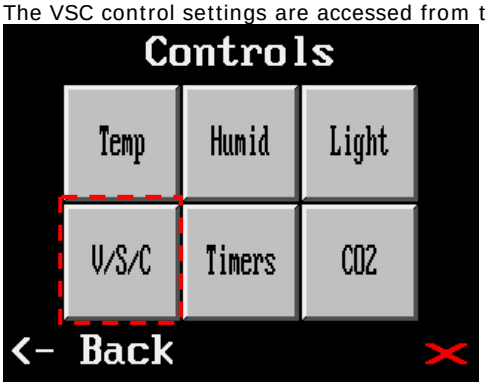
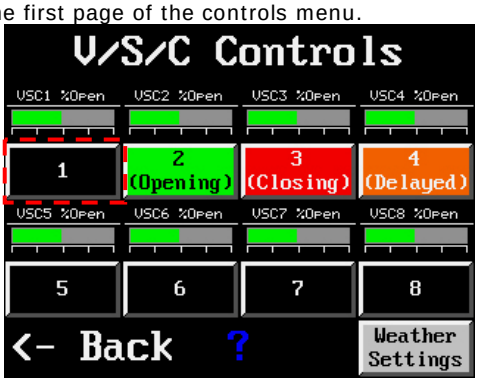
Touch Panel

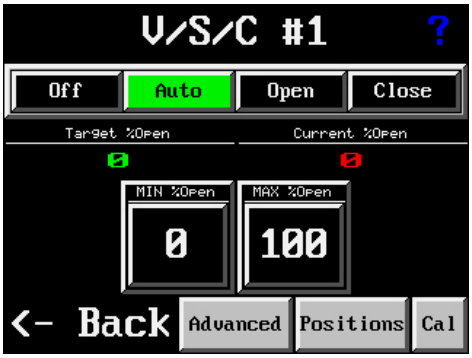
The VSC control settings are accessed from the first page of the controls menu.



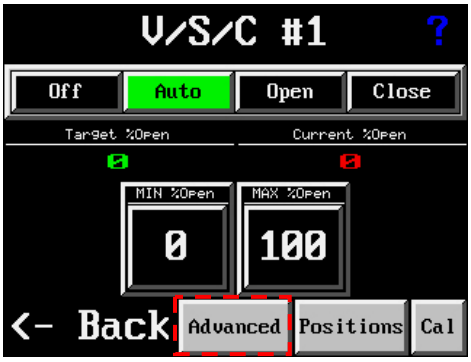
Press “VSC % Controls” button to access the VSC controls.



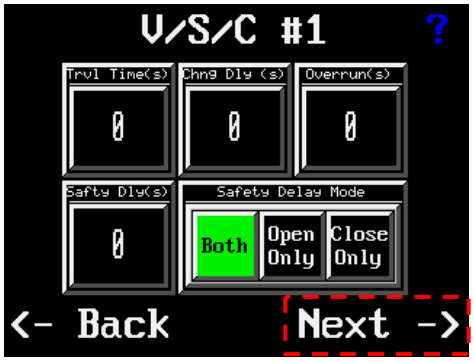
Current VSC positions are shown. Select a VSC control to view/modify settings or position.



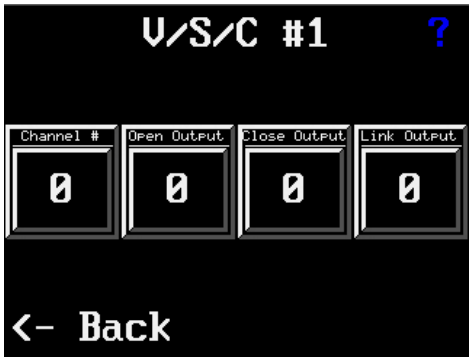
VSC control can be set to auto, off or manual control, and displays target position from the VSC channel and actual position.



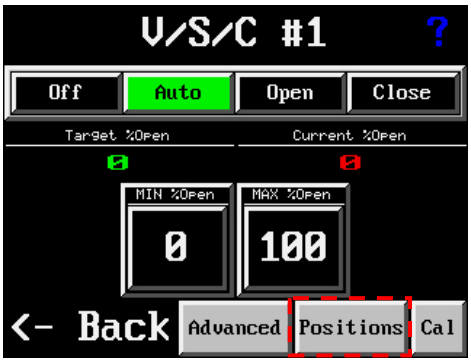
Press “Advanced” button to access the advanced VSC settings.



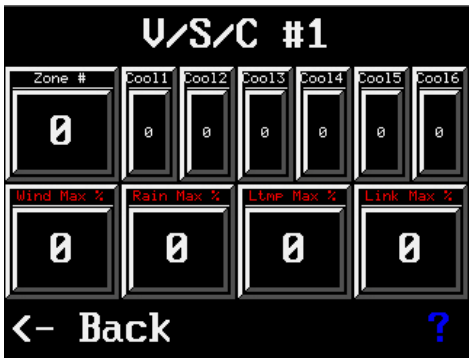
A travel time is required to operate the VSC control. A safety delay corrects for delays built into motor controller. Over-run ensures vents close when at 0%.



‘Next’ from the advanced menu displays the VSC channel setting and the open/close output settings. A Link output may be entered for the link function.



Press “Positions” button to access the cooling stage positions and weather limit position settings.



Zone number and Cool positions set the target% according to the active cooling stage in the entered zone. Max% weather positions (in red) limit the VSC % open when the respective weather alarms are active.

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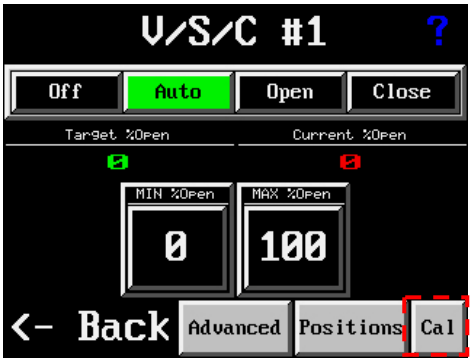
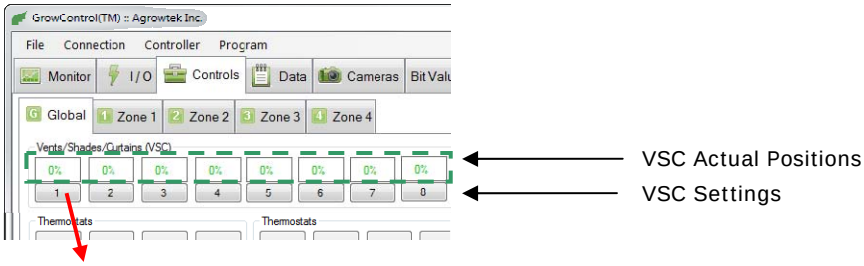


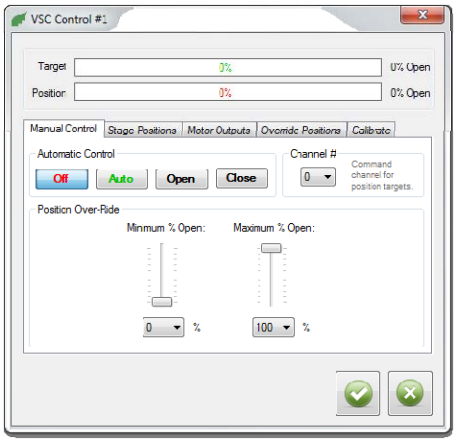
Press “Cal” button to adjust calibration of VSC actual positions.

When fully closed, set the position to zero, or when fully open set the position to 100%.

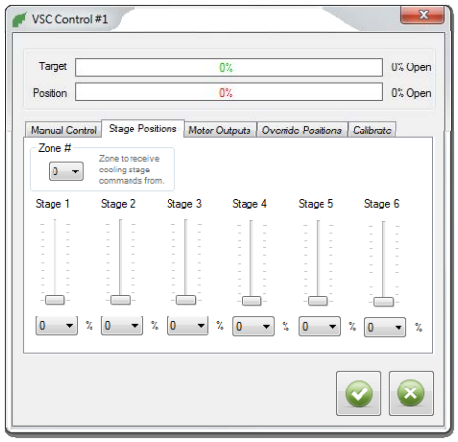
Software

The VSC controls can be monitored and adjusted in the “VSC” group on the “Controls” tab.

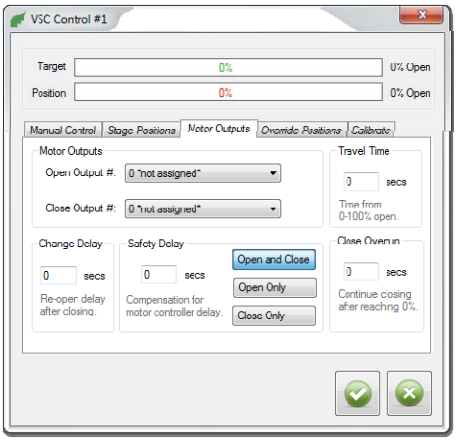




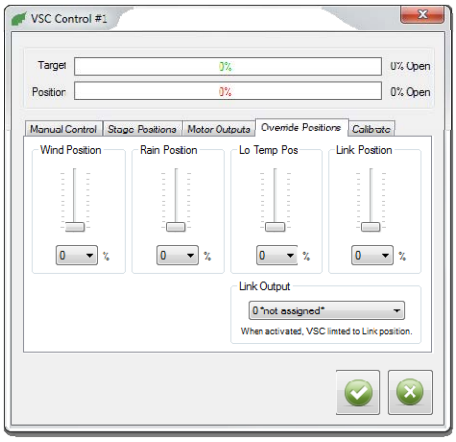
Min/Max positions and manual override controls. Channel number for operation from control functions.



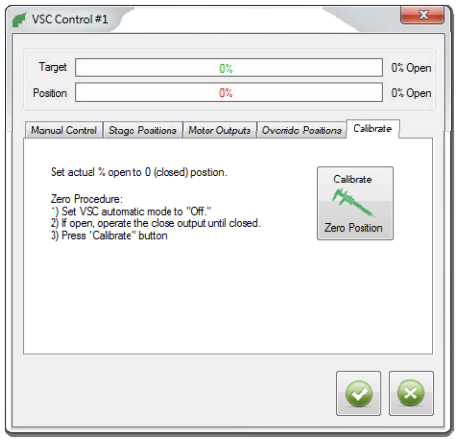
Stage position settings set VSC position based on active cooling stage.



Motor outputs (forward & reverse) assignment, total travel time and time delay settings.



Maximum positions for alarm and link conditions.



Set the %open to 0.

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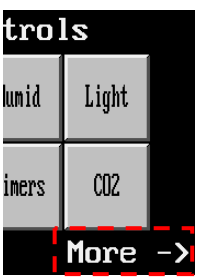
Windstat

Windstats serve to operate an output on a high or low wind condition, similar to the operation of a thermostat with a set point, dead band and output.



Press the "More" button on the Controls page to access the WindStats button.

Enter the desired day/night speed trigger points, then press the bottom button to toggle to the output setting.

Set the output you want the controller to operate when the windstat is activated.

Software

Windstats are accessible via the Windstats group on the Controls > Global tab.

Configure the windstat functions as described above.

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Photostat

Photostats utilize an outdoor weather station's light sensor reading to enable lighting when the outdoor levels are below a specific threshold. The photostat may be used in conjunction with a static lighting timer, or may be the only function controlling the lighting as the photostat has a 24-hour timer built in.

To configure the photostat:

1. Set the "Lights Timer" such that the lighting output is properly assigned for your lights, and the on and off times are both set to 0:00 (the lighting timer values will not control the lights, the photo stat will.) *See Lights Timer section for more details.*

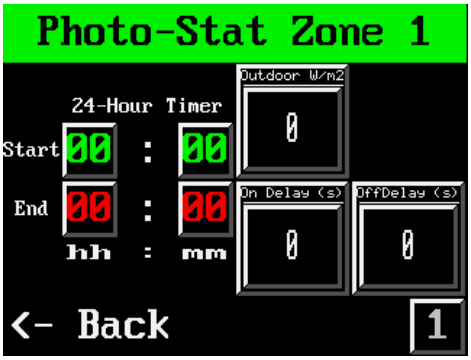
2. Open the photostat control and configure the on and off times according to your desired lighting schedule.

3. Set the minimum outdoor lighting level before the system activates the lights outputs.

4. Set the on-delay and off-delay timer values.

If the outdoor light intensity is below the outdoor light level set point, the lights will begin the on-delay timer, then turn on. When the outdoor intensity increases above the set point, the off-delay timer will begin and then turn the lights off.

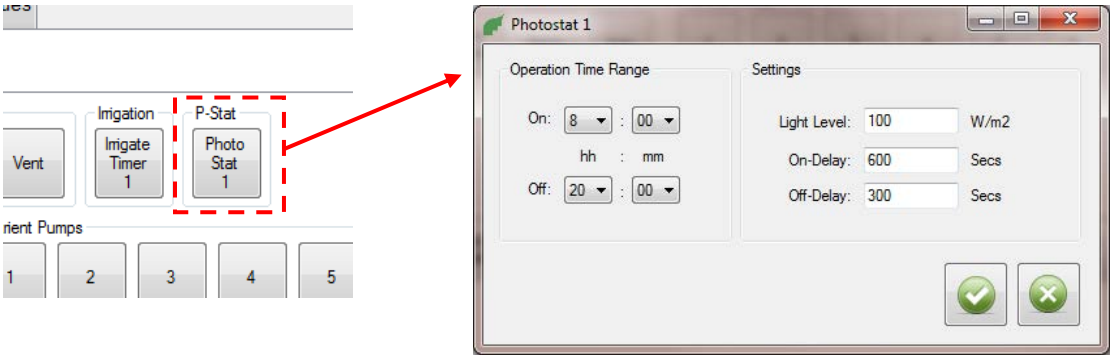
Press the "Photostat" button on the Controls > Lights menu.



Configure the settings as recommended above.

Software

Photostats are accessible via the photostats group on the Controls > "Zone" tabs.



Configure the windstat functions as described above.

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Nutrient Dosing

GrowControl™ can monitor your nutrient levels and dose up to an 8-part nutrient solution to maintain automatic control of your nutrient concentration. The GC-Pro is designed to deliver precision volumetric doses with Agrowtek's standard AgrowDose™ nutrient pumps.

AgrowDose™ pumps are durable peristaltic pumps which deliver consistent doses from any size stock tank to your reservoir for reliable, low maintenance dosing. Solenoid valves and other equipment can also be used on a timed basis.

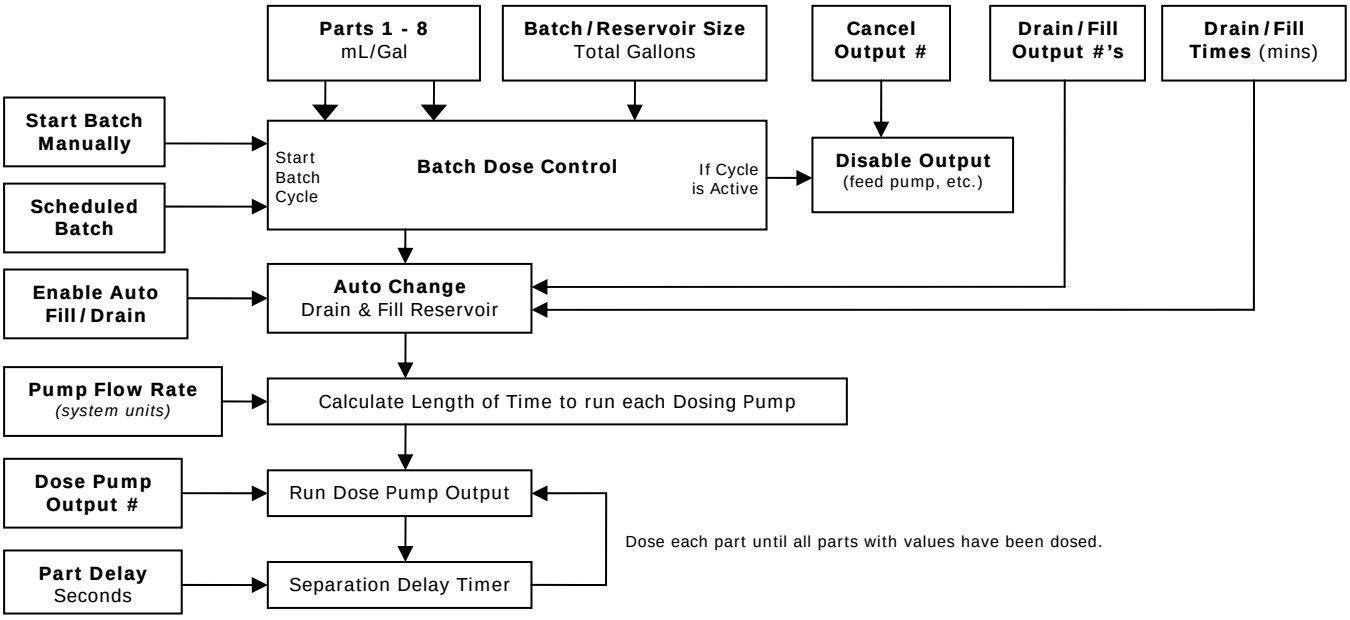
Automatic & Batch Nutrient Dosing

Monitoring Only	Batch Dosing Only	Automatic & Batch Dosing
Controller and sensors allows monitoring of hydroponics systems.	Without hydroponics sensors, GrowControl™ can automatically change and dose nutrient batches on a 16-week schedule or manually on demand.	A controller with sensors and dosing pumps allows both dosing option to be used. Schedule reservoir changes and perform batch-dosing, as well as maintain ideal nutrient concentration and pH automatically.

Batch Dosing

Batch dosing automatically calculates and injects the proper volume of nutrients for a given batch or reservoir size. Setup the nutrient parts according to the manufacturer's mL/Gallon concentrations (see advanced settings.) Enter the batch volume in U.S. gallons. If desired, setup drain and fill outputs and times to automatically drain and re-fill the reservoir prior to dosing the batch.

Batch dosing will automatically dose all parts that have a ratio (mL/Gal) and a pump output assigned when a batch is manually started, or when the scheduler shifts to new settings at a specified date and time.



Batch/Reservoir Size: Total gallons of water in the reservoir. The batch dosing control will multiply the nutrient part ratios (mL/Gal) by the total amount of water to determine the total amount of each nutrient to add.

Drain/Fill Output #: The outputs which operate drain/fill pumps or valves for automatic water changes.

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Drain/Fill Time: Minutes to drain and fill the reservoir respectively.

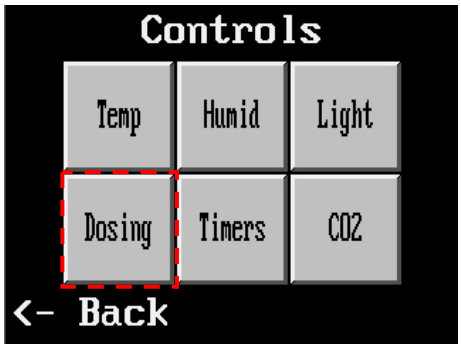
Cancel Output #: Output to cancel when batch dosing is active. Use this to prevent feed pumps from operating when dosing. Set to disable the cancel output when dosing is active in batch mode only, or either batch mode or auto mode.

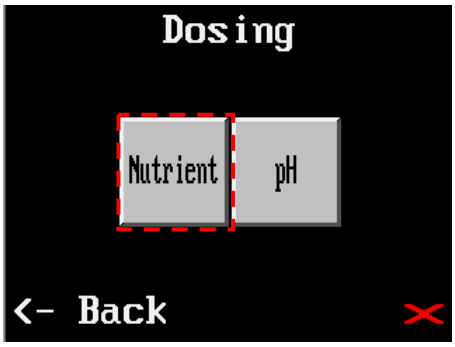
Dose Pump Flow Rate: This is set in system settings and tells the controller how much volume in mL the dosing pumps flow per minute (mL/minute.) The controller uses this flow rate to calculate how long to operate the dosing pumps to output the mL for the number of gallons entered.

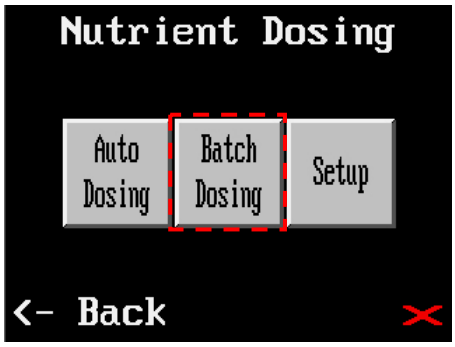
Part Delay: Time delay in seconds (to allow mixing of nutrients) between each dosing pump operating.

Touch Panel

The nutrient dosing settings are accessed from the controls menu.

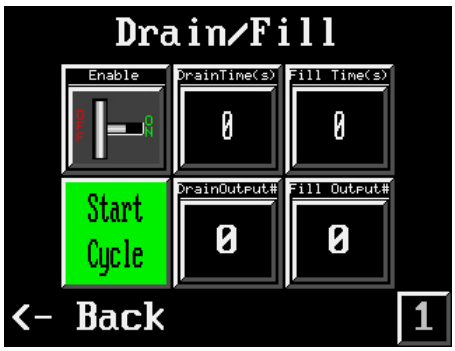




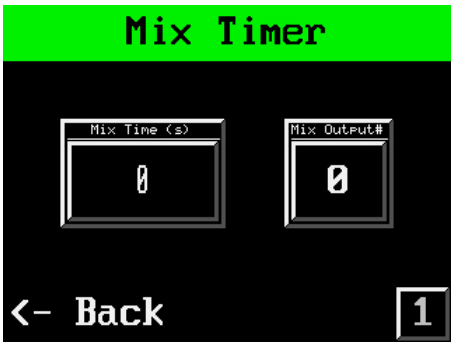


Press switch button to enable/disable batch dosing.

Batch Settings; adjust trigger mode, batch size (gallons of water) and repeats (optional.)



Drain/Fill settings to empty/re-fill a tank at the start of a batch dose. Drain/Fill cycle can be started manually.



Nutrient mixing timer allows tank to mix while a batch is being dosed and after the dosing is complete.

A batch can be initiated by a nutrient schedule change, input or output activation, or by manual start.

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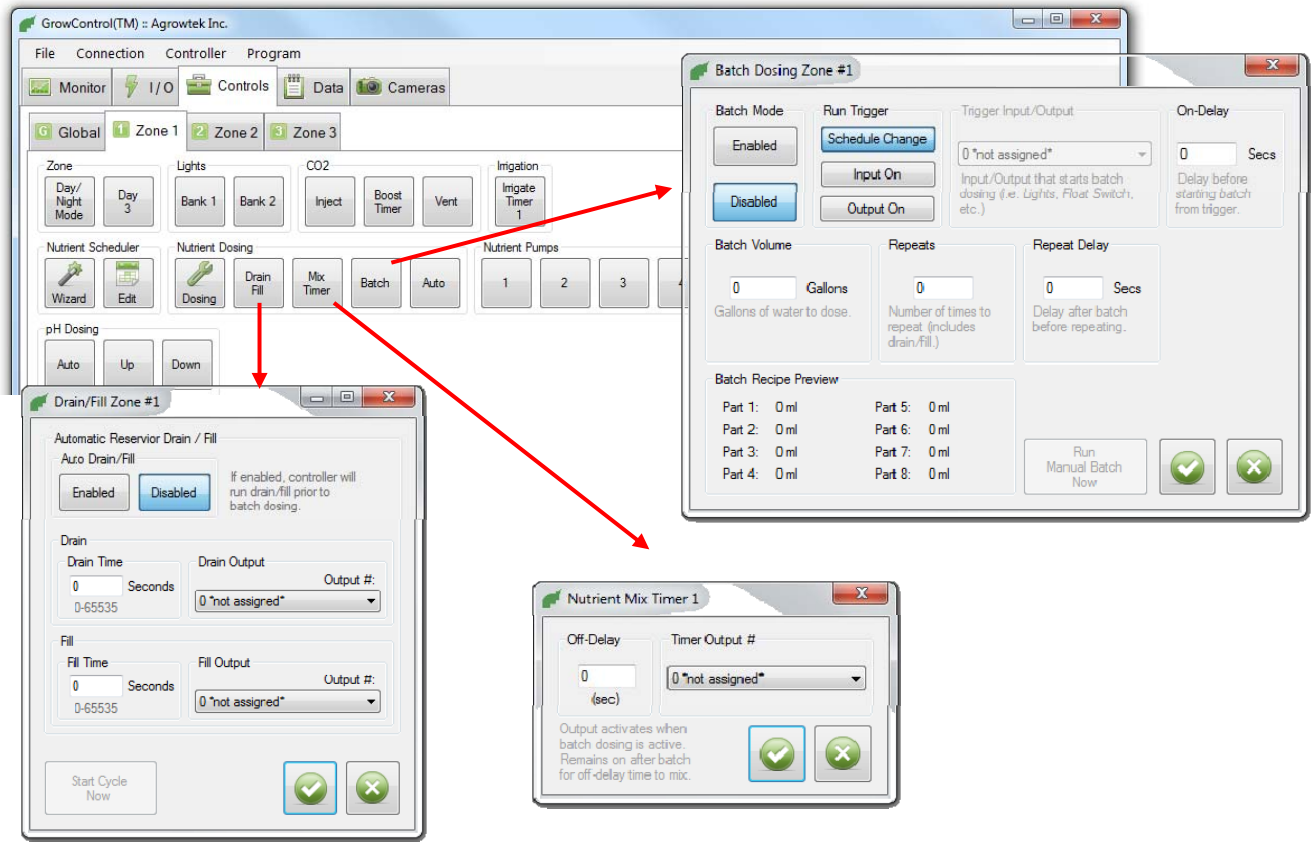
Software

The batch dose settings are found under the Nutrient Dosing box under the “Controls” tab for zones with hydroponics controls.

Click on a button to bring up the settings windows, then press the green check button to send the settings to the controller.



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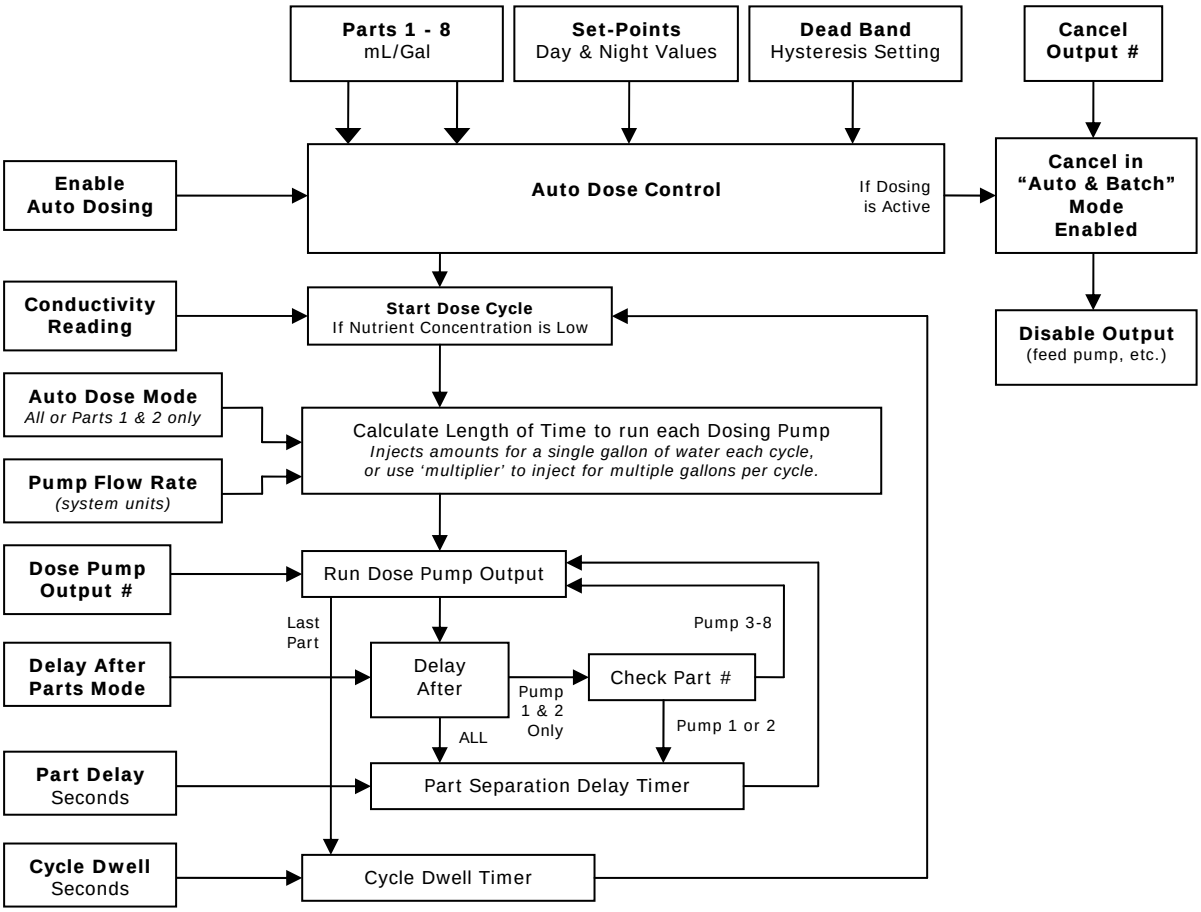
Automatic (Demand Based) Dosing

If your GrowControl system is equipped with hydroponics sensors, (pH, conductivity and water temperature) the controller can maintain the nutrient concentration automatically. The automatic nutrient dosing works like many other commercial dosing systems available today and is a very simple, reliable process.

The controller monitors the conductivity, or concentration, of the nutrient solution. When the concentration is below the set points, the dosing process will be initiated. Each pump will deliver the dose in milliliters as set in each part. The process will then repeat with the dwell time between each cycle until the nutrient level reaches the set-point.



Part 1-8: (mL/Gal or seconds) In 'batch' mode, the part ratio (mL/Gal) is multiplied by the total batch size to find the total dose amount for each part. In 'auto' mode the controller will add this amount (for one gallon) of each part in repeating cycles until the concentration set point has been met.

Output Pump 1-8: The output numbers to assign to the respective dosing pumps.

Day / Night EC (or TDS): The desired conductivity (or TDS) for the controller to maintain during the day and night periods. *Note: to disable dosing during day or night set the value to 0.*

Deadband: The EC (or ppm) drop to allow before starting a dosing cycle (see below.)

Cancel Output #: Output to cancel when batch dosing is active. Use this to prevent feed pumps from operating when dosing. Set to disable the cancel output when dosing is active in batch mode only, or either batch mode or auto mode.

Dose Pump Flow Rate: This is set in system settings and tells the controller how much volume in mL the dosing pumps flow per minute (mL/minute.) The controller uses this flow rate to calculate how long to operate the dosing pumps to output the mL for the number of gallons entered.

Auto Dose Mode: (ALL or 1 & 2) Select whether all nutrient parts are auto-dosed on demand, or only parts 1 & 2.

Auto Dwell Time: The time to wait when nutrient level goes low and between each subsequent dosing cycle.

Part Delay: Time delay in seconds (to allow mixing of nutrients) between each dosing pump operating.

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Multiplier: On each auto dose cycle the pumps will dispense volume for 1 gallon of standard nutrient mix according to the amounts set in each pump (mL/gal.) To inject multiple gallons worth of nutrient on each cycle enter a multiplier.

Cancel Mode: (Auto Only or Auto & Batch) Disable the "cancel output" when batch dosing only, or when batch dosing and automatic dosing.

Cancel Output #: Output number to turn off when dosing is active (i.e. feed pump output.)

Scheduler: Enable or Disable automatic updates from nutrient scheduler (see scheduler.)

Delay After Mode: Select whether the controller will apply the "part delay" time after all parts, or only 1 & 2.

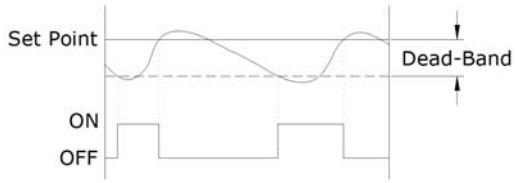
Notes:

1. The cycle dwell time can be set to 0 for continuous dosing cycles.
2. The part delay time can be set to 0.
3. The dose parts can be multiplied by a factor to achieve larger doses per cycle and the reservoir/batch size divided by the same factor to batch dose proper amounts.

Dead-Band

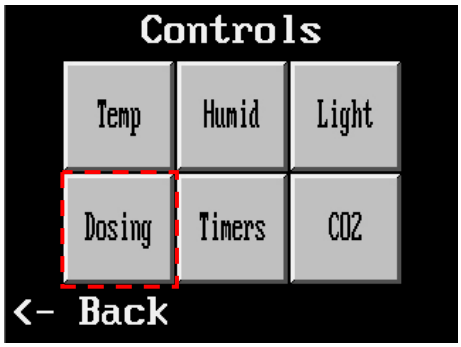
The "Dead-band" determines how much of a nutrient drop is allowed before re-dosing back up to the set point.

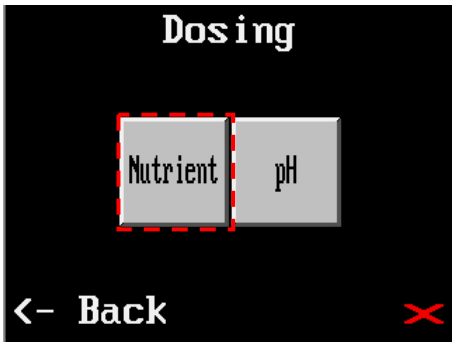
Example: Controller doses up to 1000ppm; dead-band = 100ppm. When ppm falls below 900, controller will dose back up to 1000.

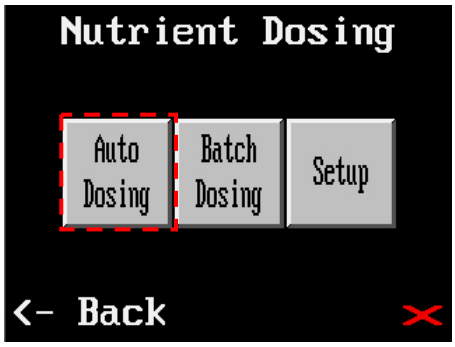


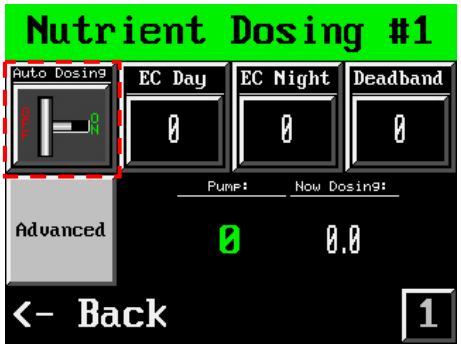
Touch Panel

The auto dosing controls are located in the main controls menu.









Press switch button to enable/disable auto dosing. Day and Night conductivity set points and dead band.

Advanced Settings; dose parts 1&2 only or all parts, dwell between auto cycles, and cycle multiplier.

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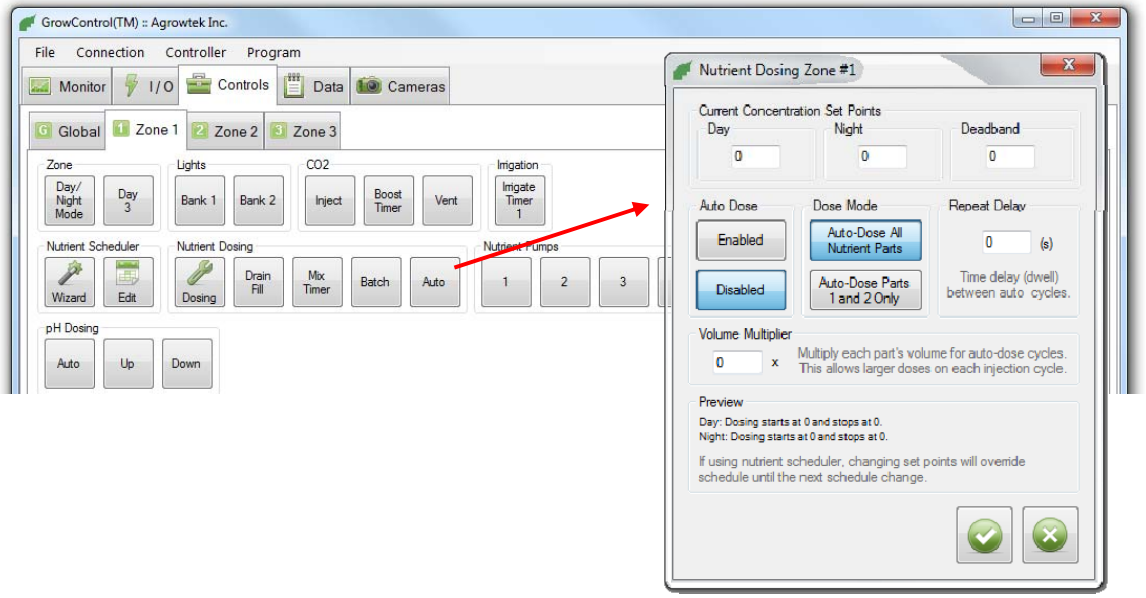
Software

The nutrient dosing settings are accessed via the controls tab under the “Nutrient Dosing” group.

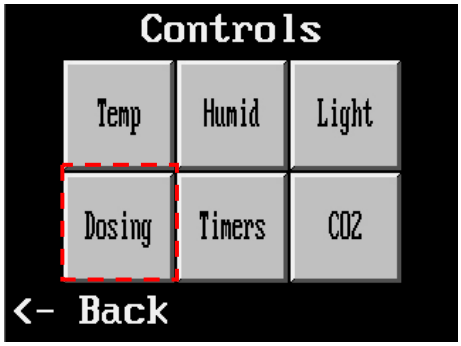


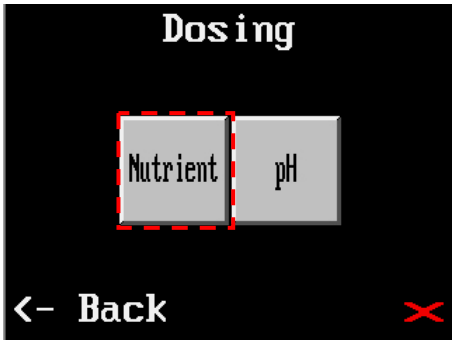
Dosing Parts / Pumps

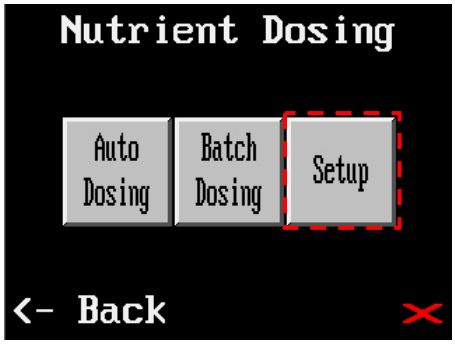
The GC-Pro can operate up to eight (8) dosing pumps each with their own dose volume (or time.)

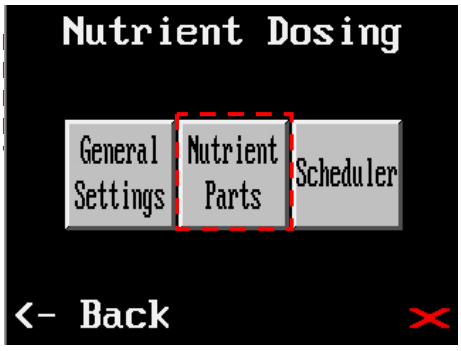
Touch Panel

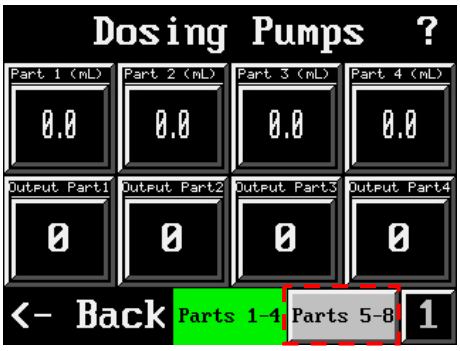
The dosing pumps and part ratios are found under the nutrient dosing main menu.



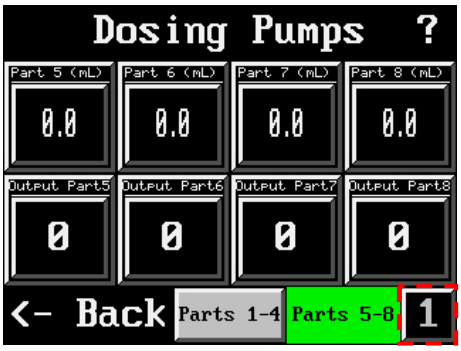








Set nutrient part ratios and pump output assignments.



Press “1” to toggle zone 1 to zone 2 (multi-zone mode only.)

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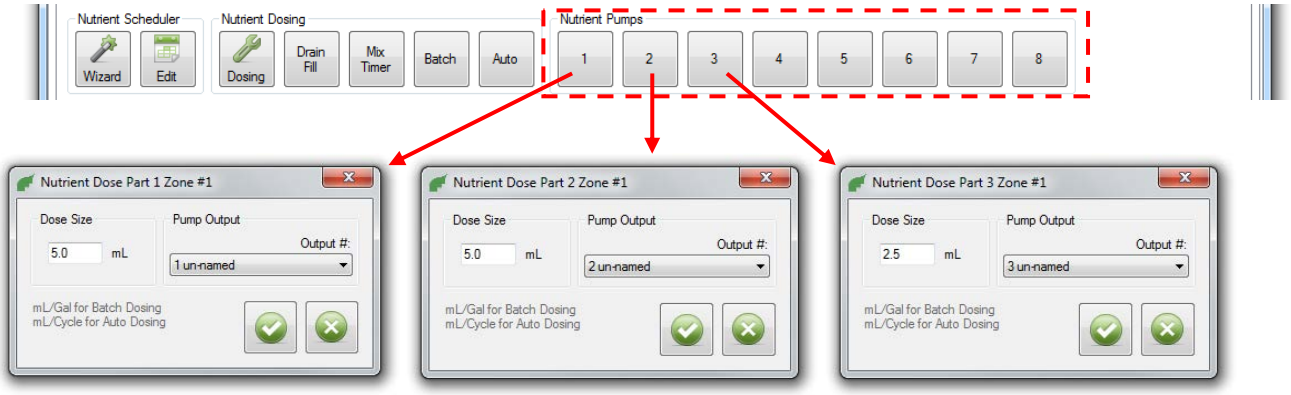
Software

The dosing pump outputs and ratios are each displayed separately and indicate green which stage of dosing is active.

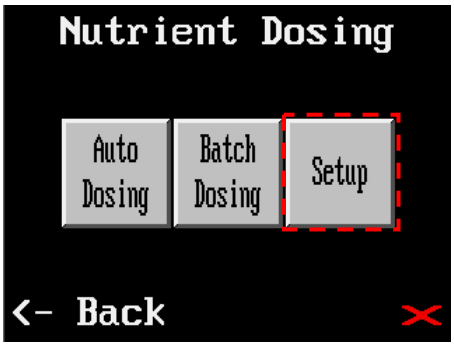


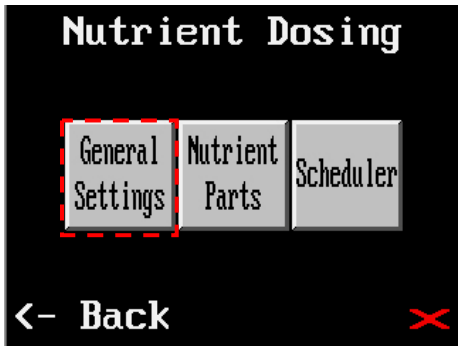
General Nutrient Dosing Settings

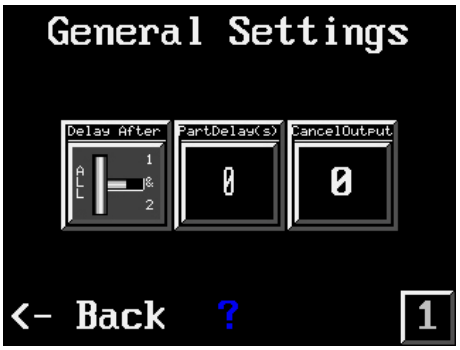
General settings apply to both batch and auto dosing modes including part separation delay time, part delay mode (part separation delay after parts 1 and 2 only, or all parts) and 'cancel' output number.

Touch Panel

The advanced nutrient dosing settings are accessed from the 'auto' or 'batch' dosing menu.

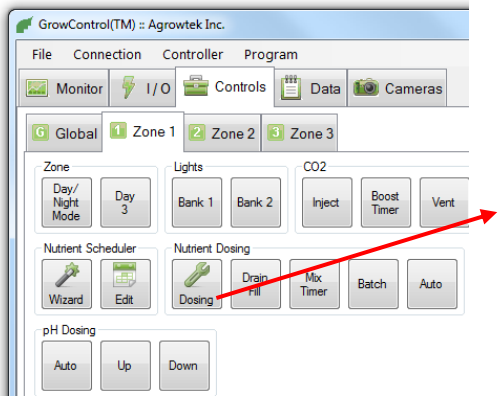


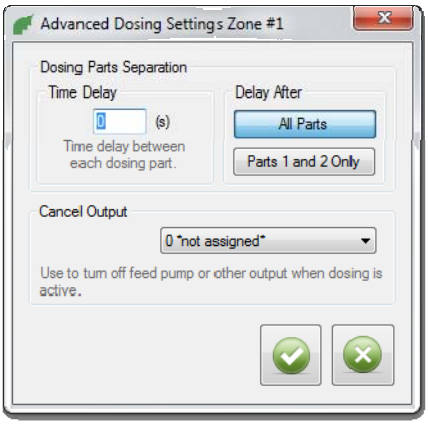




Global settings which apply to both batch and auto dosing modes.

Software





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16-Step Nutrient Scheduler

GrowControl can automatically update your nutrient ratio profiles, up to 16 stages, at specific times and dates. Batch dosing can be automatically initiated on the change to drain and fill the reservoir, then dose with the required nutrient amounts.

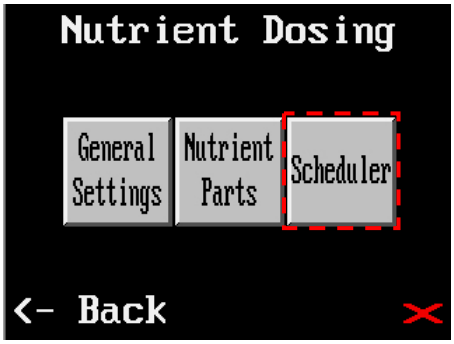
The scheduler can update the concentration set points and nutrient part ratios at the time and date which is set for each stage to begin.

To setup the scheduler:

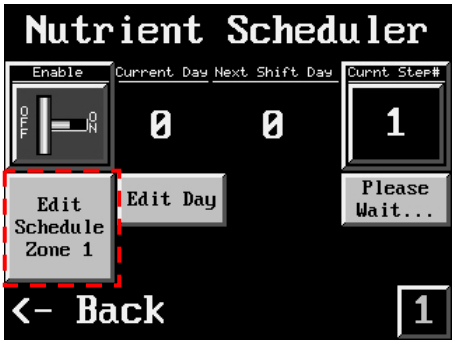
1. Starting at step #1, enter a date and time when the step will begin.
2. Set the desired concentration levels (if using auto dosing.)
3. Set the nutrient part ratios (mL/Gal)
4. Repeat 1 to 3 for each step in the growth process.
5. Enable the dosing scheduler.

Touch Panel

The scheduler is accessed via the nutrient dosing menu.

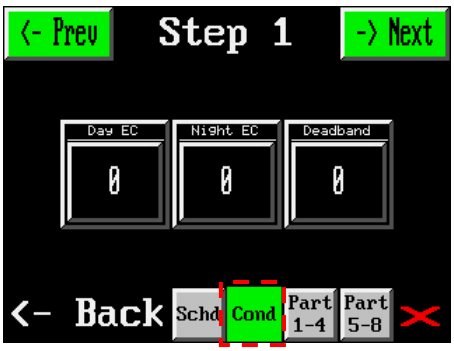


Access the nutrient scheduler settings.

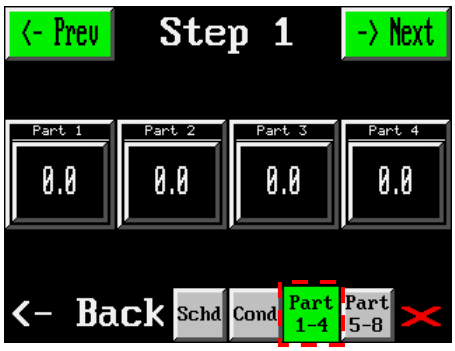


Enable/disable the automatic scheduler. Edit the current day or step manually. Press “Edit Schedule” to adjust schedule parameters.

Use “Prev” & “Next” at the top to shift through the 16 steps. Each step has a start day and time on that day. Days count up at midnight using the day counter (see lights section.)



Set the target conductivity level for each step. If auto dosing is not used, this is optional.



Set the dosing concentration for the pumps for each step. This is entered in mL/Gallon. When the schedule shifts on the day/time of the associated step, the schedule concentration values will be copied into the pump concentration values.

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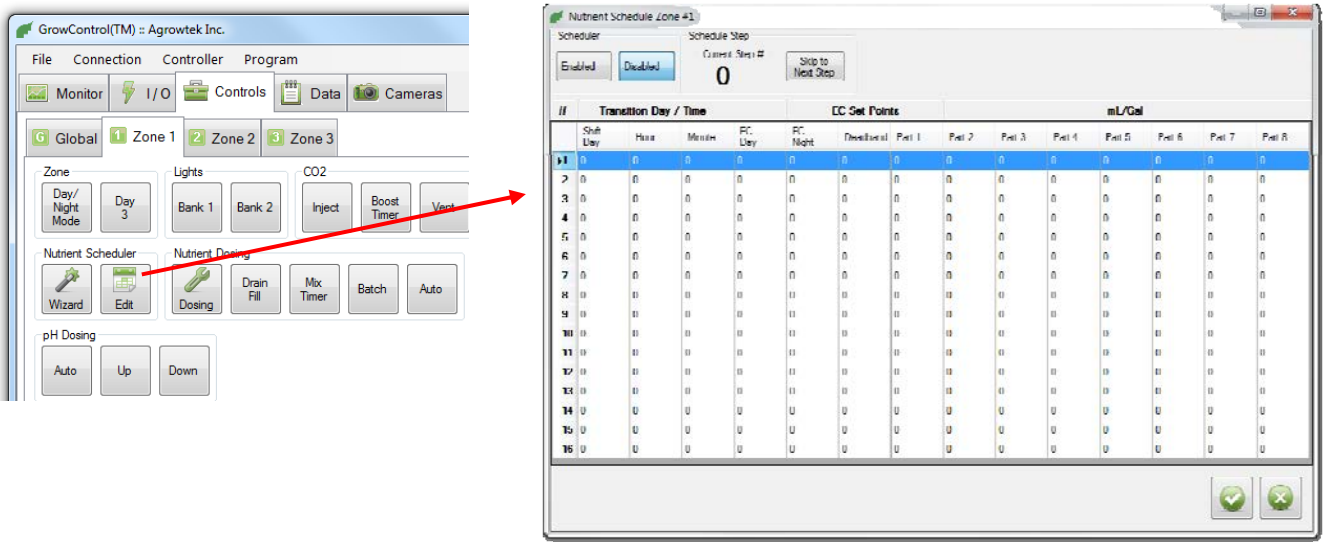
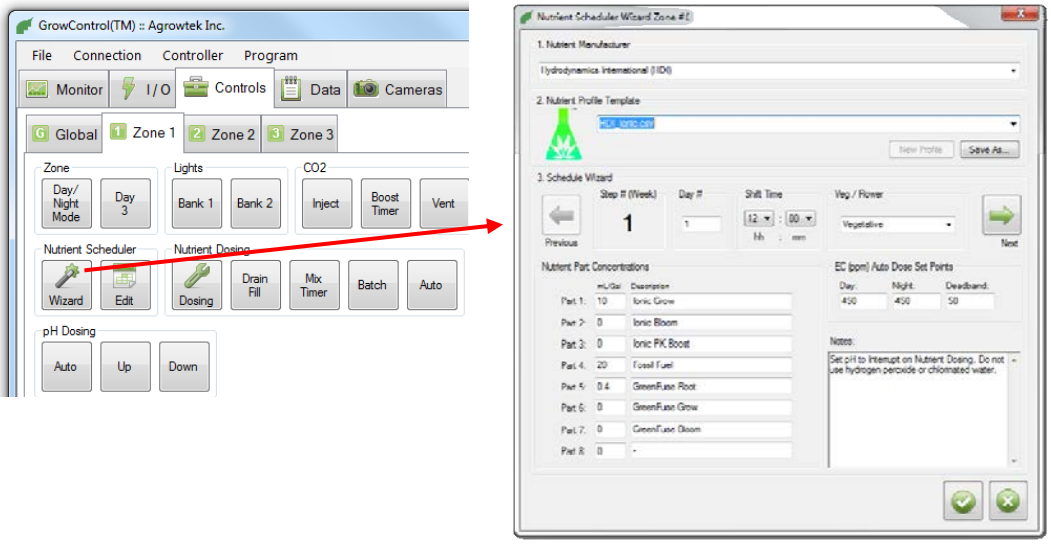
Software

The software has a manual schedule editor which is similar to the touch screen operation except in spread-sheet format for easier editing, plus a “wizard” which can automatically generate schedules based on nutrient manufacturers recommendations.

Manual Editor



Nutrient Wizard



pH Dosing

GC-Pro can monitor your pH levels and dose up and down buffer solutions to maintain automatic control of your nutrient pH.

The GC-Pro is designed to deliver volumetric doses with Agrowtek’s standard AgrowDose™ pumps. AgrowDose™ pumps are durable peristaltic type pumps which deliver consistent doses from any size stock tank to your reservoir for reliable, low maintenance dosing. Solenoid valves and other equipment can also be used on a timed basis if desired.

pH dosing works like nutrient dosing and is a very simple process.

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The controller monitors the pH reading and when it is outside of your pH settings, it will initiate the dosing process either up or down as required. The dosing process starts with a delay time; if the pH returns to within parameters before the delay time has elapsed, the dosing process will be terminated. If the pH still needs correction after the delay time, the required pump will deliver the set milliliter dose. The process will then repeat with the delay time between each dose until the pH reaches the set-point.

Note: The delay time can be set to '0' for continuous dosing cycles.

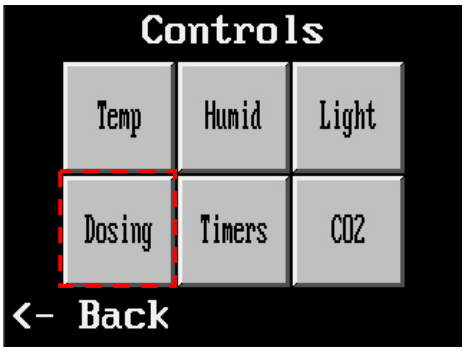
Additionally, if the hydroponics sensors are installed in a manner in which reliable readings are dependent on a circulation pump's operation, the dosing process can be halted in the event that this pump is not on. Enter the output that the circulation pump is assigned to in the "Enable Output" setting.

pH Settings

Day / Night pH: The desired pH for the controller to maintain during the day and night periods.

Touch Panel

The pH dosing settings are accessed from the controls menu.

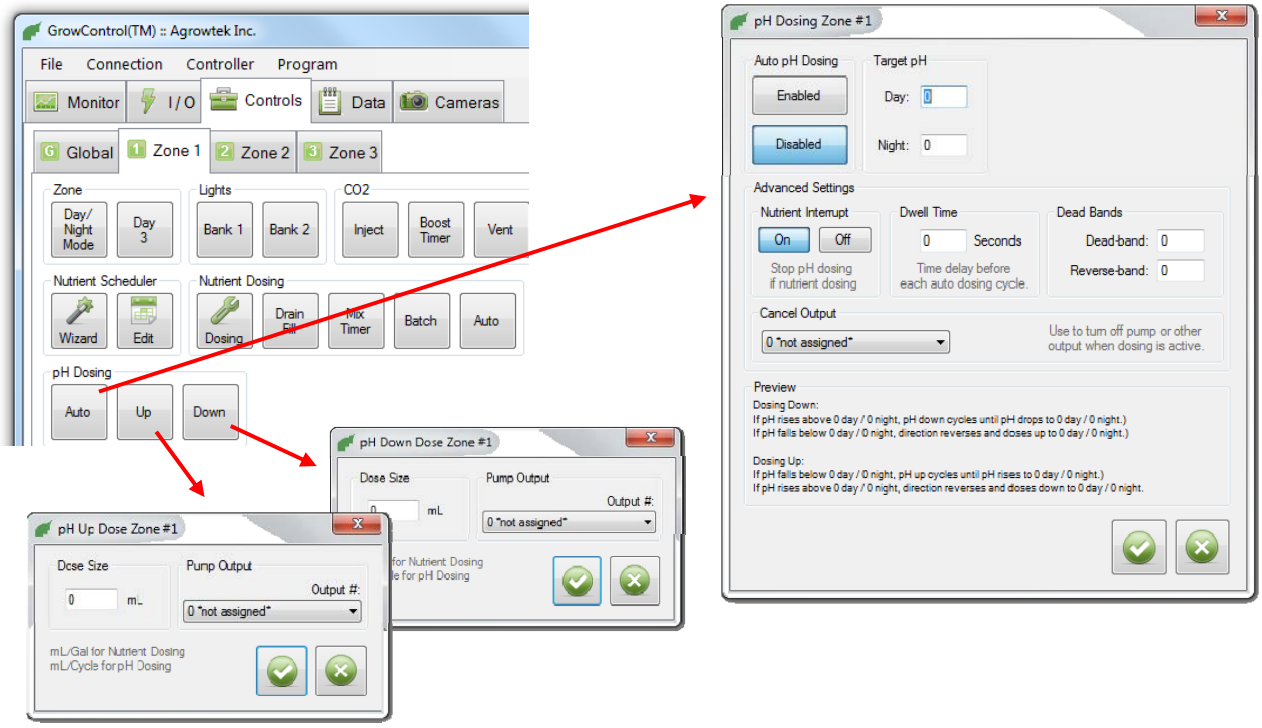


Press "pH Dosing" button to access the pH dosing settings.

Press the number values to enter or adjust with the numeric key pad. Press the switch to turn dosing on or off.

Software

The pH dosing settings are accessed via the controls tab under the "pH Dosing" group.



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Advanced pH Dosing Settings

Nutrient Dosing Interrupt
pH is often influenced by nutrient dosing and it may be desirable to have the system wait until the nutrient dosing is complete before dosing pH; if this is the case, set the nutrient dosing interrupt to "On." Otherwise, to allow pH dosing to occur simultaneously with nutrient dosing, set the dosing interrupt to "Off."

Dwell Time: The time to wait before dosing when pH needs correction and between each subsequent dosing cycle.

Deadband Settings
The pH control can dose in both directions; pH up and pH down. When the controller is called to dose pH, it will inject doses as specified until it reaches the set point. If the pH drifts back again by the dead band amount, dosing will resume until it reaches the set point. If, for some reason, pH goes the opposite direction, the system will allow a drift of the reverse dead band before dosing the opposite direction. A higher reverse dead band will help prevent over-dosing from over-shooting if necessary.

Dead Band: Drift allowed from set point before re-dosing back to set point.

Reverse Band: Drift allowed in opposite direction before dosing opposite pump back to set point.

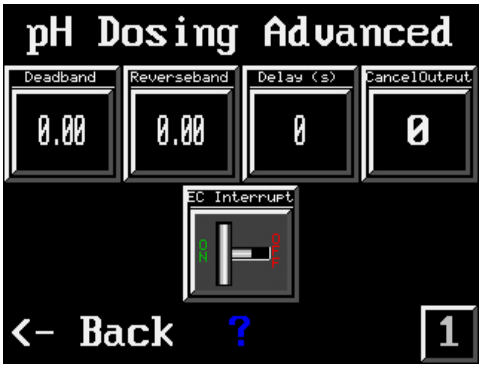
For example: Set point =6.00, dead band = 0.1, reverse band = 0.3. The tank starts at pH 8 and is dosed down to pH 6. If pH rises above 6.1 the system will re-dose down to 6.1. If the pH had fallen below 5.7 it would dose up to 6.0. Once it has dosed in the up direction, it will dose back up if pH falls below 5.9 or dose down if pH rises above 6.3. The dead band and reverse band may be set to the same value.

Enable Output: Disable dosing unless this output is active.

Touch Panel

The pH dosing settings are accessed from the controls menu.

Press "Advanced Settings" button to display advanced menu.



Press the switch to turn interrupt on or off; press the numbers to make adjustments via the numeric keypad.

Software

The pH dosing enable/disable is located in the main pH dosing settings window.

pH Dosing Pump Settings

The GC-Pro can operate one up and one down pump/solenoid per zone.

UP Dose: mL (or seconds) The dose amount that the UP dosing pump should deliver on each up-dosing cycle.

DN Dose: mL (or seconds) The dose amount that the DOWN dosing pump should deliver on each down-dosing cycle.

UP / DOWN Output: The output numbers to assign to the respective dosing pumps.

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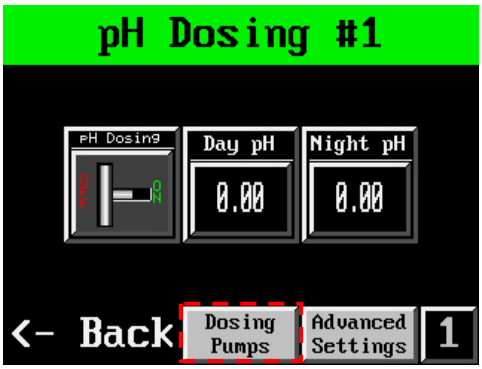
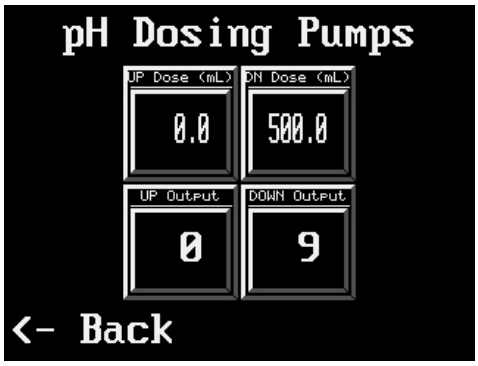
Touch Panel

The pH dosing pump settings are accessed from the pH dosing menu.



Press “Dosing Pumps” button to access the dosing pump settings.



Press the number values to enter or adjust with the numeric key pad.

Software

The dosing pump settings are accessed via the controls tab under the “pH Dosing” group.

Alarms

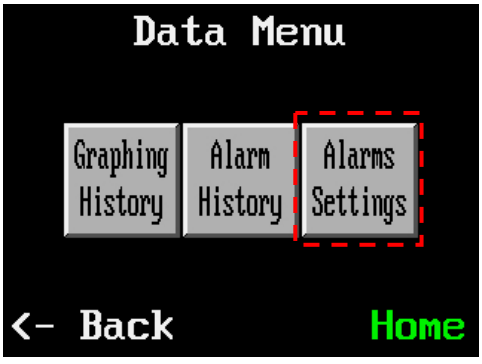
The GC-Pro has built-in high and low set-point alarms for all of the sensor readings. Alarms are displayed and logged in the AgrowTouch™ panel and are sent in an email alert by the GrowControl™ software.

Each alarm has a trigger point and a toggle to enable or disable the alarm.

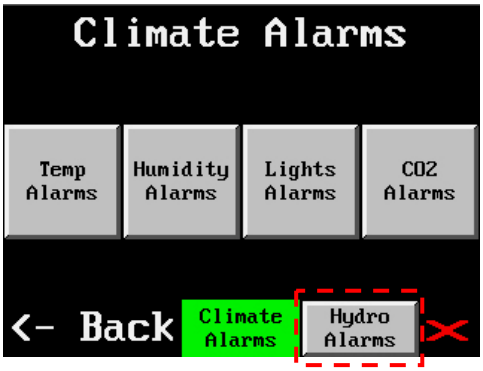
High Air-Temperature Alarm will automatically disable the lighting output for the respective zone.

Touch Panel

The alarms settings are accessed under the “Data” menu from the Main menu.



Press “Alarms Settings” button to access the alarms settings menu.



Select an alarm class to view its alarms settings or press “Hydro Alarms” (if available) to view additional alarms.

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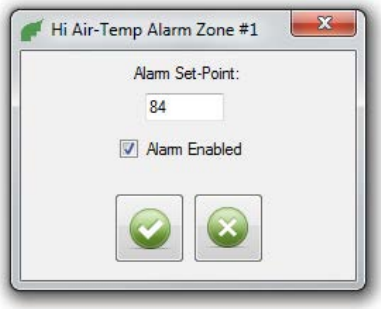
Software

The alarms settings are accessed via the “Alarms” groups on each zone under the “Controls” tab.



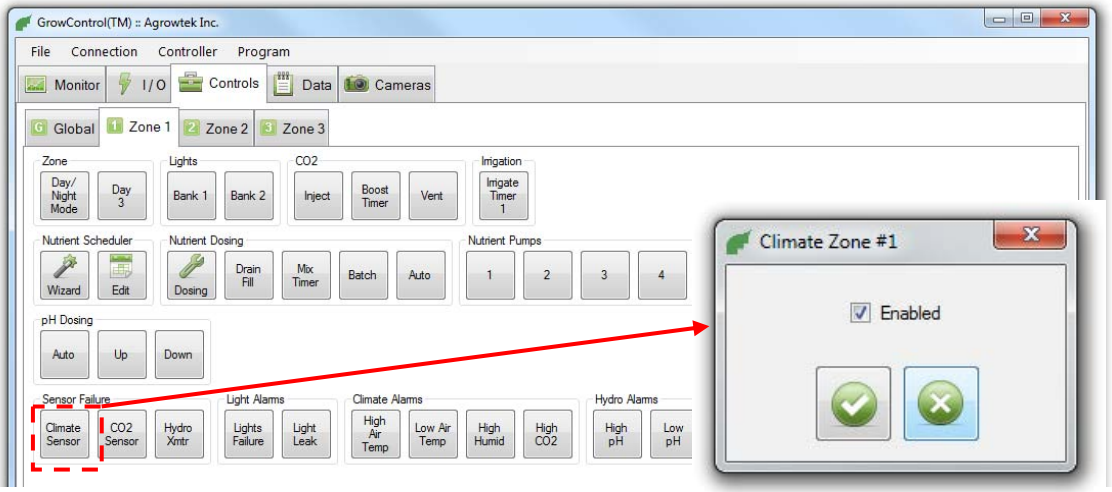
Additional Software Alarms

The software has several additional alarms which can send an email or sms. Simply check “Enable” to activate the alarm.

Analog Sensor Failure: If one of the analog sensors (such as climate sensor or hydroponics transmitter) become disconnected, the software will send an email alert.

Note: In the event one of the analog sensors becomes disconnected, the controls functions associated with that sensor will be disabled.

Digital Input Alarms: Activates when the respective digital input (such as a door switch, leak sensor, etc.) is activated (see inputs section.)



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Alarms Email/SMS Text Alerts

The software is capable of sending an email or SMS alert in the event an alarm is triggered. The alert will include the details of the alarm including the current sensor reading, time stamp and the zone that it was triggered from. Alerts are sent using an email address (such as gmail) to send alerts to the same email address, or to SMS.

To send alerts:

- The computer must be connected to the Internet.
- The GrowControl software must be connected and monitoring the controller(s.)
- The sending email account settings must be configured and a test-email successfully delivered.
- The alarms settings must be configured.

Email Settings:

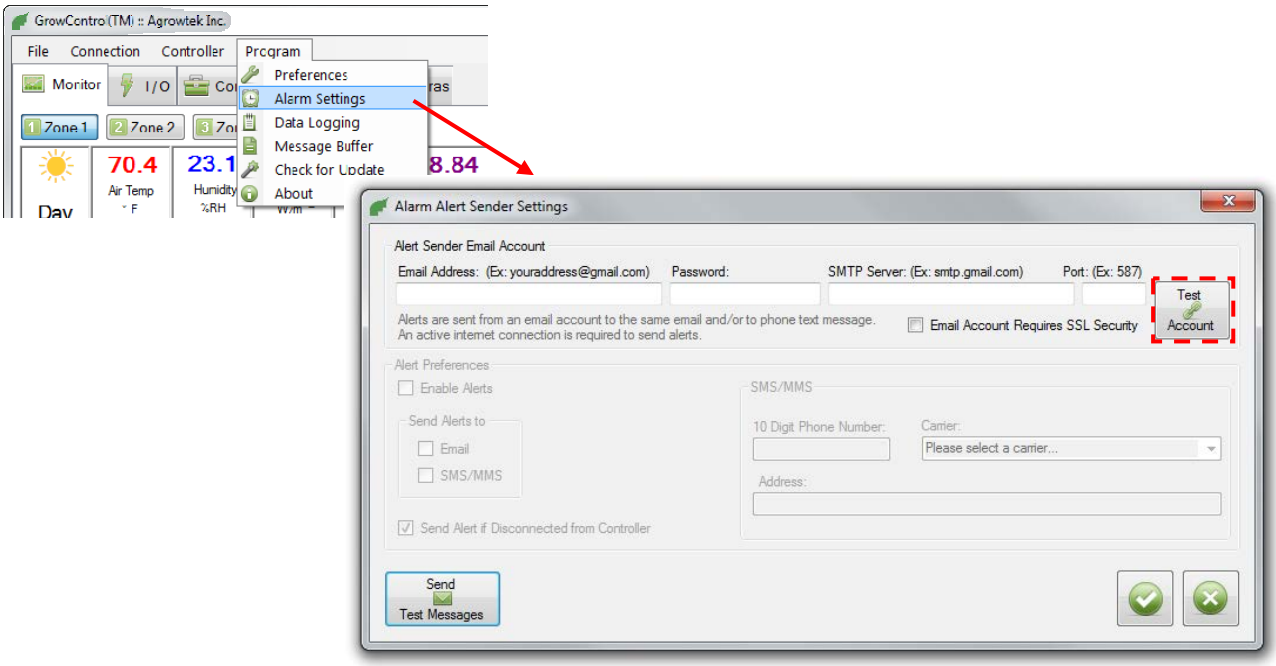
Email Address: Enter the email address of the account you will be using to send and receive emails.
Ex: "youremail@gmail.com"

Password: Enter the password for the email account. (It will not be displayed.)

SMTP Server: Enter the SMTP server address that your email server uses. See your email provider for this information.
Ex: smtp.gmail.com

Port: Enter the port number that your email server uses. See your email provider for this information.
Ex: "587" is used for gmail.

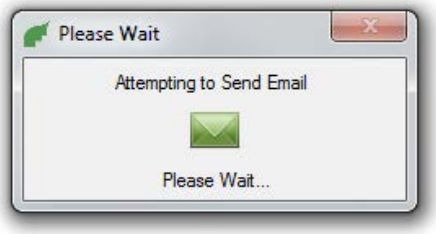
Enable SSL Security: Check whether your email server uses SSL encryption.



Sending a Test Email

Once you have entered the email settings as described above, press "Send Test Mail" to test the settings.

If the email was sent successfully, the "Enable Email Alerts" check box will become clickable. Check the check box to allow the software to send alerts when alarms are triggered.



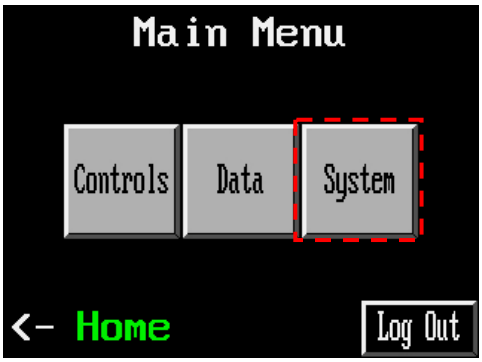
System Settings

The GC-Pro has a variety of global system settings which affect the way the controller operates and displays data.

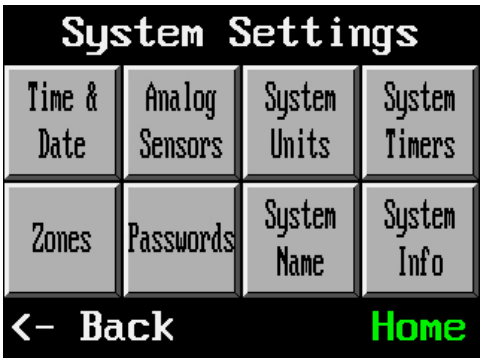
Menus which have a lock icon are restricted to the system administrator; see Users & Passwords.

Touch Panel

The System menu is accessed from the main menu.



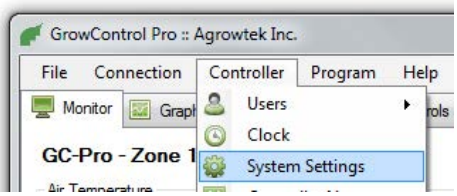
Press “System” button to access the system settings menu.



The system settings menu contains global system settings.

Software

The system settings menus can be found in the “Controller” menu.



System Units

The GC-Pro has a variety of system units settings for temperature, speed, conductivity, dosing and more.
Note: When changing system units, ensure that your settings are also in the correct units.

Temperature: °F or °C.

Wind Speed: mph or kmh

Light Sensor: Set according to the type of light sensor installed. (Hi-range 5-2000W/m^2, Lo-range 0.1 – 1000W/m^2)

EC Units: Choose between uS/cm2 and TDS (ppm.) When in TDS mode, select the conversion factor that is appropriate for your requirements; the three standard conversion factors are available: 0.5, 0.64 and 0.7.

EC ATC: The EC has a standard automatic temperature correction (ATC) factor of 2.14%/°C which is standard for NaCl solutions. This value may be modified if a customized ATC factor is desired.

Dosing Units: Choose between the standard volumetric mL dose unit or a time-based unit (seconds). When in volumetric mode, set the flow rate value to match the flow rate of the dosing pumps.

Flow Rate: Flow rate (mL/Min) of dosing pumps. The controller uses this value to determine how long to operate the dosing pumps in order to dispense the proper amount of fluid.

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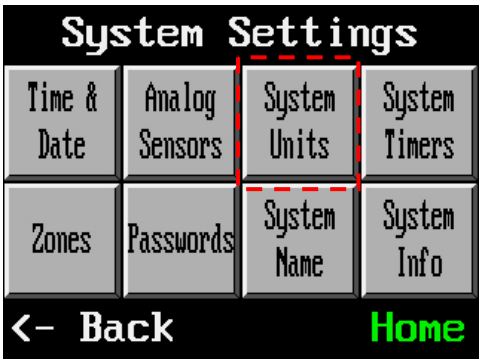
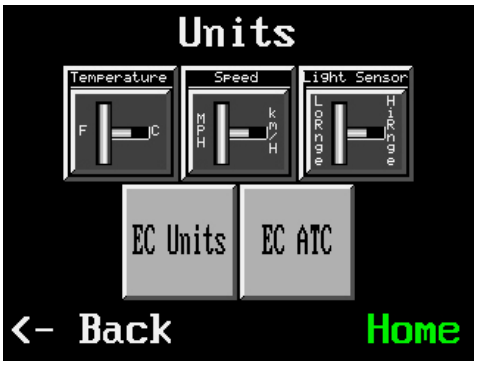
Touch Panel

Access the “System” menu from the “Main” menu.



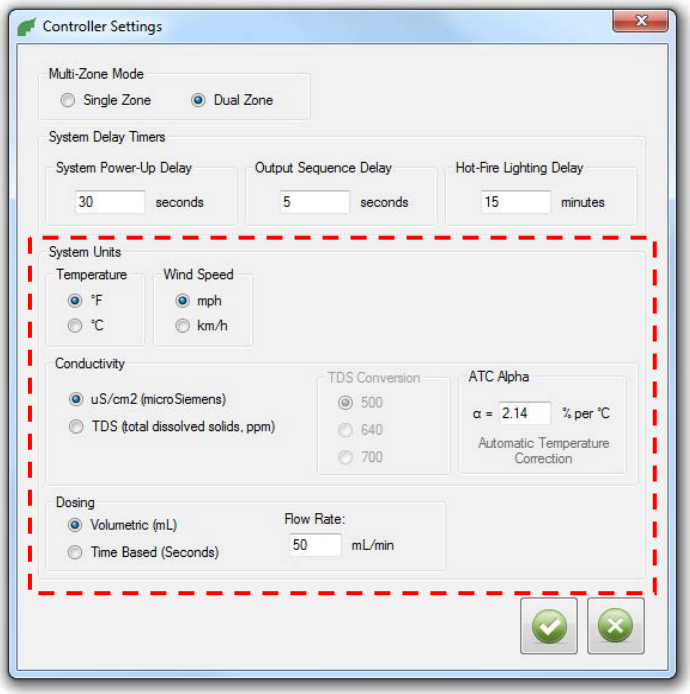
Press “System Units” to access the units menu. *System password required.*



Toggle units or select a sub-menu.

Software

The units settings are accessed in the “Controller -> System Settings” window.



System Timers

The GC-Pro has several built-in system timers:

System Start-up Delay: Delay timer that starts at power-up and disables all outputs until the time has elapsed. This can prevent immediate re-starting of outputs in a power glitch or allow time for sensor readings to stabilize before starting.

Output Sequence Delay: Delay time that separates outputs from starting at the same time. If multiple outputs are activated simultaneously (such as when changing between day/night or at system start-up) the controller will separate the starting of the outputs by the delay time. This reduces surges in the electrical loading.

Hot-Fire Delay: The outputs assigned to the lighting controls are monitored by the controller; if they turn off automatically, manually, or if the power is interrupted, the controller will prevent them from operating until the hot-fire delay time has elapsed.

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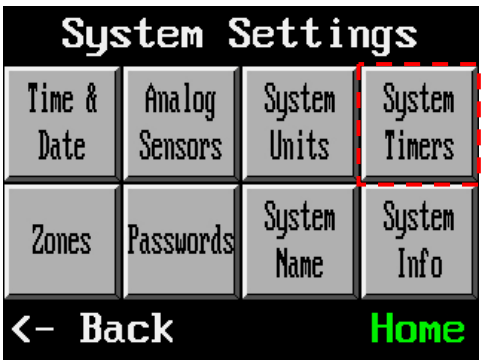
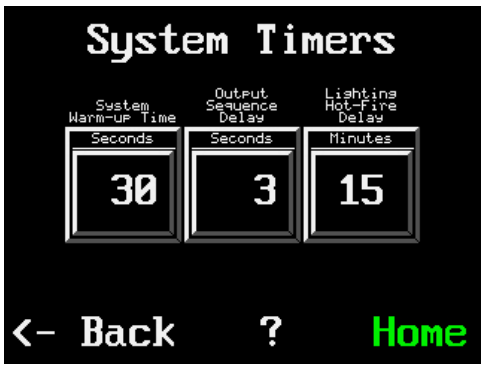
Touch Panel



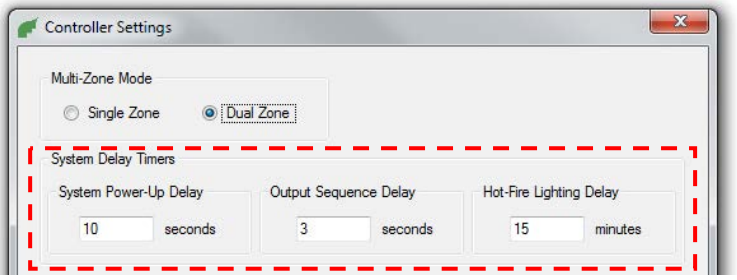
Press “System Timers” to view the system timers menu.



Select a system timer to modify the settings.

Software

The zone settings are located in the “Controller Settings” window.

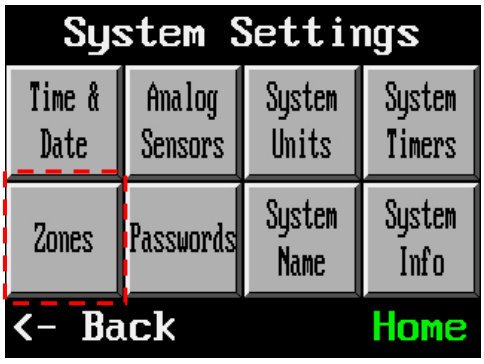


Zones

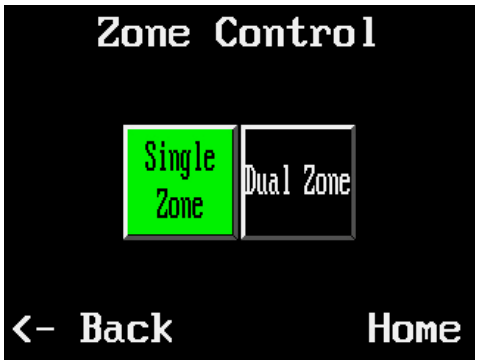
The GC-Pro can monitor sensors in two different zones (two greenhouses or rooms.) To operate the system with two zones, place the controller into ‘dual-zone’ mode.

Each control function has a setting for “Zone” number (0 defaults to zone 1.) To setup a control function to operate on the sensor readings and day/night status of zone 2, enter “2” for the zone number.

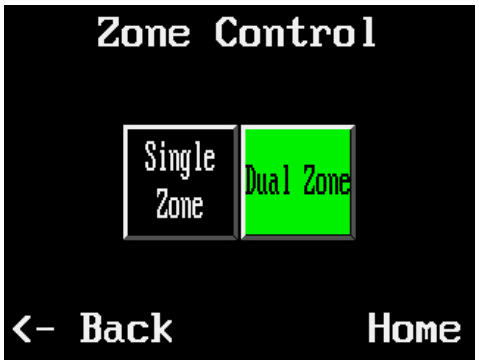
Touch Panel



Press “Zones” to change the controller zone mode.



Single zone mode displays only a single home screen and will not show zone 2 controls functions.



Dual zone mode will display a button to switch between home screens both zones will be displayed in the controls.

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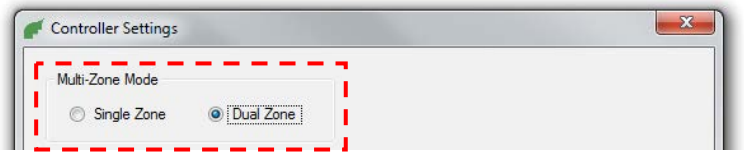
Software

The zone settings are located in the “Controller Settings” window.



System and User Passwords

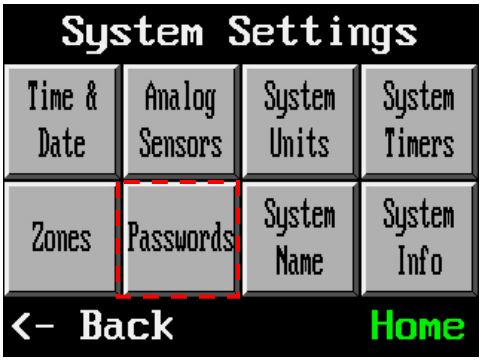
The controller has a system (administrator) password and four (4) operator (user) passwords. The operators have access to the controls functions necessary for day to day operations including temperature and timer settings, etc. The administrator has access to all areas of the controller including the output assignments, zone control, sensor mapping, etc.

The controller logs the last 10 user login entries with time and date stamps. The administrator can retrieve and view this log via the PC software at any time.

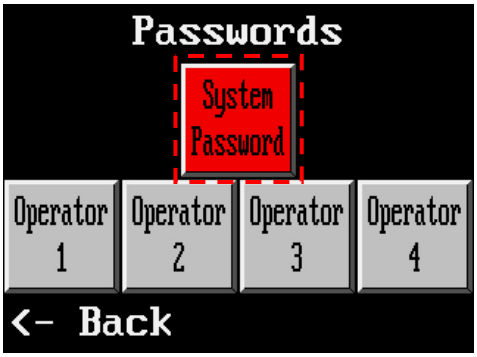
Setting the Passwords

Touch Panel

The system settings menu is accessed from the “Main” menu.



1. From the System Settings menu press “Passwords” button.
(Must be logged in as System admin.)



2. Press the pin number button and enter the desired 1 to 4 digit pin number. The pin number is shown in the button.
Set to 0 to clear the password.

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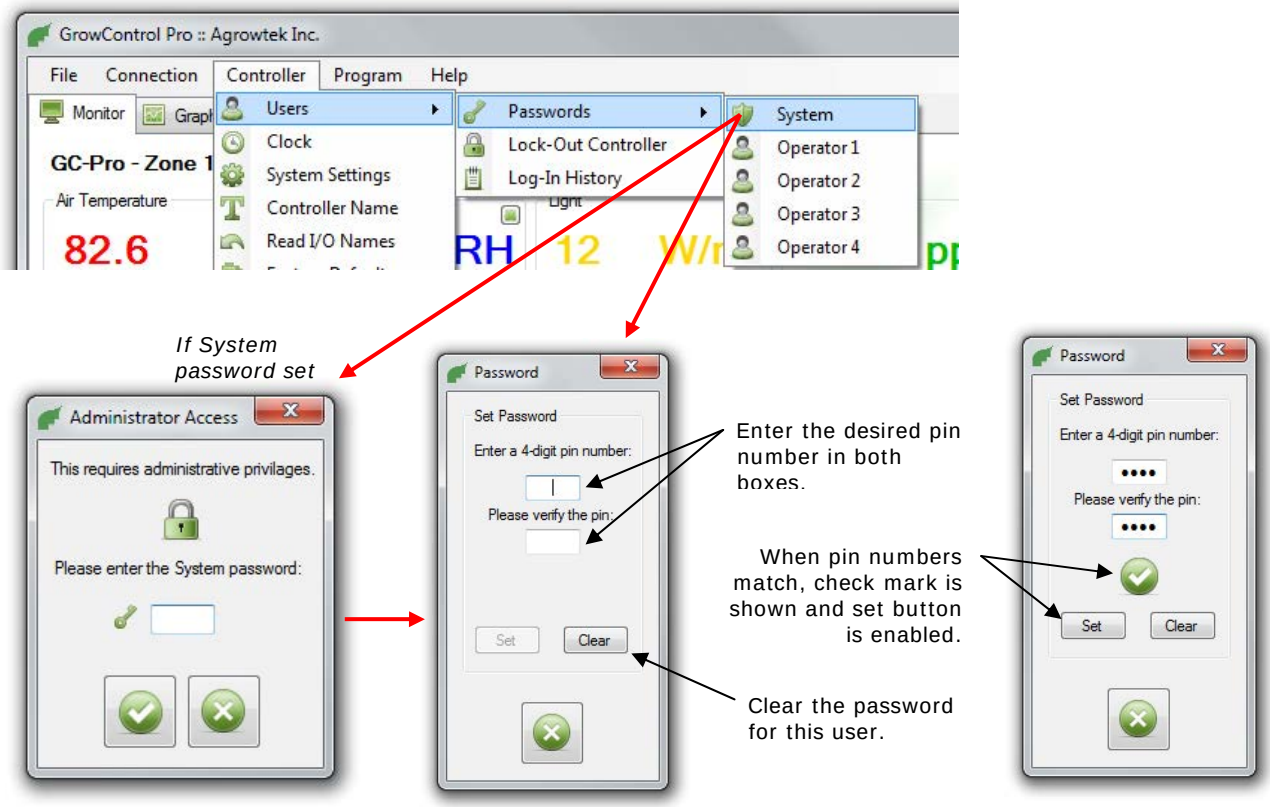
Software

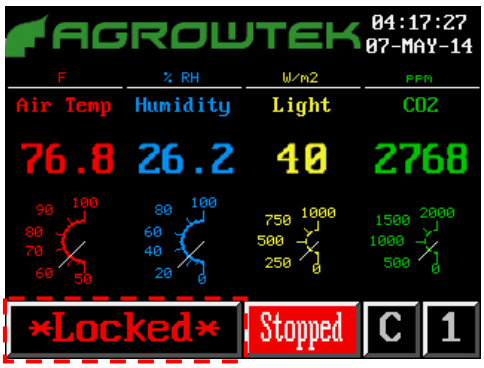
Navigate to “Controller -> Users -> Passwords” and select the user you wish to set or change a password for.



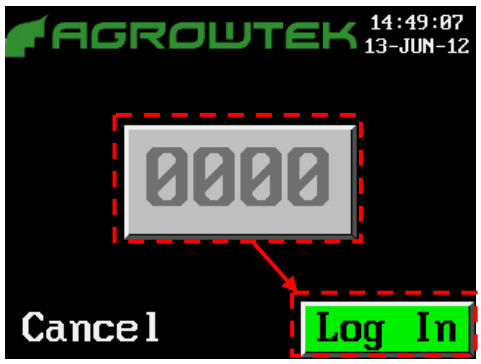
Logging-In

Touch Panel

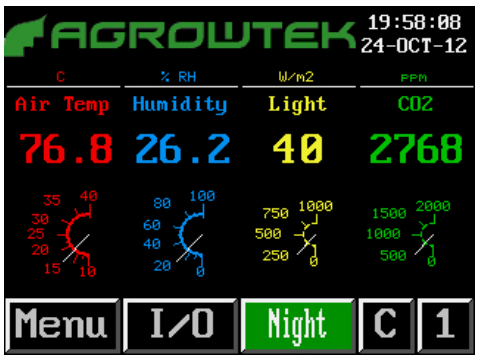
Once the controller has passwords setup on it, the system can be “logged out” so that it is inaccessible to un-authorized users. When logged out, the controller screen is locked. Only the sleep button and login buttons are usable.



1.The controller is logged out. Press Log-In to access to login screen.



2. Press the pin number button (0000) to enter your pin number. If a correct pin number is entered, the “Log In” button will appear; press it to log in.



3. User now has access to menus and graphical trending.

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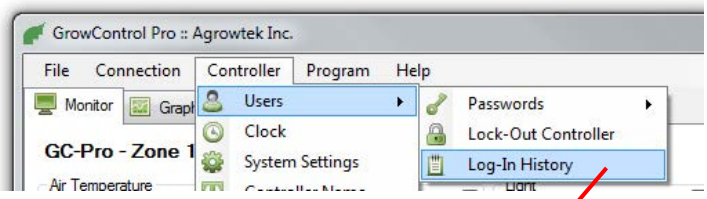
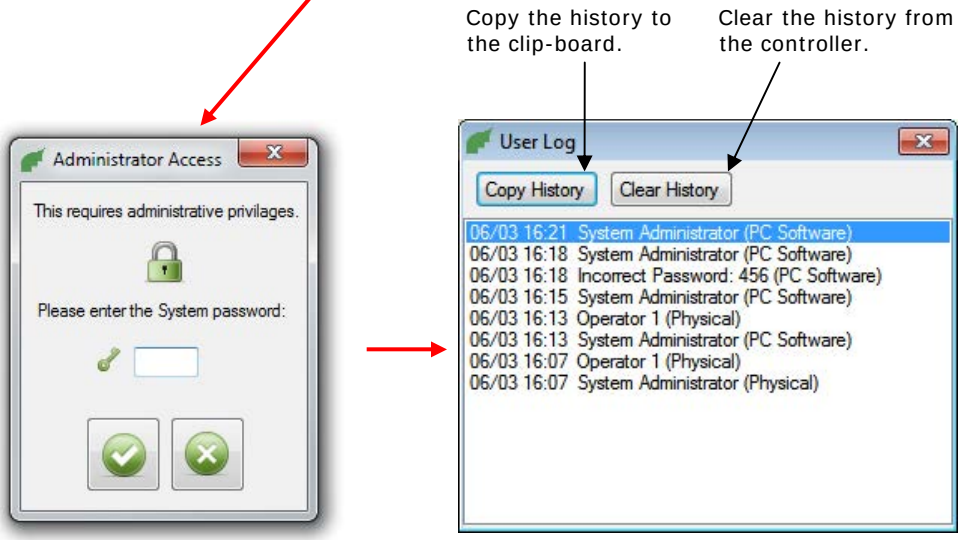
Software

When connecting to the controller via the PC software, you will be prompted to enter a password (if operator passwords are set.)
No connection will be allowed without a matching operator or system password.

All log-in attempts are logged by the controller including incorrect attempts. The controller will store the last 10 logins, the time and date, and whether the login was local or at the controller screen.

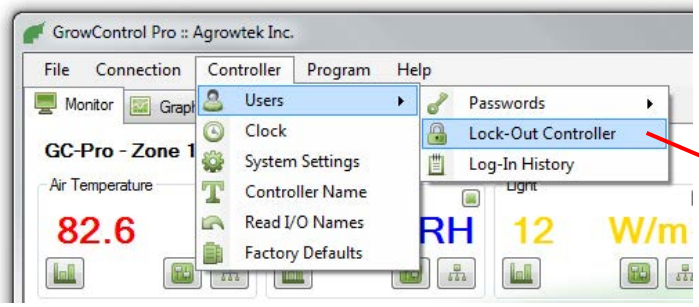
To access the login history, navigate to "Controller -> Users -> Log-in History."

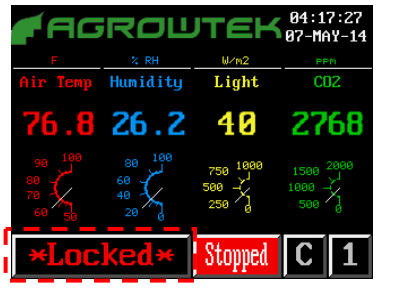




Locking the Controller from the Software

If a user has left the controller logged in by accident, or if the system administrator wishes to banish a user from the controller, the controller can be locked-out (logged-out) remotely from the PC software.





Controller screen will be logged out.

To banish a user:

1. Change the user's password (only administrator can do this.)
2. Lock out the controller.
3. The controller is now locked out and the user will not be able to re-gain access without a correct password.

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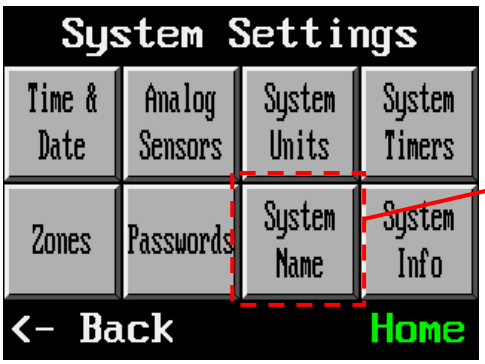
System Name

Each controller in your facility can be named so that it can be identified from a remote connection and so that log files, configuration files and other information specific to each controller can be easily tracked an managed. If more than one controller is connected on your network, then each controller should have a unique name.

Touch Panel

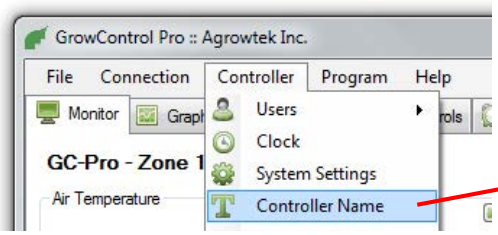


1. From the System Settings menu press the “System Name” button.

2. Press the name button to enter a name for the controller.

Software

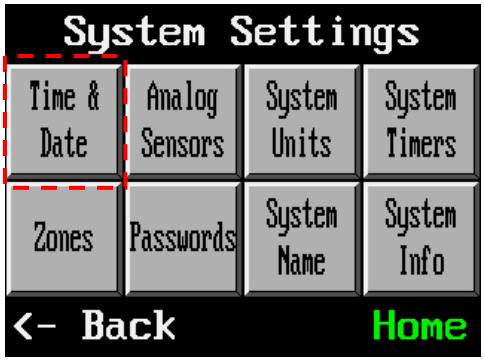
Select “Controller -> Controller Name” from the top menu strip to change the controller’s name.

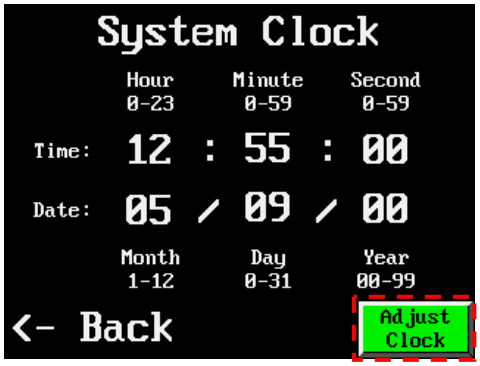


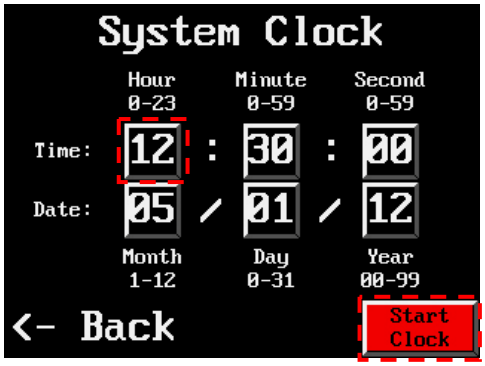
Setting the Time & Date

The GC-Pro has a precision internal clock and calendar with a built-in battery back up to maintain the clock and program settings in the event of a power interruption. The lighting and 24-hour based timers operate on the controller’s clock.

Touch Panel







Press “Time & Date” to change the controller’s time and date settings.

Press “Adjust Clock.”

Press the values to adjust with the numeric key pad. When the settings are correct, press “Start Clock” to set the time and date.

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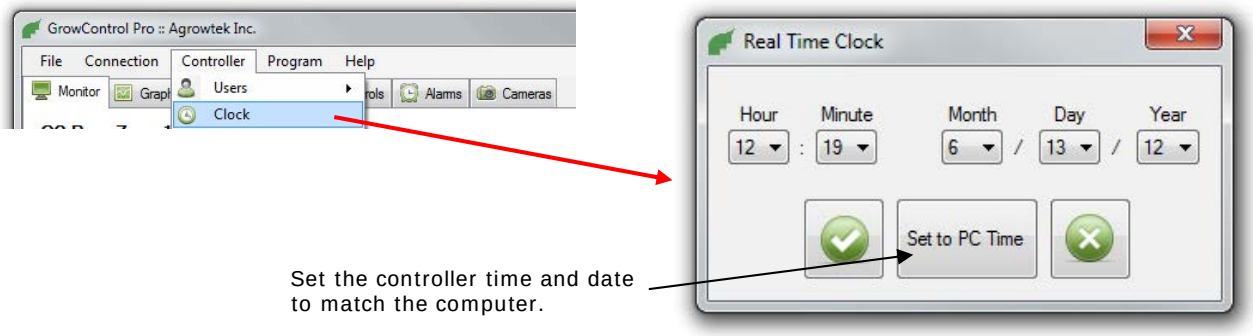
Software

Navigate to “Controller -> Clock,” or press the clock button at the bottom of the window.



Set the controller time and date to match the computer.

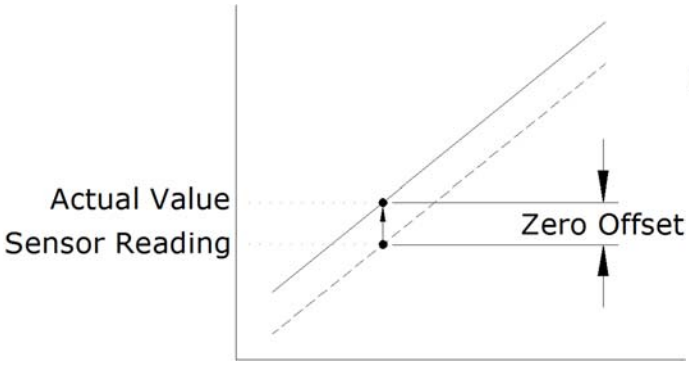
Sensor Calibration

The precision electronic sensors of the GC-Pro can be fully calibrated for “zero offset” and “span” (slope) if necessary.

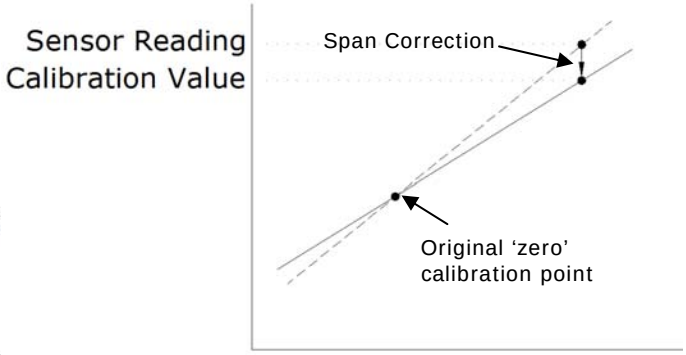
When calibrating a sensor, always perform the “Zero” calibration first. Performing a zero calibration automatically resets the span calibration to the factory default. Span calibrations can be performed successively without affecting the zero calibration.

> A ‘Zero’ calibration is typically all that is needed to correct a reading. Perform a ‘Span’ calibration only if necessary.

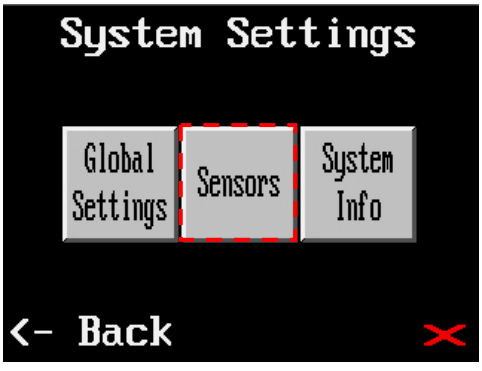
Zero calibration is a linear offset which shifts the sensor reading so that it matches the actual value.



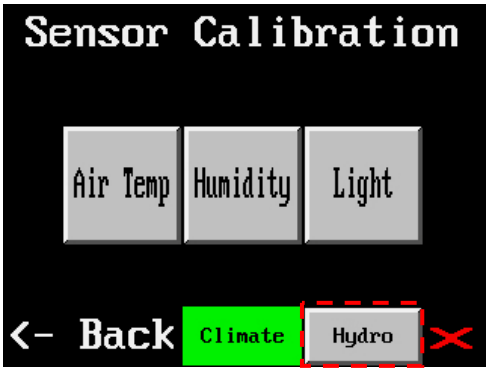
Span calibration adjusts the slope response of the reading to correct for any error as the reading gets further away from the zero calibration point.



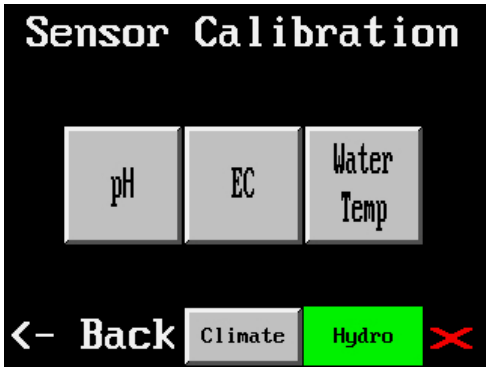
Touch Panel



Press “Analog Sensors” to enter the sensors menu. *System password req’d.*



Press “Hydro” to enter the calibration menu for hydroponics sensors.



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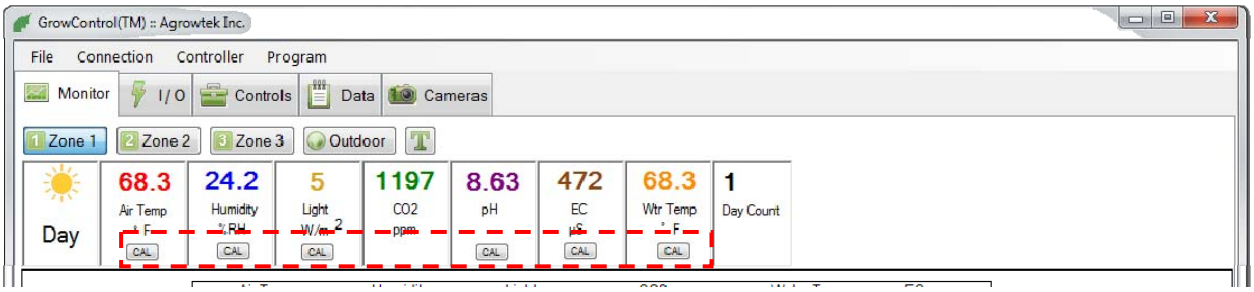
Software

The calibration settings are found in each sensor's display group. To open the calibration window, press the CAL button under the reading to calibrate.



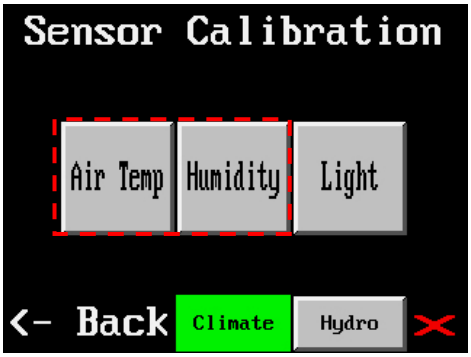
Temperature / Humidity Calibration

Temperature and humidity both have a standard "zero offset" calibration and a "span" calibration.

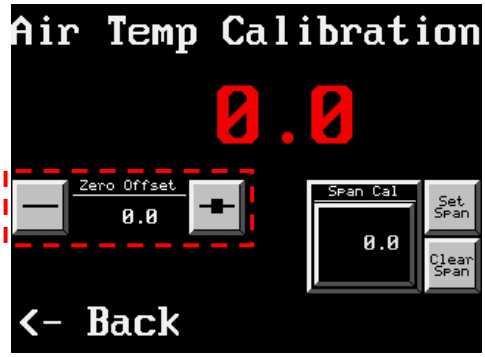
Note: It is advised to set the span calibration only if necessary.
If it is necessary, span calibration should be done with as much differential from the zero calibration point as possible.

Touch Panel

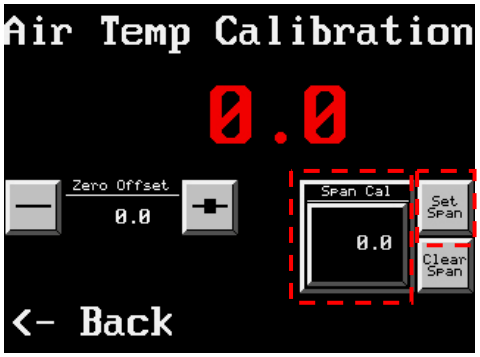
Access the sensor calibration menu from "Main Menu -> System -> Analog Sensors -> Sensor Cal."



Select a temperature or humidity sensor to calibrate.



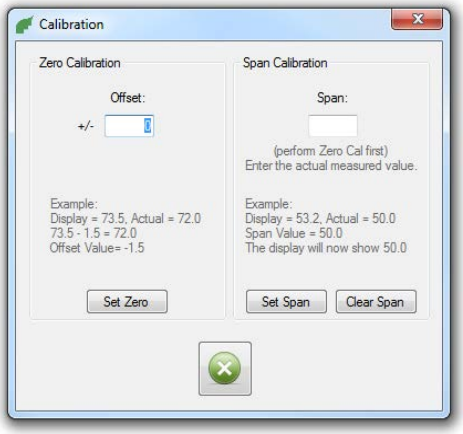
Zero: Press "Zero Offset" to enter a zero calibration with the key pad, or press "+/-" to increment by 0.1.



Span: First enter the actual value in "Span Cal" with the key pad, then press "Set Span" to set the span calibration. Press "Clear Span" to restore to factory default.

Software

Press the calibration button for the sensor to calibrate.



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pH Calibration

pH has a standard zero calibration which is performed at pH 7, and a span calibration which can be performed at any value (typically pH 4 or pH 10.)

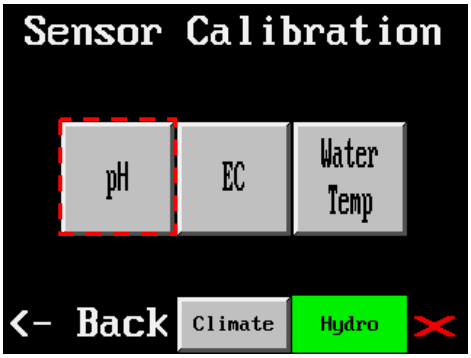
Automatic Temperature Correction (ATC)
The pH reading is automatically corrected for temperature.
The pH probe must be calibrated with the temperature probe in the calibration solution.

Calibration Procedure:

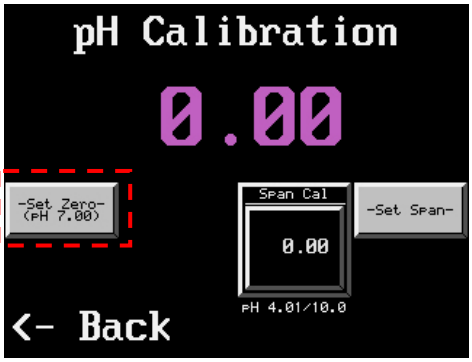
1. Clean and wipe the pH and temperature probes dry.
2. Place both probes into pH 7 calibration solution.
3. Allow the reading to stabilize and set the zero calibration. The reading should now display “7.00.”
4. Rinse and dry the pH and temperature probes.
5. Place both probes into pH 4 (or other) calibration solution.
6. Allow the reading to stabilize. Enter the pH of the calibration solution and set the span calibration.
7. Calibration is complete. The reading should display the pH of the calibration solution.

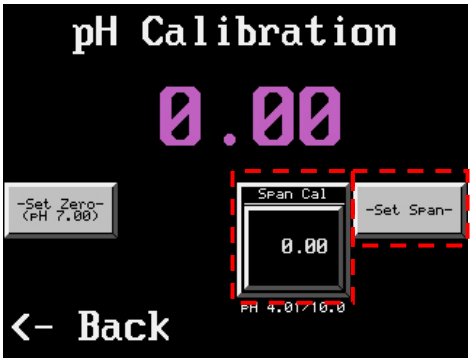
Touch Panel

Access the sensor calibration menu from “Main Menu -> System -> Analog Sensors -> Sensor Cal.”



Press “pH” to access the pH calibration.

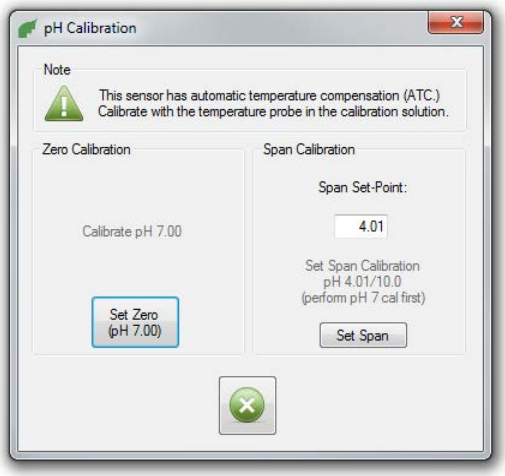




Span: To set the span calibration (pH 4/10) first, enter the calibration solution’s pH, then press “Set Span.”

Software

Press the calibration button for the pH sensor to calibrate.



Note: Always set the zero (pH 7) calibration before setting the span calibration.

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Conductivity Calibration

Conductivity calibration is performed with a zero calibration with the probe clean and dry, and with a single calibration solution of known conductivity.

> **Automatic Temperature Correction (ATC)**
> The conductivity reading is automatically corrected for temperature.
> The conductivity probe must be calibrated with the temperature probe in the calibration solution.

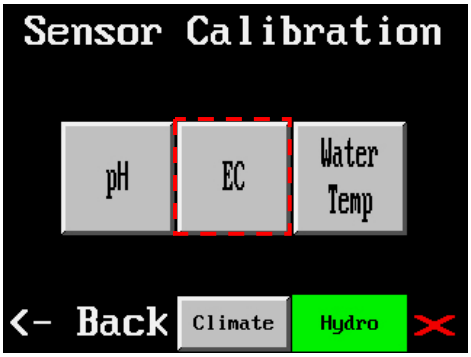
Calibration Procedure:

1. Clean and wipe the conductivity and temperature probes dry.
2. Ensure the conductivity sensor is completely dry and wait until the EC reading has stopped falling.
3. Once the readings are no longer falling, set the zero calibration.
4. Place both the conductivity and temperature probes into the calibration solution.
5. Wait for the reading to stabilize.
6. Enter the conductivity of the calibration solution into the span calibration value and set the span calibration.
7. The calibration is complete; the reading should display the conductivity of the calibration solution.

Note: Once the zero calibration is complete, it should not be necessary again. Re-calibration of the span is all that is necessary to maintain the accuracy of the sensor.

Touch Panel

Access the sensor calibration menu from “Main Menu -> System -> Analog Sensors -> Sensor Cal.”

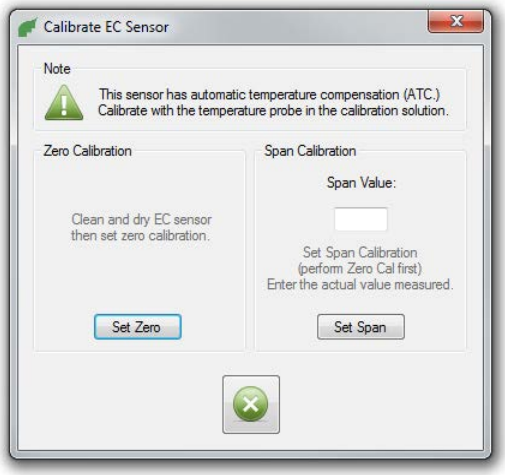


Press “EC” to access the conductivity calibration.

Zero: To set the zero, press “Set Zero” when the probe is clean and thoroughly dry.

Software

Press the calibration button for the conductivity sensor to calibrate.



Note: Always set the zero calibration before setting the span calibration.

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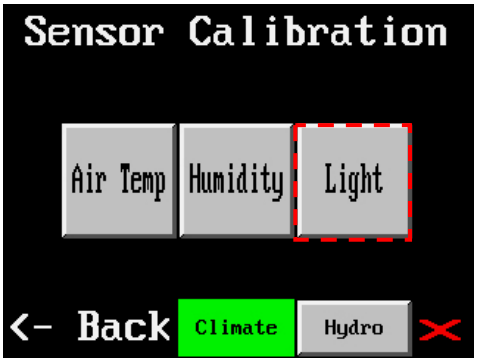
Light Sensor Calibration

The light sensor has a simple zero calibration which is designed to calibrate the sensor for darkness.

Before calibrating the light sensor zero, ensure the light sensor is in total darkness.

Touch Panel

Access the sensor calibration menu from “Main Menu -> System -> Analog Sensors -> Sensor Cal.”

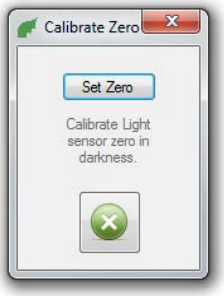


Press “Light” to calibrate the light sensor.

Zero: Press “Set Zero” to calibrate the light sensor zero in darkness.

Software

Press the calibration button for the light sensor to calibrate.



Software Features

The GC-Pro comes with free computer software which allows full remote monitoring and control of the GC-Pro, as well as some additional features, including:

- Data-logging to CSV files
- Graphical trending up to 48 hours
- Email alerts from alarms
- Video camera monitoring and image logging
- Upload/Download settings files to/from controllers

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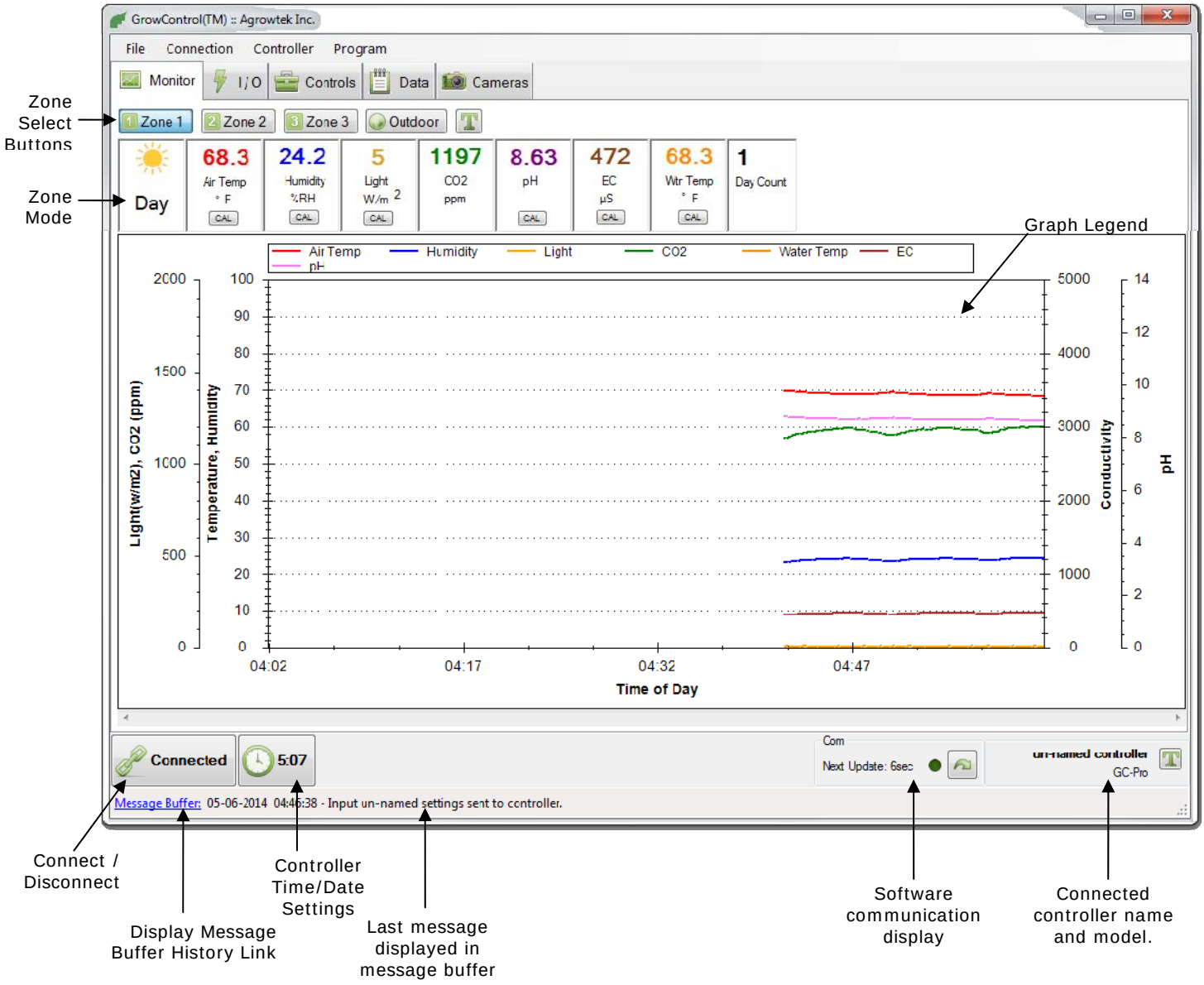
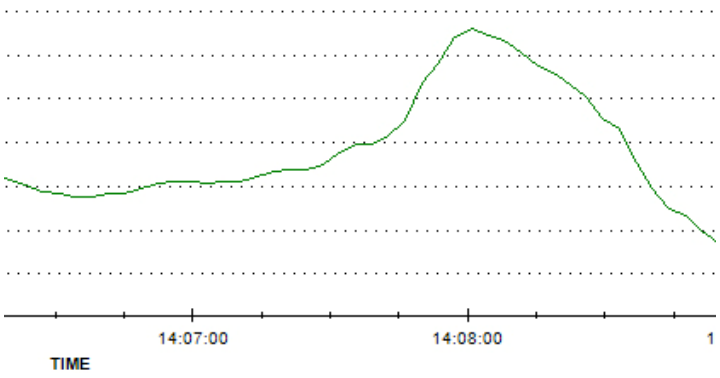
Monitoring

The sensor readings are displayed and graphed on each of the zone tabs. The graph displays up to 48 hours of history which can be zoomed by dragging a rectangle or rolling the scroll wheel. Use the right-click menu or buttons on the left to copy, print and save the graphs.





Note:
Drag a rectangle around a point of interest to **zoom-in** and get a closer look. Print or save a picture for reports.

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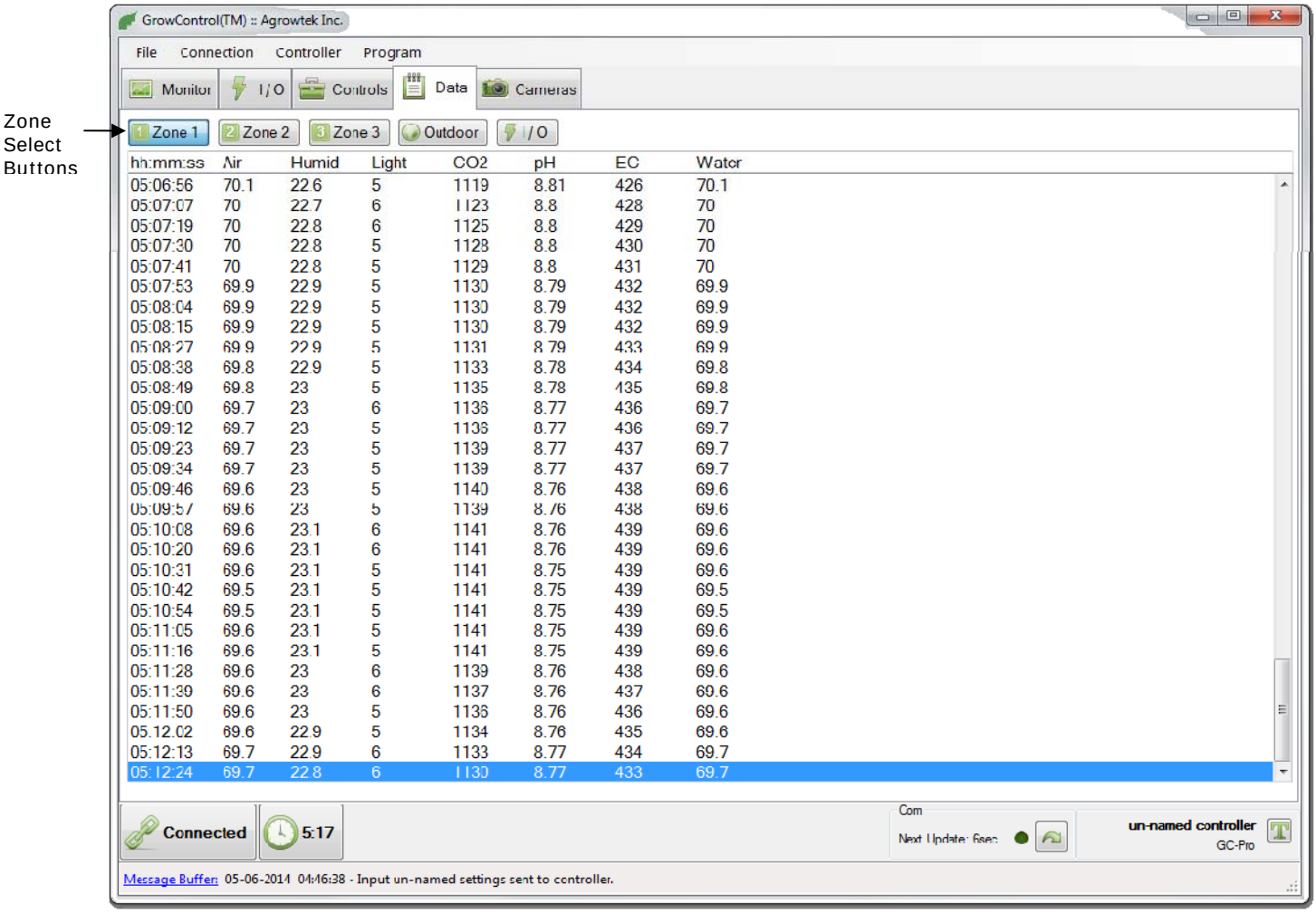
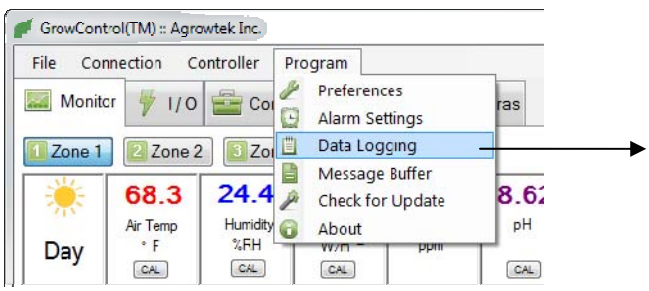
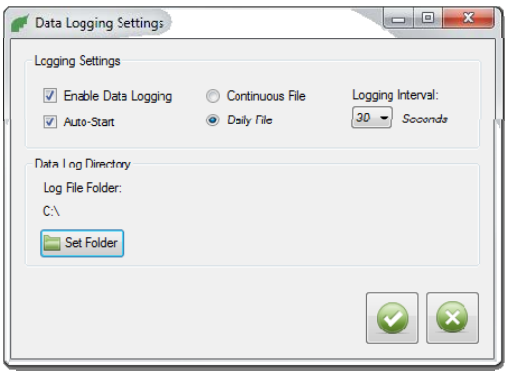
Data Logging Tab

Data logging saves a history of your sensor readings as well as the digital input and output stats' to a common .csv spreadsheet format. The program can start a new log file each day which is automatically named according to date, or all logging can be kept in one continuous file. A pre-view of the last 1024 lines logged is shown in the zone tabs.



To adjust the logging interval, logging location, etc. open Program -> Data Logging.





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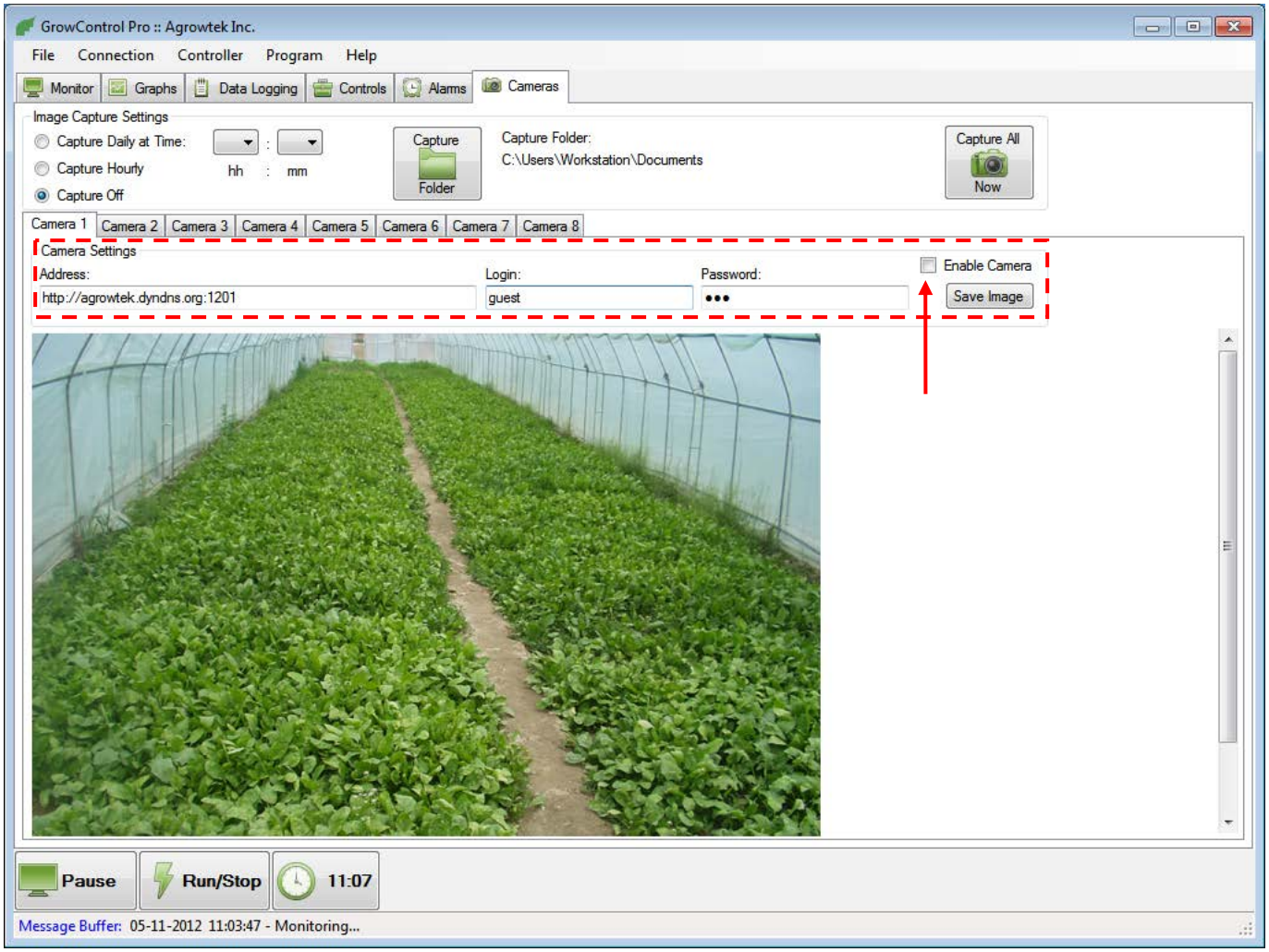
Cameras

The cameras tab allows monitoring up to 9 video cameras per program window. The software can capture images from the cameras hourly through out the day, or at a specific time each day. Coupled with the data logs, this allows a visual log as well. Photos are saved with their controller name, camera number, time and date in the selected “Capture Folder.”

Cameras are supplied with a set of setup instructions. When the cameras are properly configured, you can setup the cameras in the PC software.

1. Enter the local (or remote) address of the camera. This may be an IP address or web address starting with http.
2. Enter the user login and password information.
3. Check the “Enable Camera” box. The software will attempt a connection. If successful, it will begin monitoring the camera, updating as quickly as the hardware and internet connection(s) will allow.



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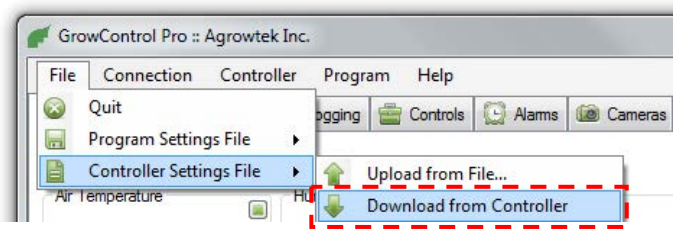
Controller Settings File Upload / Download

All of the settings in a GC-Pro can be downloaded and saved to an '.agk' file.

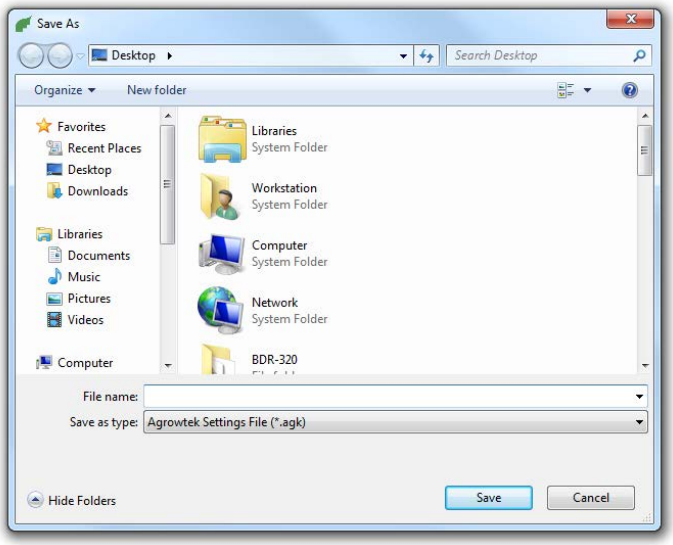
- Settings files can be uploaded to one or more controllers so that they all have the identical settings.
- Settings files can be uploaded after a firmware update to quickly restore all of the settings and calibration values.
- Download settings files and save your setup for each stage of growth.

Download a Settings File from Controller

1. Navigate to "File -> Controller Settings File -> Download from Controller."



2. Select a folder where you would like to save your settings file and enter a name for the file:



3. The controller will read all of the settings in the controller; this may take a minute. When it is complete, the wait window will disappear and the file will be saved to the location you selected.

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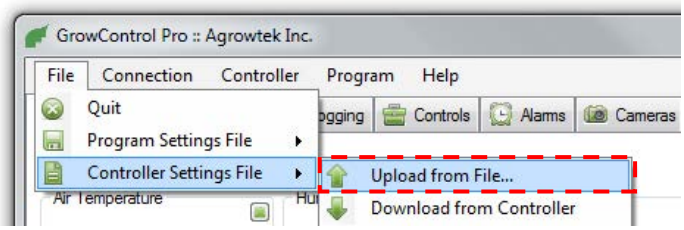
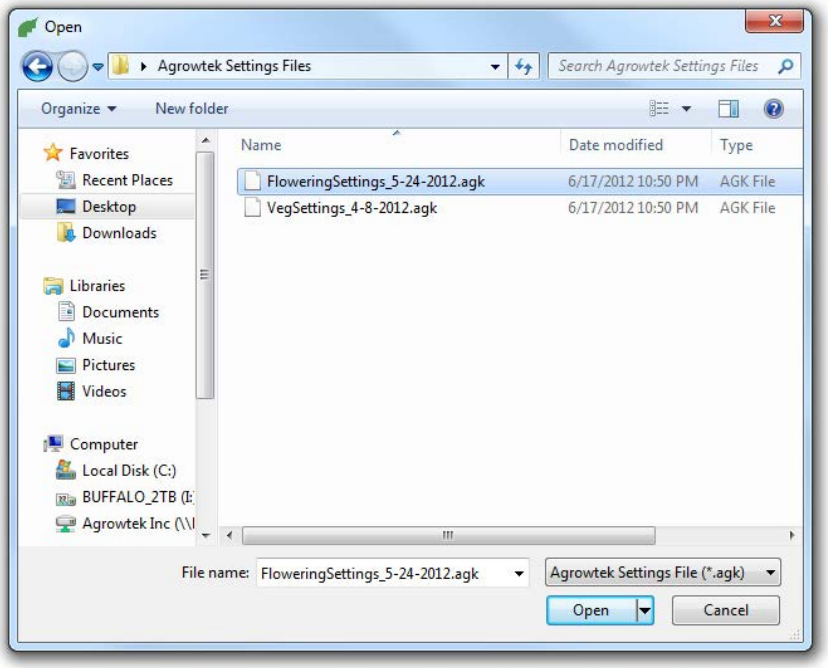
Upload a Settings File to Controller

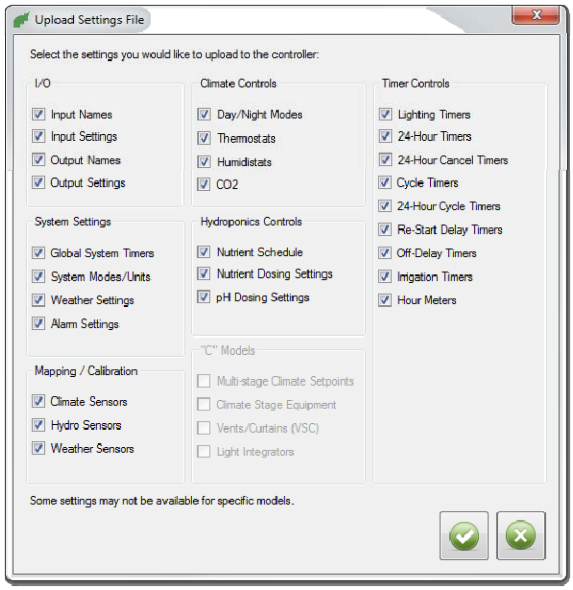
1. Navigate to “File -> Controller Settings File -> Upload from File…”



2. Select the settings file you would like to upload to the controller:



3. Select which parts of the settings file you would like uploaded to the controller.



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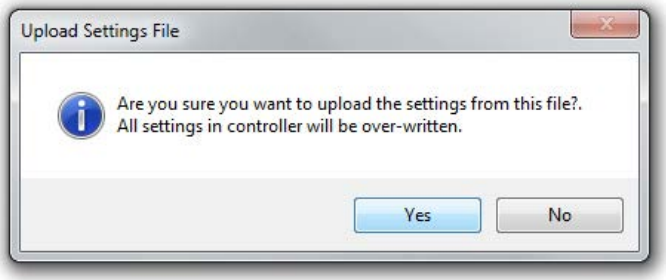
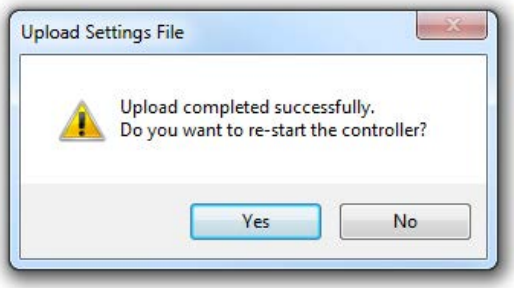
4. If the controller is running, select whether to stop it or leave it running.
It is recommended to stop the controller before uploading a settings file.

5. Verify that you want to upload the settings and you are aware that the settings in the controller will be over-written.



6. The controller will write the values to the controller that you selected; this may take a minute.

7. When the upload is complete, if the controller is stopped you will be asked if you want to re-start the controller.



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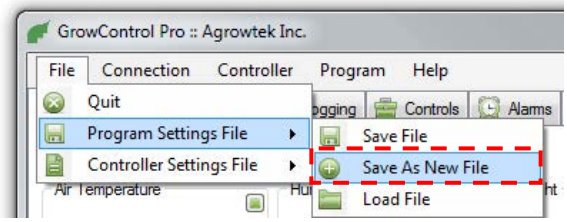
Connecting to Multiple Controllers

If there are multiple controllers to be monitored from one computer, they can either be connected to one at a time, or multiple copies of the program can be opened to monitor the controllers simultaneously. In either instance, a “Program Settings File” should be created for each controller to store the controller’s address, logging directories, etc.

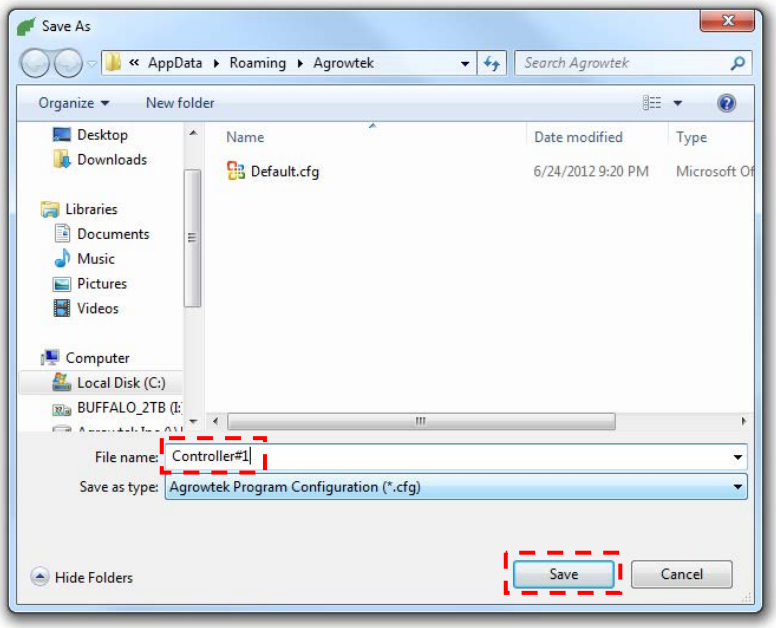
When multiple program settings files are available, the program will prompt the user to select which file they would like the program to open with. When opening multiple copies of the program, select the program settings file for each controller.

Saving a Program Settings Files for Each Controller

1. Connect to the first controller and navigate to “File -> Program Settings File -> Save As New File.”



2. The default directory will be displayed; the file must be saved here to be loaded by the program. Enter a name for the file and press “Save.”



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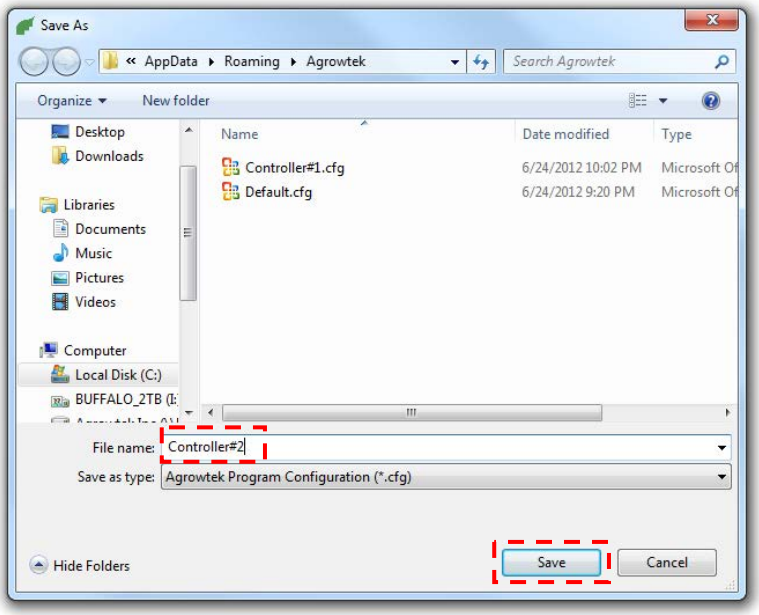
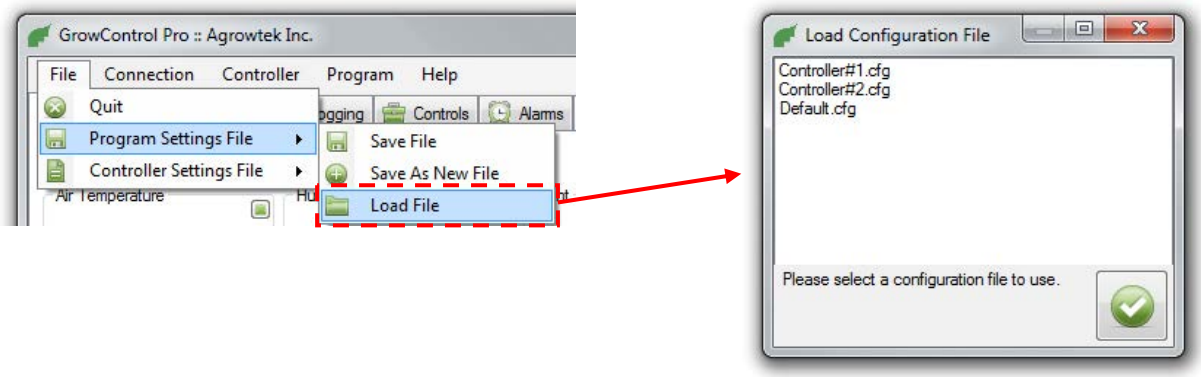
3. Select “Save As New File” again and save another file for your second controller (and so on.)



4. Load the file that was just saved for the second controller: “File -> Program Settings File -> Load File.” Select the file and press .



5. Change the data logging and camera logging directories if desired.

6. Adjust the Ethernet settings as required for the second unit and connect to it.

7. Ensure that the controller has a unique “Controller Name.” If there is no name set or multiple controllers share the same name, the data logging files may be written to the same file and the camera images may over-write each other. Files are named automatically with the controller name and date stamp.

Connect to Multiple Controllers

Once a configuration file has been created for each controller, the program will ask which it is to load when it opens.

1. Open a copy of the program for each controller you wish to connect to.
2. Select the program settings file for each controller.
3. The connection settings will be automatically loaded; connect to the controller(s.)

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Network Settings

Changing the IP address

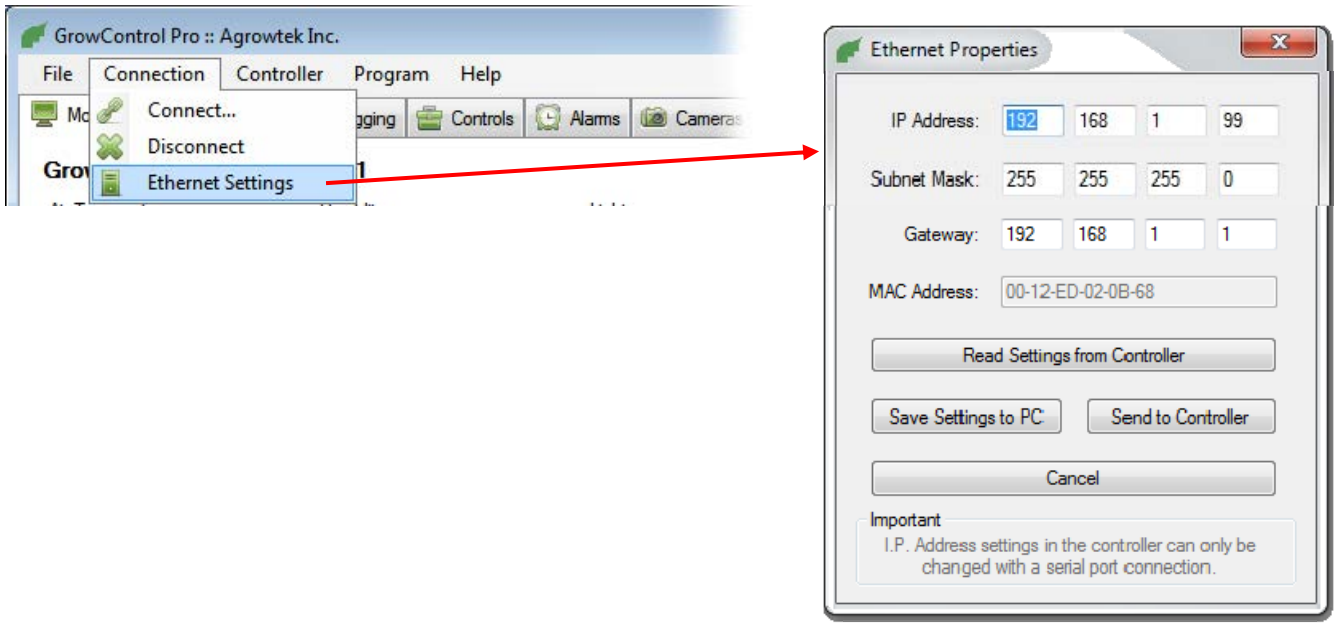
The default IP address as shipped is 192.168.1.99 and assumes a router gateway address of 192.168.1.1 and subnet mask of 255.255.255.0; these are defaults for many standard routers.

To determine the settings to use, log into your router and view the configuration for your network. You may also check the settings that a computer on the network is using to determine the gateway and subnet mask information.

> ***NOTE***
> Each controller must have it's own unique IP address which is not assigned to any other device on the network. The subnet mask and gateway must match that of the router that the controller is connected to.

Changing the Ethernet Settings

1. To change the IP address or Ethernet settings of the controller, you must first connect to the controller via the standard serial port.
2. Next, open the "Ethernet Settings" window from the "Connection" menu in the top menu strip. The current settings as loaded from the configuration file on the computer are shown (these may not match the settings in the controller.)
3. Update the values from the controller to determine what the settings are in the controller; press the "Read Settings from Controller" button. Modify the settings as required and then press "Send to Controller." This will send the settings to the controller and update the configuration file saved to the PC for future use.
4. Cycle the power to the controller to set the new Ethernet settings.



> ***NOTE***
> It is recommended to assign static IP addresses in the router so that the router does not automatically assign the controller's IP to another device.

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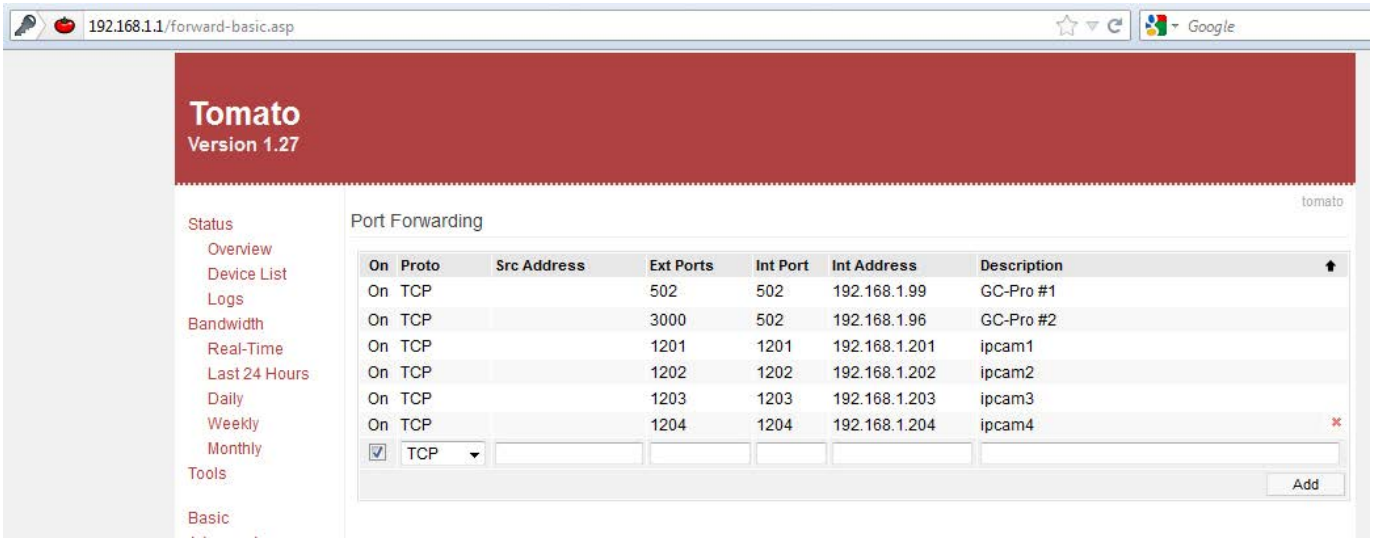
Port Forwarding

In order to access the controller from the internet, or outide of the local area network, the network router port forwarding must be configured. The GC-Pro controller requires TCP port 502 to be forwarded to the IP addresses of the controllers on the network.

The sample below shows two GC-Pro controllers on one network; “GC-Pro #1” with IP address 192.168.1.99 and “GC-Pro #2” with address 192.168.1.96.

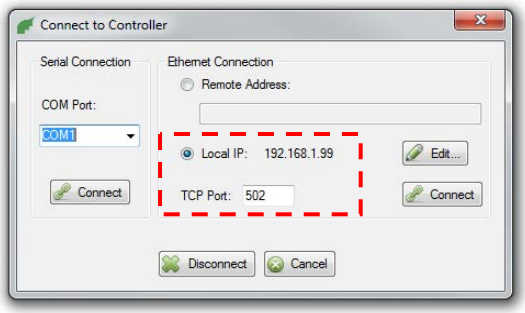
Both controllers have TCP port 502 forwarded to them from the router (internal port.)

The “External Port” can be left as 502 as shown with “GC-Pro #1,” or can be modified to any port number desired as shown with “GC-Pro #2” set to external port 3000.

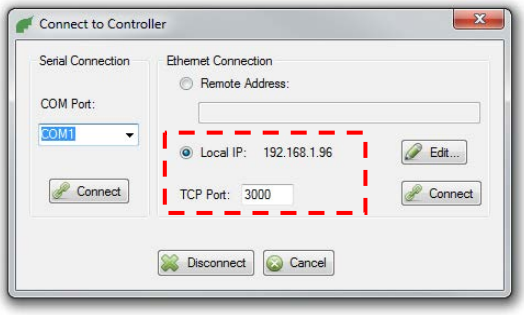


Settings to connect to each controller:

“GC-Pro #1” Ethernet Settings



“GC-Pro #2” Ethernet Settings



Dynamic DNS Forwarding

If your internet service is provided with a static IP address, your controller can be acessed by simply entering your IP address into the ‘remote address’ field. If you have a dynamic IP address (like most internet connections,) you will need to use a dynamic dns service to generate a web address for your dynamic IP; Agrowtek recommends **DynDNS.org**. Follow the instructions on the dynamic dns provider’s website.

1. Enter the URL web address from your DNS service into the ‘remote address’ field.
For example: greengrower.dyndns.org (“greengrower” is the dyndns user name.)
2. Make sure the port number is correct; 502 is default. (Port forwarding must be properly setup in your router.)
3. Press “Connect” (in the Ethernet connection box.)

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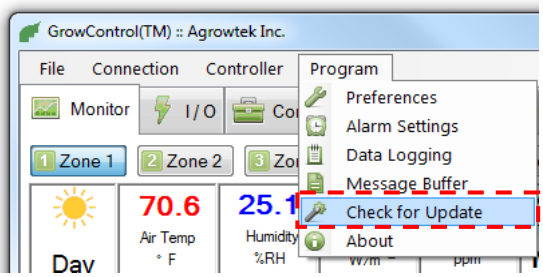
Software Updates

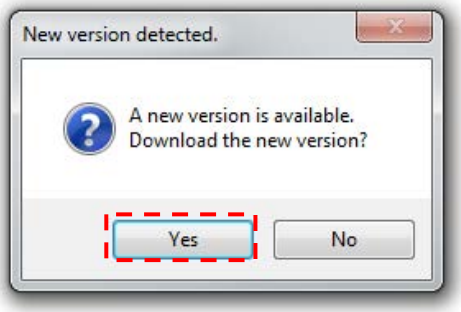
To check Agrowtek's website for the latest software updates, navigate to "Help -> Check for Updates…"

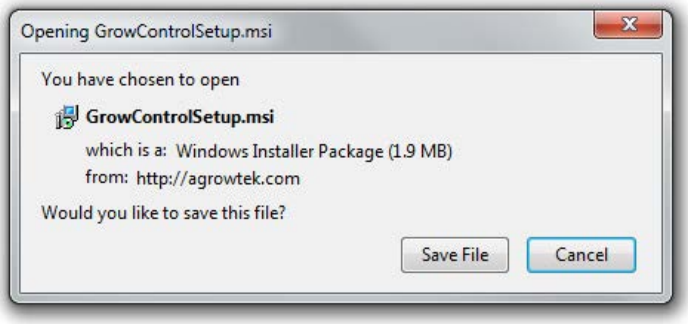
Note: An internet connection is required to check for updates.

1. Click "Program -> Check for Update" The software will check the website to see if you have the latest version installed.



2. If your software is out of date, you will be promted to download the latest version. Save the file to your computer.

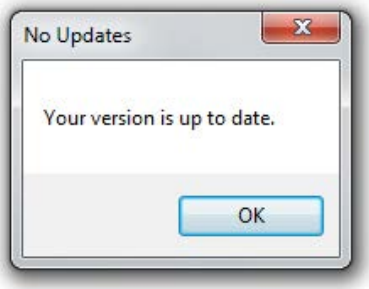




3. When the download completes, open the file and follow the prompts to install the new version.

Note: It is not necessary to remove the old version first.

4. If there are no updates, your version is up to date.



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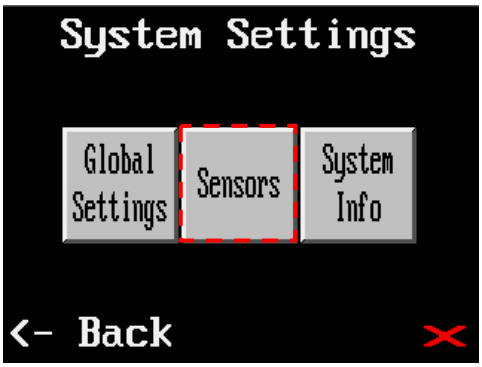
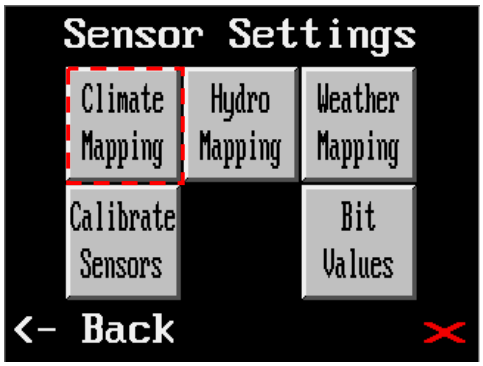
Sensor Mapping

Sensors must be "mapped" according to how they are connected to the ports on the controller. See the "Installation Manual" guide or the product manuals for the available sensors for suggestions on how to map the sensors.

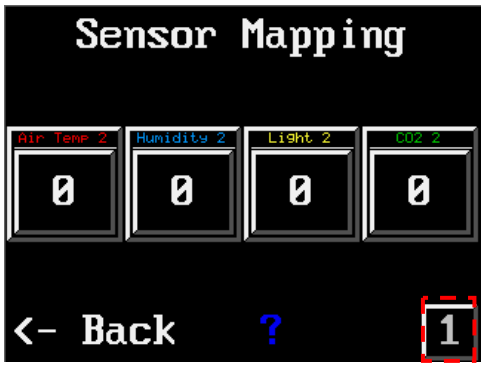
To access the sensor mapping, select Menu > Sensors and then select the type of sensor to map.



Press “Sensors” button to access the sensors settings menu.



Select "Climate Mapping" to configure climate sensor connections.



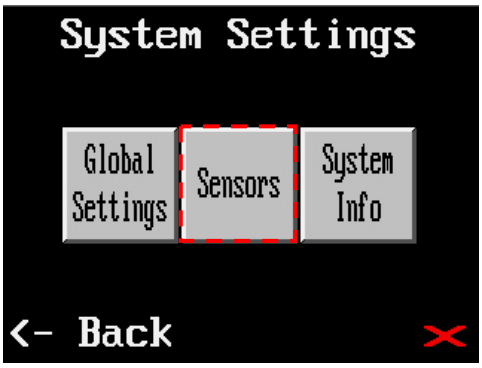
Select the correct zone number, then set the mapping numbers according to the instructions and the ports as connected.

Sharing a Weather Station

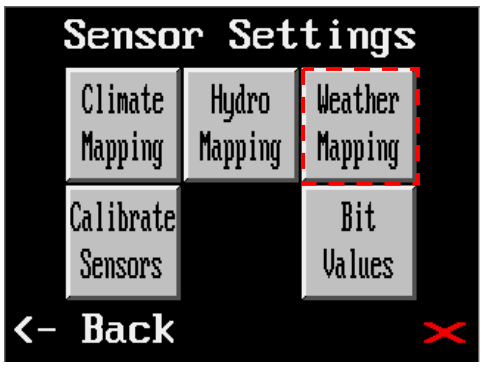
Multiple controllers can share a single weather station provided:

1. All of the controllers are equipped with the Ethernet port.
2. All of the controllers are connected to the same Ethernet network.
3. The controller with the weather station is set to the default factory IP address (192.168.1.99)

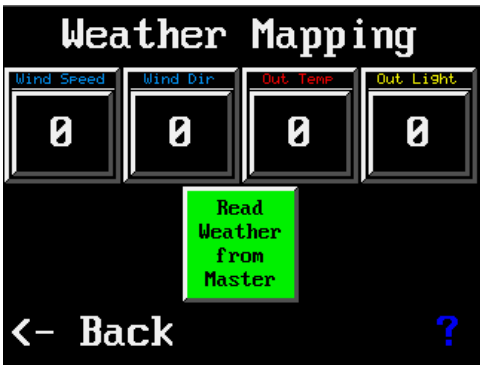
If all of the above conditions are met, then multiple controllers may poll the controller with the weather station to read the weather data from the weather station.



Press “Sensors” button to access the sensors settings menu.



Select "Weather Mapping."



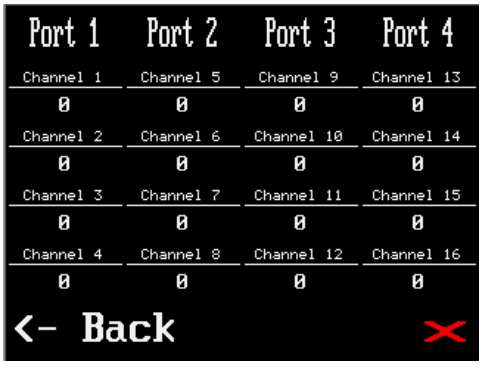
Press the buttons so it shows "read weather from master."

Checking Sensor Port Bit Values

"Bit Values" allow the user to observe the "raw" data entering each sensor port for diagnostic purposes. Each port contains four sensor value channels which have a valid of 0 to 4095.

Channels with all values = 0 are indicative of no connection.
Channels with a value of 4095 are indicative of a sensor pegged at the maximum value, or in a faulty condition.

Use the bit values and channels to check for faulty connections and correct sensor mapping.



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Setup Tips

Hi-Temperature Limits
Temperature limit functions are ideal for several situations:

- The CO2 output can be disabled just before ventilation fans are set to operate; this way CO2 can be turned off before ventilation occurs instead of simply when ventilation occurs.
- Low temperature limits can be used as fail-safes against run-away chillers and air-conditioners, or prevent induction of outdoor air temperatures which are too cold and may shock plants.
- Vents and roll-up curtains can be set to a maximum position when outdoor temperatures are below a limit.
- Shades can be closed during the day and opened at night if the temperature rises above a limit.

Note: Lights functions have a built-in high-temperature shut-down. When the "High Air Temp" alarm limit is reached, the lights outputs for the respective zone will be disabled until the alarm is clear and for no less than the hot-fire delay time.

Hi-Humidity Limits disable an output (or sets a VSC maximum % open) when the humidity rises above the "Limit" set point. When the humidity falls by the "Deadband" amount below the set-point, the output is allowed back on or the VSC is allowed to open further if required.

The CO2 output can be disabled just before ventilation fans are set to operate based on humidistats; this way CO2 can be turned off before ventilation occurs (instead of simply when ventilation occurs; see "Output Cancels.")

CO2 Setup

See "Interrupts" under "Output Controls" for disabling CO_2 output when ventilation output(s) turn on. Also see temperature limit functions to cancel CO2 in anticipation of ventilation or to prevent combustion generators from operating above a set limit temperature.

Control Hierarchy

Control functions have an order of operations. The following list describes the highest priority down to the lowest priority functions.

A high priority function will override a lower priority function if both functions are assigned to the same output.

Priority:

1. Output Cancel functions
2. Input functions 8 to 1
3. Restart Delay Timers 4 to 1
4. VSC functions (C Models)
5. 24 Hour Cancel Timers 4 to 1
6. Thermostats 8 to 5
7. Humidistats 8 to 5
8. Thermostats 4 to 1
9. Humidistats 4 to 1
10. Light Integrators 4 to 1
11. Irrigation Timers
12. On-Delay Timers 4 to 1
13. 24-Hour Cycle Timers 4 to 1
14. 24-Hour Timers 8 to 1
15. Cycle Timers 8 to 1
16. Lights Timer
17. CO2
18. Multi-Stage Temp/RH Functions (C Model)

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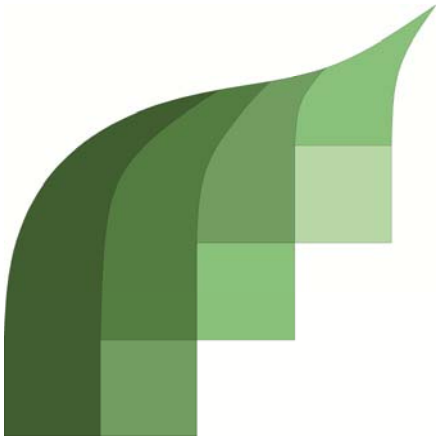

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