Trio
Controller

User Manual

Trio

Swine Controller

Ag/MIS/ImEN-2748-09/19 Rev 4.1
P/N: 116798

Munters

Trio Swine Controller

User Manual

Rev 4.1, 02/2024

Software Ver: 7.2.40

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

This document is destined for the user of the apparatus: it may not be reproduced in whole or in part, committed to computer memory as a file or delivered to third parties without the prior authorization of the assembler of the system.

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

Index

Chapter *page*

1 INTRODUCTION 7
1.1 Disclaimer 7
1.2 Introduction 7
1.3 Notes 7
2 USING THE TRIO TOUCH SCREEN 8
2.1 Icons 8
2.2 Dashboard 9
3 BASIC SETUP 11
3.1 Defining the General Settings 11
3.1.1 Defining the Preferences 11
3.1.2 Defining the Time/Date 12
3.1.3 Defining the Room Setting 13
3.2 Batch Settings 14
3.2.1 Defining the Batch Settings Parameters 14
3.2.1.1 Manual Set Up 15
3.2.1.2 New Batch Wizard 16
3.2.2 Defining the Batch Settings 18
3.3 Defining the Expected Animal Weight 19
3.3.1 Animal Weight Main Screen 20
3.3.2 Animal Weight Curve 21
3.4 Adjusting the Animal Count 21
3.5 Tech Support Information 22
4 TEMPERATURE SETTINGS 23
4.1 What is the Temperature Curve 23
4.2 Configuring the Temperature Curve 24
4.2.1 Defining the Temperature Curve Parameters 24
4.2.2 Defining Temperature Curve Settings 25
4.3 Emergency Temperature Control 26
5 INTRODUCTION TO VENTILATION 27
5.1 Defining the Minimum and Maximum Ventilation 27
5.2 Defining the Fans/Ventilation Scheme 28
5.2.1 Basic Ventilation 28
5.2.2 Extra Ventilation 29

5.2.3 Tunnel Ventilation 30
6 MINIMUM AND MAXIMUM VENTILATION 31
6.1 Building Structure Summary 31
6.2 Defining Basic Ventilation 32
6.2.1 Defining Dynamic Ventilation 33
6.2.2 Ventilation by Weight 35
6.2.2.1 How Does Ventilation by Weight Work 35
6.2.2.2 Defining the Ventilation By Weight Parameters 35
6.2.3 Adding a Curve 36
6.3 Measuring Fan 36
6.3.1 Measuring real time air speed 37
6.3.2 Ventilation Compensation 37
7 LEVELS OF VENTILATION 39
7.1 Configuring the Basic Ventilation Settings 39
7.2 Basic Ventilation 40
7.2.1 Defining Basic Ventilation 40
7.2.2 Fan Options 42
7.2.2.1 Minimum Ventilation Cycle 43
7.2.2.2 Analog Fans 45
7.2.2.3 Fans (Efficiency Fan) 46
7.2.2.4 Fan Rotation 47
7.2.3 Inlet and Curtain Ventilation 49
7.2.3.1 Level Control 50
7.2.3.2 Static Pressure Control 51
7.2.3.2.1 Static Pressure in Minimum Ventilation or Extra Ventilation 51
7.2.3.2.2 Static Pressure Main Screen 52
7.2.3.2.3 Static Pressure Settings Screen 53
7.2.3.2.4 High Static Pressure Alarm State 53
7.3 Extra Ventilation 53
7.3.1 Introduction to Extra Ventilation 53
7.3.2 Defining Extra Ventilation 54
7.4 Tunnel Ventilation 56
7.4.1 Defining the Tunnel Ventilation Parameters 56
7.4.2 Defining the Tunnel Ventilation Settings 59
7.4.3 Tunnel Doors 59
7.4.4 Tunnel Ventilation Static Pressure 60
7.5 Calibrating the Inlet/Tunnel Door 61
7.6 Stir Fan 62
8 COOLING FUNCTIONS 63
8.1 Cooling Principles 63

8.2 Selecting the Cooling Mode 64
8.2.1 Continuous Cooling 65
8.2.2 Cycle Cooling 66
8.2.3 Ramping Cooling 67
9 SPRINKLER 68
9.1 Defining the Sprinkler Parameters 68
9.2 Defining the Sprinkler Settings 69
10 HEATING FUNCTIONS 70
10.1 Heating Functions 70
10.2 Central Heaters 70
10.2.1 Analogue Heaters 71
10.2.2 Heat Cycles 72
10.3 Zone Heaters 72
10.4 Piglet Zone 74
11 FEED MANAGEMENT 77
11.1 Feeding Summary 77
11.2 Setting up Feeding 77
12 AIR QUALITY 79
12.1 Defining the Air Quality Parameters 79
12.2 Defining the Air Quality Settings 80
13 TIMERS 82
14 ALARMS 84
14.1 Defining the Alarm Parameters 84
14.1.1 Alarm Definitions 84
14.1.2 Alarm Test 85
14.1.2.1 Manual Test 85
14.1.2.2 Scheduled Tests 85
14.2 Viewing the Alarms 86
14.3 Defining the Auxiliary Alarms 86
14.4 Sending a General Alarm 87
14.5 Water Alarm 88
15 HISTORY 90
15.1 Climate and Air Quality 90
15.2 Alarms and Events 91
15.3 Water and Feed History 92
15.4 Devices History 93
16 RESETTING, SAVING AND LOADING SETTINGS, UPDATING SOFTWARE 95
16.1 Resetting the Settings 95

16.2 Resetting the Trio CPU and Sensor Connections 96
16.3 Saving or Loading the Settings 97
16.4 Viewing the Log 97
16.5 Updating the Software 98
17 APPENDIX A: CENTRAL EXHAUST 99
17.1 Introduction to Central Exhaust 99
17.2 Selecting Central Exhaust 100
17.3 Central Exhaust Dashboard 101
17.4 Central Exhaust Functions 101
17.5 Setting the Static Pressure 102
17.6 Room Setting 103
17.7 Levels of Ventilation 103
17.8 History 105
18 APPENDIX B: CENTRAL CORRIDOR 106
18.1 Introduction to Pressure Control 106
18.2 Selecting Central Corridor 106
18.3 Central Corridor Dashboard 107
18.4 Central Corridor Functions 108
18.5 Setting the Pressure Levels 109
18.6 Defining the Heat 110
18.7 Room Setting 111
19 WARRANTY 112

1 Introduction

1.1 Disclaimer

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

1.2 Introduction

Congratulations on your excellent choice of purchasing a Trio Swine Controller!

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

1.3 Notes

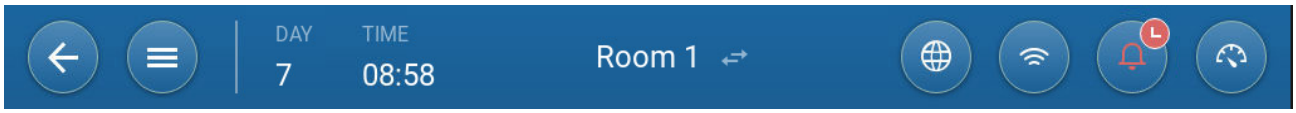
Date of release: Jan 2020

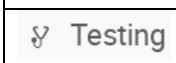
Munters cannot guarantee to inform users about the changes or to distribute new manuals to them.

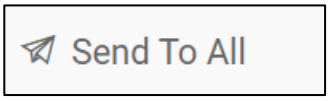
2 Using the Trio Touch Screen

- Icons
- Dashboard

2.1 Icons

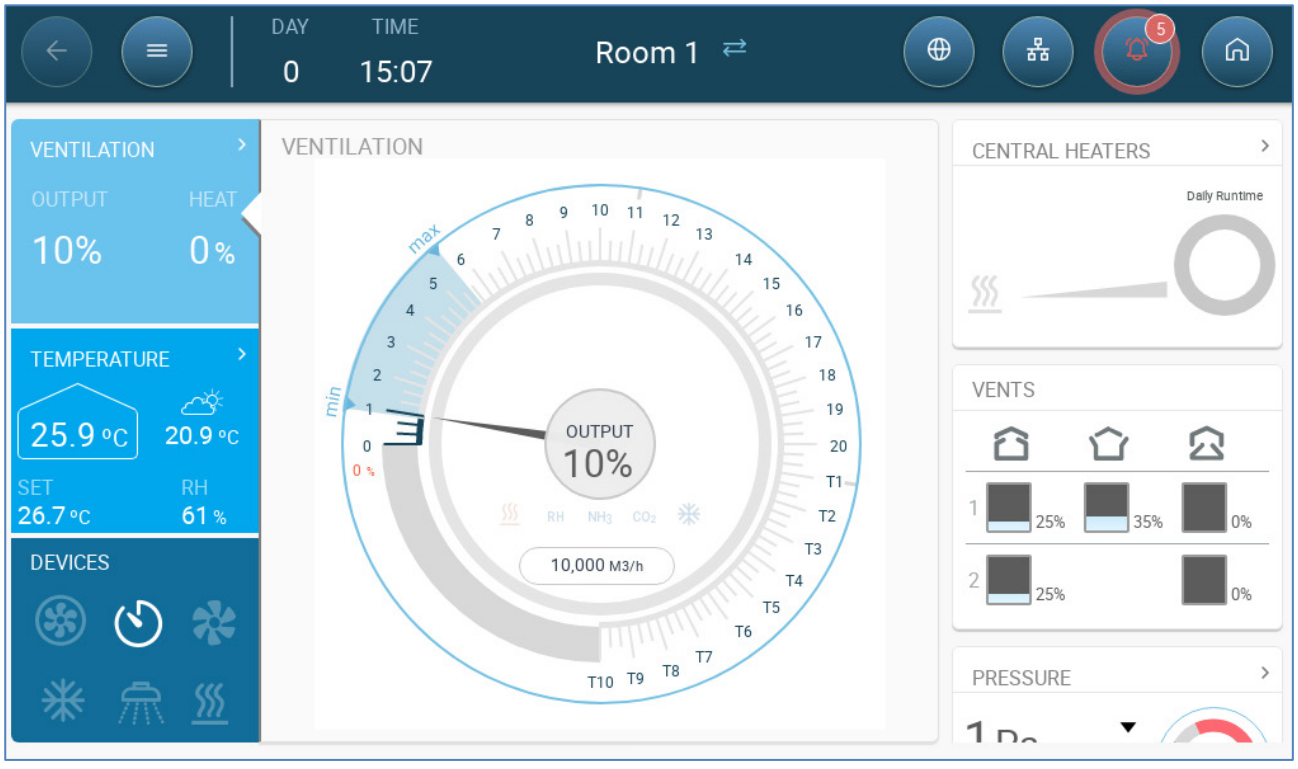


	Go back to the previous screen
	View the Main menus
	Choose language
	Trio connected to internet via Wi-Fi. Click to view network settings.
	Trio connected to internet via LAN. Click to view network settings.
	View alarms
	Go back to the main screen
	Extra icons
	Function settings
	Function test
	Edit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

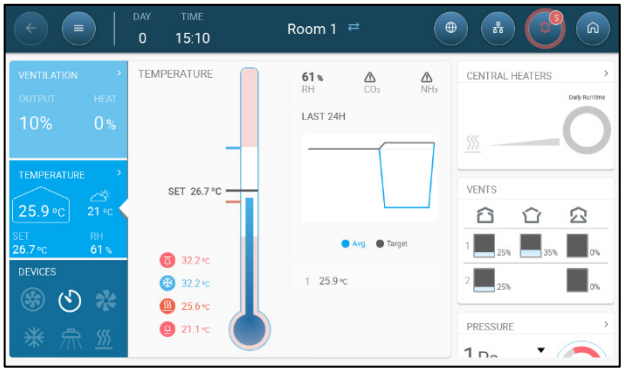
	Replace the dashboard battery with a standard 3V battery.
	Click this icon to delete data stored on that page.
Phone App	
	Click the circle containing the user name to edit personal preferences such as the language, units, name, and more.
	When a Trio controls two or more rooms or there are two or more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

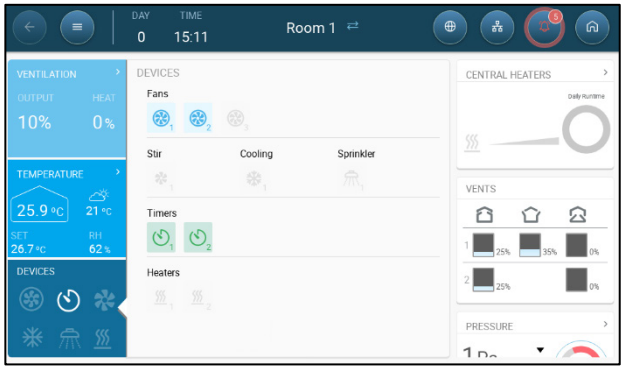
2.2 Dashboard

The Dashboard gives an overview of all Trio functions.



- 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.





3 Basic Setup

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

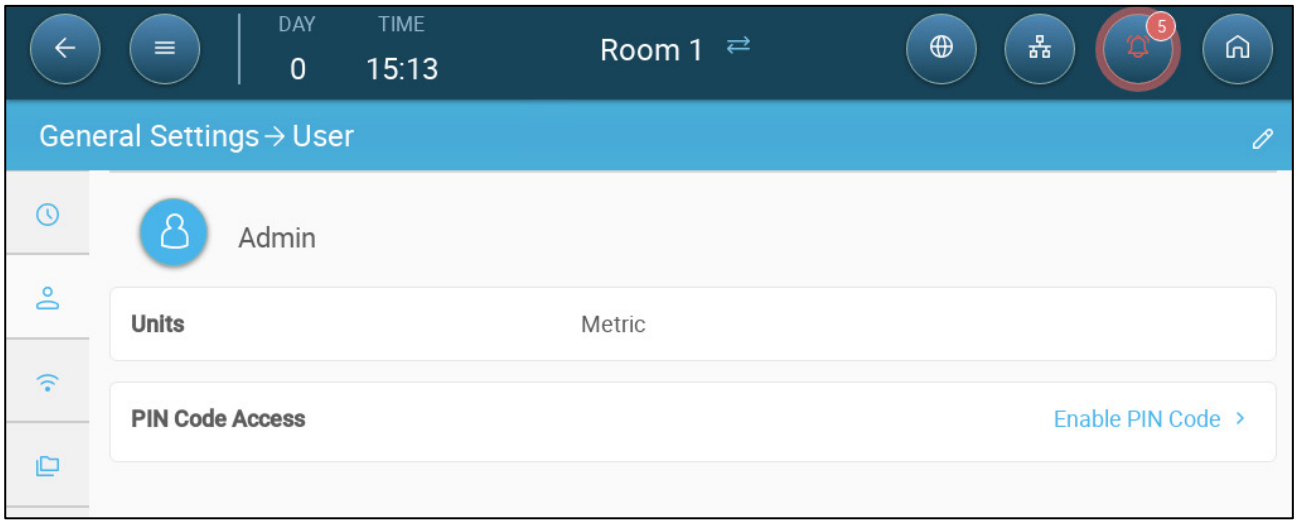
- Defining the General Settings
- Batch Settings
- Defining the Expected Animal Weight
- Adjusting the Animal Count
- Tech Support Information

3.1 Defining the General Settings

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

3.1.1 DEFINING THE PREFERENCES

1. Go to System › General Settings › User .

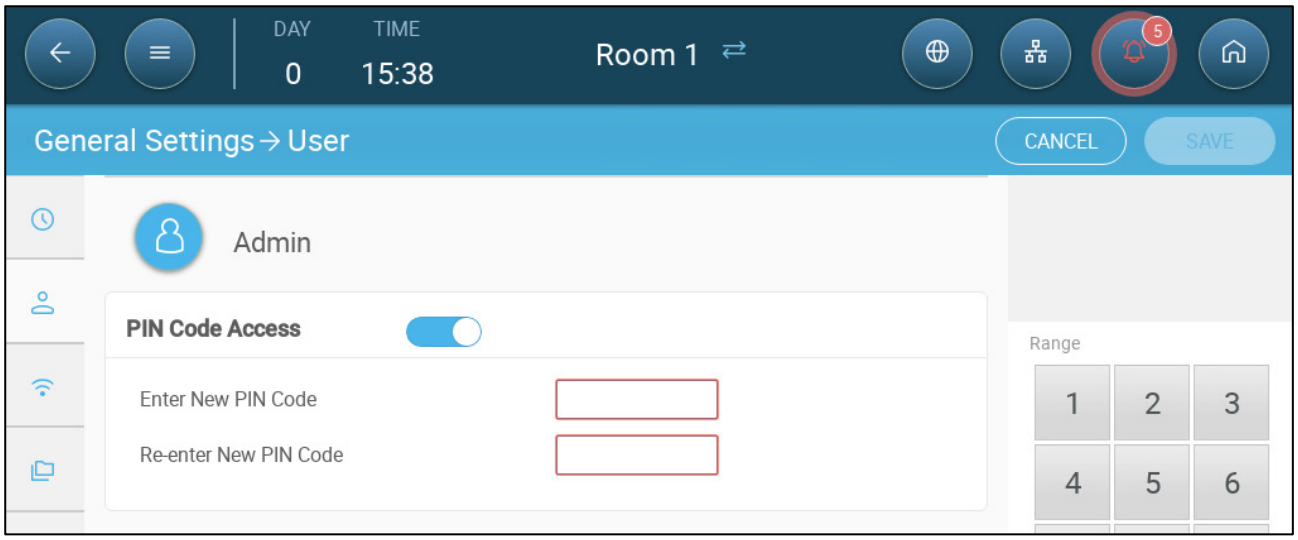


2. Define the units: There are two options:

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

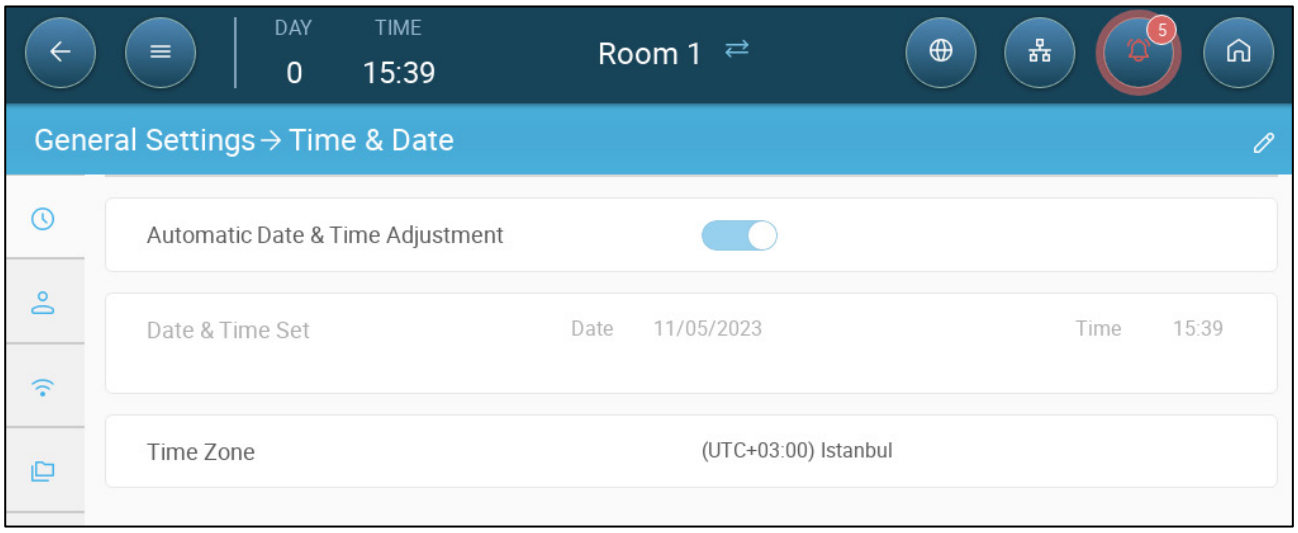
- Illuminance (Lux or Foot Candle)
- Length (Meter or Foot)

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 .



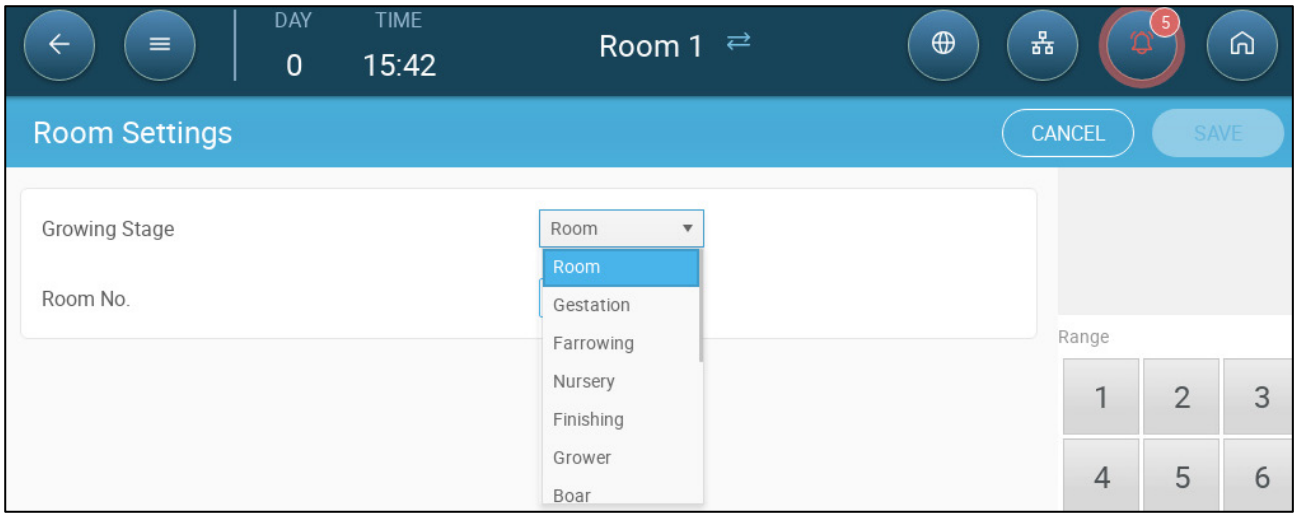
2. Define:
   - Time
     - Automatic Date & Time Adjustment: Enable this option to update date and time automatically
     - Date and Time Set: Manually enter the date and time.
   - Time Zone: Select the zone from the drop-down list.

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

3.1.3 DEFINING THE ROOM SETTING

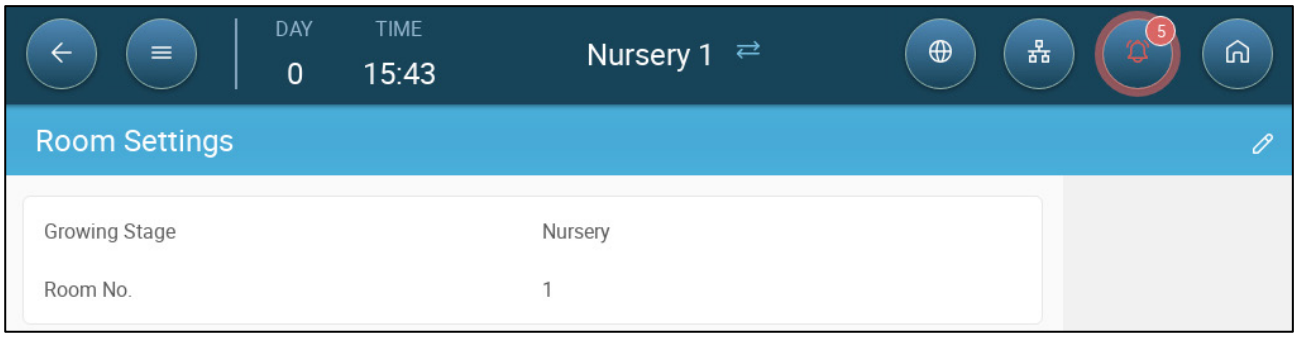
In System › Room Settings, select the growing stage. You can change the stage throughout the growth cycle. The default is Room.

NOTE The Growing Stage is used when comparing data from rooms, it does not change room settings.



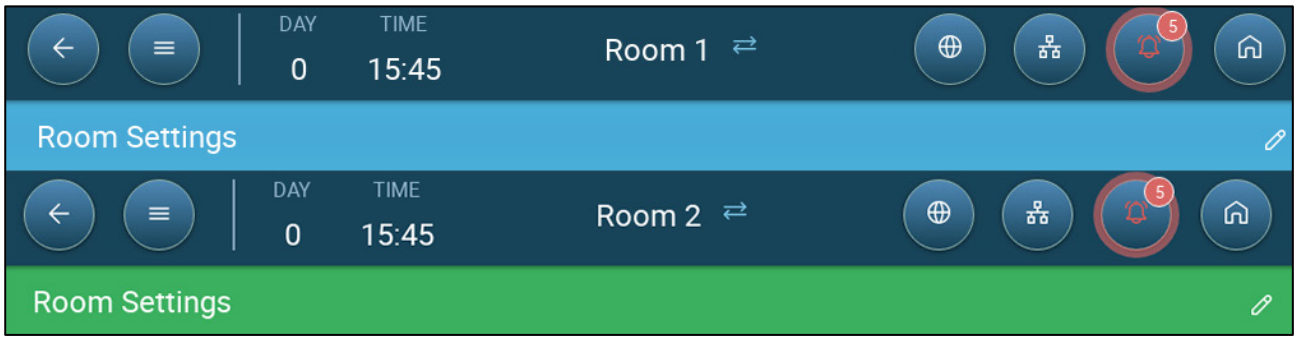
- Define:
  - Growing Stage
    - Gestation: Pregnancy period (114 days)
    - Farrowing: From the piglets' birth until day 21 (when they are weaned).
    - Nursery: This is the period when they are separated from their mothers.
    - Finishing: Pigs are moved from the nursery to a finishing barn for 115 – 120 days.
    - Grower: Same as Finishing
    - Boar: Male pigs being raised for breeding.
    - Gilts: Female pigs being raised for breeding.
    - Sows: Female pigs
    - Weaners: Same as Nursery
    - Mating: Breed gilts
    - Insemination
    - Stimulation
    - Quarantine

When you change the room setting from Room to any other setting, the new setting appears on the menu bar.



- Room number

NOTE The Room 1 menu bar is blue. Room 2's menu bar is green. Click the arrows to switch between rooms.



3.2 Batch Settings

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

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

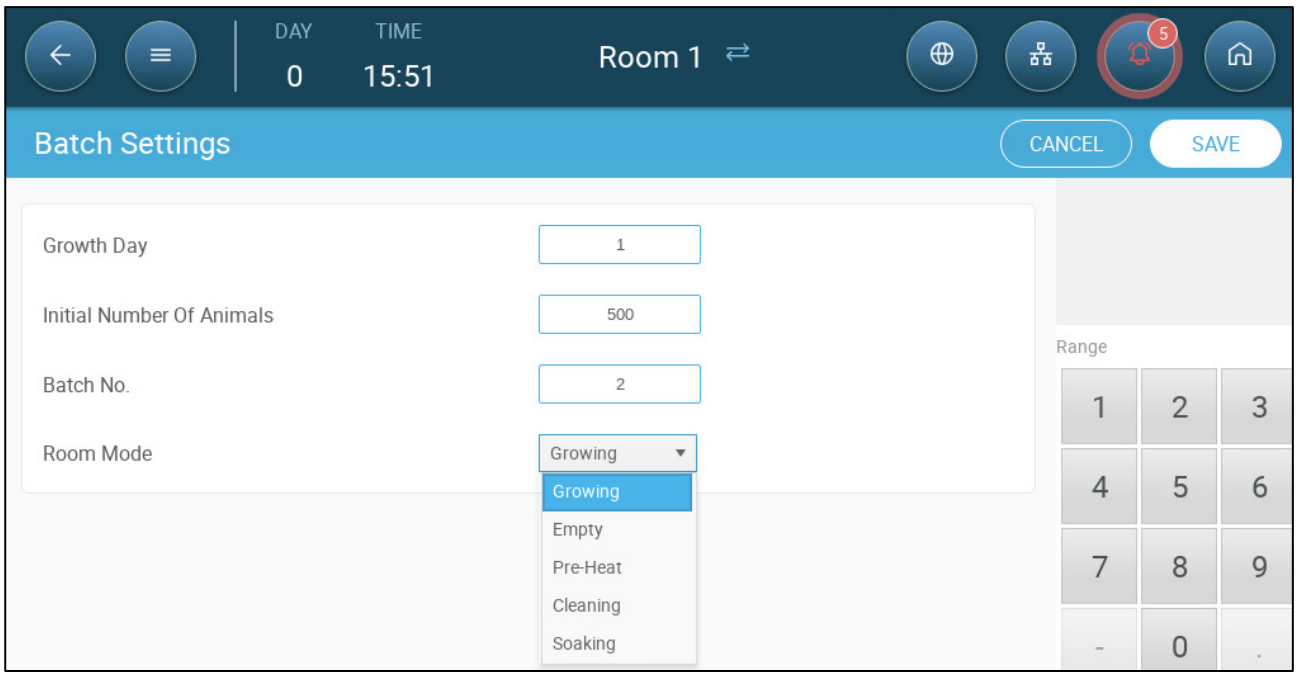
- Defining the Batch Settings Parameters
- Defining the Batch Settings

3.2.1 Defining the Batch Settings Parameters

- Manual Set Up
- New Batch Wizard

3.2.1.1 Manual Set Up

1. Go to Batch > Batch Settings.



2. Define:
    - Growth day: This parameter defines the animals' 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 Animals: Set the number of animals that are in the beginning of a batch.

NOTE In case animals die, you can edit the number of animals. Go to Adjusting the Animal Count, page 21.

    - Batch No.: Give a unique number for each herd.

- Room 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.
    - Growing: Normal running mode. As an option, the Growing mode can be configured in the wizard. Refer to the next section.
    - Empty
        - Provide ventilation according to the output set by the heat and ventilation.
        - Stop growth day progress.
        - 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/Soaking: Between batches the facility is cleaned by pre-soaking and/or soaking.

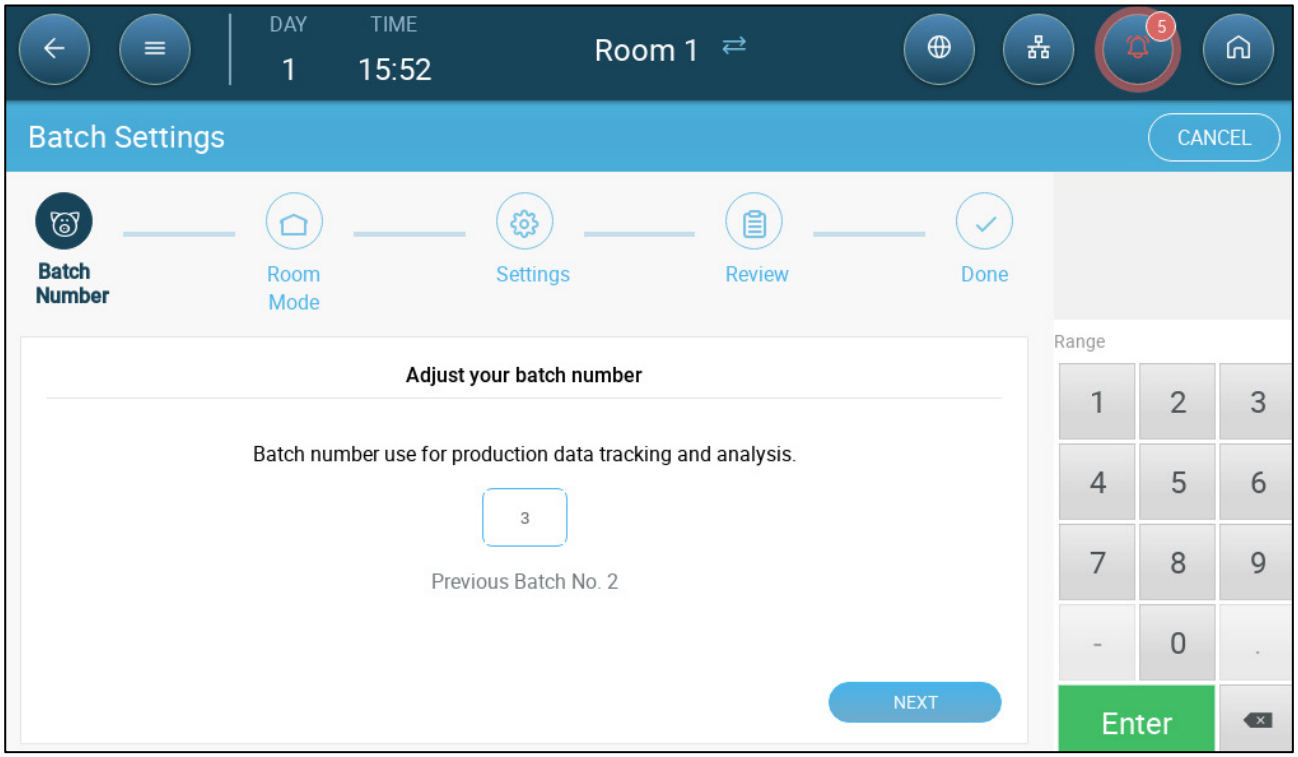
- Provide ventilation according to the output set by the heat and ventilation.
- Stop growth day progress.

3.2.1.2 New Batch Wizard

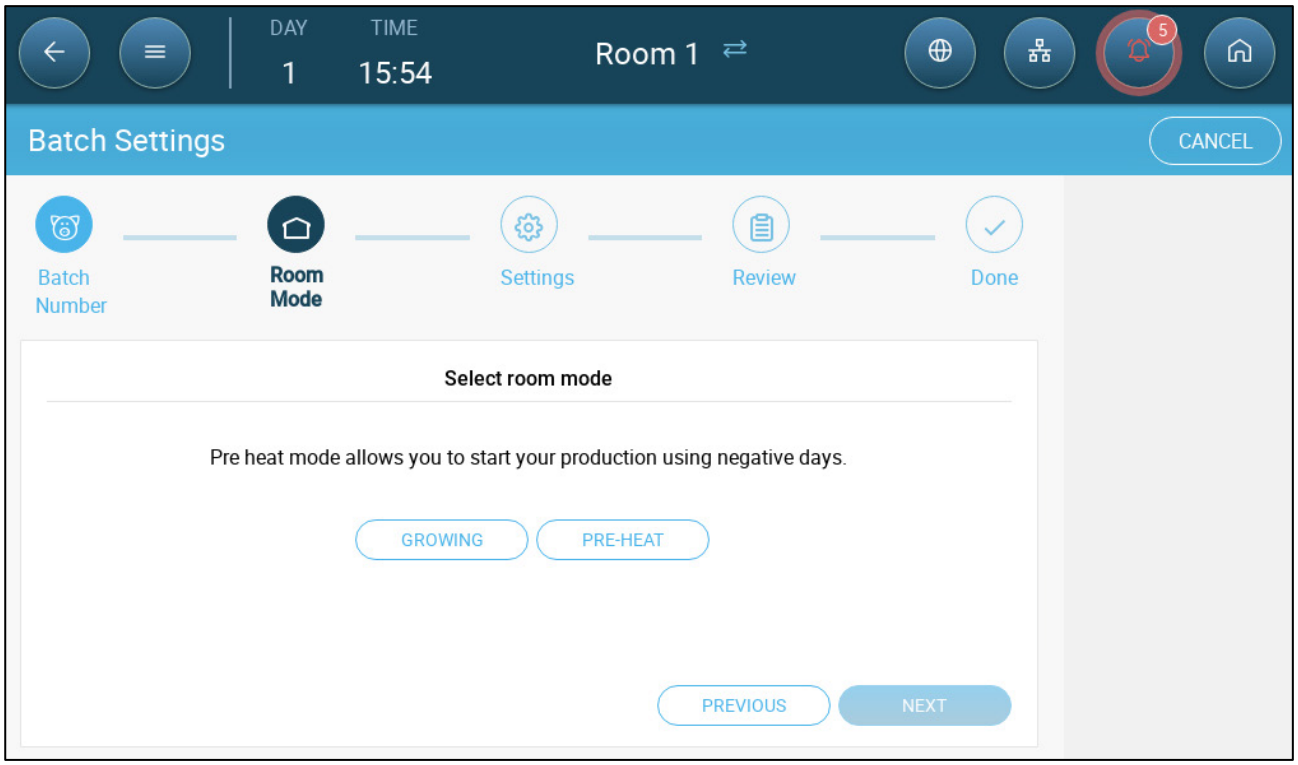
Trio provides a simple to use wizard to set up the Growing or Pre-Heat modes. Using the wizard enables defining negative growth days. When starting a new batch Trio:

- Resets historical data
- Sets the growth day to zero
- Increases the batch number by one
- Records a "New Batch" event

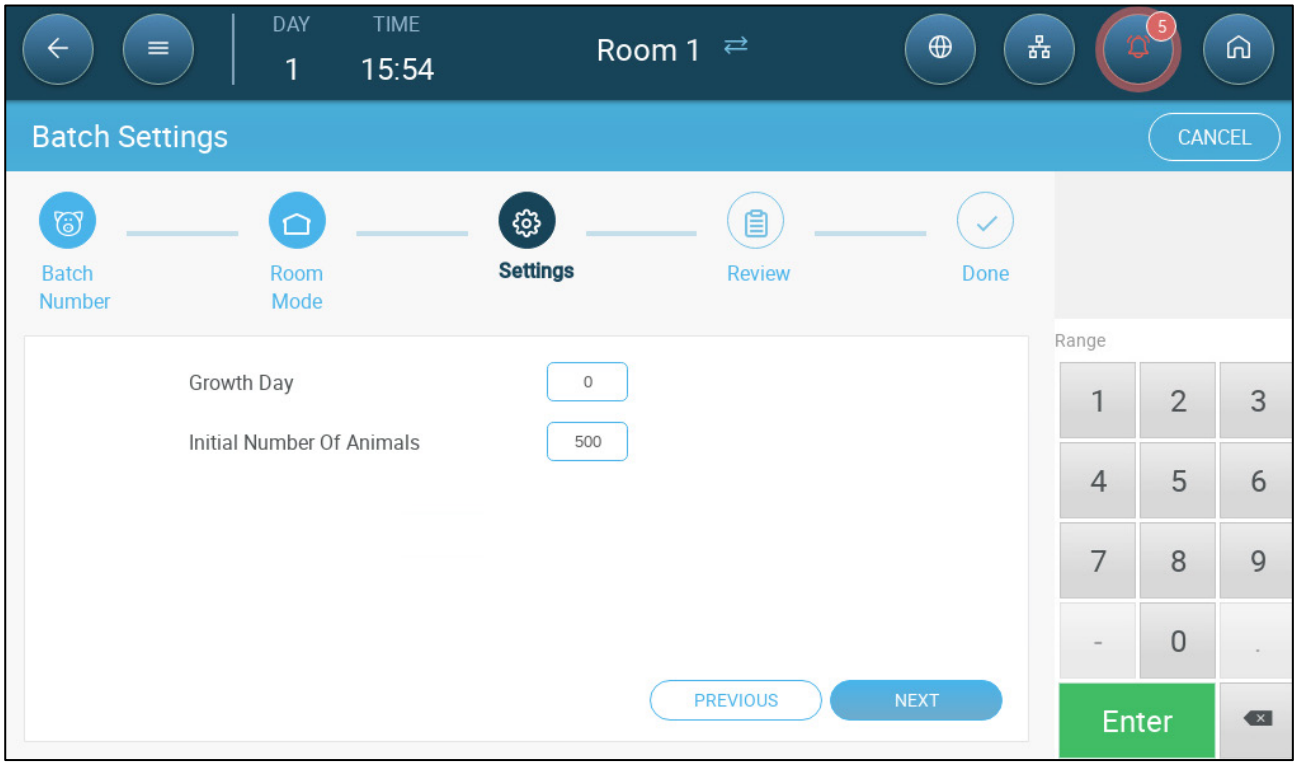
1. Click START NEW BATCH.



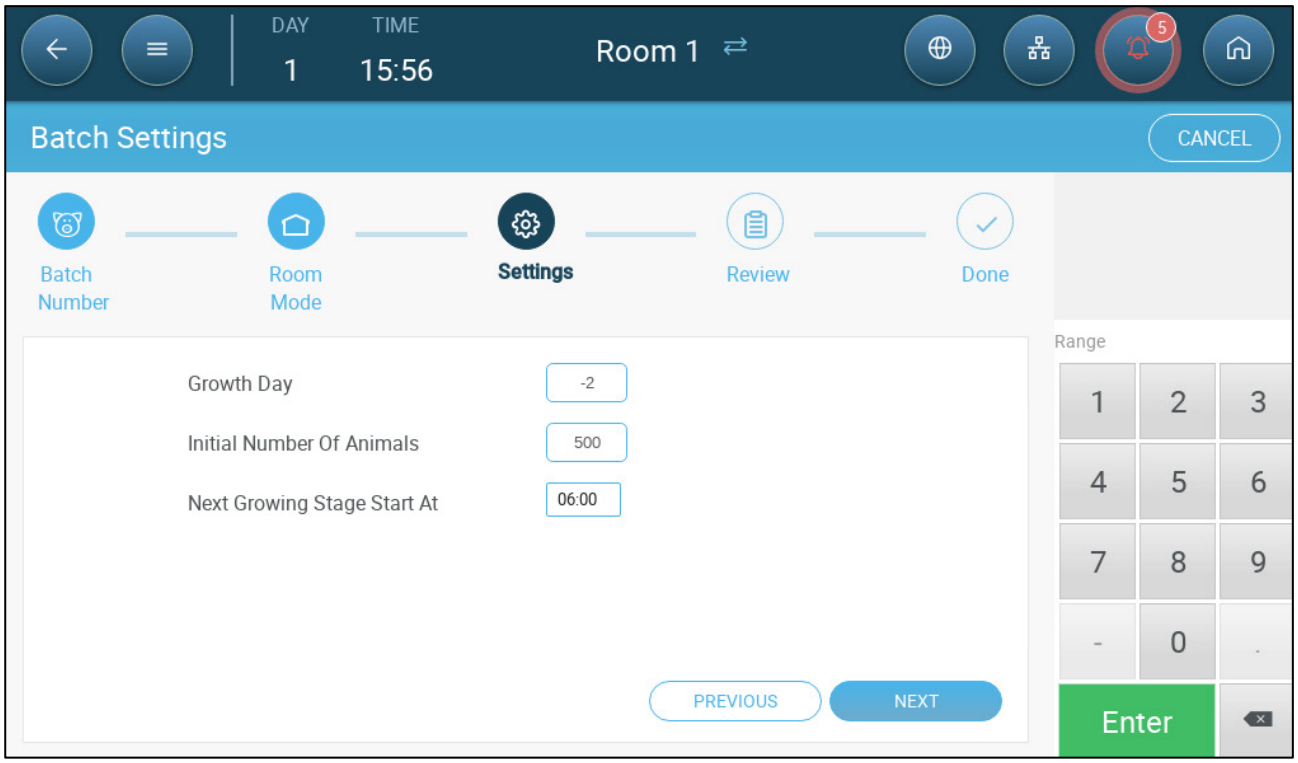
2. Define the batch number and click **Next**.



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



        - Define the Growth Day (zero or higher) and Initial Number of Animals.
    - Pre-Heat Mode:

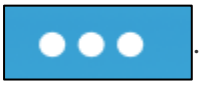


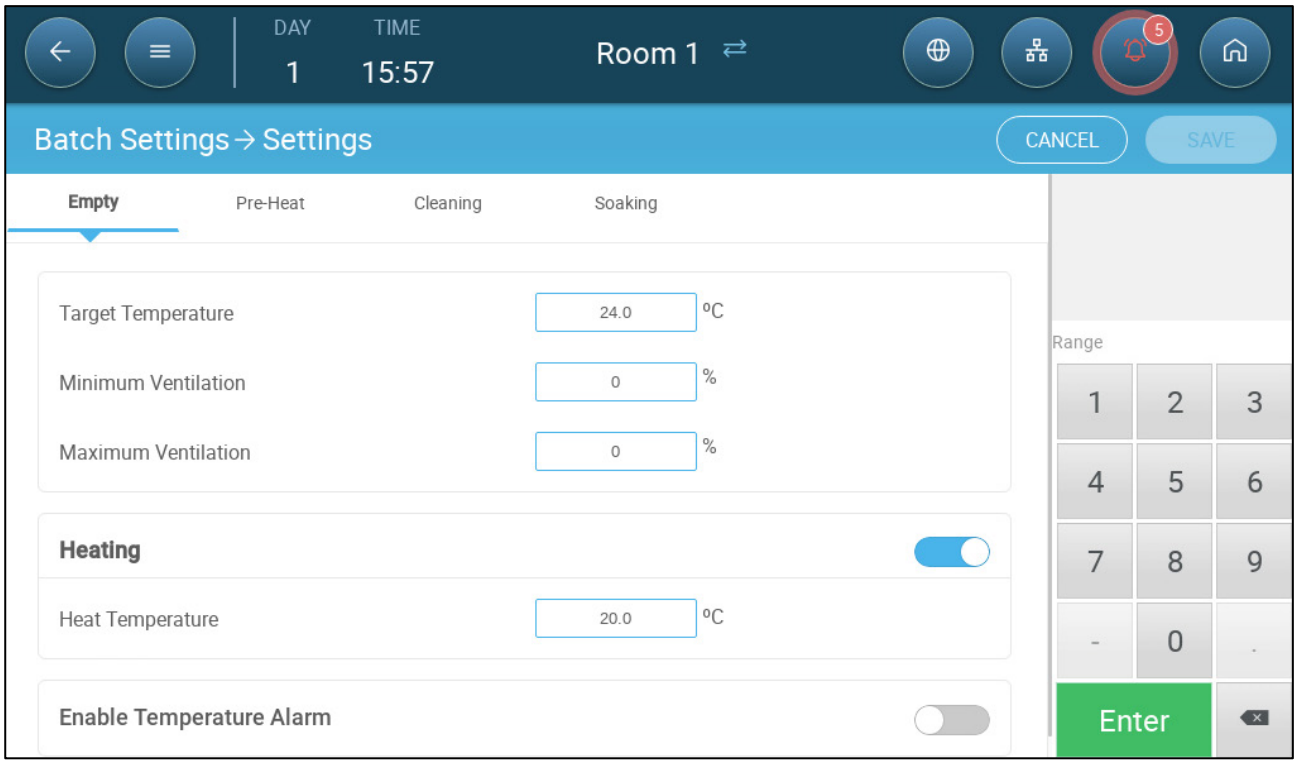
- Define:
  - Growth Day (-7 or higher; default is -2)
  - Initial Number of Animals
  - Next Growing Stage:

4. Click Next, Review and Save.

3.2.2 DEFINING THE BATCH Settings

"Batch Settings" Settings page defines basic parameters for rooms when these room are NOT in normal 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 animals' age.
    - Heating: This parameter enables heating and defining a heating temperature in each special room mode.
        - Enable the heater.
        - Define the temperature at which the heater turns on.

NOTE A heater must be mapped. Refer to the Installation Manual. This heating takes place whether heaters are central or zoned.

- 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 Defining the Expected Animal Weight

Animal weights are used when calculating the amount of air required when using Ventilation by Weight (page 35). In this screen, define the expected weights over the growth cycle. Trio provides a default chart which can be edited.

- Piglets: 1.5kg – 2.0kg
- Remain with mothers 21 – 42 days (20 kg)
- Finishing facility: up to 75 – 100 kg

- Animal Weight Main Screen
- Animal Weight Curve

3.3.1 ANIMAL WEIGHT MAIN SCREEN

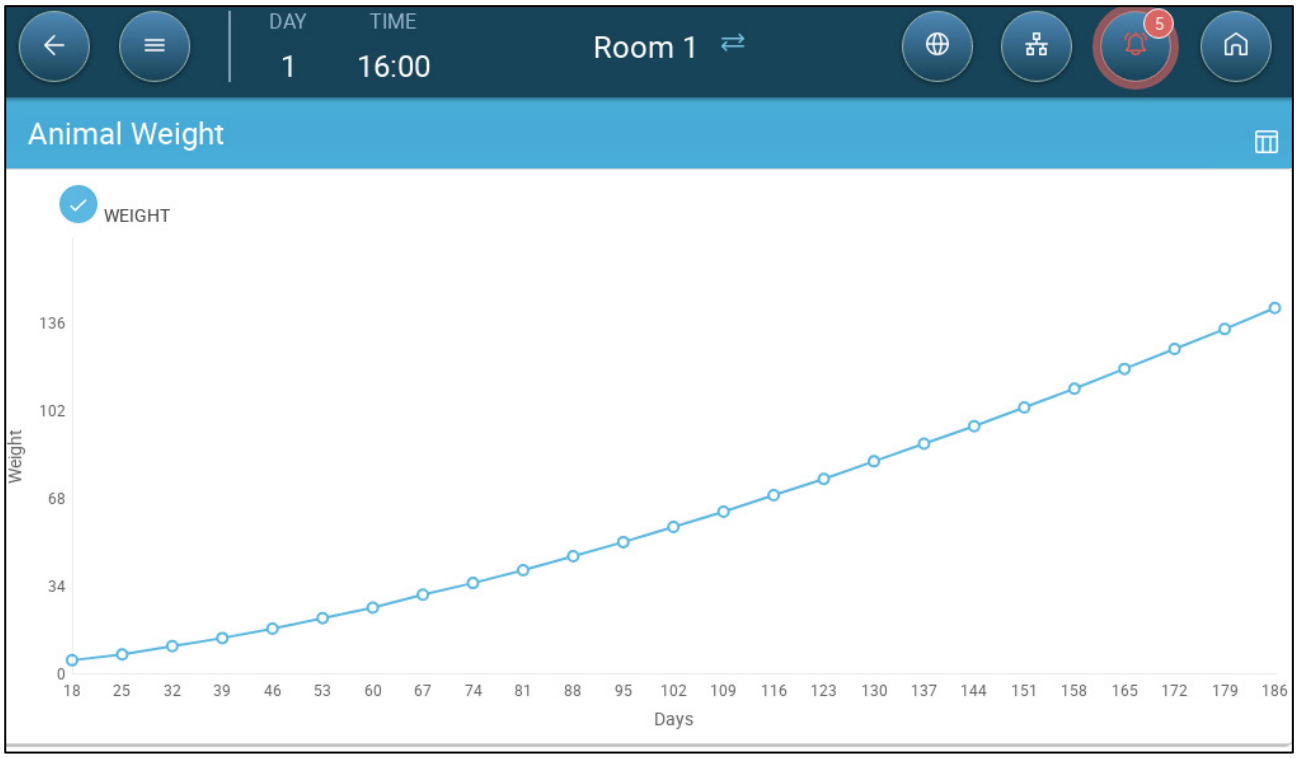
1. Go to Batch › Animal Weight.

2. Define:
    - Growth Day: Define the growth day to determine the desired weight. Range 0 - 999
    - Animal Weight: Set the expected animal weight. Range 0 - 250.0

NOTE Trio provides a default growth curve. If required, you can edit the growth days and animal weights.

3.3.2 ANIMAL WEIGHT CURVE

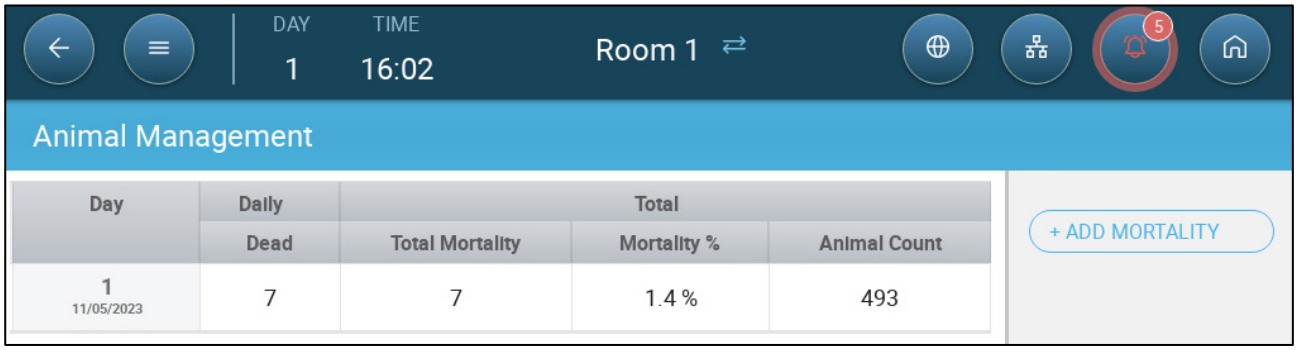
Click  or  to view the weight curve.



3.4 Adjusting the Animal Count

Edit the number of animals when animals are removed from or added to the herd.

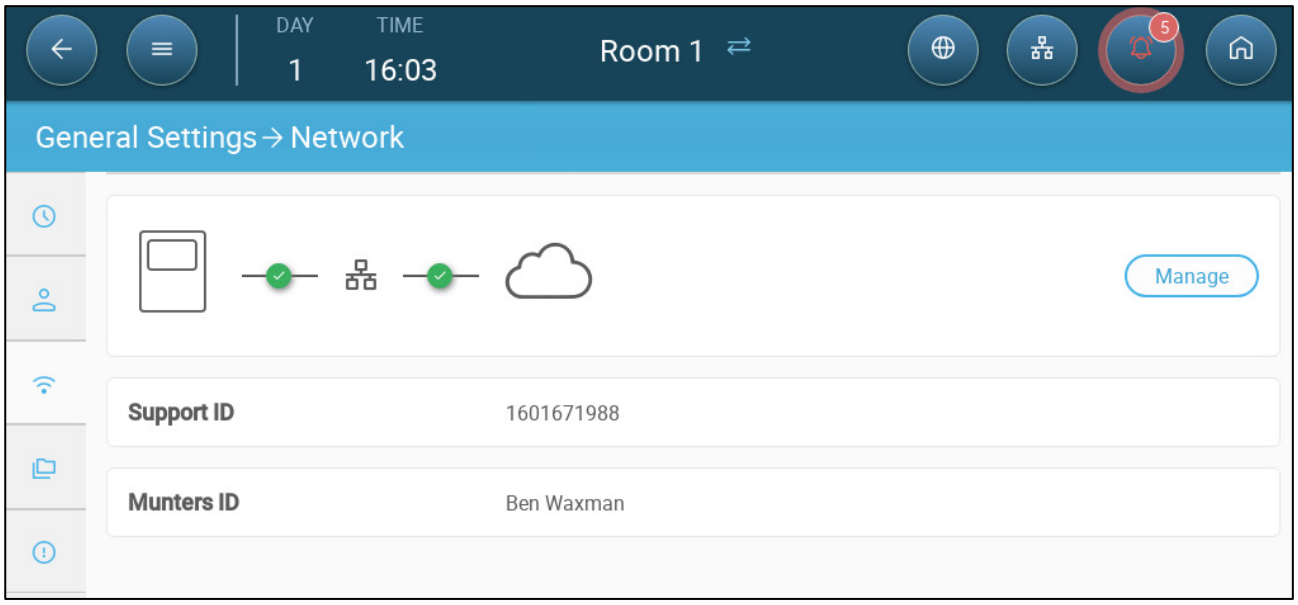
1. Go to Batch › Animal Management. This screen displays the animal mortality data.



2. Click **Add Mortality** and edit (add or subtract) the number of animals removed or added.

3.5 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.

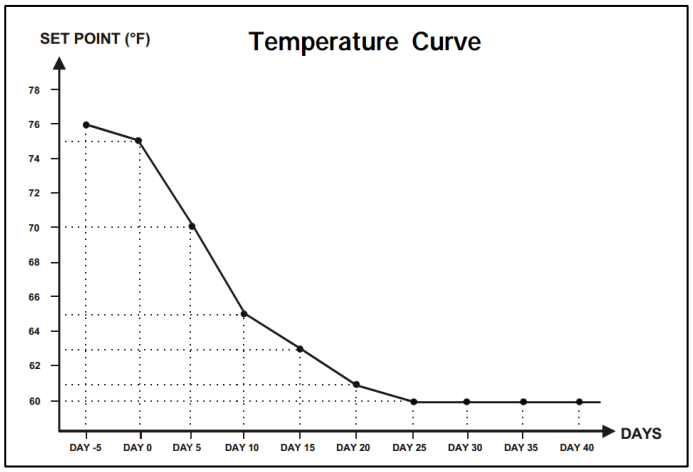


Figure 1: Temperature Curve Example

In addition the Temperature Curve has secondary functions:

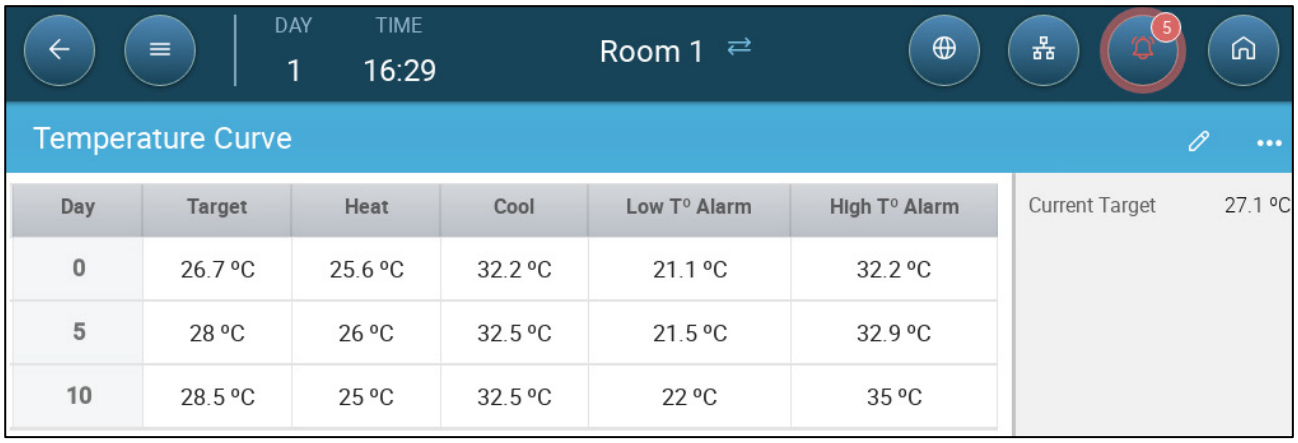
- Defines when heating begins in cases where the actual temperature drops below the target temperature (**Heat**).
- Defines when heating turns off.
- Defines when an alarm is sent when temperatures are too low (**Low Alarm**)
- Defines when an alarm is sent when temperatures are too high (**High Alarm**)

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.



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 pig house. All ventilation calculations are based on this specification. Range -40° to +90° C.
    - Heat: This parameter is the set point at which the heaters are activated.
    - Cool: This parameter is the set point at which cooling devices are activated. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C.

NOTE Heat and Cool appear if a heater and cooler are defined. Refer to the Installation Manual.

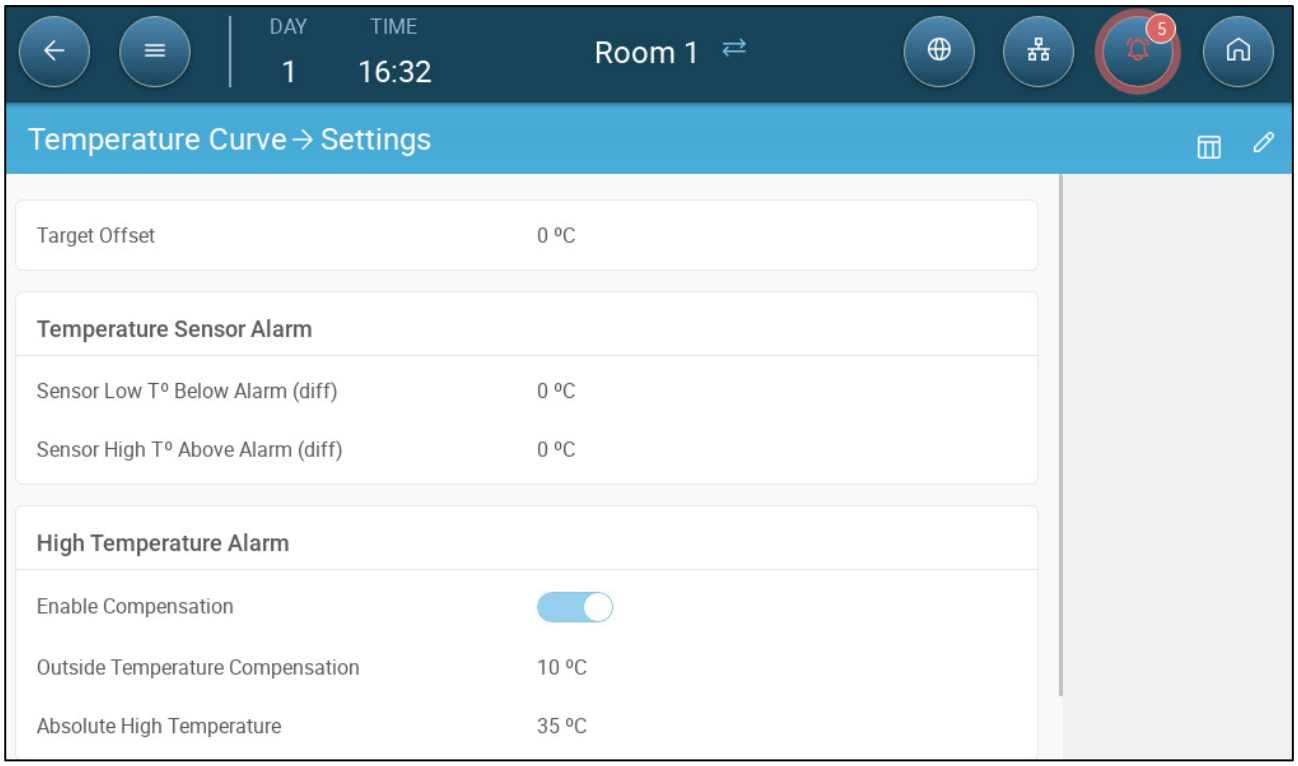
    - Tunnel: This parameter is the set point at which tunnel ventilation begins. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C.

NOTE Tunnel appears if Tunnel Ventilation is enabled in Ventilation Settings (page 56).

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

4. Click  to view the curve history.

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°
    - High Temperature Alarm: Enable if required.
        - Outside Temperature Compensation: High temperature set point = measured outside temperature + “outside temperature compensation”. Range [0.0° – 10.0°]
        - Absolute High Temperature: Set the critical temperature (maximum allowable).

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

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 49.

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.

    - Dynamic minimum: The controller adjusts the minimum between the cold and warm set points according to the warm and cold outside temperature set points.
    - Dynamic maximum: The controller adjusts the maximum between the maximum cold and max warm set points according to the warm and cold outside temperature set points.

  For more information, refer to Defining Dynamic Ventilation, page 33.
- 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 35.
- 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 36.

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)

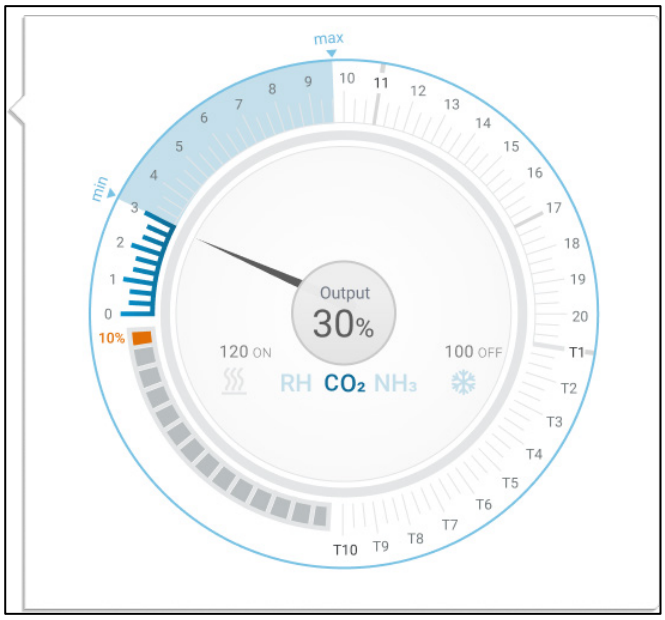
5.2.1 Basic Ventilation

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 Basic Ventilation, page 40 for more details.

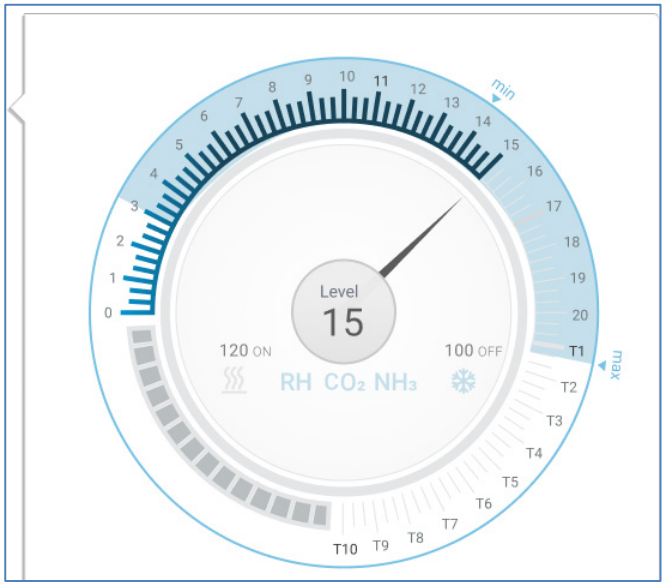


5.2.2 Extra Ventilation

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).



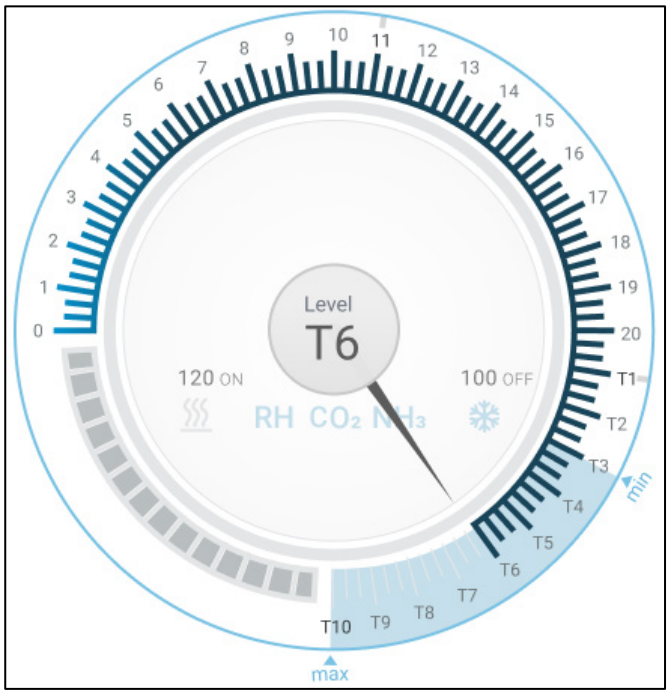
- Refer to Extra Ventilation, page 53 for more details.

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 56 for more details.

6 Minimum and Maximum Ventilation

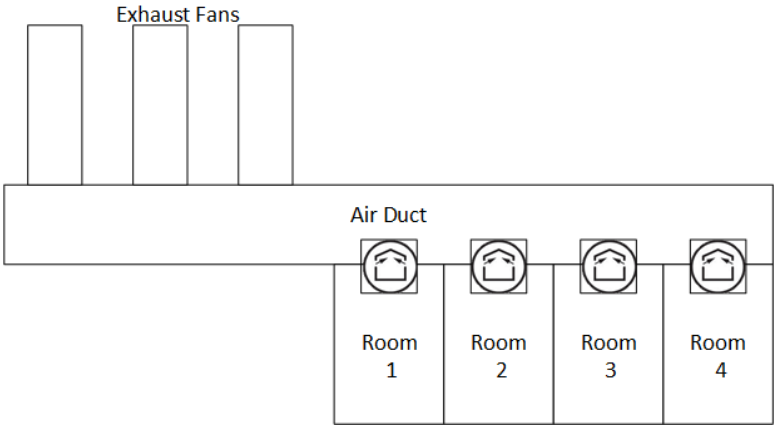
The following sections detail how to configure the minimum and maximum ventilation levels by growth day. As the temperature rises above the target temperature, Trio gradually increases ventilation level using a combination of increased fan speeds, cycle times, opening the inlets and more.

- Building Structure Summary
- Defining Basic Ventilation
- Measuring Fan

6.1 Building Structure Summary

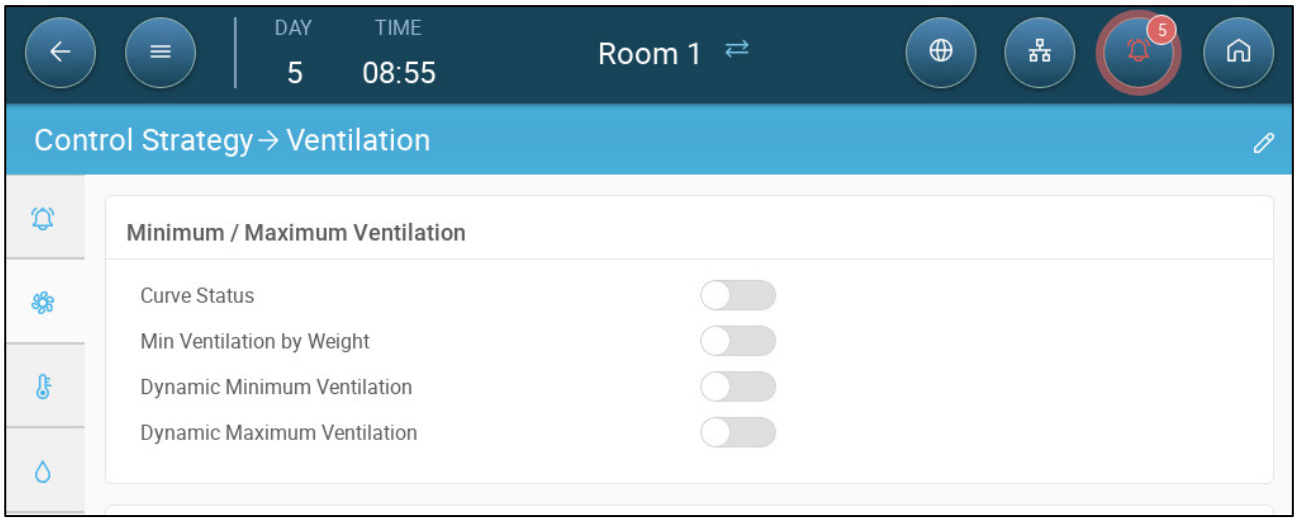
In a typical setup, herds are housed in a building in which all rooms are connected to one central ventilation system. Each room has an inlet which controls the amount of air entering. Centralized fans push air in via the inlet.

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.

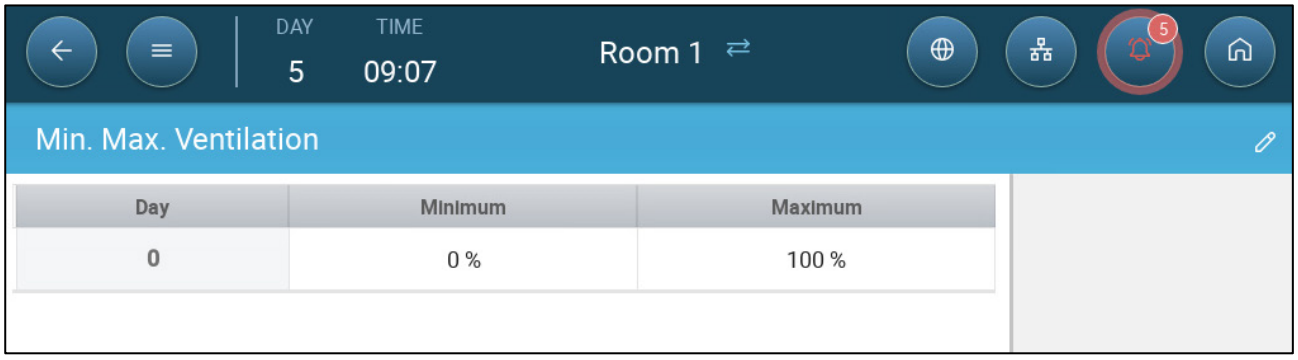


6.2 Defining Basic Ventilation

1. Go to System › Control Strategy › Ventilation .



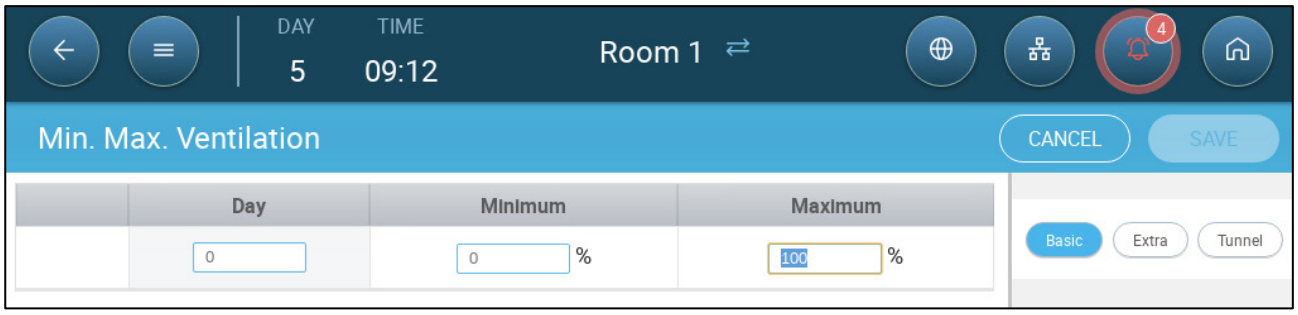
2. Verify that Dynamic Minimum/Maximum and Min Ventilation by Weight are disabled.
3. Go to Climate › Min/Max Ventilation.



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 percentage: Define the minimum and maximum ventilation percentages. 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 54).
7. In Climate › Min. Max. Ventilation, click .
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.

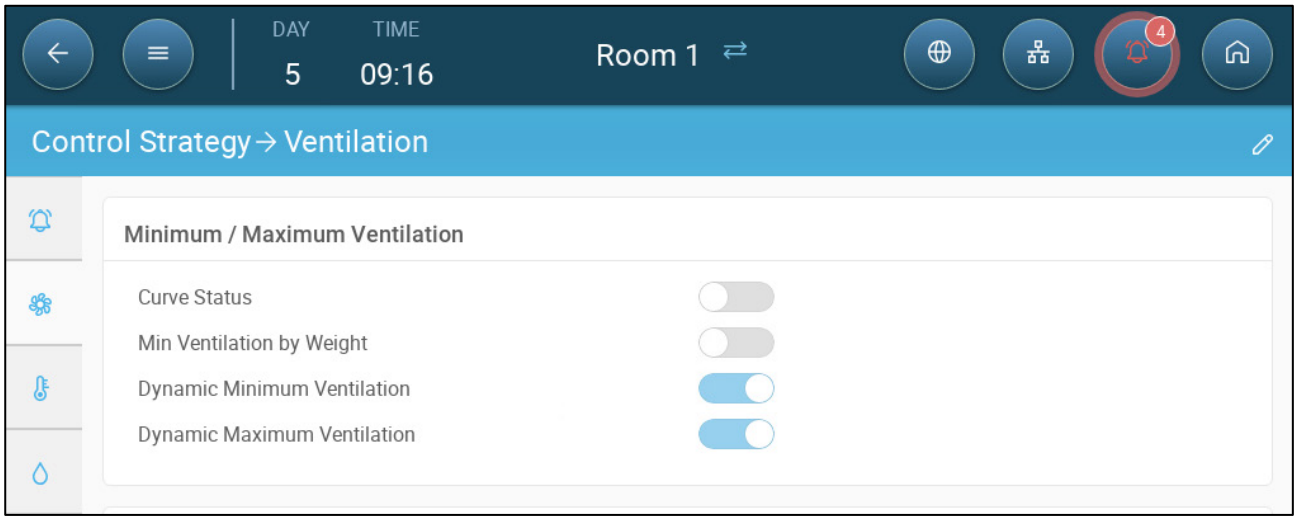
- Options:
  - Defining Dynamic Ventilation
  - Ventilation by Weight
  - Adding a Curve

6.2.1 DEFINING DYNAMIC VENTILATION

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

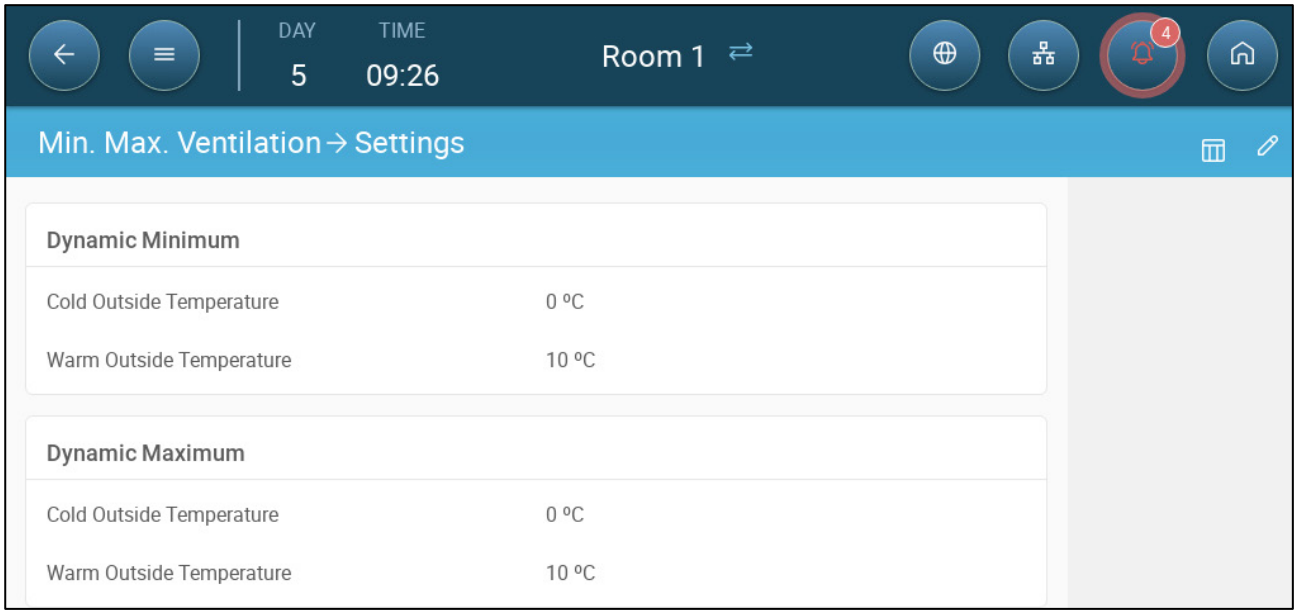
- Dynamic Minimum: The user defines the cold and warm temperatures at which the minimum ventilation takes places. In addition, the user defines the ventilation percentages. To ensure air quality, install air quality sensors (CO2, Ammonia, Humidity). These sensors will increase ventilation when necessary.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

1. Go to System › Control Strategy › Ventilation  .

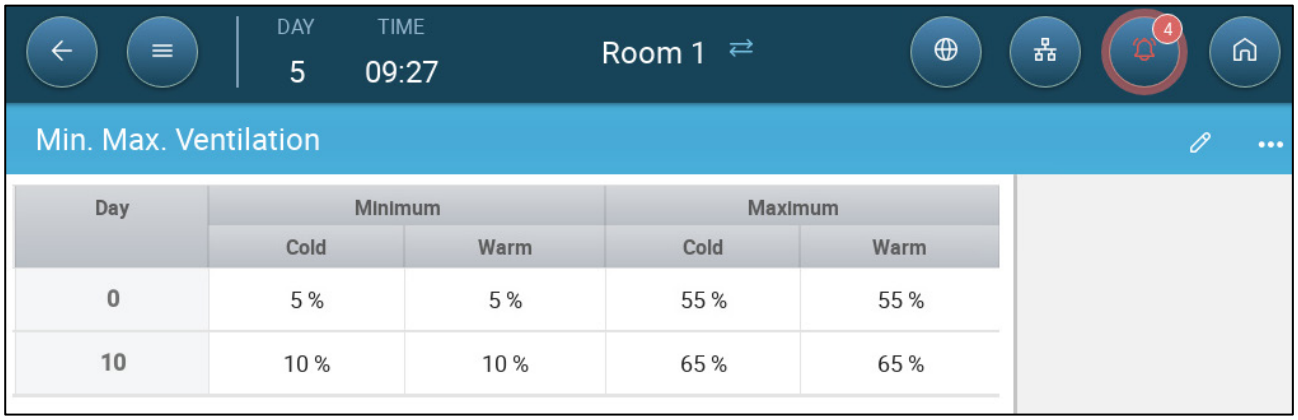


2. Under Minimum / Maximum Ventilation, enable:
   - Dynamic Minimum Ventilation or
   - Dynamic Maximum Ventilation or
   - Both. In this example both are enabled.

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



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



Day	Minimum		Maximum	
	Cold	Warm	Cold	Warm
0	5 %	5 %	55 %	55 %
10	10 %	10 %	65 %	65 %

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

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

6.2.2 VENTILATION BY WEIGHT

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

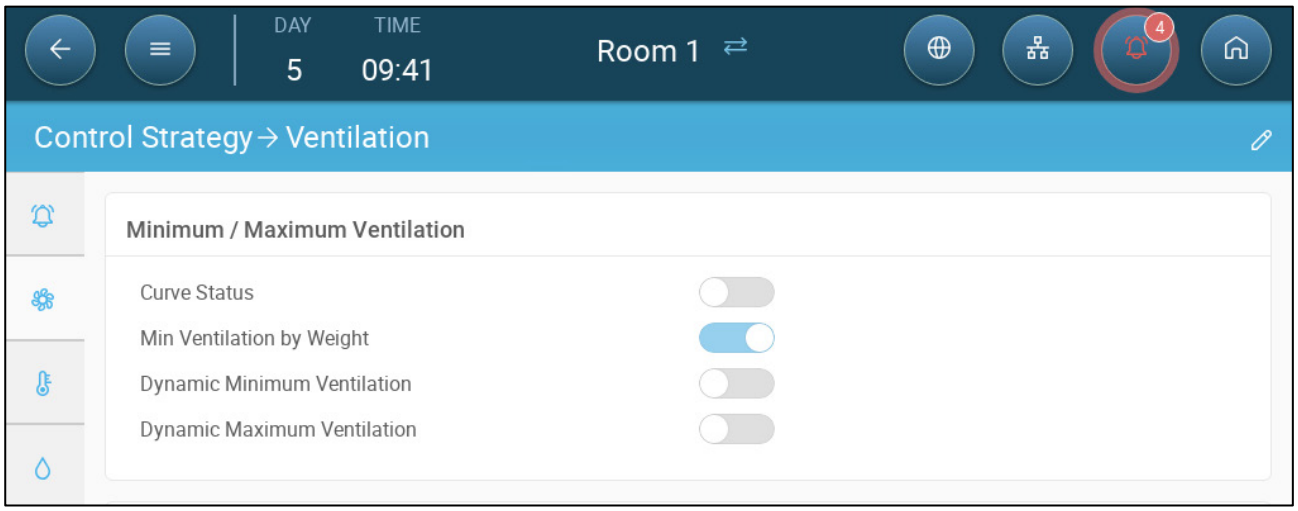
6.2.2.1 How Does Ventilation by Weight Work

Ventilation by Weight provides air based on the number of animals 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).

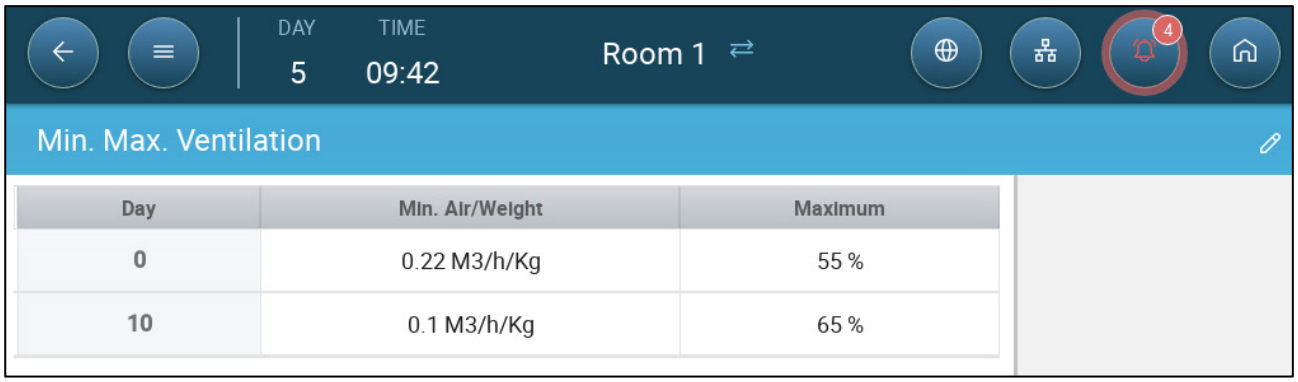
- When using cycle fans, each level has minimum and maximum on times, which determine the minimum and maximum CFM. If the ventilation doesn't provide enough air for the pigs (based on their numbers and weight) Trio sends an alarm. You will need to redefine the minimum level.
- When using variable speed 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.

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 

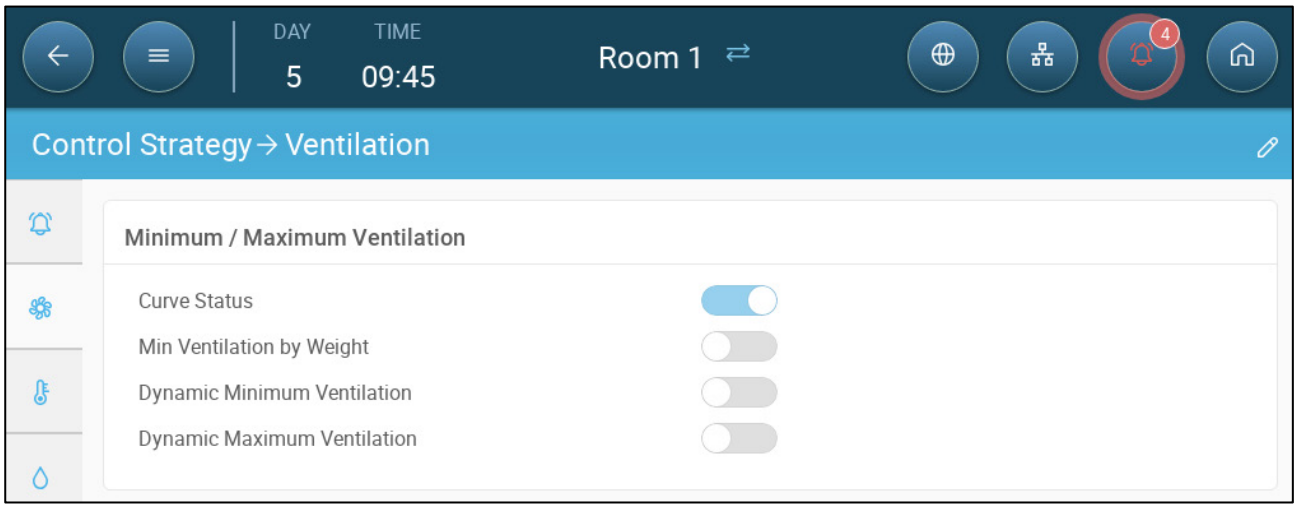
5. Define:
    - Min Air Weight: The amount of air per animal's weight supplied.
    - Max: The maximum ventilation level by growth day.

NOTE If you enabled Dynamic Ventilation, click Settings and define the parameters. Refer to Defining Dynamic Ventilation, page 33.

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.

6.3 Measuring Fan

Measuring fans measure the air speed inside the rooms. More exactly, the fan is used to precisely determine the actual conveyed exhaust air volume. This device can be used for:

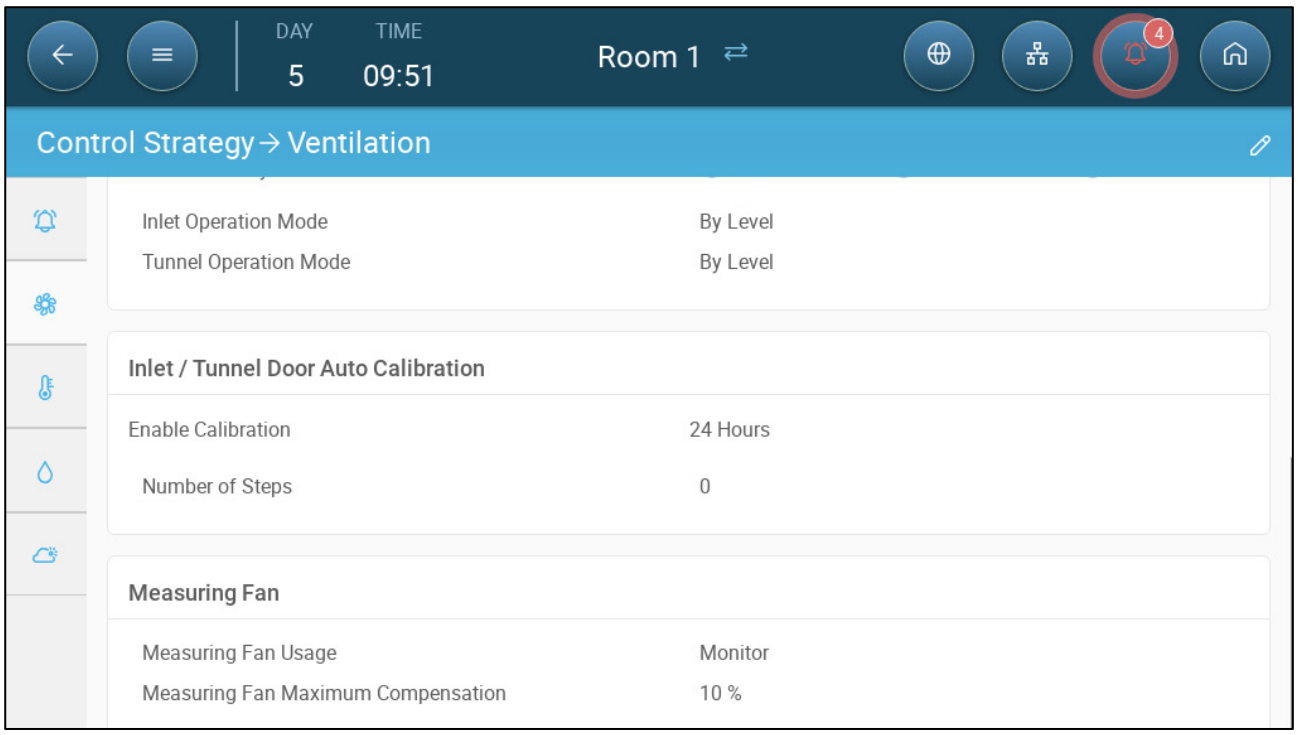
- Measuring real time air speed
- Enable ventilation compensation if the air speed does not meet the calculated minimum ventilation requirements.

➲ **Define a sensor as Measuring Fan. Refer to the Installation Manual.**

6.3.1 MEASURING REAL TIME AIR SPEED

In this setup, the measuring fan is used to show the real time air speed.

1. Go to System › Devices & Sensor. On the Measuring Fan port define the Related Fan as None.
2. Go to System › Control Strategy › Ventilation .



3. In the Measuring Fan Usage parameter, define the usage as Monitor.

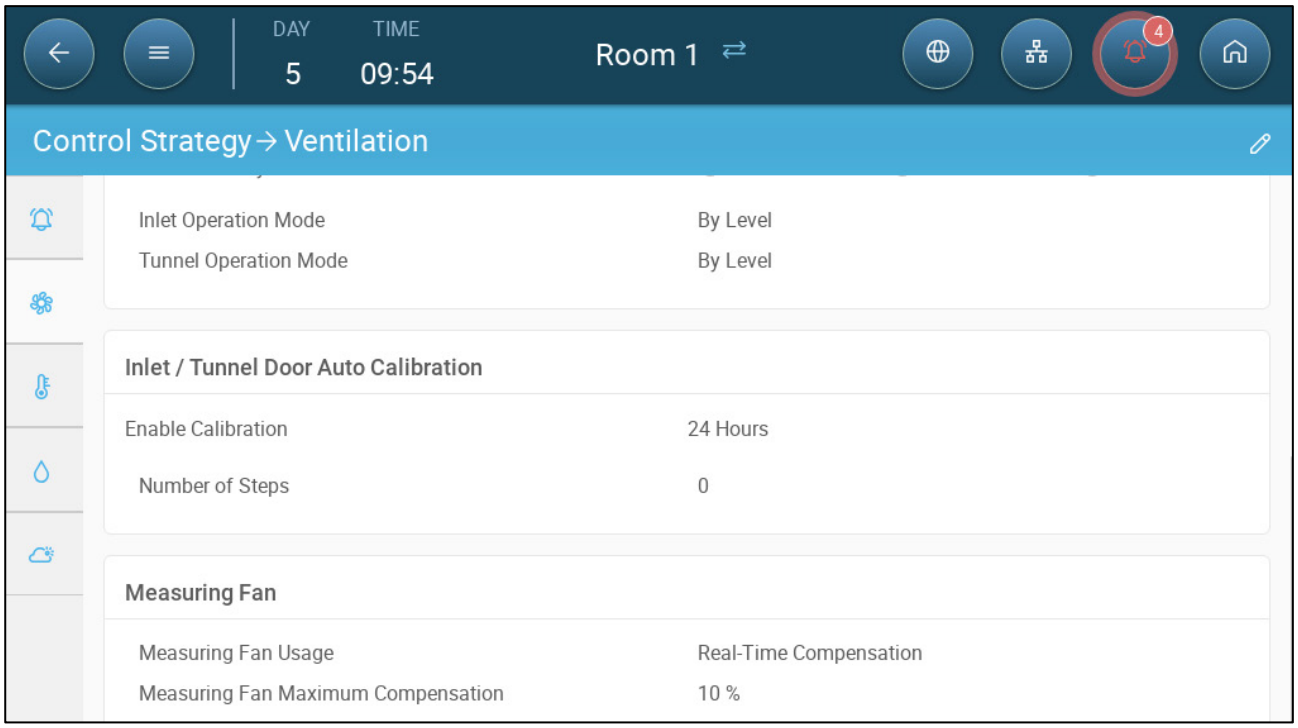
NOTE The Measuring Fan Maximum Compensation parameter is irrelevant in this setup.

6.3.2 VENTILATION COMPENSATION

In this option, the measuring fan is used to ensure that the air volume meets the minimum defined in the Minimum and Maximum Ventilation, page 31. The Minimum Ventilation function defines the minimum amount of air that the fans must supply. The Measuring Fan measures the actual amount of air supplied. If the actual amount is less than the required amount of air, the Measuring Fan increases the speed of a designated fan to compensate for the difference.

➲ **Define a relay or analog port as a fan. This fan's capacity must be defined. Refer to the Installation Manual.**

1. Go to System › Devices & Sensor and select the Measuring Fan.
2. In the Related Fan parameter, define the designated compensation fan.
3. Go to System › Control Strategy › Ventilation .



4. In the Measuring Fan Usage parameter, define the usage as Real-Time Compensation.

5. In the Measuring Fan Maximum Compensation parameter, define the maximum percentage increase in the Related Fan's speed. Range 0 – 100. Default 10%.

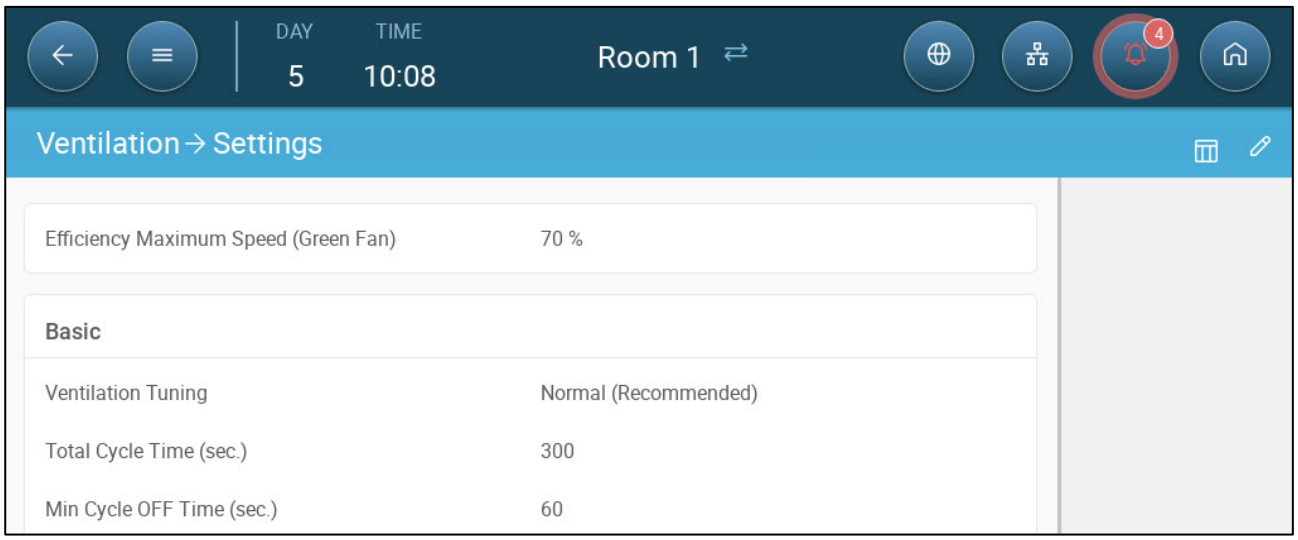
7 Levels of Ventilation

- 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.**

1. Go to Climate › Ventilation and click ●●●.



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

CAUTION *Munters recommends leaving this parameter at Normal.*

Total Cycle Time (sec)/Min Cycle OFF Time (sec.): refer to Minimum Ventilation Cycle, page 43. (CHECK THIS WITH POULTRY)

7.2 Basic Ventilation

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

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

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

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 System map relays and analog output ports to fans (including the capacity), inlets, and stir fans as required. Only mapped devices show up in the following screens.**

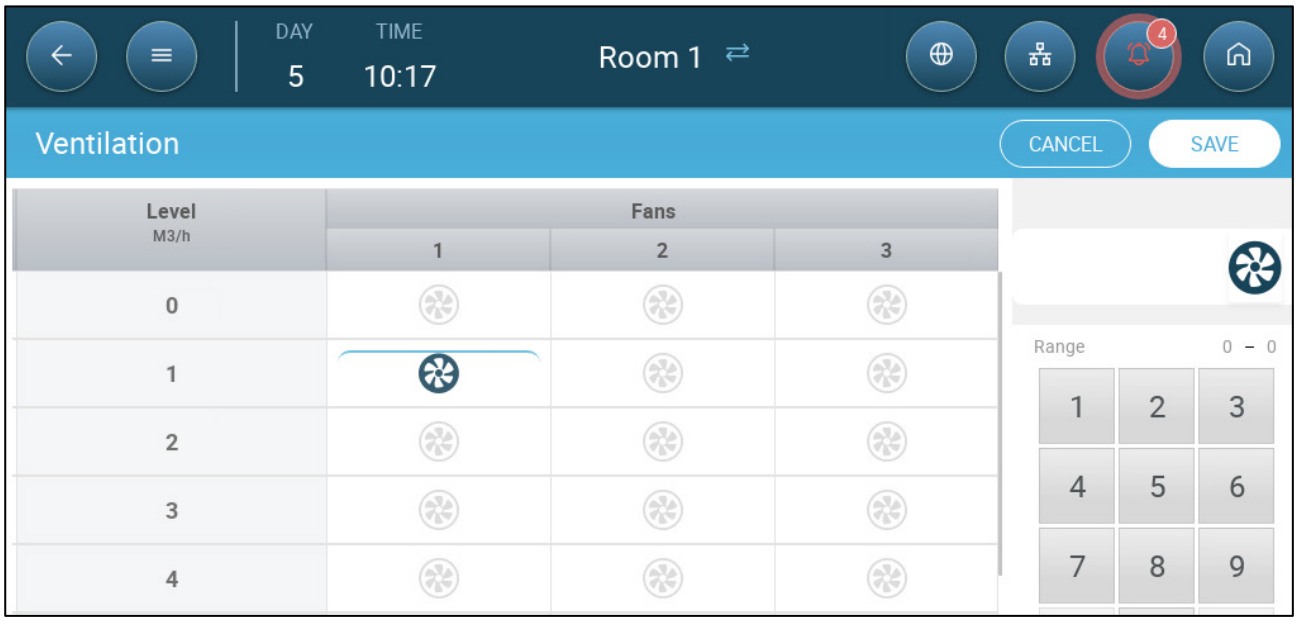
1. Go to Climate › Ventilation.

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.

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

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

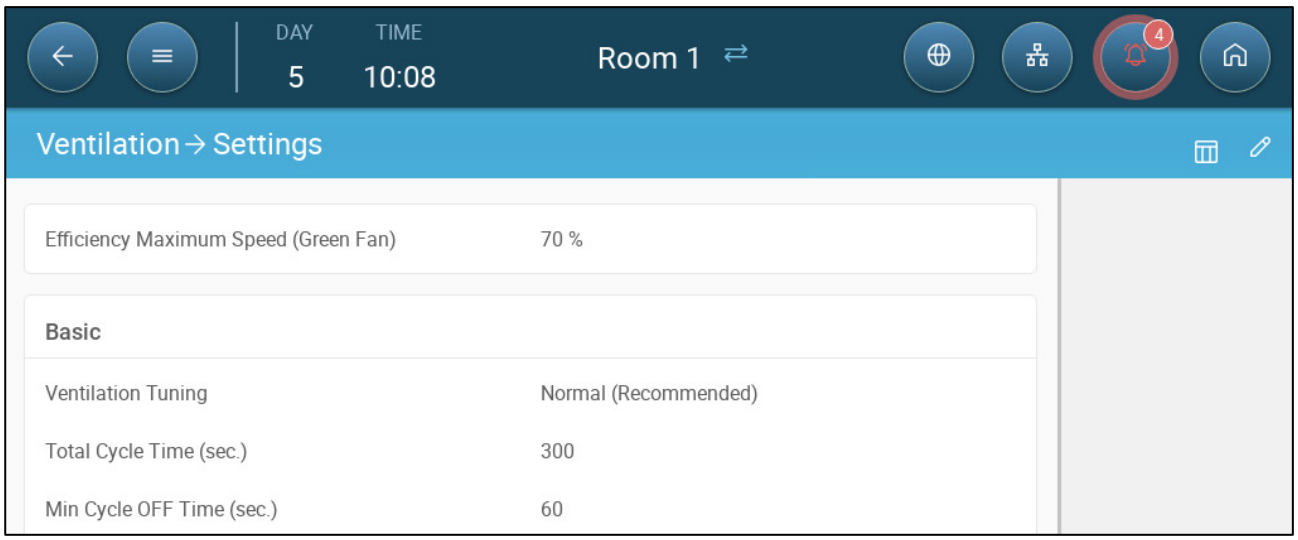
7.2.2 Fan Options

The following sections shows examples of different ventilation options.

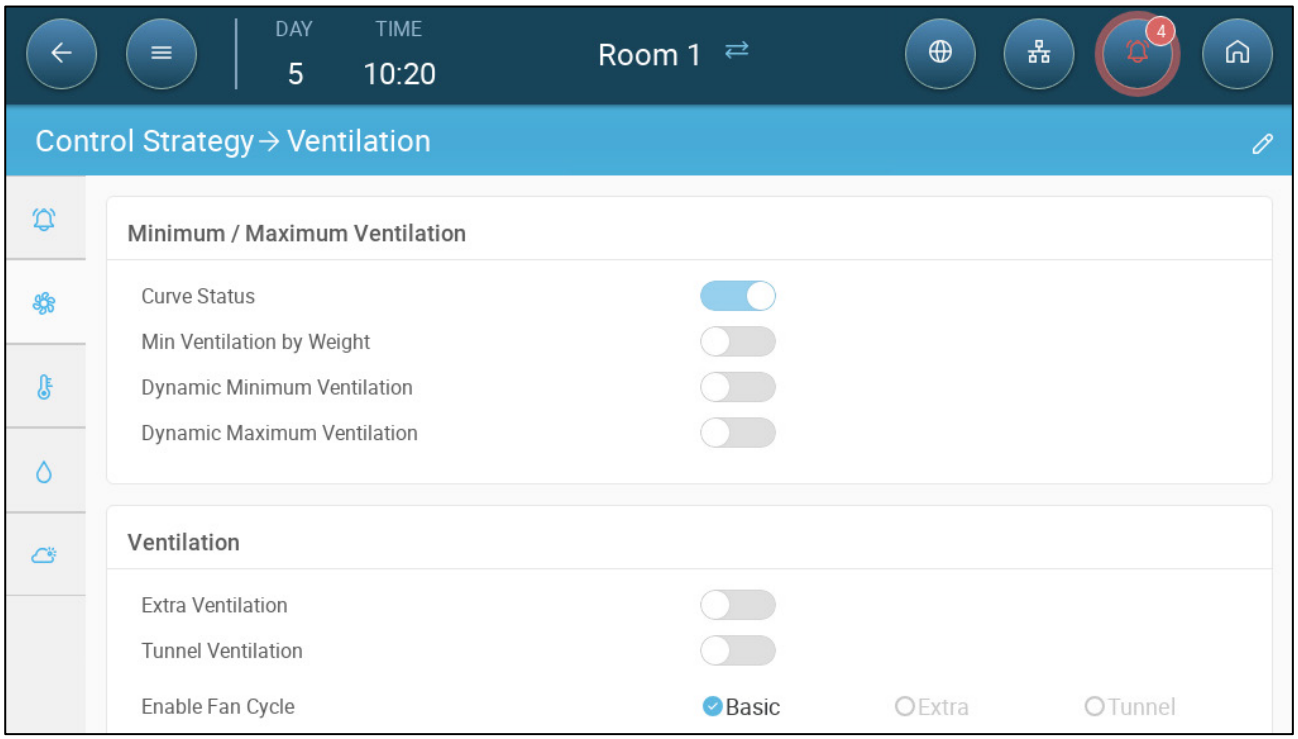
- Minimum Ventilation Cycle: Minimum Ventilation Cycle: Fans run in an on/off cycle with user-defined times.
- Analog Fans: Fan speed changes as ventilation requirements change.
- Fans (Efficiency Fan): Fan runs at a maximum speed percentage defined by the user.
- Fan Rotation: Different fans running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

7.2.2.1 Minimum Ventilation Cycle

1. Go to Climate › Ventilation › Settings.



2. Define:
   - Total Cycle Time (sec): 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. System › Control Strategy › Ventilation  .



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

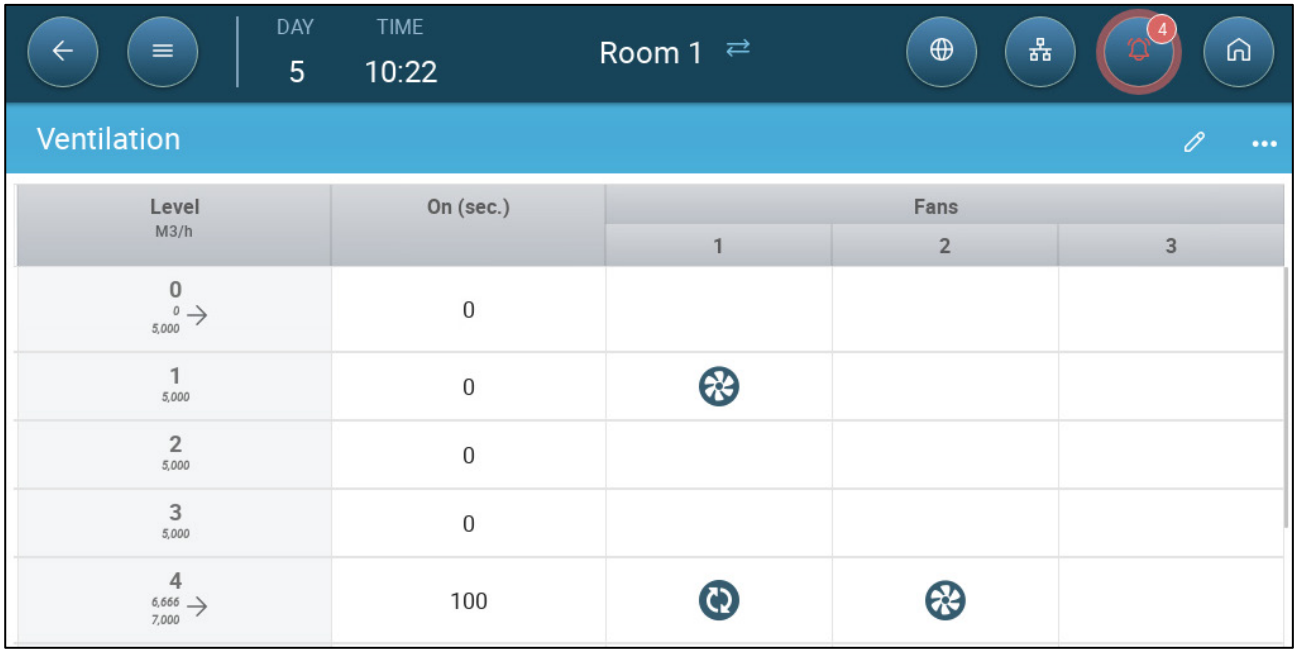
6. To run a fan in cycles:

a. Click  .

The  symbol appears.

b. Click  . The symbol turns blue  .

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

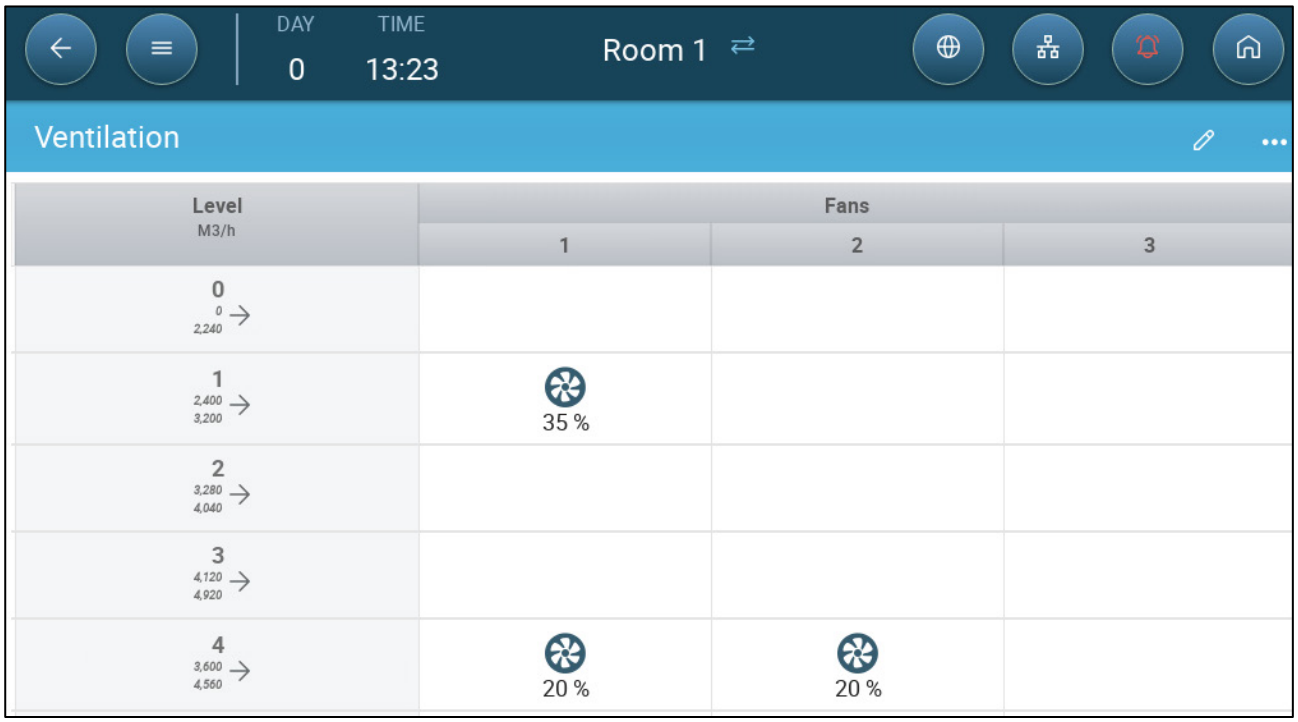


In this example, at Level 4 Fan 1 runs in cycles (100 seconds on) and Fan 2 runs continuously. The maximum ventilation capacity reflects the change caused by running the fan in a cycle.

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 enter the fan's output.

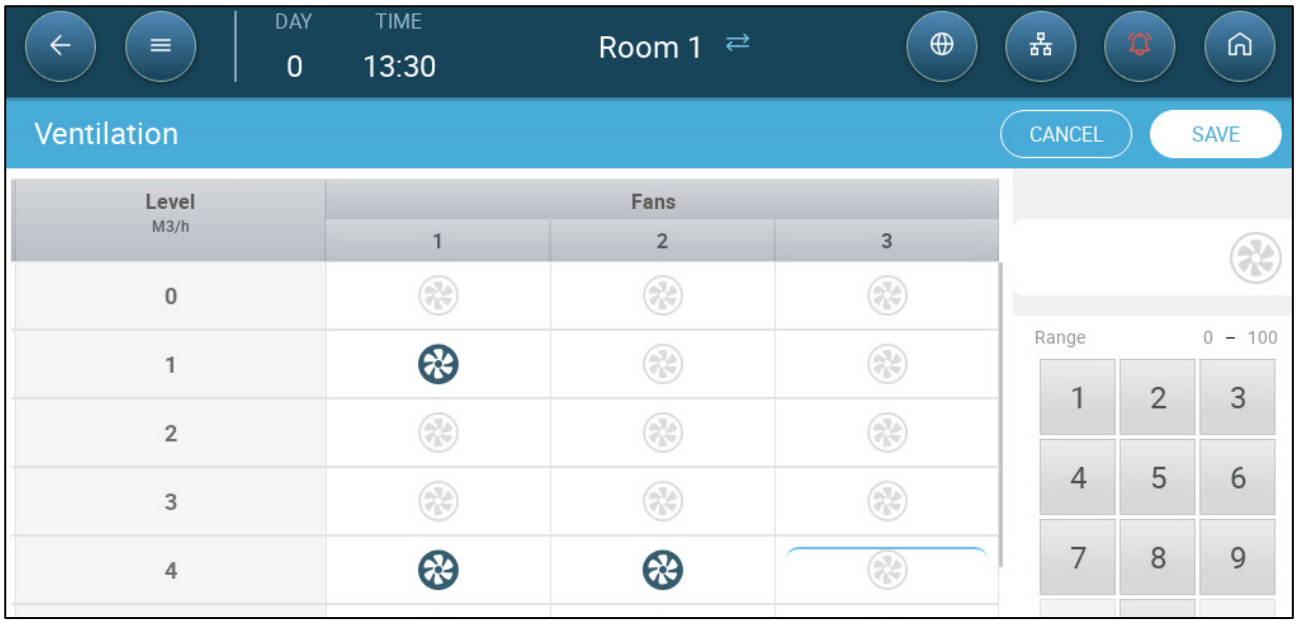


At Level 1 (10% output of the total fan capacity), Fan 1 runs at 35% speed. At Level 4 (40% of the total output), the speed drops to 20% but Fan 2 turns on as well.

7.2.2.3 Fans (Efficiency Fan)

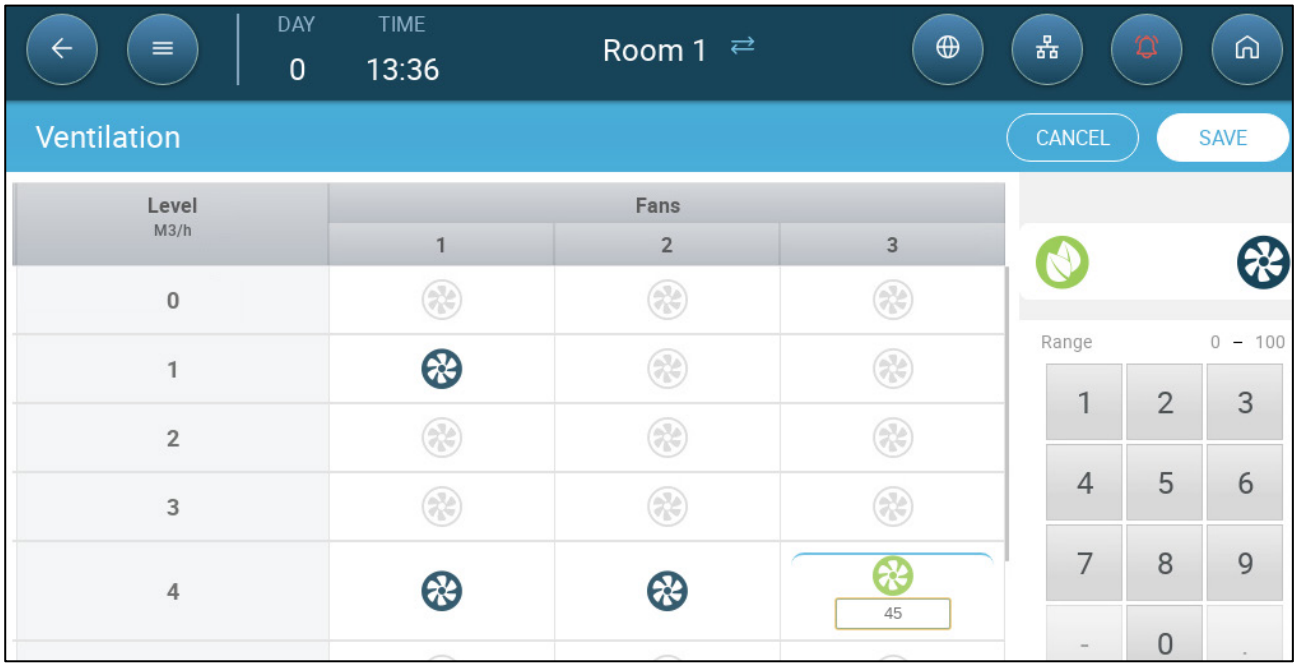
Efficiency fans enable limiting the maximum operating speed. By default the maximum is set to 70%.

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



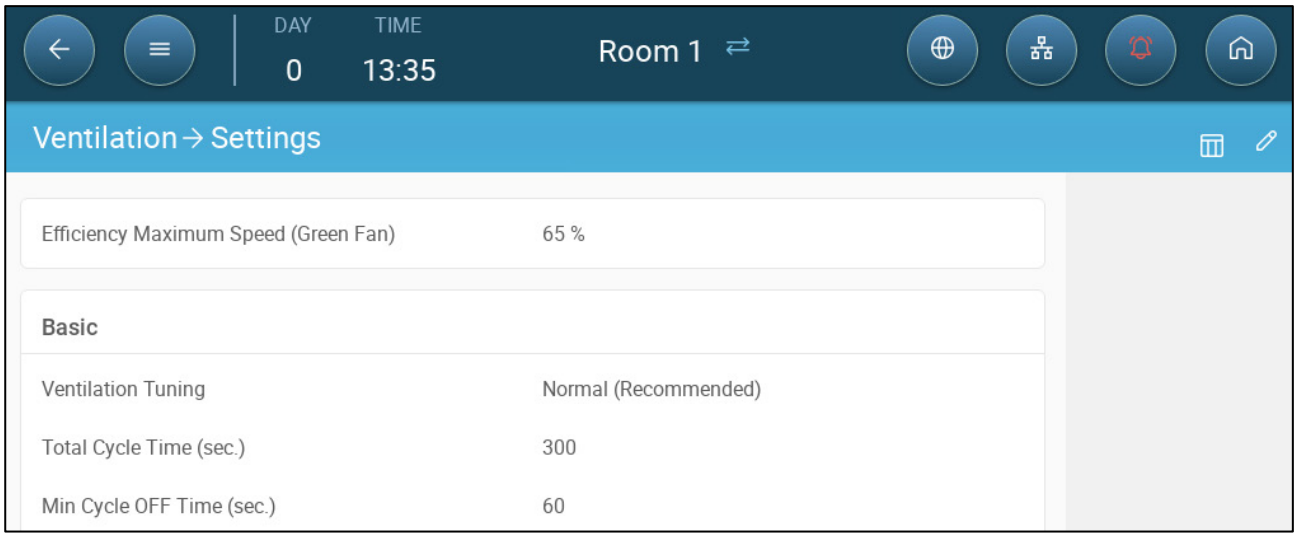
2. Click the fan in the upper right. Both fans turn blue. A percentage appears under the fan.

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.



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

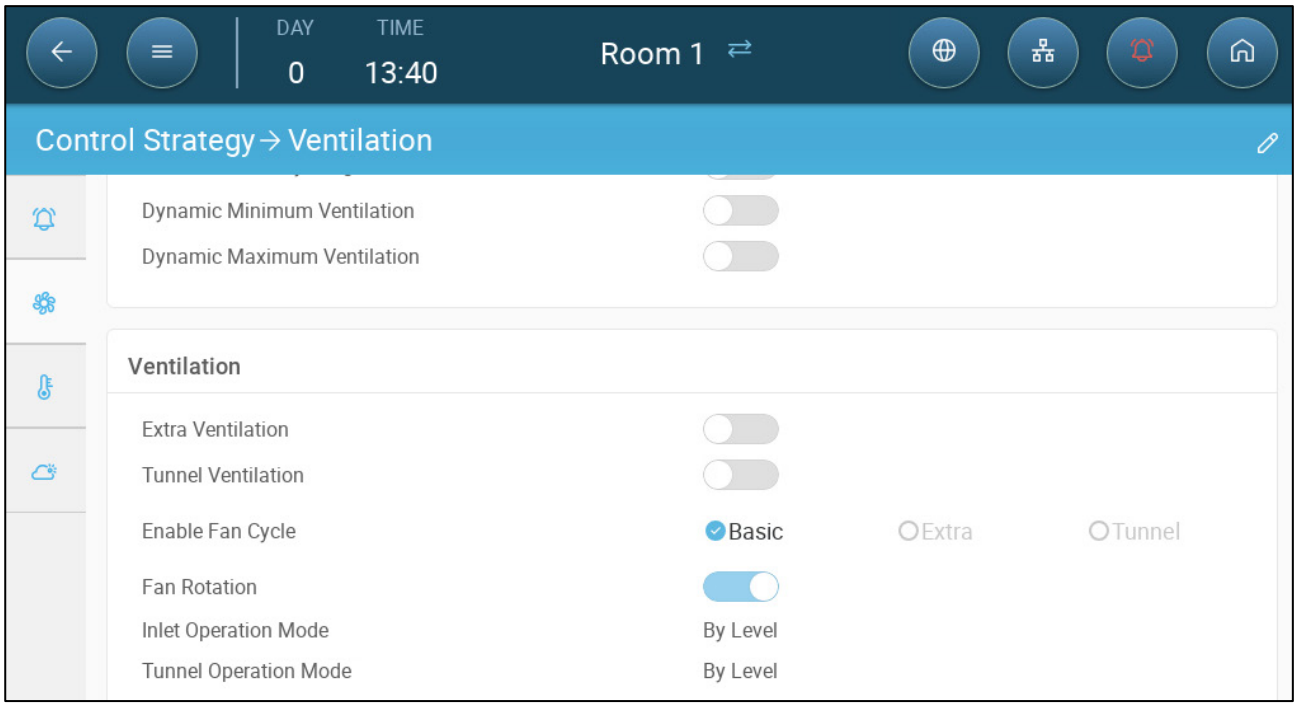
7. In this example Fan 1 and Fan 2 work continuously, and Fan 3 is an efficiency fan whose minimum speed is 45% and maximum speed is 60% of the fan's possible speed. The ventilation capacity reflects the efficiency fan's capacity.

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.

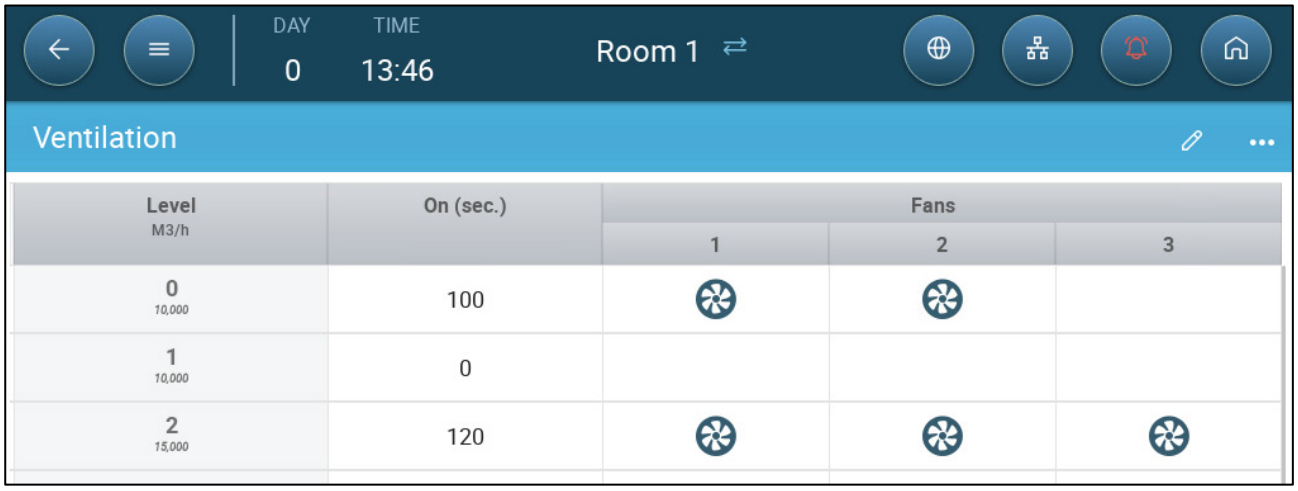
To enable fan rotation:

1. Go to System › Control Strategy › Ventilation.



2. Enable Fan Rotation and Minimum Ventilation Cycle. (Fan Rotation does not appear unless Fan Cycle is enabled.)

3. Go to Climate > Ventilation.



4. After enabling fans, click on any fan that you want to rotate. appears.

5. Click the icon. Repeat for any required fans.

In the above example, at level 0 Fan 1 rotates with Fan 2. At level 2, Fan 1 rotates with Fan 2 while Fan 3 always runs during the on cycle.

7.2.3 Inlet and Curtain Ventilation

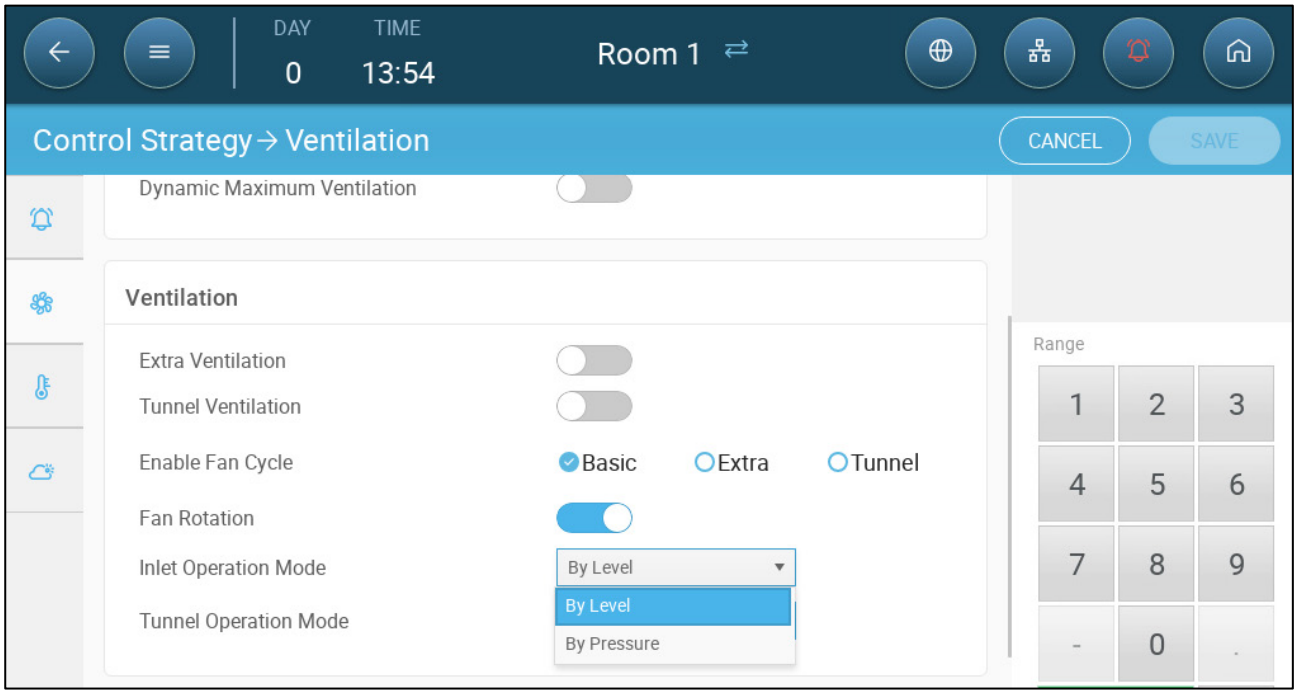
In Basic Ventilation, Trio enables control over the inlets using one of two methods:

- Level
- Static Pressure

NOTE Outlet control is by level only.

To select the inlet control method:

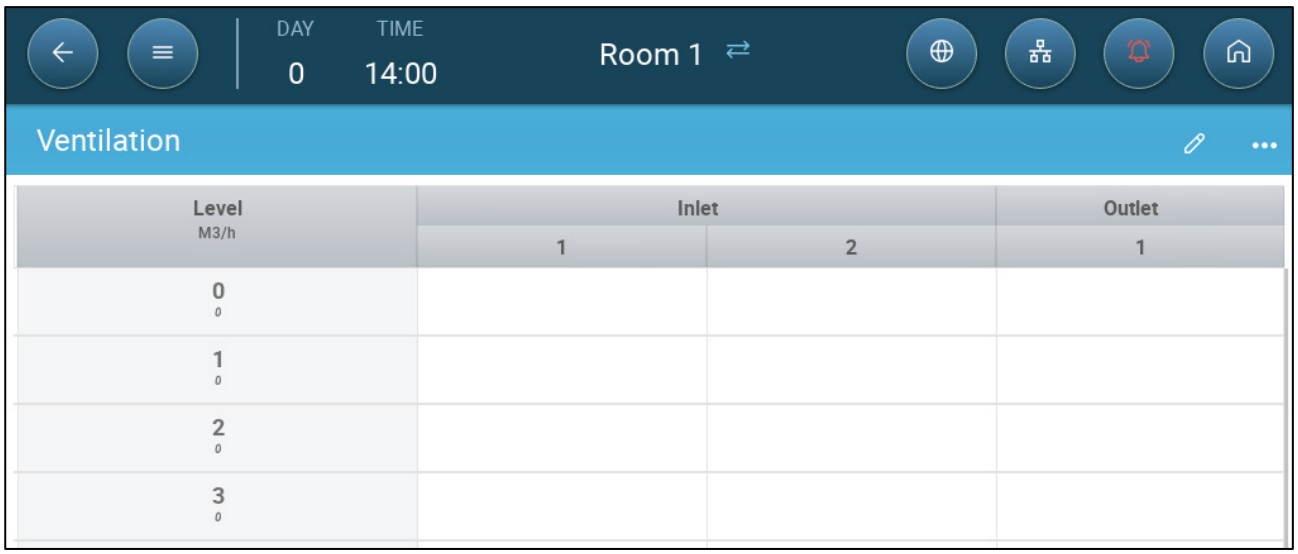
1. Go to System › Control Strategy › Ventilation .



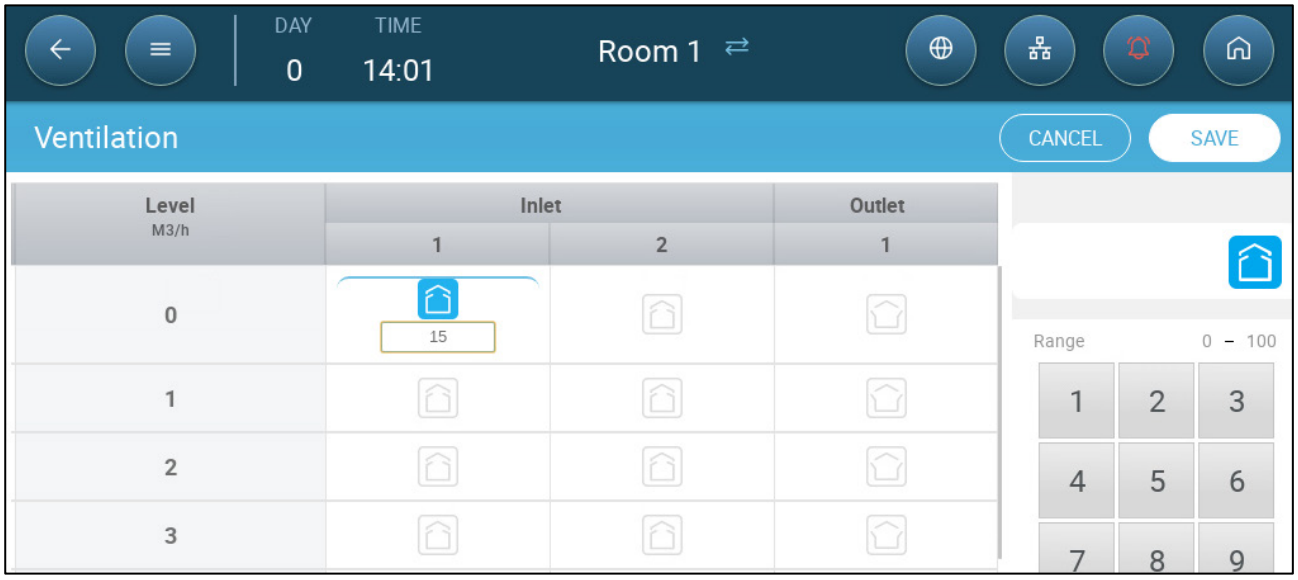
2. Under Inlet Operation Mode, select **Level** or **Pressure**.

7.2.3.1 Level Control

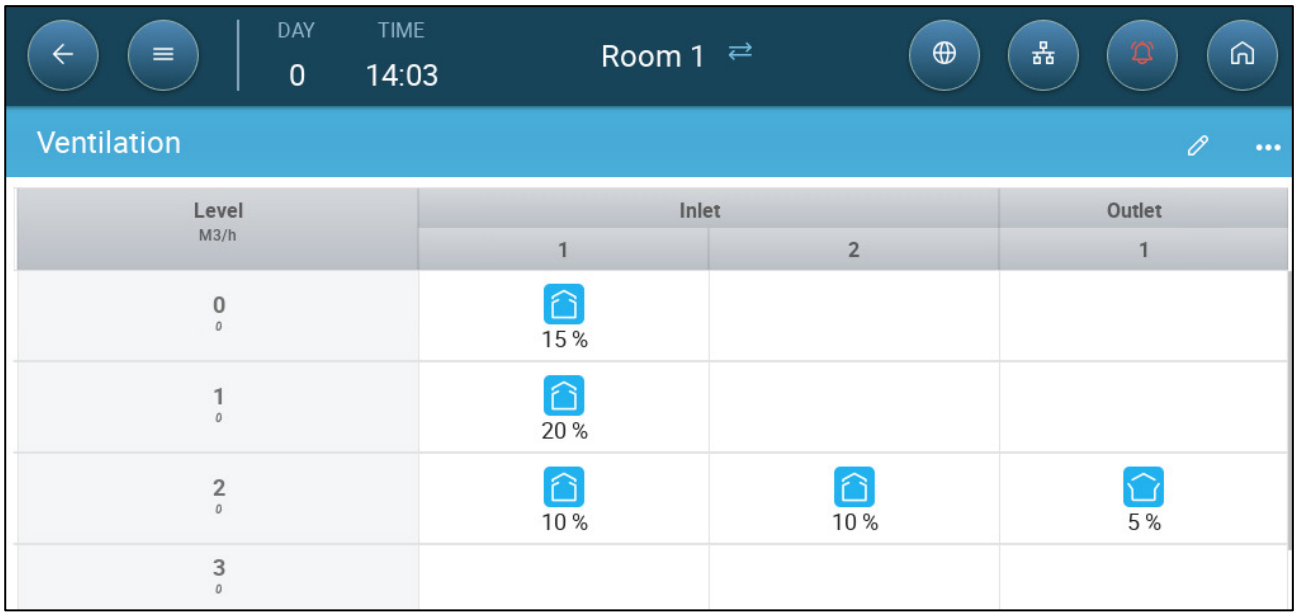
1. Go to Climate › Ventilation.



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 inlet/outlet at each level.



7.2.3.2 Static Pressure Control

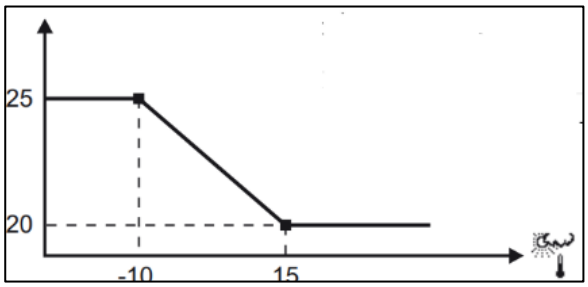
When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Maintaining the proper pressure enables air to enter the rooms at the right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

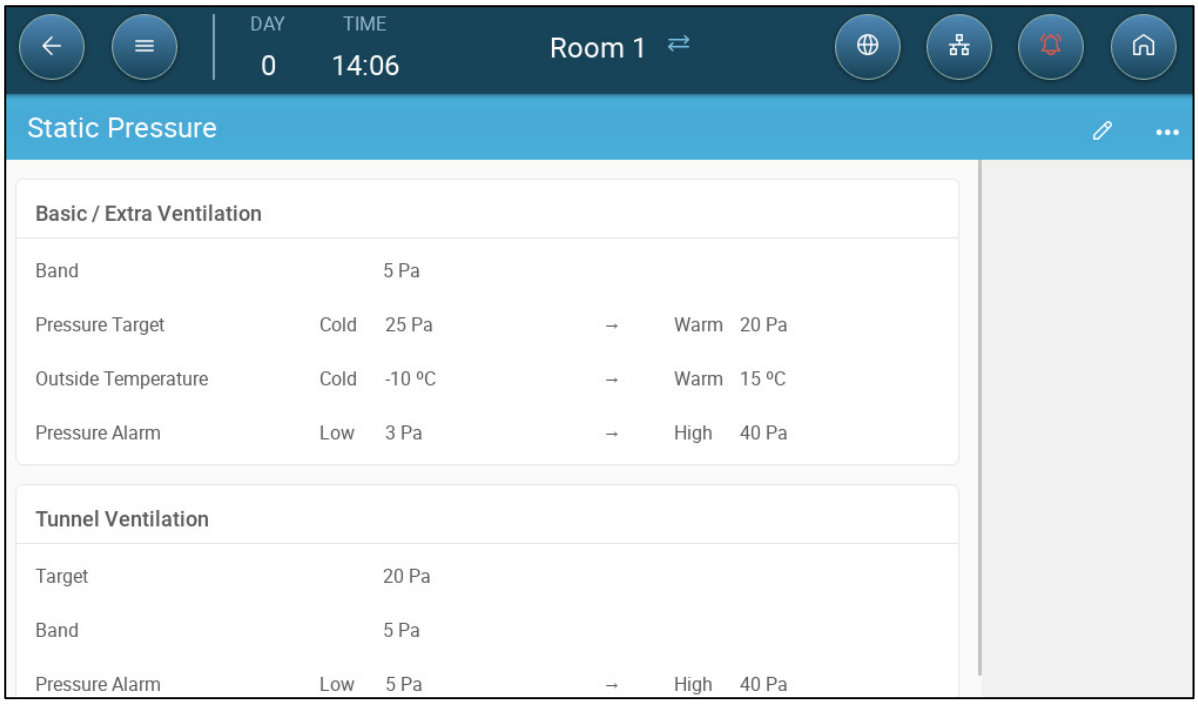


The curve is adjusted according to the outside temperature, to maintain the pressure. If the outside temperature is warm, large amounts of slow-moving air is allowed to enter the house (low static pressure). When the outside air is cold, the Vent Master adjusts the inlets to allow a low volume of fast-moving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

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

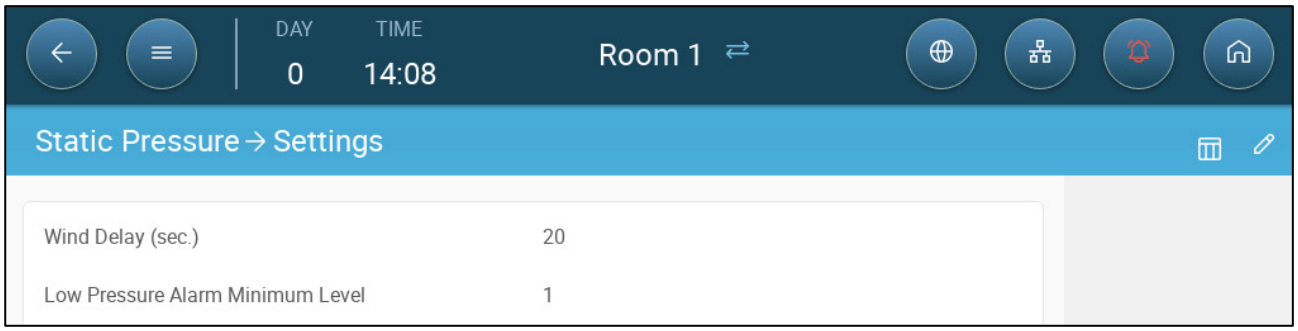
7.2.3.2.2 Static Pressure Main Screen

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.
    - Emergency Pressure State: If the air pressure reaches a level such that a high pressure alarm is generated, Trio goes into an Emergency Pressure state:
        - Any vent that is not fully open, opens an additional 10%.
        - Trio remeasures the pressure. If the air pressure is still too high, vents open an additional 10%. This process continues until pressure meets the specification.
        - If the vents are open fully (100% open), other ventilation devices open by 10%,
        - **Note**:
            - Ventilation continues according to the climate conditions.
            - Vents do not close.
            - If the vent cycle time is off, they do not open.
            - Auto calibration is disabled.
            - The alarm must be reset, an event generated, and the pressure lowered to cancel the condition.

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

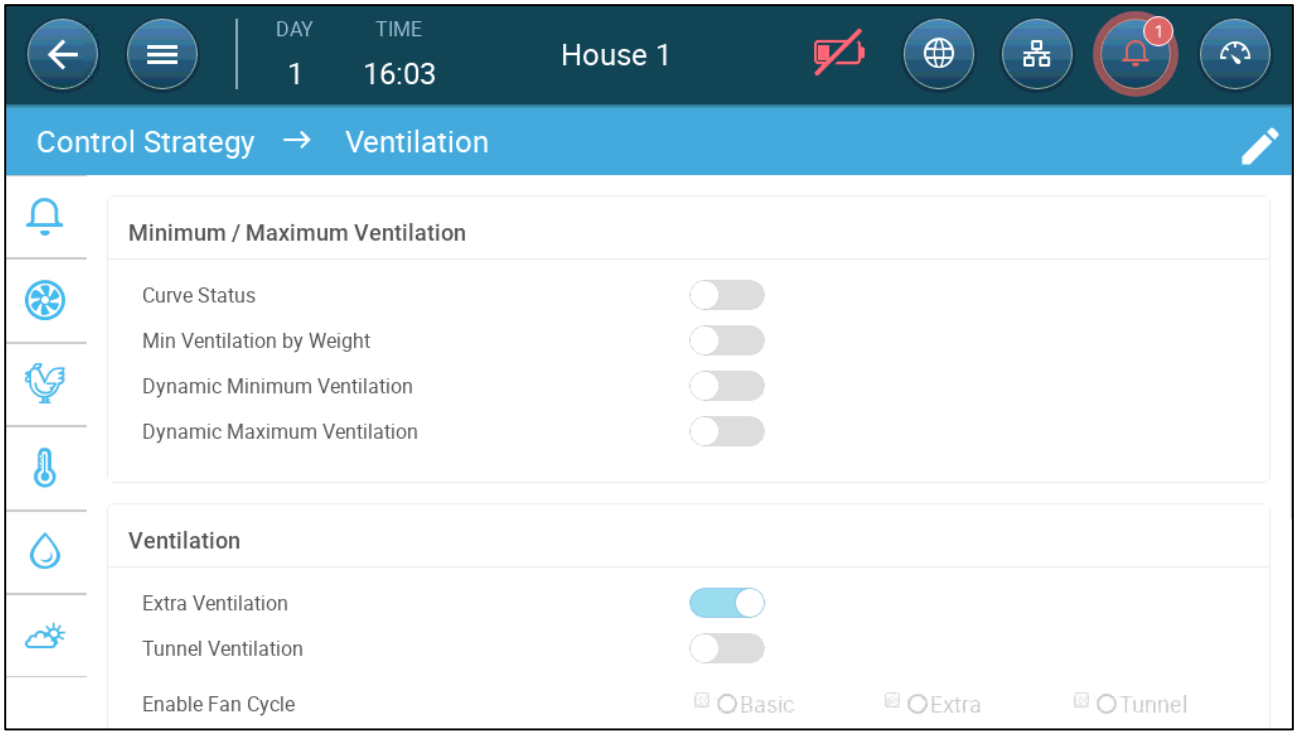
7.3.1 Introduction to Extra Ventilation

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

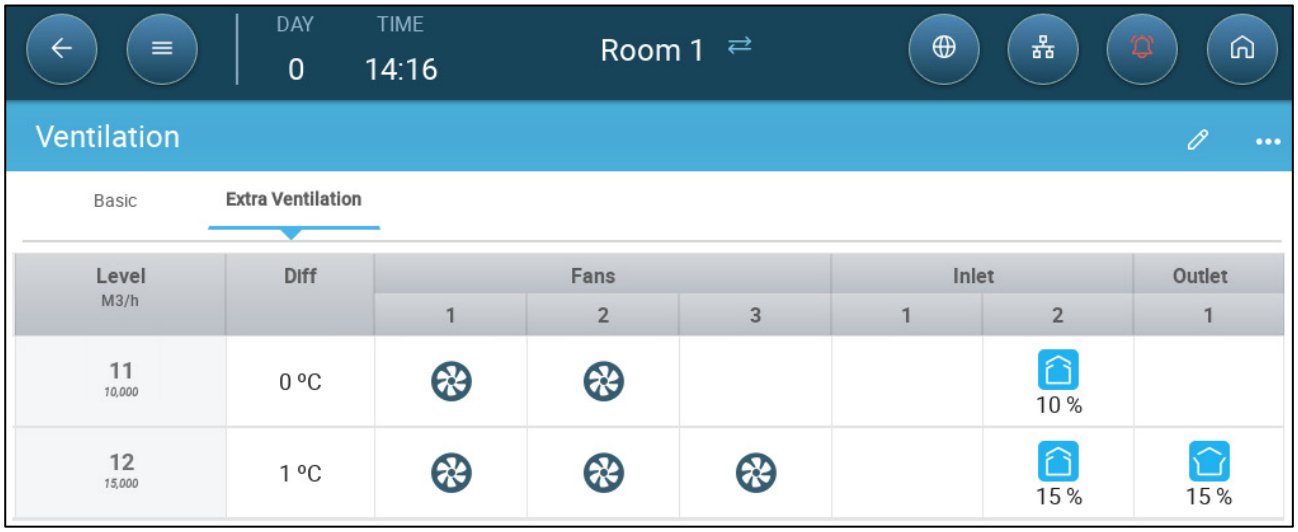
- Minimum ventilation runs at 100%
- Temperature has not reached tunnel target temperature.
- The room temperature is at least 0.5° C above the target temperature. However you can define a higher differential.

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 >15.0°C. By default, there is a 0.5°C/F minimum differential,

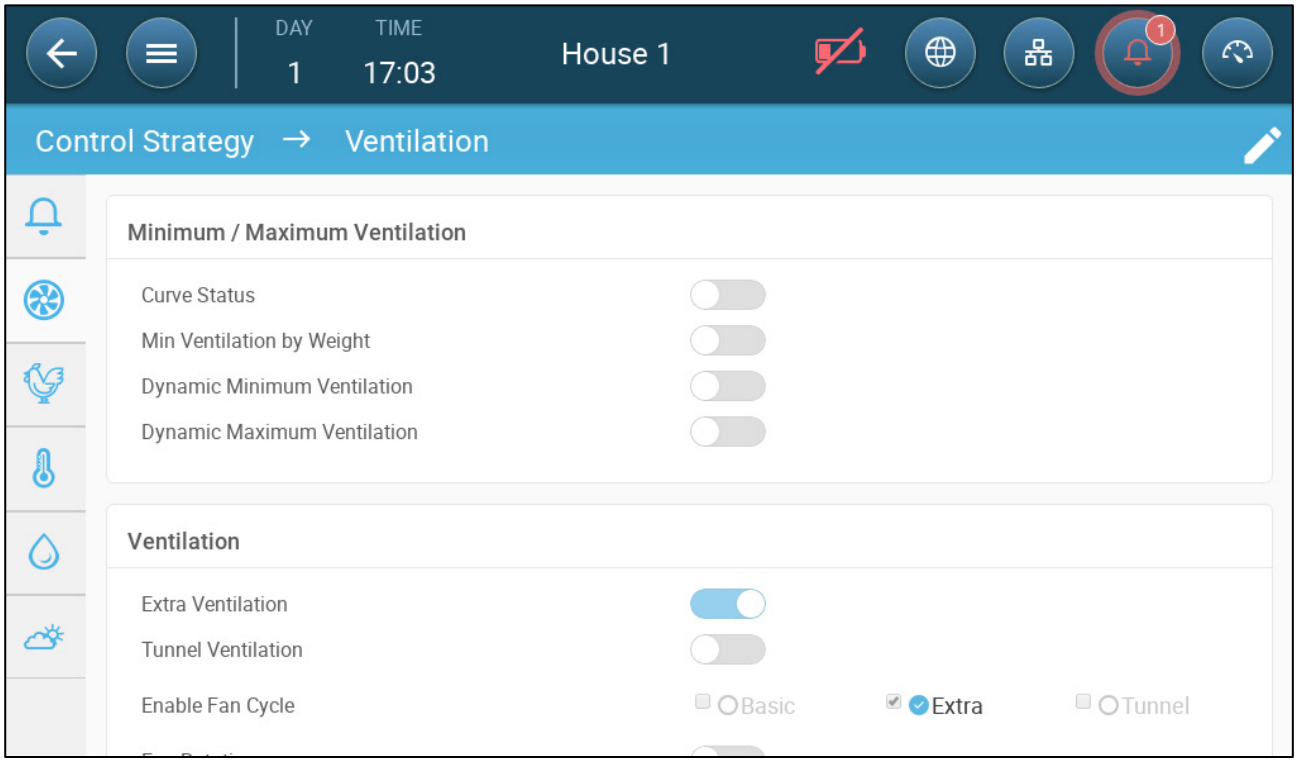
even if 0.0°C appears. Any differential must be higher than 0.5°C to take effect.

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

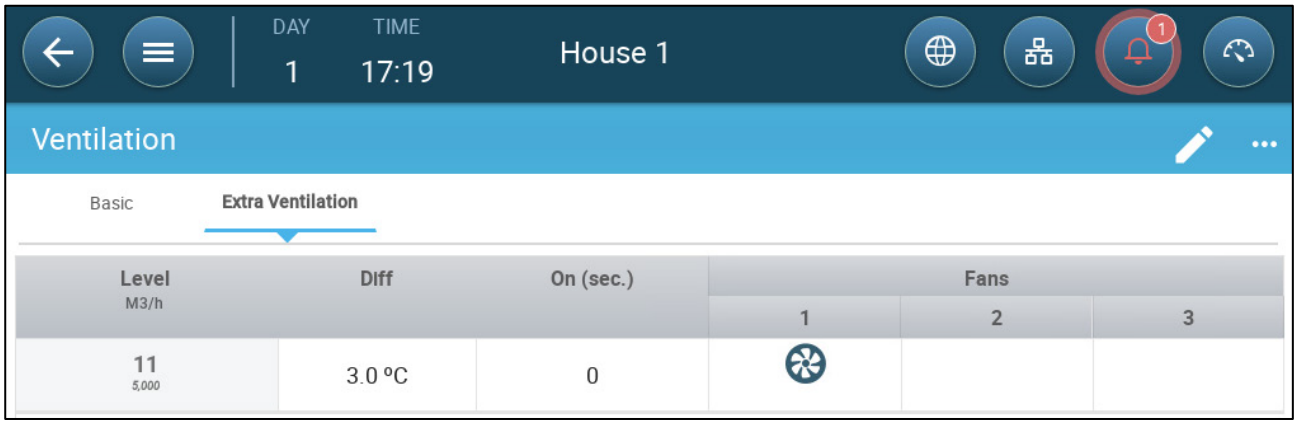
- Fan Status. Refer to Defining Basic Ventilation, page 40 on how to configure fans.

Extra Ventilation Fan Cycle (Optional):

6. Go to System › Control Strategy › Ventilation .



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



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

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 24).

➲ **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.**

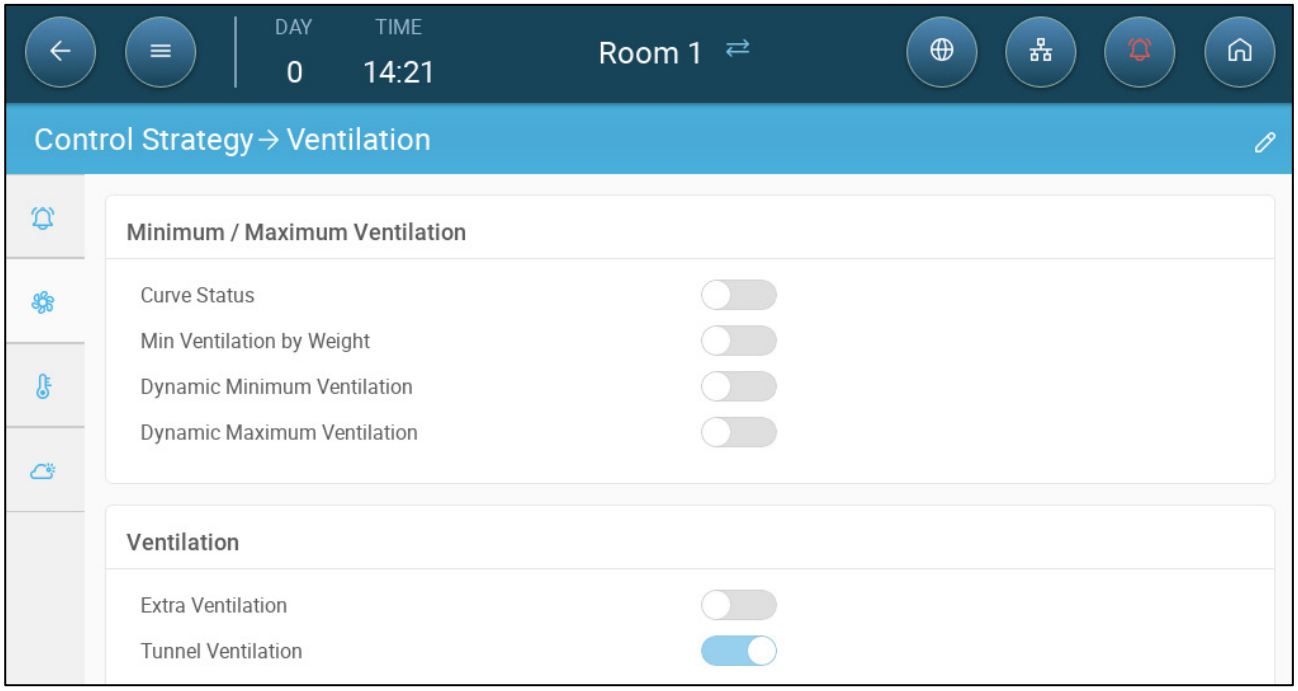
➲ **Tunnel Ventilation must be enabled for the functions to appear on the screen.**

- Defining the Tunnel Ventilation
- Defining the Tunnel Ventilation Settings
- Tunnel Doors
- Tunnel Ventilation Static Pressure

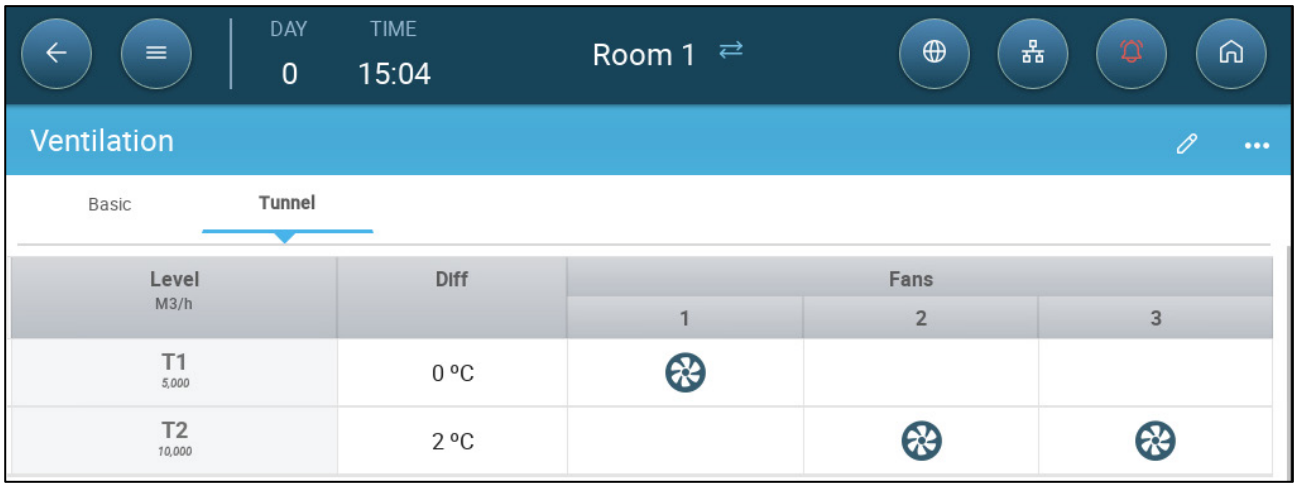
7.4.1 DEFINING THE TUNNEL VENTILATION PARAMETERS

1. Go to System › Control Strategy › Ventilation .

2. Under Ventilation, enable Tunnel.



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

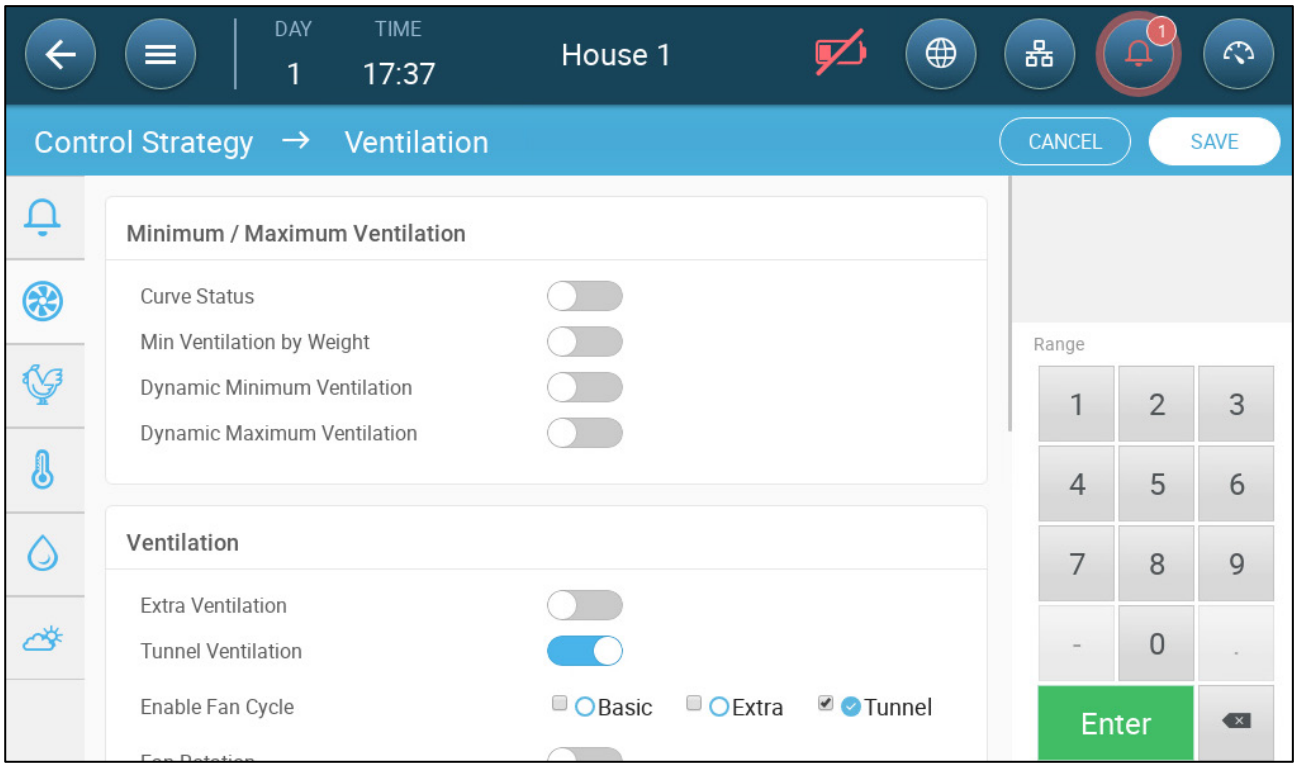


4. On each level, define:
    - Level: Read-only.
    - Diff: Define the temperature differential. When the temperature rises above the target temperature by this amount at each level, Extra Ventilation begins. Range: 0.0°C ›10.0°C.
        - Each differential must be equal to or higher than the previous level's differential.
        - At T1, the differential is predefined as 0.0.
    - Fan Status. Refer to Defining Basic Ventilation, page 40 on how to configure fans.
    - Tunnel Doors: Refer to Tunnel Doors, page 59. (Inlets close during tunnel mode.)

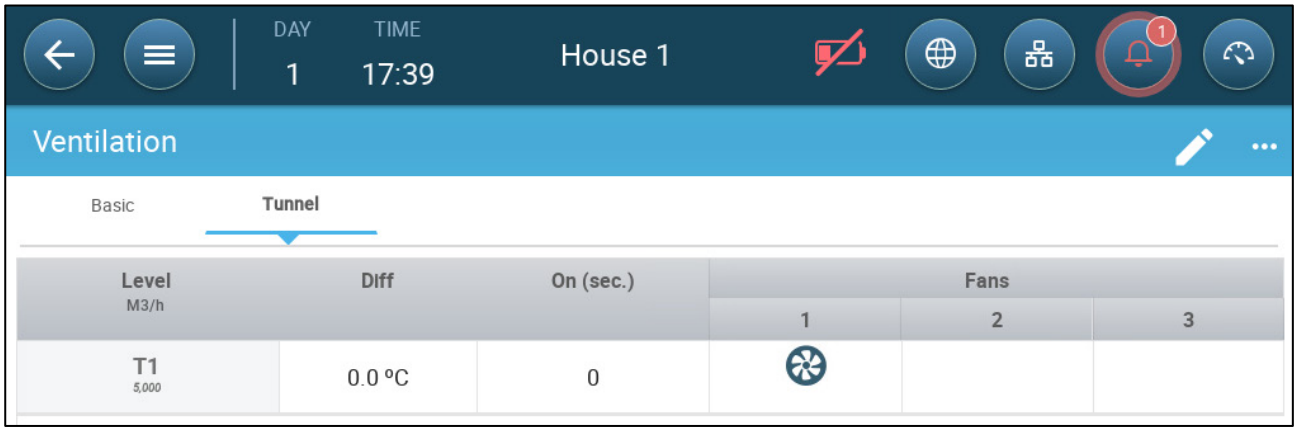
NOTE To prevent overcooling, when defining the fans in the first tunnel level, the total amount of air should be the same or slightly lower than the last Minimum Ventilation or Extra Ventilation level.

Tunnel Ventilation Fan Cycle (Optional):

5. Go to System › Control Strategy › Ventilation .

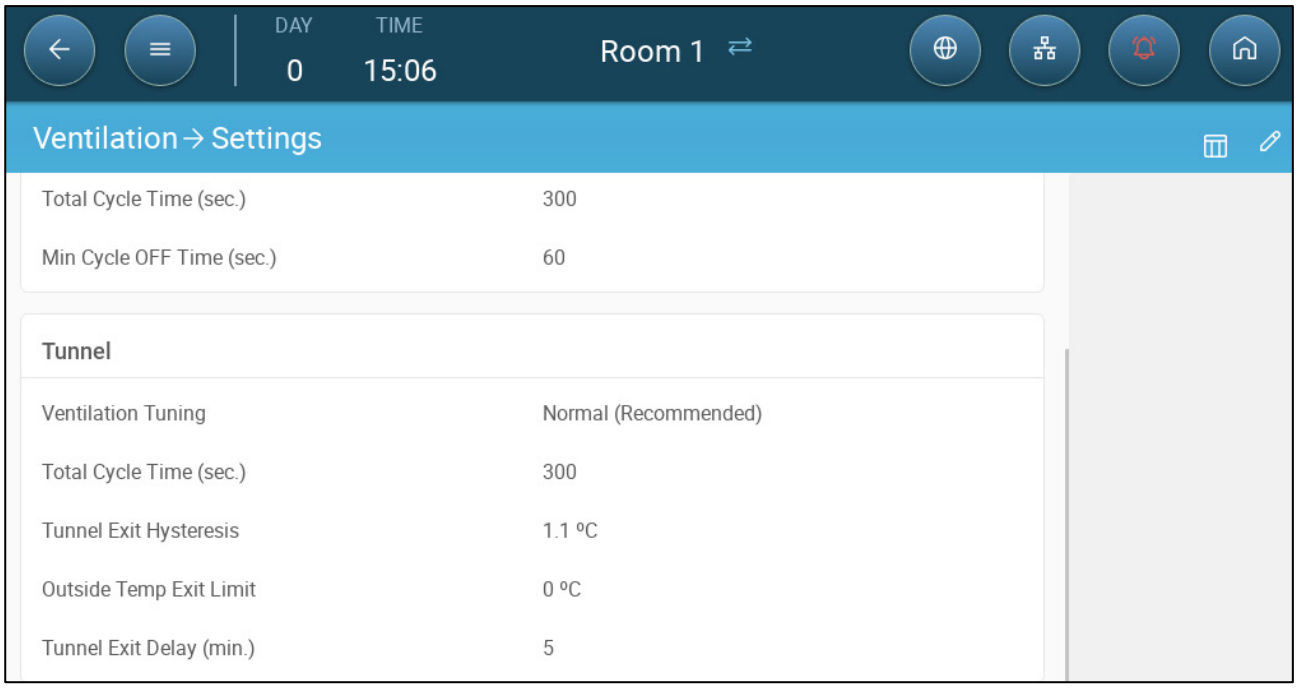


6. Under Enable Fan Cycle, check Tunnel.
7. Go to Climate › Ventilation › Tunnel.



8. Define the cycle times. Refer to Minimum Ventilation Cycle, page 43 for details.

7.4.2 DEFINING THE TUNNEL VENTILATION SETTINGS



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

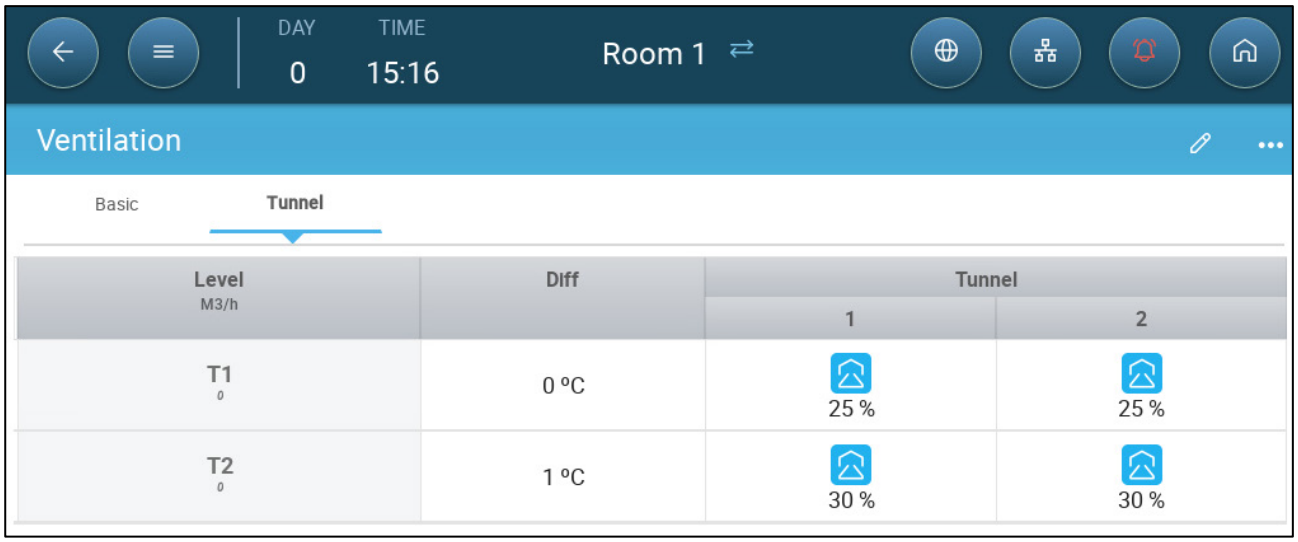
CAUTION *Munters recommends leaving this parameter at Normal.*

  - Total Cycle Time (sec): Define the ventilation cycle time. Range: 60 – 999 seconds.
  - Tunnel Exit Hysteresis: This is a differential. When the temperature reaches the tunnel temperature minus this differential, ventilation goes down to Extra Ventilation (if enabled) or Minimum Ventilation.
  - Outside Temp Exit Limit: This is a differential. When the outside temperature reaches the tunnel temperature plus this differential, ventilation will remain in Tunnel Mode.
  - 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.

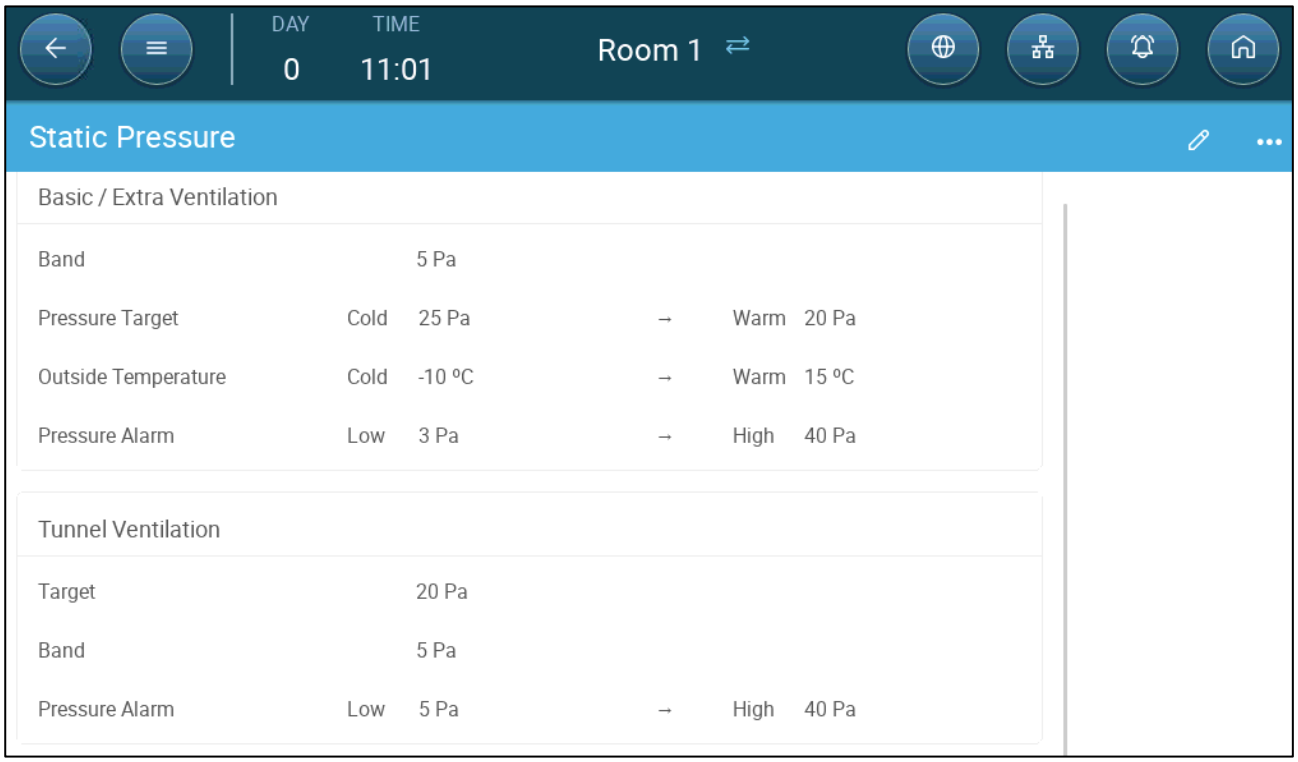
- Level Control
- Static Pressure Control



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

7.4.4 Tunnel Ventilation Static Pressure

1. Go to Climate › Static Pressure.



2. Define:
   - Target: Define the required pressure level when using tunnel ventilation. Range: 0 – 100 Pa. Default 20.
   - Band: The static pressure level below or above which the controller must close or open the inlets to minimize or maximize the ventilation. Range: 0 – 20 Pa. Default: 5
   - Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted. Range: 0 – 40 Pa.

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.

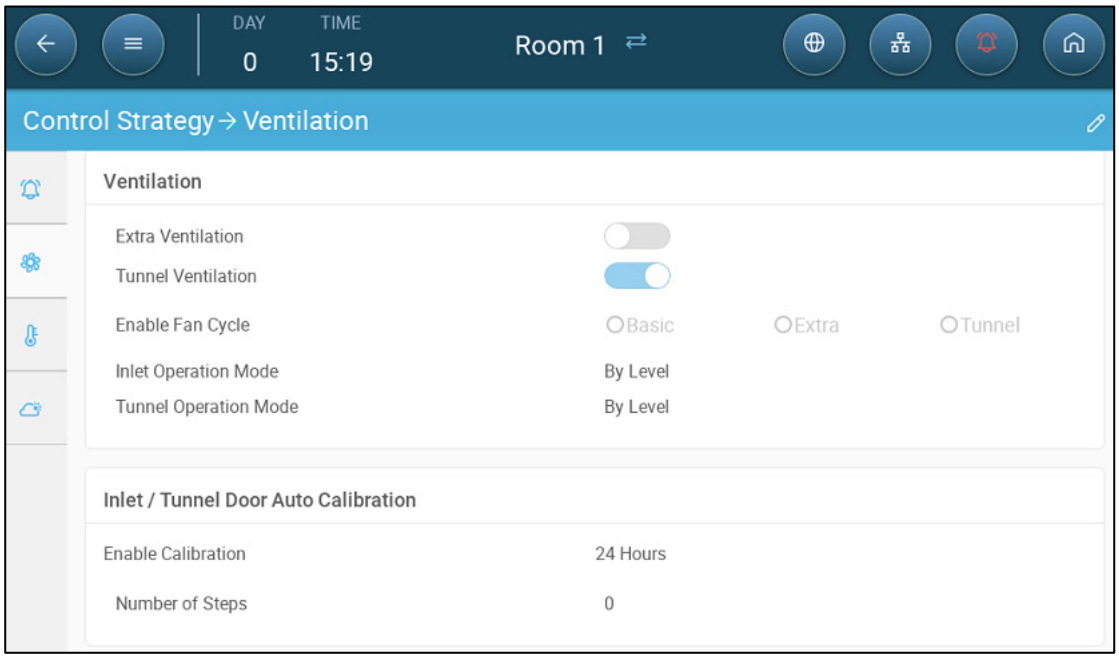
However when there is no potentiometer, positioning accuracy tends to degrade after the inlets go through several opening and closing cycles. The following section describes how to recalibrate the inlets, using a potentiometer or without a potentiometer.

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%.

1. Go to System › Control Strategy › Ventilation  .

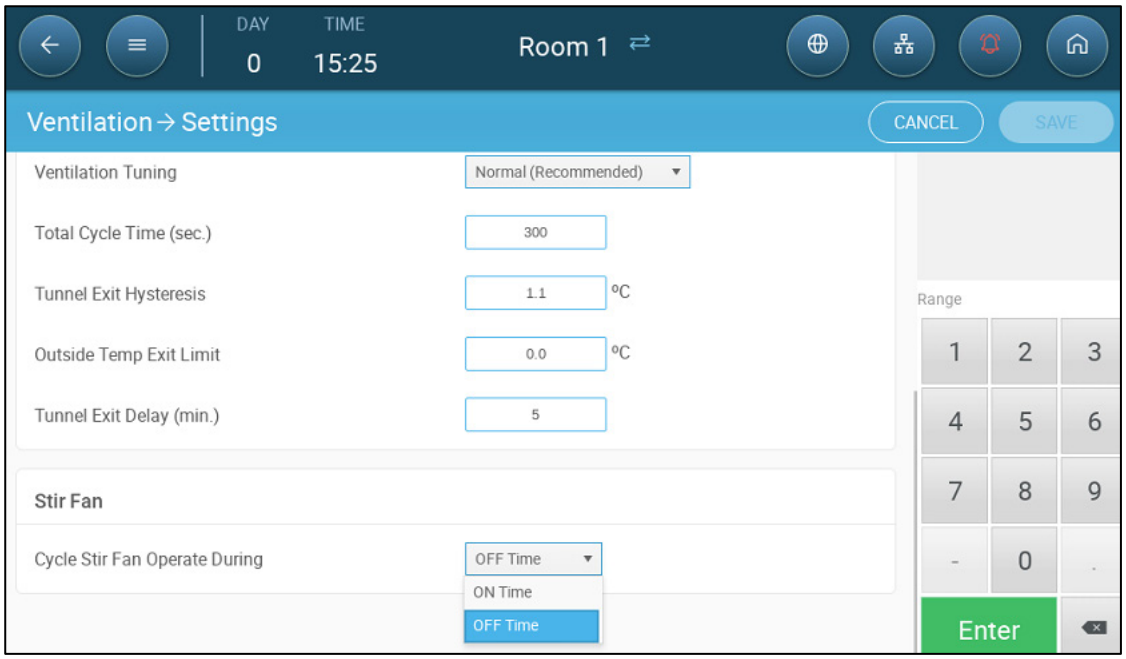


2. Click  .
3. Define:
    - Enable Calibration: Select 24 hours a day or define a specific time frame.
    - Number of steps: Set up the number of steps (number of movements).

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 43)
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

- Cooling Principles
- Selecting the Cooling Mode

8.1 Cooling Principles

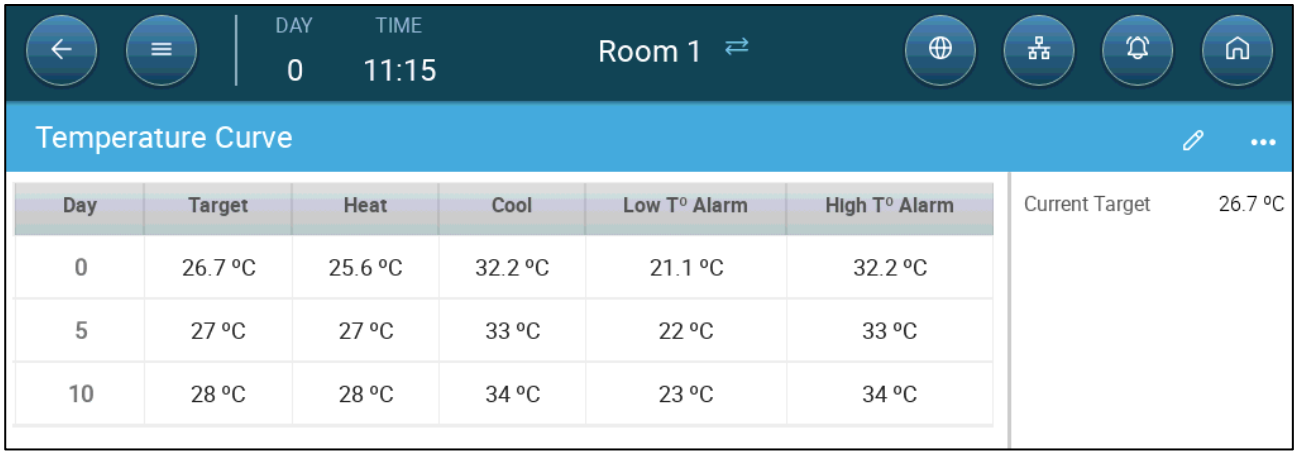
Trio supports controlling up to two cooling devices (foggers or cooling pads). The devices can run separately or together.

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



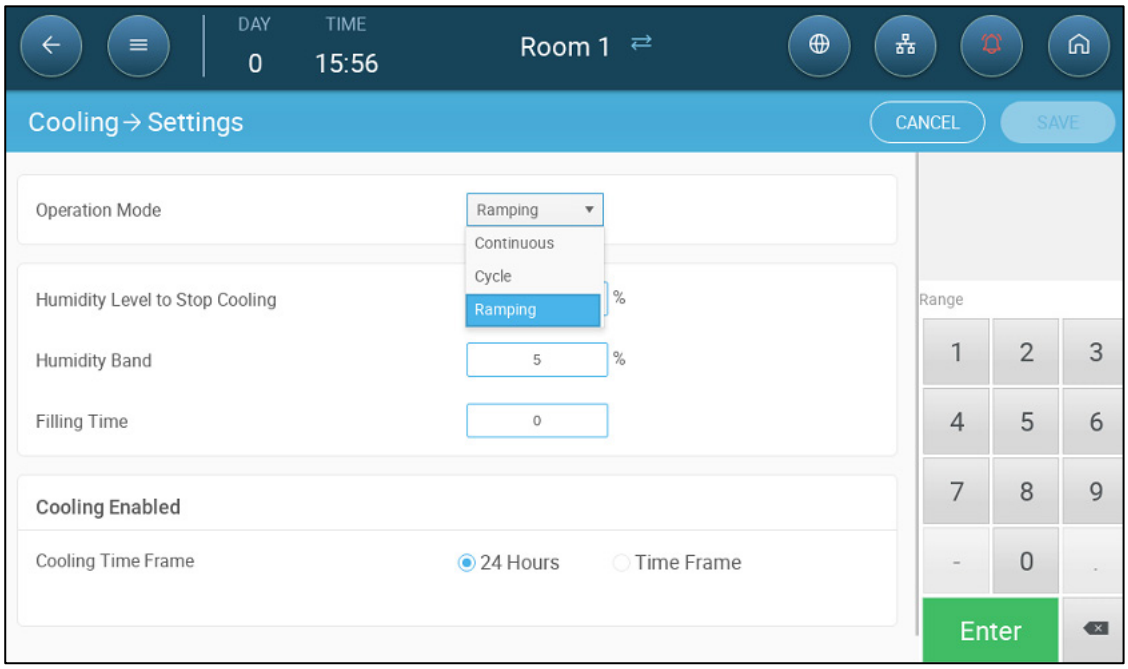
- If the humidity level rises above the To Humidity parameter (plus the Humidity Band), cooling ceases.
- Cooling only takes place between the start and finish times.
- When the minimum OFF time = 0sec, and the temperature reached ON temp + Ramping range the cooling device operates continuously.
- While cycling, the minimum OFF time will never be less than 5 seconds.
- Cooling runs in all ventilation modes.
- To record the amount of water used during cooling: install, map, and define a water meter (refer to the Installation Manual)

8.2 Selecting the Cooling Mode

Trio enables running the cooling device in three different modes:

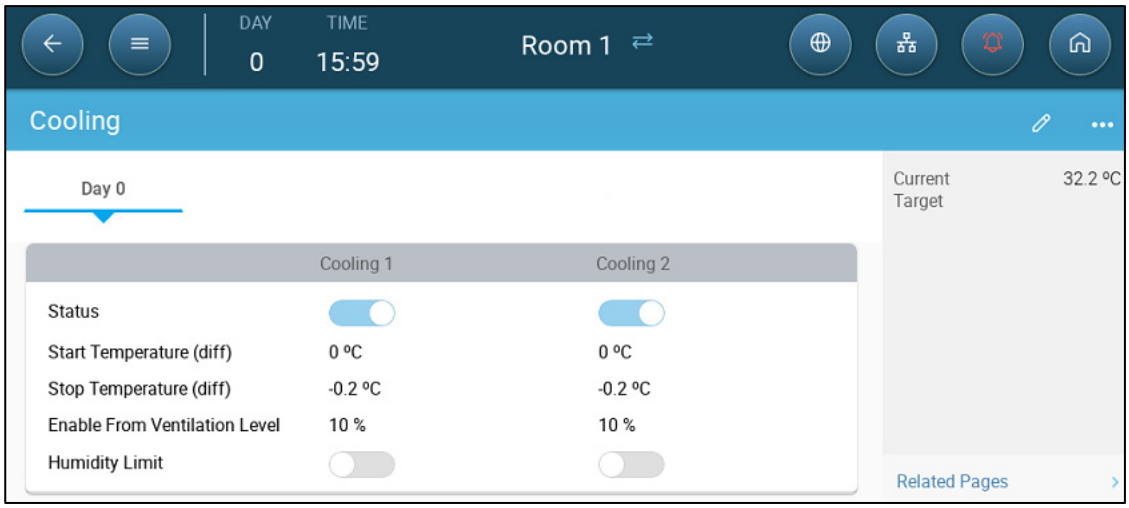
- Ramping: Cycle modulation, frequency depends on the error in °C, with respect to the cooling setting (target).
- Continuous: When activated, the cooling devices operate continuously.
- Cycle: When activated, the cooling device operate according to user-defined an on/off cycle.

1. Go to Go to Climate › Cooling.› Settings.



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

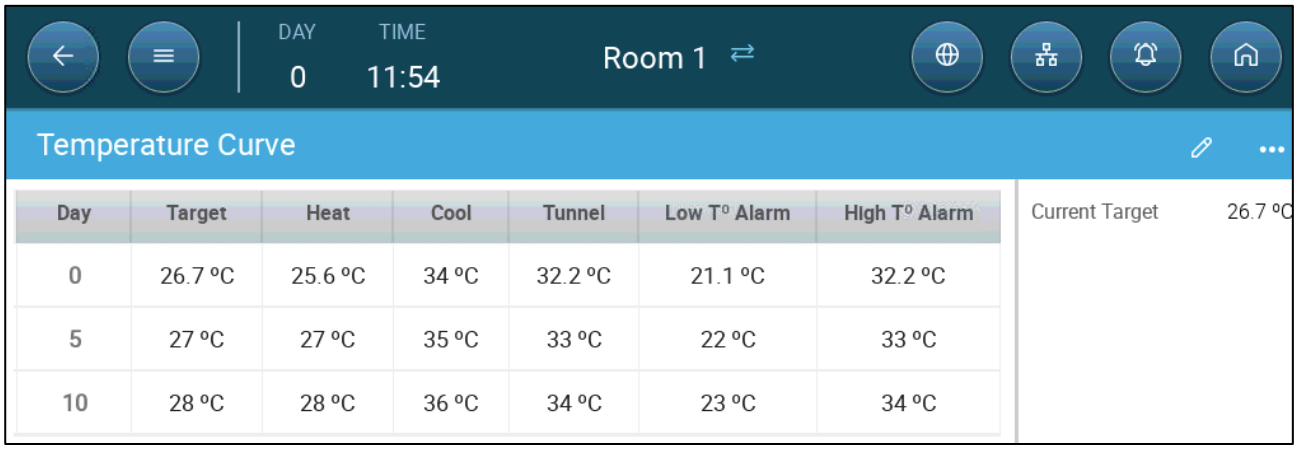
8.2.1 CONTINUOUS COOLING



- Define:
  - Growth days at which the settings change. Define up to four days.
  - 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.

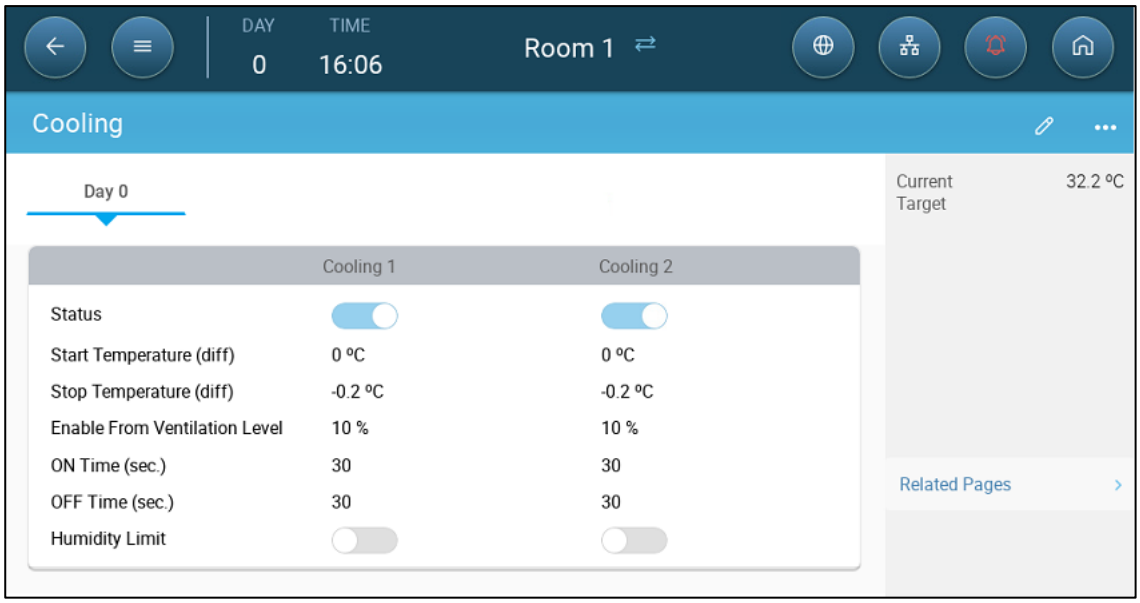
NOTE Each cooling device operates according to its own temperature (Temperature Definition).

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



  - Humidity Limit: Stop cooling when the humidity level reaches the level defined in the Humidity settings.

8.2.2 CYCLE COOLING

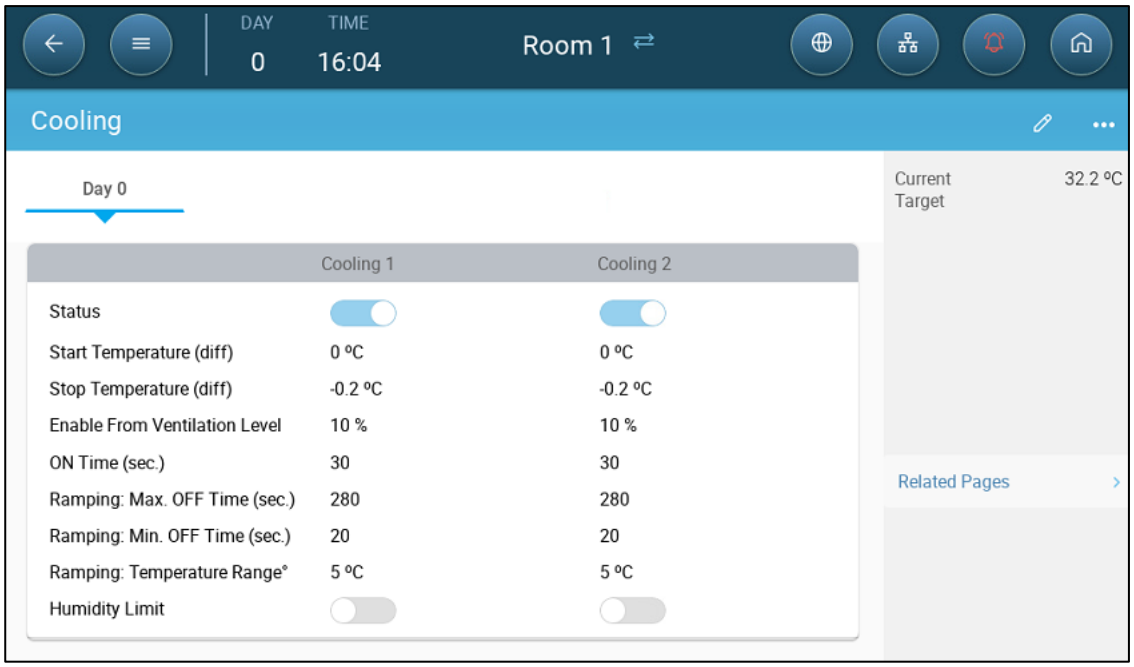


- Define:
  - Growth days at which the settings change (Note: When using Central Exhaust, growth days are not defined).
  - Status: Enable or disable a cooling device.
  - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. 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: Describe 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 (Note: When using Central Exhaust, growth days are not defined).
  - 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).

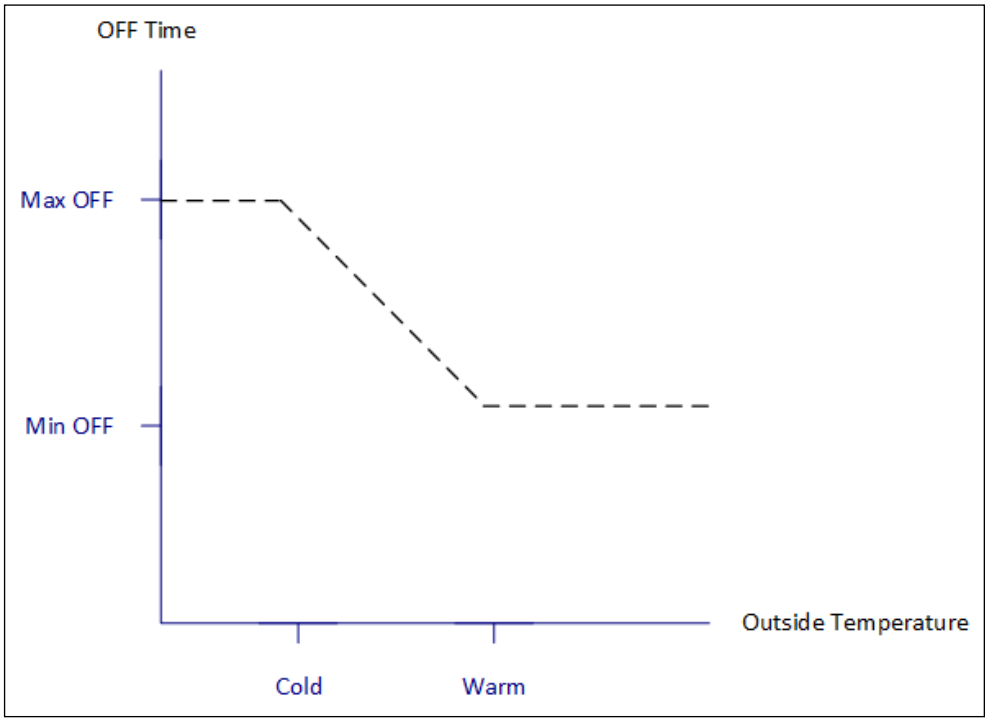
  - Stop temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device.
    - Stop cooling device temperature = Cooling Target ± Stop temperature
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation. (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 off cycle. When cooling starts, the off time will be the maximum off time. As the temperature rises to the band maximum, the maximum off time decreases to the minimum.
  - Humidity Limit: Enable stopping cooling at a certain humidity level.

9 Sprinkler

The sprinkler works according to the outside temperature. If there is no outside temperature sensor or if the sensor fails, the sprinkler ceases to operate.

Sprinklers run during the time frame that you define. Sprinklers run in cycles whose on/off time is based on a curve:

- The warm outside temperature defines the minimum OFF time.
- The cold outside temperature defines the maximum OFF time.



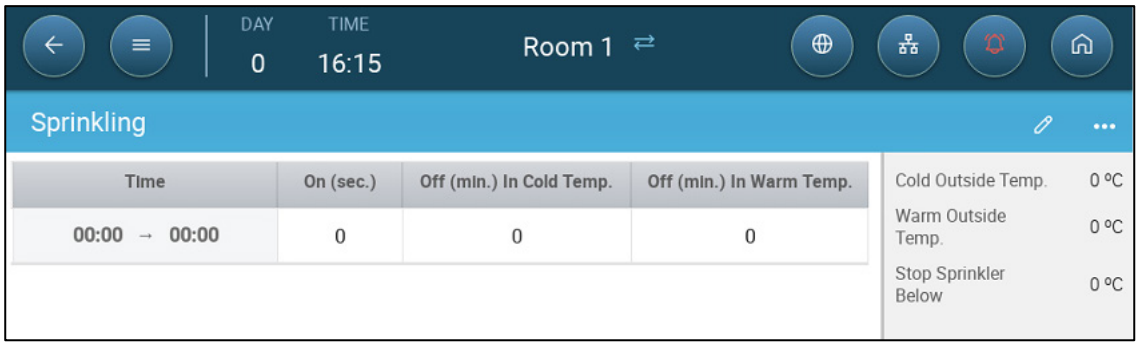
- Defining the Sprinkler Parameters
- Defining the Sprinkler Settings

9.1 Defining the Sprinkler Parameters

In the sprinkler program, you can set up to four intervals per day in which sprinkling can take place. Water is sprayed at different intervals, depending on the outside temperature.

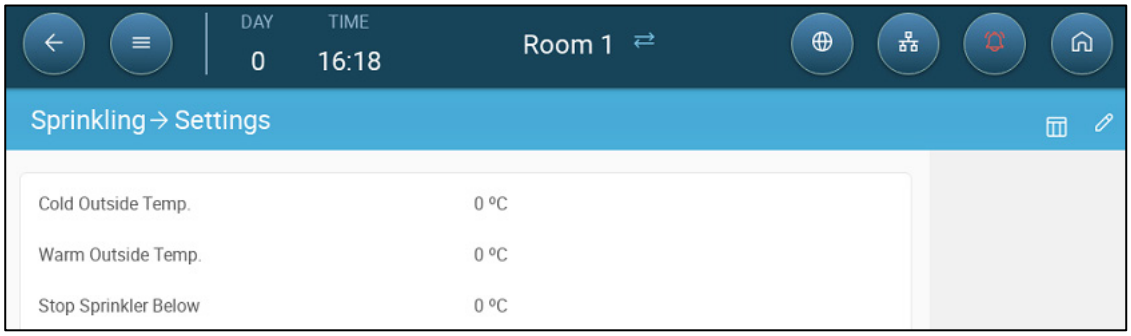
➲ **Go to System › Devices and Sensors and define one relay as sprinkler (refer to the Installation Manual).**

1. Go to Control › Sprinkling.



2. For one or more periods, define:
    - Time: Define the times during which the sprinkler can be activated. 00:00 - 00:00 means that the sprinkler can work 24 hours.
    - On (sec): Set device run time (values range 0 - 999, default 0).
    - Off In Cold Temp (Minutes): Set the number of minutes device waits before it starts up again when it's cold outside (range 999 default 0).
    - Off In Warm Temp: Set the number of seconds device will wait before it starts up again when it's warm outside.

9.2 Defining the Sprinkler Settings



- Define:
    - Cold outside Temperature: Set the cold temperature for maximum sprinkling off time.
    - Warm outside Temperature: Set the warm temperature for min sprinkling off time.
    - Stop outside temperature: The temperature below which the device stops.

10 Heating Functions

- Heating Functions
- Central Heaters
- Zone Heaters

10.1 Heating Functions

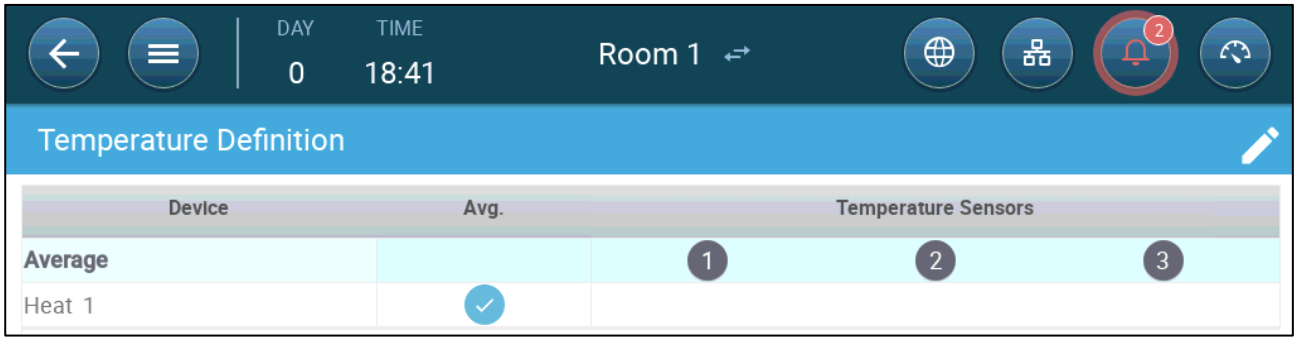
Trio supports up to six (6) on/off heating devices and variable heaters. To control the heat, Trio has two different programs, one to maintain the target temperature in the entire house and one program that controls separate heating zones. In the case of the latter, each heater has a dedicated sensor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

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

- Central Heaters
- Zone Heaters

10.2 Central Heaters

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

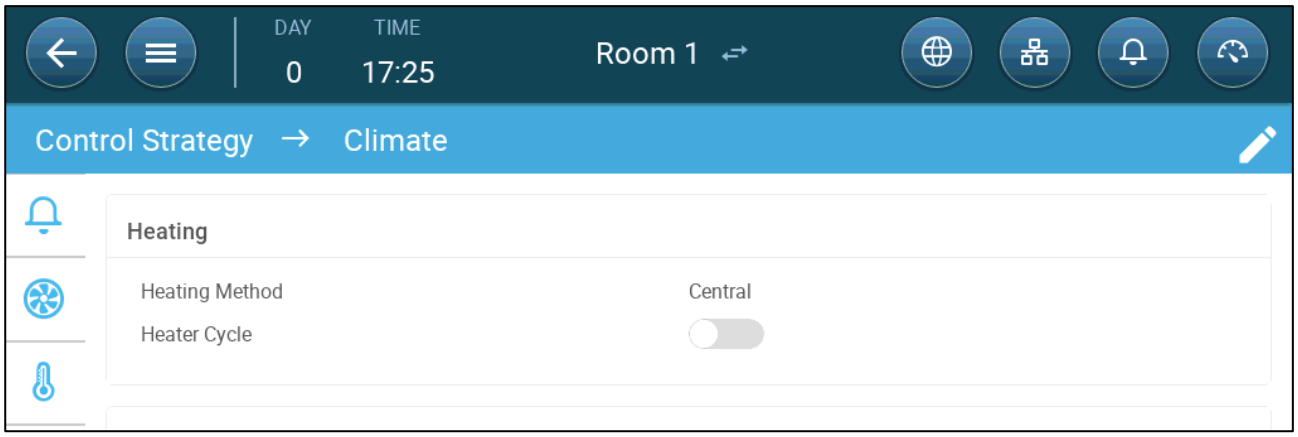


As temperature drops, TRIO reduces the amount of ventilation until it provides the minimum defined amount. If the temperature goes below the target temperature, TRIO continues to run at minimum ventilation. At the same time, heating begins when the temperature drops to a user defined temperature.

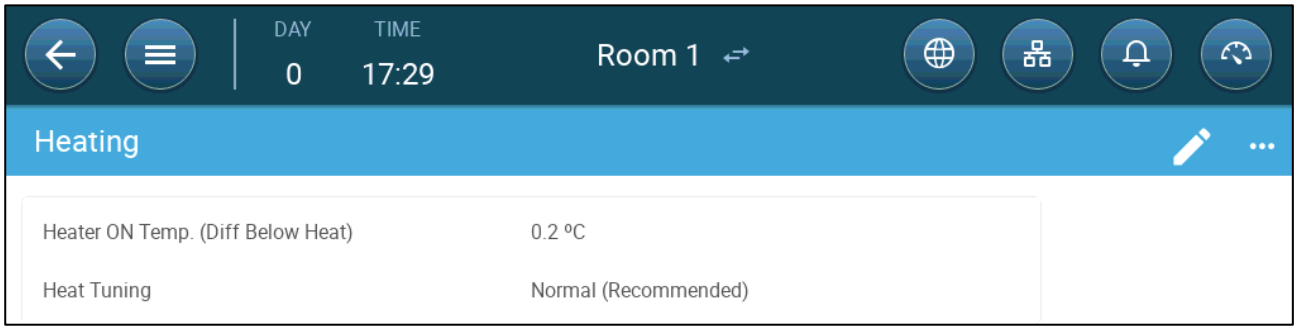
➲ **Define relays output ports as heaters. Refer to the Installation Manual.**

To define the central on/off heaters:

1. Go to System › Control Strategy › Climate .



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



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

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

Options:

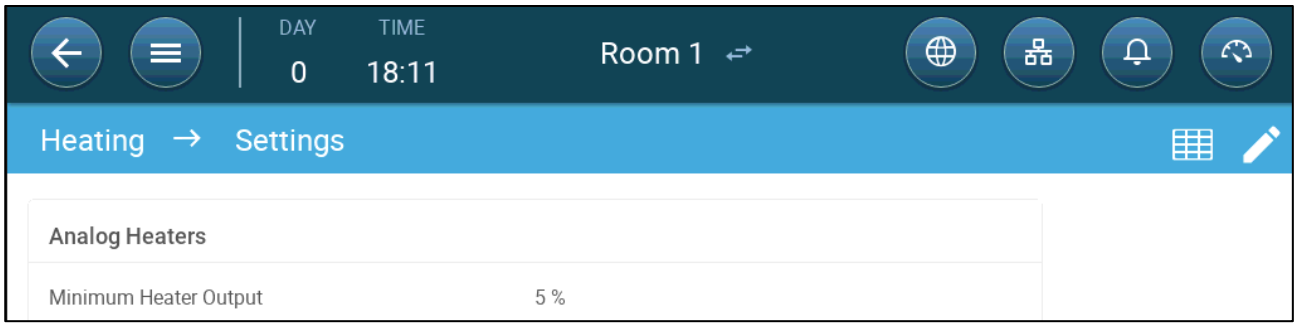
- Analogue Heaters
- Heat Cycles

10.2.1 ANALOGUE HEATERS

➲ **Define analog ports as heaters. Refer to the Installation Manual.**

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

1. Go to Climate › Heating › Settings.

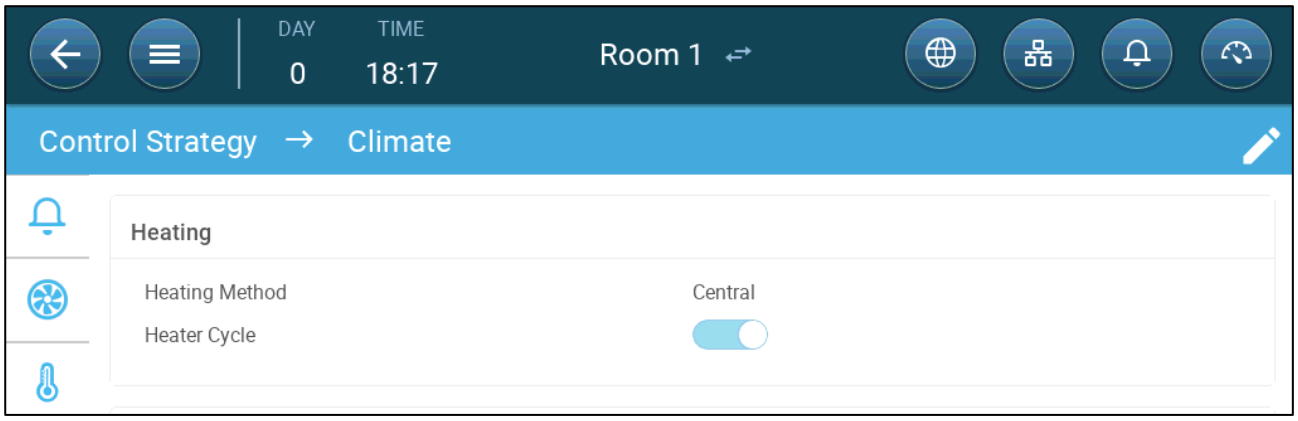


2. Define the Minimum Heater Output. Range: 0 – 100%

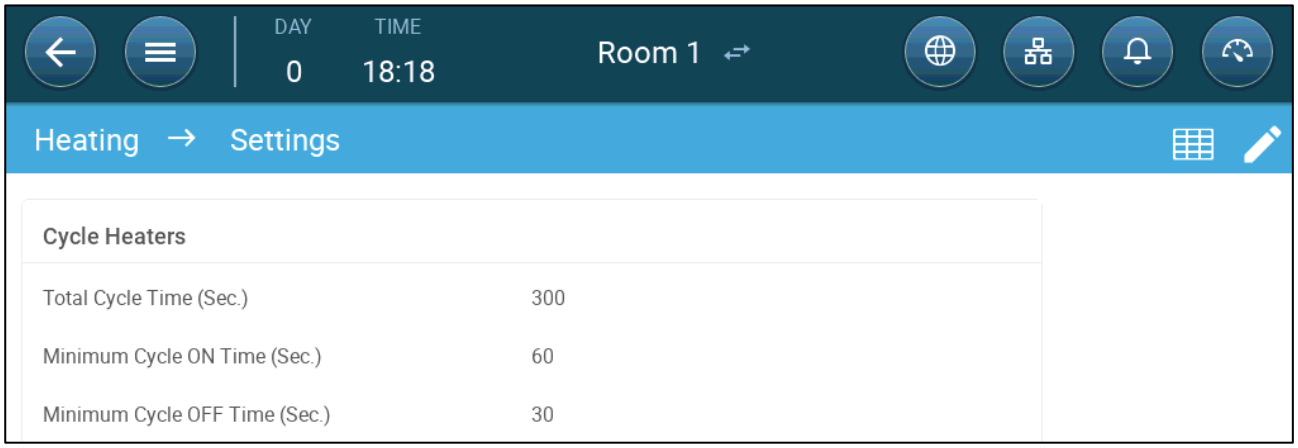
10.2.2 HEAT CYCLES

To enable running heaters in a cycle:

1. Go to System › Control Strategy › Climate .



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



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

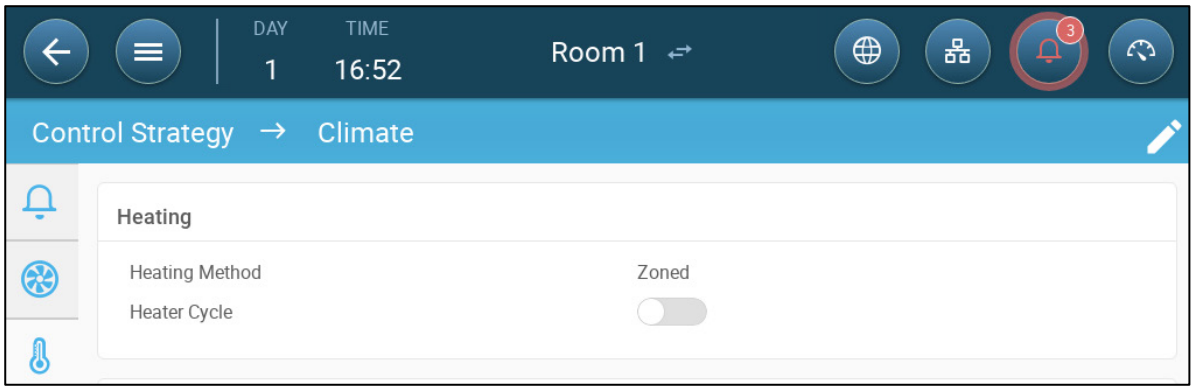
10.3 Zone Heaters

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

➲ **Define relays output ports as heaters. Refer to the Installation Manual.**

To define the zoned on/off heaters:

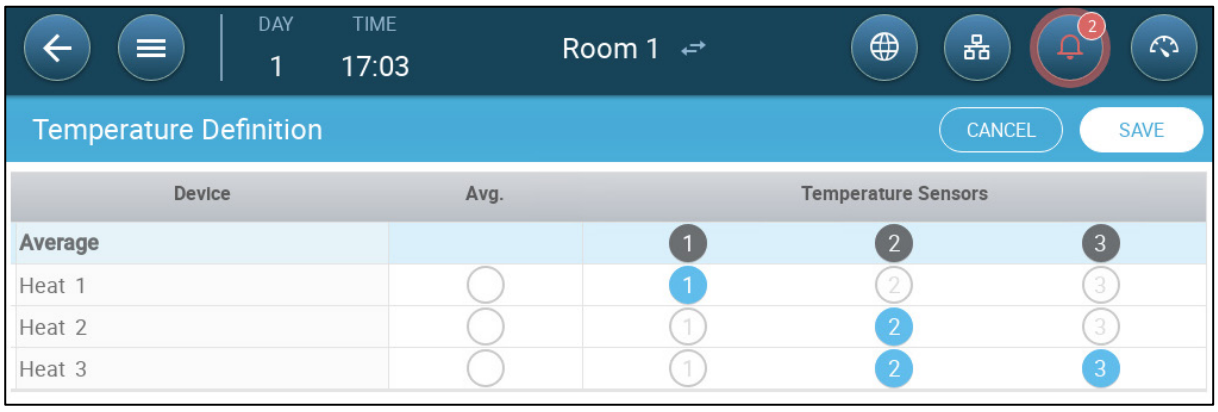
1. Go to System › Control Strategy › Climate .



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

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

5. Go to System › Temperature Definition.



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

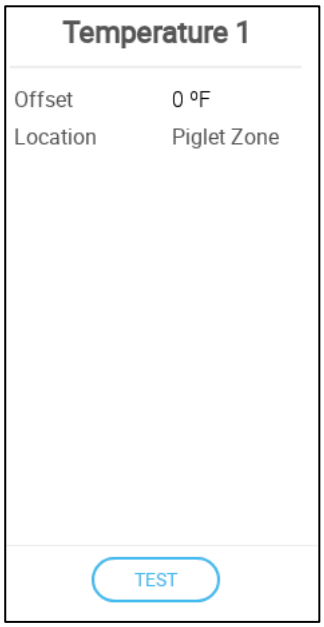
- Options:
    - Analogue Heaters
    - Heat Cycles

10.4 Piglet Zone

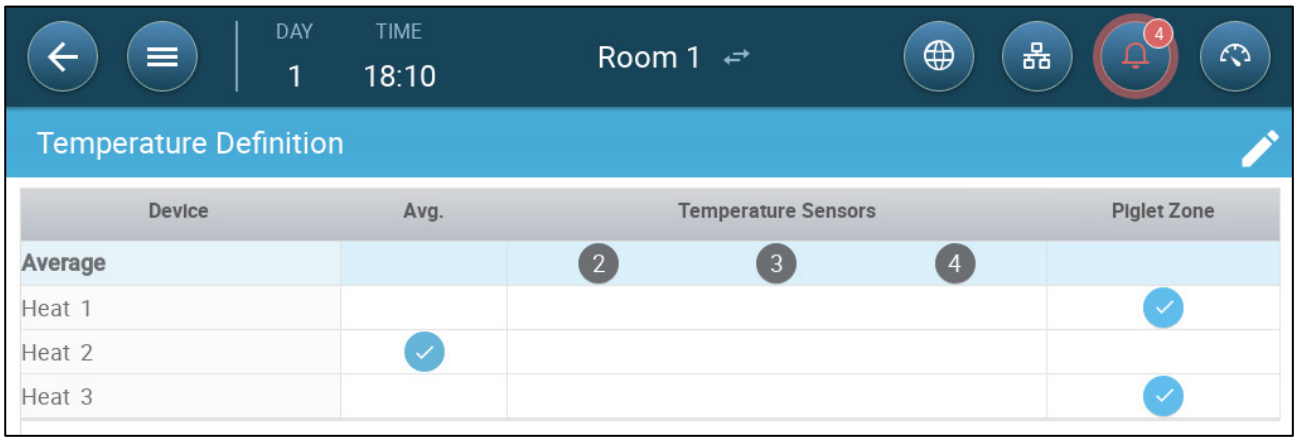
Trio supports a piglet zone, which is a thermal environment that maintains the newly born animals' heat. Using a dedicated temperature sensor for that area, Trio's software automatically adjusts the heat output to maintain the required temperature.

To set up piglet zones:

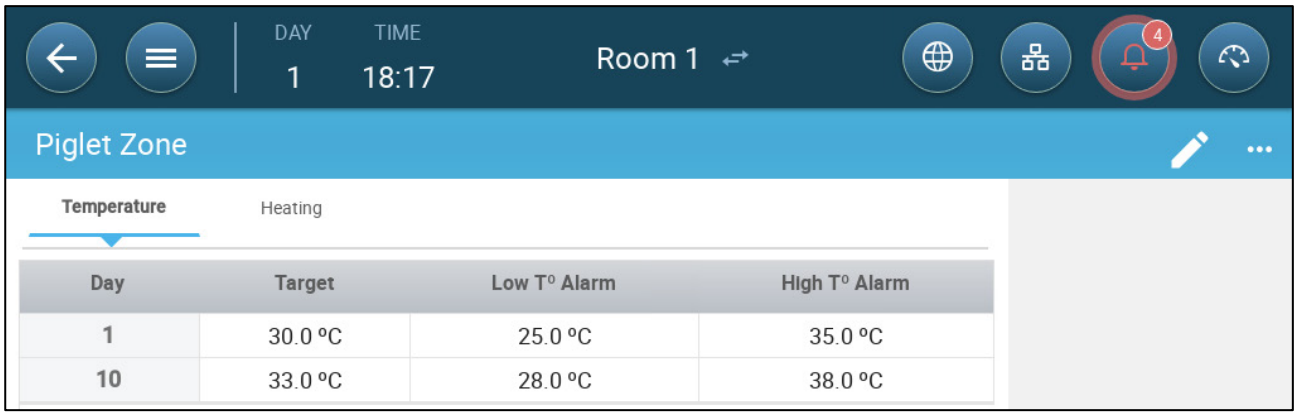
1. In System › Device & Sensors, define the location of one temperature sensor as Piglet Zone.



2. Go to System › Temperature Definition.



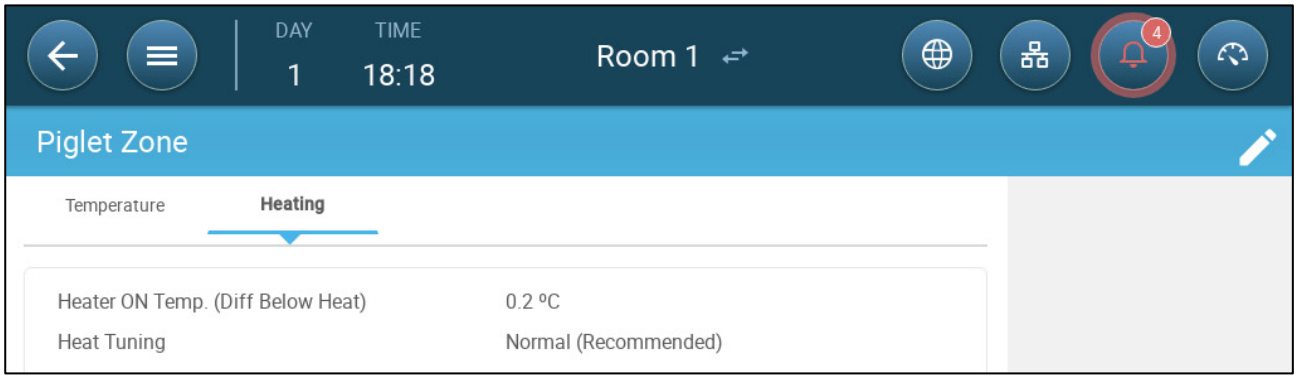
3. Map the required heaters to the piglet zone.
   - If the heating system is defined as Zoned, you can map the other heater(s) to temperature sensors.
4. Go to Climate › Piglet Zone.



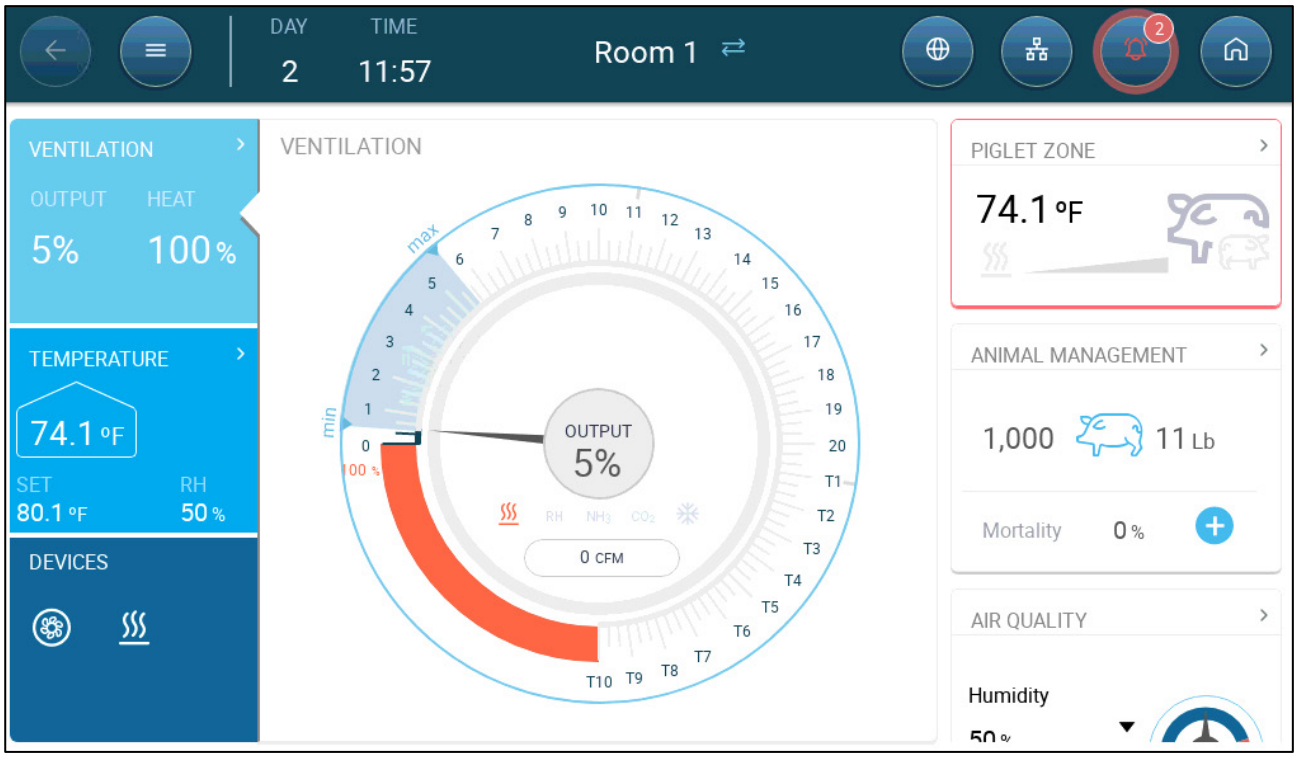
5. Click Temperature tab.

Define the growth day, target temperature, and low/high temperature alarms.

6. Click Heating tab.



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



After defining the Piglet Zone, an icon appears on the dashboard.

11Feed Management

- Feeding Summary
- Setting up Feeding

11.1 Feeding Summary

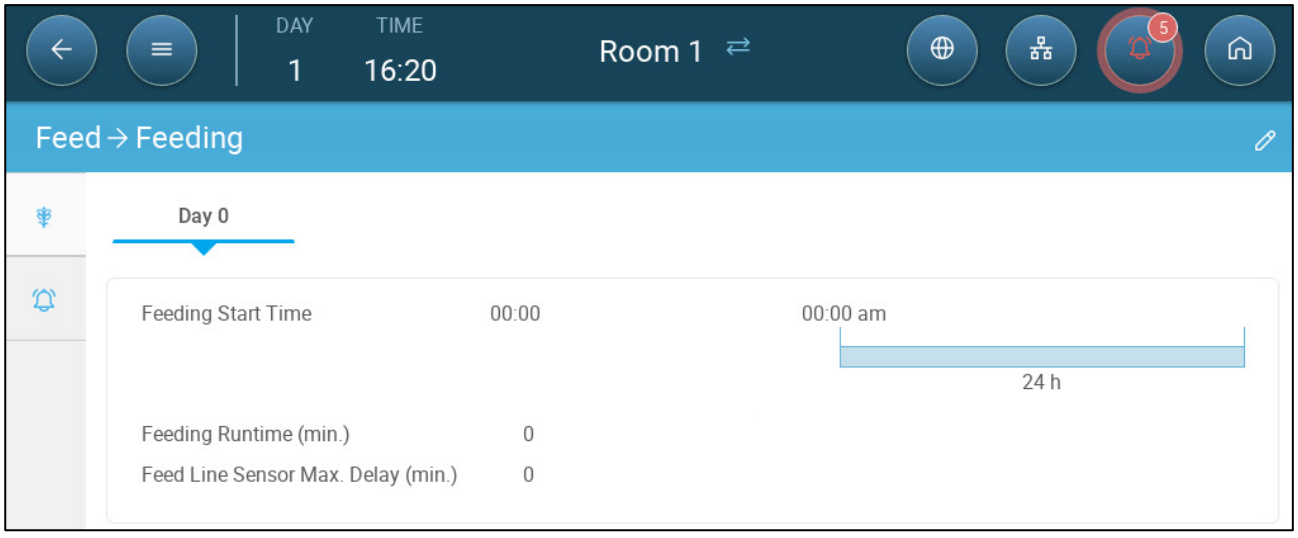
Feed is stored in silos located outside the animal house. Augers transport the feed to hoppers. Sensors are installed on the augers and hoppers to ensure that the proper amount of feed is transported. Feed lines transport the feed from the hoppers to feeding pans, according to signals sent from the hoppers.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

- **A feeder relay must be wired, defined, and mapped.**
- **Feed line 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.

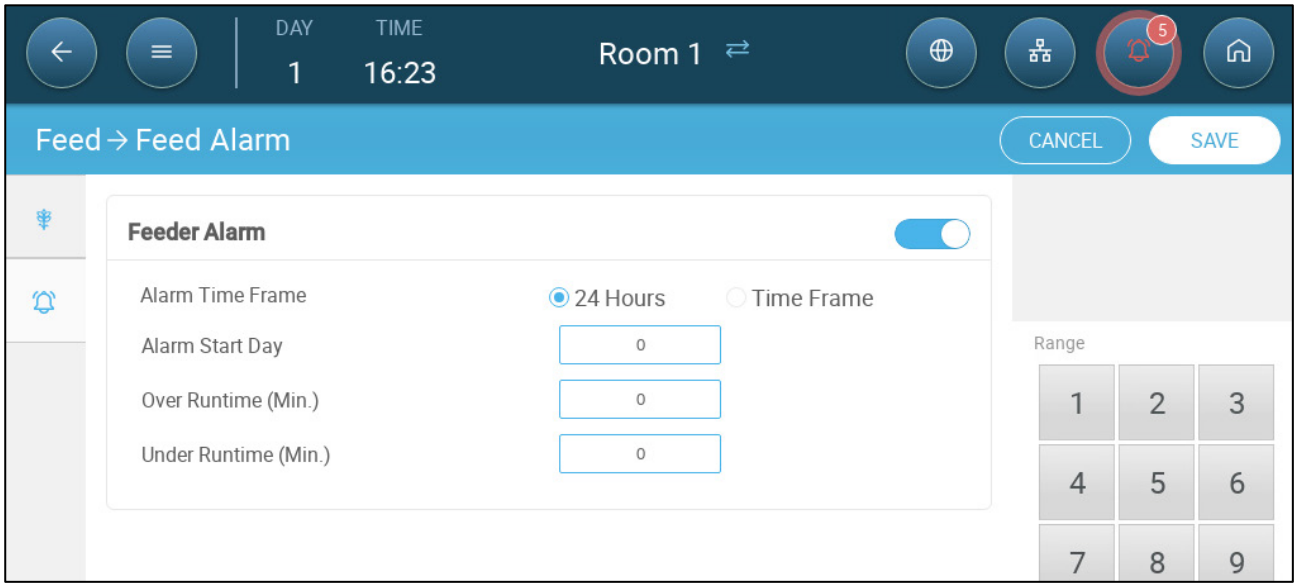
1. Go to Control › Feed.



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.

- Feeding Start time: Define the time when each feed run begins. Add more starting times as required.
- Feeding Runtime (min.): Define how long the feed runs last.
- Feed Line Sensor Max. Delay (min.): Define the maximum amount of time that can pass from a feeding start time before Trio generates an alarm.

4. If required, go to Control › Feed › Alarm  to set the alarms. Enable the alarms.



5. Click  and enable the feeder alarm:

- 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.
  - 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.

12 Air Quality

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

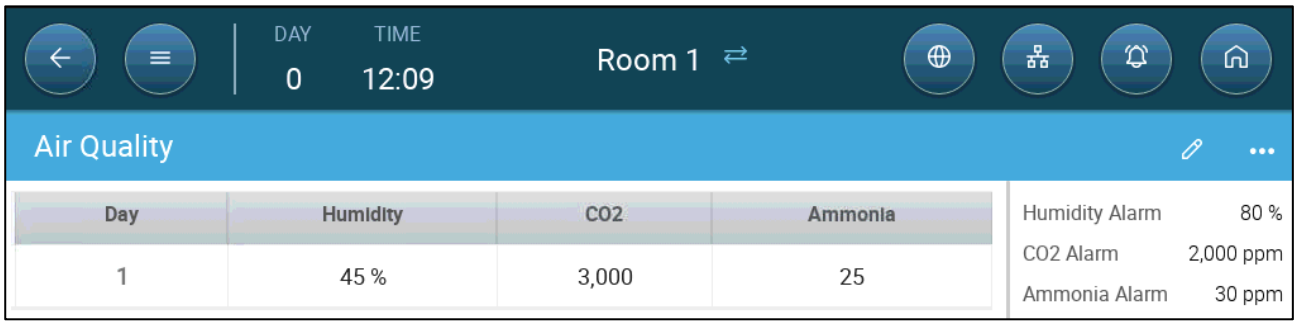
- Ventilation must be running for compensation to begin. Air quality control runs during basic ventilation only.
- If one of these factors is above the user defined set point, compensation begins. If one of these factors is above the user defined set point, compensation begins. If two or more factors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

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

12.1 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 the Installation Manual.**



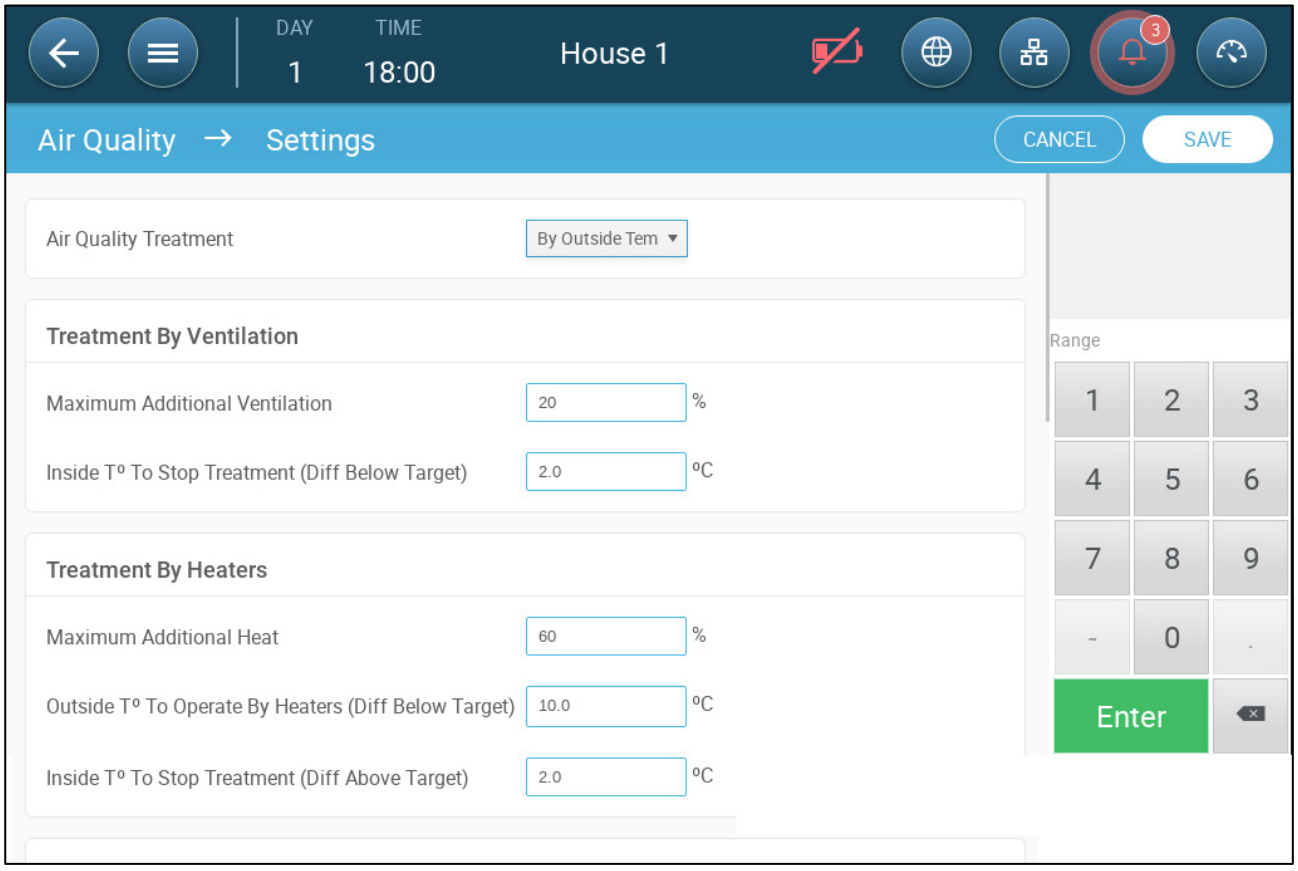
2. Set the values over which the "air treatment" starts; these values are adjusted over the growth days (no curve).

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

12.2 Defining the Air Quality Settings

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

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



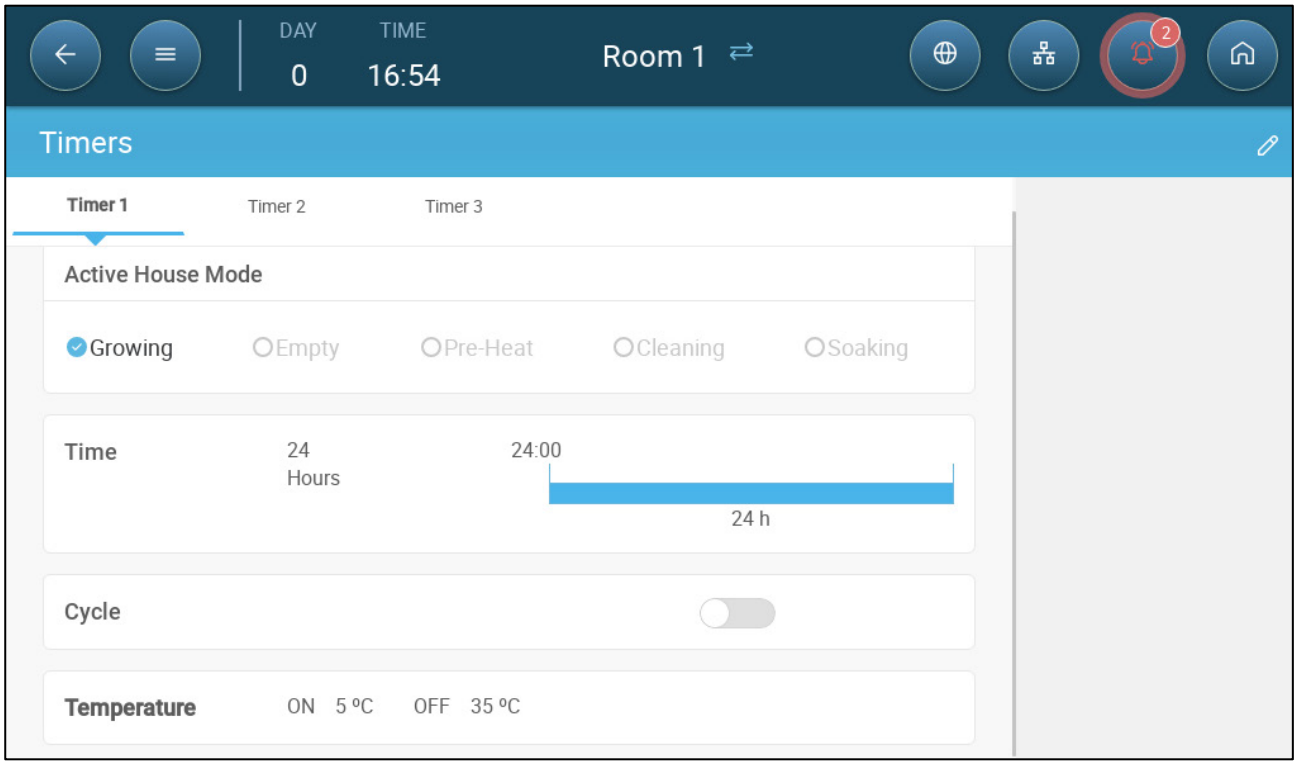
- Define:
    - Air Quality Treatment:
        - Off
        - By Ventilation (Treatment by Ventilation only is enabled)
        - By Heat (Treatment by is Heat only is enabled)
        - By Outside Temp (both Treat by Ventilation and Heat are enabled)
    - Treatment by Ventilation:

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

13 Timers

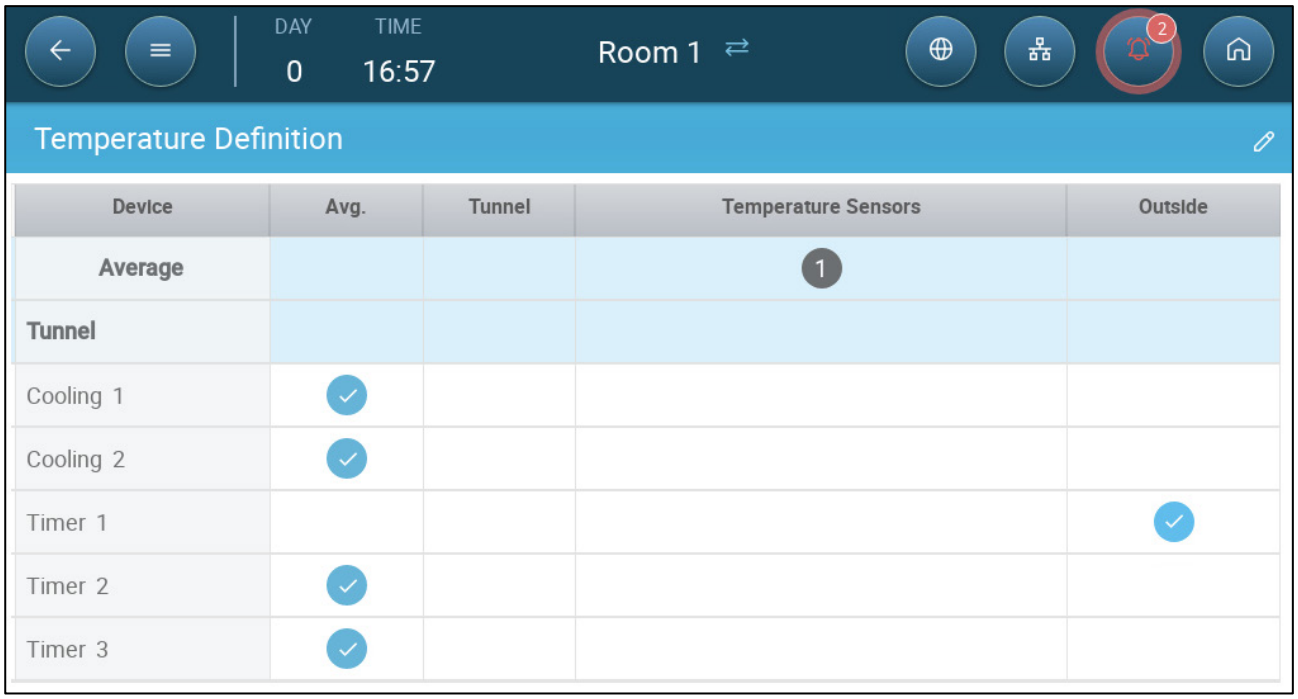
Timers provide an additional method of controlling relay devices, namely setting a timetable in which the device can operate. In addition to the timetable, Trio enables setting up time cycles and temperature ranges in which a device can operate.

Trio supports up to five timers.



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

1. In Control › Timers, click edit, and define a timer as Active.
2. Define for each timer:
    - Active House Mode: Define in which mode each timer can operate. Multiple modes can be selected. Note: This option is not available for Central Exhaust or Central Corridor setups.
    - 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.



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

14 Alarms

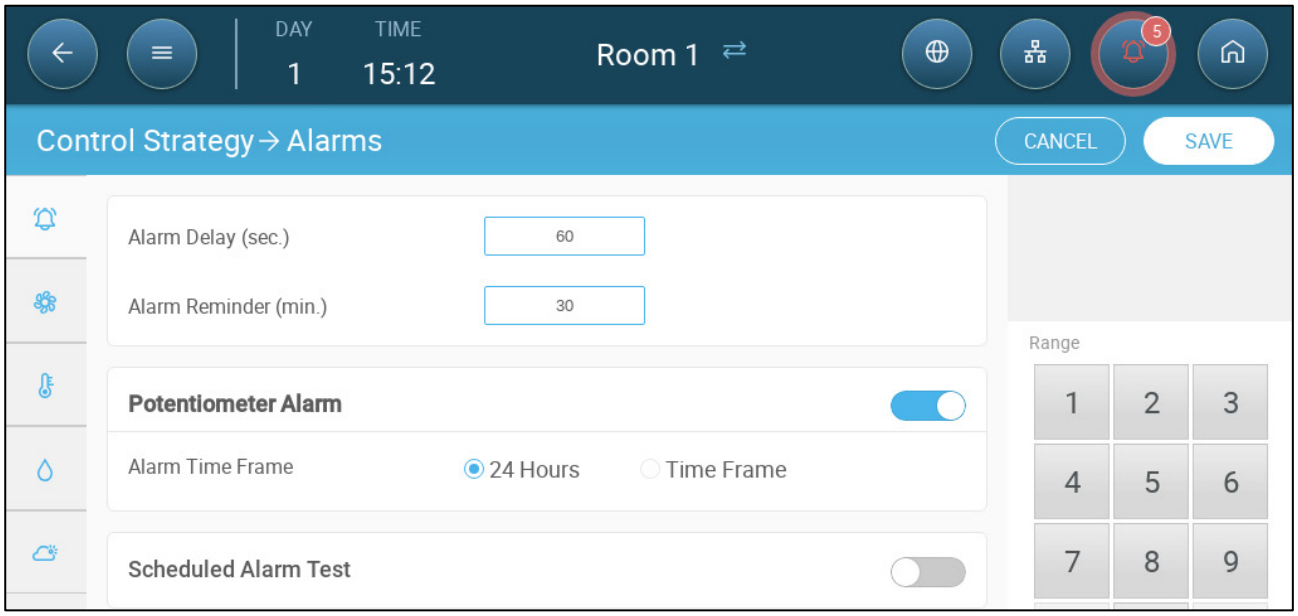
- Defining the Alarm Parameters
- Viewing the Alarms
- Defining the Auxiliary Alarms
- Sending a General Alarm

14.1 Defining the Alarm Parameters

- Alarm Definitions
- Alarm Test

14.1.1 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 the Installation Manual.

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.

14.1.2 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

14.1.2.1 Manual Test

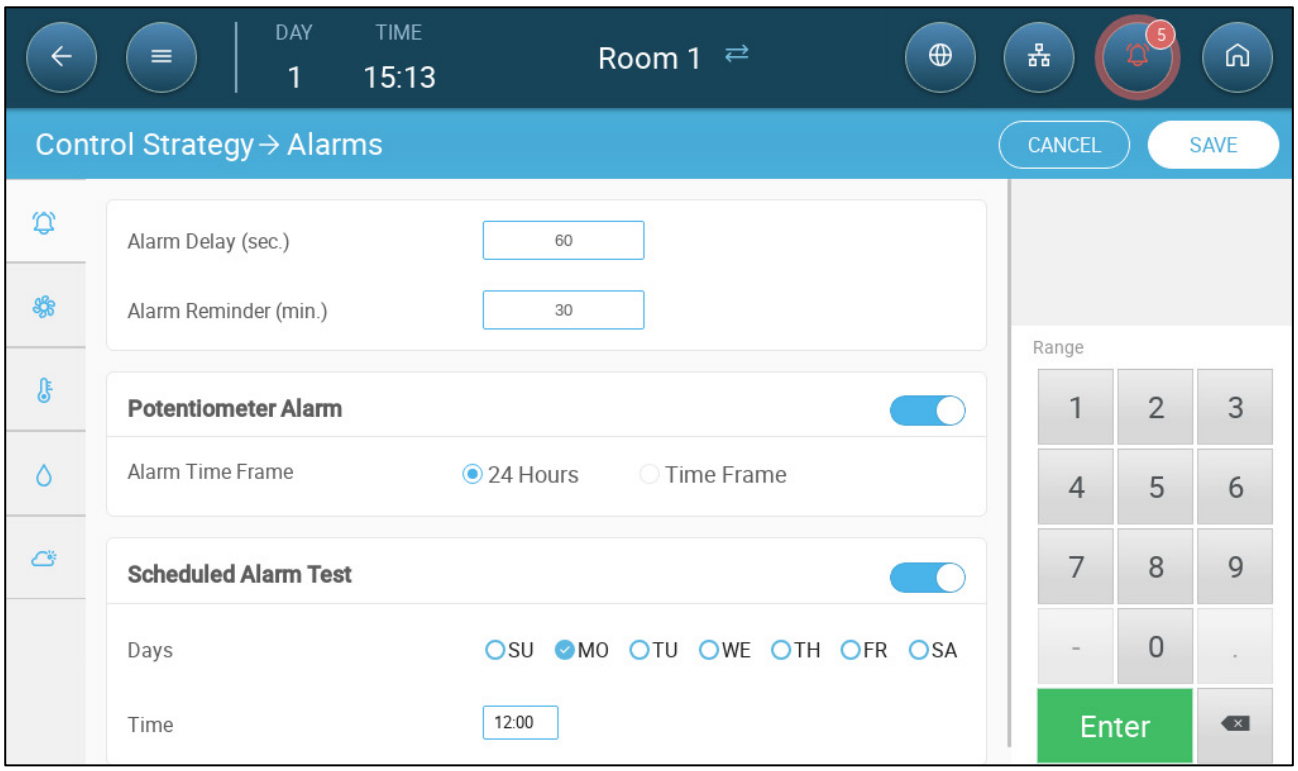
- Click 

. Stop the test as needed.

14.1.2.2 Scheduled Tests

Scheduled tests can be performed once a day only.

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

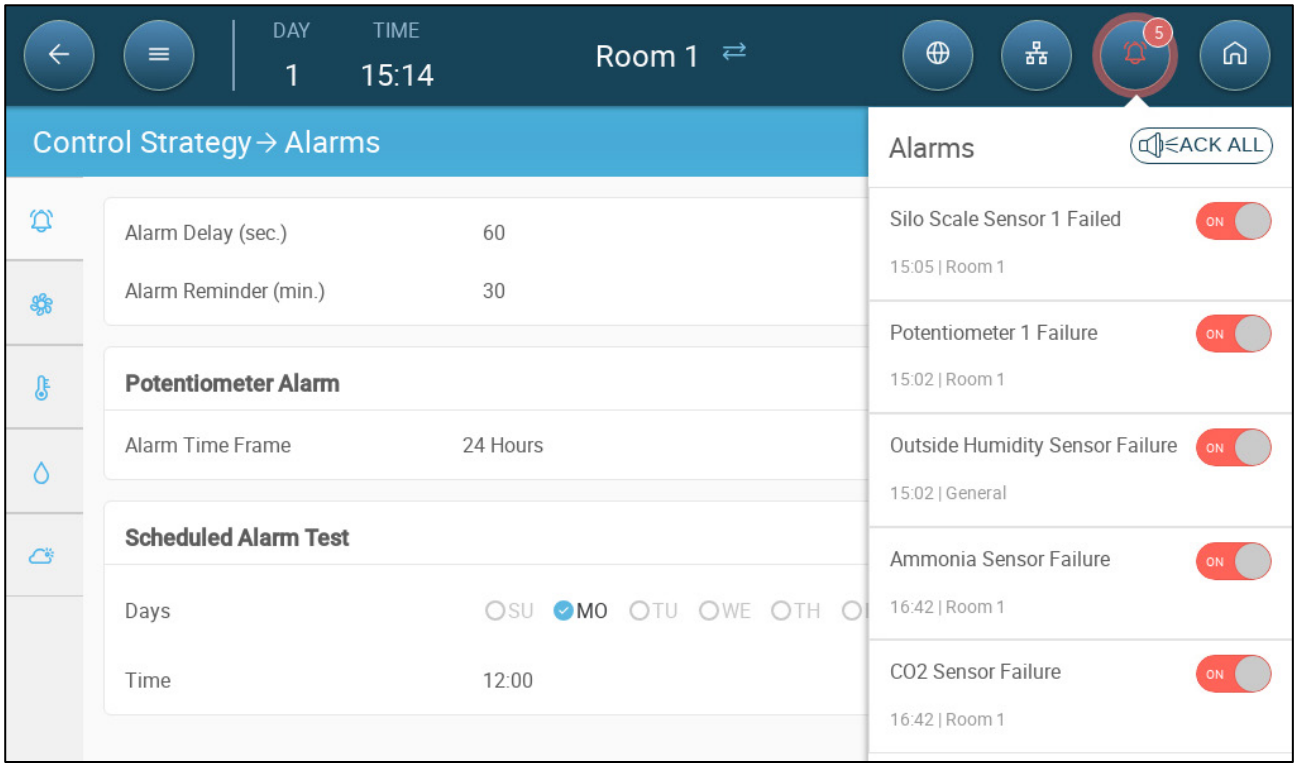


2. Define the day(s) and time at which the test is performed.

NOTE Testing takes places 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.

14.2 Viewing the Alarms

- On the Main Menu bar, click  .



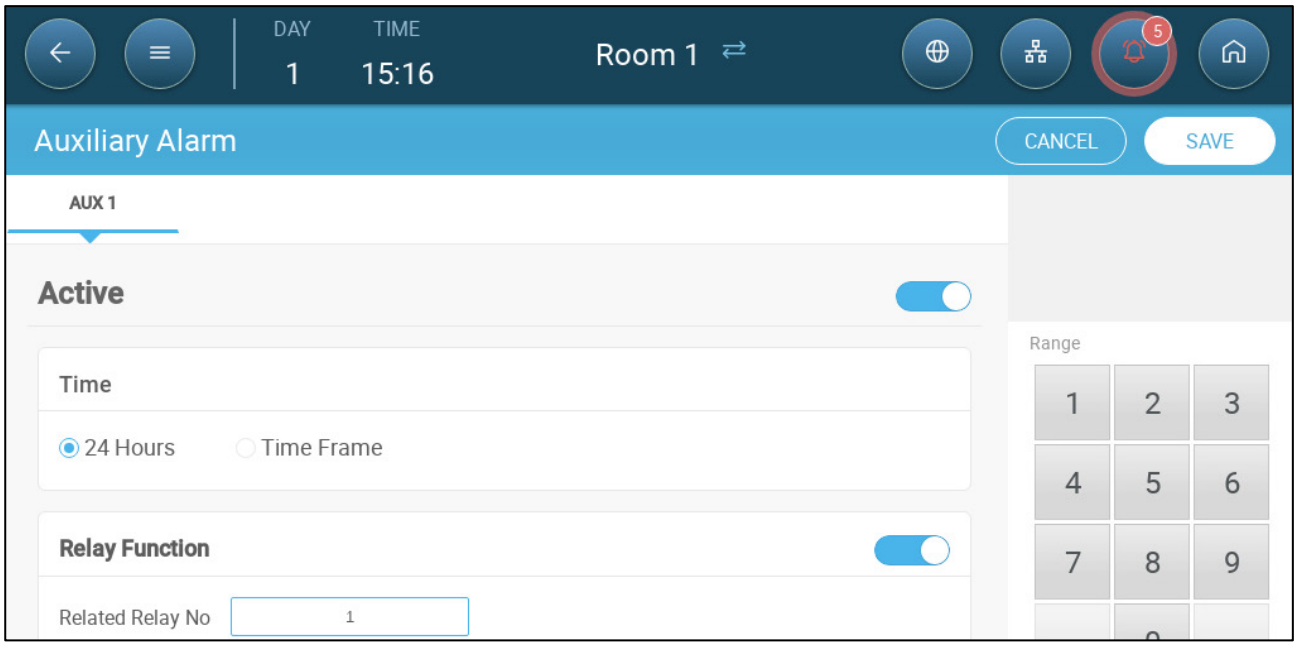
- Click  to acknowledge all alarms or acknowledge each one as required.

14.3 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. Refer to the Installation Manual.**

1. Go to Control › Auxiliary Alarm.

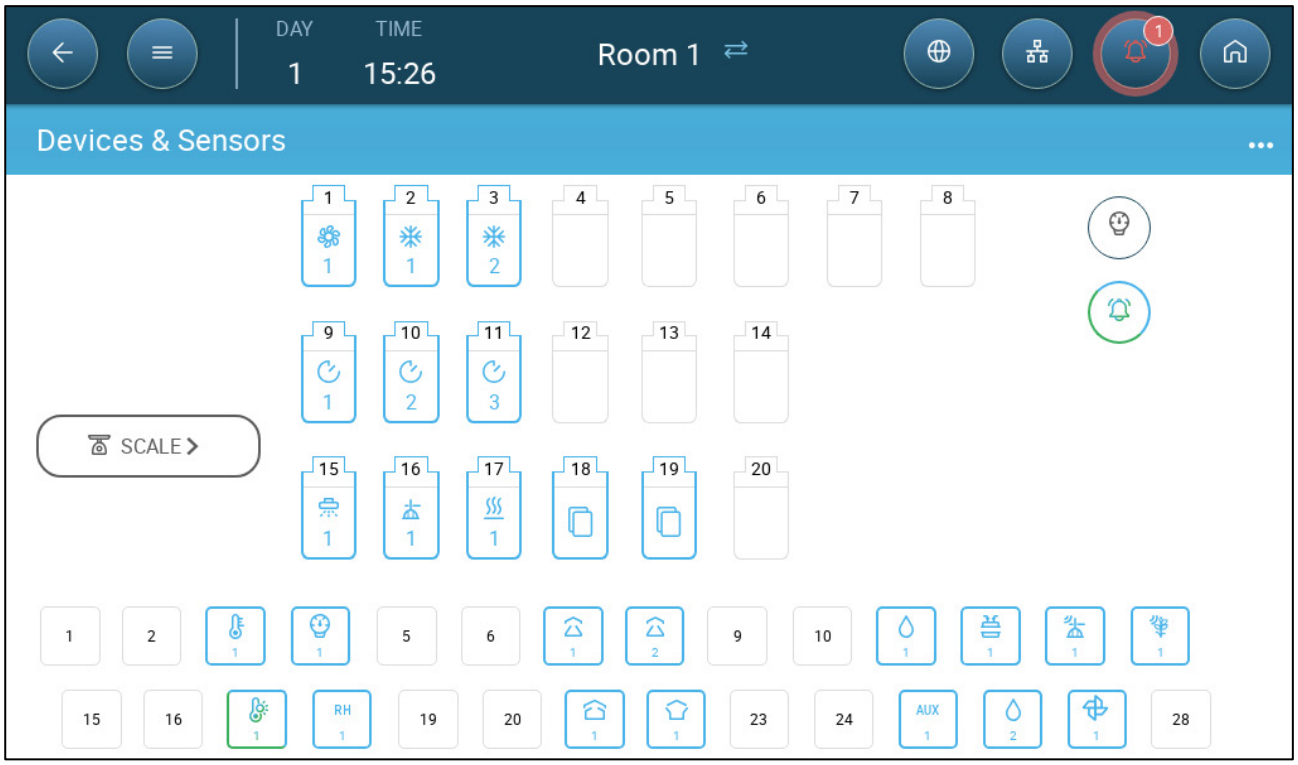


2. Click edit, define an alarm as Active.
3. Define:
    - Time Frames: Define the time frame, either 24 hours a day or specific time frames.
    - Relay Function: Enable this function. Define the relay being monitored. When this relay is no longer in its defined state (normally open, normally closed)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

14.4 Sending a General Alarm

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

1. Go to System > Device and Sensors.



2. Click  .

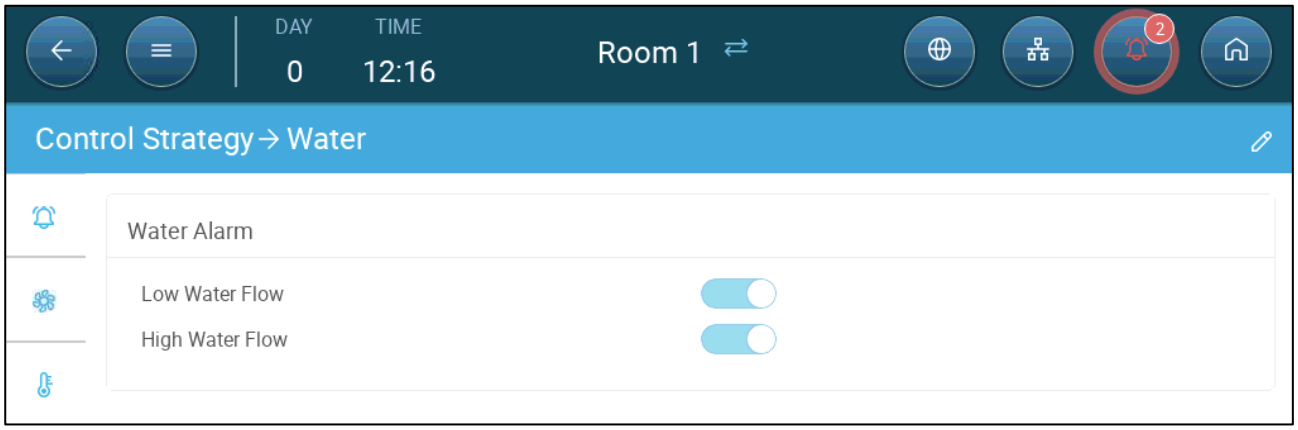
An alarm is sent to everyone on the contact list.

14.5 Water Alarm

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

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

1. Go to System › Control Strategy › Water  .

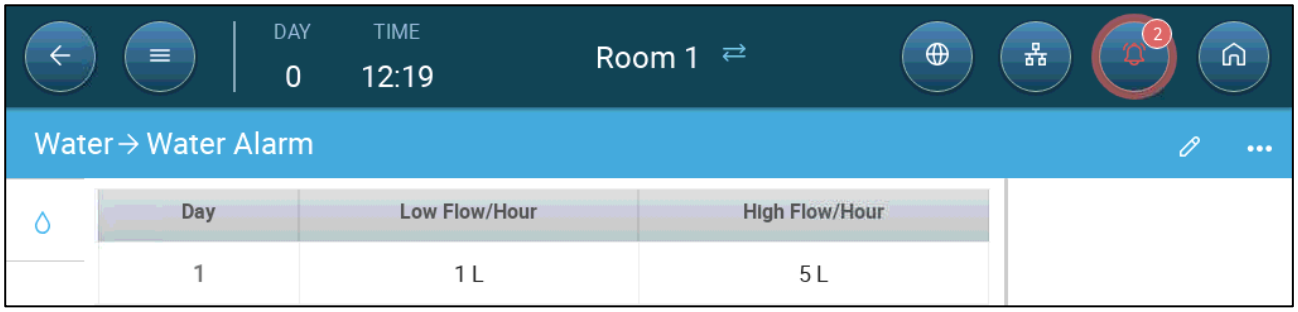


2. Enable (according to your requirements):
   - Low water flow: This alarm is triggered when there is a shortage in the estimated water consumption.

- High water flow: This alarm is triggered when the actual consumption exceeds the estimated water consumption or there is a water leak.

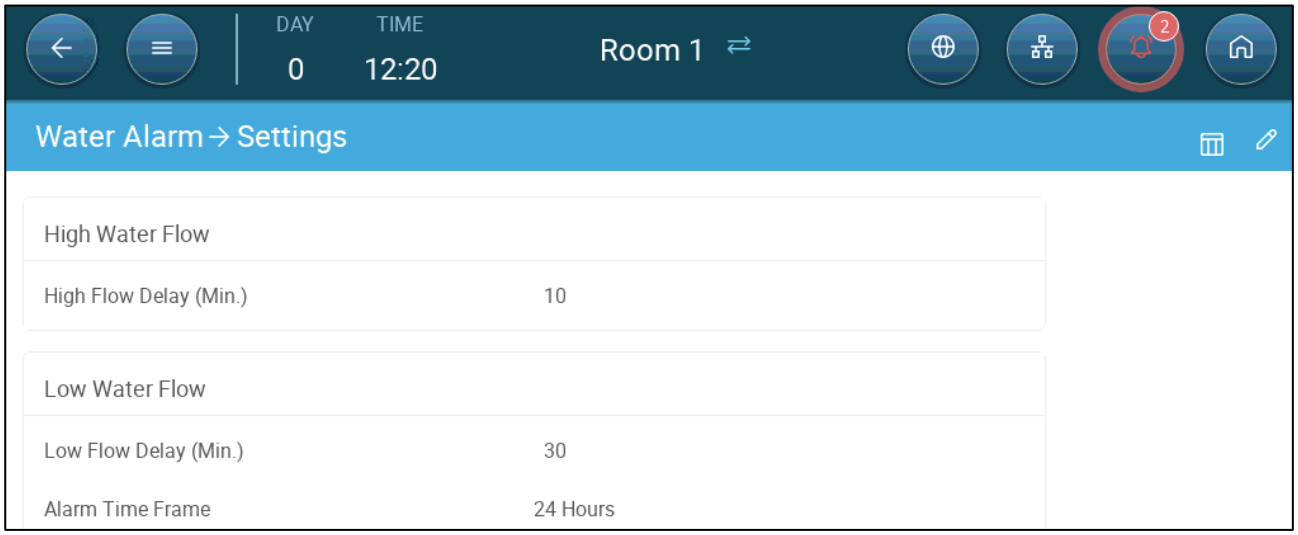
3. Go to Control > Water.

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



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

5. Go to Control > Water > Settings.



6. Define:

- High Flow Delay (Min.): Define the amount of time that water flows at the high flow rate before Trio sends an alarm.
- Low Flow Delay (Min.): Define the amount of time that water flows at the low flow rate before Trio sends an alarm.
- Alarm Time Frame: 24 hours or user defined time frames.

15 History

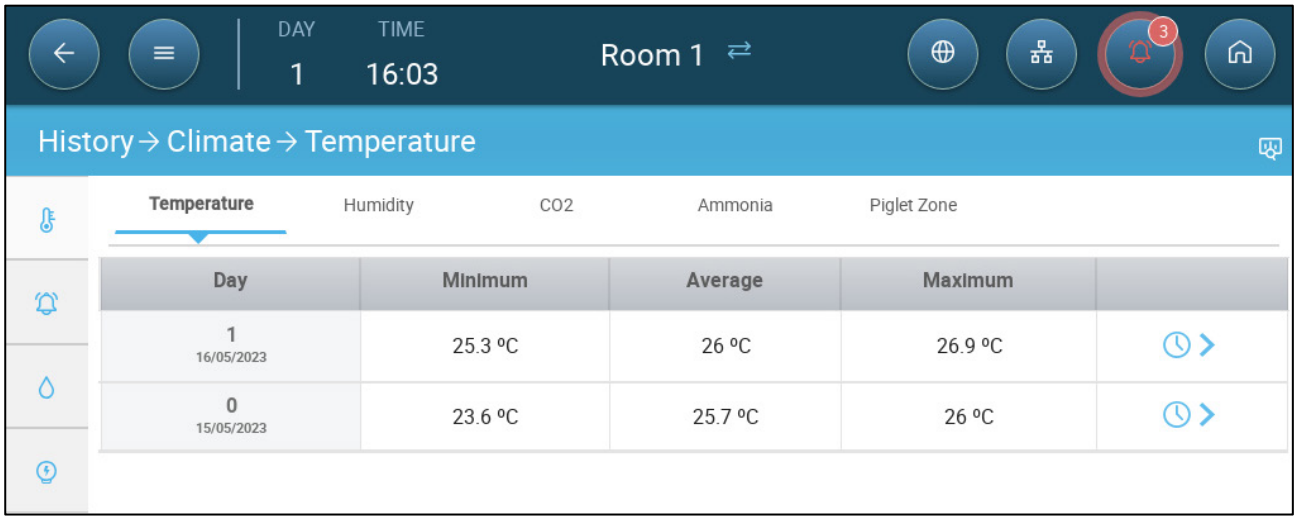
- A Trio controller saves:
  - 150 growth days of history data (minimum).
  - Up to 365 growth days of history data (estimated maximum)
- TrioAir saves data on the server for an unlimited amount of time.
- Starting a new batch/flock erases all history data.
- The alarm and events history table can store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

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

15.1 Climate and Air Quality

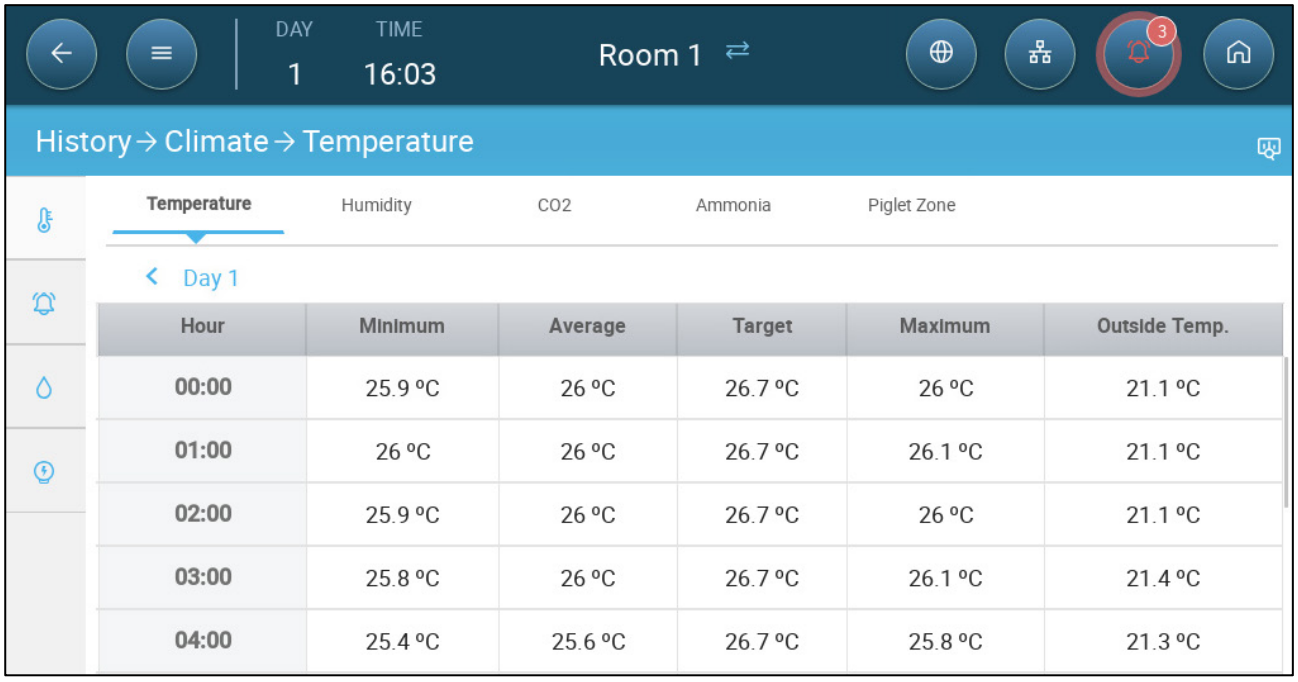
1. Go to Batch › History › .
2. Click the relevant tab to see its history.

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.

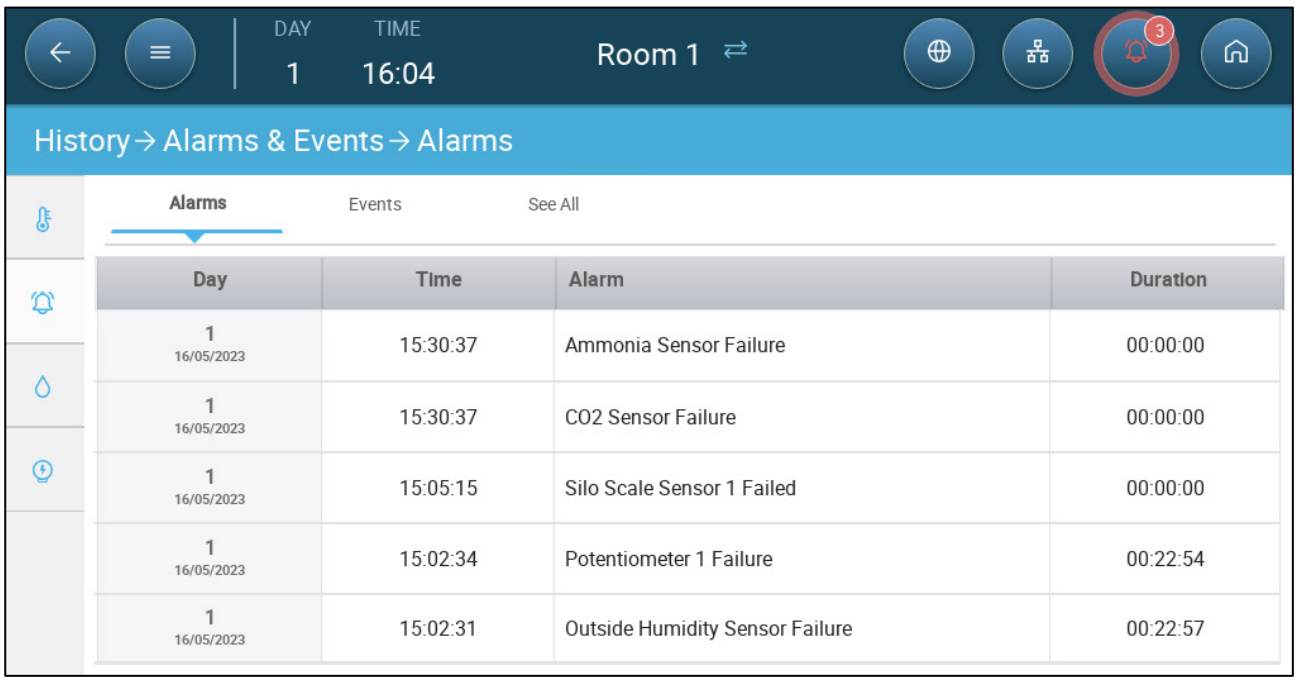


15.2 Alarms and Events

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 Batch › History › Alarms .
2. Click the relevant tab.

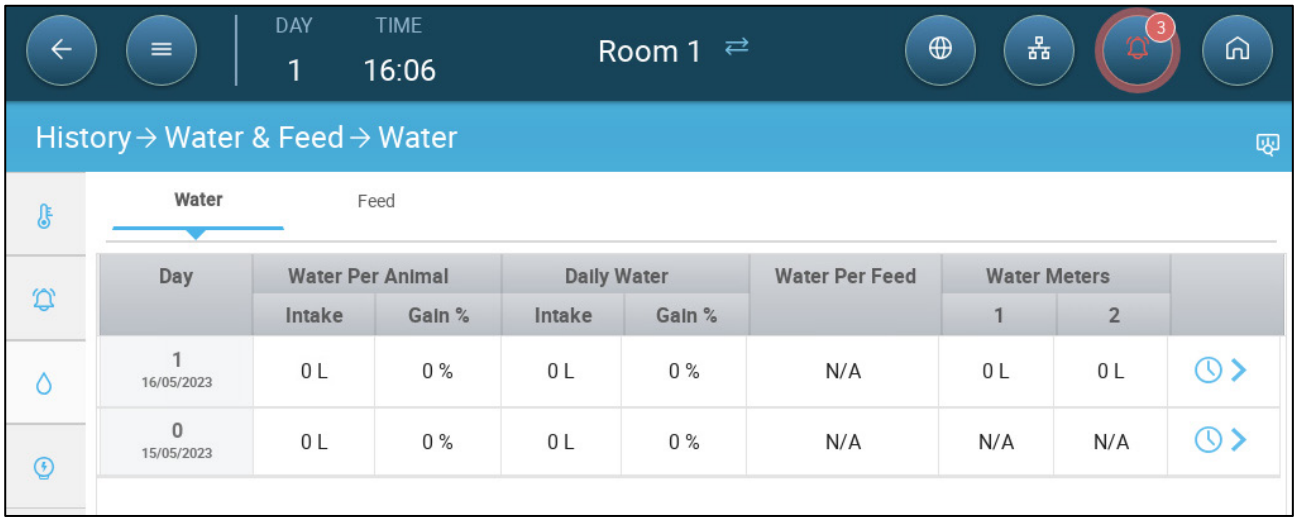


- Alarm Description
  - Unknown Alarm
  - High Temperature
  - Sensor # High Temperature
  - High Co2
  - Low Pressure
  - Water Overflow
  - Outside Temperature Failure
  - Humidity Sensor Failure
  - Ammonia sensor failure
  - Potentiometer # Failure
  - Alarm Test
  - CPU Low Battery
  - Low Temperature
  - 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

15.3 Water and Feed History

NOTE Water and feeder relays or sensors must be enabled to see these screens

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

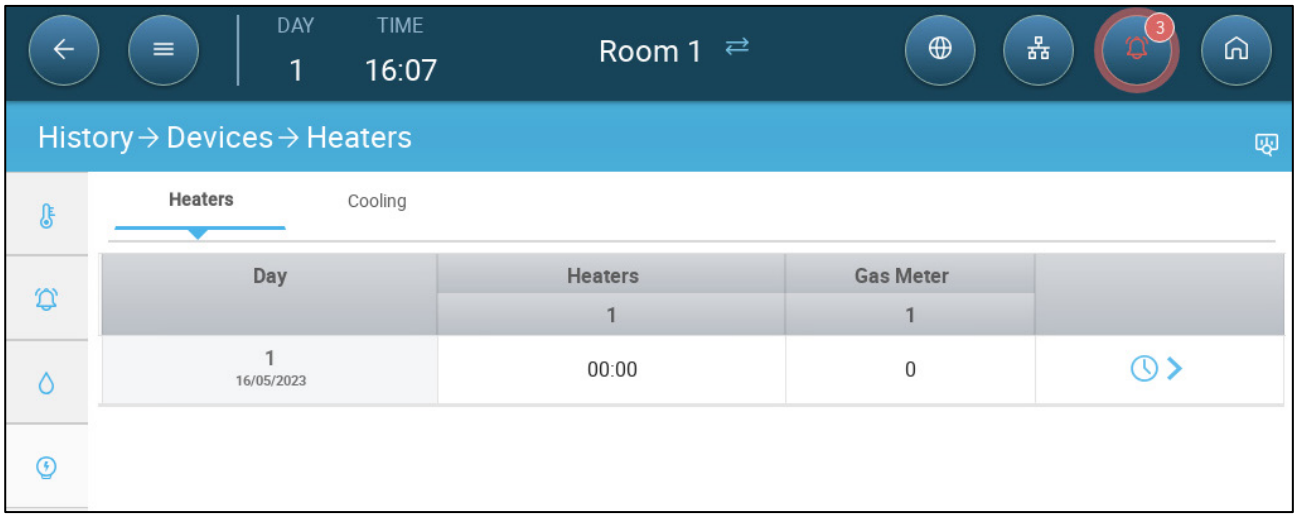


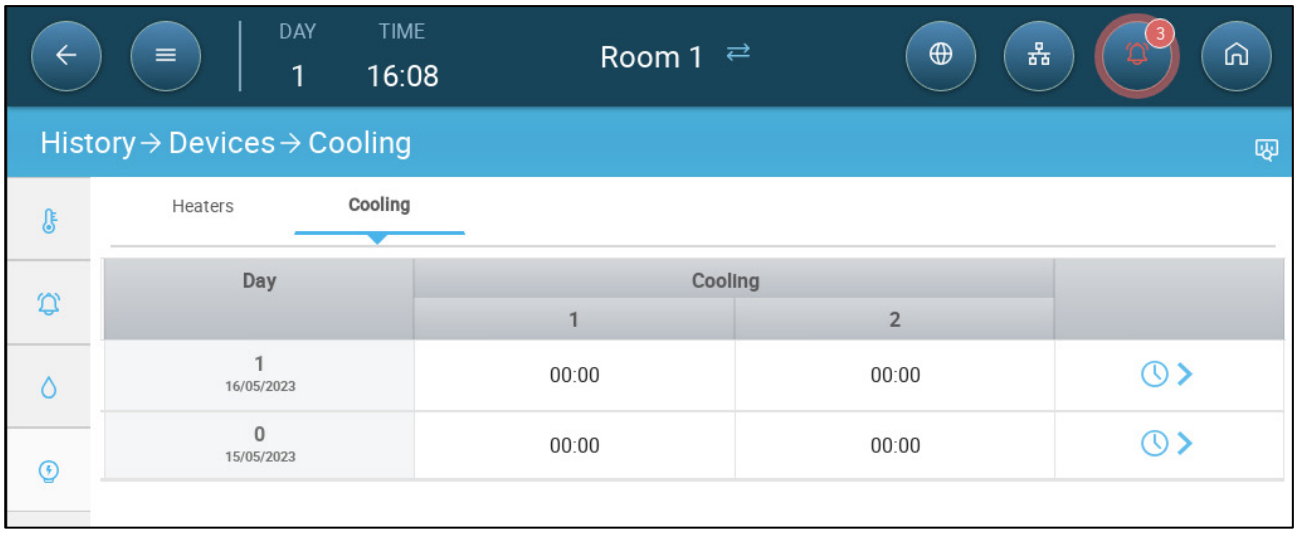
- Click the clock symbol to view the hourly breakdown.

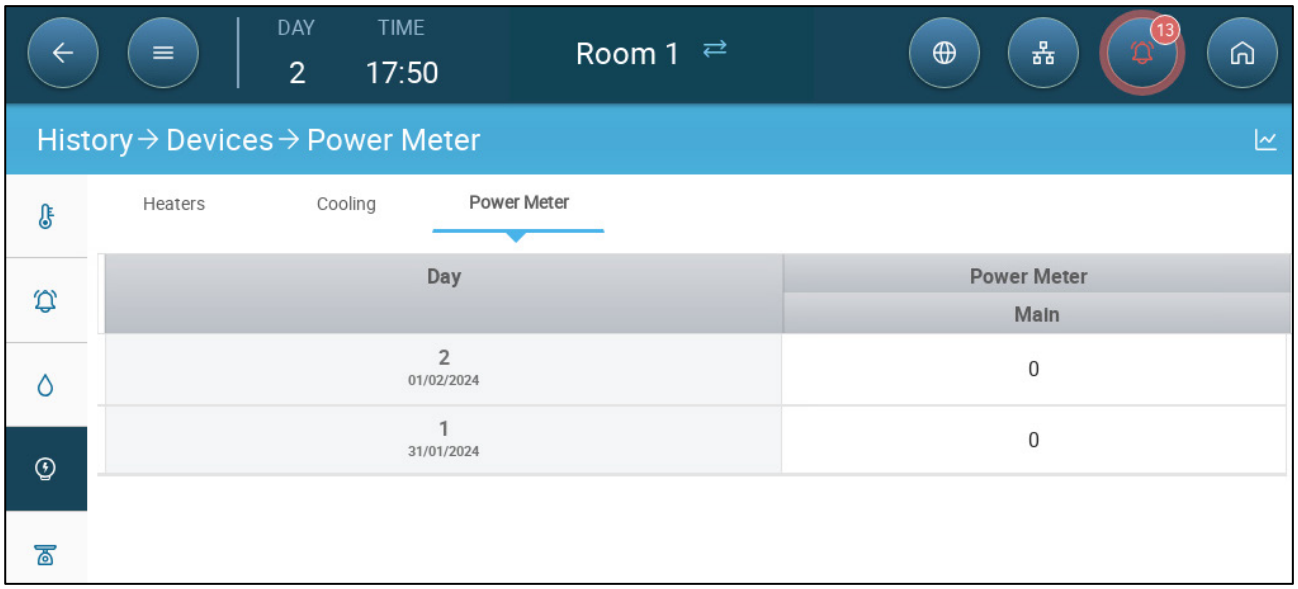
15.4 Devices History

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 Batch › History › Devices .







- Click the clock symbol to view the hourly breakdown.

NOTE History displays installed devices only.

16 Resetting, Saving and Loading Settings, Updating Software

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

- Resetting the Settings
- Updating the Software
- Viewing the Log
- Updating the Software

16.1 Resetting the Settings

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

To reset the Trio:

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

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

16.2 Resetting the Trio CPU and Sensor Connections

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

- To reset the CPU and the user interface, press the button shown in Figure 2: CPU Reset Button.
- To reset the unit's connection to the sensors, press the button shown in Figure 3.

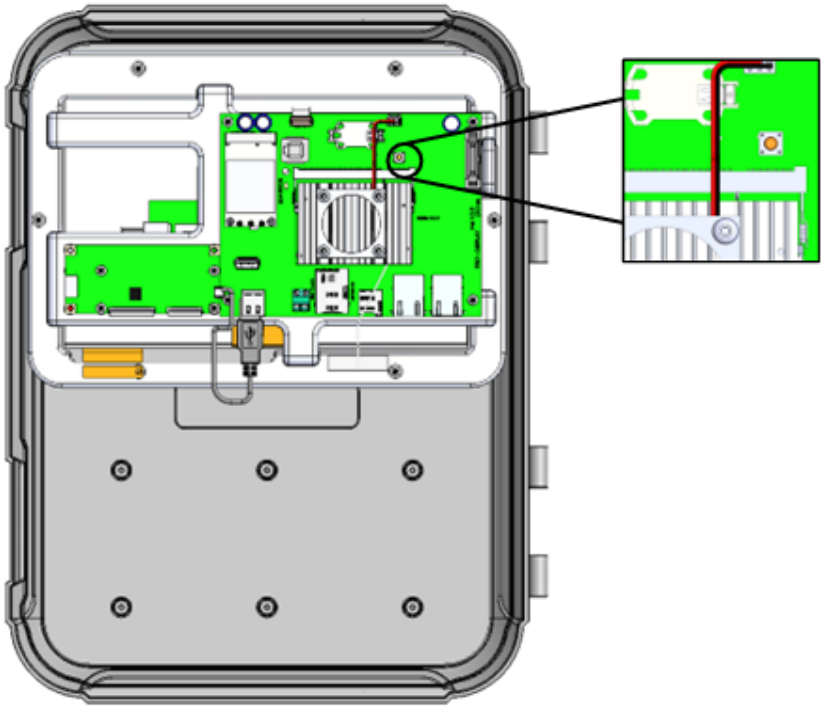


Figure 2: CPU Reset Button

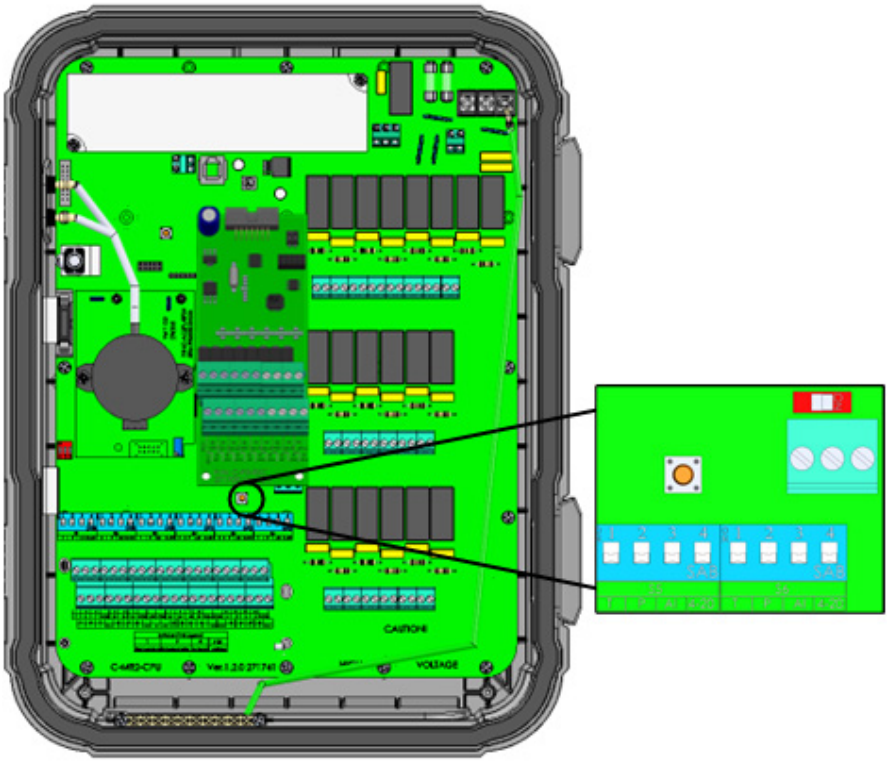
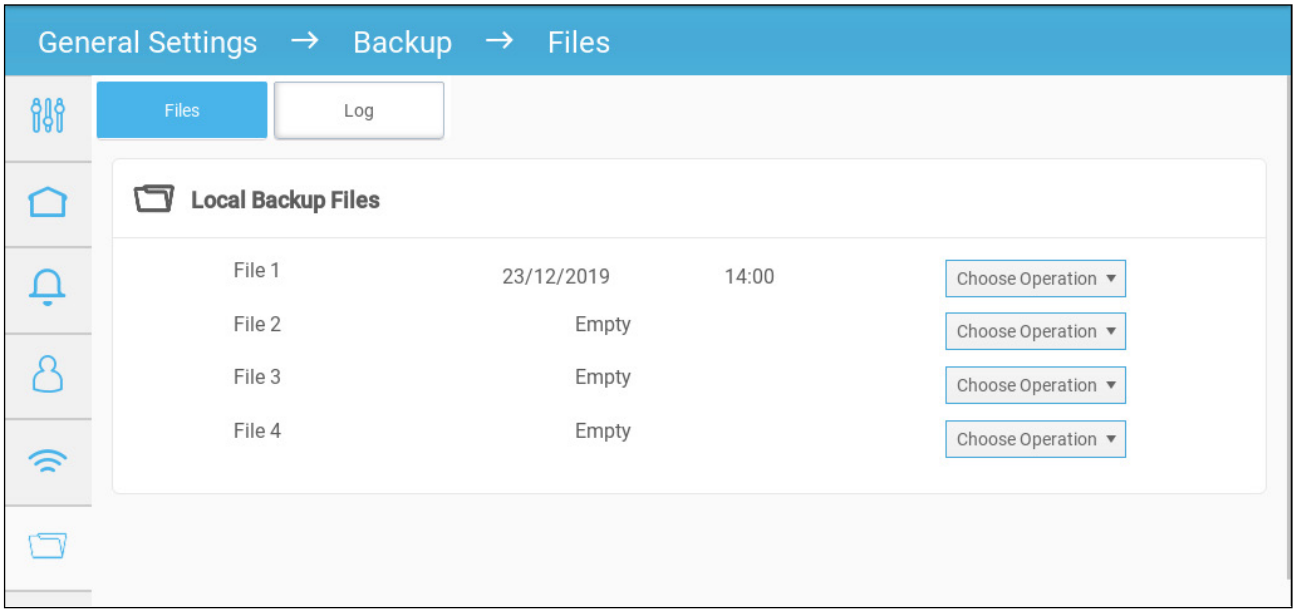


Figure 3: Connection to Sensors Reset

16.3 Saving or Loading the Settings

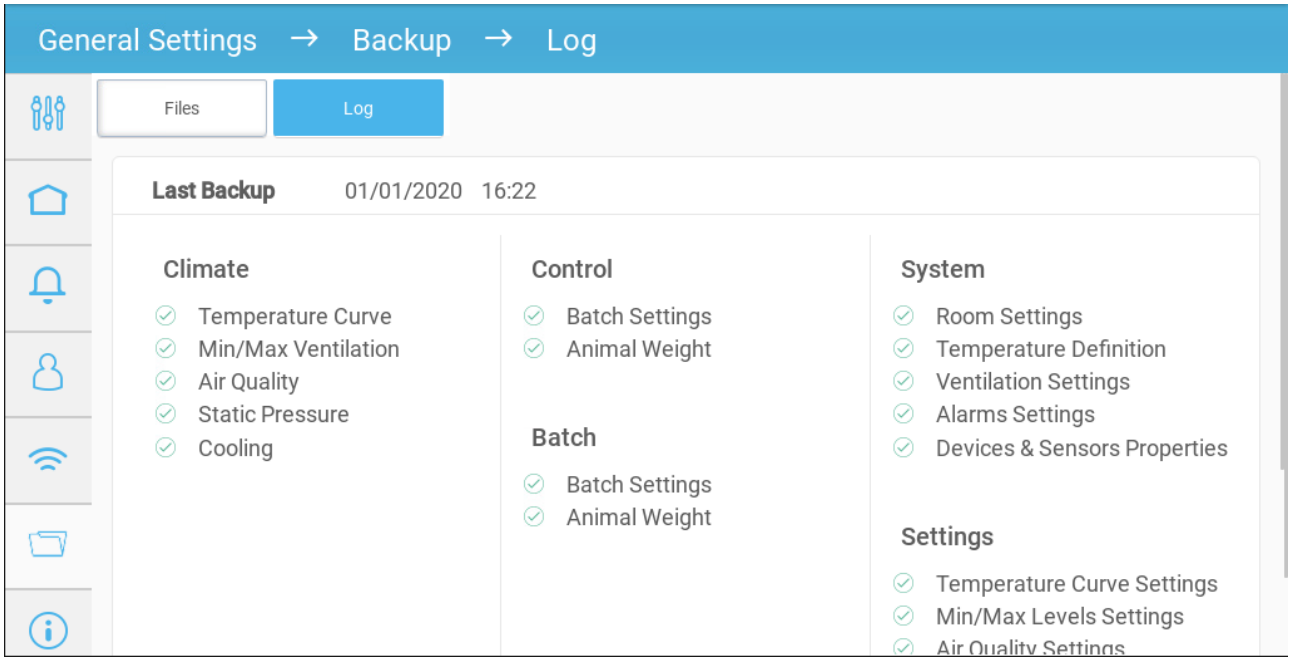
1. Go to System › General Settings and click Files .



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

16.4 Viewing the Log

The log displays which tables were successfully saved.



16.5 Updating the Software

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

To update the Trio Software:

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

17 Appendix A: Central Exhaust

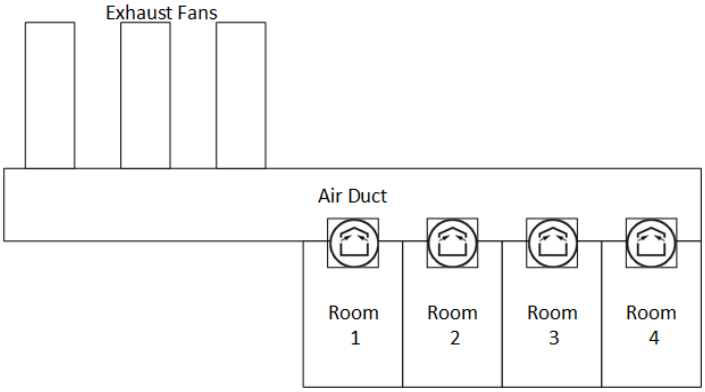
The Central Exhaust Mode uses static pressure levels to determine the ventilation levels. This appendix explains how to set up the Central Exhaust System.

- Introduction to Central Exhaust
- Selecting Central Exhaust
- Central Exhaust Dashboard
- Central Exhaust Functions
- Setting the Static Pressure
- Room Setting
- Levels of Ventilation

17.1 Introduction to Central Exhaust

In a Central Exhaust setup, herds are housed in a building in which all rooms are connected to one central ventilation system. The central fans are controlled based on the positive pressure in the duct system. After setting the static pressure level, ventilation levels change as the pressure changes. Meaning, if the measured pressure drops, the ventilation increases. If the pressure rises, ventilation decreases.

- 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 and distributed via the air duct; the controller maintains the required pressure in the air duct. By adjusting the ventilation, each room independently controls the amount of air entering.
- As temperature rises, the inlets' opening increases. Trio dynamically adjusts the ventilation to maintain the required pressure.

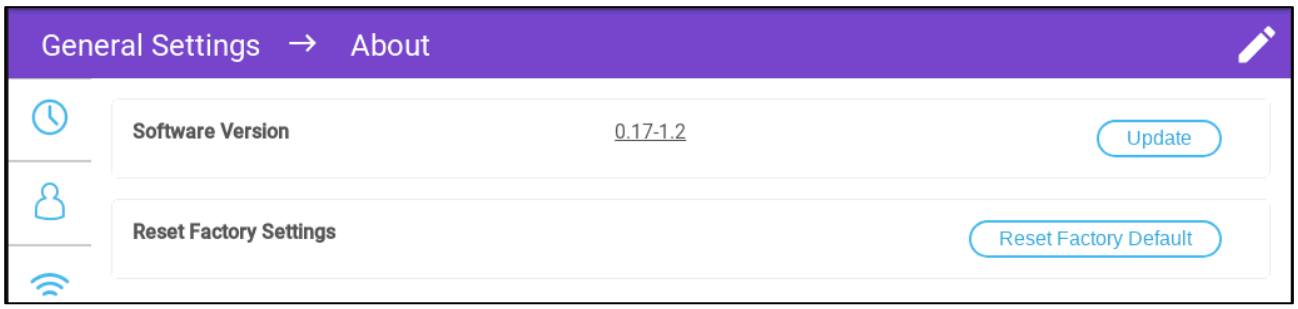


Since Central Exhaust sets the pressure settings for the entire structure, there is only one room in this mode.

17.2 Selecting Central Exhaust

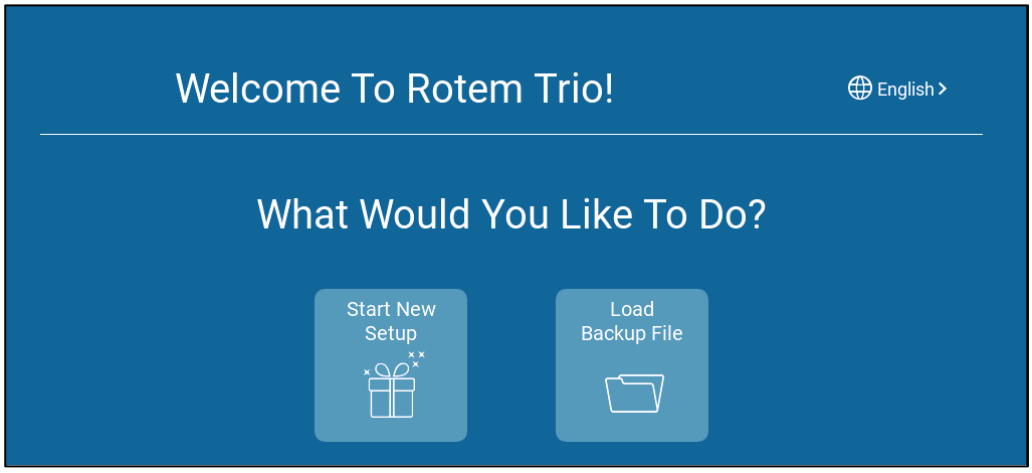
To select the Central Exhaust Mode:

1. Perform a Cold Start. Go to System › General Settings › About.

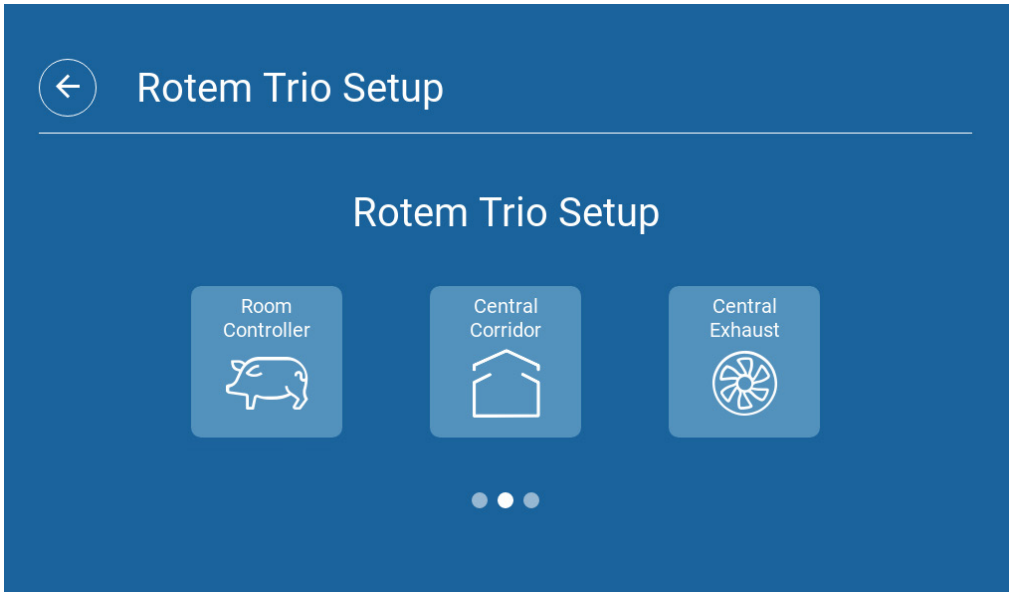


   a. Click Reset Factory Default.
   b. Create a backup if required.

2. Click Reset.



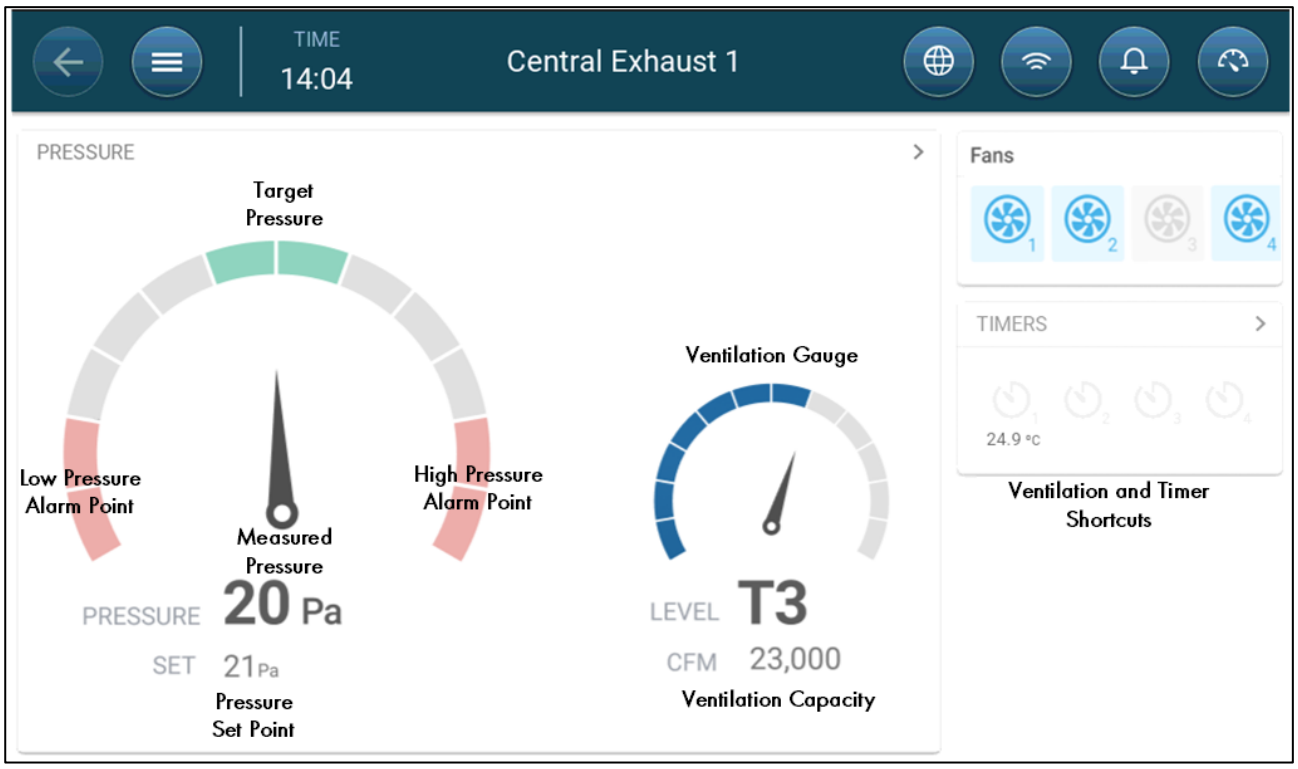
3. Click Start New Setup.



4. Click Central Exhaust.

17.3 Central Exhaust Dashboard

The basic task of the Central Exhaust Mode is to control and monitor the air pressure. The dashboard shows the pressure and ventilation status.



The dashboard details the pressure settings, ventilation settings, and installed devices. Fans and timers only appear if they are defined in System › Devices and Sensors (refer to the Installation Manual).

17.4 Central Exhaust Functions

Central Exhaust supports the following functions:

- Control
  - Ventilation Levels

NOTE Central Ventilation (Version 4.1.10) supports 30 levels of ventilation. Refer to Levels of Ventilation, page 103.

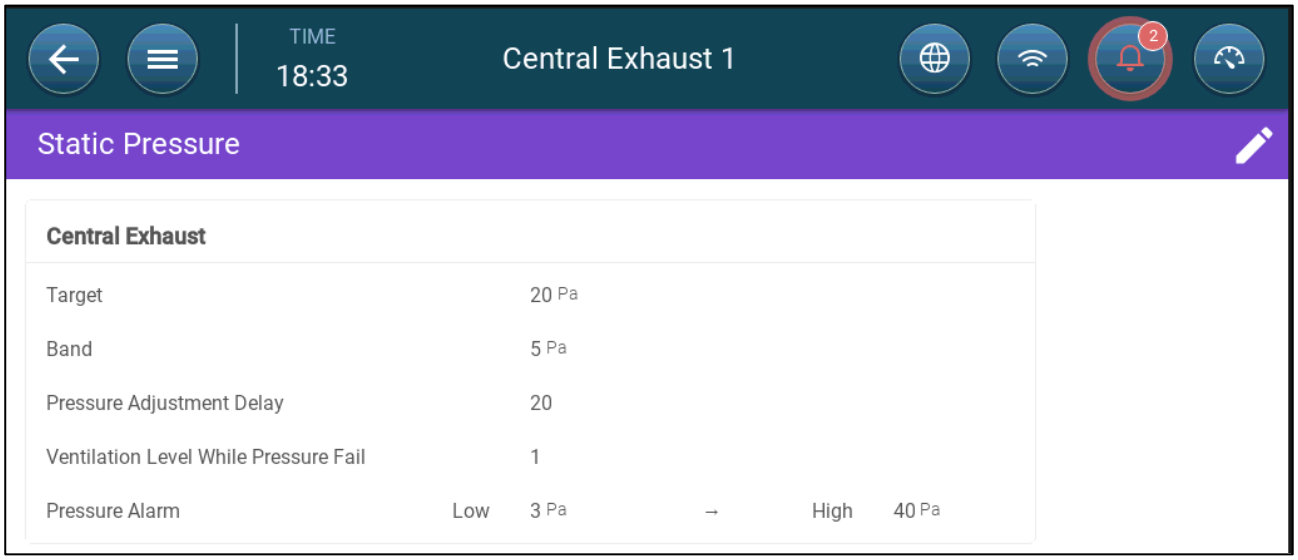
  - Cooling (Version 4.2.3 and above)
  - Pressure
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition (Installation Manual)
  - Device & Sensors Definition and Mapping (Installation Manual)
  - Room Settings

- Mapping Devices
- General
  - Time & Date
  - Static Pressure
  - Alarm
  - User
  - Network (TrioAir Manual)
  - Backup
  - About

17.5 Setting the Static Pressure

➲ **Enable a static pressure sensor in Devices & Sensors. Refer to the Installation Manual.**

1. Go to Control › Static Pressure.



2. Define the parameters:
   - Target: Set the desired target to maintain band. Range 0 – 100 Pascal.
   - 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 Adjustment Delay: When the pressure is outside of the band limits, define the amount of time that Trio waits before adjusting the inlets. Range 5 – 30 seconds.
   - Ventilation Level while Pressure Fails: In the event that the pressure sensor fails, set the ventilation level.

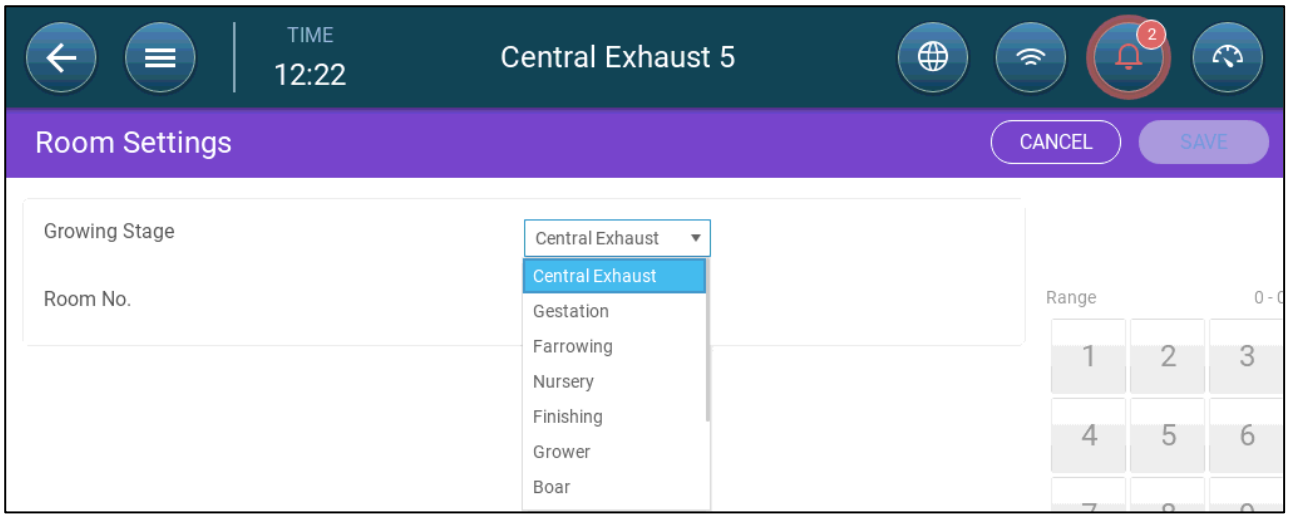
CAUTION *This parameter is extremely important and can ensure animal survival in the event of a sensor failure.*

   - Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.

17.6 Room Setting

In System › Room Settings, select the room mode. Room mode is based on the animals' growth stage. You can change the stage throughout the growth cycle. The default is Central Exhaust.

NOTE The room setting is used when comparing data from rooms, it does not change room settings.



- Gestation: Pregnancy period (114 days)
- Farrowing: From the piglets' birth until day 21 (when they are weaned).
- Nursery: This is the period when they are separated from their mothers.
- Finishing: Pigs are moved from the nursery to a finishing barn for 115 – 120 days.
- Grower: Same as Finishing
- Boar: Male pigs being raised for breeding.
- Gilts: Female pigs being raised for breeding.
- Weaners: Same as Nursery

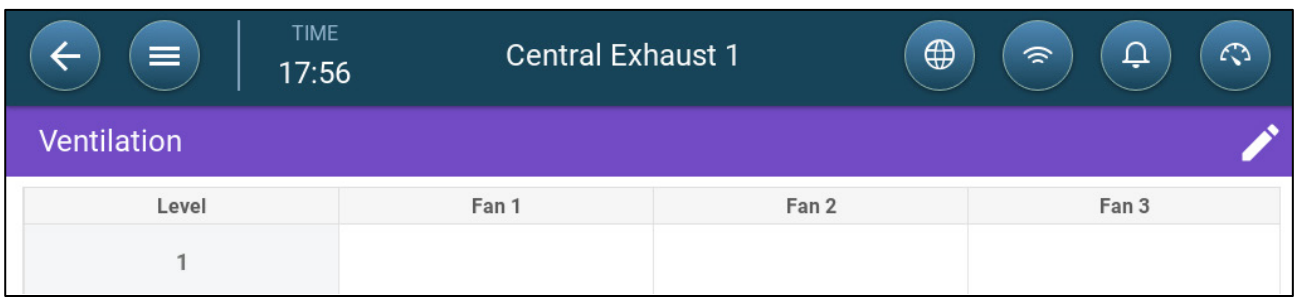
17.7 Levels of Ventilation

Central Exhaust supports 30 levels of ventilation. The user adds each layer manually.

To set up the ventilation levels:

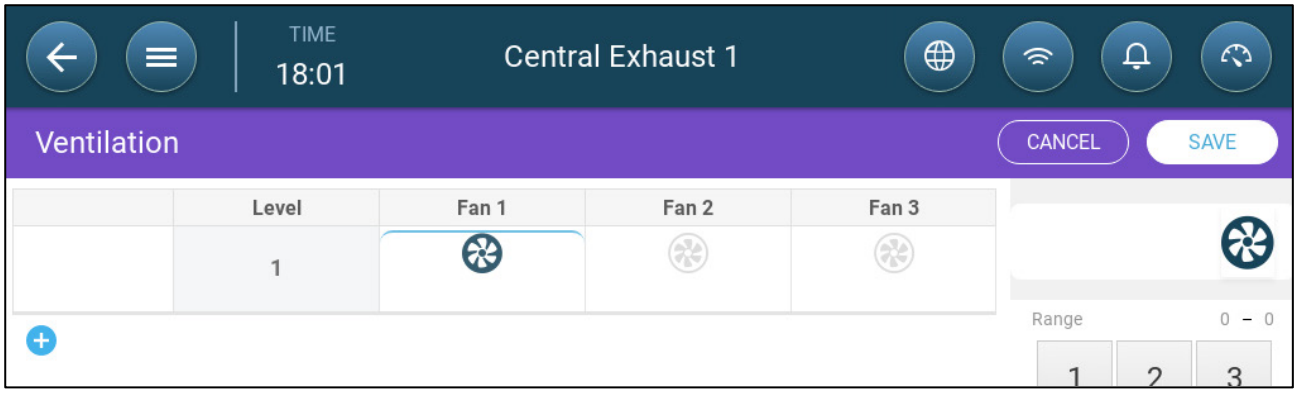
1. Go to System › Devices & Sensors and define the fans. Refer to the Installation Manual.

2. Go to Control › Ventilation.

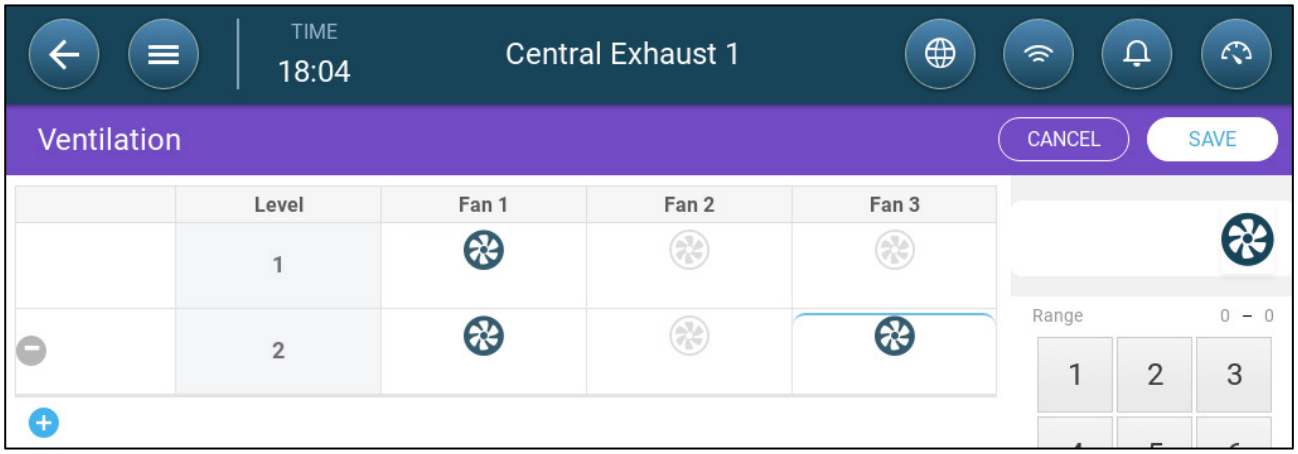


3. Click  .

4. Enable the fan(s) in Level 1 as required. Refer to Defining the Fans/Ventilation Scheme, page 28 for details.



5. Click  to add an additional level and define the Level 2 fan(s) as required.

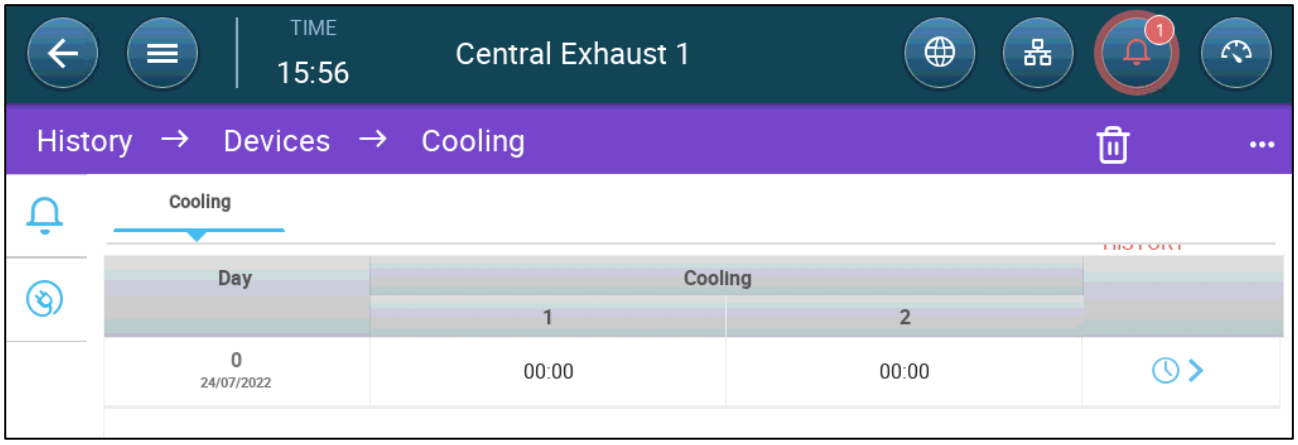


6. Repeat these steps, up to 30 levels.

7. Click **Save**.

17.8 History

Go to History › Devices › Cooling to view the controller's cooling data.



18 Appendix B: Central Corridor

The Central Corridor system supplies air to pigs, from a central corridor into individual rooms. The air in the corridor is kept at a defined pressure level by adjusting the inlets' position. If required, the air in the corridor can be heated before being distributed to the rooms. Central Corridor's functionality is designed to provide these services. Central Corridor can support two rooms.

- Introduction to Pressure Control
- Selecting Central Corridor
- Central Corridor Dashboard
- Central Corridor Functions
- Setting the Pressure Levels
- Defining the Heat
- Room Setting

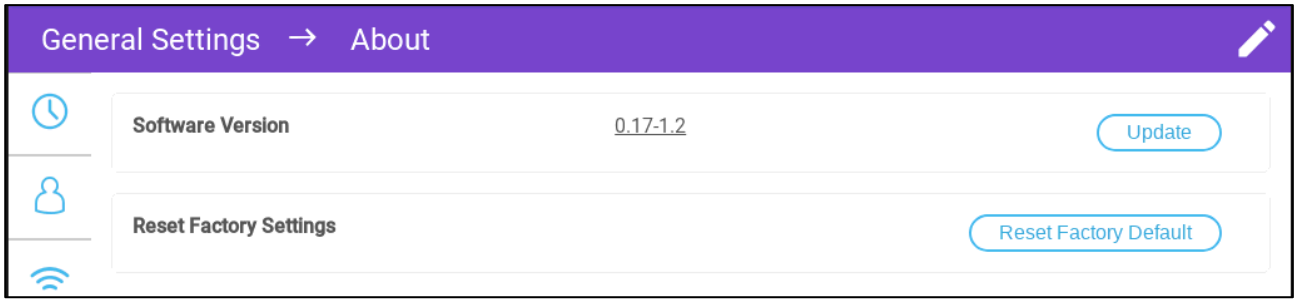
18.1 Introduction to Pressure Control

Trio adjusts the inlet positions to maintain the defined static pressure levels. Inlet position open or close as required to maintain a pressure level that is within the target level's band. To ensure that inlets open or close only when required, there is a delay time; the pressure must remain outside of the pressure band for a certain amount of time before the inlets move.

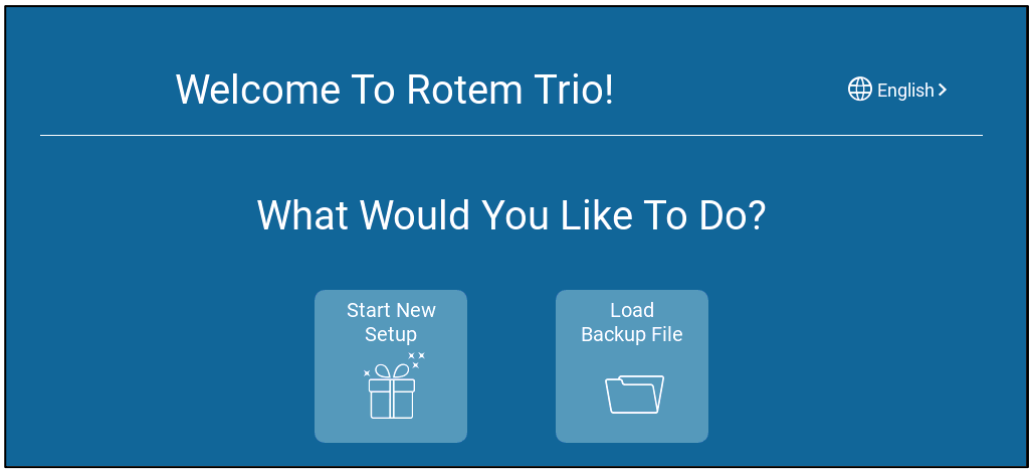
18.2 Selecting Central Corridor

To select the Central Corridor Mode:

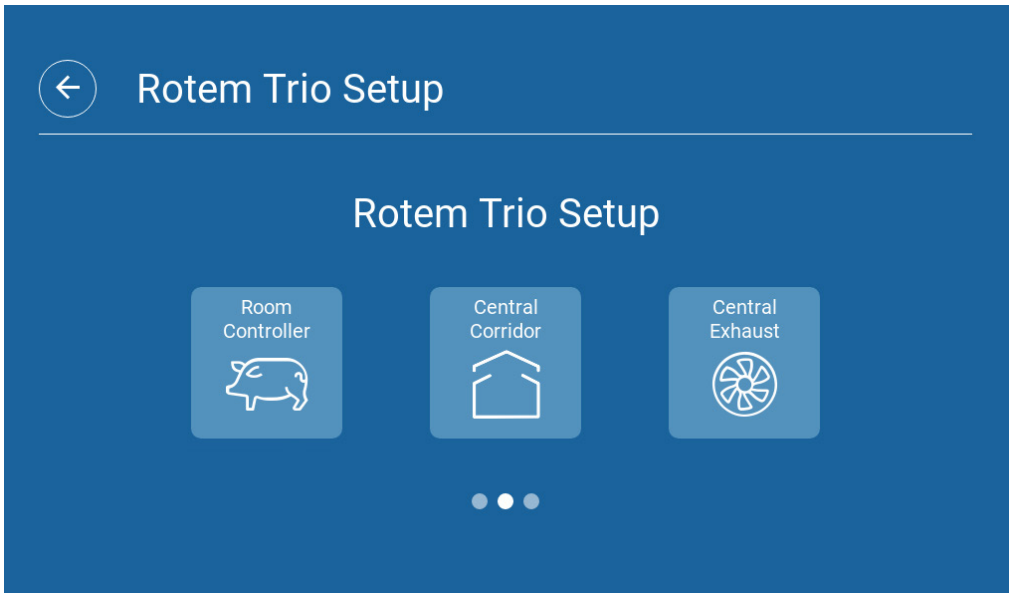
1. Perform a Cold Start. Go to System › General Settings › About.



   a. Click Reset Factory Default.
   b. Create a backup if required.
2. Click Reset.



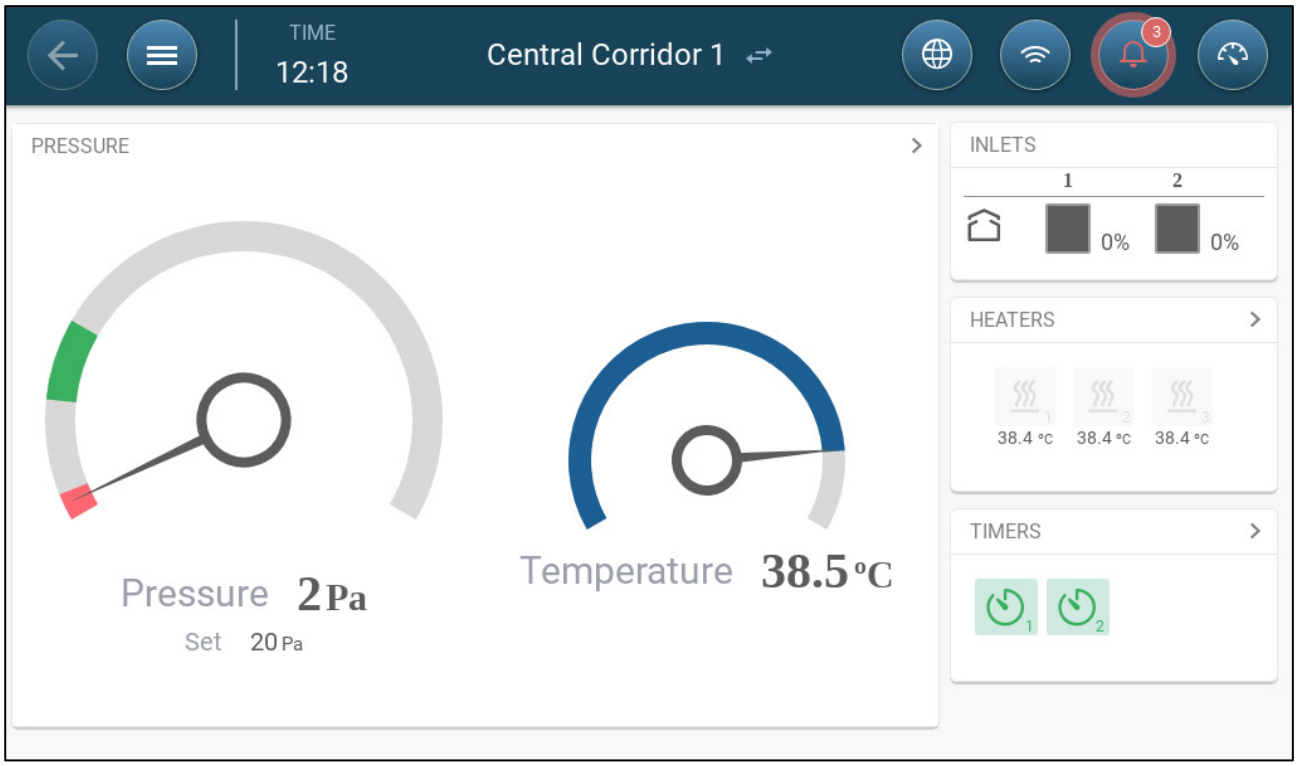
3. Click Start New Setup.



4. Click Central Corridor.

18.3 Central Corridor Dashboard

The basic task of the Central Exhaust Mode is to control and monitor the air pressure. The dashboard shows the pressure and ventilation status.



The dashboard details the current pressure, temperature, inlet openings, and heater status. These devices only appear if they are defined in System › Devices and Sensors (refer to the Installation Manual).

18.4 Central Corridor Functions

Central Corridor supports the following functions:

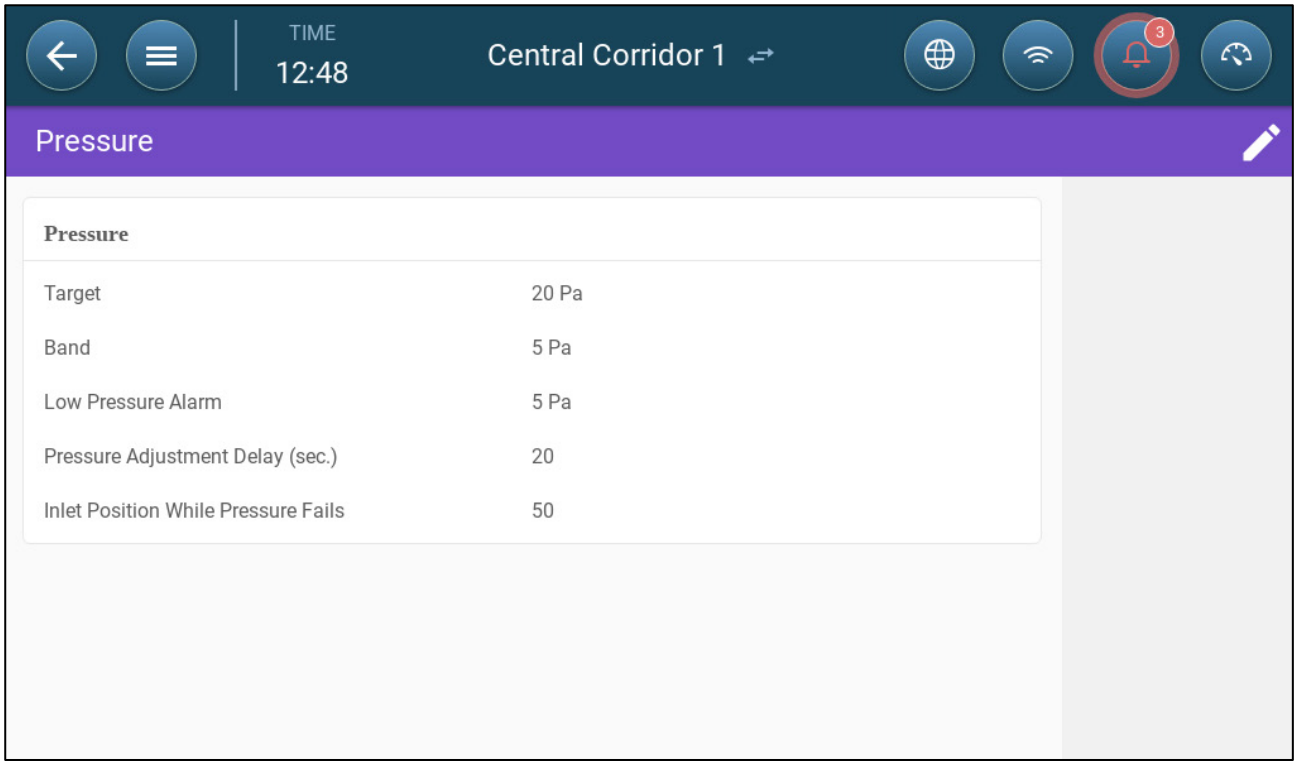
- Control
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition
  - Alarm Settings
  - Device & Sensors Definition and Mapping
  - Room Settings
  - Mapping Devices
  - General
    - Time & Date
    - Alarm
    - User
    - Network
    - File Saving and Loading
    - Software Update

18.5 Setting the Pressure Levels

➲ **Define Pressure. Refer to the Installation Manual.**

Enable a static pressure sensor in Devices & Sensors (refer to the Installation Manual).

1. Go to Control › Pressure.



2. Define the parameters:
    - Target: Set the desired target to maintain band. Range 0 – 100 Pascal.
    - 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.
    - Low Pressure Alarm: Define the pressure level at which an alarm is generated.
    - Pressure Adjustment Delay: When the pressure is outside of the band limits, define the amount of time that Trio waits before adjusting the inlets. Range 5 – 30 seconds.
    - Ventilation Level while Pressure Fails: In the event that the pressure sensor fails, set the ventilation level.

CAUTION *This parameter is extremely important and can ensure animal survival in the event of a sensor failure.*

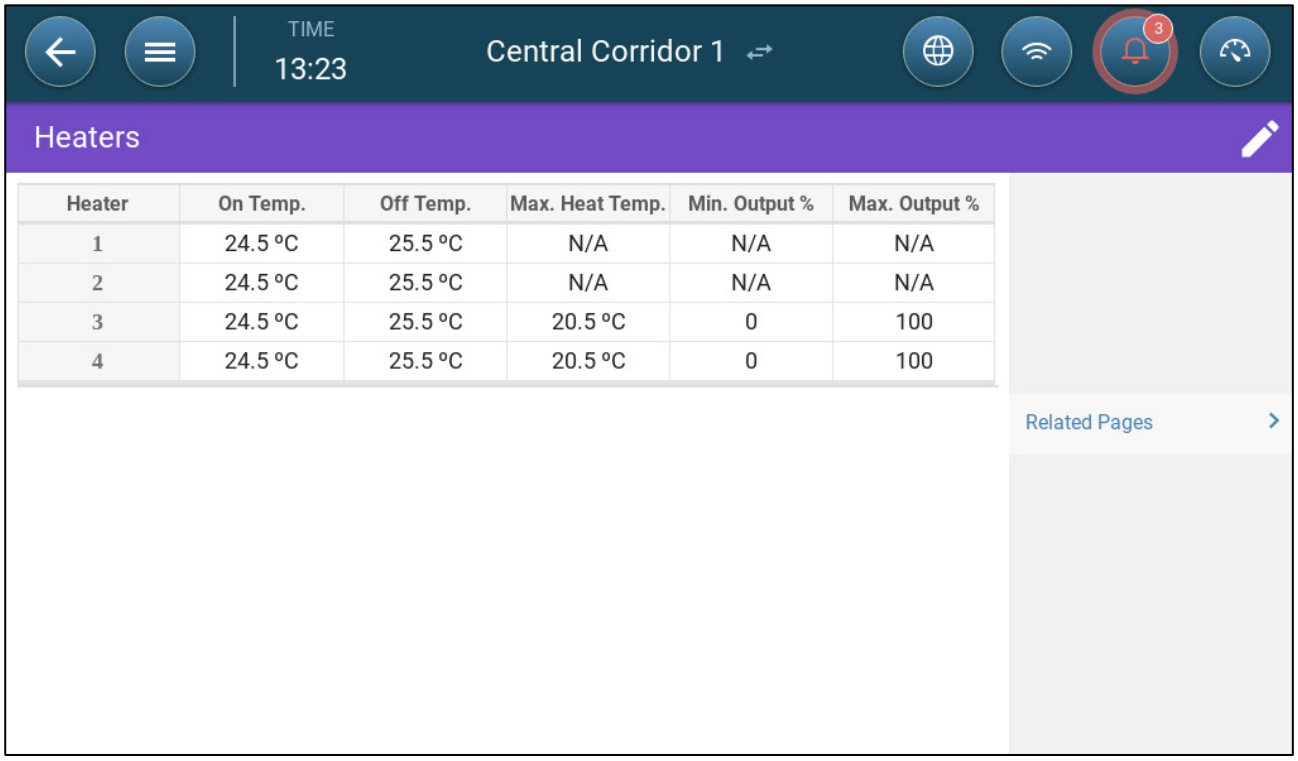
- Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.
- Inlet Position while Pressure Fails: In the event that the pressure sensor fails, define the inlet position to provide emergency ventilation.

18.6 Defining the Heat

Central Corridor enables heating the air before it enters the rooms. Heaters act as zone heaters.

➲ **Define up to six relays and/or ports as heaters. Refer to the Installation Manual.**

1. Go to Control › Heat. In the following example, four heaters are enabled, two on off heaters and two 0 – 10VDC variable heaters.



Heater	On Temp.	Off Temp.	Max. Heat Temp.	Min. Output %	Max. Output %
1	24.5 °C	25.5 °C	N/A	N/A	N/A
2	24.5 °C	25.5 °C	N/A	N/A	N/A
3	24.5 °C	25.5 °C	20.5 °C	0	100
4	24.5 °C	25.5 °C	20.5 °C	0	100

- In this example, Heaters 1 and 2 and on off heaters. Heaters 3 and 4 are variable heaters.

2. Define:

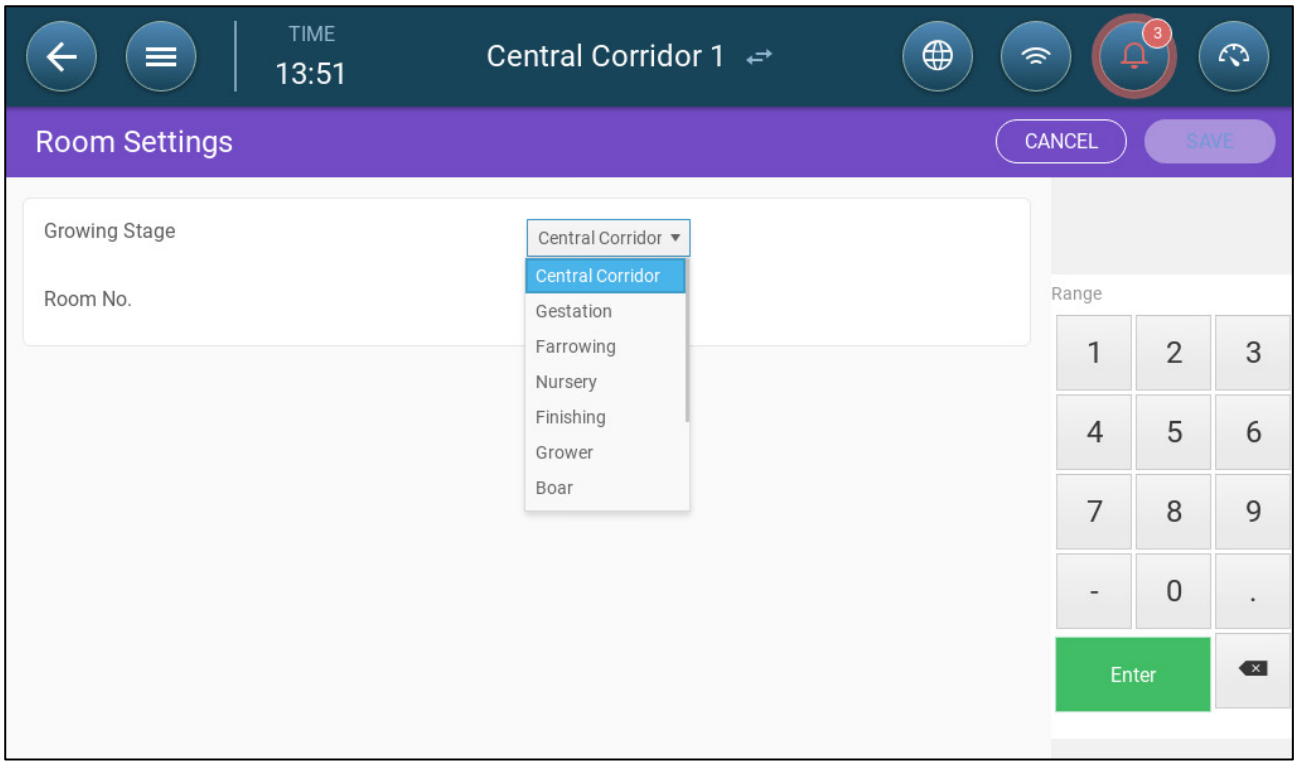
NOTE The temperatures here are absolute temperatures; there is no temperature band.

- On Temperature: Below this temperature, the heaters turn on. Range: -40° to Off temperature
- Off Temperature: Above this temperature, the heaters turn off. Range: Off temperature to 90° C.
- Max Heat Temperature: Set the temperature at which heaters work at maximum capacity. Range: -40° to On temperature
- Minimum Output: Set the voltage at which heaters work at their minimum level.
- Maximum Output: Set the voltage at which heaters work at their maximum level.

18.7 Room Setting

In System › Room Settings, select the room mode. Room mode is based on the animals' growth stage. You can change the stage throughout the growth cycle. The default is Central Corridor.

NOTE The room setting is used when comparing data from rooms, it does not change room settings.



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.

Ag/MIS/ImEN-2748-09/19 Rev 4.1