

CLIMATEBOSS
Controller
(Louver & Fan/GHK Mode)

Operation Manual

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Introduction

This manual covers the operation of the *ClimateBoss* temperature controller. The *ClimateBoss* is a versatile touch screen controller that features heating and cooling outputs, 3 stages (DIF, DAY, and NITE), a cycle timer for irrigation, misting or lights, high and low temperature alarms, statistics, and much more. The *ClimateBoss* is equipped with Wi-Fi capabilities for software updating, as well as remote programming and monitoring through the Bartlett Headgrower App.

Notes

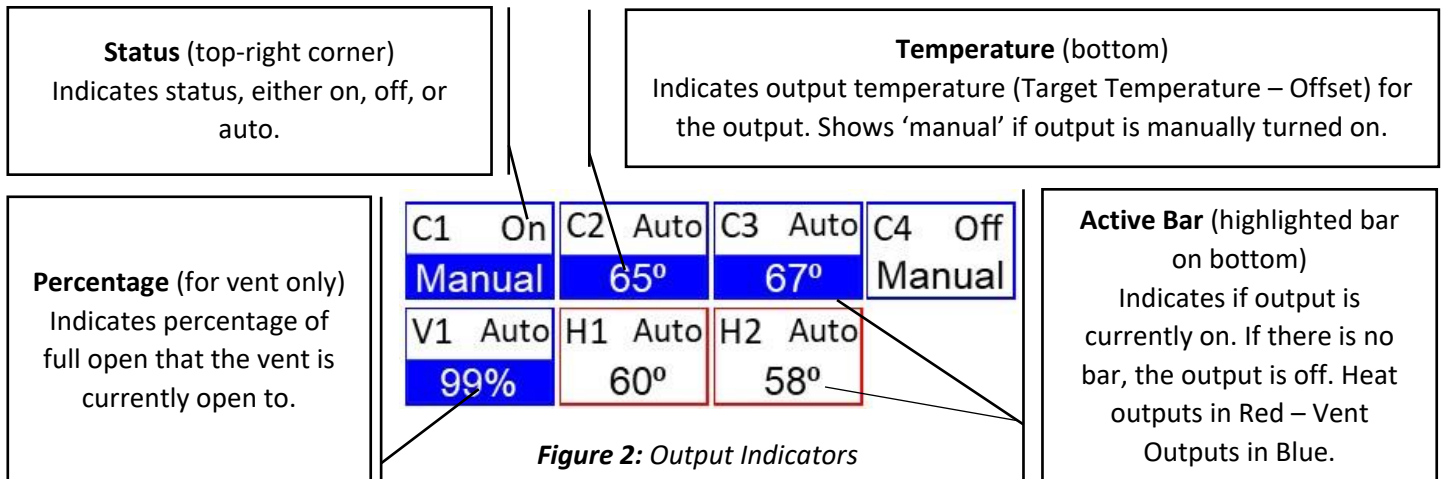
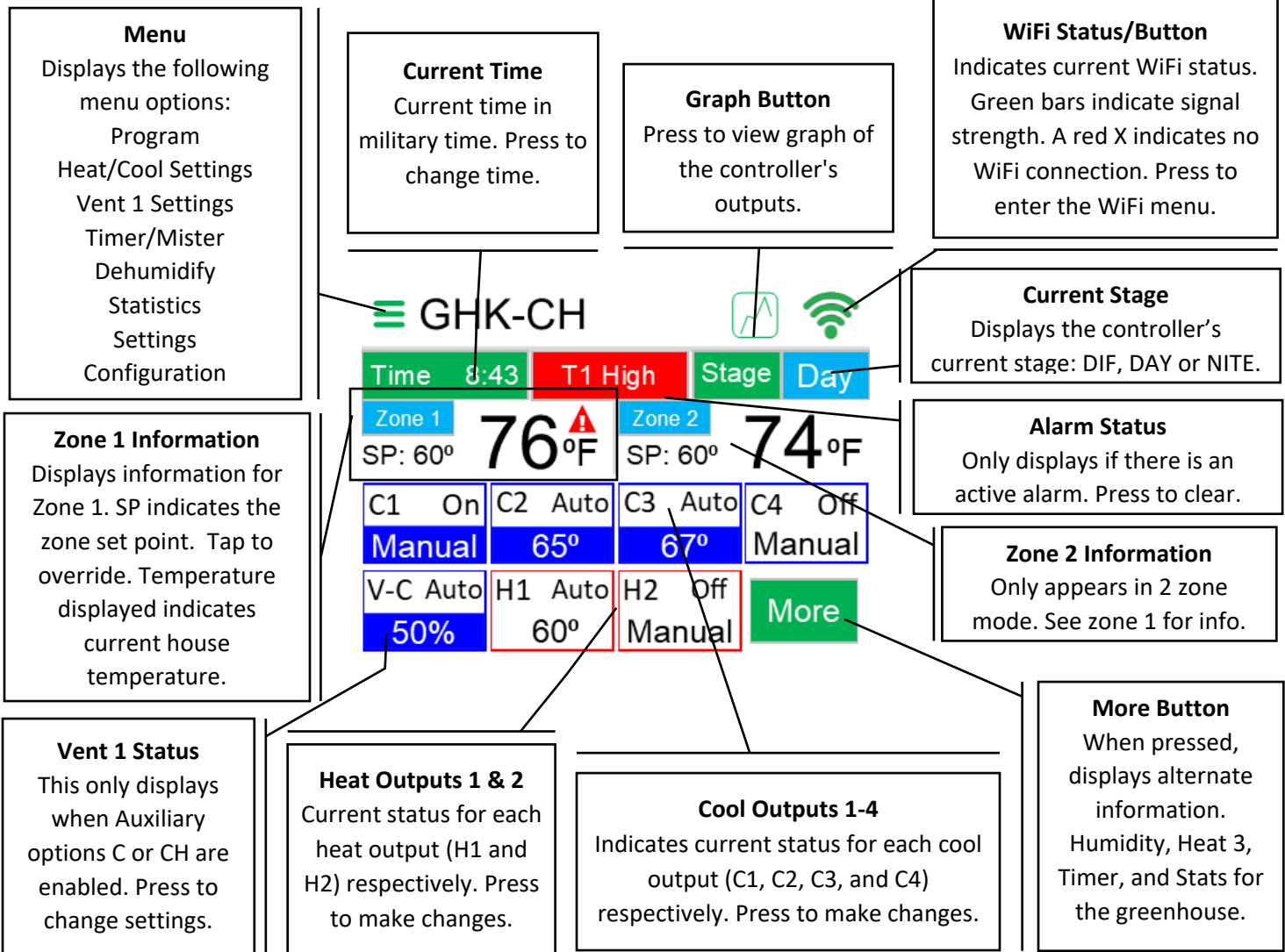
- The controller uses a 24-hour clock format (military time). Ex: 5 PM = 17:00
- The DIF stage must start before the DAY stage and DAY must start before NITE
- Allowable target temperatures range from 32°F to 131°F.
- Allowable offsets for each output range from 0°F to 31°F.
- When set for Louver/Fan (Forced Air) houses:
 - In single-zone mode, COOL 2, 3, 4 activate 30 seconds after COOL 1 to allow louvers to open.
 - In two-zone mode, COOL 2 and COOL 4 will not activate for 30 seconds after COOL 1 and COOL 3 (respectively).

Definitions

First, we need to define and understand some terms.

| TERM | MANUAL DEFINITION AND DESCRIPTION |
|-------------------------------------|---|
| Output | OUTPUT is a relay that corresponds to a particular function – heat, cool, timer, etc. |
| Target Temperature or Set Point | The base temperature set for each stage (DIF, DAY and NITE). Usually, the temperature for the first HEAT to come on. |
| Temperature Offset or Set Point +/- | The temperature offset is the amount added (cools) to or subtracted (heats) from the target temperature to determine the output temperature. Commonly abbreviated as Set Point +/-. |
| Output Temperature | This is the TARGET TEMPERATURE with the STEP applied. For heating APPLIANCES this is the TARGET TEMPERATURE minus the OFFSET. For cooling APPLIANCES this is the TARGET TEMPERATURE plus the OFFSET. |
| Trip Point | The temperature at which an output (relay) turns on or off. |
| Appliances | APPLIANCES are the heating and cooling connected to the controller. |
| | |

Home Screen Overview



More Screen Overview

The screenshot shows the 'More' screen for a GHK-CH device. At the top, there is a menu icon, the device name 'GHK-CH', a line graph icon, and a Wi-Fi icon. Below this, there are two rows of information: 'Time 8:43' and 'Stage Day', and 'Humidity 30%' and 'Heat 3 SP: 55° 56°F'. The main area contains several controls: 'V-D Auto 50%', 'Timer 1 Timer', 'Timer 2 Off', 'Stats', 'Dehum Timed', 'Outside 46°', and a 'More' button. Callout boxes provide detailed descriptions for each of these elements.

Humidity Information
Displays humidity reading of optional humidity sensor add-on, if connected.

Vent D
Proportional vent option included in all models. Tap to change settings.

Timers
Timer outputs used for lights, irrigation, or other equipment. Tap to change settings.

Dehumidification
Dehumidification Vent Cycle used to maintain proper humidity levels. Tap to change.

Statistics
Statistics page for troubleshooting and graphical tracking. Press to view.

Heat 3 (Model H or CH)
Displays information for the heat 3 optional output. Tap SP to change set point. Reading comes from thermistor 3.

Outside Weather
Displays current temperature outside. Tap to view status and settings of Wind/Rain alarm, if connected.

More Button
When pressed, returns to the home screen detailed above.

Figure 3: More Screen Overview

Controller Operations

This section will overview the controller and how it operates. It will explain how the settings you input in the controller will affect your greenhouse appliances. For example, it will talk about **steps that** are used to calculate what percentage your vents should open to. It *does not* explain how to program said settings; that will be covered on page 12.

Overview/Features

The ClimateBoss environmental controller for louver/fan houses is a growing tool with multiple set points, data collection, and coordinated heating and cooling to save you time and money. Here are the ClimateBoss series main highlights.

- DIF, DAY, and NITE temperature setting for height control and energy savings.
- 2 temperature sensors allow 1 or 2 zone operation. (1 large area or 2 ground-to-ground houses)
- 2 heat and 4 cool outputs. (1 heat and 2 cools per zone in 2 zone mode) + 2 proportional
- High and Low temperature setting for the alarm output. (an independent setting for each zone)
- Statistics/average temperature for each stage and 24hr period. Helps with troubleshooting and graphical tracking.
- Timer/Mister output for lights or irrigation/fogging.
- Humidity probe input to trigger the dehumidification vent cycle or the humidify misting cycle. (Humidify misting cycle option is not available at this time but will be coming).

Controller Operations: Options

Option C – Adds Proportional Output for Curtain/Vent Control

The model ACLIMATEBOSSC has the standard features listed above plus time proportional outputs (open/close) to control a curtain, roof vent, or vent window. It has a programmable step size and 5 steps of control.

Option H – Adds 3rd Heat Output, Set Point Heat Output

The model ACLIMATEBOSSH also has the standard features and includes an extra heat output with an independent set point and a sensor for controlling boilers or bench heat. This is accessible from the *more* option on the home screen.

Option CH – Curtain/Vent Control + Set Point Heat Output

The model ACLIMATEBOSSCH combines the standard feature, curtain/vent control, and set point heat.

On the home screen, you can check which model you are using by looking at the model at the top. It should say GHK, GHK-C, GHK-H, or GHK-CH.

You can also check your firmware version at any time through *Menu > Configuration > Controller Info*.

Controller Operations: Stages – DIF, DAY, NIGHT

The ClimateBoss has three operating stages (DIF, DAY, and NITE).

- The DIF stage allows you to adjust the temperature a few hours before sunrise to help control crop height.
- The DAY stage allows you to take advantage of solar energy to increase the daytime temperature so you can maintain the correct average daily temperature to control crop maturity.
- The NITE stage allows you to lower the temperature at night to save on heating.

Controller Operations: Target Temperature

The figure below explains the workings of the stages, DIF, DAY, and NIGHT.

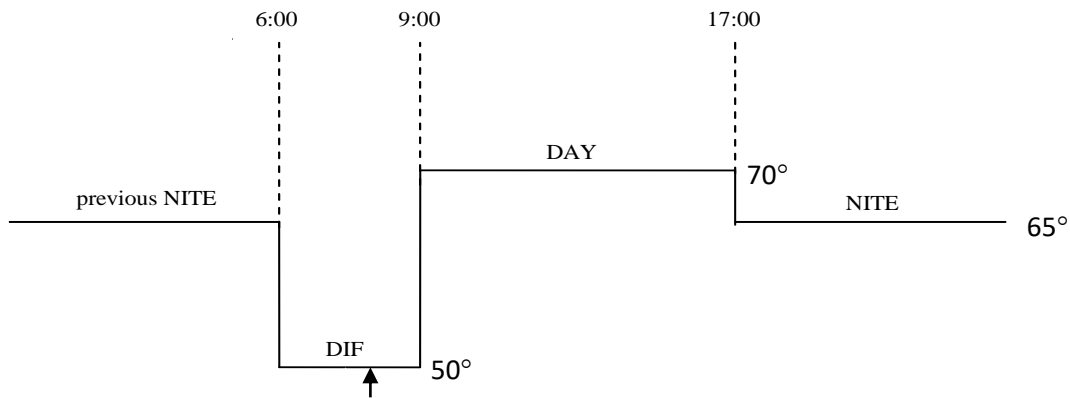


Figure 4: Target Temperature Changing With Time of Day

Figure 4 shows the controller programmed the DIF stage to start at 06:00 (6:00 am), the DAY stage at 09:00 (9:00 am) and the NITE stage for 17:00 (5:00 pm). The target temperatures for the DIF stage: 50°F, the DAY stage: 70°F, and the NITE stage for 65°F. As indicated by the arrow, at 8:00 am you are in the DIF stage and the target temperature is 50°F.

Controller Operations: Output Steps

The target temperature is the baseline for determining when each output comes on. Each output has a temperature offset to be added to (Cools) or subtracted from (Heats) the target temperature to determine that output's activation temperature. Therefore, as the target temperature changes with the operating stage, the activation temperature for each output changes. **Figure 5** shows the sample settings for the step temperatures and the activation temperatures with respect to the target temperature for each output.

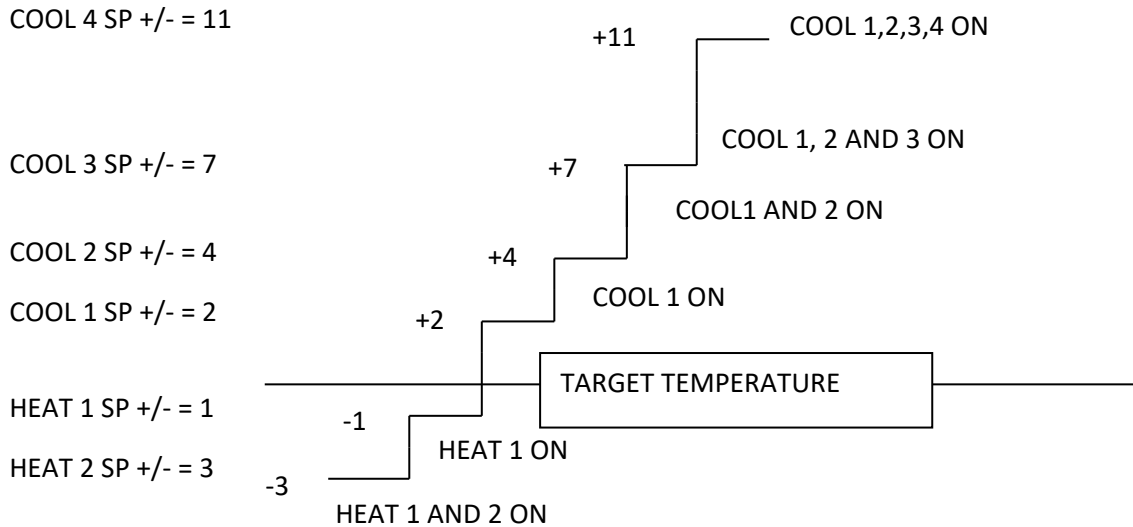


Figure 5: Output Steps

Controller Operations: Output Temperature

Using the information in **Figure 4** & **Figure 5**, if the time is 8:00 AM the operating stage is DIF and the target temperature is 50°F. The output temperatures for each output are as follows:

| | Target Temperature | Offset | Output Temperature |
|--------|--------------------|--------|--------------------|
| COOL 4 | 50° F | + 11 = | 61° |
| COOL 3 | 50° F | + 7 = | 57° |
| COOL 2 | 50° F | + 4 = | 54° |
| COOL 1 | 50° F | + 2 = | 52° |
| HEAT 1 | 50° F | - 1 = | 49° |
| HEAT 2 | 50° F | - 3 = | 47° |

Table 1: The Effect of Step on Target Temperature to Get Output Temperature

Controller Operations: Output ON/OFF Transitions

The trip point for an output is the temperature at which the output actually turns on or off. The “ON” and “OFF” points for an output are separated slightly to prevent the rapid cycling of appliances. This separation above and below the output temperature is called hysteresis (**Figure 6**). A hysteresis of 1 degree is built into the controller and will give more efficient cycling of appliances but will also give a wider swing in temperature.

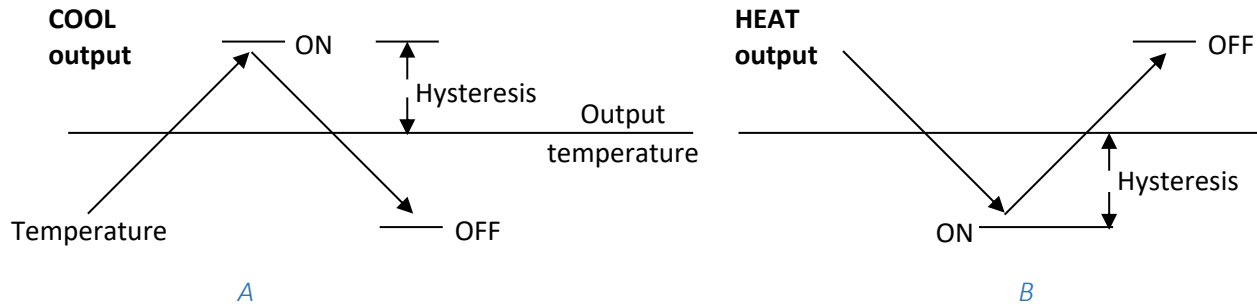


Figure 6: Hysteresis on both Cools and Heats

Using the output temperatures from **Table 1** and a hysteresis setting of 1, the trip points for each output will be as follows (all temperatures are in °F):

| | Output Temperature | Hysteresis | ON | OFF |
|--------|--------------------|------------|-----|-----|
| COOL 4 | 61° | 1 | 62° | 60° |
| COOL 3 | 57° | 1 | 58° | 56° |
| COOL 2 | 54° | 1 | 55° | 53° |
| COOL 1 | 52° | 1 | 53° | 51° |
| HEAT 1 | 49° | 1 | 48° | 50° |
| HEAT 2 | 47° | 1 | 46° | 48° |

Table 2: Hysteresis and Trip Points

Menu Screen

By pressing the Menu button – indicated by 3 bars in the top left corner - on the Home Screen, you'll be taken to the Menu Screen. The Menu Screen is a list of various options from controller info, WiFi settings, selecting the number of timers, and more. To navigate through the menu options, press and hold the green slider on the right side of the screen and slide up or down for more options. For more information on each component of the Menu, see the descriptions below:

Program

The ClimateBoss has 3 stages – DIF, DAY, and NITE. Each stage has a start time and target temperature. 2-zone operation will have an additional target temperature for the second zone. See the Programming, page 14 section for more information.

Heat/Cool Settings

Use to set the mode, set point, and offset for each heating and cooling output. Each heating and cooling output has three different modes - Auto, On, and Off. In the “**Auto**” mode, the controller will regulate the temperature to correspond with the target temperature +/- the offset. In the “**On**” mode the output is active. The controller has an **On-To-Auto** setting that will return the control from **On** mode to **Auto** mode after the programmed length of time has expired. See page 14, under Outputs, for more information. In the “**Off**” mode the output is inactive until the setting is changed.

The set point or target temperature is what the ideal setting for the greenhouse would be. This is the baseline which determines when each output comes on, based on their offset. Each output has an offset or step temperature to be added to (Cools) or subtracted from (Heats) the set point to determine when each output will activate. As the controller changes modes, the Heats and Cools will activate at different temperatures, based on the mode's (DIF, DAY or NITE) set point. See the **Programming**, page 14, for more information.

Vent C/D Settings

All *ClimateBoss* models come equipped with at least one proportional vent output, output D. If you have models C or CH, you will also have an additional proportional vent output. These outputs can be used to control a curtain, roof vent, or vent window. Using these menu options, users will set up step size and 5 steps of vent percentage opening control. Settings include **mode, step size, open time, threshold time, and 5 step vent percentages**. See Curtain/Vent Control, page 20 for more information.

Timer/Mister 1/2

The *ClimateBoss* has a two timer outputs that are not used for temperature control but can be used to turn on lights or other appliances at a certain time or to run mist type irrigation. The TIMER/Mister option has three modes of operation; TIMER, MISTER, and OFF. In the **Off** position, the timer relay will not turn on. In **TIMER** mode the timer relay will turn on at a designated time of day and run for a set length. The **MISTER** mode causes the timer appliance to enter an on-off cycle. In this on-off cycle, the timer is on for a programmed number of seconds repeating after the set number of minutes has expired. The timer along with the alarm output can also be used to run a shade or energy curtain. See page 18 for more information on programming the Time/Mister output.

Dehumidify

The *ClimateBoss* has a dehumidification vent cycle. It consists of three programmable length stages – a first exhaust stage, a heating stage, and a second exhaust stage. One, two, or all three stages can be used. See page 15 for more information on programming the dehumidify mode.

Statistics

The *ClimateBoss* collects and stores temperature averages for 7 days for each zone respectively. Each day it stores the average temperature for each operating stage (DIF, DAY, and NITE) and the average for the 24 hours from the start of DIF until the end of NITE. To view, press the **Zone 1 Daily Averages** or **Zone 2 Daily Averages** (only displayed in 2 zone mode).

Along with the averages, the *ClimateBoss* tracks the minimum and maximum temperatures for each zone as well. The minimum/maximum temperatures will be stored until they are reset by pressing the **Reset Min/Max** button on this screen. Run times for each output: Cools 1-4 and Heats 1-2 (Heat 3 if activated), can be observed as well. Press the **Run Times** button to view. The Run Times will be stored until reset by pressing the **Reset** button and the controller will display the number of days since the last reset.

Settings

Zone 1 Low Alarm - Used to set the temperature for Zone 1 low alarm. Default = 32°F.

Zone 1 High Alarm - Used to set the temperature for Zone 1 high alarm. Default = 131°F.

Zone 2 Low Alarm - Used to set the temperature for Zone 2 low alarm. Default = 32°F.
(Only appears when the controller is set for 2 Zones.)

Zone 2 High Alarm - Used to set the temperature for Zone 2 high alarm. Default = 131°F.
(Only appears when the controller is set for 2 Zones.)

On to Auto Time – Sets duration time in minutes for when all manually on outputs return to auto. For more comfortable working conditions or if an emergency situation develops, any output may be turned on manually. On to Auto will return any output that is set in the on position after a certain length of time has expired. To disable the On-to-Auto time, set to 0. Default = 15

Heat/Cool Delay – Sets the delay time (in minutes) when transitioning from cooling to heating. Default = 10 minutes. Minimum = 0 minutes. Maximum = 30 minutes.

Thermistor Fail Mode – Determine what the controller will default to if a thermistor fail error is detected. Setting to **Off** causes all outputs to turn off for the failed zone. Setting to **Heat** puts the controller in a 50% on 50% off heating duty cycle. The 50/50 cycle is designed for use during colder weather or in colder climates to prevent loss of crops. Default = Heat.

Night Lockout Cools – Used to disable all cooling outputs from running during the **Nite** stage. This is used as an energy-saving feature. Enabling Night Lockout will prevent the dehumidification cycle from working.

Set Clock - Select to set the *ClimateBoss* clock. It is in military time. For Example: 3PM is entered as 15:00, 12AM is entered as 0:00, and 10AM is entered as 10:00. The clock can also be changed from the main screen by pressing Time.

Set Date – Select to set the Day, Month, and Year in the controller.

Temperature/Speed Units – Used to change the temperature & speed scale for the controller. Options are Fahrenheit/MPH or Celsius/KPH.

Number of Zones – Used to set the number of zones for the controller. When set to single-zone mode, the temperature readings from the 2 thermistors are averaged to determine the temperature. When set to 2 zone mode, thermistor 1 reads the temperature for zone 1 and thermistor 2 reads the temperature for zone 2. Default = 2.

Configuration

Controller Info – Contains the **CIS ID** used to set a unique ID for each controller. **Firmware Version, Serial Number** and **Mac address** for the controller are also shown here. This information is used in conjunction with the Headgrower mobile app for remote monitoring and control of the Climate Boss. See the WiFi section for more information about firmware updates.

WiFi – Set up Wi-Fi for Firmware download and for remote control and monitoring from the Headgrower mobile app (Requires subscription).

Enable Wi-Fi – Enable or disable the Wi-Fi feature. **Disable** turns Wi-Fi capabilities off at all times. **Enabled** turns the Wi-Fi on any time it is within range of a setup Wi-Fi connection.

Wi-Fi Setup – To set up Wi-Fi for the *ClimateBoss*, press “**Wi-Fi Setup**” and the controller will scan for nearby networks. Select your desired network and enter the password (if required) and press “**Save**”.

*****For security reasons, we highly recommend that the user place all controllers into a separate logical network or VLAN, separate from other networks, routers, and hardware.**

Update Firmware – If your controller is connected to the internet through the WiFi module, by pressing Update Firmware, you will connect to www.bartinst.com to see if any updates are available. Once it has found the firmware, you have the option to update your controller. Updating firmware will **NOT** affect the timer programs.

Reset WiFi – Press Reset WiFi when having trouble with the WiFi connection. The controller will reset the WiFi connection and attempt to reconnect to your currently saved connection.

Manual WiFi Setup – Used to manually set up a WiFi network that is hidden or otherwise not found when running WiFi Setup. Enter the network name under SSID and press “Save”. Under Password, enter the network password at press “Save”.

WiFi Status - Displays the currently connected network, WiFi signal strength, and cloud connection status.

Auxiliary Board – Additional output options for the *ClimateBoss* – Louver/Fan version. An Auxiliary board is required to add these additional outputs to a standard *ClimateBoss*. Auxiliary board not included in the standard *ClimateBoss*.

- Option C – adds a proportional output for Curtain/Vent Control. This is a time proportional output (open/close) to control a curtain, roof vent, or vent window. It has a programmable step size and 5 steps of control.
- Option H – add a 3rd heat output. This is a heat output with an independent set point and a separate sensor (thermistor) for controlling boilers or bench heat.
- Option CH – combines Option C & Option H to add both a proportional Curtain/Vent control and a 3rd Heat option.

Timer Alarm Shade – The Timer and Alarm outputs can be used to run a shade or energy curtain. The timer is used as the extend signal and the alarm is used as the retract signal. See page 19 for more information.

Humidity Cal – Used to enter the calibration code for the optional humidity sensor. Calibration codes can be found on the Humidity Calibration sheet sent with your humidity sensor. The humidity sensor does not come with the standard *ClimateBoss* but is an additional option.

Reset Factory Defaults - Resets all settings to factory defaults. Upon selection, you will be asked to confirm before the controller will be reset.

Calibrate Touch – Used to re-calibrate the touch screen if buttons aren’t working properly. Press the “Calibrate Touch” button and follow the onscreen instruction to re-calibrate.

Factory Protected - Factory protected is used by Bartlett to set controller and display modes.

Programming

Stages – DIF, DAY, NIGHT

The *ClimateBoss* has 3 stages – DIF, DAY, and NIGHT. Each stage has a start time and a target temperature, as shown in **Figure 7**. (2-zone operation will have an additional target temperature for the second zone.

To change your stage settings, either use the *Program Settings* option in the menu or press the *current stage* button from the home screen (**Figure 1**). The menu will look like **Figure 7**, seen below.

On this screen, you have both a start time and zone temperature for each stage. Keep in mind that you will only see the second zone if you are running your controller in two-zone mode.

To edit a start time, press the green text for the correct stage under the start column. Enter the time in the 24-hour clock on the next screen, then press save.

To edit a temperature, follow the same steps except under the zone1 or zone2 column, entering your desired temperature on the next screen.

You can see the timeline of your settings on the top of the screen, a full 24-hour timeline starting at 0:00.

| Stage | Start | Zone1 | Zone2 |
|-------|-------|-------|-------|
| DIF | 6:00 | 65 | 65 |
| Day | 8:00 | 65 | 65 |
| Night | 17:00 | 65 | 65 |

Figure 7: Program Settings

Outputs (Heat 1, Cool 1...)

To access your output settings, either press *Heat/Cool Settings* in the menu or press any of your output indicators on the home screen (**Figure 2**). You should see a screen like **figure 7**. Be sure to read through the *Controller Operations* section of this manual so you are aware of how these values function.

Mode
On, Off, or Auto. Press to edit.

Step (+/-)
Difference between the temperature set point and the output's activation point. Press to edit.

| | H1 | C1 | C2 | H2 | C3 | C4 |
|-------|------|------|------|------|------|------|
| Dif | 65 | 68 | 70 | 65 | 72 | 73 |
| Day | 65 | 68 | 70 | 65 | 72 | 73 |
| Night | 65 | 68 | 70 | 65 | 72 | 73 |
| Mode | Auto | Auto | Auto | Auto | Auto | Auto |
| SP+/- | -2 | +3 | +5 | -4 | +7 | +8 |

Output Temperature
When the output will turn on. Not directly changeable. Rather, it is equal to Zone 1 Target Temperature for DIF (65, seen in **Figure 4**) + Cool 1 Step (+3)

Figure 8: Heat/Cool Settings

Modes

Auto – The auto mode automatically turns your outputs on and off depending on your **target temperature** (Set during Stage programming, page 14) plus or minus your **step value**.

On – On means your output (heat or cool) will be turned on. You can manually turn it back off by selecting the off mode. If left on, the output will automatically be turned back to auto after a period of time determined by your On-to-Auto setting. See page 10 for more information on On-to-Auto. Manually turning an appliance on is generally used for comfort, say, if a gardener was in the greenhouse temporarily.

Off – Off means your output (heat or cool) will be turned off. You can manually turn it back on by selecting the on mode.

Output Temperature

The output temperature indicates when your appliance will activate. In the example of **Figure 8**, the Cool 1 appliance will turn on when the temperature rises above 68°F. When the temperature goes back under 68°F, the appliance will turn off.

This value is not directly changeable. Rather, it is calculated by taking your target temperature and adding/subtracting your step value, see **Table 1** on page 8.

Therefore, you edit this value by changing the step value, seen below.

SP +/-

To change your offset value, press the green number in the SP +/- row. Enter your value in degrees. It will automatically become a negative number if entered for a heat appliance and a positive number if entered for a cool.

Date & Time

It is important to remember that the *ClimateBoss* uses a 24-hour clock (military time). For morning times, the clock setting will be from 00:00 until 11:59 and the afternoon settings are from 12:00 until 23:59.

To modify your current time, press the current time button on the home screen (**Figure 1**). Enter the current time in military time and press save. You can also access this function from the Menu > Settings > Set Clock.

To modify the current date, go to Menu > Settings > Set Date. Here, you set the day, month, and year individually.

Dehumidification Vent Cycle

The vent cycle is a flexible dehumidification cycle. When active, the *Dehum* box on the more section of the main screen will be green and the orange box in the center will show the current cycle stage. The cycle can be started by a programmed start time, can be run manually, or can be run by high humidity if the optional sensor is installed. Each option is detailed below.

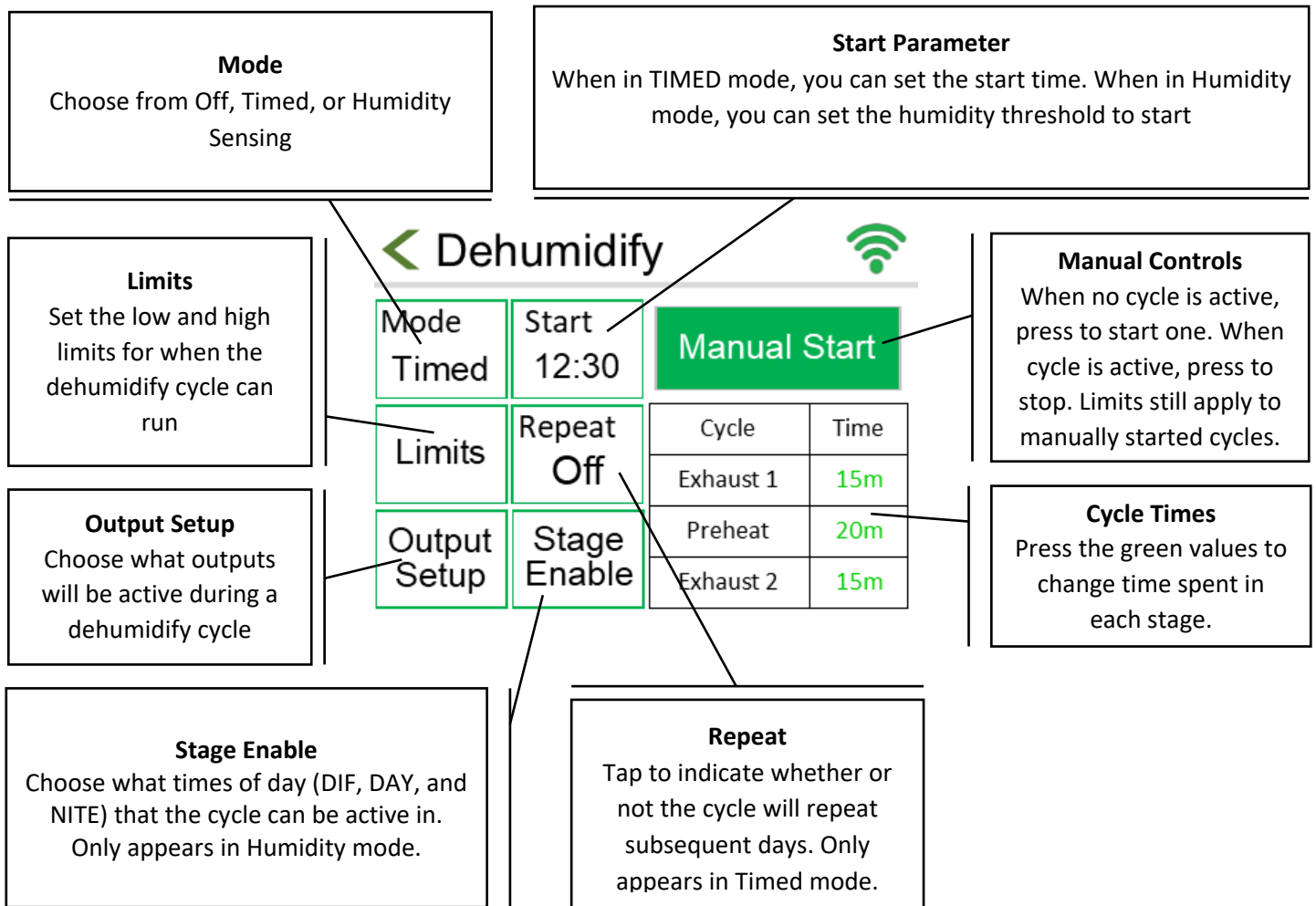


Figure 9: Dehumidification Vent Cycle

Options

Mode – By pressing the mode button, you are brought to a menu with three options: Off, Timed, and Humidity. Off means that the cycle will not run. Timed means that the cycle will start at a certain time during the day (with the option to repeat subsequent days). Humidity uses a humidity sensor (option is only available with an optional humidity sensor attached to the controller) to start the cycle when humidity breaches a set point.

Limits – The limits button allows you to set low and high limits to control when the cycle can run. If the temperature is below the low limit or above the high limit, the vent cycle will be aborted or will not start. By default, the limits are set to use your Heat 1 output temperature as the low, and your Cool 2 output temperature as your high. You can change it to use a custom value by pressing the checkbox next to *set temperature* and entering a value. The limits can only be set between the values of 32° and 131°.

Output Setup – Pressing output setup will bring you to a menu showing all of your appliances. Here, you configure which appliances will be used during a vent cycle and whether the heats will be used to maintain target temperature during the exhaust stages. If something is toggled off, it will not run during the vent cycle no matter its other settings.

On this menu, you will also see the option *Heat Enbl*. This option indicates whether your heat outputs will be active during the exhaust stage. When active, the heaters will work to maintain the programmed temperature in an exhaust stage. If inactive, the heats will remain off during an exhaust stage but if the temperature drops below 55°F, the exhaust stage will be ended and the vent cycle will move on to the next stage.

Start Parameter (Start or Humidity) – If in *Timed* mode, this will show *Start* and will indicate a time of day that the cycle will start to run. If in *Humid* mode, this will show *Humidity* and will indicate a set point in which the cycle will start, should humidity surpass it. To enter a value, press the start/humidity box, enter the value, and press save.

Repeat – This option only shows up if you are in *Timed* mode. Press it to toggle between on and off. If on, the vent cycle will continue to activate at its start time every day. If off, the vent cycle will activate at its start time a single time but then once the cycle completes, the mode will change to *Off*.

Stage Enable – This option will only appear if you are in *Humid* mode. It allows you to choose which times of day (DIF, DAY, NIGHT) the cycle can be active in. By disabling a time of day, the vent cycle will not activate on that day even if the humidity is above the set point.

Manual Controls – If no vent cycle is active, this green box will show *Manual Start*. By pressing it, you can start a cycle instantly. If there is a vent cycle active, the box will show *Manual Stop*. By pressing it, you can end the cycle. Manually started cycles will still be affected by any *limits* you have active.

Cycle Time – By pressing either exhaust 1, preheat, or exhaust 2, you will be able to enter the amount of time spent in each stage. Simply press the one you want to edit, enter a time in minutes (1-99), then press save.

Using the Vent Cycle in the 2-Zone Mode

If you have the controller programmed for 2 zones but only want to use the vent cycle on one of the zones, go into the *output setup* and turn all the outputs for the zone not being vented to *off* (slider to the left) The zone with its settings at "Off" will function normally.

Timer/Mister Function

Depending on whether you are in Timer mode or Mister mode, the timer settings screen will look different. By pressing the *mode* box, you can toggle between the two options. You have a total of two timer outputs, meaning that you could have one on timer mode and the other on mister mode, if desired. There is also an option to use the timer in combination with the alarm function for shade curtain control.

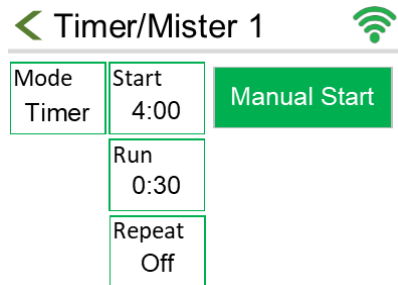


Figure 10: Timer Settings

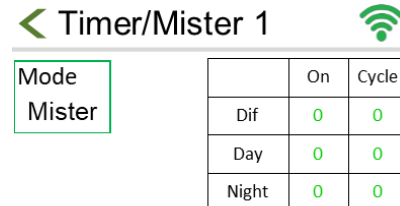


Figure 11: Mister Settings

Timer Mode

In timer mode (**Figure 10**), the timer relay will turn on at a single designated time of day and run for a set length, with the option to repeat daily. You can also manually start the timer whenever desired while in this mode, unlike mister mode.

Start – To set when your timer will turn on during the day, press the start box like seen in **Figure 10**. On the following screen, you can enter your start time.

Run – To choose the run time press the run box, as seen in **Figure 10**. On the following screen, you can enter the duration of your run time in hours:minutes format. The maximum entry is 23 hours and 59 minutes (23:59).

Repeat – To choose whether it will repeat the following day, press the repeat box, like seen in **Figure 10**. This will toggle between on and off. If set to off, the mode will return to the “off” state after the timer runs.

Manual Control – Timers can also be manually started by pressing the green manual start button like seen in **Figure 10**. When a timer is running, this button can be used to turn it off.

Mister Mode

In the misting mode (**Figure 11**), the timer will come on for a number of seconds (the *On*-time) and will repeat after a number of minutes (the *Cycle* time). Each stage (DIF, DAY, NIGHT) has unique on and cycle times. To program them, simply press the value you want to change in the chart, as seen in **Figure 11**. Remember, the On-time refers to how long each timer will become active for in **seconds**. The Cycle time refers to how long each timer will wait before becoming active again in **minutes**.

The cycle time will start counting when the output comes on. For instance, an on-time of 30 seconds and cycle time of 1 minute, will have 30 seconds of on-time and 30 seconds of off time.

Timer/Alarm for Shade Curtain Control

The Timer 1 and Alarm Outputs can be used to run a shade or energy curtain. The timer is used as the extend signal and the alarm is used as the retract signal. The Timer/Alarm for Shade curtain control has a slow retract feature and temperature monitoring.

There are four things to note about this function:

- This uses the alarm relay so it can only be activated if the Alarm output is NOT being used.
- This does not use or affect your Zone 1 Low/High or Zone 2 Low/High Settings or the function of those alarms, it is only using the alarm relay connected to your shade or curtain to signal it to close.
- The Timer/Alarm feature coordinates the outputs to give a 10-second delay between extend and retract signals to allow the motor to come to a complete stop before changing directions.

To program the TIMER/ALARM for shade curtain control press More (from the main screen) > *Timer 1* > *Shade*. Here, press Enable Shade Mode to toggle on and off. With the mode activated, you now need to set the timer like in the Timer Mode section above. The start time will determine when the curtain opens (extends) and the run time will determine how long it stays open (extended). At the end of the run time, the alarm output will activate and will begin closing (retracting) your curtain/shade.

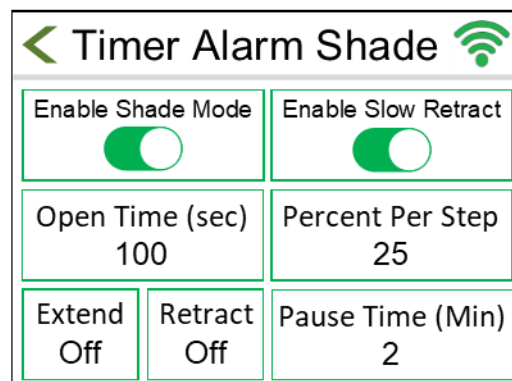


Figure 12: Timer Alarm Shade configuration screen.

Enable Shade Mode – Toggling this option will enable or disable shade curtain mode. Simply press anywhere in this box to switch it on or off.

Open Time (sec) – the amount of time in seconds that it takes for the curtain to fully open.

Enable Slow Retract – Toggling this option will enable or disable the slow retract feature for the shade curtain. Simply press anywhere in this box to switch it on or off. The slow retract feature allows the user to retract the curtain in 3 pulses (retract, pause, retract, pause, retract, pause, retract fully) so cold air from above the curtain and warm air below the curtain have time to mix before hitting the plants. This prevents the curtain from opening too fast which can allow very cold air to drop on the plants and cause damage.

Percent Per Step – Press to program the percentage amount that each pulse should retract the curtain further. Example: Percent Per Step set to 10%. The 1st pulse will retract 10%, the 2nd pulse will retract an additional 10% (total of 20% retracted), 3rd pulse will retract an additional 10% (total of 30% retracted) and then, after the 3rd pulse, will fully retract.

Pause Time (Min) – How long, in minutes, the curtain will pause between pulses.

***Note: If there is a 4 degree drop at any point. The sequence will be interrupted and the curtain will pause until the temperature recovers.

Curtain/Vent Control

The Curtain/Vent control option adds the ability to open a curtain, roof vent, or vent window in 5 proportional steps (5-Step option). This includes a step size, or a programmable number of degrees above the target temperature. As the temperature rises above the target temperature, the output will open to the percentage that is proportional to the number of steps the temperature is above the target temp. For example, if the temperature rises to more than 1 step above the target temperature, the output will open to percentage 1. As it continues to rise above the next step, the output will open to percentage 2. If it decreases to just one step above the target temperature the output will close to percentage 1.

All models of the *ClimateBoss* come with at least one vent output, but the C or CH upgrade includes another output, output C, accessible from the home screen. The default output, output D, is available from the “more” screen of the home screen.

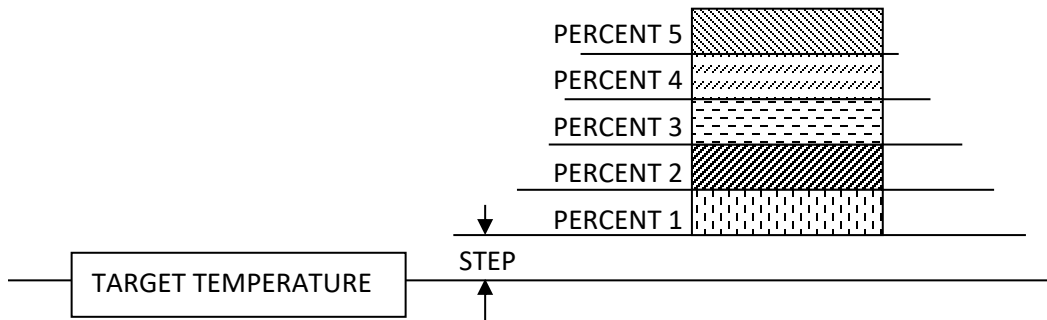


Figure 13: Curtain and Vent Control

Overview

You can access the Curtain/Vent controls through *Menu > Vent C Settings*. Alternatively, press the VCR output in the bottom left of the home screen. The menu will look like the figure, below.

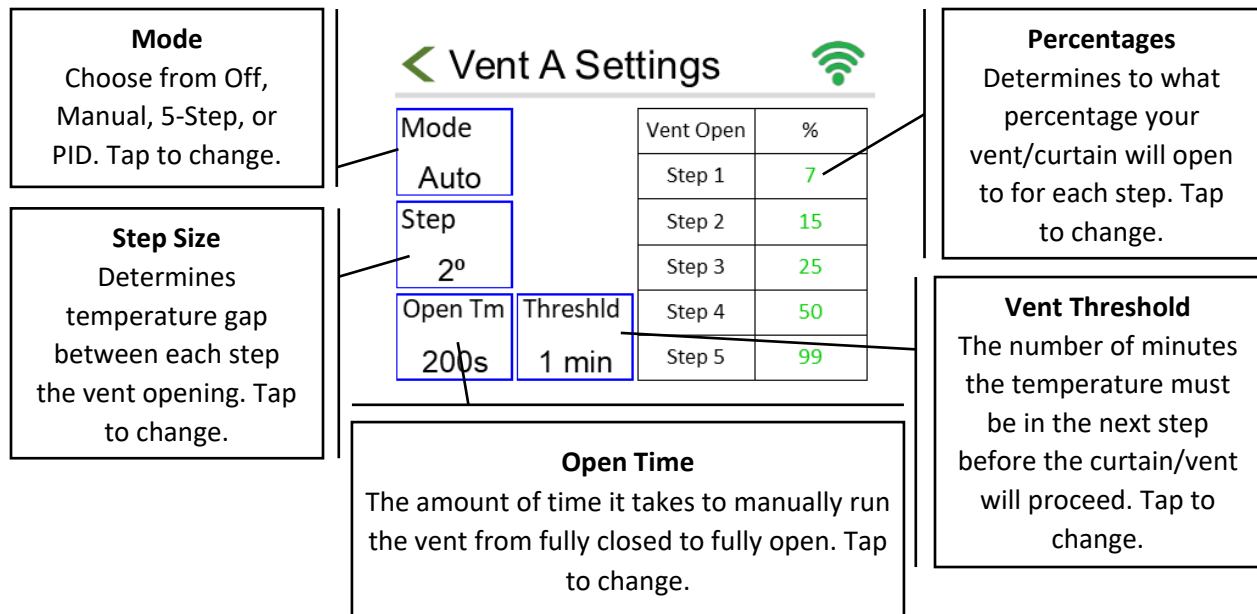


Figure 14: Curtain/Vent Overview

Options

Mode – By tapping this box, you can select which mode you want your controller to run in. Off means the vent will not be adjusted by the controller. Manual will make another box appear in which you can select a percentage for your curtain/vent. Auto means the vent will open to different percentages based on your settings for Step and Percentages. With PID (Proportional, Integral, and Derivative) control is a mathematical way of determining how far to open a roof vent.

With proportional control, the vent will open in stages as the temperature rises above the desired level. Using just proportional control requires that the temperature gets significantly above your desired set point before the roof is completely open.

Integral control causes the vent to continue opening slowly if the temperature is above the desired setting. Therefore, the vent can reach the full open position without the temperature continuing to climb.

Adding derivative control allows the controller to respond to the rate of temperature change and direction of the change. For instance, the temperature could be above the set point but falling, indicating the vent should start closing instead of continuing to open.

Step Size – Sets the tightness of control by determining how many degrees the temperature must rise above the target temperature before the vent opens to **Step 1**, then **Step 2**, then **Step 3**, etc. Tap this box to enter a value between 1 and 9.

Vent Threshold – This is the number of minutes the temperature must be in the next step before the curtain/vent will open or close to the next setting. Tap this box to enter a value between 1 and 9 minutes.

Open Time – You'll need to manually measure the amount of time (in seconds) to manually run the vent from fully closed to fully open. By tapping this box and entering a value between 200 and 9999 seconds, you can tell the controller the time that is required for the curtain or vent to transition from closed to full open.

Percentages – Determines to what percentage your vent/curtain will open to for each step. You can tap each green value in the chart to change it. Valid percentages are 0-99. 99% is full open. Percentages do **not** have to increase with increasing steps. When using PID Control, only percent 1 and percent 5 are used.

To synchronize the controller and appliance, set the curtain/vent to *Off* and wait for the curtain/vent to close completely. Then, set the controller to *Auto* mode.

Your vent can also work with your Wind/Rain Alarm (not included) to automatically close your vents in the event of wind or rain. See page 24 for more information.

Heat 3 Option (Models H & CH)

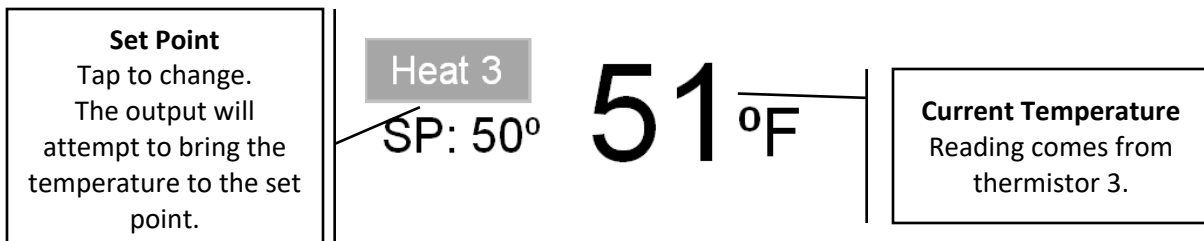


Figure 15: Heat 3

The Heat 3 output is a set point heat with its own temperature sensor. It can be used for turning on a boiler based on outdoor temperature or controlling a bench heater. The settings for Heat 3 are not connected to the target temperature and do not change with the stage (DIF, DAY, NIGHT) as the target temperature does. You can access this setting at any time on the home screen of the controller (**Figure 1**) by pressing the green *More* button on the bottom right. The current temperature reading of Heat 3 and the current set point will be located on the mid-right of the screen. See **Figure 15**.

The Heat 3 output is currently active if the box surrounding Heat 3 is red. Grey indicates inactivity.

Wind/Rain Alarm Integration

If your operation has both our PC software, **C.I.S**, and a **Wind/Rain alarm**. The *ClimateBoss* can look at the activity of the wind/rain alarm through the computer software and react accordingly. By taking information from C.I.S, the *ClimateBoss* can learn of outside temperature, humidity, wind speed, and rain. To access this screen, press the *more* button on the home screen (**Figure 1**), then press the box labeled *outside*. The screen will look like **Figure 16**, below.

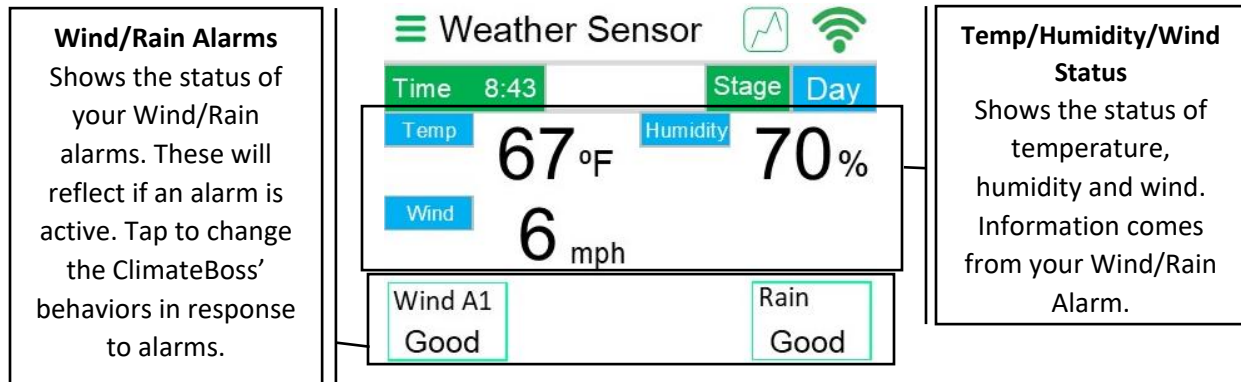


Figure 16: Weather Sensor Overview

The main functionality that the Wind/Rain alarm integration offers is the ability to close your vent in response to rain or wind. To do this, tap either the wind/rain alarm status box (**Figure 16**). On the following screen showing a table of your alarms and vent, you can tap the green Yes/No boxes to toggle your preference.

Statistics

The *ClimateBoss* collects and stores averages for 7 days. Each day it stores average temperature for each operating stage (DIF, DAY, NIGHT) as well as the average for the 24 hours from the start of DIF to the end of NIGHT.

To view the controller's statistics, press *Menu > Statistics*. You can also access the statistics from the more section of the controller's home screen.

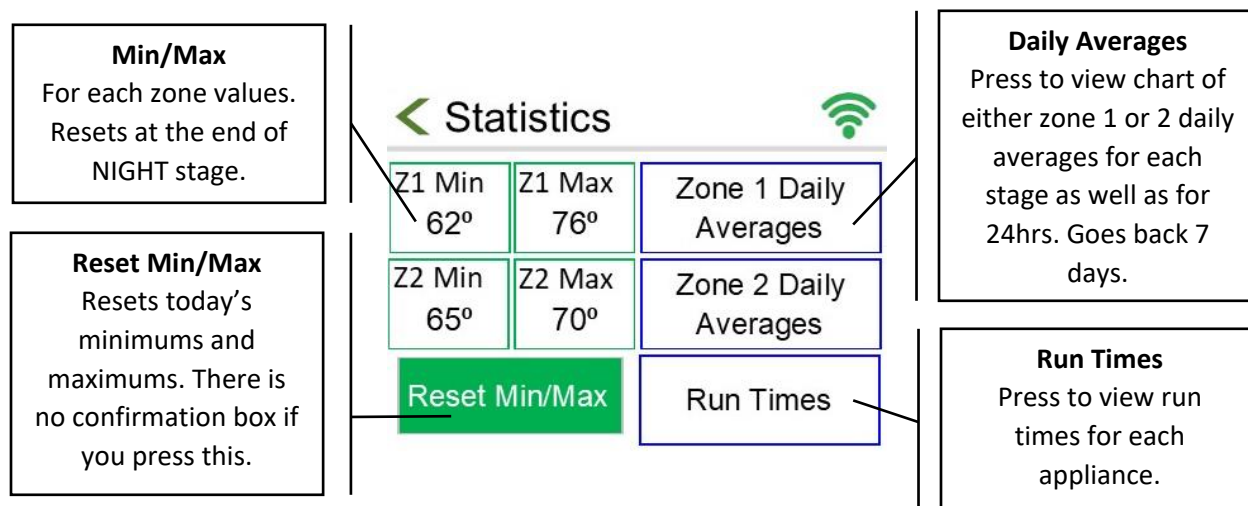


Figure 17: Statistics

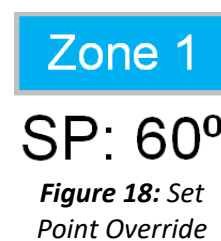
The *ClimateBoss* also tracks the run time of each of the outputs: Heat 1, Heat 2, Cool 1, Cool 2, Cool 3, Cool 4, and Heat 3 (H and CH versions). The *ClimateBoss* will store the information until it is reset and will also display the number of days since the last reset. To **view run times**, press the *Run Times* button in the bottom right of the statistics screen. To **reset run times**, press the *Reset* button in the bottom left of the Run Times screen. A prompt will pop up confirming your decision. Press *yes* to proceed.

Overrides

Not only is the *ClimateBoss* programmed for automatic operation but it can also give the grower temporary overrides of the target temperature, manual start of the timer or dehumidification options, and on/off control of each output.

Target Temperature (Set Point) Override

The target temperature can be temporarily changed from the controller's home screen. This feature is primarily used for when you want to change the growing temperature because it is too uncomfortable to work in, but you want to revert back to the automatic program after you have completed your task.



To override, press the area of the home screen that says the zone you are working in and SP = ? underneath. See **Figure 18: Set Point Override**. By tapping that box, you will be brought to a screen to enter a temperature. Entering a value will turn the Set Point green on the home screen, signaling a manual override. The temperature will reset back to the normal programmed set point (see Stages, page 13) during the next stage transition (DIF, DAY, NIGHT).

Vent Cycle or Timer Manual Start

The dehumidification vent cycle or a timer cycle can be manually started. This allows you to program a cycle, set it to off and run it only on a manual cycle. For instructions on how to manually start one of these cycles, see Page 15 for the vent cycle and Page 18 for the timer cycle.

Outputs

Each Heat or Cool output can be set to on or off, in addition to the automatic function. This will override the safety checks and you may have instances where the heats and cools run at the same time. For information on how to manually turn on or off an output, see Page 14, Outputs.

Error Codes

Clock – indicates that the controller’s clock is not functioning properly.

TH1 – indicates that thermistor 1 has a short circuit or an open circuit

TH2 – indicates that thermistor 2 has a short circuit or an open circuit

T1 Low – Indicates a low temperature alarm in Zone 1

T2 Low – Indicates a low temperature alarm in Zone 2

T1 High – Indicates a high temperature alarm in Zone 1

T2 High – Indicates a high temperature alarm in Zone 2

Appendix A. Celsius Settings Conversions

When operating in Celsius mode the controller settings are different than in the Fahrenheit. The following table will illustrate the differences between temperature settings. Remember that the default setting for the controller is Fahrenheit.

| SETTING | CONTROLLER DEFAULT | COMMENTS |
|-------------------------|----------------------------------|---|
| DIF target temperature | 18 | Maximum setting of 55. Minimum setting of 1. |
| DAY target temperature | 18 | Maximum setting of 55. Minimum setting of 1. |
| NITE target temperature | 18 | Maximum setting of 55. Minimum setting of 1. |
| Hysteresis setting | 1 | Not changeable. |
| Alarm settings | Low value = 0 High value = 55 | Values of 1 through 55 accepted. |

Converting the Fahrenheit settings to Celsius temperatures generates the values in this table. Although the default setting for Alarm Low is 0, only values of 1 or higher are acceptable for entry. This is due to the internal conversion that the controller performs.

Appendix B. Default Settings

See the following charts for the default settings of the *ClimateBoss* for Natural Vent Houses:

| STAGE SETTINGS | | | |
|----------------|------------|-----|-----|
| STAGE | START TIME | °F1 | °F2 |
| DIF | 6:00 | 65 | 65 |
| DAY | 8:00 | 65 | 65 |
| NITE | 17:00 | 65 | 65 |

| EXTRA MODES | DEFAULT SETTING |
|-----------------------------|-----------------|
| Timer or Mister | Timer Mode |
| Dehumidification Vent Cycle | Off |

| TIMER DEFAULTS | |
|----------------|---------|
| OPTION | SETTING |
| Start Time | 12.00 |
| Run Time | 00.00 |
| Repeat | OFF |

| DEHUMIDIFICATION VENT CYCLE DEFAULTS | |
|--------------------------------------|---------|
| OPTION | SETTING |
| Start Time | 19.00 |
| Exhaust 1 | 00.00 |
| Preheat | 00.00 |
| Exhaust 2 | 00.00 |

| MENU SETTINGS | |
|-------------------------|------------------------------|
| MENU FUNCTION | SETTING |
| Temperature/Speed Units | Fahrenheit (°F), mph |
| CIS ID | 1 |
| On to Auto time | 10 |
| Heat/Cool Delay | 15 |
| Hysteresis | 1 (cannot be changed) |
| Alarms (both zones) | Low – 32 °F High – 131 °F |
| Number of Zones | 1 |
| Thermistor Fail Mode | HEAT |

| OUTPUT SETTINGS | | |
|-------------------|-------|----------------|
| OUTPUT | MODE | OFFSET or STEP |
| HEAT 1 and HEAT 2 | Auto | 0 |
| COOL 1 and COOL 3 | Auto | 1 |
| VENT 2 | Auto | 4 |
| TIMER | Timer | N/A |

Appendix C. Humidity Sensor Option

The *ClimateBoss* requires the AHUMSEnz humidity sensor to run the automatic dehumidification cycle. See page 6 of the ClimateBoss Installation Manual for installation guide.

Notes

- Proper calibration provides a ± 2 percent accuracy on reading humidity levels.
- After 15 seconds without a keypress, the ClimateBoss will return to normal operation without saving the calibration data.
- Once entered, the calibration data remains until changed.
- Different humidity probes may have different calibration codes.
- Altering the calibration code value could invalidate readings. See below.

CALIBRATION CODE

| | | | |
|--|--|--|--|
| | | | |
|--|--|--|--|

The numbers above are the calibration code. This is the value entered when the calibration code is requested below. The calibration code is also located on the label inside the humidity sensor casing.

To change/enter your calibration code, go to *Menu > Configuration > Humidity Cal*. On the screen with the number pad, enter your 4 digit code and press SAVE.

If necessary, you may need to fine-tune the calibration code. Changing the value by +5 will cause a 2% drop in humidity readings and a -5 change will cause a 2% rise in humidity readings.

For Example, if the calibration code is 6550 and a 4% drop in humidity readings is desired, then reentering the calibration data with a calibration code of 6560 will approximate this.

If modified, the humidity should be closely monitored to ensure proper humidity readings.

Caution: Changing the first two digits of the calibration code will cause erroneous readings by the probe and will invalidate all humidity readings.