User Manual

Trio 20
Poultry
Controller

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Ag/MIS/UmEn-2777-08/20 Rev 4.1
P/N: 116825

Munters

Trio 20 Poultry Controller

User Manual

Rev 4.1, 11/2025

Product Software: Version 9.1.10

This manual for use and maintenance is an integral part of the apparatus together with the attached technical documentation.

Munters reserves the right to effect modifications to the apparatus in accordance with technical and legal developments.

Index

1 Introduction

1.1 Disclaimer

Munters reserves the right to make alterations to specifications, quantities, dimensions etc. for production or other reasons, subsequent to publication. The information contained herein has been prepared by qualified experts within Munters. While we believe the information is accurate and complete, we make no warranty or representation for any particular purposes. The information is offered in good faith and with the understanding that any use of the units or accessories in breach of the directions and warnings in this document is at the sole discretion and risk of the user.

1.2 Introduction

Congratulations on your excellent choice of purchasing a Trio 20 Poultry Controller!

In order to realize the full benefit from this product it is important that it is installed, commissioned and operated correctly. Before installation or using the controller, this manual should be studied carefully. It is also recommended that it is kept safely for future reference. The manual is intended as a reference for installation, commissioning and day-to-day operation of the Munters Controllers.

1.3 Notes

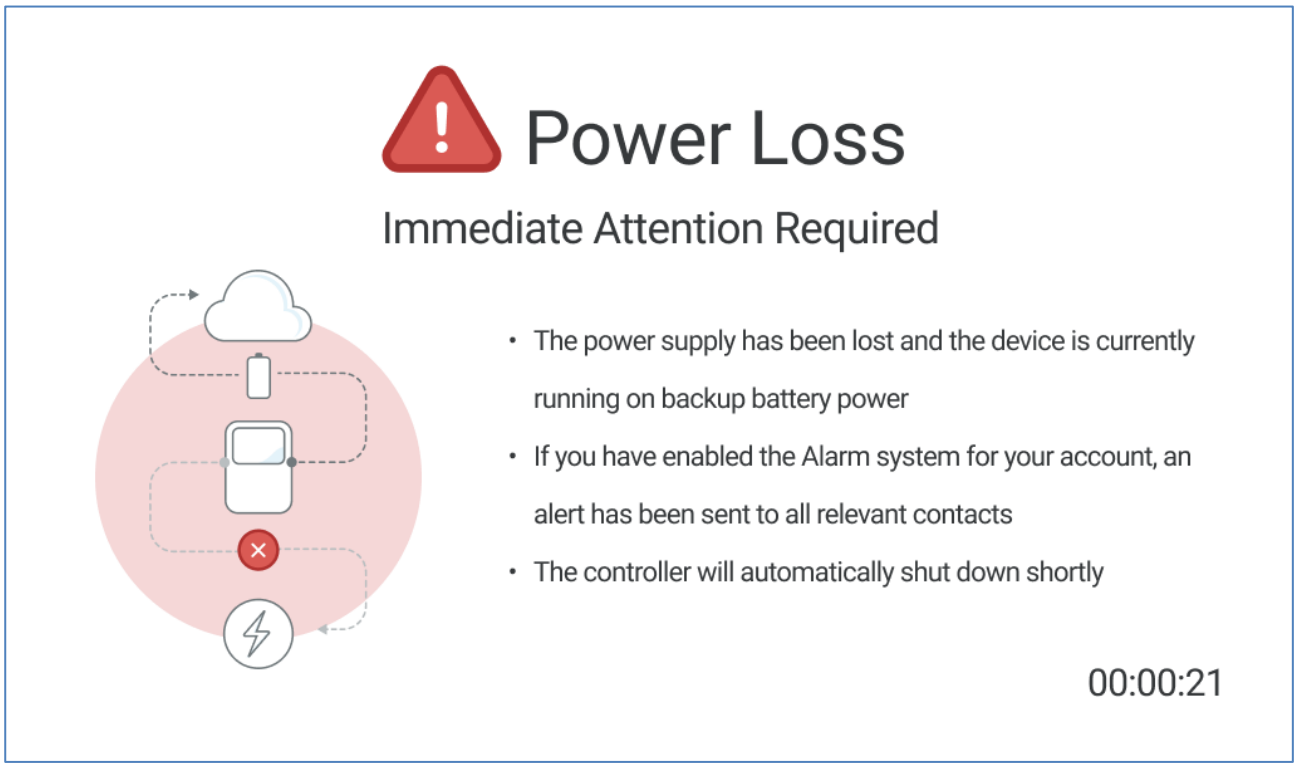
Date of release: Jan 2020

Munters cannot guarantee to inform users about the changes or to distribute new manuals to them.

2 Power Outage

2.1 Trio Dashboard

In the event of a power outage, the following warning appears:



- Controller functions will cease
- The alarm will be delivered by all approved methods.
- Once power is re-applied, the controller resumes normal operations.

CAUTION *This warning only appears in units equipped with a backup battery. Refer to the Installation Manual for more details.*

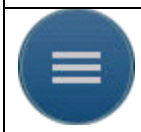
2.2 TrioAir

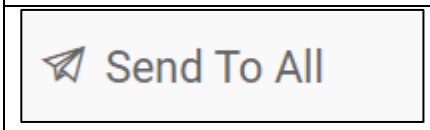
In situations where no other internet services are available, farms subscribed to the TrioAir Premium package can receive an alarm via TrioAir. To enable this service, the Trio must equipped with a cellular modem and an integrated Munters SIM card. Refer to the TrioAir Zendesk for more details.

3 Using the Trio Touch Screen

- Icons
- Dashboard

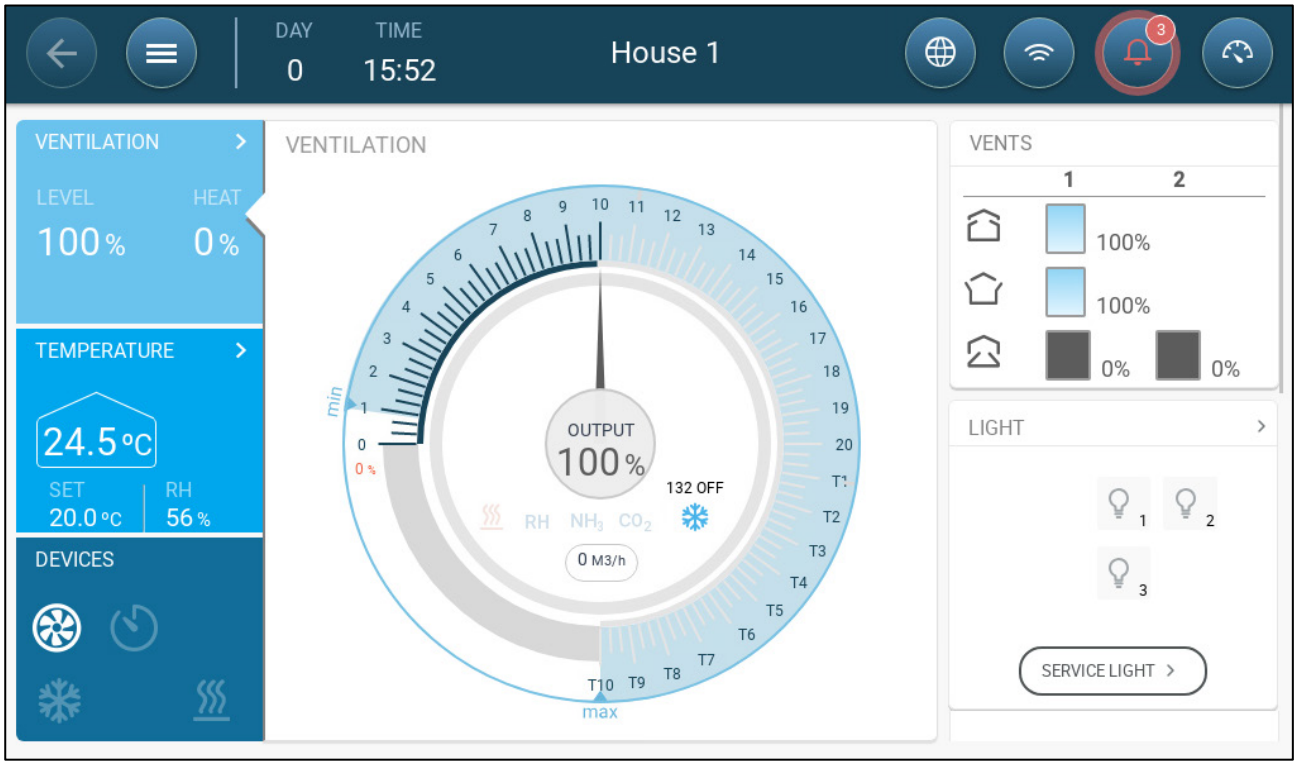
3.1 Icons

	Go back to the previous screen
	View the Main menus
	Choose language
	Trio connected to internet via Wi-Fi. Click to view network settings.
	Trio connected to internet via LAN. Click to view network settings.
	View alarms
	Go back to the main screen
	Settings icon
	Edit parameters
	Function settings
	Function test

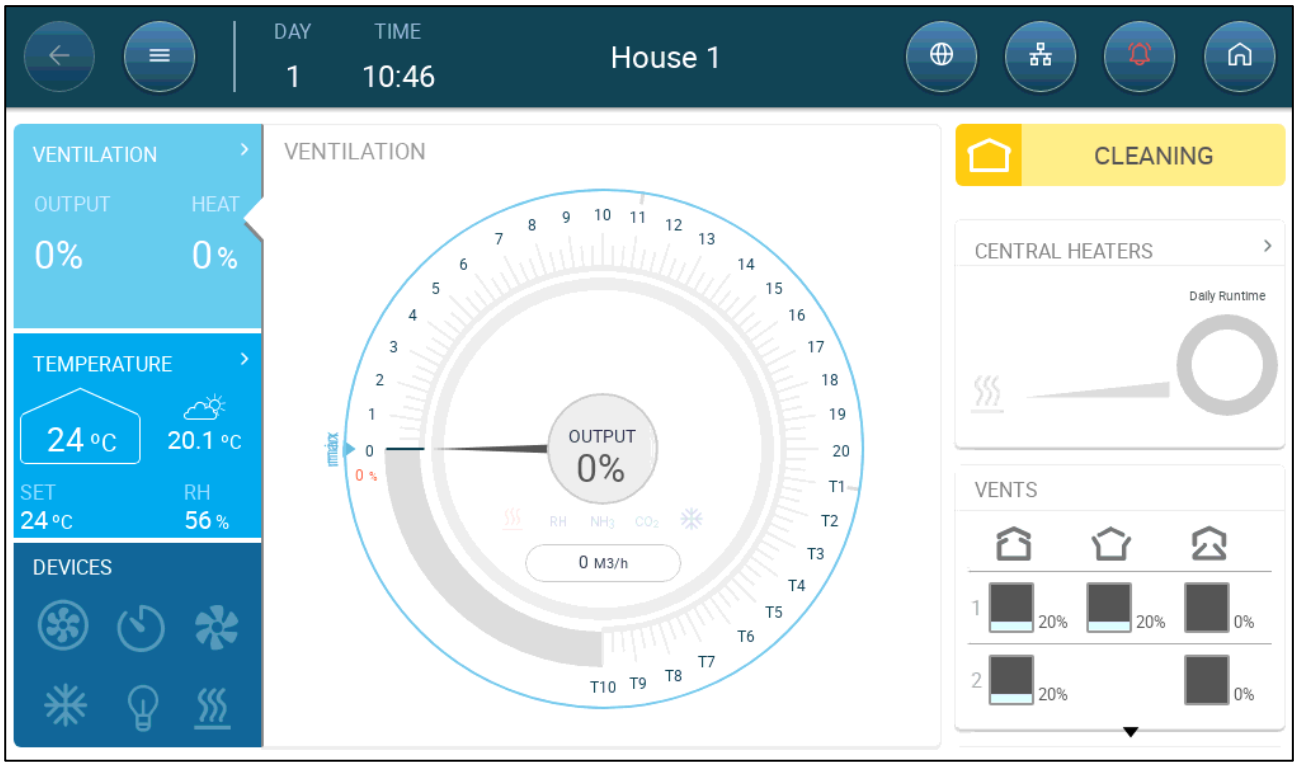
	Replace the dashboard battery with a standard 3V battery.
	Click this icon to delete data stored on that page.
Phone App	
	Click the circle containing the user name to edit personal preferences such as the language, units, name, and more.
	When a Trio controls two or more rooms or there are two or more houses on a farm, Send to All enables editing certain select functions in more than one room or house. Edit the setting, click Send to All, and select the required Trios. The select rooms' or houses' settings are updated. Note: Send to All does not appear on every screen.

3.2 Dashboard

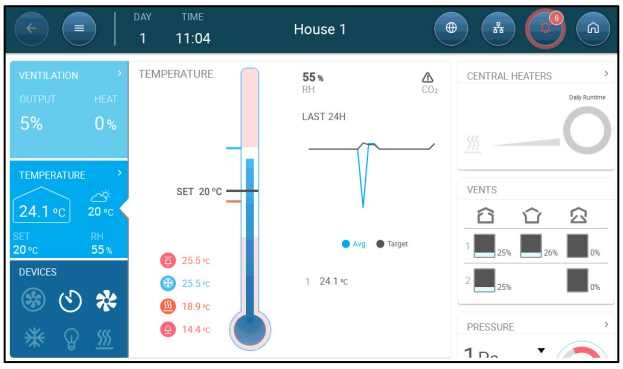
The Dashboard gives an overview of all Trio functions.

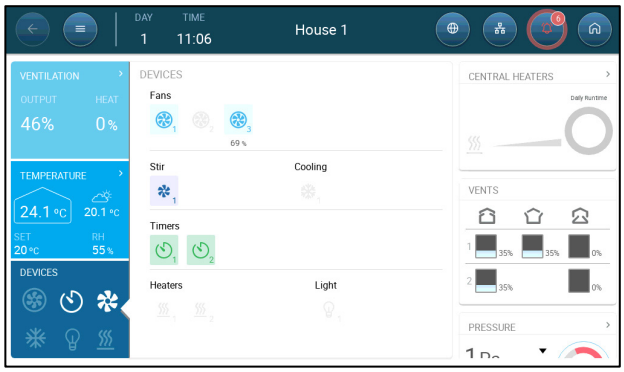


- Version 8.3 displays the Service Light icon. Refer to Service Lights page 124 for details.
- Version 5.0.15 and above displays the house mode, when defined in any mode besides Growing Mode (refer to Manual Set Up, page 16).



- Click on the > in each section to go to the relevant control page.
- Click on Ventilation, Temperature, or Devices squares to view the hot screen for those functions.





4 Basic Setup

The following section describes the initial steps to be performed after completing the physical installation.

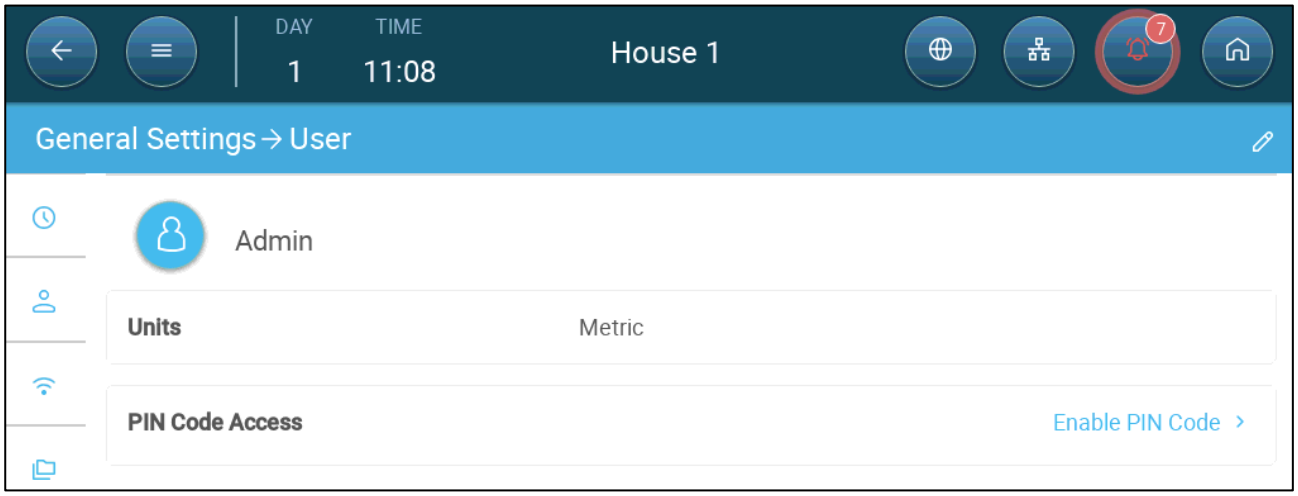
- Defining the General Settings
- Flock Settings
- Adjusting the Bird Count

4.1 Defining the General Settings

- Defining the Preferences
- Defining the Time/Date
- Defining the Sleep Mode
- Defining the House Setting

4.1.1 DEFINING THE PREFERENCES

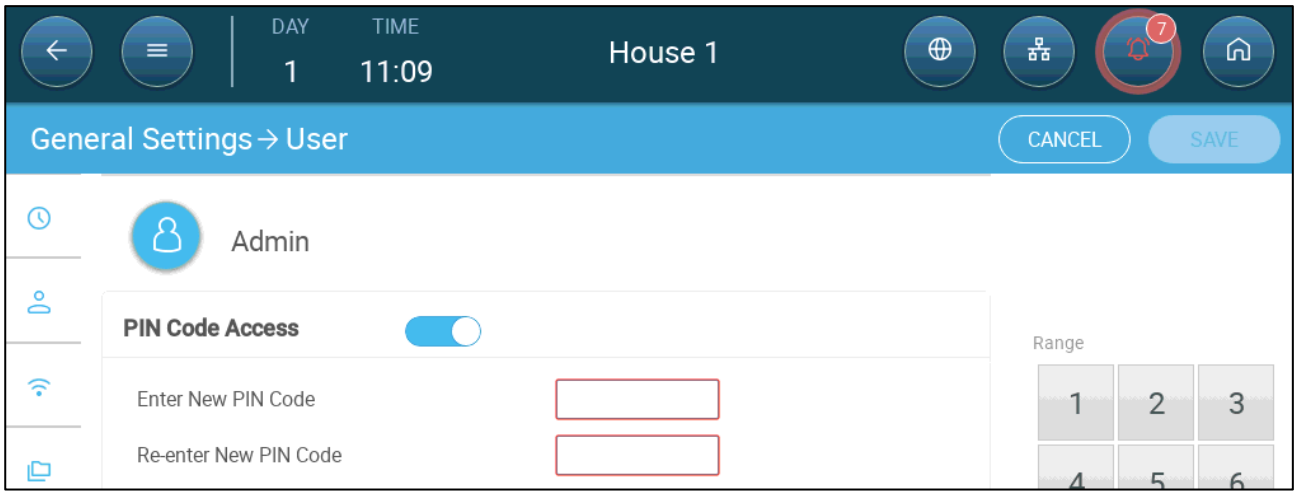
1. Go to System › General Settings › User  .



2. Define the units: There are two options:

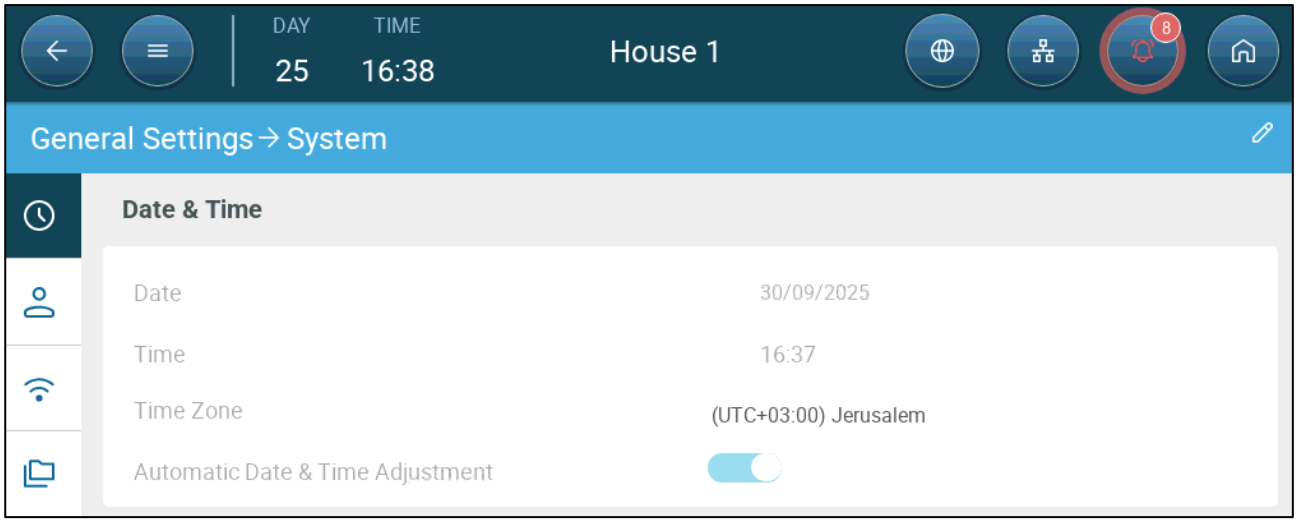
- Define all units as metric or imperial.
- Define each unit. Click Edit › Customize and define:
  - Temperature (Celsius or Fahrenheit)
  - Pressure (Pascal/Inches of Water)
  - Weight (Kilogram/Pounds)
  - Air Flow: Cubic Meter/Hour or Cubic Feet/Minute

3. Enable/disable Pin Code Access: Pin Code Access is a security measure. Anyone wanting to edit the settings must have this code.



4.1.2 DEFINING THE TIME/DATE

1. Go to System › General Settings › Date & Time .



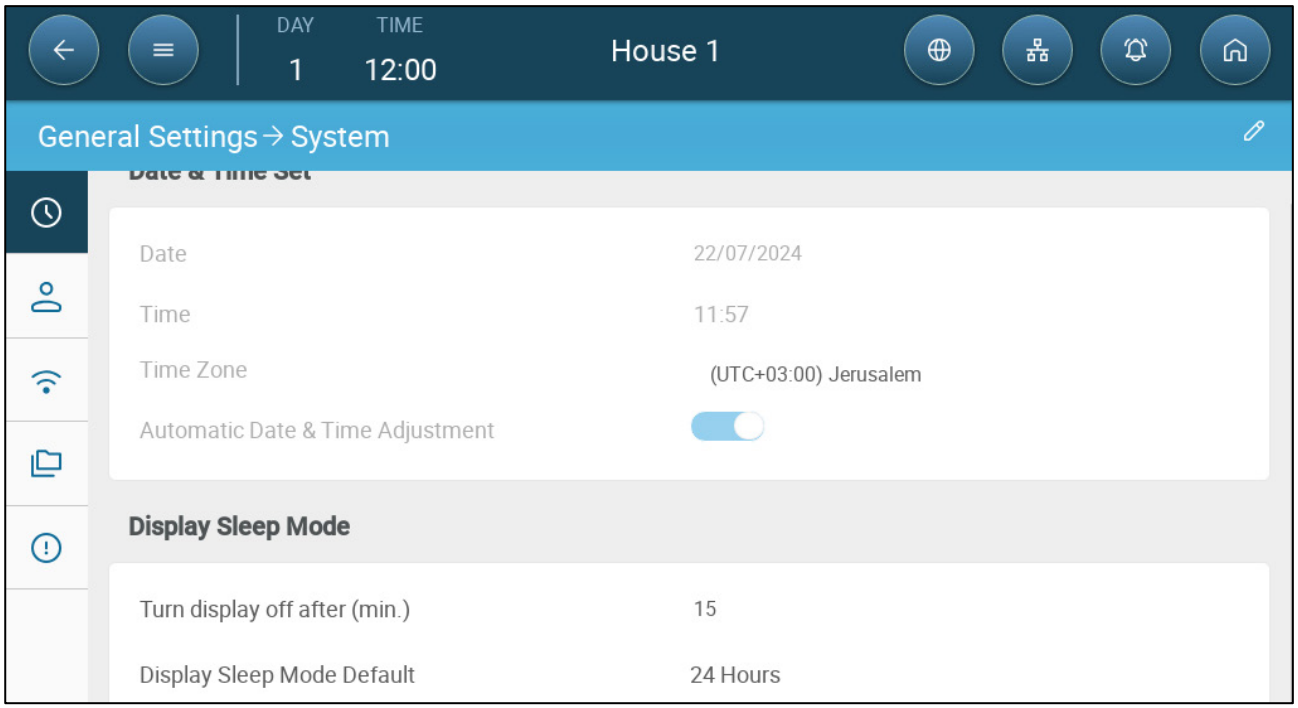
2. Define:
    - Time
        - Automatic Date & Time Adjustment: Enable this option to update date and time automatically.
        - Date and Time Set: Manually enter the date and time.
    - Time Zone Select the zone from the drop-down list.

CAUTION *Set the time zone even if you enable automatic date and time adjustment.*

4.1.3 DEFINING THE SLEEP MODE

Version 9.0: To extend the life time of the controller display screen's LEDs, the screen dims after a given amount of time has passed since a user touches the screen.

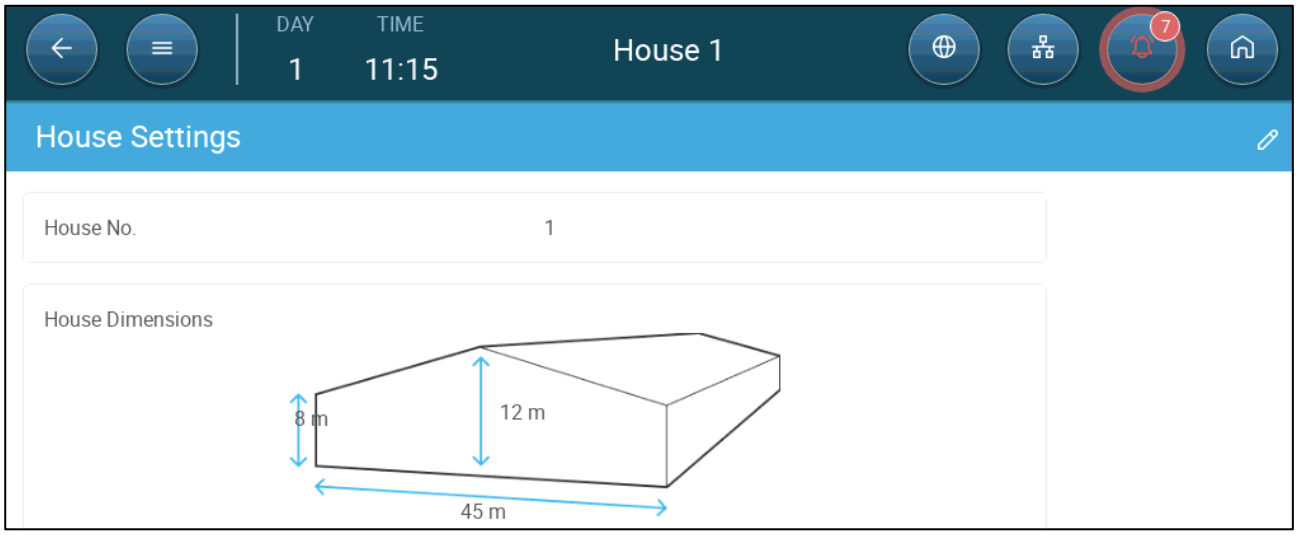
1. Go to System › General Settings › Time & Date .



2. Click Edit and define:
    - Turn Display Off After: 15, 30, 45 minutes (15 minute default).
    - Display Sleep Mode Default: Choose 24 hours or define the time frame.

4.1.4 DEFINING THE HOUSE SETTING

Go to System › House Settings. The screen enables the user to set the house dimensions. Set them according to the actual house size. These dimensions are used for calculating the wind chill factor.



- Define:
    - House number. Each controller on a network must have a unique number.
    - Define height, width, and length of house (controller calculates total area).
        - To set the dimensions in metric or non-metric units, go to Defining the Preferences, page 13 and edit the units.

4.2 Flock Settings

Flock Settings are data points used to define each flock. Define these settings at the beginning of a growth cycle. Flock settings include:

- Growth day (used in various system algorithms)
- Flock number enables tracking each flock's production

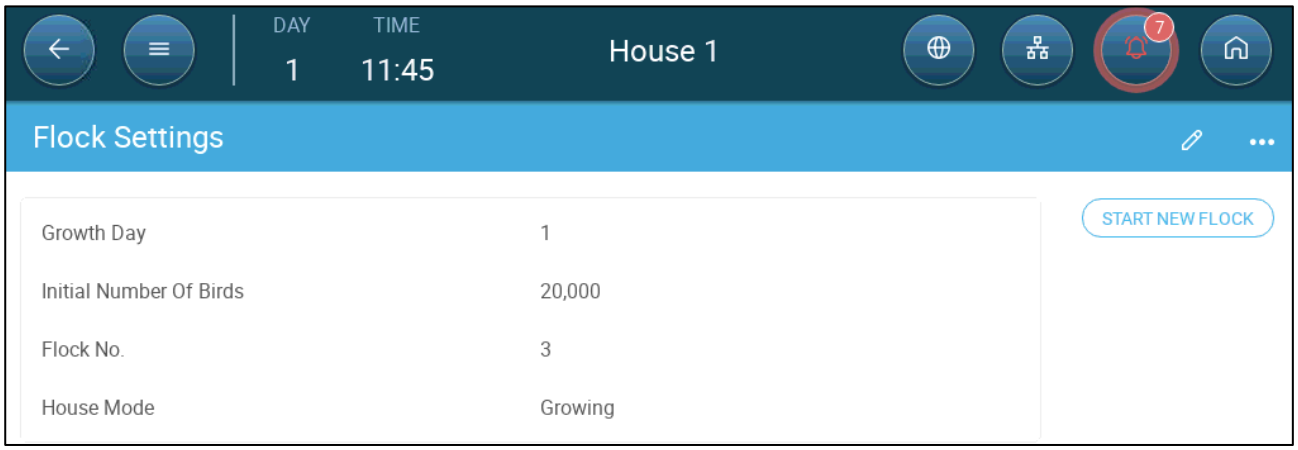
- Manual Set Up
- New Flock Wizard

4.2.1 MANUAL SET UP

- Flock Settings Main Screen
- Settings
- House Modes

4.2.1.1 Flock Settings Main Screen

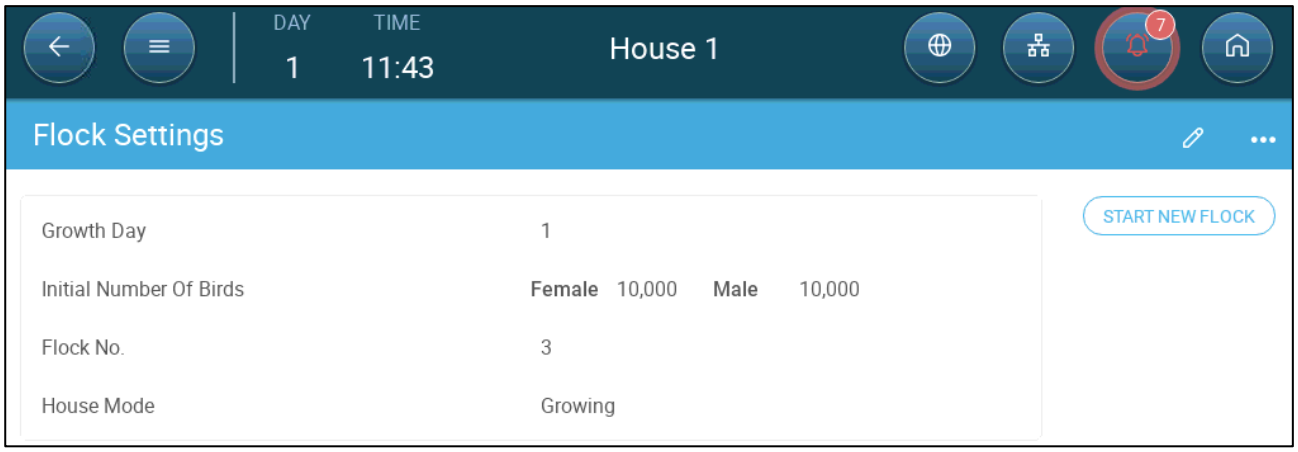
1. Go to Flock > Flock Settings.



2. Define:
   - Growth day: This parameter defines the birds' age. Growth day automatically goes up by one (1) at midnight. When editing the growth day, you can increase the number; you cannot decrease the number. Trio increases the growth day at midnight. Range: 0 - 999
   - Initial Number of Birds: Set the number of birds that are in the beginning of a flock.

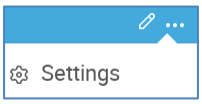
NOTE In case birds die, you can edit the number of birds. Go to Adjusting the Bird Count, page 22.

NOTE If you wish to display the number of female and male birds separately, go to Control Strategy > Flock and enable Separate Male/Female. Refer to Gender Separated Weighing, page 131.

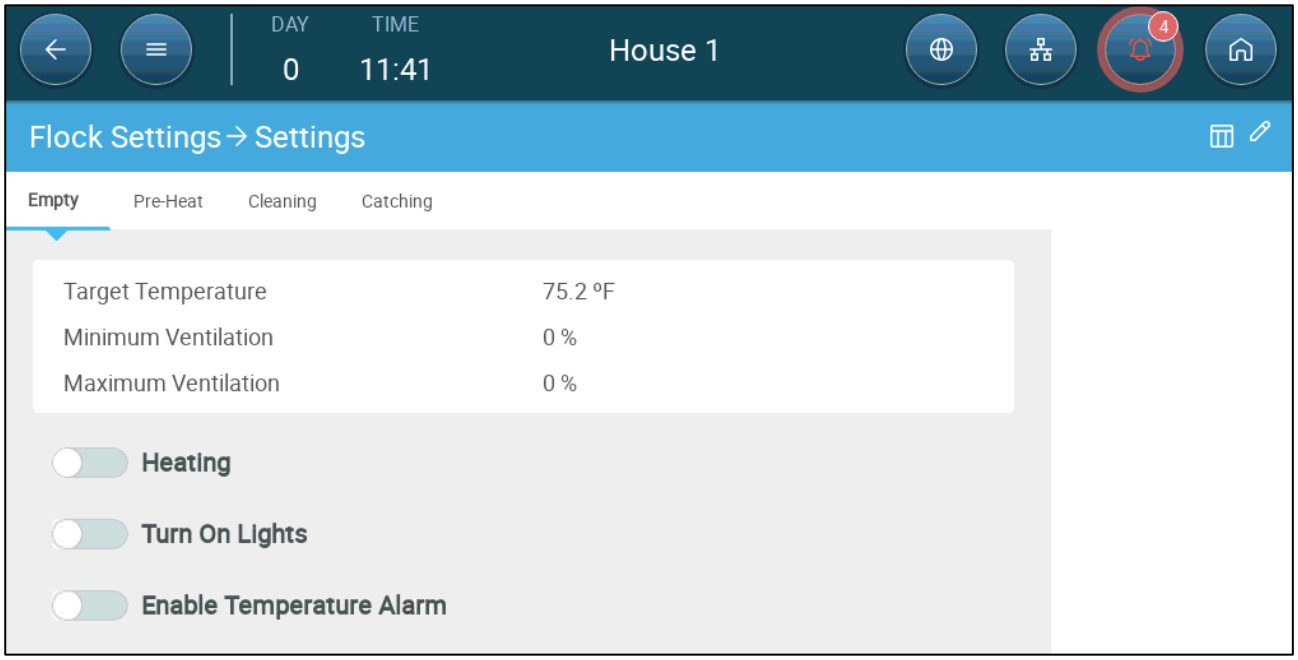


- Flock No.: Give a unique number for each flock.
- House Mode: Room mode enables or disables general functionality. When defined as Normal, all functions can be enabled. Growth day is managed as above. If you switch the room to a different mode, growth day stops advancing and only certain, specific functions are enabled. If you select a house mode other than Normal, the mode is displayed on the Dash Board.
  - The House Modes are detailed in House Modes, page 18.
  - For information on Brooding, refer to Brood Area, page 95.

4.2.1.2 Settings

1. Click 

.



2. Click the required tab and define:
   - Set the target temperature above which ventilation output increases. Range: -40 to +192° F; Default: +75.2° F

- Minimum/Maximum Ventilation: Set the minimum and maximum ventilation for air exchange, according to the birds' age. If these values are the same, ventilation is constant.
- Heating: This parameter enables heating and defining a heating temperature in each special room mode.
  - Enable the heater.
  - Define the temperature at which the heater turns on.

NOTE A heater relay must be defined and mapped for this parameter to appear.

- Turn On Lights: This parameter turns on lights when the mode is activated.
  - Enable the lights.
  - Lights Output: Define the light intensity.

NOTE A light relay must be defined and mapped for this parameter to appear.

- Enable Temperature Alarms: Set the temperature below/above which Trio activates an alarm. Range:
  - Enable the alarm.
  - Low alarm: -40 to +103° F; Default: 32°
  - High alarm +0.9 to 193.9° F; Default: 104°

4.2.1.3 House Modes

"Flock Settings" Settings page defines basic parameters for houses when these houses are NOT in Growth mode. All four modes have the same parameters.

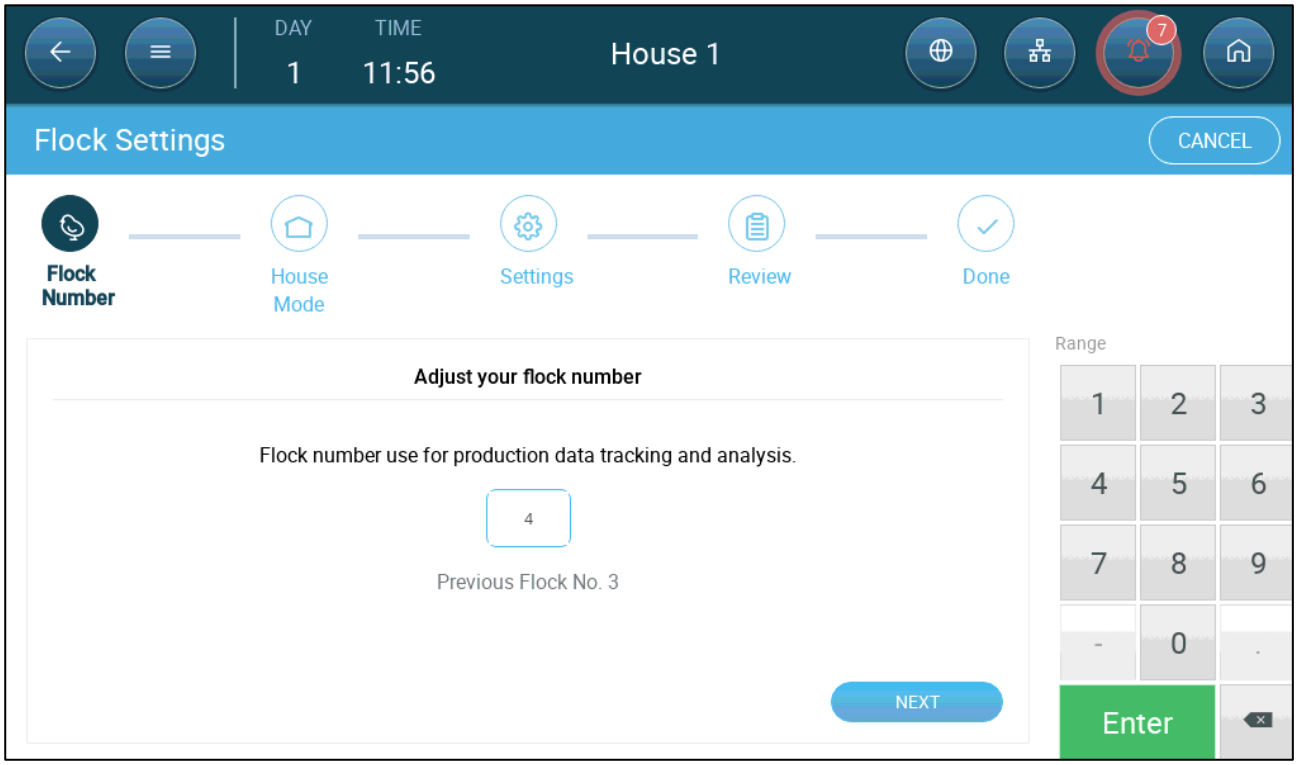
- Empty: Empty house mode is used when the whole house is empty (meaning, between flocks).
  - Provide ventilation according to the output set by the heat and ventilation.
  - Growth day stays at zero.
  - Stop water alarm - even when the alarm function is enabled.
- Pre-Heat: Pre heat the facility before moving the birds in to the pre-heat temperature set-point. This mode is used 24 – 72 hours before starting a new flock. If you wish to use this mode, the Wizard option appears. Refer to the next section.
- Cleaning: Between batches the facility is cleaned by soaking.
  - Provide ventilation according to the output set by the heat and ventilation.
  - Stop growth day progress.
- Catching: Catching Mode is used when birds are being removed from the chicken house. In this mode:
  - Provide ventilation according to the level
  - Heat output should be OFF.
  - Growth day stays at zero.
    - Turn on light if enabled. The user defines the lighting intensity

4.2.2 NEW FLOCK WIZARD

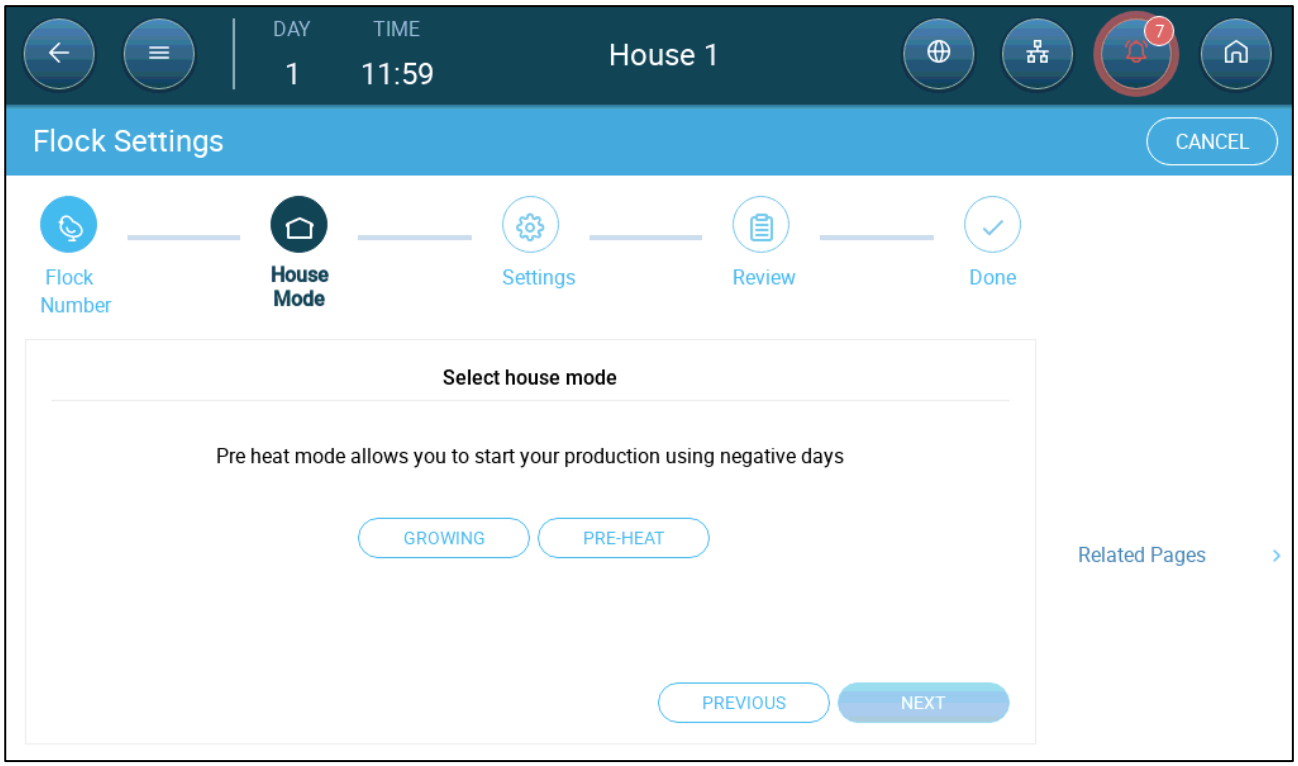
Trio provides a simple wizard to set up the Growing or Pre-Heat modes. Using the wizard enables defining negative growth days. When starting a new flock Trio:

- Erases historical data
- Sets the growth day to zero
- Increases the batch number by one
- Records a “New Batch” event

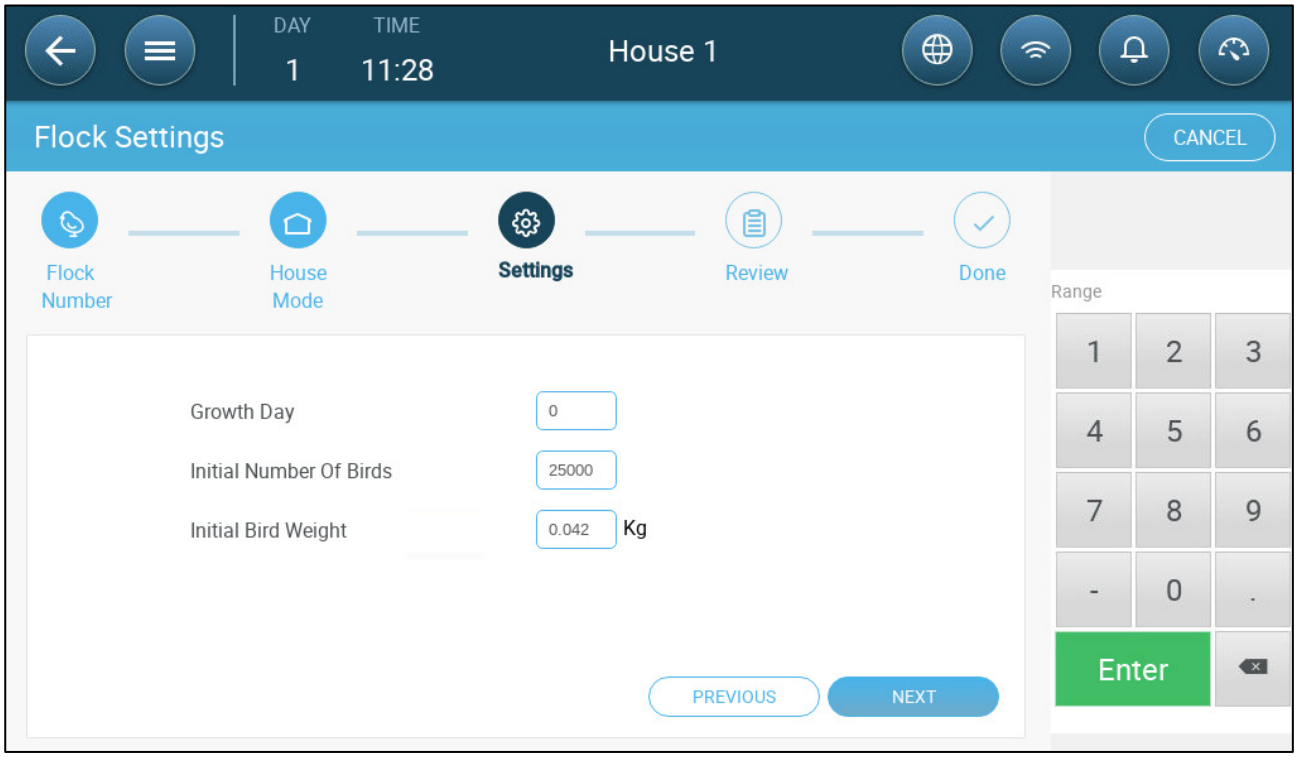
1. Click START NEW FLOCK.



2. Define the flock number and click **Next**.

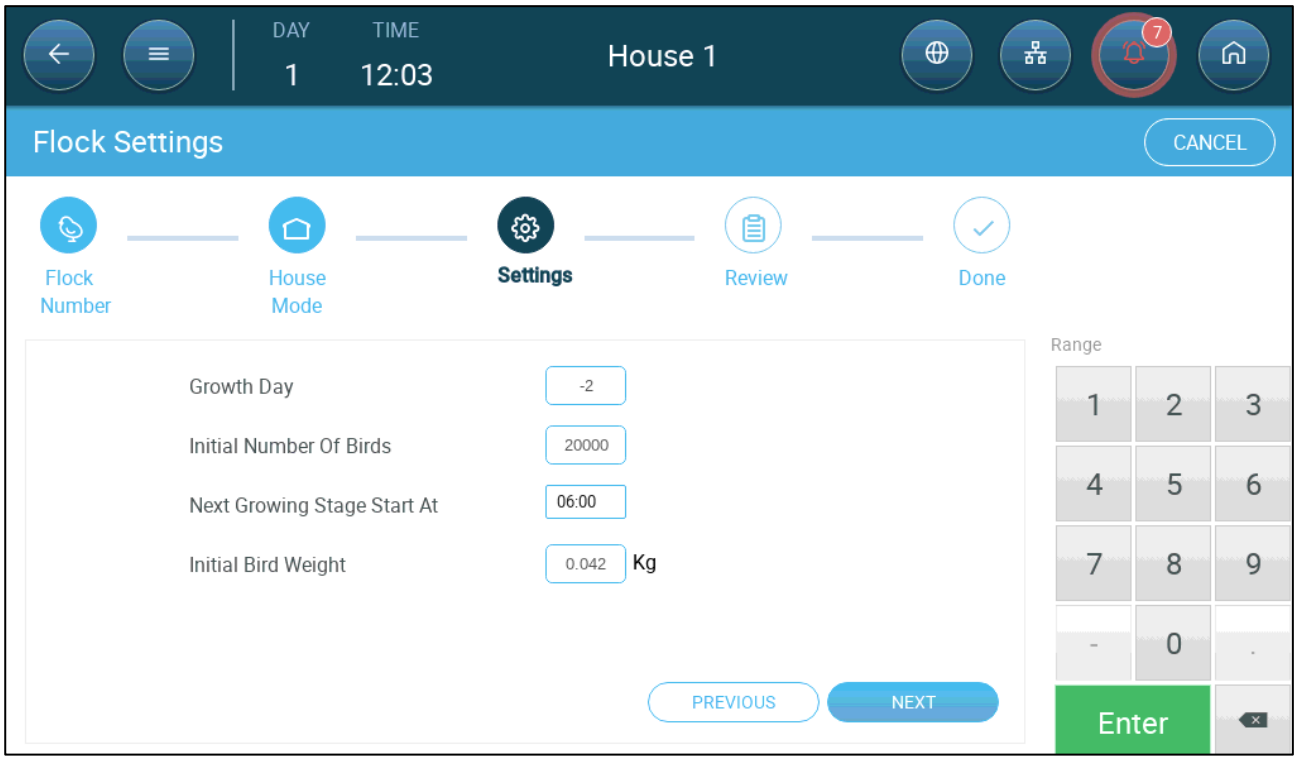


3. Select Growing or Pre-Heat. You must select an option to continue.
    - Growing Mode



- Define the Growth Day (zero or higher), Initial Number of Birds, and Initial Bird Weigh.

- Pre-Heat Mode:

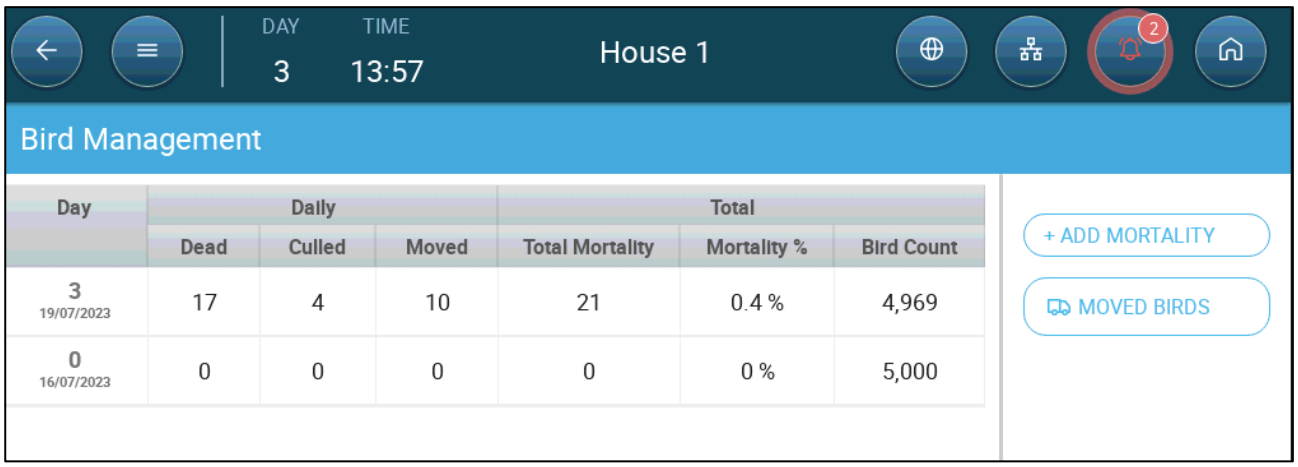


  - Define:
    - Growth Day (-7 or higher; default is -2)
    - Initial Number of Animals
    - Next Growing Stage
    - Initial Bird Weight

4.3 Adjusting the Bird Count

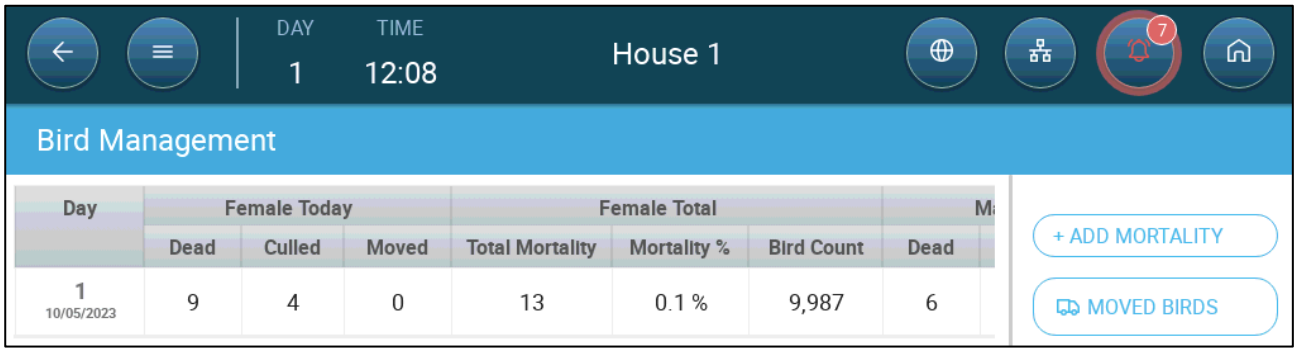
Edit the number of birds when removing or adding them to/from to the flock.

1. Go to Flock › Bird Management. This screen displays the bird mortality data.



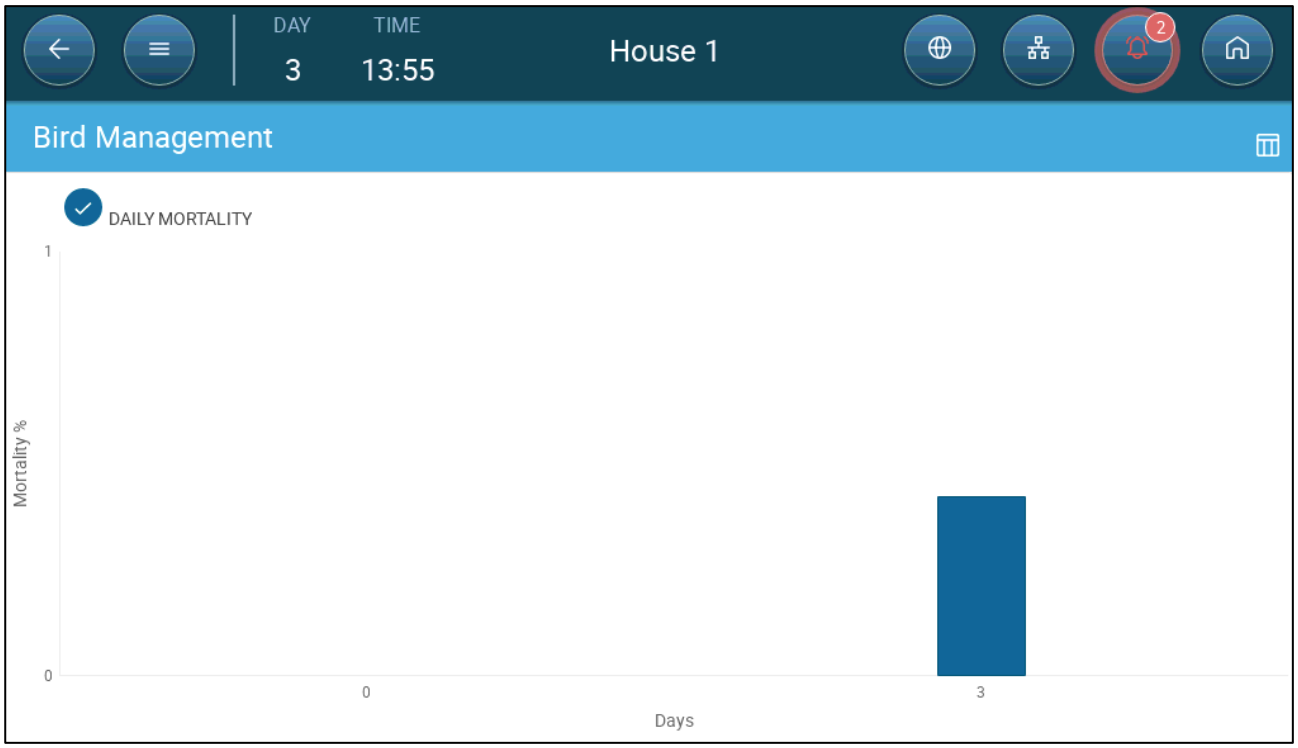
- Dead: Number of birds found dead.
- Culled: Number of injured or sick birds removed.
- Moved: Number of birds moved daily. This refers to birds that were moved for reasons other than death. This number is not factored into the morality percentage rate.
- Total Mortality: Cumulative mortality.
- Mortality %: Total mortality divided by the initial number of birds.
- Bird Count: Current bird count. Trio calculates this number based on the above factors.

NOTE If you wish to display the number of female and male birds separately, go to Control Strategy › Flock and enable Separate Male/Female. Refer to Gender Separated Weighing, page 131.



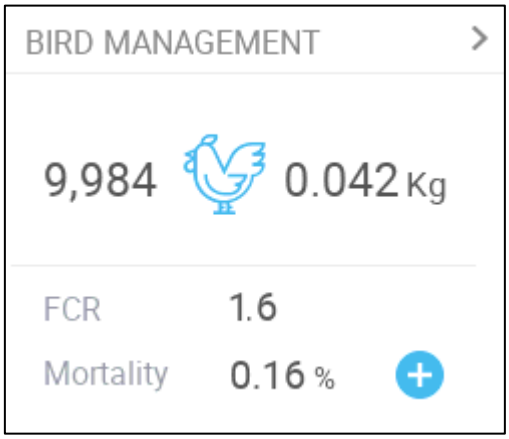
2. To adjust the number of birds:
   - Click **Add Mortality** and edit the number of birds that died or were culled.
   - Click **Moved Birds** to enter the number of live birds removed from the house. This number is used when calculating the total number of birds, but not the mortality.

Click the graph symbol to view the data in a chart form.



The Dashboard summarizes this screen's data showing:

- the current total number of birds.
- the FCR (feed conversion ratio (the amount of feed delivered converted to meat. The lower the number, the better)).
- the mortality rate.



5 Temperature Settings

- What is the Temperature Curve
- Configuring the Temperature Curve
- Emergency Temperature Control
- Temperature Humidity Index
- Nighttime Temperature Settings

5.1 What is the Temperature Curve

As animals grow, the required air temperature changes. Trio enables setting up a temperature chart in which you set the target temperatures for (up to) 10 days in the growth cycle. **Target temperature** is the ideal temperature for birds on that growth day. After defining the target temperatures and growth days, Trio creates a curve in which the target temperature automatically, gradually adjusts itself. As the growth days increase, the target temperature gradually decreases to the next setting.

For example, if on day 1 the target temperature is 95° F and on day 5 the target temperature is 86° F, Trio adjusts the target temperature on days 2 to 4 so that it approaches the day 5 setting.

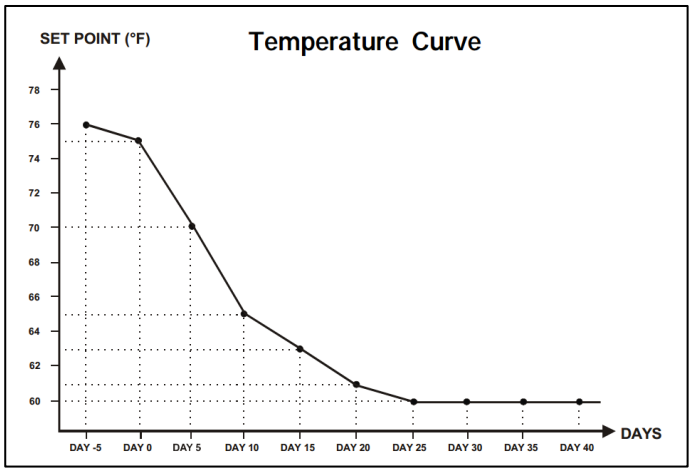


Figure 1: Temperature Curve Example

In addition the Temperature Curve has secondary functions:

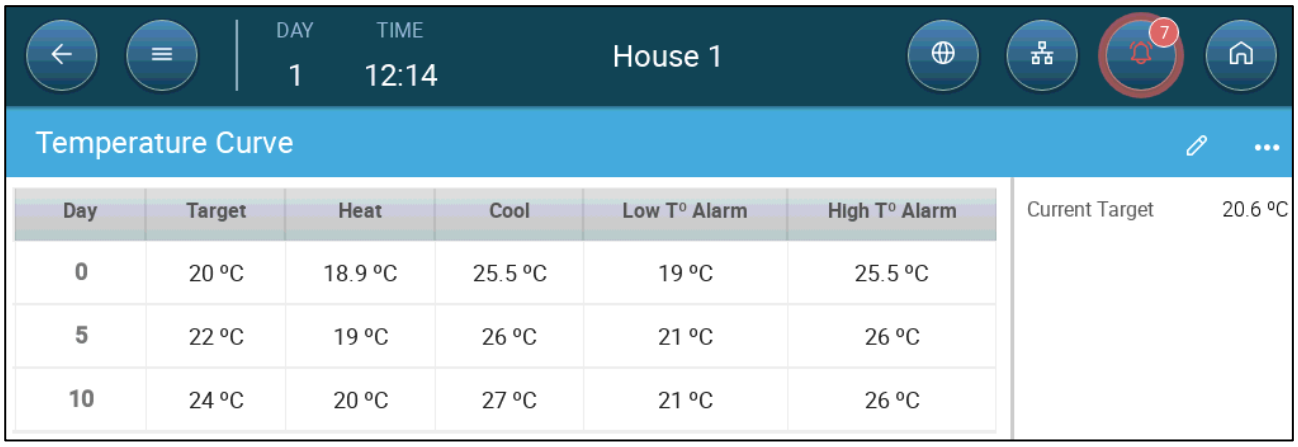
- Defines when heating begins in cases where the actual temperature drops below the target temperature (**Heat**).
- Defines when heating turns off.
- Defines when an alarm is sent when temperatures are too low (**Low Alarm**)
- Defines when an alarm is sent when temperatures are too high (**High Alarm**)

5.2 Configuring the Temperature Curve

- Defining the Temperature Curve
- Defining Temperature Curve Settings

5.2.1 DEFINING THE TEMPERATURE CURVE PARAMETERS

1. Go to Climate › Temperature Curve.



2. Configure up to 20 points in the curve (Version 9.0).

NOTE Controllers running Version 8.3 or below can configure up to 10 points.

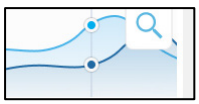
3. Define:
   - Day: Define the growth day at which each temperature spec applies. Each day must have a unique number. Range: 0 – 999.
   - Target: Target temperature is the required temperature for the bird house. All ventilation calculations are based on this specification. Range -40° to +90° C/-40° to +194° F.
   - Heat: This parameter is the set point at which the heaters are activated.
   - Cool: This parameter is the set point at which cooling devices are activated. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C.

NOTE Heat and Cool appear if a heater and cooler are defined in Devices and Sensors.

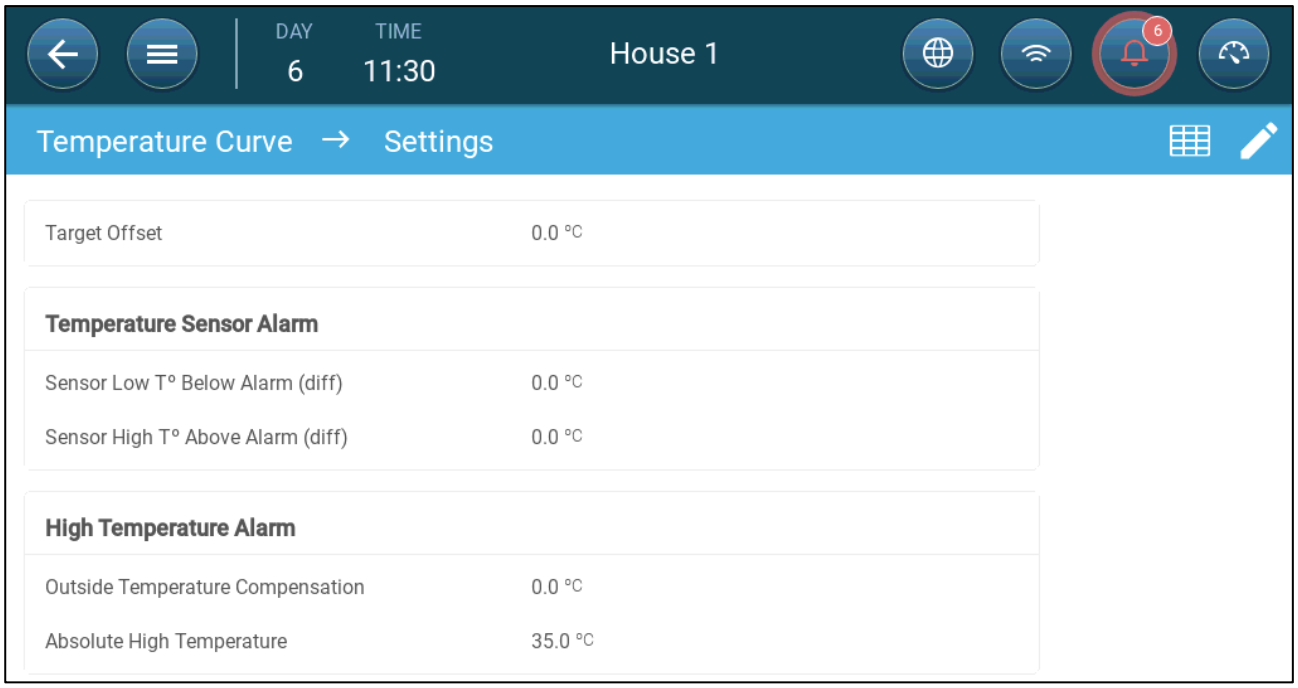
   - Tunnel: This parameter is the set point at which tunnel ventilation begins. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C/194° F.

NOTE Zone Heat and Cool only appear if relays are defined as Zone Heaters or Cooler (refer to the Installation Manual). Tunnel appears if Tunnel Ventilation is enabled in Ventilation Settings (page 56).

   - Low/High Temperature Alarm: These parameters are **differentials** from the target temperature at which Trio sends an alarm. Range:
     - Low Temp Alarm: -40°- Target
     - High Temp Alarm: Target - 90°C/194° F

4. Click  to view the curve history.

5.2.2 DEFINING TEMPERATURE CURVE SETTINGS



1. Click  .
2. Define:
    - Target Offset: Adjusts all temperature curves by this amount. You can use this to temporarily adjust all temperatures up or down for special circumstances. The offset applies to all table parameters.
    - Sensor Low T° Below Alarm: Set value below which the “Low temperature sensor” alarm is activated. This is a differential. Range 0.0° - 10.0°
    - Sensor High T° Above Alarm Diff: Set value above which the “High temperature sensor” alarm is activated. This is a differential. Range 0.0° - 10.0°
    - High Temperature Alarm. Enable if required.
        - Outside Temperature Compensation: High temperature set point = measured outside temperature + “outside temperature compensation”. Range [0.0° – 10.0°]
        - Absolute High Temperature: Set the critical temperature (maximum allowable).

5.3 Emergency Temperature Control

In the event that Trio fails to receive a signal from the temperature sensor for an extended period of time, an alarm is triggered. Between the time that Trio stops receiving a signal and when an alarm is triggered, ventilation remains at the current level. When an alarm is triggered:

- If there is an outside temperature sensor,
    - ventilation is adjusted.
    - Ventilation levels will not fall lower than the Minimum Ventilation

- If there is no outside temperature sensor
  - maintain the last known positive output (before the failure)
  - turn off negative output
  - cooling and air quality treatment cease

5.4 Temperature Humidity Index

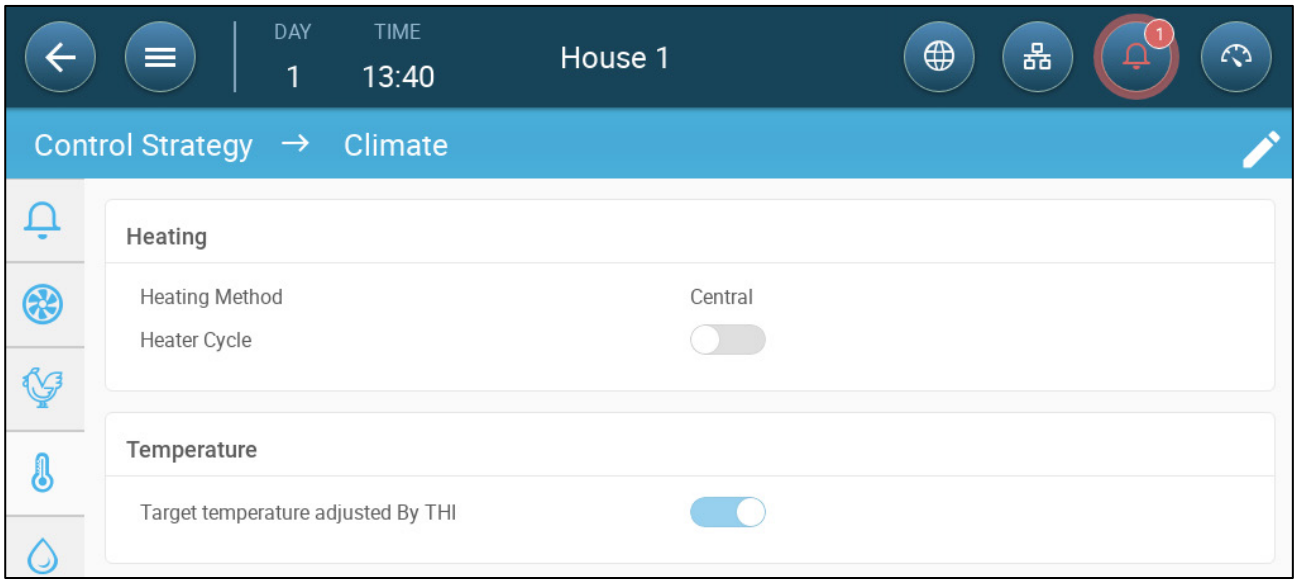
As an option, Trio Version 6.07 can operate the ventilation according to a temperature-humidity index (THI), a formula that combines the temperature and humidity levels. This formula measures heat stress and is an industry standard that can be used to provide ventilation efficiently. Based on this formula, Trio recalculates the target and heat temperatures defined in the Temperature Curve screen. Ventilation is then based on the calculated values. Please note:

- The calculated target temperature can be higher or lower than the standard target temperature.
- When this option is used:
  - the Humidity Treatment continues to function.
  - the temperature curve offset is disabled.
- THI does not affect the Tunnel Temperature.
- THI does not affect CO2 or ammonia treatments.
- THI temperatures only operate when the controller provides minimum ventilation o (meaning, not in Tunnel Mode).

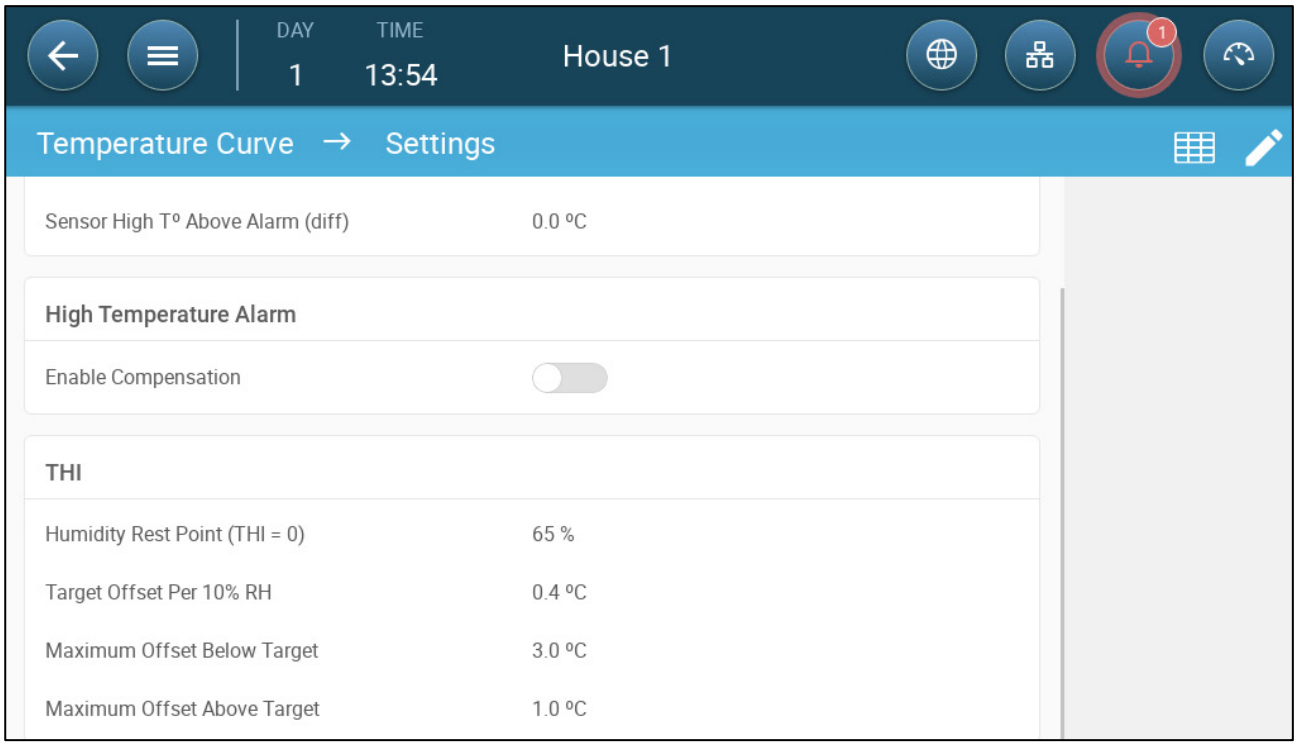
To set the THI:

➲ **Install a humidity sensor.**

1. Go to System › Control Strategy › Climate .



2. Enable the THI function.
3. Go Climate › Temperature Curve › Settings.



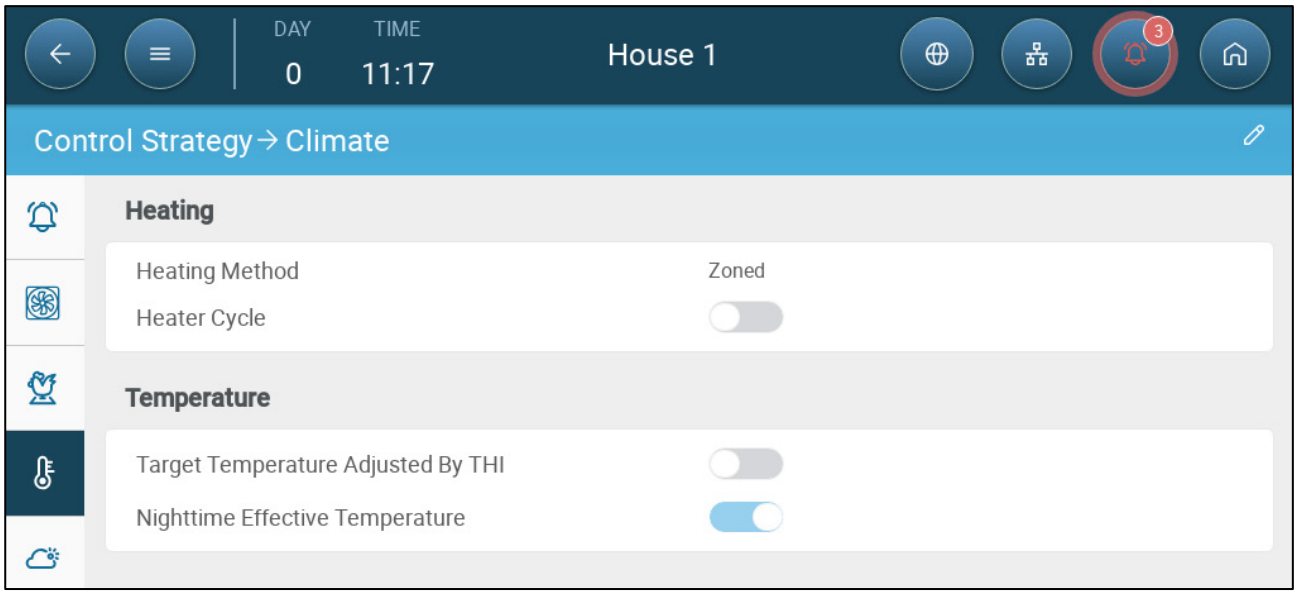
4. Define:
    - Humidity Rest Point: Define the level of humidity at which THI has no effect. Range: 55-75%.
    - Target Offset per 10% RH: Define the change to the target temperature for each 10% difference from the Humidity Rest Point. Range: 0 - 5° C
    - Maximum offset below target: Sets the maximum change below the target temperature. Range: 0 - 5° C. Default 3
    - Maximum offset above target: Sets the maximum change above the target temperature. Range: 0 - 5° C. Default 1

5.5 Nighttime Temperature Settings

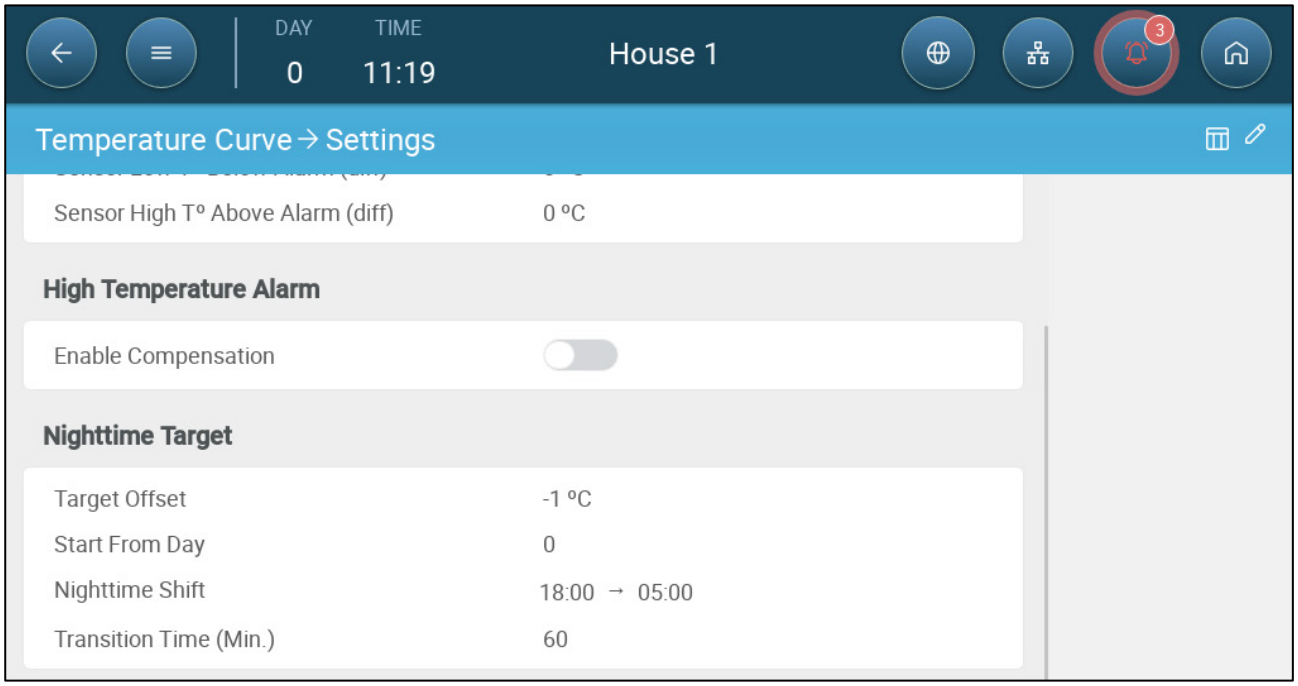
As an option, Version 9.0 enables defining a nighttime temperature differential. This option lowers the target temperature during the night (the user defines the nighttime period), starting from a user defined day. Effectively this function means that the heater starts functioning at a lower temperature.

To enable a nighttime differential:

1. Go to System › Control Strategy › Climate and enable **Effective Nighttime Temperature**.



2. Go to Climate › Temperature Curve › Settings.



3. Define:
   - Target Offset: Define the nighttime temperature offset. Default: -1° C. Range: -5° - 0° C.
   - Start from Day: Define the growth day at which the function begins to operate. Default: 0. Range: 0 - 999
   - Nighttime: Define the nighttime hours. Default: 18:00 – 5:00.
   - Transition Time: Define the amount of time over which the temperature curve transitions between day to night and night to day. Default: 60 minutes. Range: 5 – 120.

6 Introduction to Ventilation

Defining Munters' Trio ventilation consists of three elements:

- Defining the Minimum and Maximum Ventilation: Defining the minimum and maximum ventilation defines how much air is required for any given growth day. Based on these requirements, Trio determines which fans run.
- Defining the Fans/Ventilation Scheme: Defining the fans/ventilation determines how much air the fans provide and which fans provide the air.
- In addition, Trio controls the inlets and tunnel doors. There are two ways to control the inlets and tunnel doors:
    - Static pressure: Based on the difference in the interior and exterior air pressures, Trio continually calculates the inlets'/doors' opening positions. When inlets/doors change to another level, they do so before the fans increase/decrease to that level. Note that Trio uses the positions assigned to the inlets/tunnel doors levels as the minimum position.
    - Position control: The user can define the opening positions of the inlets, outlets, and tunnel doors by level. Note that when inlets/doors change to another level, they do so before the fans increase/decrease to that level.
- Inlet control is fully explained in Inlet and Curtain Ventilation, page 50.

6.1 Defining the Minimum and Maximum Ventilation

In setting up the Climate › Min/Max Ventilation screen, the user defines the lower and upper ventilation limits during the growth cycle: the minimum and maximum amount of air exchange allowed for each growth day.

- When minimum ventilation is operating, the ventilation works to ensure that there is sufficient clean air while keeping the air temperature close to the target temperature.
- The maximum limit ensures that the birds/animals do not receive too much air during any particular growth stage.
- If the temperature is above the target temperature by a sufficient amount, the ventilation level increases. If the increase in ventilation does not reduce the temperature, ventilation increases until it reaches the maximum amount defined for that growth day.
- If the temperature decreases to a user-defined point, heaters can turn on. At this temperature, ventilation will be at the minimum level.

Options:

- Day curve only.
- Dynamic Ventilation: This option enables increasing or decreasing the minimum/maximum ventilation based on the outside temperature.

    - Dynamic minimum: The controller adjusts the minimum between the cold and warm set points according to a user-defined differential from the target temperature.
    - Dynamic maximum: The controller adjusts the maximum between the maximum cold and max warm set points according to a user-defined differential from the target temperature.

  For more information, refer to Defining Dynamic Ventilation, page 36.
- Ventilation by Weight: The user defines the amount of air to be supplied to the birds, based on their cumulative weight. For more information, refer to Ventilation by Weight, page 38.
- Curve: Trio calculates a curve between growth days; the increase between days is steady. If a curve is not enabled, ventilation increases at the next defined growth day. For more information, refer to Adding a Curve, page 39.

6.2 Defining the Fans/Ventilation Scheme

Trio enables defining the volume of air supplied using three different methods:

- Basic Ventilation (required)
- Extra Ventilation (option)
- Tunnel Ventilation (option)

6.2.1 Basic Ventilation

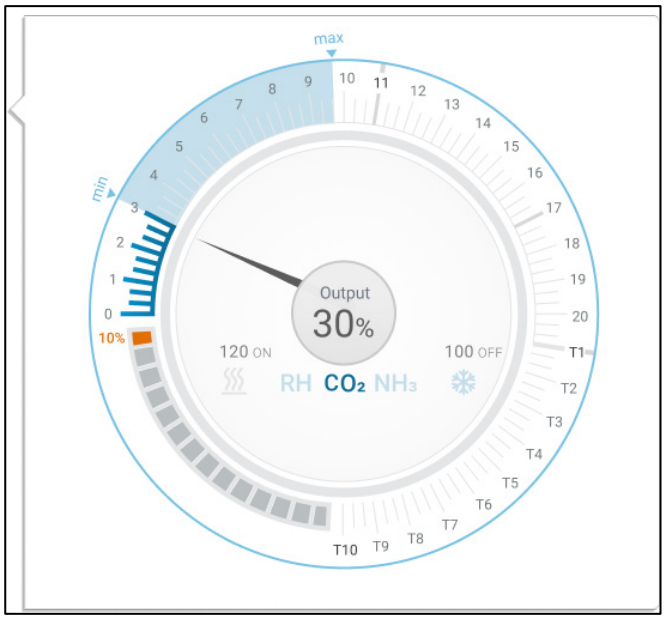
Basic Ventilation provides extremely precise levels of ventilation. There are up to 10 levels of ventilation (the user can define less than 10 if desired). Each level represents a 10% increase in ventilation, with Trio precisely adjusting the fan speeds and combinations to ensure that exactly the right amount of air is being provided. At each level, the user defines what combination of fans provide the required level of ventilation. Before going to the next level, fans will provide the maximum amount of air possible at that level.

Depending on the type of fans installed, Basic Ventilation supports on-off fans, variable fans, and efficiency fans. In addition, fans can run in a cycle (option).

If the Basic Ventilation runs at 100% (the highest amount of air defined) and the temperature continues to rise, Trio switches to Extra or Tunnel Ventilation (if enabled).

In the illustration below, Basic Ventilation is running at 30% (the defined minimum). Maximum ventilation is set to 95%. In addition, the ventilation is running at the minimum and the temperature is low, heating is running at 10%.

- Refer to Defining Basic Ventilation, page 35 for more details.

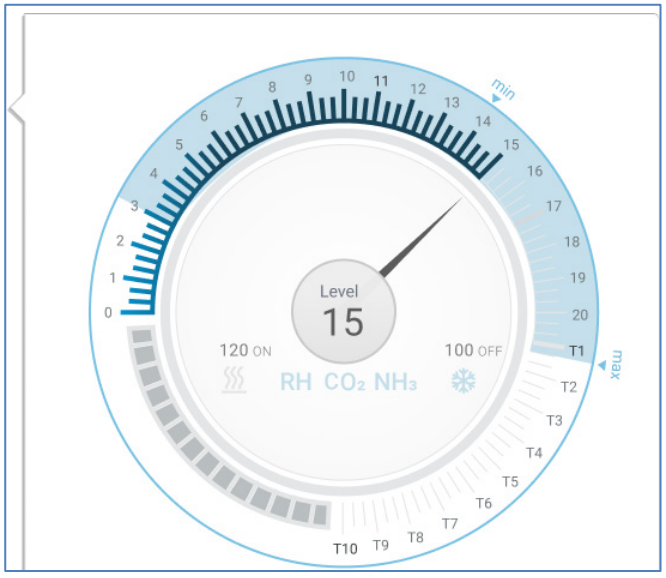


6.2.2 Extra Ventilation

If enabled, Extra Ventilation acts as a transitional phase. Extra Ventilation operates in situations where:

- Basic Ventilation does not provide enough air to lower the temperature to the Target Temperature
- The temperature is still below the Tunnel Set Point.
- Trio only enters Extra Ventilation if the temperature is 0.5° above the Target Temperature (this is the minimum; you can set the differential to be higher).
- You can set a differential for each level to ensure that ventilation increases only when required.
- Extra Ventilation supports up to 10 levels. As in Basic Ventilation, you define the fans to be used in each level. However, there is no curve between levels.

In the example below, Extra Ventilation is running at Level 15. The minimum for this growth day is Level 3 (30%) and the maximum is Level T1 (first tunnel level).



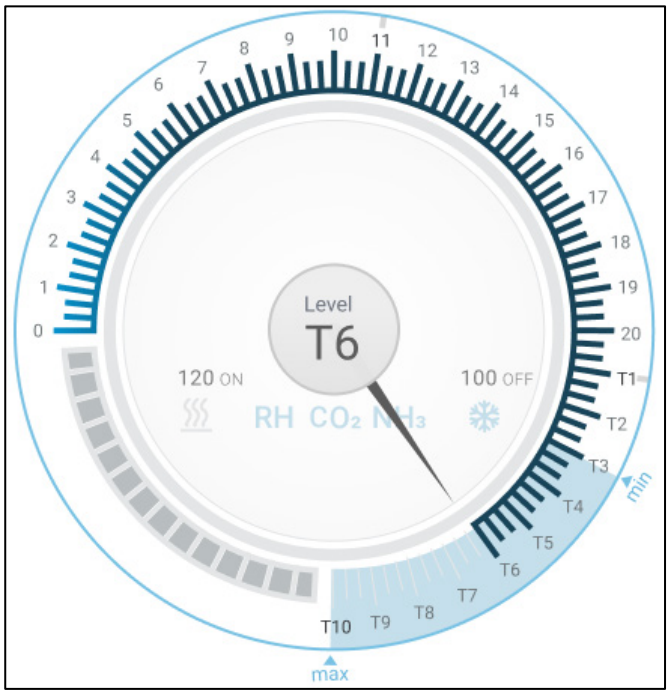
- Refer to Extra Ventilation, page 54 for more details.

6.2.3 TUNNEL VENTILATION

If enabled, once the temperature reaches the Tunnel Set Point, Trio turns on the tunnel fans and opens the tunnel doors. As in Basic Ventilation, you define the fans to be used in each level. However, there is no curve between levels.

- Even if Extra Ventilation is enabled, Trio will go straight to tunnel mode if the temperature is above the Tunnel Set Point (skipping over Extra Ventilation).
- You can set a differential for each level to ensure that ventilation increases only when required.

In this example, tunnel fans are at level T6.



- Refer to Tunnel Ventilation, page 56 for more details.
- Refer to Defining the Wind Chill Factor, page 62 for details on factoring in the wind chill factor in tunnel mode.

7 Minimum and Maximum Ventilation

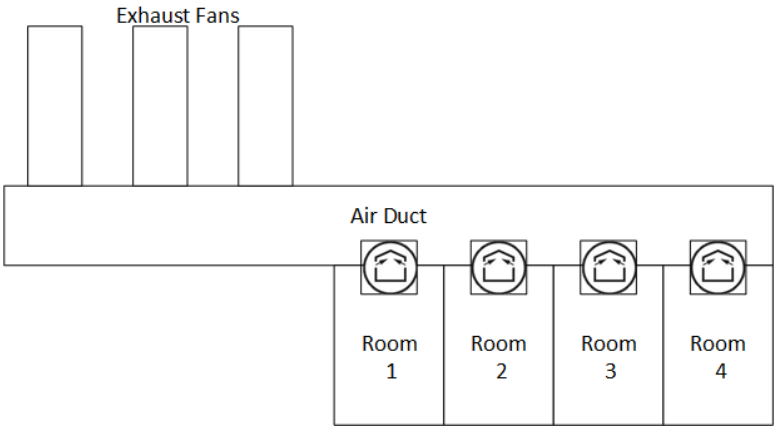
The following sections detail how to configure the minimum and maximum ventilation levels by growth day. As the temperature rises above the target temperature, Trio gradually increases ventilation level using a combination of increased fan speeds, cycle times, opening the inlets and more.

- Building Structure Summary
- Defining Basic Ventilation

7.1 Building Structure Summary

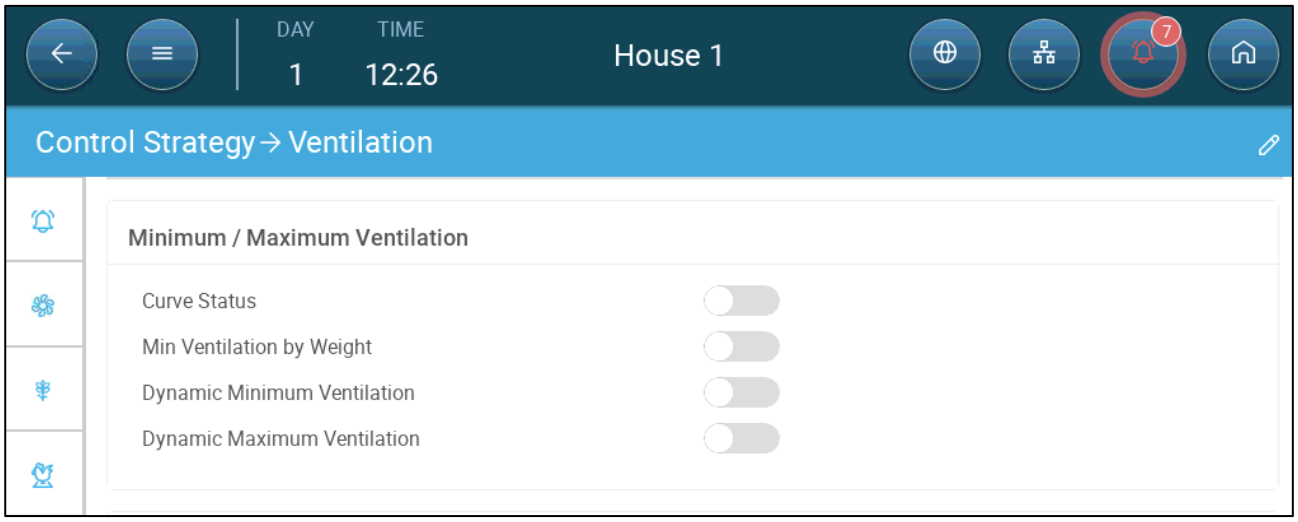
In a typical setup, flocks are housed in a building in which all rooms are connected to one central ventilation system. Each room has an inlet which controls the amount of air entering. Centralized fans push air in via the inlet.

Outside air is pushed into the attic; the controller maintains the required pressure in the air duct. By adjusting the air inlet, each room independently controls the amount of air entering. As temperature rises, the inlets' opening increases.

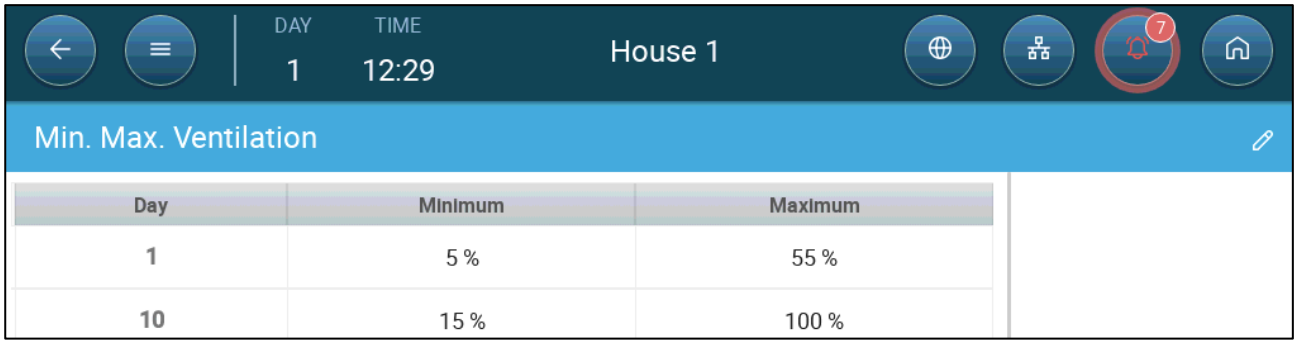


7.2 Defining Basic Ventilation

1. Go to System › Control Strategy › Ventilation  .



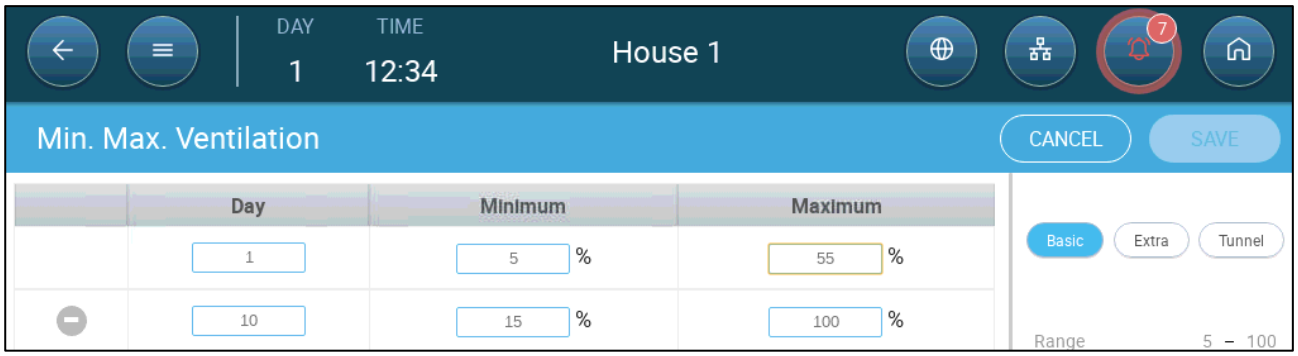
2. Verify that Dynamic Minimum/Maximum and Min Ventilation are disabled.
3. Go to Climate › Min/Max Ventilation.



4. Click  .
5. Define:
   - Day: Set the growth day for the required min/max set points. Each day must have a unique number. Add up to ten lines.
   - Min/Max Level: Define the minimum and maximum ventilation levels. Trio will automatically adjust the ventilation as the temperature changes.

Extra/Tunnel Minimum Ventilation: As option when additional minimum ventilation is required in hot climates, Extra and Tunnel Ventilation can provide minimum ventilation.

6. In System › Control Strategy › Ventilation  , enable Extra Ventilation and/or Tunnel (refer to Defining Extra Ventilation, page 55).
7. Go to Climate › Min. Max. Ventilation.
8. Place the cursor in Min Level or Max Level. The Basic/Extra/Tunnel icons appear.



9. Click the required ventilation icon.
10. Define the ventilation as required.

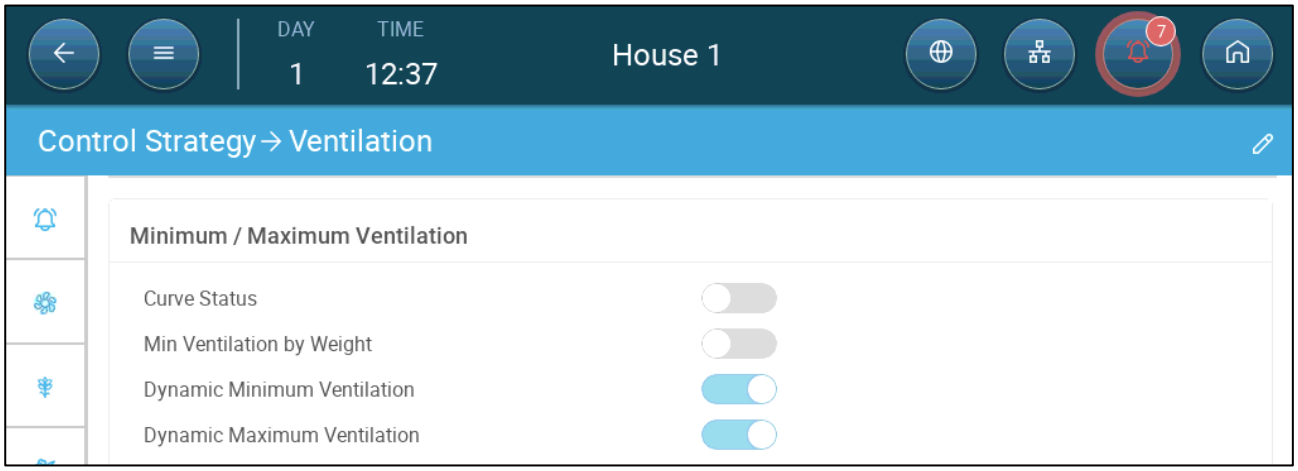
- Options:
  - Defining Dynamic Ventilation
  - Ventilation by Weight
  - Adding a Curve

7.2.1 DEFINING DYNAMIC VENTILATION

Dynamic Ventilation means that at extreme temperatures (which the user defines), ventilation can be increased or decreased.

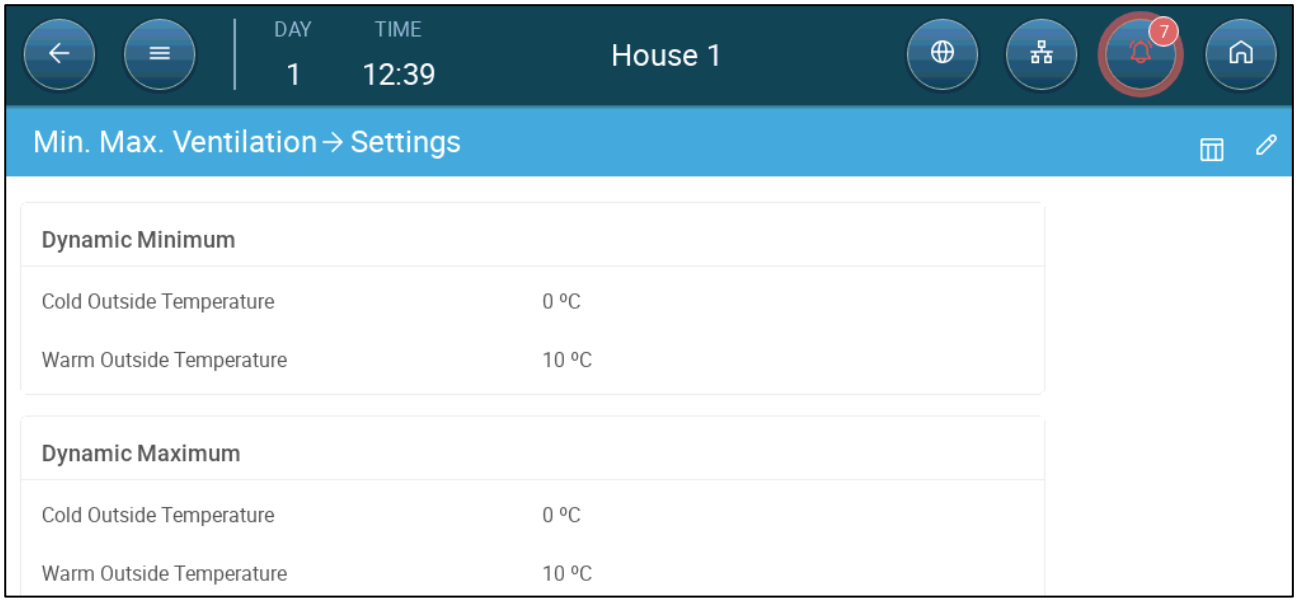
- Dynamic Minimum: The user defines the cold and warm temperatures at which the minimum ventilation takes places. In addition, the user defines the ventilation percentages. To ensure air quality, install air quality sensors (CO2, Ammonia, Humidity). These sensors will increase ventilation when necessary.
- Dynamic Maximum: The user defines the cold and warm temperatures at which the maximum ventilation takes places. outside temp. In addition, the user defines the ventilation percentages (for cold temperatures) and the ventilation level (for warm temperatures).

1. Go to System › Control Strategy › Ventilation  .

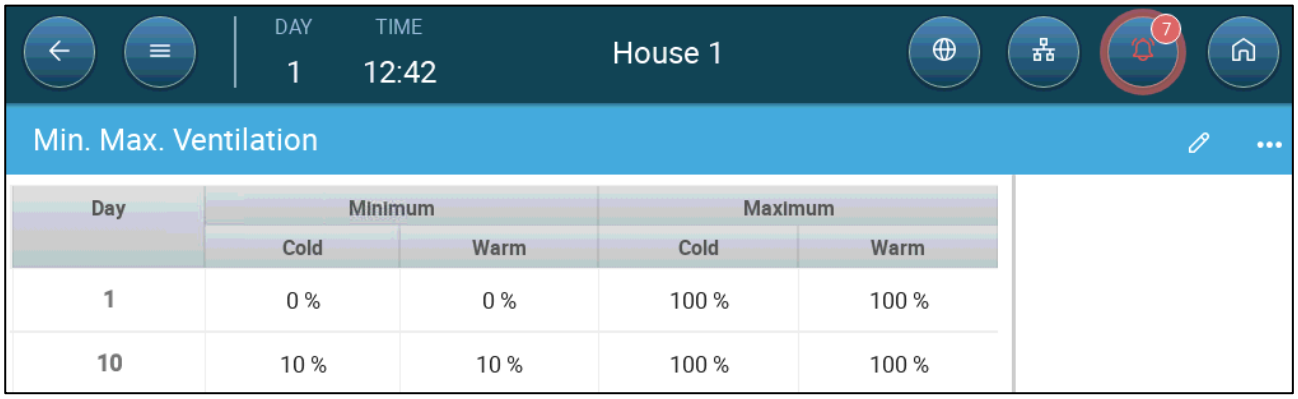


2. Under Minimum / Maximum Ventilation, enable
   - Dynamic Minimum Ventilation or
   - Dynamic Maximum Ventilation or
   - Both. In this example both are enabled.

3. Go to Climate › Min/Max Ventilation › Settings.



4. Define:
   - Dynamic Minimum Cold/Warm Outside Temperature: Define the cold and warm outside temperature points.
   - Dynamic Maximum Cold/Warm Temperature: Define the cold and warm outside temperature points.
5. Go to Climate › Min/Max Ventilation.



Day	Minimum		Maximum	
	Cold	Warm	Cold	Warm
1	0 %	0 %	100 %	100 %
10	10 %	10 %	100 %	100 %

6. Define:
   - Cold Minimum.: When the outside temperature reaches the **Dynamic Minimum Cold Outside Temperature**, Minimum Ventilation runs at this percentage.
   - Warm Minimum : When the outside temperature reaches the **Dynamic Minimum Warm Outside Temperature**, Minimum Ventilation runs at this percentage.
   - Cold Maximum: When the outside temperature reaches the **Dynamic Maximum Cold Outside Temperature**, Maximum Ventilation runs at this percentage.
   - Warm Max. Level: When the outside temperature reaches the **Dynamic Maximum Warm Outside Temperature**, Maximum Ventilation runs at this Extra Ventilation level.

CAUTION *When employing Dynamic Minimum, it is important to install air quality sensors to ensure that there is sufficient minimum air. If the air quality decreases, these sensors increase the air flow.*

7.2.2 VENTILATION BY WEIGHT

- How Does Ventilation by Weight Work
- Defining the Ventilation By Weight Parameters

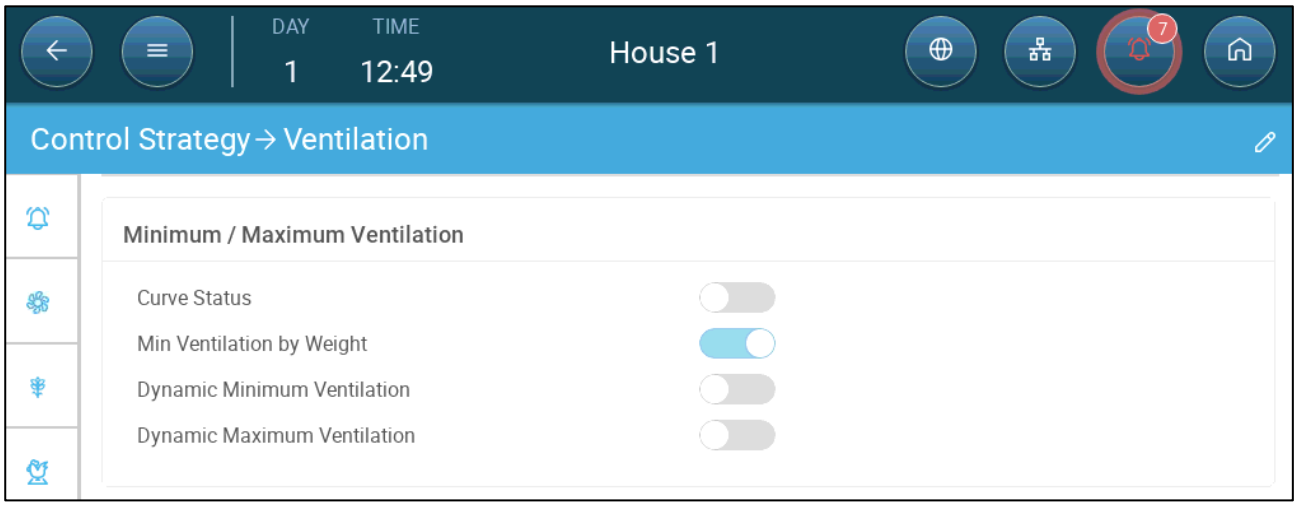
7.2.2.1 How Does Ventilation by Weight Work

Ventilation by Weight provides air based on the number of birds in the house, their projected weight, and the outside temperature. After calculating how much air is required based on these factors, Trio determines the required ventilation level to supply the air. Anytime one of the factors changes, Trio recalculates the ventilation (to prevent changing the ventilation too frequently any change must be larger than a user-defined amount).

- When using cycle fans, each level has minimum and maximum on times, which determine the minimum and maximum CFM. If the ventilation doesn't provide enough air for the birds (based on their numbers and weight) Trio sends an alarm. You will need to redefine the minimum level.
- When using variable speed fans, the defined percentages determine the minimum and maximum CFM. However, if a variable fan is set to run in a cycle, the cycle time determines the fan operation, not the user-defined fan speed.

7.2.2.2 Defining the Ventilation By Weight Parameters

1. Go to System › Control Strategy › Ventilation  .



2. Under Minimum / Maximum Ventilation, enable Min Ventilation By Weight.
3. Go to Climate › Min/Max Ventilation.

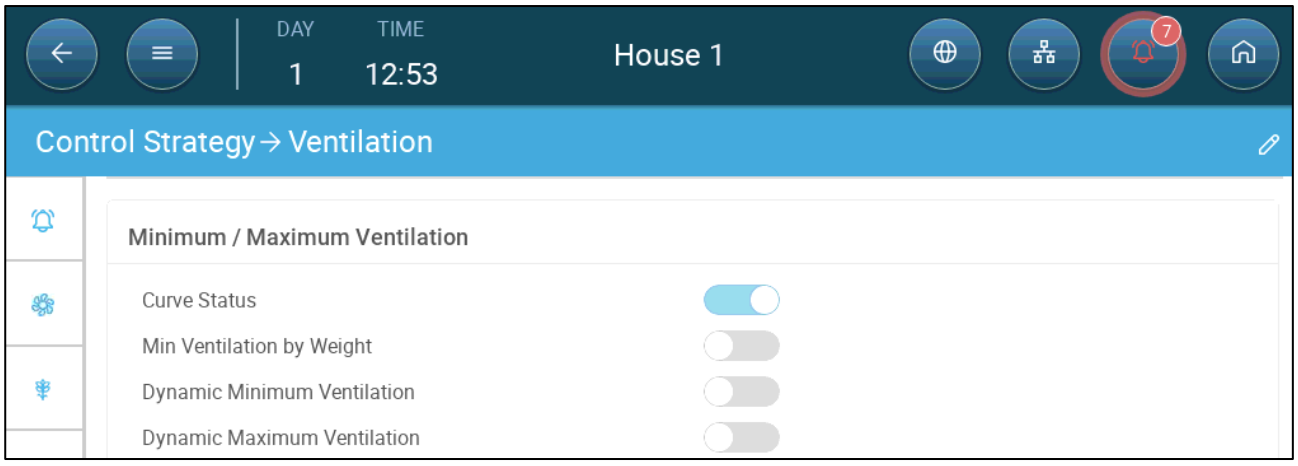
4. Click  .
5. Define:
    - Min Air Weight: The amount of air per bird's weight to be supplied.
    - Max: The maximum ventilation level by growth day.

NOTE If you enabled Dynamic Ventilation, click Settings and define the parameters. Refer to Defining Dynamic Ventilation, page 36.

7.2.3 ADDING A CURVE

The following section shows how to configure your fans to increase in a curve between the days defined in the Min Max Ventilation Screen.

1. Go to System > Control Strategy > Ventilation  .



2. Enable Curve Status. Ventilation now increases in a curve.

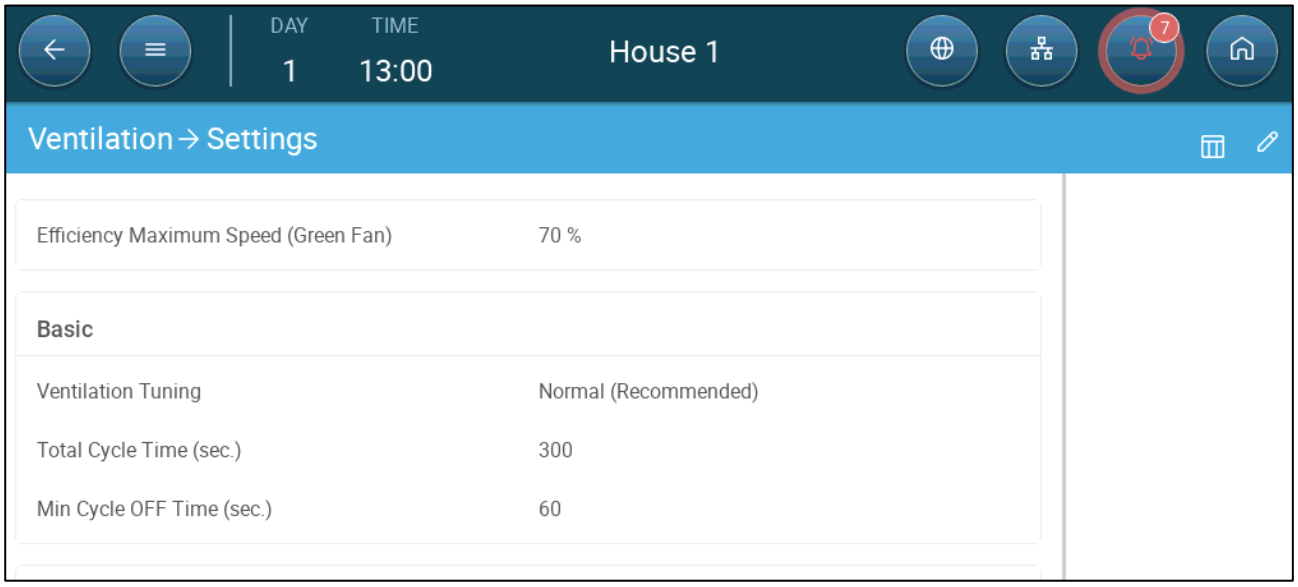
8 Levels of Ventilation

- Configuring the Basic Ventilation Settings
- Basic Ventilation
- Extra Ventilation
- Tunnel Ventilation
- Testing the Ventilation System
- Calibrating the Inlet/Tunnel Door
- Stir Fan

8.1 Configuring the Basic Ventilation Settings

➲ **Map at least one fan and one inlet before beginning.**

1. Go to Climate › Ventilation and click  .



2. Define:
   - **Efficiency Maximum**: Refer to Fans (Efficiency Fan)
   - **Ventilation Tuning**: This parameter determines how aggressively the Trio responds to differences between the measured temperature and the target temperature.

CAUTION *Munters recommends leaving this parameter at Normal.*

   - **Total Cycle Time (sec.)**: Total time in ventilation cycle.
   - **Min Cycle Off Time (sec.)**: Refer to Minimum Ventilation Cycle, page 44.

8.2 Basic Ventilation

Basic Level Ventilation defines the amount of air to be supplied at each level of minimum ventilation level. As the temperature increases, minimum ventilation increases the amount of air supplied to maintain the temperature as close to the target temperature as possible.

- Fans controlled by relays are on/off. When they are on, they run at maximum speed. Variable fans' speed can be controlled, according to needs.
- As you configure the levels, make sure that ventilation increases as the levels increase. Trio displays each level's fan output. When using on/off fans (fans controlled by relays) increasing the number of fans increases the ventilation. When using analog fans, the user defines the fans' maximum output; this output must be taken into account along with the number of fans.

- Defining Basic Ventilation
- Fan Options
- Inlet and Curtain Ventilation

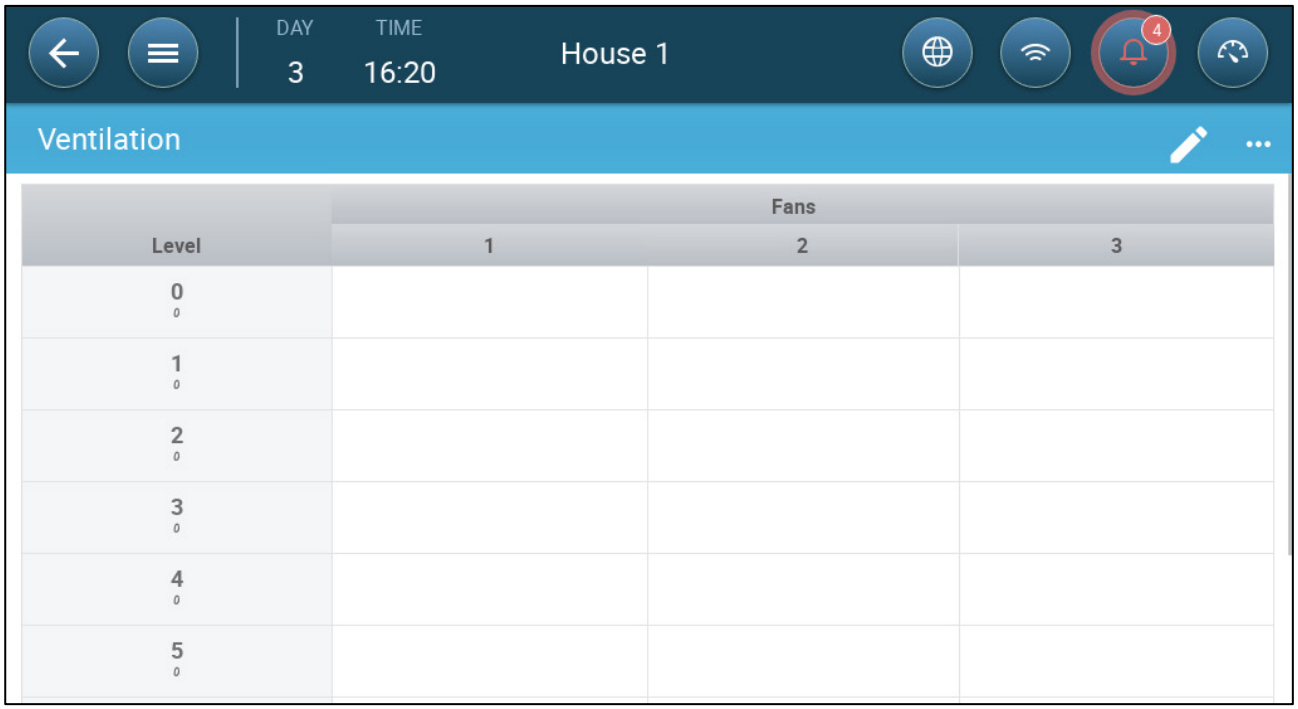
8.2.1 Defining Basic Ventilation

In this configuration, Trio raises the minimum ventilation from 10% at Level One to 100% at Level 10.

➲ **In Devices and Sensors map relays and analog output ports to fans, inlets, and stir fans as required. Only mapped devices show up in the following screens.**

➲ **Always define at least one inlet (refer to Inlet and Curtain Ventilation, page 50).**

1. Go to Climate › Ventilation.



NOTE At this point, fans do not appear.

2. Click  .

3. Click a relay-controlled fan that you want to activate. 1) A box appears around the fan. 2) A fan appears in the upper right.

4. Click the fan in the upper right. Both fans turn blue.

5. Define fans as required.

In this example Fan 1 operates according to the levels determined by the temperature and day, beginning at Level 1. The fan will supply up to 10% of the possible ventilation. At Level 4, Fan 2 also begins to operate, supplying up to 40% of the possible ventilation.

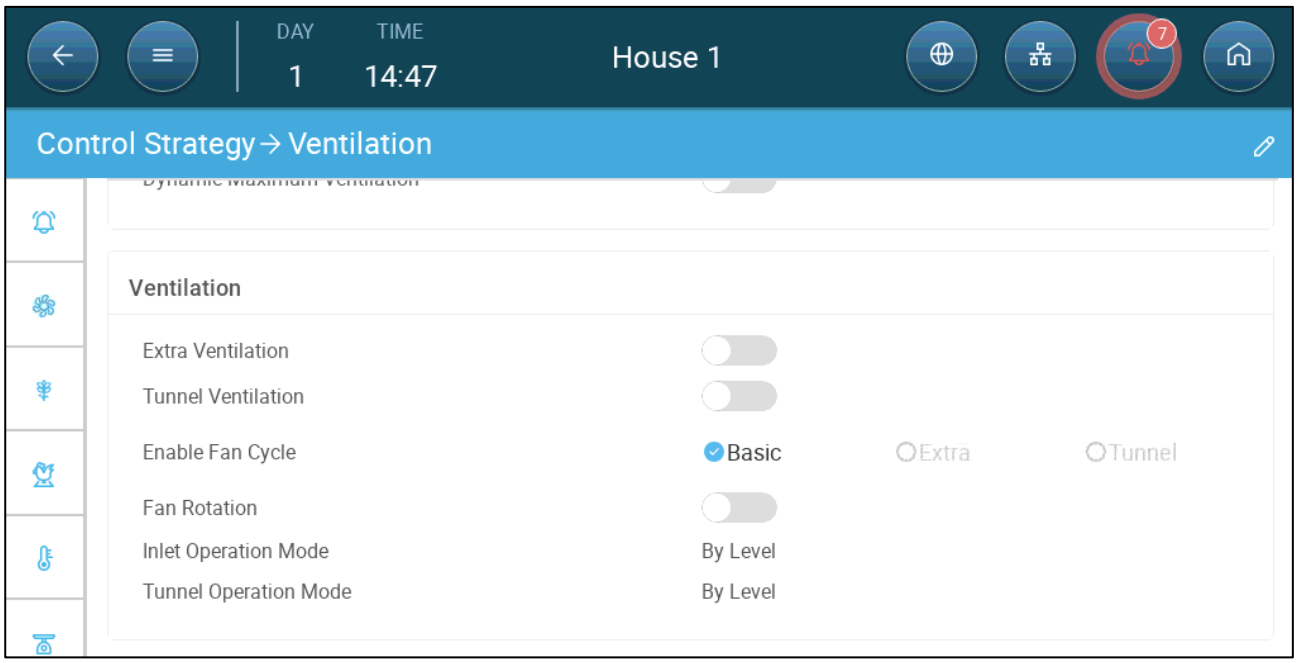
Each level shows the maximum possible ventilation capacity. In this example, each fan has a capacity of 5000 M3/h. At Level 1 this means that the maximum is 5000 M3/h and at Level 4 10,000 M3/h.

8.2.2 FAN OPTIONS

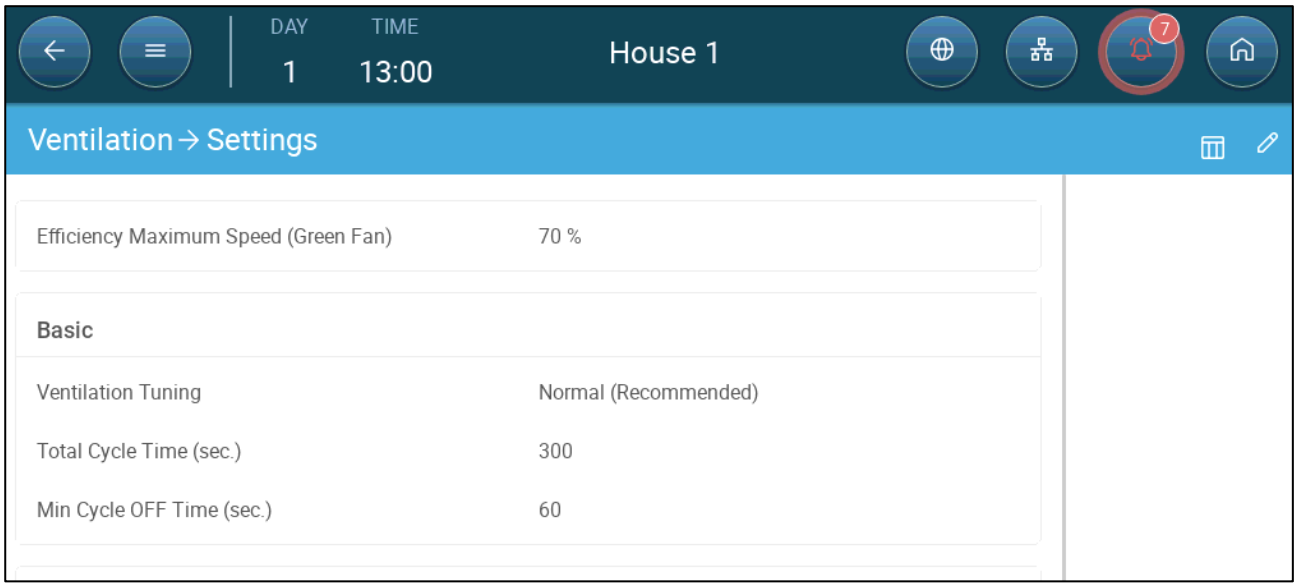
- Minimum Ventilation Cycle: Fans run in an on/off cycle with user-defined times.
- Analog Fans: Fan speed changes as ventilation requirements change.
- Efficiency fan: Fan runs at a maximum speed percentage defined by the user.
- Fan Rotation: Different fans running in Minimum Ventilation Cycle can be designated to run in rotation.

8.2.2.1 Minimum Ventilation Cycle

1. Go to System › Control Strategy › Ventilation  .



2. Enable Fan Cycle (Basic).
3. Go to Go to Climate › Ventilation › Settings.



4. Define:
   - Total Cycle Time (sec): Define the minimum ventilation cycle time. Range: 60 – 999 seconds.
   - Min Cycle Off Time (sec.): When using cycle time, Trio automatically adjusts the ON time set in the main screen. This parameter defines the minimum cycle off time. Range: 0 – 600 seconds.
5. Go to Climate › Ventilation. The (Fan) On time appears on the screen.

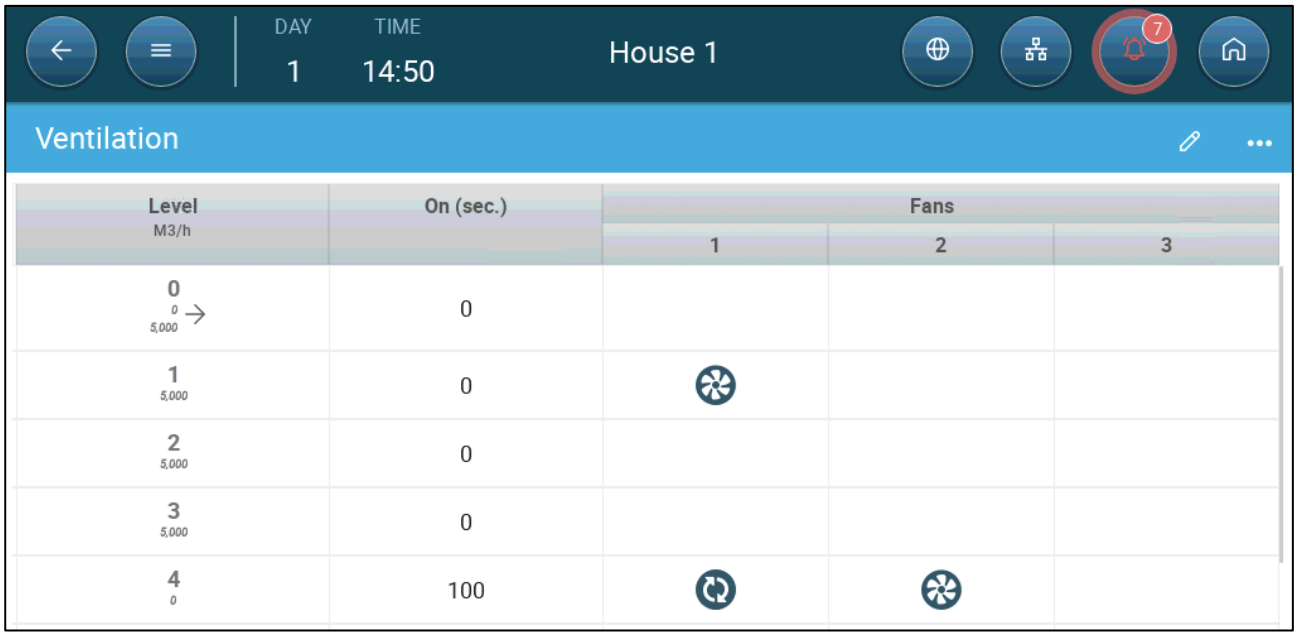
6. To run a fan in cycles:

a. Click 

b. Click a fan. The  symbol appears.

c. Click  . The symbol turns blue  .

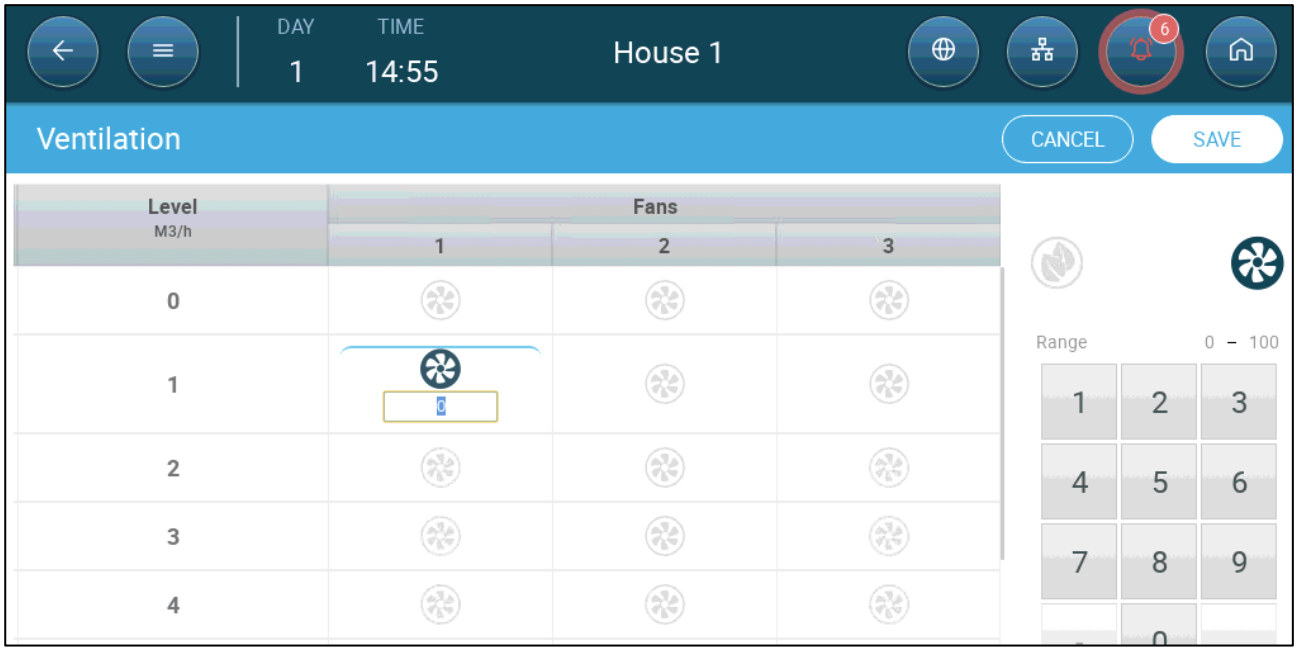
d. Under On (sec), enter the cycle ON time (Go to the Settings to define the Off time).



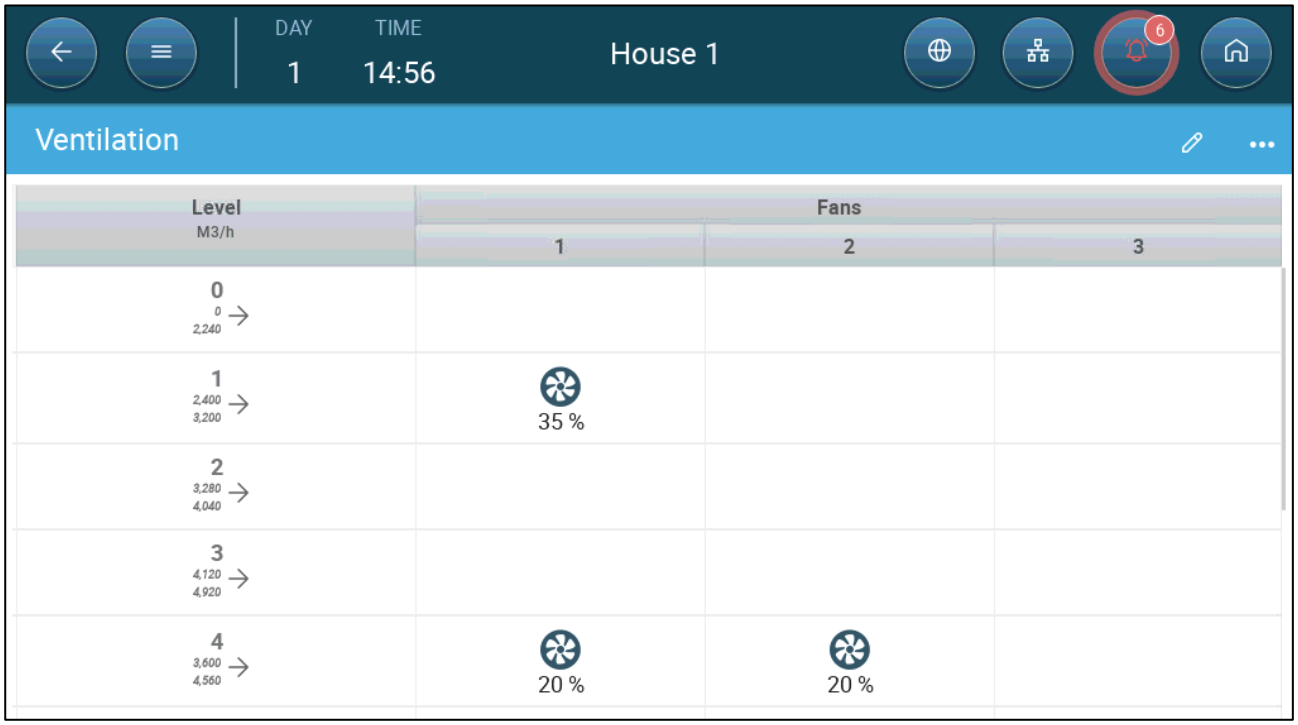
In this example, at Level 4 Fan 1 runs in cycles (100 seconds on) and Fan 2 runs continuously. The maximum ventilation capacity reflects the change caused by running the fan in a cycle.

8.2.2.2 Analog Fans

1. Click an analog output-controlled fan. 1) A box appears around the fan. 2) A fan appears in the upper right.



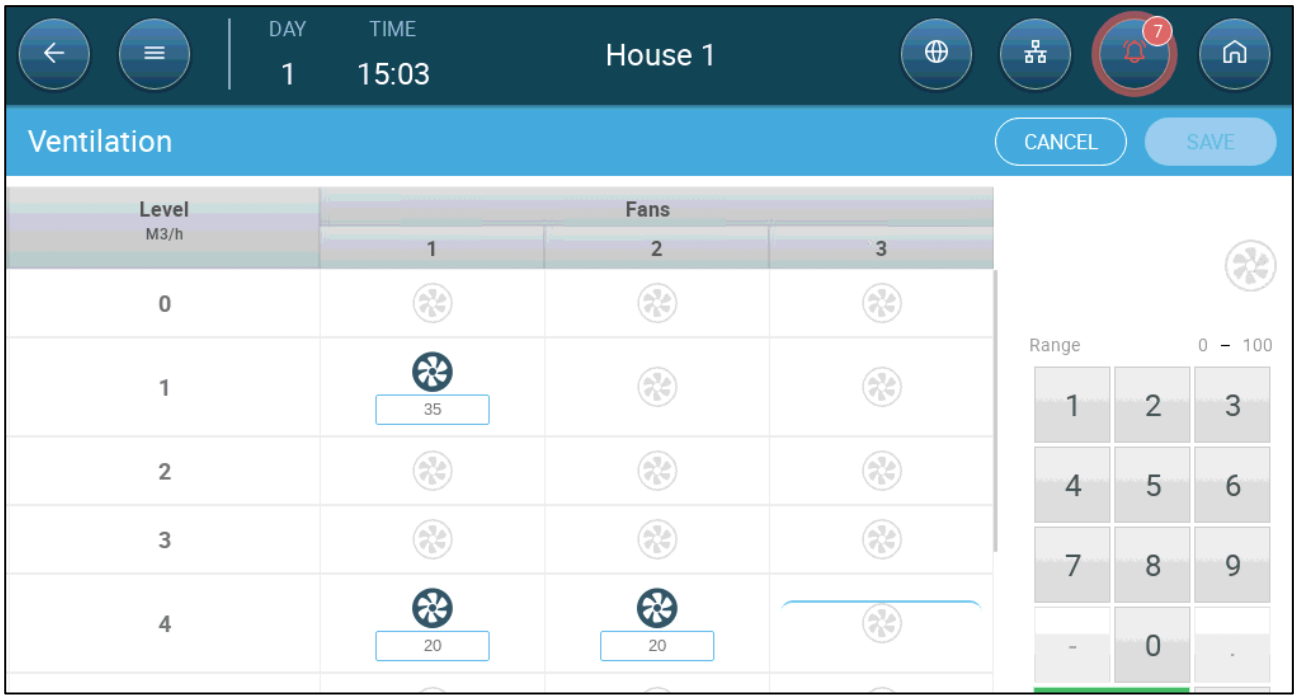
2. Click on the fan and the Analog Cycle icons.
3. Enter the fan's output.



At Level 1 (10% output of the total fan capacity), Fan 1 runs at 35% speed. At Level 4 (40% of the total output), the speed drops to 20% but Fan 2 turns on as well.

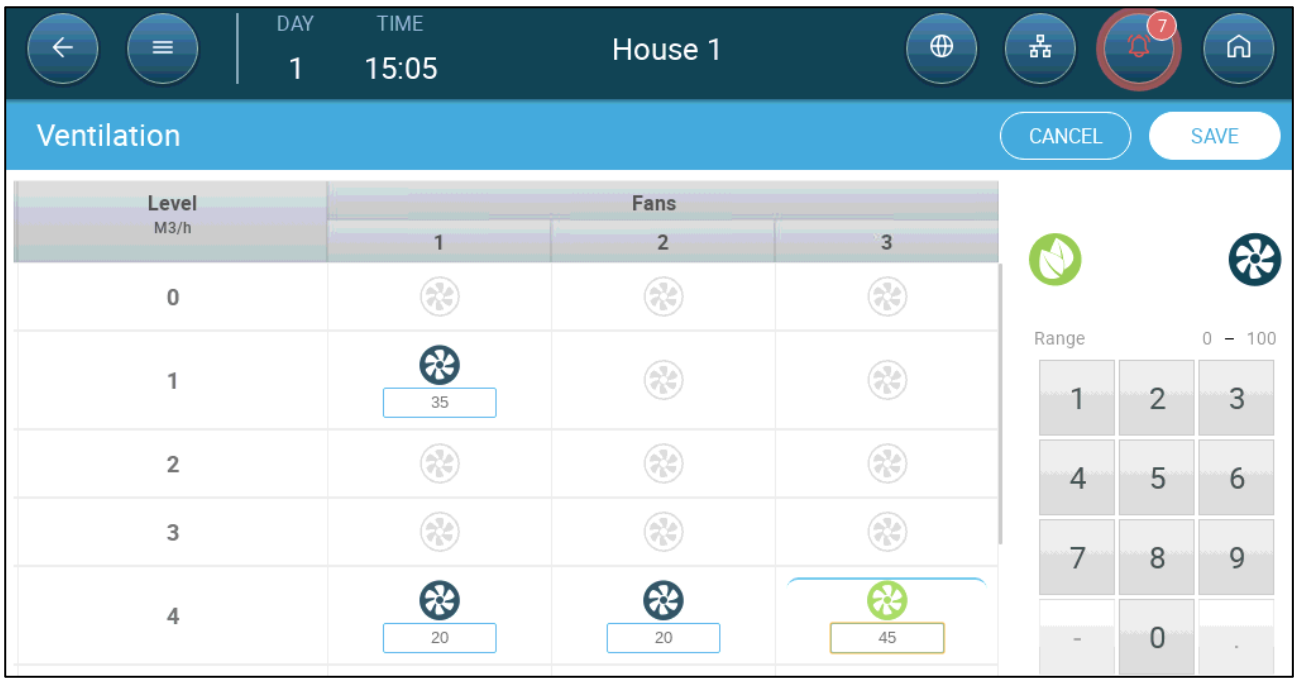
8.2.2.3 Fans (Efficiency Fan)

1. Click an analog output-controlled fan. 1) A box appears around the fan. 2) A fan appears in the upper right.



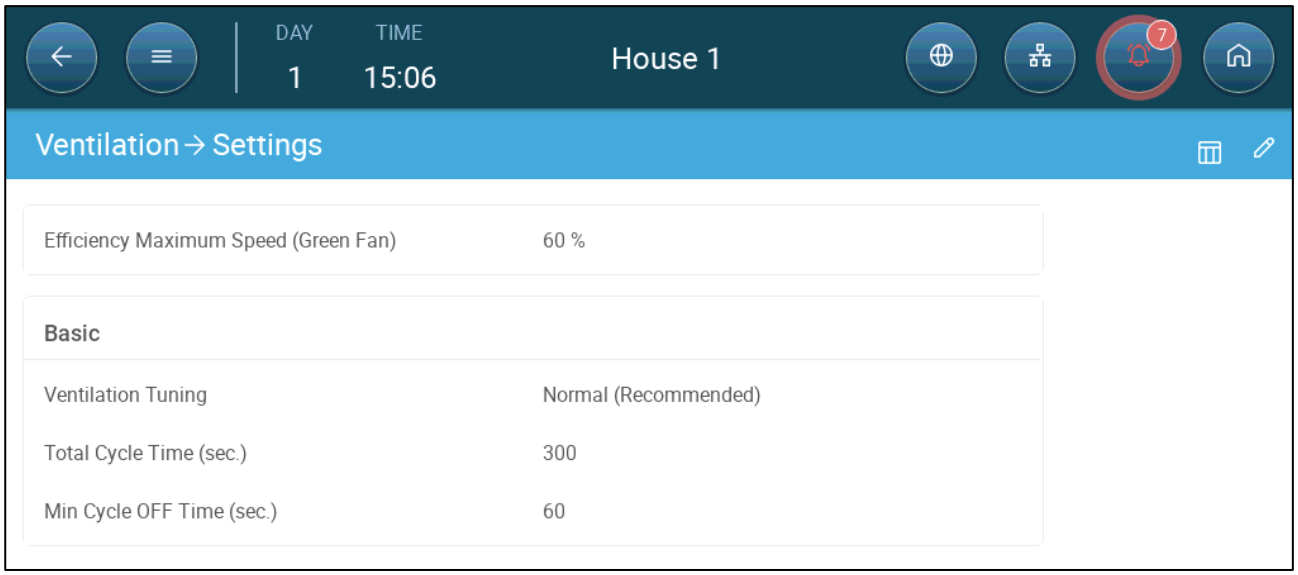
2. Click the fan in the upper right. Both fans turn blue. A percentage appears under the fan.

3. Click  . This icon and the fan icon turn green.

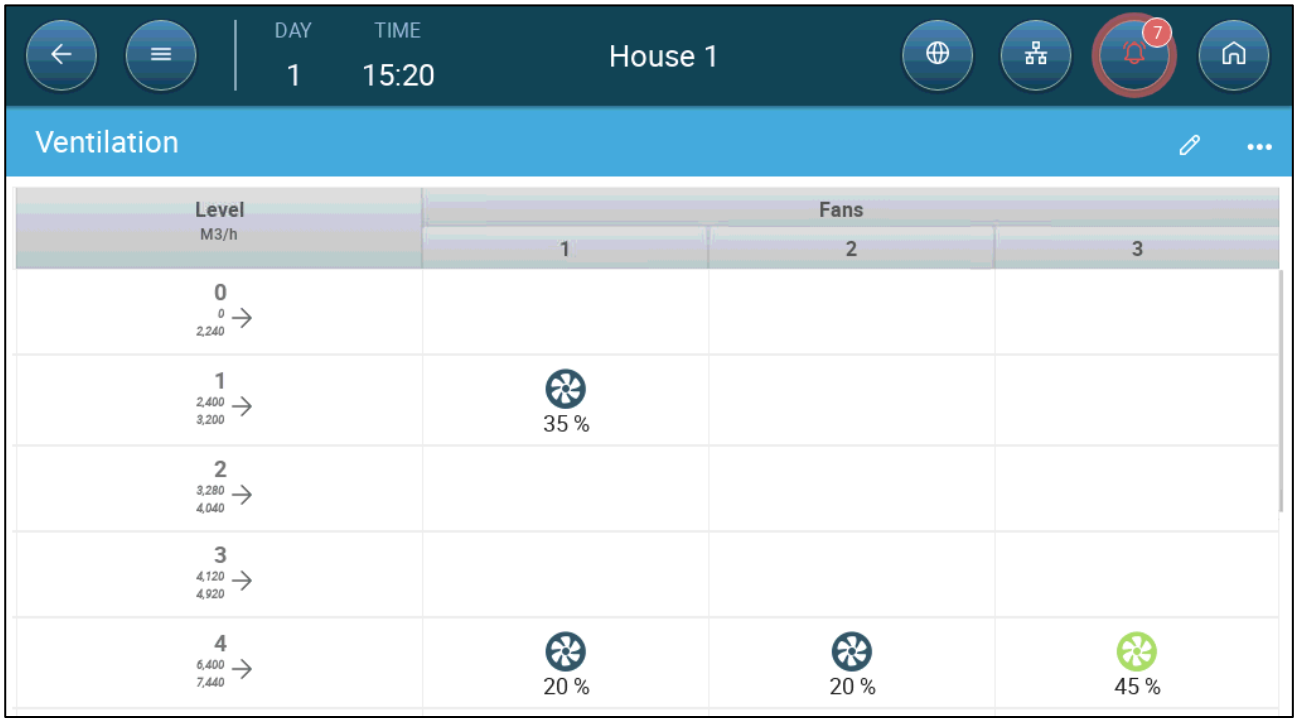


4. In the text box, enter the fan's **minimum speed** (in percentage).

5. Go to Settings.



6. In Efficiency Maximum Speed, enter the fan's **maximum speed** (in percentage).



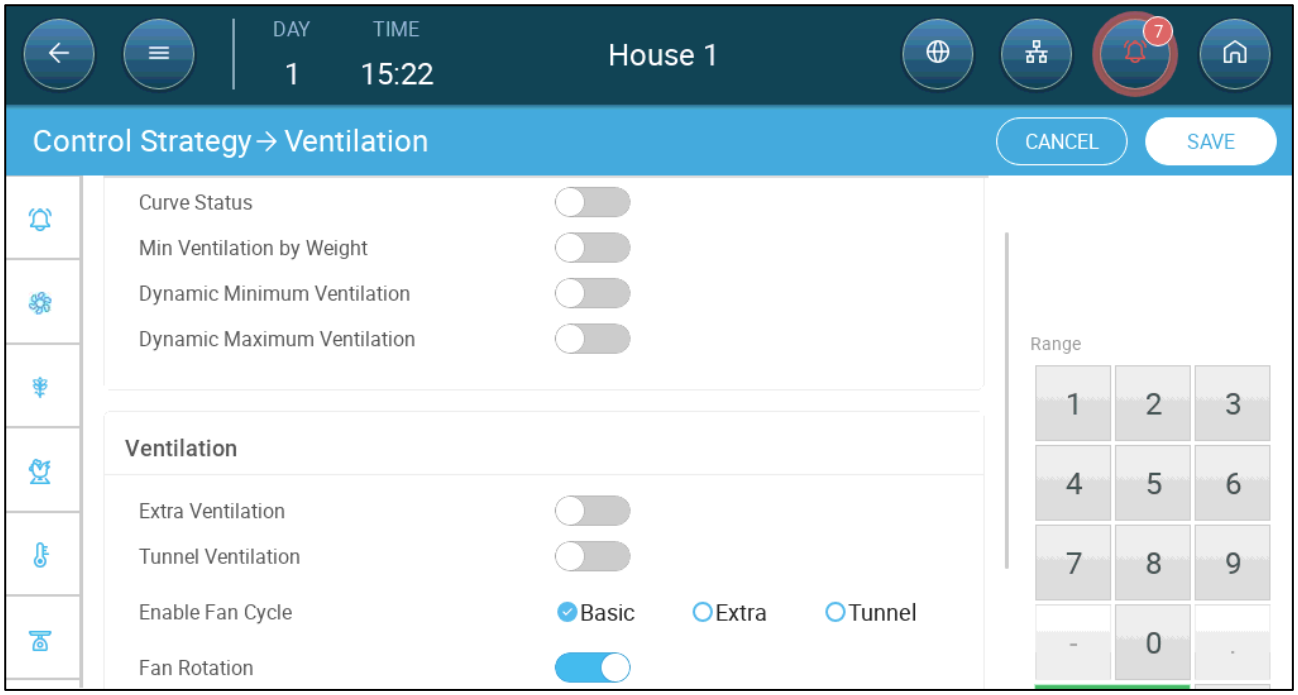
7. In this example Fan 1 and Fan 2 are standard analog fans, and Fan 3 is an efficiency fan whose minimum speed is 45% and maximum speed is 60% of the fan's possible speed. The ventilation capacity reflects the efficiency fan's capacity.

8.2.2.4 Fan Rotation

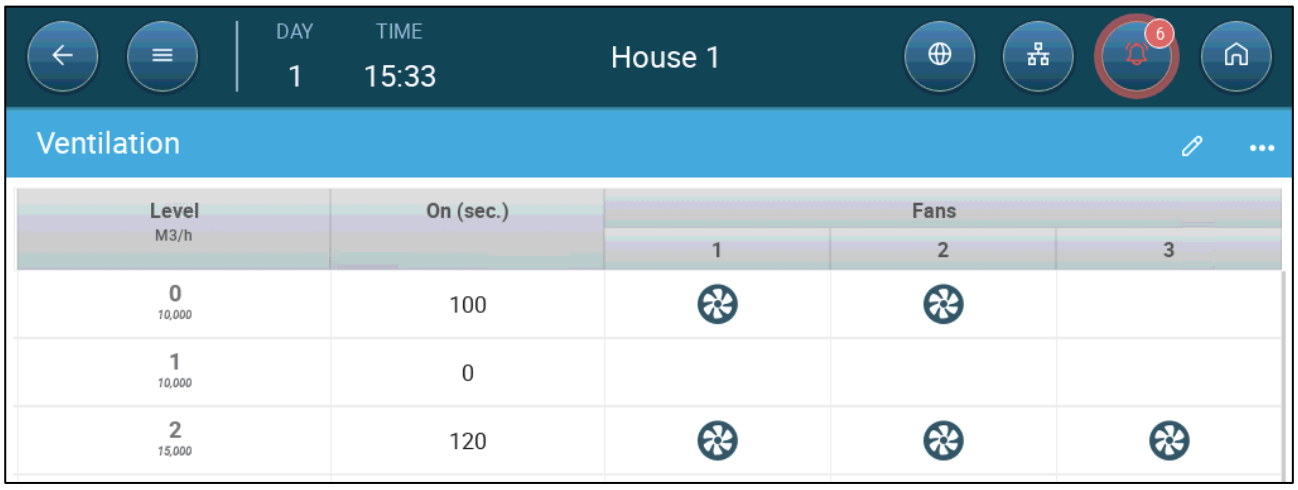
Using the same fan or a limited number of fans exclusively can lead to mechanical wear and tear, for example to the drive belt. To minimize this damage, Trio enables "rotating" between fans. Fan Rotation is used mainly in the lower ventilation levels. The rotation function switches between cycle fans in the same stage.

To enable fan rotation:

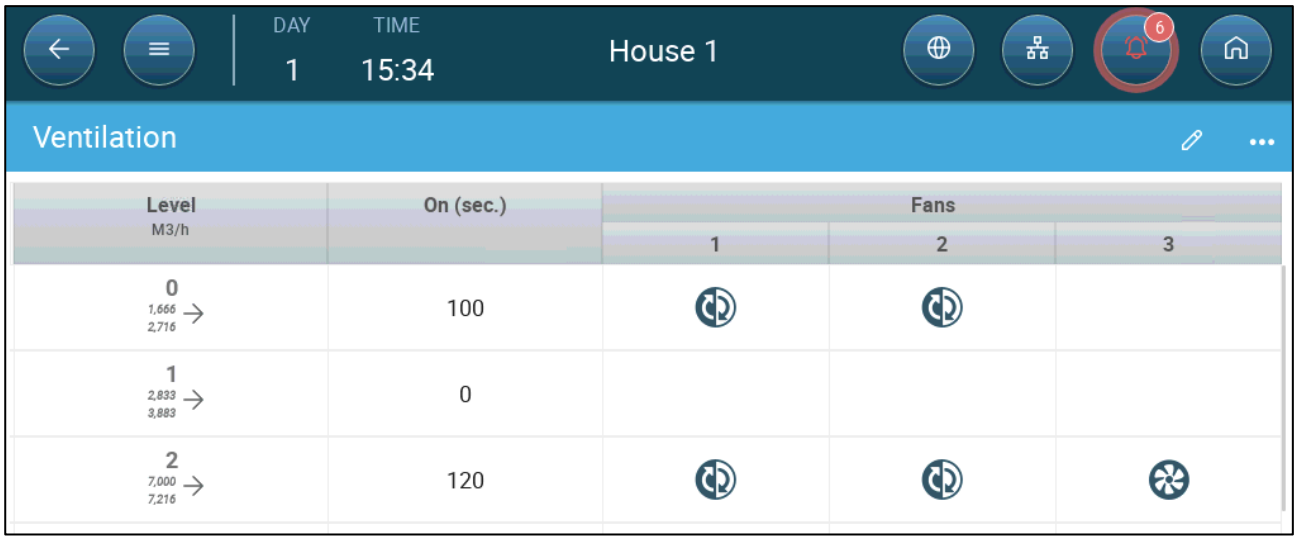
1. Go to System > Control Strategy > Ventilation.



2. Enable Fan Cycle and Fan Rotation (Fan Rotation does not appear unless Fan Cycle is enabled.)
3. Go to Climate > Ventilation.



4. After enabling fans, click on any fan that you want to rotate. appears.
5. Click the icon. Repeat for any required fans.



In the above example, at level 0 Fan 1 rotates with Fan 2. At level 2, Fans 1 and 2 rotate while Fan 3 remains constant.

8.2.3 Inlet and Curtain Ventilation

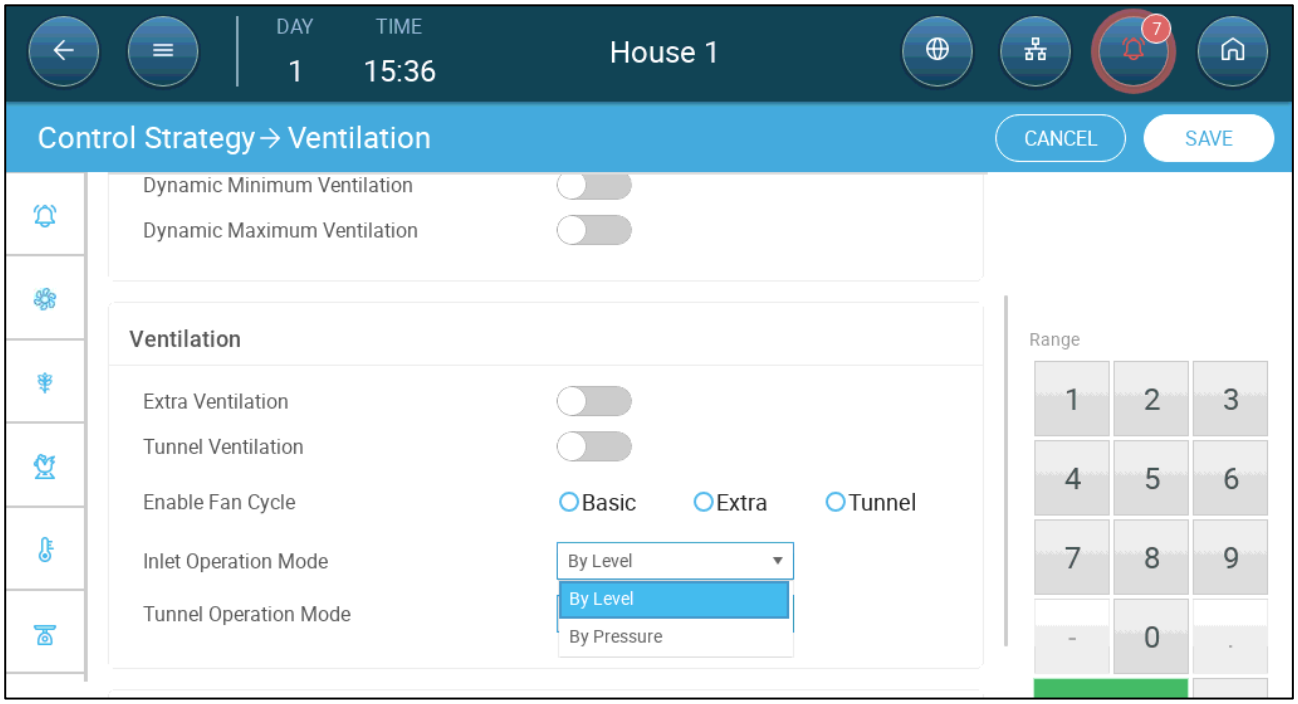
In Basic Ventilation, Trio enables control over the inlets using one of two methods:

- Level Control
- Static Pressure Control

NOTE Outlet control is by level only.

To select the inlet control method:

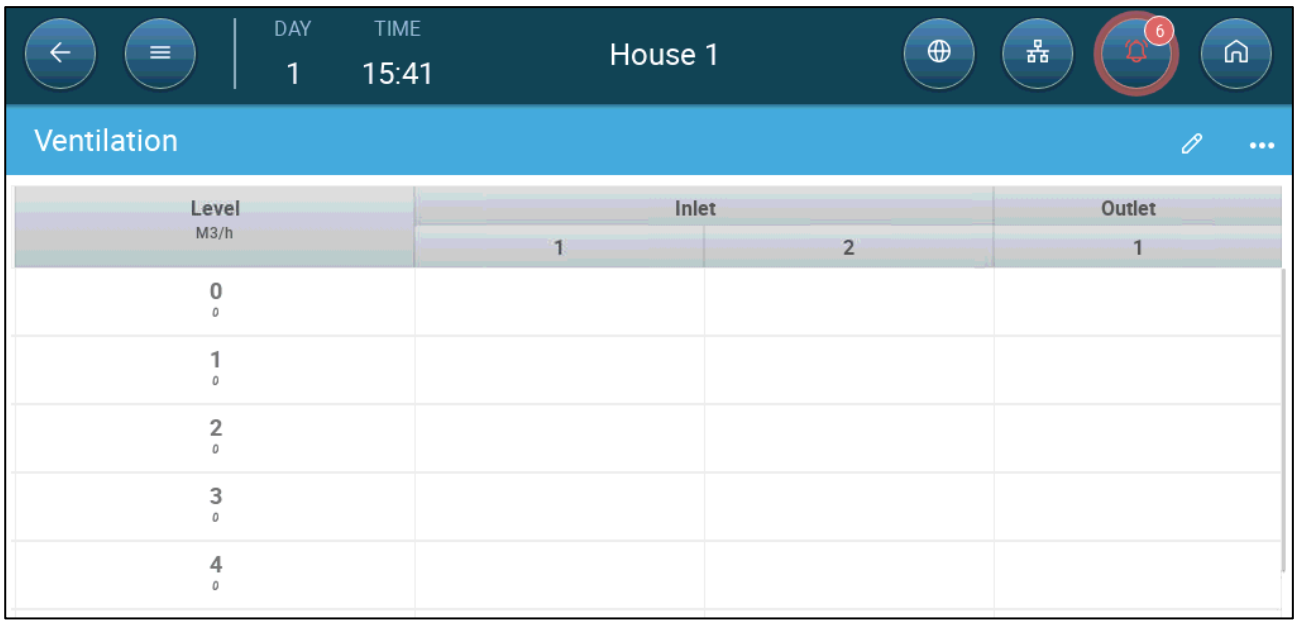
1. Go to System › Control Strategy › Ventilation .



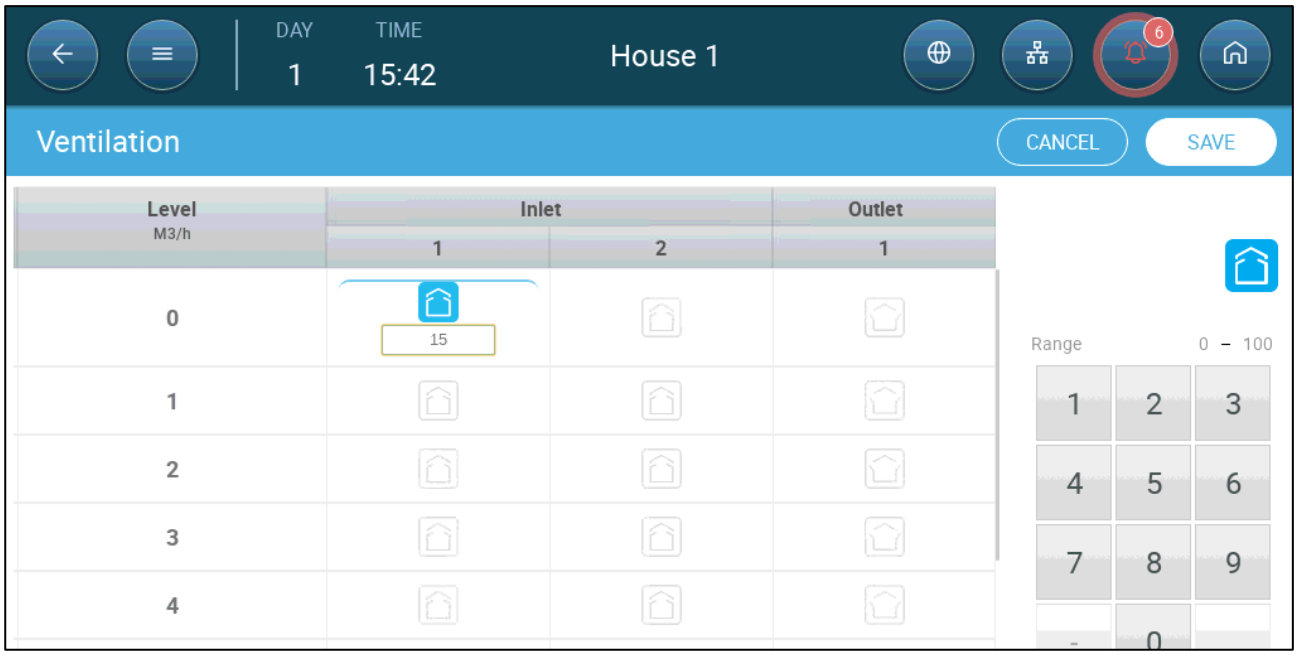
2. Under Inlet Operation Mode, select **Level** or **Pressure**.

8.2.3.1 Level Control

1. Go to Climate › Ventilation.



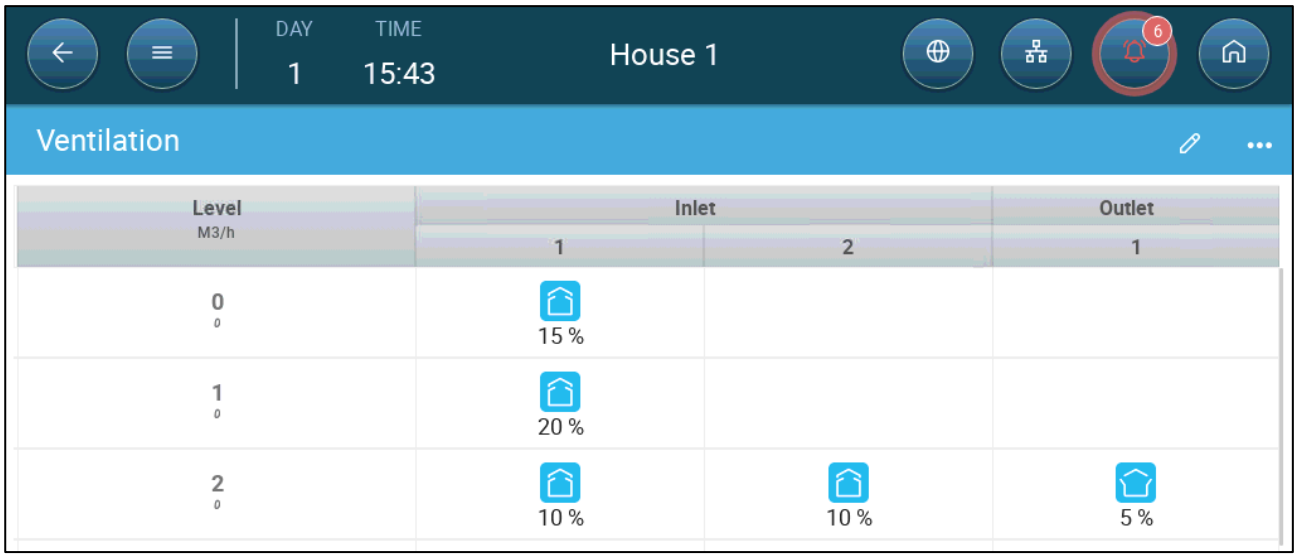
2. Click  .



3. Click on a required inlet/outlet and enable it by clicking on the fan symbol that appears.
4. Define the opening level.
5. Repeat for every required fan at each level.

NOTE Munters recommends configuring the inlets for every ventilation level.

NOTE Inlets open before the fans being to operate, preventing excess pressure.



8.2.3.2 Static Pressure Control

When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Maintaining the proper pressure enables air to enter the rooms at the right speed and direction and ensures efficient air exchange. Note that the Trio adjusts the inlets' opening only if one or more fan is operating.

Set the required pressure, according to the air flow specification. The greater the difference between the exterior and interior pressures, the greater the air flow.

- Static Pressure in Minimum Ventilation or Extra Ventilation
- Static Pressure Main Screen
- Static Pressure Settings Screen
- High Static Pressure Alarm State

8.2.3.2.1 Static Pressure in Minimum Ventilation or Extra Ventilation

In minimum/extra ventilation the target pressure is adjusted as a function of the outside temperature. Trio calculates the pressure target according to a curve between low and high temperature target pressure set points.

NOTE Static pressure ventilation does not operate in tunnel mode.

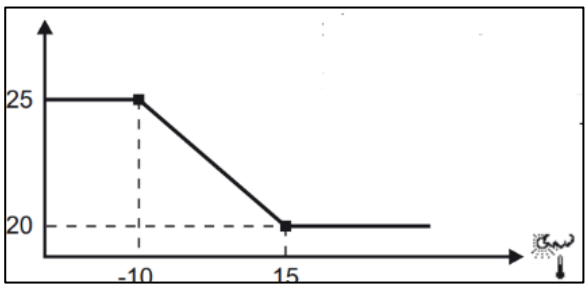
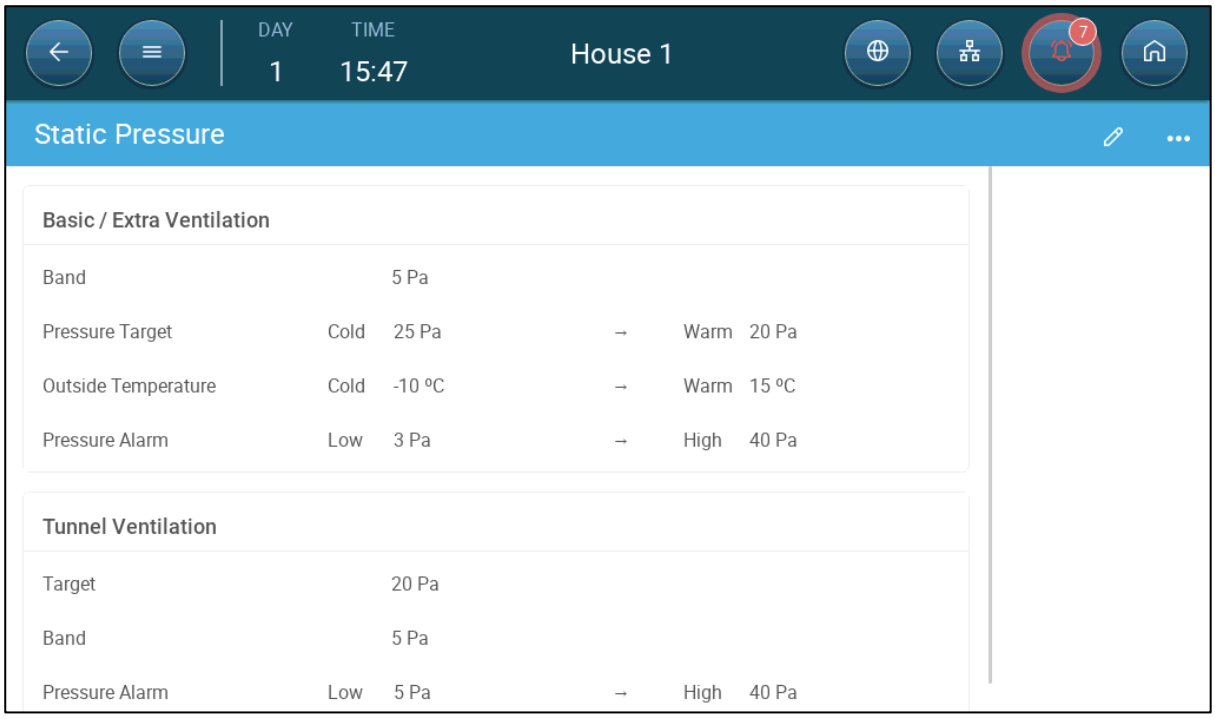


Figure 2: Temperature vs Static Pressure

The curve is adjusted according to the outside temperature, in order to maintain the pressure. If the outside temperature is warm, large amounts of slow moving air is allowed to enter the house (low static pressure). When the outside air is cold, the Vent Master adjusts the inlets to allow a low volume of fast-moving cold air (high static pressure).

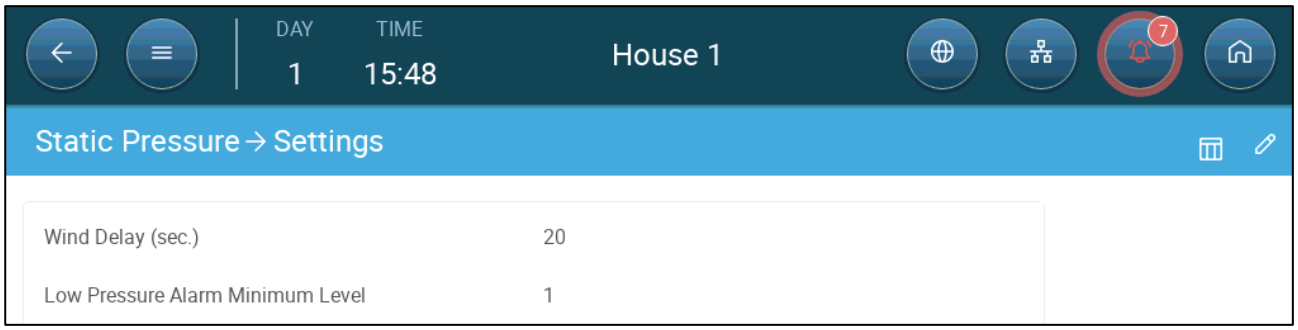
8.2.3.2.2 Static Pressure Main Screen

1. Go to Climate › Static Pressure.



2. Define:
    - Band: The static pressure level below or above which the controller must close or open the inlets to minimize or maximize the ventilation. Range: 0 – 20 Pascal.
    - Pressure Targets: Set the required pressure level for the cold and warm outside temperatures.
    - Outside Temperatures: Set the temperatures at which the inlets open or close. (This parameter requires an outside temperature sensor).
    - Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.
    - Emergency Pressure State: If the air pressure reaches a level such that a high pressure alarm is generated, Trio goes into an Emergency Pressure state:
        - Any vent that is not fully open, opens an additional 10%.
        - Trio remeasures the pressure. If the air pressure is still too high, vents open an additional 10%. This process continues until pressure meets the specification.
        - If the vents are open fully (100% open), other ventilation devices open by 10%,
        - **Note**:
            - Ventilation continues according to the climate conditions.
            - Vents do not close.
            - If the vent cycle time is off, they do not open.
            - Auto calibration is disabled.
            - The alarm must be reset, an event generated, and the pressure lowered to cancel the condition.

8.2.3.2.3 Static Pressure Settings Screen



- Define:
  - Wind delay: When pressure rises above or drops below the required level, Trio waits this amount of time before adjusting the inlet openings. Range: 0 – 999 seconds
  - Low Pressure Alarm Minimum Level: Low static pressure alarm is disabled when the minimum ventilation drops below this level. Range 1 – 10.

8.2.3.2.4 High Static Pressure Alarm State

Version 9.0: If the static pressure is above the target level, inlets continue to open until they reach the maximum position. In the situation where static pressure is above the target and all inlets are open, Trio enters a High Static Pressure Alarm state. In this situation:

- Trio triggers a High Pressure Compensation event that is recorded.
- Other inlets are opened by 10%. This step is repeated if the pressure does not go down.
- The high static pressure alarms continue until the user resets the alarm, even if the static pressure falls below the alarm set point. The user must reset the alarm; acknowledging the alarm or rebooting the unit does not stop the alarm.

8.3 Extra Ventilation

Enable this option to provide extended layout to set the power/transitional ventilation levels.).

➲ **Extra Ventilation must be enabled for the functions to appear on the screen.**

➲ **Configuring Extra Ventilation requires mapping at least one fan, one inlet, or one tunnel door**

- Introduction to Extra Ventilation
- Defining Extra Ventilation

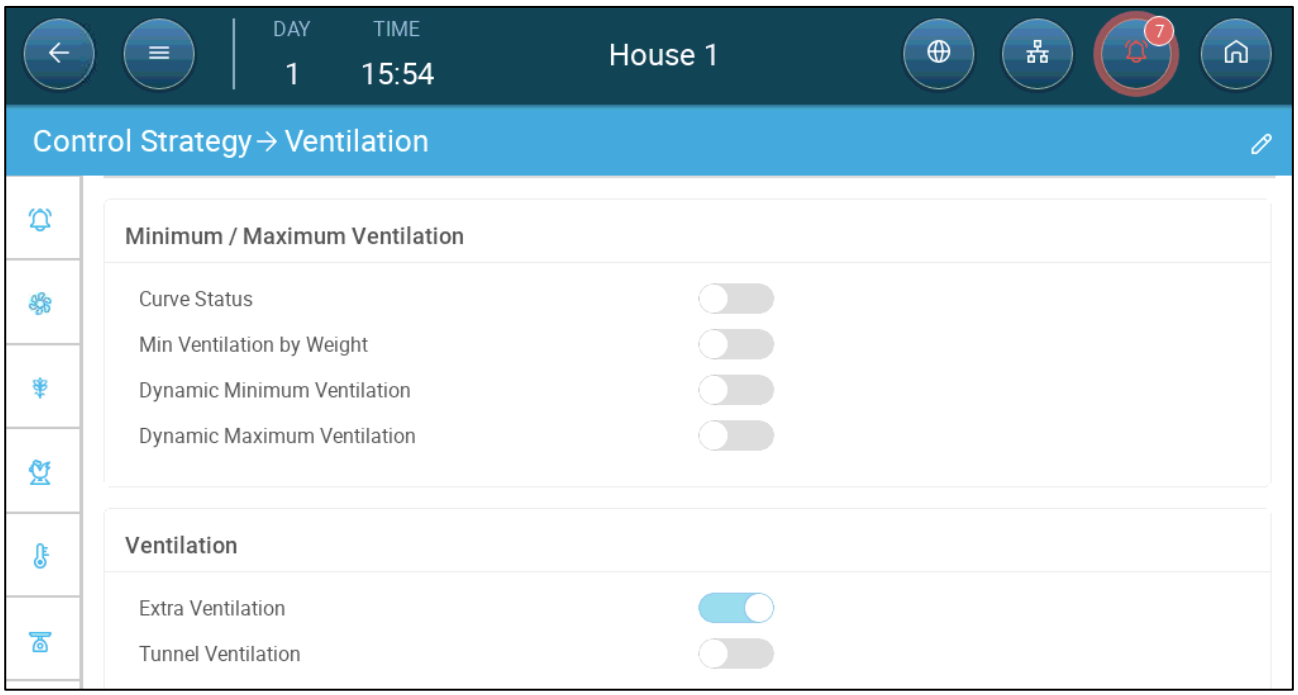
8.3.1 Introduction to Extra Ventilation

Extra ventilation is an **option** used to increase ventilation when:

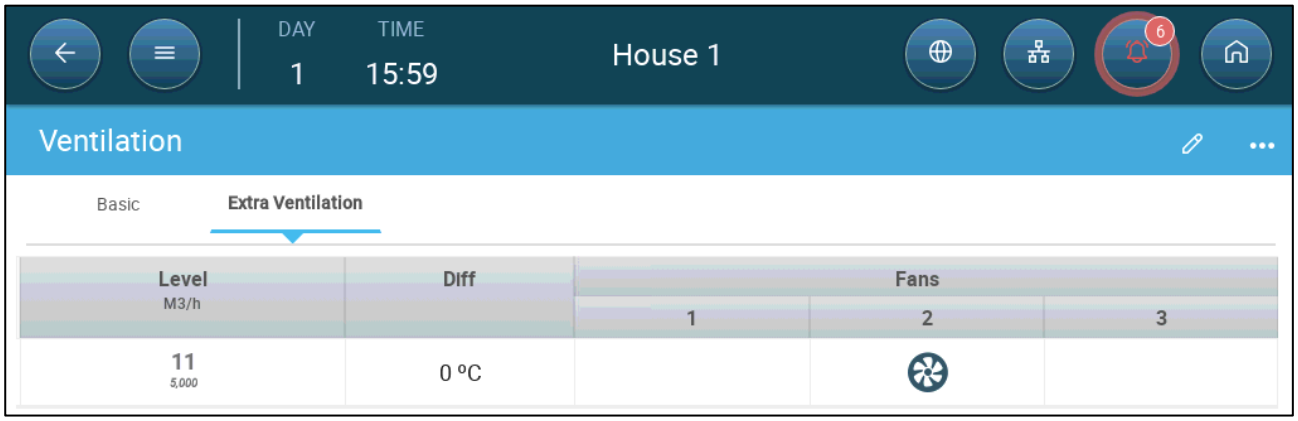
- Minimum ventilation runs at 100%.
- Temperature has not reached tunnel target temperature.
- The room temperature is at least 0.5° C above the target temperature. However you can define a higher differential.

8.3.2 DEFINING EXTRA VENTILATION

1. Go to System › Control Strategy › Ventilation  .
2. Under Ventilation, enable Extra Ventilation.



3. Go to Climate › Ventilation and click the Extra Ventilation Tab.
4. Click  .



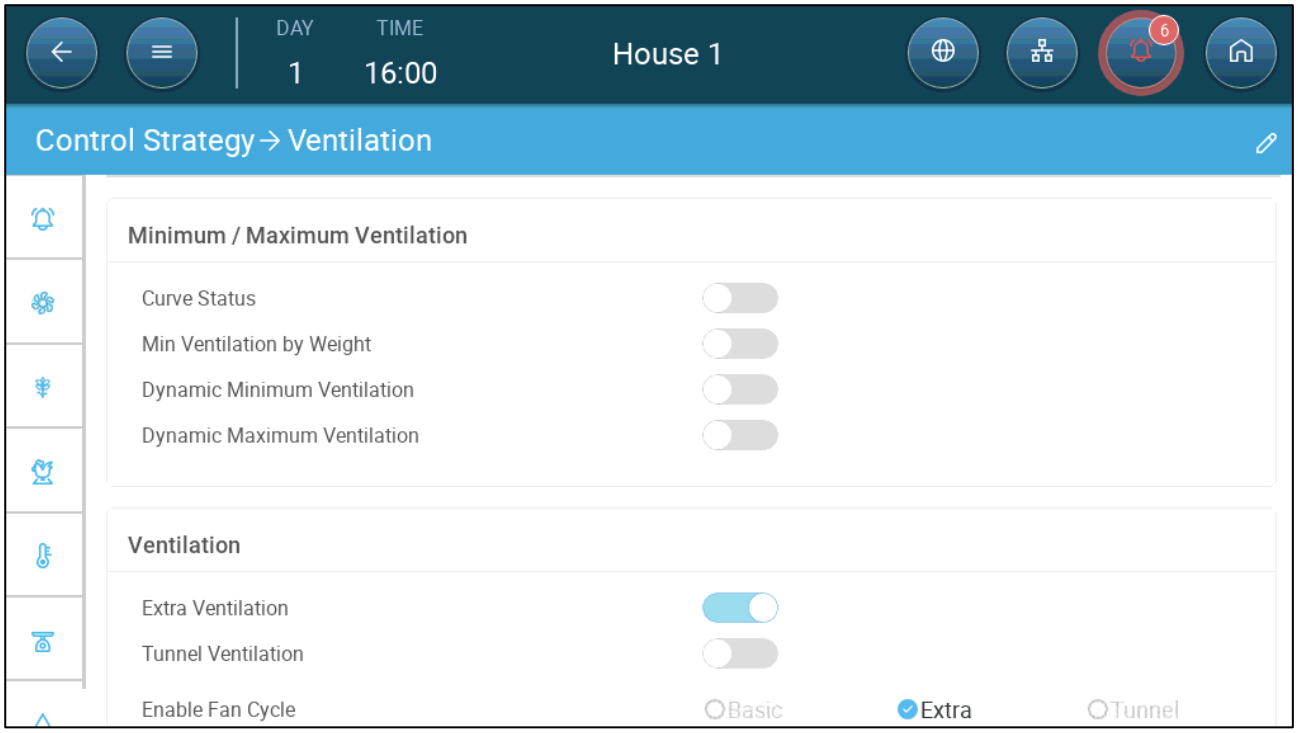
5. On each level, define:
   - Level: Read-only.
   - Diff: Define the temperature differential. When the temperature rises above the target temperature by this amount at each level, Extra Ventilation begins. Range: 0.0°C ›10.0°C.

NOTE Each differential must be equal to or higher than the previous level's differential.

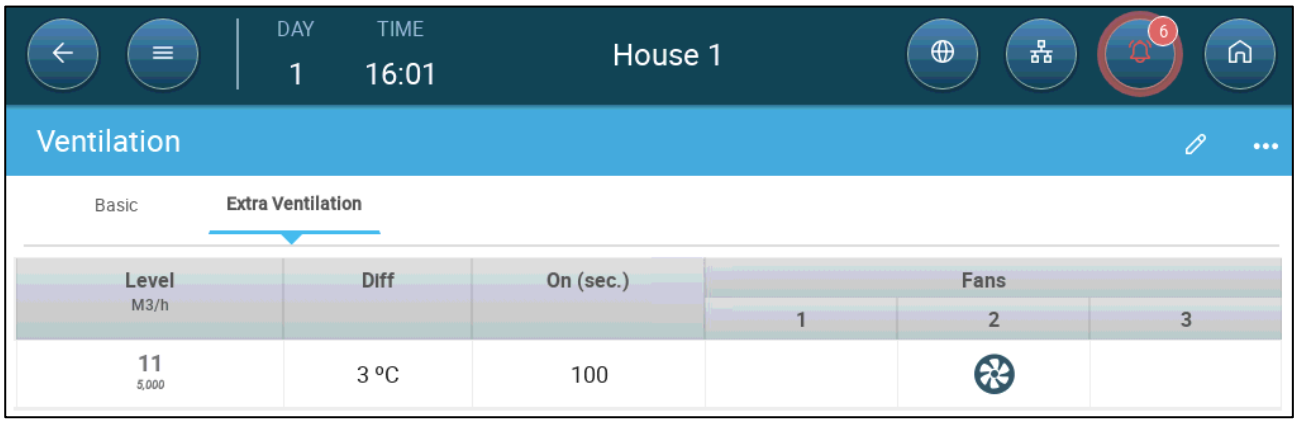
   - Fan Status. Refer to Defining Basic Ventilation, page 41 on how to configure fans.

Extra Ventilation Fan Cycle (Optional):

6. Go to System › Control Strategy › Ventilation .



7. Under Enable Fan Cycle, check Extra.
8. Go to Climate › Ventilation › Extra Ventilation.



9. Define the cycle times. Refer to Minimum Ventilation Cycle, page 44 for details.

8.4 Tunnel Ventilation

When enabled, you can:

- Set tunnel levels in the ventilation program.
- Define tunnel set points in the ventilation program.
- Define Pressure settings for tunnel.
- Define Tunnel temperature set point in the temperature curve (refer to Configuring the Temperature Curve, page 25).

➲ **One tunnel door must be mapped or tunnel ventilation will not operate.**

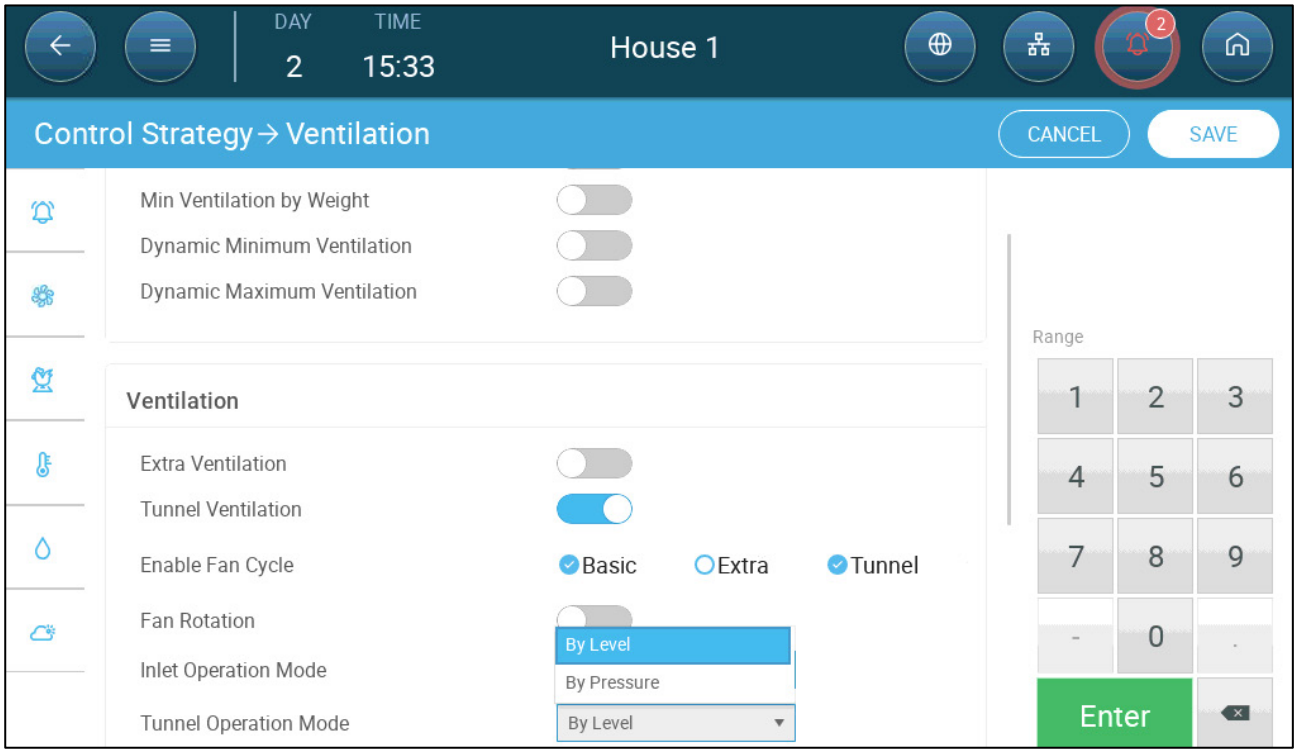
➲ Configuring Tunnel Ventilation requires mapping at least one fan or one tunnel door.

➲ Tunnel Ventilation must be enabled for the functions to appear on the screen.

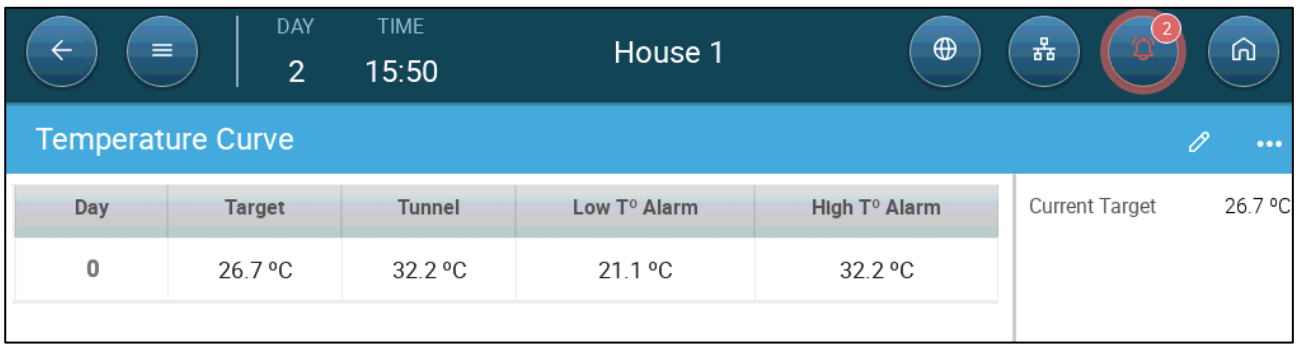
- Defining the Tunnel Ventilation
- Defining the Tunnel Ventilation Settings
- Tunnel Doors
- Defining the Wind Chill Factor
- Tunnel Ventilation Static Pressure

8.4.1 DEFINING THE TUNNEL VENTILATION PARAMETERS

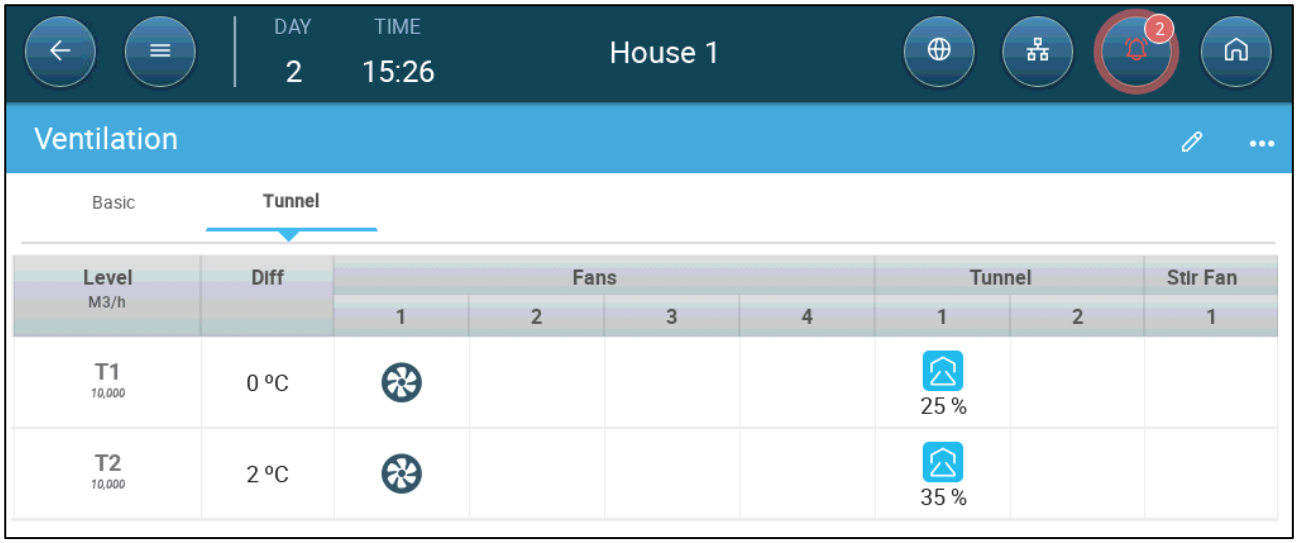
1. Go to System › Control Strategy › Ventilation .
2. Under Ventilation:
   a. Enable Tunnel.
   b. Select the tunnel operation mode (refer to Inlet and Curtain Ventilation, page 50 for details on this parameter).



3. Go to Climate › Temperature Curve.



4. For each day, define the Tunnel temperature. This parameter defines the temperature at which Tunnel Mode begins to operate.
5. Go to Climate › Ventilation and click the Tunnel Tab.



6. On each level, define:
    - Level: Read-only.
    - Diff: Define the temperature differential. This factor defines the wind chill factor. Trio switches to the higher level when the temperature reaches the tunnel temperature plus the differential. Range: 0.0°C ›10.0°C.

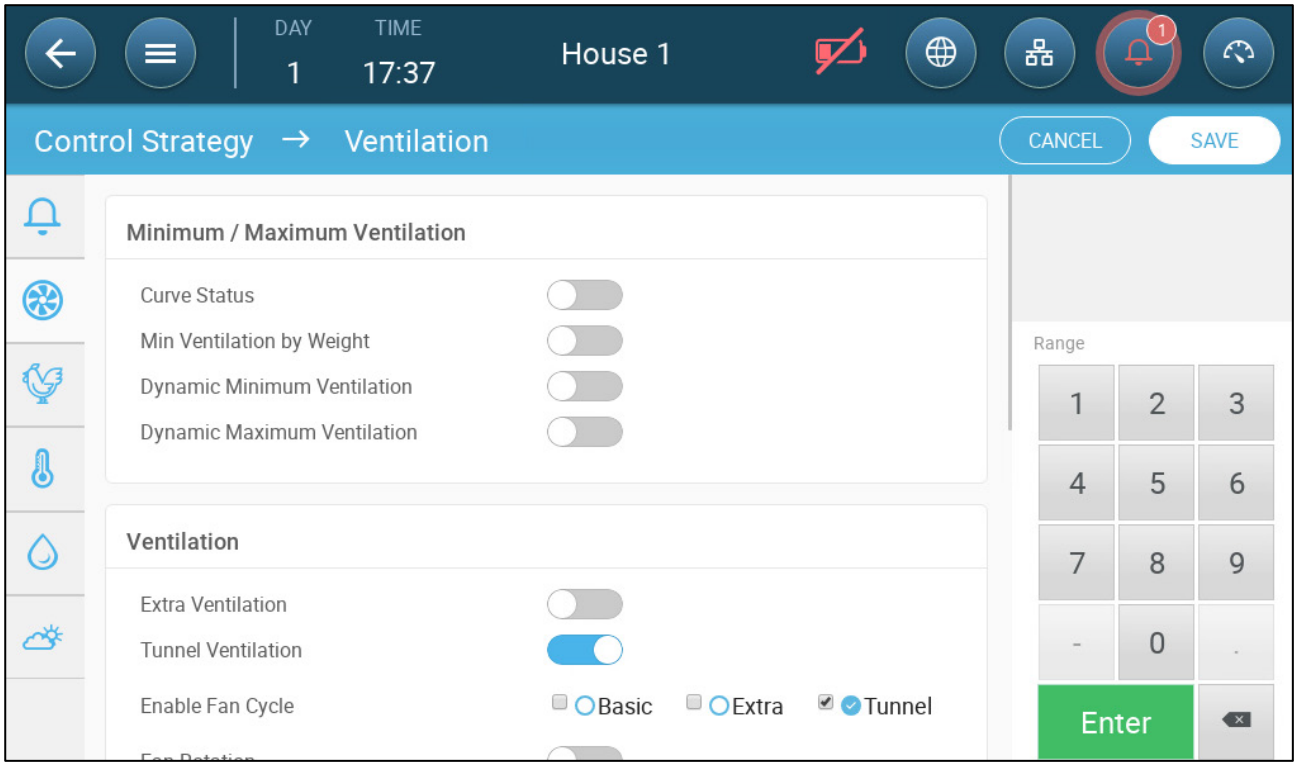
NOTE The Diff parameter manually defines the wind chill factor for each level. To automatically define the wind chill factor, refer to Defining the Wind Chill Factor, page 62.

        - Each differential must be equal to or higher than the previous level's differential.
        - At T1, the differential is predefined as 0.0.
    - Fan Status. Refer to Defining Basic Ventilation, page 41 on how to configure fans.
    - Tunnel Doors: Refer to Tunnel Doors, page 61. (Inlets close during tunnel mode.)

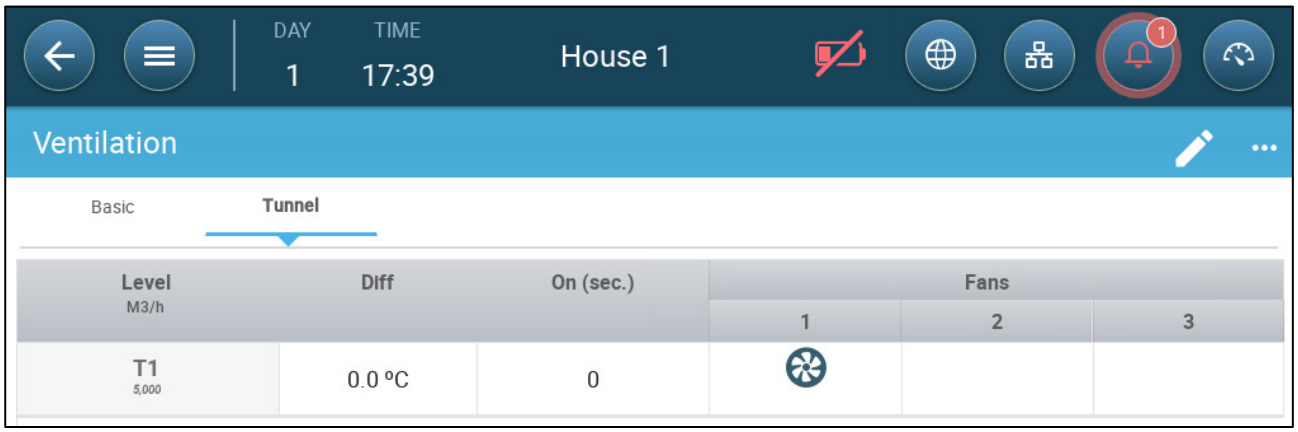
NOTE To prevent overcooling, when defining the fans in the first tunnel level, the total amount of air should be the same or slightly lower than the last Minimum Ventilation or Extra Ventilation level.

Tunnel Ventilation Fan Cycle (Optional):

7. Go to System › Control Strategy › Ventilation .

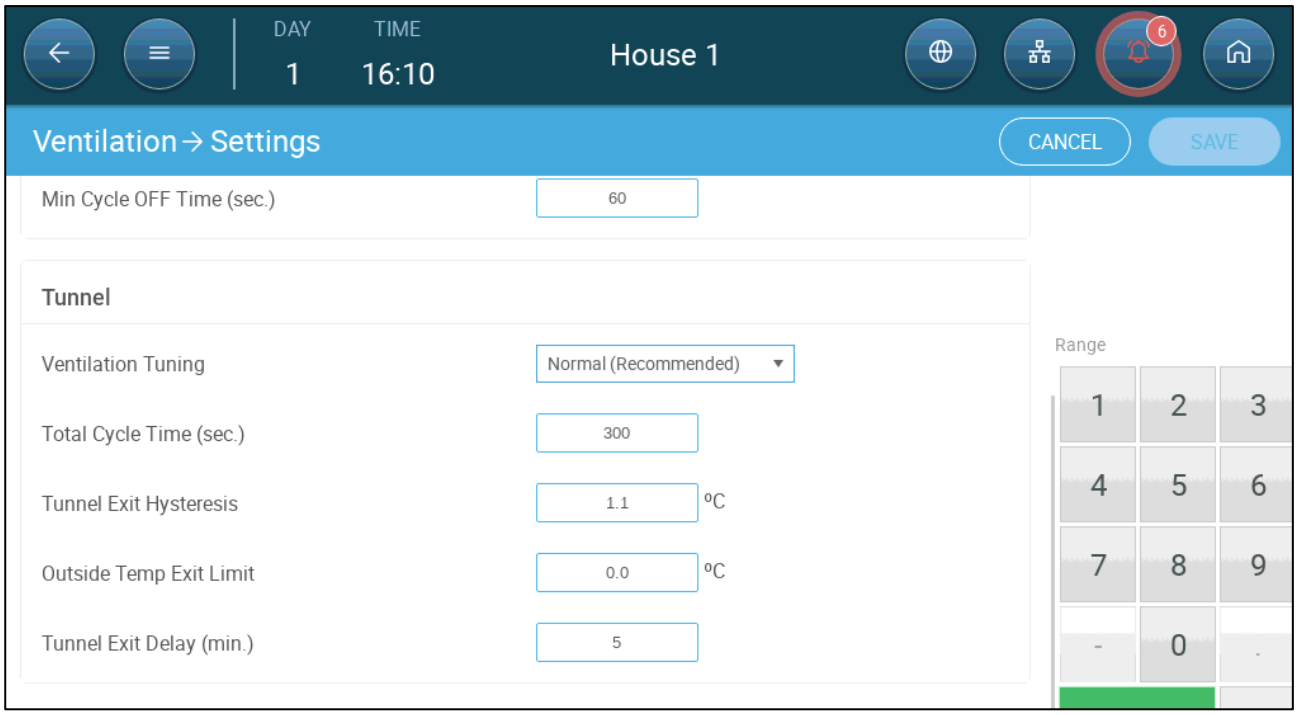


8. Under Enable Fan Cycle, check Tunnel.
9. Go to Climate › Ventilation › Tunnel.



10. Define the cycle times. Refer to Minimum Ventilation Cycle, page 44 for details.

8.4.2 DEFINING THE TUNNEL VENTILATION SETTINGS



- Define:
  - **Ventilation Tuning**: This parameter determines how aggressively the Trio responds to differences between the measured temperature and the target temperature.

CAUTION *Munters recommends leaving this parameter at Normal.*

  - Total Cycle Time: When the tunnel is working in cycle mode, the total cycle is defined here.
  - Tunnel Exit Hysteresis: This is a differential. When the temperature reaches the tunnel temperature minus this differential, ventilation goes down to Extra Ventilation (if enabled) or Minimum Ventilation.
  - Outside Temp Exit Limit: This is a differential. When the outside temperature reaches the tunnel temperature plus this differential, ventilation will remain in Tunnel Mode, regardless of the inside temperature.
  - Tunnel Exit Delay (min.): When Trio calculates that ventilation should exit Tunnel Mode, there is a delay (of this amount of time) before actually exiting. This parameter prevents Trio from entering and exiting Tunnel Mode too rapidly.

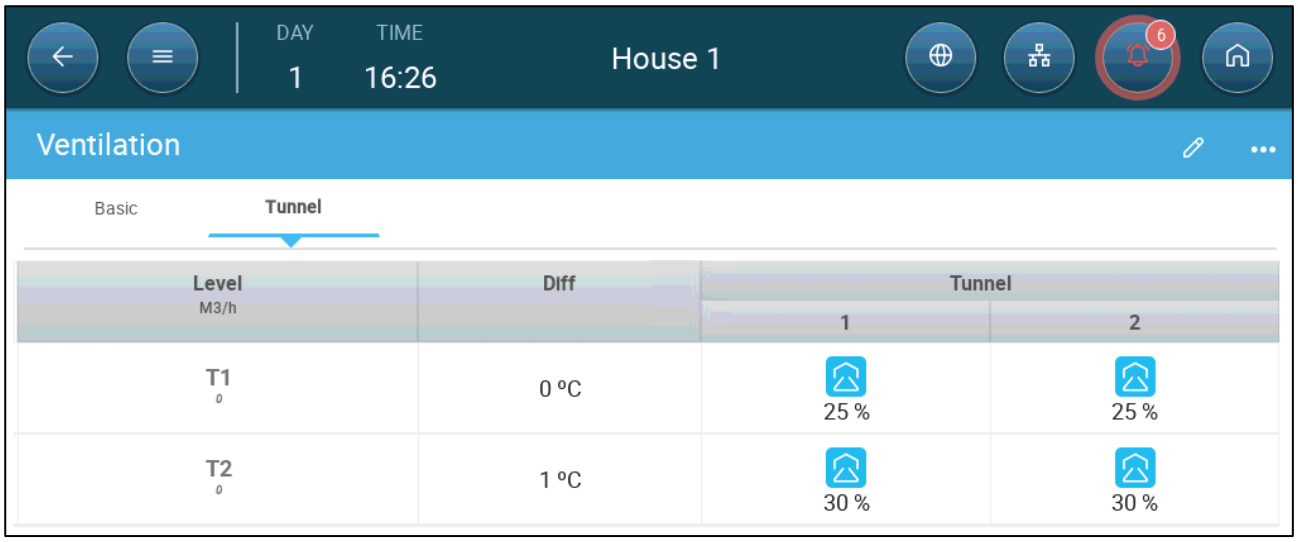
8.4.3 TUNNEL DOORS

- Tunnel Ventilation
- Basic Ventilation

8.4.3.1 Tunnel Ventilation

In Tunnel Ventilation, Trio enables control over the tunnel doors using control by level or control by static pressure. Control of these doors is the same as control over inlets. Refer to these sections for details.

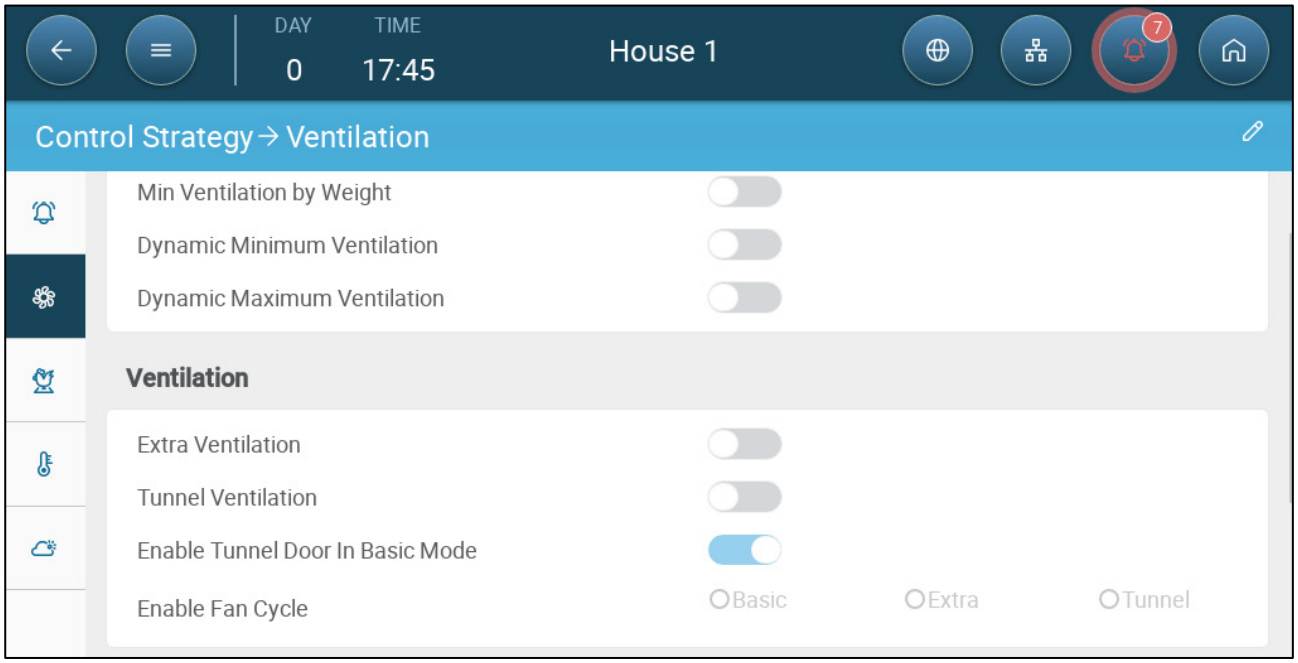
-



8.4.3.2 Basic Ventilation

In Version 8.3, Trio enables operating the tunnel doors (curtains) in Basic Ventilation. This function provides extra sources of ventilation in hotter climates.

1. Go to System › Control Strategy › Ventilation.
2. Enable Tunnel Door in Basic Mode.



8.4.4 Defining the Wind Chill Factor

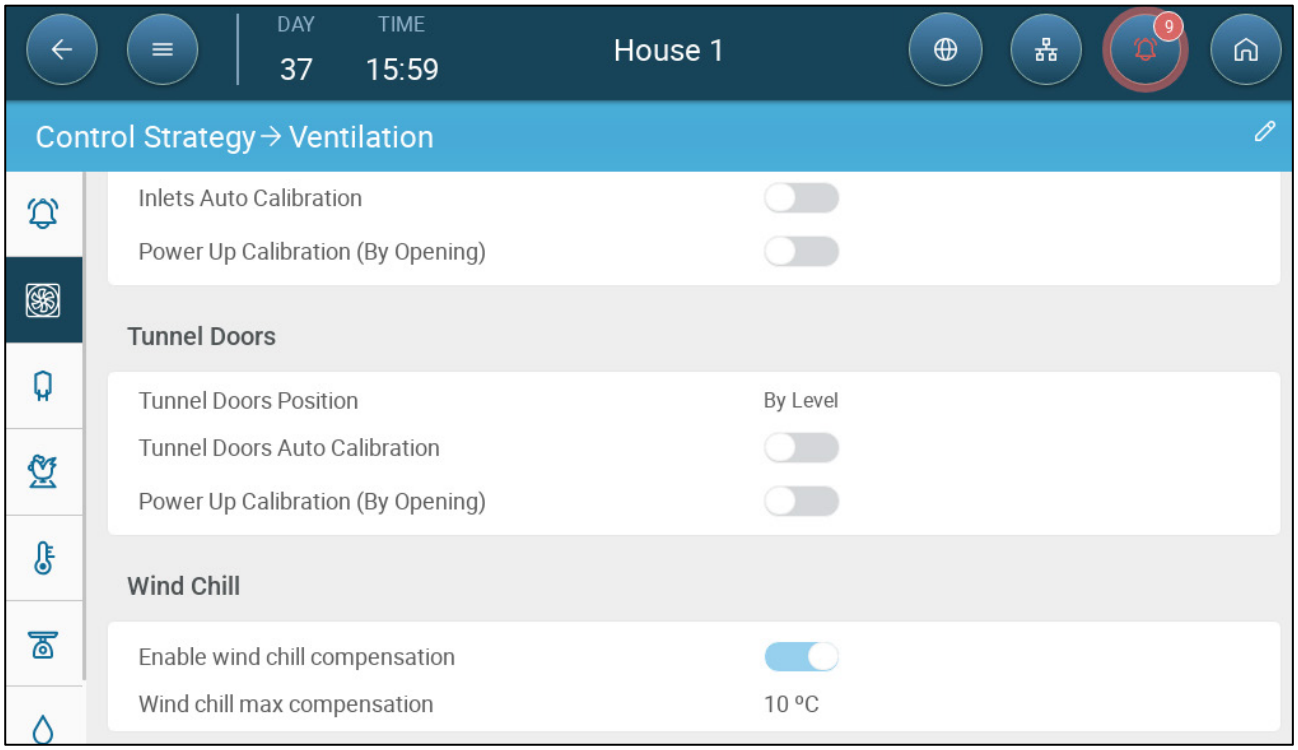
Trio can take into account the tunnel wind speed. The effect of this speed is the wind chill factor. When taken into account, the ventilation is adjusted to reflect the effective temperature according to a built-in algorithm. The algorithm takes into account the wind velocity, house dimensions, and growth day. If there is a humidity sensor installed, the algorithm also factors the relative humidity into the calculation (starting from 40% RH). Factoring in the RH lowers the calculated wind chill factor.

- Wind chill is activated in tunnel mode only.
- Wind chill calculations take place between days 10 – 50.

➲ **Define the fan capacity (refer to the Installation Manual).**

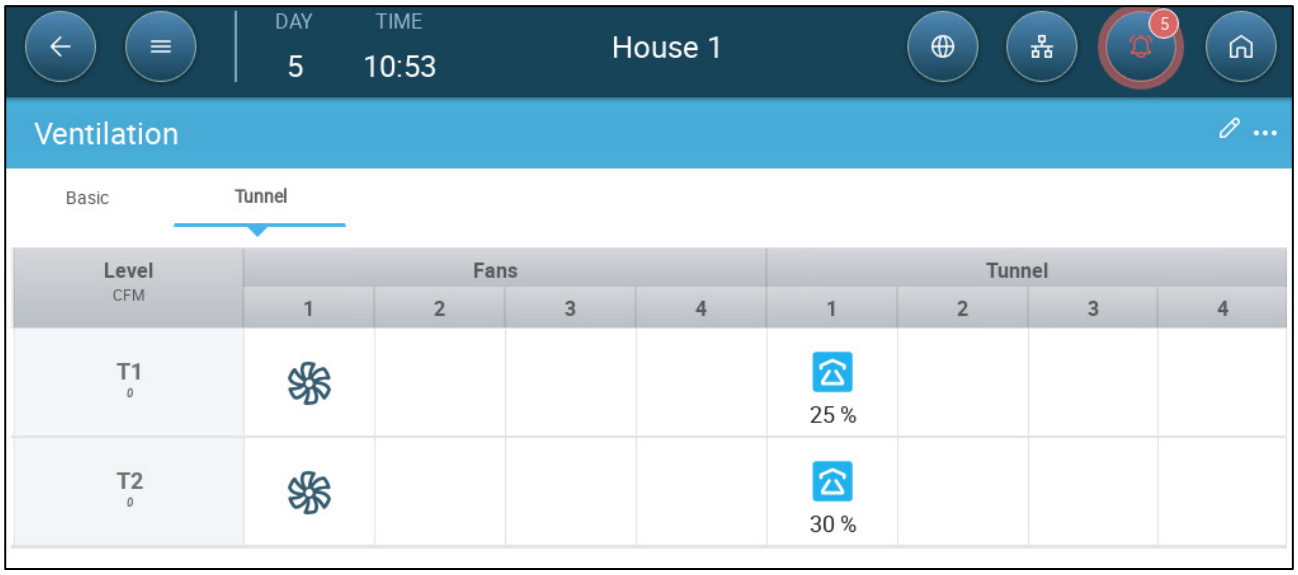
➲ **Define the house dimensions (refer to Defining the House Setting, page 15).**

1. Go to System › Control Strategy › Ventilation. Scroll down to Wind Chill.



2. Define:
   - Enable wind chill compensation: The level target is defined as the tunnel set point plus the wind chill factor.
   - Wind chill max compensation: Define the maximum temperature adjustment.

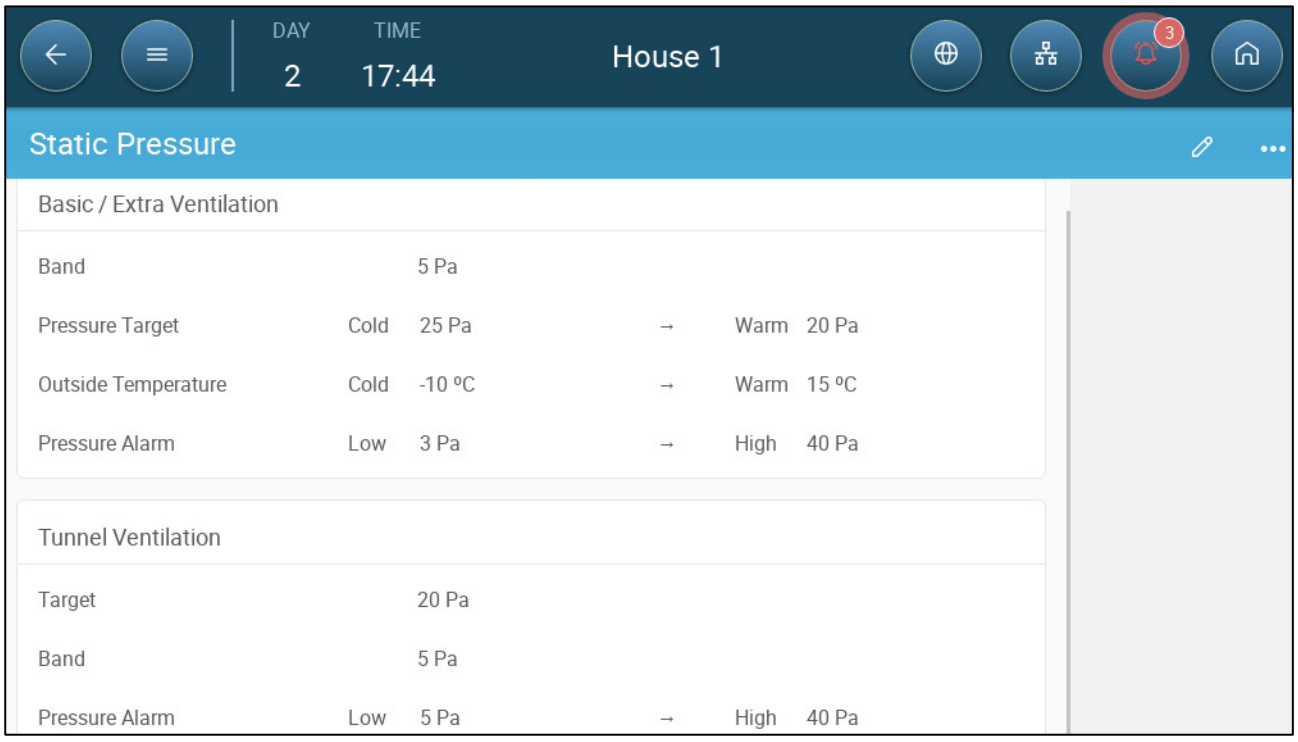
NOTE When Wind Chill factor is enabled, Trio automatically calculates the Tunnel ventilation differential.



8.4.5 TUNNEL VENTILATION STATIC PRESSURE

If you selected By Pressure to determine the tunnel opening, define the static pressure settings.

1. Go to Climate › Static Pressure.



2. Define:
   - Band: The static pressure level below or above which the controller must close or open the inlets to minimize or maximize the ventilation. Range: 0 – 20 Pa. Default: 5
   - Pressure Target: Define the required pressure level when using tunnel ventilation. Range: 0 – 100 Pa. Default 20.
   - Outside Temperature: Set the relative cold/warm temperature to adjust the static pressure target.

- Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted. Range: 0 – 40 Pa.

8.4.6 BLOWBACK FAN

As an option, one blowback fan can be used during tunnel ventilation to improve airflow in the area of the cooling pads. The purpose is to distribute air in areas with limited air flow.

➲ **Go to System › Devices and Sensors and set one relay as Blowback Fans (refer to the Installation Manual).**

- Operation
- Configuration

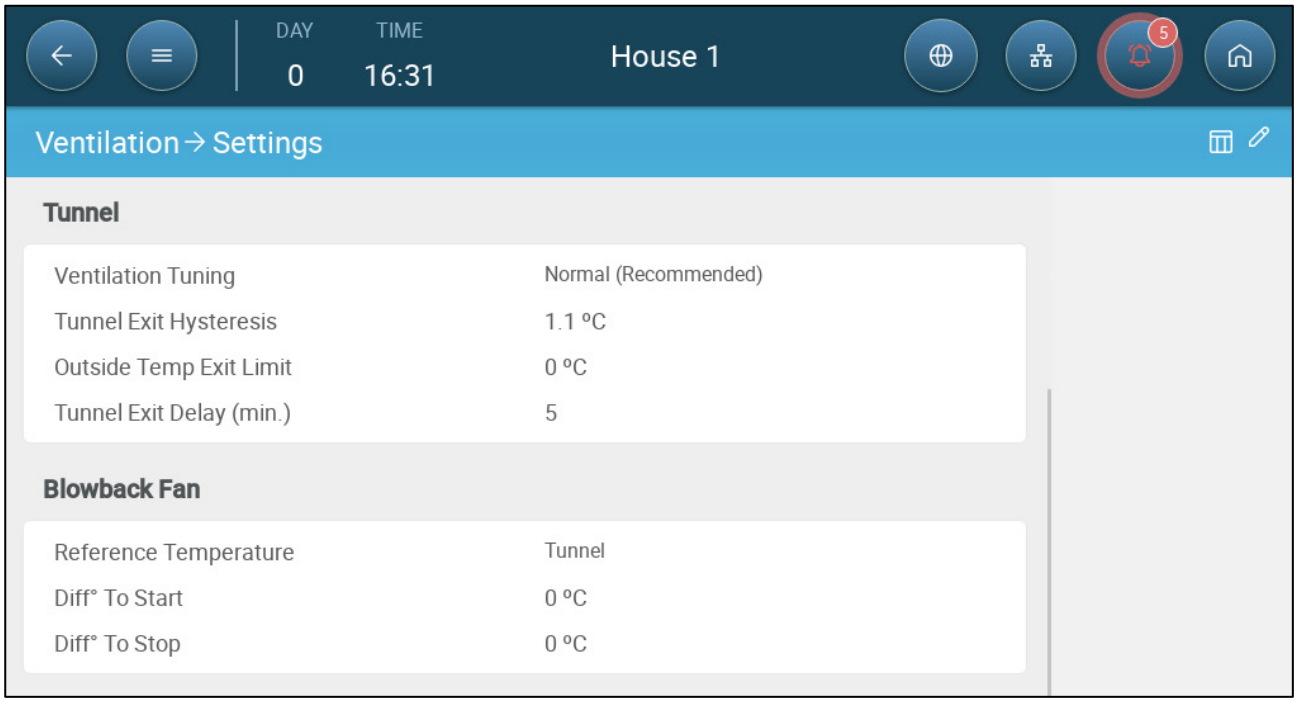
8.4.6.1 Operation

- The blowback fan operates in tunnel mode only.
- The blowback fan operates according to temperature readings. The fans must be mapped to a specific temperature sensor(s).
  - The fan does not operate according to the average temperature reading. If the mapped sensors fail, the fans cease operating.
- Blowback fan activation and deactivation temperatures are in reference to the tunnel temperature or the cool pad temperature.

8.4.6.2Configuration

➲ **Tunnel Ventilation must be enabled (refer to page 57).**

1. Go to Climate › Ventilation › Settings.



2. Select the reference temperature: Tunnel or Cooling.
3. Define the differential between the reference temperature and the start/stop temperature. Default: 0°. Range: -10° to +10°

8.5 Testing the Ventilation System

After configuring the fans and ventilation definitions, it is important to test the system to verify that ventilation flows as required (for example by employing a smoke machine). In addition, if there is any problem in the ventilation system, this test can help identify the problem.

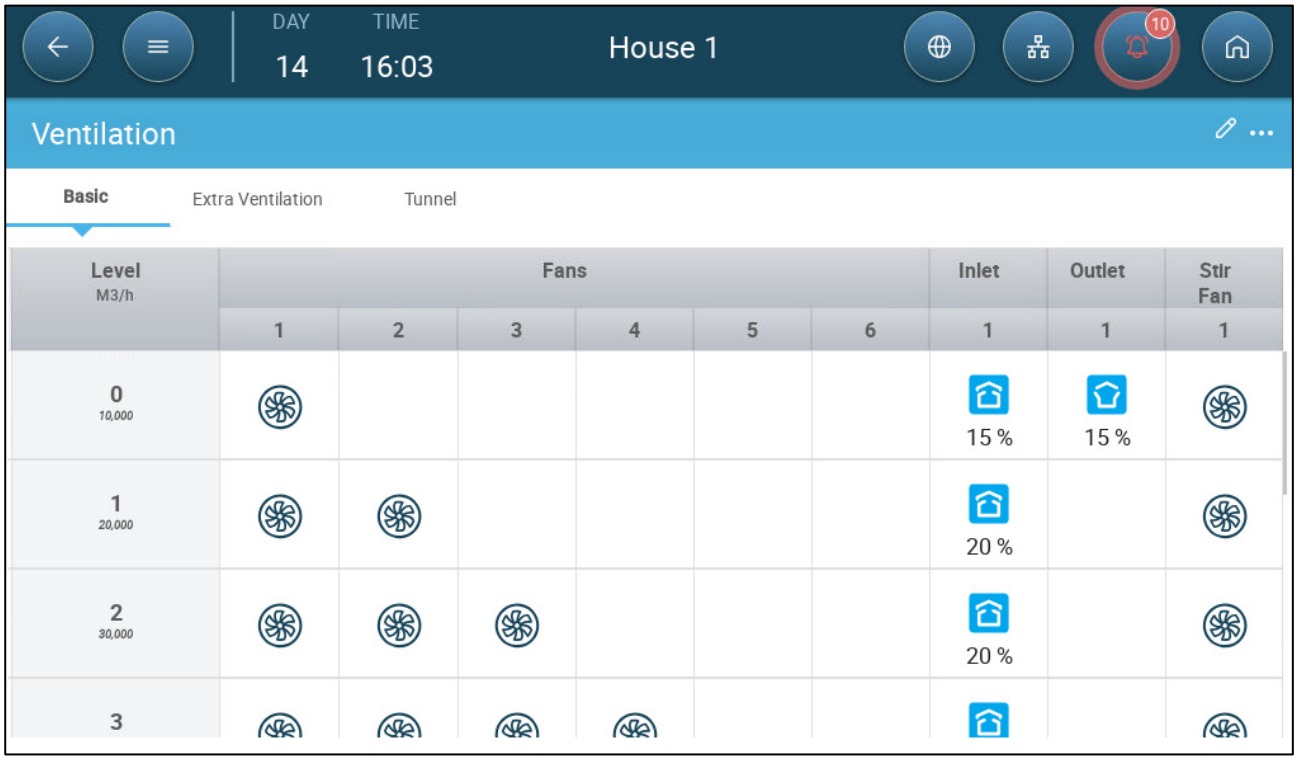
Testing can be performed in Basic Mode. From Version 8.3, testing is also available in Extra and Tunnel Modes.

Testing checks:

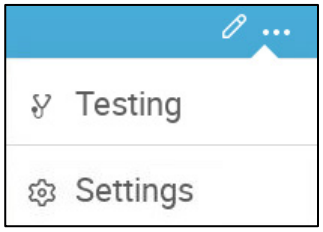
- Air speed
- Airflow patterns (exhaust through the inlets)
- Testing room differential pressure (setting the right position for the inlets/outlets/tunnel doors).
- Filter/cooling pad performance
- Fan performance (mechanical drop)

To test the system:

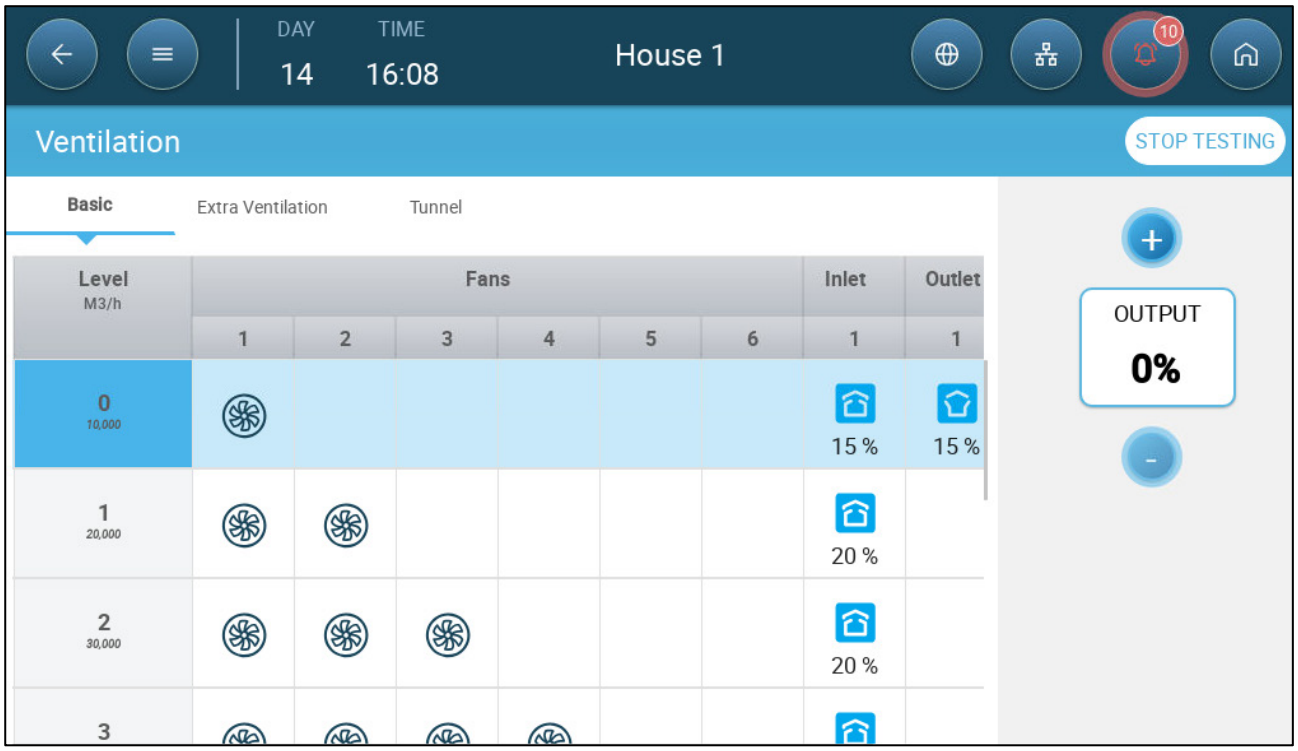
1. Configure your ventilation system as required.



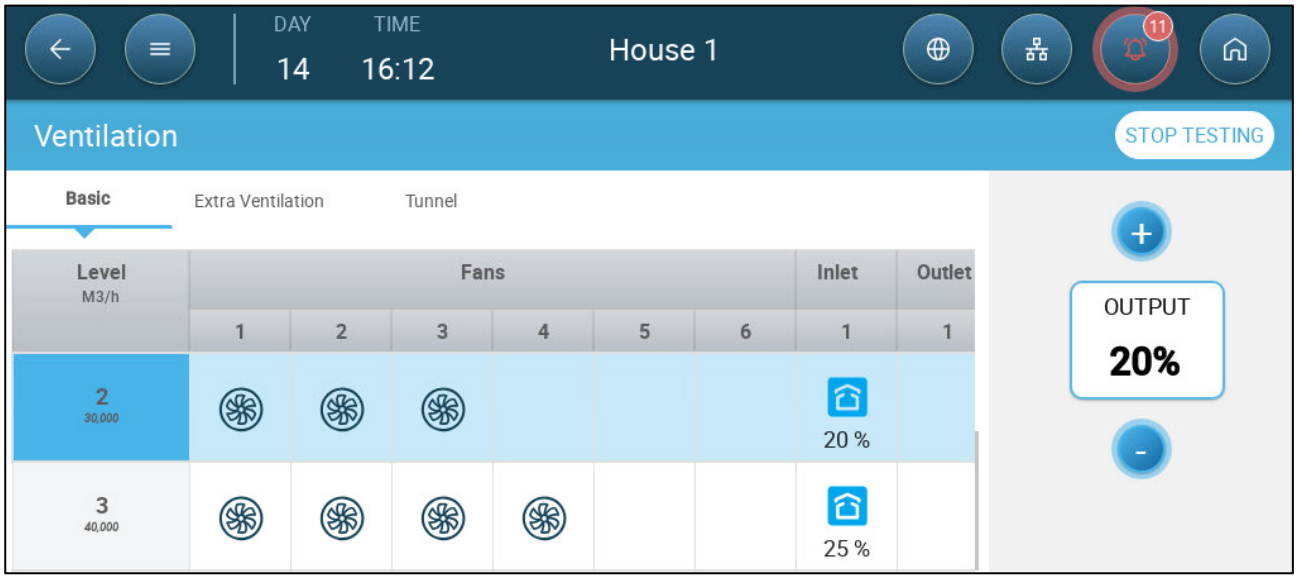
2. Click the three dots and select **Testing**.



3. Confirm the test start. Note that automatic ventilation control ceases to operate during a test.



4. Testing begins at Level 0. Begin increasing the output. When the output increases to 10%, the ventilation level should rise to Level 1. When the output increases to 20%, the ventilation level should rise to Level 2.



5. Ensure that all systems are operating properly.

- Press **Stop Testing** to cease the test. If there is no user input for five minutes, testing stops automatically.
- If Extra Ventilation is enabled, testing automatically switches to Extra Ventilation when Minimum Ventilation passes 100%. The same process happens if Tunnel Ventilation is enabled.

8.6 Calibrating the Inlet/Tunnel Door

To ensure that air circulation is carried out in the most efficient manner and according to the specifications, inlets must be positioned (opened) accurately. If used a potentiometer can control the opening and closing with a high degree of precision.

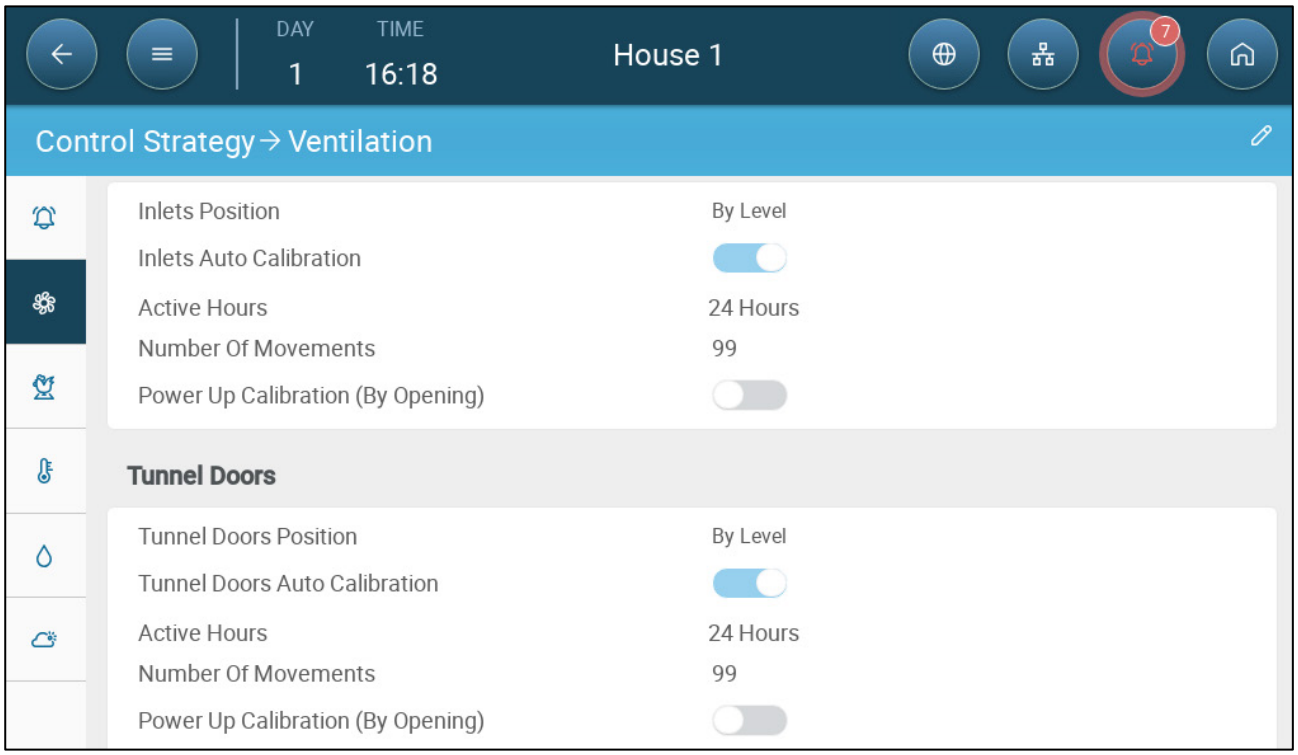
However when there is no potentiometer, positioning accuracy tends to degrade after the inlets go through several opening and closing cycles. The following section describes how to recalibrate the inlets and tunnel doors, without a potentiometer.

During installation, the user enables auto-calibration in digital output inlets. Calibration automatically takes place after the number of inlet movements equals the number of movements required to start calibration.

Only one inlet or tunnel curtain can be calibrated at a time.

- Relay open occurs when the target position is 100%.
- Relay close occurs when the target position is 0%.

1. Go to System › Control Strategy › Ventilation  .



2. Define:
   - (Option): Enable Inlets/Tunnel Door Auto Calibration. If this is enabled, the following parameters appear. Define:

- 24 hours a day or a specific time frame.
- Number of Movements: Define the number of movements (meaning when the opening changes from idle to open or to close) after which the inlets or tunnel door auto calibrates. The movement can be automatic or manual. Range: 5 – 99. Default: 99

  - Power Up Calibration (By Opening): Upon power up, the inlets or tunnel door are opened completely.

8.7 Stir Fan

Stir fans mix the air within the rooms. Because warm air rises and cool air falls, there can be a difference of several degrees in the temperature between the floor and the ceiling. By circulating the air, heating costs can be reduced while the environmental conditions are improved.

Stir fans can work continuously or in cycles.

- How do Stir Fans and Exhaust Fans Work Together?
- Version 8.3 and Below
- Version 9.0 and Above

8.7.1 How do Stir Fans and Exhaust Fans Work Together?

There are several rules guiding stir fan operation.

- An exhaust fan must be defined at the same level as a stir fan. The stir fan will not operate without an exhaust fan.

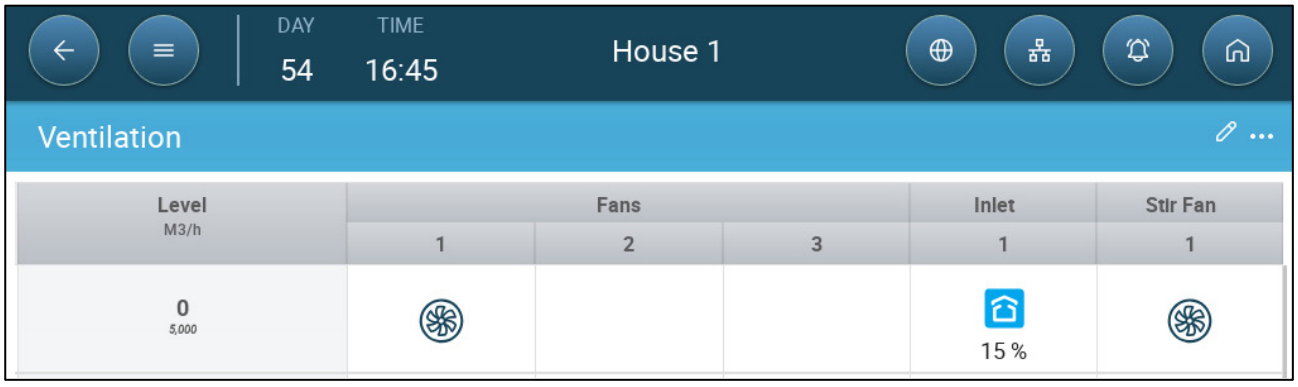


Figure 3: Valid Stir Fan – Exhaust Fan Configuration

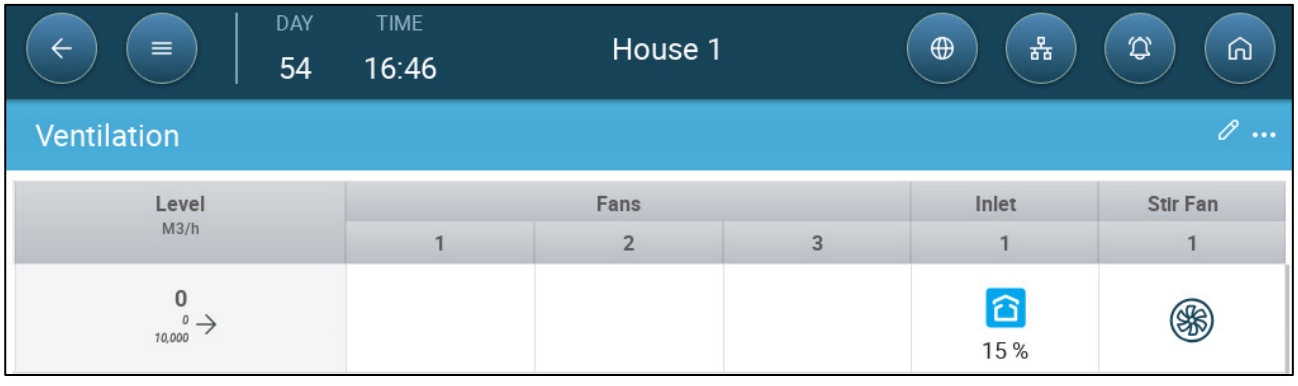


Figure 4: Invalid Stir Fan – Exhaust Fan Configuration

- As the level of ventilation rises, the stir fan operates until there is a change in the exhaust fan configuration. At that point, the stir fan must be redefined or it will stop operating. In Figure 4, The stir fan operates at Level 0 and Level 1. At Level 2, when the exhaust fan configuration changes, the stir fan stops operating. Figure 5 illustrates how to define the stir fan to ensure continuous operation.

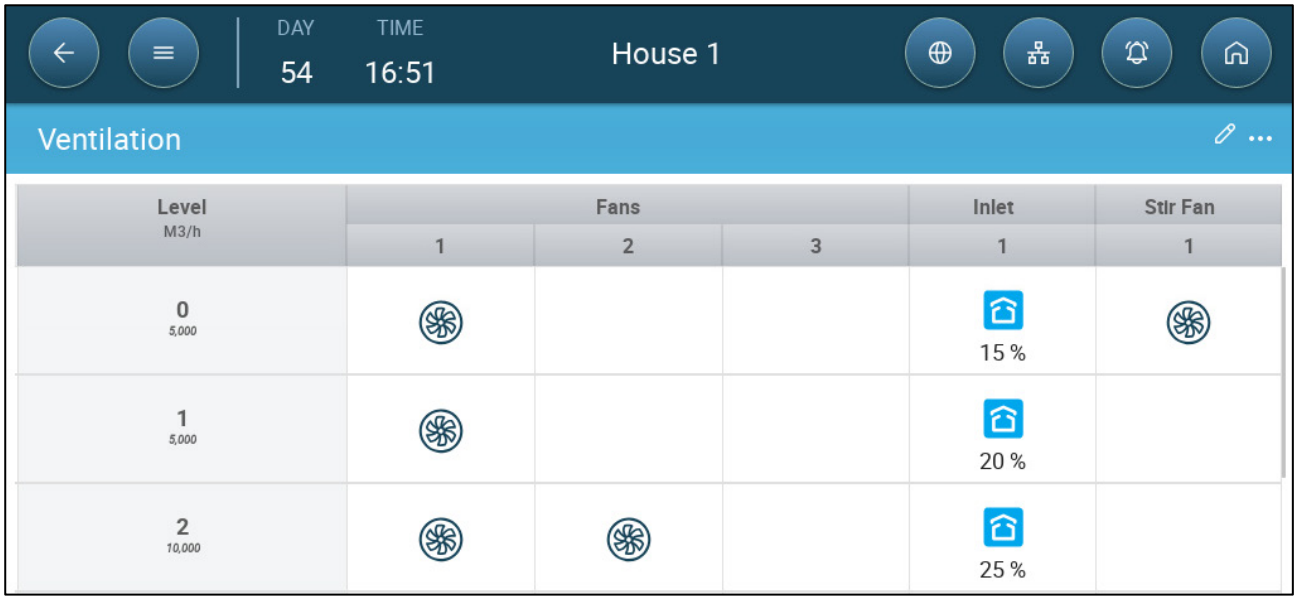


Figure 5: Change in Exhaust Fan – Stir Fan Stops Working

Figure 6: Change in Exhaust Fan – Stir Fan Continues Working

- Variable speed stir fans continue working at the same level until a new level is defined; there is no ramping. In Figure 6 the stir fan works at 25% from Level 0 to Level 2. At Level 3, it rises to 50%.

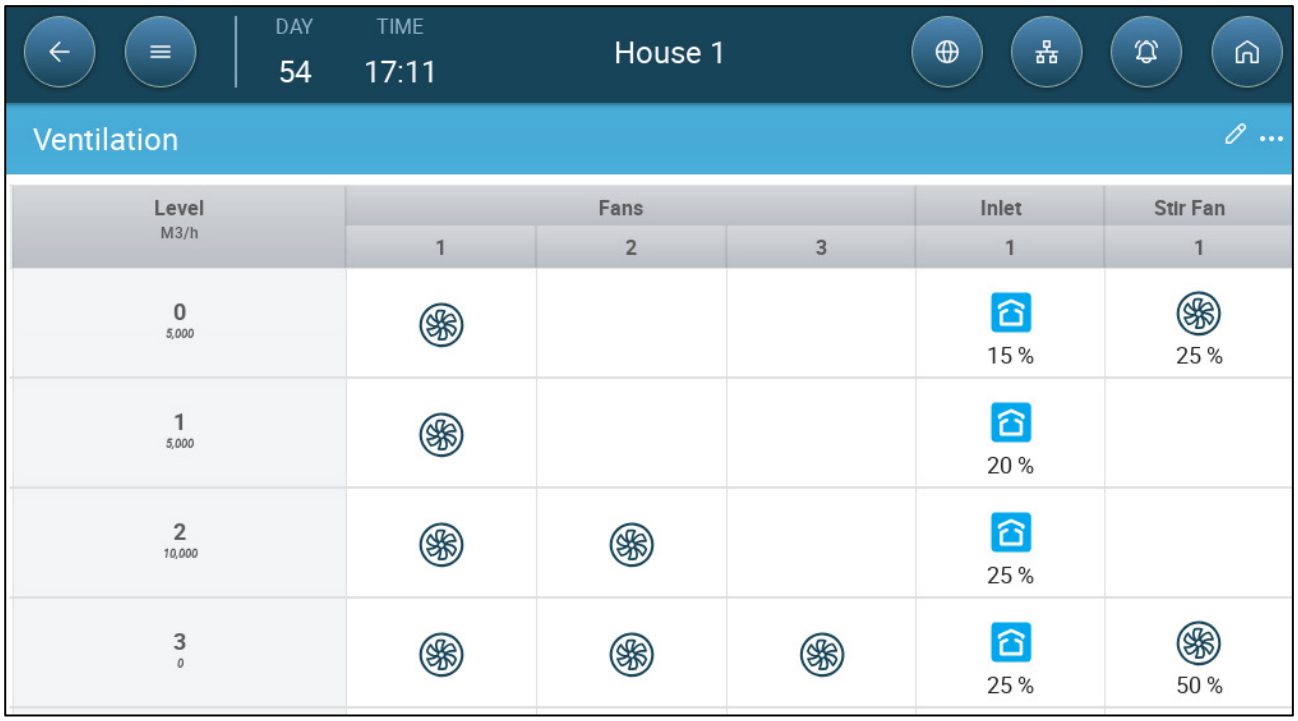


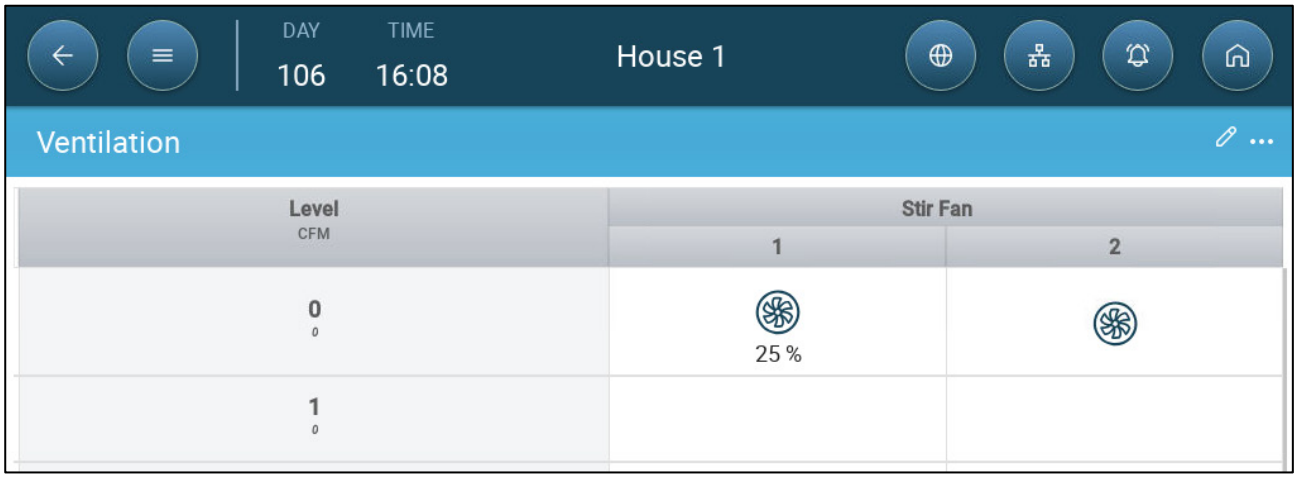
Figure 7: Variable Stir Fan Speed

- If the stir fans operate in a cycle, they can synchronize their on-time with exhaust fans that operate in a cycle (refer to Cycle Time Option). If the exhaust fans work continuously, the stir fans operating in a cycle work independently of the exhaust fans.

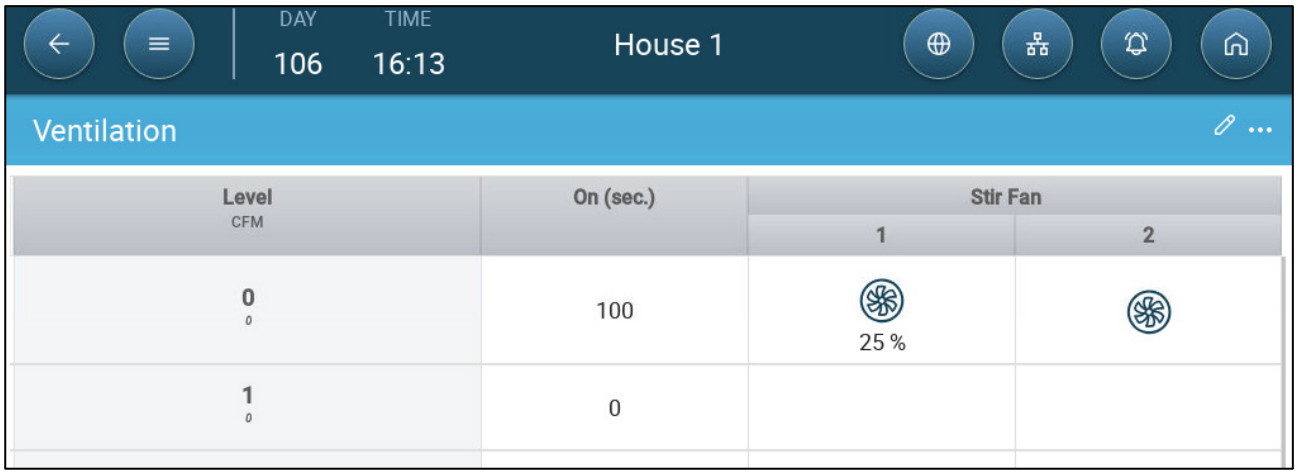
8.7.2 VERSION 8.3 AND BELOW

To define the stir fan functionality:

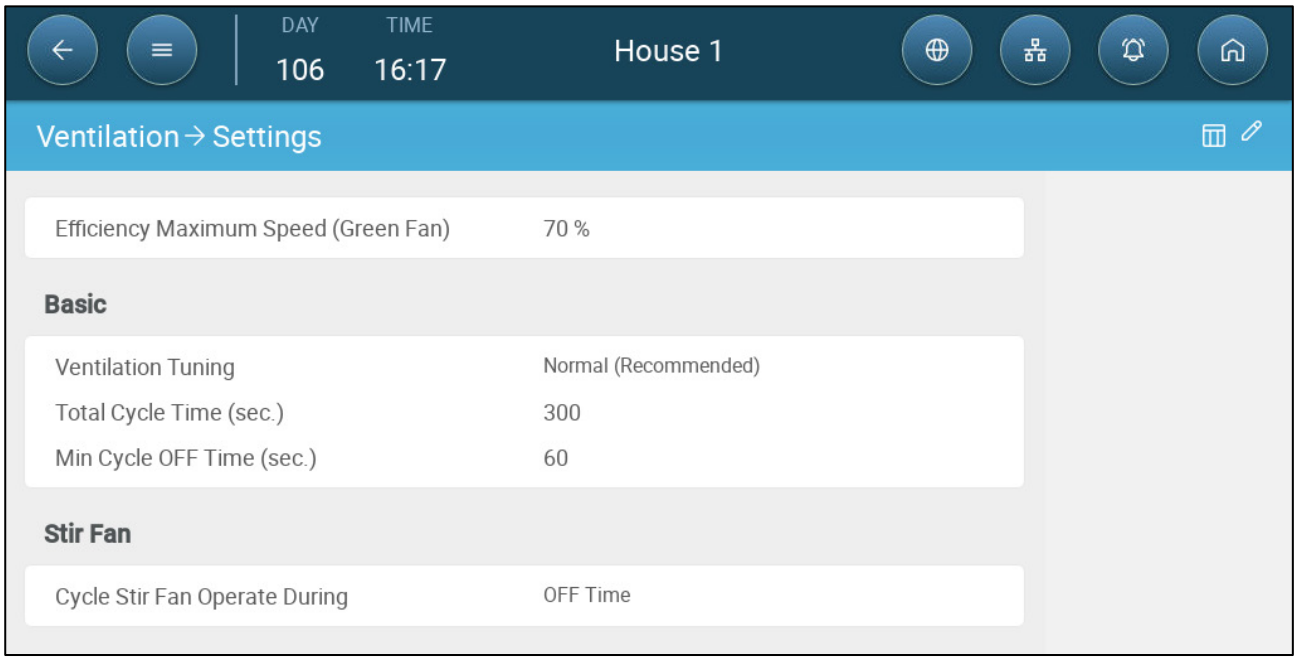
1. Define up to two relays or analog ports as a stir fan (refer to the Installation Manual).
2. Define the stir fan parameters (refer to the Installation Manual).
3. Go to Climate > Ventilation, enable the fan(s) and define the fan(s) parameters.



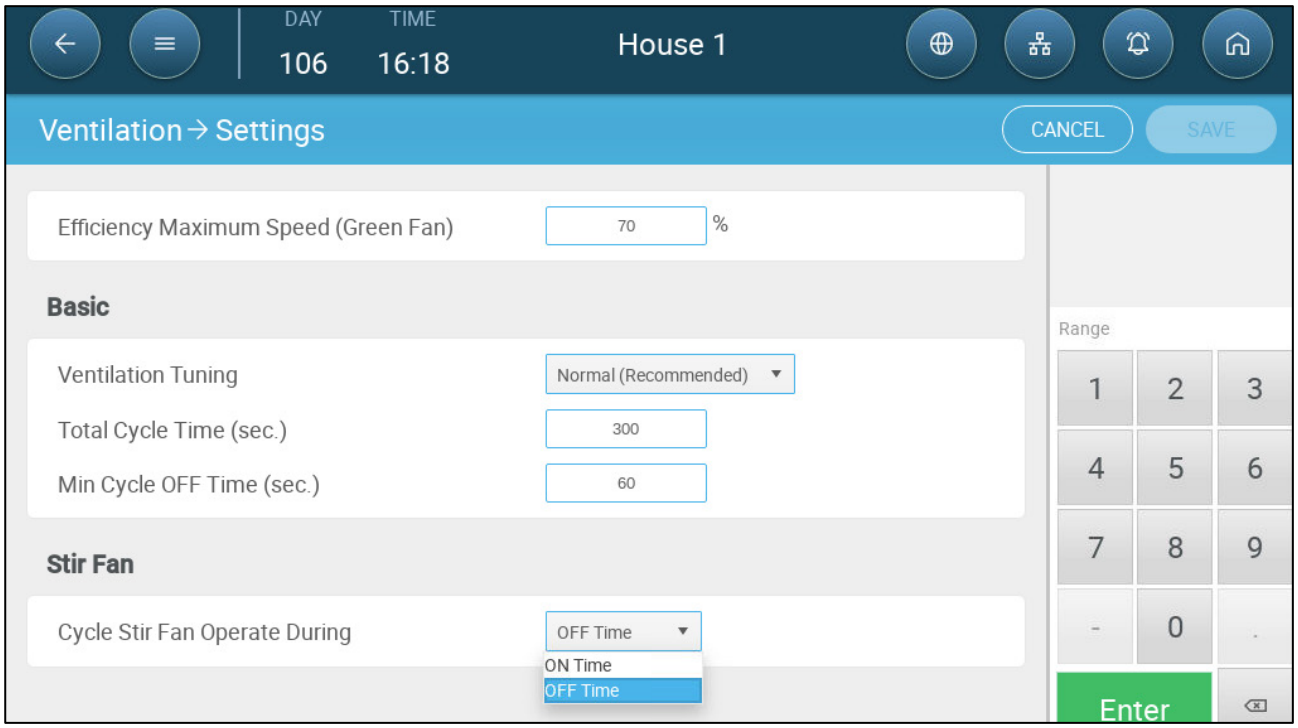
4. **Cycle Time Option**: If ventilation runs in cycle, define the stir fan cycle time (refer to Minimum Ventilation Cycle, page 44 for details).
   a. Define the On Time.



b. Go to Climate › Ventilations › Settings and define the cycle times.



c. Define when the stir fan operates, during the exhaust fans' cycle On or Off time.



8.7.3 VERSION 9.0 AND ABOVE

NOTE Stir fan settings are defined for each fan individually.

- Operation Conditions
- Basic Configuration
- Cycle Time
- Operation Based on Temperature Difference

8.7.3.1 Operation Conditions

- Inlet Synchronization: If cycle mode stir fans operate during the **exhaust fans off cycle**, there is an option that enables stir fan operation only when the inlets are completely closed. This option does not allow any ventilation during stir fan operation.
  - Fans begin to operate **only** when the inlets reach their 0% position. This means that there can be a short delay between the time that exhaust fans are off and the stir fans begin to operate.
  - Opening an inlet manually during fan operation does not affect the stir fans.
  - Once inlets begin to open, stir fans cease to operate.
- Temperature input: As an option, Trio can use temperature data to determine if the stir fans should operate. Two zones are mapped to specific temperature sensors (one zone can be mapped to the average temperature). When the difference between the zones' temperature reaches a certain threshold, stir fans begin to operate. Once the difference falls below that threshold, the stir fan ceases to operate.
  - The temperatures are continually monitored.
  - If one sensor fails or is disabled, the stir fan stops operating.

- If variable speed stir fans are employed:
  - The fans' speed varies from the minimum to maximum.
  - The user defines the temperature difference (from the initial threshold temperature) at which the fan works at maximum speed.

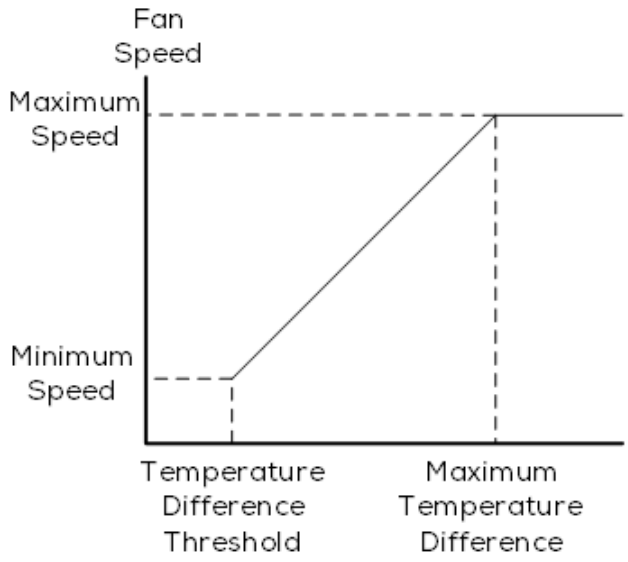
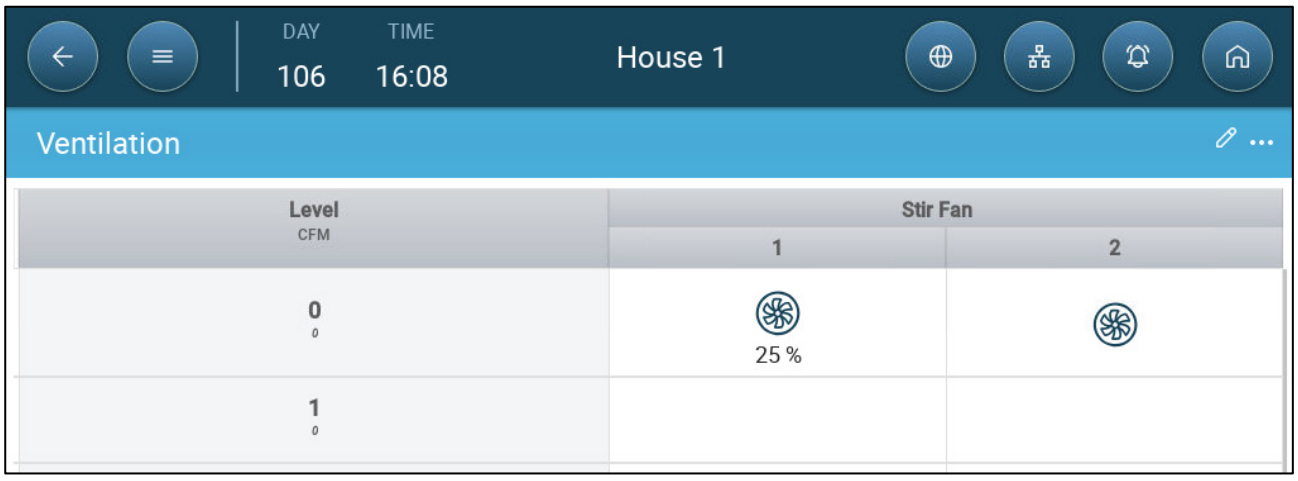


Figure 8: Variable Speed Stir Fan Speed vs Temperature

8.7.3.2 Basic Configuration

To define the stir fan functionality:

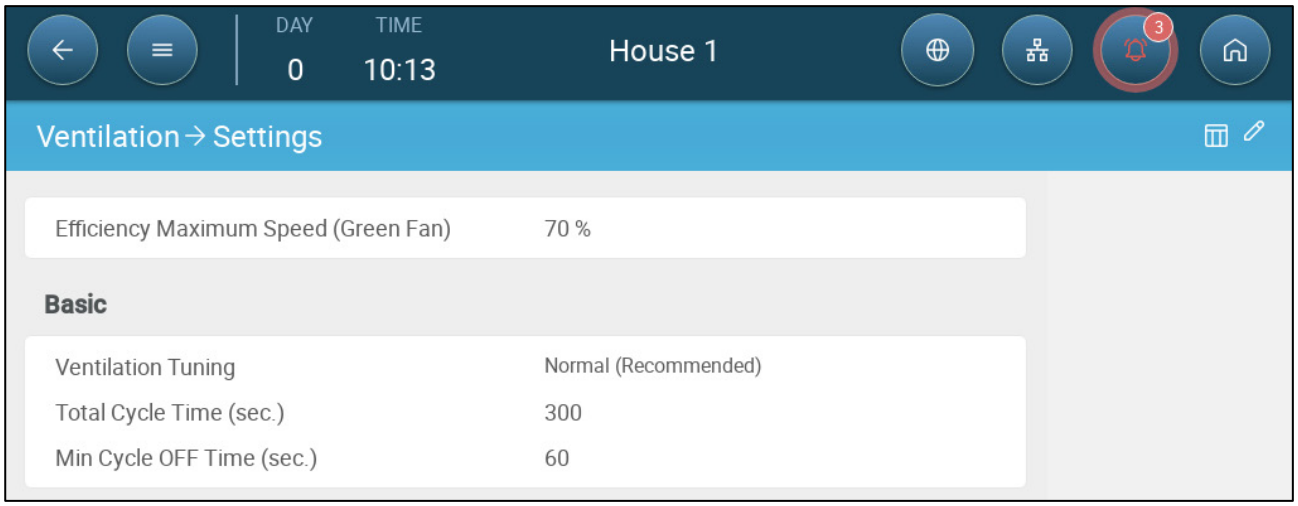
1. Define up to five relays or analog ports as a stir fan (refer to the Installation Manual).
2. Define the stir fan parameters (refer to the Installation Manual).
3. Go to Climate > Ventilation, enable the fan(s) and define the fan(s) parameters.



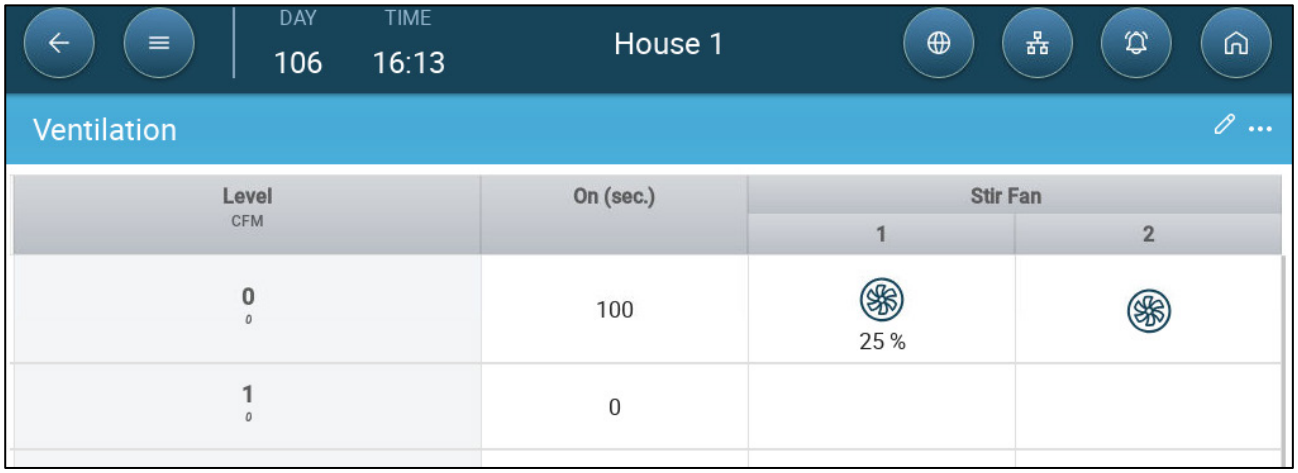
8.7.3.3 Cycle Time

To configure the cycle time:

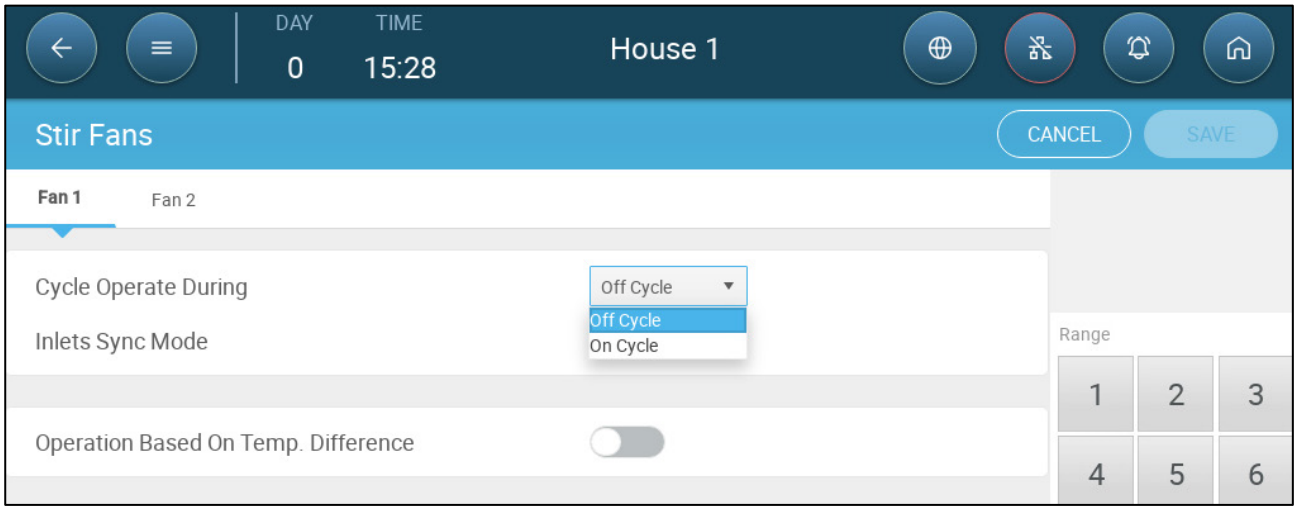
1. Go to System > Control Strategy > Ventilation and enable fan cycling in Basic (refer to Minimum Ventilation Cycle, page 44).
2. Go to Climate > Ventilations > Settings and define the cycle times.



3. Go to Climate › Ventilation and define the On Time.



4. Go to Climate › Ventilation › Stir Fans and define when the stir fan operates, during the cycle On or Off time.



5. Inlets Sync Mode: If the stir fan operates during the Off Cycle, there is an option to enable the stir fan only after the inlets reach their zero position. Enable this option if required.

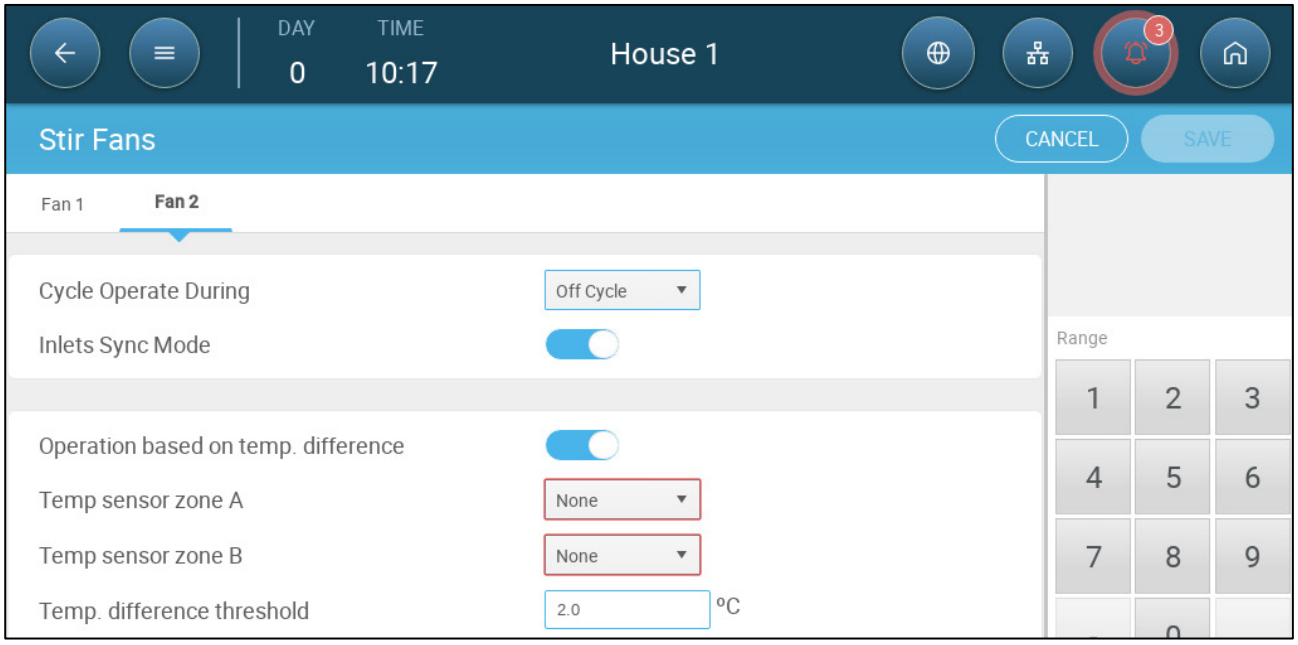
NOTE If the inlet cannot close, the stir fan will operate.

8.7.3.4 Operation Based on Temperature Difference

- On – Off Stir Fans
- Variable Speed Stir Fans

8.7.3.4.1 On – Off Stir Fans

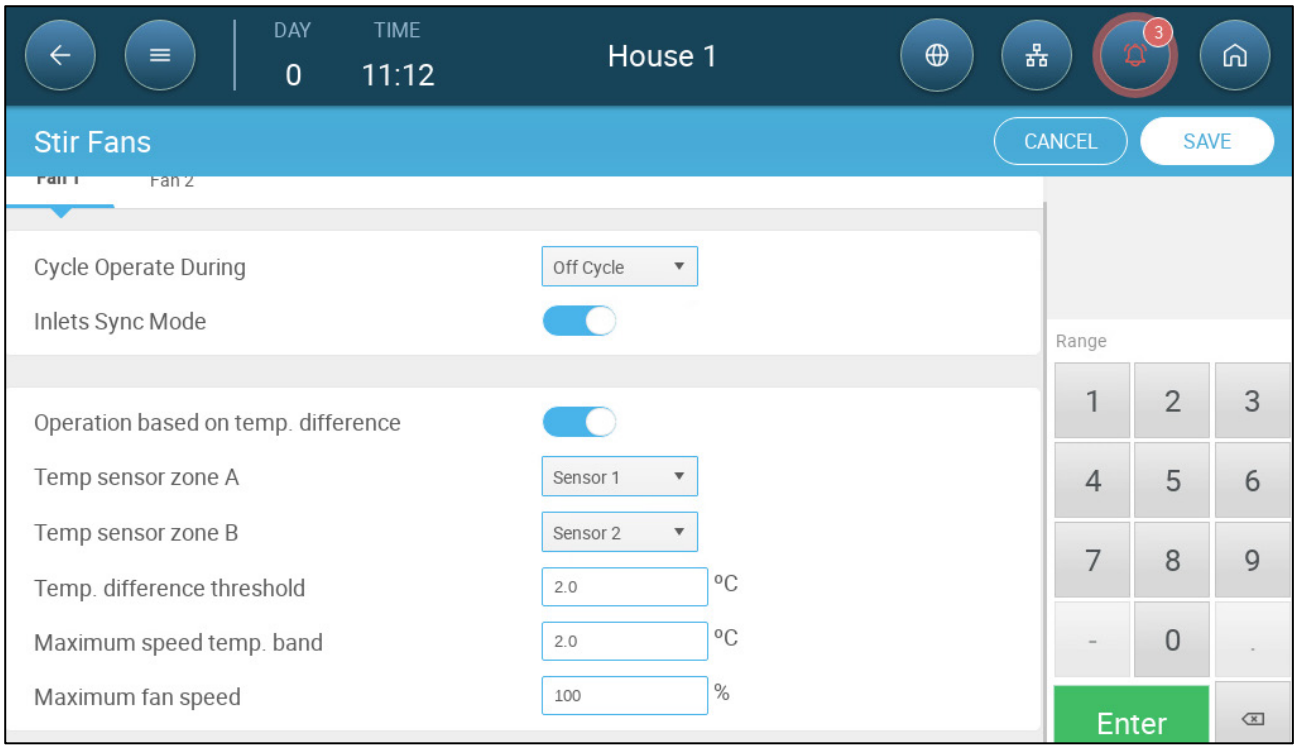
1. Go to Climate › Ventilation › Stir Fans and enable Operated Based On Temp. Difference.



2. Map each zone to a specific sensor.
    - One zone can be mapped to the average temperature (option).
    - Both sensors must be mapped. Selecting None disables the function.
3. Define the temperature difference threshold. Default: 2°. Range 0.5° - 10°.

8.7.3.4.2 Variable Speed Stir Fans

1. Go to Climate › Ventilation › Stir Fans and enable Operated Based On Temp. Difference.



2. Map each zone to a specific sensor.
    - One zone can be mapped to the average temperature (option).
    - Both sensors must be mapped. Selecting None disables the function.
3. Define the temperature difference threshold. Default: 2°. Range 0.5° - 10°.
4. Define the Maximum Speed Temperature Band. The variable stir fan reaches its maximum speed when the temperature rises to the threshold plus this differential. Default: 2°. Range 0.5° - 10°
5. Define the Maximum Fan Speed: Define the maximum fan speed percentage. Default: 100%. Range: 0 – 100%.

NOTE The minimum speed is the speed defined in the stir fan table.

9 Cooling Functions

- Cooling Pads
- Foggers

9.1 Cooling Pads

- Cooling Principles
- Selecting the Cooling Mode

9.1.1 COOLING PRINCIPLES

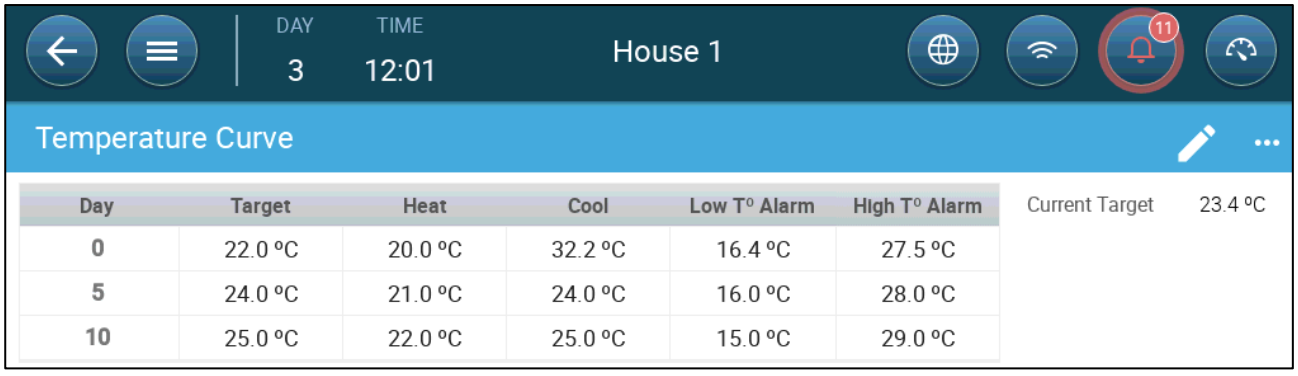
Trio supports controlling up to two cooling devices (foggers or cooling pads). The devices can run separately or together.

The relative humidity directly affects the ability of birds to cool down, even when the temperature is the same (heat loss decreases in higher humidity rate causing heat stress). What is important to remember is that the cooling process adds moisture to the air; therefore it needs to stop when the relative humidity is too high.

- To enable limiting cooling according to the humidity, install a humidity sensor.
- Invalid humidity sensor readings are not taken into consideration.

To avoid causing the birds undo heat stress during periods of high relative humidity, Trio employs the following rules:

- When the temperature reaches the Cooling Temperature in the Temperature Curve, cooling begins and continues until the temperature falls below this point. The Cooling Temperature must be higher than the Target Temperature.



- If the humidity level rises above the To Humidity parameter (plus the Humidity Band), cooling ceases.
- Cooling only takes place between the start and finish times.
- When the minimum OFF time = 0sec, and the temperature reached ON temp + Ramping range the cooling device operates continuously.
- While cycling, the minimum OFF time will never be less than 5 seconds.
- Cool pads run in all ventilation modes.

- To record the amount of water used during cooling: install, map, and define a water meter (refer to the Installation Manual).

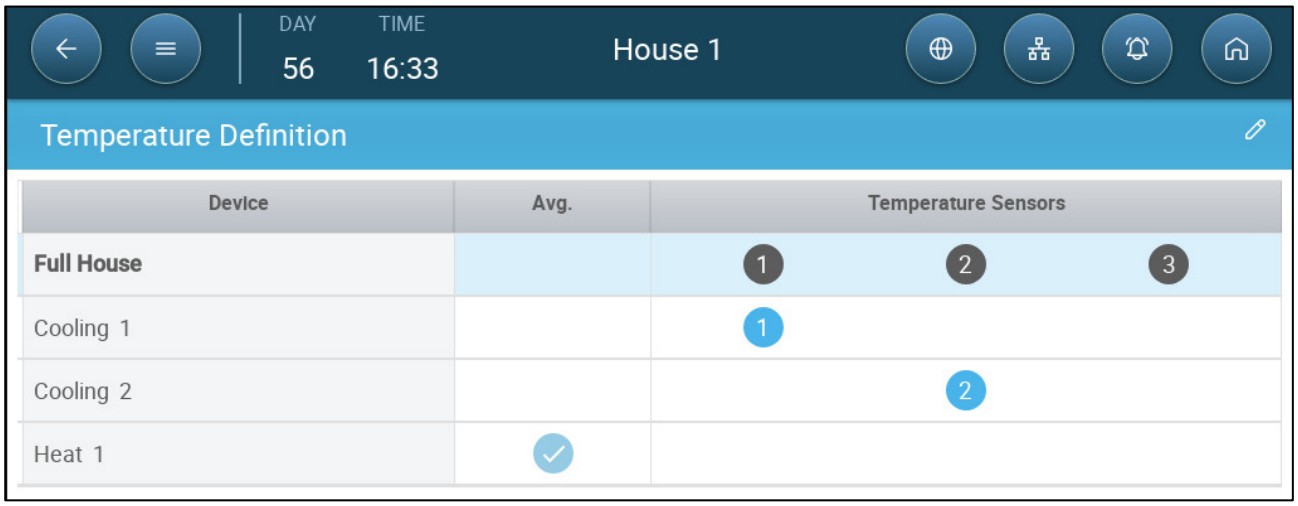
9.1.2 SELECTING THE COOLING MODE

Trio enables running the cooling device in three different modes:

- Ramping: Cycle modulation, frequency depends on the error in °C, with respect to the cooling setting (target). Ramping is the default mode.
- Continuous: When activated, the cooling devices operate continuously.
- Cycle: When activated, the cooling device operates according to user-defined an on/off cycle.

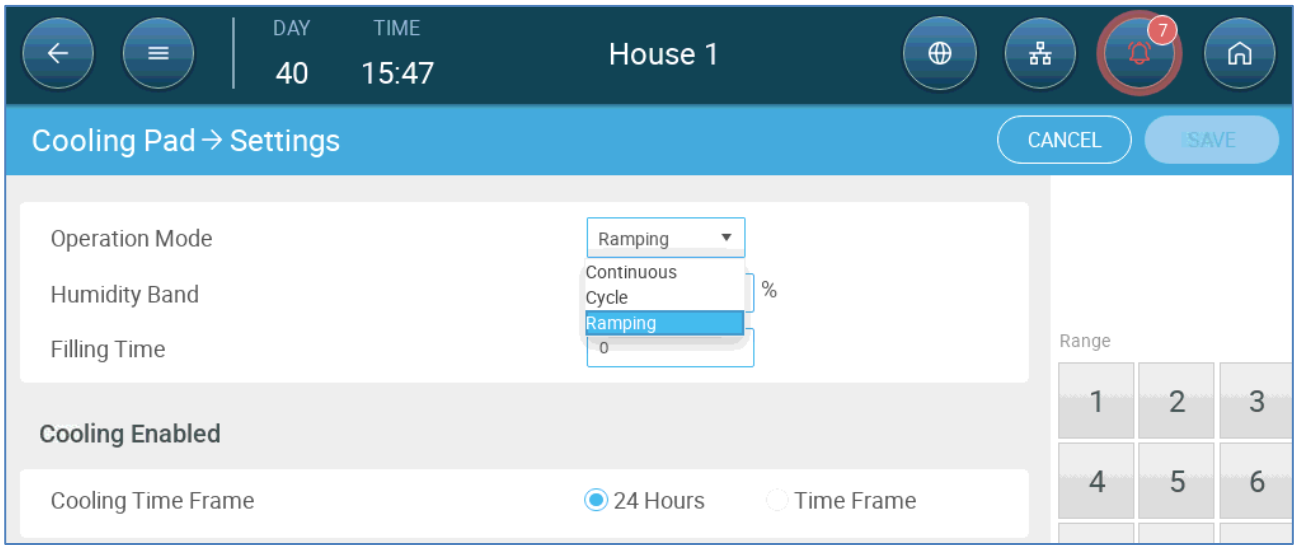
➲ **Go to System › Devices and Sensors and set the relays as cooling (refer to the Installation Manual).**

1. Go to System › Temperature Definition and map the cooling pads to a sensor(s).



NOTE If the RTS-2 sensors fail, the device stops operating.

2. Go to Climate › Cooling.› Cooling Pad  › Settings.



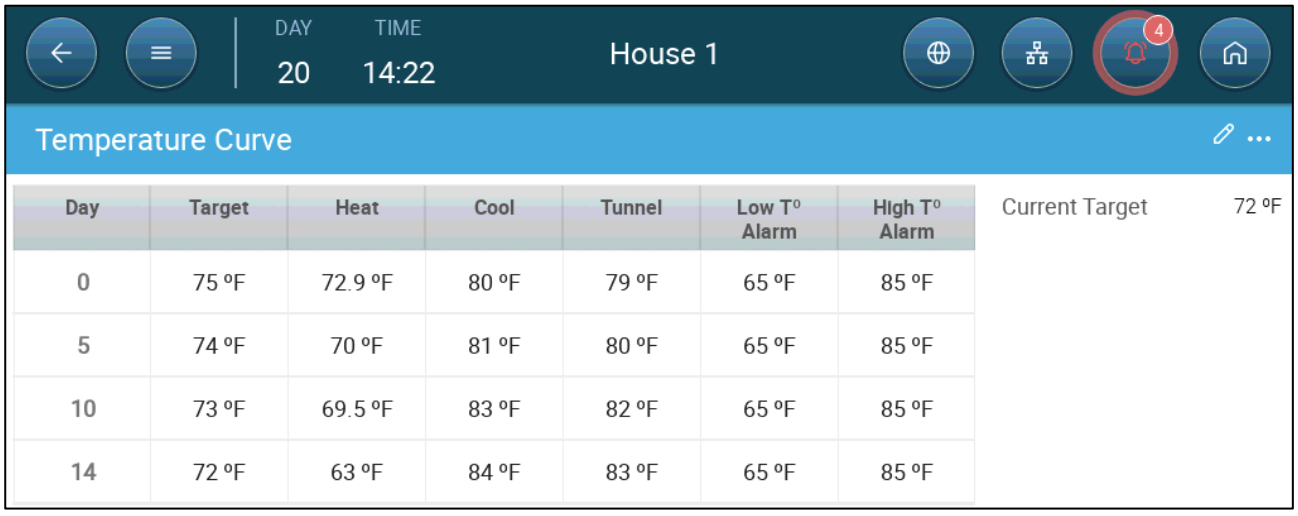
3. Define:
    - The operation mode.

- Humidity Band: Set the humidity band to re-enable cooling outputs after the process ceases because of the high humidity level. Default: 5%. Range: 2 – 10%
- Filling Time: Define the amount of time required to distribute water over the pad.
- Cooling Enabled: Define when cooling is enabled, 24 hours a day or time frames.

4. Go to Climate › Cooling › Cooling Pad  . The screen that appears depends on the operation mode chosen.

- Continuous Cooling
- Cycle Cooling
- Ramping Cooling

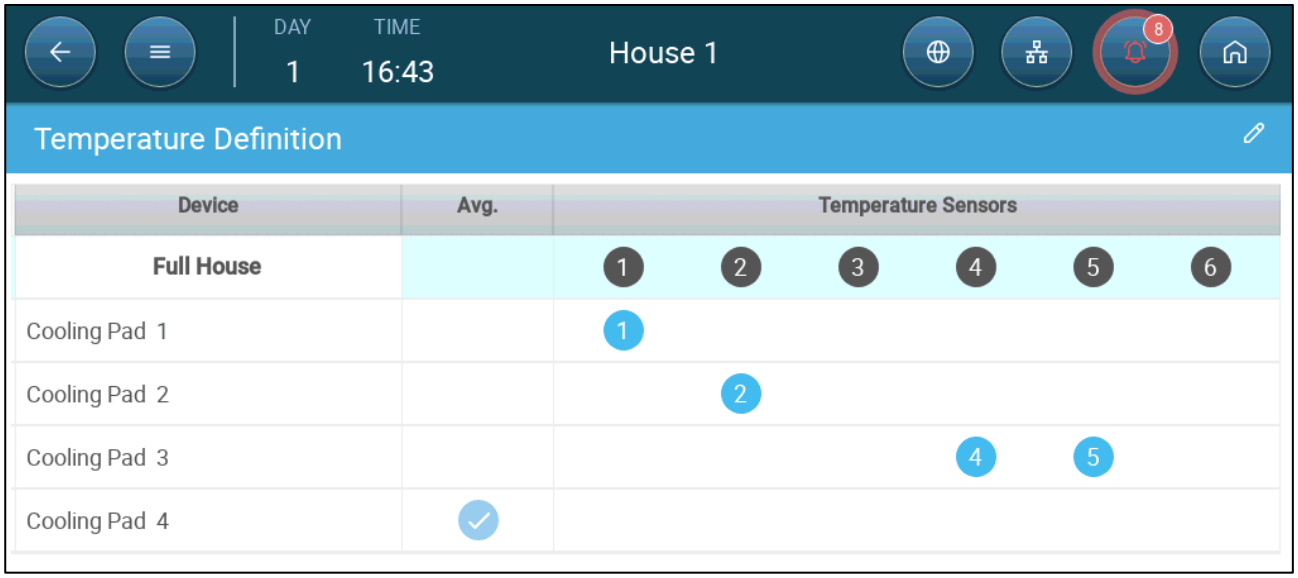
- If you want cooling pads to operate only in Tunnel mode, 1) enable Tunnel Mode 2) set up the Temperature Curve so that Tunnel Target Temperature is below the Cooling Temperature.



Day	Target	Heat	Cool	Tunnel	Low T° Alarm	High T° Alarm
0	75 °F	72.9 °F	80 °F	79 °F	65 °F	85 °F
5	74 °F	70 °F	81 °F	80 °F	65 °F	85 °F
10	73 °F	69.5 °F	83 °F	82 °F	65 °F	85 °F
14	72 °F	63 °F	84 °F	83 °F	65 °F	85 °F

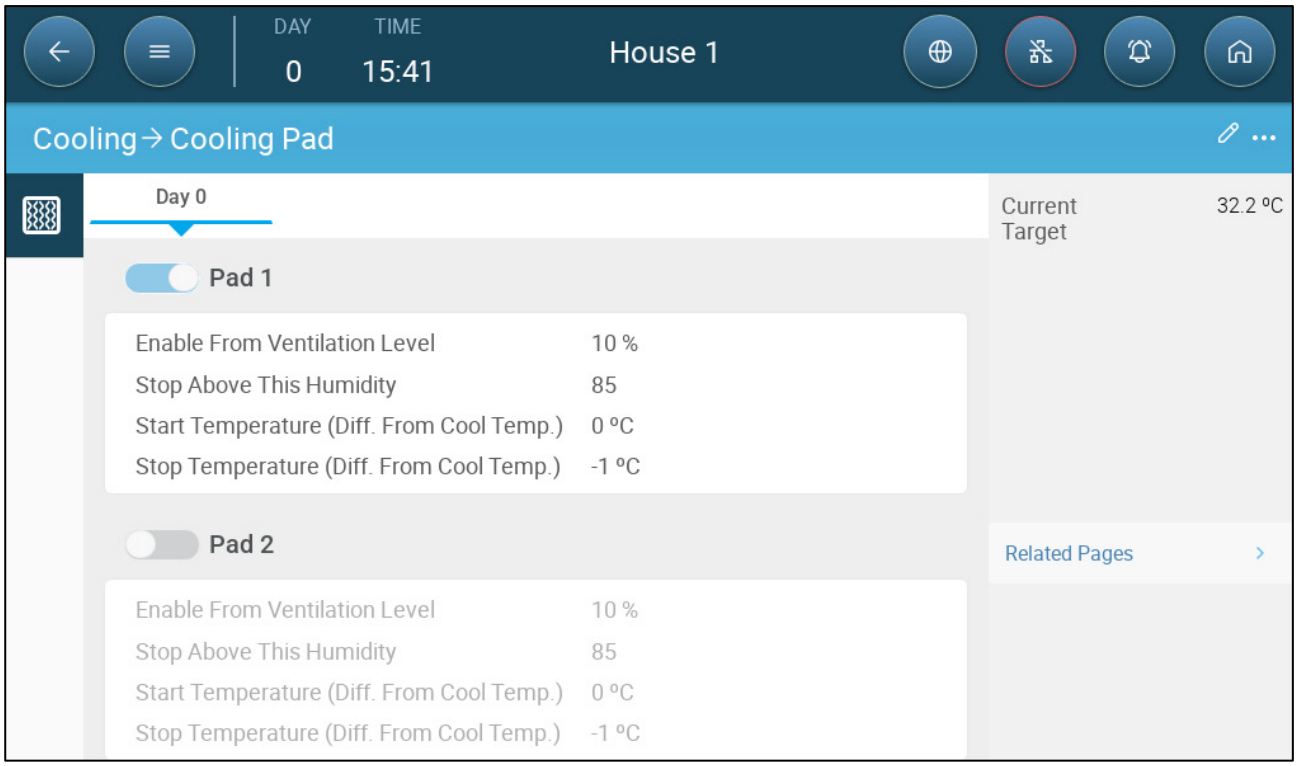
Current Target 72 °F

- Each cooling pad can be mapped to its own temperature sensor(s) or can operate according to the average temperature (System › Temperature Definition).



Device	Avg.	Temperature Sensors
Full House		1 2 3 4 5 6
Cooling Pad 1		1
Cooling Pad 2		2
Cooling Pad 3		4 5
Cooling Pad 4	✓	

9.1.2.1 Continuous Cooling



- Define:
  - Enable each required cooling pad.
  - Growth days at which the settings change. Define up to four days (Version 9.0: 15 days).
  - Status: Enable or disable a cooling device. Disabling a device is useful if there is a need to temporarily stop the operation.
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
    - If Extra or Tunnel ventilation modes are enabled, you can enable ventilation to start in any one of these modes.
  - Stop Above This Humidity: Stop cooling when the humidity level reaches the level defined in the Humidity settings.

NOTE Each cooling device operates according to its own humidity definition (Version 9.0).

  - Start Temperature (Diff From Cool Temp.): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days. Default: 0°. Range: -10° to – 10°

NOTE Each cooling device operates according to its own temperature (Temperature Definition).

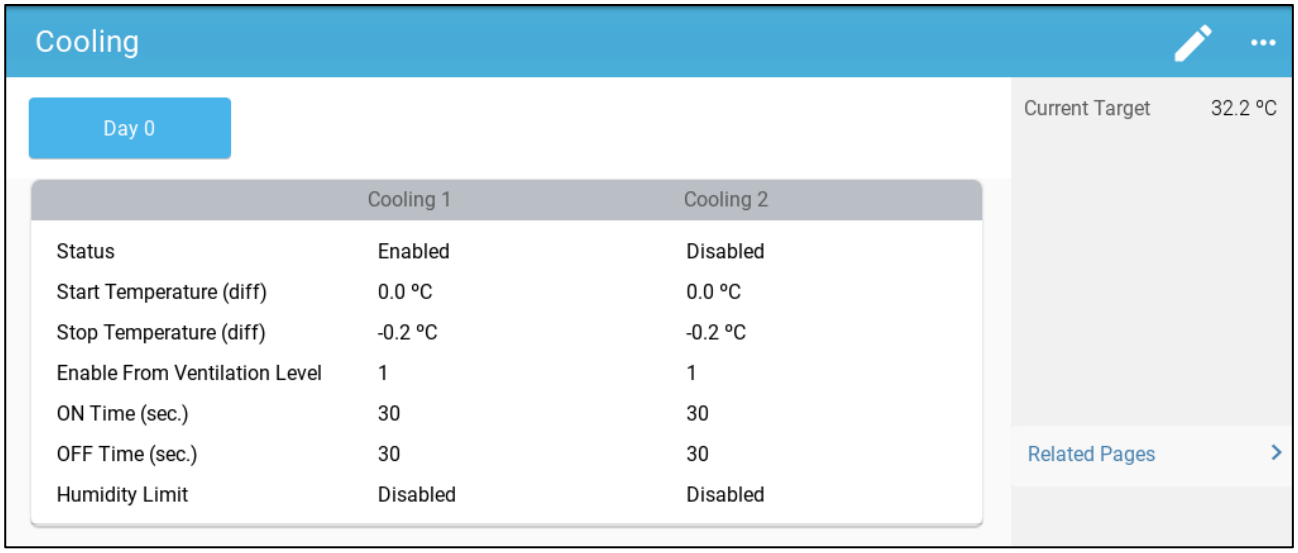
  - Stop Temperature (Diff From Cool Temp.): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device. Default: -0.2°. Range: -10.0° to -0.1°
    - Stop cooling device temperature = Cooling Target + Stop temperature

9.1.2.2 Cycle Cooling

Cycle cooling means that the cooling pad runs according to a schedule. When the conditions are met, the cooling runs according to the user-defined on and off times (in seconds).

- Version 8.3 and Below
- Version 9.0 and Above

9.1.2.2.1 Version 8.3 and Below



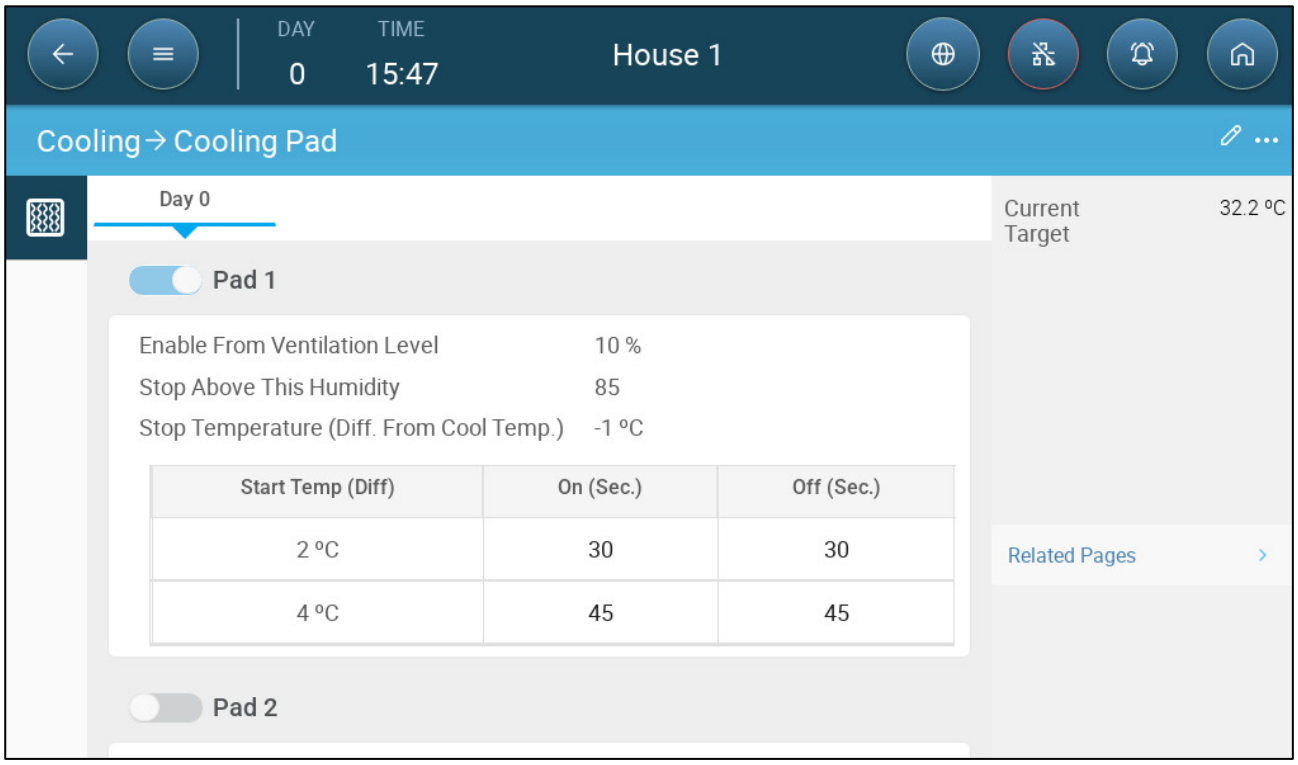
- Define:
  - Enable each required cooling pad. Disabling a device is useful if there is a need to temporarily stop the operation.
  - Growth days at which the settings change. Define up to four days.
  - Status: Enable or disable a cooling device. Disabling a device is useful if there is a need to temporarily stop the operation.
  - Start temperature (diff): Defines a temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days. Default: 0^{o}. Range: 0 – 10^{o}

NOTE Each cooling device operates according to its own temperature (Temperature Definition).

  - Stop temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device. Default: -0.2^{o}. Range: -10.0^{o} to -0.1^{o}
    - Stop cooling device temperature = Cooling Target + Stop temperature
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
  - ON/OFF Time: Define the amount of time the cycle is ON and OFF, respectively.
  - Humidity Limit: Enable stopping cooling at a certain humidity level.

9.1.2.2.2 Version 9.0 and Above

Version 9.0 enables defining up to eight cooling cycles, each with its own temperature definition and duration. Trio continually measures the difference between the current temperature and cooling temperature. When the difference exceeds the threshold, the appropriate cycle is activated. Once a cycle starts, Trio does not recheck the temperature until the cycle finishes.

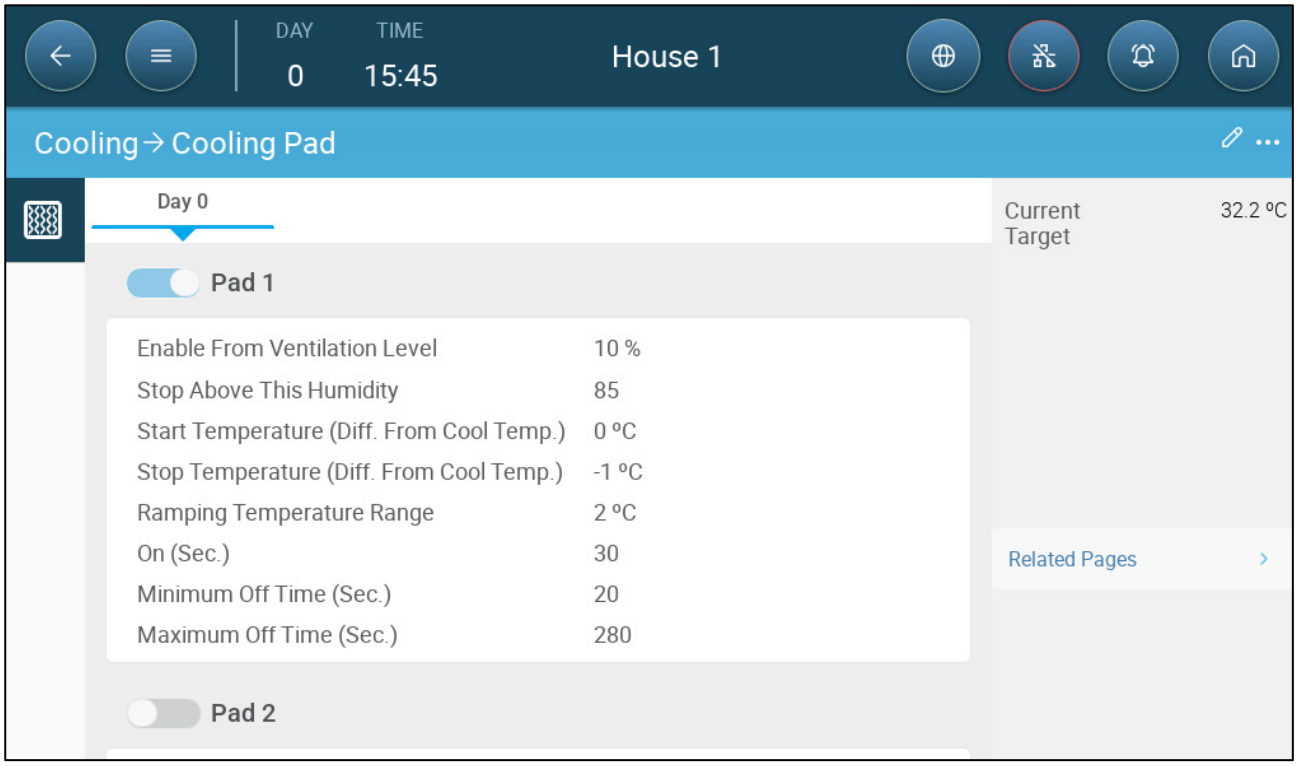


- Define:
  - Enable each required cooling pad. Disabling a device is useful if there is a need to temporarily stop the operation.
  - Growth days at which the settings change. Define up to 15 days.
  - Status: Enable or disable a cooling device. Disabling a device is useful if there is a need to temporarily stop the operation.
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
    - If Extra or Tunnel ventilation modes are enabled, you can enable ventilation to start in any one of these modes.
  - Stop Above This Humidity: Stop cooling when the humidity level reaches the level defined in the Humidity settings.
  - Stop Temperature (Diff From Cool Temp.): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device. Default: -0.2°. Range: -10.0° to -0.1°
    - Stop cooling device temperature = Cooling Target + Stop temperature
  - For each cycle define:
    - Start Temp (Diff): Set the temperature differential from the cooling temperature (Temperature Curve) to activate the next cycle.

- ON/OFF Time: Define the amount of time the cycle is ON and OFF, respectively.
  - On: Default 30 seconds. Range: 5 – 999
  - Off: Default 30 seconds. Range: 0 – 9,999
- Click ADD CYCLE to define temperature differentials and cycle times.

9.1.2.3 Ramping Cooling

Ramping Cooling uses a cycle, but decreases the off-time as the temperature increases (within a temperature band).



- Define:
  - Enable each required cooling pad.
  - Growth days at which the settings change. Define up to four days (Version 9.0: 15 days).
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
    - If Extra or Tunnel ventilation modes are enabled, you can enable ventilation to start in any one of these modes.
  - Stop Above This Humidity: Stop cooling when the humidity level reaches the level defined in the Humidity settings.
  - Start Temperature (Diff From Cool Temp.): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days. Default: 0°. Range: -10° to – 10°

NOTE Each cooling device operates according to its own temperature (Temperature Definition).

- Stop Temperature (Diff From Cool Temp.): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device. Default: -0.2°. Range: -10.0° to -0.1°
  - Stop cooling device temperature = Cooling Target + Stop temperature
- Ramping Temperature Range: Sets a temperature range to modulate the cooling device off cycle. When cooling starts, the off time will be the maximum off time. As the temperature rises to the band maximum, the maximum off time decreases to the minimum.
- ON (Sec.): Describe the amount of time the cycle is ON. This number is a constant and does not change.
- Minimum/Maximum Off Time (sec): Define the maximum and minimum off time that cooling devices remain off after having operated during the ON time.
  - Maximum Default: 280. Range: 0 – 999. **Version 9.0** Range: 0 -9999.
  - Minimum Default: 20. Range: 0 – 999.

9.2 Foggers

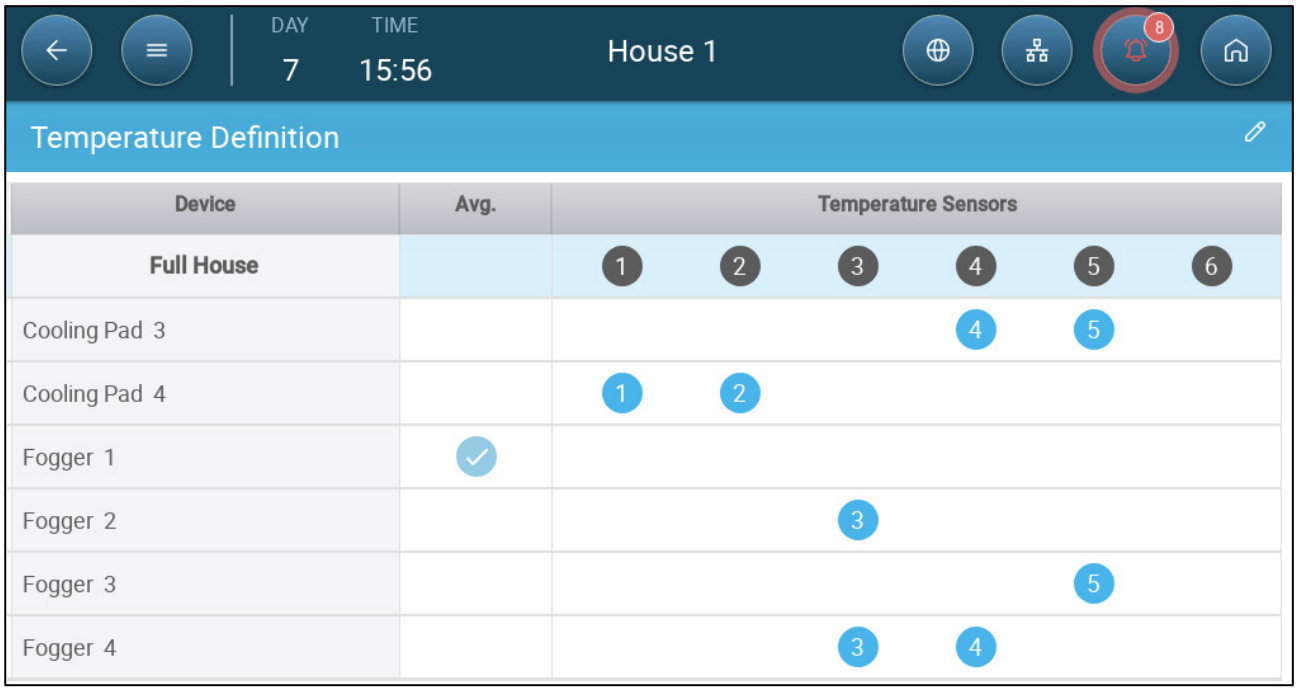
Foggers shoot a mist of water into the air to lower the temperature. Foggers are most effective when the humidity is below 60%.

- Foggers operate according to the house temperature, humidity, and bird age.
- A fogger can be mapped to a particular temperature sensor or be controlled by the average temperature.
- The amount of water sprayed should increase as the birds age.
- Foggers run is cycles, with the user defining the on and off times.
- Foggers functionality definitions are the same for all foggers.

To configure the foggers:

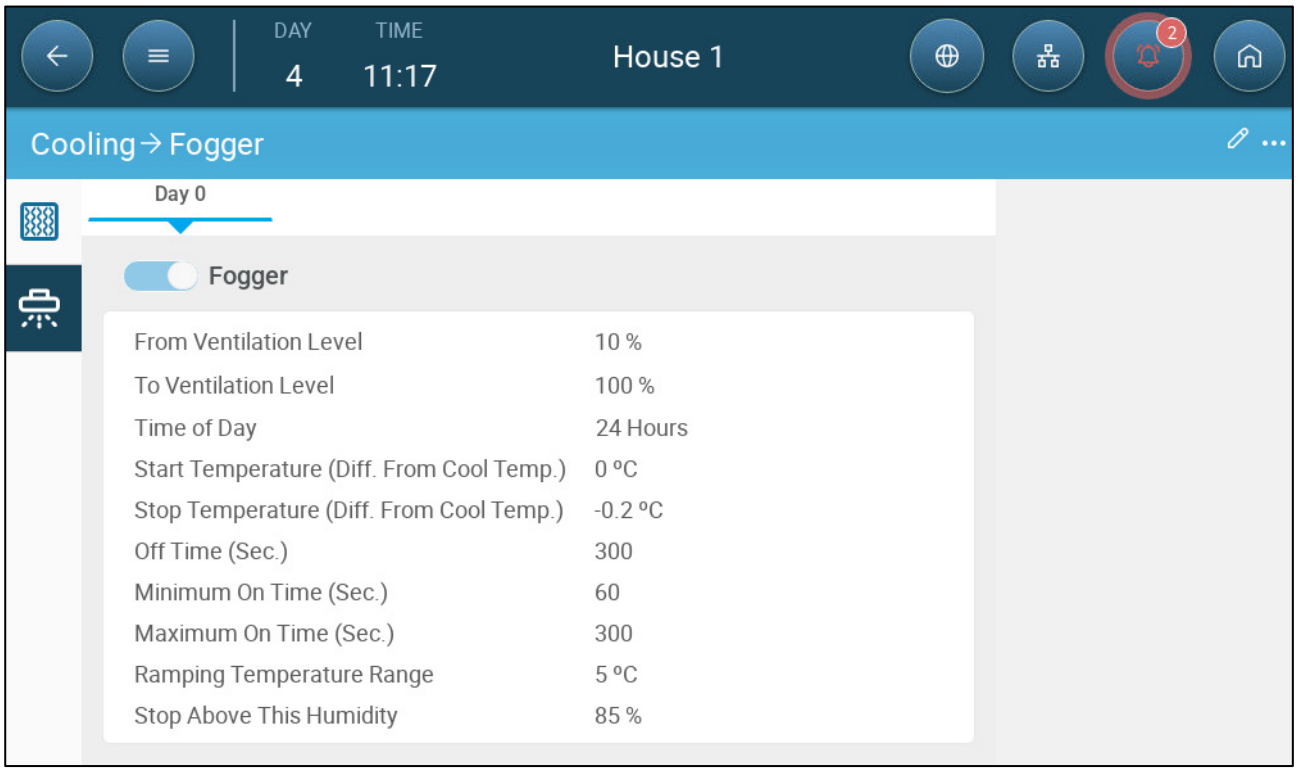
➲ **Map at least one fogger in Devices and Sensors (refer to the Installation Manual).**

1. Go to System › Temperature Definition.



2. Map the fogger(s) to specific temperature sensors or to the average temperature.

3. Go to Climate > Cooling > Foggers  .

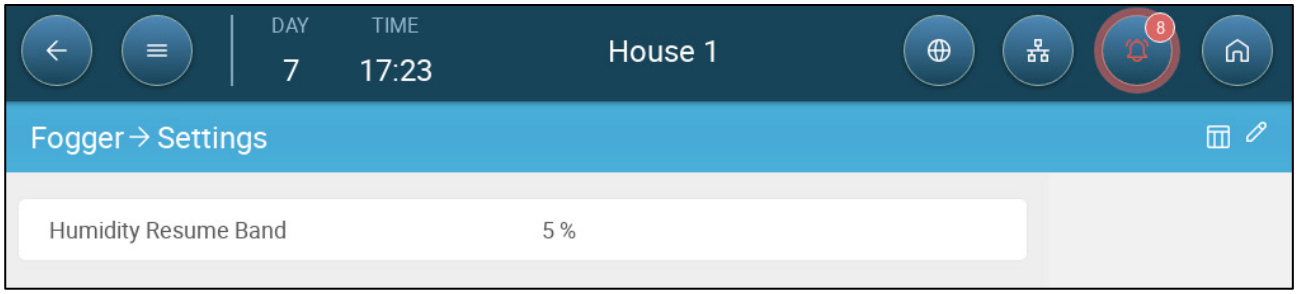


4. Define:
   - Enable or disable the foggers (all foggers are enabled or disabled together).
   - Growth days at which the settings change. Define up to four days. The foggers run at their current levels until the next defined day.
   - From/To Ventilation Level: Define the minimum and maximum ventilation levels. If Extra or Tunnel Ventilation are enabled, the maximum level can be

within these modes. Minimum level is always in Basic ventilation. Default: 10%/100%.

- Time of Day: Set the time frame during which fogger operation is possible (24H or time frames). Default: 24 hours.
- Start Temperature (Diff. From Cool Temp.): Define the temperature differential above the cooling temperature (Temperature Curve) above which the fogger starts to operate. Default: 0° F. Range: 0° - 18° F.
- Stop Temperature (Diff. From Cool Temp.): Define the temperature differential above the cooling temperature (Temperature Curve) below which the fogger ceases to operate. Default: -0.4° F. Range: -18° to -0.4° F.
- Off Time (Sec.): Define the time between fogging cycles. Default: 300 seconds. Range: 1 – 3600 seconds.
- Minimum On Time: Once the temperature rises above the Start Temperature, the fogger operates for at least this amount of time. Default: 60 seconds. Range: 1 – 3600 seconds.
- Maximum On Time: Once the fogger begins to operate, at a maximum the fogger operates for this amount of time. Trio automatically adjusts the actual on time based on the Ramping Temperature Range.
- Ramping Temperature Range (Sec.): If the temperature rises, Trio adjusts the Maximum On Time based on this parameter. Default: 9° F. Range: 0° - 17.9° F
- Stop above this Humidity: Stop fogging when the humidity level reaches this level. Default: 85%. Range: 0 – 100.
  - This parameter requires that a humidity sensor be installed. If the humidity sensor readings are invalid, this limit is disabled.
  - Based on this parameter, Trio prevents the foggers from starting an on cycle. Trio does not stop fogging midway through a cycle.

5. Go to Climate › Cooling › Foggers › Settings.



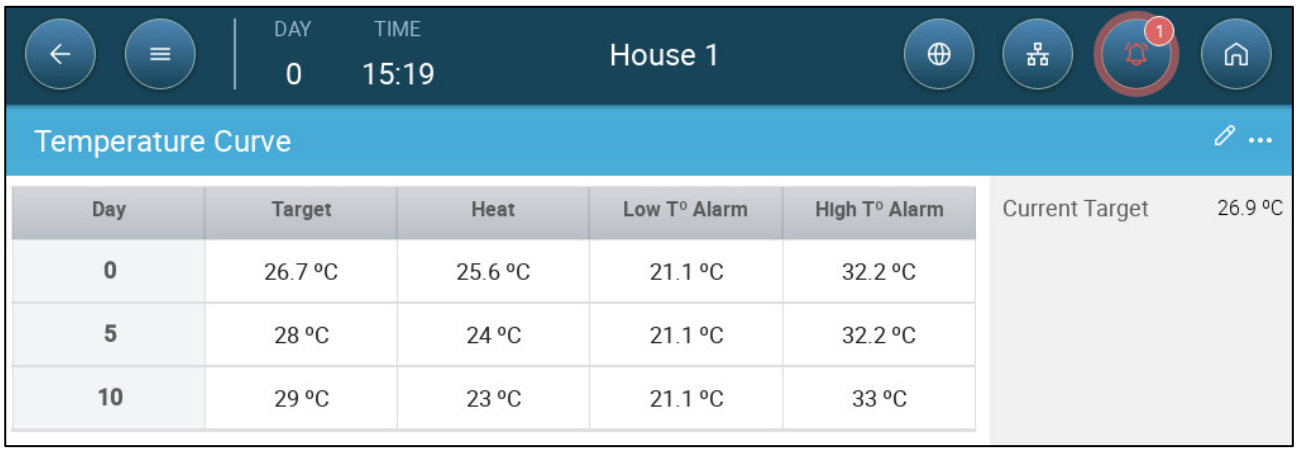
6. Define:
   - Humidity Resume Band: Before fogging can resume, the humidity must decrease from the [Stop Level] – [Resume Band]. For example, if the Stop Level is 80% and the resume band is 10%, fogging will not resume until the humidity drops to 70%. Default: 5%. Range: 2- 10%.

10 Heating Functions

- Heating Functions
- Second Stage Heating
- Central Heaters
- Zone Heaters
- Options

10.1 Heating Functions

When the temperature reaches the Heat Temperature in the Temperature Curve, heating begins and continues until the temperature rises to this point. The Heating Temperature must be lower than the Target Temperature.



Trio supports up to:

- six (6) on/off heating devices and variable heaters
- six (6) high heaters (relay controlled only)

To control the heat, TRIO has two different programs, one to maintain the target temperature in the entire house (Central Heaters) and one program that controls separate heating zones (Zone Heaters). In the case of the latter, each heater has a dedicated sensor and unique target temperature.

Trio supports on/off and 0-10V analog heaters. In additions, heaters can run in cycles.

10.2 Second Stage Heating

- What is Second Stage Heating
- How do Heaters and High Heaters Work Together?

10.2.1 What is Second Stage Heating

Second stage heating (high heating) provides additional heat beyond the main heating system. Alternatively, second stage heating employs 2-stage heater (low/high fire). The second stage heating operates when the outside weather is so cold that the standard heaters cannot maintain the required temperature.

There must be a primary heater defined for the second stage heater to operate. For example if there is one primary heater and two secondary heaters, heater #1 and high heater #1 work together; the 2nd secondary heater will not operate. Refer to the Installation Manual for more information.

10.2.2 How do Heaters and High Heaters Work Together?

Heaters and high heaters can work together or the only the heater can operate (depending on the temperature). Each unit has a separate temperature definition.

- The basic heat temperature is defined in the Temperature Curve (refer to Configuring the Temperature Curve, page 25)
- Heater and Higher Heater differentials are defined in the Heating program screen (click here for details).

The following table uses Heater 1 and High Heater 1 as models.

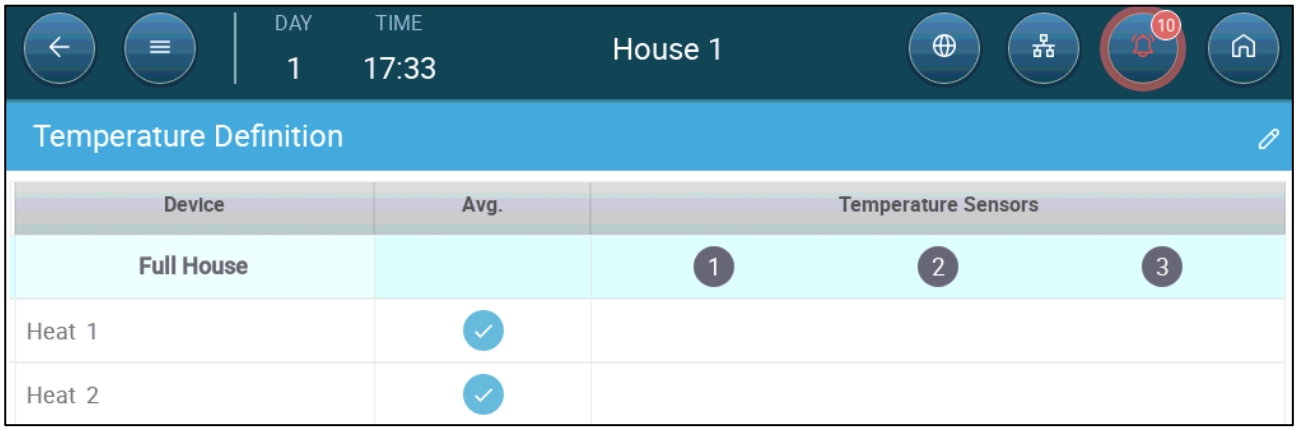
- Current Temperature:
  - Below Heat Temperature: The heater is currently on.
  - Above Heat Temperature: The heater is currently off.
  - Below High Heat Temperature: The high heater is currently on.
  - Above High Heat Temperature: The high heater is currently off.
- Heater Icons:
  -  : Both heaters are off
  -  : The heater is operating alone
  -  : Both the heater and the high heater are operating or the high heater is operating alone

NOTE When the heating method is defined as central heating, Trio displays one icon on the dashboard. When the heating method is defined as zoned heating, Trio displays an icon for each heater-high heater pair.

Heater: Current Temperature	High Heater: Current Temperature	Icon Displayed
Below heat temperature	Below high heat temperature	Both heaters are operating
Below heat temperature	Above high heat temperature	Only the heater is operating
Above heat temperature	Above high heat temperature	Neither heater is operating

10.3 Central Heaters

When using central heat, the heater output is defined by the average measured temperature of all temperature sensors.

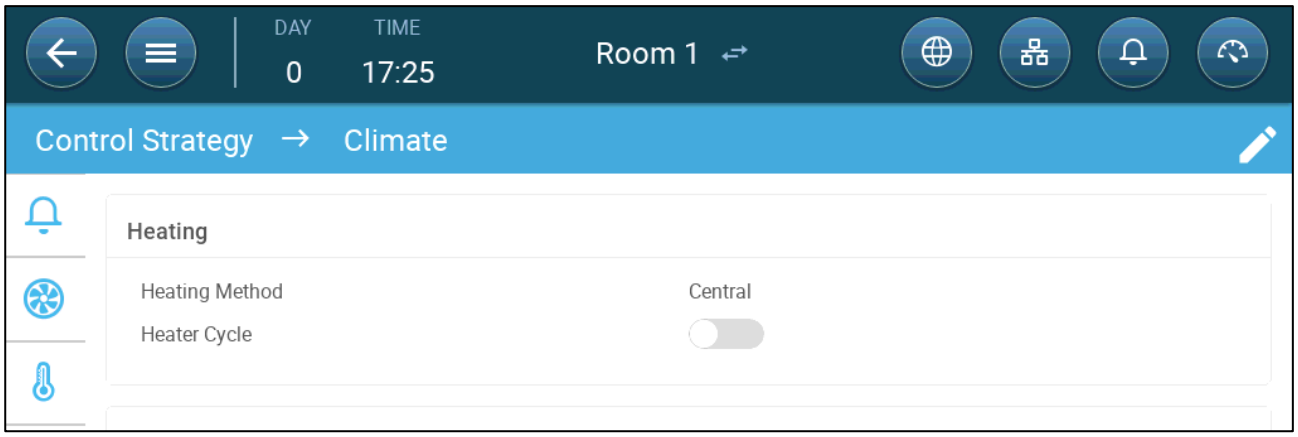


As temperature drops, Trio reduces the amount of ventilation until it provides the minimum defined amount. If the temperature goes below the target temperature, TRIO continues to run at minimum ventilation. At the same time, heating begins when the temperature drops to a user defined temperature.

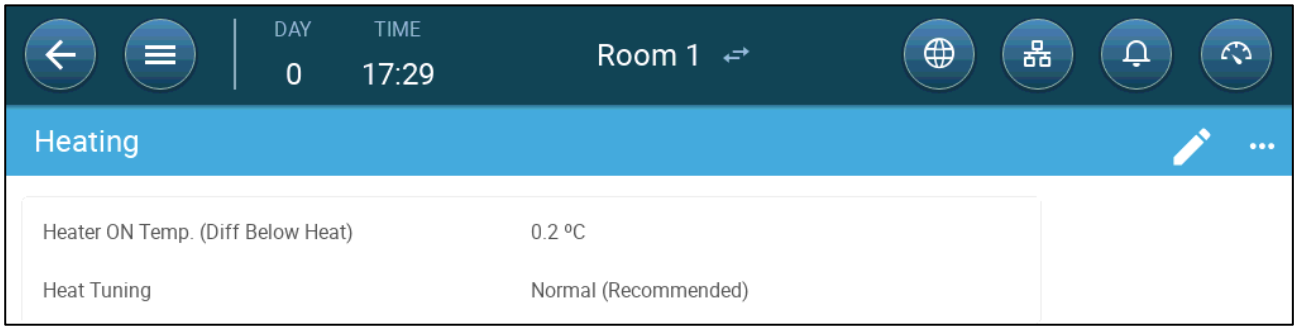
- **Define relays output ports as heaters in Devices and Sensors. Refer to the Installation Manual.**
- **In Configuring the Temperature Curve, page 25 define the Heat parameter.**
- **Configuring On-Off heaters requires mapping one fan, inlet, outlet, or tunnel door.**

To define the central on/off heaters:

1. Go to System › Control Strategy › Climate .



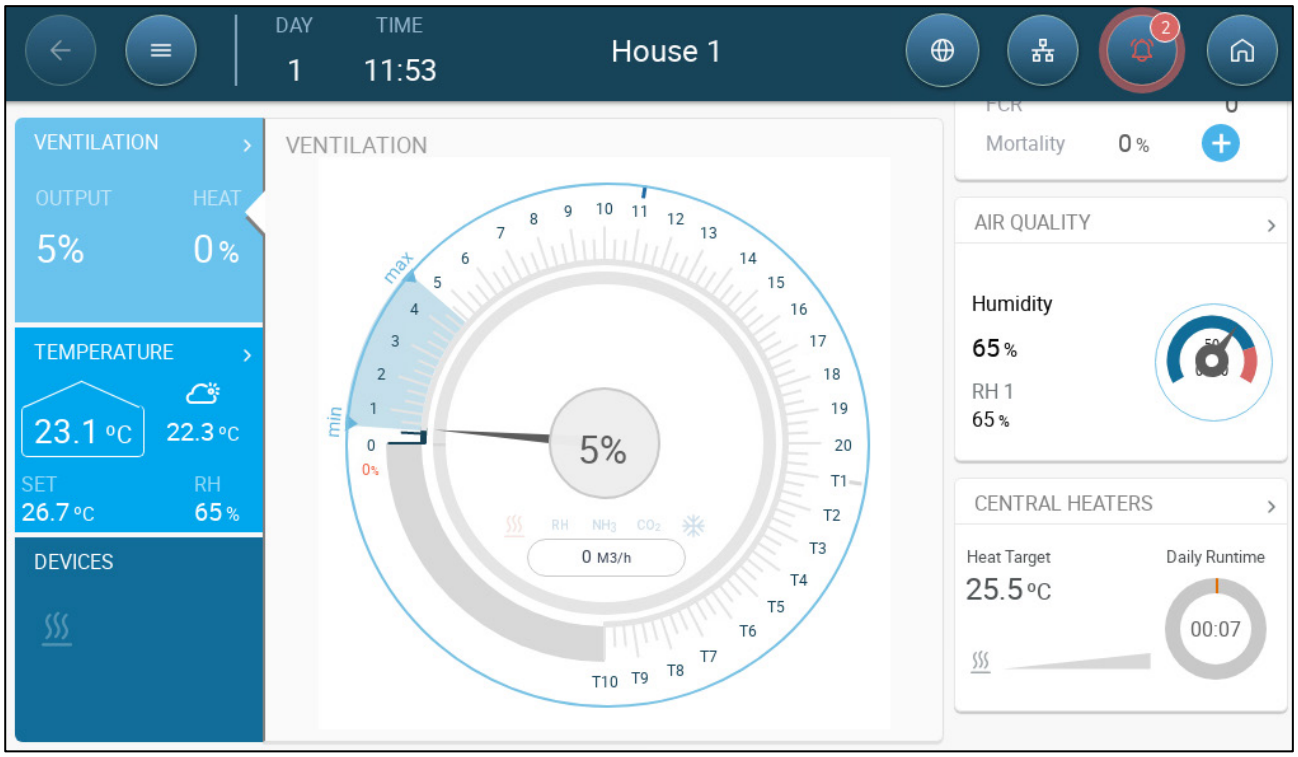
2. Define the Heating Method as Central.
3. Go to Climate › Heating.



4. Define:
    - Heater On Temp: Define the difference from the Heat target temperature at which the heaters turn on. Range: 0.2 - 5° C.
    - Heat Tuning: This parameter determines how aggressively the TRIO responds to differences between the measured temperature and the target temperature.

NOTE ***Munters*** *recommends leaving this parameter at Normal.*

- The central heaters appear on the dashboard.



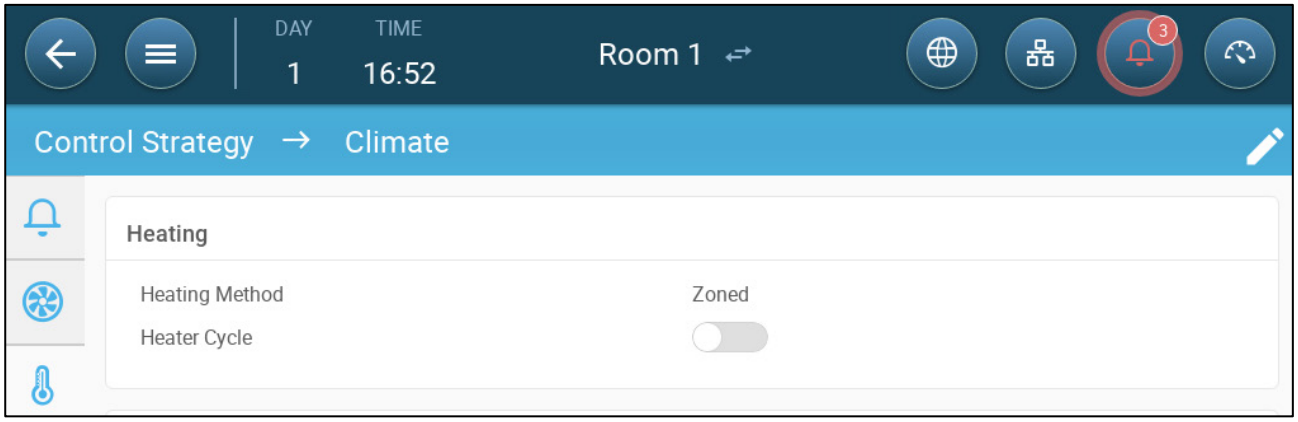
10.4 Zone Heaters

A zone is an area in the poultry house. Each zone heater can be mapped to specific temperature sensor(s) and operates according to that sensor's data output. The heat set point in the temperature curve is the same for all zones. Once a zone's heater is activated, it will work to maintain the temperature. All zone heaters work independently.

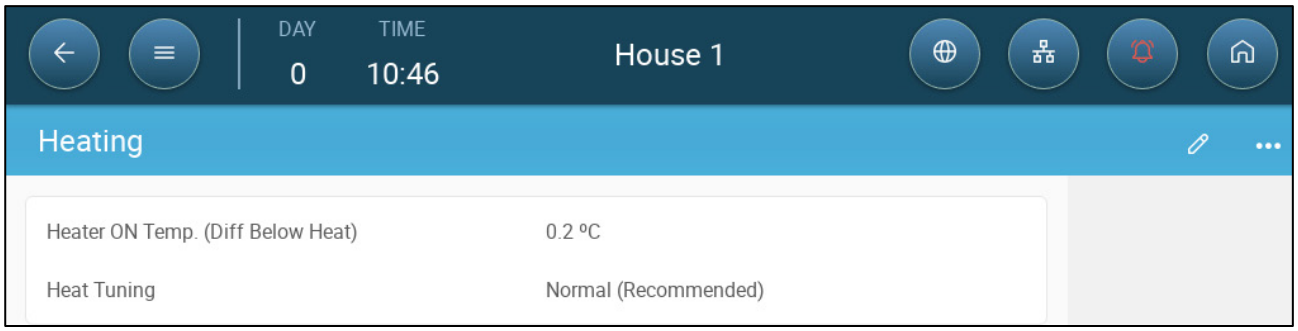
- Define relays output ports as heaters. Refer to the Installation Manual.
- In Configuring the Temperature Curve, page 25 define the Heat parameter.

To define the zoned on/off heaters:

1. Go to System › Control Strategy › Climate .



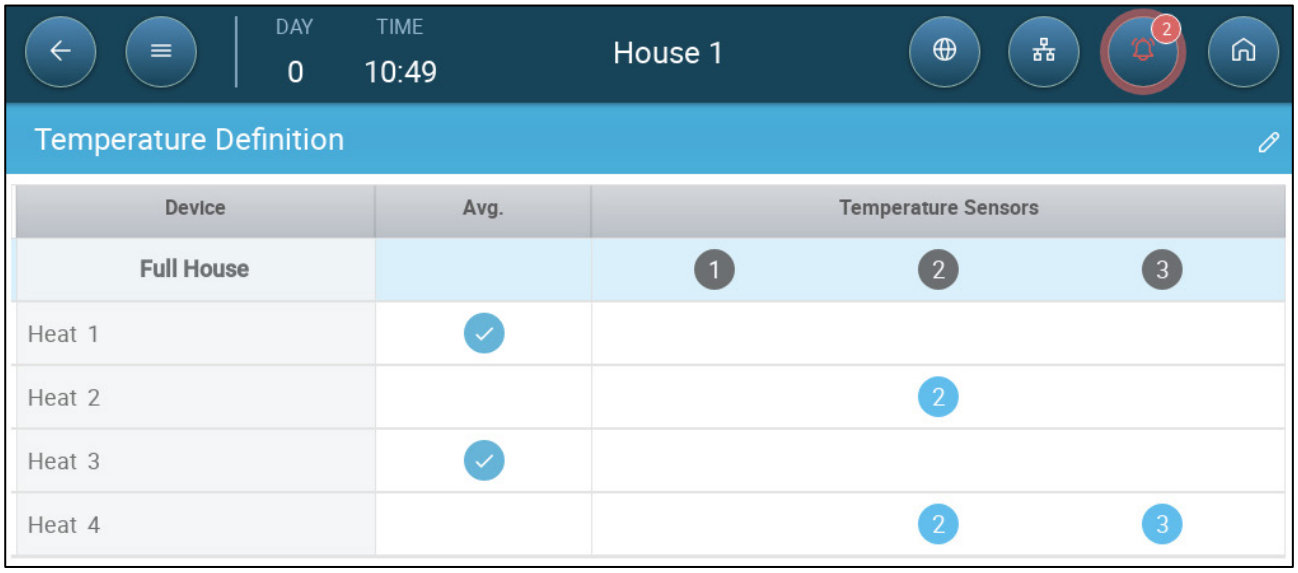
2. Define the Heating Method as Zoned.
3. Go to Climate › Heating.



4. Define:
    - Heater On Temp: Define the difference from the Heat target temperature at which the heaters turn on. Range: 0.2 - 5° C.
    - Heat Tuning: This parameter determines how aggressively the TRIO responds to differences between the measured temperature and the target temperature.

*NOTE **Munters** recommends leaving this parameter at Normal.*

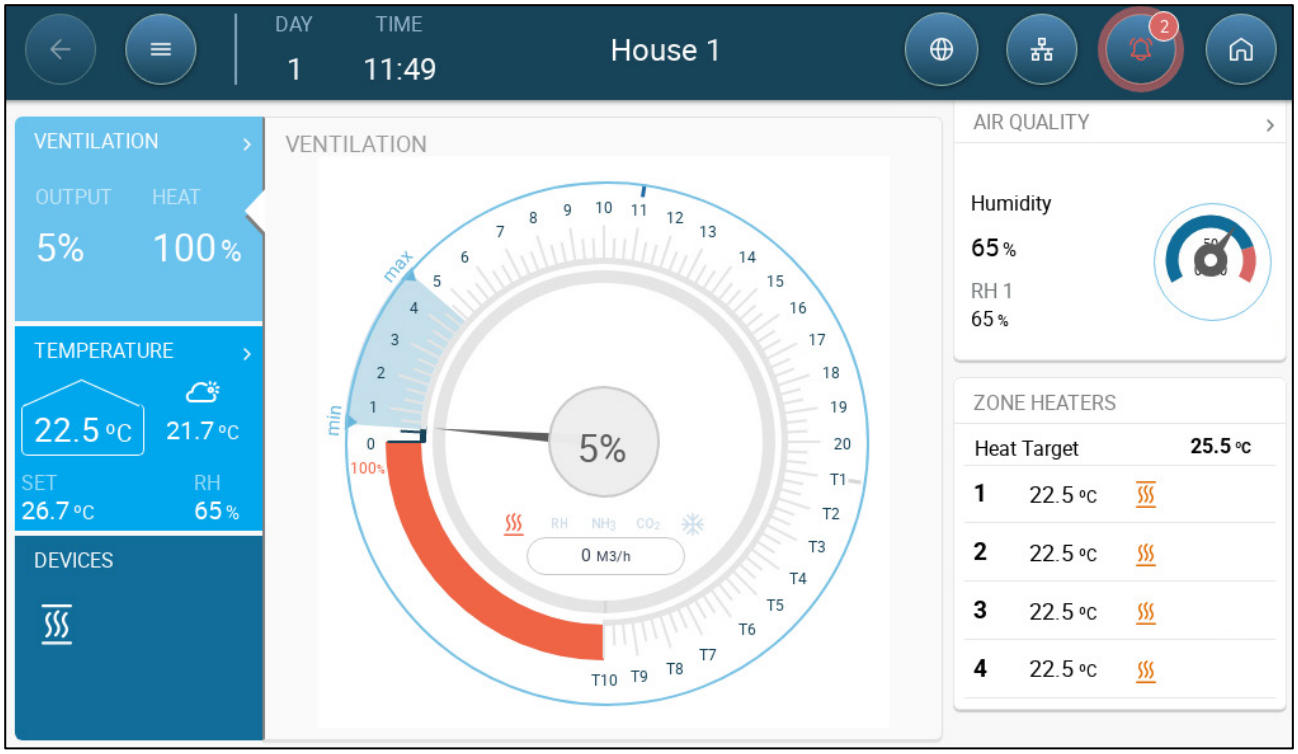
5. Go to System › Temperature Definition.



6. Map each heater to one or more temperature sensors.

NOTE Two or more temperature sensors must be defined to enable mapping devices to temperature sensors.

- The zone heaters appear on the dashboard.



10.5 Options

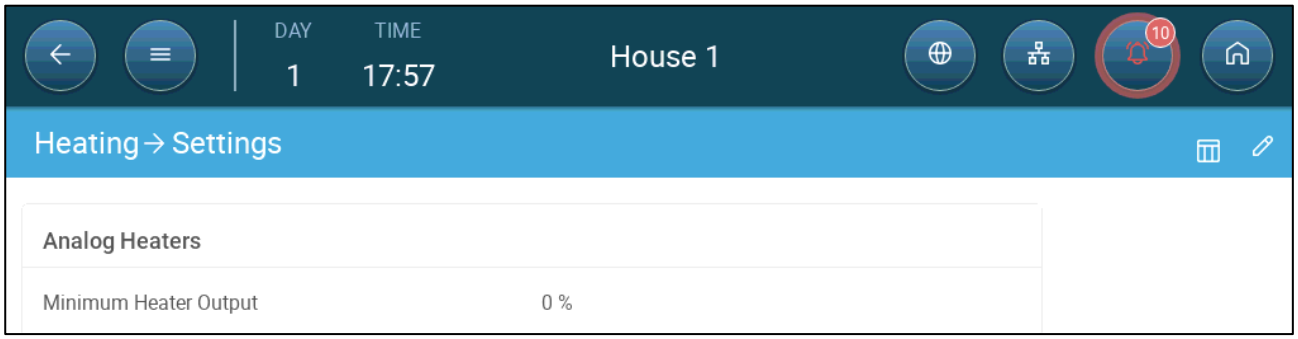
- Analogue Heaters
- Heat Cycles

10.5.1 ANALOGUE HEATERS

➲ **Define analog ports as heaters in Devices and Sensors. Refer to the Installation Manual.**

Define the analogue heaters using the same procedure as the on/off heaters. In addition:

1. Go to Climate › Heating › Settings.

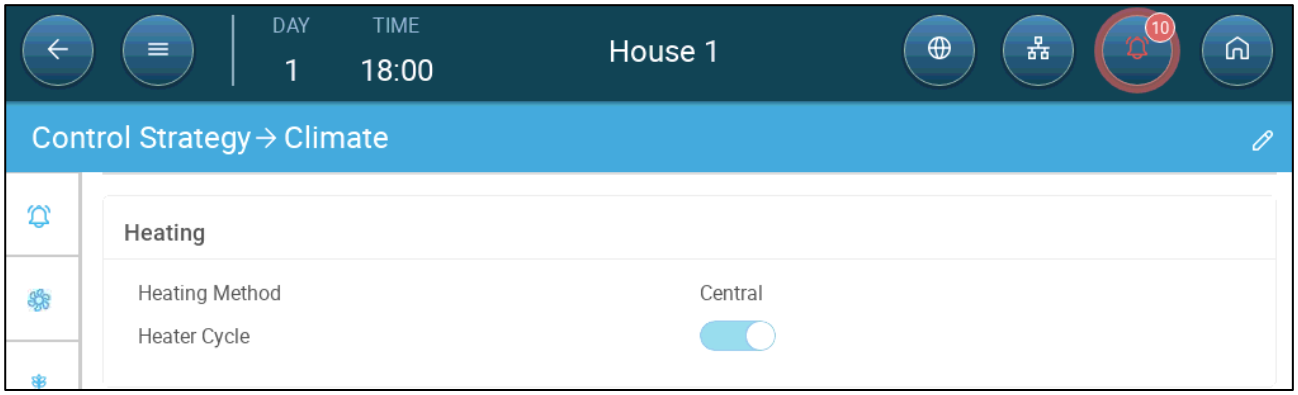


2. Define the Minimum Heater Output. Range: 0 – 100%

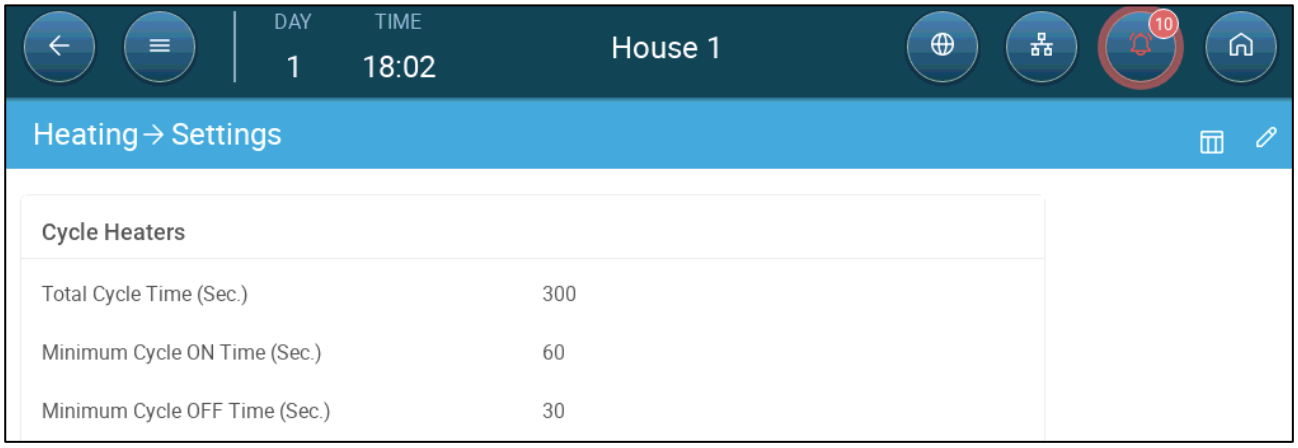
10.5.2 HEAT CYCLES

To enable running heaters in a cycle:

1. Go to System > Control Strategy > Climate .



2. Enable Heater Cycle.
3. Go to Climate > Heating > Settings.



4. Define:
   - Total Cycle Time (sec.): Range 5 – 600 seconds. Default 300 seconds
   - Minimum Cycle On Time (sec): Range 5 – 600 seconds. Default 60 seconds
   - Minimum Cycle Off Time (sec): Range 5 – 600 seconds. Default 30 seconds

11Brood Area

Chicks require extra heat during the first few weeks (8 – 14 days) of their lives. To reduce energy costs, Trio enables designating a certain area as a brooding area; that specific area can be kept extra warm. At a certain point in the chicks' growth cycle, the brooding area is expanded to the full house.

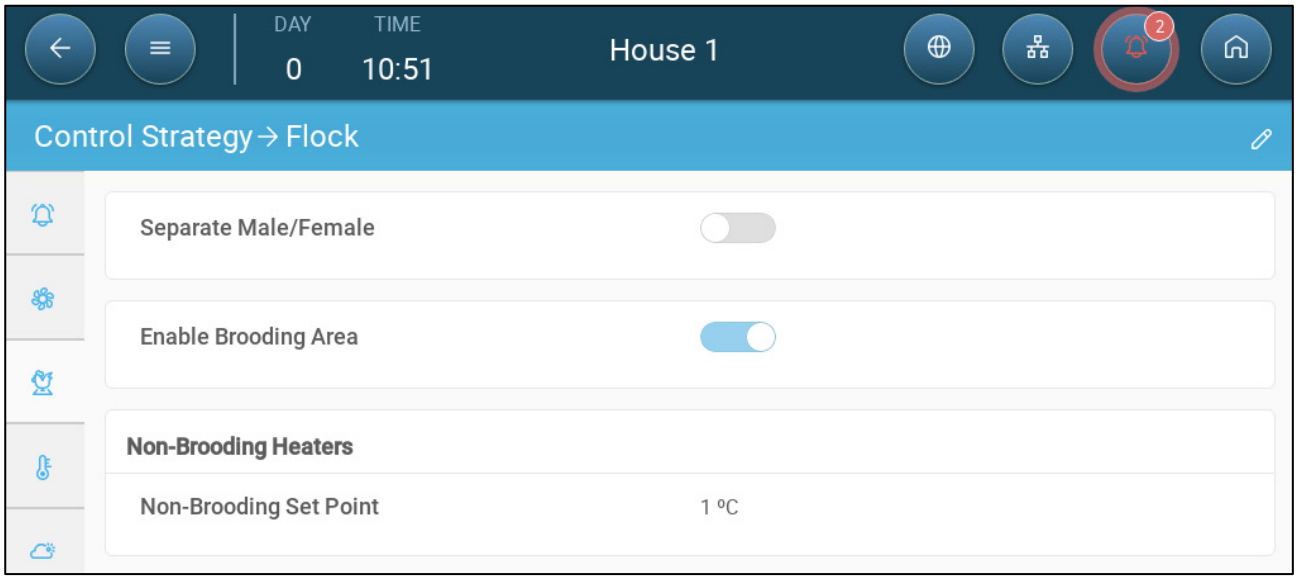
The brood area has its own temperature sensor(s) assigned to it. All devices and programs operate according to the brood area temperature sensors. However, as an option you can enable non-brood area heaters. In that scenario, those heaters operate according to the non-brood area temperature sensors and temperature set points.

Brooding affects the following screens:

- Mortality
- Bird scale settings and history
- Dashboard
- Scale Card

11.1 Version 8.3 and Below

1. Go to System › Control Strategy › Flock  .



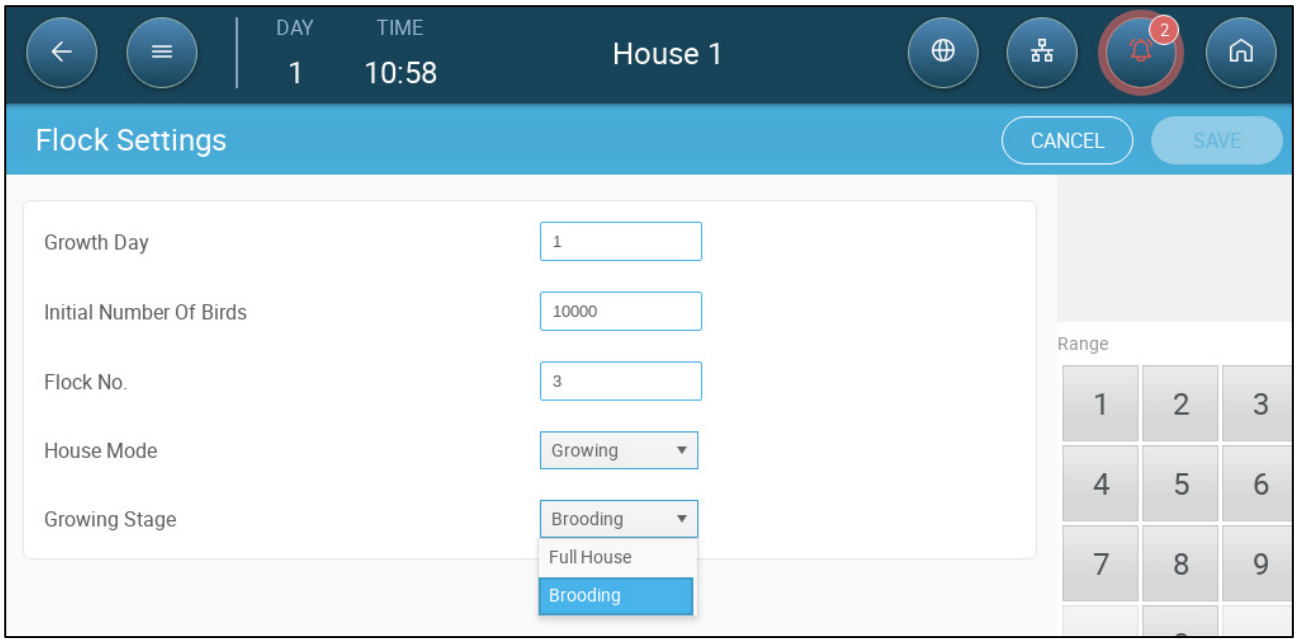
   a. Enable Brooding Area.

   b. If required, enable non-brood heaters and define the set point. These heaters are mapped to those sensors not mapped to the brooding area temperature sensors (next step). Range -40.0 to +193.9° F. Default: 32.0

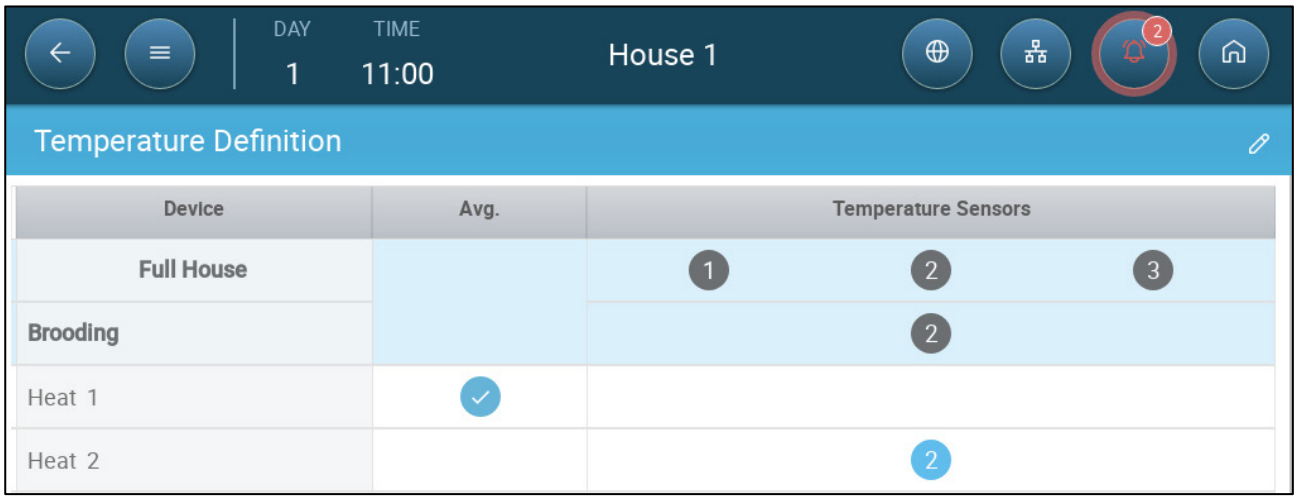
   - This function must be enabled for these heaters to operate.

2. Go to Flock › Flock Settings.

3. In Growing Stage, select **Brooding**.



4. Go to System › Temperature Definition (temperature sensors must be defined).

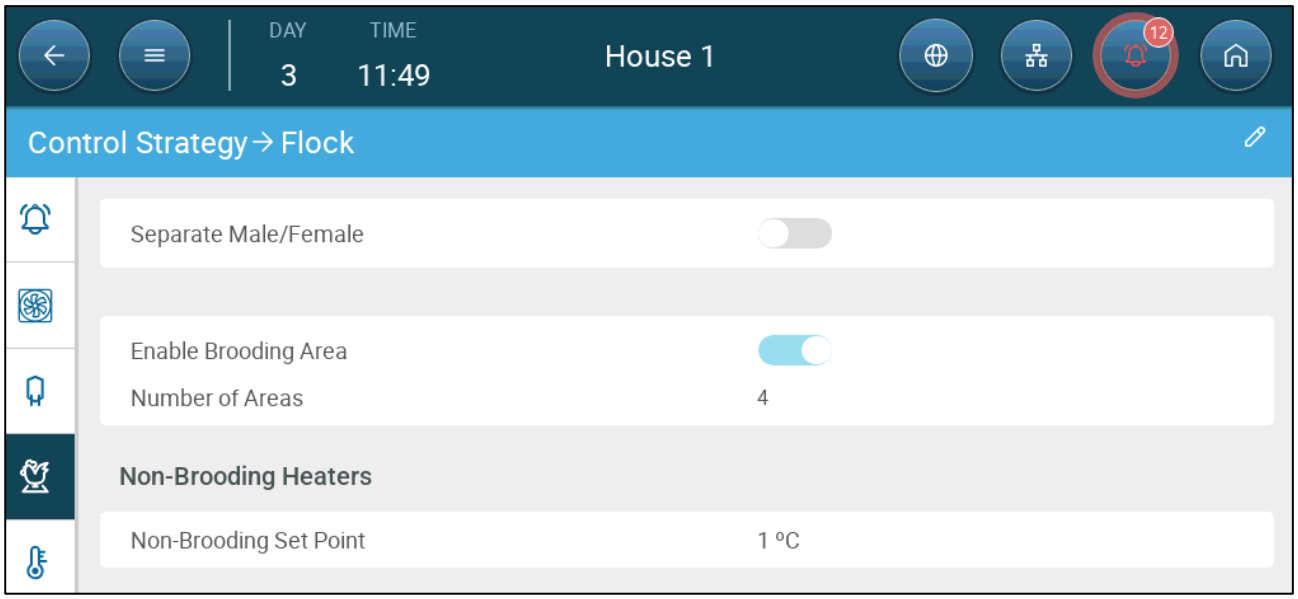


5. Map temperature sensor(s) to the brooding area.

11.2 Version 9.0 and Above

Version 9.0 supports up to five (5) brooding areas. Each area is mapped to a specific temperature sensor. If more than one sensor is assigned to a brooding area, the functionality is determined by the average temperature.

1. Go to System › Control Strategy › Flock  .



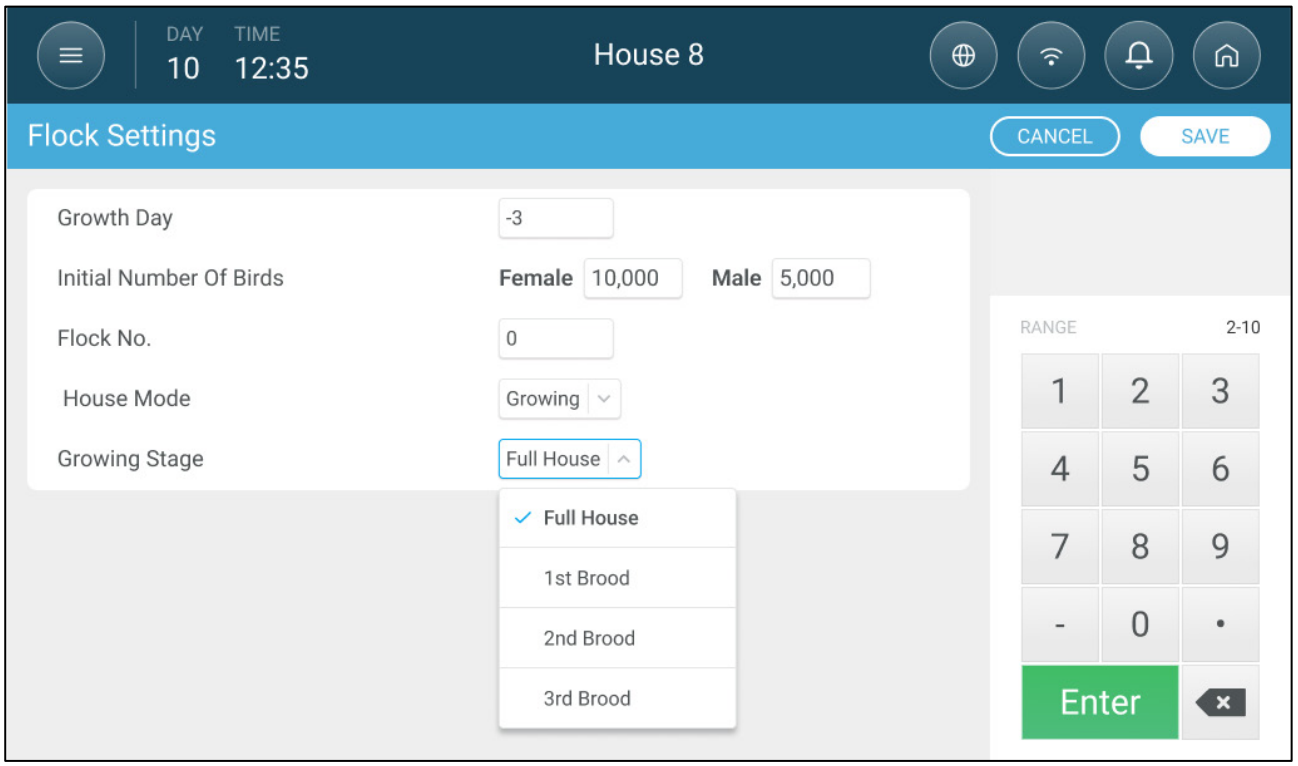
a. Enable Brooding Area.

b. Select the number of brood areas.

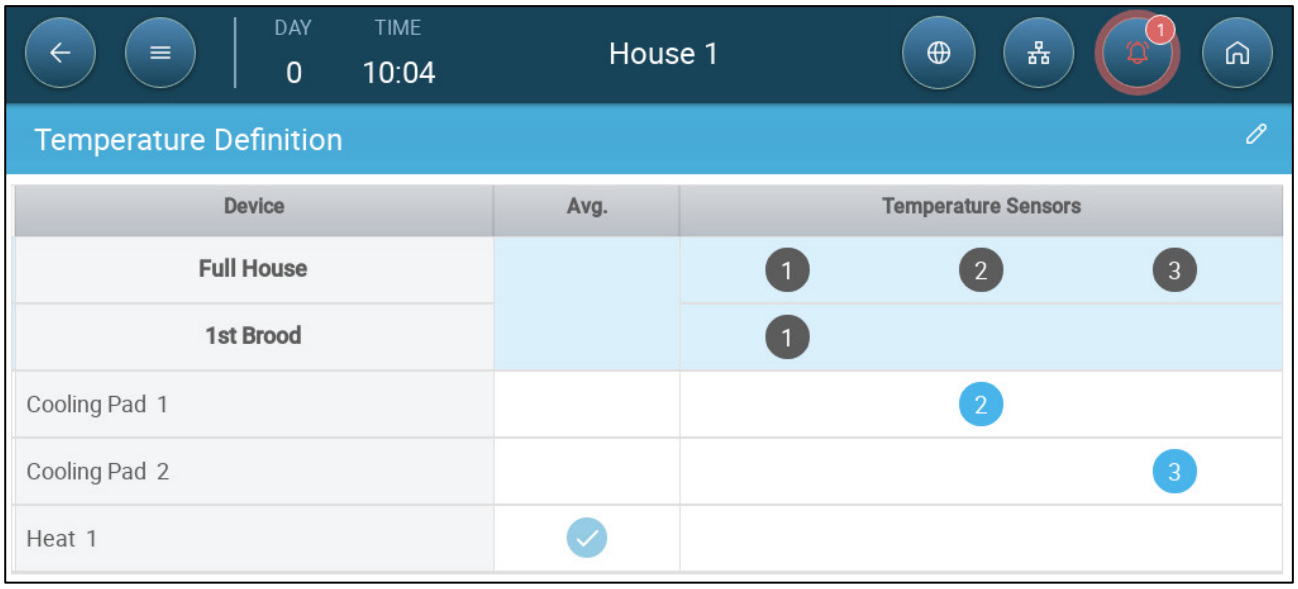
c. If required, enable non-brood heaters and define the set point. These heaters are mapped to those sensors not mapped to the brooding area temperature sensors (next step).

- This function must be enabled for these heaters to operate.

2. Go to Flock › Flock Settings.



3. Select the growing stage.
4. Go to System › Temperature Definition (temperature sensors must be defined).
5. Map each brood zone to one or more RTS-2 sensors.



12 Feed and Silo Management

- Feeding Summary
- Setting up Feeding
- Configuring the Silo
- Batch Weighing System

12.1 Feeding Summary

Feed is stored in silos located outside the chicken house. Augers transport the feed to hoppers. Sensors are installed on the augers and hoppers to ensure that the proper amount of feed is transported. Feed lines transport the feed from the hoppers to feeding pans, according to signals sent from the hoppers. Trio receives inputs from the augers and hoppers that enable controlling the feed distribution (start and stop signals). In addition, the user enable am alarm if the run time exceeds the defined parameters.

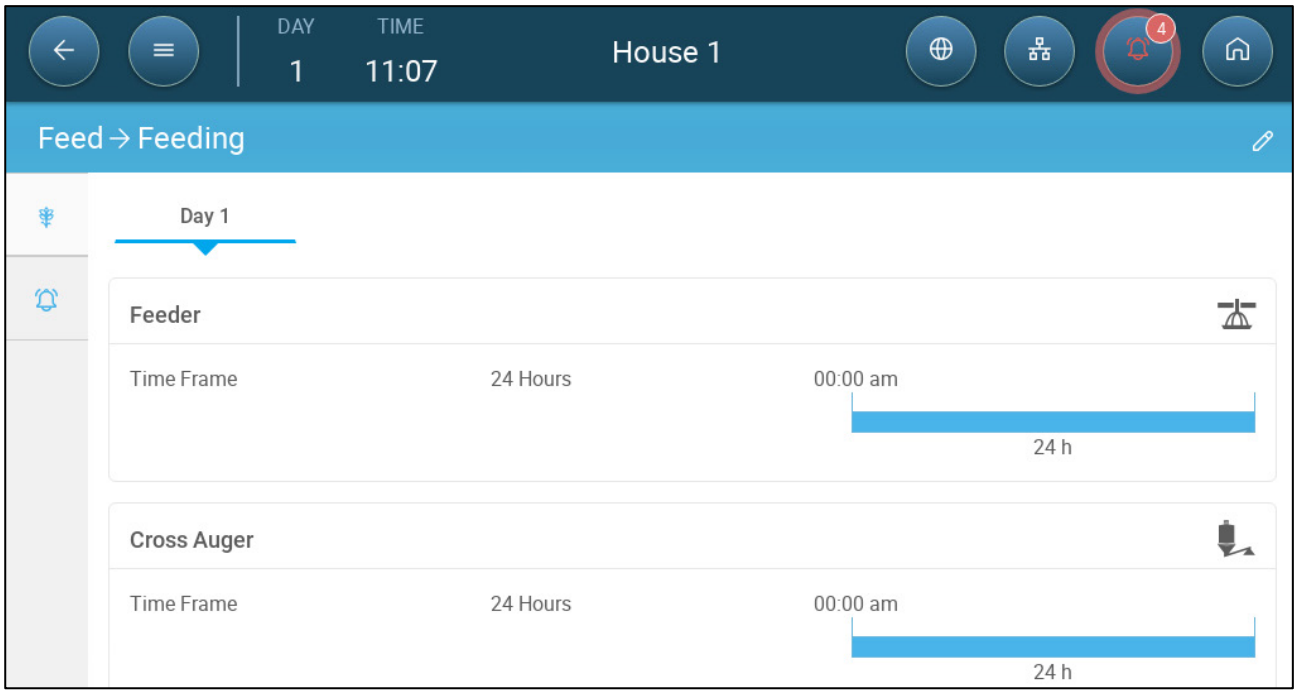
➲ **Cross auger, feeder, and silo relays must be wired, defined, and mapped.**

➲ **Auger active and feeder active digital sensors must be wired, defined, and mapped.**

12.2 Setting up Feeding

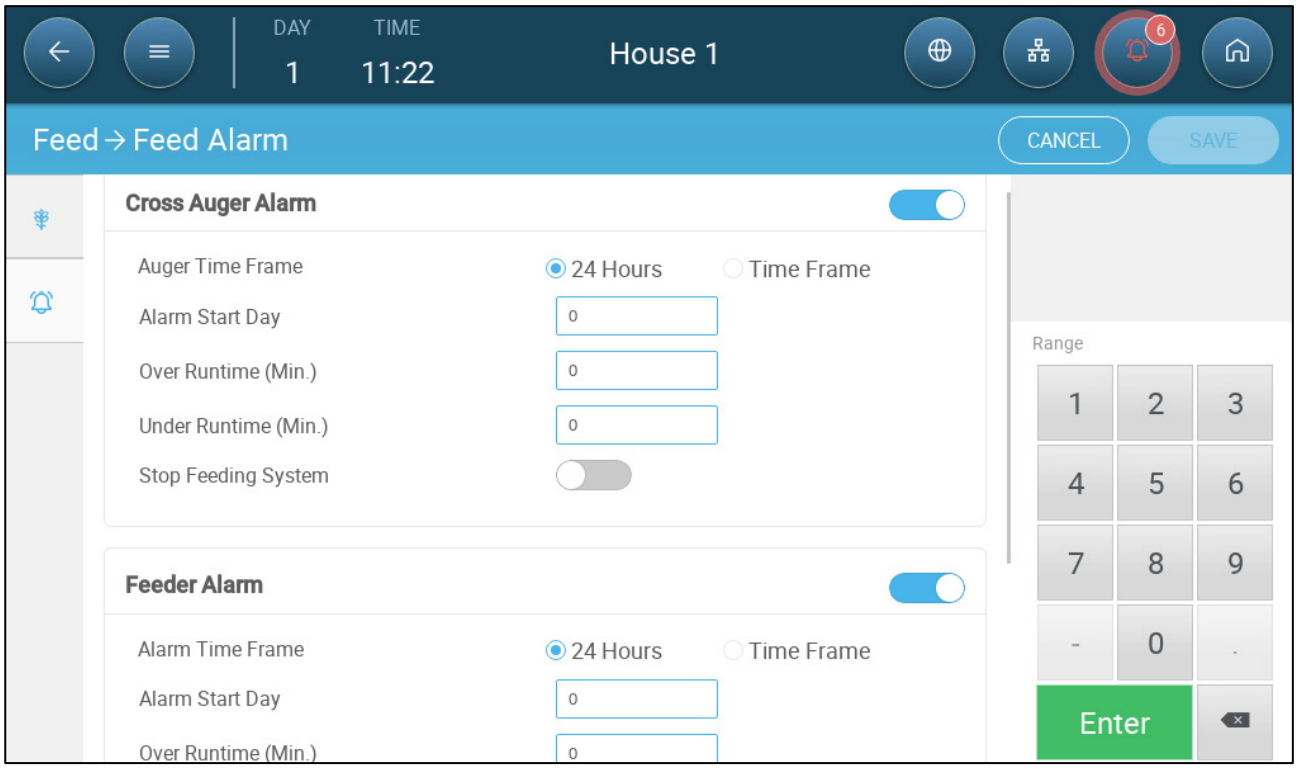
Use the Feed Screen to turn on/off augers and feeders according to the user-designed schedule. All augers operate according to the auger schedule and all feeders work according to the feeder schedule.

1. Go to Control › Feed › Feeding  .



2. Click  .
3. Define:
    - Day tab: This defines the growth day at which the program runs until the next defined day. Define up to eight days.
    - Time Frame: Define the period in which the feeders and augers are active:
        - Specific time frames define the start and stop time for each device via the input parameters.
            - Define up to eight time frames.
            - Times frames must be in consecutive order (beginning to end of the day).
            - Do not overlap time frames. If time frames are overlapped, the latter frame is ignored.
        - 24 hours a day.

4. If required, go to Control > Feed > Alarms  to set the alarms. Enable the alarms.



5. Click  and define the feeder and auger
    - Alarm Time Frame: Define the period in which the feeders and auger are active, 24 hours a day or specific time frames.
    - Alarm Start Day: The growth day on which the controller begins to send alarms.
    - Over/Under Runtime: If the feeders and auger run more or less (respectively) than these times, the controller sends an alarm.
        - Auger overtime alarm: The augers operate when the hoppers switch transmits a signal to distribute feed. The augers cease operating when hoppers are full. If the run time exceeds the user defined run time, the auger active sensor (refer to Devices and Sensors) should generate an alarm.
        - Auger under-time alarm: Under time alarms occur when the auger motor has been off for longer than the under time parameter.
        - Feeder overtime alarm: Feeders begin receiving feed when the last pan sends a signal. Feed distribution continues until the pans are full. If the feed distribution is longer than the user-defined time, the feeder active sensor should generate an alarm.
        - Feeder under time: Feeder under time defines the time required to generate an alarm when the feeder is not active.
    - Stop Feeding System: If enabled, the controller stops the feeding cycle once a cross over runtime is detected.

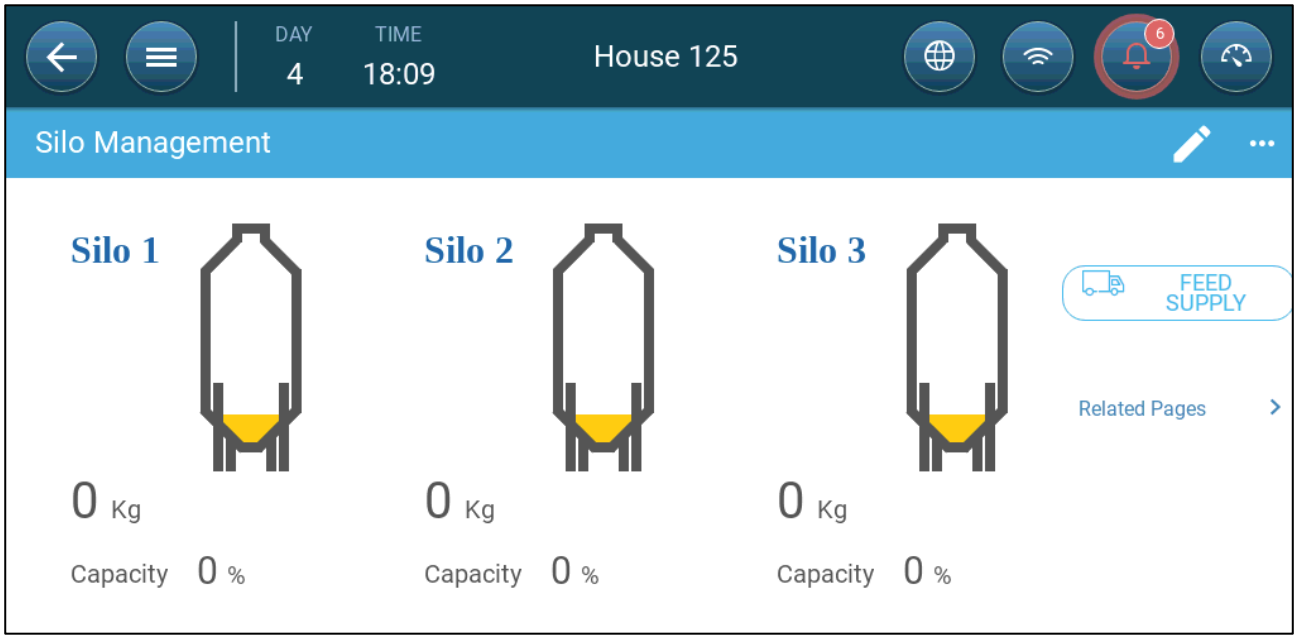
12.3 Configuring the Silo

Silo content is determined by weight using load cells attached to the silo legs.

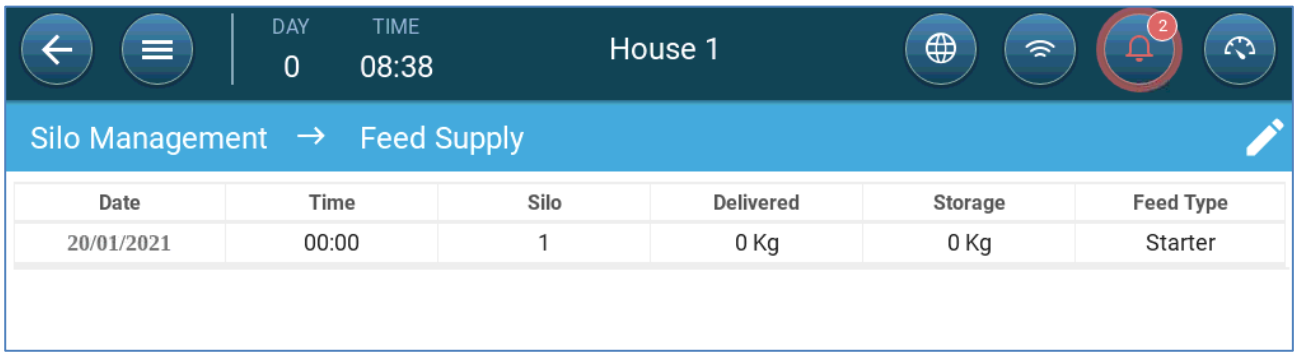
- Silo weight increases when feed is delivered
- Silo weight decreases when feed is distributed to birds

1. Go to Flock > Silo Management.

The screen displays the amount of feed remaining in each silo, in quantity and percentage of the total capacity.



2. Enter the amount of feed in each silo. Range: 0 – 50000 kgs.
3. To specify the feed type, click Feed Supply. Click Feed Type and select the type.



4. Go to Flock › Silo Management › Settings.

5. Define:
    - Minimum Filling Detection Amount: Define the minimum amount of feed to be delivered to be recorded. Range 50 – 5000 kg.
    - Silo Low Storage Alarm: Enabling this alarm allows generating an alarm when the amount of feed in the silo drops to this percentage of the capacity.

12.4 Batch Weighing System

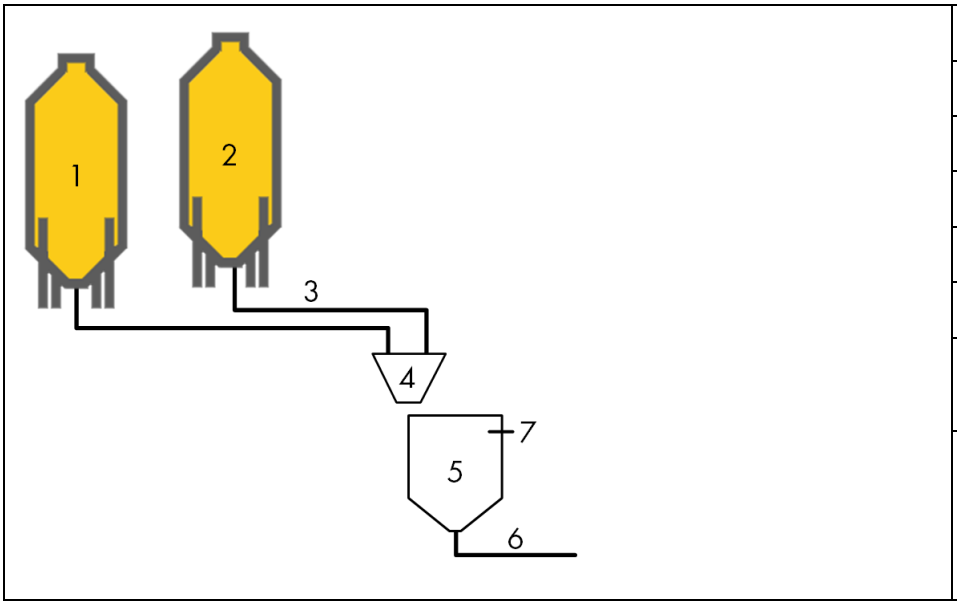
The Trio Batch Weighing System enables mixing different feeds stored in two or three silos and distributing the feed mixture to hoppers (Figure 8).

Trio supports two types of weighers:

- External batch weighers, in which defined quantities of feed are added to the mix. Each batch generates a pulse, which is transmitted to the Trio via the digital input channel.
- Electronic batch weighers, which use a load cell system to measure the feed delivered on each batch. Trio receives the data via the scale card. The user defines the batch size (weight) and the feed mixture (in percentages). This data determines how much feed each silo provides to each batch.

This system does not require silo load cells to provide data on feed distribution. However, when there are multiple systems in place, Trio automatically prioritizes the data input as follows:

- Batch weighers
- Silo
- Cross auger (time)



Number	Name
1	Silo 1
2	Silo 2
3	Silo Augers
4	Batch Bin
5	Hopper
6	Cross Auger
7	Batch Hopper Limit sensor

Figure 9: Batch Weighing System

➲ **Refer to the Installation Manual for details on installation, wiring, and calibration.**

12.4.1 Electronic Batch Weighing

Batch weigher load cells measure the quantities of the feeds placed into the bin. The batch weight is measured during the filling process to ensure accurate ingredient weight data. Over time, Trio learns how much time is needed between transmitting the stop signal and actually stopping the augers.

After filling the batch bin, Trio releases a valve, emptying the feed into the batch hoppers. The mixing process continues until the hopper is filled and a signal is sent.

As an option the batch quantity can be delivered in cycles (improving the ingredient mixing).

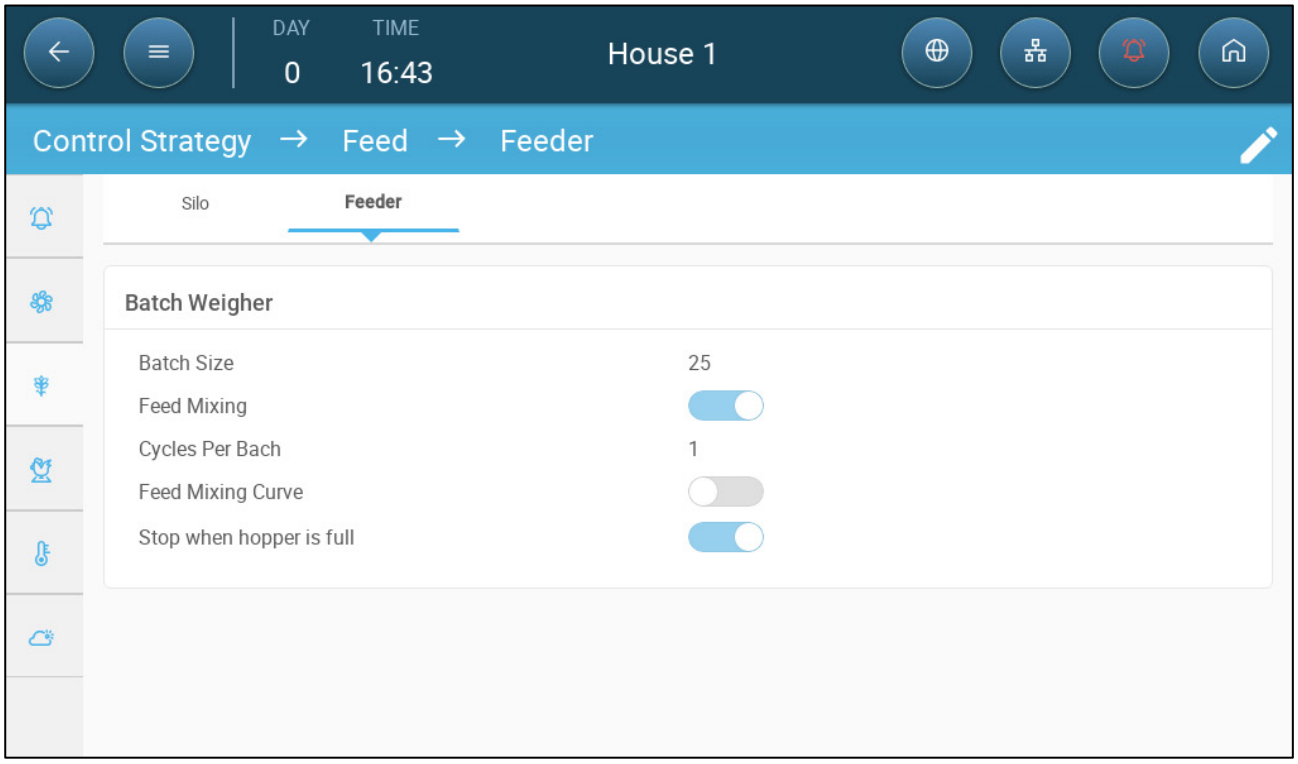
- Configuration
- Dashboard
- Pausing Batching Mixing and Feed Mixing

12.4.1.1 Configuration

NOTE The following configuration process is used for Electronic Batch Weighing installations only. External batch weighers do not require configuration.

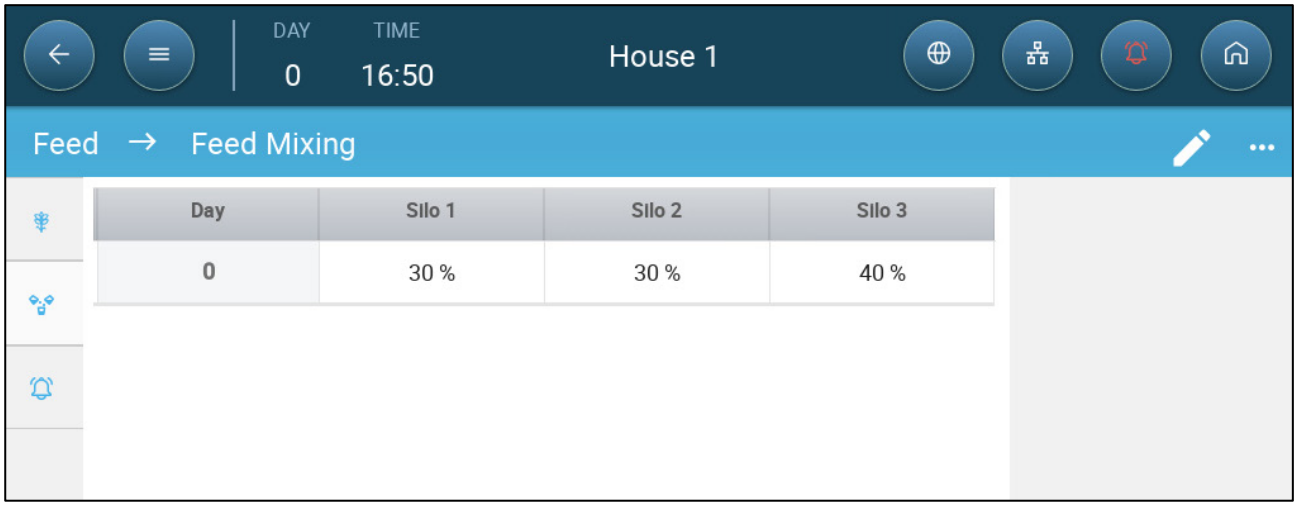
➲ **Silos and silo augers must be mapped.**

1. Go to System › Control Strategy › Feed › Feeder. This screen defines the feed mixing functions.



2. Define:
   - Batch Size: Define the batch quantity (per cycle). Range: 0 – Batch Bin Capacity (refer to the Installation Manual).
   - Feed Mixing: Enable/disable feed mixing. Feed mixing must be enabled for other configuration screens to appear and for the batch weigher icon to appear on the dashboard.
   - Cycles Per Batch: Trio can divide each batch into sub-batches. This parameter defines how many sub-batches there are in each batch. The quantity of each feed type in each cycle is determined by this number. Range: 1 – 6.
   - Feed Mixing Curve. This parameter enables increasing the amount of feed between growth days proportionally.
   - Stop When Hopper is Full: Define if the batch bin is emptied or left full when the hopper has been filled.

3. Go to Control › Feed › Feed Mixing  .

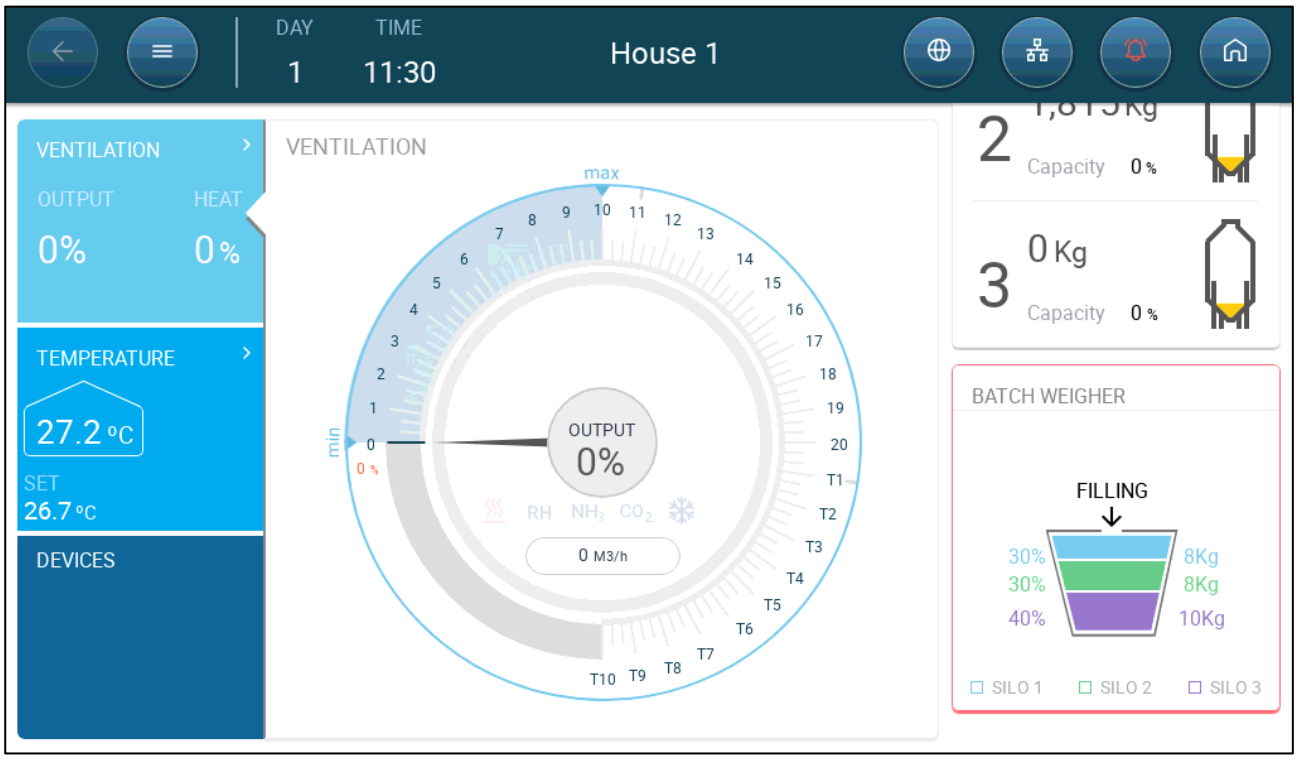


4. Define:
   - Day: Growth days at which proportions change.
   - Silo 1/2/3: Enter the percentage of the feed mix that each silo supplies. **The total must add up to 100%.**
     Example: If there are two cycles per batch, Silo 3 supplies 20% in each cycle, Silo 1 and 2 supply 15% in each cycle.

NOTE Mixing always begins with the silo proving the largest amount of feed (Silo 3 in the screen above).

12.4.1.2 Dashboard

After configuring the various parameters, Batch Weighing appears on the Dash Board.

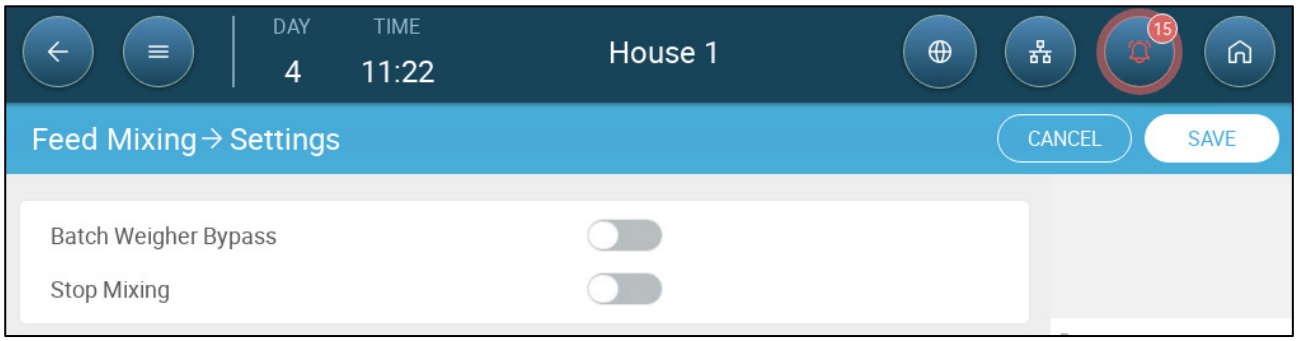


The graphic shows:

- The number of silos
- The feed quantities in percentages and weight (25 kg in this example)
- Which silo auger is active
- If the batch weigher valve is active (open)

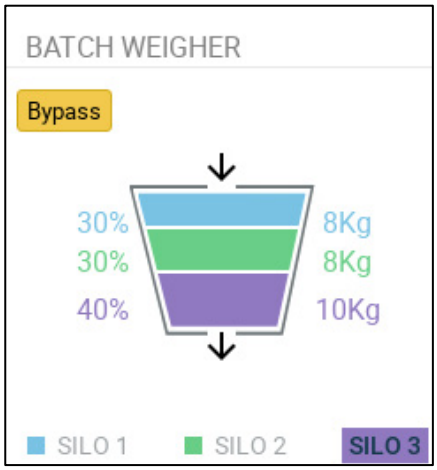
12.4.1.3 Pausing Batching Mixing and Feed Mixing

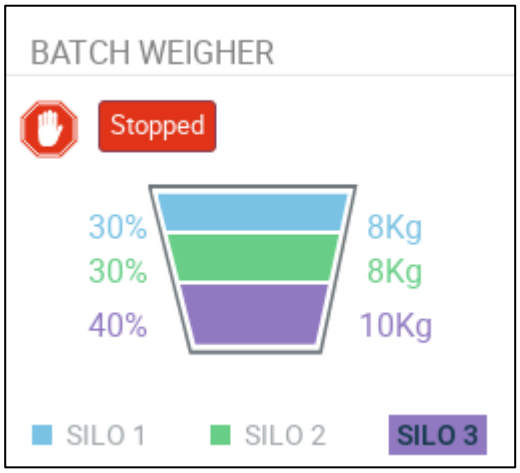
1. Go to Settings.



2. Define:
    - Batch Weigher Bypass: Enabling this function bypasses the bin weight during the feeding process. If enabled, you must confirm the selection. This function negates the weighing functions, cancels any cycles, and distributes feed according to time.
    - Stop Mixing: This function manually stops (and restarts) the feed mixing system. If enabled, you must confirm the selection.

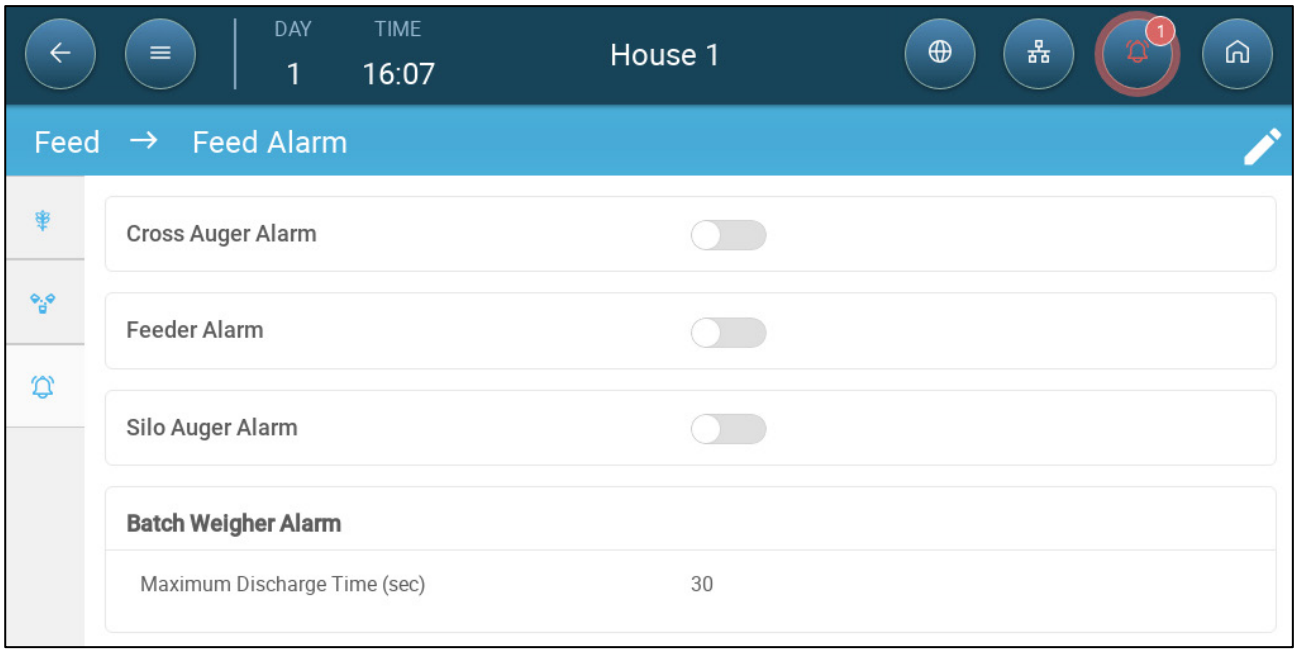
If either of these options is chosen, the Dashboard displays the option.





12.4.2 Batch Weigher Alarms

1. Go to Control › Feed › Alarms .



NOTE Only mapped systems appear on this screen.

2. Click and define the cross auger, feeder, and silo auger alarm parameters:
    - Cross Auger Alarm: Define:
        - The period in which the auger alarms are active, 24 hours a day or specific time frames.
        - Over Runtime: The augers operate when the hoppers switch transmits a signal to distribute feed. The augers cease operating when hoppers are full. If the run time exceeds the user defined run time, the auger active sensor should generate an alarm.
        - Auger under-time alarm: Under time alarms occur when the auger motor has been off for longer than the under-time parameter.
        - Stop Feeding: If enabled, feeding stops when overtime or undertime alarms are detected.
    - Feeder Alarm. Define:
        - The period in which the feeder alarms are active, 24 hours a day or specific time frames.
        - Feeder overtime alarm: Feeders begin receiving feed when the last pan sends a signal. Feed distribution continues until the pans are full. If the feed distribution is longer than the user-defined time, the feeder active sensor should generate an alarm.
        - Feeder under time: Feeder under time defines the time required to generate an alarm when the feeder is not active.
    - Silo Auger Alarm. Define:
        - Over Runtime (Min): Trio generates an alarm when the silo auger provides too much feed to the hoppers.

        - Stop feeding System: If enabled, the controller stops the feeding cycle once a cross over runtime is detected.
    - Batch Weigher Alarm. Define:
        - Maximum Discharge Time: Set maximum time that it takes for the feed to be released from the bin before sending an alarm.

13 Water Control

- Introduction to Water on Demand
- Setup
- Flushing the Drinking Lines

13.1 Introduction to Water on Demand

- How is Water Pressure Measured
- Water Program Control
- Water Pressure Units

13.1.1 How is Water Pressure Measured

Trio controls water pressure at two levels:

- A WOD Pro 0 – 10V device controls the water pressure.
- A water pressure (analog) sensor measures the actual pressure, providing feedback to the system.

13.1.2 Water Program Control

The WOD program can be managed according to:

- Trio's Light program.
- User-defined time schedule.

13.1.3 Water Pressure Units

Trio measures water pressure in either metric or imperial units. Water pressure to the control room is measured in bars or PSI. Water pressure in the actual drinking lines is measured in centimeters-water or inch-water.

To select the units, go to System > General Settings > User (refer to Defining the Preferences, page 13).

13.2 Setup

The following section details how to set up the WOD, according to the options chosen. Control can be via relays (WOD) or a sensor (WOD Pro). In addition, Trio controls the program according to time or the light program.

NOTE Pressure must increase during the growth cycle.

- WOD Relay Control
- WOD Pro 0 – 10 Volt Control

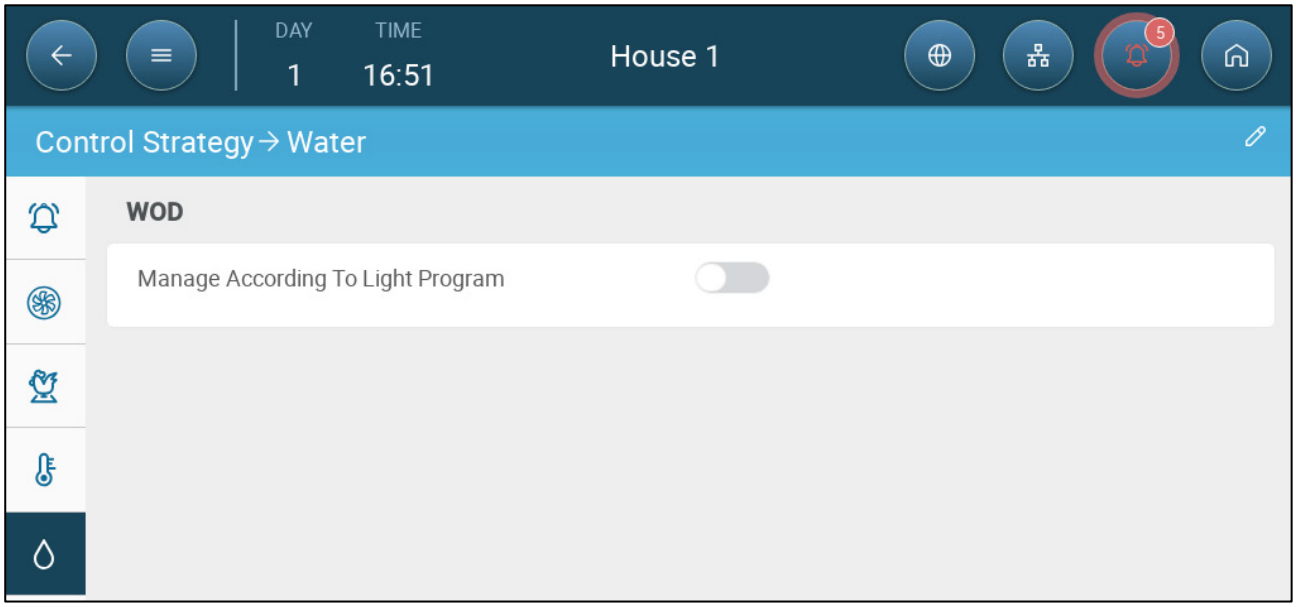
13.2.1 WOD Relay Control

➲ **In Devices and Sensors, define 1 – 3 relays as WOD. Refer to the Installation Manual.**

- WOD - Time Control
- WOD - Light Control

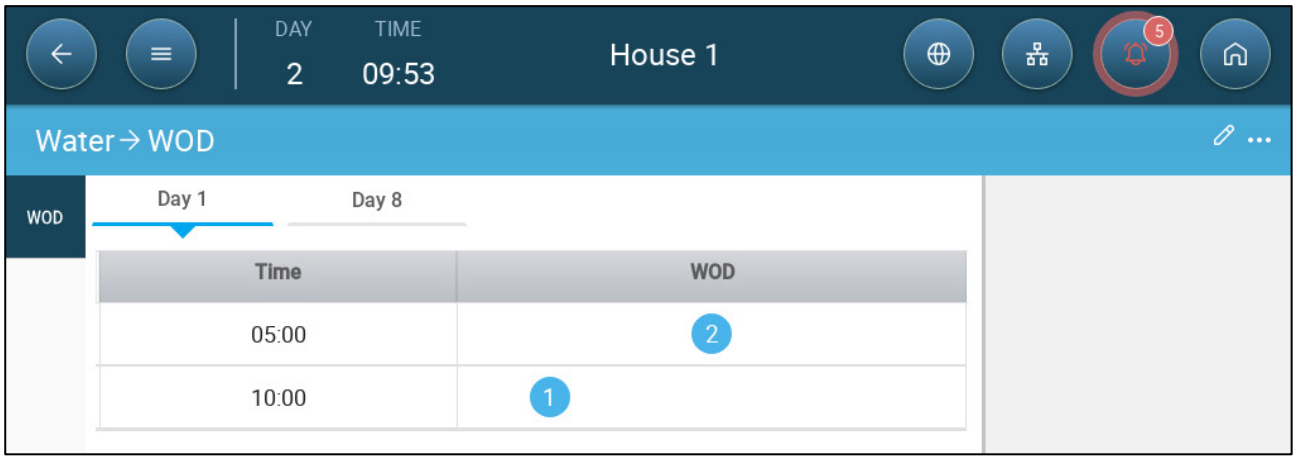
13.2.1.1 WOD - Time Control

1. Go to System › Control Strategy › Water.



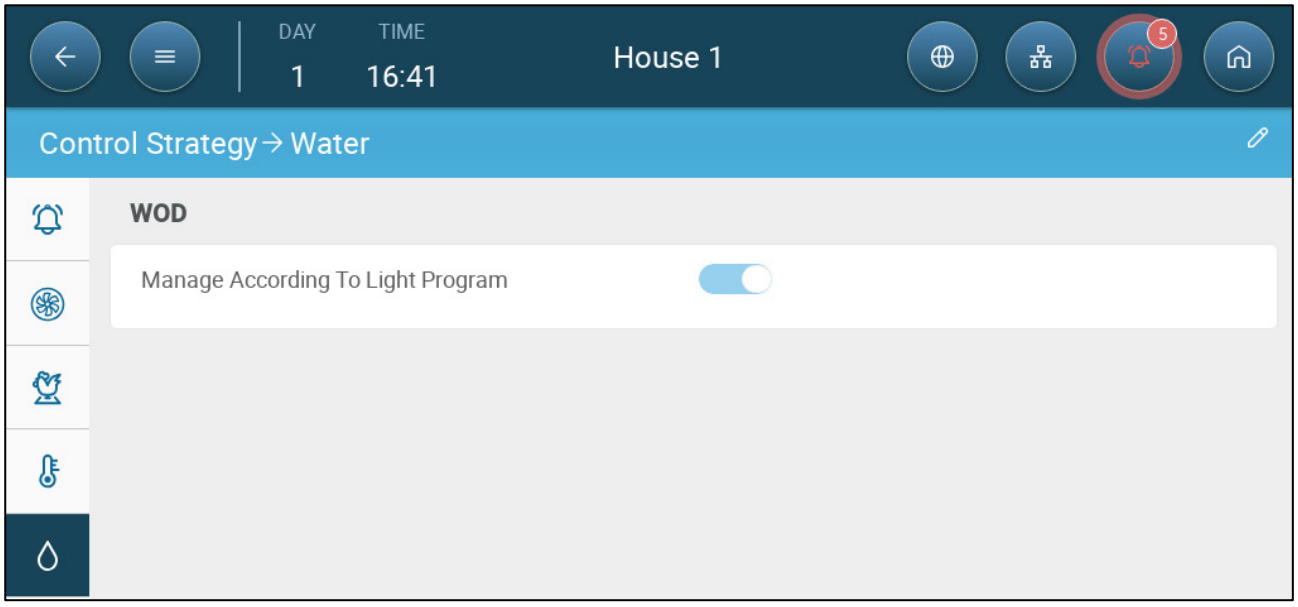
2. Verify that the option is disabled.
3. Go to Control › Water › WOD.

4. Click  .
5. Define the growth day, the start times, and the relays used to control the pressure.
6. Add a tab for each growth day and define the parameters.



13.2.1.2WOD - Light Control

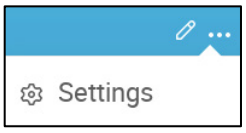
1. Go to System › Control Strategy › Water.



2. Enable **Manage According To Light Program**.
3. Go to Control › Water › WOD.

4. Click  .
5. For each growth day, define the relay(s) used during the following times:
    - Light times: Period when lighting is on.
    - Dark Time: Period when lighting is off.

- Boost Time: These are the times when water consumption is increased. These periods are defined in the settings.

6. Go to 

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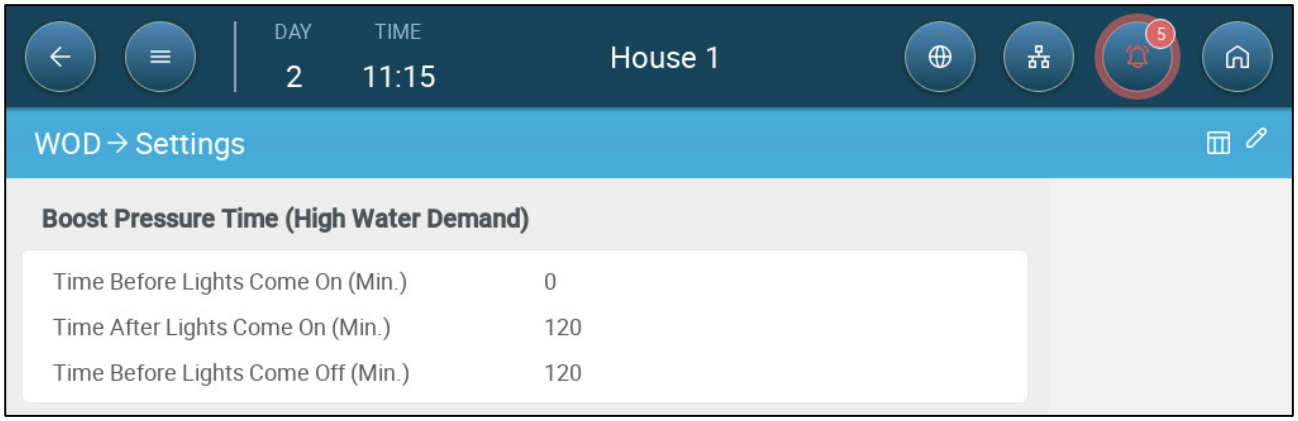


7. Define:
   - Time Before Lights Come On: Define the number of minutes that pressure is increased before the lights come on. Default: 0. Range: 0 – 300.
   - Time After Lights Come On: Define the number of minutes that pressure is increased after the lights come on. Default: 120. Range: 0 – 300.
   - Time Before Lights Come Off: Define the number of minutes that pressure is increased after the lights turn off. Default: 120. Range: 0 – 300.

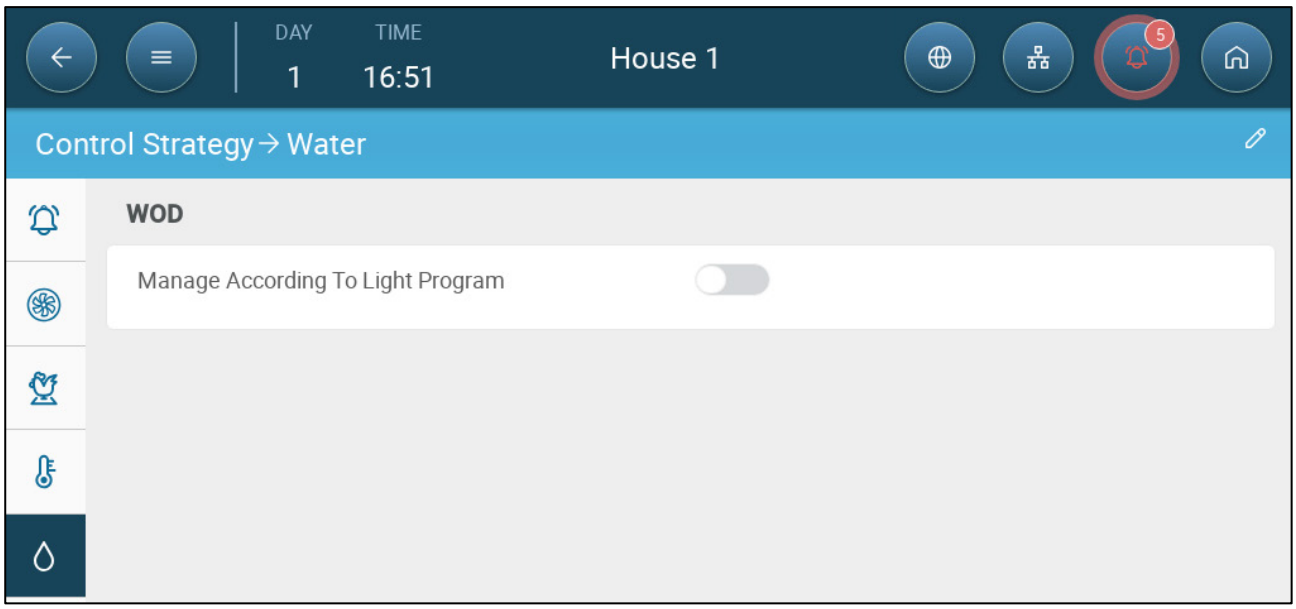
13.2.2 WOD Pro 0 – 10 Volt Control

➲ **In Devices and Sensors, define one analog port as WOD Pro. Refer to the Installation Manual.**

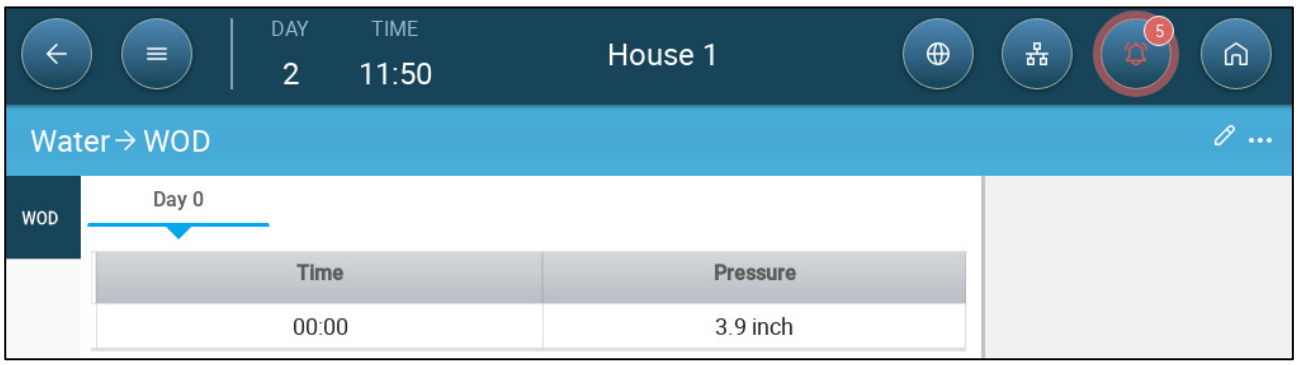
- WOD Pro - Time Control
- WOD Pro - Light Control
- WOD Pro Pressure Alarms

13.2.2.1WOD Pro - Time Control

1. Go to System > Control Strategy > Water.



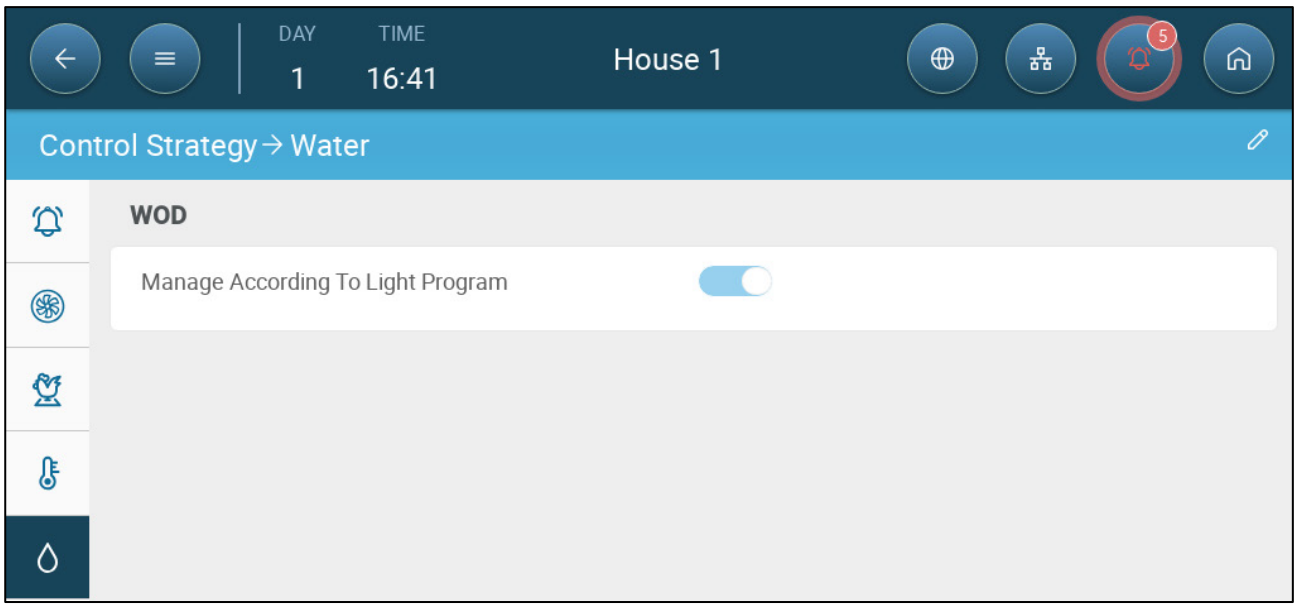
2. Verify that the option is disabled.
3. Go to Control > Water > WOD.



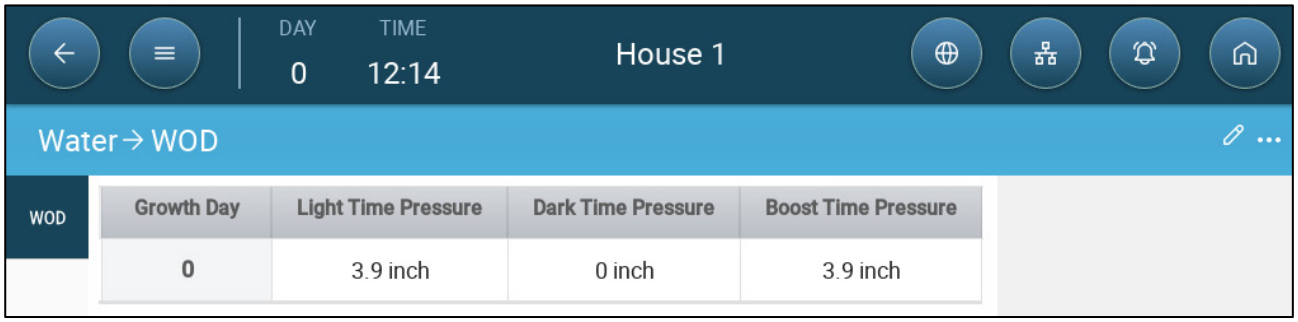
4. Click  .
5. Define the growth day, the start times, and the drinker line pressure.
6. Add a tab for each growth day and define the parameters.

13.2.2.2 WOD Pro - Light Control

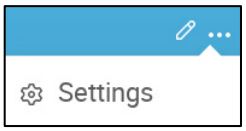
1. Go to System > Control Strategy > Water.



2. Enable **Manage According To Light Program**.
3. Go to Control > Water > WOD.



4. Click  .
5. For each growth day, define the drink line pressure for the following times:
   - Light times: Period when lighting is on.
   - Dark Time: Period when lighting is off.
   - Boost Time: These are the times when water consumption is increased. These periods are defined in the settings.

6. Go to 

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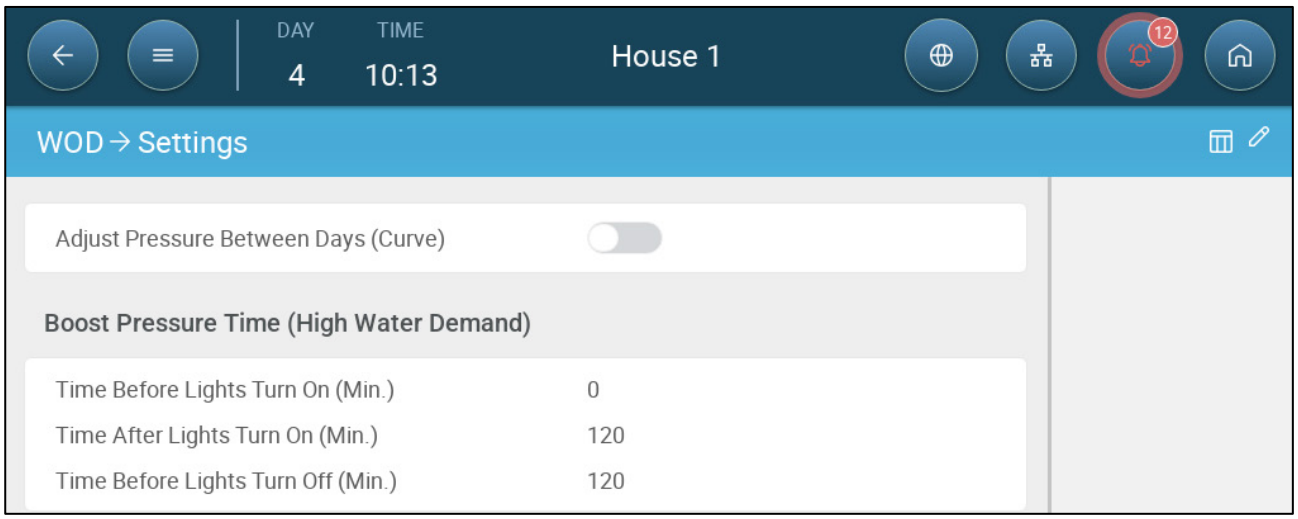


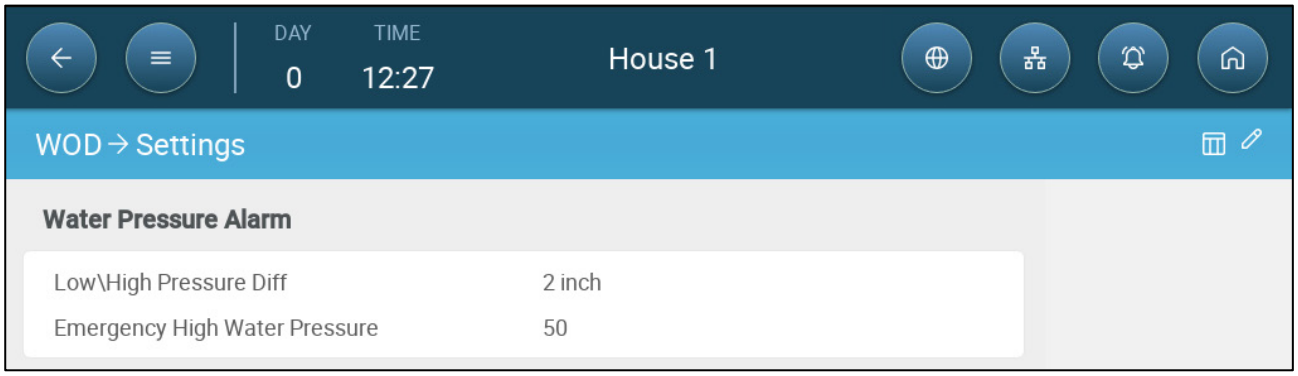
7. Define:
   - Time Before Lights Come On: Define the number of minutes that pressure is increased before the lights come on. Default: 0. Range: 0 – 300.
   - Time After Lights Come On: Define the number of minutes that pressure is increased after the lights come on. Default: 120. Range: 0 – 300.
   - Time Before Lights Turn Off: Define the number of minutes that pressure is increased after the lights turn off. Default: 120. Range: 0 – 300.

13.2.2.3 WOD Pro Pressure Alarms

When employing WOD Pro, Trio can generate water pressure alarms based on the difference between the requested pressure (defined by the WOD Pro) and the pressure measured by the water pressure sensor.

➲ **In Devices and Sensors, define one analog port as Water Pressure. Refer to the Installation Manual.**

1. Go to Control › Water › WOD › Settings.



2. Define:
   - Low\High Pressure Diff: Define the difference between the requested and measured pressure to generate a low\high water pressure alarm. The condition must continue for 30 seconds for an alarm to be generated.

- Emergency High Water Pressure: Define the pressure required to generate an alarm.
  - If there is a leak, this leakage is translated into a high pressure signal. An alarm is generated when the pressure is above the defined level for more than five seconds. In the event of an emergency alarm, the pump is shut off.
  - Reset the alarm to exit the emergency state.

13.3 Flushing the Drinking Lines

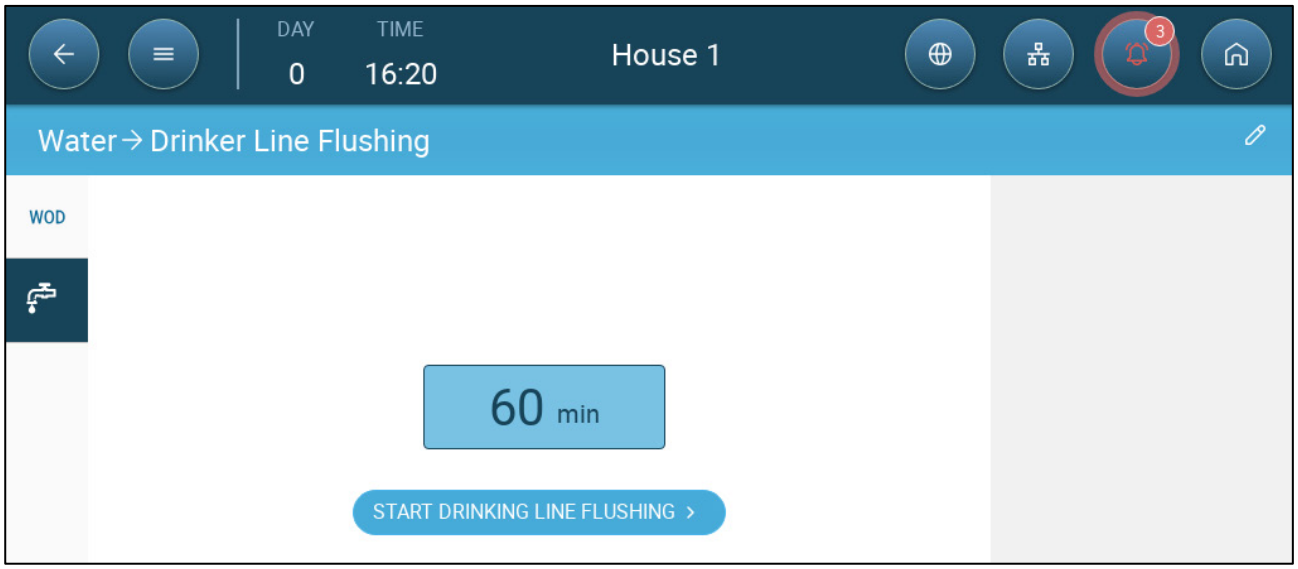
Flushing means running clean water, at high pressure, through the drinking lines. Flushing:

- Keeps the nipple drinkers clear of any blockage
- Keeps the lines clean of contaminants
- Provides cooler water to birds which encourages them to drink more

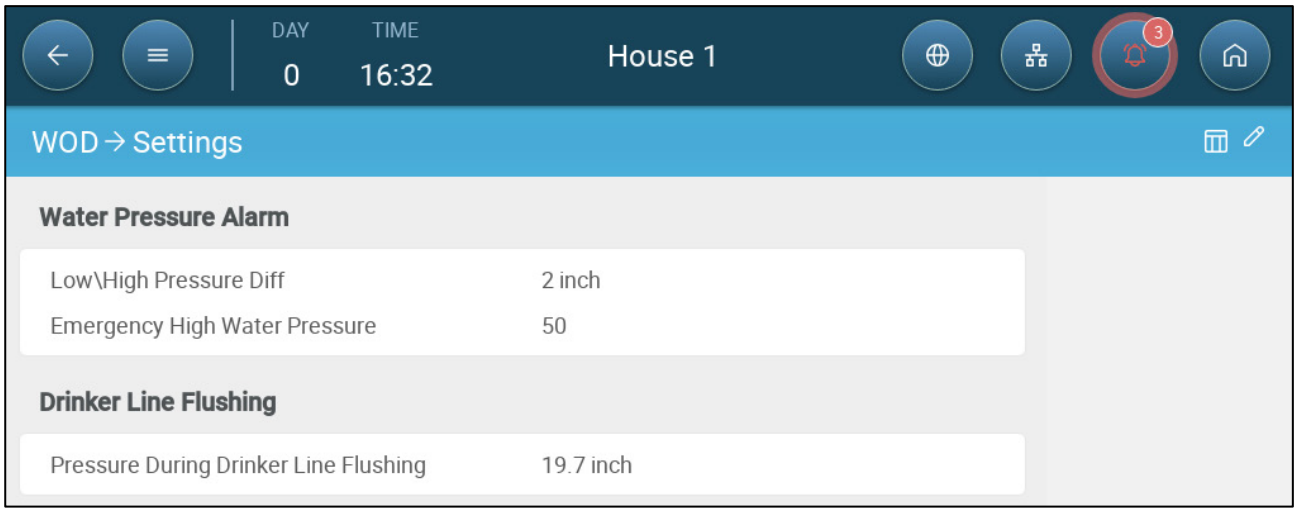
To flush the drinker lines:

➲ **Define WOD relays and WOD Pro analog port as required.**
➲ **Define Water Meter sensors.**
➲ **Define Water Pressure sensors.**

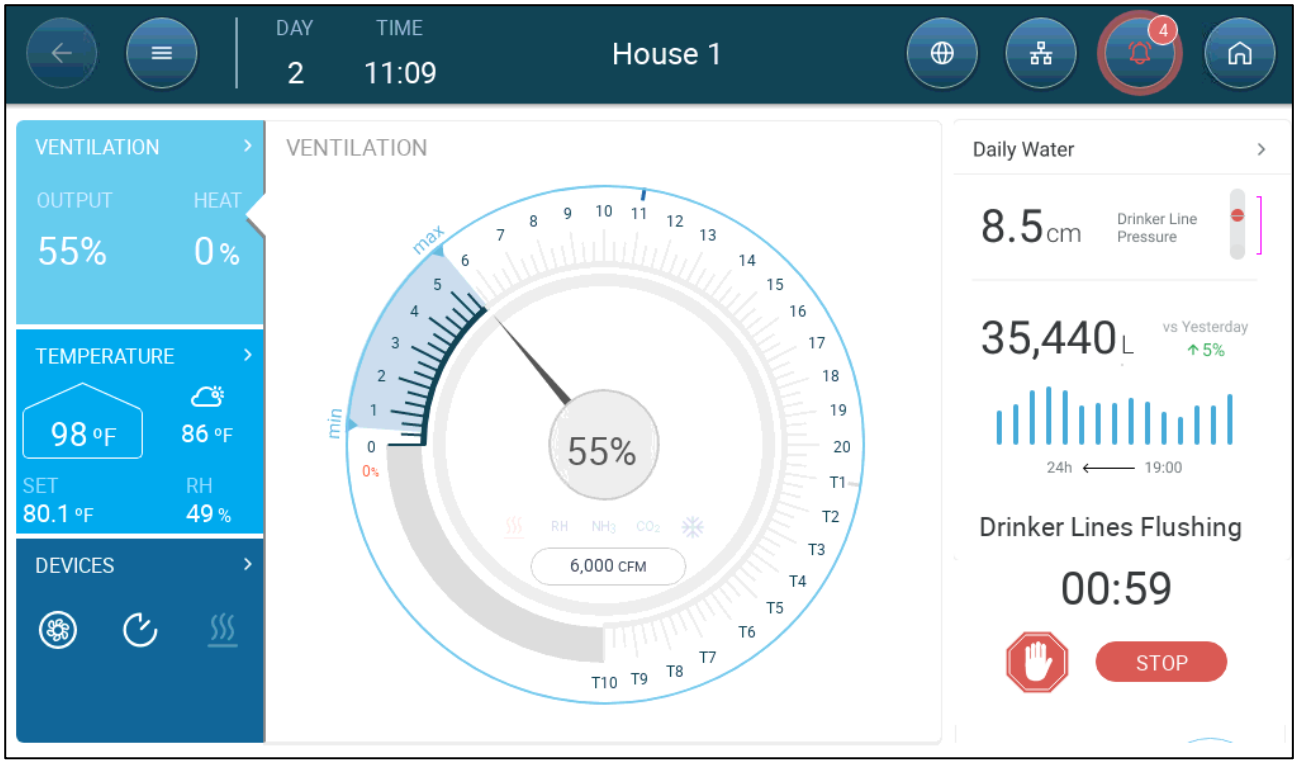
1. Go to Control › Water.



2. Click:
   - Start Drinking Line Flushing to begin the process.
   - Click to change the amount of time that flushing continues.
3. Go to Control › Water › WOD › Settings (option).



4. Click  .
5. Define the Pressure During Drinker Line Flushing.
    - The Drinker Line Flushing setting is available only when WOD Pro is enabled.
    - When flushing is taking place, a pop up appears on the dashboard.



NOTE During flushing, the water measured by the water meter are not added to the drinking water history.

14 Lighting Program

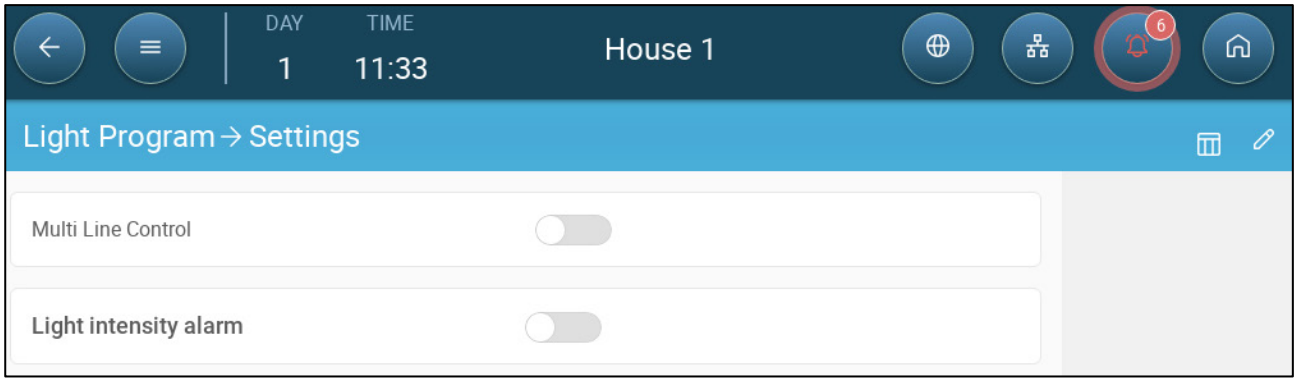
Trio supports on/off (non-dimmable) lights and dimmable lights. In setting up the program, the following options must be defined:

- On/Off and/or 0 – 10 Volt Variable Lights (defined in Devices and Sensors). A system can include both.
- Single line or multiline control: In single line control, all light lines have the same output. In multiline control, the user defines the value (on/off or intensity level) for each line.
- Time: Starting time for each lighting event.
- If a light sensor is installed, an alarm can be generated if the light goes below a certain intensity.

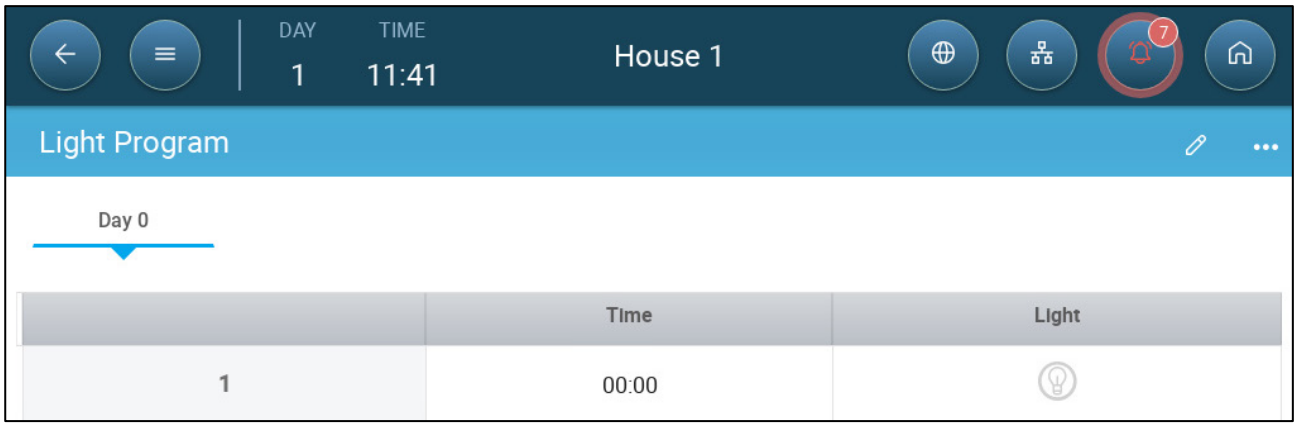
- Relay Control
- 0 – 10 Volt
- RLED 2.0
- Service Lights
- Light

14.1 Relay Control

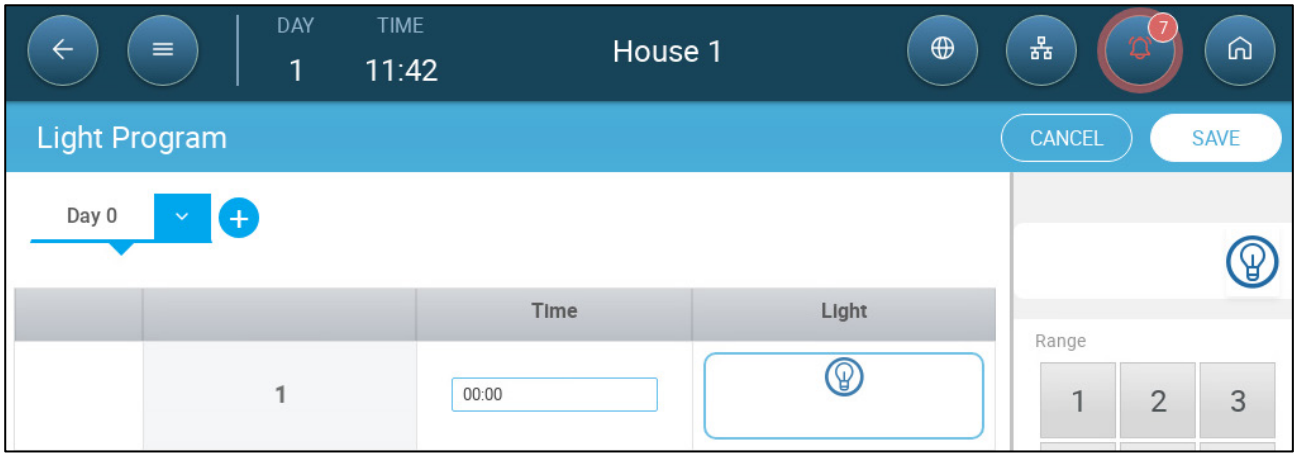
1. To enable multi line control, go to Control > Light > Settings and enable Multi Line Control (option).



2. Go to Control > Light.

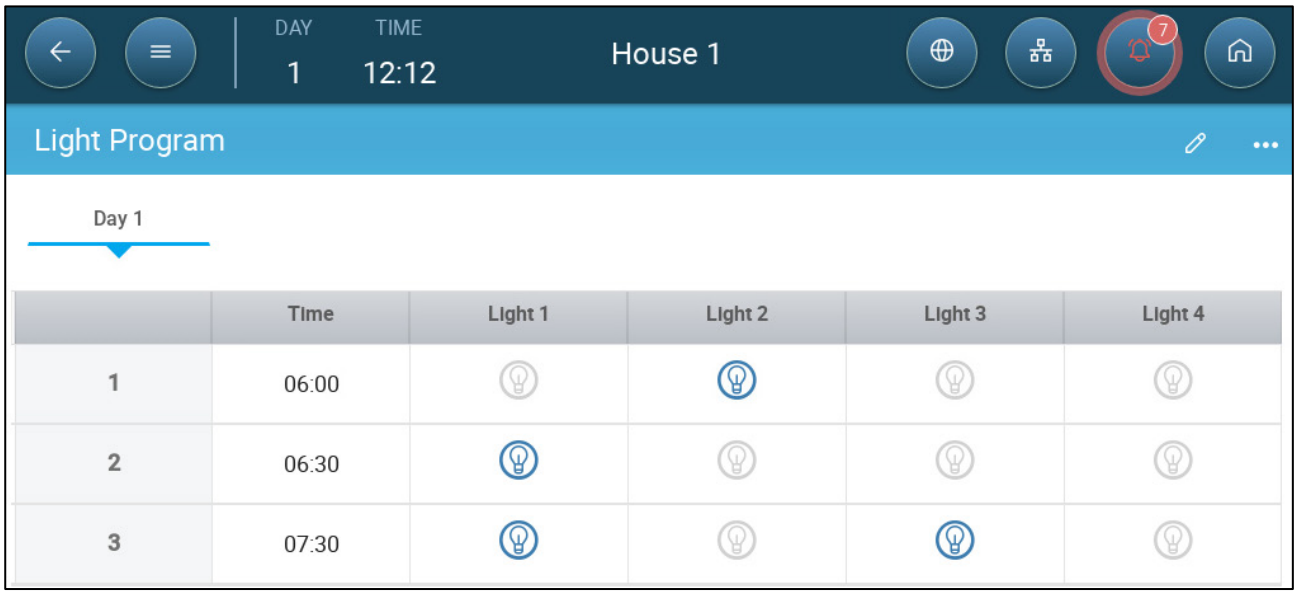


3. Define the growth day.
4. In line one, define the time that the lights go on.
5. Enable the line(s)  :
   - In single line control, click the light icon. Another light icon appears. Click that icon. Both icons turn blue.
   - In multi-line control, click the icon of each required line. Another light icon appears. Click that icon. All icons turn blue.



6. Add additional programming lines to define when the light lines go off and then on. Repeat for each growth day.
7. Click **Save**.

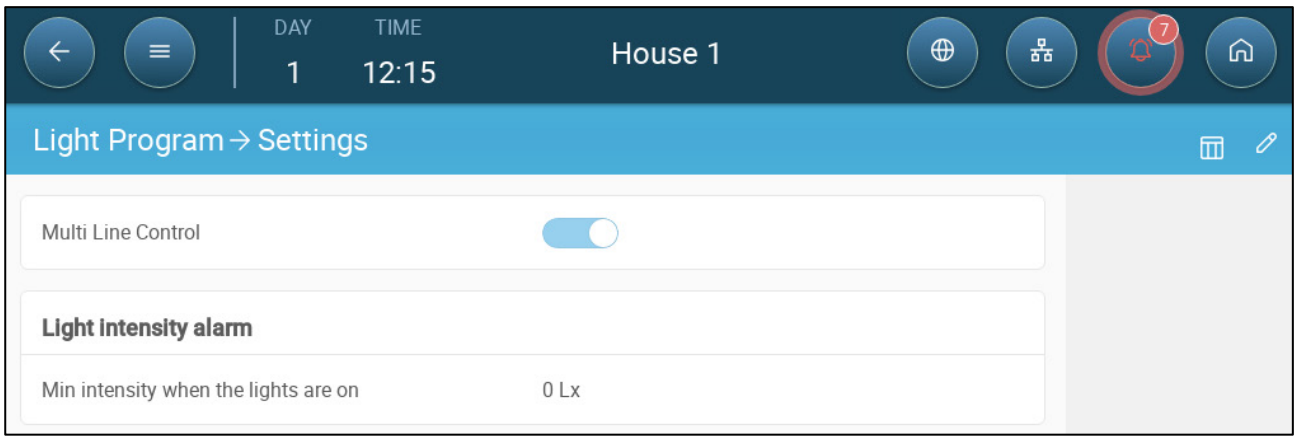
In this scenario, all lights go on at 6:00, turn off at 7:00, and turn on at 8:00.



In this scenario, light line 2 goes on at 6:00. At 6:30, light line 2 goes off and light line 1 goes on. At 7:30, light line 3 goes on along with light line 1.

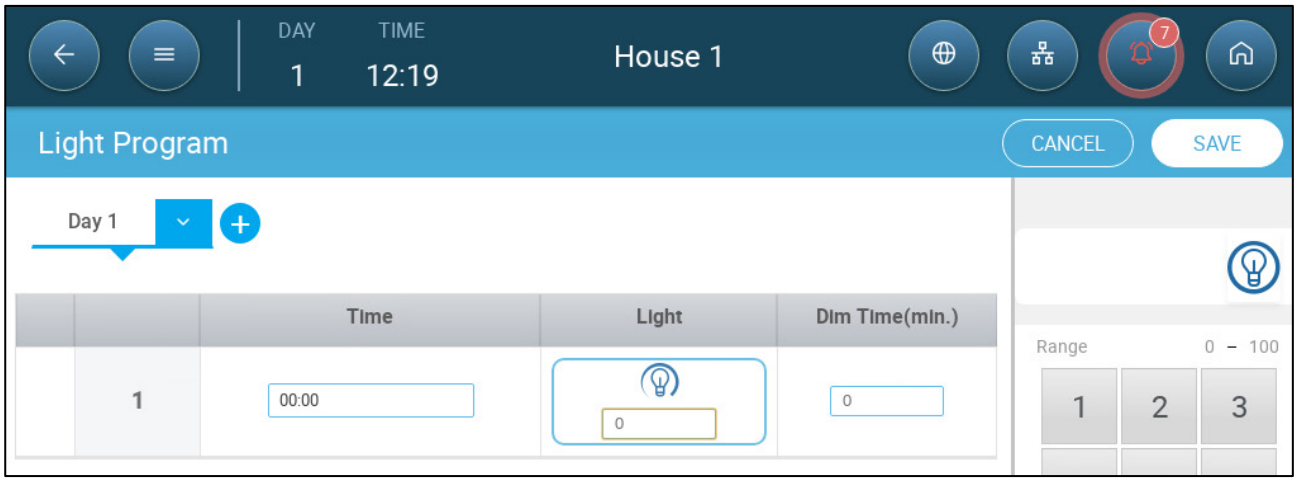
14.2 0 – 10 Volt Control

1. To enable multi line control, go to Control › Light › Settings and enable Multi Line Control (option).



2. Go to Control › Light.

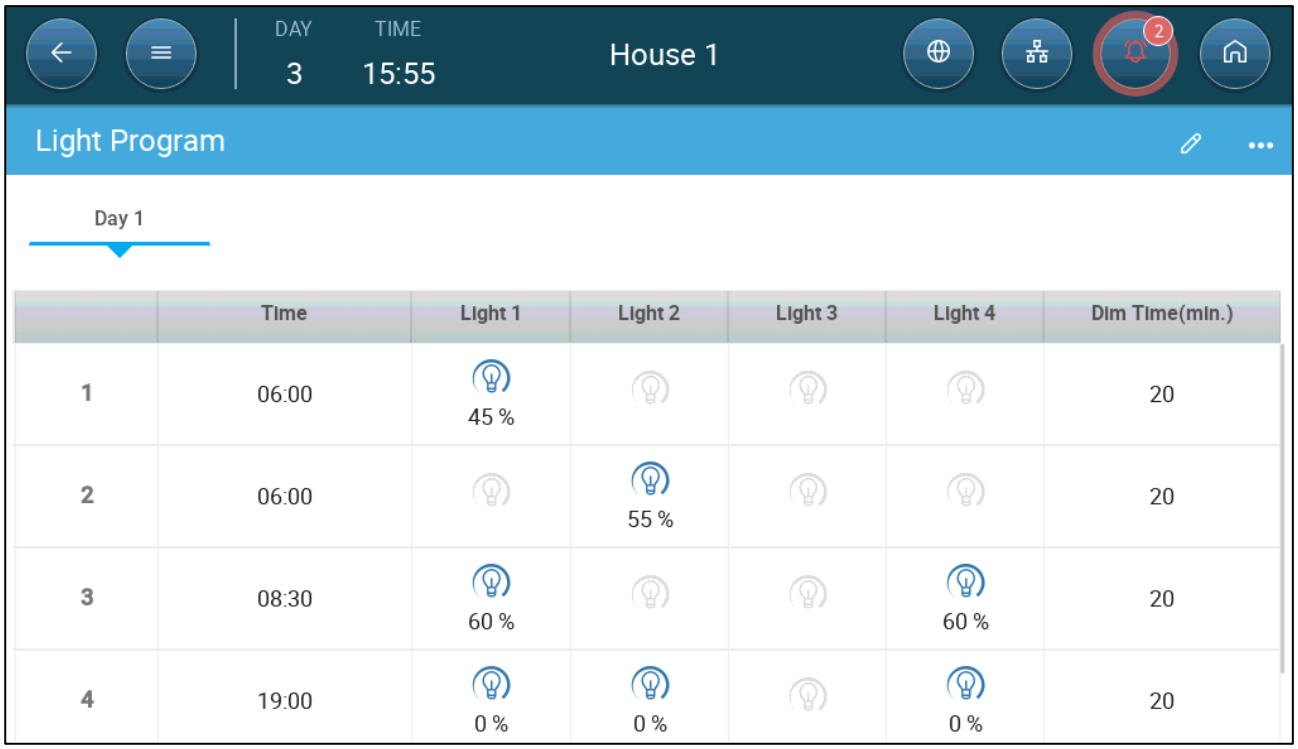
3. Click  .
4. Define the growth day.
5. In line one, define the time that the lights go on.
6. Enable the line(s)  :
   - In single line control, click the light icon. Another light icon appears. Click that icon. Both icons turn blue.
   - In multi-line control, click the icon of each required line. Another light icon appears. Click that icon. All icons turn blue



7. Under each light icon, define the light intensity.
8. Under Dim Time, define the amount of time before the next lighting event that the lights begin to change their intensity.
9. Add additional programming lines. Repeat for each growth day.
10. Click **Save**.

	Time	Light	Dim Time(min.)
1	06:00	45 %	20
2	07:00	55 %	20
3	08:30	60 %	20
4	19:00	0 %	20

In this scenario, all light lines begin to turn on at 5:40. At 6:00, lights reach 45% intensity. At 6:40, light intensity begins to increase, reaching 55% at 7:00. At 8:10, light intensity begins to increase, reaching 60% at 8:30. At 18:40, lights begin to dim, reaching 0% at 19:00.



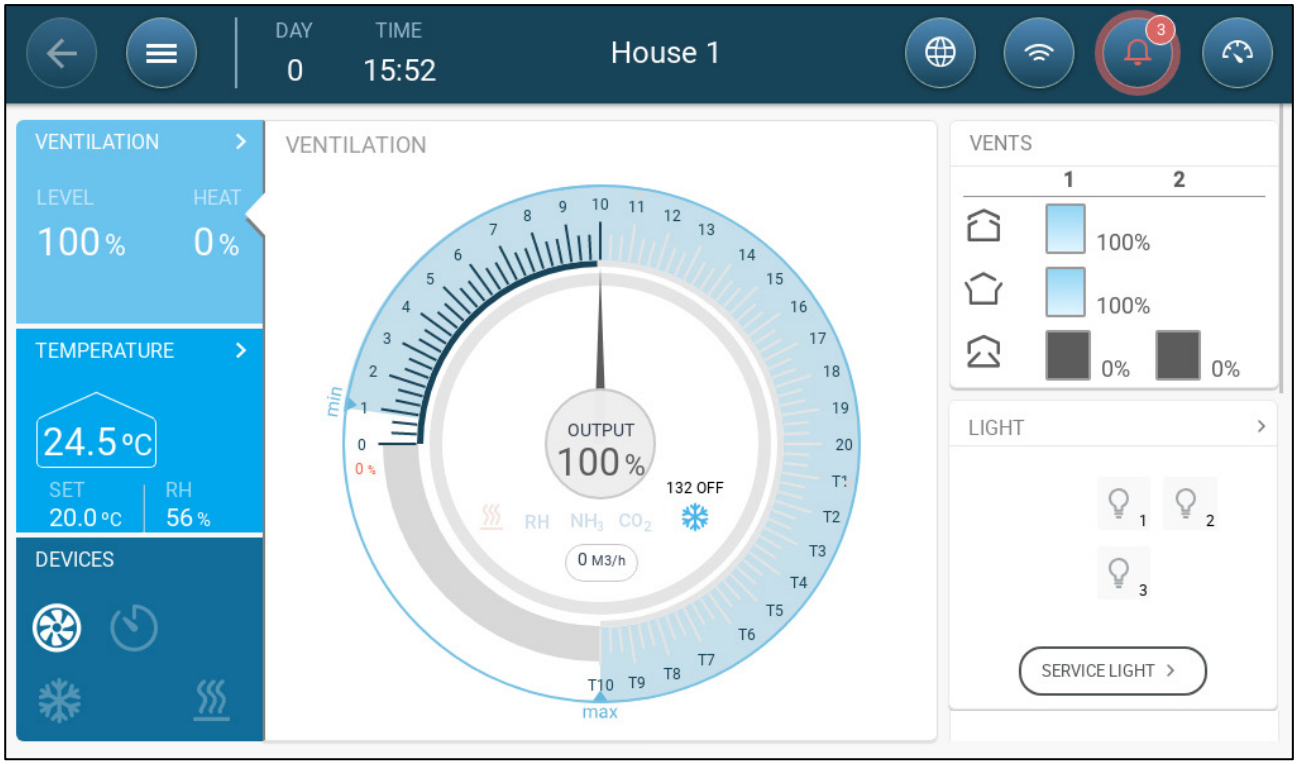
NOTE In multi-line mode devices may have different intensity settings; the dimming rate should be calculated for each line separately.

At 5:40 Line 1 and Line 2 turn on. Both reach their intensity (45% and 55% respectively) at 6:00. At 8:10, Line 1 begins to increase its intensity and Line 4 turns on. Both Line 1 and Line 4 reach 60% at 8:30. At 19:00 all lines begin to turn off, turning off completely at 19:20.

14.3 RLED 2.0

Trio Version 8.3 supports the RLED 2.0. For details on operating the RLED 2.0, refer to the relevant manual. When the RLED 2.0 is in auto-mode, Trio controls the actual lighting parameters.

14.4 Service Lights

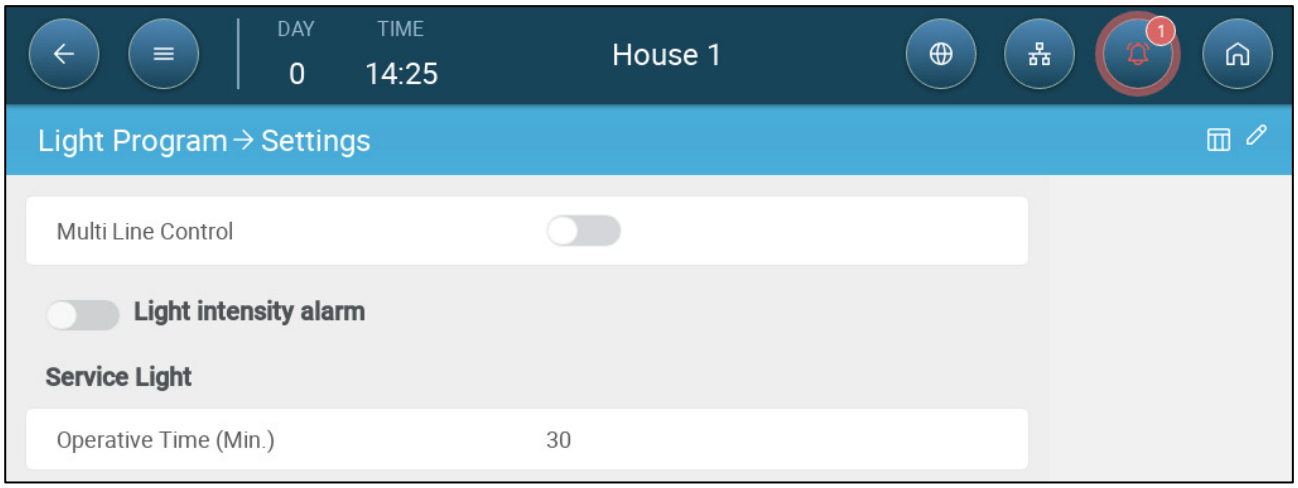


Service lights is a function that turns on the lights for a defined amount of time, temporarily overriding the programming. When the service light icon (which appears on the dashboard) is pressed, all lights are turned on.

- Turning the lights on:
  - 0 – 10 volt lights: When turned on, the lights gradually rise to the defined brightness. The time required for the lights to fully turn on is user-defined. If the light level is higher according to the programming than the level defined in the Service Light function, the lights remain at their programmed level.
  - On/Off lights: All lines turn on immediately.
- Turning the lights off: Lights turn off when the defined service time expires or the user presses the Turn Off icon.
  - 0 – 10 volt lights: When turned on, the lights gradually return to the defined brightness. The time required for the lights to turn off is user-defined.
  - On/Off lights: All lines turn off immediately.

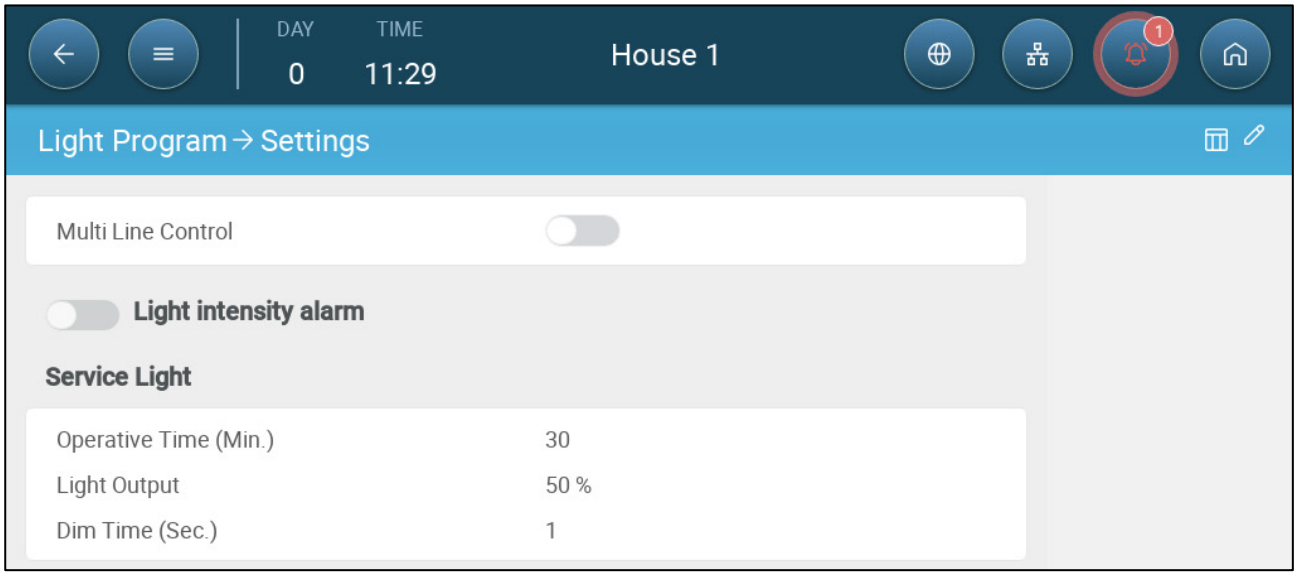
To define the Service Light functionality:

1. Go to Control › Light › Settings.
2. Define the parameters.
   - On/Off lights:



- Operative Time (Min.): Define the amount of time (in minutes) that the lights remain on. Range 1 – 120. Default: 30

- 0 – 10 volt lights:



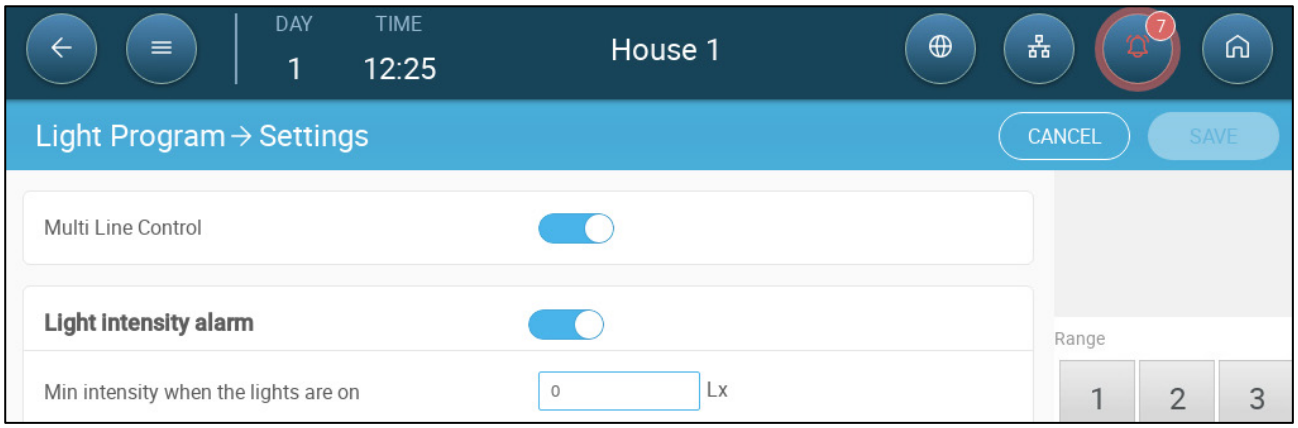
- Operative Time (Min.): Define the amount of time (in minutes) that the lights remain on. Range 1 – 120. Default: 30
- Light Output: Define the lights' output (in percentages). Range: 10 – 100. Default: 50
- Dim Time (Sec.): Define the amount of time that the lights require to power up to light output level and to power down to the programmed level.

14.5 Light Intensity Alarm

Trio can generate an alarm when lights go below a user-defined level.

➲ **This function requires a light sensor. Refer to the Installation Manual.**

1. Go to Control › Light › Settings and enable Light intensity alarm.



2. Define the minimum light intensity that lights must achieve. Below this level, Trio generates an alarm.

15 Expected Bird Weight

Trio collects bird weight data. Factors to set up when configuring how Trio measures weight:

- Reference Bird Curve: The reference weight is a value that reflects the birds' expected target weight.
  - Enabled: Trio provides a weight curve (by growth day). The user can choose an industry standard template or manually define a curve.
  - Disabled: Trio provides a reference weight that can be edited.
- Separate male/female weighing: When enabled:
  - Scales can be defined as male, female, or both.
  - Weight range can be specified for both genders.
  - If the bird curve is enabled, there are separate curves for each gender.

➲ **To enable editing the weight range and bird scale definition, define at least one scale in Devices & Sensors. Two bird scales are required for weighing male and female bird separately.**

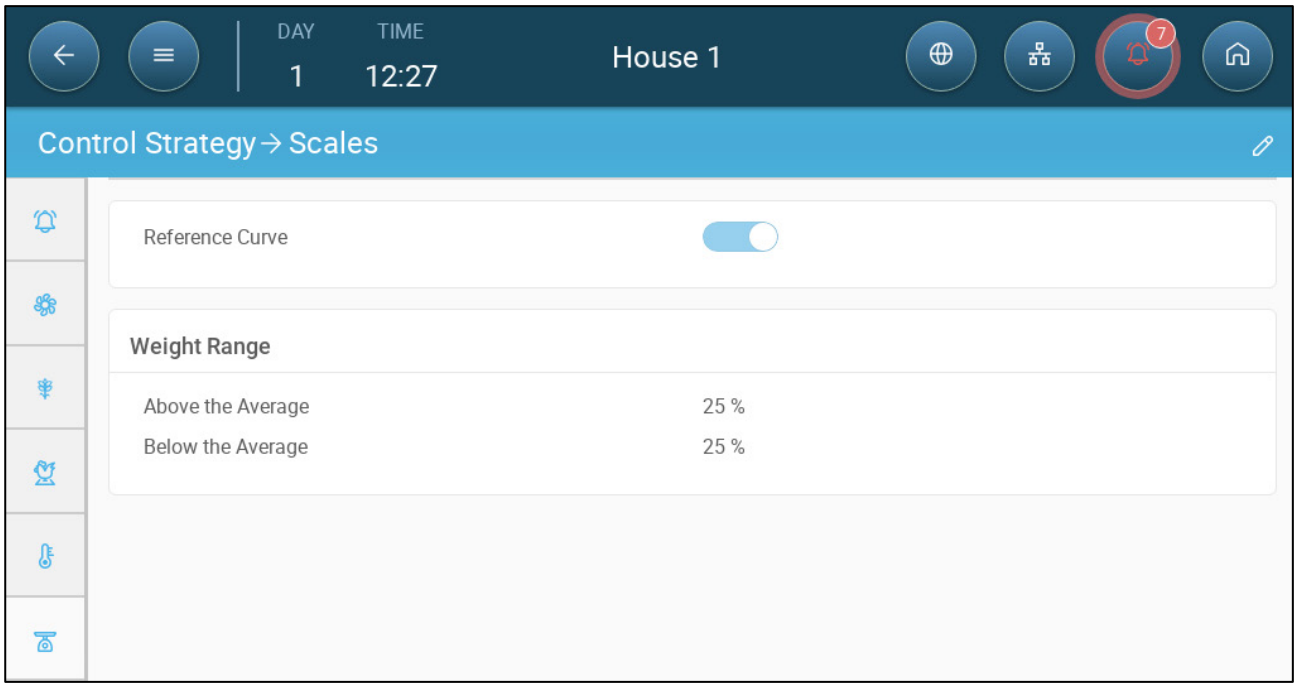
15.1 Reference Bird Curve

As an option, Trio provides industry standard growth curves which increase according to the average weight. Alternatively, the curve can be disabled. These bird curves do not change according to the birds' actual weight. If required, you can edit the growth days and bird weights.

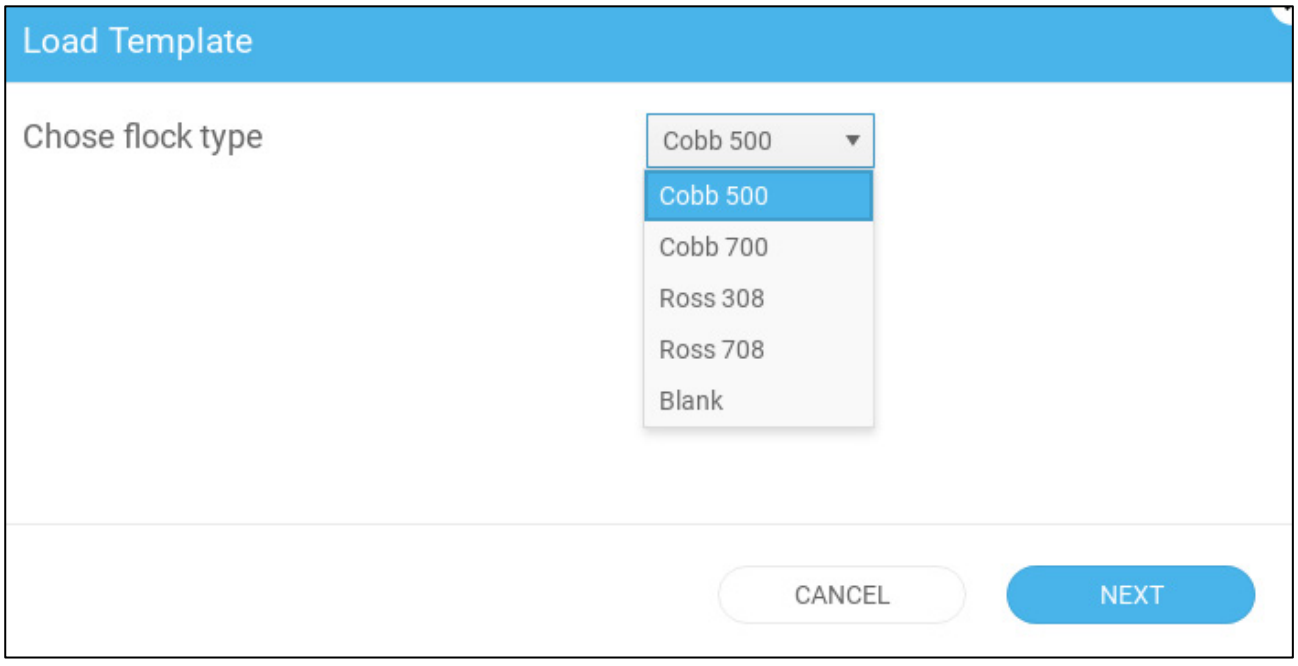
- Curve Enabled
- Curve Disabled

15.1.1 CURVE ENABLED

1. To enable a bird curve, go to System › Control Strategy › Scales  .



2. Click  and enable the reference curve.
3. Go to Flock › Bird Weight › Load Template. From the drop-down list, select one of the following:
    - Industry standard curve
    - Blank. This option enables manually defining a growth curve.



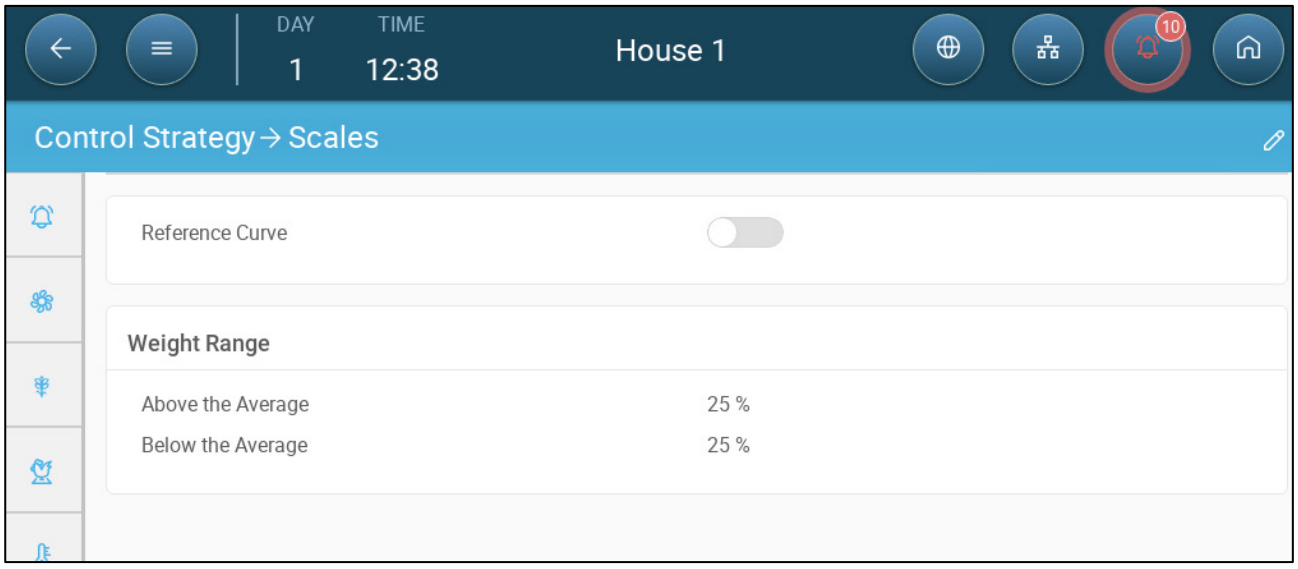
4. Click **Next** and confirm your choice.
5. If required, edit the curve and save.
6. Go to Flock › Bird Weight.

NOTE In the illustration above, the curve is not gender-separated. If male and female birds are weighed separately, two curves appear.

7. Click  and define:
   - Day: Define the growth day used to determine the desired weight. Range 0 - 999
   - Weight: Set the expected bird weight. Range 0 - 30.0 kg/0- 66 lbs.
8. Click  and edit the Curve Offset (option).

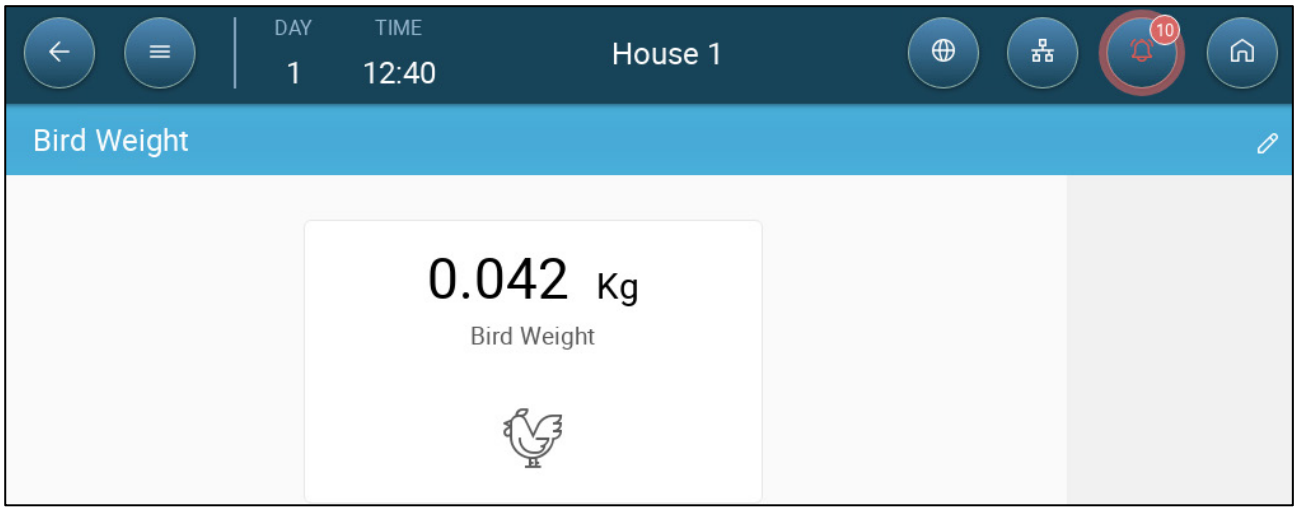
15.1.2 CURVE DISABLED

1. To disable a bird curve, go to System › Control Strategy › Scales  .



2. Verify that the curve is disabled.

3. Go to Flock › Bird Weight.



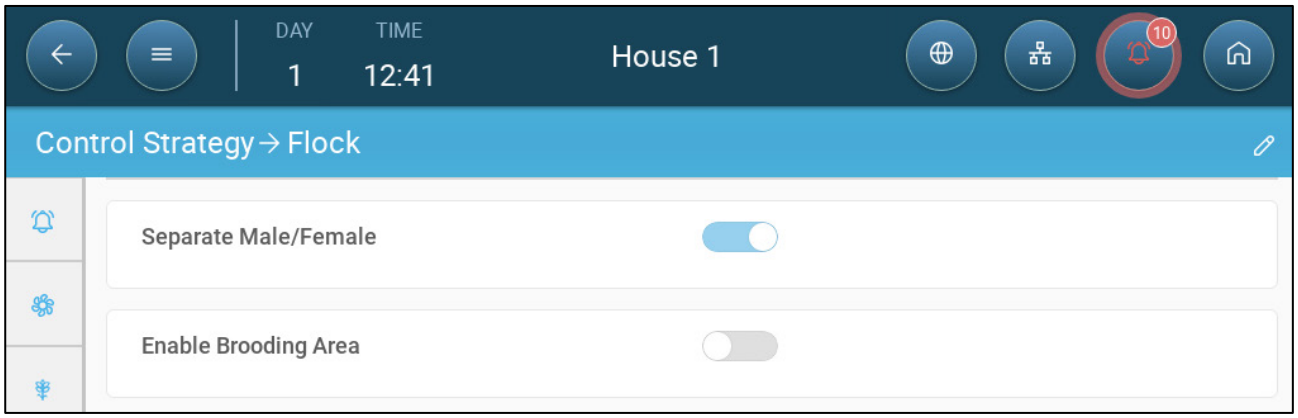
4. Click  to edit the reference weight.

15.2 Male/Female Weighing

- Gender Separated Weighing
- Non-Separated Weighing

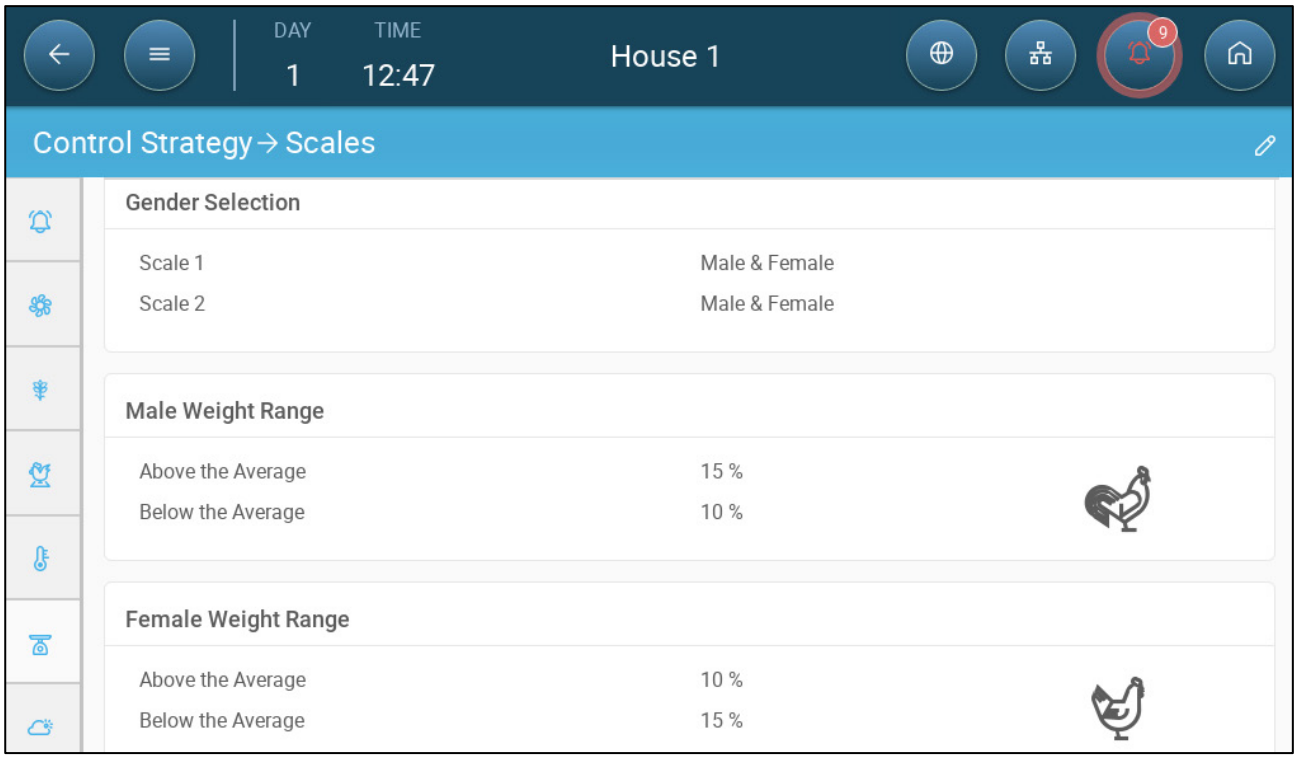
15.2.1 GENDER SEPARATED WEIGHING

1. Go to System › Control Strategy › Flock  .



2. Click  and enable Separate Male/Female.

3. Go to System › Control Strategy › Scales  .

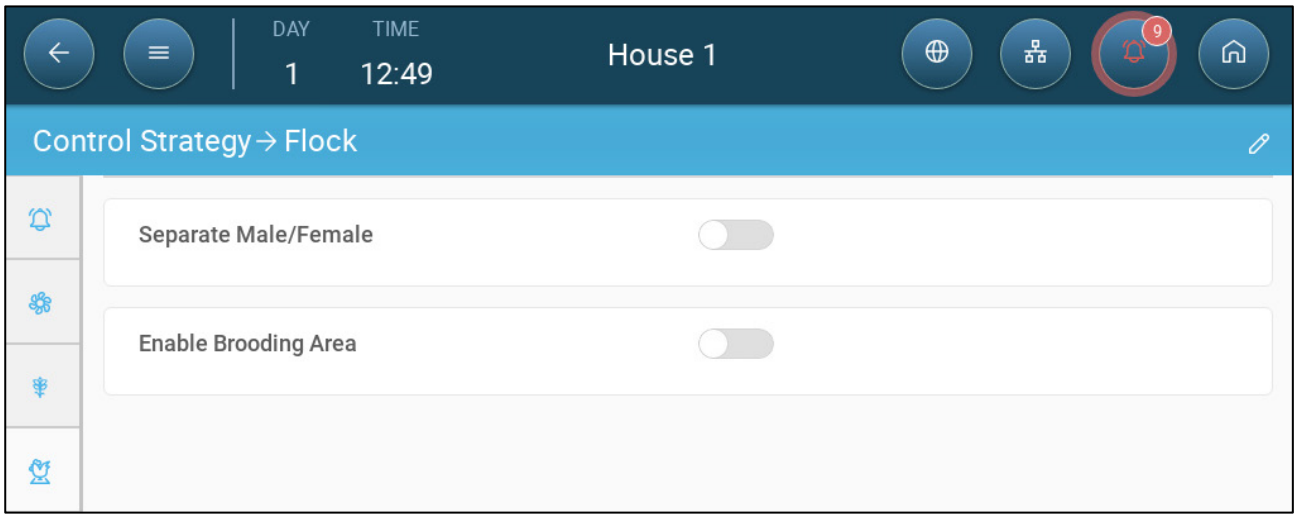


4. Define:
    - Gender Selection: Define each scale as Male & Female, Male, or Female.
    - Male/Female Weight Range: These parameters define the bands above and below the reference weights. If a bird weight is above or below this band, it is not included in the data.

NOTE When Separate Male/Female is enabled, there are reference curves, reference weights, and curve offsets for each gender in the Flock > Bird Weight Screen.

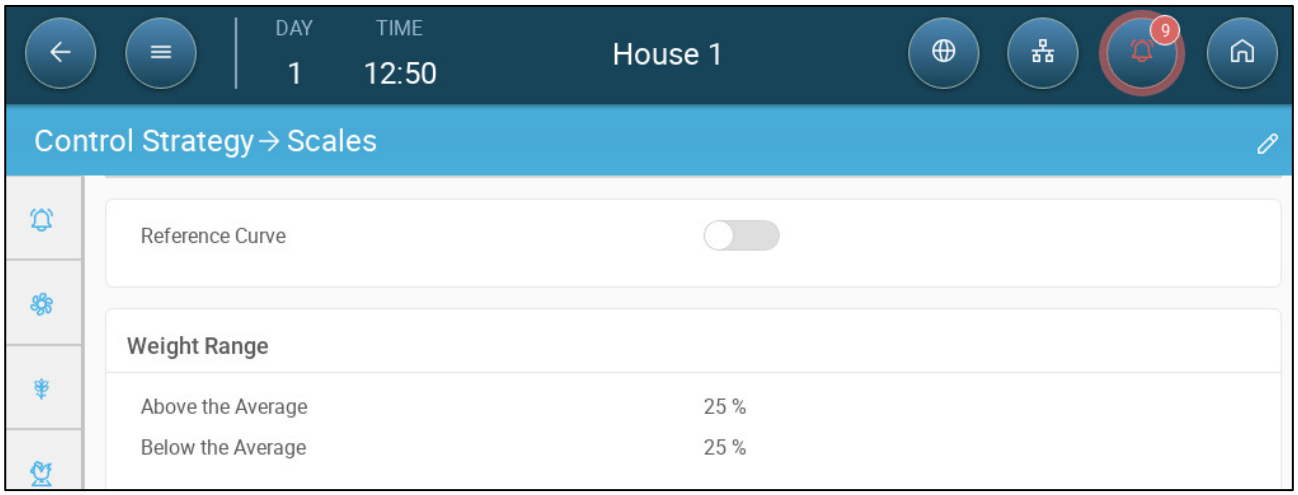
15.2.2 NON-SEPARATED WEIGHING

1. Go to System > Control Strategy > Flock  .



2. Click  and disable Separate Male/Female.

3. Go to System › Control Strategy › Scales  .



- Weight Range: These parameters define the bands above and below the reference weights. If a bird's weight is above or below this band, it is not included in the data.

16 Air Quality

Ensuring air quality means configuring the Trio relative humidity, CO2, and ammonia sensors. Each of these factors are independent and require a sensor. When any of these factors rise above the user defined levels, Trio compensates by increasing the ventilation rate or by increasing the heat.

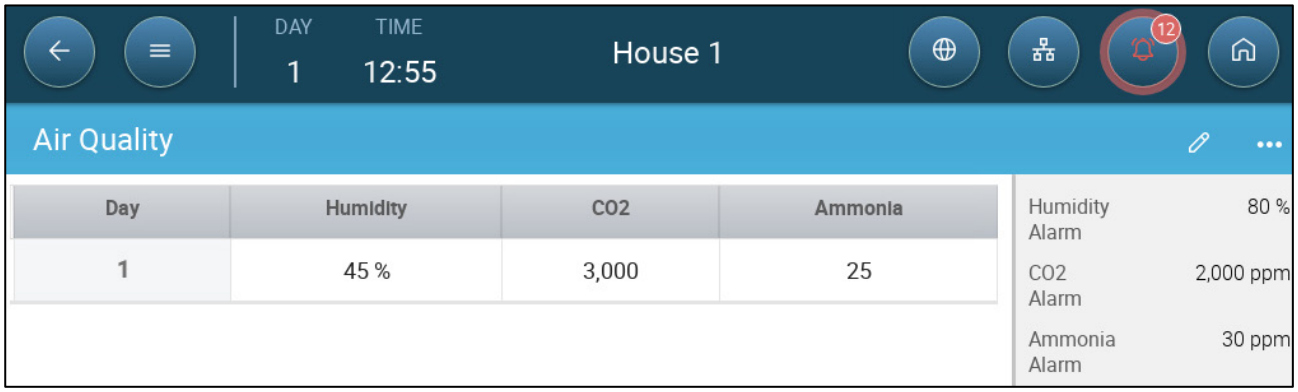
- Ventilation must be running for compensation to begin. Air quality control runs during basic ventilation only.
- If one of these factors is above the user defined set point, compensation begins. If two or more factors are above the user-defined set point, only one air quality program runs. When that factor falls to the required level, only then does the second air quality factor begin to operate.
- The user defines which type of compensation is used.
- As compensation takes place, Trio continually checks the sensors' measurements. As long as the measured RH, CO2, or ammonia remain above the defined levels (levels are checked every 30 seconds), ventilation or heating increases by 2%.
- Once the levels are below the required levels, compensation begins to decrease by 2%. Trio continues to check the sensors' measurements (every 30 seconds). Treatment continues until the shut off values are reached.
- If the humidity, CO2, or ammonia levels reach (user-defined) levels, Trio can initiate failsafe measures.

- Defining the Air Quality Parameters
- Defining the Air Quality Settings
- Defining the Failsafe Functions

16.1 Defining the Air Quality Parameters

1. Go to Climate › Air Quality.

➲ **Each sensor must be defined and mapped for the sensor to appear on this screen. Refer to the Installation Manual.**

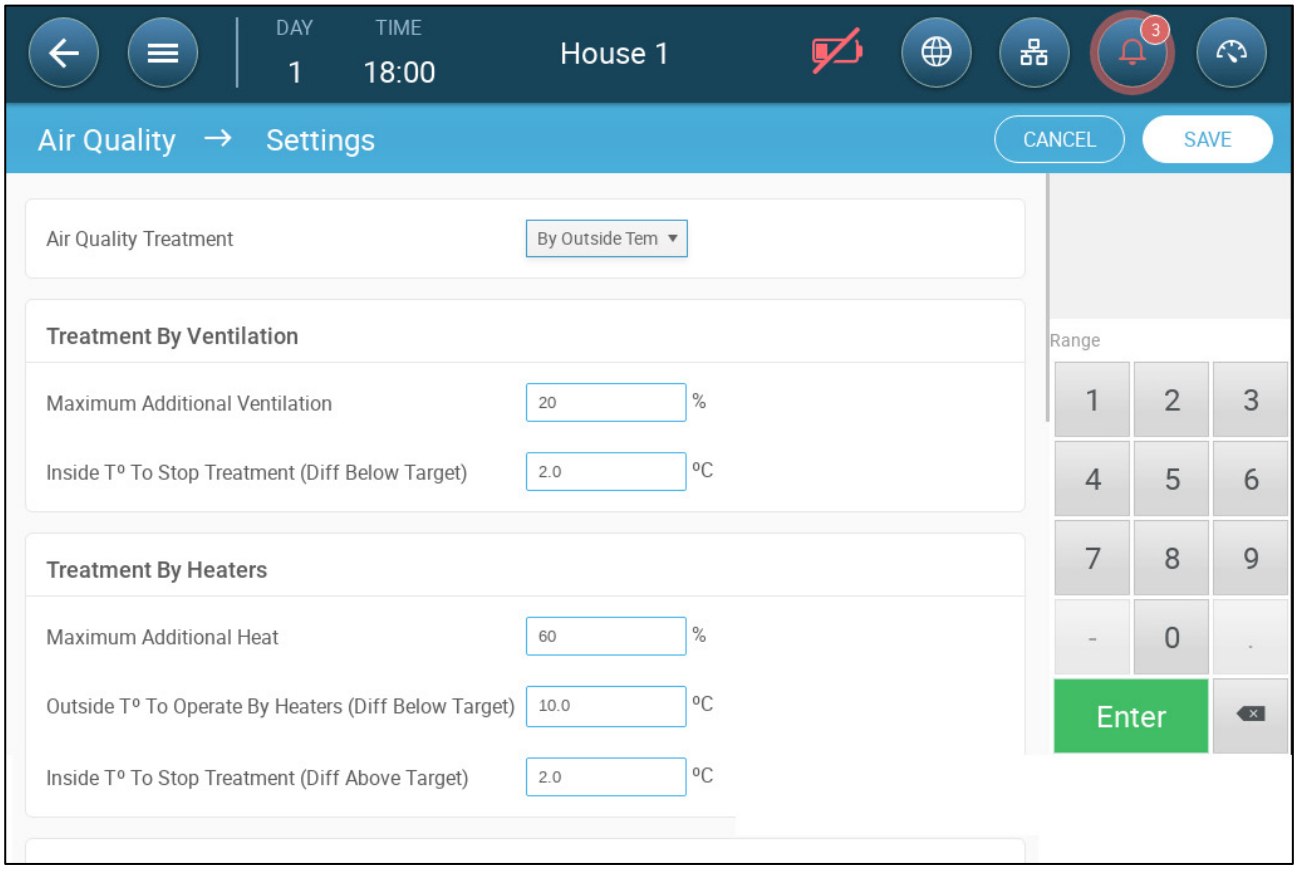


2. Set the values over which the “air treatment” start, these values are adjusted over growth days (no curve).
3. Define:
    - Day: Set the growth day to determine the desired set points for RH, C02 and NH3. Range 0-999
    - Humidity: Set the humidity level above which air treatment starts. Range 0%-100%
    - Co2: Set the Co2 level above which air treatment starts. Range 0 - 5000 ppm
    - NH3: Set the ammonia level above which air treatment starts. Range: 0 - 100 ppm

16.2 Defining the Air Quality Settings

When the air quality (CO2/NH3/Humidity) exceeds the specifications defined in the Air Quality Screen, Trio can increase the ventilation, the heat or both. (Alternatively, additional treatment can be disabled.)

When central heating is employed, the changes to heating are global. When zone heaters are employed, changes are specific to each heater.



- Define:
    - Air Quality Treatment:
        - Off
        - By Ventilation (Treatment by Ventilation only is enabled)
        - By Heat (Treatment by is Heat only is enabled)

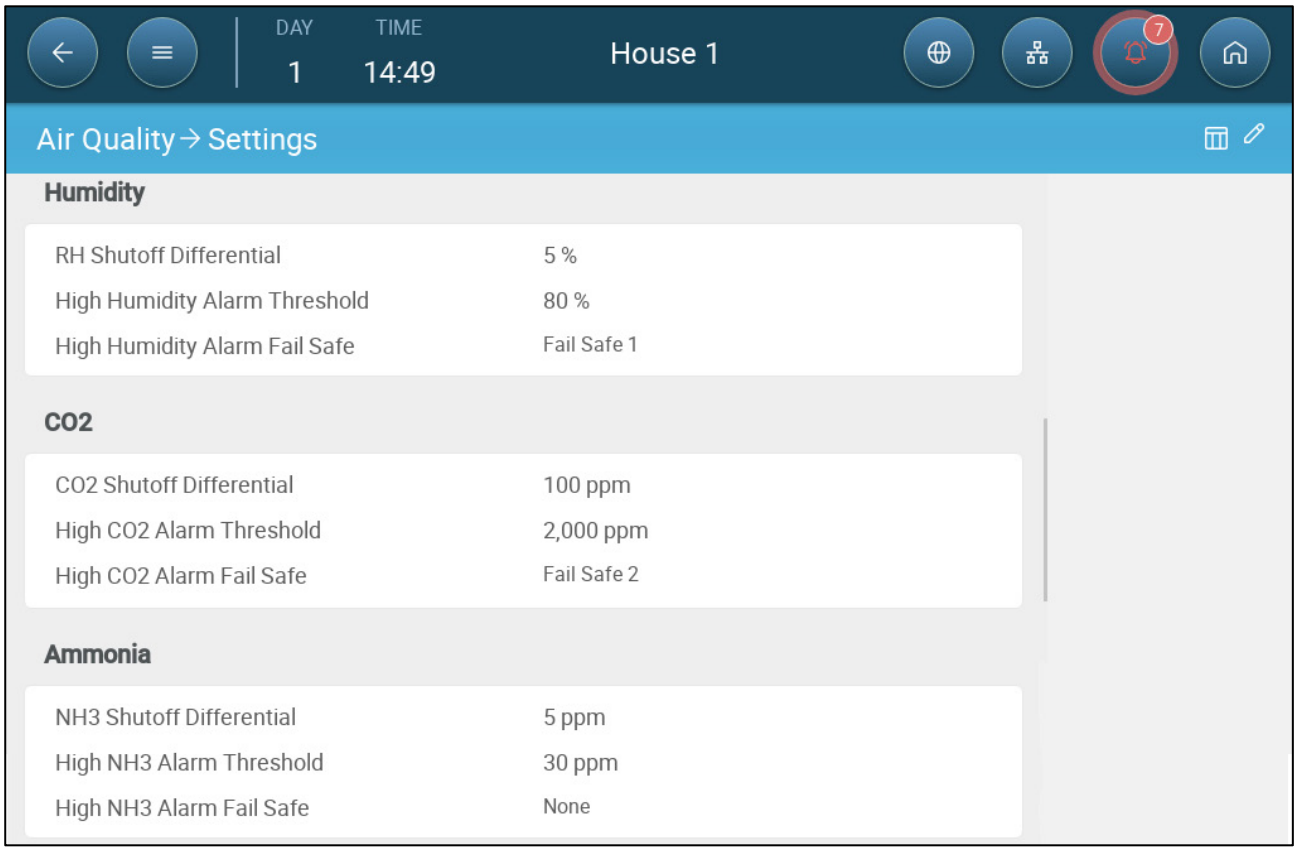
        - By Outside Temp (both Treat by Ventilation and Heat are enabled)
    - Treatment by Ventilation:
        - Maximum Additional Ventilation: Define the maximum ventilation adjustment to cycle times or speed to variable speed fans. Range: 1 – 100%. Default: 20%
        - Inside T° to Stop Treatment (Diff Below Target): Define the difference below the target temperature at which additional ventilation treatment ceases. Range: 0 - 50°. Default 2°.
    - Treatment by Heat:
        - Maximum Additional Heat (%): The maximum increase in heat (max compensation). Either the cycle time or heat intensity in variable heaters increases. Range: 1% to 100%
        - **Outside** T° To Operate By Heaters (Diff Below Target): Below this difference from the target temperature the controller automatically adjusts the heat output to compensate the air quality. Range -40°to +90°
        - **Inside** T° to Stop Treatment (Diff Above Target): Above this difference from the target temperature the controller stops this heat treatment. Range: 0 - 50°. Default: 2°.
    - RH Shutoff Differential: (%): Below this level, humidity treatment ceases. Range: 0% to 10%
    - High RH Alarm Threshold (%): Trio sends an alarm when the humidity level rises above this level. Range: 0% to 100%
    - Co2 Shutoff Differential: (ppm): When CO2 levels are below the target level by this amount, all CO2 treatment stops. Range: 0 to 500 ppm
    - High Co2 Alarm threshold (ppm): Trio sends an alarm when the CO2 level rises above this level. Range: 0 to 5000 ppm
    - NH3 Shutoff Differential: (ppm): When ammonia levels are below the target level by this amount, all ammonia treatment stop. Range:0 ppm to 10 ppm
    - High NH3 Alarm threshold (ppm): Trio sends an alarm when the ammonia level rises above this level. Range: 0 to 100 ppm

16.3 Defining the Failsafe Functions

The Failsafe function defines extreme conditions that activate dedicated failsafe relays. These relays activate external devices used to deal with the condition.

➲ **Define up to four relays as failsafe relays. Refer to the Installation Manual.**

1. Go to Climate › Air Quality › Settings.



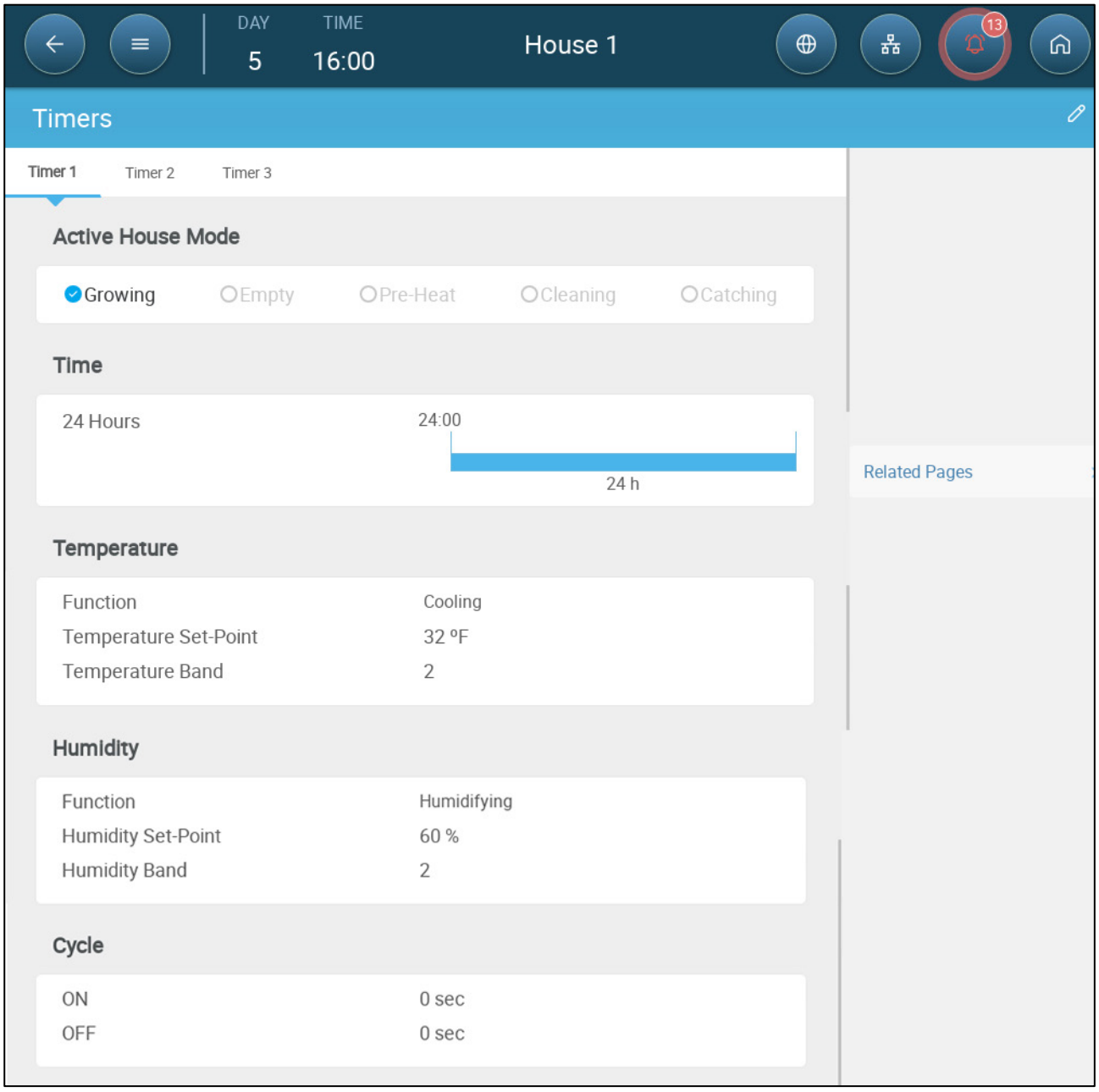
2. Define:
   - Alarm Threshold: At this level, an alarm is generated.
   - Alarm Fail Safe: Define the fail-safe relay that controls the external device that operates when a particular air quality factor reaches its alarm threshold. For example, if the humidity reaches 80%, an alarm is generated and Fail Safe relay 1 activates its external device.

   The fail safe operation continues until the condition drops below the alarm threshold.

17 Timers

Timers provide an additional method of controlling relay devices, namely setting a timetable in which the device can operate. In addition to the timetable, Trio enables setting up time cycles and temperature ranges in which a device can operate.

Trio supports up to five timers.

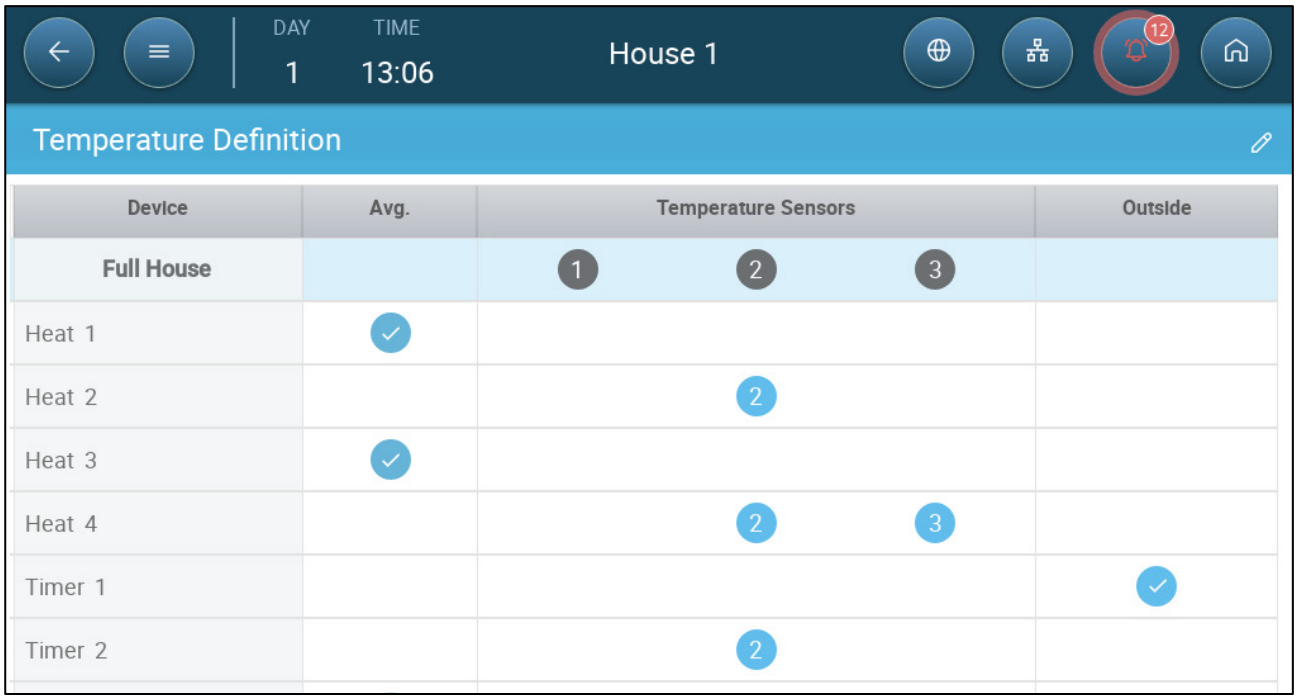


➲ **Define at least one relay as a timer. Refer to the Installation Manual.**

1. In Control › Timers, click edit, and define a timer as Active.
2. Define for each timer:

- **Active House Mode**: Define in which mode each timer can operate. Multiple modes can be selected.
- **Time**: Timers can run 24 hours a day or in user-defined time frames. Define up to four time frames for each timer.
- **Temperature**: This function enables controlling devices according to temperature. If enabled, define:
  - Function: Define the timer control mode:
    - Cooling: The timer operates when the temperature rises above the set point plus the band and continues to operate until the temperature drops below the set point.
    - Heating: The timer operates when the temperature drops below the set point minus the band and continues to operate until the temperature rises above the set point.
  - Temperature Set-Point: Define the target temperature. Range -40.0 to +193.0° F. Default 32.0° F
  - Temperature Band: The temperature band defines the range in which the timer operates. Range 0 to 10° F. Default 2° F.
- **Humidity**: This function enables controlling devices according to humidity. If enabled, define:
  - Function: Define the timer control mode:
    - Dehumidify: The timer operates when the humidity rises above the humidity set point plus the band and continues to operate until the humidity drops to the set point.
    - Humidify: The timer operates when the humidity drops below the set point minus the band and continues to operate until the humidity rises to the set point.
  - Humidity Set-Point: Define the target humidity. Range: 0 – 100%. Default: 60%.
  - Humidity Band: The humidity band defines the range in which the timer operates. Range 0 to 10%. Default 2%
- **Cycle**: If enabled, define the cycle times. The timer operates using the cycle defined here. Range: 0 – 999 seconds (optional). For the cycle to activate, other conditions (temperature/humidity/time) must be fulfilled.

3. As an option, timers can be mapped to an outside temperature sensor. Go to System › Temperature Definition.



- If an outside temperature sensor is enabled, map timers to it (if required).

18 Alarms

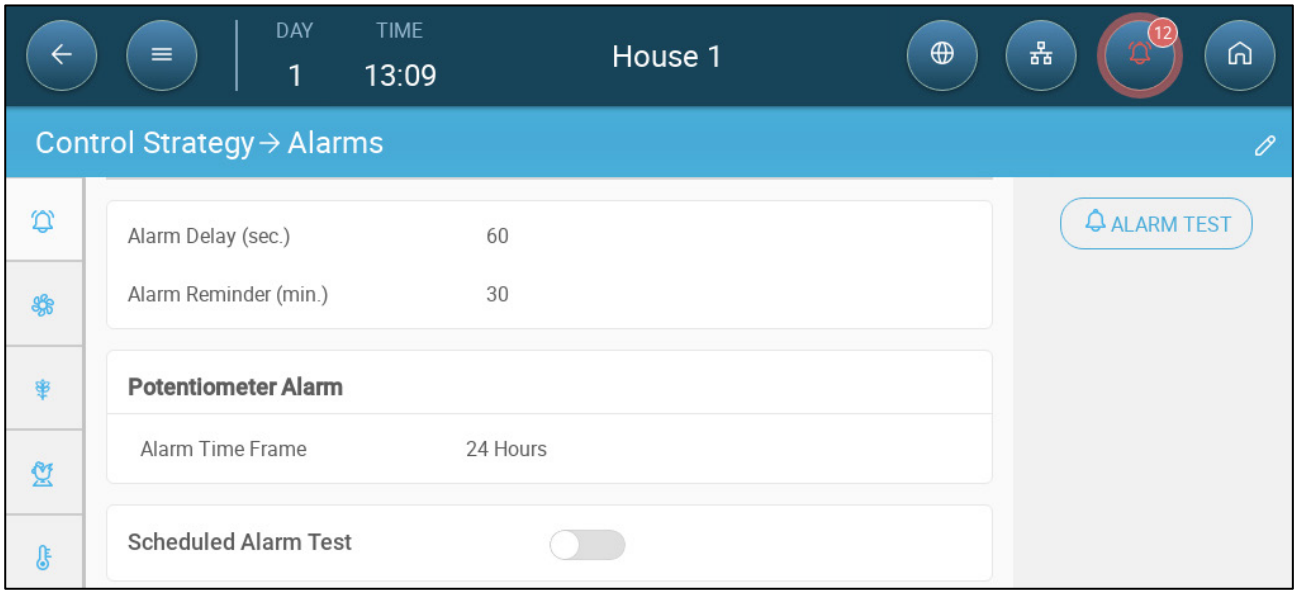
- Defining the Alarm Parameters
- Viewing the Alarms
- Defining the Auxiliary Alarms
- Sending a General Alarm

18.1 Defining the Alarm Parameters

- Alarm Definitions
- Alarm Test

18.1.1 ALARM DEFINITIONS

1. Go to System › Control Strategy › Alarms .



NOTE Potentiometer only appears if this device is mapped. Refer to Devices and Sensors.

2. Click .
3. Define:
    - Alarm Delay: After detecting that a parameter has gone above or below its specs, Trio waits this amount of time before sending an alarm. This prevents sending alarms for short deviations. Range: 0 – 999 seconds.
    - Alarm Reminder: Trio will resend an alarm after this amount of time if the alarm is not acknowledged. Range: 0 – 999 minutes.
    - Potentiometer: Enable Potentiometer Alarm: Trio will send an alarm if potentiometer-controlled inlets are not opening to the required levels.

Define the period in which the alarm is active, 24 hours a day or specific time frames.

18.1.2 ALARM TEST

The alarm test confirms that the alarm system is functioning properly. A test can be performed manually at any time or scheduled weekly or daily.

- Manual Test
- Scheduled Tests

18.1.2.1 Manual Test

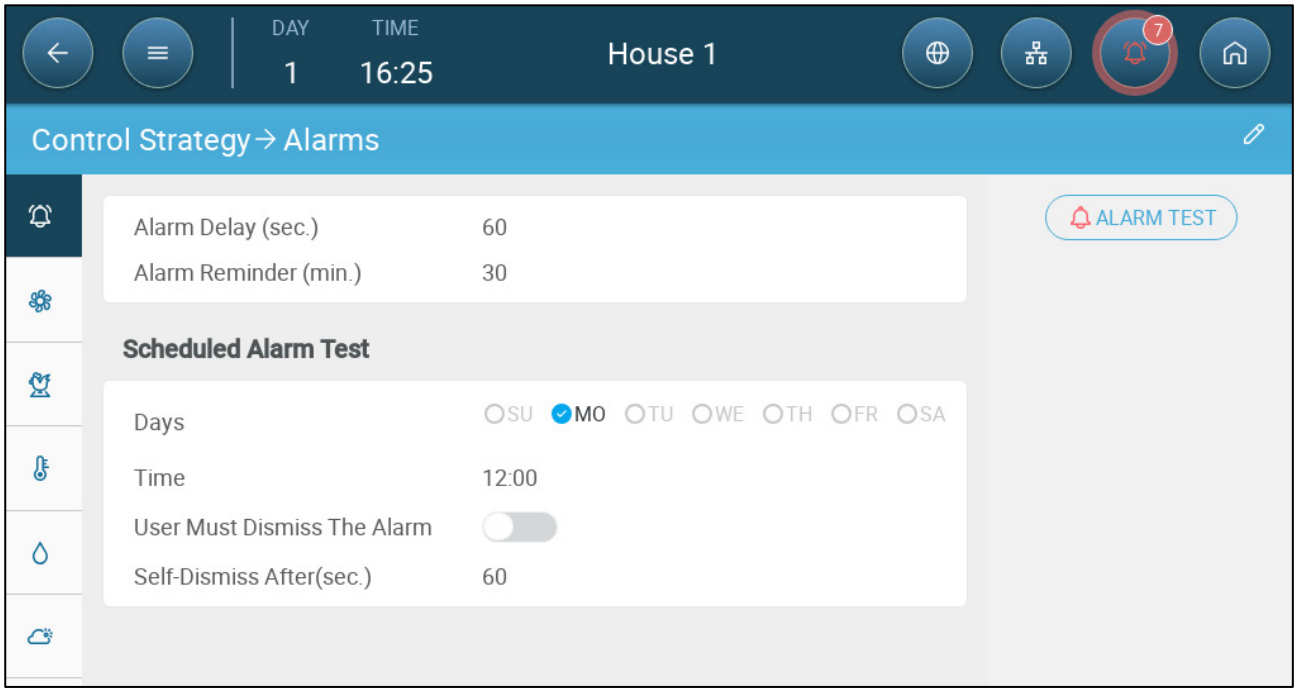
- Click 

. Stop the test as needed.

18.1.2.2 Scheduled Tests

Scheduled tests can be performed once a day only.

1. On the Alarm Screen, enable Scheduled Alarm Test.

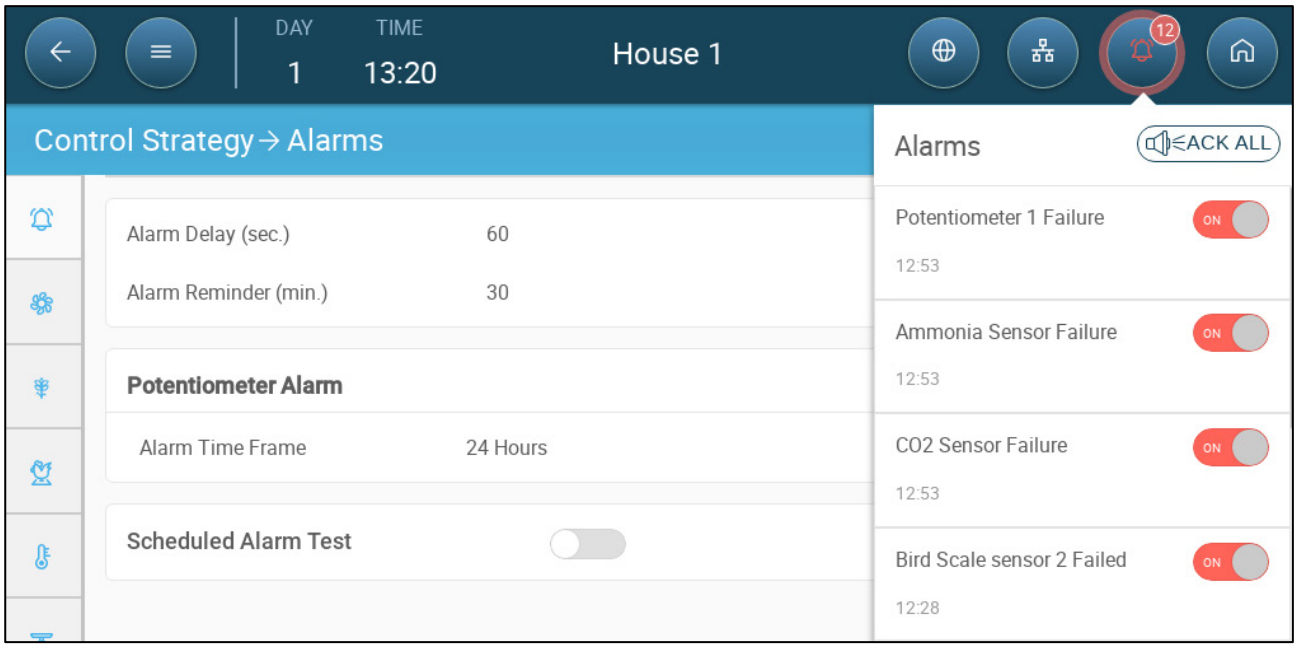


2. Define:
    - The day(s) and time at which the test is performed.
    - User Must Dismiss The Alarm:
        - When enabled, the user must acknowledge the alarm. The alarm remains active until the acknowledged.
        - When disabled, the alarm stops after a specified amount of time (Self-Dismiss After (sec.).

NOTE Testing takes place at the scheduled time. If there is a delay for any reason (for example, a power outage), the test will not take place more than five (5) minutes after the scheduled time.

18.2 Viewing the Alarms

- On the Main Menu bar, click  .



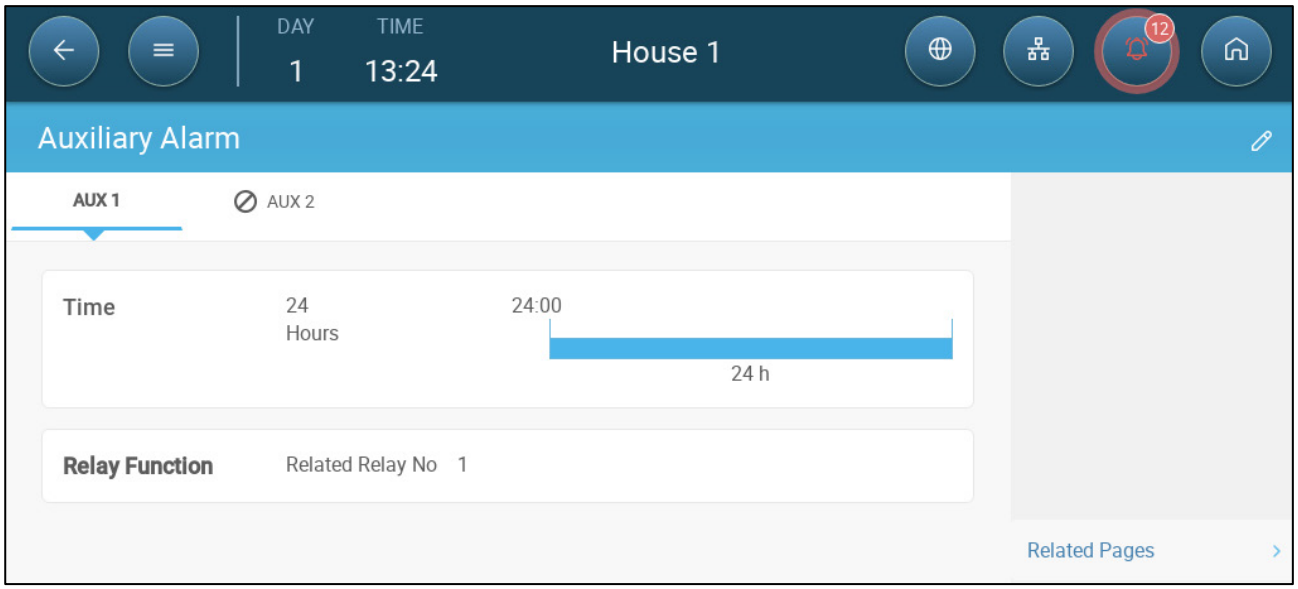
- Click  to acknowledge all alarms or acknowledge each one as required.

18.3 Defining the Auxiliary Alarms

The auxiliary alarm provides an additional method for adding alarm functions to specific relays. This function compares the relay's current state to its defined state (normally open, normally close). If the relay is not in its defined state, Trio sends an alarm. You can define the auxiliary alarms to operate during specific time periods. Use this alarm for those relays controlling important functions.

➲ **Define at least one sensor as an auxiliary input in Devices and Sensors.**

1. Go to Control › Auxiliary Alarm.

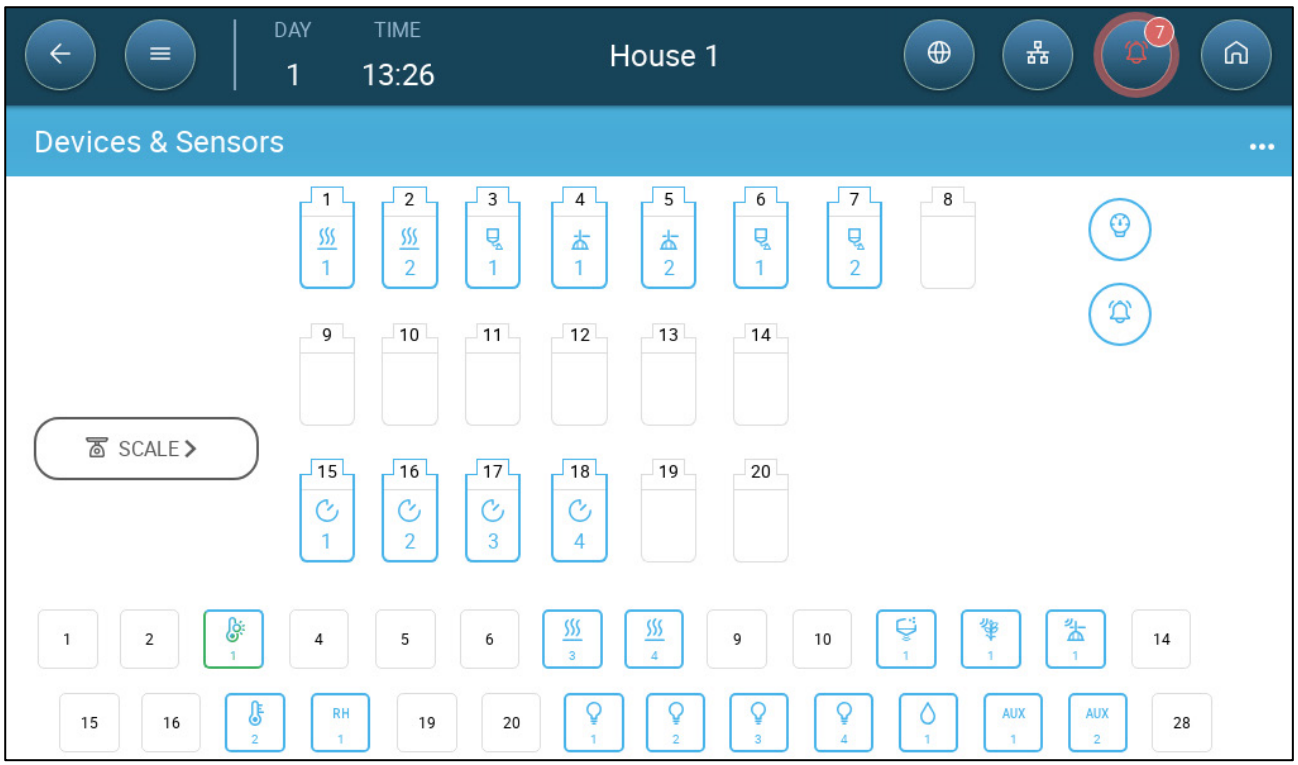


2. In Control > Auxiliary Alarm, click edit, define an alarm as Active.
3. Define:
    - Time Frames: Define the time frame, either 24 hours a day or specific time frames.
    - Relay Function: Enable this function. Define the relay being monitored. When this relay is no longer in its defined state (normally open, normally closed) an alarm is sent.

18.4 Sending a General Alarm

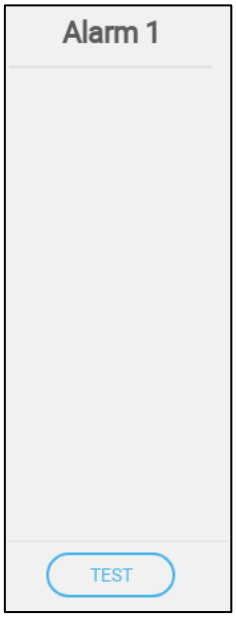
➲ **Define a relay as an alarm. Refer to the Installation Manual.**

1. Go to System › Device and Sensors.



2. Click  .

The Alarm function appears.



3. Click Test.

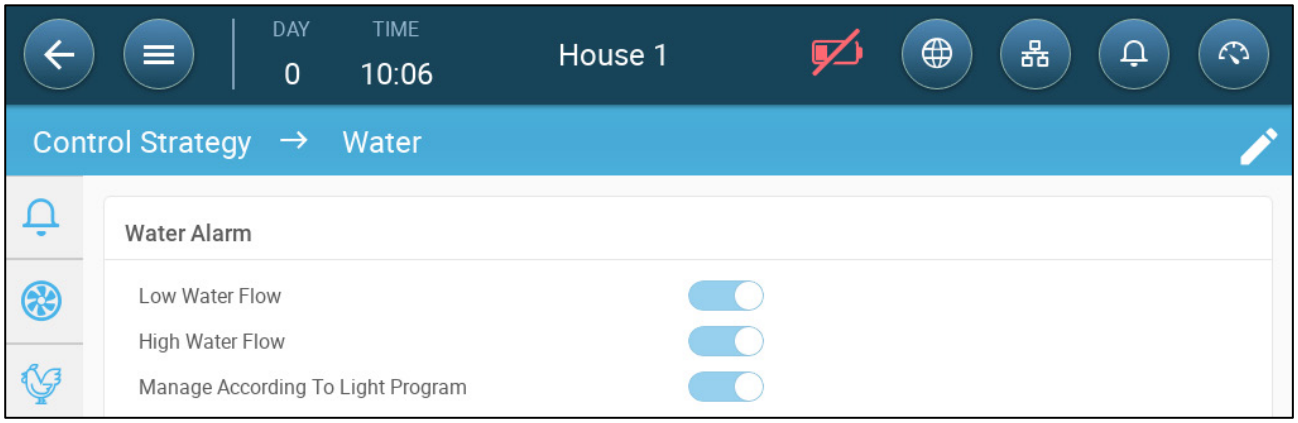
An alarm is sent to everyone on the contact list.

18.5 Water Alarm

The Water Alarm is a unique function which informs the user when water consumption is too low or too high, a parameter which is indicative of bird health issues.

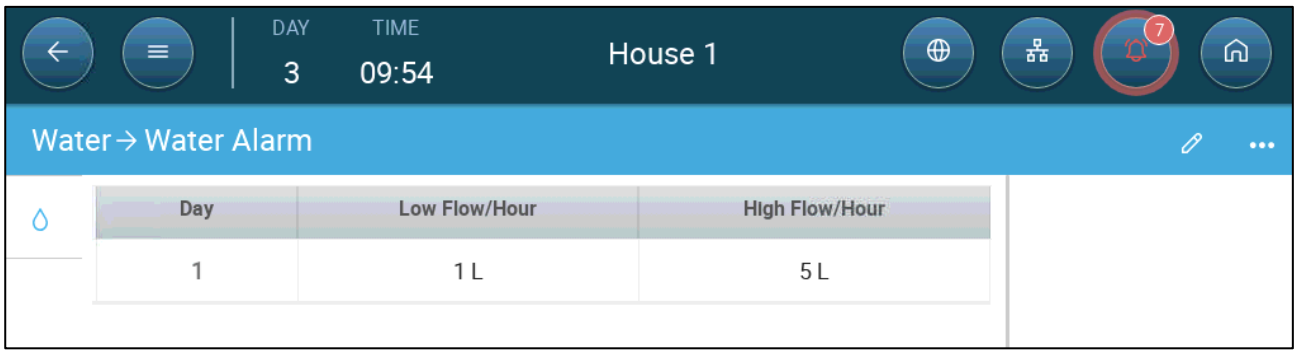
➲ **In Devices and Sensors, map and define at least one digital sensor as a water meter sensor and defined as drinking water. Refer to the Installation Manual.**

1. Go to System › Control Strategy › Water .

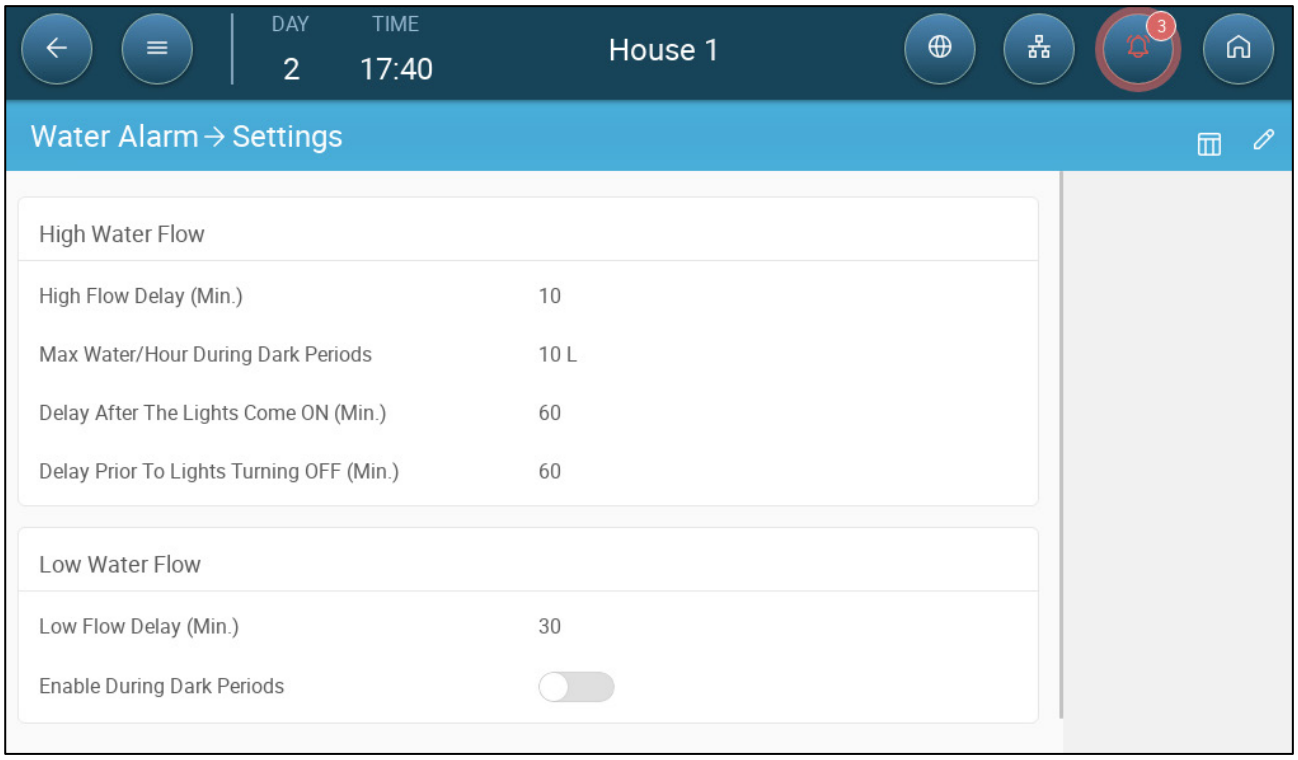


2. Enable (according to your requirements):
   - Low Water Flow: This alarm is triggered when there is a shortage in the estimated water consumption.
   - High Water Flow: This alarm is triggered when the actual consumption exceeds the estimated water consumption or there is a water leak.
   - Manage According to Light Program (the alarm only operates according to the light program).
3. Go to Control › Water.

NOTE The columns that appear here depend on which alarms were enabled in Control Strategy › Water.



4. Define the days and flow rates that trigger an alarm. These quantities remain in effect until another day is defined. Range: 0 – 999.9 liters/gallons per hour. Default: 0.
5. Go to Control › Water › Settings.



6. Define:
    - High Flow Delay (Min.): Define the amount of time that water flows at the high flow rate before Trio sends an alarm.
    - Max Water/Hour During Dark Periods: Define the water flow that triggers an alarm when lighting is off. Range: 0.0 to 264.0 gallons. Default: 2.6 gallons
    - Delay After The Lights Come ON (Min): After lights turn on, there is often a spike in water intake. Define the amount of time that the water intake is ignored (and no alarm is generated) after the lights come on. Range: 0 – 120 minutes. Default: 60
    - Delay Prior To Light Turning OFF (Min): Before lights go off, there is often a spike in water intake. Define the amount of time that the water intake is ignored (and no alarm is generated) before the lights turn off. Range: 0 – 120 minutes. Default: 60.
    - Low Flow Delay (Min.): Define the amount of time that water flows at the low flow rate before Trio sends an alarm.
    - Enable During Dark Periods: Enable low water alarms when lighting is off (and drinking is normally reduced).

19 History

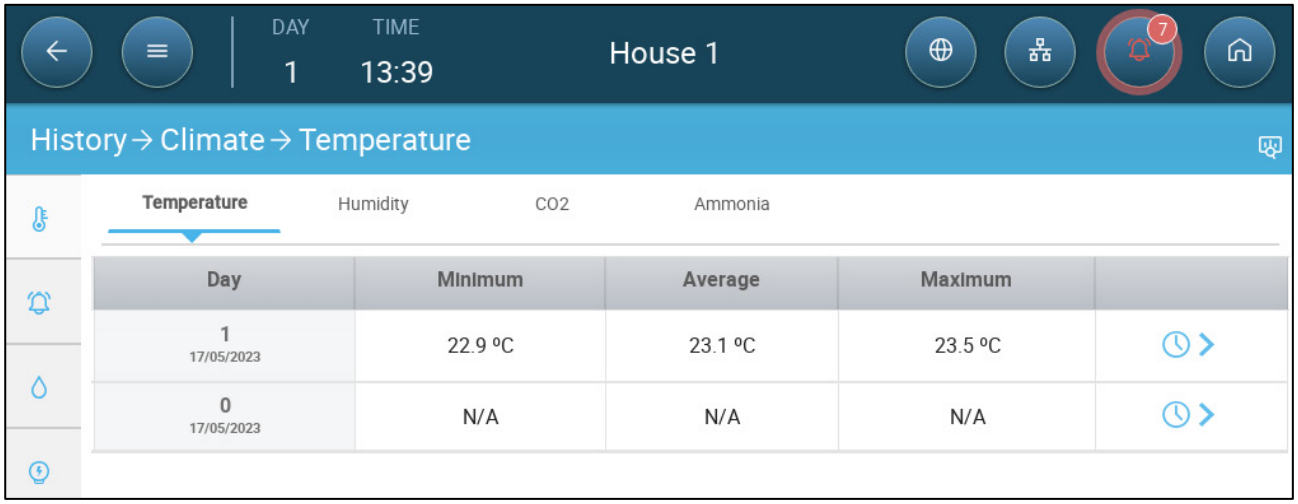
- A Trio controller saves:
  - 150 growth days of history data (minimum)
  - Up to 365 growth days of history data (estimated maximum)
- TrioAir saves data on the server for an unlimited amount of time.
- Starting a new batch/flock erases all history data.
- The alarm and events history table can store up to 2000 items.

- Climate and Air Quality
- Alarms and Events
- Water and Feed History
- Devices History
- Bird Weight History
- Exporting History Data

19.1 Climate and Air Quality

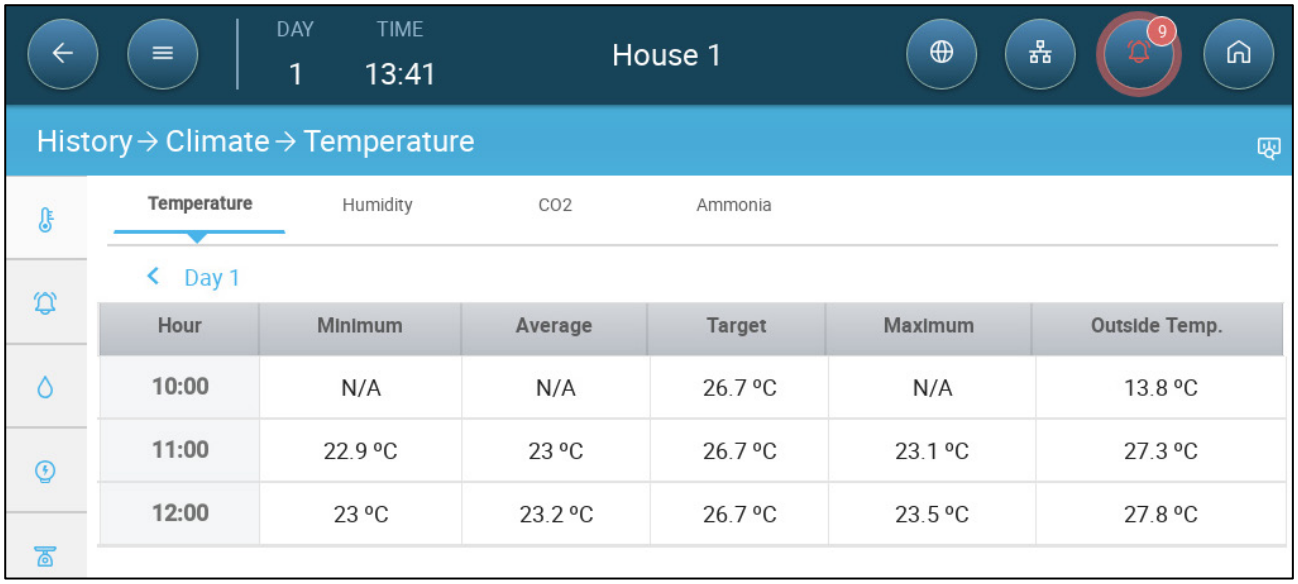
1. Go to Flock > History > .
2. Click the relevant tab to see its history.

NOTE The History screen only shows the history of installed sensors.

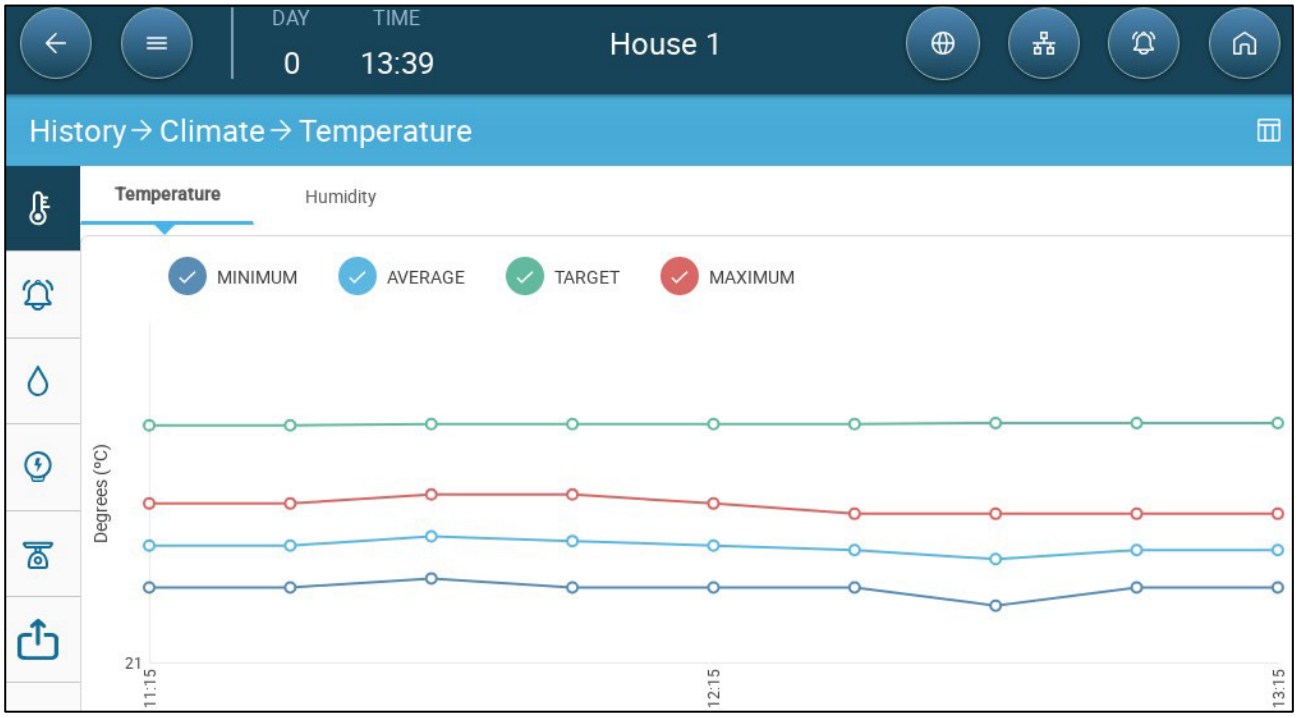


- Temperature History: Records the average, minimum and maximum temperature for each growth day every hour
- Humidity History: Records the average, minimum and maximum humidity for each growth day every hour.
- Co2 History: Records the average, minimum and maximum Co2 for each growth day every hour.

- Ammonia History: Records the average, minimum and maximum ammonia for each growth day every hour.
- Click the clock symbol () to view a detailed breakdown.



  - In the above table, data points are displayed on an hourly basis.
  - Click the Graph icon  to view the data in a graph format. In these graphs data points are generated every 15 minutes (Version 9).

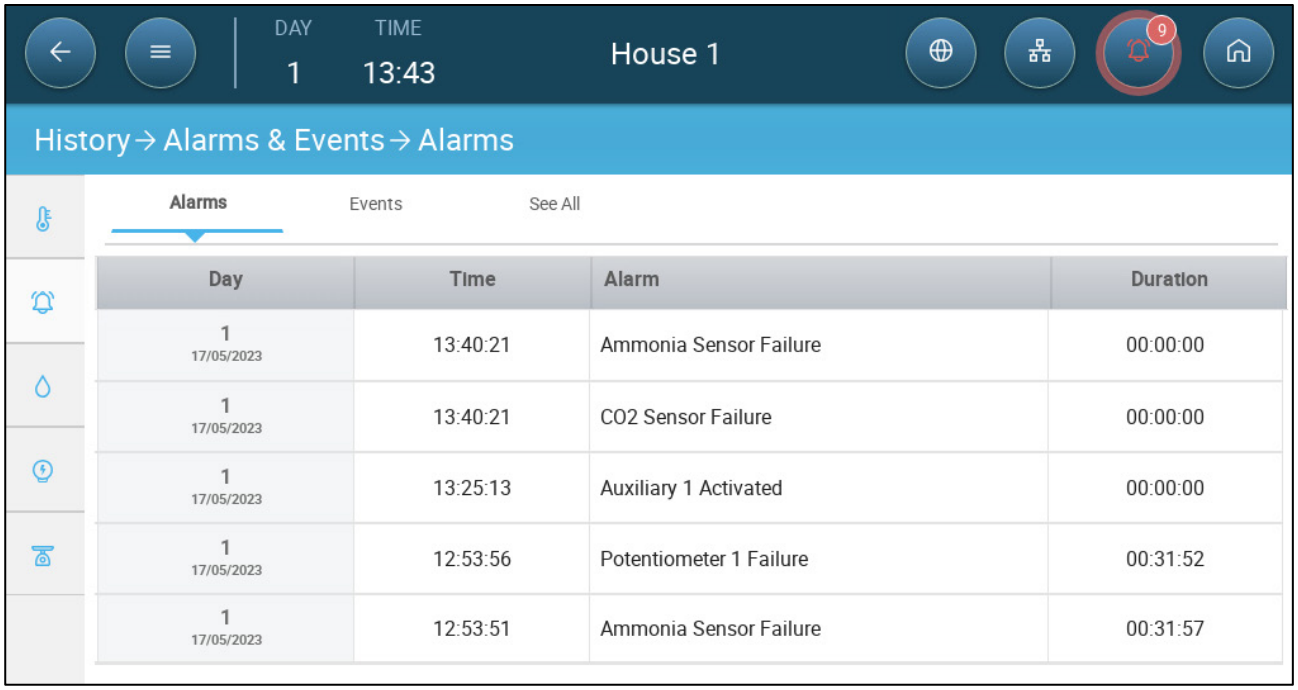


19.2 Alarms and Events

Go to this screen to view the last 999 alarms and events. Alarms history can display the following alarms.

NOTE Performing a Cold Start or Starting a new group clears the Alarm History.

1. Go to Flock > History > .
2. Click the relevant tab.

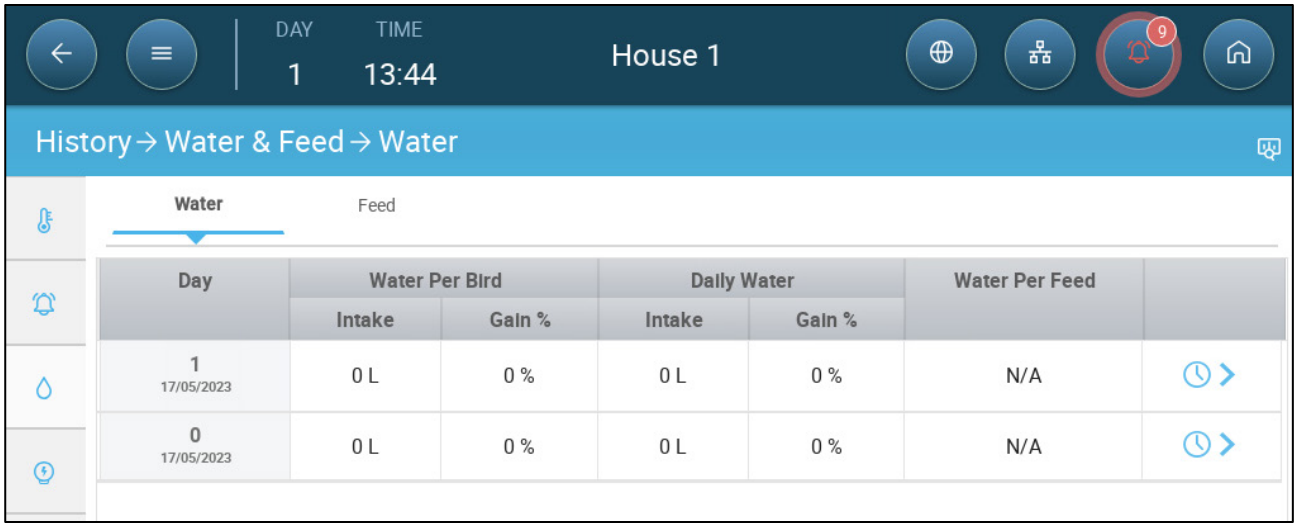


- Alarm Description
  - Unknown Alarm
  - High Temperature
  - Sensor # High Temperature
  - High Co2
  - Low Pressure
  - Water Overflow
  - Outside Temperature Failure
  - Humidity Sensor Failure
  - Ammonia sensor failure
  - Potentiometer # Failure
  - Alarm Test
  - CPU Low Battery
  - Low Temperature
  - Sensor # Low Temperature
  - High humidity
  - High Ammonia
  - High Pressure
  - Water Shortage
  - Temperature Sensor # Failure
  - Co2 Sensor Failure
  - Pressure Sensor Failure
  - Auxiliary # Activated
  - Insufficient Air Supply
  - Emergency Temperature

19.3 Water and Feed History

NOTE All relevant water, auger, feeder relays or sensors must be enabled to see these screens.

1. Go to Flock › History › Water .
2. Click the relevant tab to see its history.



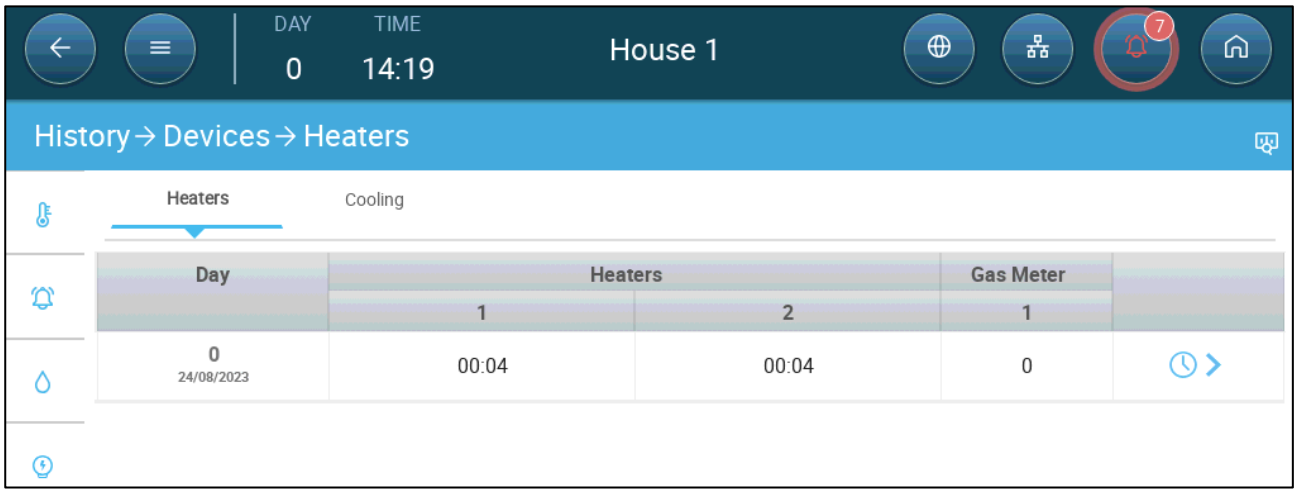
NOTE Click the clock symbol to view the hourly breakdown.

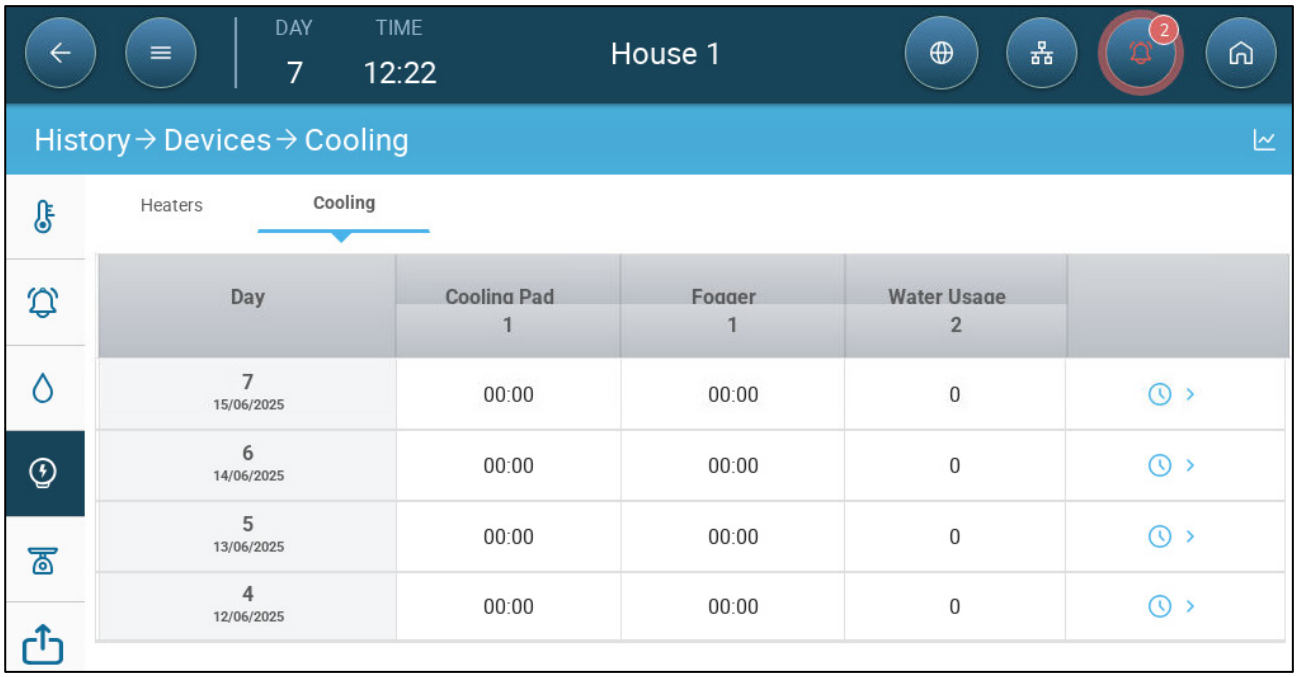
19.4 Devices History

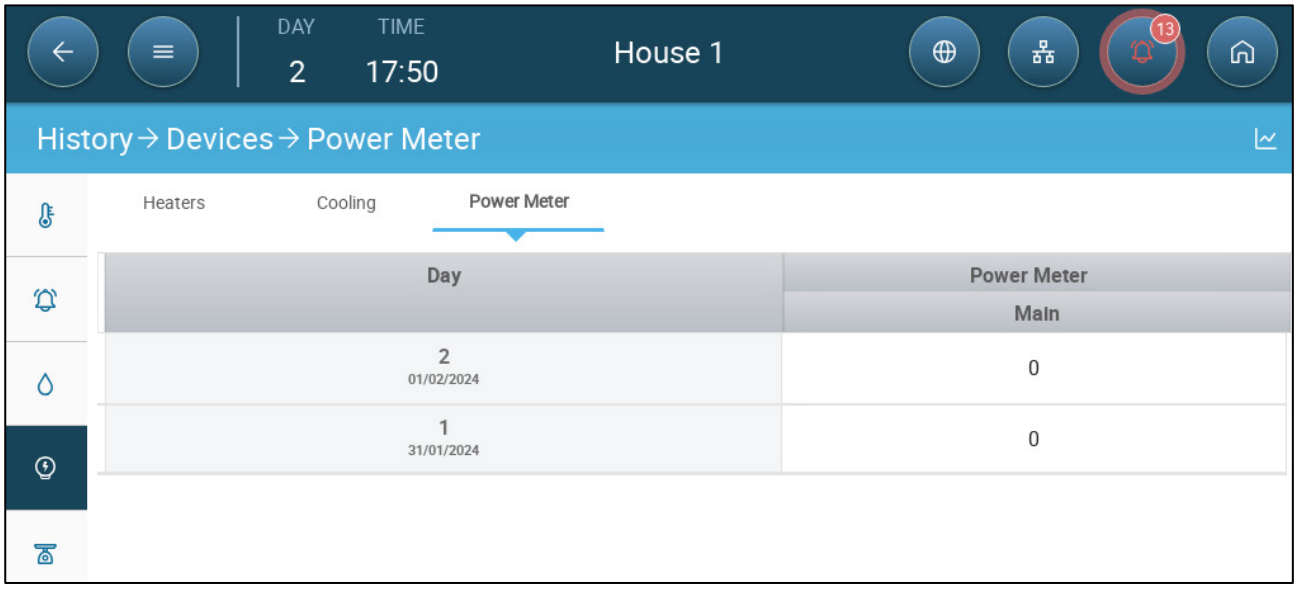
Records the heaters and cooling pad devices run time (in minutes) for each growth day in 24H resolution, this information gives the opportunity to investigate and verify if the runtime of a device performs as expected.

NOTE These devices appear only if they are defined and mapped.

- Go to Flock › History › .







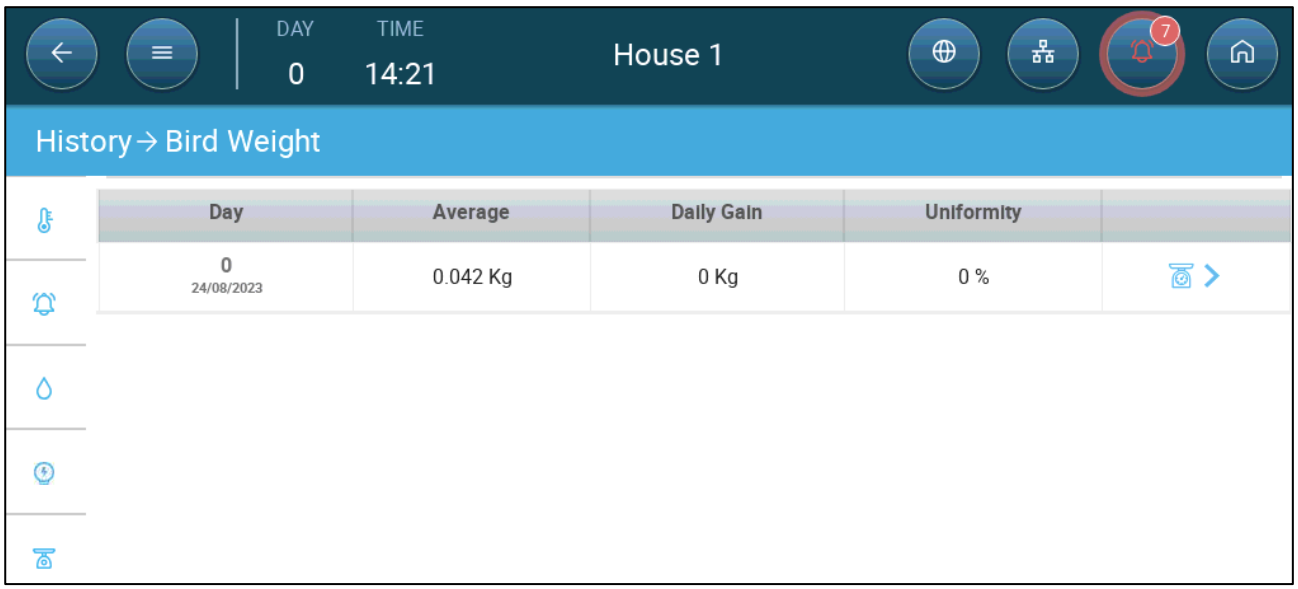
- Click the clock symbol to view the hourly breakdown.

NOTE History displays installed devices only.

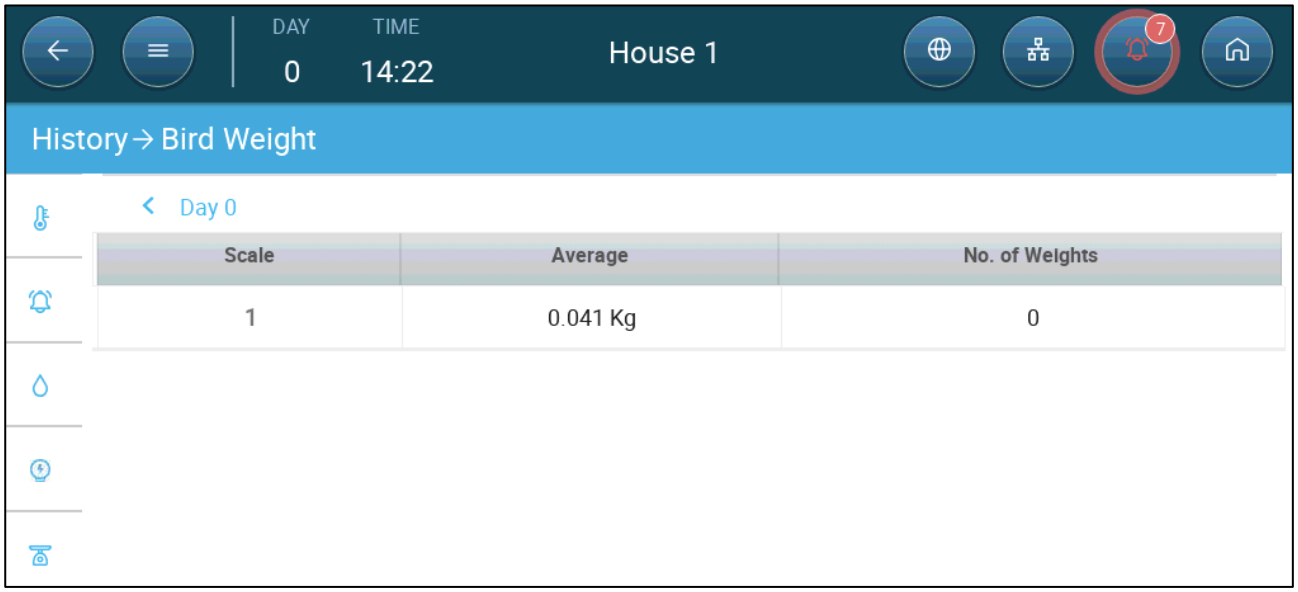
19.5 Bird Weight History

Trio provides the history of the average weight, daily gain, and uniformity. In addition, Trio provides data from one or both scales.

- Go to Flock › History › Bird Weight  .



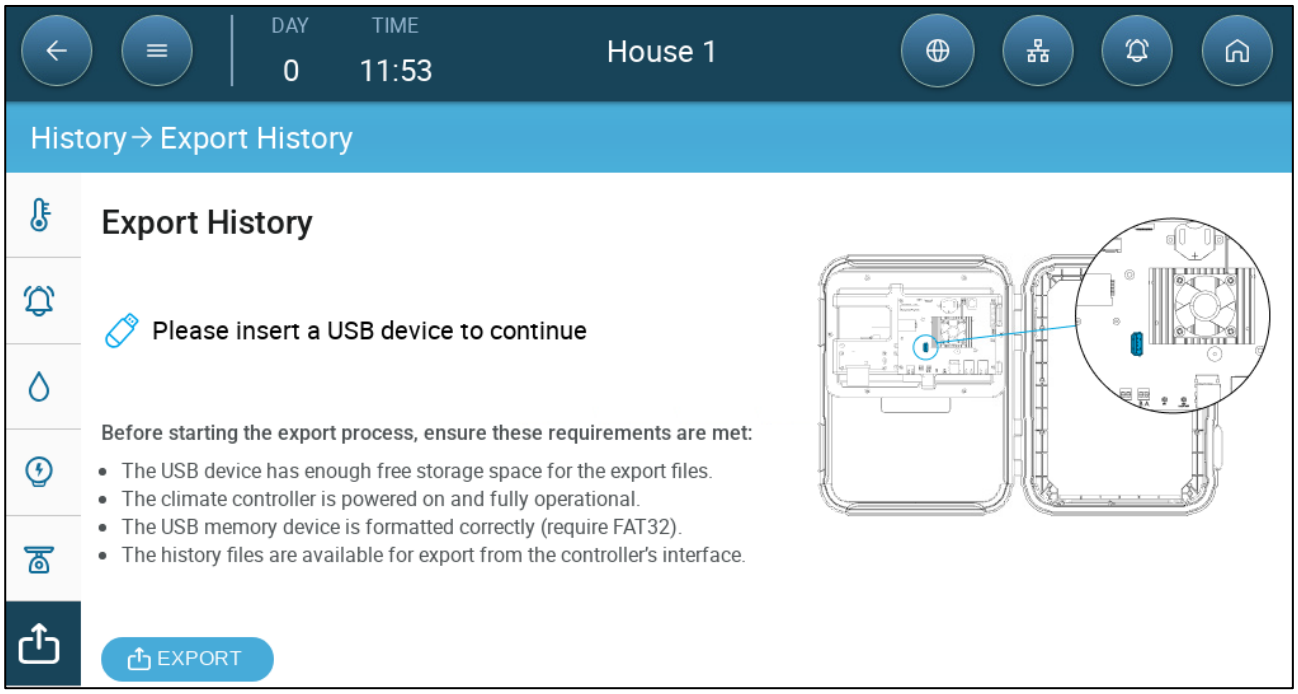
- Click  to view the bird scale data.



19.6 Exporting History Data

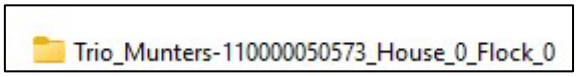
Version 9.0 enables exporting history data to a USB device (flash drive). Data points are generated every 15 minutes.

1. Go to Flock › History › Export History  . The following screen appears.



2. Insert a USB drive into the port as indicated and click **Export**.
3. Once the process is complete, remove the USB drive.

A directory containing excel files has been created on the drive.



20 Resetting, Saving and Loading Settings, Updating Software

Resetting means erasing the tables and current product definitions. Once the settings have been erased, the user can manually reconfigure the Trio or load settings from a USB device.

- Resetting the Settings
- Resetting the Trio CPU and Sensor Connections
- Updating the Software
- Viewing the Log
- Updating the Software

20.1 Resetting the Settings

CAUTION *Do not disconnect the power while resetting the unit. Any disconnection can cause severe hardware damage.*

To reset the Trio:

1. Go to System › General Settings.
2. Click  .
3. Click 

.
4. Follow the on-line instructions. You have the option of backing up the settings.

20.2 Resetting the Trio CPU and Sensor Connections

There are two ways to reset the Trio unit, depending on what is required.

- To reset the CPU and the user interface, press the button shown in Figure 9: CPU Reset Button.
- To reset the unit's connection to the sensors, press the button shown in Figure 10.

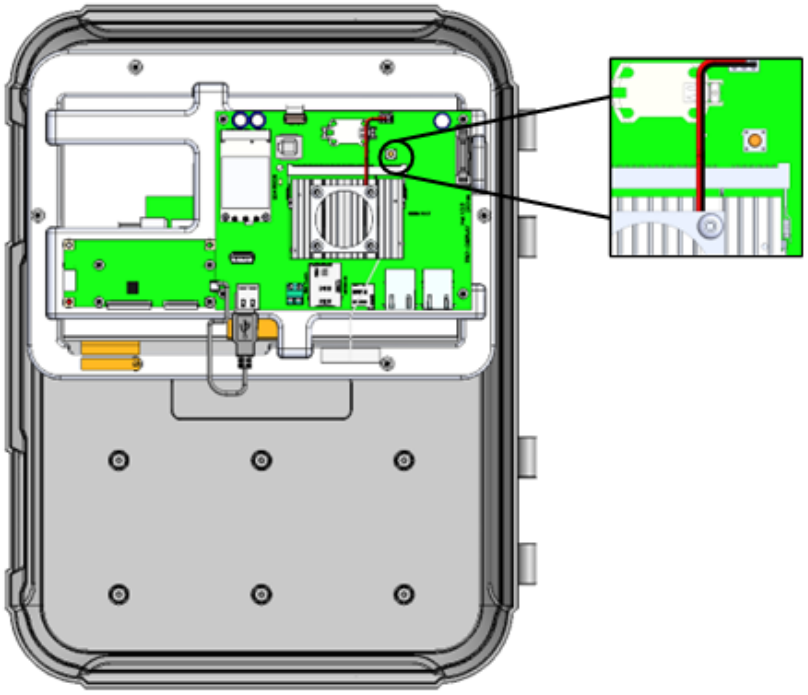


Figure 10: CPU Reset Button

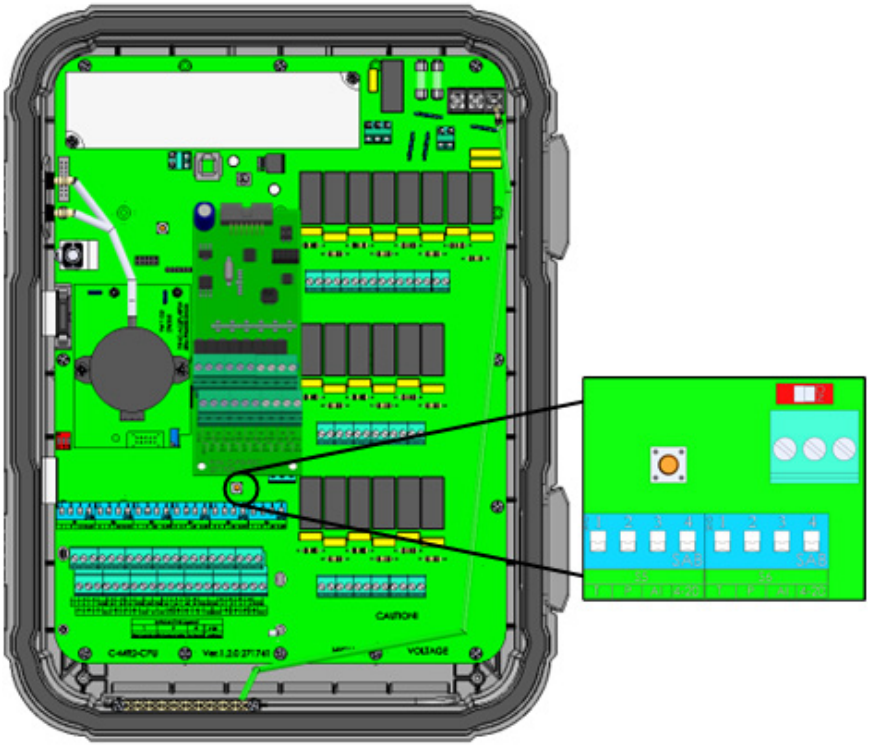
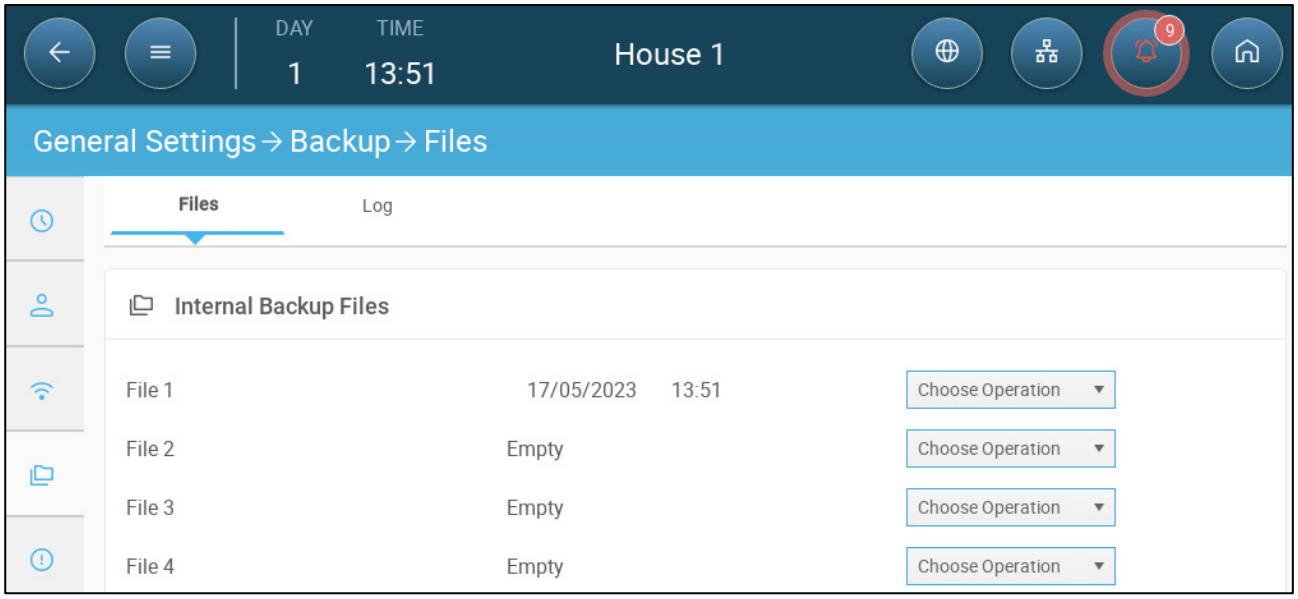


Figure 11: Connection to Sensors Reset

20.3 Saving or Loading the Settings

1. Go to System › General Settings › .

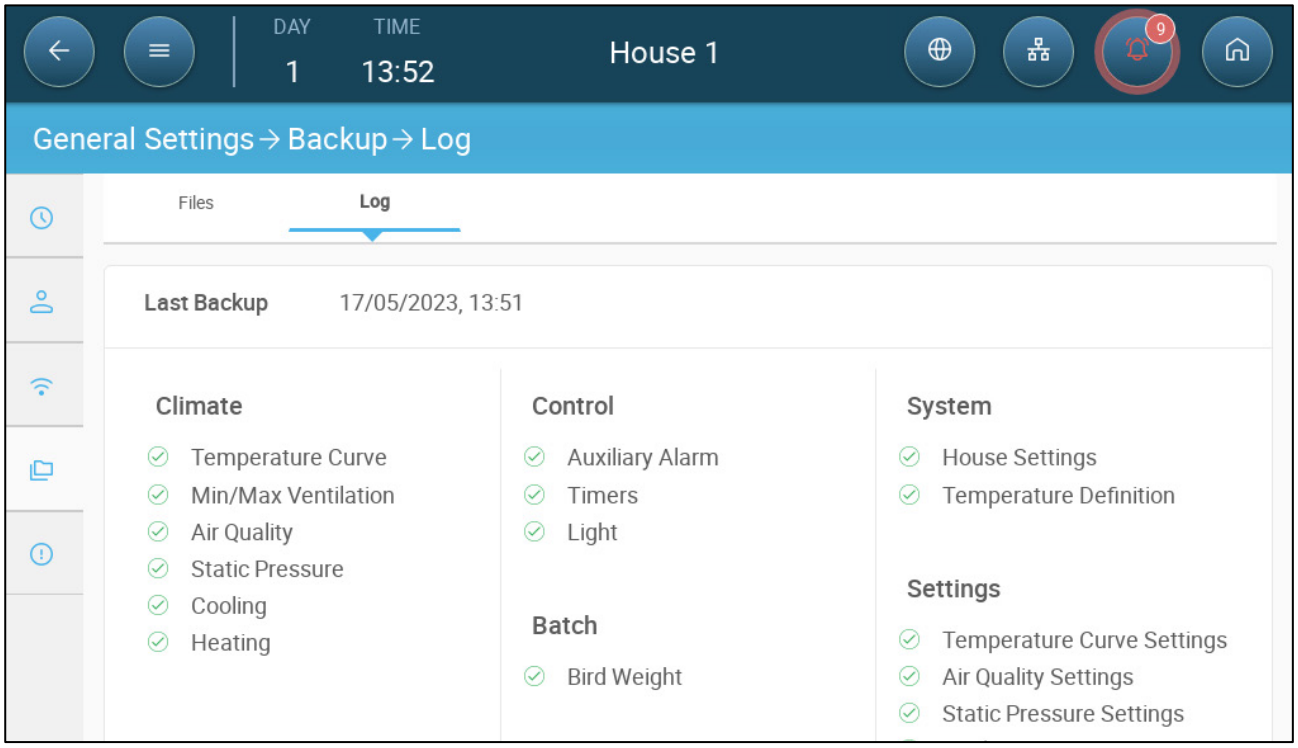


2. Click Choose Operation and select Load Settings, Save Settings, or Delete File.
3. Follow the instructions.

NOTE In Choose Operation, you can also delete a backed-up file.

20.4 Viewing the Log

The log displays which tables were successfully saved.



20.5 Updating the Software

- General Instructions
- Updating to Version 8.3
- Updating to Version 9.0

20.5.1 General Instructions

CAUTION *Do not disconnect the power while updating the software. Any disconnection can cause severe hardware damage.*

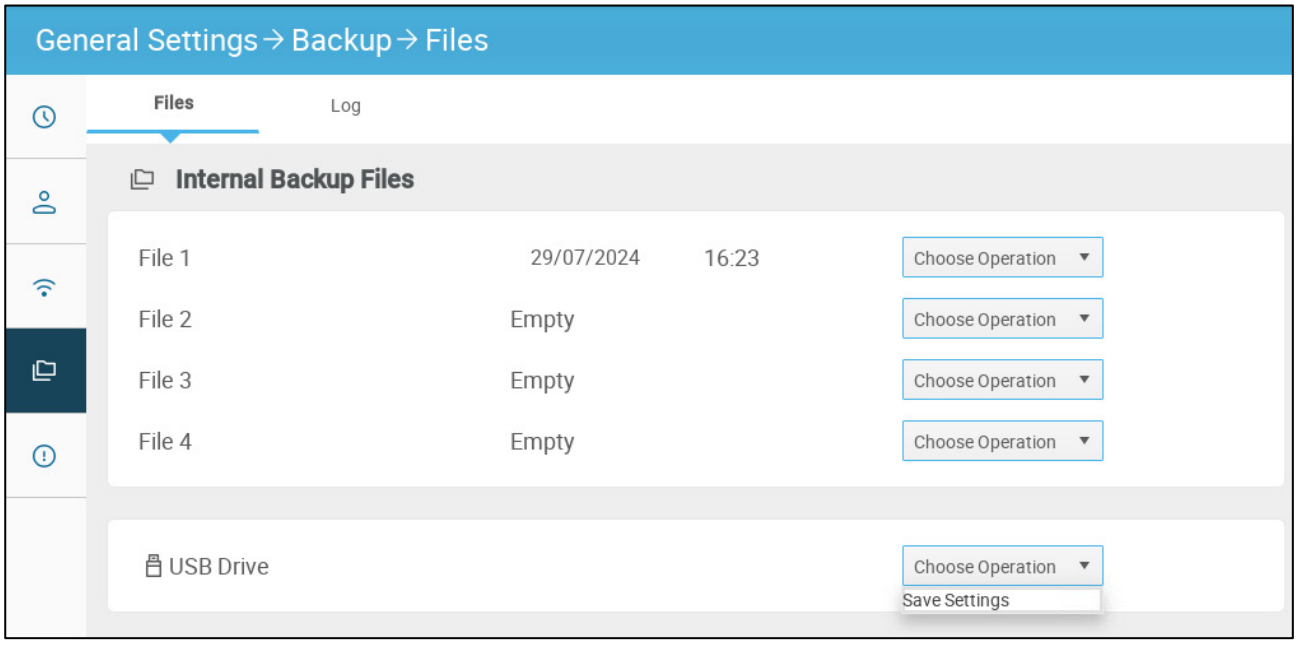
To update the Trio Software:

1. Go to System > General Settings.
2. Click  .
3. In Software Version, click **Update**.
4. Follow the on-line instructions.

20.5.2 Updating to Version 8.3

Before updating the Trio 20 to Version 8.3, save a backup file to an external USB flash drive.

- Saving a backup file to an internal slot does not mean that the file is saved on the flash drive.
- A flash drive must be inserted into the Trio for this option to appear.



20.5.3 Updating to Version 9.0

When updating the software to Version 9.0, Trio saves the Flock Settings data (number of birds, growth day, and flock number). These features enables updating the software during the growth cycle without losing data. In addition, the user can transfer configuration settings from one Trio to another while preserving the Flock Settings.

21 Index

22 Warranty

Warranty and technical assistance

Munters products are designed and built to provide reliable and satisfactory performance but cannot be guaranteed free of faults; although they are reliable products they can develop unforeseenable defects and the user must take this into account and arrange adequate emergency or alarm systems if failure to operate could cause damage to the articles for which the Munters plant was required: if this is not done, the user is fully responsible for the damage which they could suffer.

Munters extends this limited warranty to the first purchaser and guarantees its products to be free from defects originating in manufacture or materials for one year from the date of delivery, provided that suitable transport, storage, installation and maintenance terms are complied with. The warranty does not apply if the products have been repaired without express authorisation from Munters, or repaired in such a way that, in Munters' judgement, their performance and reliability have been impaired, or incorrectly installed, or subjected to improper use. The user accepts total responsibility for incorrect use of the products.

The warranty on products from outside suppliers fitted to Trio, (for example antennas, power supplies, cables, etc.) is limited to the conditions stated by the supplier: all claims must be made in writing within eight days of the discovery of the defect and within 12 months of the delivery of the defective product. Munters has thirty days from the date of receipt in which to take action, and has the right to examine the product at the customer's premises or at its own plant (carriage cost to be borne by the customer).

Munters at its sole discretion has the option of replacing or repairing, free of charge, products which it considers defective, and will arrange for their despatch back to the customer carriage paid. In the case of faulty parts of small commercial value which are widely available (such as bolts, etc.) for urgent despatch, where the cost of carriage would exceed the value of the parts, Munters may authorise the customer exclusively to purchase the replacement parts locally; Munters will reimburse the value of the product at its cost price.

Munters will not be liable for costs incurred in demounting the defective part, or the time required to travel to site and the associated travel costs. No agent, employee or dealer is authorised to give any further guarantees or to accept any other liability on Munters' behalf in connection with other Munters products, except in writing with the signature of one of the Company's Managers.

WARNING: In the interests of improving the quality of its products and services, Munters reserves the right at any time and without prior notice to alter the specifications in this manual.

The liability of the manufacturer Munters ceases in the event of:

- dismantling the safety devices;
- use of unauthorised materials;

- inadequate maintenance;
- use of non-original spare parts and accessories.

Barring specific contractual terms, the following are directly at the user's expense:

- preparing installation sites;
- providing an electricity supply (including the protective equipotential bonding (PE) conductor, in accordance with CEI EN 60204-1, paragraph 8.2), for correctly connecting the equipment to the mains electricity supply;
- providing ancillary services appropriate to the requirements of the plant on the basis of the information supplied with regard to installation;
- tools and consumables required for fitting and installation;
- lubricants necessary for commissioning and maintenance.

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.

Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

The use of non-original spare parts or incorrect assembly exonerates the manufacturer from all liability.

Requests for technical assistance and spare parts can be made directly to the nearest Munters office.

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