



GrowControl™ GC-Pro

Cultivation Control System



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.

Install in accordance with the installation manual (provided separately.)

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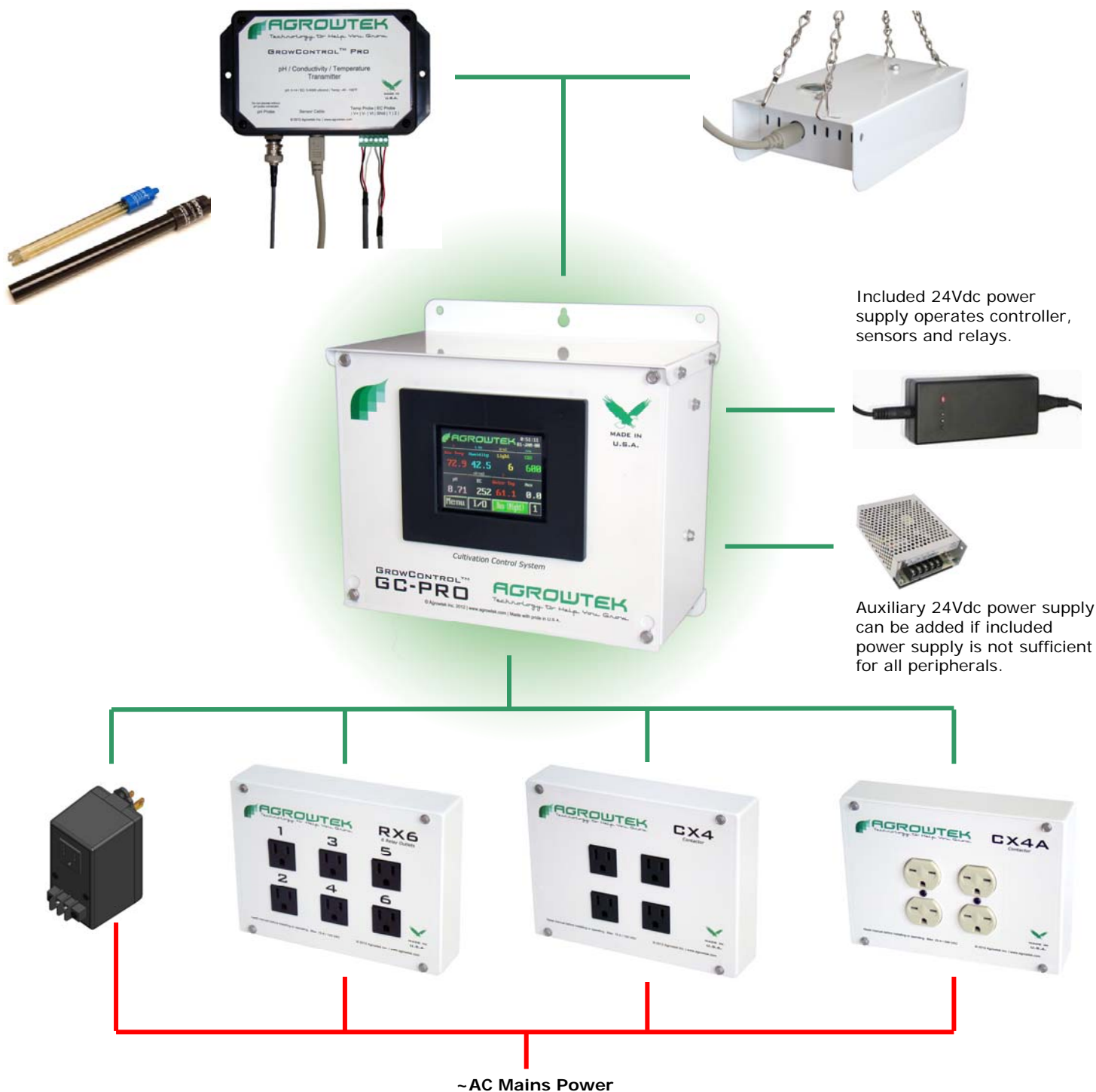
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GrowControl™ GC-Pro Platform

GrowControl™ GC-Pro is a modular control system designed to be fully customizable to nearly any growing control requirements. The core of the system is the GC-Pro controller itself where all of the settings are stored and control operations take place. The GC-Pro 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, turns equipment on or off via the controller's "outputs." The controller and its outputs are low-voltage wet contacts (24Vdc) designed to be connected to Agrowtek's RX/CX relays to switch AC mains power to equipment. Outputs can also be wired to custom contactor panels with 24Vdc pilot relays to switch equipment power.



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.

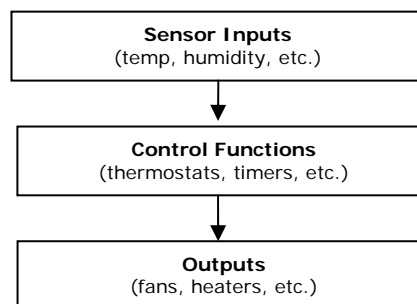
Analog sensors are those that have a variable value such as temperature, humidity, etc.

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.

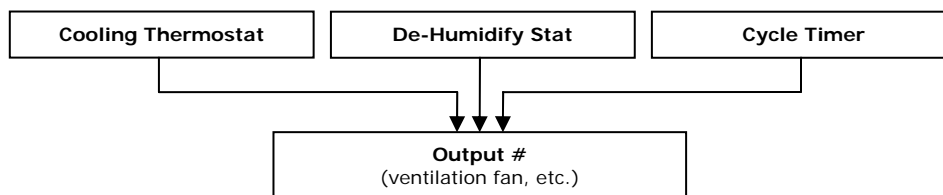
Zones are separate environments that are independently monitored and controlled with sensors in each zone.



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.



AgrowTouch™ Touch Screen

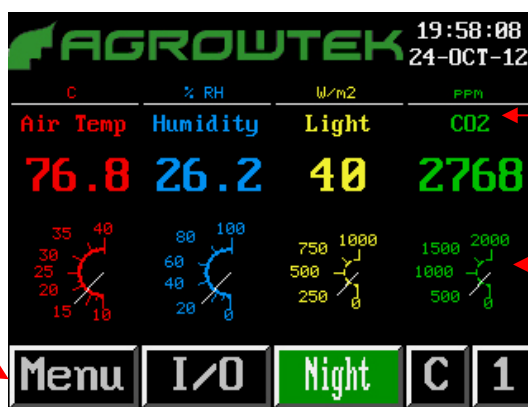
Home Screen

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.

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 anywhere on the screen.



Time & Date
Press here to activate screen saver

Reading Heading
Press here to view graphing history

Sensor reading value

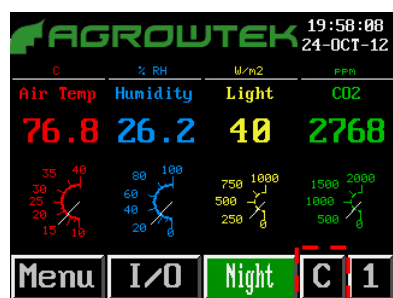
Graphical meter display

Change display to next zone

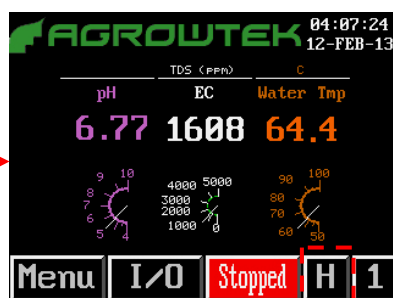
Inputs & Outputs Status / controls

Controller Run Mode status and start/stop menu

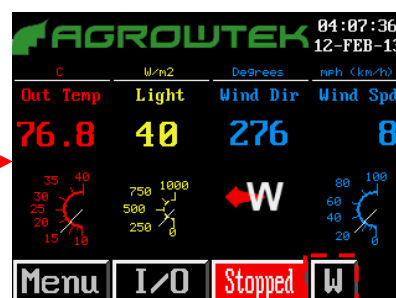
Change display between climate, hydro, weather and other sensor displays.



Indoor climate sensor display.



Hydroponics sensor display.



Outdoor weather sensor display.

Key Pads

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

Numeric Keypad

7	8	9	Day 0.0 MINIMUM -40.0 MAXIMUM 155.0 CURRENT 0.0
4	5	6	
1	2	3	
0	Clear		
+/-			
			Cancel Enter

Acceptable range

Current Setting

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

Alpha-numeric Keypad

						CAN	ENT
A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X
Y	Z	1	2	3	4	CAP	SP
5	6	7	8	9	0	DEL	CLR

Cancel

Enter

Space

Clear

Delete / Backspace

Press the 'CAP' key to change between upper and lower case, and to display special characters.

Decimal Values

There is no decimal point key on the touch screen. 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**

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://www.agrowtek.com/download/GrowControlSetup.msi](http://www.agrowtek.com/download/GrowControlSetup.msi)



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



Running the Software

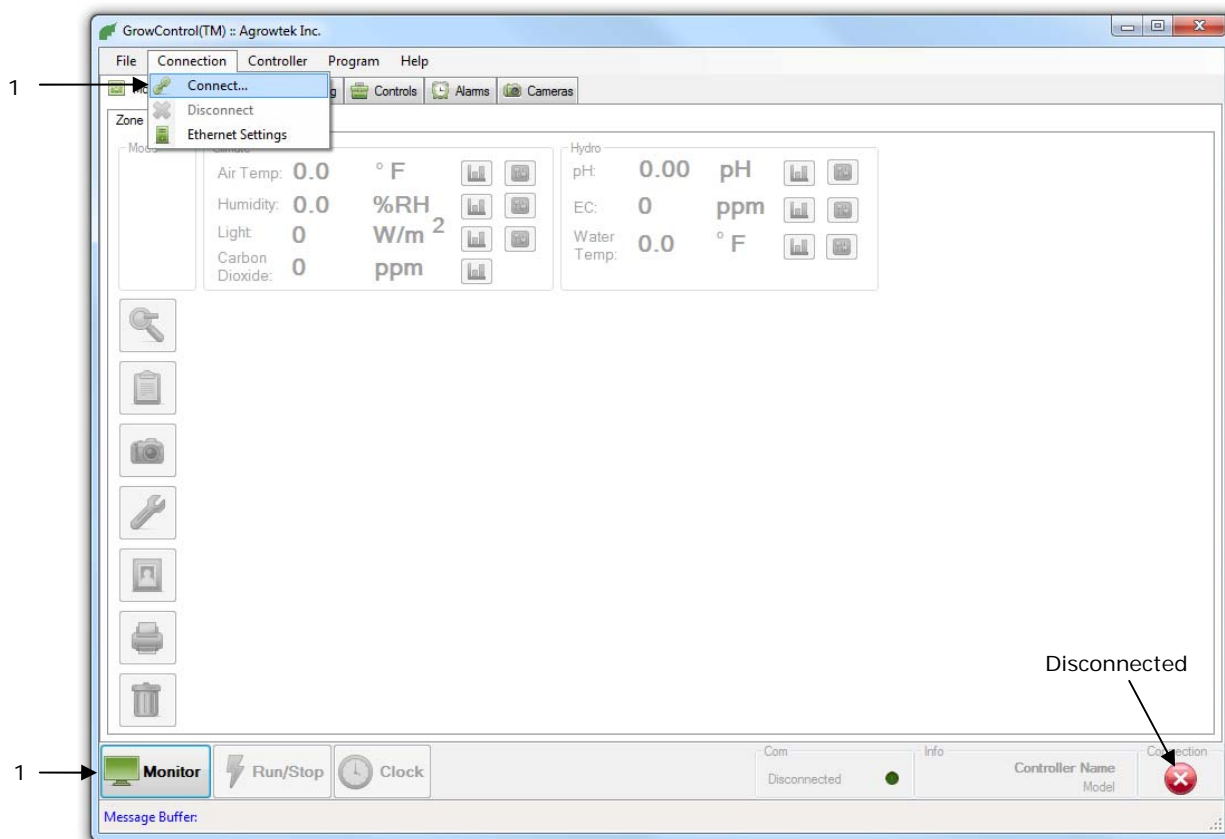


A short-cut to the program should automatically be placed on your desktop and in your start-menu.

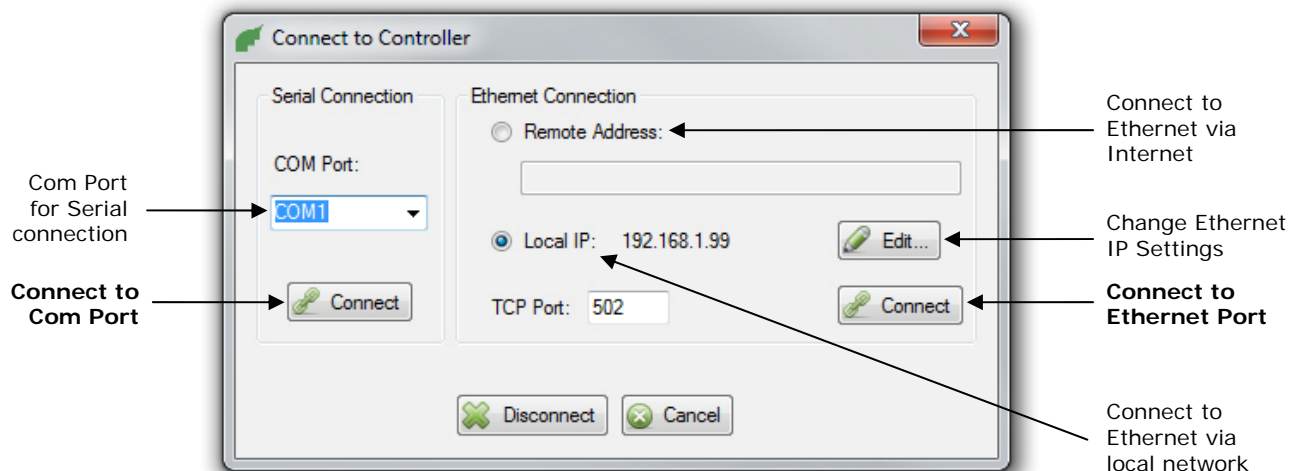
Double-click the desktop icon or navigate to "Agrowtek > GrowControl(TM)" in the start-menu to open the program.

Connecting to the controller

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



2. The connection dialog appears; select a COM port, or enter the controller's IP or Remote address.
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.
3. Press the "Connect" button in the box with the connection you want to use.

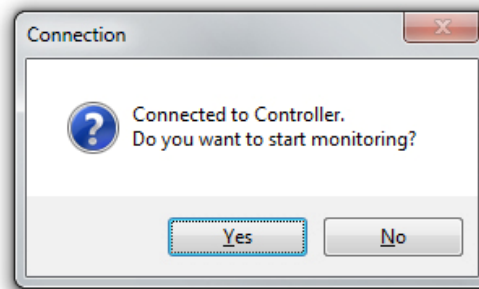


4. If the controller has an operator password set, you will be prompted to enter your operator (or system) password.



Enter 4-digit pin password to connect.

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. The connection indicator in the lower right corner will change to show the connection status.



Disconnected



Connected to
Serial Port



Connected to
Ethernet Port
(Local Network)



Connected to
Ethernet Port
(Remote Address)

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



Run / Stop

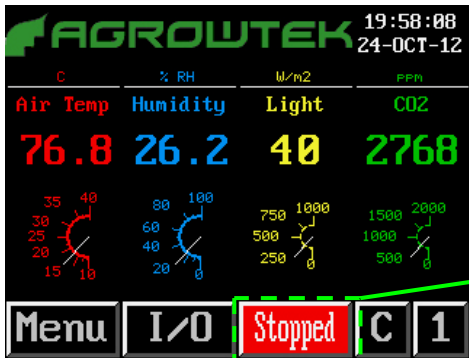
The controller will automatically turn the equipment outputs on and off depending on how they are programmed to operate when the system is in "Run" mode. All of the outputs can be stopped simultaneously by placing the controller into "Stop" mode. Placing the controller back into "Run" mode by pressing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

NOTE

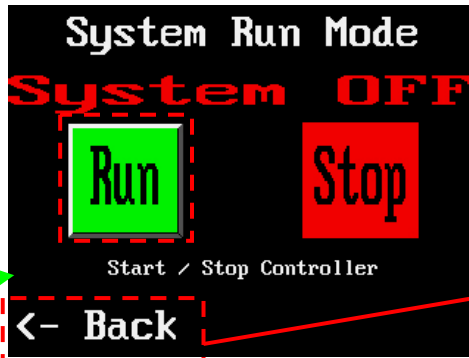
Before any outputs will activate, the system must be placed into "Run" mode. When the system is in "Run" mode, the outputs can be turned on. When in "Stop" mode, all outputs will be disabled.

Touch Panel

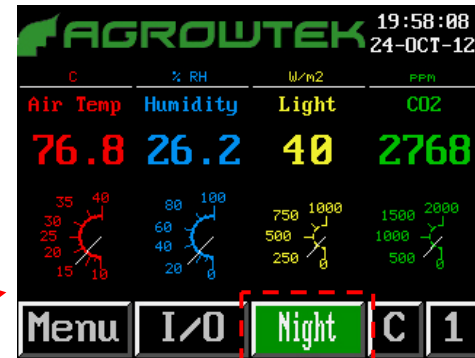
From the Home screen press the Status button to access the run mode menu. When the controller is stopped, "System OFF" will be displayed in red. When the controller is running, "System ON" will be flashing in green.



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



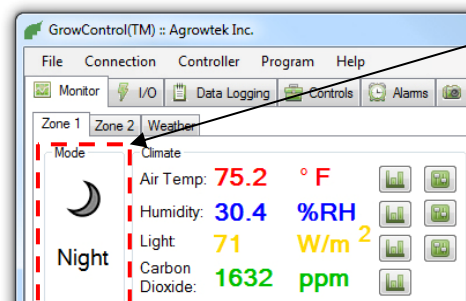
2. Press "Run" to place the system into 'run' mode or "Stop" to stop the controller. Press "Back" to return to the previous screen.



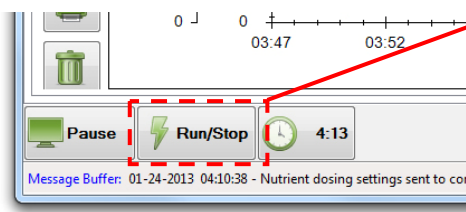
3. The home screen will show green for run and the current zone's day or night mode.

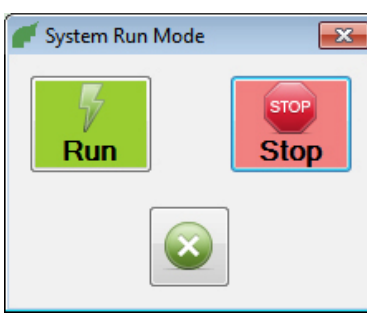
Software

The controller can be started or stopped from the PC software by pressing the "Run/Stop" button in the lower left corner when connected to the controller.



Day/Night/Off mode display





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.

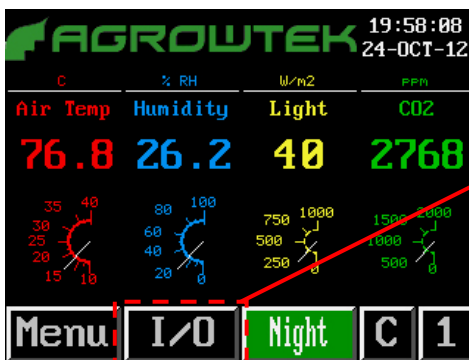
Note: "Output Sequence Delay Timer" may delay the activation of any output by the delay time. This prevents multiple outputs from activating simultaneously thereby reducing electrical load spikes.

Inputs

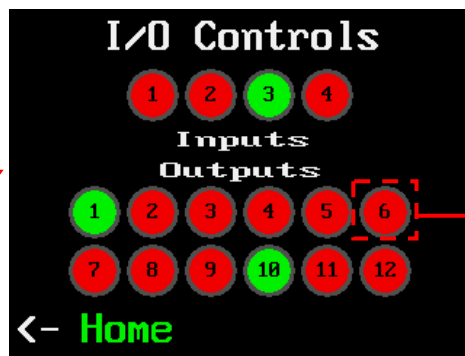
Four (4) "Digital" inputs are available to connect switch type sensors (float switches, door switches, leak sensors, smoke detectors, etc.) Digital inputs can be programmed to act in a variety of different ways including turning an output device on or off when the input is tripped.

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.

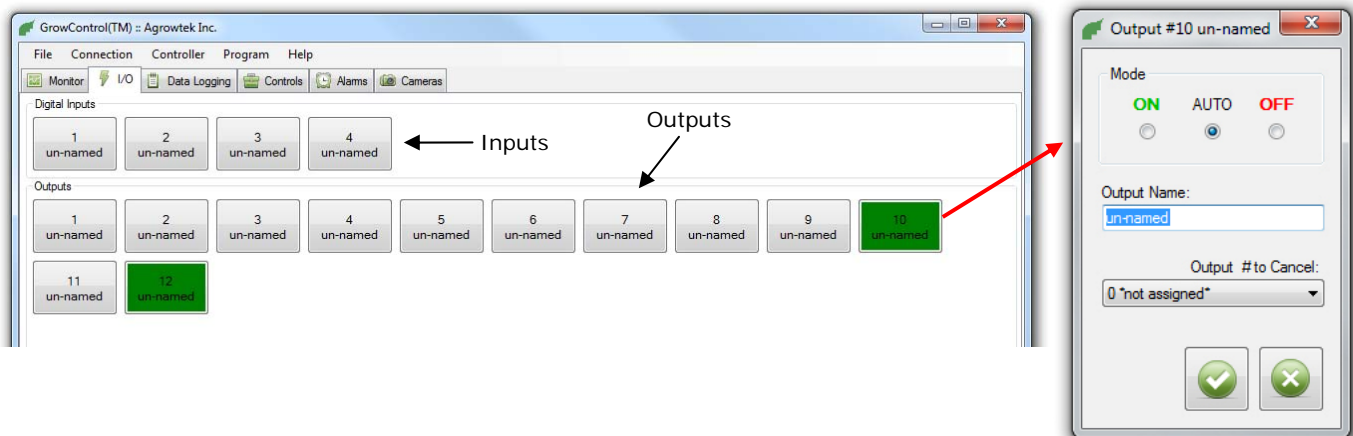


Output can be named for reference, manually operated or disabled, and be programmed to disable another output when on (advanced settings.)

Software

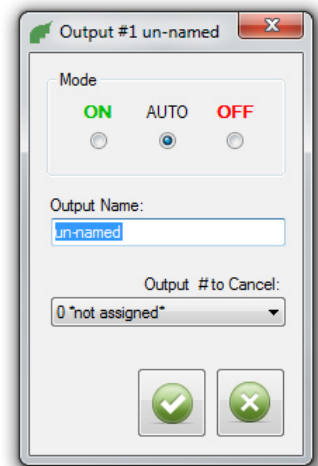
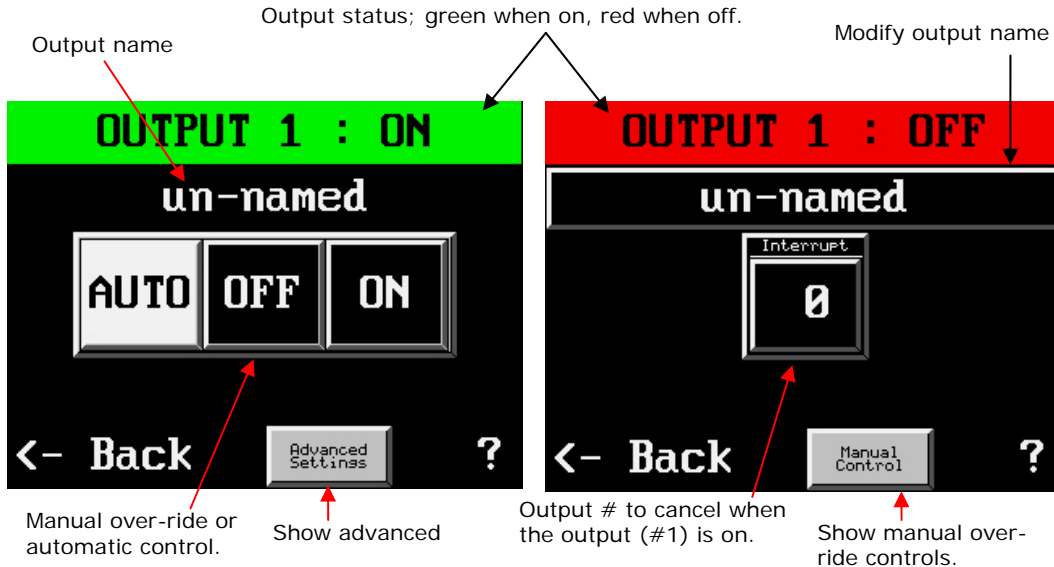
The PC software contains the I/O controls on the 'IO' tab. If an input or output is activated, it will be shown in **green**.

Click an input or output button to start, stop or set to automatic mode, change the name or set the interlock/interrupt output#.



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.



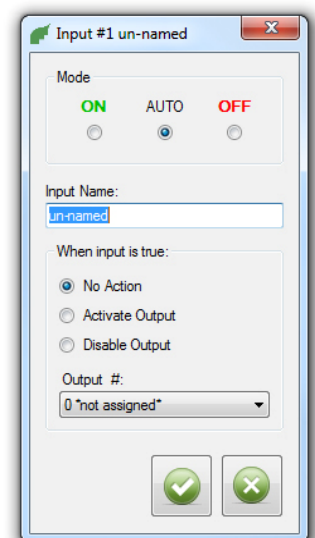
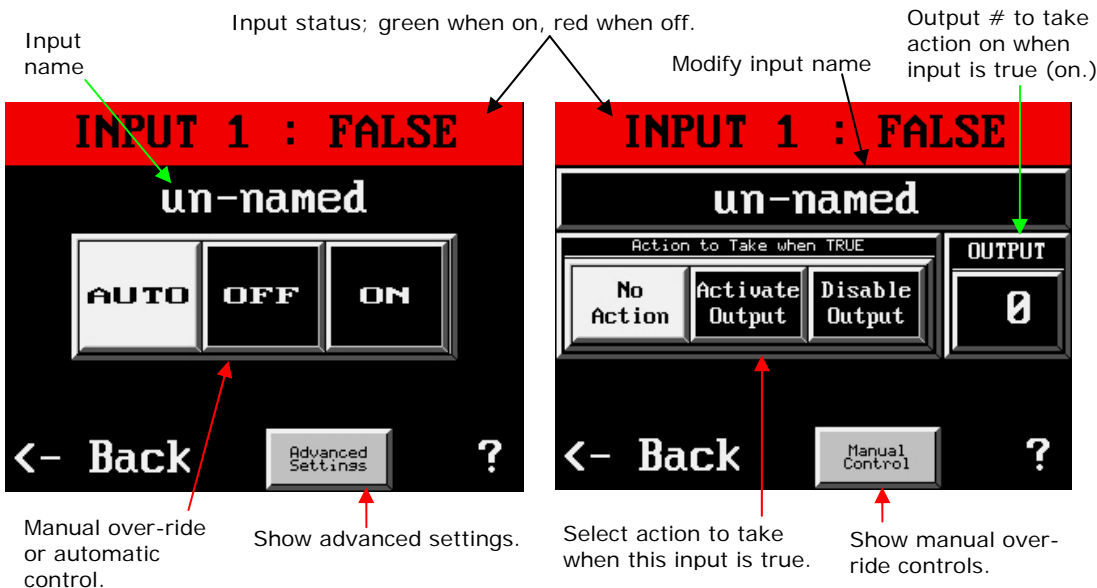
Output Interrupts

The **interrupt** 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.

Interrupt Example: If the output shown above (output #1) is assigned to ventilation fans, and output #2 is assigned to CO2, enter "2" in the interrupt value of output 1. (Also see temperature limit functions to cancel CO2 in anticipation of ventilation or to prevent combustion generators from operating above a set limit temperature.)

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 #.

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.

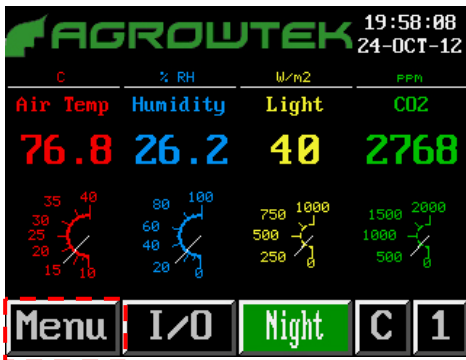
For example; a cooling thermostat and a de-humidistat can both be assigned to an output connected to a ventilation fan in order to turn the fan on for either high temperature or high humidity.

Controls functions can be assigned to a zone.

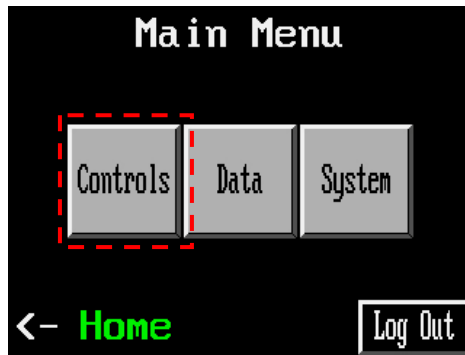
The controller can monitor up to two sensor zones and the control you set up needs to know if it should respond to the sensor readings for zone 1 or zone 2. (A zone number of 0 defaults to zone 1.)

Touch Panel

The controls functions are accessed via the main menu.



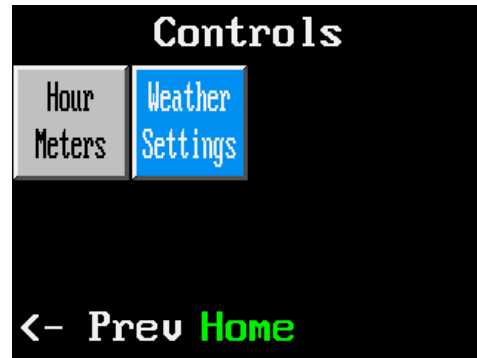
Press “Menu” button to enter main menu.



Press “Controls” to enter controls menu.



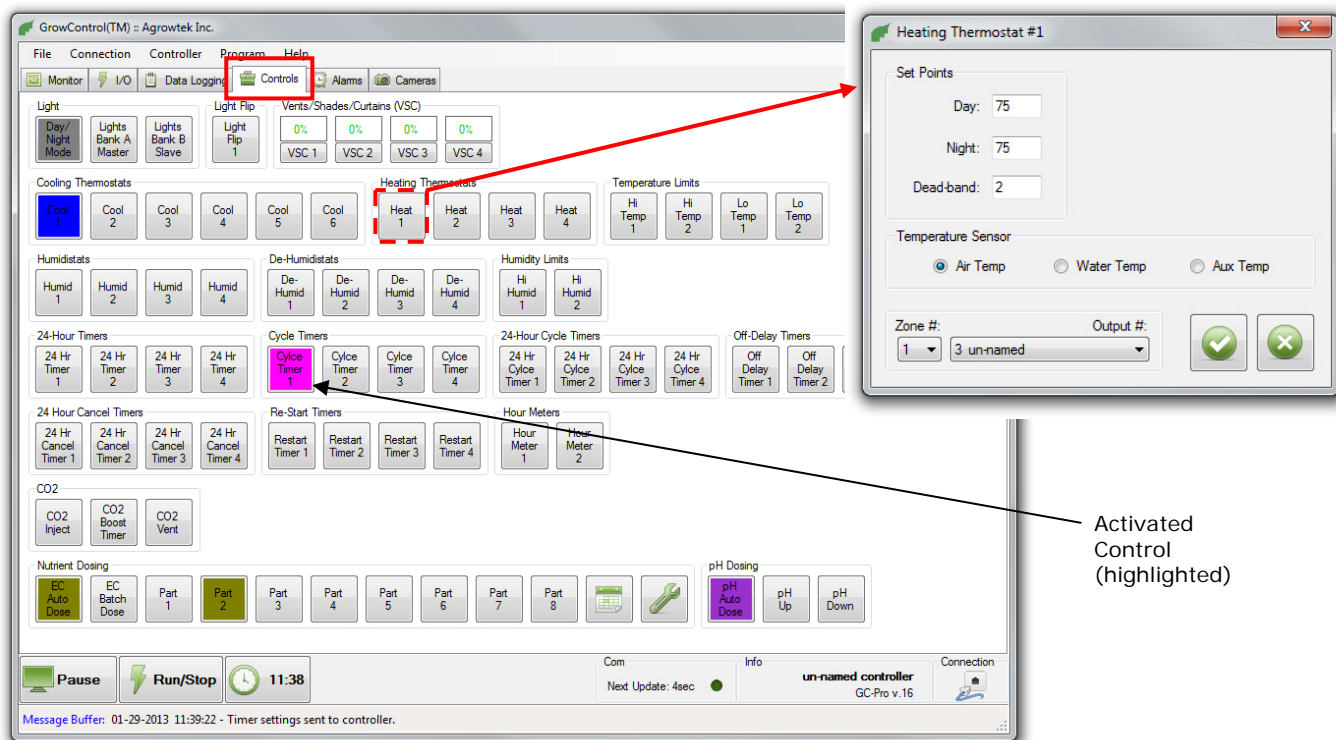
Controls are broken down into basic categories. Press “Next” to access additional controls.



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 with their respective function color.
- Clicking on a control button will display the settings for that control function.



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.

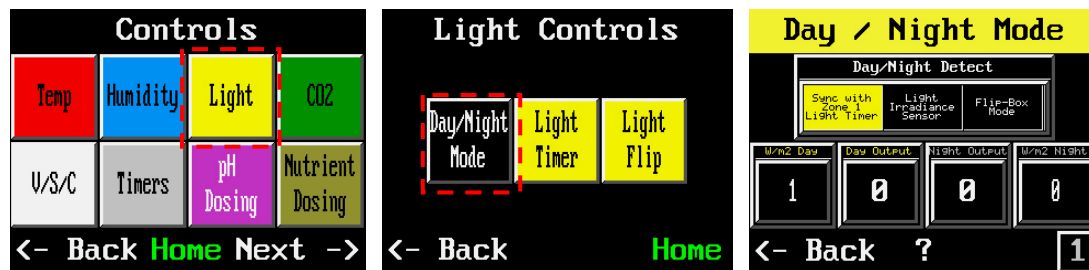
"Light Irradiance Sensor" mode activates day mode when the light level reaches the "W/m2 Day" set point and activates night mode when the light level falls to the "W/m2 Night" set point. *This mode is intended to be used in environments with sunlight.*

"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: Enter an output number to activate 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.



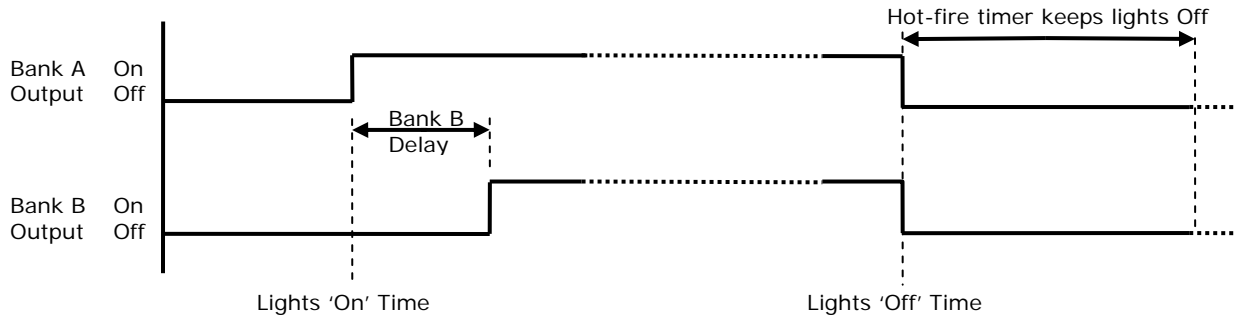
The day and night mode settings are accessed on the first page of the controls menu by pressing the "Light" controls button then "Day/Night Mode" button.

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.

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.

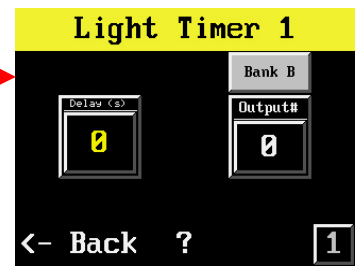
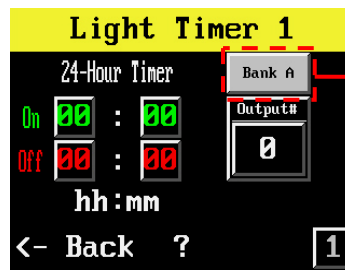
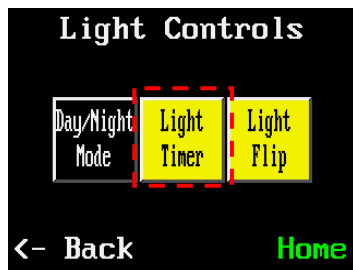


Lighting Timer: Enter the time of day (in 24-hour format 0:00-23:59) when the lights should turn on and off.

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.

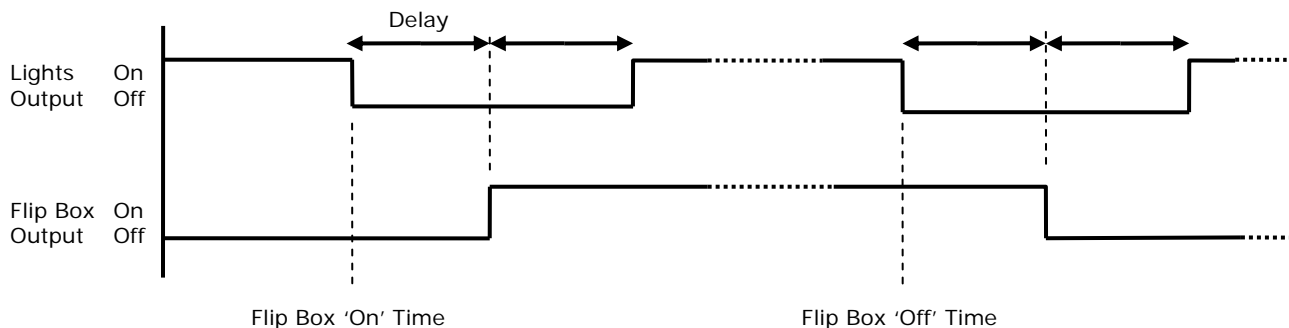
Lights can be operated by a 24-hour on/off timer. Enter the on and off times, and select the lights output#. Press "Bank" button to show delayed bank B.

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.

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.

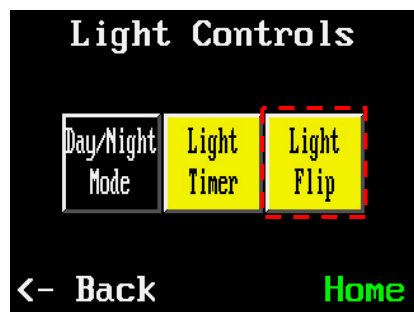


Flip Delay: Seconds to delay before and after switching flip box trigger.

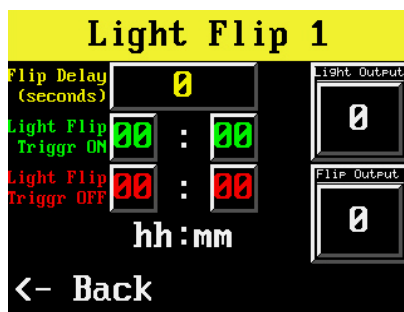
Light Flip Trigger ON/OFF time: Time of day (hh:mm) to turn flip trigger on and off.

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.



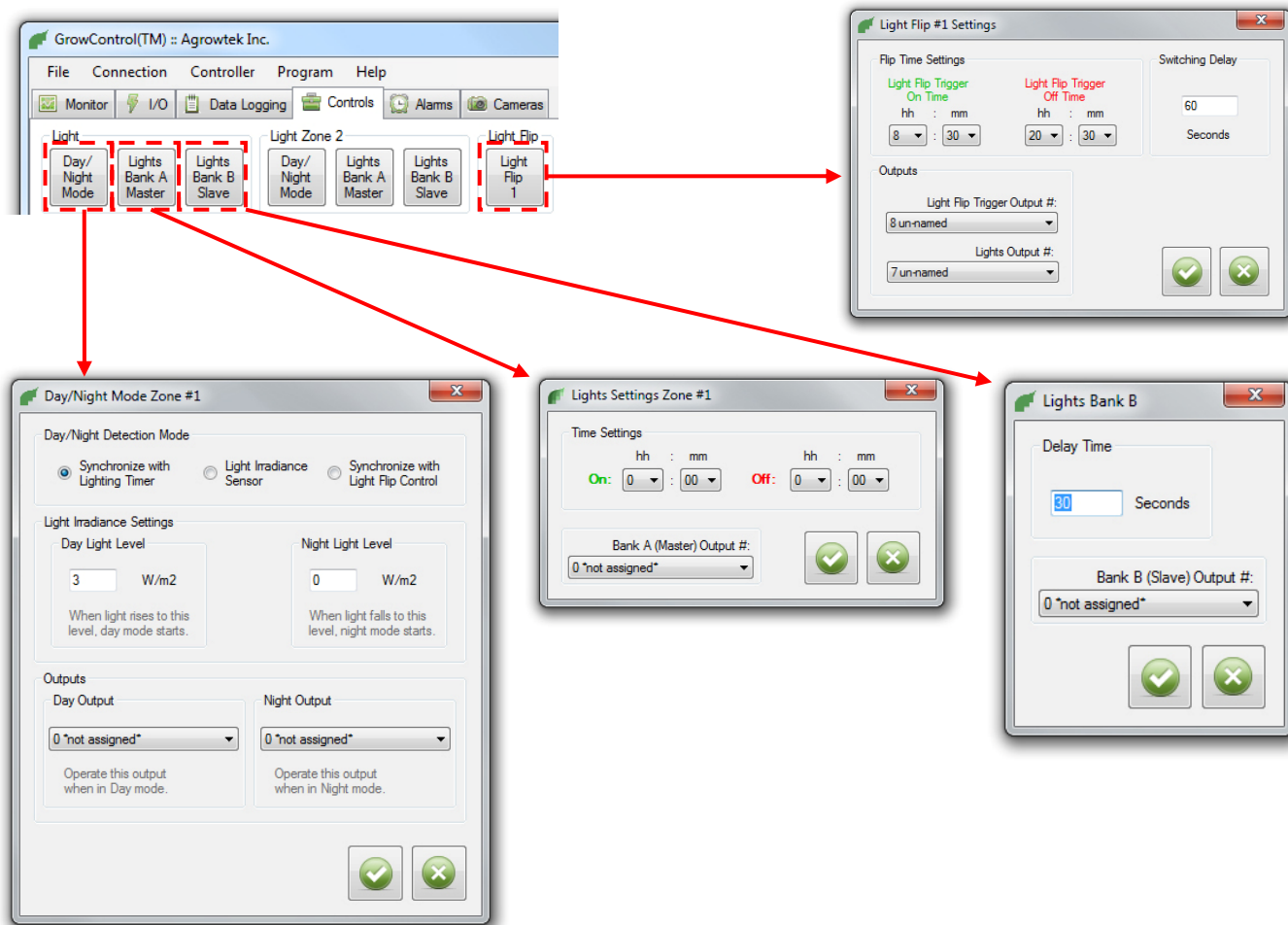
Light flip settings are found in the Light controls menu.



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

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.



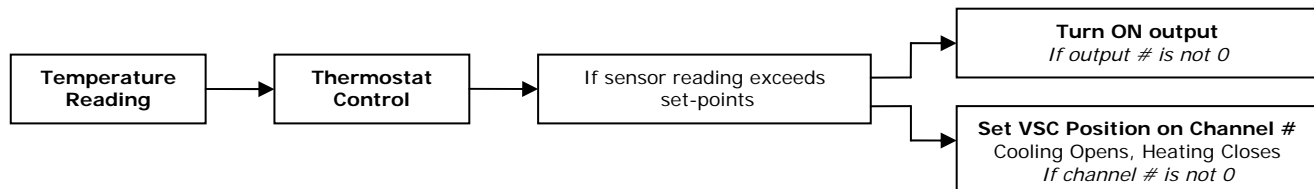
Temperature Controls

Temperature controls consist of heating and cooling thermostats, and high and low temperature limits (shut-offs.)

Heating & Cooling Thermostats

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

Heating Thermostats turn an output **on** or close 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.

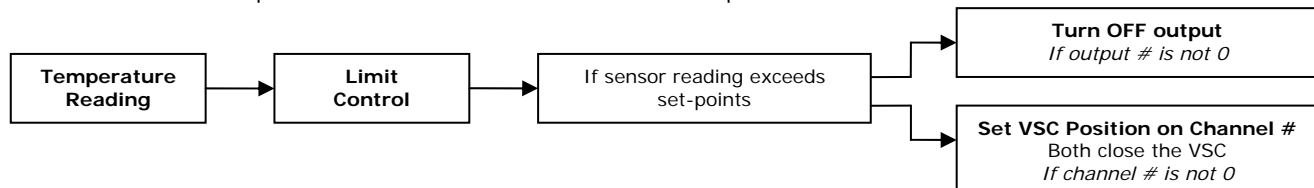


Limit Thermostats

Lo-Temp Limits turn an output **off** or close 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.

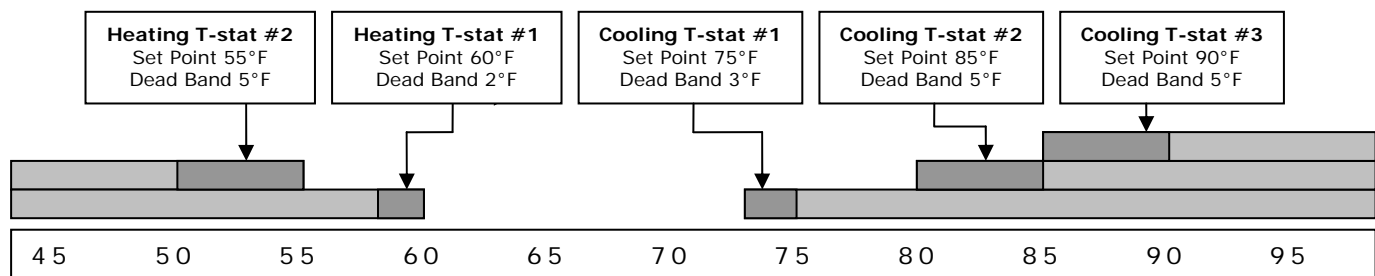
Hi-Temp Limits turn an output **off** or close VSC's when the temperature is too hot. High temperature limits can turn off CO2 combustion generators, light banks, and other equipment if a room is too hot, or to disable heating systems if the outdoor temperature is above a minimum.

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



Staging Thermostats

Thermostats can be staged for multiple levels of heating and cooling.



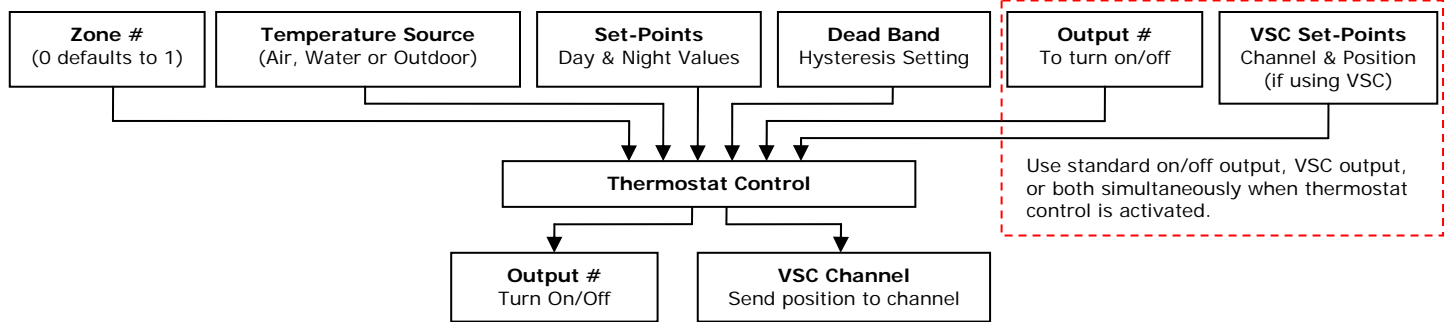
In the example above:

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

Cool 1 will operate any time the temperature rises above 75 and will continue to cool until 72.
Cool 2 will operate any time the temperature rises above 85 and will continue to cool until 80.
Cool 3 will operate any time the temperature rises above 90 and will continue to cool until 85.

Thermostat Settings

Each thermostat has specific settings which control its function.



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

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

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

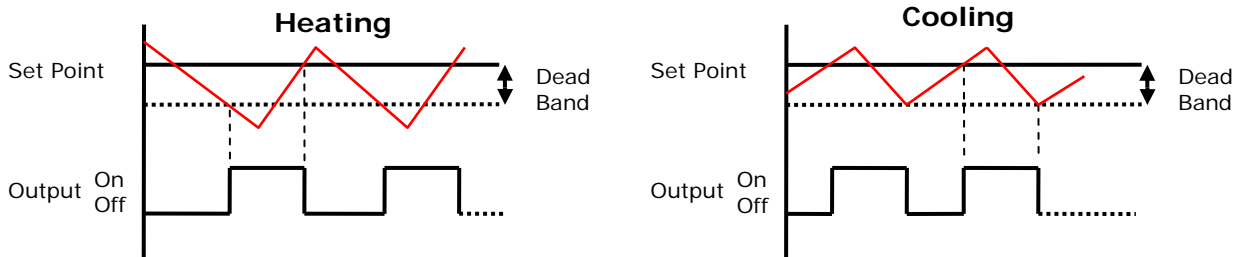
Dead-band: Temperature drop from set-point before turning on heat or turning off cooling (see dead-band below.)

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

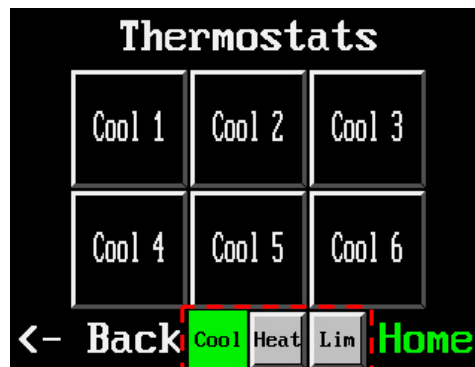
The "Deadband" setting in determines how tightly a thermostat tries to keep the temperature to the set-point. It is necessary to have some dead-band: generally 2.0-5.0°F or 1.0 – 3.0°C.



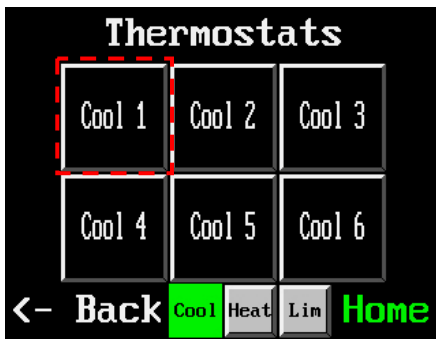
Touch Panel



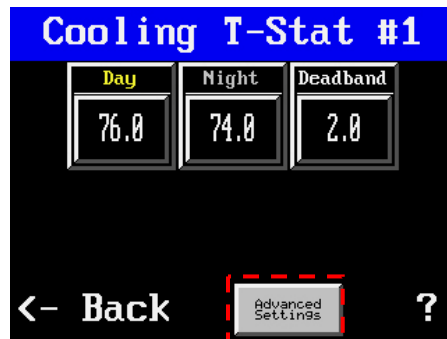
Press "Temp" from the controls menu.



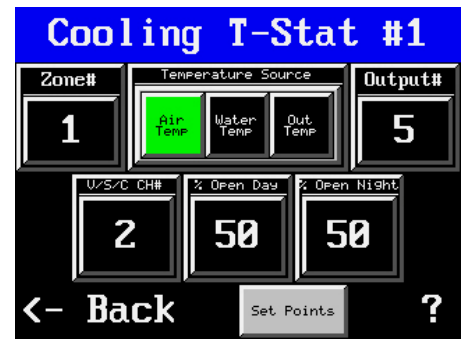
Select cooling, heating or high/low limit functions.



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



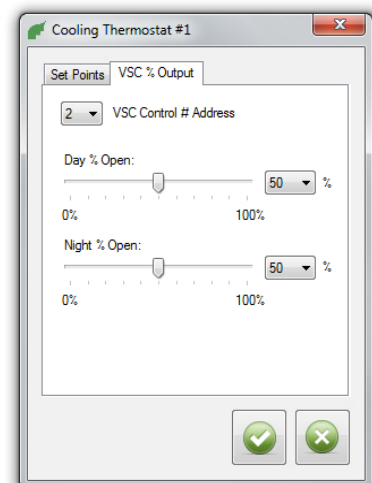
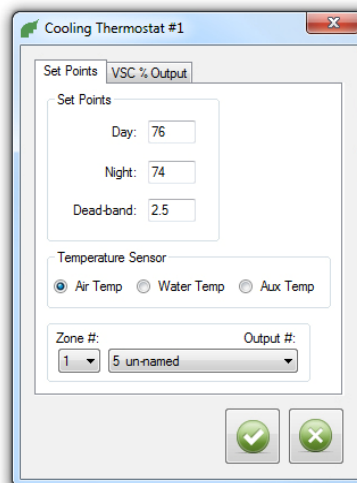
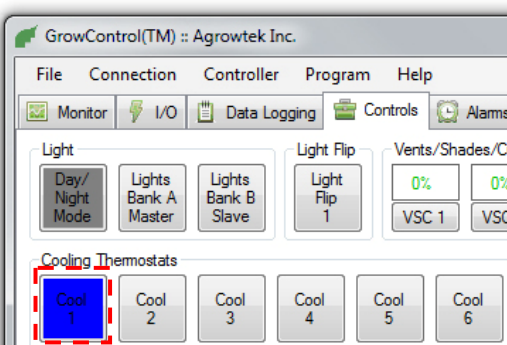
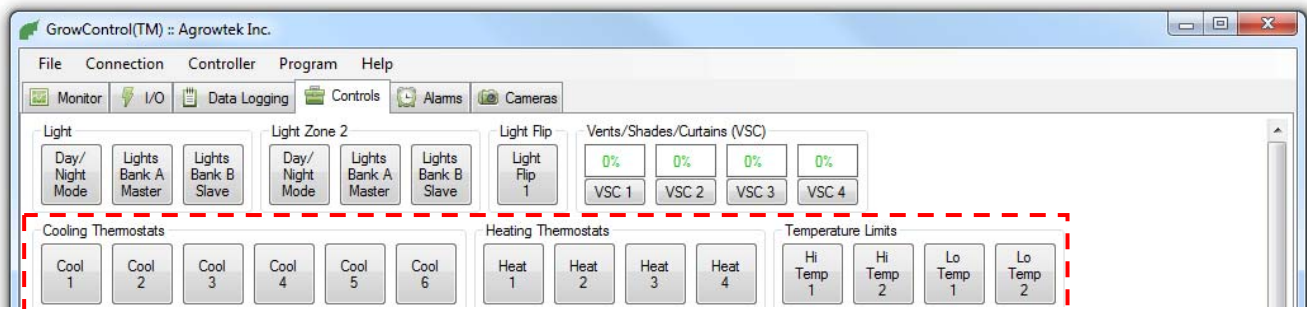
Enter the set-points and dead-band settings. Press "Advanced Settings" button to change to advanced settings.



Select temperature zone, sensor source and output #. If VSC controls are used, enter a channel and position settings if desired.

Software

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



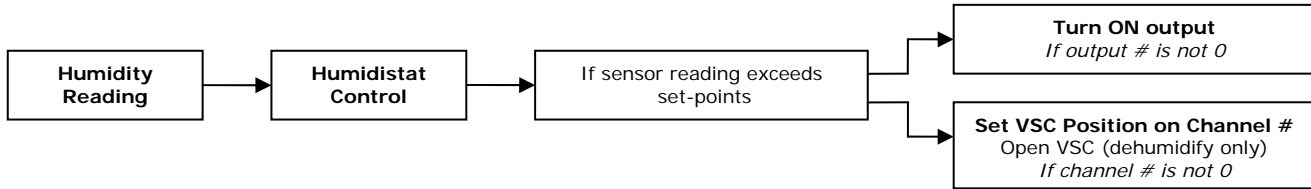
Humidity Controls

Humidity controls consist of humidistats and de-humidistats, and high humidity limits.

Humidistats

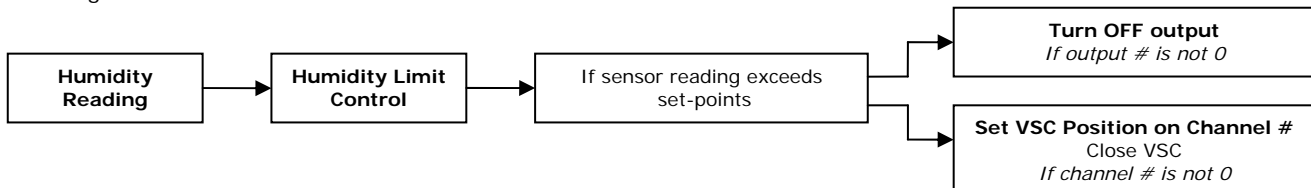
Humidification Humidistats turn an output on when the humidity is too low. Humidification is used to operate humidifiers.

De-Humidification Humidistats turn 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.

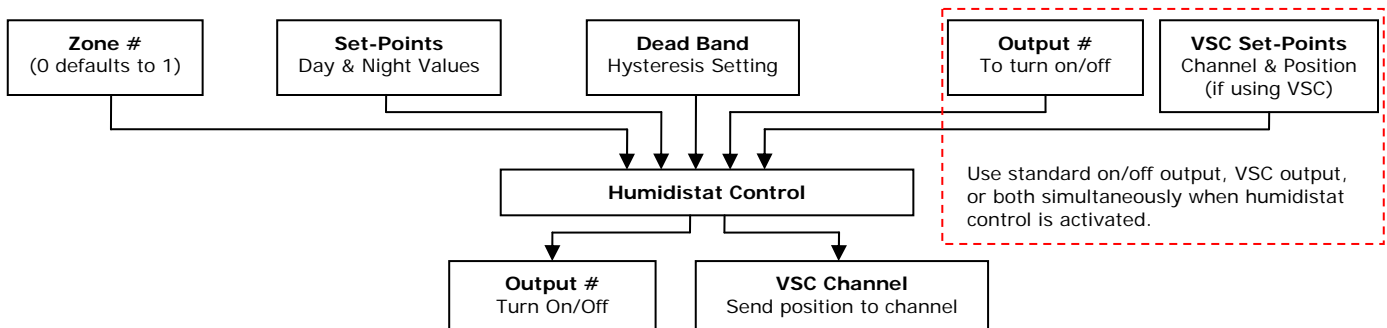


Humidity Limits

Hi-Humidity Limits turn 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.

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

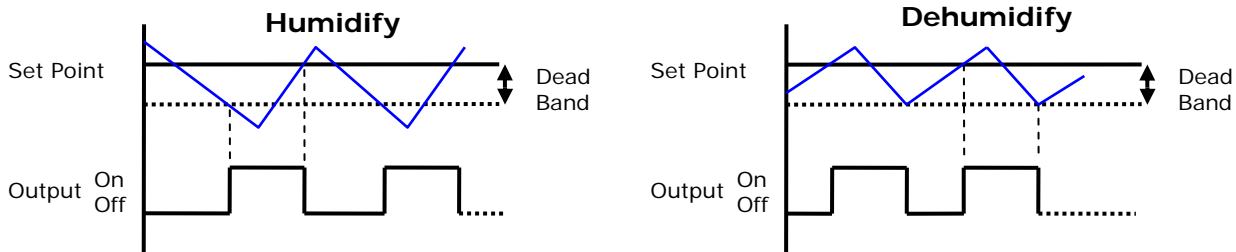
Dead-band: Humidity drop from set-point before turning on humidification or turning off de-humidification.

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 in 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.



Touch Panel



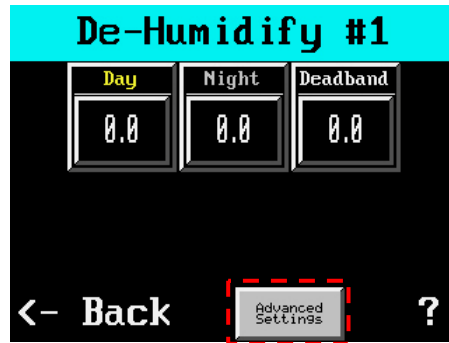
Press "Humidity" from the control menu.



Select from de-humidify, humidify or limit humidistats.



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



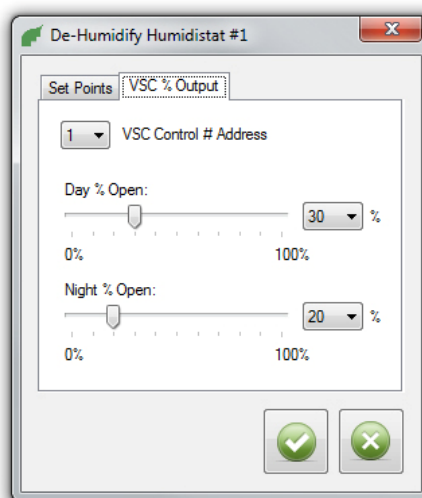
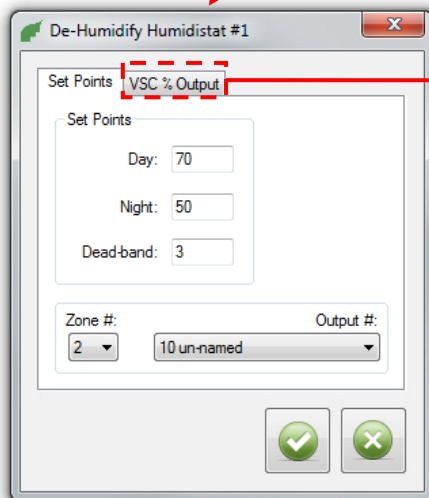
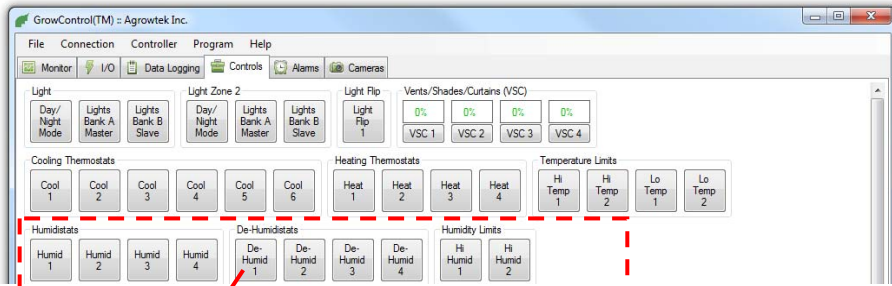
Enter the set-points and dead-band settings.
Press "Advanced Settings" to show advanced.



Enter a zone#, output# and/or VSC channel and position settings.

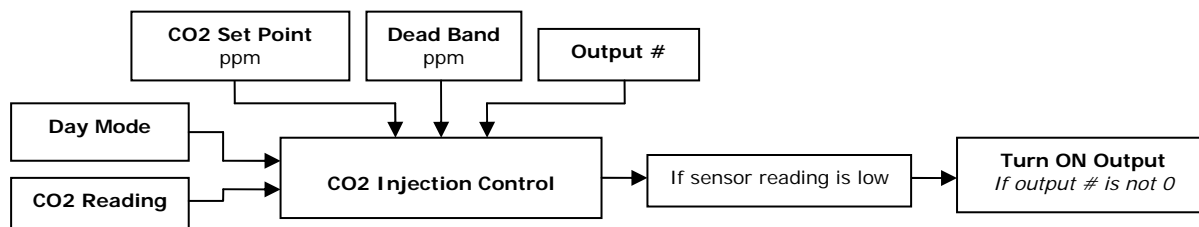
Software

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



CO₂ Injection

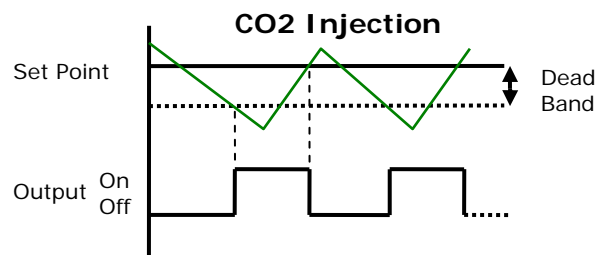
CO₂ augmentation is controlled via a day-time ppm concentration set-point and the readings from the CO₂ sensor. Carbon dioxide is not injected during the night time.



Day ppm: Enter the target CO₂ concentration for the day time.

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

Output#: Enter the output number that the CO₂ device being controlled is connected to.



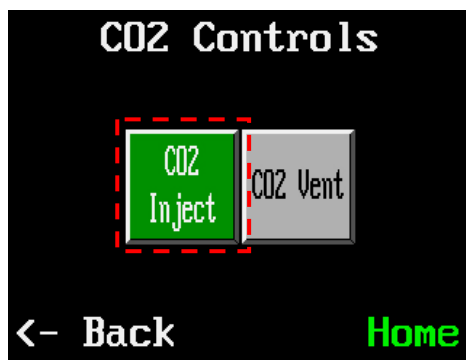
See “Interrupts” under “Output Controls” for disabling CO₂ output when ventilation output(s) turn on. Also see temperature and humidity limit functions to cancel CO₂ in anticipation of ventilation or to prevent combustion generators from operating above a set limit temperature or humidity.

Touch Panel

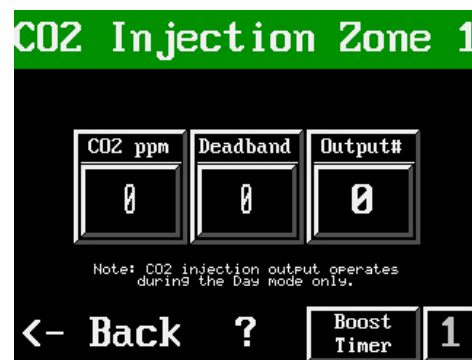
The CO₂ controls are accessed from the “Controls” menu by touching the “CO₂” button. Select between injection and ventilation controls.



Press “CO₂” button to access the CO₂ controls.



Select injection settings.



Enter day ppm target, dead-band and CO₂ output number. Press “boost timer” button to modify boost settings.

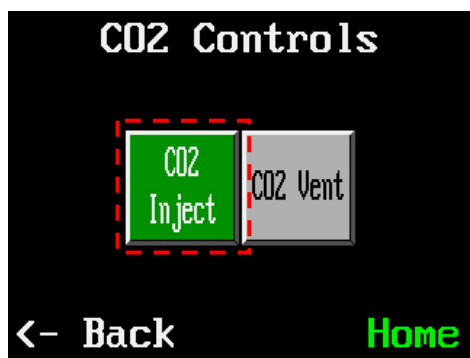
CO₂ Boost Timer

CO₂ 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.

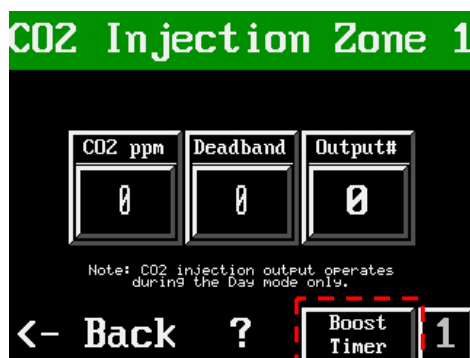
Boost ppm: Enter the target CO₂ concentration during the boost timer duration. Note: the boost value may also be lower than the standard set-point. When the boost timer period has ended, the CO₂ set point will return to the standard set point.

Touch Panel

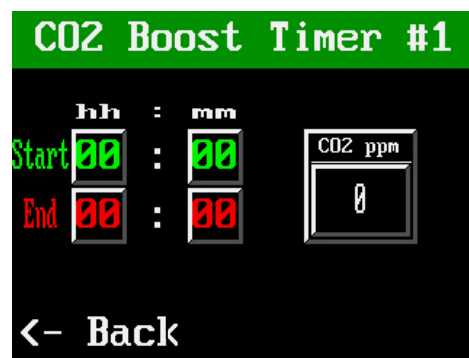
The CO₂ boost controls are accessed from the CO₂ injection controls settings by pressing the “boost timer” button.



Access the CO₂ injection settings from the controls menu.



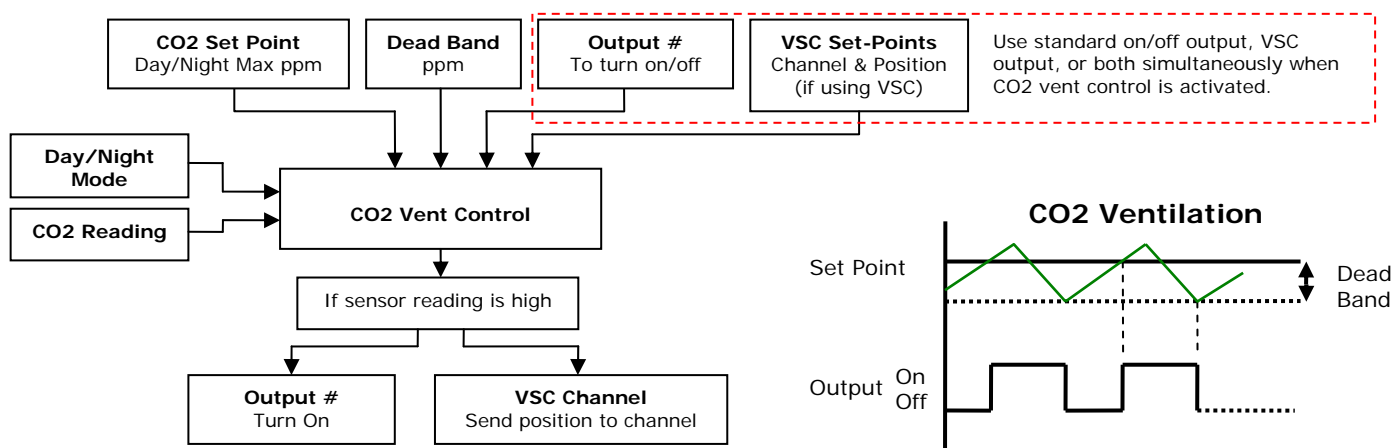
Press the “boost timer” button to access the boost over-ride settings.



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

CO₂ Ventilation

CO₂ 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 CO₂ 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 CO₂ device being controlled is connected to.

VSC# VSC Channel to send minimum open command to.

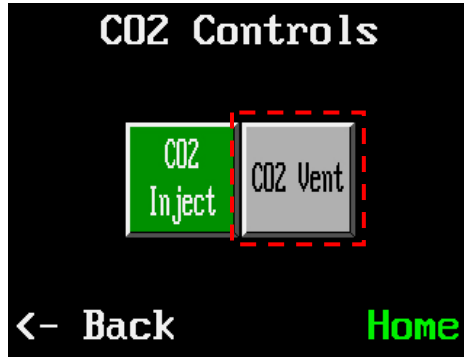
% Open Minimum desired VSC open position day or night when CO₂ level exceeds set-points.

Touch Panel

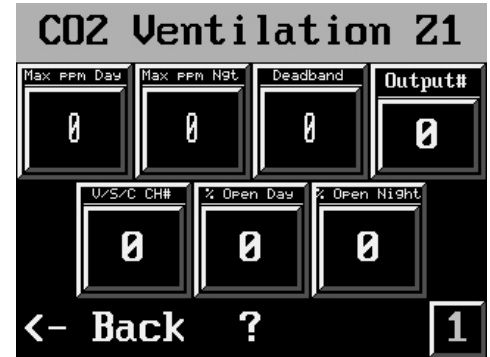
The CO₂ controls are accessed from the "Controls" menu by touching the "CO2" button. Select between injection and ventilation controls.



Press "CO2" button to access the CO₂ controls.



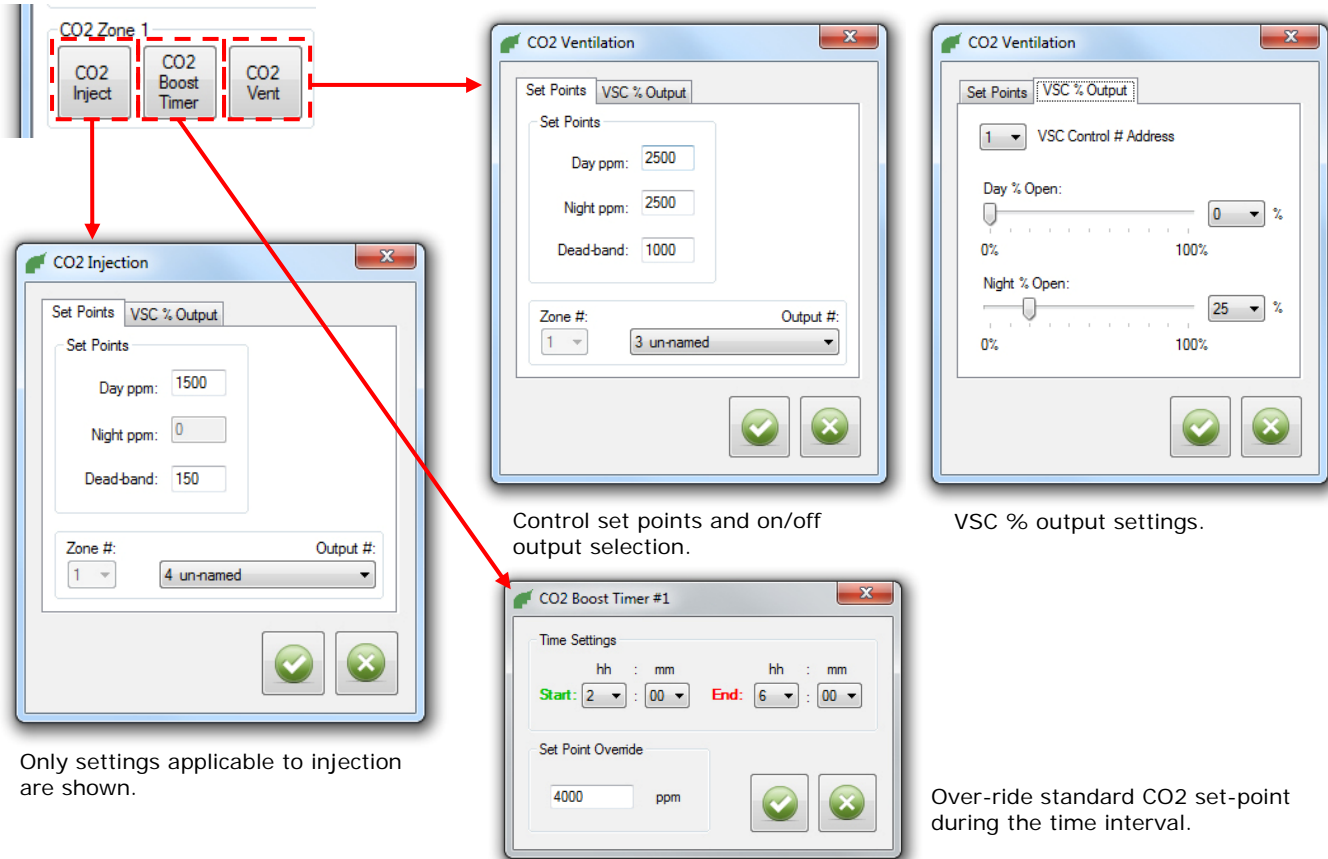
Select ventilation settings.



Enter maximum ppm values, dead-band, on/off output and/or VSC # and minimum % open settings for VSC.

Software

The CO₂ ventilation controls are accessed from the "CO2" controls group on the "Controls" tab.



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.

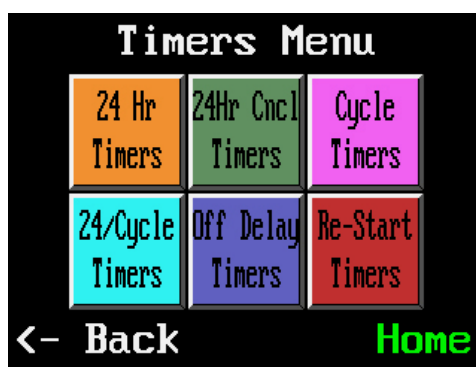
Re-Start Delay Timers disable an output for a delay time after the output has shut off.

Touch Panel

The timers are accessed from the control menu.



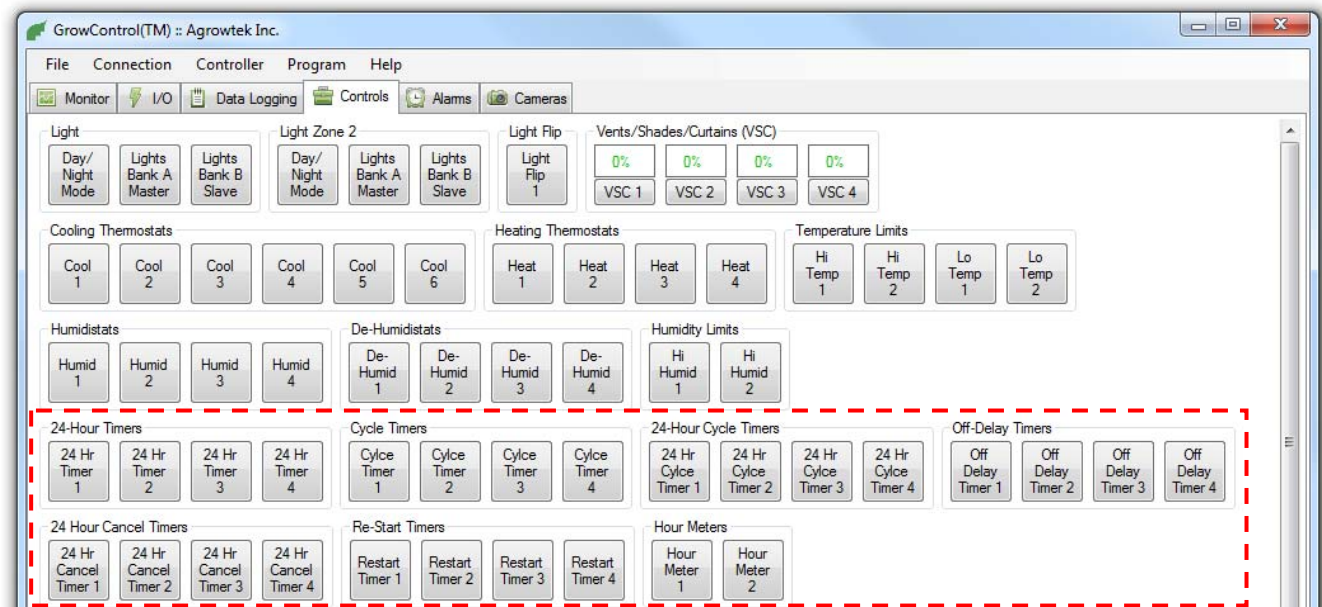
Press "Timers" button to access the timers sub-menu.



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

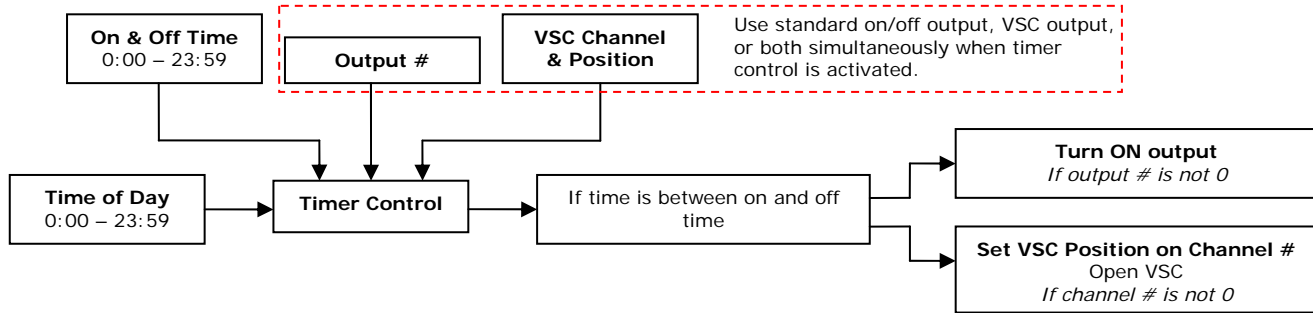
Software

The timer settings are accessed via the controls tab under the timers groups.



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.

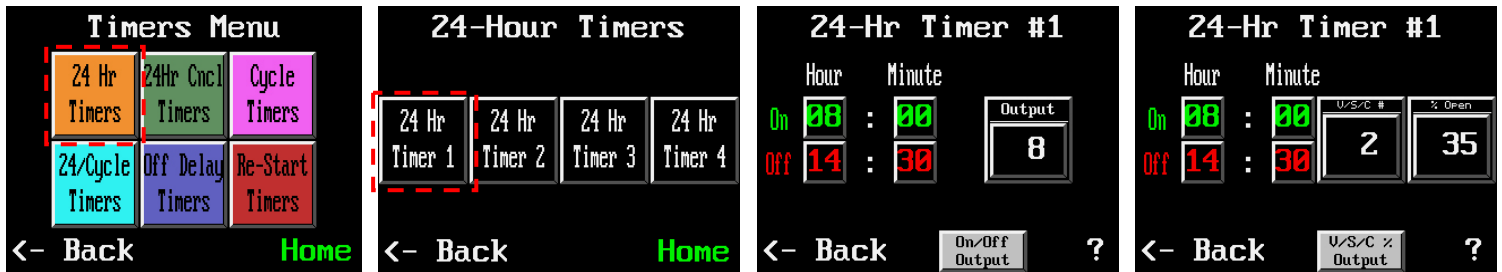
Off Time: Time of day to turn off timer control.

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.

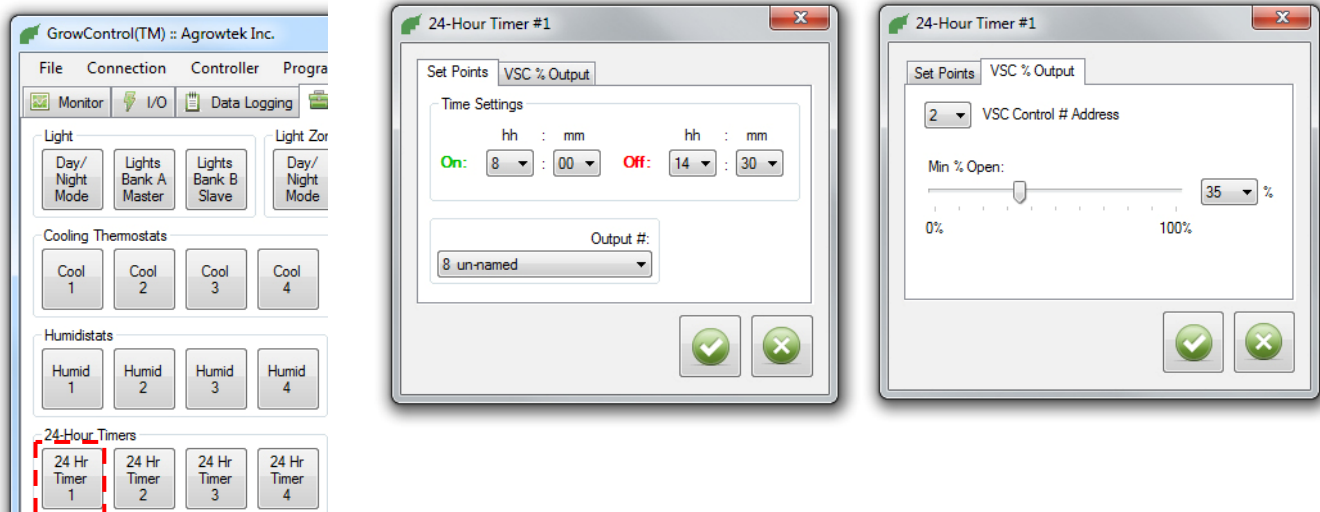
Select a timer to view settings.

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.)

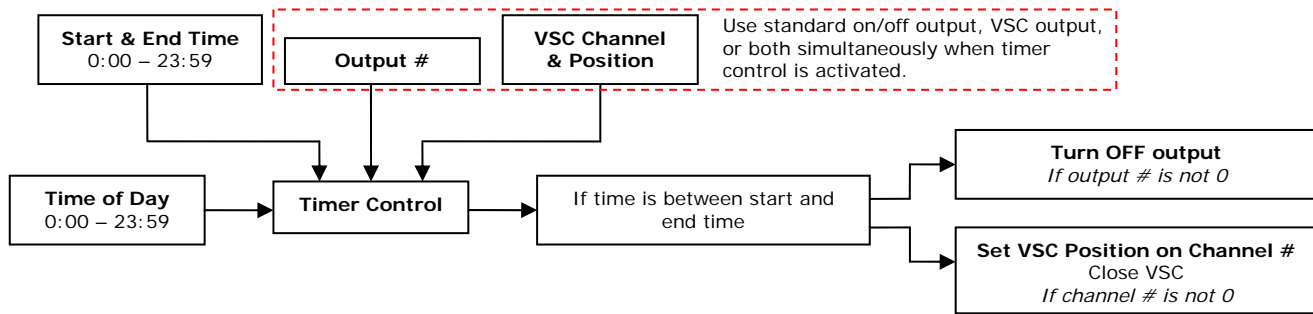
Software

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



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.

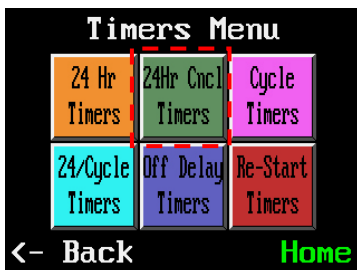
End Time: The time of day that the output is allowed to be activated again.

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

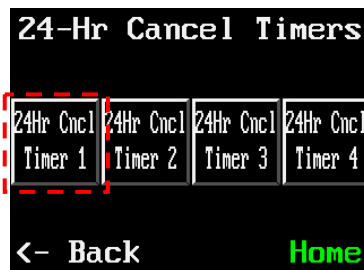
VSC #: VSC control to limit to maximum % open value when cancel timer is active.

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.



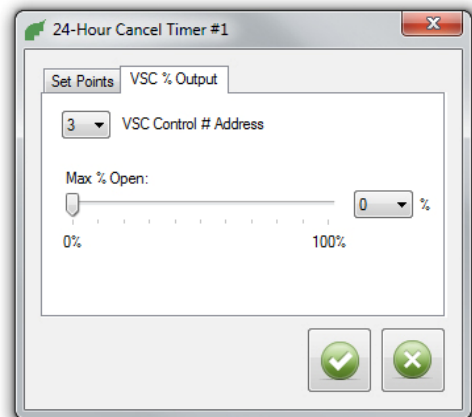
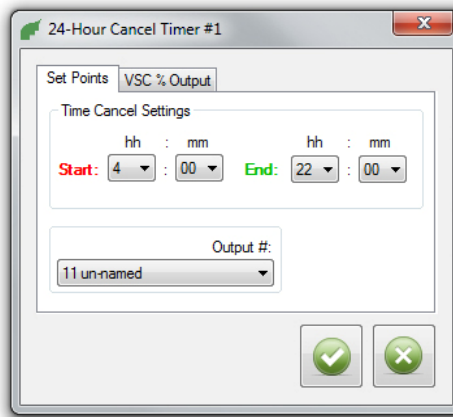
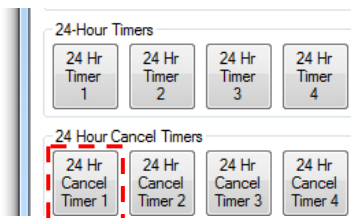
Enter the start and end times and output number to disable (if desired.) Press 'output' button to toggle to VSC settings.



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

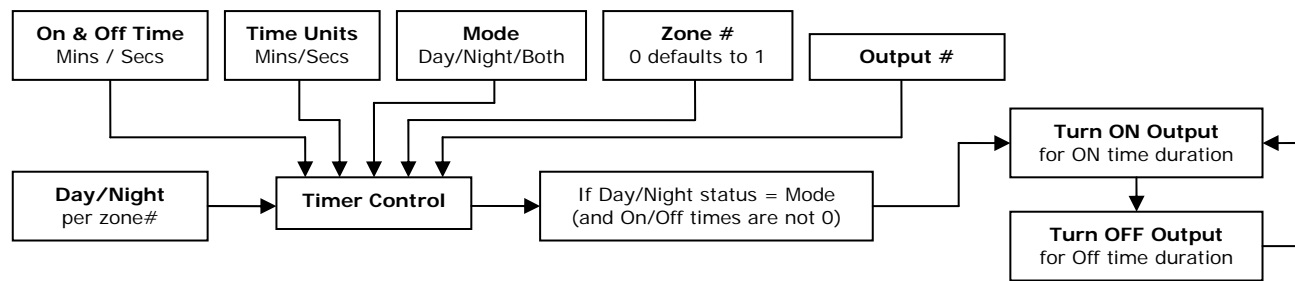
Software

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



Cycle Timers

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



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

Timer Units: Select units of minutes or seconds.

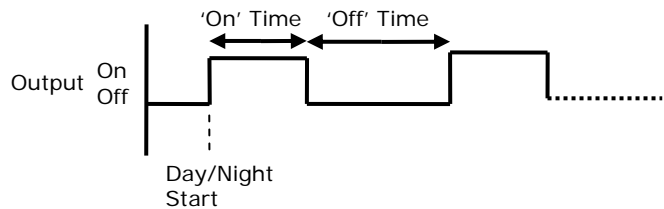
When to Operate Timer: Choose when this timer should operate; day only, night only or both.

Zone: Zone to detect day and night from.

Output: Output to operate with the cycle timer.

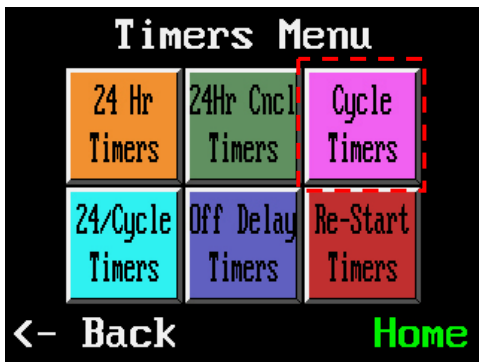
Example uses include:

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

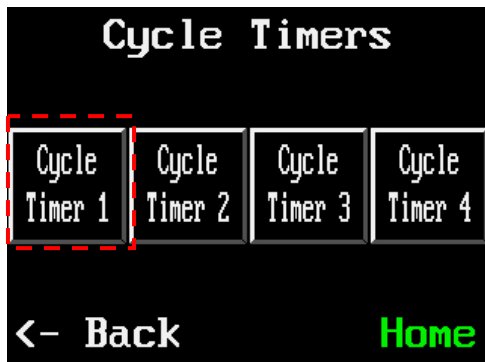


Touch Panel

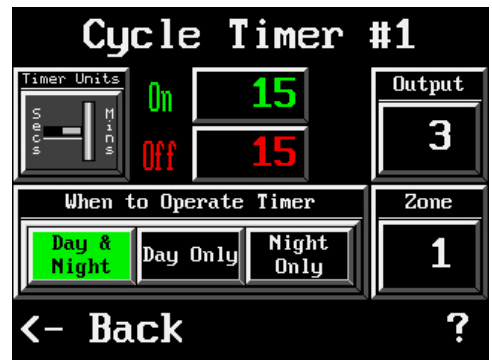
The cycle timer menu is accessed from the timers menu.



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



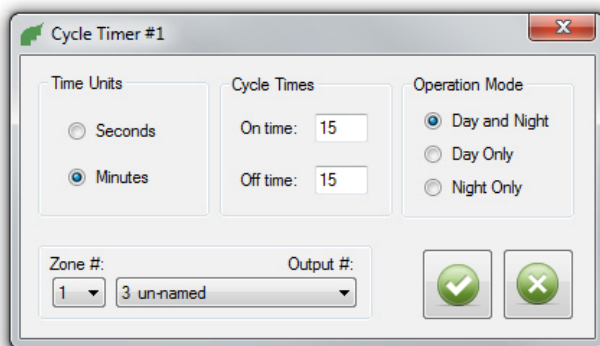
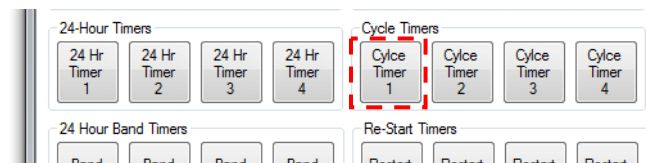
Select a timer to view its settings.



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

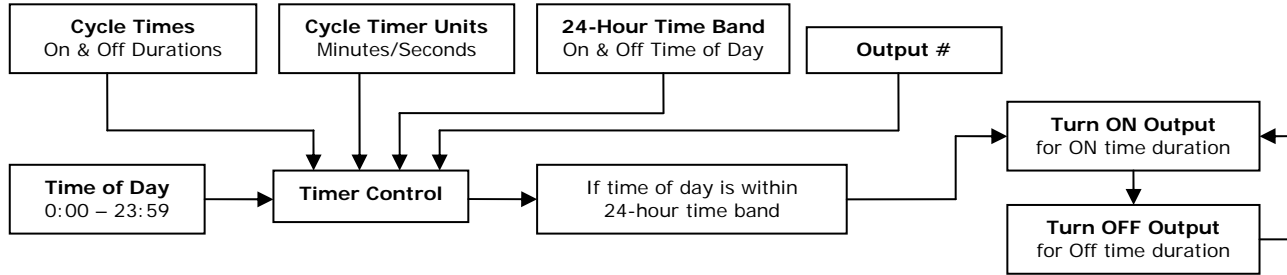
Software

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



24-Hour Cycle Timers

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

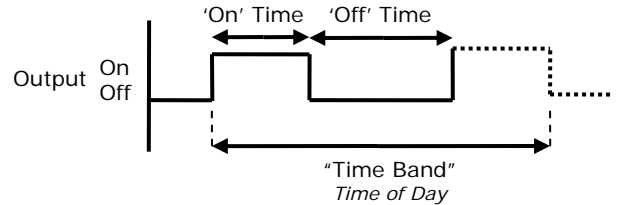


Time Band: Specify the time daily time band that the output should be allowed to operate in.

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

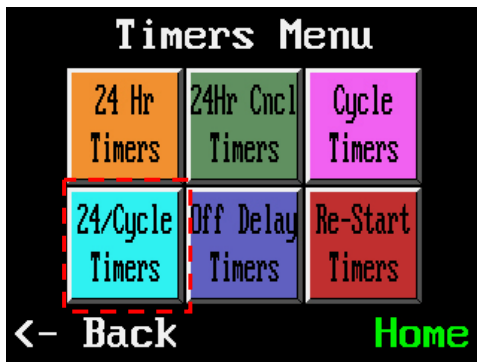
Timer Units: Select units of minutes or seconds for the cycle timer.

Output #: Output to operate with the cycle timer.

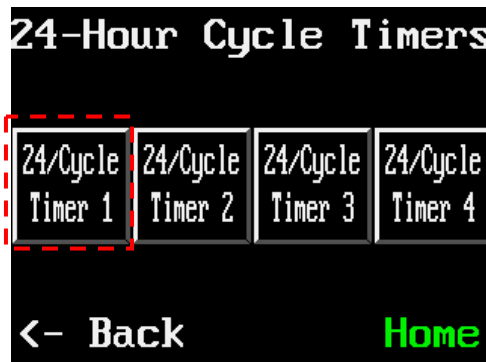


Touch Panel

The cycle timer menu is accessed from the timers menu.



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



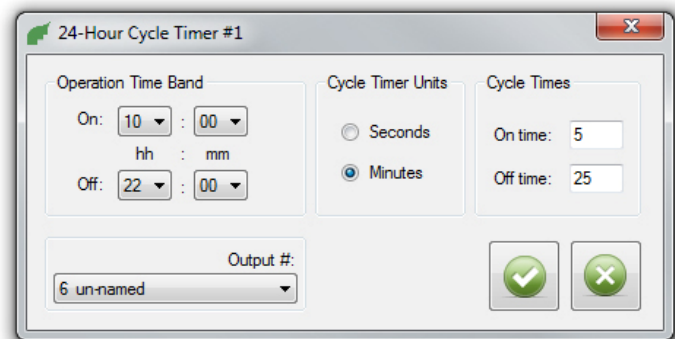
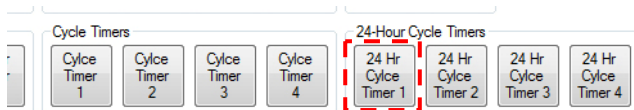
Select a timer to view its settings.



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

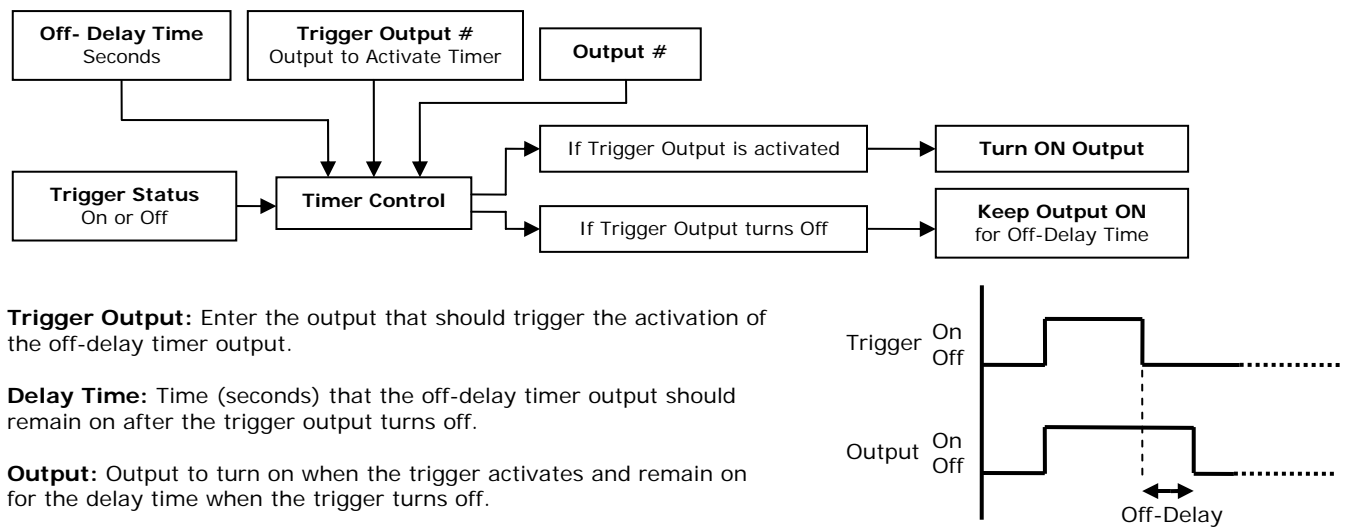
Software

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



Off-Delay Timers

Off-Delay timers operate an output when the “trigger output” is activated and continue to operate the “Off Delay” time after the trigger has turned off.



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.

Example uses include:

- Operating a heater fan so that it is synchronized with the heater’s thermostat but 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 longer than a main feed pump.
- Prevent a fill valve or pump from short cycling due to a ‘bouncing’ float switch.

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.



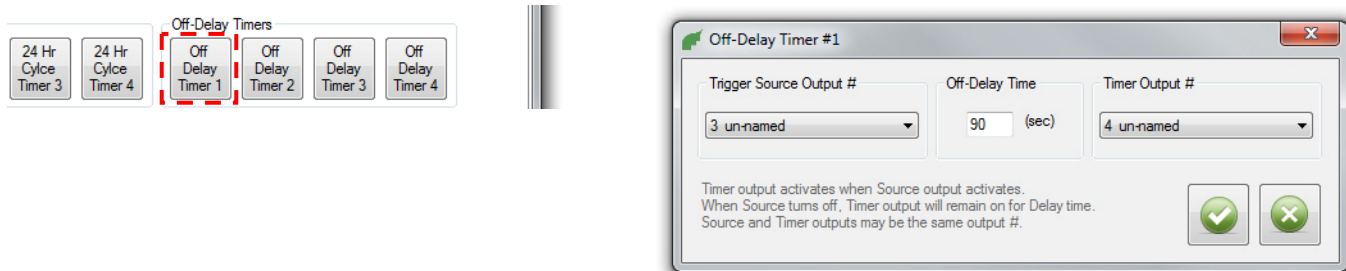
Press “Off Delay Timers” button to access the off-delay timers menu.

Select a timer to view its settings.

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

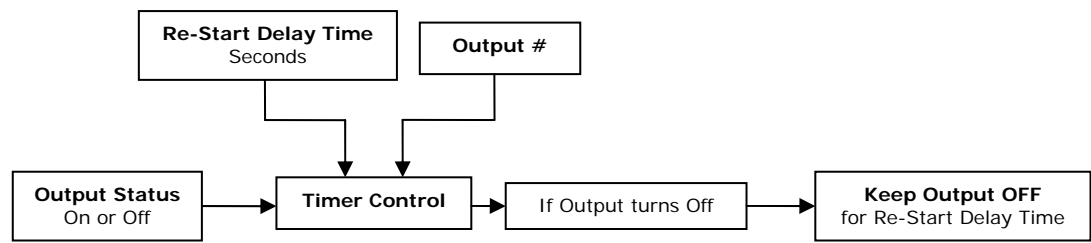
Software

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



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.

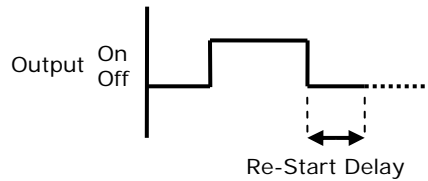


Delay Time: The amount of time that the output will be disabled for once it has turned off.

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

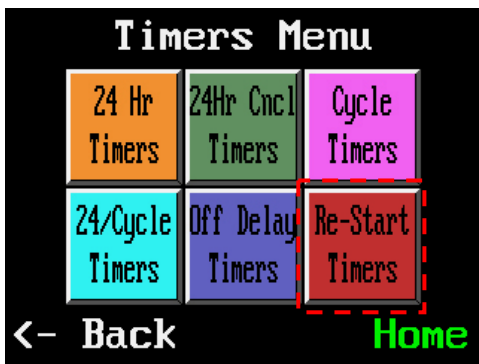
Example uses include:

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



Touch Panel

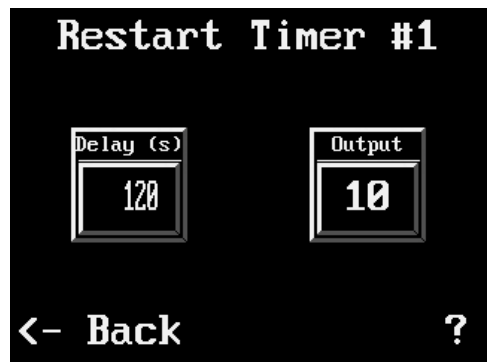
The band timer menu is accessed from the timers menu.



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



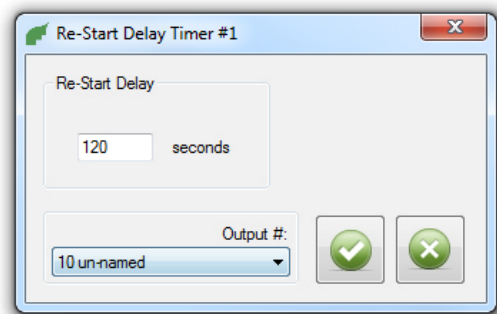
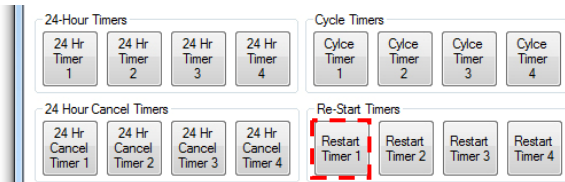
Select a timer to view its settings.



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

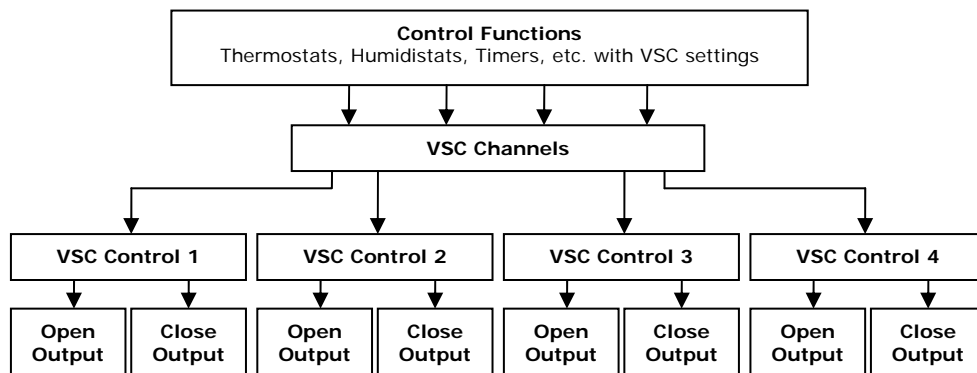
Software

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



VSC Vent, Shade & Curtain Controls

GC-Pro has four (4) VSC controls which can control roof vents, side wall curtains, sun shades and more. VSC controls manage a vent, shade or curtain from 0-100% open. The default position is closed (0% open) and VSC controls are told to open by thermostats, humidistats, timers and more- any control with a VSC output option.

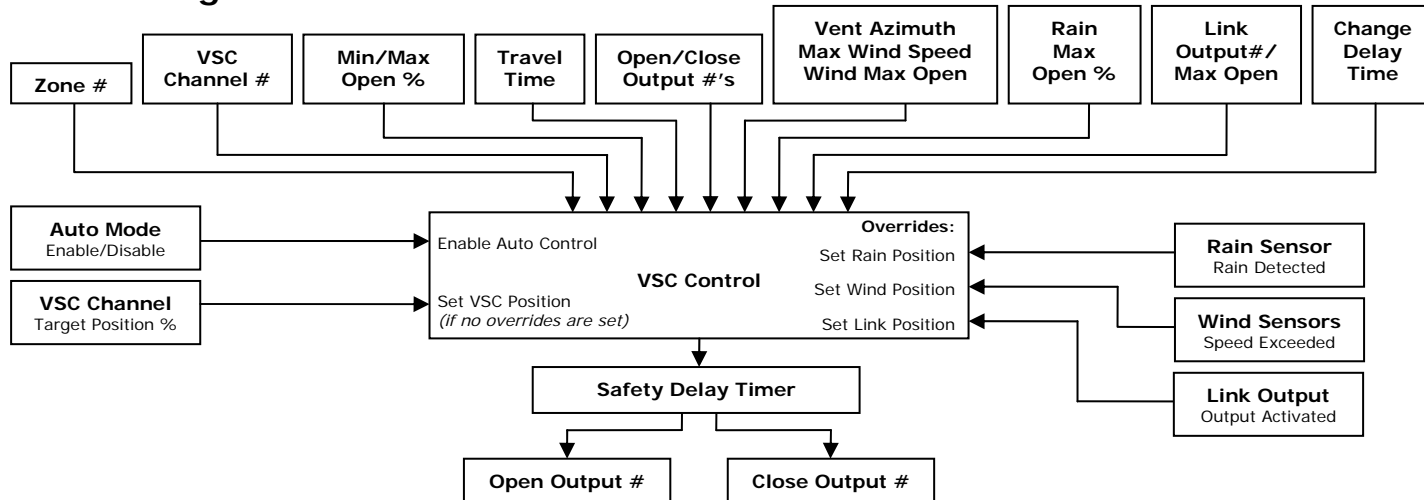


How VSC Works:

- 1) Controls functions such as a thermostat, humidistat or timer are addressed to the VSC channel of choice.
- 2) A VSC control is set up including: the open and close outputs to operate the motor(s) and the total travel time for the vent, shade or curtain to move from fully closed to fully open (advanced settings.)
- 3) The channel for the VSC to receive commands must be entered into the VSC control. Multiple VSC controls may be on the same channel to open and close to the same positions.
- 4) The VSC control is placed into "Auto" mode.
- 5) 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.

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



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.

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.

Azimuth: The windward direction of the vent as viewed from inside the structure. The controller will automatically calculate a 180° range from this direction (90° each way) in which if the maximum wind speed is detected, the vents will activate the wind speed override. If no wind direction sensor is present, the system defaults to speed only.

Max Wind Speed: If the wind speed is exceeded the VSC control will activate the wind speed override and set the wind position as the maximum allowed position. The override will be released when the wind speed drops below the limit. (Recommended to set the Change Delay Time to prevent short cycling.)

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

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

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 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

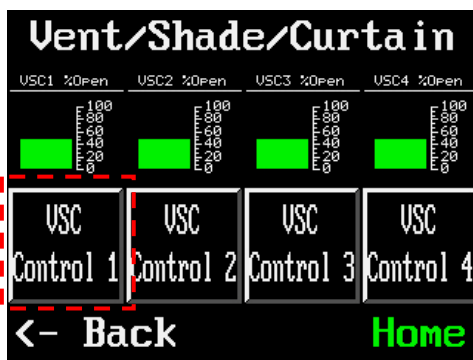
If the motor controller has been operated manually, the position will most likely need to re-calibrated. Simply close the vent or curtain fully and set the position to 0.

Touch Panel

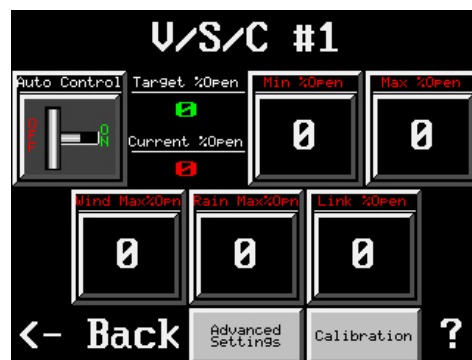
The VSC control settings are accessed from the first page of the controls menu.



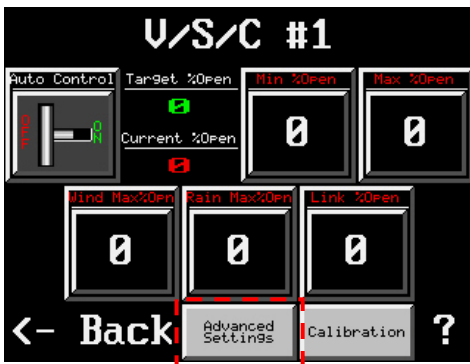
Press “VSC % Controls” button to access the VSC controls.



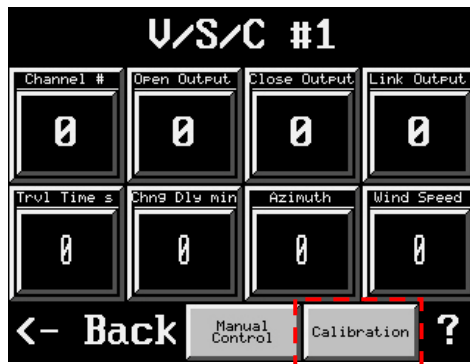
Current VSC positions are shown. Select a VSC control to view/modify settings or position.



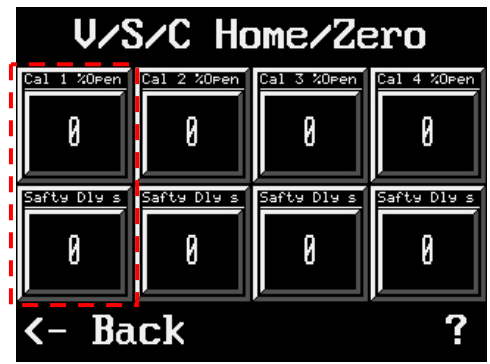
VSC control can be set to auto or off and displays target position from the selected channel and actual position. The position settings can be viewed and modified here.



Press "Advanced Settings" button to access the advanced VSC settings.



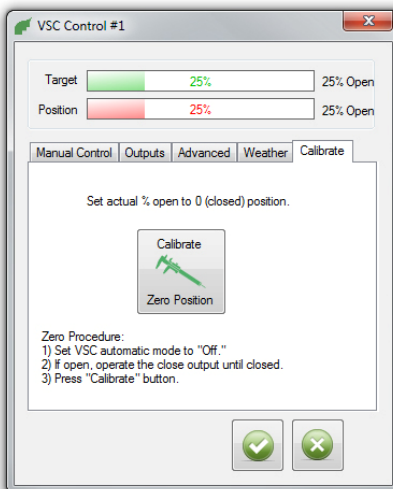
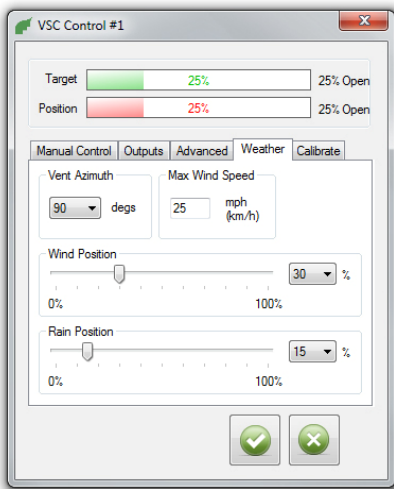
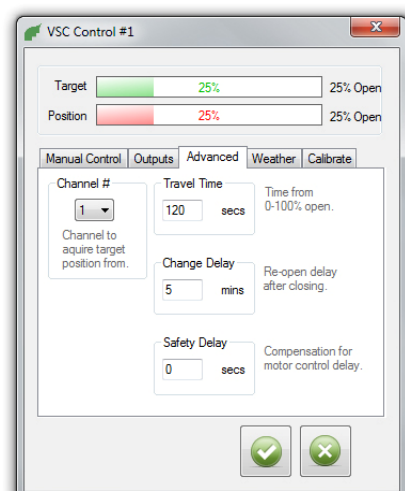
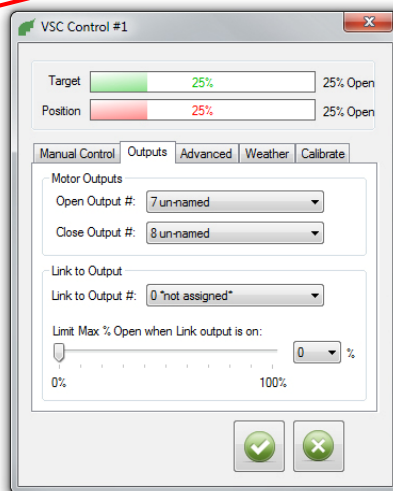
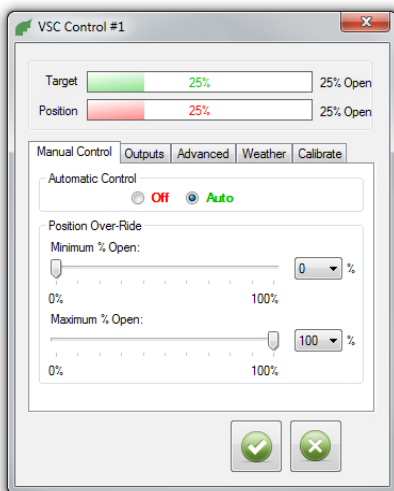
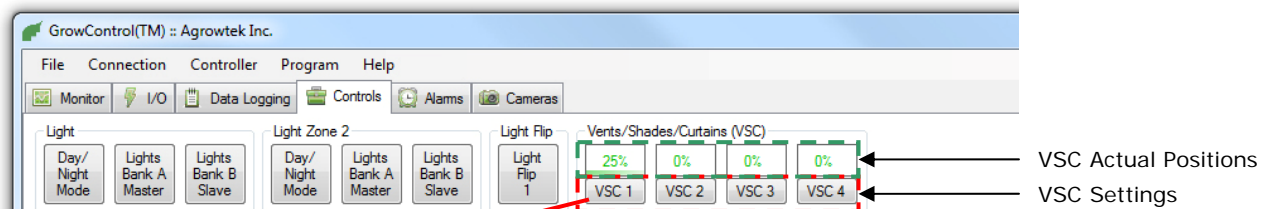
Enter settings as required. Press "calibration" to set the VSC position and modify the safety delay timer.



Calibration and Safety Delay timers are shown for VSC controls 1-4. Enter the actual position or "0" to set home (closed) position. Safety delay time setting is below the calibration setting.

Software

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



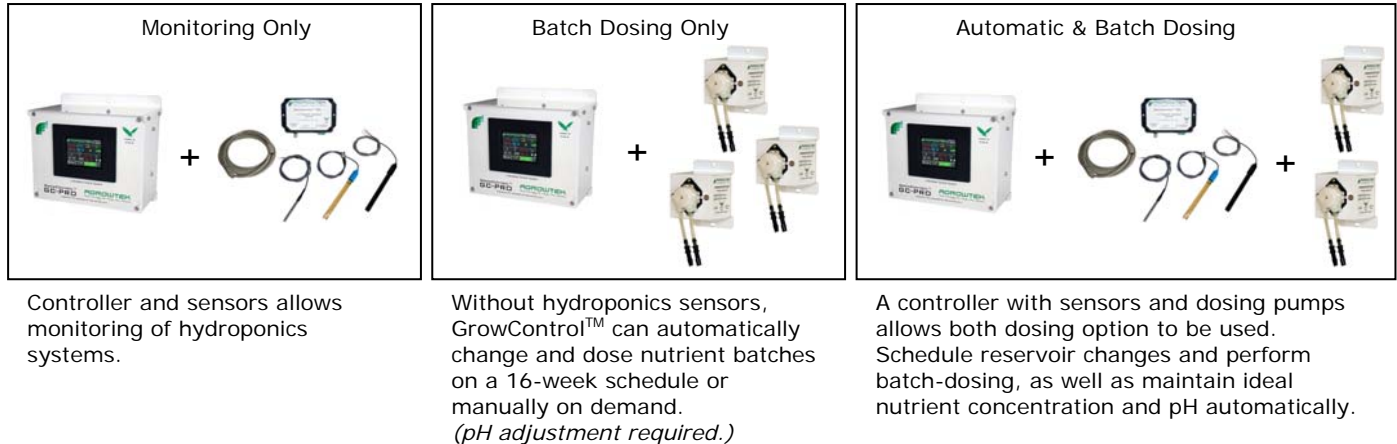
Nutrient Dosing

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.



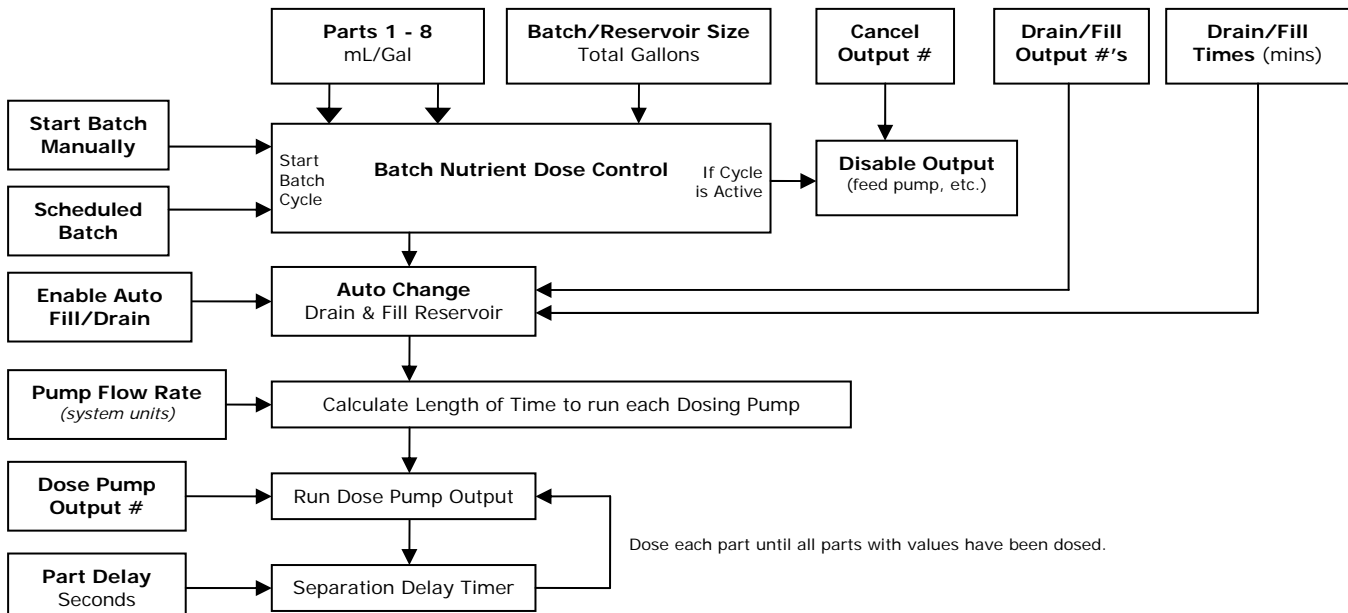
Automatic & Batch Nutrient Dosing



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.

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

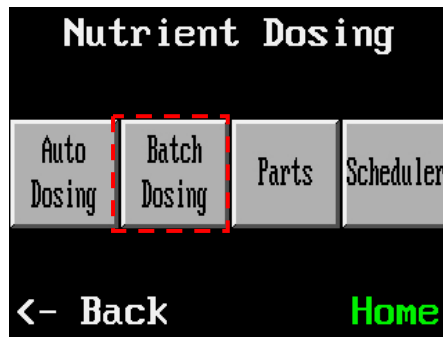
Cancel Output #: Output to cancel when batch dosing is active. Use this to prevent feed pumps from operating when dosing. Set to disable the cancel output when dosing is active in batch mode only, or either batch mode or auto mode.

Touch Panel

The nutrient dosing settings are accessed from the controls menu.



Press "Nutrient Dosing" button to access the nutrient dosing menu.



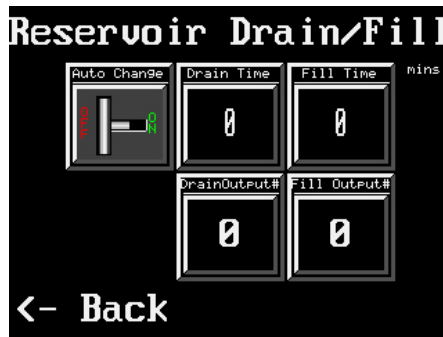
Press "Auto Dosing" button to access the automatic nutrient dosing menu.



Enter a batch/reservoir size (gallons.) Enable/Disable batch dosing. Press "1" to toggle zone 1 to zone 2.



Setup drain & fill (optional) and manually start a batch.

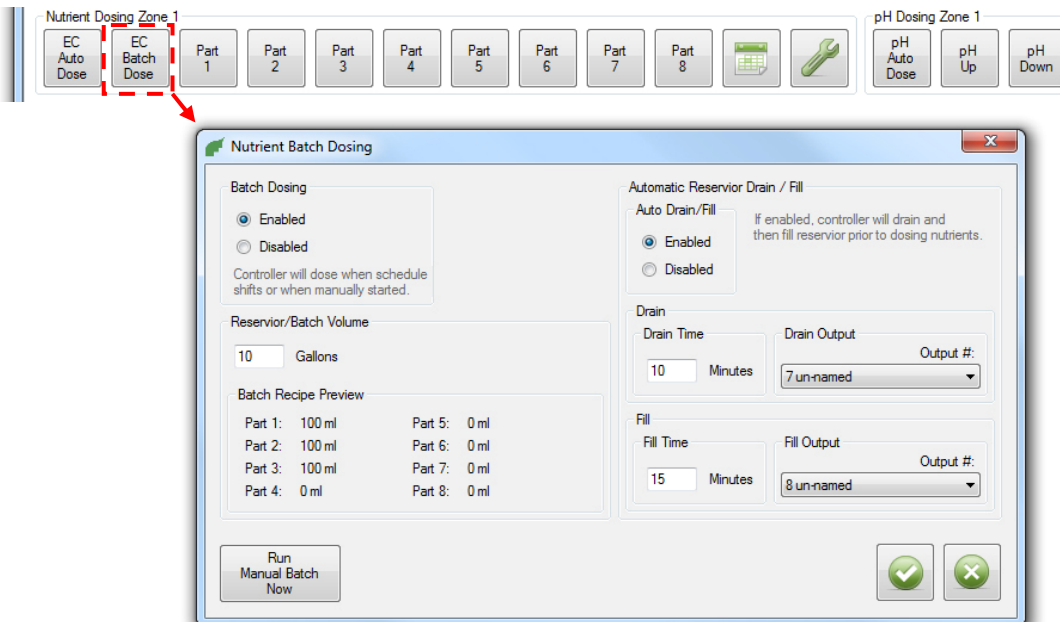


Enable/Disable automatic reservoir changes, set drain & fill times and output numbers.



Initiate a batch cycle and monitor which pump is active and the total amount it will dose.

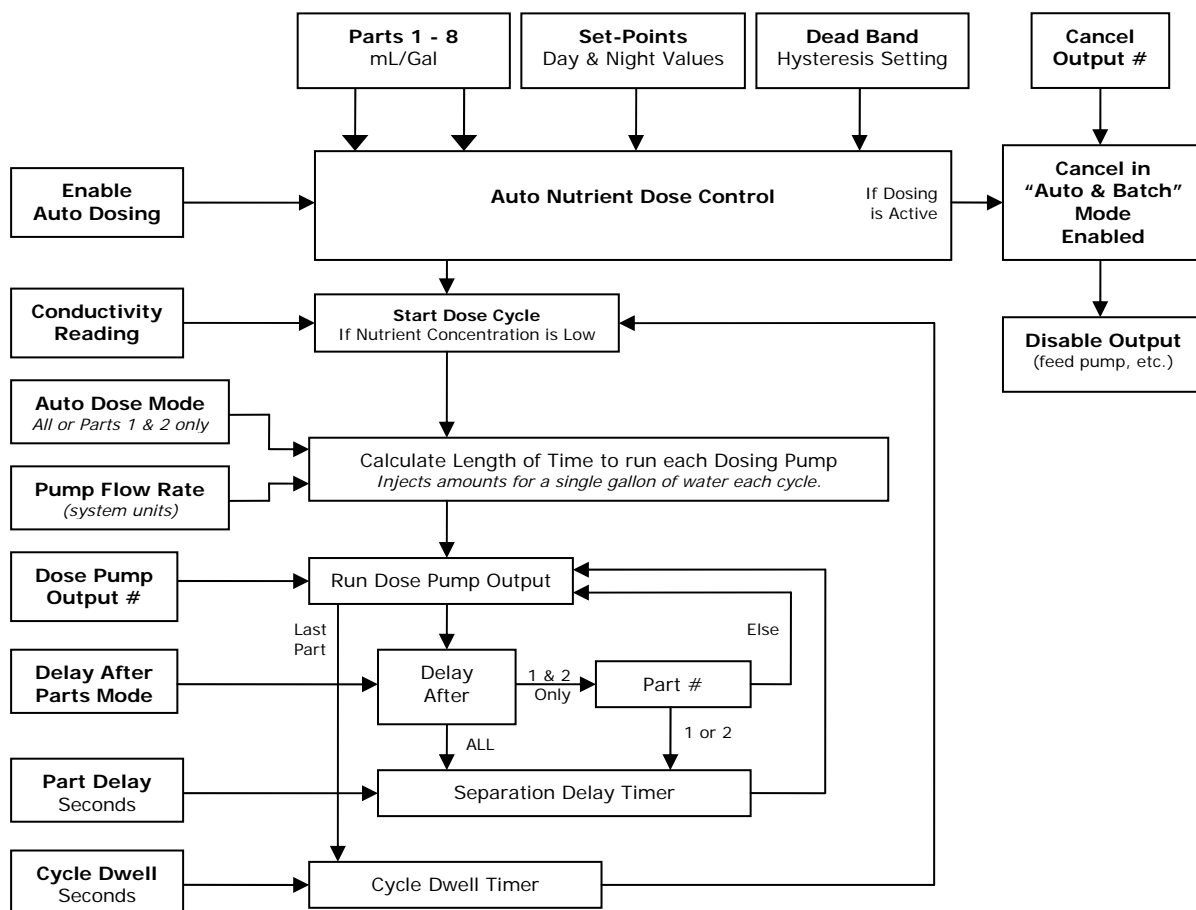
Software



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.



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.

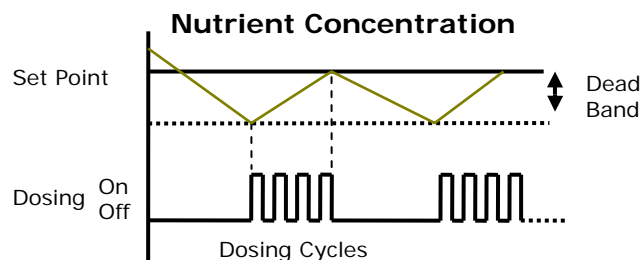
Notes:

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.

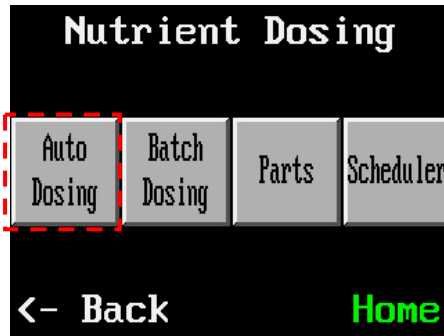


Touch Panel

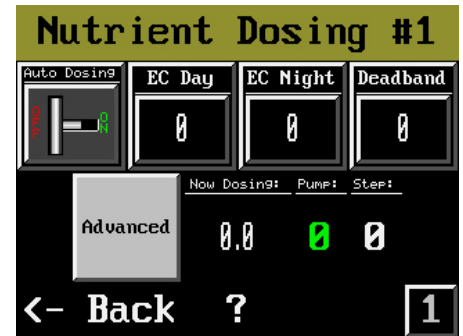
The auto dosing controls are located in the main controls menu.



Press "Nutrient Dosing" button to access the nutrient dosing menu.



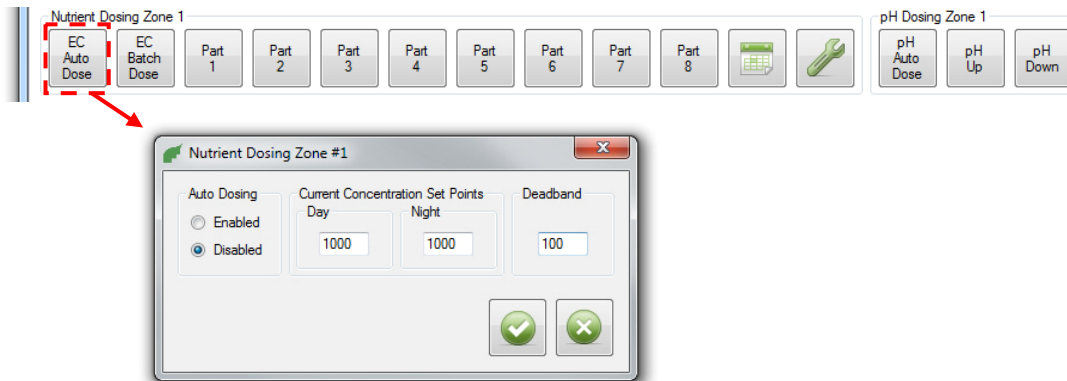
Press "Auto Dosing" button to access the automatic nutrient dosing menu.



Press the number values to enter or adjust with the numeric key pad. Press "1" to toggle zone 1 to zone 2 (multi-zone mode only.)

Software

The nutrient dosing settings are accessed via the controls tab under the "Nutrient Dosing" group. If the controller is in multi-zone mode, there will be two dosing groups; 1 & 2.



Dosing Parts / Pumps

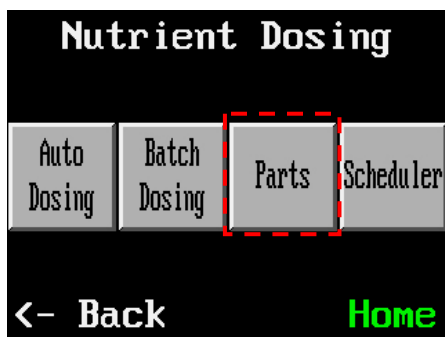
The GC-Pro can operate up to eight (8) dosing pumps each with their own dose volume (or time.)

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.

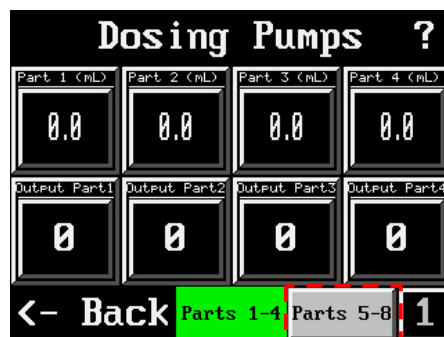
Output Pump 1-8: The output numbers to assign to the respective dosing pumps.

Touch Panel

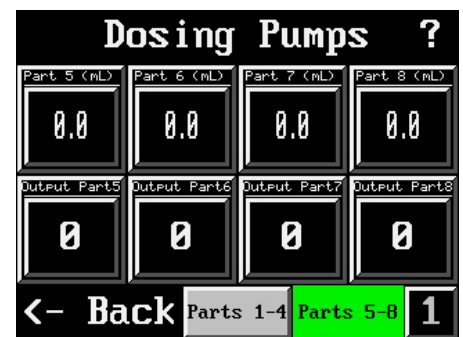
The dosing pumps and part ratios are found under the nutrient dosing main menu.



Press "Parts" button to access the nutrient part ratios and pump outputs.



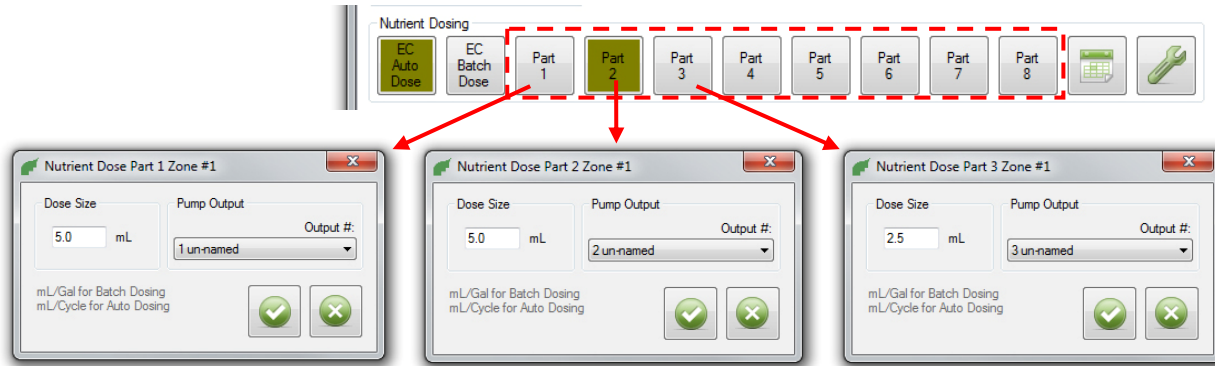
Set nutrient part ratios and pump output assignments.



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

Software

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



Advanced Nutrient Dosing Settings

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

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

Part Delay Time: (seconds) Time to wait between dosing each part.

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.)

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

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

Touch Panel

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



Access the “Advanced” settings from the auto or batch dosing menus.

Set auto dose mode, part delay mode, cancel mode, enable/disable scheduler, set auto cycle dwell time, part separation delay time and cancel output#.

16-Step Nutrient Scheduler

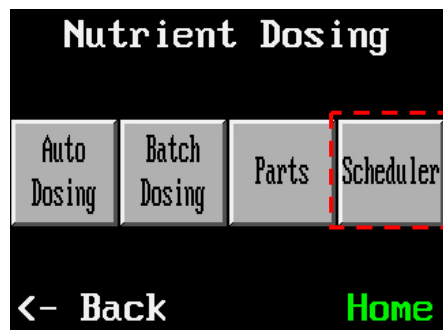
GrowControl The scheduler can update the concentration set points and nutrient part ratios at the time and date which is set for each of the available 16 steps. Batch dosing can be automatically initiated on the change to drain and fill the reservoir, then dose with the required nutrient amounts.

To setup the scheduler:

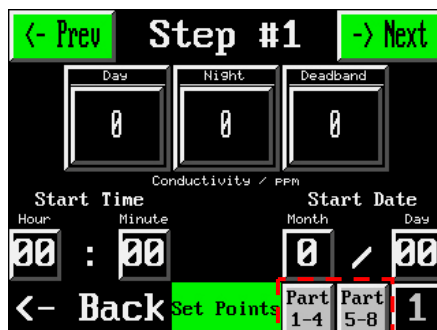
1. Starting at step #1, enter a date and time when the change will occur.
2. Set the desired concentration levels (if using auto dosing.)
3. Set the nutrient part ratios (mL/Gal) for each part to be dosed.
4. Repeat steps 1 through 3 for each of the steps/dates in the growth process.
5. Enable the dosing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

Touch Panel

The scheduler is accessed via the nutrient dosing menu.



Access the nutrient scheduler settings.

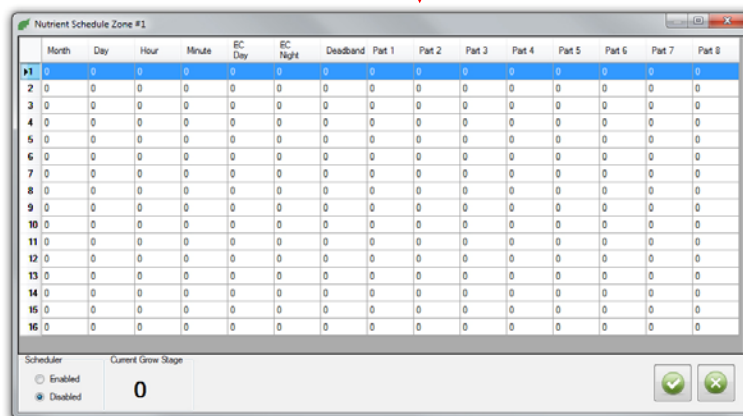


Adjust the concentration set points and effective date/time. Press the "Part" buttons to access mL/Gal ratios.



Set mL/Gal values. Use "Next/Prev" buttons to move through the scheduler steps.

Software

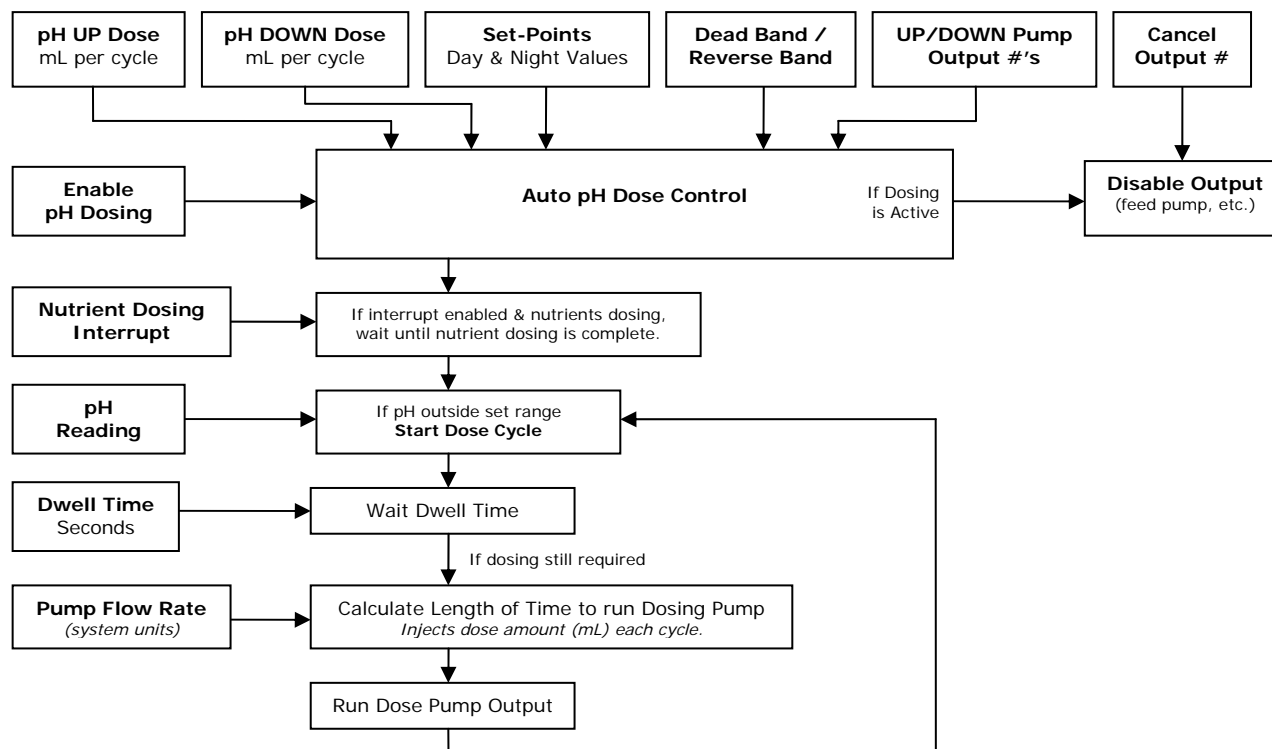


pH Dosing

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. 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.



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

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

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

UP / DOWN Output #'s: The output numbers to assign to the respective up and down dosing pumps.

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

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

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."

Cancel Output: Output to disable when pH dosing is active. Intended to disable the main feed pump when dosing if desired. To disable this feature, leave the cancel output set to 0.

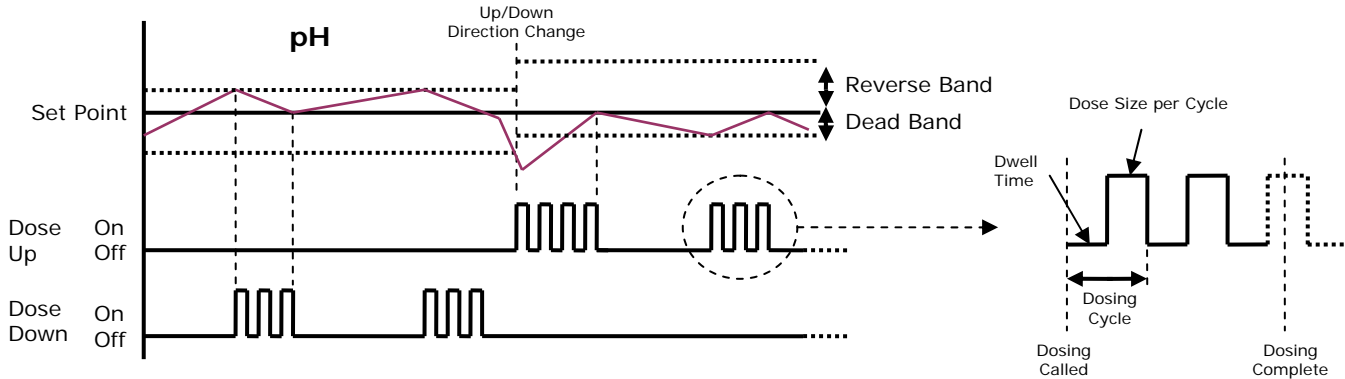
Dead Band: Drift allowed from set point before re-dosing back to set point.

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

Dead-band 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.

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. 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.*



Touch Panel

The pH dosing settings are accessed from the controls menu.



Touch "pH Dosing" to view the pH dose controls.

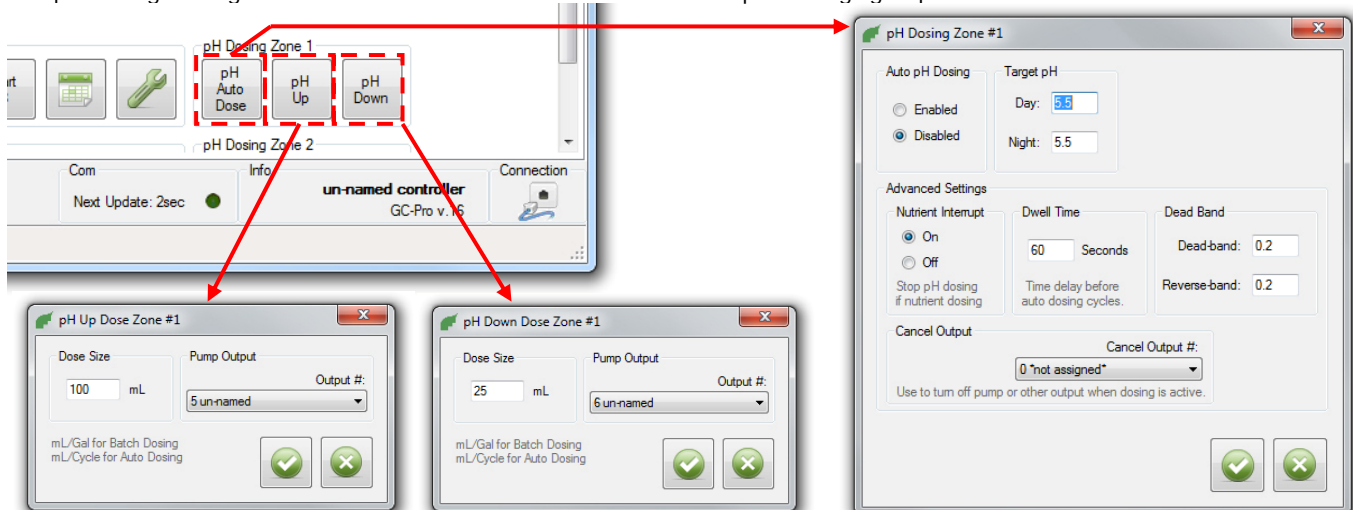
Enter day/night set points. Select pumps or advanced to modify additional settings.

Set dosing pump outputs and size of dose (ml) per dosing injection cycle.

Dead-band, reverse-band, disable output #, dwell delay time and interrupt mode are set in advanced.

Software

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



Alarms

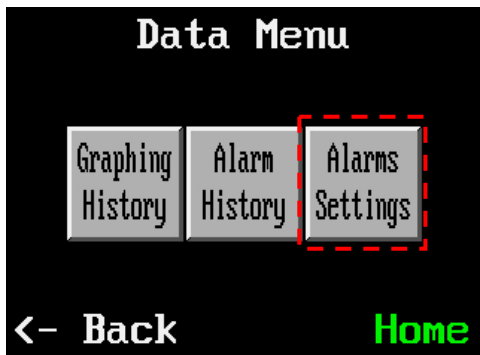
The GC-Pro has built-in high and low set-point alarms for all of the sensor readings. Alarms are displayed and logged in the AgrowTouch™ panel and are sent in an email alert by the GrowControl™ software.

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

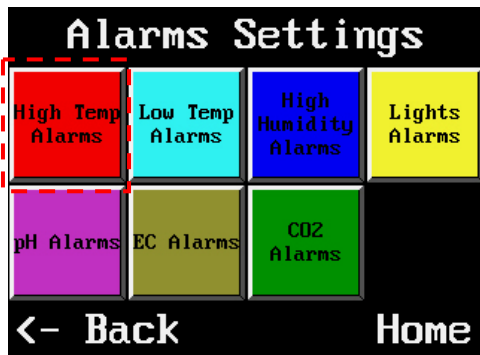
High Air-Temperature Alarm will automatically disable the lighting output for the respective zone.

Touch Panel

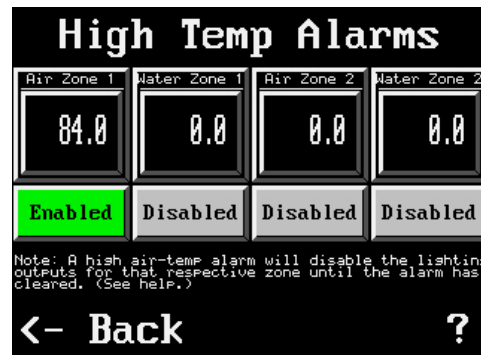
The alarms settings are accessed under the “Data” menu from the Main menu.



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



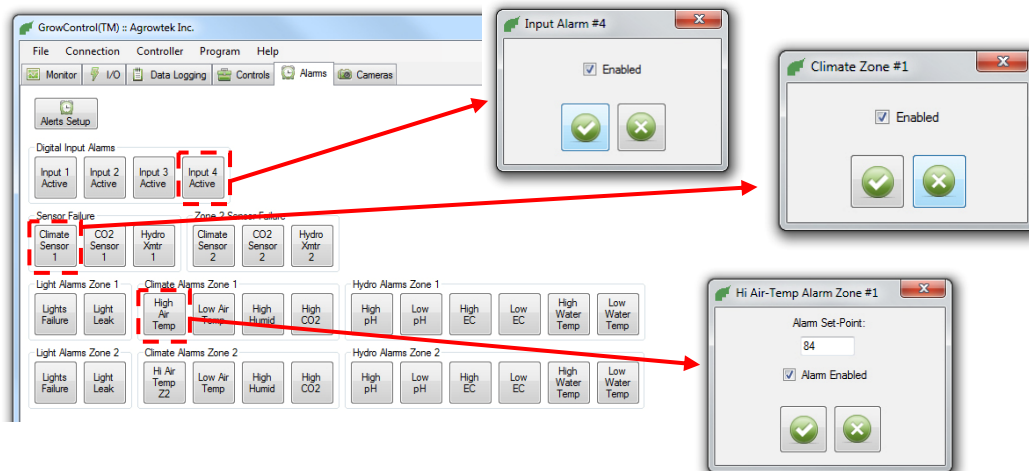
Select an alarm class to view its alarms settings.



Note: If the alarm has a set point, enter it before enabling the alarm.

Software

The alarms settings are accessed via the “Alarms” tab. The software has several additional alarms for notification in the event that a sensor is disconnected and if a digital input has been activated.



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.

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.)

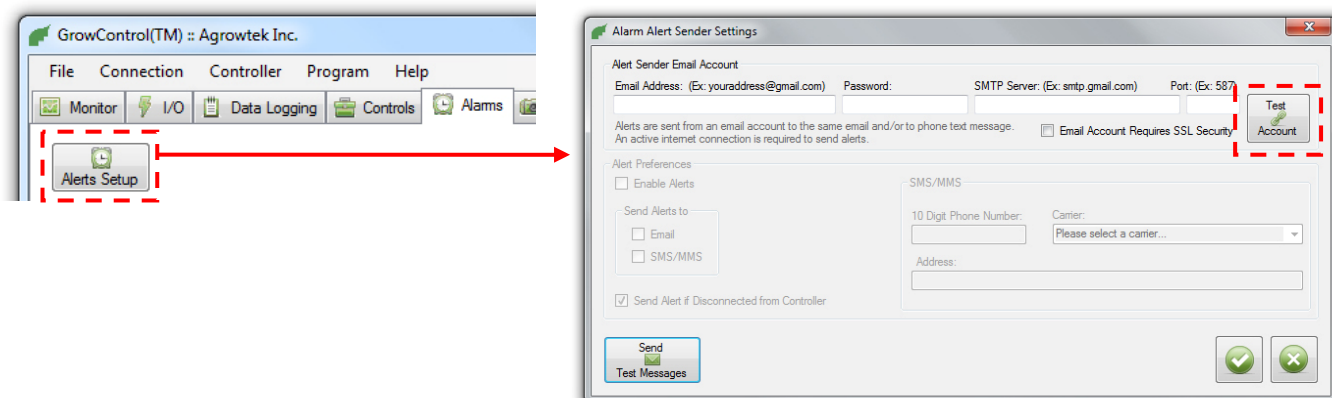
SMTP Server: Enter the SMTP server address that your email server uses. See your email provider for this information.

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.

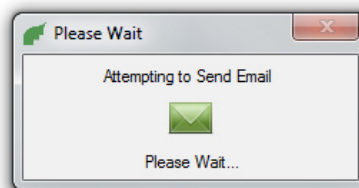
Enable SSL Security: Check whether your email server uses SSL encryption.



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.

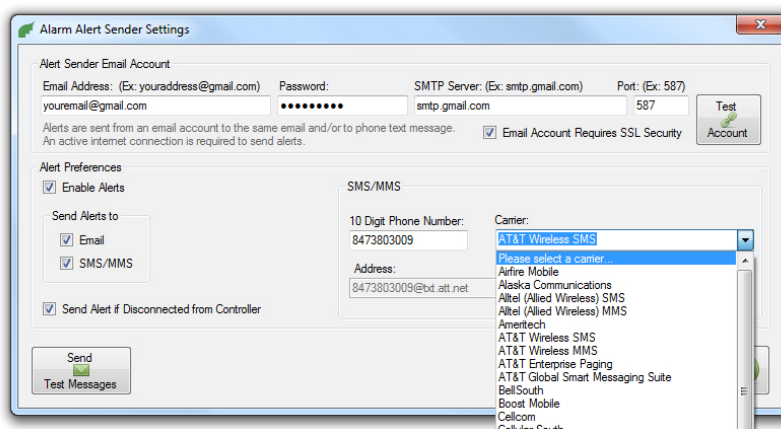


SMS Settings

Once a test email has been sent and alerts are enabled, they can be sent to a wireless phone number as well as email.

Enter your complete 10-digit phone number and select your mobile wireless carrier from the drop-down list.

If your carrier is not listed, you can enter a custom sms/mms gateway address, select "custom" from the bottom of the carrier list.



System Settings

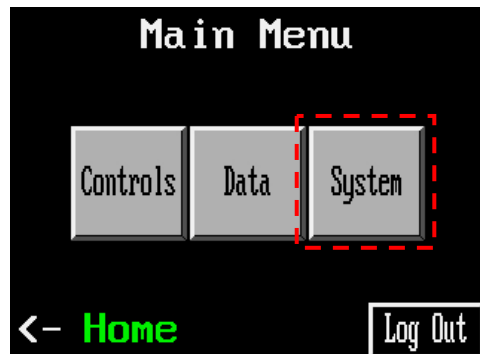
The GC-Pro has a variety of global system settings which affect the way the controller operates and displays data.



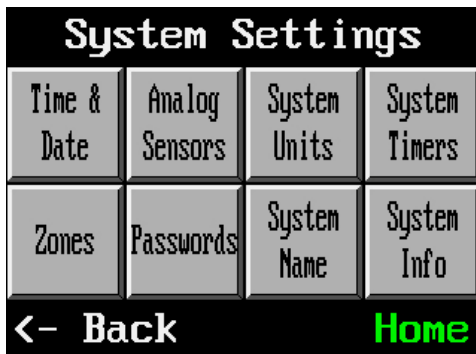
Menus which have a lock icon are restricted to the system administrator; see Users & Passwords.

Touch Panel

The System menu is accessed from the main menu.



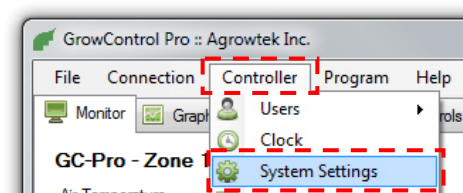
Press "System" button to access the system settings menu.



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/m², Lo-range 0.1 – 1000W/m²)

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.

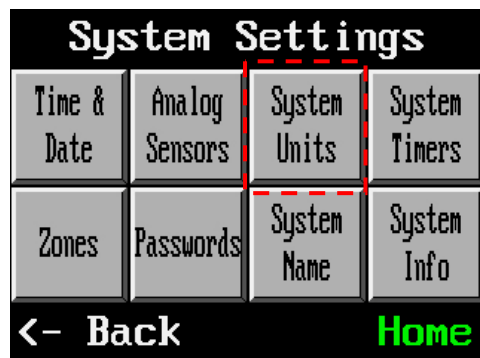
EC ATC: The EC has a standard automatic temperature correction (ATC) factor of 2.14%/°C which is standard for NaCl solutions. This value may be modified if a customized ATC factor is desired.

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.

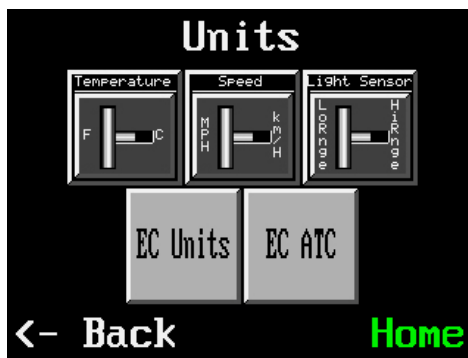
Flow Rate: Flow rate (mL/Min) of dosing pumps. The controller uses this value to determine how long to operate the dosing pumps in order to dispense the proper amount of fluid.

Touch Panel

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



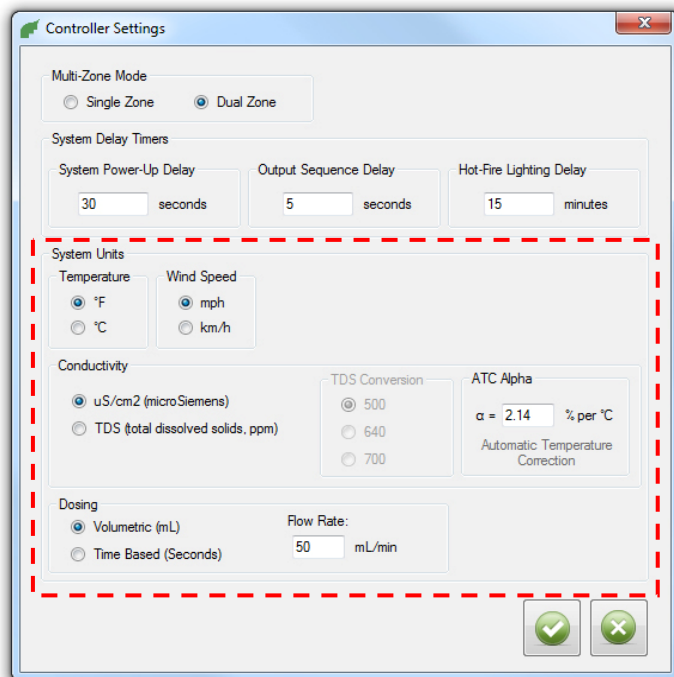
Press “System Units” to access the units menu. *System password required.*



Toggle units or select a sub-menu.

Software

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



System Timers

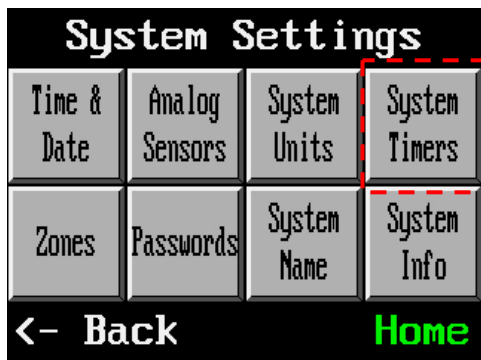
The GC-Pro has several built-in system timers:

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.

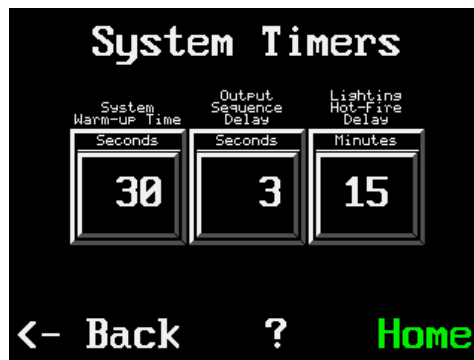
Output Sequence Delay: Delay time that separates outputs from starting at the same time. If multiple outputs are activated simultaneously (such as when changing between day/night or at system start-up) the controller will separate the starting of the outputs by the delay time. This reduces surges in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

Touch Panel



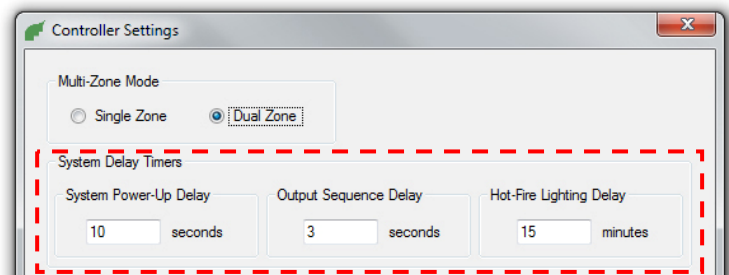
Press "System Timers" to view the system timers menu.



Select a system timer to modify the settings.

Software

The zone settings are located in the "Controller Settings" window.

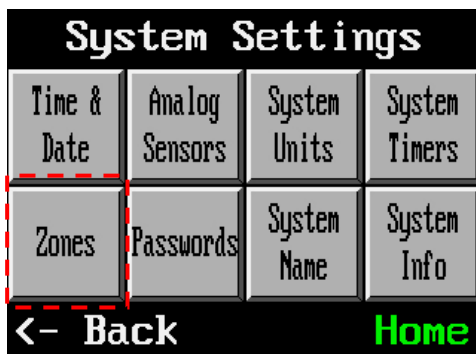


Zones

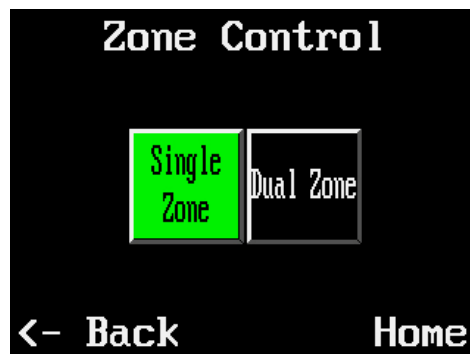
The GC-Pro can monitor sensors in two different zones (two greenhouses or rooms.) To operate the system with two zones, place the controller into 'dual-zone' mode.

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.

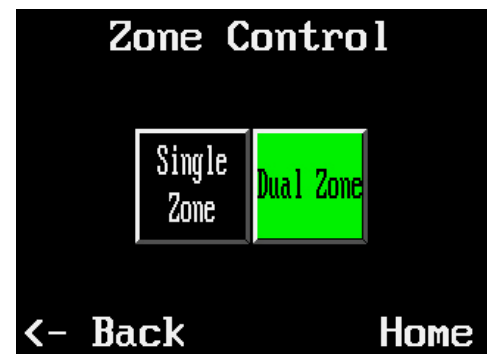
Touch Panel



Press "Zones" to change the controller zone mode.



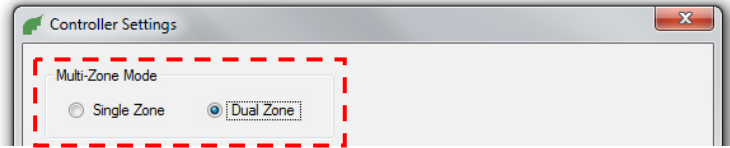
Single zone mode displays only a single home screen and will not show zone 2 controls functions.



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

Software

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



System and User Passwords

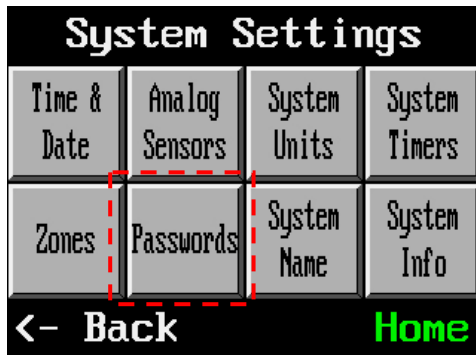
The controller has a system (administrator) password and four (4) operator (user) passwords. The operators have access to the controls functions necessary for day to day operations including temperature and timer settings, etc. The administrator has access to all areas of the controller including the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

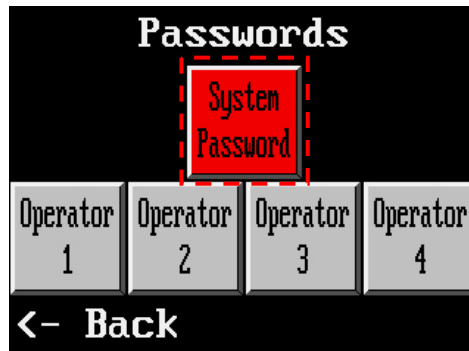
Setting the Passwords

Touch Panel

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



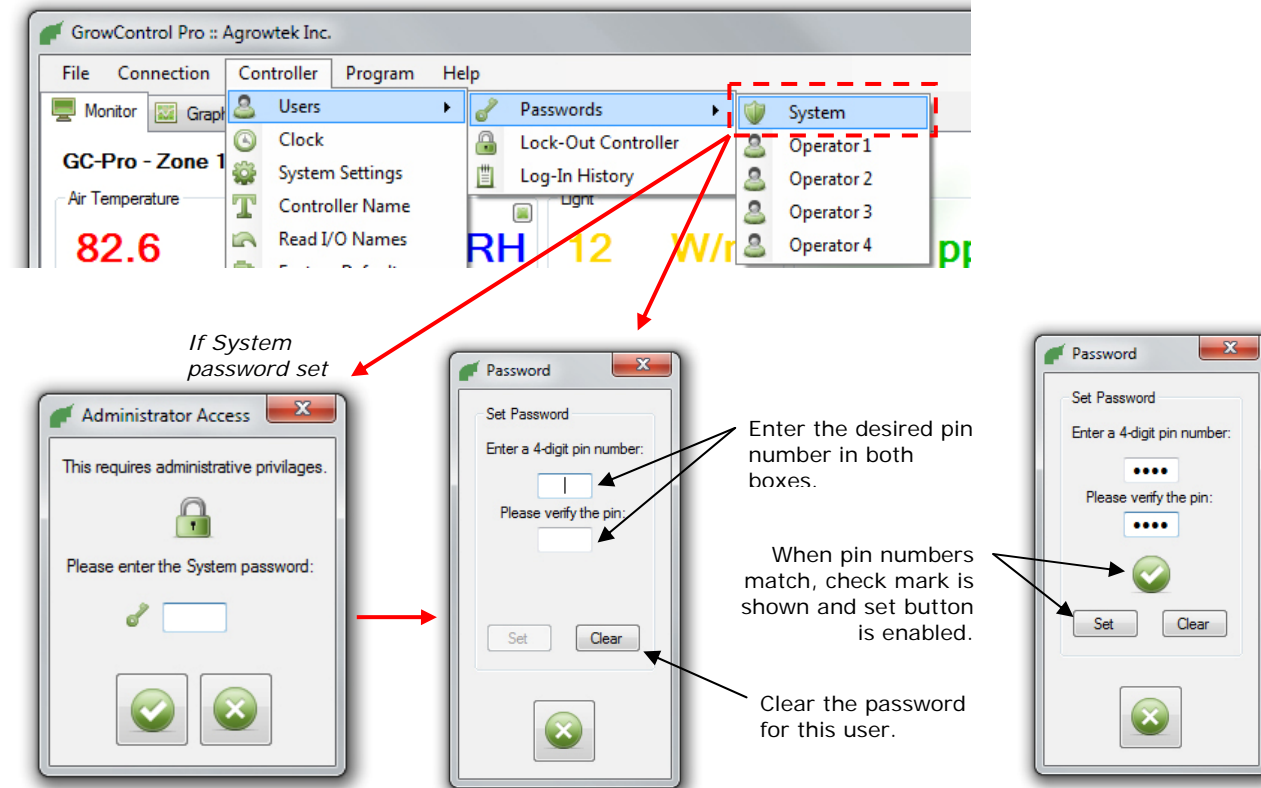
1. From the System Settings menu press “Passwords” button.
(Must be logged in as System admin.)



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.

Software

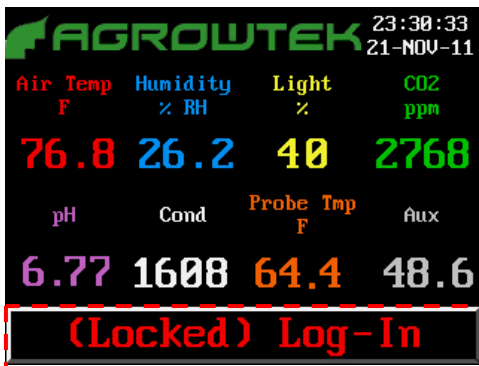
Navigate to “Controller -> Users -> Passwords” and select the user you wish to set or change a password for.



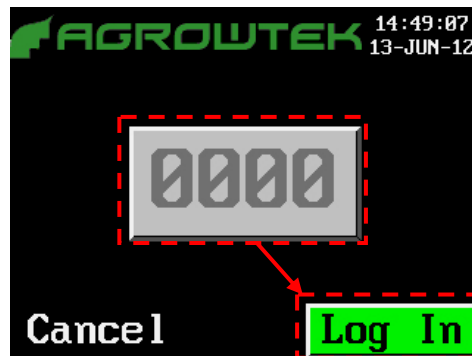
Logging-In

Touch Panel

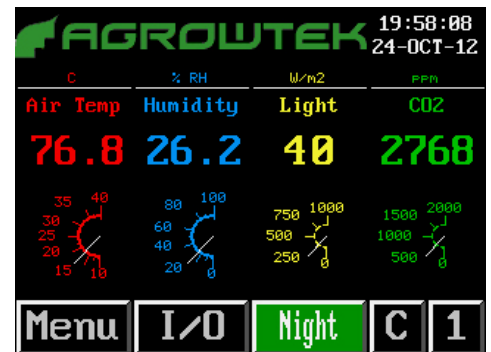
Once the controller has passwords setup on it, the system can be “logged out” so that it is inaccessible to un-authorized users. When logged out, the controller screen is locked. Only the sleep button and login buttons are usable.



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.

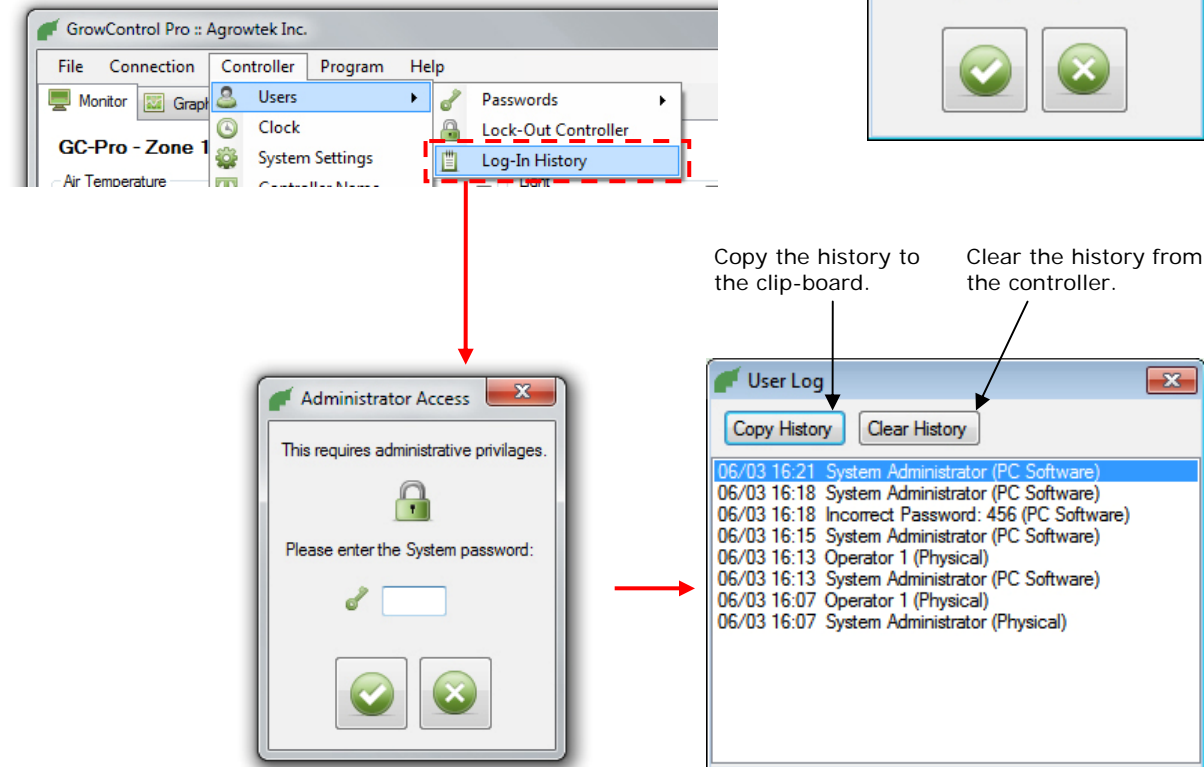
Software

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.

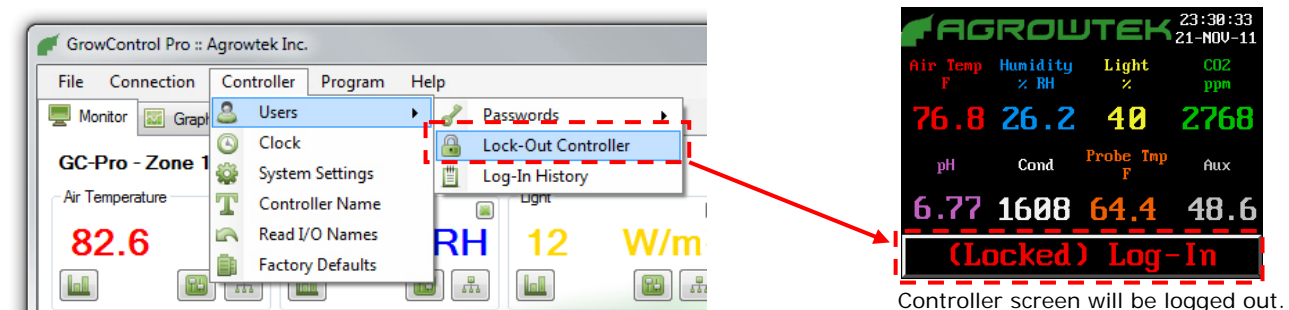
All log-in attempts are logged by the controller including incorrect attempts. The controller will store the last 10 logins, the time and date, and whether the login was local or at the controller screen.

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.



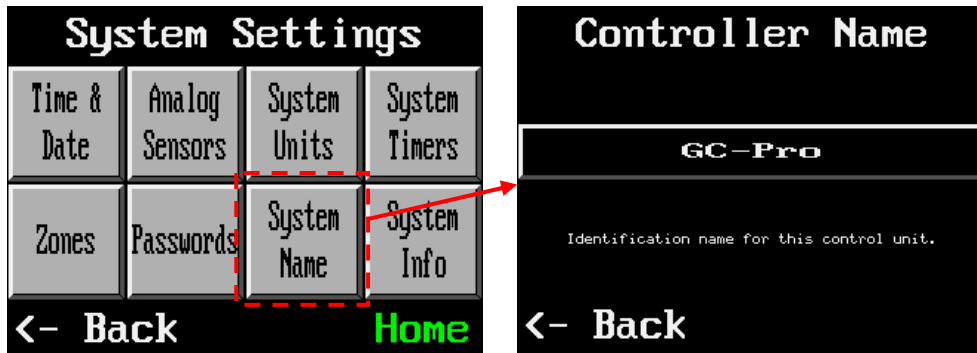
To banish a user:

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.

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 and managed. If more than one controller is connected on your network, then each controller should have a unique name.

Touch Panel

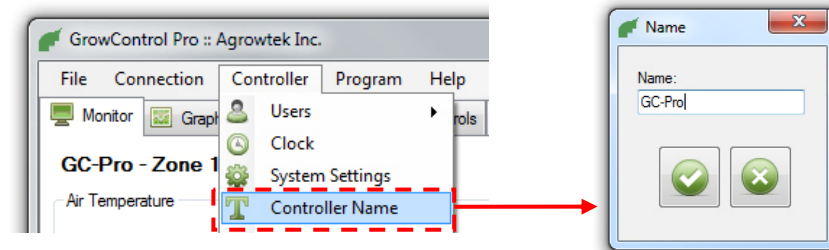


1. From the System Settings menu press the "System Name" button.

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

Software

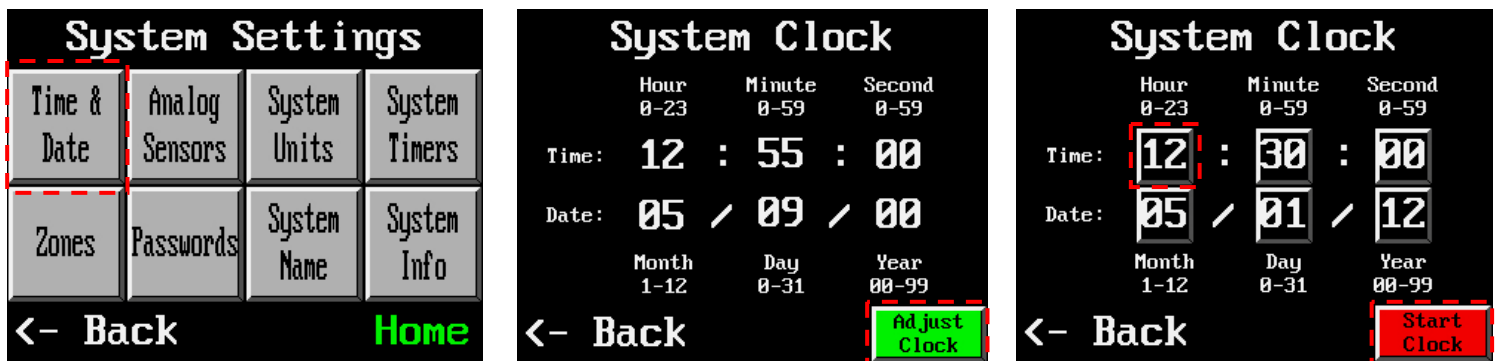
Select "Controller -> Controller Name" from the top menu strip to change the controller's name.



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



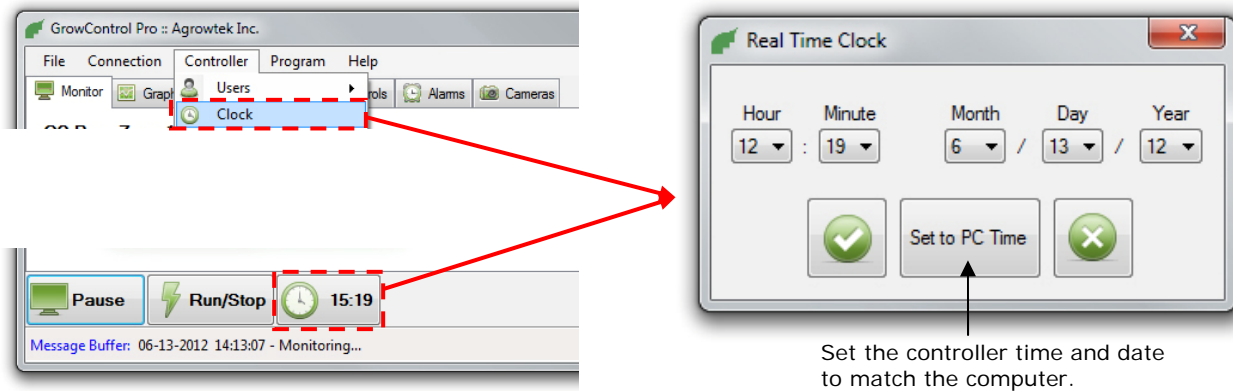
Press "Time & Date" to change the controller's time and date settings.

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.

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.

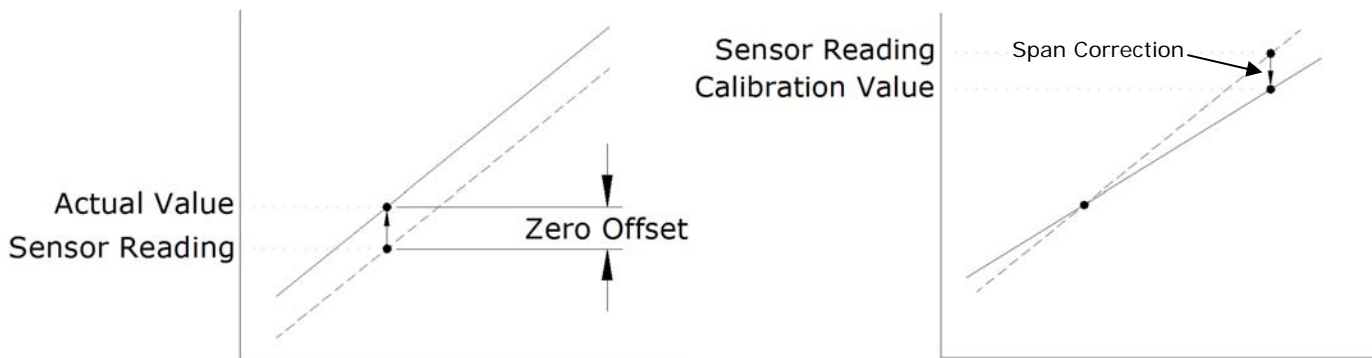
Sensor Calibration

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

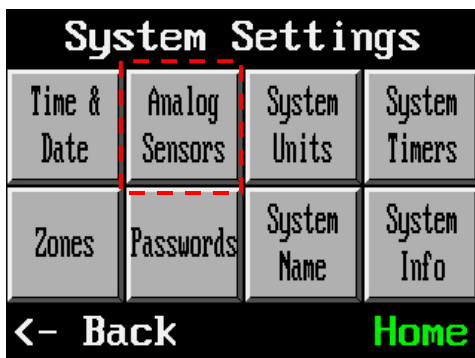
When calibrating a sensor, always perform the "Zero" calibration first. Performing a zero calibration automatically resets the span calibration to the factory default. Span calibrations can be performed successively without affecting the zero calibration.

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

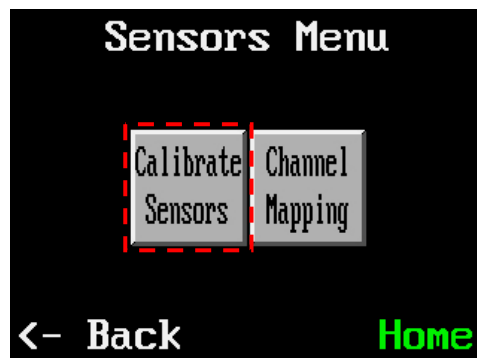
Span calibration adjusts the slope response of the reading to correct for any error as the reading gets further away from the zero calibration point.



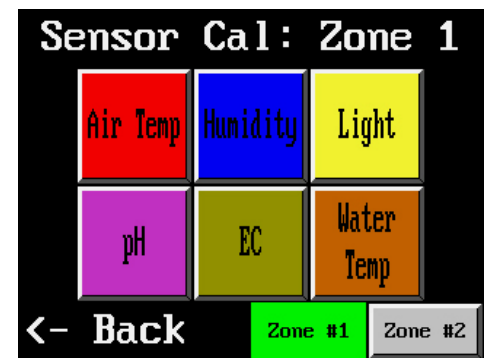
Touch Panel



Press "Analog Sensors" to enter the sensors menu. *System password req'd.*




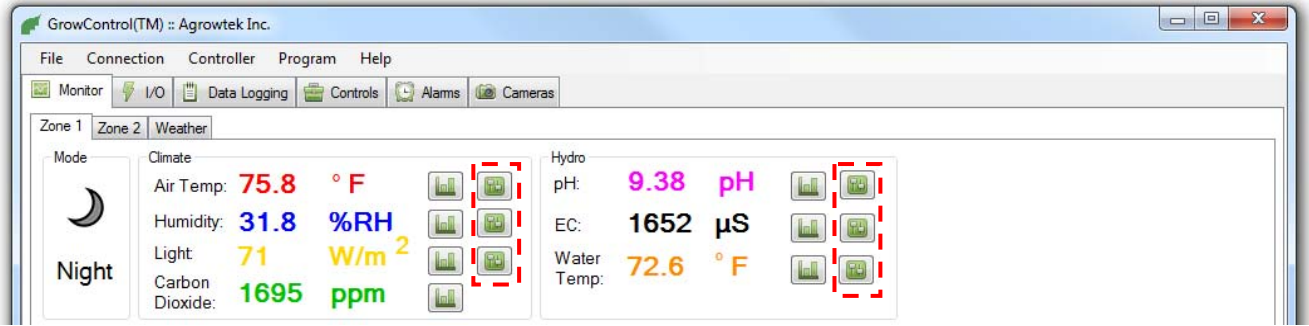
Press "Calibrate" to enter the calibration menu.



Select the zone and which sensor to calibrate.

Software

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



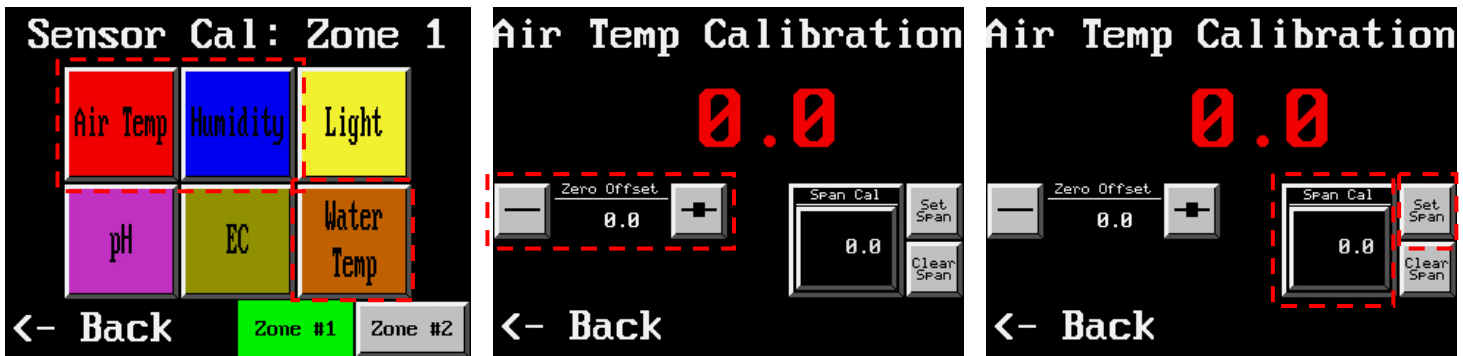
Temperature/Humidity Calibration

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."



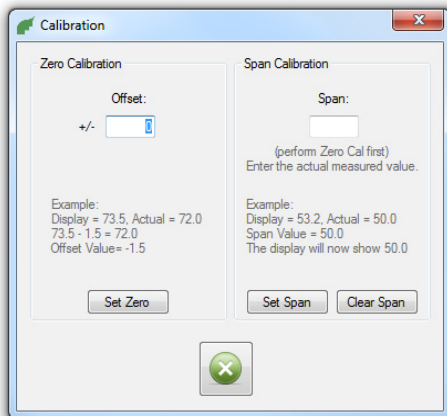
Select a temperature or humidity sensor to calibrate.

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.



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)

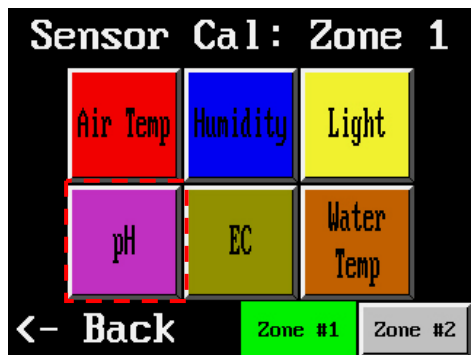
The pH reading is automatically corrected for temperature.
The pH probe must be calibrated with the temperature probe in the calibration solution.

Calibration Procedure:

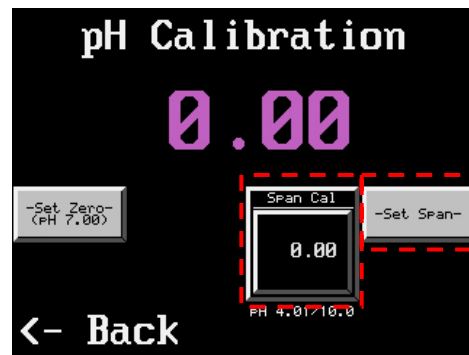
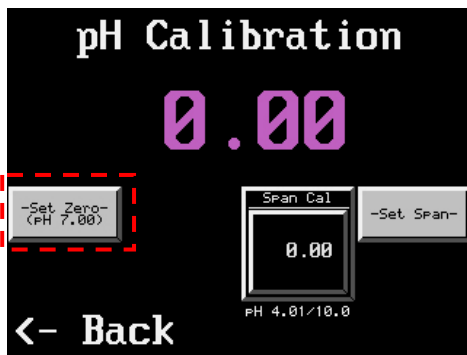
1. Clean and wipe the pH and temperature probes dry.
2. Place both probes into pH 7 calibration solution.
3. Allow the reading to stabilize and set the zero calibration. The reading should now display "7.00."
4. Rinse and dry the pH and temperature probes.
5. Place both probes into pH 4 (or other) calibration 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."



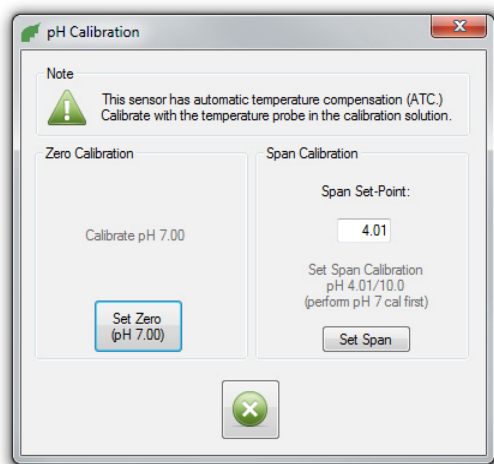
Press "pH" to access the pH calibration.



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.

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.

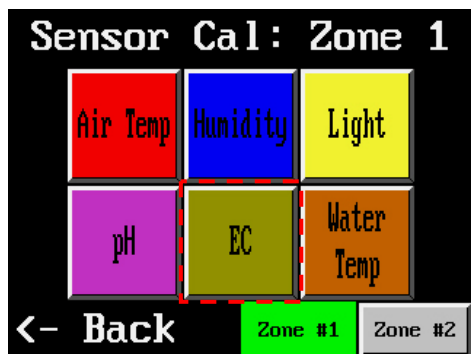
Calibration Procedure:

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.

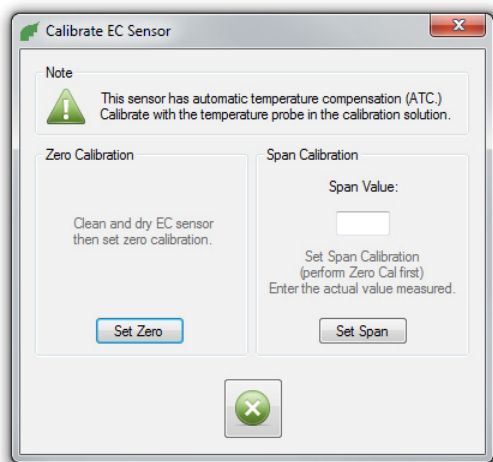


Zero: To set the zero, press "Set Zero" when the probe is clean and thoroughly dry.



Software

Press the calibration button  for the conductivity sensor to calibrate.



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

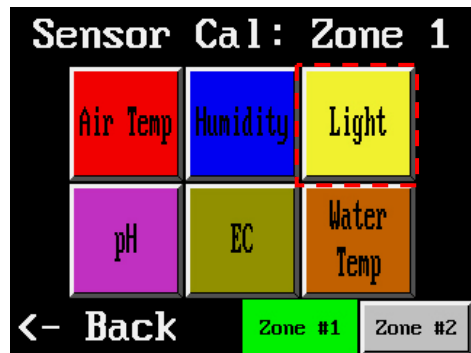
Light Sensor Calibration

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. Allow at least 60 seconds for the light reading to fully settle and stabilize.

Touch Panel

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



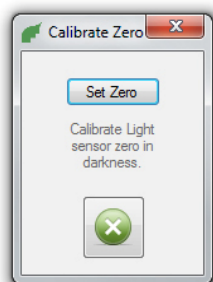
Press "Light" to calibrate the light sensor.



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

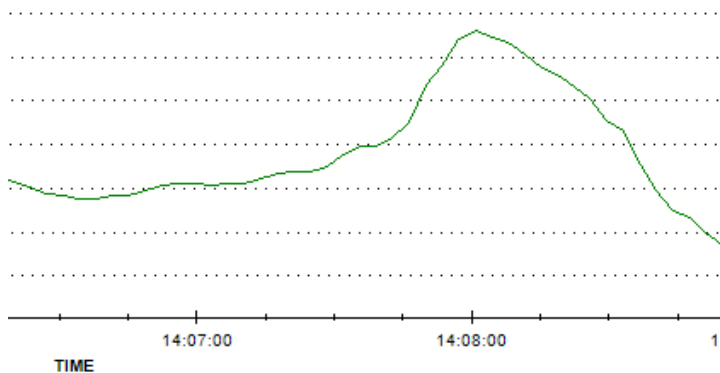
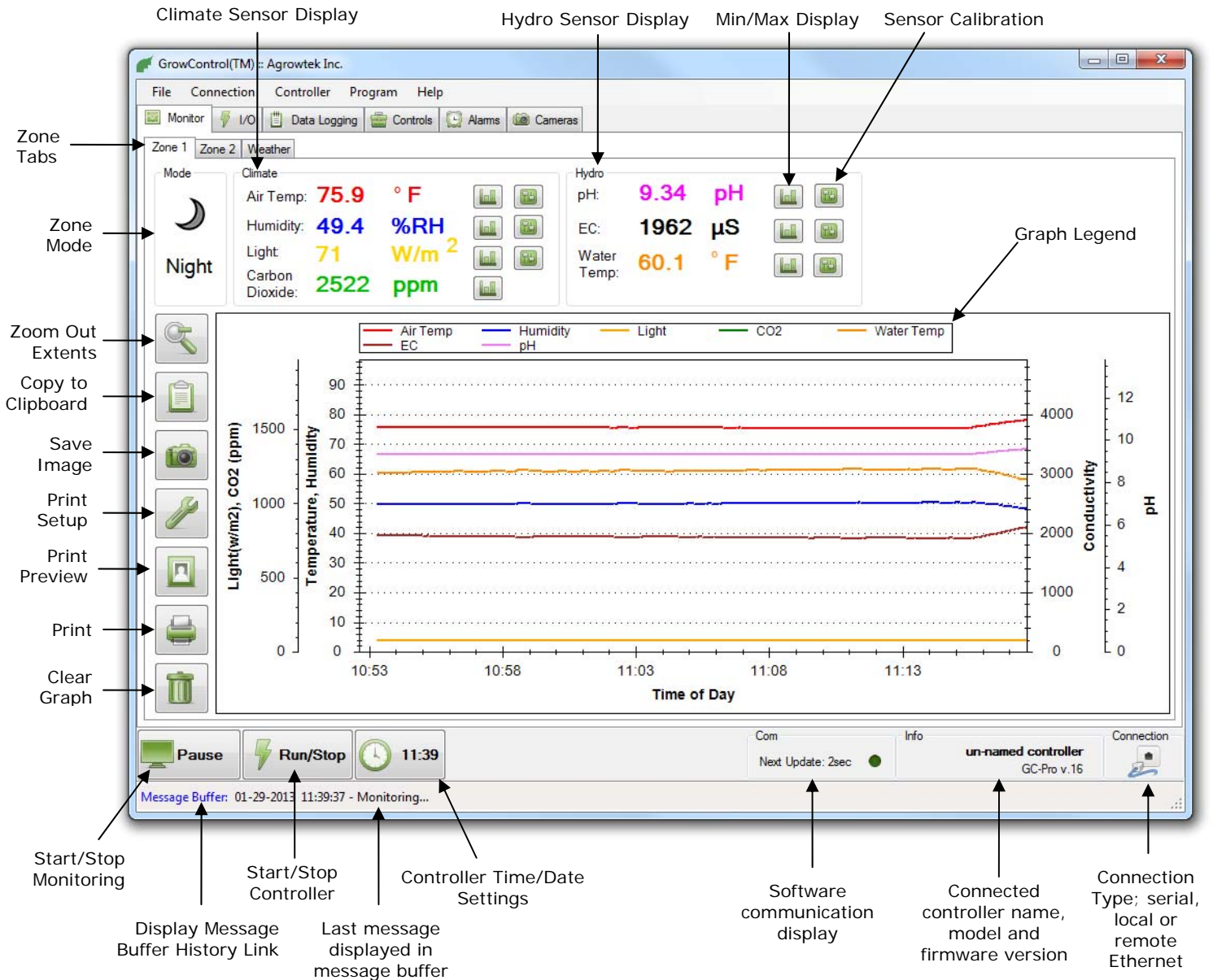
The GC-Pro comes with free computer software which allows full remote monitoring and control of the GC-Pro, as well as some additional features, including:

- 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

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.

Use the historical data buttons to view the max/min and average values since the last reset.



Note:

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

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.

Start / Stop logging

Zone Tabs

Seconds between data samples

Select continuous or daily file generation

Set the directory that the program should save log files to

GrowControl(TM) :: Agrowtek Inc.

File Connection Controller Program Help

Monitor I/O Data Logging Controls Alarms Cameras

Logging Interval: 5 Seconds

Auto-Start

Continuous File

Daily File

Set Save Folder

Logging File Folder: C:\Users\Workstation\Desktop

Zone 1 Zone 2 Weather

Date	Time	Air Temp	Humidity	Light	CO2	pH	EC	Wtr Temp	Inputs	Outputs
01-29-2013	11:37:20	75.9	49.3	71	2517	9.35	1970	59.9		3
01-29-2013	11:37:25	75.9	49.3	71	2516	9.35	1970	59.9		3
01-29-2013	11:37:30	75.9	49.3	71	2517	9.35	1970	59.9		3
01-29-2013	11:37:35	75.9	49.4	71	2520	9.35	1967	60.0		3
01-29-2013	11:37:40	75.9	49.4	71	2518	9.35	1967	60.0		4
01-29-2013	11:37:46	75.9	49.3	71	2517	9.35	1970	59.9		4
01-29-2013	11:37:51	75.9	49.3	71	2516	9.35	1970	59.9		4
01-29-2013	11:37:56	75.9	49.3	71	2516	9.35	1970	59.9		4
01-29-2013	11:38:01	75.9	49.3	71	2515	9.35	1973	59.8		8 10
01-29-2013	11:38:06	75.9	49.2	71	2514	9.35	1973	59.8		8
01-29-2013	11:38:11	75.9	49.3	71	2515	9.35	1973	59.8		8 10
01-29-2013	11:38:16	75.9	49.4	71	2518	9.35	1967	60.0		8
01-29-2013	11:38:21	75.9	49.4	71	2522	9.35	1964	60.1	1	10
01-29-2013	11:38:26	75.9	49.4	71	2522	9.35	1964	60.1	1	10
01-29-2013	11:38:31	76.0	49.4	71	2521	9.35	1965	60.1	1	10
01-29-2013	11:38:36	76.0	49.4	71	2520	9.35	1968	60.0		
01-29-2013	11:38:41	76.0	49.4	71	2518	9.35	1968	60.0	2	10
01-29-2013	11:38:46	75.9	49.4	71	2518	9.35	1967	60.0	2	
01-29-2013	11:38:51	75.9	49.3	71	2517	9.35	1970	59.9	2	10
01-29-2013	11:38:56	76.0	49.3	71	2516	9.35	1971	59.9		8
01-29-2013	11:39:02	76.0	49.3	71	2516	9.35	1971	59.9		8 10
01-29-2013	11:39:07	75.9	49.3	71	2517	9.35	1970	59.9		8
01-29-2013	11:39:12	75.9	49.4	71	2518	9.35	1967	60.0		8 10
01-29-2013	11:39:17	75.9	49.3	71	2516	9.35	1970	59.9	1	
01-29-2013	11:39:22	75.9	49.3	71	2515	9.35	1973	59.8	1	10
01-29-2013	11:39:28	75.9	49.2	71	2514	9.35	1973	59.8		12
01-29-2013	11:39:33	75.9	49.3	71	2515	9.35	1973	59.8		10 12
01-29-2013	11:39:38	75.9	49.3	71	2516	9.35	1970	59.9	2	
01-29-2013	11:39:43	75.9	49.4	71	2518	9.35	1967	60.0	2	10
01-29-2013	11:39:48	75.9	49.4	71	2518	9.35	1967	60.0	2	12
01-29-2013	11:39:53	75.9	49.4	71	2518	9.35	1967	60.0		8 10 12
01-29-2013	11:39:58	75.9	49.4	71	2518	9.34	1965	60.0		8 10 12
01-29-2013	11:40:03	75.9	49.4	71	2520	9.34	1965	60.0		8 10

Pause Run/Stop 11:39

Com Next Update: 2sec

Info un-named controller GC-Pro v.16

Connection

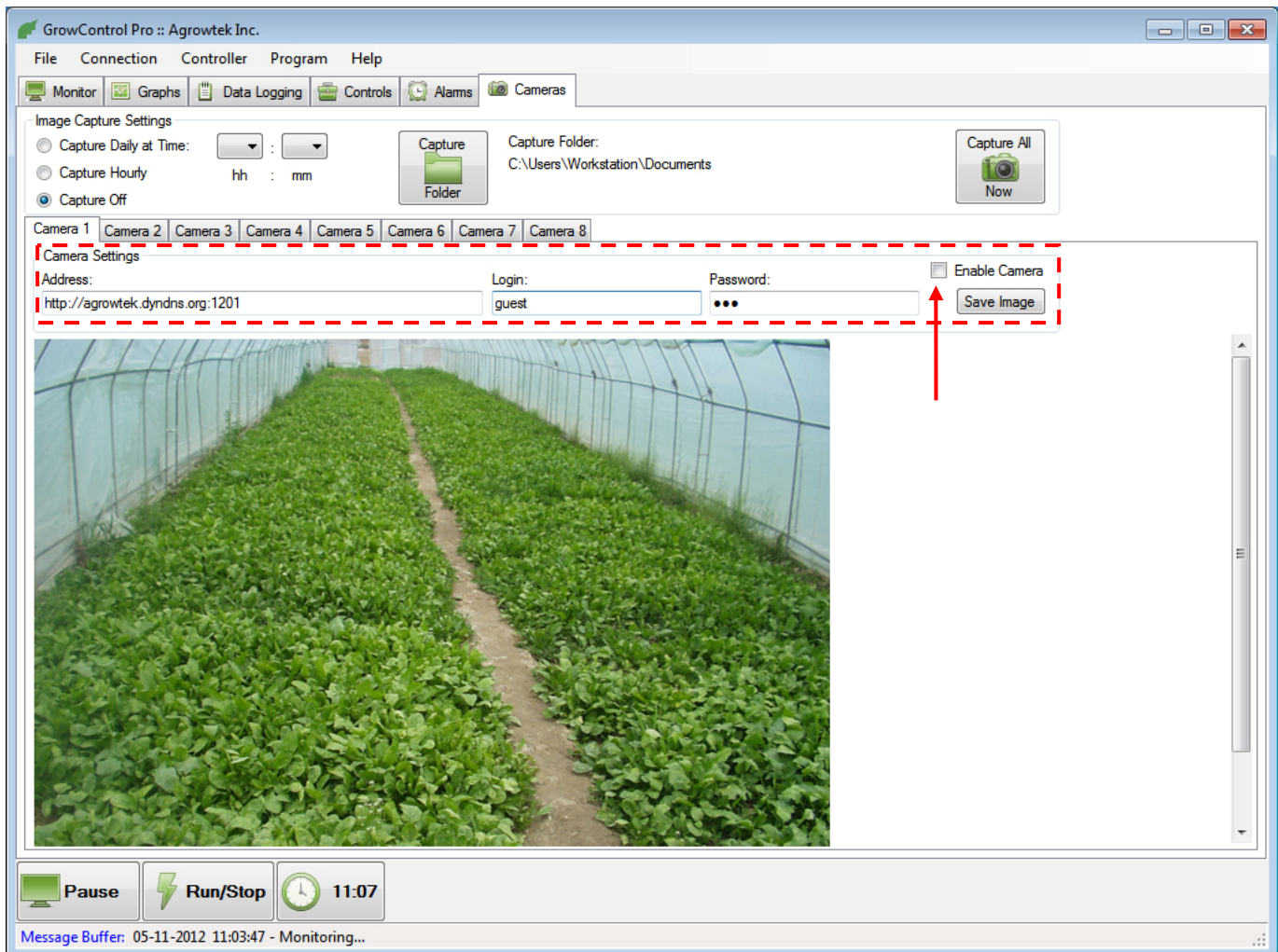
Message Buffer: 01-29-2013 11:39:37 - Monitoring...

Cameras

The cameras tab allows monitoring up to 8 video cameras per control system. 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.



Note: Currently compatible only with cameras available from Agrowtek Inc.

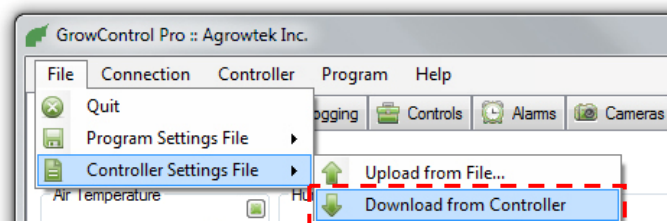
Controller Settings File Upload/Download

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

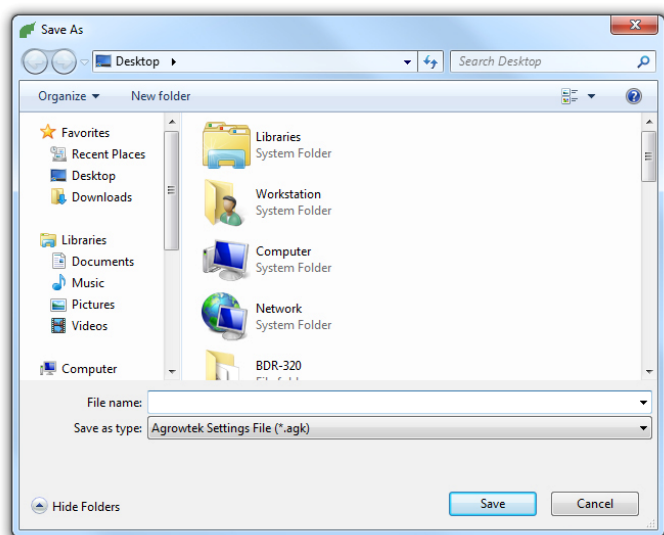
- Settings files can be uploaded to one or more controllers so that they all have the identical settings.
- Settings files can be uploaded after a firmware update to quickly restore all of the settings and calibration values.
- Download settings files and save your setup for each stage of growth.

Download a Settings File from Controller

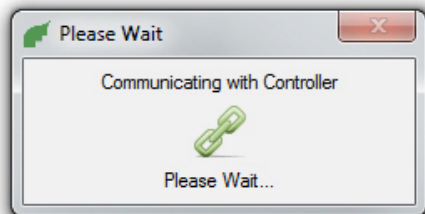
1. Navigate to "File -> Controller Settings File -> Download from Controller."



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

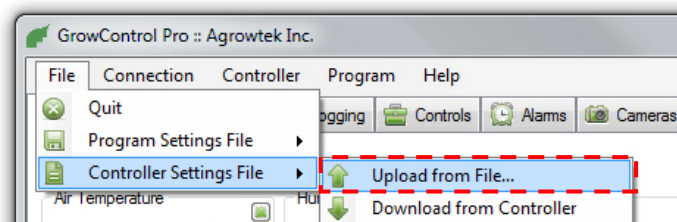


3. The controller will read all of the settings in the controller; this may take a minute. When it is complete, the wait window will disappear and the file will be saved to the location you selected.

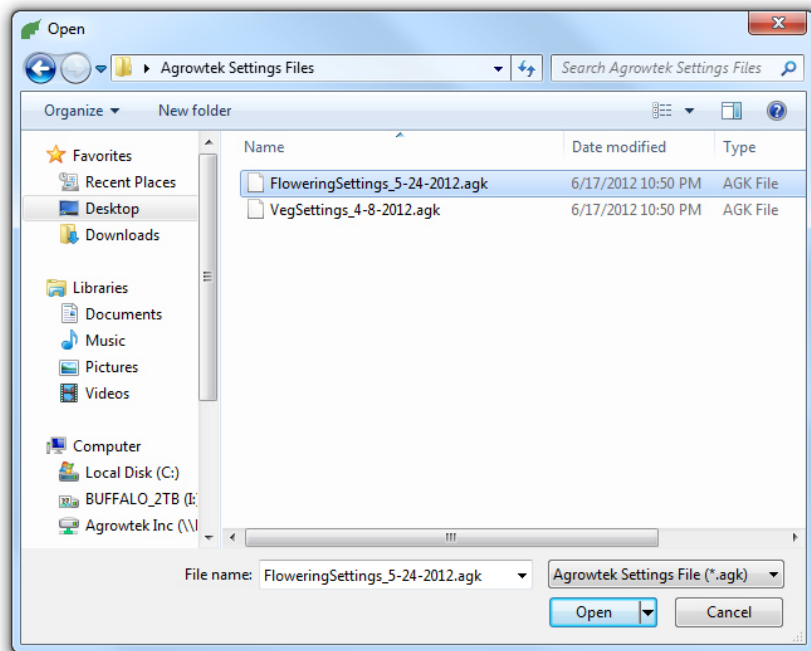


Upload a Settings File to Controller

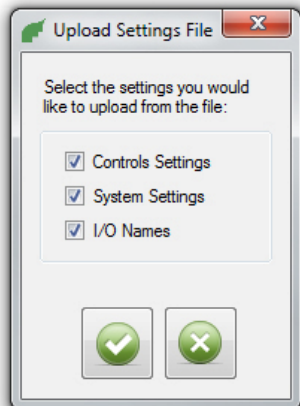
1. Navigate to "File -> Controller Settings File -> Upload from File..."



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.

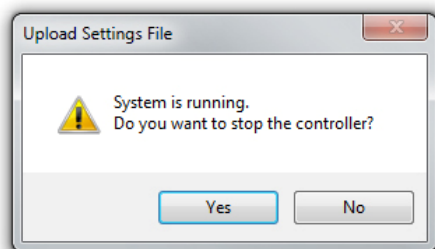


Controls Settings will upload all of the settings entered for the controls functions such as timers, thermostats, etc.

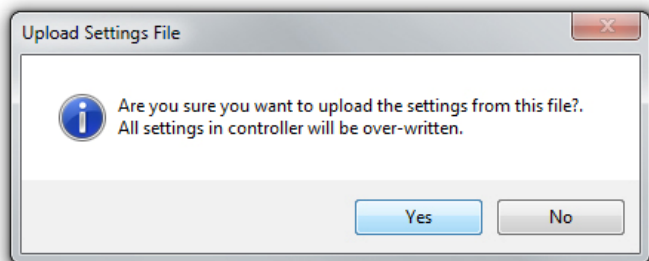
System Settings will upload the sensor mapping, calibration settings, and other system settings such as system timers, units selections, etc.

I/O Names uploads the names of the inputs and outputs stored in the settings file.

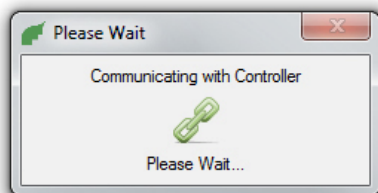
4. If the controller is running, select whether to stop it or leave it running.
It is recommended to stop the controller before uploading a settings file.



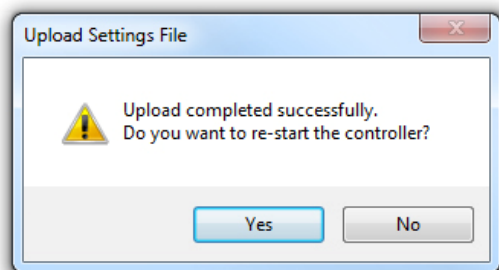
5. Verify that you want to upload the settings and you are aware that the settings in the controller will be over-written.



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.



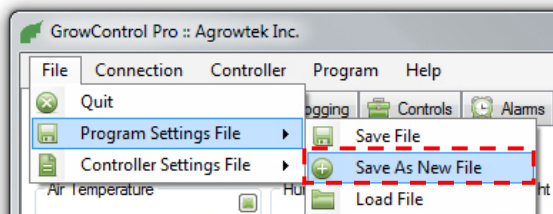
Connecting to Multiple Controllers

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.

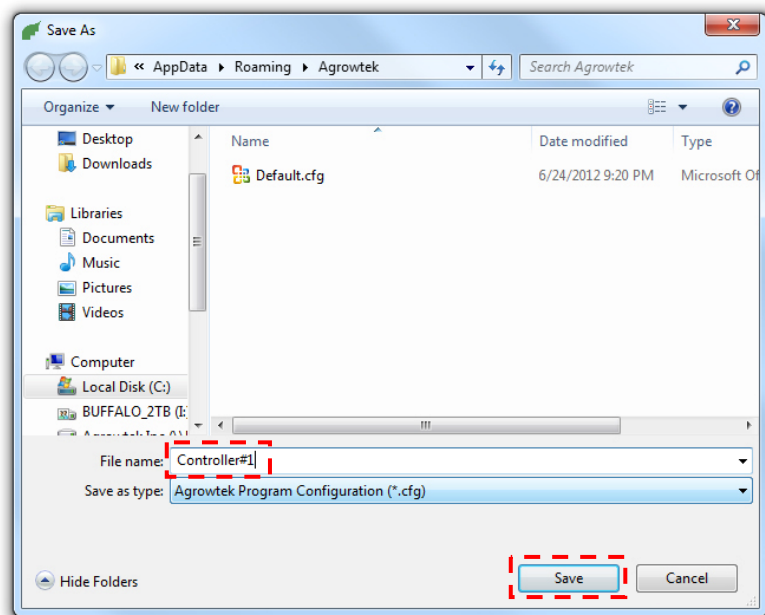
When multiple program settings files are available, the program will prompt the user to select which file they would like the program to open with. When opening multiple copies of the program, select the program settings file for each controller.

Saving a Program Settings Files for Each Controller

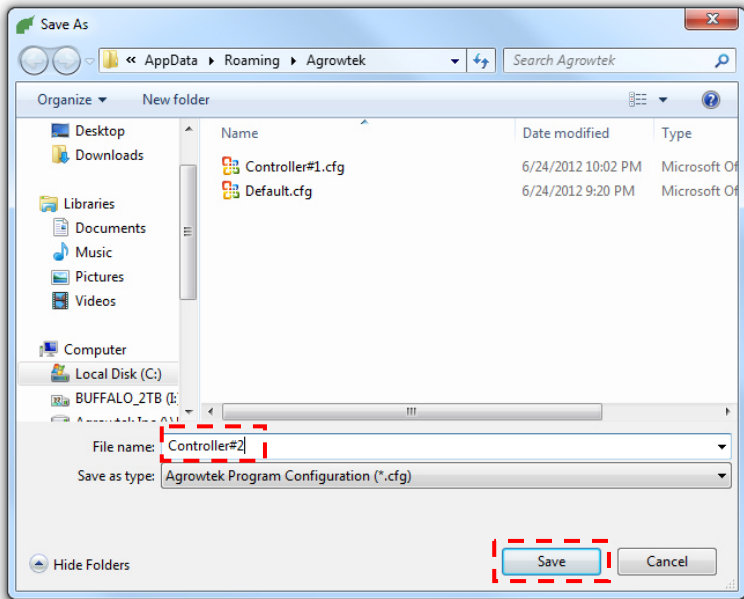
1. Connect to the first controller and navigate to "File -> Program Settings File -> Save As New File."




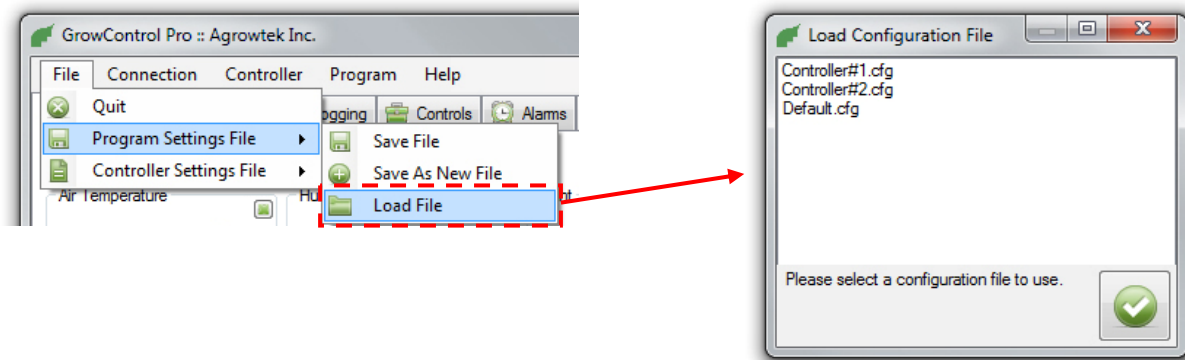
2. The default directory will be displayed; the file must be saved here to be loaded by the program. Enter a name for the file and press "Save."



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.)

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.

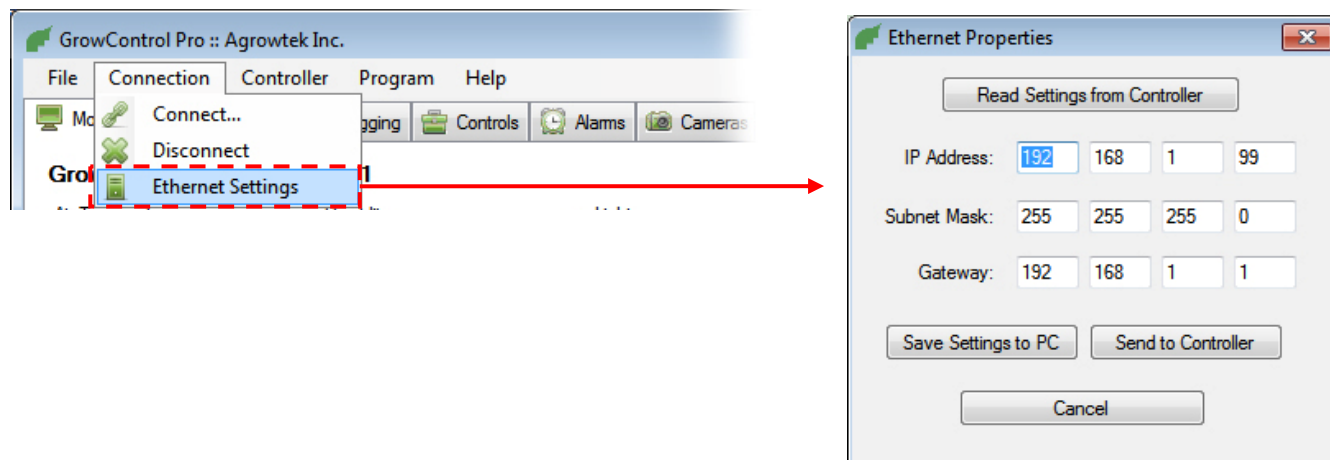
To determine the settings to use, log into your router and view the configuration for your network. You may also check the settings that a computer on the network is using to determine the gateway and subnet mask information.

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.

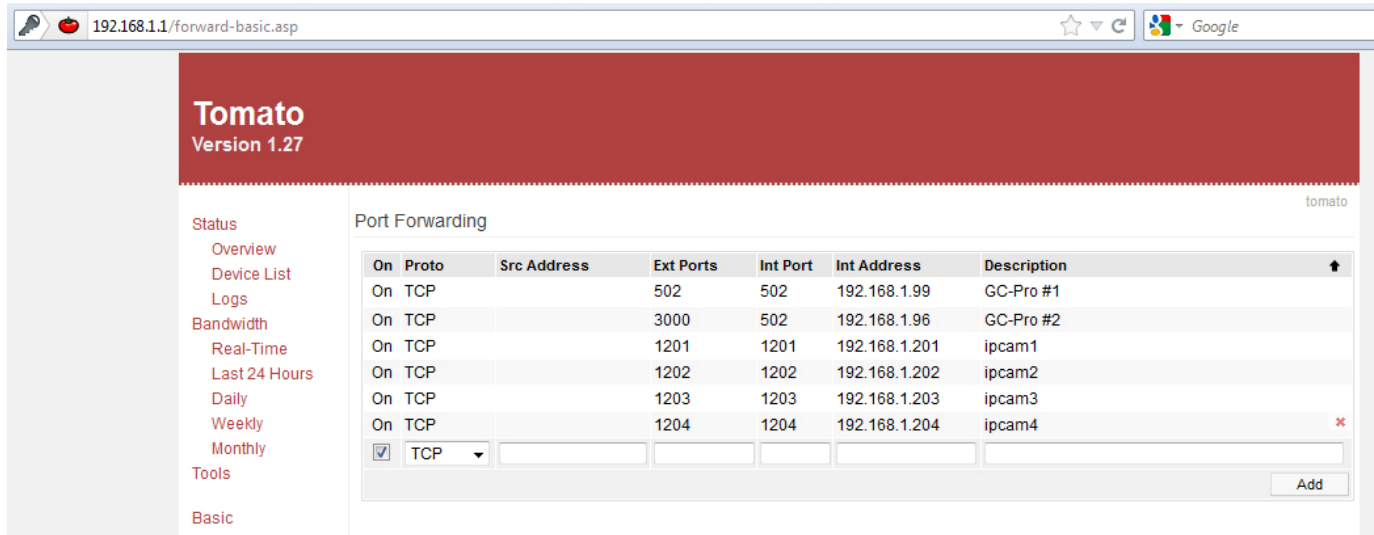
Port Forwarding

In order to access the controller from the internet, or outside 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.

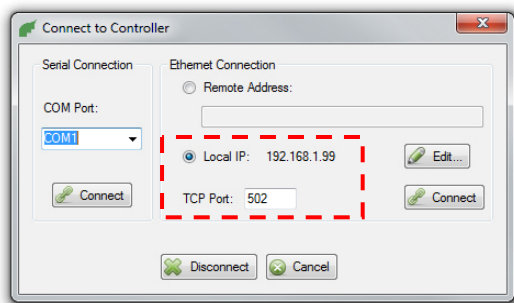
Both controllers have TCP port 502 forwarded to them from the router (internal port.)

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.

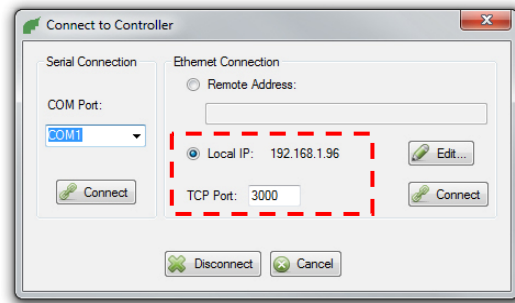


Settings to connect to each controller:

"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 accessed 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.

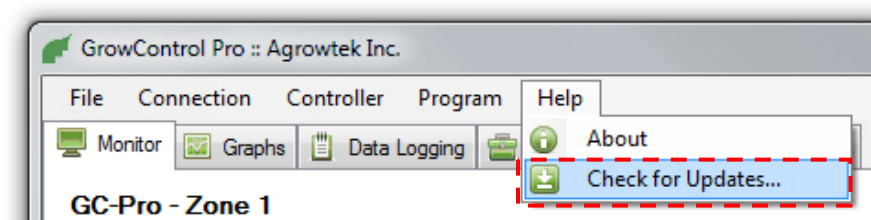
1. Enter the URL web address from your DNS service into the 'remote address' field.
For example: greengrower.dyndns.org ("greengrower" is the dyndns user name.)
2. Make sure the port number is correct; 502 is default. (Port forwarding must be properly setup in your router.)
3. Press "Connect" (in the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

Software Updates

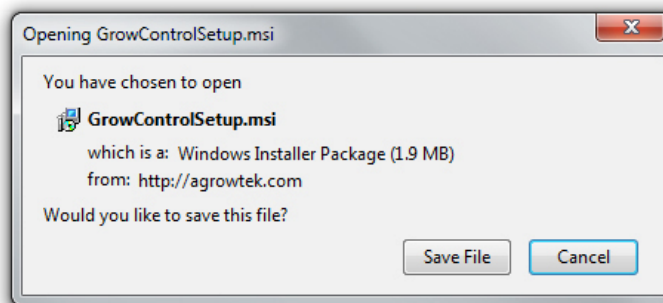
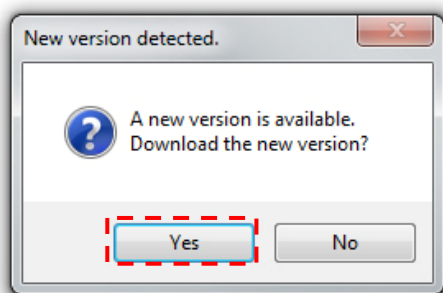
To check Agrowtek's website for the latest software updates, navigate to "Help -> Check for Updates..."

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

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



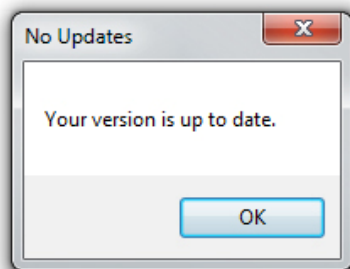
2. If your software is out of date, you will be prompted to download the latest version. Save the file to your computer.



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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