# User Manual

Trio
Poultry
Controller

# Trio

## Poultry Controller

Ag/MIS/UmGb-2830-11/21 Rev 1.6

P/N: 117790

Munters

# Trio Poultry Controller

## User Manual

Rev 1.6, 05/2023

Product Software: Version 5.0.18

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

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# Index


*Chapter* *page*

1 INTRODUCTION ..... 6
1.1 Disclaimer ..... 6
1.2 Introduction ..... 6
1.3 Notes ..... 6
2 USING THE TRIO TOUCH SCREEN ..... 7
2.1 Icons ..... 7
2.2 Dashboard ..... 8
3 FLOCK MANAGEMENT ..... 10
3.1 Defining the General Settings ..... 10
3.1.1 Defining the Preferences ..... 10
3.1.2 Defining the Time/Date ..... 11
3.1.3 Defining the House Setting ..... 12
3.2 Flock Settings ..... 12
3.2.1 Defining the Flock Settings Parameters ..... 12
3.2.2 Defining House Modes ..... 17
3.3 Adjusting the Bird Count ..... 17
3.4 Tech Support Information ..... 19
4 TEMPERATURE SETTINGS ..... 20
4.1 What is the Temperature Curve ..... 20
4.2 Configuring the Temperature Curve ..... 21
4.2.1 Defining the Temperature Curve Parameters ..... 21
4.2.2 Defining Temperature Curve Settings ..... 22
4.3 Emergency Temperature Control ..... 23
5 INTRODUCTION TO VENTILATION ..... 24
5.1 Defining the Minimum and Maximum Ventilation ..... 24
5.2 Defining the Fans/Ventilation Scheme ..... 25
5.2.1 Basic Ventilation ..... 25
5.2.2 Extra Ventilation ..... 26
5.2.3 Tunnel Ventilation ..... 27
6 MINIMUM AND MAXIMUM VENTILATION ..... 28
6.1 Building Structure Summary ..... 28
6.2 Defining Basic Ventilation ..... 29
6.2.1 Defining Dynamic Ventilation ..... 30


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6.2.2 Ventilation by Weight ... 32
6.2.3 Adding a Curve ... 34
7 LEVELS OF VENTILATION ... 35
7.1 Configuring the Basic Ventilation Settings ... 35
7.2 Basic Ventilation ... 36
7.2.1 Defining Basic Ventilation ... 36
7.2.2 Fan Options ... 38
7.2.3 Inlet and Curtain Ventilation ... 45
7.3 Extra Ventilation ... 49
7.3.1 Introduction to Extra Ventilation ... 49
7.3.2 Defining Extra Ventilation ... 49
7.4 Tunnel Ventilation ... 51
7.4.1 Defining the Tunnel Ventilation Parameters ... 51
7.4.2 Defining the Tunnel Ventilation Settings ... 52
7.4.3 Tunnel Doors ... 53
7.4.4 Defining the Wind Chill Factor ... 53
7.5 Calibrating the Inlet/Tunnel Door ... 54
7.6 Stir Fan ... 56
8 COOLING FUNCTIONS ... 57
8.1 Cooling Principles ... 57
8.2 Selecting the Cooling Mode ... 57
8.2.1 Continuous Cooling ... 58
8.2.2 Cycle Cooling ... 59
8.2.3 Ramping Cooling ... 60
9 HEATING FUNCTIONS ... 61
9.1 Defining the Central Heater Parameters ... 61
9.2 Zone Heaters ... 62
9.2.1 Defining Non-Variable Zone Heaters ... 62
9.2.2 Defining Variable Zone Heaters ... 62
10 BROOD AREA ... 64
11 FEED AND SILO MANAGEMENT ... 66
11.1 Feeding Summary ... 66
11.2 Setting up Feeding ... 66
11.3 Configuring the Silo ... 68
12 LIGHTING PROGRAM ... 70
12.1 On/Off Lights ... 70
12.2 0 – 10 Volt Variable Lights ... 73
12.3 Light Settings ... 75
13 DEFINING THE EXPECTED BIRD WEIGHT ... 76

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13.1 Reference Bird Curve ..... 76
13.1.1 Curve Enabled ..... 76
13.1.2 Curve Disabled ..... 78
13.2 Male/Female Weighing ..... 79
13.2.1 Gender Separated Weighing ..... 79
13.2.2 Non-Separated Weighing ..... 81
14 AIR QUALITY ..... 82
14.1 Defining the Air Quality Parameters ..... 82
14.2 Defining the Air Quality Settings ..... 83
15 TIMERS ..... 85
16 ALARMS ..... 87
16.1 Defining the Alarm Parameters ..... 87
16.1.1 Alarm Definitions ..... 87
16.1.2 Alarm Test ..... 88
16.2 Viewing the Alarms ..... 89
16.3 Defining the Auxiliary Alarms ..... 90
16.4 Sending a General Alarm ..... 91
17 HISTORY ..... 92
17.1 Climate and Air Quality ..... 92
17.2 Alarms and Events ..... 93
17.3 Water and Feed History ..... 94
17.4 Devices History ..... 95
17.5 Bird Weight History ..... 96
18 RESETTING, SAVING AND LOADING SETTINGS, UPDATING SOFTWARE ..... 97
18.1 Cold Start ..... 97
18.2 Saving or Loading the Settings ..... 98
18.3 Viewing the Log ..... 98
18.4 Updating the Software ..... 99
19 WARRANTY ..... 100

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# 1 Introduction

## 1.1 Disclaimer

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## 1.2 Introduction

Congratulations on your excellent choice of purchasing a Trio 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

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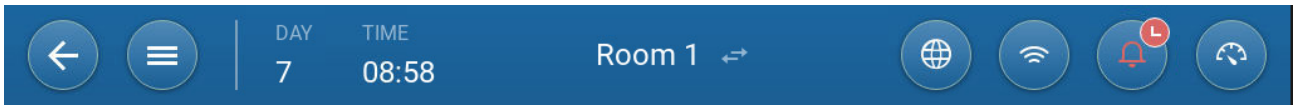
# 2 Using the Trio Touch Screen

- Icons
- Dashboard

## 2.1 Icons

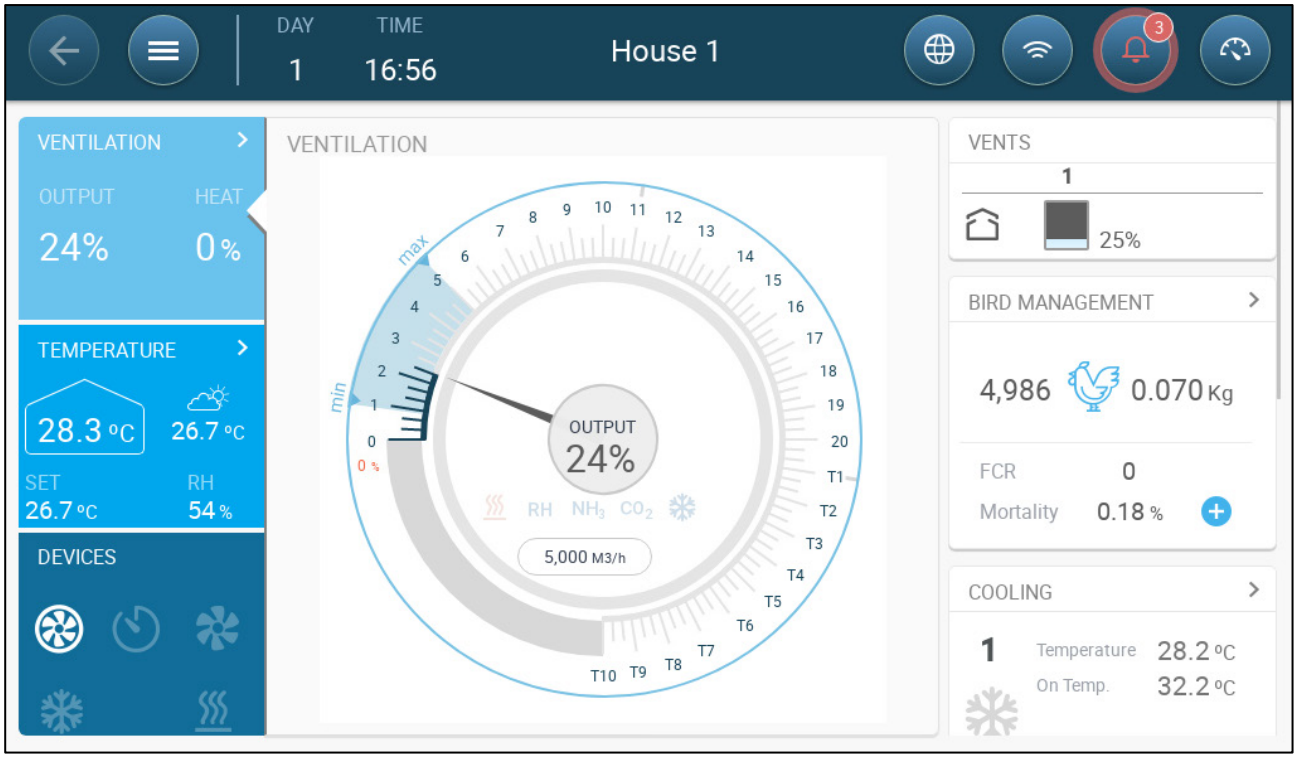



| | |
|---|---|
| | Go back to the previous screen |
| | View the Main menus |
| | Choose language |
| | Network settings |
| | View alarms |
| | Go back to the main screen |
| | Settings icon |
| | Edit parameters |
| | Replace the dashboard battery with a standard 3V battery. |
| Phone App | |
| | Click the circle containing the user name to edit personal preferences such as the language, units, name, and more. |

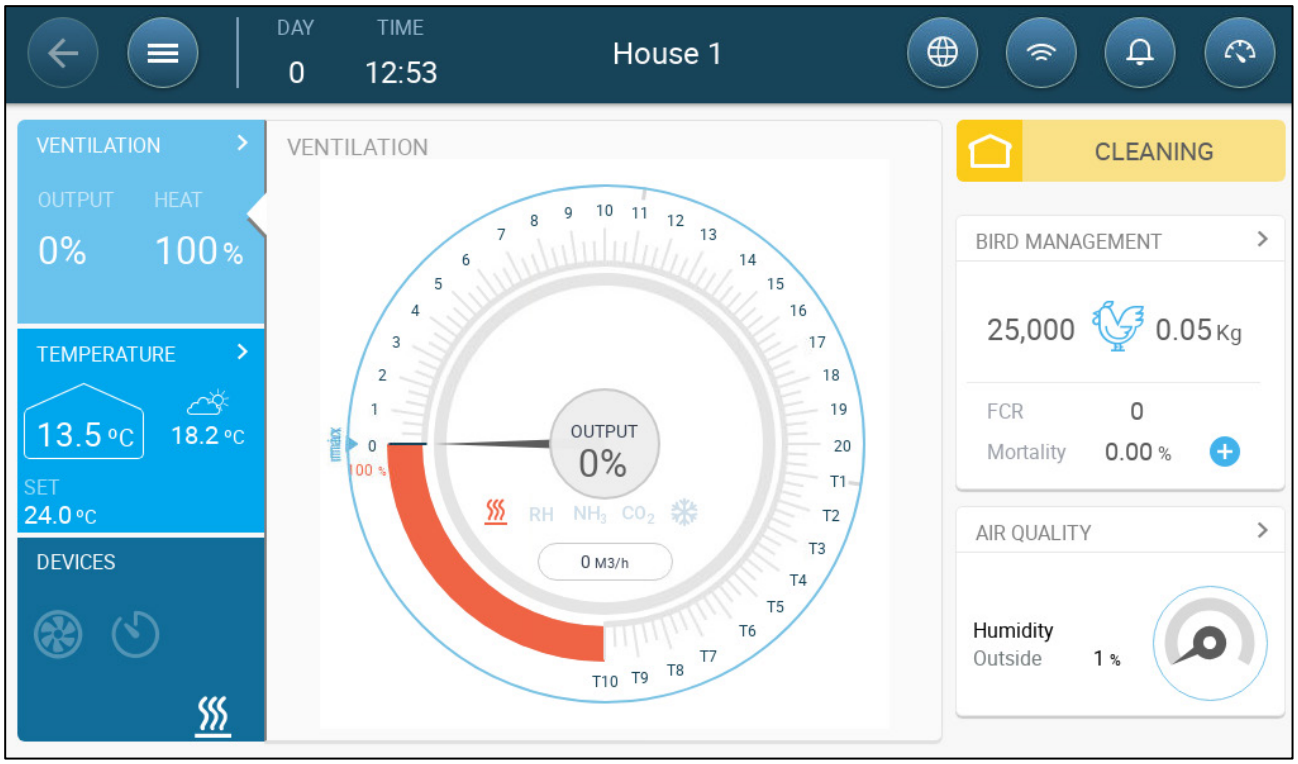
| | |
|---|---|
| Send To All | When a Trio controls two or more rooms or there are two or more houses on a farm, Send to All enables editing certain select functions in more than one room or house. Edit the setting, click Send to All, and select the required Trios. The select rooms' or houses' settings are updated. Note: Send to All does not appear on every screen. |

## 2.2 Dashboard

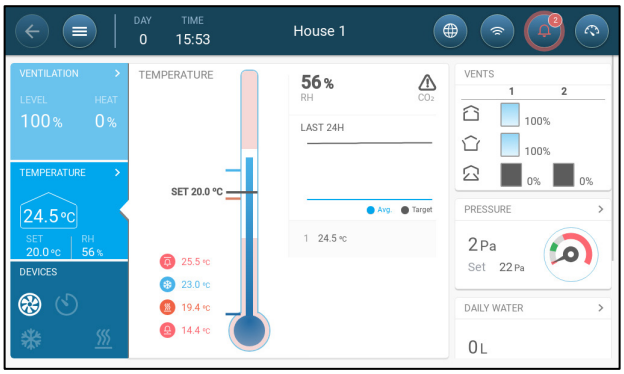
The Dashboard gives an overview of all Trio functions.

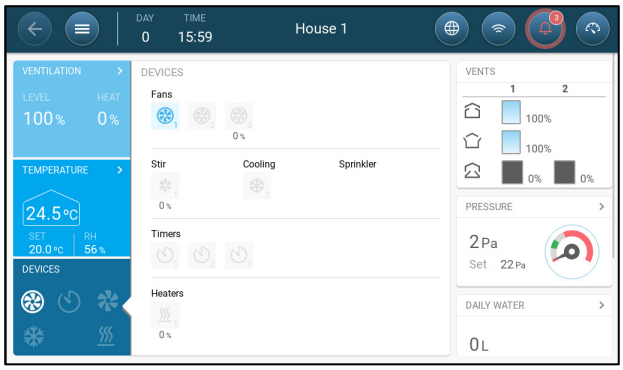



Version 5.0.15 displays the house mode, when defined in any mode besides Growing Mode (refer to Manual Set Up, page 13).




- 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.

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# 3 Flock Management

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

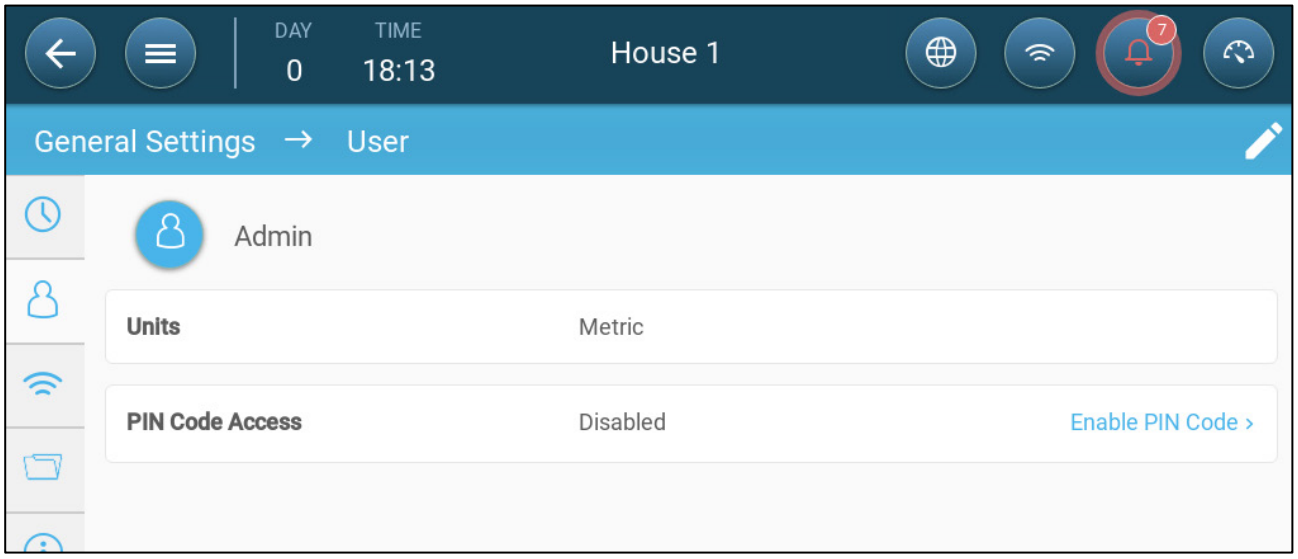
- Defining the General Settings
- Flock Settings
- Adjusting the Bird Count
- Tech Support Information

## 3.1 Defining the General Settings

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

### 3.1.1 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

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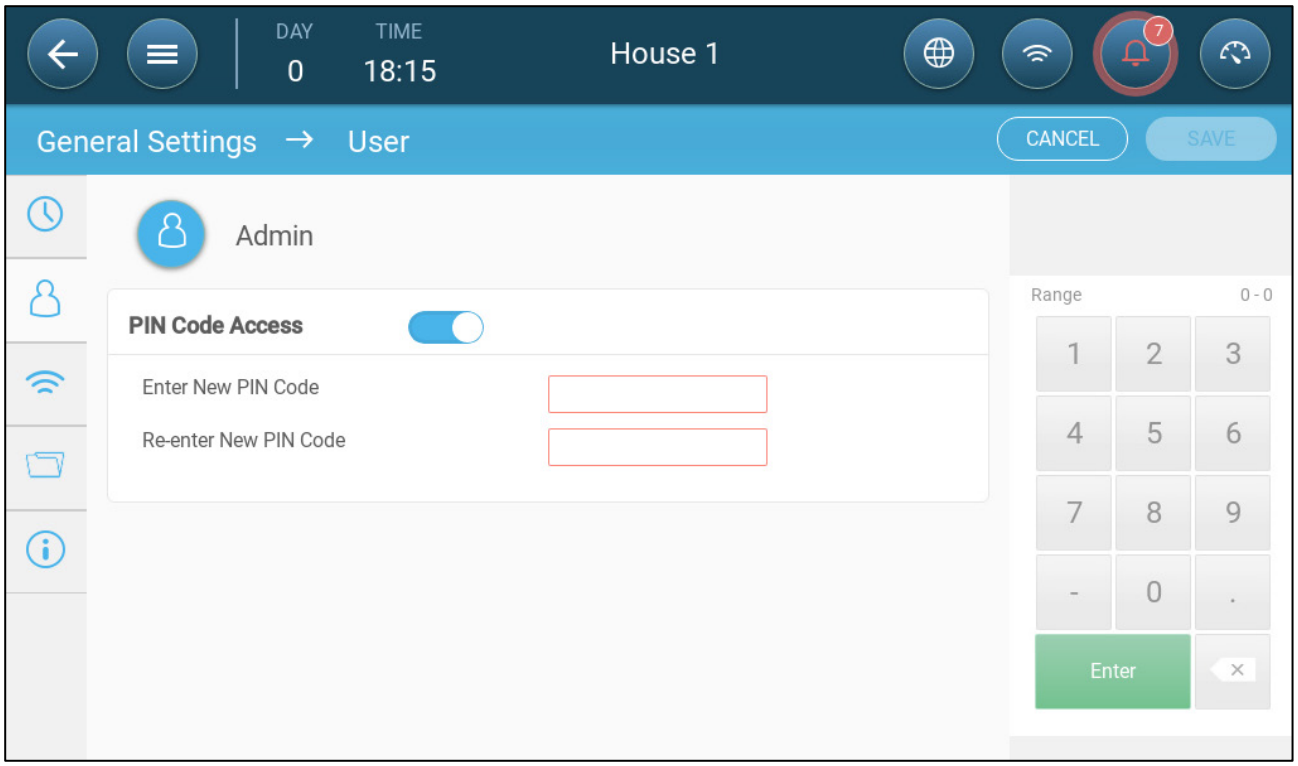
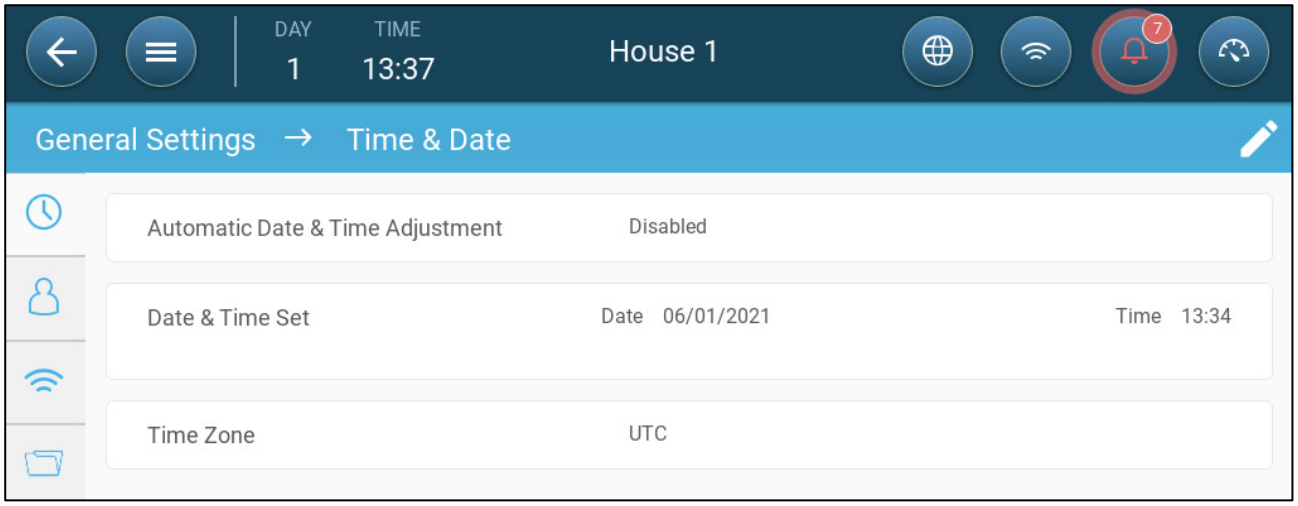
3. Enable/disable Pin Code Access: Pin Code Access is a security measure. Anyone wanting to edit the settings must have this code.




### 3.1.2 DEFINING THE TIME/DATE

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




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.*

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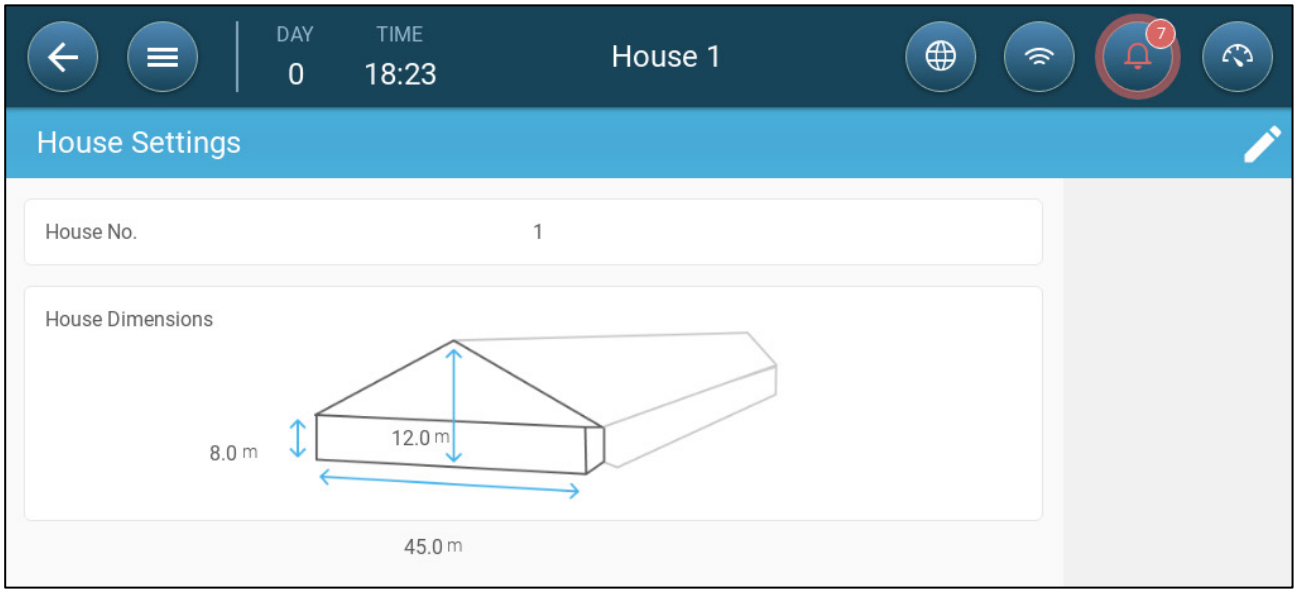
### 3.1.3 DEFINING THE HOUSE SETTING

The screen allows the user to set its' house dimensions. Set it according to the actual house size. These dimensions are used for calculating the wind chill factor (the chilling effect of the wind that can significantly lower the temperature




- 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 10 and edit the units.

## 3.2 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

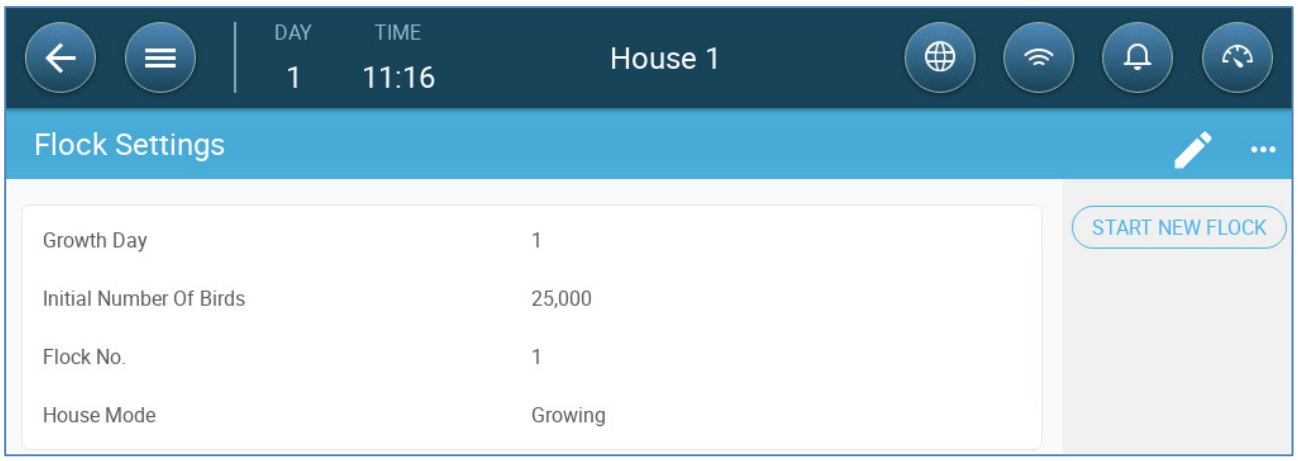
- Defining the Flock Settings Parameters
- Defining House Modes

### 3.2.1 DEFINING THE FLOCK SETTINGS PARAMETERS

- Manual Set Up
- New Flock Wizard

### 3.2.1.1 Manual Set Up

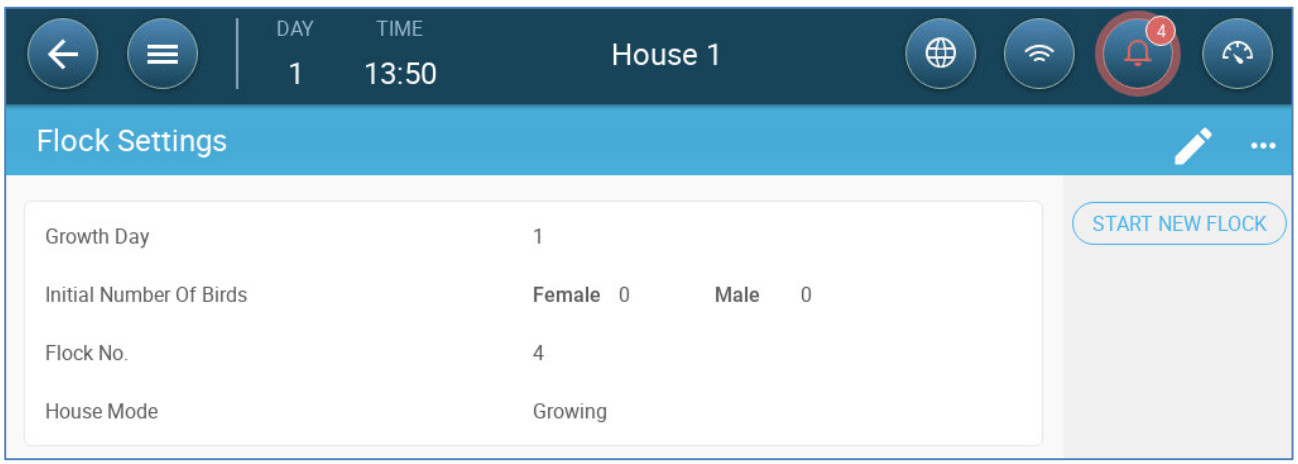
1. Go to Flock > Flock Settings.




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 17.*

*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 79.*




   - 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.
     - Growing
     - Empty: Empty house mode is used when the whole house is empty.

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        - 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 facility before moving the animals in to the pre-heat temperature set-point. 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.

*NOTE  For information on Brooding, refer to Brood Area, page 64.*

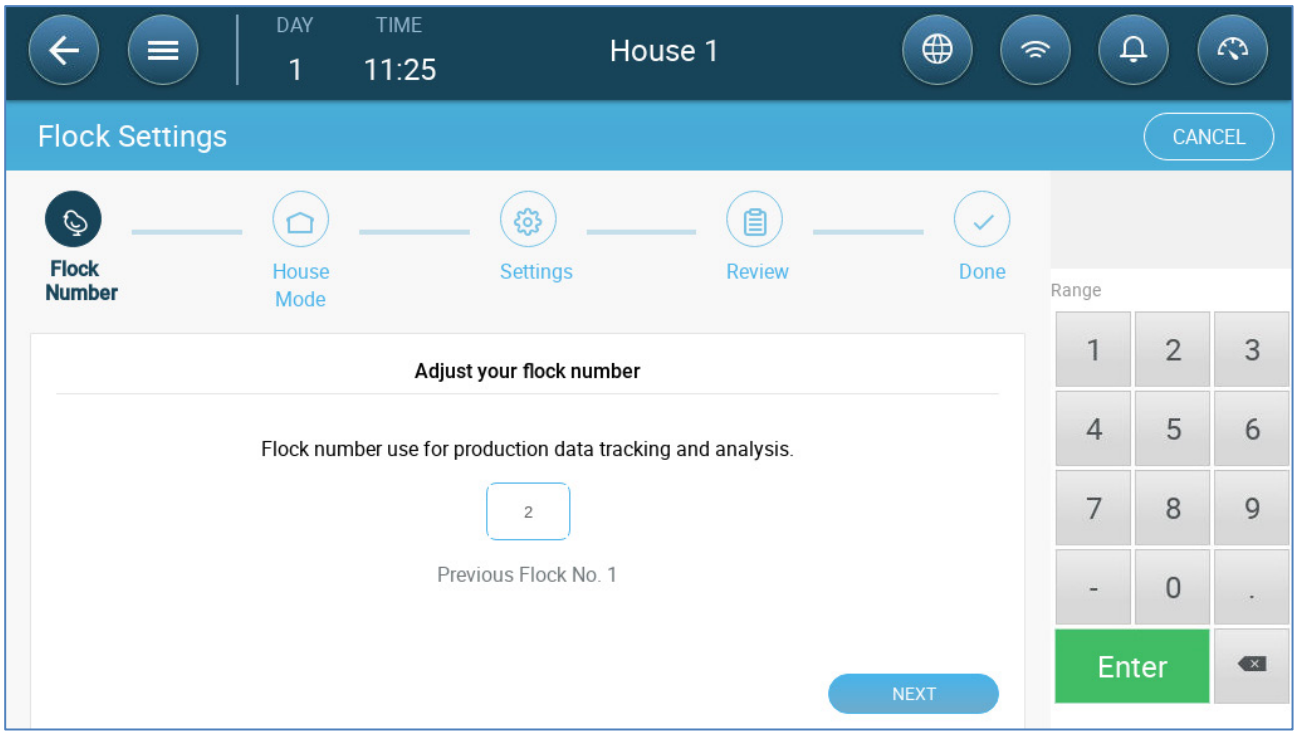
#### 3.2.1.2 New Flock Wizard

Trio Version 5.0.15 provides a simple to use wizard to set up the Growing or Pre-Heat modes. Using the wizard enables defining negative growth days. When starting a new flock Trio:

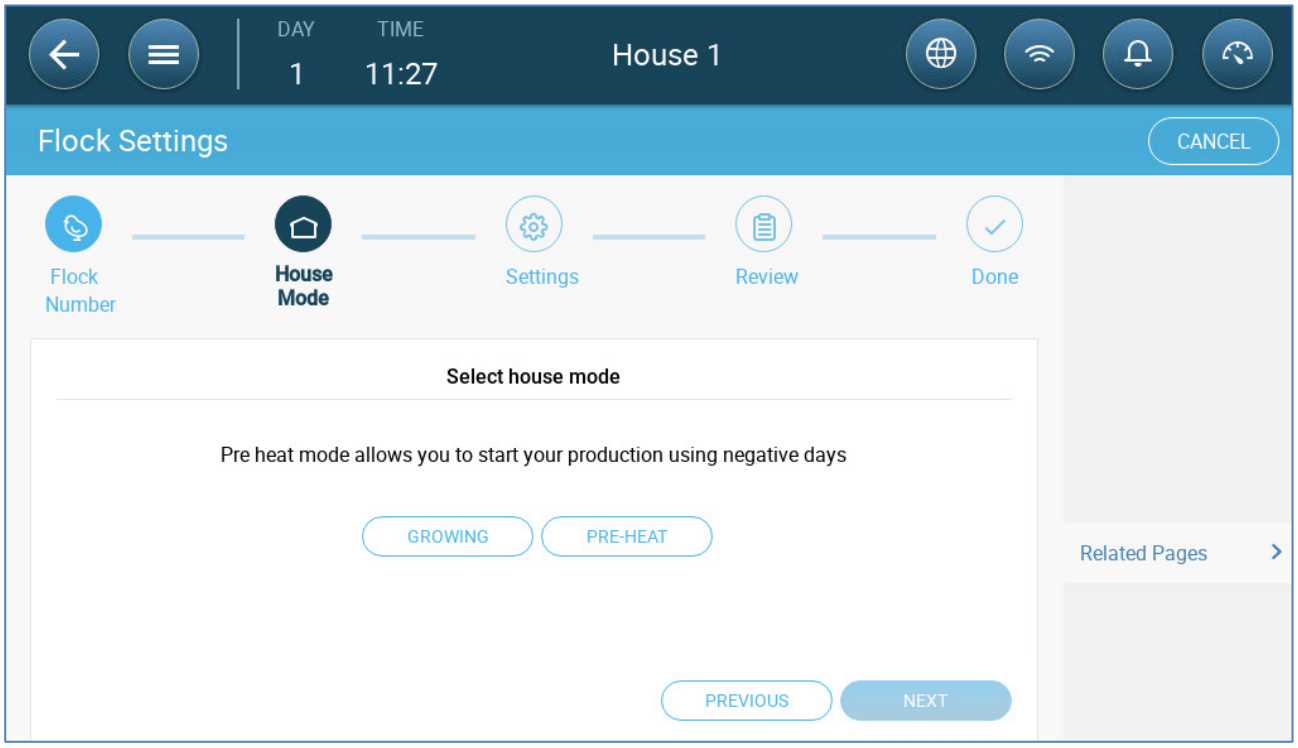
- Erases historical data
- Sets the growth day to zero
- Increases the batch number by one
- Records a “New Batch” event

1. Click

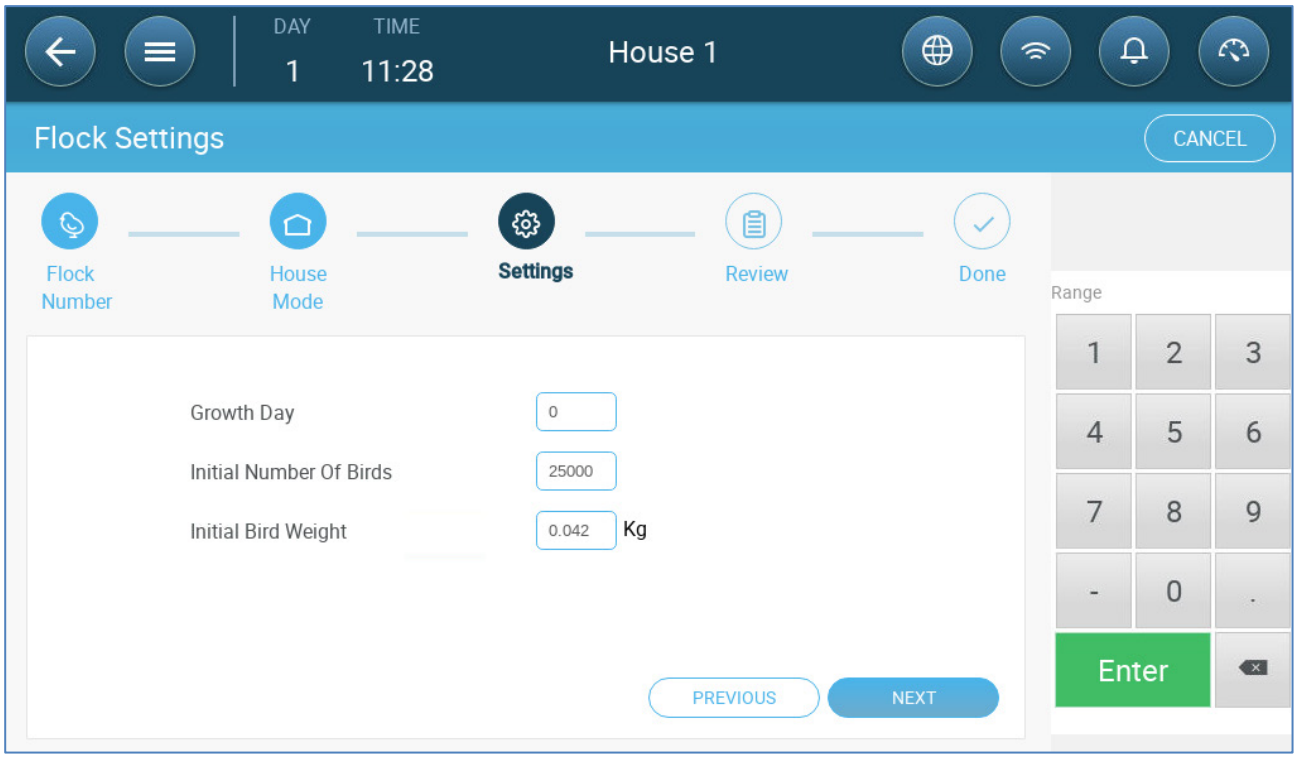
.




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

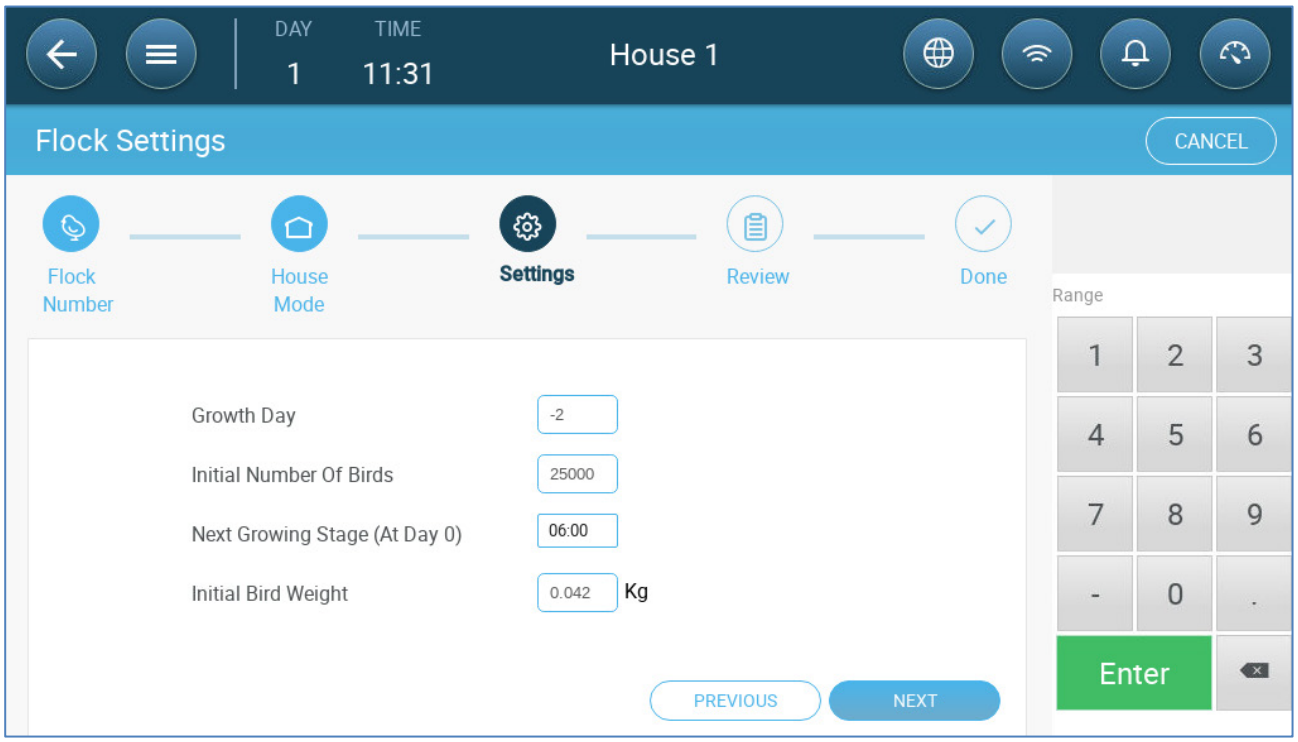



3. Select Growing or Pre-Heat. You must select an option to continue.
    - Growing Mode




- 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

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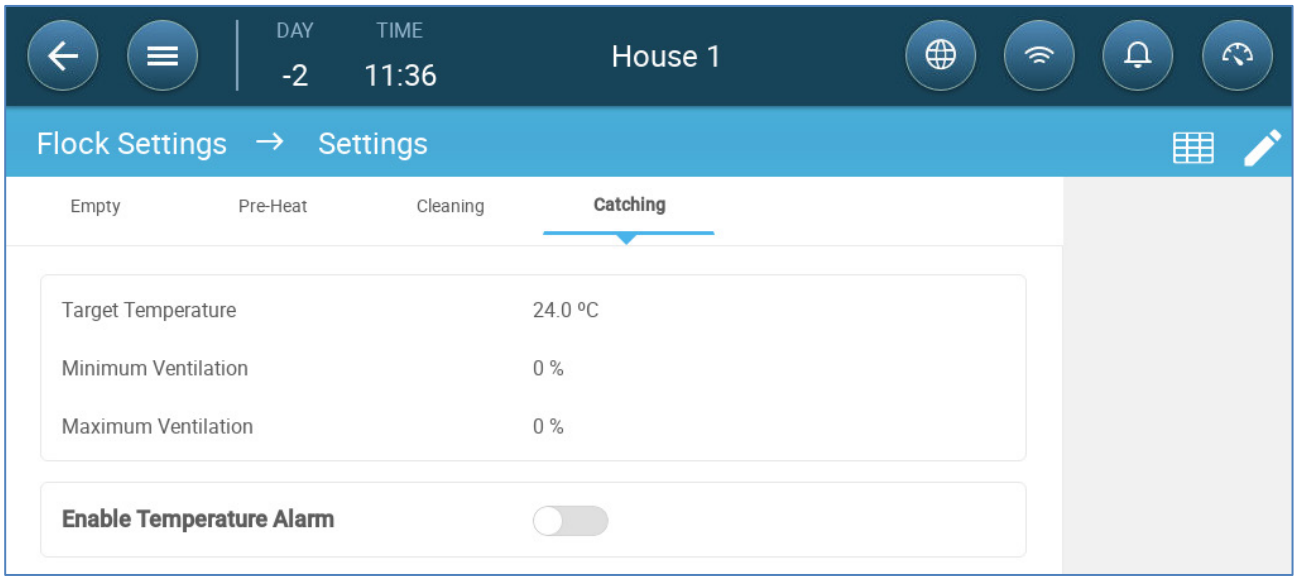
### 3.2.2 DEFINING HOUSE MODES

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

1. Click .

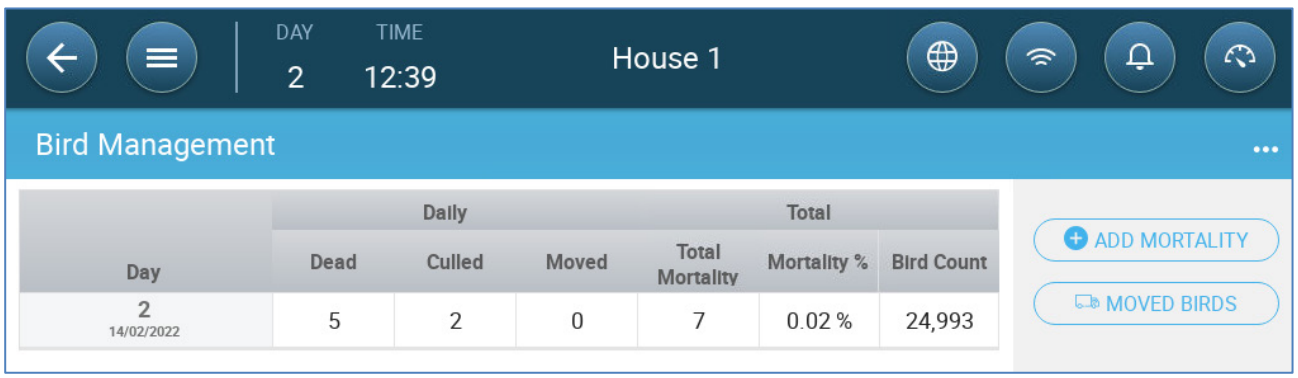



2. Click the required tab and define:
   - Set the target temperature above which ventilation output increases. Range: -40 to +90° C; Default: +24°
   - Minimum/Maximum Ventilation: Set the minimum and maximum ventilation for air exchange, according to the birds' age.
   - Enable Temperature Alarms: Set the temperature below/above which Trio activates an alarm. Range: -40 to +90° C; Default: Low alarm 0, High alarm +40°.

## 3.3 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: Daily mortality.
   - Culled: Number of dead birds removed.

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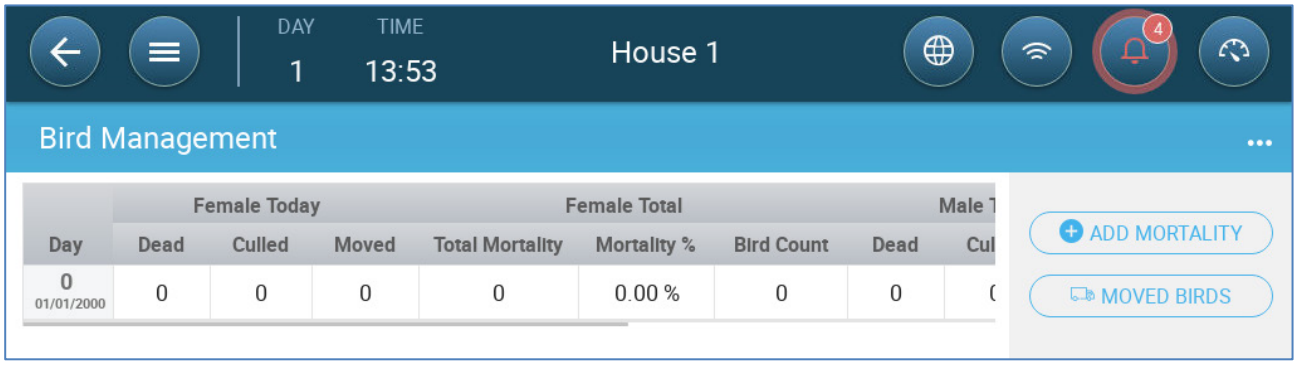
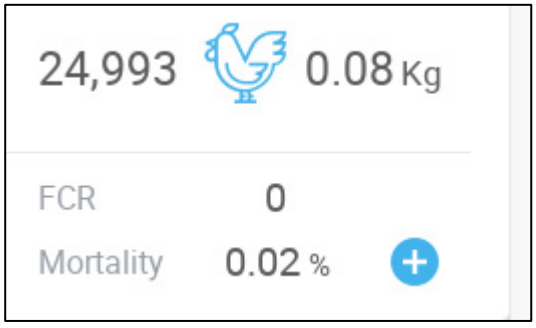
- Moved: Number of birds moved daily. This refers to birds that were moved for reasons other than death.
- Total Mortality: Cumulative mortality.
- Mortality %: Total mortality divided by the initial number of birds.
- Bird Count: Current bird count. Trio calculates this number based on the above factors.

*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 79.*



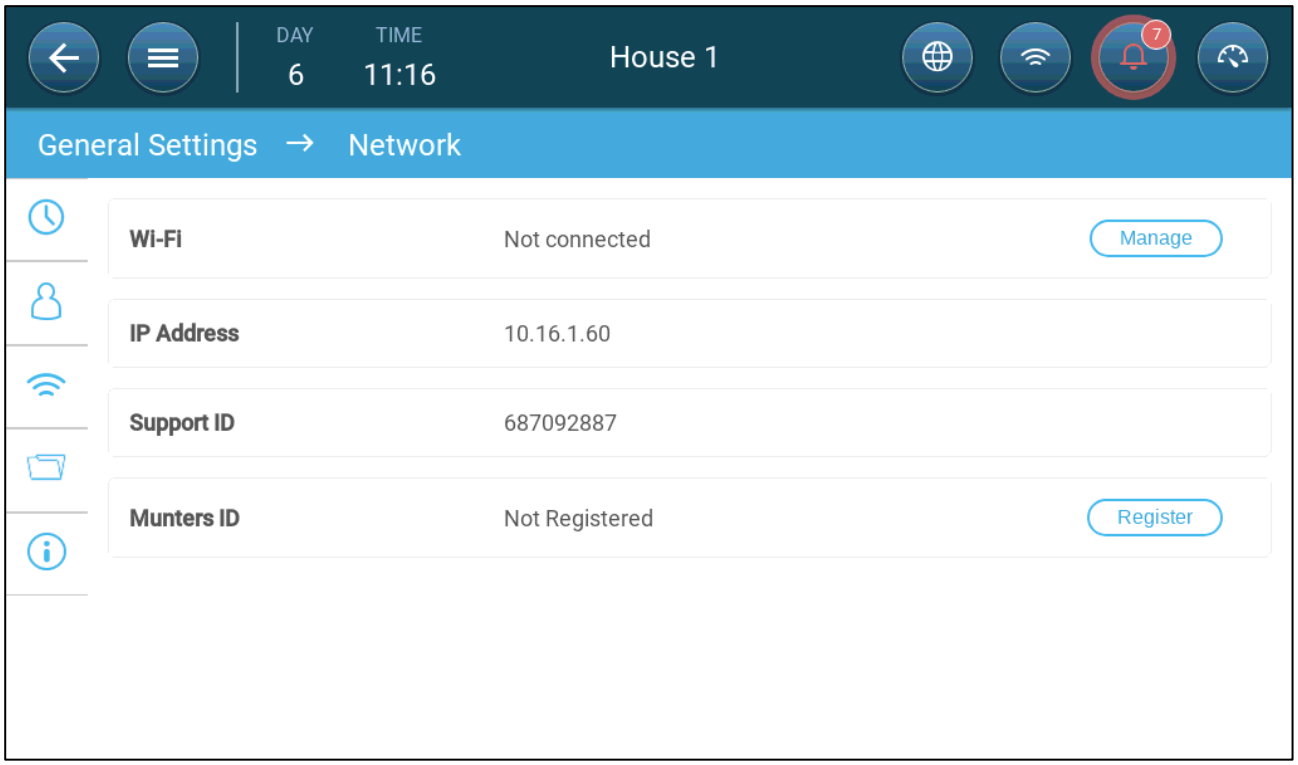

2. To adjust the number of birds:
   - Click **Add Mortality** and edit the number of birds that died or were culled.
   - Click **Moved Birds** to enter the number of live birds removed from the house. This number is used when calculating the total number of birds, but not the mortality.

   The Dashboard summarizes this screens data, showing the current total number of birds and the mortality rate.



## 3.4 Tech Support Information

To view information on your unit go to System › General Settings › Network . You will need this information when speaking with technical support.



# 4 Temperature Settings

- What is the Temperature Curve
- Configuring the Temperature Curve
- Emergency Temperature Control

## 4.1 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 pigs at 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.

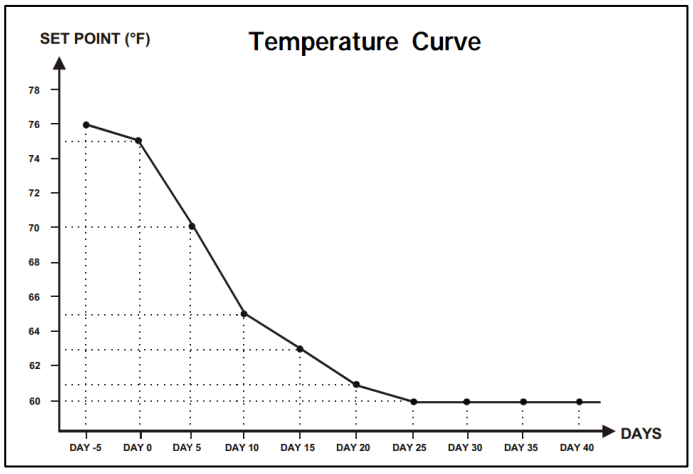



*Figure 1: Temperature Curve Example*

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**)

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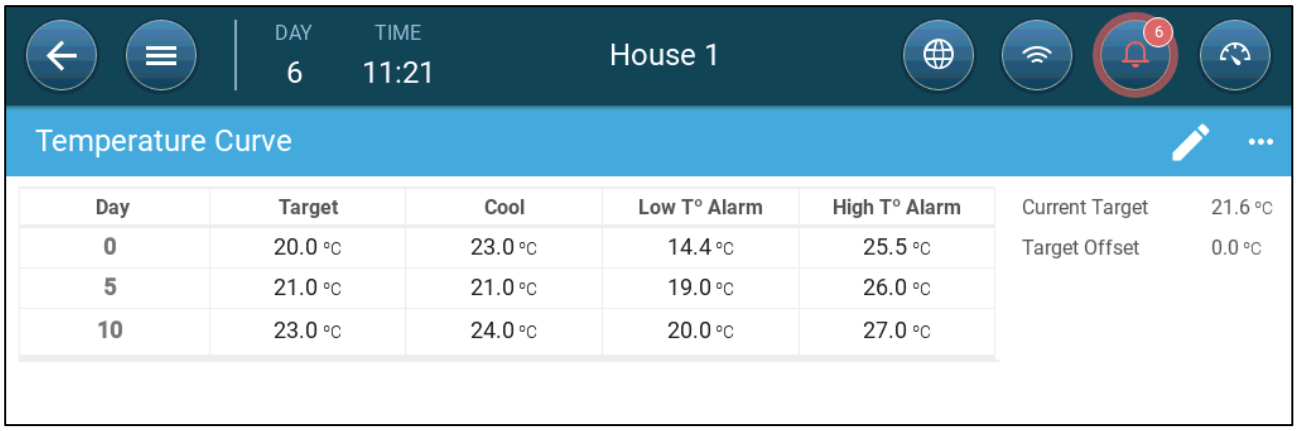
## 4.2 Configuring the Temperature Curve

- Defining the Temperature Curve
- Defining Temperature Curve Settings

### 4.2.1 Defining the Temperature Curve Parameters

1. Go to Climate › Temperature Curve.




| Day | Target | Cool | Low T° Alarm | High T° Alarm |
|---|---|---|---|---|
| 0 | 20.0 °C | 23.0 °C | 14.4 °C | 25.5 °C |
| 5 | 21.0 °C | 21.0 °C | 19.0 °C | 26.0 °C |
| 10 | 23.0 °C | 24.0 °C | 20.0 °C | 27.0 °C |

| | |
|---|---|
| Current Target | 21.6 °C |
| Target Offset | 0.0 °C |

2. Configure up to 10 points in the curve.
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.
    - Zone Heat: This parameter is the set point at which the zone 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 Zone Heat and Cool appear if a zone 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 51).*

    - 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.

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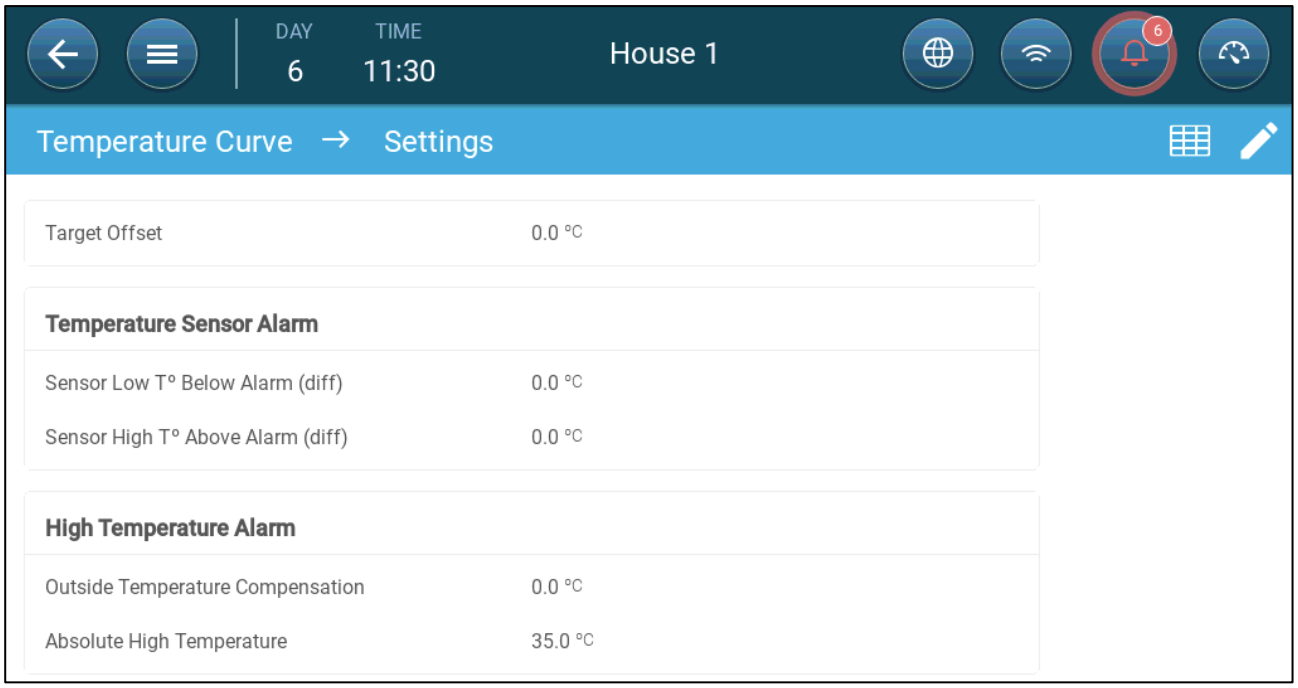
### 4.2.2 DEFINING TEMPERATURE CURVE SETTINGS




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°
    - 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).

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## 4.3 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

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# 5 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 45.

## 5.1 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.

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    - 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 30.
- 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 32.
- 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 34.

## 5.2 Defining the Fans/Ventilation Scheme

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

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

### 5.2.1 Basic Ventilation

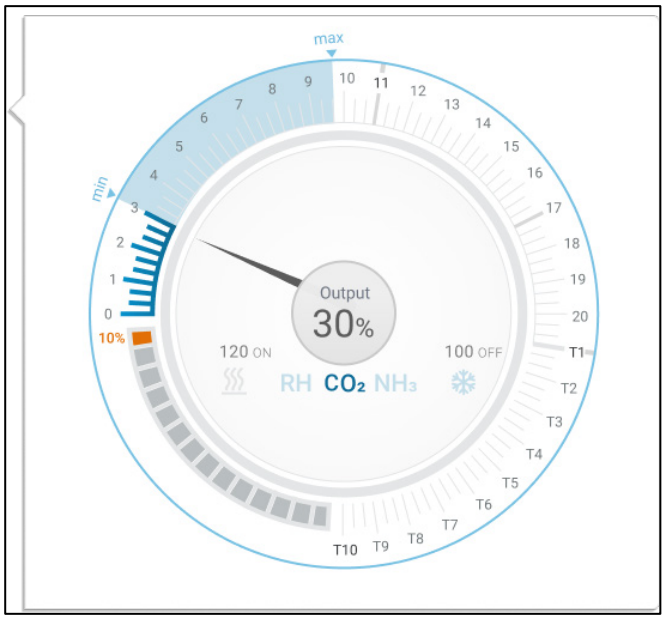
Basic Ventilation provides extremely precise levels of ventilation. There are up to 10 levels of ventilation (the user can define less than 10 if desired). Each level represents a 10% increase in ventilation, with Trio precisely adjusting the fan speeds and combinations to ensure that exactly the right 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 29 for more details.

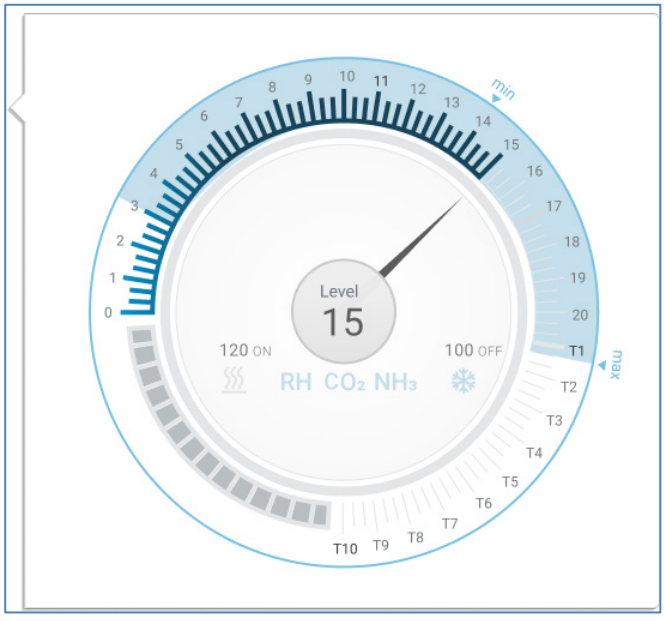



### 5.2.2 EXTRA VENTILATION

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).



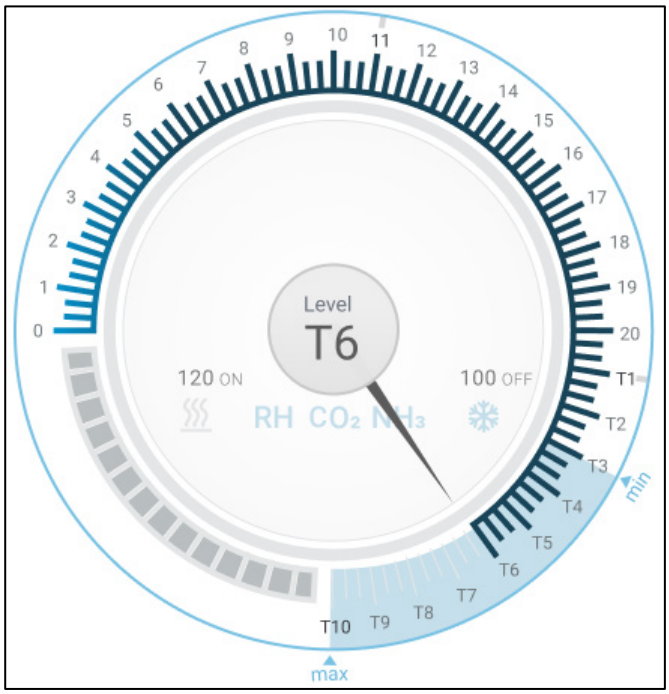
Refer to Extra Ventilation, page 49 for more details.

### 5.2.3 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 51 for more details.

Refer to Defining the Wind Chill Factor, page 53 for details on factoring in the wind chill factor in tunnel mode.

# 6 Minimum and Maximum Ventilation

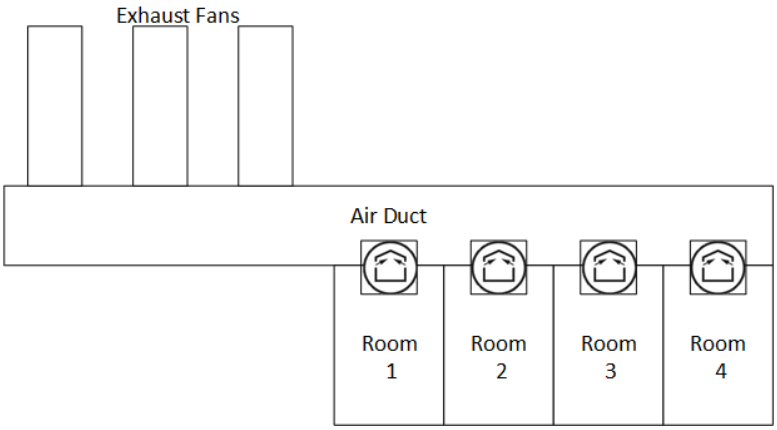
The following sections detail how to configure the minimum and maximum ventilation levels by growth day.  As the temperature rises above the target temperature, Trio gradually increases ventilation level using a combination of increased fan speeds, cycle times, opening the inlets and more.

- Building Structure Summary
- Defining Basic Ventilation

## 6.1 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.

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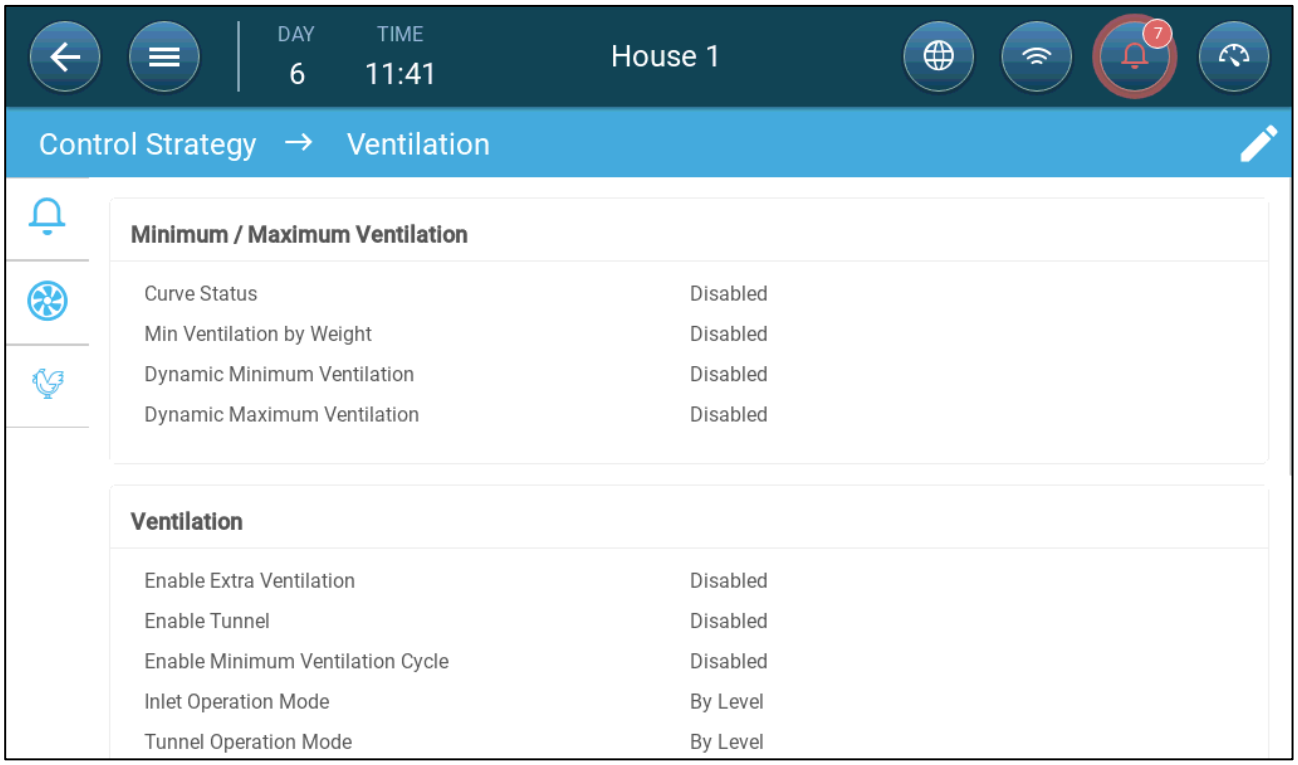
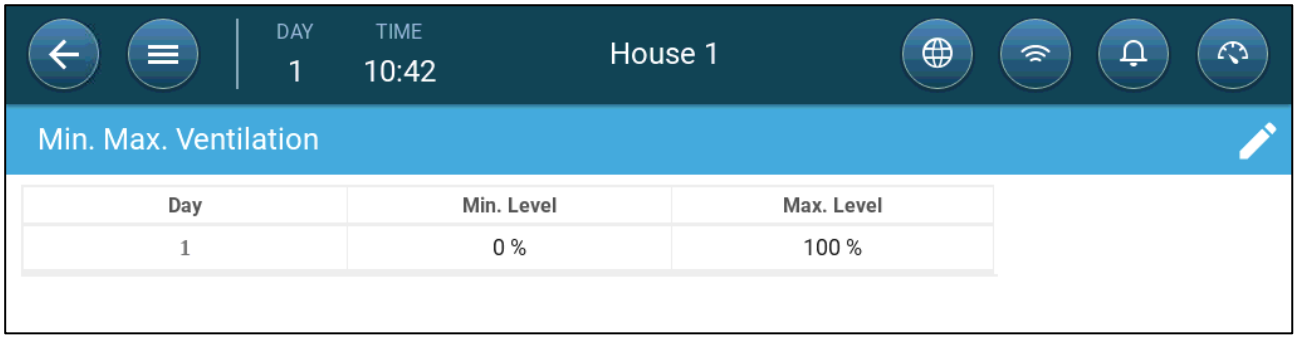
## 6.2 Defining Basic Ventilation

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 49).

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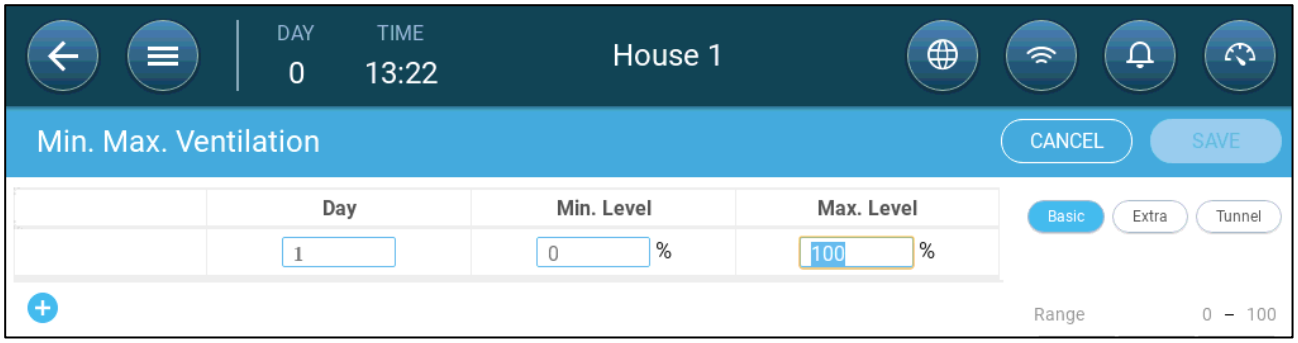
7. Go to Climate › Min. Max. Ventilation.
8. Place the cursor in Min Level or Max Level. The Basic/Extra/Tunnel icons appear.



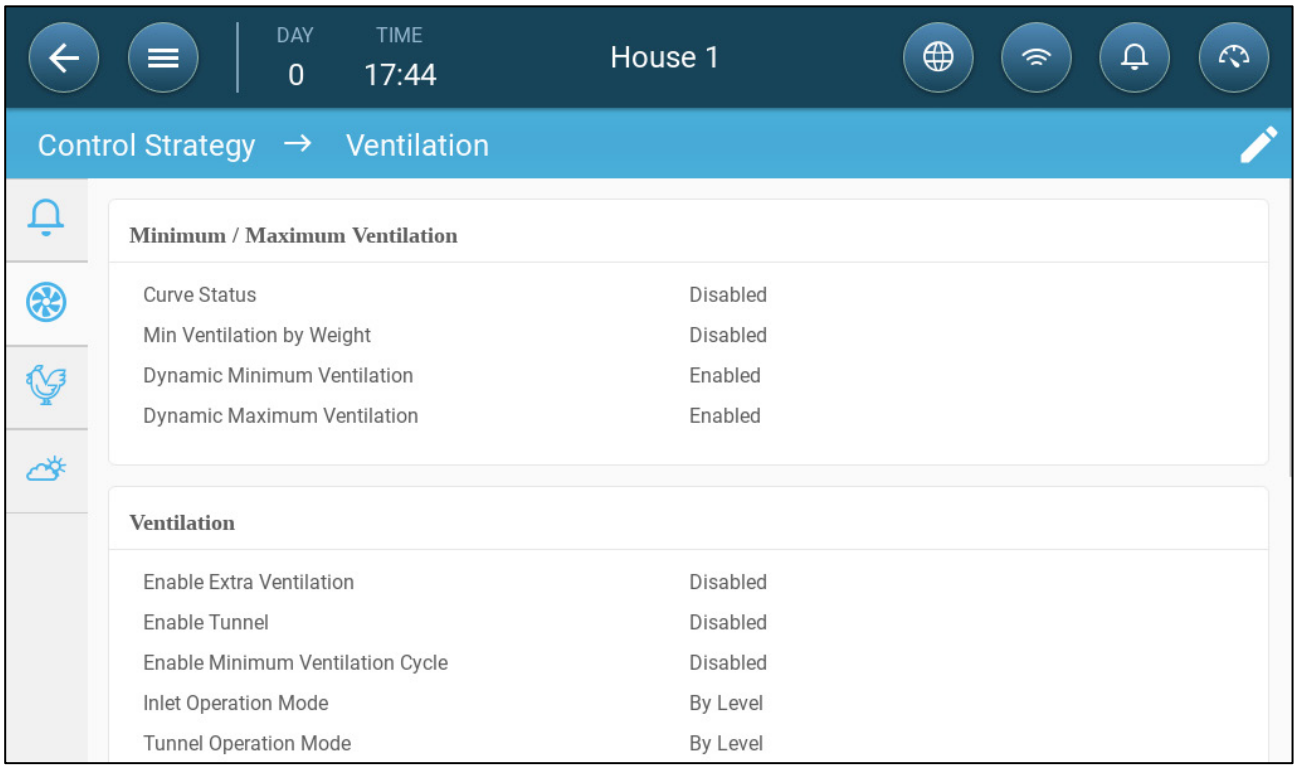

9. Click the required ventilation icon.
10. Define the ventilation as required.

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

### 6.2.1 DEFINING DYNAMIC VENTILATION

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

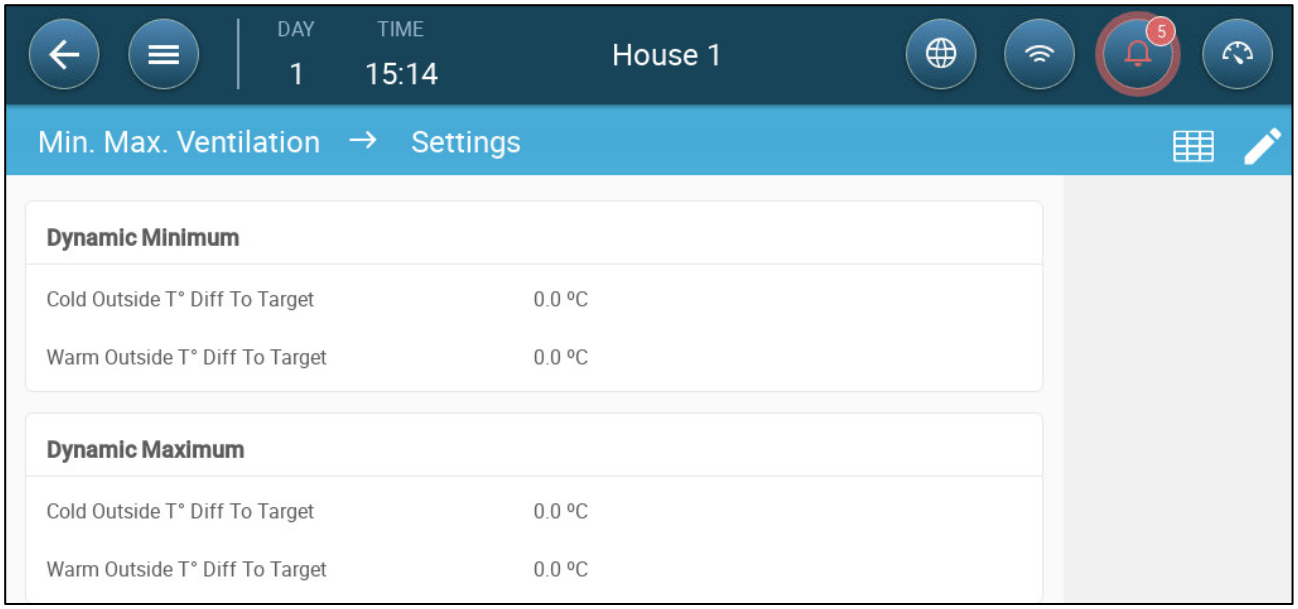
1. Go to System › Control Strategy › Ventilation .




2. Under Minimum / Maximum Ventilation, enable
   - Dynamic Minimum Ventilation or
   - Dynamic Maximum Ventilation or

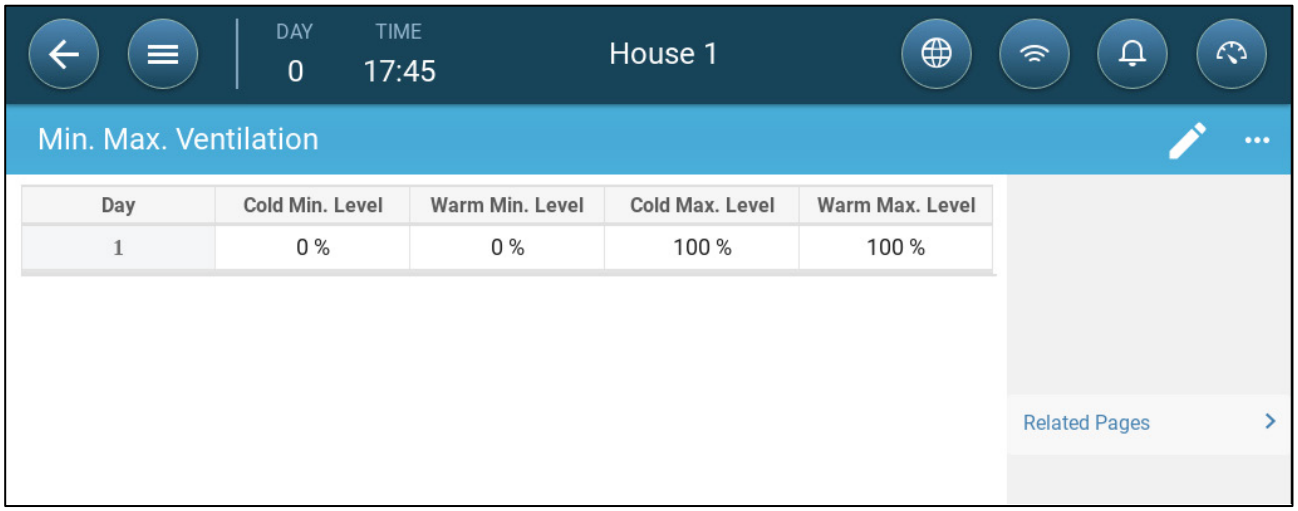
- Both. In this example both are enabled.

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




4. Define:
   - Dynamic Minimum Cold/Warm Outside T° To Target: Define the cold and warm differentials from the target temperature at which dynamic ventilation begins operating.
   - Dynamic Maximum Cold/Warm Outside T° To Target: Define the cold and warm differentials from the target temperature at which dynamic ventilation begins operating.

5. Go to Climate › Min/Max Ventilation.




6. Define:
   - Cold Min.: When the outside temperature reaches the **Dynamic Minimum Cold Outside Temperature**, Minimum Ventilation is **reduced** by this amount.
   - Warm Min: When the outside temperature reaches the **Dynamic Minimum Warm Outside Temperature**, Minimum Ventilation is **increased** by this amount.

- Cold Max. Level: When the outside temperature reaches the **Dynamic Maximum Cold Outside Temperature**, Minimum Ventilation will not go above this level.
- Warm Max. Level: When the outside temperature reaches the **Dynamic Maximum Warm Outside Temperature**, Minimum Ventilation will not go above this level.

### 6.2.2 VENTILATION BY WEIGHT

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

#### 6.2.2.1 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 that 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.

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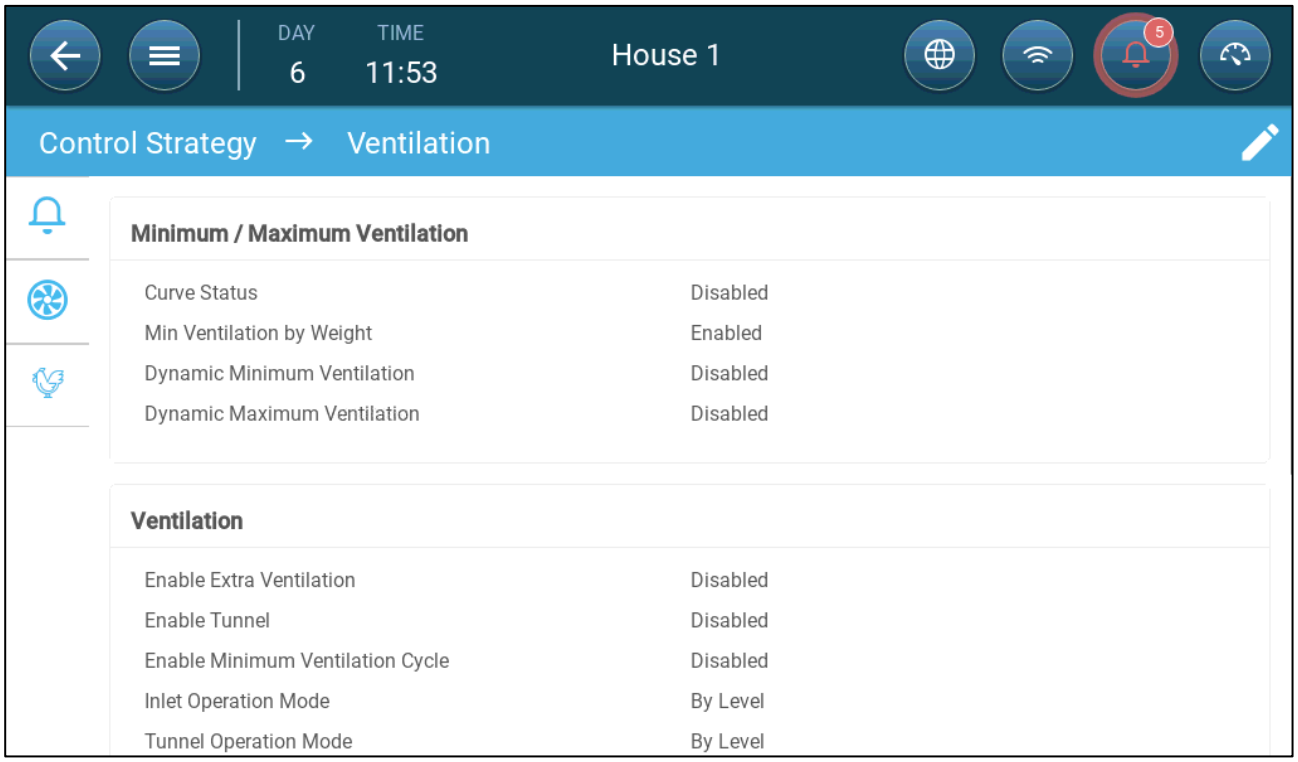
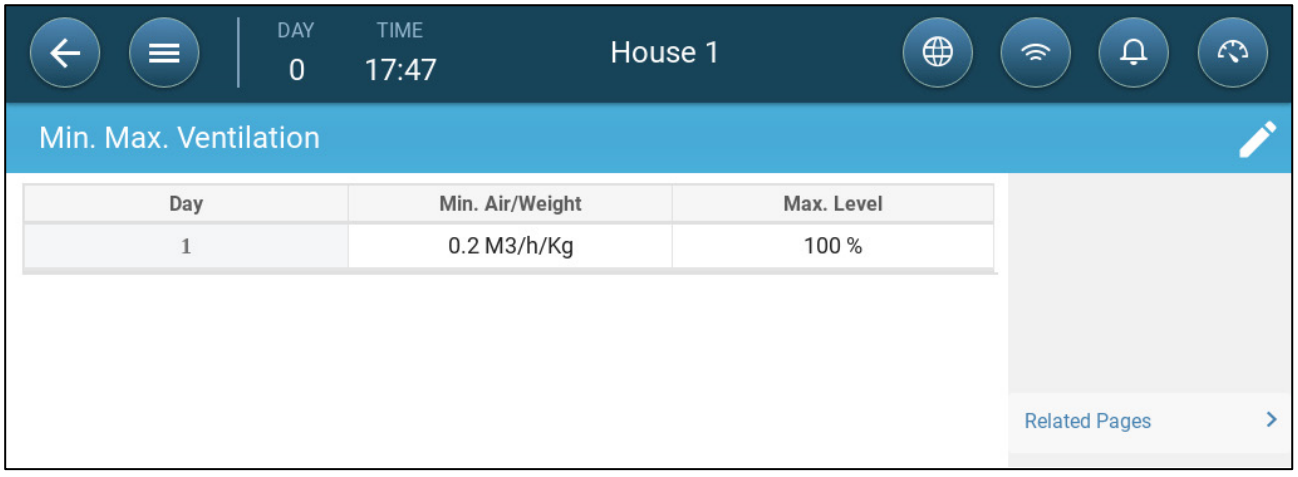
### 6.2.2.2 Defining the Ventilation By Weight Parameters

1. Go to System › Control Strategy › Ventilation .




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



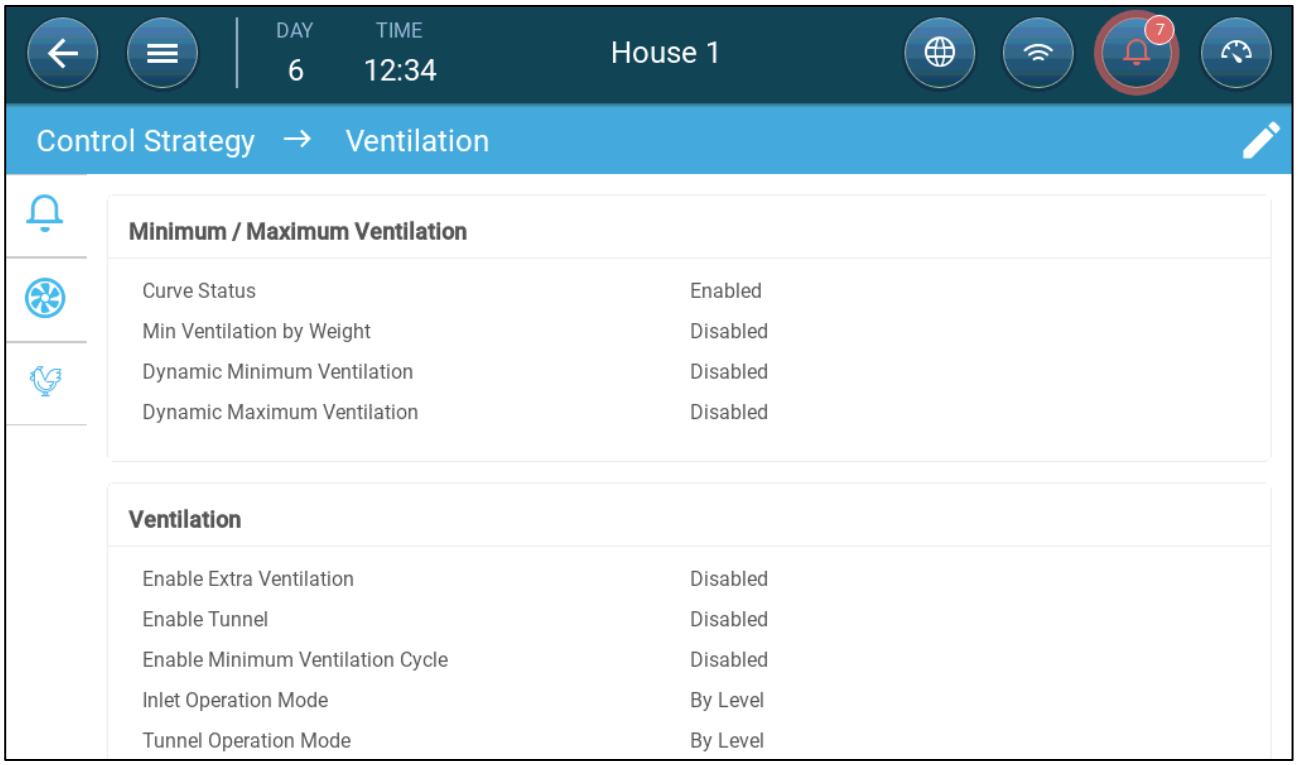

4. Click .
5. Define:
    - Min Air Weight: The amount of air per bird's weight to be supplied.
    - Max: The maximum ventilation level by growth day.

*NOTE If you enabled Dynamic Ventilation, click Settings and define the parameters. Refer to Defining Dynamic Ventilation, page 30.*

### 6.2.3 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.

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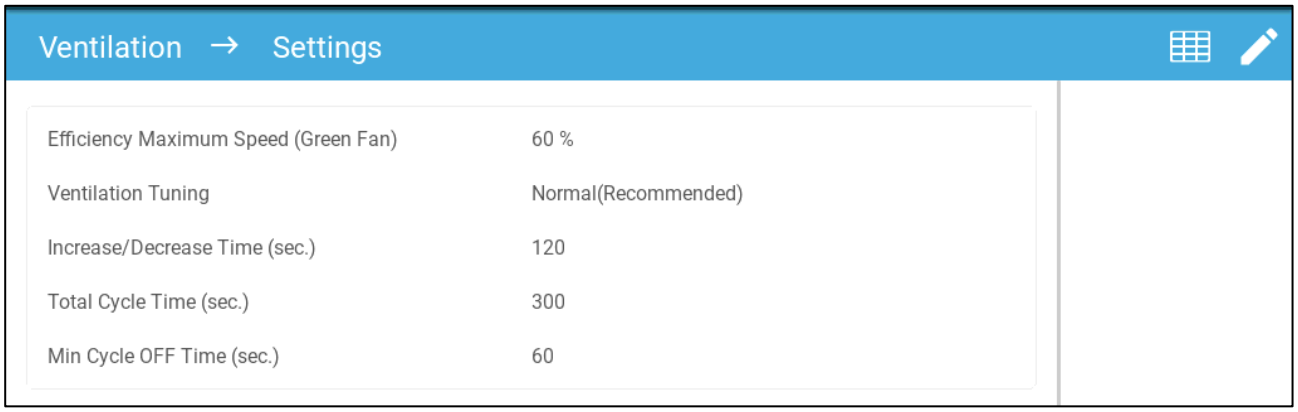
# 7 Levels of Ventilation

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

## 7.1 Configuring the Basic Ventilation Settings

➲ **Map at least one ventilation device 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 paramter at Normal.*

   - **Increase/Decrease**: Trio continually reevaluates the difference between target and measured temperatures. This parameter determines the reevaluation time frequency. Leave at default.

***CAUTION*** *Munters recommends leaving this function at the default.*

   - **Min Cycle Off Time (sec.)**: Refer to Minimum Ventilation Cycle, page 38.

## 7.2 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

*NOTE 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.*

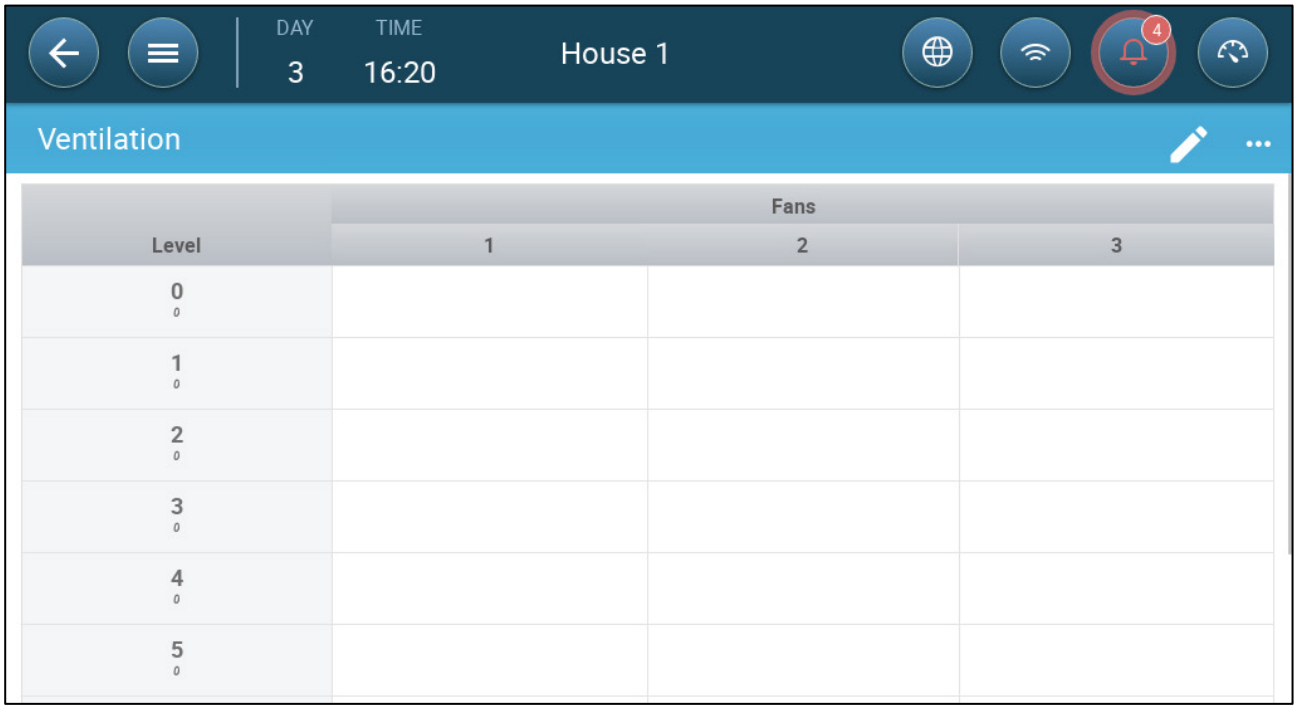
- Defining Basic Ventilation
- Fan Options
- Inlet and Curtain Ventilation

### 7.2.1 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.**

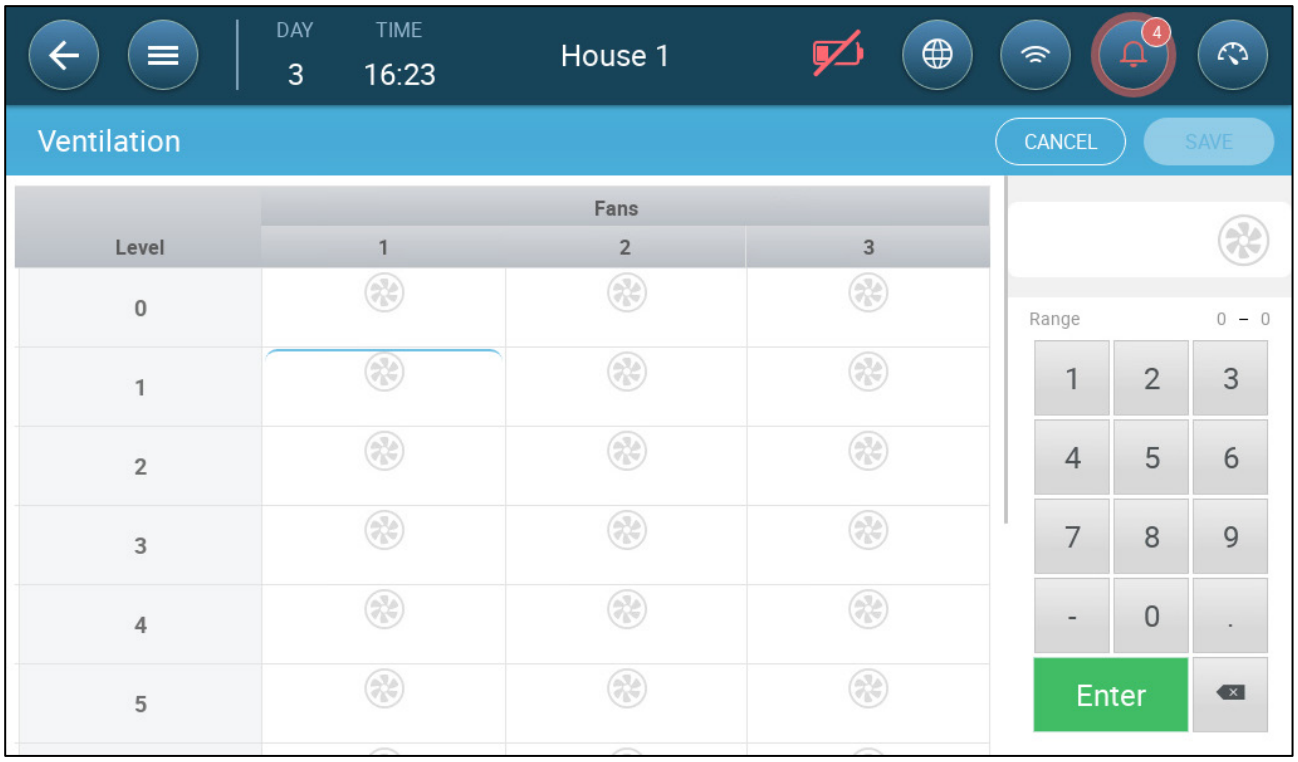
1. Go to Climate › Ventilation.



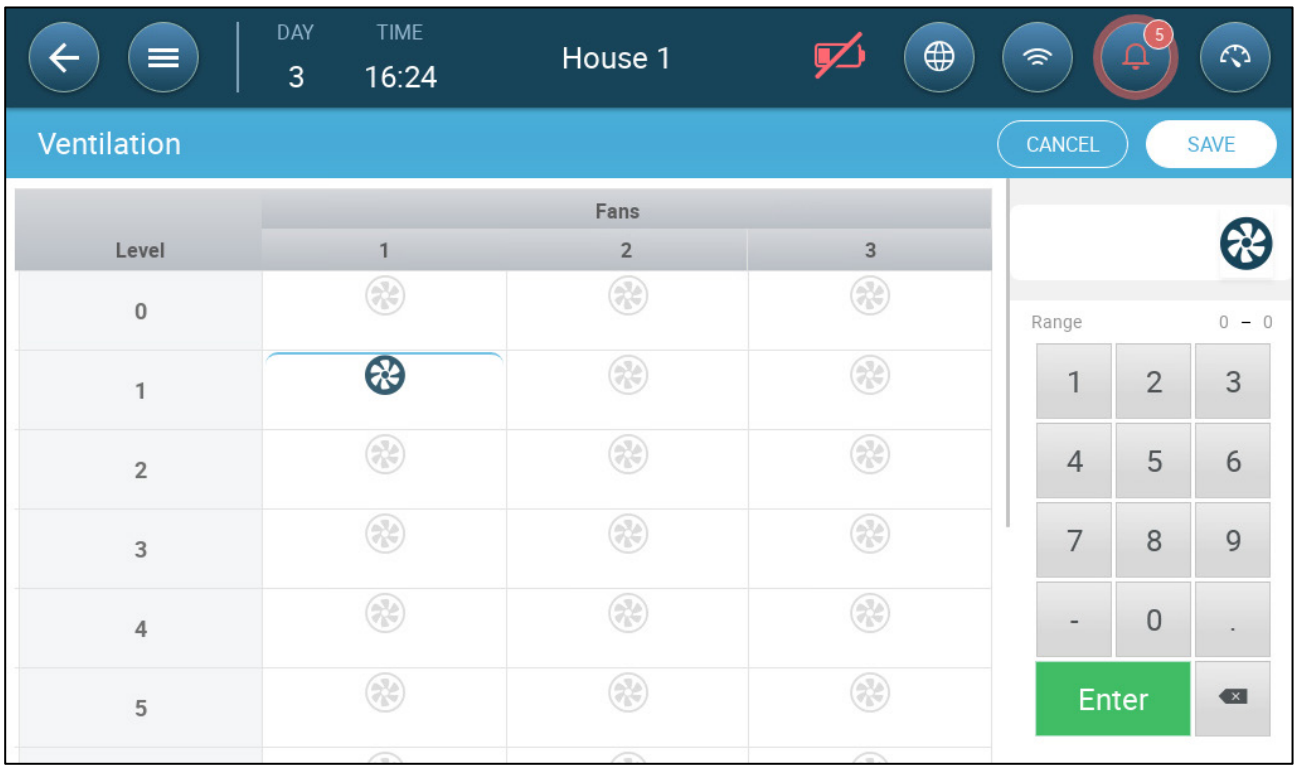

*NOTE At this point, fans do not appear.*

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.

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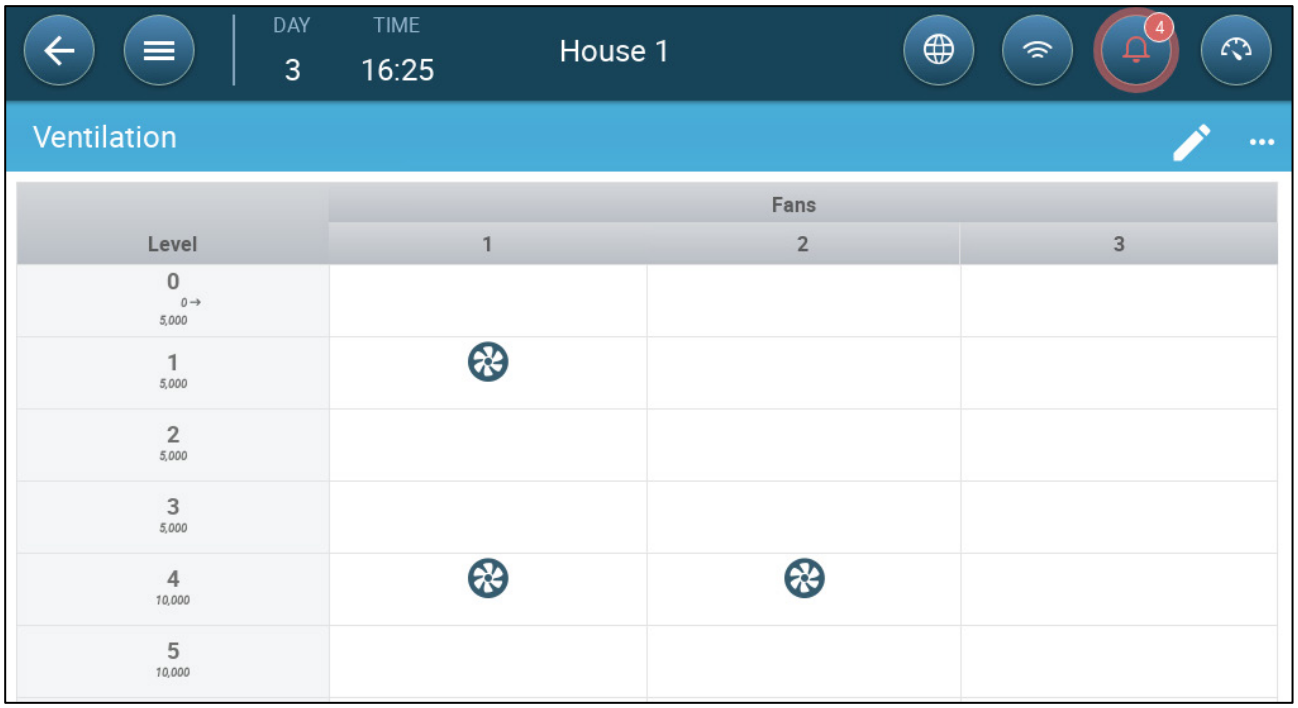



In this example Fan 1operates according to the levels determined by the temperature and day, beginning at Level 1. The fan will supply up to 10% of the possible ventilation. At Level 4, Fan 2 also begins to operate, supplying up to 40% of the possible ventilation.

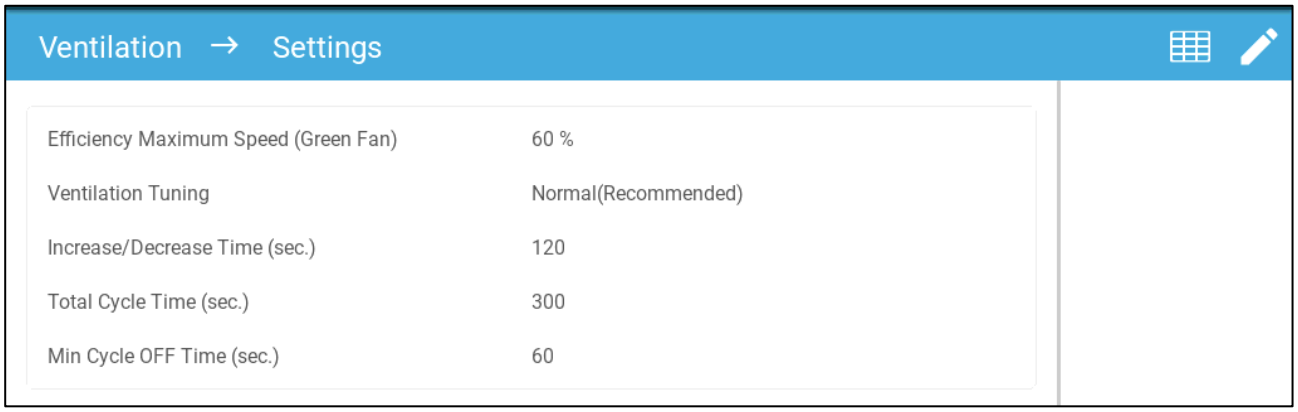
Each level shows the maximum possible ventilation capacity. In this example, each fan has a capacity of 5000 M3/h. At Level 1 this means that the maximum is 50000 M3/h and at Level 4 10,000 M3/h.

### 7.2.2 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.

#### 7.2.2.1 Minimum Ventilation Cycle

1. Go to Go to Climate > Ventilation > Settings.

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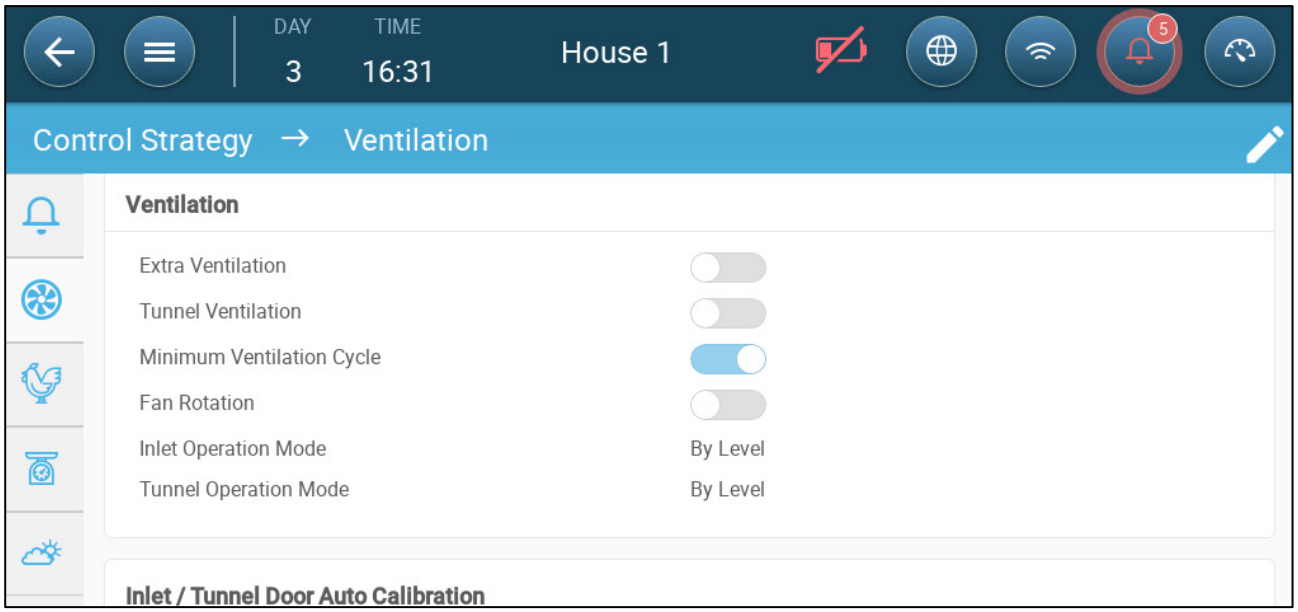
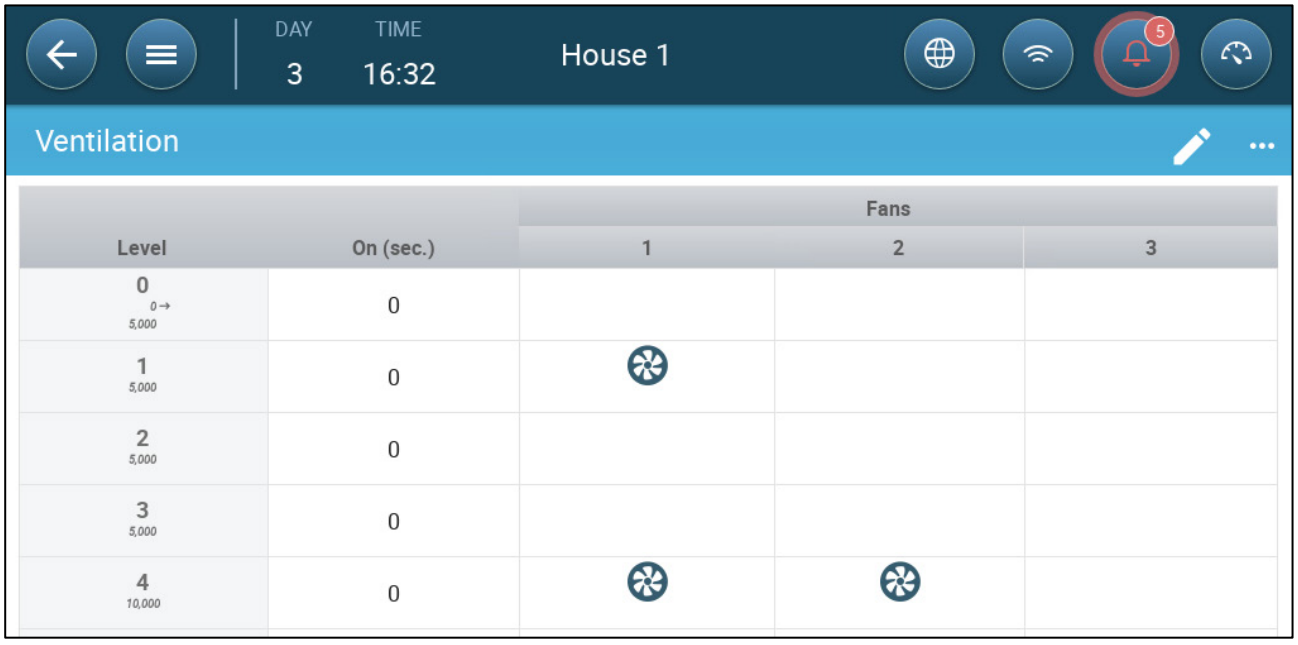
2. Define:
    - Total Cycle Time (sec): Define the minimum ventilation cycle time. Range: 60 – 999 seconds.
    - Min Cycle Off Time (sec.): When using cycle time, Trio automatically adjusts the ON time set in the main screen. This parameter defines the minimum cycle off time. Range: 0 – 600 seconds.

3. Go to System › Control Strategy › Ventilation .




4. Enable Minimum Ventilation Cycle.
5. Go to Climate › Ventilation. The (Fan) On time appears on the screen.

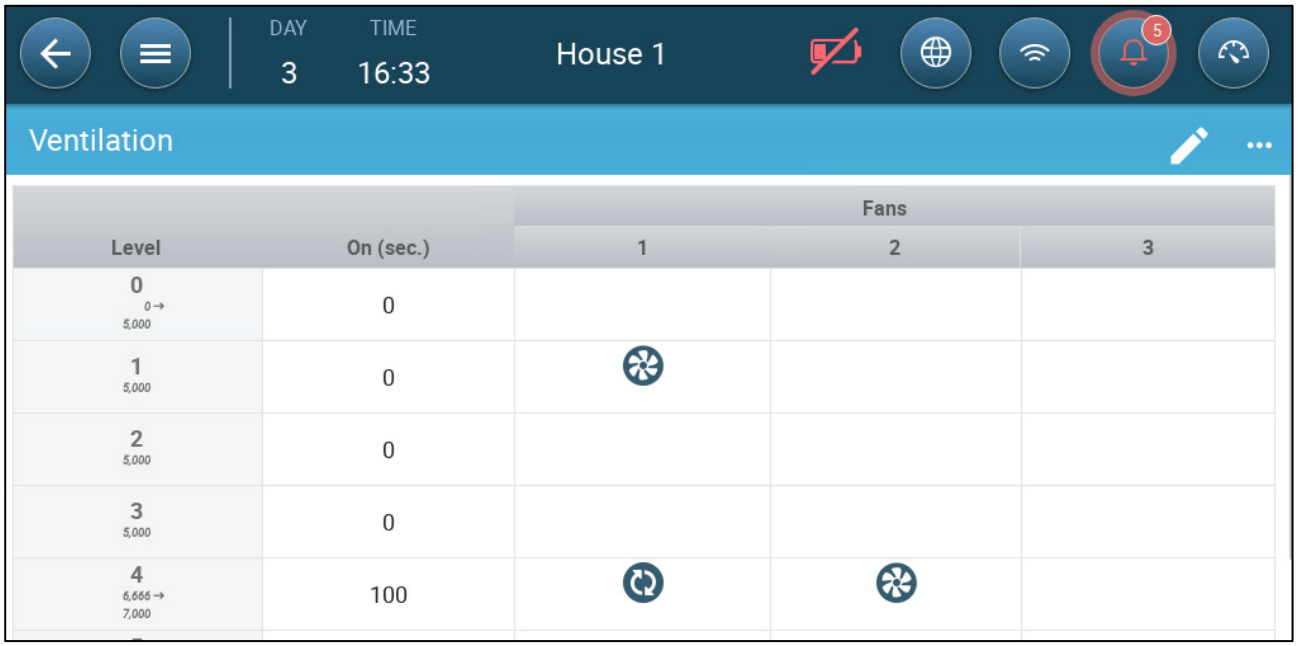



6. To run a fan in cycles:
    a. Click

b. Click a fan. The symbol appears.

c. Click . The symbol turns blue .

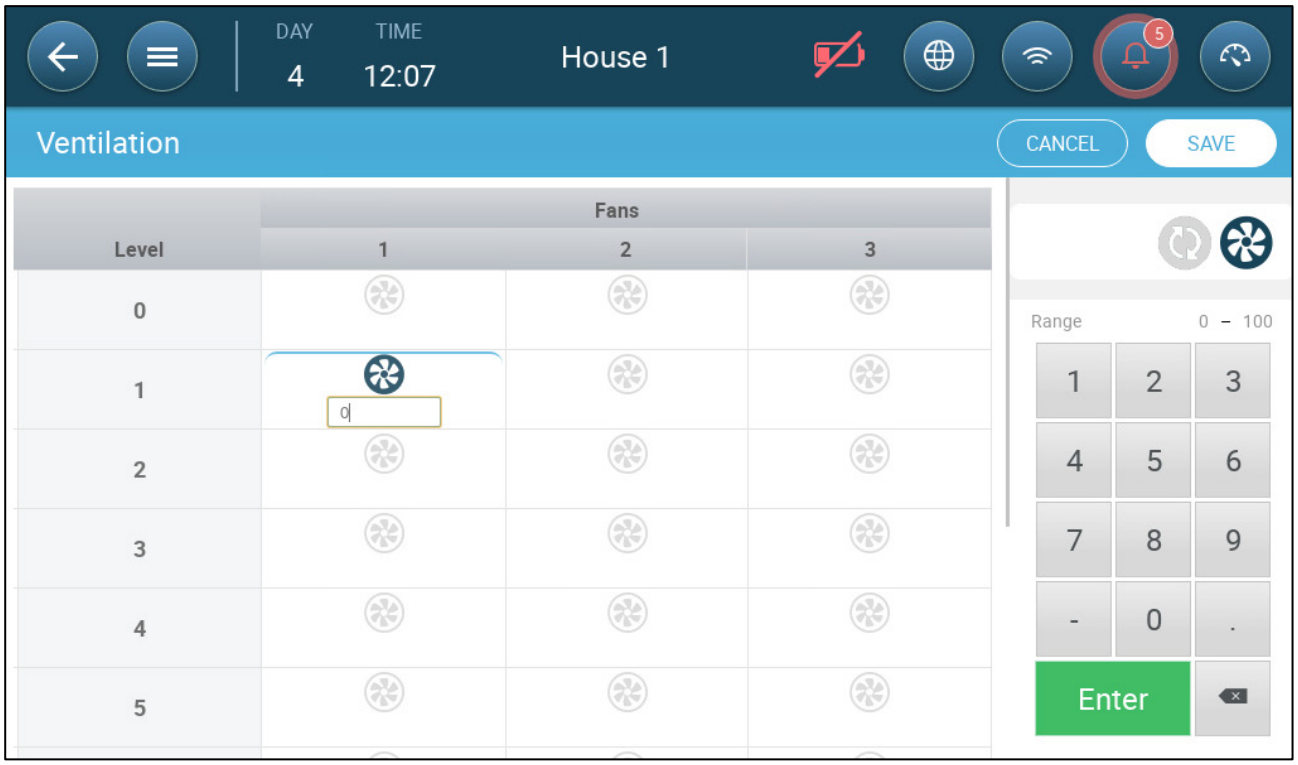
d. Under On (sec), enter the cycle ON time (Go to the Settings to define the Off time).



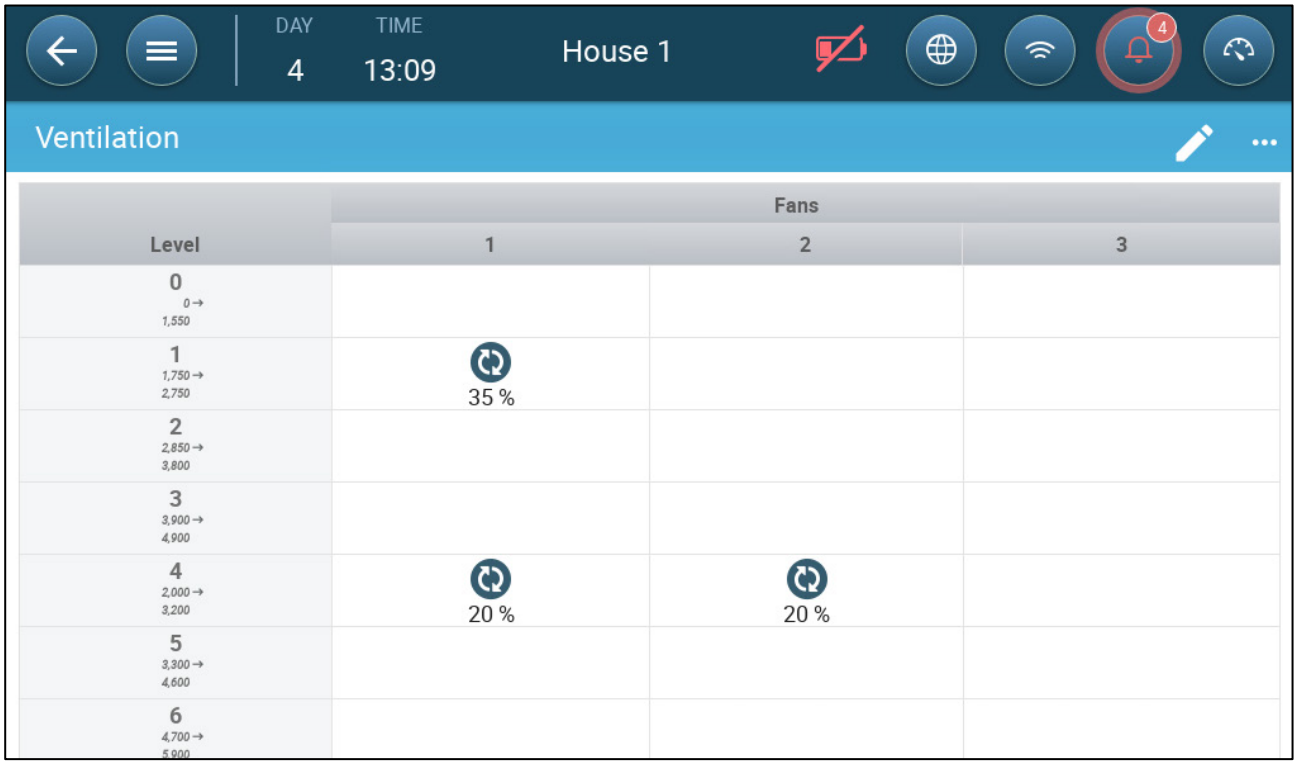

In this example, at Level 4 Fan 1 runs in cycles (100 seconds on) and Fan 2 runs continuously. The maximum ventilation capacity reflects the change caused by running the fan in a cycle.

### 7.2.2.2 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.

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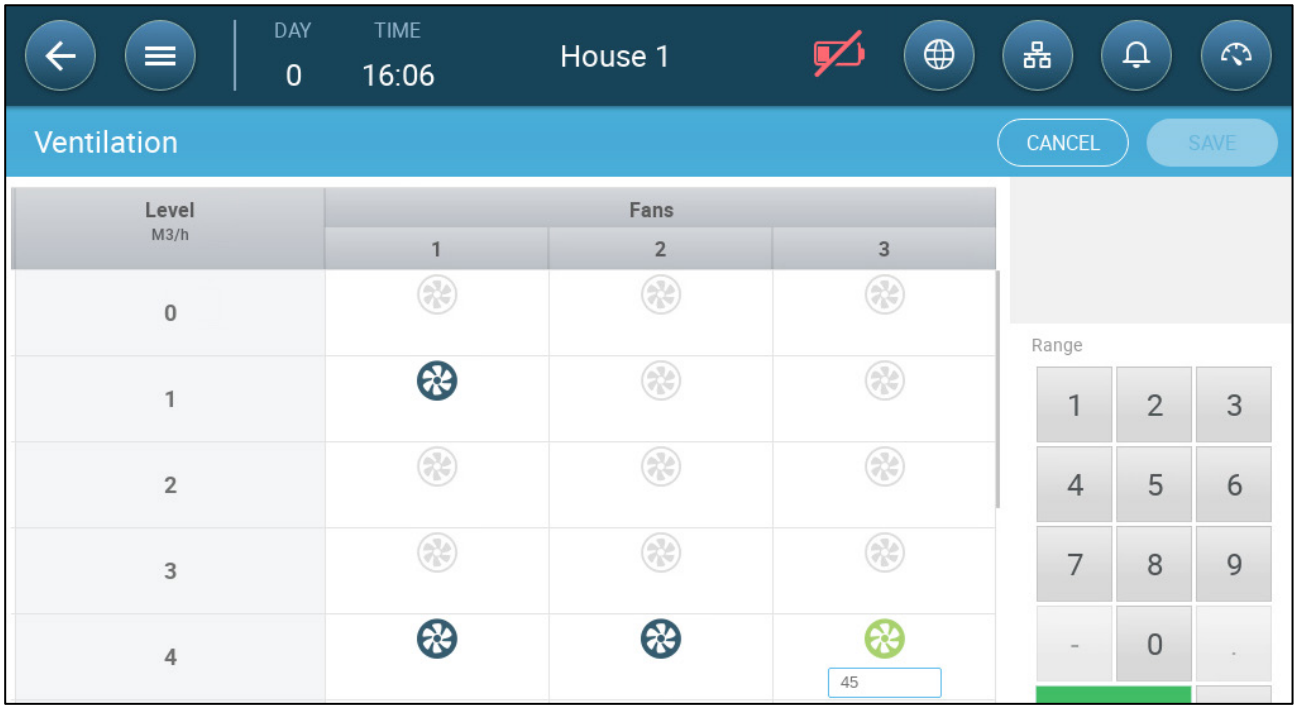
### 7.2.2.3 Fans (Efficiency Fan)

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 percentage, enter the fan's **minimum speed** (in percentage).

5. Go to Settings.

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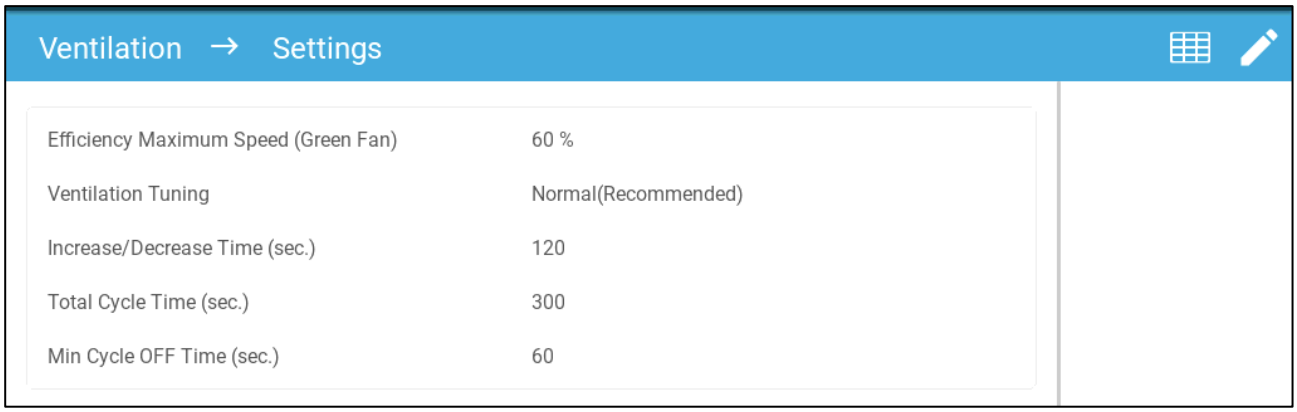
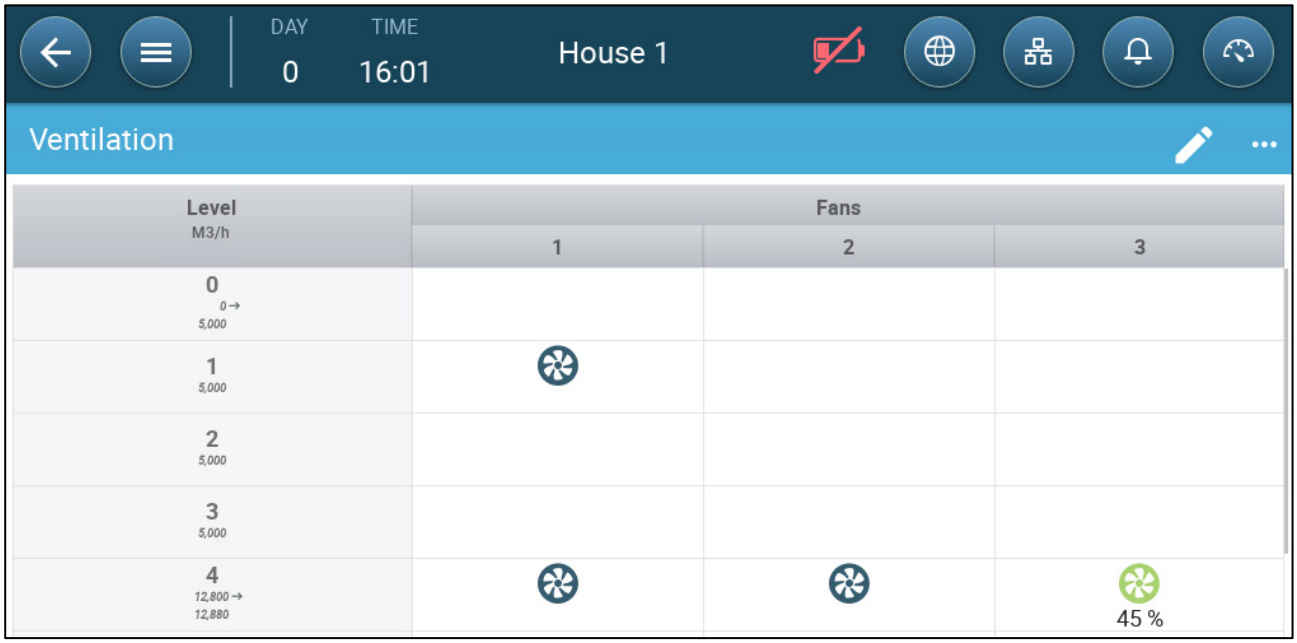



6.In Efficiency Maximum Speed, enter the fan's maximum speed (in percentage).



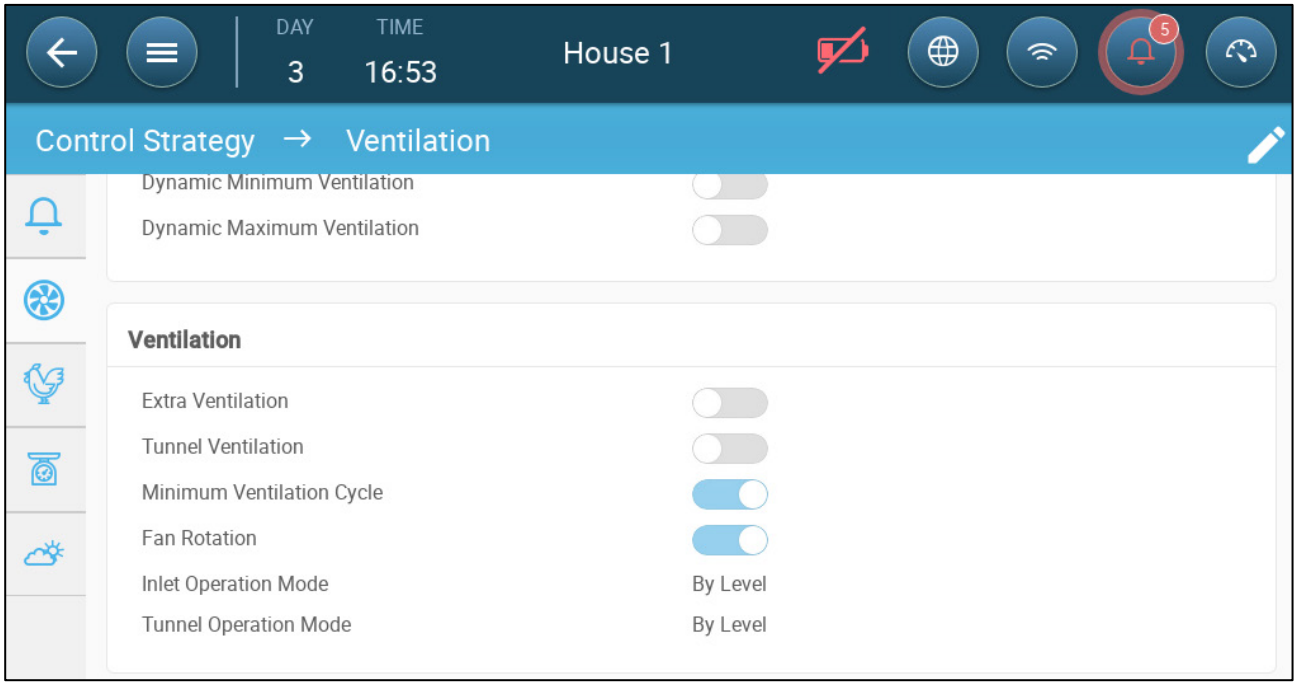

7. In this example Fan 1 and Fan 2 work continuously, and Fan 3 is an efficiency fan whose minimum speed is 45% and maximum speed is 60% of the fan's possible speed. The ventilation capacity reflects the efficiency fan's capacity.

### 7.2.2.4 Fan Rotation

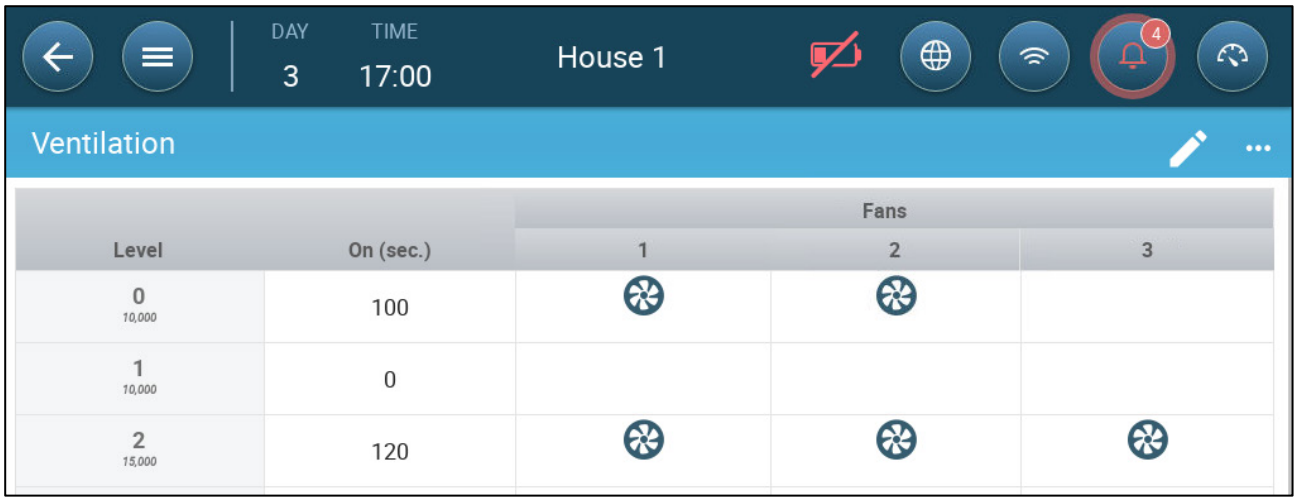
Using the same fan or a limited number of fans exclusively can lead to mechanical wear and tear, for example to the drive belt. To minimize this damage, Trio enables "rotating" between fans. The rotation function switches between cycle fans in the same stage.

To enable fan rotation:

1. Go to System › Control Strategy › Ventilation.




2. Enable Fan Rotation and Minimum Ventilation Cycle.
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.

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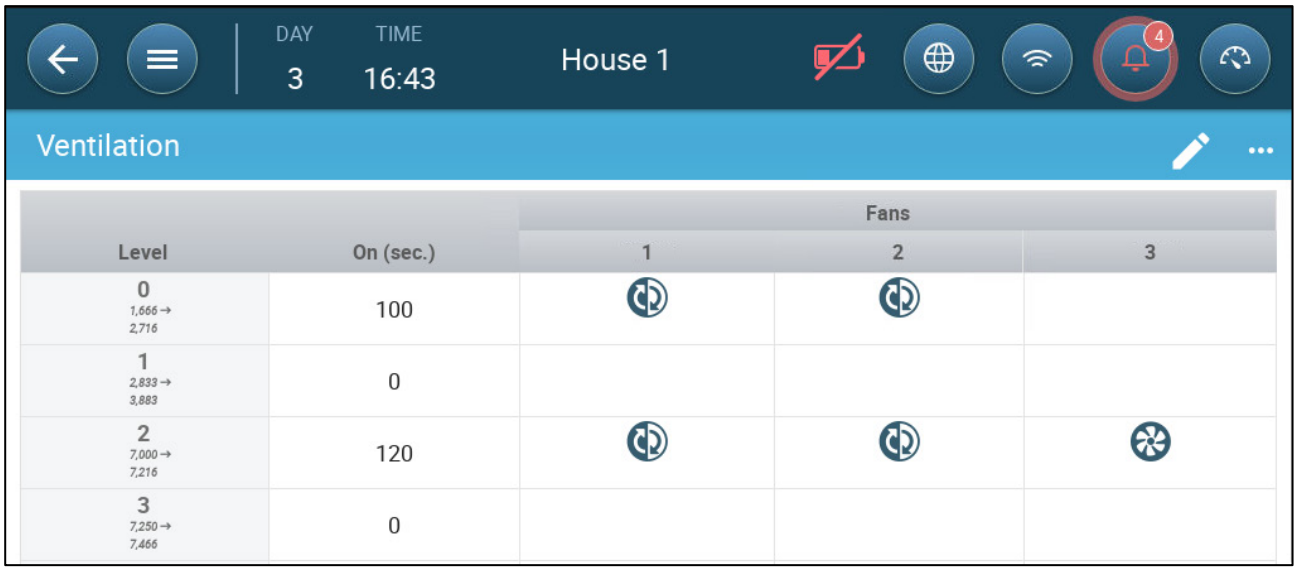



In the above example, at level 0 Fan 1 rotates with Fan 2. At level 2, Fans 1 and 2 rotate while Fan 3 remains constant.

### 7.2.3 Inlet and Curtain Ventilation

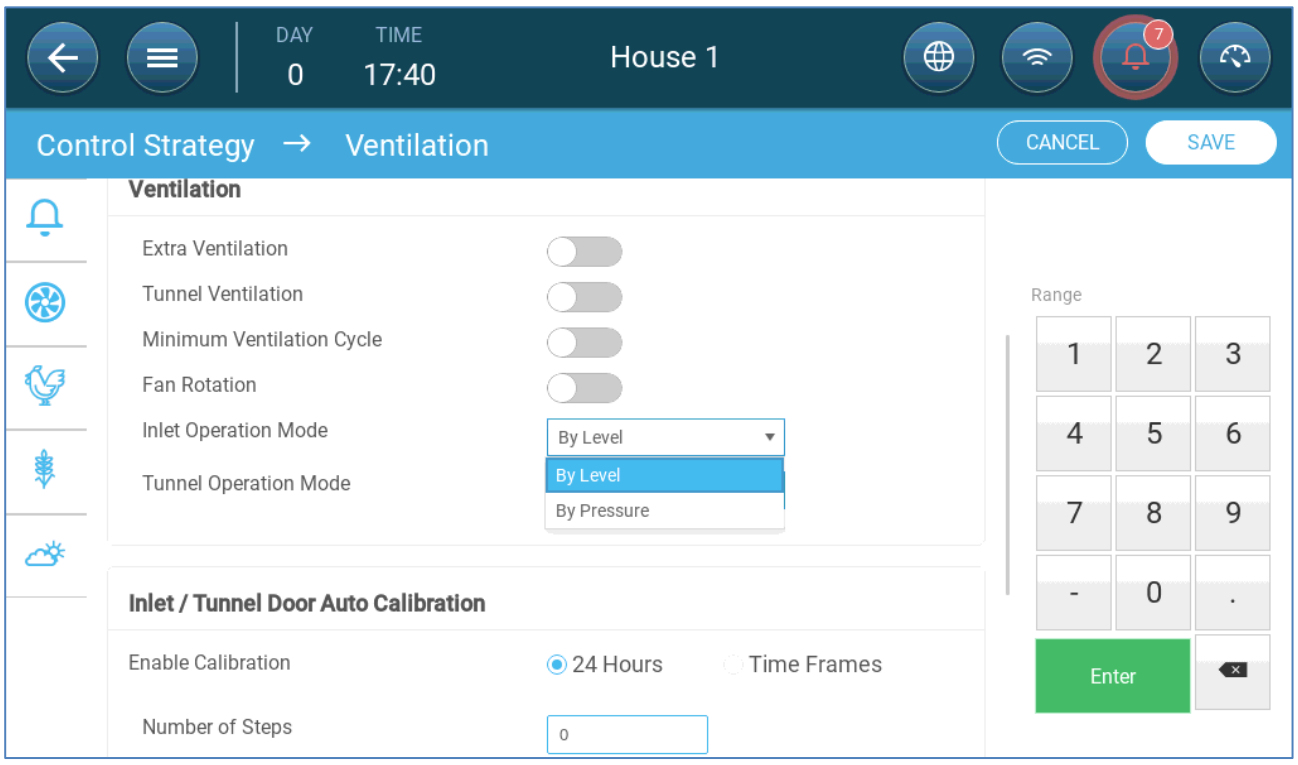
In Basic Ventilation, Trio enables control over the inlets using one of two methods:

- Level Control
- Static Pressure Control

*NOTE Outlet control is by level only.*

**To select the inlet control method:**

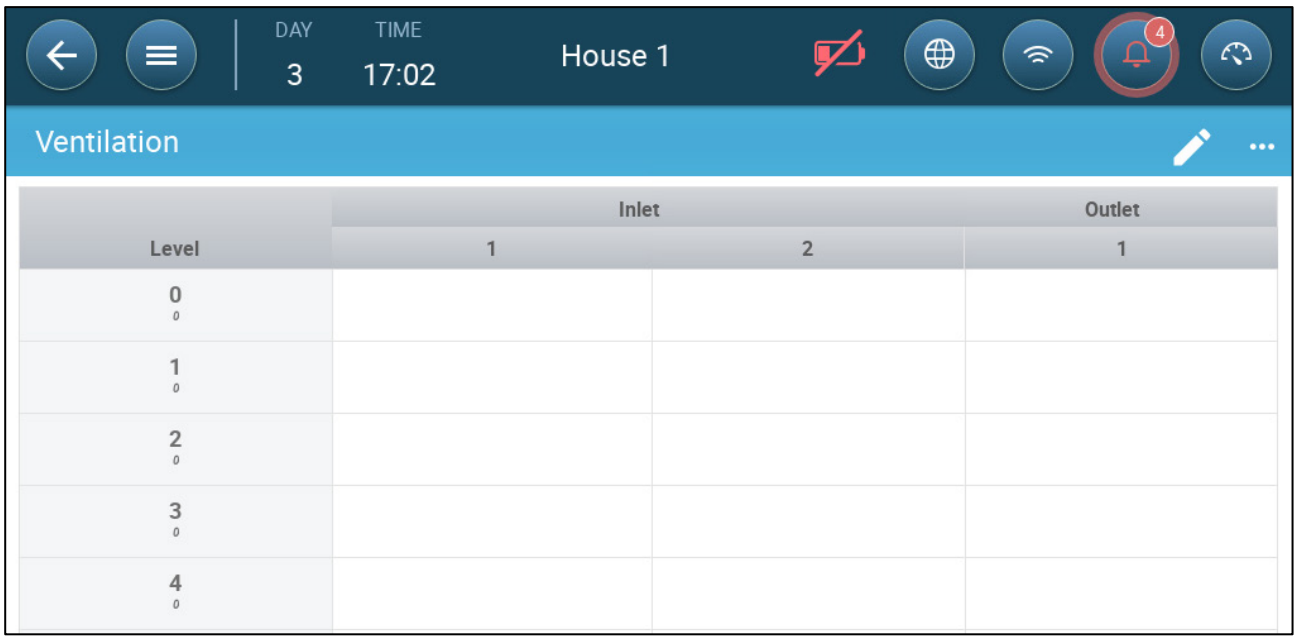
1. Go to System › Control Strategy › Ventilation .



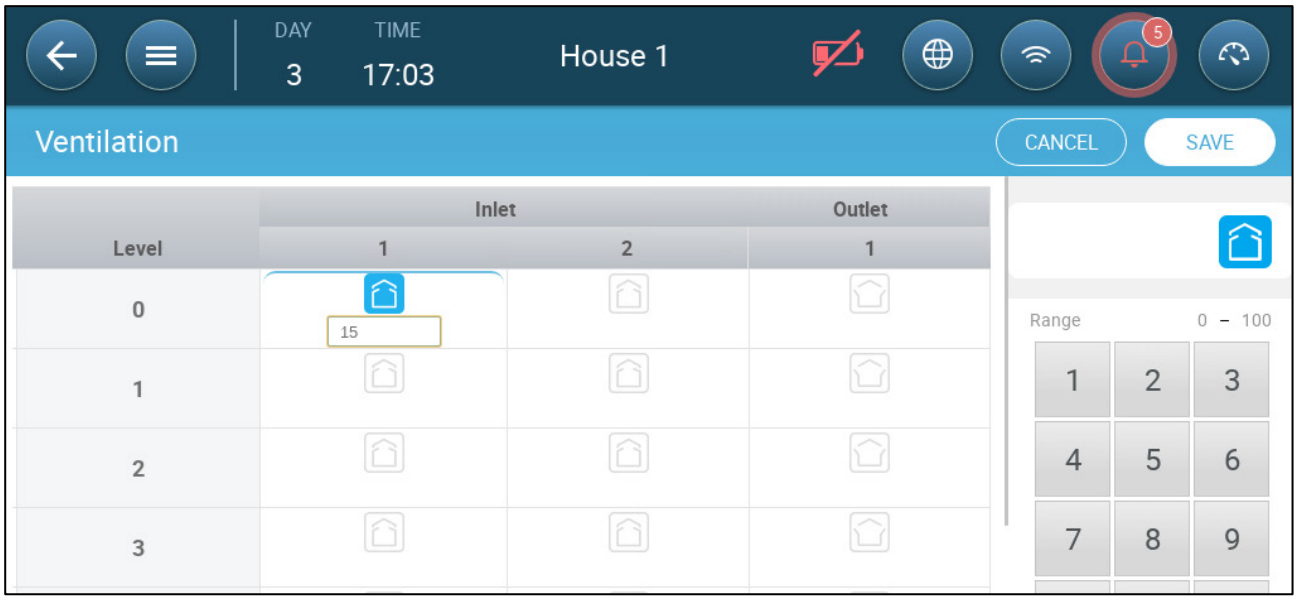

2. Under Inlet Operation Mode, select **Level** or **Pressure**.

### 7.2.3.1 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.

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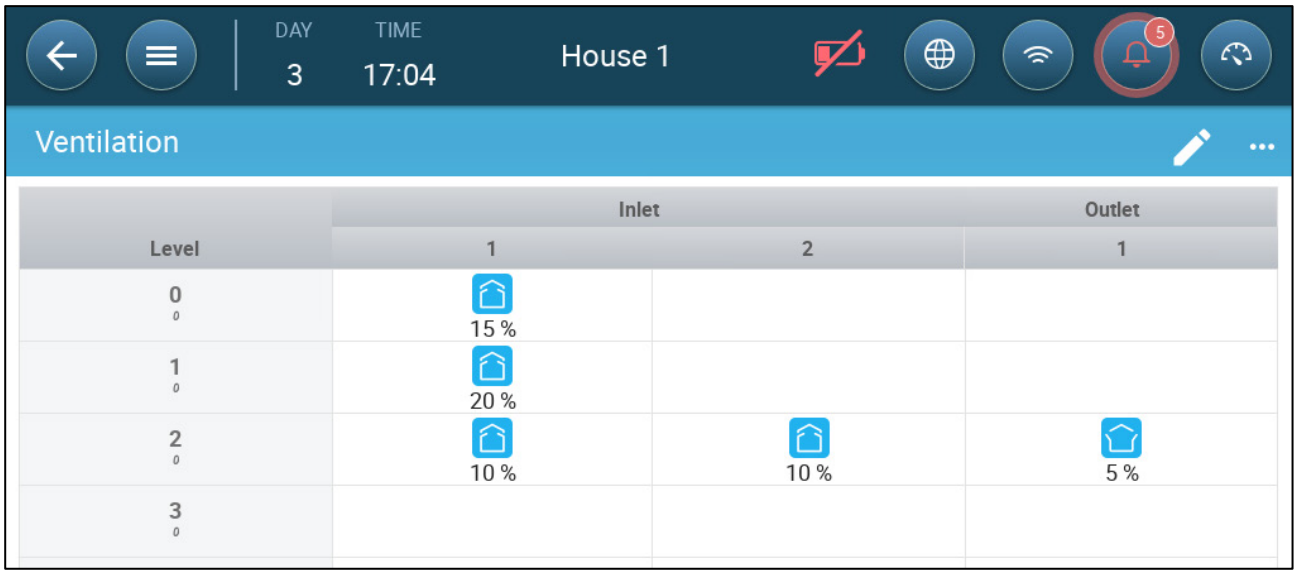



### 7.2.3.2 Static Pressure Control

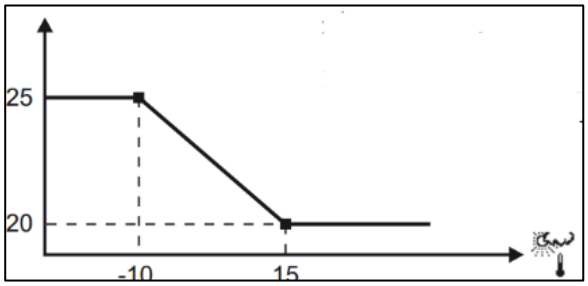
When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Maintaining the proper pressure enables air to enter the rooms at the right 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

#### 7.2.3.2.1 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.




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).

*NOTE Version 4.1.6 supports opening the vents at 0% ventilation.*

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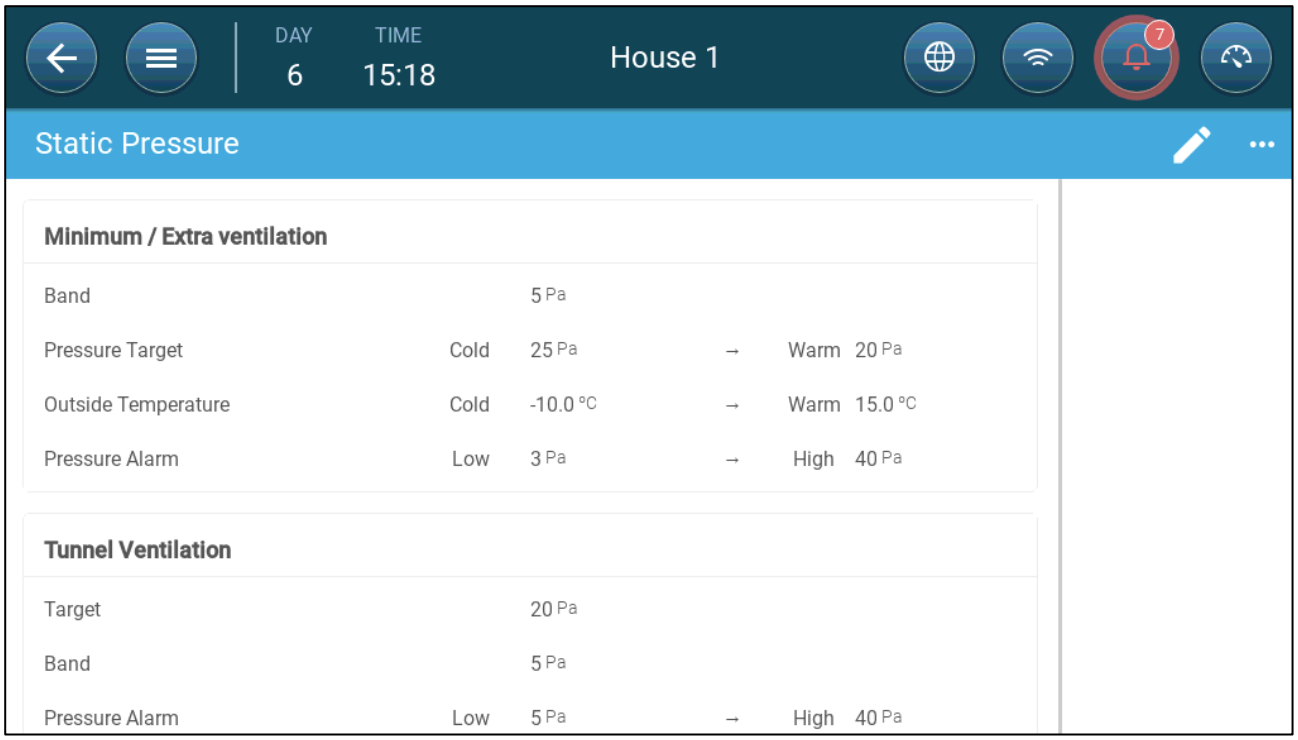
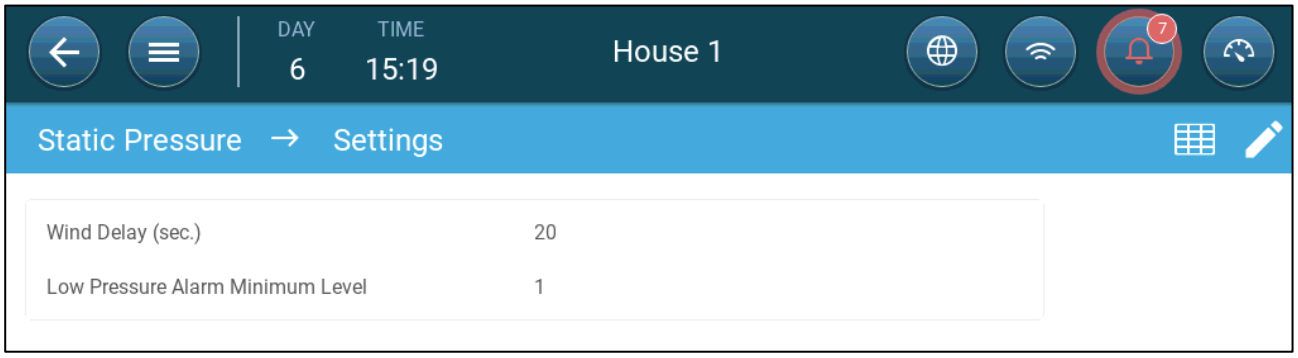
#### 7.2.3.2.2 Static Pressure Main Screen

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.

#### 7.2.3.2.3 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.

#### 7.2.3.2.4 High Static Pressure Alarm State

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.

## 7.3 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

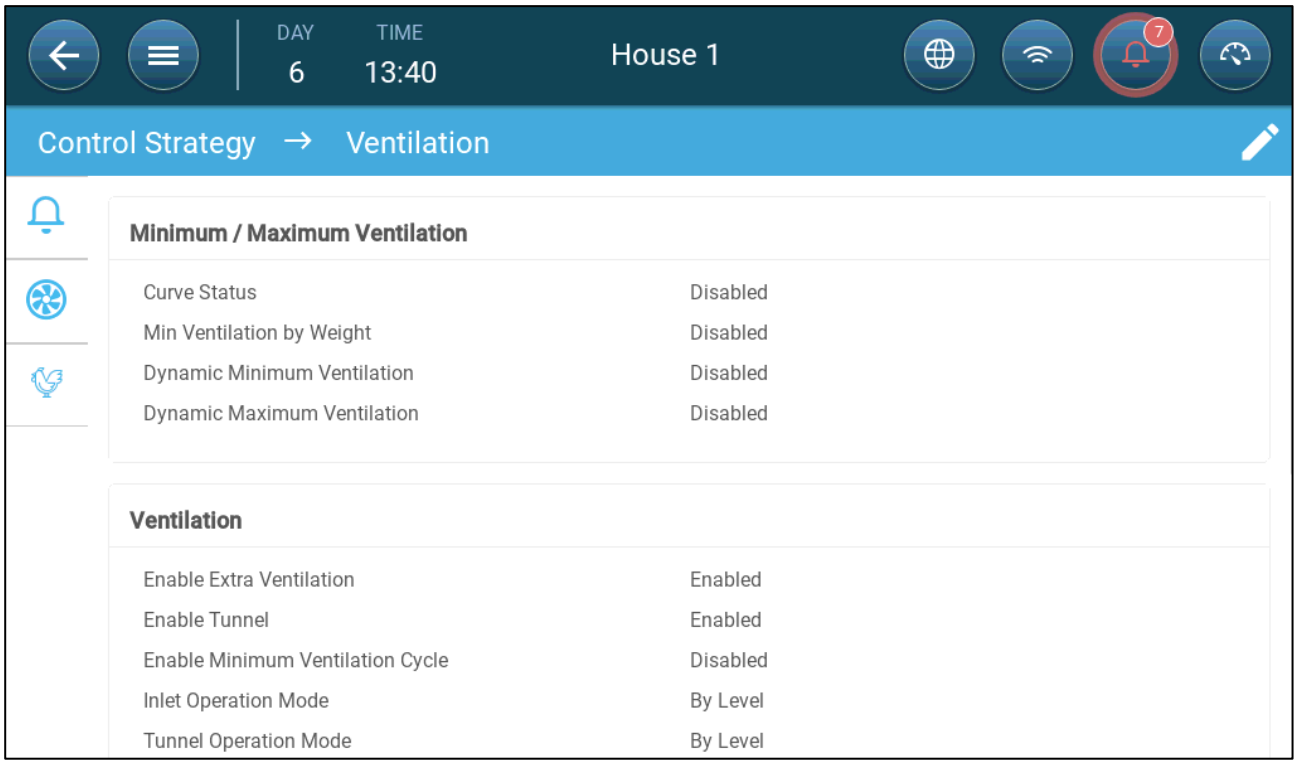
### 7.3.1 Introduction to Extra Ventilation

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

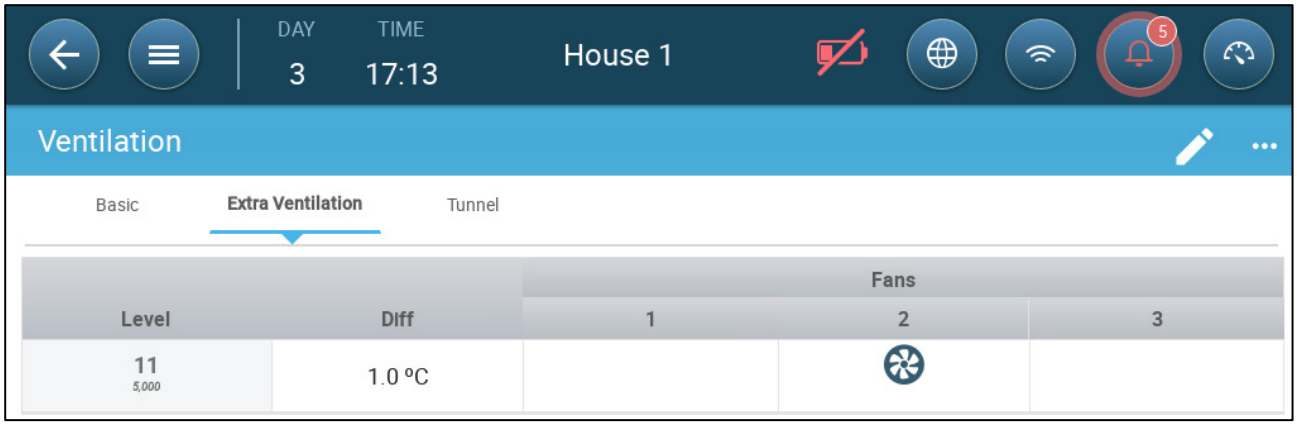
- Minimum ventilation runs at 100%
- The temperature has not reached the tunnel target temperature.
- The room temperature is at least 0.5° C above the target temperature. However you can define a higher differential.

### 7.3.2 Defining Extra Ventilation

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




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 36 on how to configure fans.

## 7.4 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 21).

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

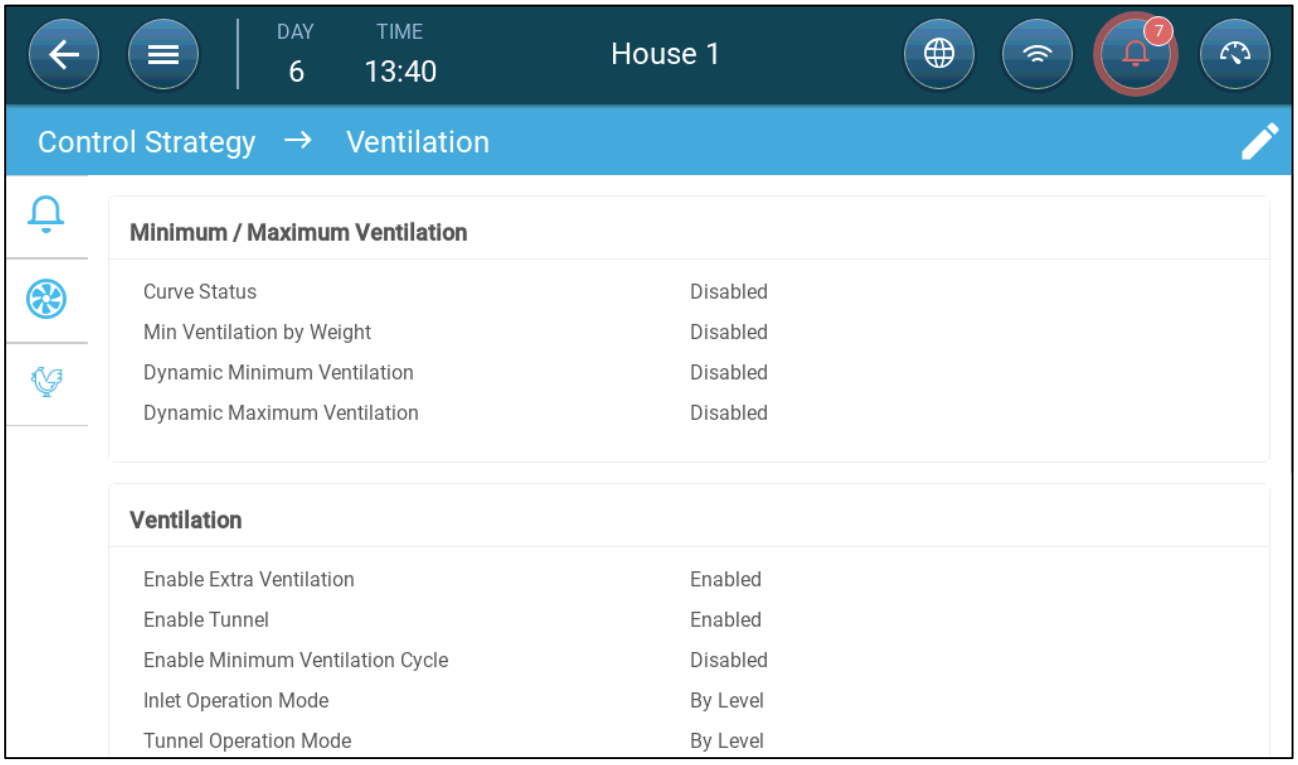
➲ **Configuring Tunnel Ventilation requires mapping at least one fan or one tunnel door.**

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

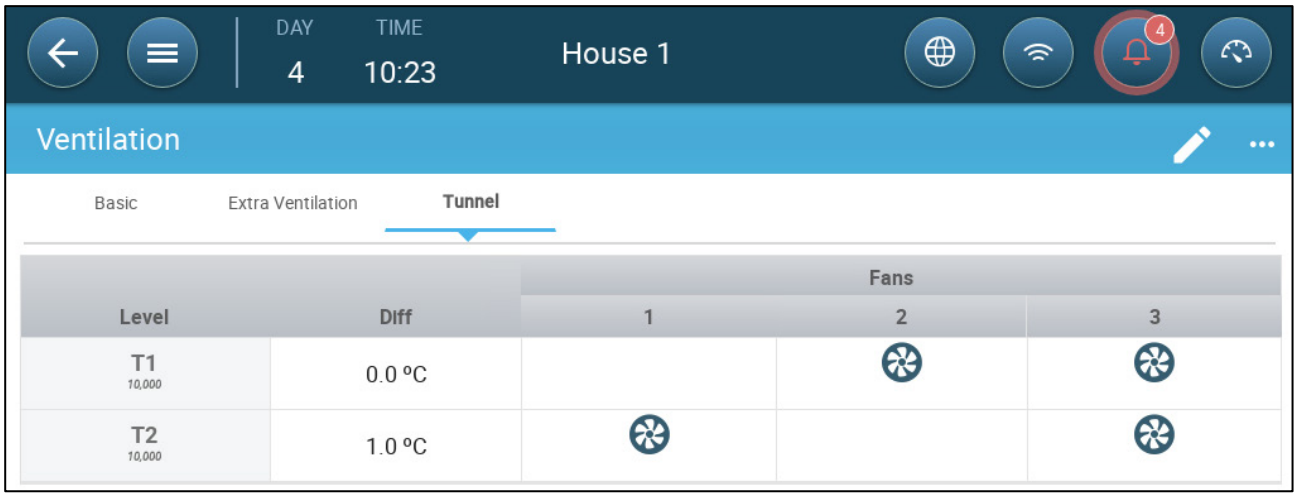
- Defining the Tunnel Ventilation
- Defining the Tunnel Ventilation Settings
- Tunnel Doors
- Defining the Wind Chill Factor

### 7.4.1 DEFINING THE TUNNEL VENTILATION PARAMETERS

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

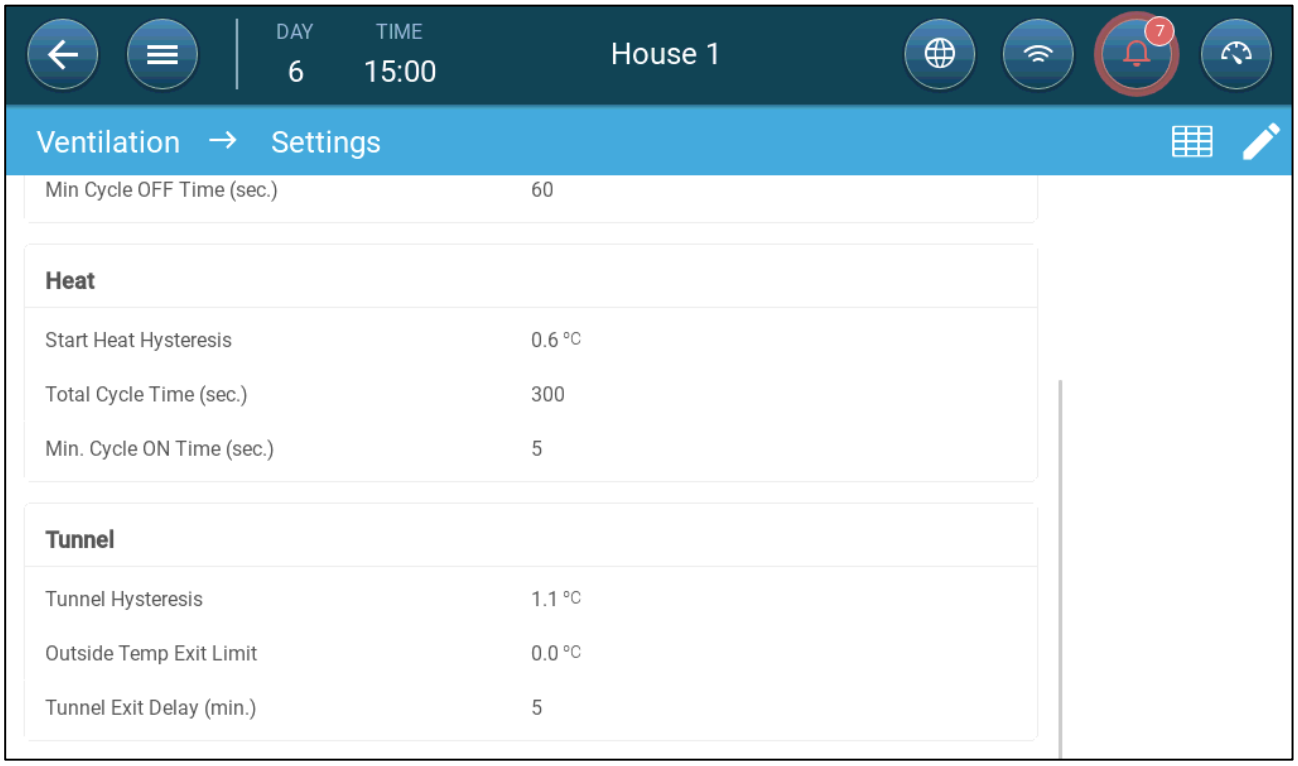



3. Go to Climate › Ventilation and click the Tunnel Tab.




4. 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, Tunnel Ventilation begins. Range: 0.0°C ›10.0°C.
     - 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 36 on how to configure fans.

### 7.4.2 Defining the Tunnel Ventilation Settings

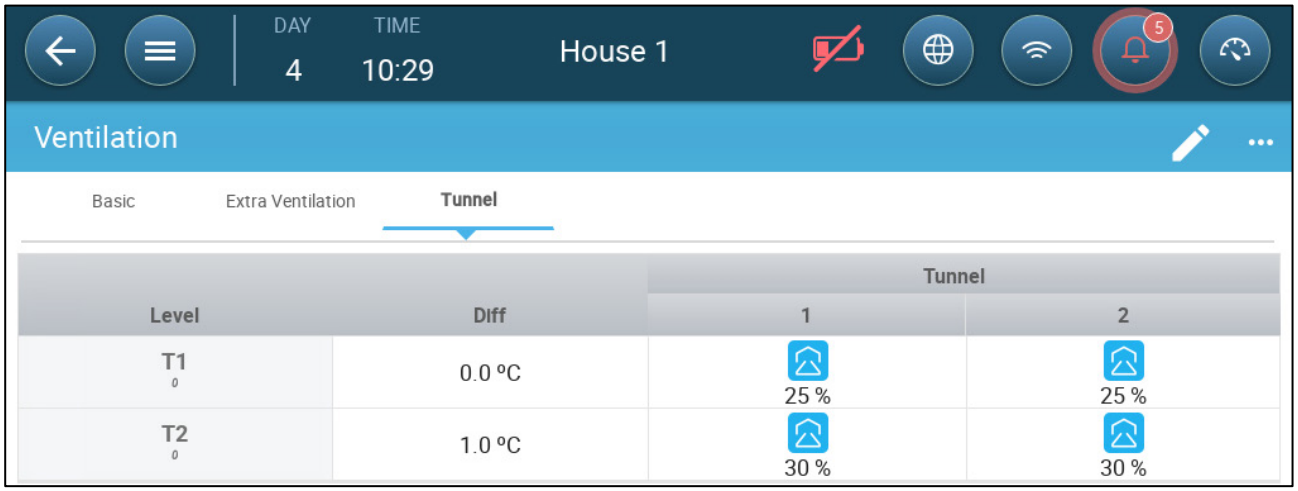


- Define:
  - Tunnel Hysteresis: This is a differential. When the temperature reaches the tunnel temperature minus this differential, ventilation goes down to Extra Ventilation (if enabled) or Minimum Ventilation.
  - Outside Temp Exit Limit: This is a differential. When the outside temperature reaches the tunnel temperature plus this differential, ventilation will remain in Tunnel Mode.
  - 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.

### 7.4.3 TUNNEL DOORS

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.

- Inlet and Curtain Ventilation




### 7.4.4 DEFINING THE WIND CHILL FACTOR

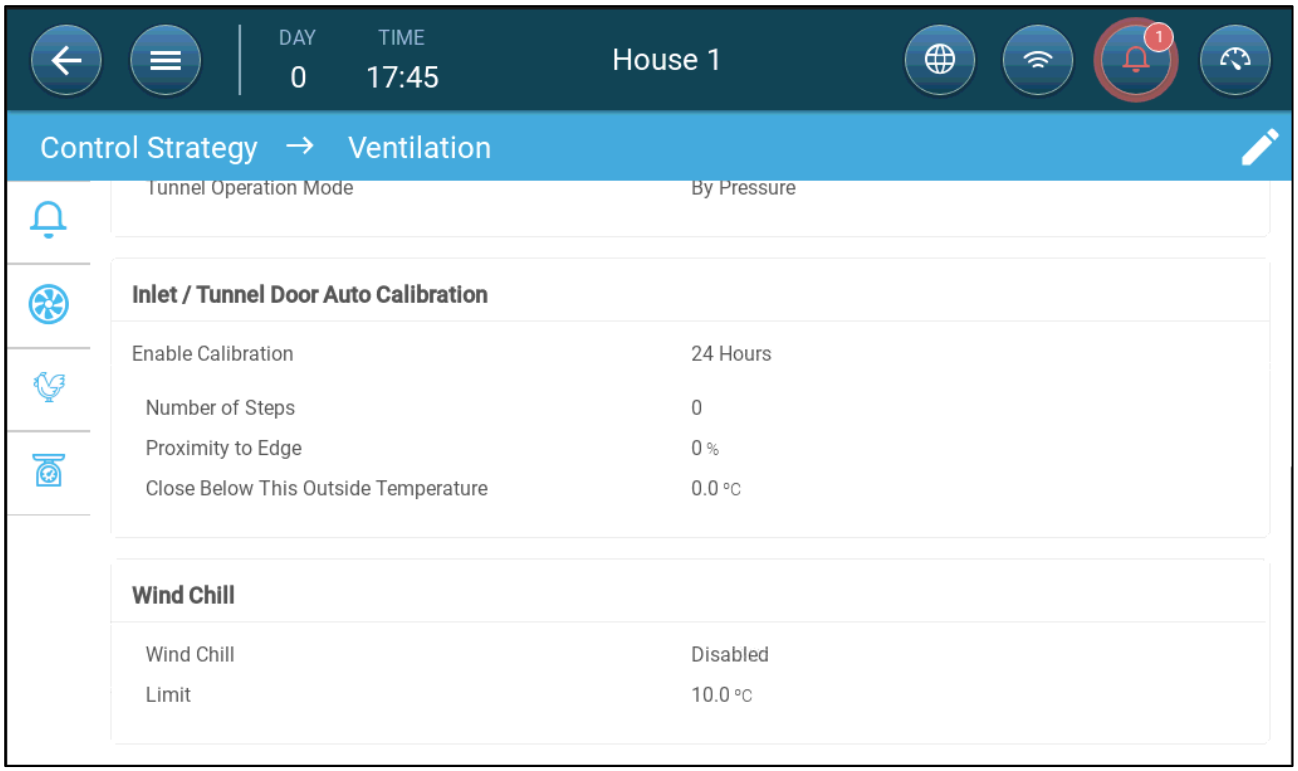
Trio can take into account the tunnel wind speed. The effect of this speed is the wind chill factor. When taken into account, the ventilation is adjusted to reflect the effective temperature according to a built-in algorithm. The algorithm takes into account the wind velocity, house dimensions, and growth 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 12)**

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




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

## 7.5 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, using a potentiometer or 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%.

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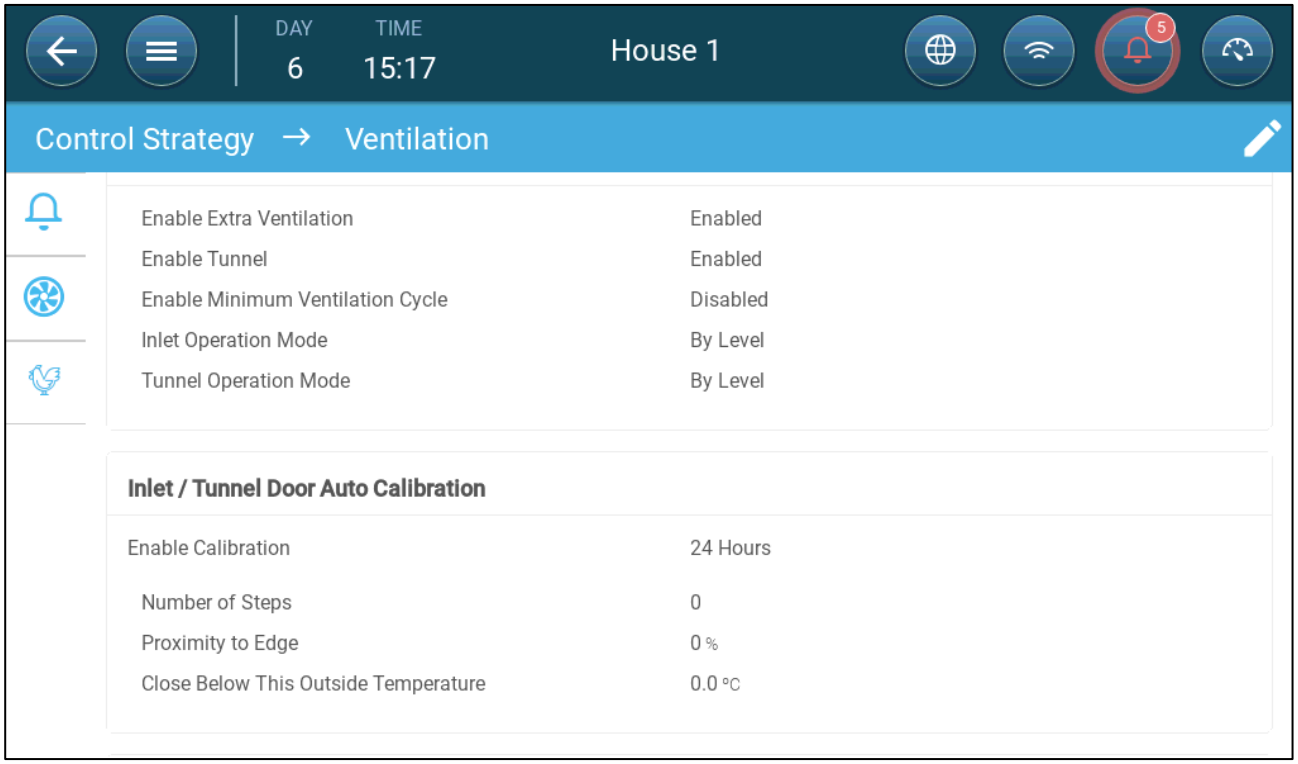
1. Go to System › Control Strategy › Ventilation ..




2. Click .
3. Define:
    - Enable Calibration: Select 24 hours a day or define a specific time frame.
    - Number of steps: Set up the number of steps (number of movements).
    - Proximity to Edge: Inlets will open or close based on this proximity to the edge. For example, when set to 10%, the curtain closes when the opening is less than 10% and opens completely when the opening is greater than 90%.
    - Close Below This Temp. (out): Inlets close when the outside temperature reaches this point.

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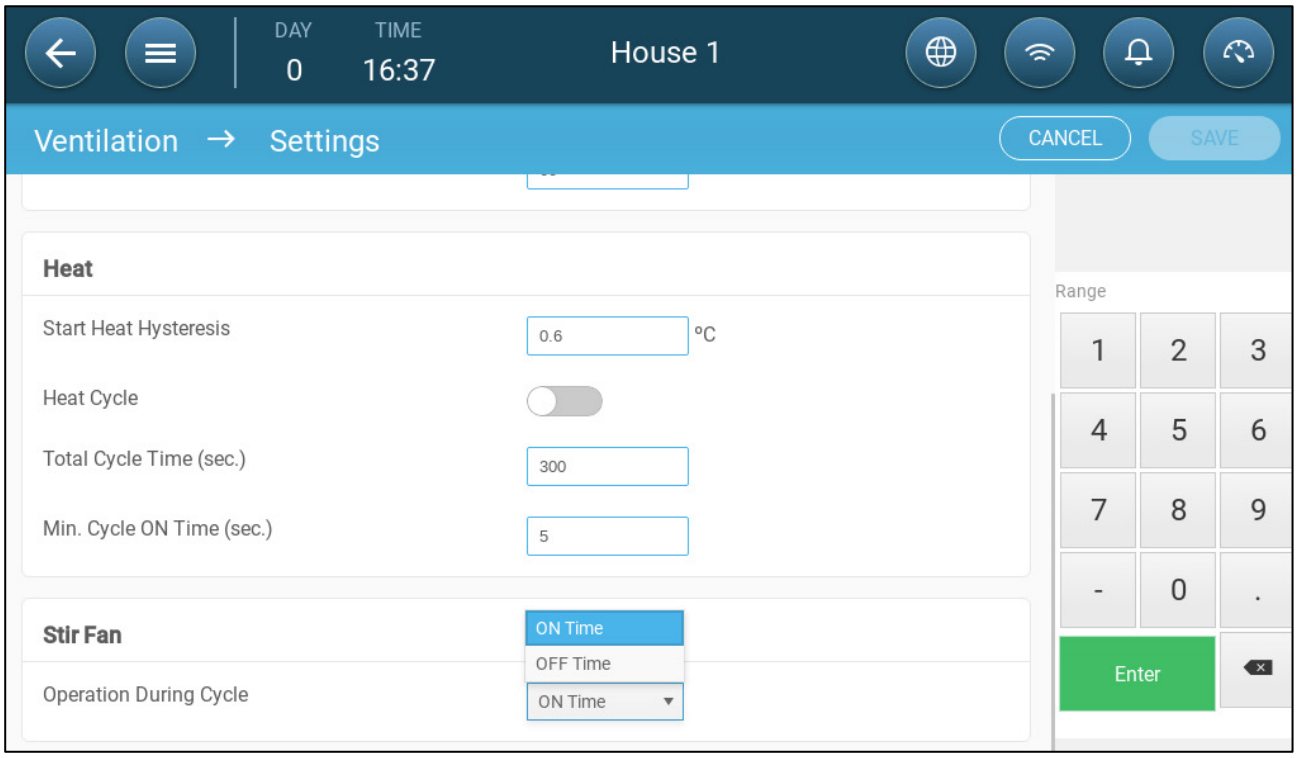
## 7.6 Stir Fan

Stir fans mix the air within the rooms. To define the stir fan functionality:

1. Define a relay or analog port as a stir fan (refer to the Installation Manual).
2. Define the stir fan parameters (refer to the Installation Manual).
3. Option: Define the stir fan cycle time (refer to Minimum Ventilation Cycle, page 38)
4. If the ventilation fans are running in a cycle, go to Climate › Ventilations › Settings.




5. Define when the stir fan operates, during the cycle On or Off time.

# 8 Cooling Functions

## 8.1 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 pigs 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 animals undo heat stress during periods of high relative humidity, Trio employs the following rules:

- When the temperature reaches the Target Temperature plus the Temperature Difference, cooling begins and continues until the temperature falls below this point (minus the band).
- 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.

## 8.2 Selecting the Cooling Mode

Trio enables running the cooling device in three different modes:

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

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

1. Go to Climate › Cooling.› Settings.

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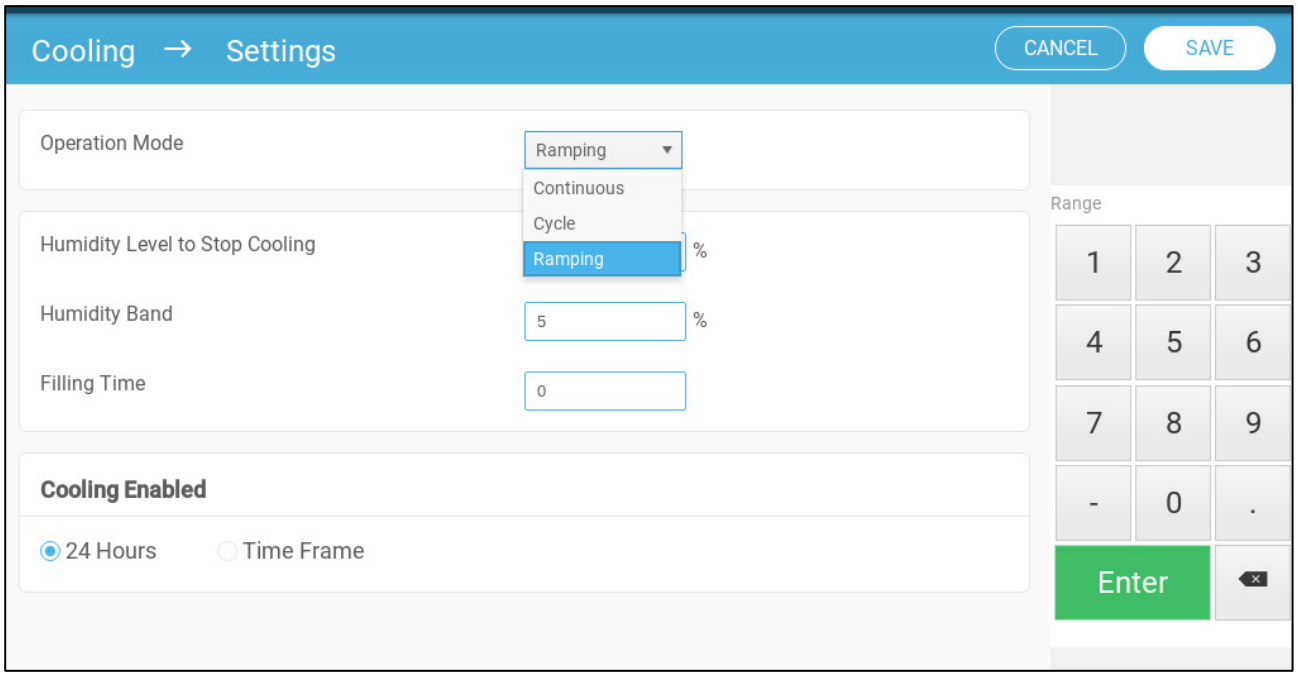
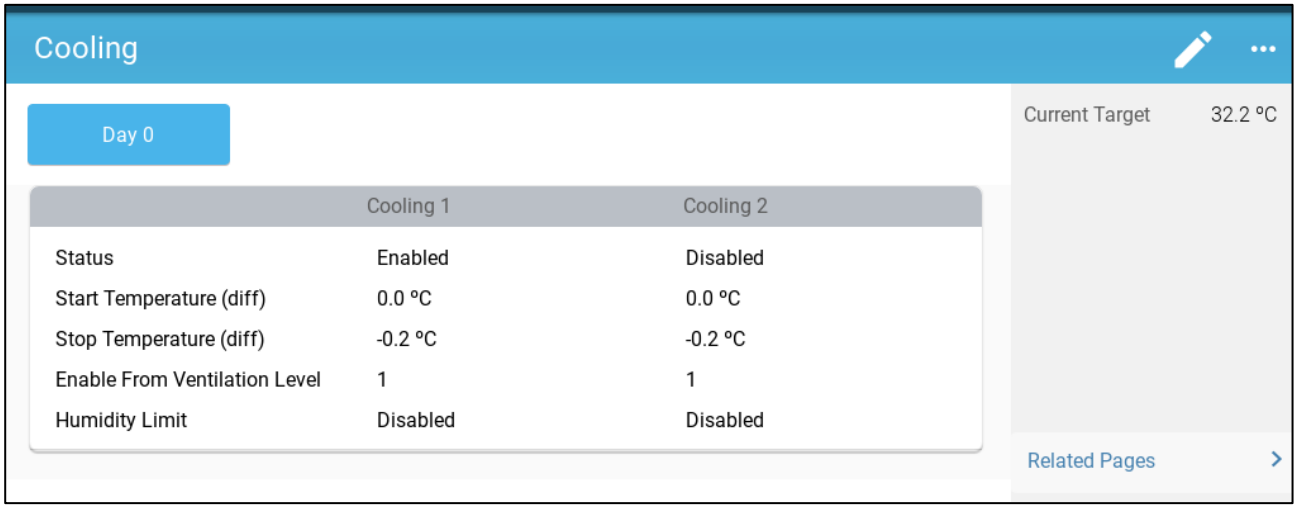



2. Define:
    - The operation mode.
    - Humidity to Stop: Define the humidity level at which cooling stops.
    - Humidity Band: Set the humidity band to re-enable cooling outputs after the process ceases because of the high humidity level.
    - Filling Time: Define the amount of time required to distribute water over the pad.
    - Cooling Enabled: Define when cooling is enabled, 24 hours a day or time frames.

3. Go to Climate > Cooling. The screen that appears depends on the operation mode chosen.
    - Continuous Cooling
    - Cycle Cooling
    - Ramping Cooling

### 8.2.1 CONTINUOUS COOLING

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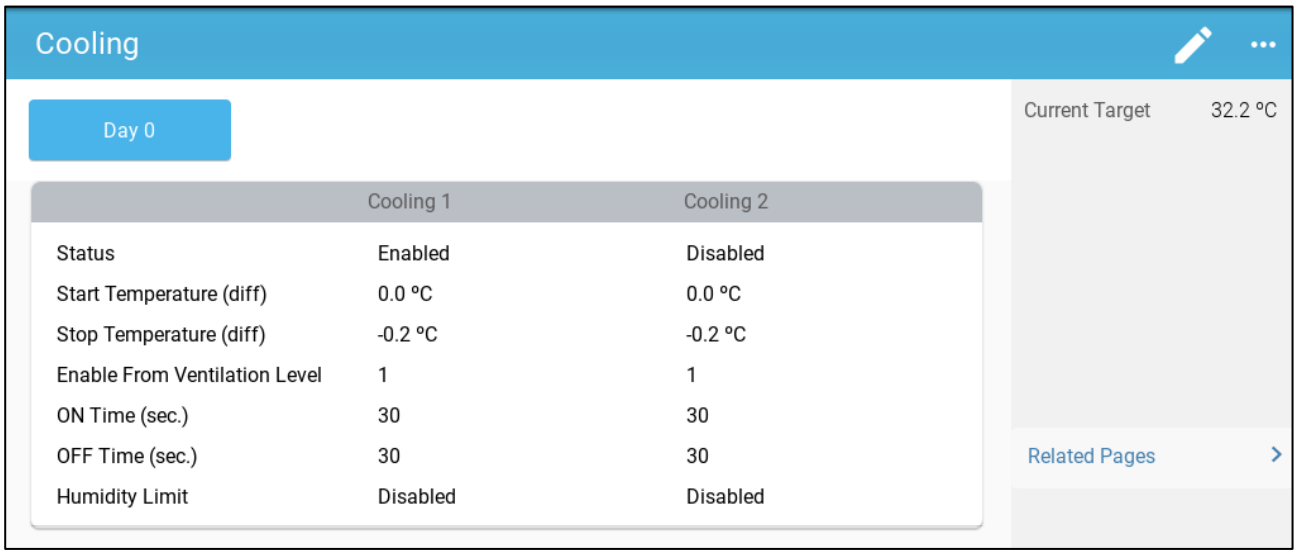
- Define:
    - Growth days at which the settings change.
    - Status: Enable or disable a cooling device.
    - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days.

*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.
        - Stop cooling device temperature = Cooling Target ± Stop temperature
    - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
    - Humidity Limit: Enable stopping cooling at a certain humidity level.

### 8.2.2 CYCLE COOLING



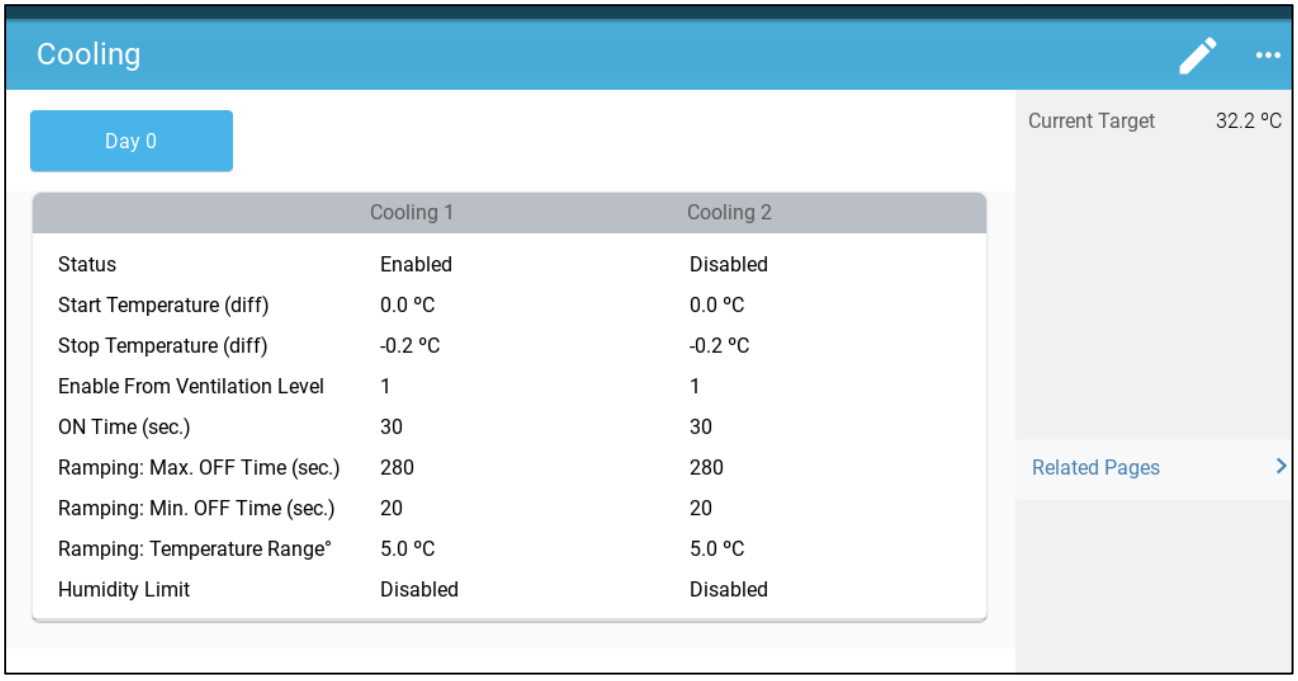

- Define:
    - Growth days at which the settings change.
    - Status: Enable or disable a cooling device.
    - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days.

*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.
        - 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.

### 8.2.3 RAMPING COOLING




- Define:
  - Growth days at which the settings change.
  - Enable: Enable or disable a cooling device.
  - Start temperature (diff): 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.

*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.
    - Stop cooling device temperature = Cooling Target ± Stop temperature
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (Default 1).
  - ON Time: Describe the amount of time the cycle is ON.
  - Ramping Maximum/Minimum OFF Time (sec): Define the maximum and minimum off time that cooling devices remain off after having operated during the ON time.
  - Ramping Range T°: Sets a temperature range to modulate the cooling device cycle.
  - Humidity Limit: Enable stopping cooling at a certain humidity level.

# 9 Heating Functions

Trio supports up to six (6) on/off heating devices and variable heaters. To control the heat, Trio has two different programs, one to maintain the target temperature in the entire house and one program that controls separate heating zones. In the case of the latter, each heater has a dedicated sensor and unique target temperature.

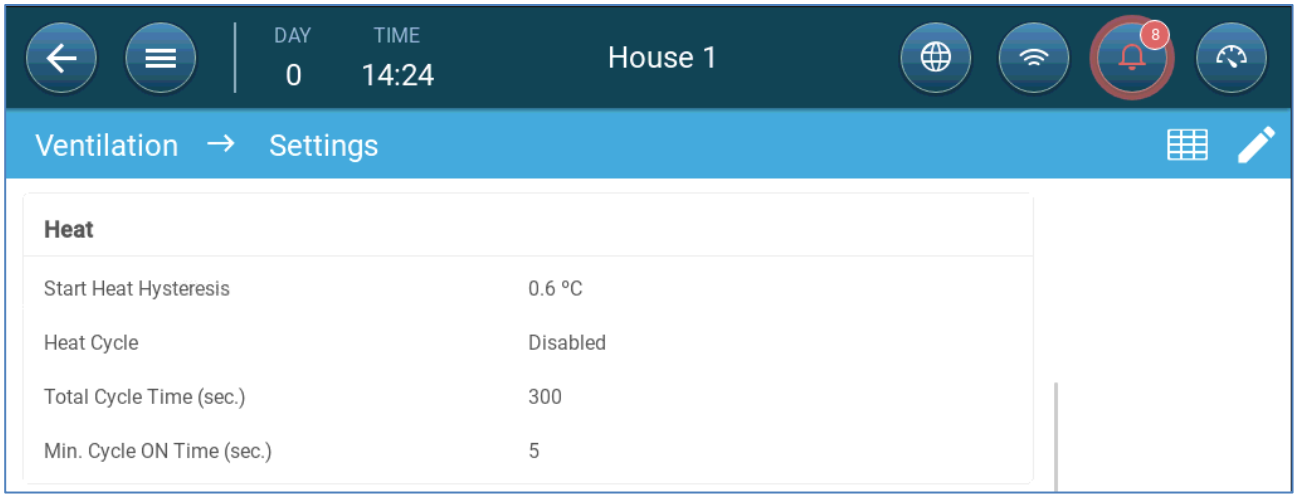
- Defining the Central Heater Parameters
- Zone Heaters

## 9.1 Defining the Central Heater Parameters

As the 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 (hysteresis).

➲ **Define relays and/or analogue output ports as heaters in Devices and Sensors.**

1. Go to Climate › Ventilation › Settings.




2. Define:
   - Start Heat Hysteresis: This is a differential. When the temperature drops to the target temperature minus this amount, heating begins.
   - Heat Cycle: Enable central heaters to work in cycles.
   - Total Cycle Time (sec.): For heaters defined as cycle heaters, define the cycle time.
   - Min Cycle On Time (sec.): For heaters defined as cycle heaters, define the minimum on time.

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## 9.2 Zone Heaters

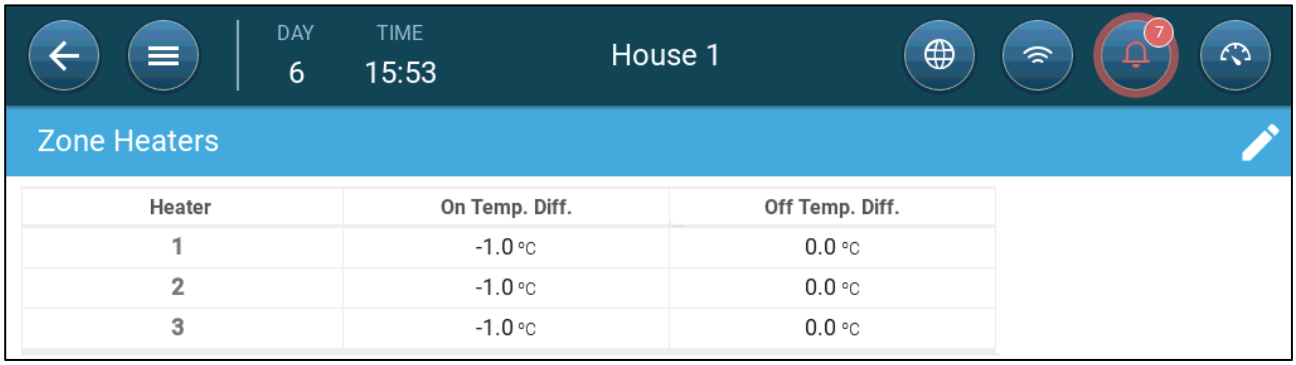
➲ **Define relays and/or analogue output ports as heaters in Devices and Sensors.**

➲ **Define at least one heater as a Zone Heater in Devices and Sensors.**

- Defining Non-Variable Zone Heaters
- Defining Variable Zone Heaters

### 9.2.1 DEFINING NON-VARIABLE ZONE HEATERS

1. Go to Climate › Zone Heaters.

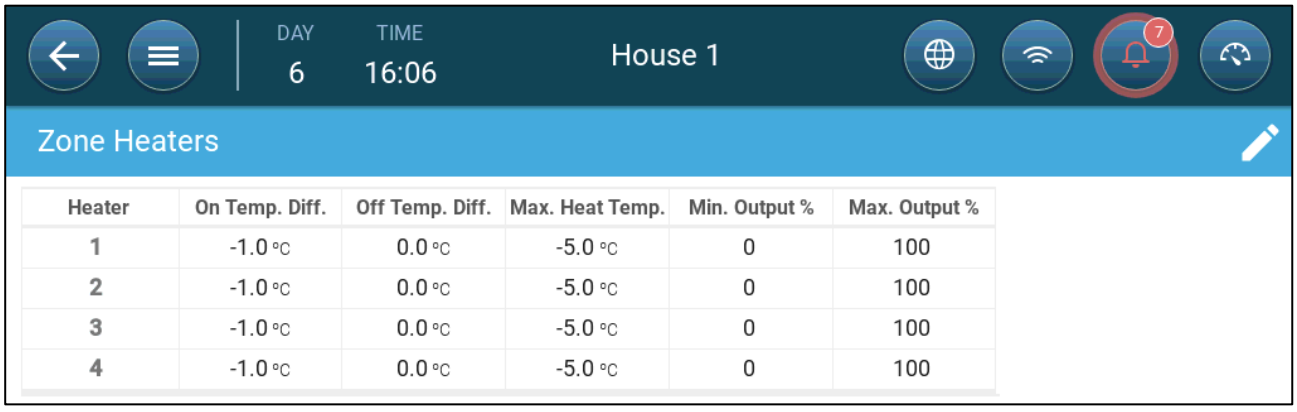



| Heater | On Temp. Diff. | Off Temp. Diff. |
|---|---|---|
| 1 | -1.0 °C | 0.0 °C |
| 2 | -1.0 °C | 0.0 °C |
| 3 | -1.0 °C | 0.0 °C |

2. Click .
3. Define:
    - On Temp Diff: This is a differential. When the temperature reaches the target temperature minus this amount, heating begins.
    - Off Temp Diff. This is a differential. When the temperature reaches the target temperature minus this amount, heating stops.

### 9.2.2 DEFINING VARIABLE ZONE HEATERS

1. Go to Climate › Zone Heaters.




| Heater | On Temp. Diff. | Off Temp. Diff. | Max. Heat Temp. | Min. Output % | Max. Output % |
|---|---|---|---|---|---|
| 1 | -1.0 °C | 0.0 °C | -5.0 °C | 0 | 100 |
| 2 | -1.0 °C | 0.0 °C | -5.0 °C | 0 | 100 |
| 3 | -1.0 °C | 0.0 °C | -5.0 °C | 0 | 100 |
| 4 | -1.0 °C | 0.0 °C | -5.0 °C | 0 | 100 |

2. Click .
3. Define:
    - On Temp Diff: This is a differential. When the temperature reaches the target temperature minus this amount, heating begins.

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- Off Temp Diff. This is a differential. When the temperature reaches the target temperature minus this amount, heating stops.
- Max Heat Temp: Set the temperature under which the heaters work at their maximum output.
- Min/Max Output: Set the voltage output for minimum and maximum.

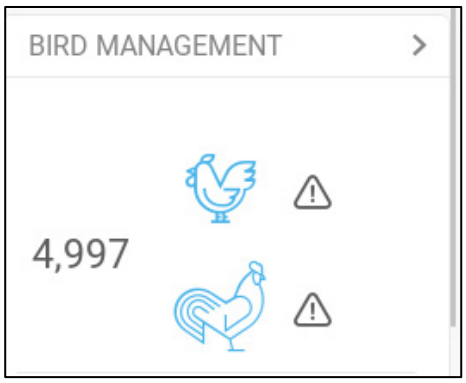
# 10 Brood Area

Chicks require extra heat during the first few weeks 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.

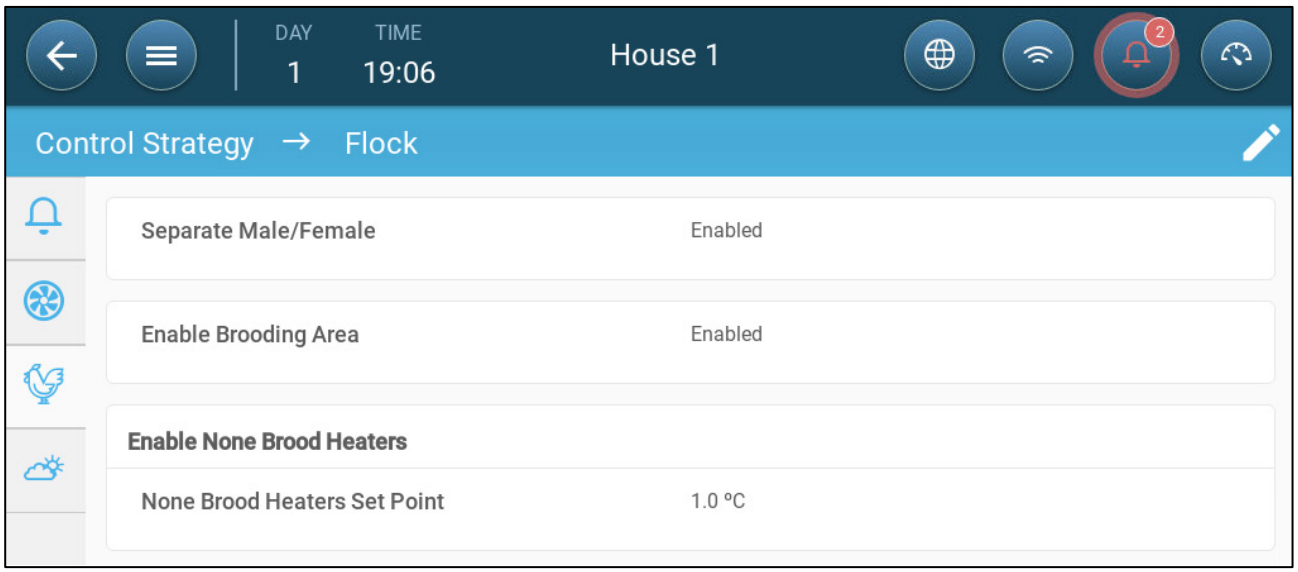
The brood area has its own temperature sensor(s) assigned to it. All devices and programs operate according to the brood area temperature sensors. However, as an option you can enable non-brood area heaters. In that scenario, those heaters operate according to the non-brood area temperature sensors and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

Brooding affects the following screens:

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




1. Go to System › Control Strategy › Flock .

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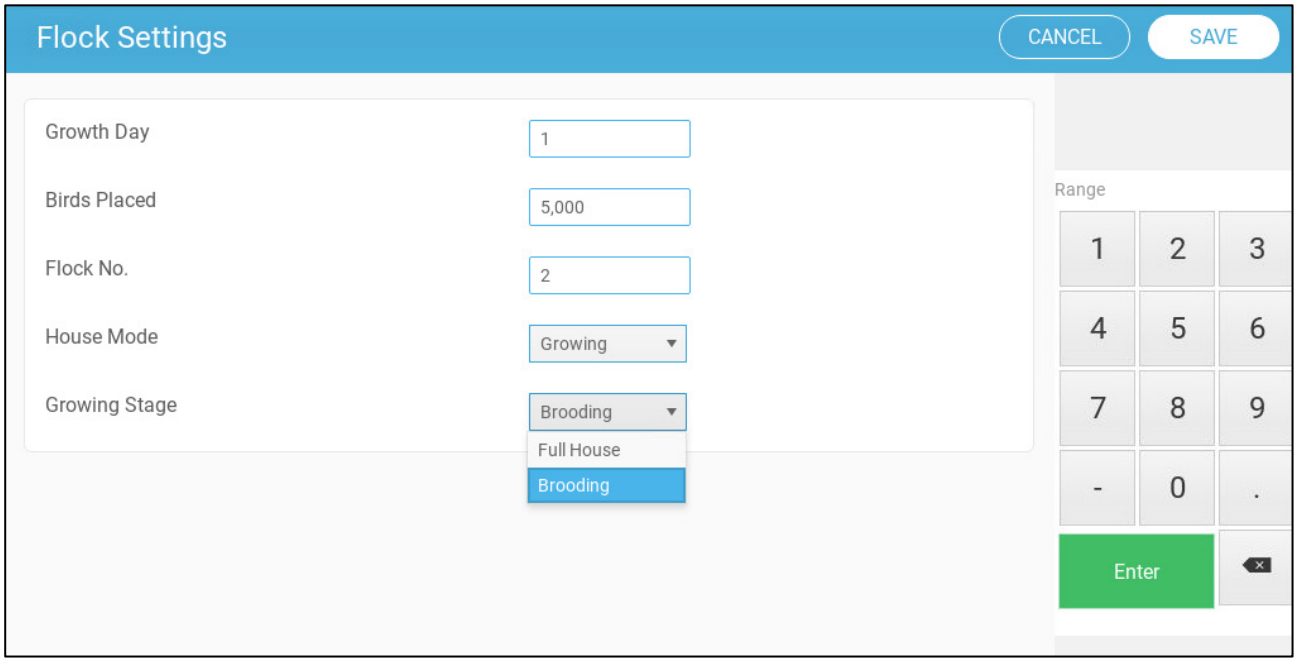
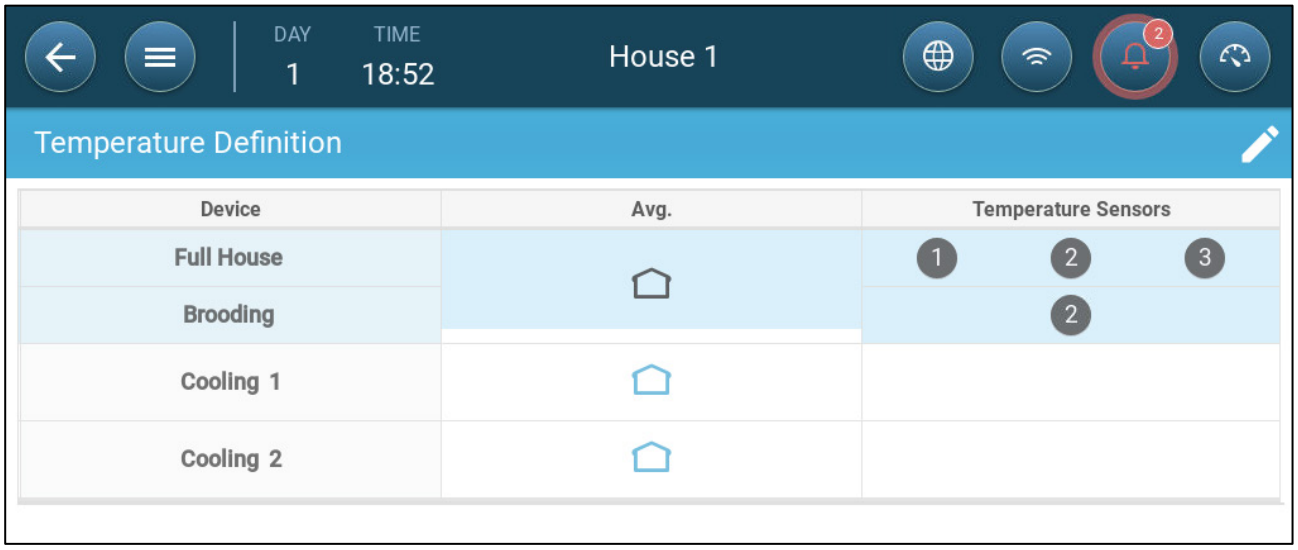
a. Enable Brooding Area.

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).

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.

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# 11Feed and Silo Management

- Feeding Summary
- Setting up Feeding
- Configuring the Silo

## 11.1 Feeding Summary

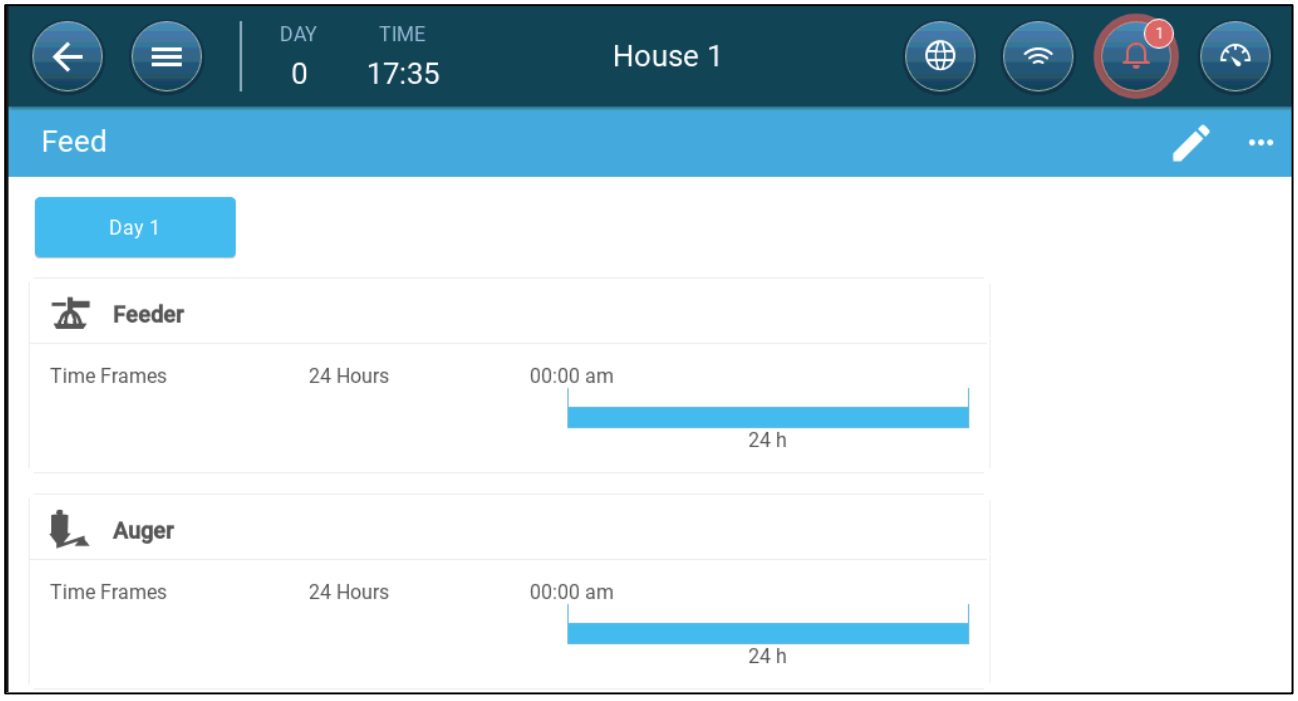
Feed is stored in silos located outside the chicken house. Augers transport the feed to hoppers. Sensors are installed on the augers and hoppers to ensure that the proper amount of feed is transported. Feed lines transport the feed from the hoppers to feeding pans, according to signals sent from the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

- **Auger, feeder, and silo relays must be wired, defined, and mapped.**
- **Auger active and feeder active digital sensors must be wired, defined, and mapped.**

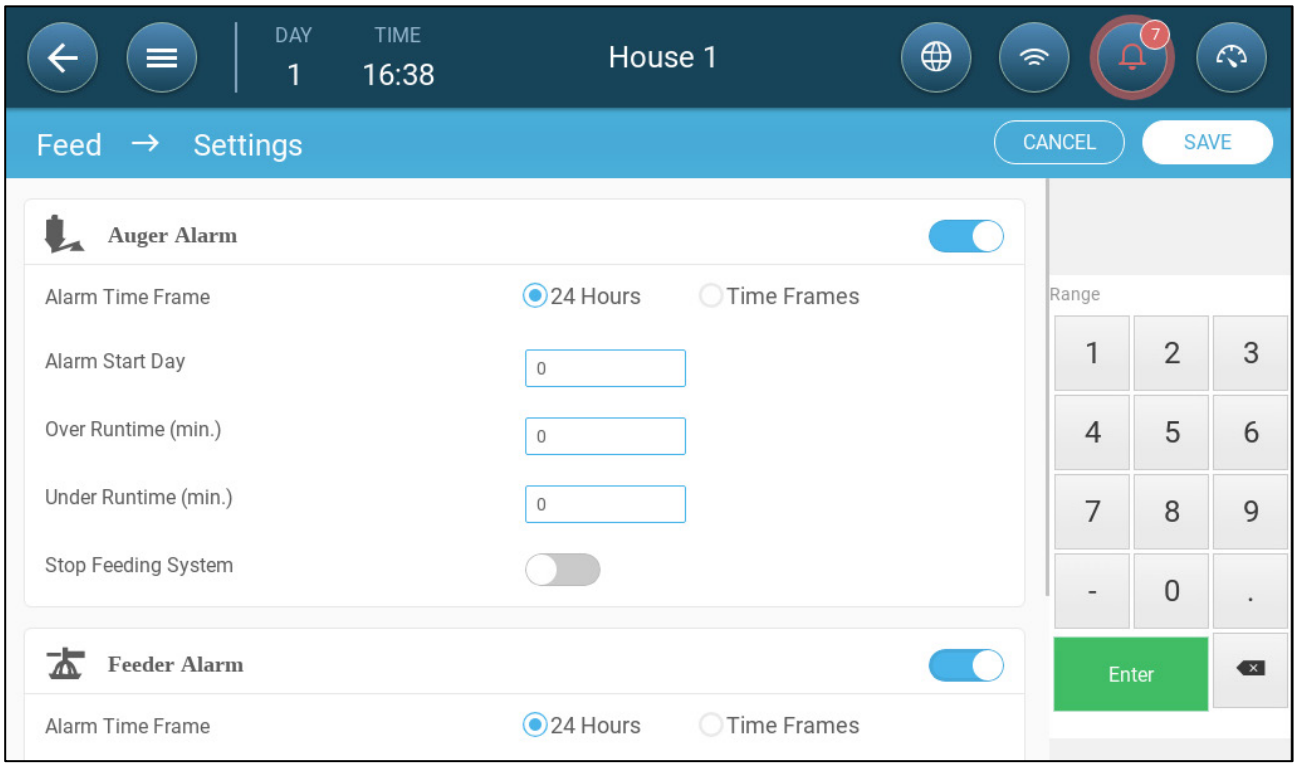
## 11.2 Setting up Feeding

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.



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 > Settings 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.

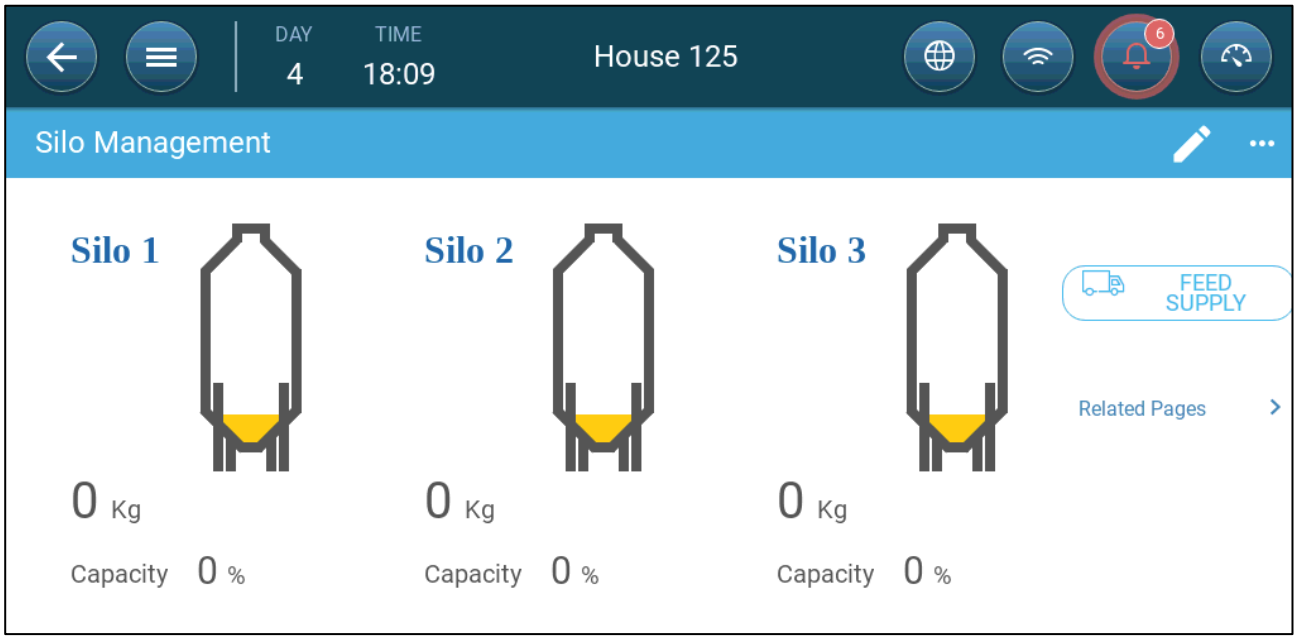
## 11.3 Configuring the Silo

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.

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# 12 Lighting Program

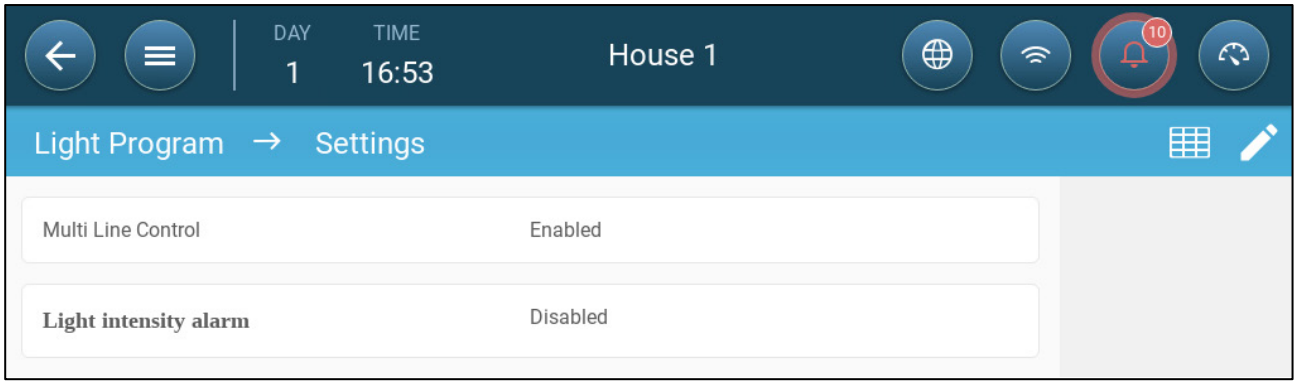
Trio supports on/off (non-dimmable) lights and dimmable lights. In setting up the program, the following options must be defined:

- 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.

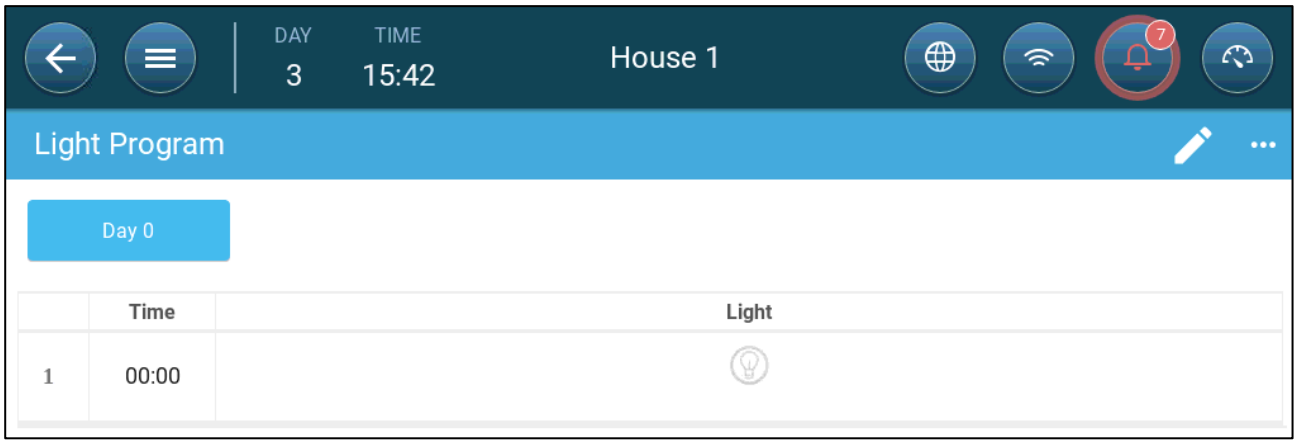
- On/Off Lights
- 0 – 10 Volt Variable Lights
- Light Settings

## 12.1 On/Off Lights

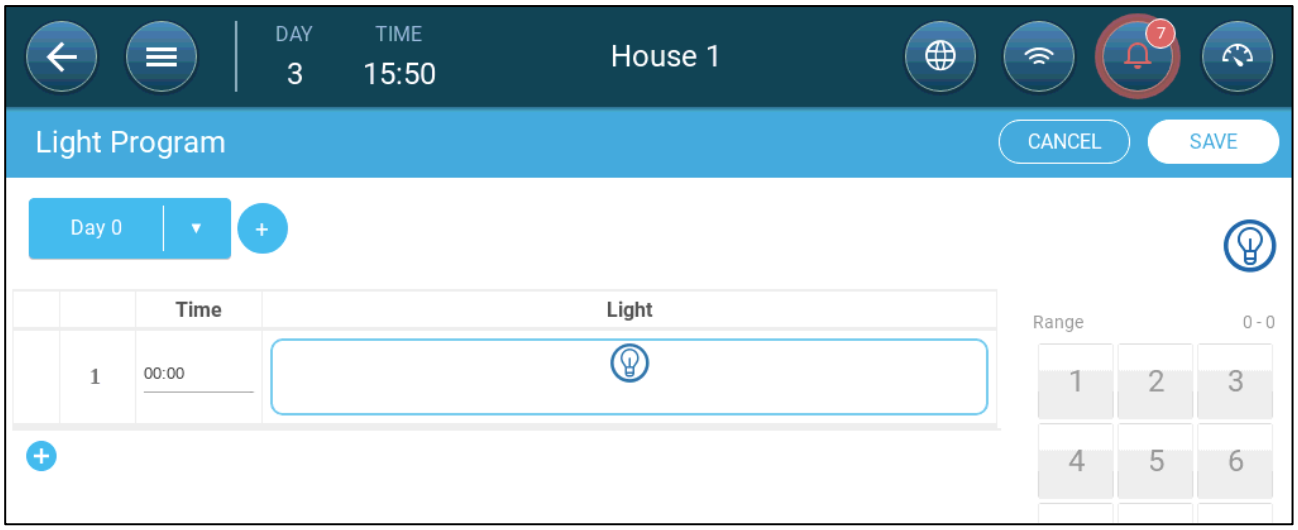
1. To enable multi line control, go to Control › Light › Settings and enable Multi Line Control (option).



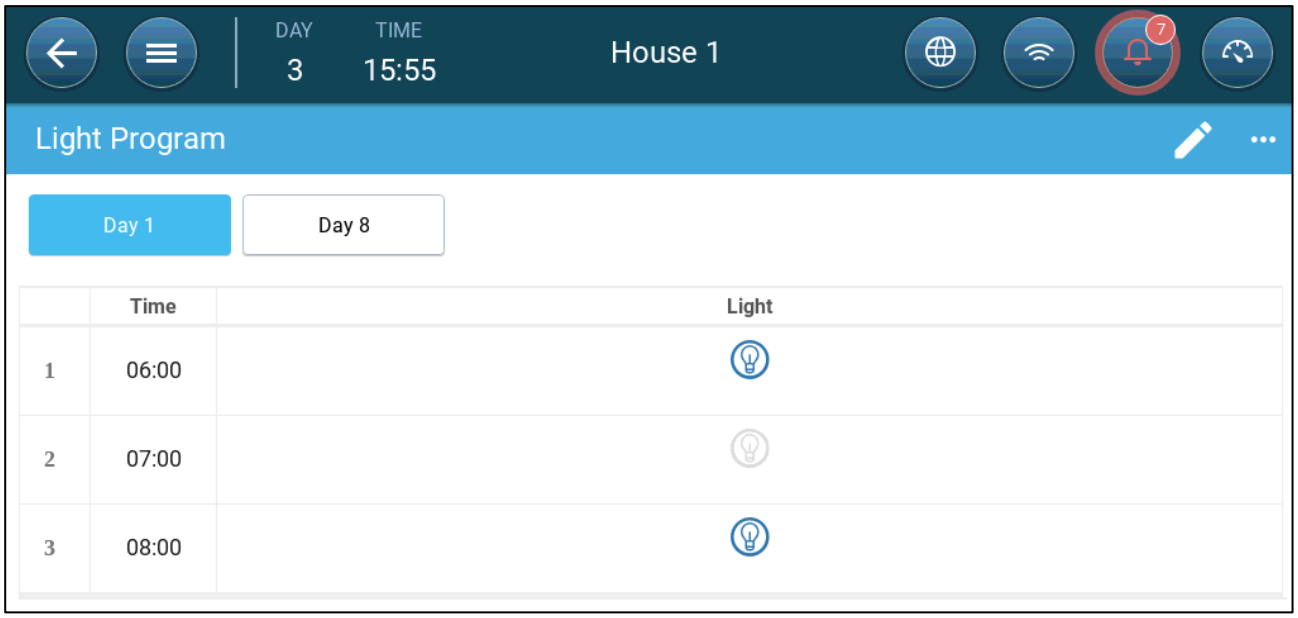

2. Go to Control › Light.



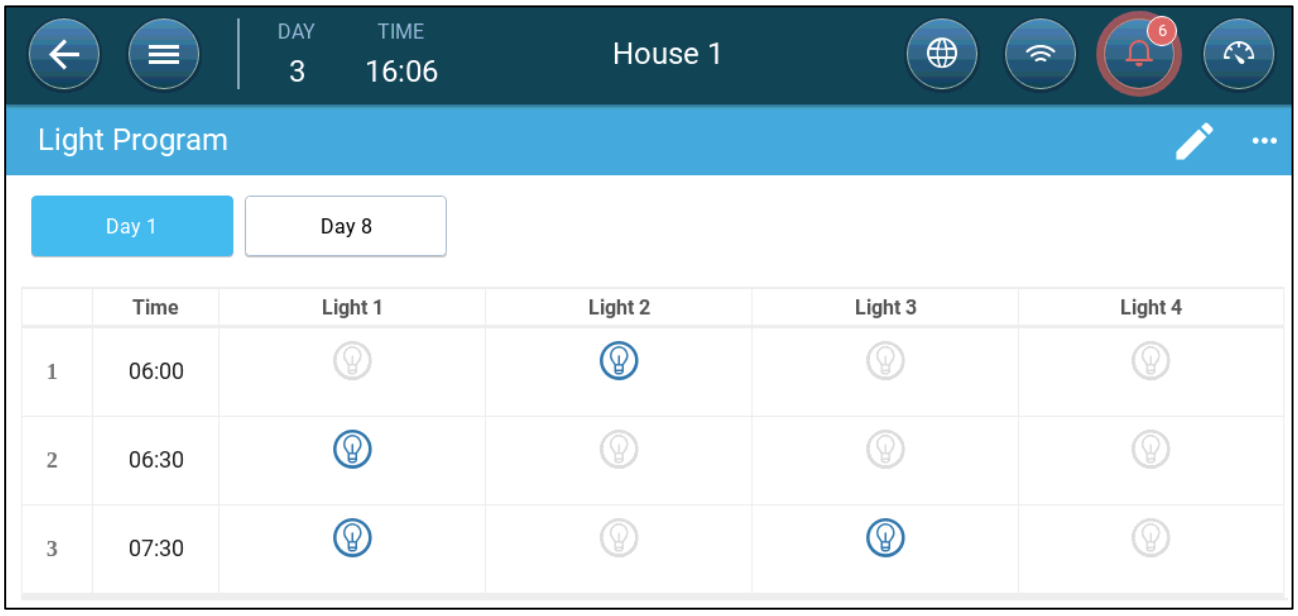

3. Click .
4. Define the growth day.
5. In line one, define the time that the lights go on.
6. Enable the line(s) :
    - In single line control, click the light icon. Another light icon appears. Click that icon. Both icons turn blue.
    - In multi-line control, click the icon of each required line.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




7. Add additional programming lines to define when the light lines go off and then on. Repeat for each growth day.
8. 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.

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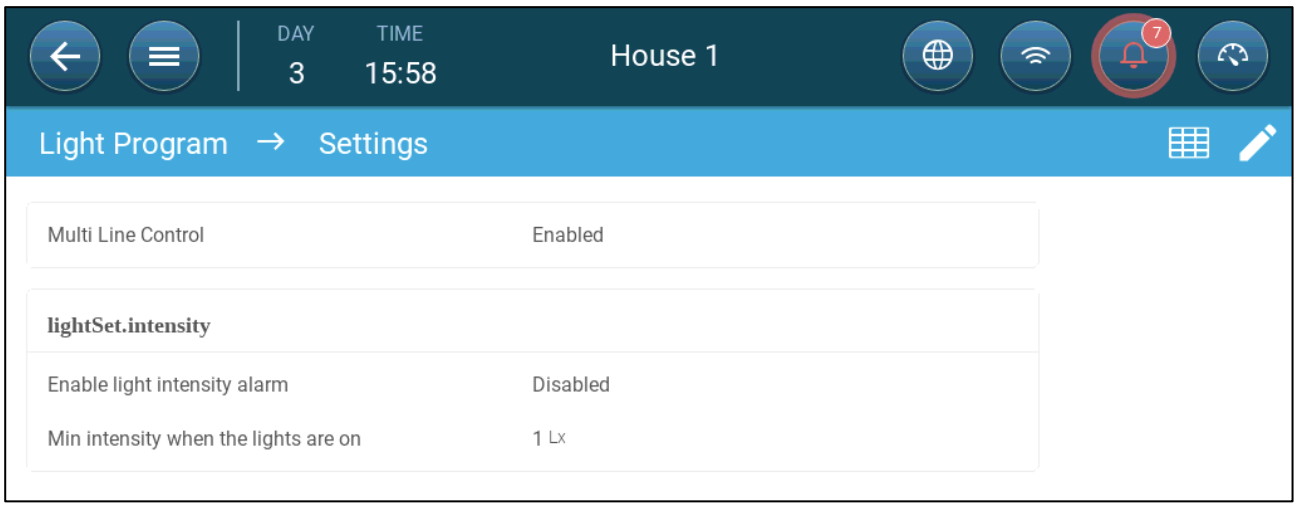
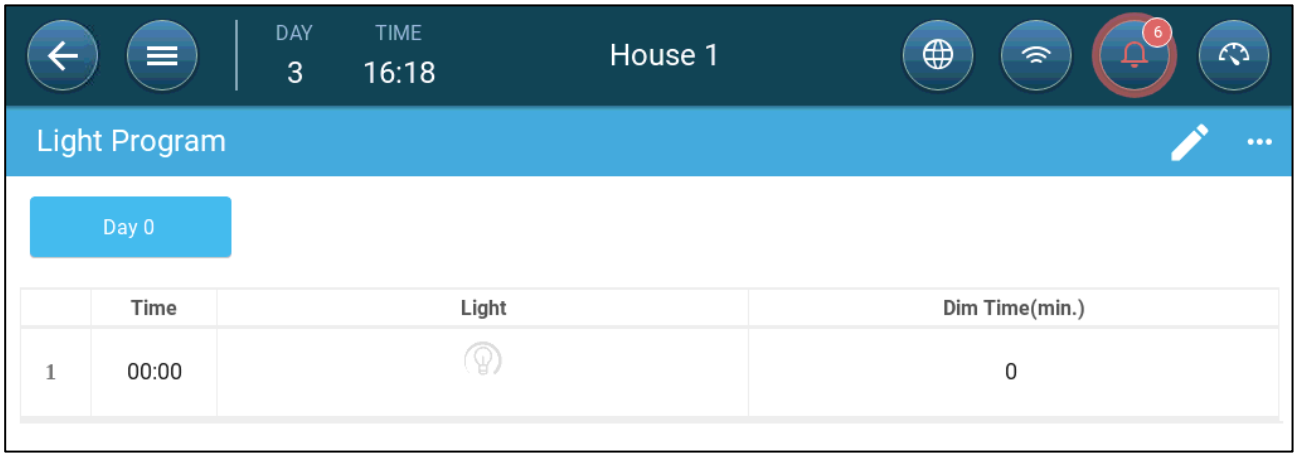
## 12.2 0 – 10 Volt Variable Lights

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

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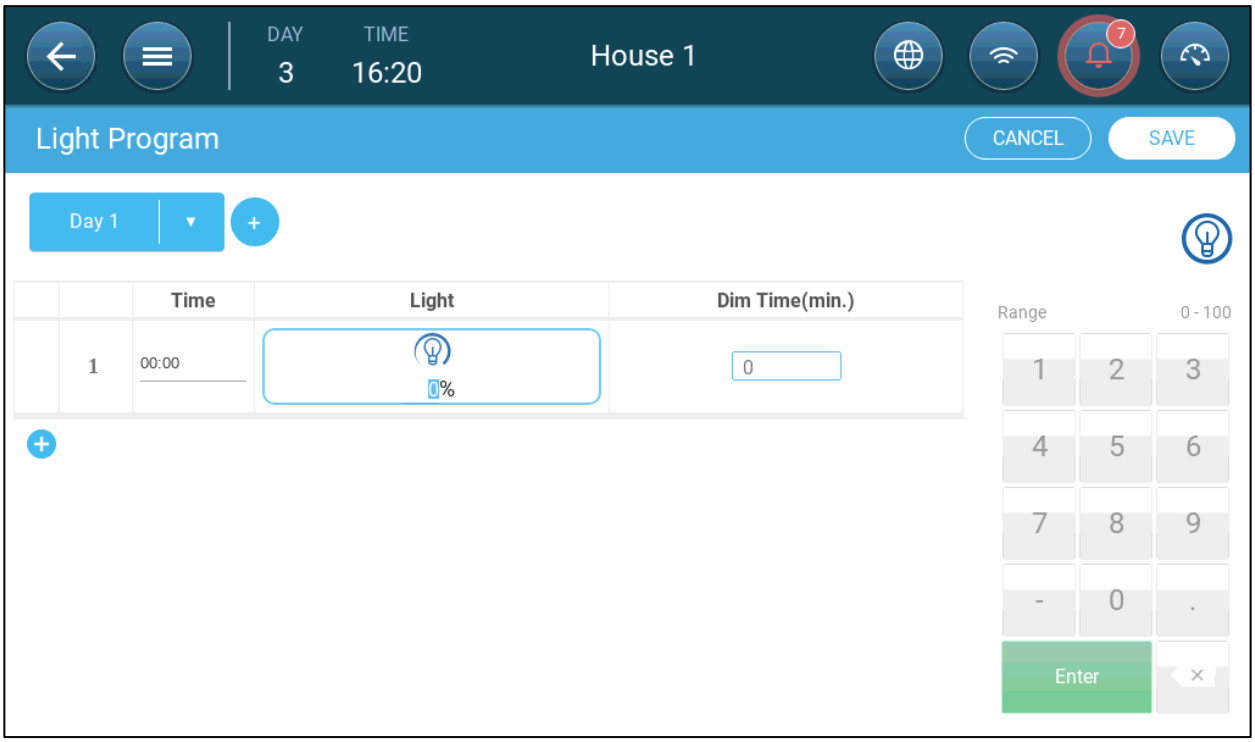
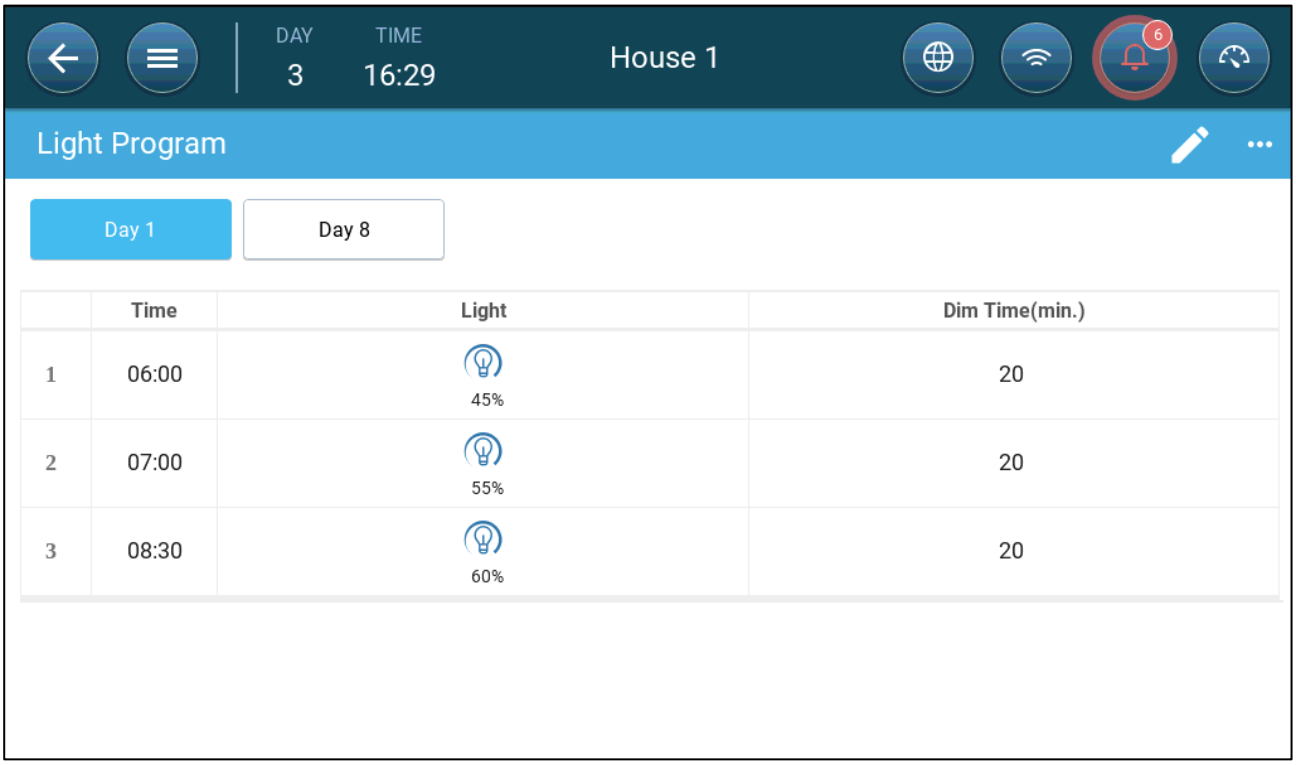



7. Under each light icon, define the light intensity.
8. Under Dim Time, define the amount of time before the next lighting event that the lights begin to change their intensity.
9. Add additional programming lines. Repeat for each growth day.
10. Click **Save**.




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.

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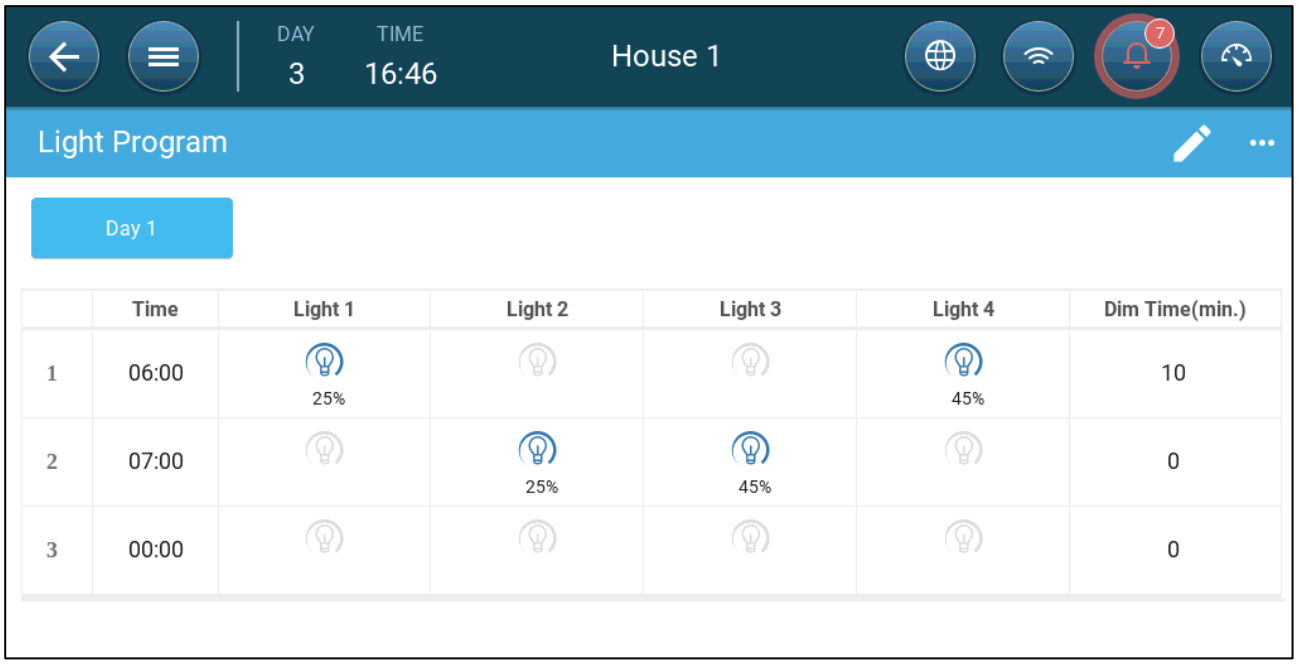


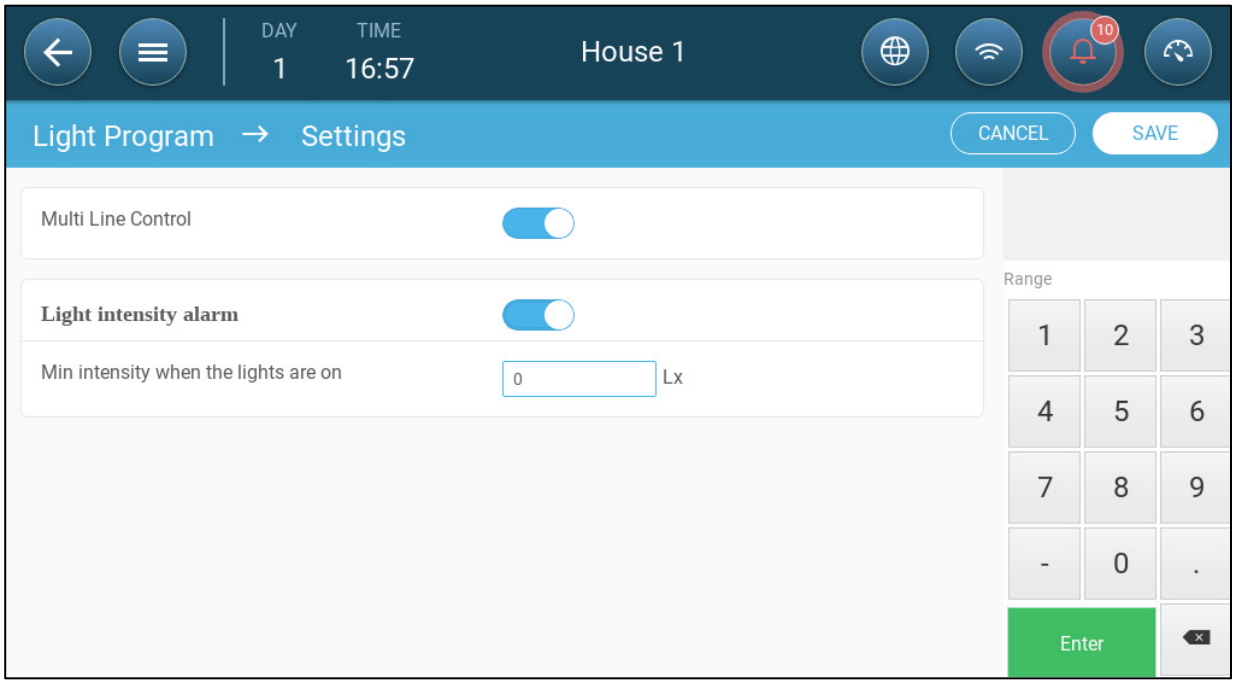

In this scenario, light line 1 and light line 4 begin to turn on at 5:50. At 6:00, light line 1 reaches 25% and light line 4 reaches 45%. At 7:00, light line 1 and light line 4 turn off. Light line 2 and light line 3 reach 25% and 45%, respectively.

## 12.3 Light Settings

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.

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# 13 Defining the 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.**

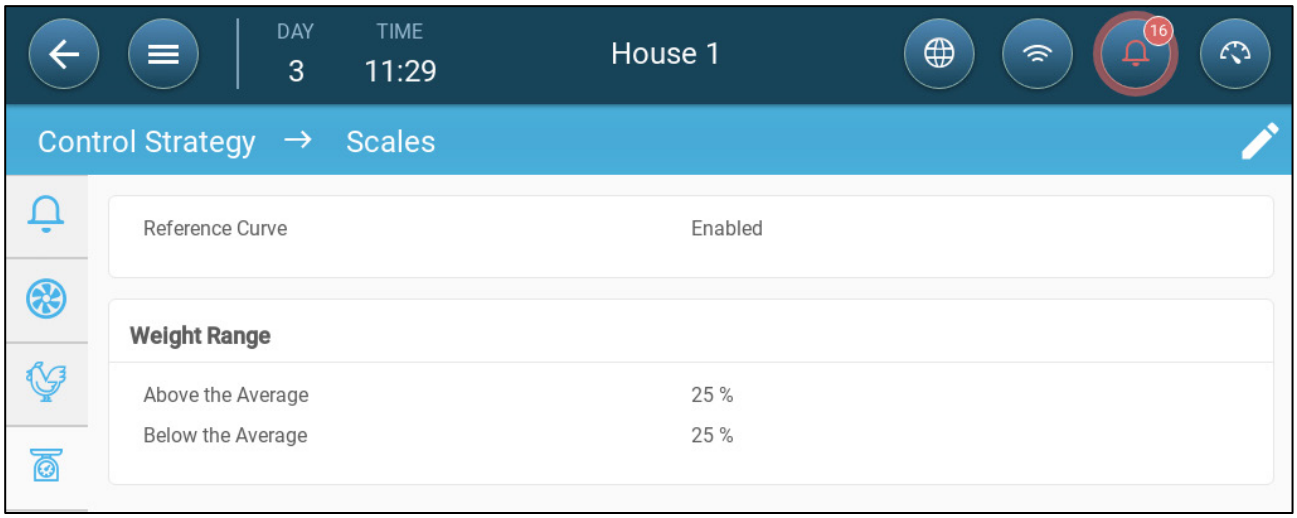
## 13.1 Reference Bird Curve

As an option, Trio provides a default growth curve. If required, you can edit the growth days and bird weights.

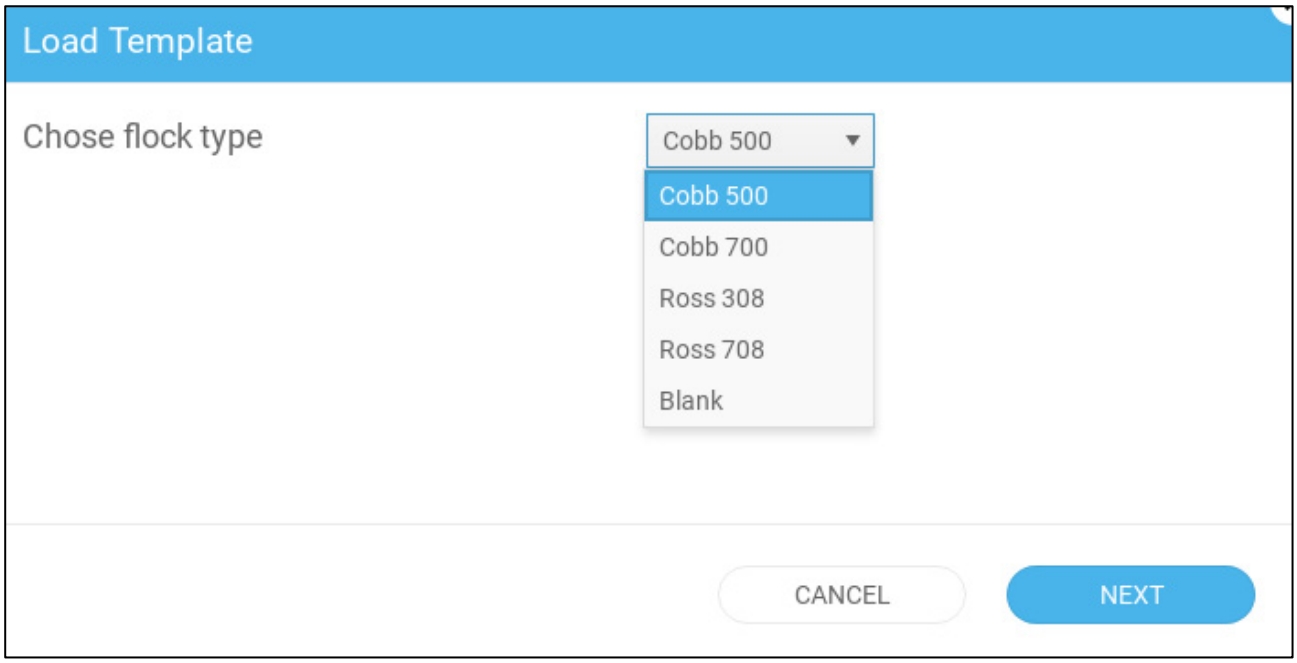
- Curve Enabled
- Curve Disabled

### 13.1.1 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.

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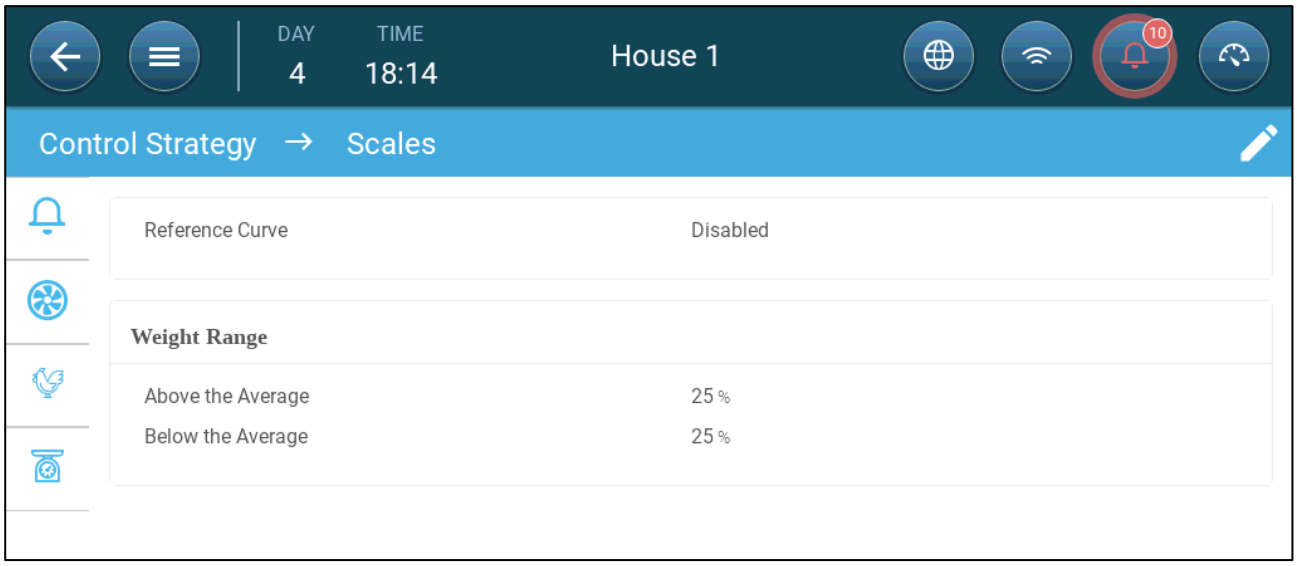
*NOTE In the illustration above, the curve is not gender-separated. If male and female birds are weighed separately, two curves appear.*

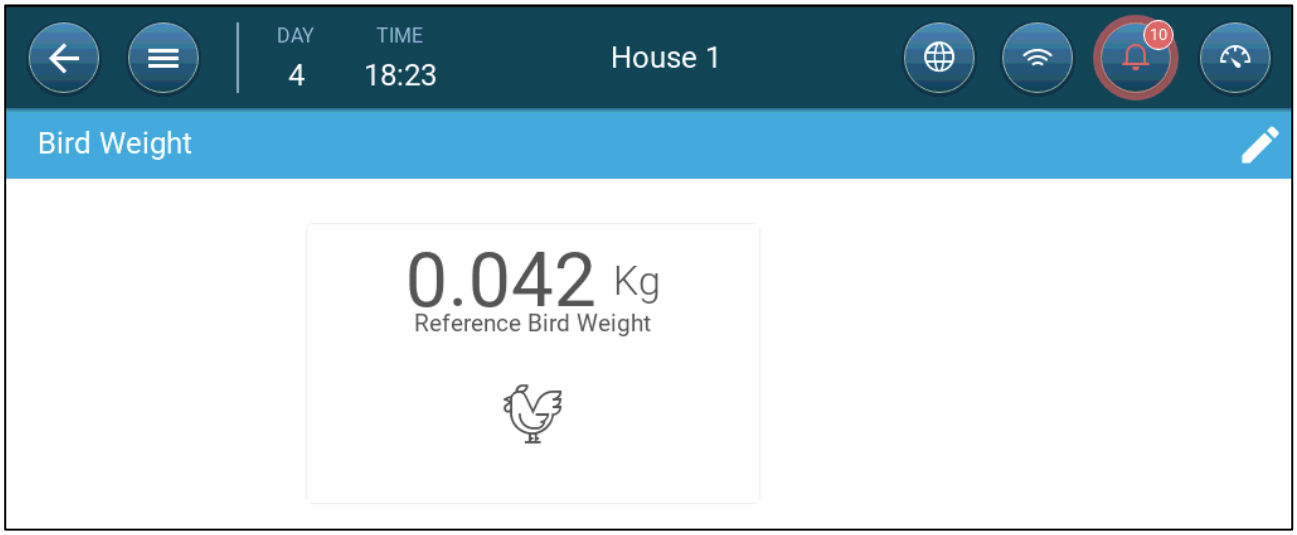
7. Click and define:
   - Day: Define the growth day used to determine the desired weight. Range 0 - 999
   - Weight: Set the expected bird weight. Range 0 - 30.0 kg/0- 66 lbs.
8. Click and edit the Curve Offset (option).

### 13.1.2 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.



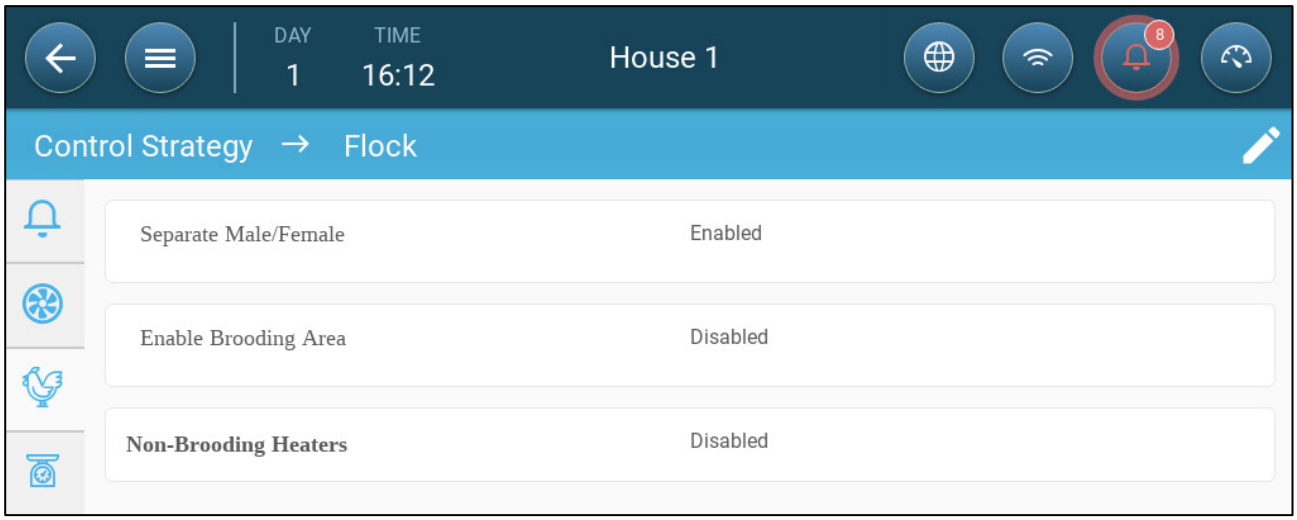

4. Click to edit the reference weight.

## 13.2 Male/Female Weighing

- Gender Separated Weighing
- Non-Separated Weighing

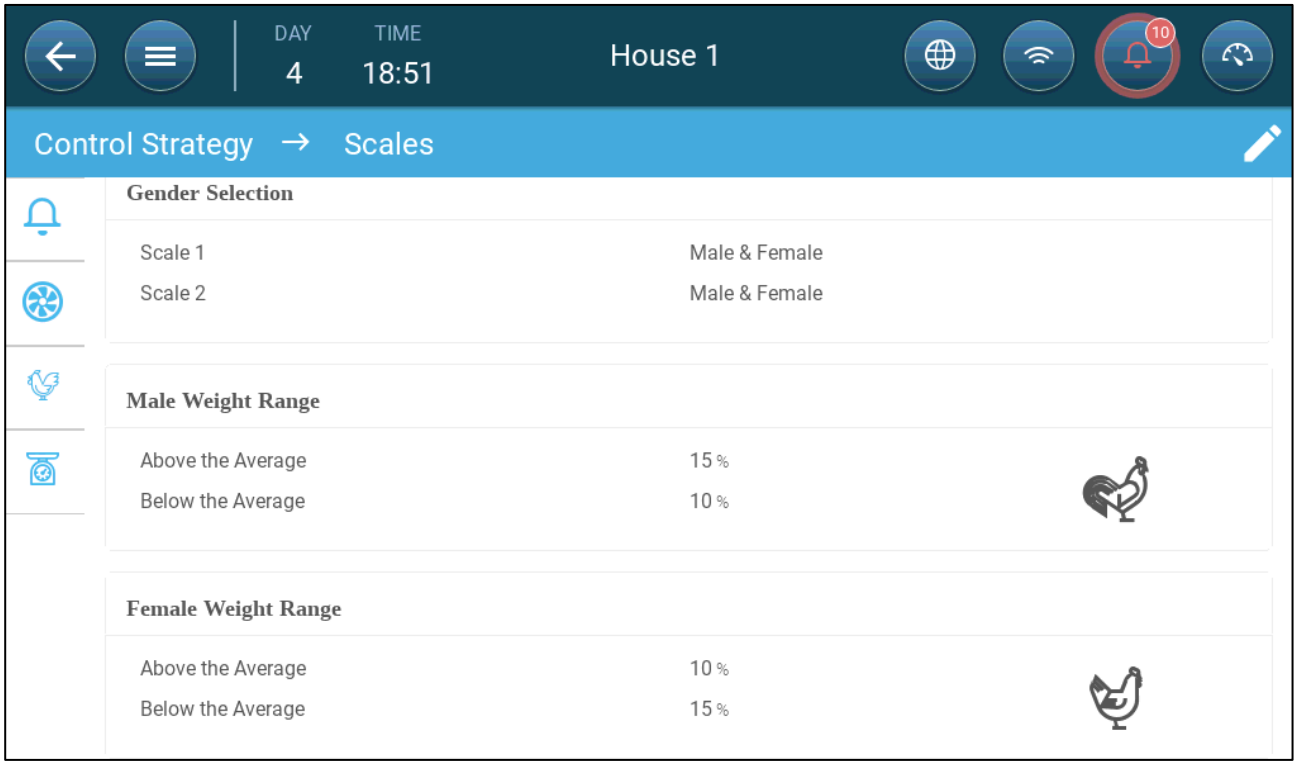
### 13.2.1 Gender Separated Weighing

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 weight, and curve offsets for each gender in the Flock › Bird Weight Screen.*

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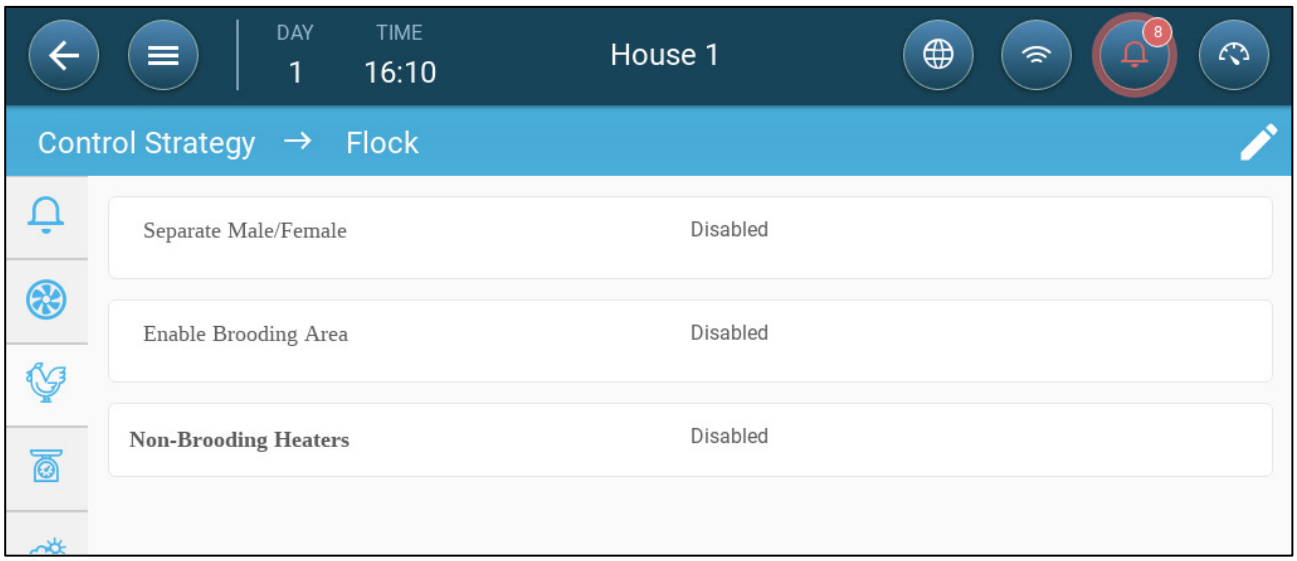
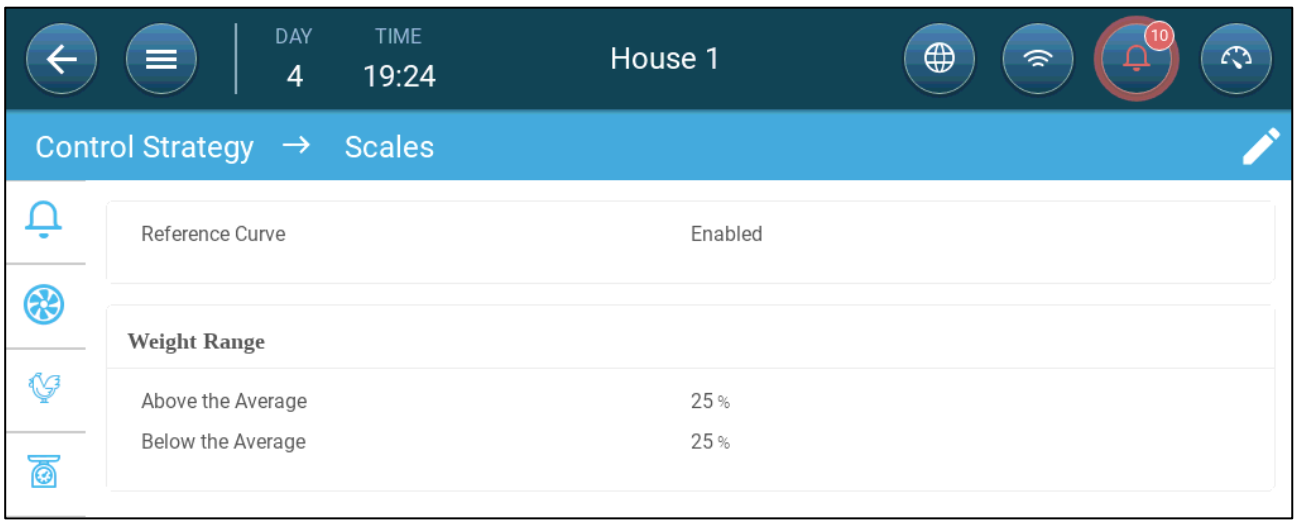
### 13.2.2 NON-SEPARATED WEIGHING

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 weight is above or below this band, it is not included in the data.

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# 14 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.

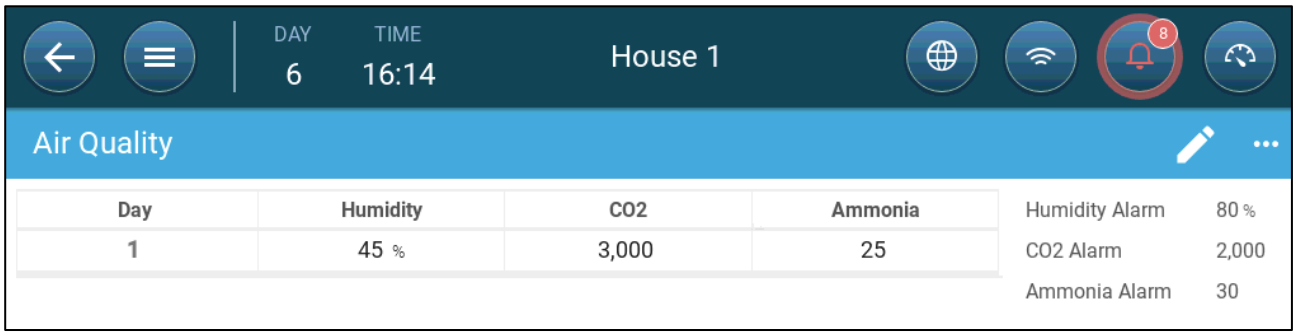
- Ventilation must be running for compensation to begin.
- If one of these factors is above the user defined set point, compensation begins. If two or more factors are above the user-defined set point, compensation continues until both factors are below the required level.
- The user defines which type 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.

- Defining the Air Quality Parameters
- Defining the Air Quality Settings

## 14.1 Defining the Air Quality Parameters

1. Go to Climate › Air Quality.

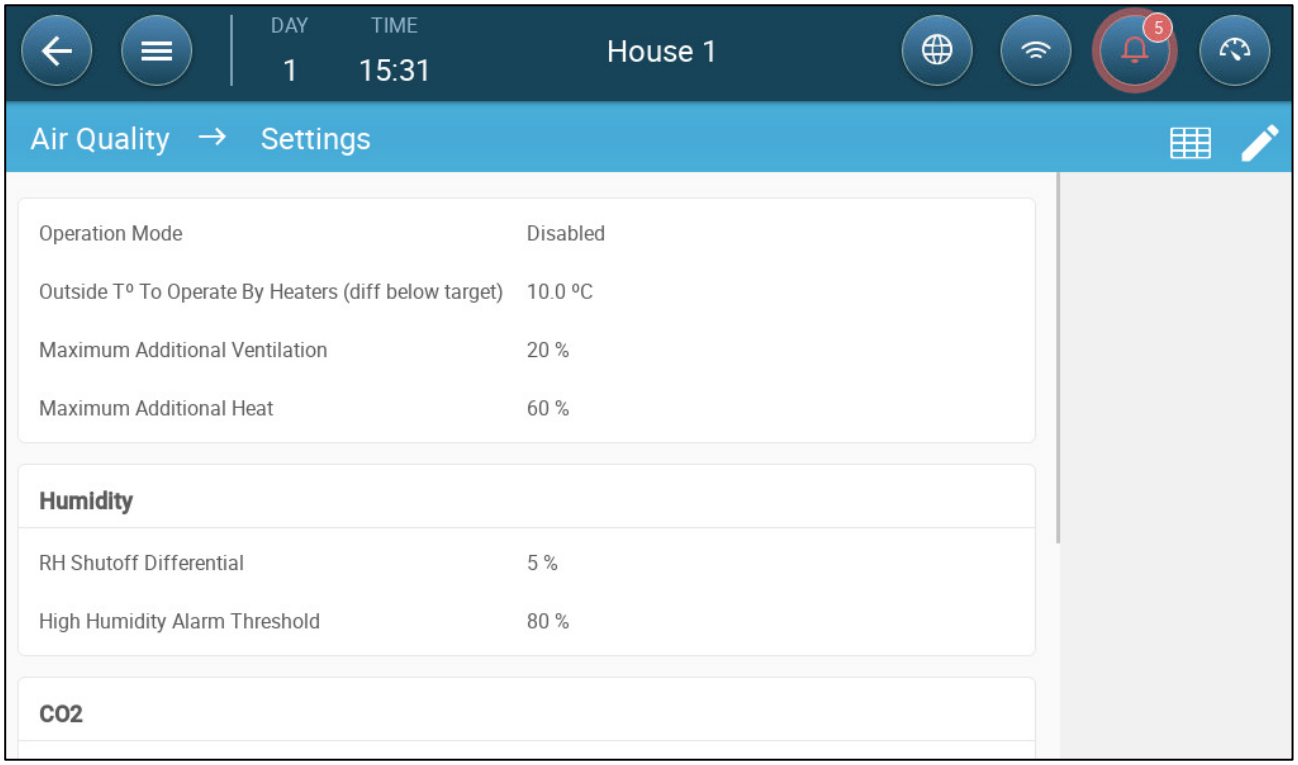
➲ **Each sensor must be defined and map for the sensor to appear on this screen. Refer to Devices and Sensors.**




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

## 14.2 Defining the Air Quality Settings




- Define:
  - Mode: Select how to compensate air quality:
    - Disabled
    - By Ventilation
    - By Heat
    - By Outside Temp (Auto)
  - 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°
  - Maximum Additional Ventilation (%): The maximum increase in ventilation (maximum compensation). Range: 1% to 100%
  - Maximum Additional Heat (%): The maximum increase in heat (max compensation). Range: 1% to 100%
  - 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

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- 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 stops. 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

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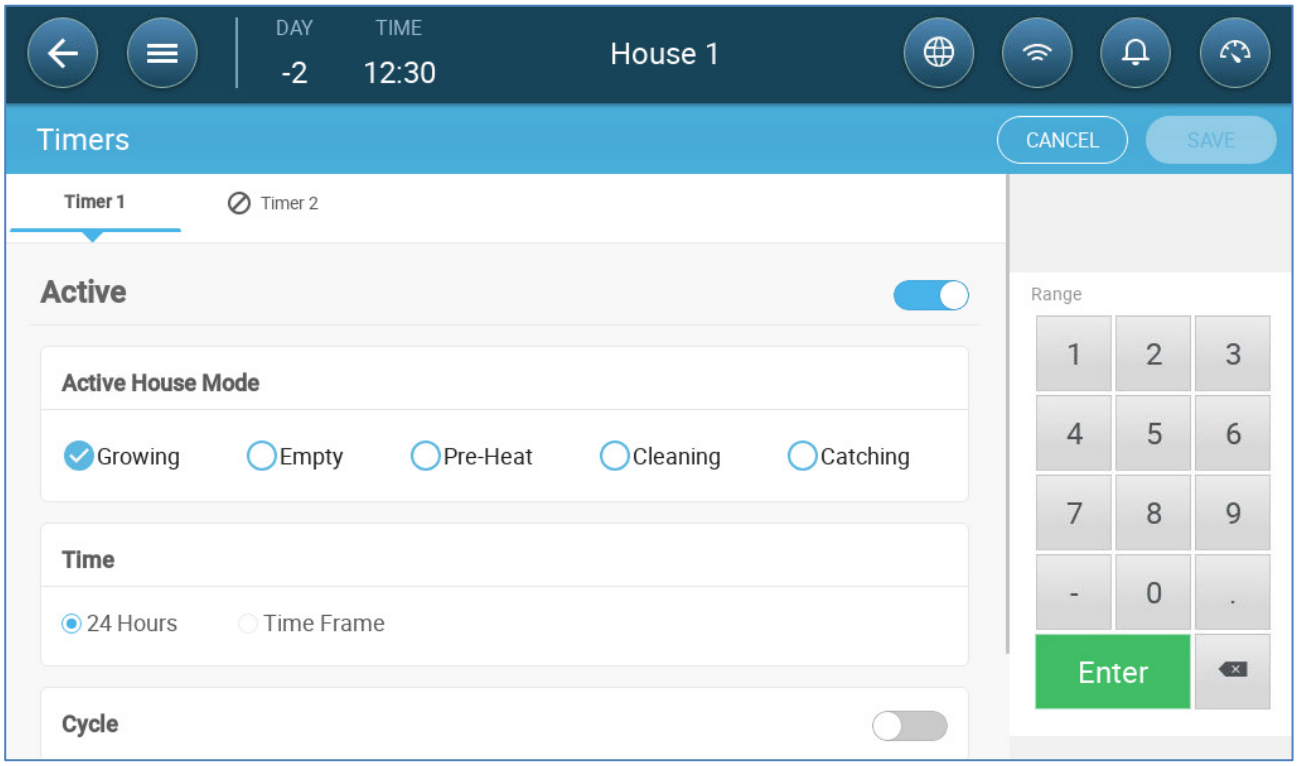
# 15 Timers

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 in Devices and Sensors.**

1. In Control › Timers, click edit, 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.
    - Cycle: If enabled, define the cycle times. Range: 0 – 999 seconds.
    - Temperature: If enabled, define the temperature range in which the timers operate. Range [-40° - +90°].
3. As an option, timers can be mapped to an outside temperature sensor. Go to System › Temperature Definition.

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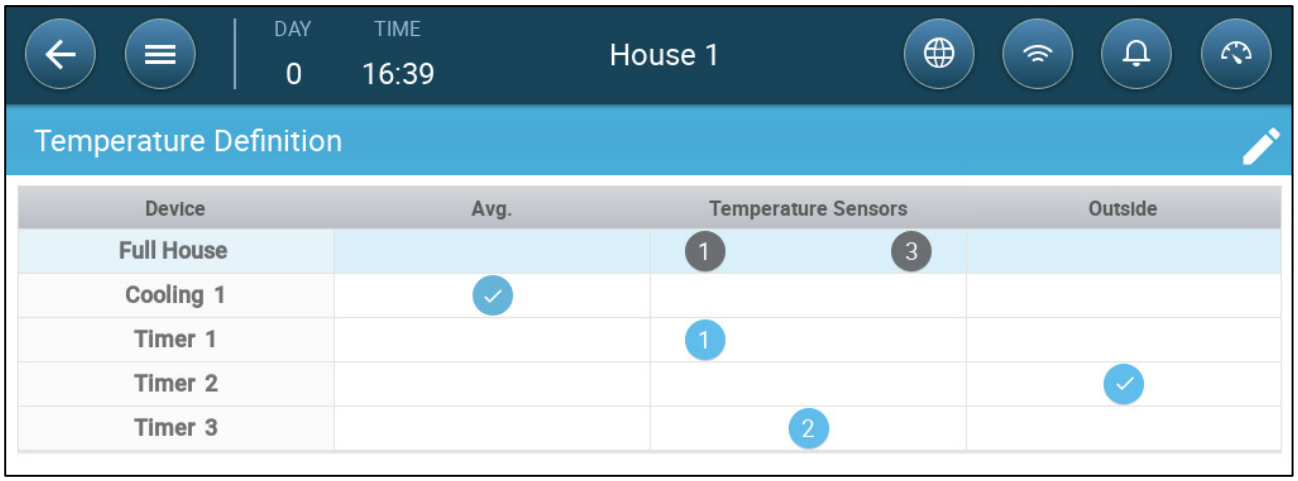


- If an outside temperature sensor is enabled, map timers to it (if required).

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# 16 Alarms

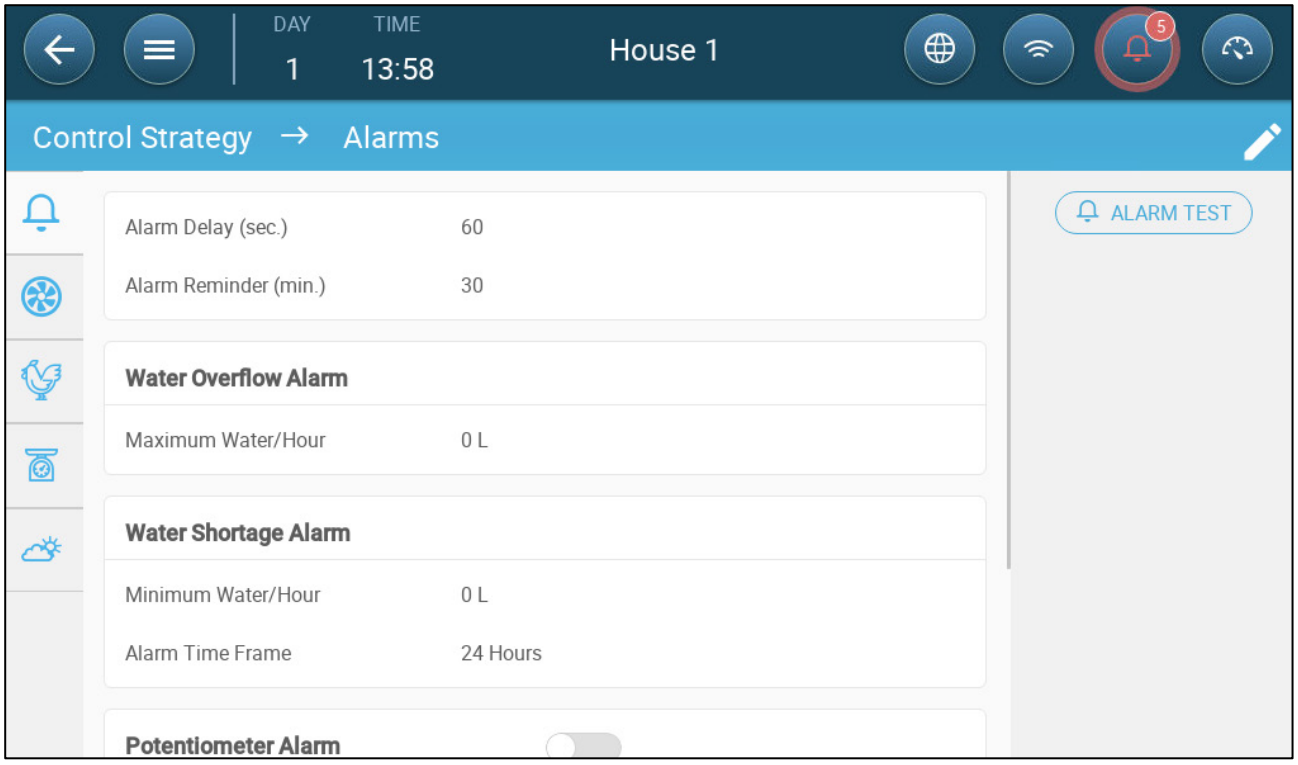
- Defining the Alarm Parameters
- Viewing the Alarms
- Defining the Auxiliary Alarms
- Sending a General Alarm

## 16.1 Defining the Alarm Parameters

- Alarm Definitions
- Alarm Test

### 16.1.1 Alarm Definitions

1. Go to System › Control Strategy › Alarms .




*NOTE Water Overflow, Water Shortage, and Potentiometer only appear if these devices are 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.
    - Water Overflow Max Water/Hour: Trio sends an alarm if the water flow exceeds this amount.
    - Water Shortage:
        - Min Water/Hour: Trio will send an alarm if the water flow is less than this amount. Range: 0 – 999 gallons/liters.
        - Enable Water Shortage Alarm: Define the period in which the alarm is active, 24 hours a day or specific time frames.
    - 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.

### 16.1.2 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

#### 16.1.2.1 Manual Test

- Click

. Stop the test as needed.

#### 16.1.2.2 Scheduled Tests

Scheduled tests can be performed once a day only.

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

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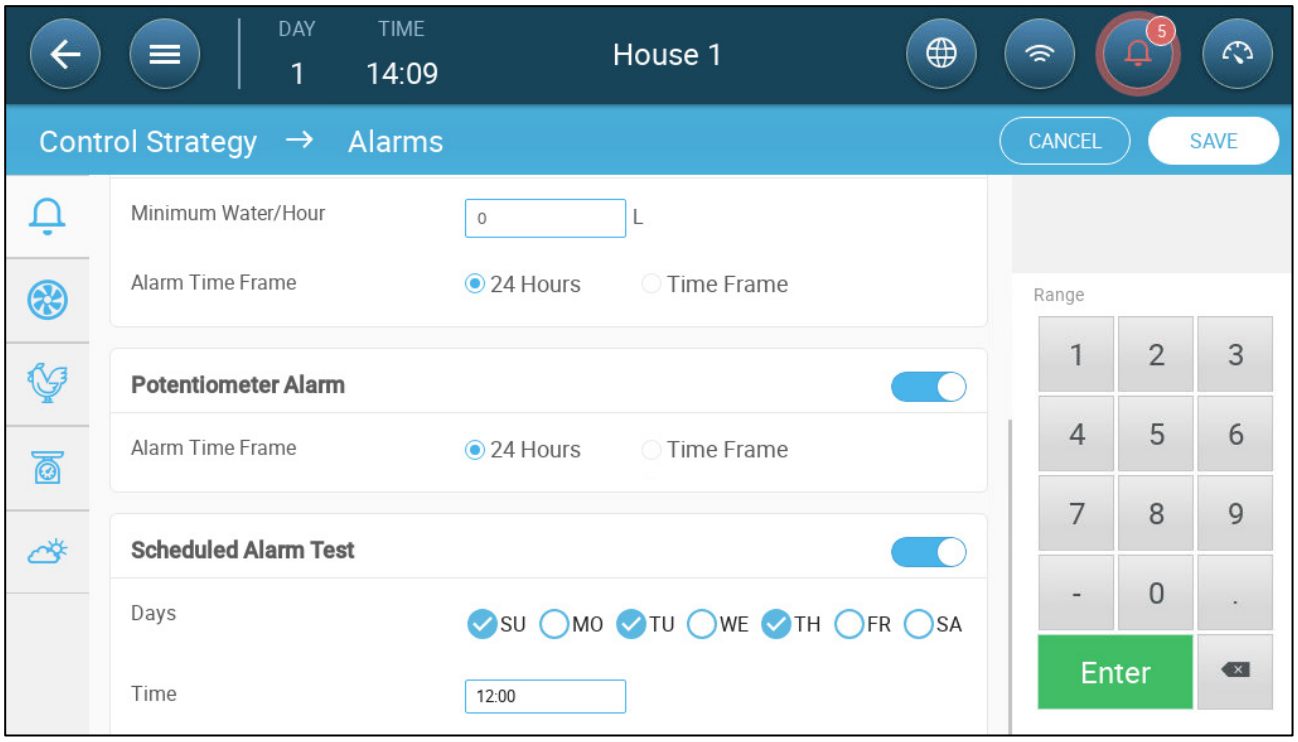
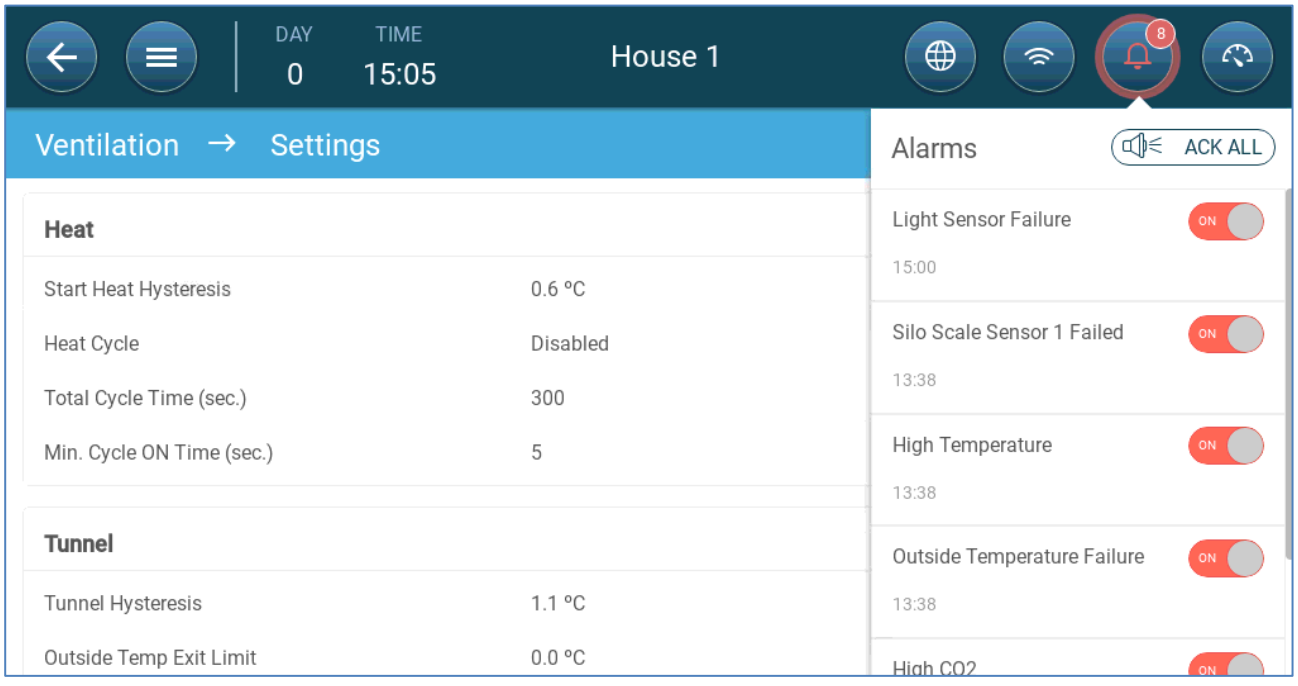



2. Define the day(s) and time at which the test is performed.

*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.*

## 16.2 Viewing the Alarms

- On the Main Menu bar, click .



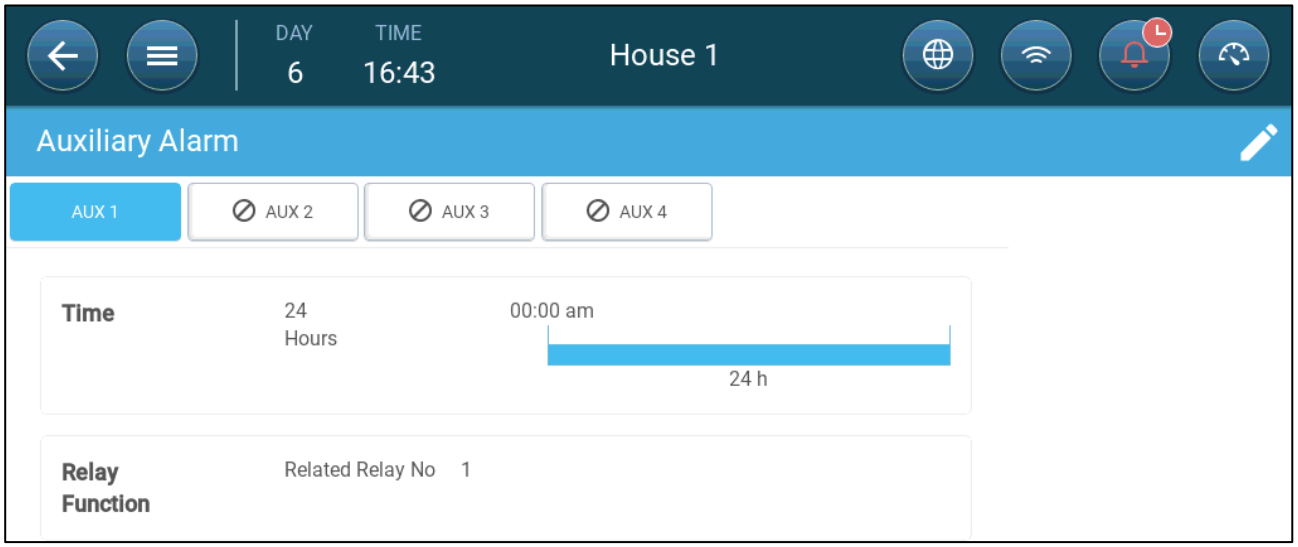
- Click ACK ALL to acknowledge all alarms or acknowledge each one as required.

## 16.3 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.

## 16.4 Sending a General Alarm

1. Go to System › Device and Sensors.

2. Click

.

An alarm is sent to everyone on the contact list.

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# 17 History

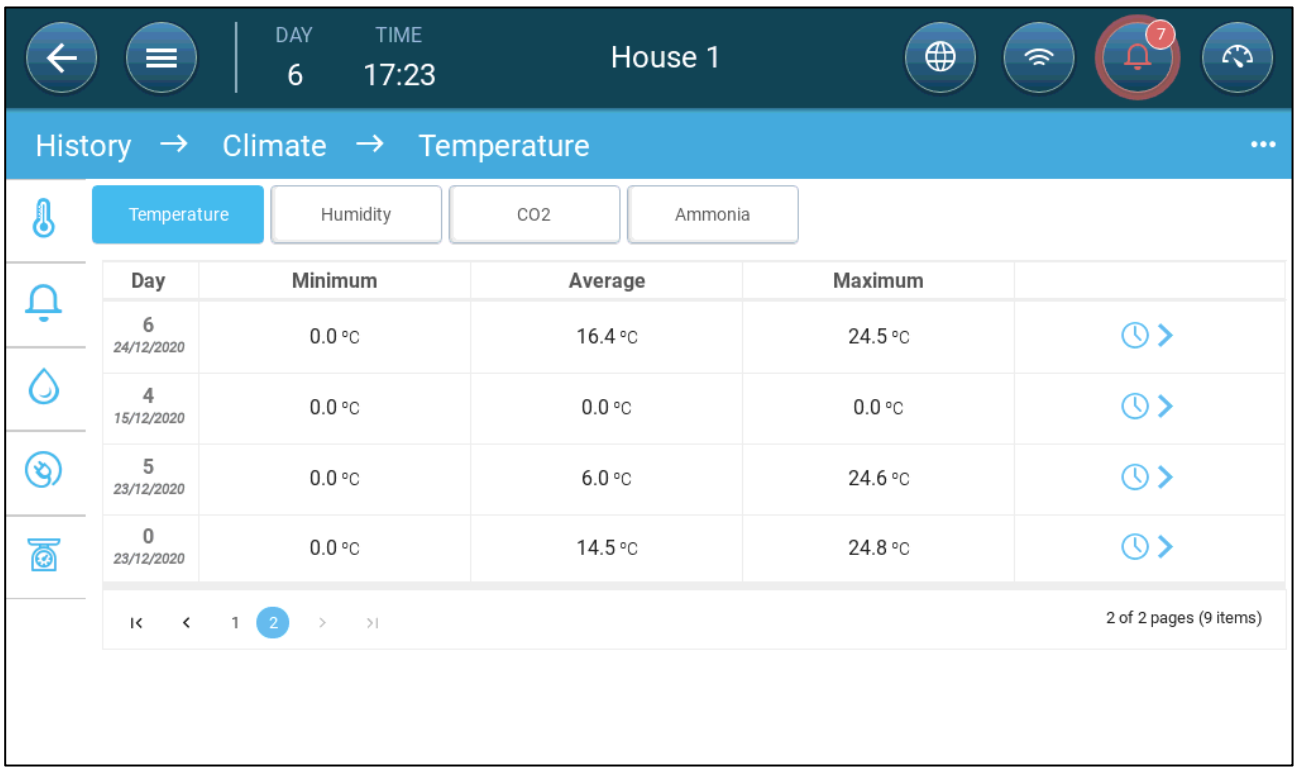
- A Trio controller saves:
  - 150 growth days of history data (minimum).
  - Up to 365 growth days of history data (estimated maximum)
- TrioAir saves data on the server for an unlimited amount of time.
- Starting a new batch/flock erases all history data.
- The alarm and events history table can store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

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

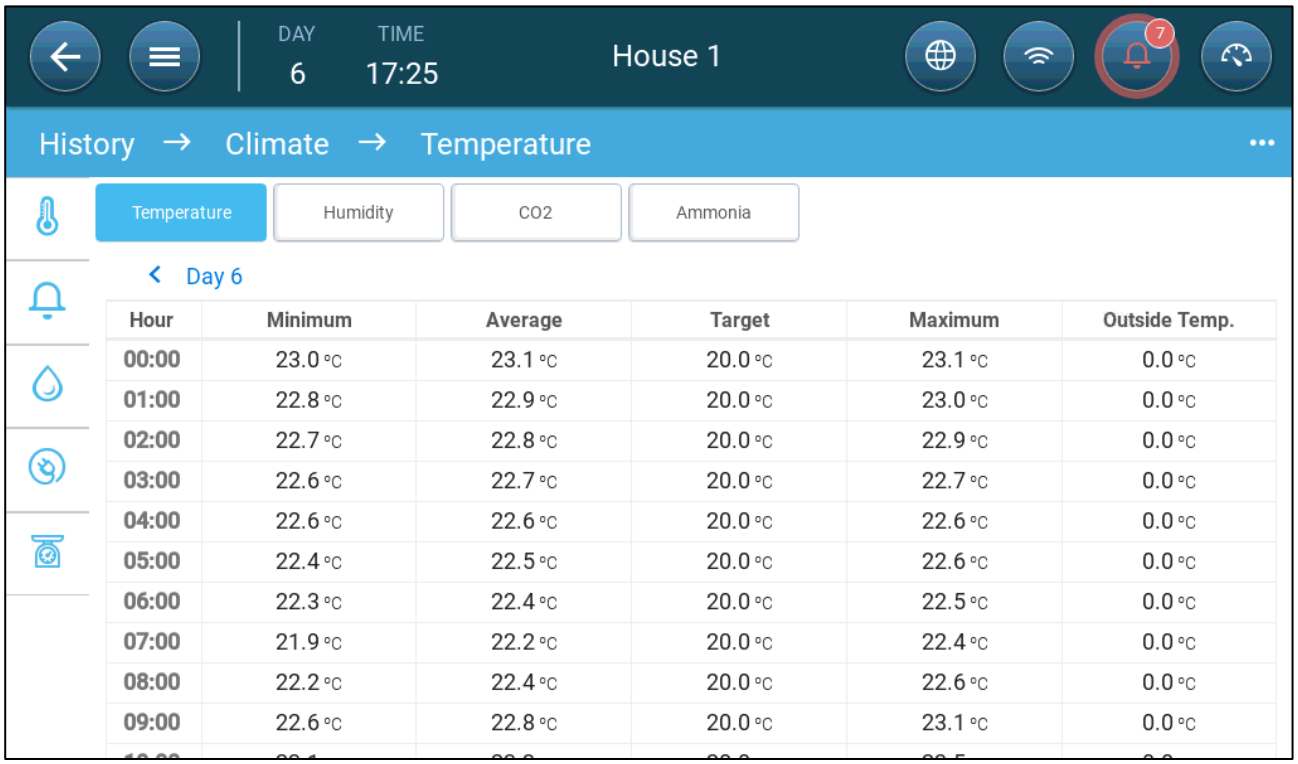
## 17.1 Climate and Air Quality

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 the hourly breakdown.



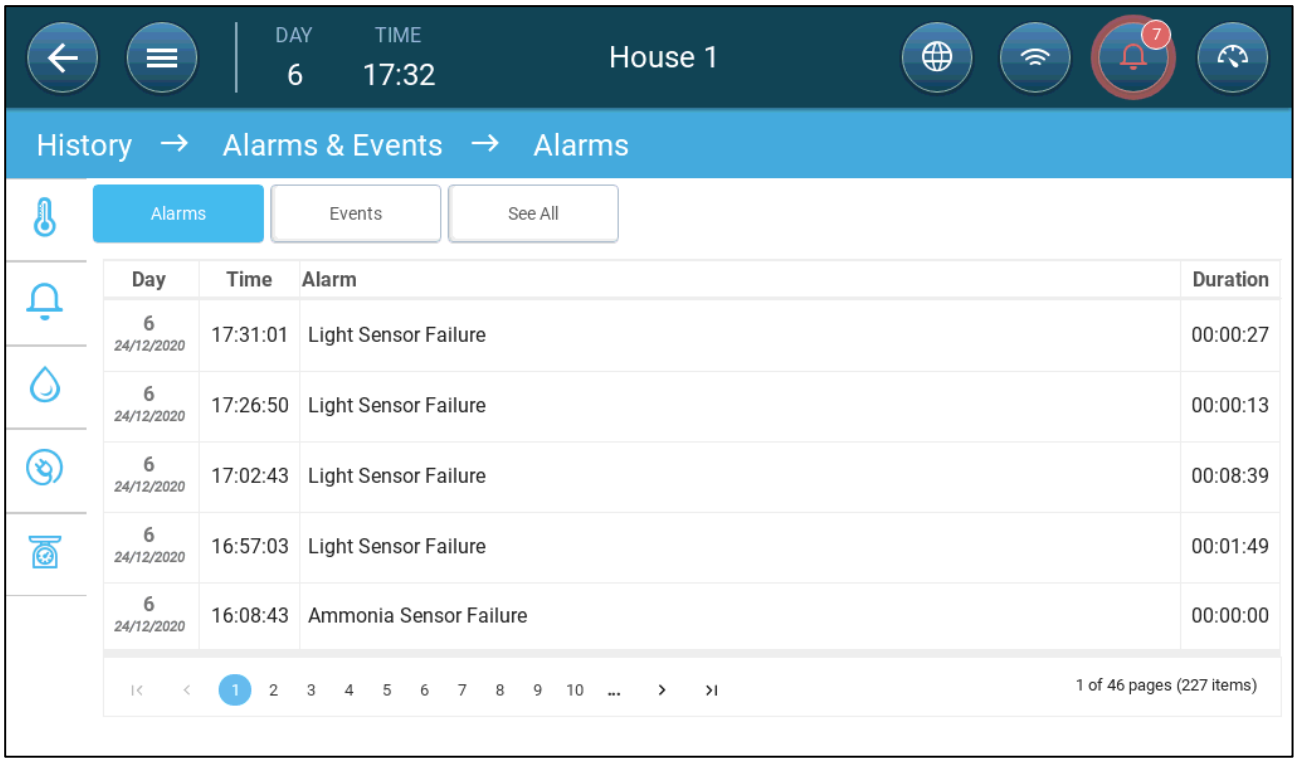

| Hour | Minimum | Average | Target | Maximum | Outside Temp. |
|---|---|---|---|---|---|
| 00:00 | 23.0 °C | 23.1 °C | 20.0 °C | 23.1 °C | 0.0 °C |
| 01:00 | 22.8 °C | 22.9 °C | 20.0 °C | 23.0 °C | 0.0 °C |
| 02:00 | 22.7 °C | 22.8 °C | 20.0 °C | 22.9 °C | 0.0 °C |
| 03:00 | 22.6 °C | 22.7 °C | 20.0 °C | 22.7 °C | 0.0 °C |
| 04:00 | 22.6 °C | 22.6 °C | 20.0 °C | 22.6 °C | 0.0 °C |
| 05:00 | 22.4 °C | 22.5 °C | 20.0 °C | 22.6 °C | 0.0 °C |
| 06:00 | 22.3 °C | 22.4 °C | 20.0 °C | 22.5 °C | 0.0 °C |
| 07:00 | 21.9 °C | 22.2 °C | 20.0 °C | 22.4 °C | 0.0 °C |
| 08:00 | 22.2 °C | 22.4 °C | 20.0 °C | 22.6 °C | 0.0 °C |
| 09:00 | 22.6 °C | 22.8 °C | 20.0 °C | 23.1 °C | 0.0 °C |

## 17.2 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

## 17.3 Water and Feed History

*NOTE 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.

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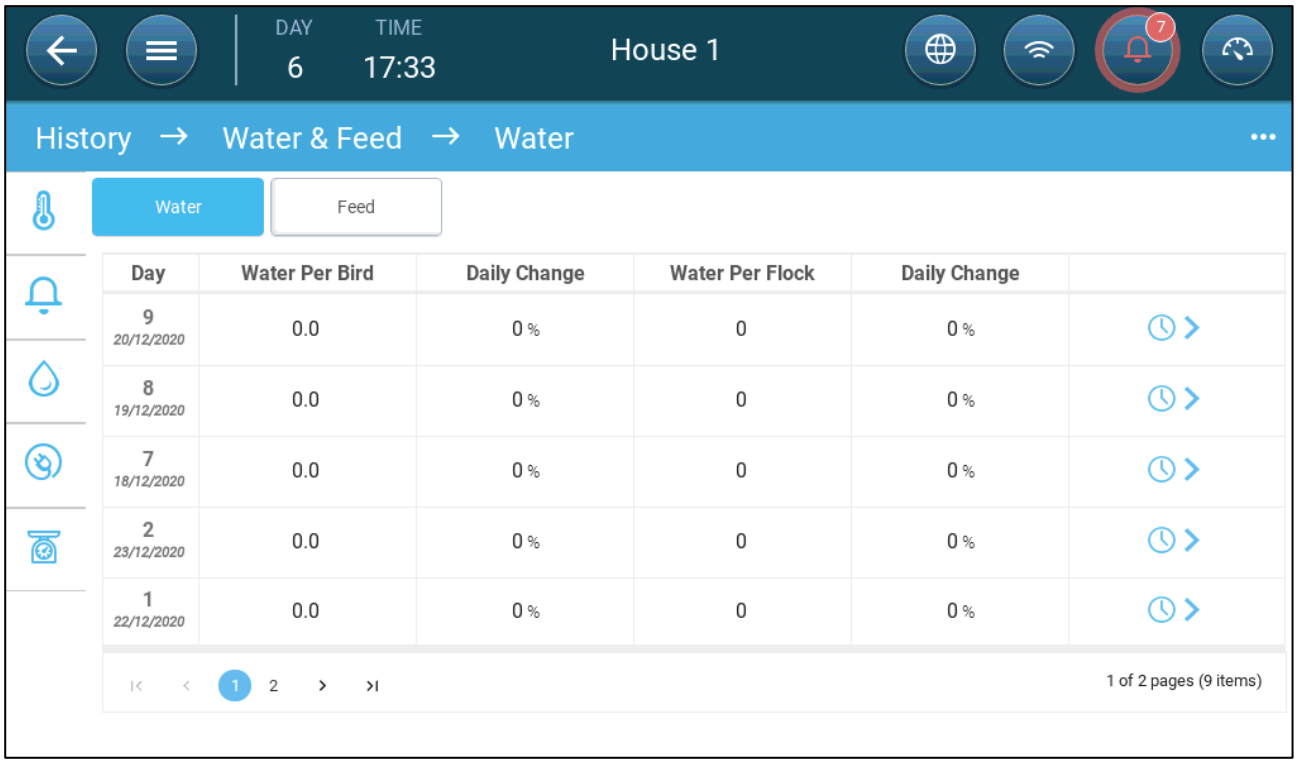
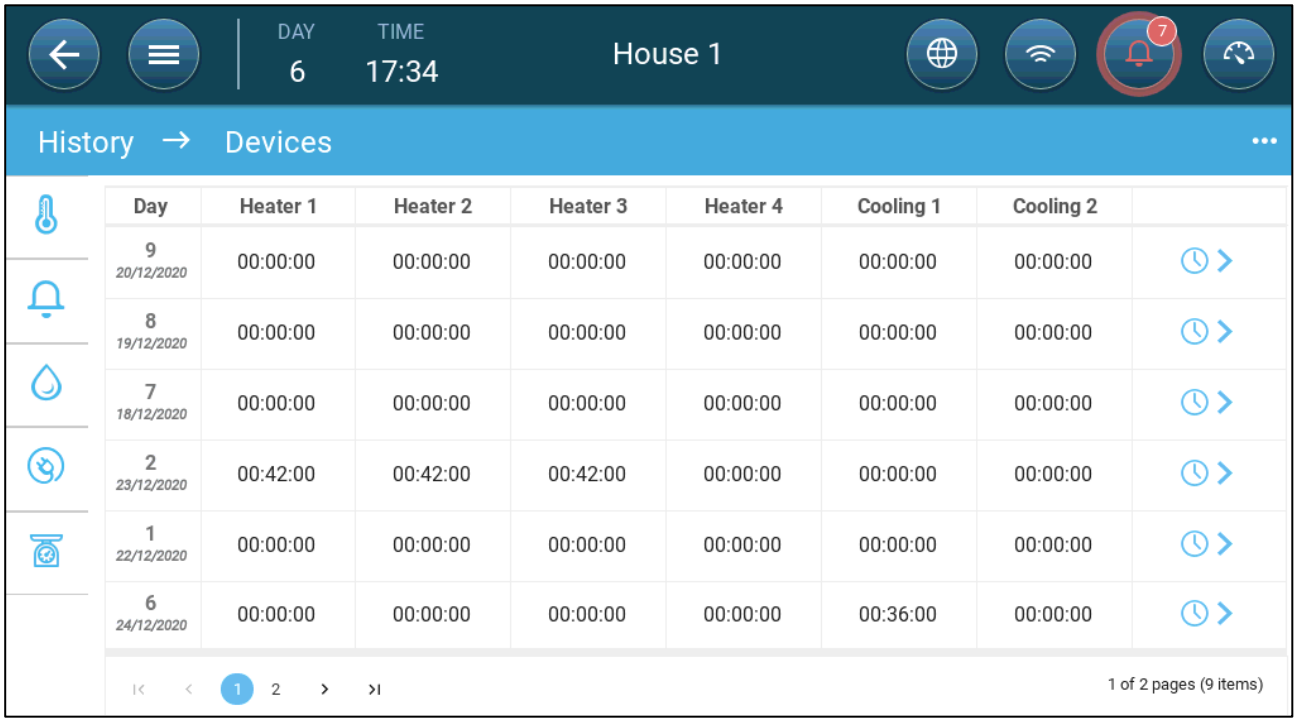



*NOTE Click the clock symbol to view the hourly breakdown.*

## 17.4 Devices History

Records the heaters and cooling 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.

- Go to Flock › History › .



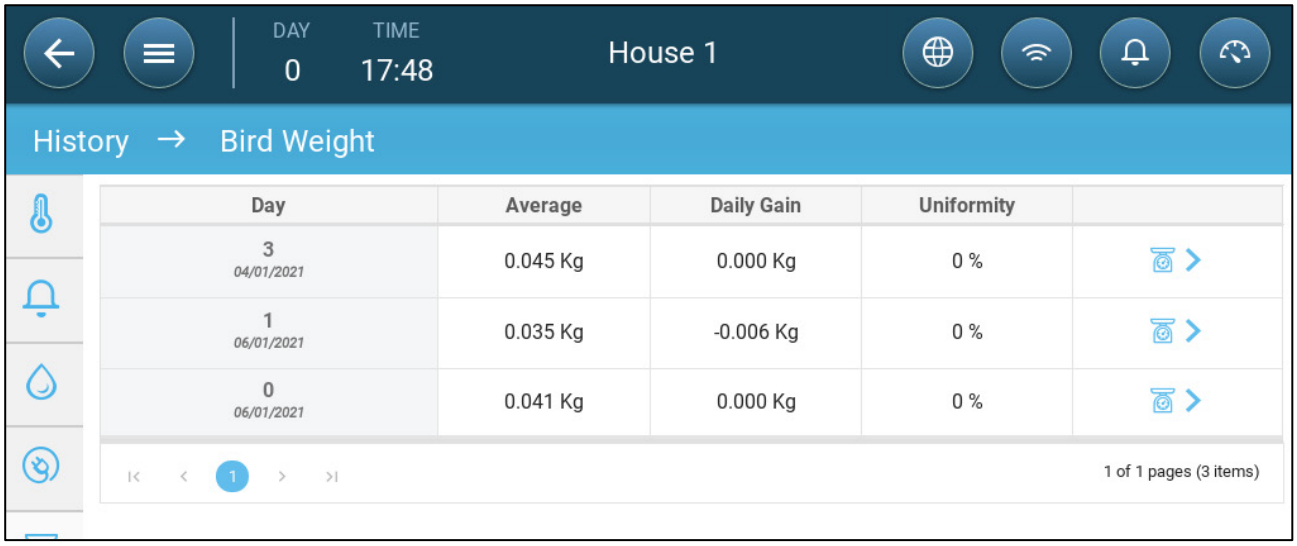

- Click the clock symbol to view the hourly breakdown.

*NOTE History displays installed devices only.*

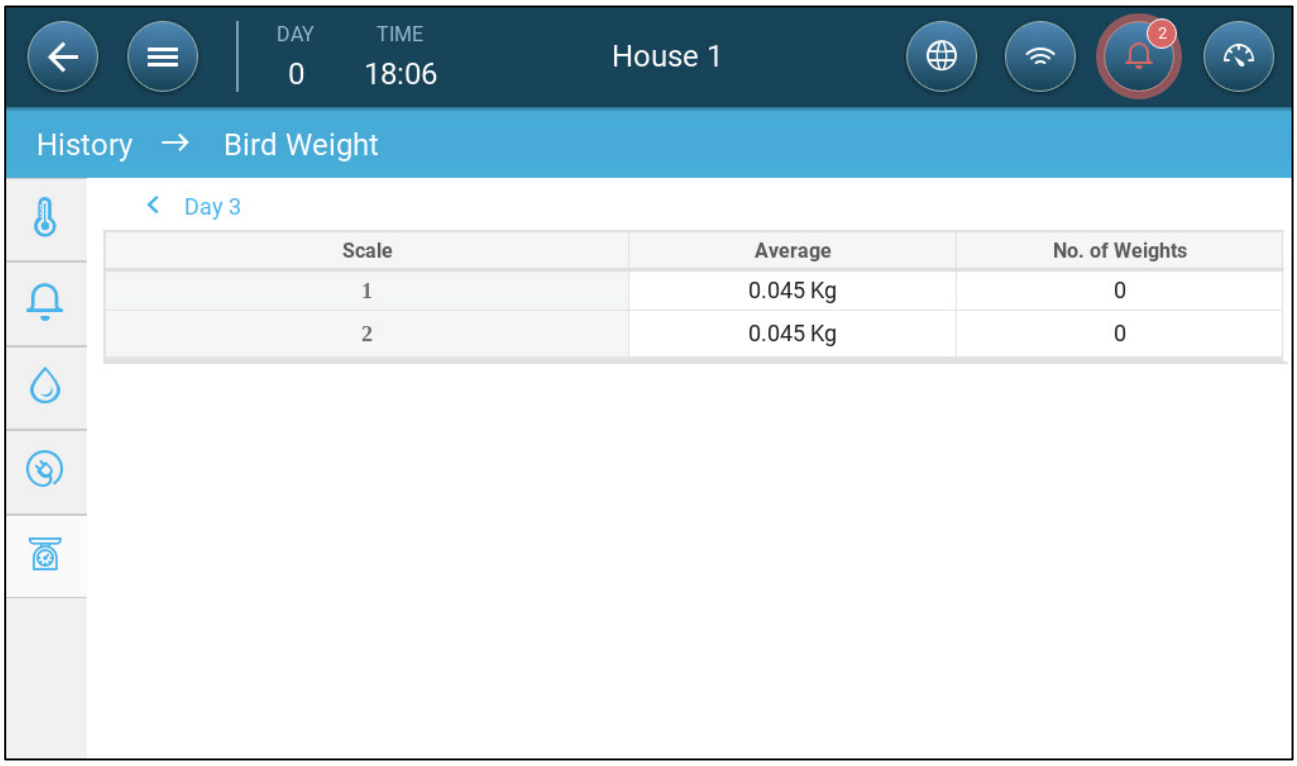
## 17.5 Bird Weight History

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

- Go to Flock › History › .




- Click to view the bird scale data.



# 18 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.

- Cold Start
- Updating the Software
- Viewing the Log
- Updating the Software

## 18.1 Cold Start

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

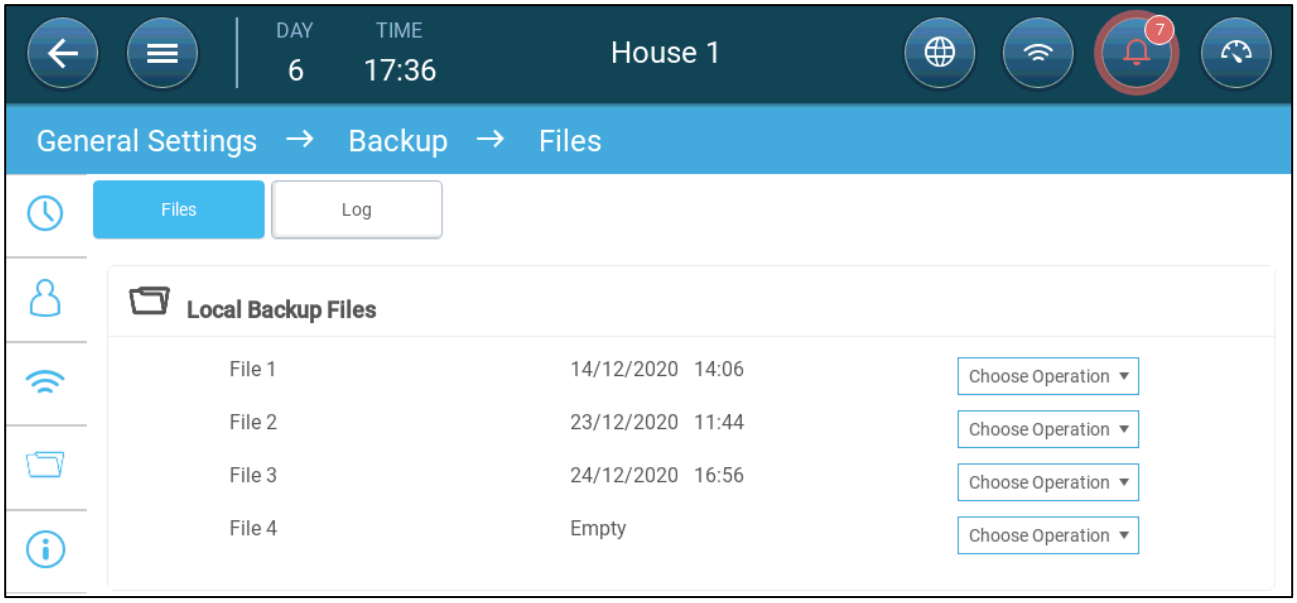
**To reset the Trio:**

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.

## 18.2 Saving or Loading the Settings

1. Go to System › General Settings › .

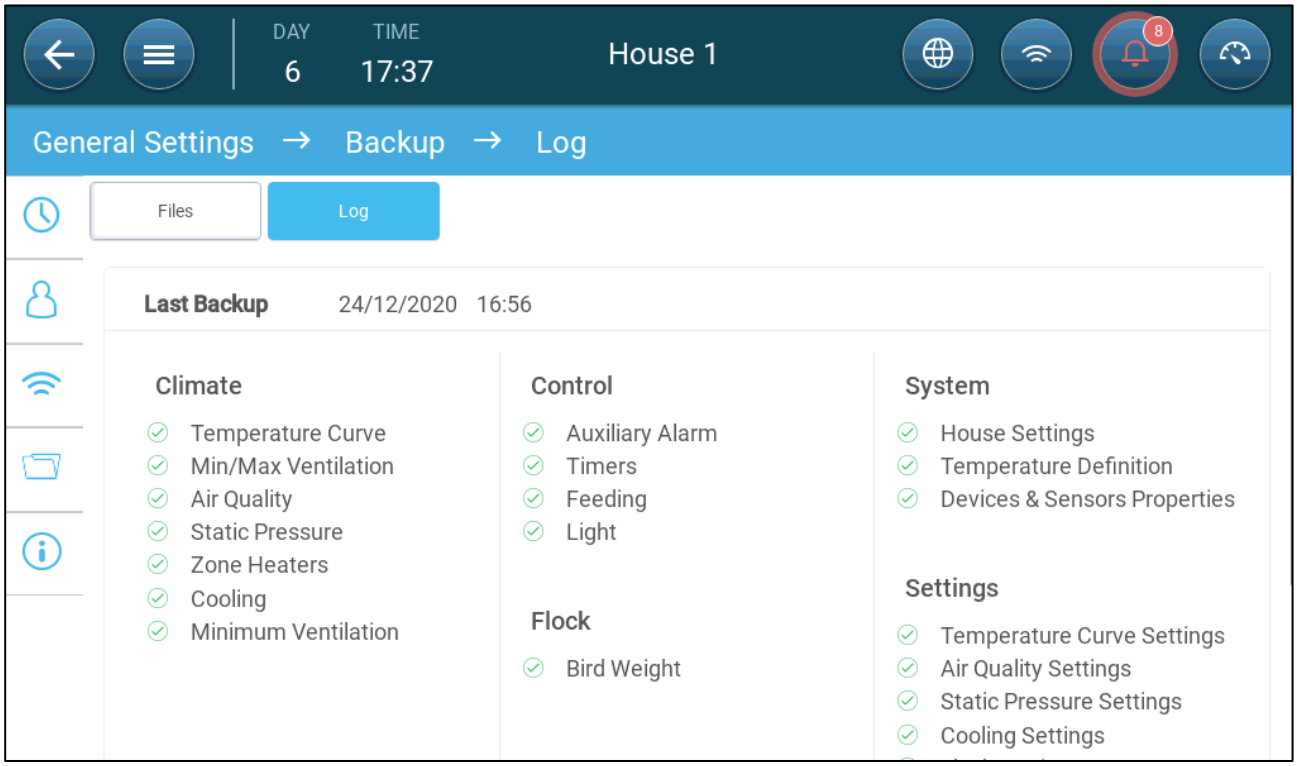



2. Click Choose Operation and select Load Settings or Save Settings.
3. Follow the instructions.

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

## 18.3 Viewing the Log

The log displays which tables were successfully saved.

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## 18.4 Updating the Software

***CAUTION*** *Do not disconnect the power while resetting the unit. 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.

# 19 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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