TRIO
Controller

User and Installation Manual

TRIO

Swine Controller

Ag/MIS/ImEN-2748-09/19 Rev 1.8

P/N: 116798

Munters

TRIO Swine Controller

User and Installation Manual

Rev 1.8, 02/2021
Software Ver: 3.0.5-1.4

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

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

Index

1 Introduction

1.1 Disclaimer

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

1.2 Introduction

Congratulations on your excellent choice of purchasing a TRIO 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 Precautions

CAUTION *Protection provided by the equipment can be impaired if the equipment is used in a manner not specified by the manufacturer!*

CAUTION *There is a risk of explosion if the lithium battery is replaced with an incorrect type. Replace the battery using the same type and manufacturer only.*

- Grounding
- Filtering
- Checking the Battery Level
- Frequency Inverters

2.1 Grounding

- Always connect temperature and sensor shields to earth ground. Avoid mixing high voltage wiring with sensor and low voltage wiring.
- Keep the controller as far as possible from heavy contactor boxes and other sources of electrical interference.
- Do not connect communication wire shields, which go from one house to another at both ends. Connect them at one end only. Connection at both ends can cause ground loop currents to flow, which reduce reliability.
- The COM connection for communications is not the shield wire. The COM, RX and TX wires must connect to each other at all controllers.

2.2 Filtering

If this installation includes a power inverter to drive variable speed fans, install an EMI filter in front of the inverter, according to the specifications provided by the inverter manufacturer. Refer to the inverter documentation.

2.3 Checking the Battery Level

Check the battery once a year. The output must be 2.7 volts (minimum). Authorized personnel only must replace the battery if the output is below the minimum required level or every five years.

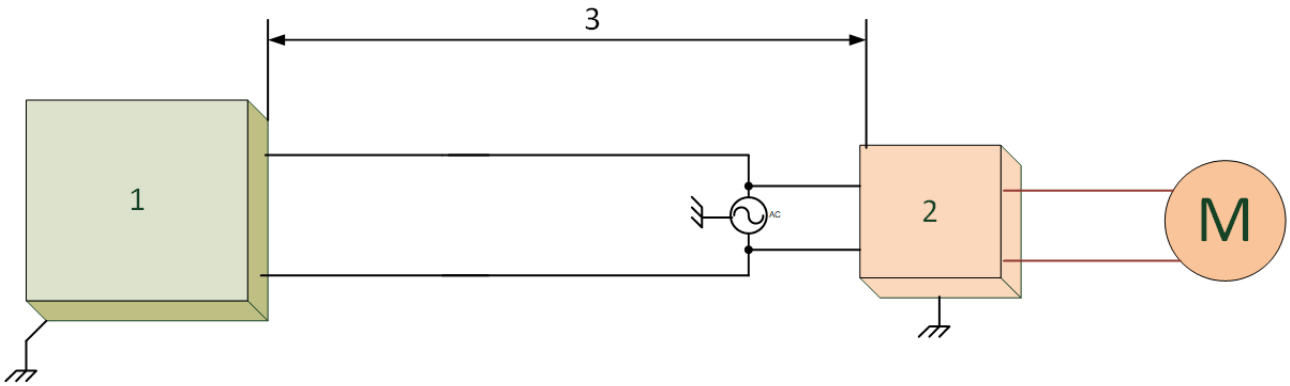
2.4 Frequency Inverters

Frequency inverters can cause severe electrical and electromagnetic interference. Therefore, when employing a frequency inverter, it is critical that you carefully follow the manufacturer's installation instructions.

In particular verify:

- That the cable shielding between the inverter and any motor meets industry standards
- Proper grounding of the inverter's chassis and motor power cable

- Proper grounding of low voltage cable shield wire
- That the controller and inverter cables are kept in separate conduits or wire bundles



1. Controller
2. Inverter
3. Place the controller at least five meters from the inverter

3 Unit Installation

The following sections detail how to mount and wire the TRIO.

NOTE Munters recommends that a trained technician perform the following operations.

- Preliminary Information
- Mounting the Unit
- Layout
- Wiring Diagrams
- Pressure Sensor Hoses
- Key
- Product Symbols

3.1 Preliminary Information

- Safety Precautions
- What Comes in the Package

3.1.1 SAFETY PRECAUTIONS

CAUTION *These units must be installed by an authorized electrician. Disconnect the power to avoid electrical shock and damage.*

NOTE Installation Category (Over voltage Category) II

- The power supply to the controller should be protected by 1 amps circuit breaker.
- All electrical connections should comply with National Electrical code (NEC).

3.1.1.1 Grounding and Shielded Wiring

- ***From the ground terminal, run a heavy wire directly to the ground rod. If necessary, run a heavy ground wire to the electrical service grounding system rather than directly to the ground rod.***
- Do not use light wires for these ground connections. They must carry heavy lightning currents, sometimes exceeding thousands of amperes. Certainly, do not use the shielding of sensor and low voltage wiring for this purpose.
- When splicing sensors to longer wires, ensure that the splice is **waterproof**. Use adhesive lined heat shrink (marine grade) to make waterproof connections.
- Every low power device (digital, analog, or communication) must have a shield cable connected to the unit ground strip.

3.1.1.2 Installation and Electrical Connections

- Install computerized electronic controls at least three feet (one meter) away from interference sources such as high voltage wiring to motors, variable speed, light dimmers, relays.

- Install electronic controls in a separate ventilated control room that is protected from extreme temperatures and dirty environments. Place the controls so that the operators can conveniently use the control and read indicators and displays.
- Keep low voltage wires separate from high voltage wires.
- Use shielded wiring for low level signals. For buried wiring (building to building runs) use high grade jell filled cables that are impervious to moisture.
- Seal cable entry points and control boxes to prevent contamination and corrosion. If you use silicon sealant with acetic acid cure, keep the control open and ventilated until cured. Otherwise, the acetic acid will attack the metal parts, including circuitry.

3.1.2 What Comes in the Package

- One TRIO unit
- One hanging bracket
- Two screws

3.2 Mounting the Unit

- Knockouts
- Hanging the Unit

3.2.1 Knockouts

1. Using the supplied clips and screws, mount the TRIO.
2. On the bottom the TRIO are knockouts used to route the low and high voltage cables.

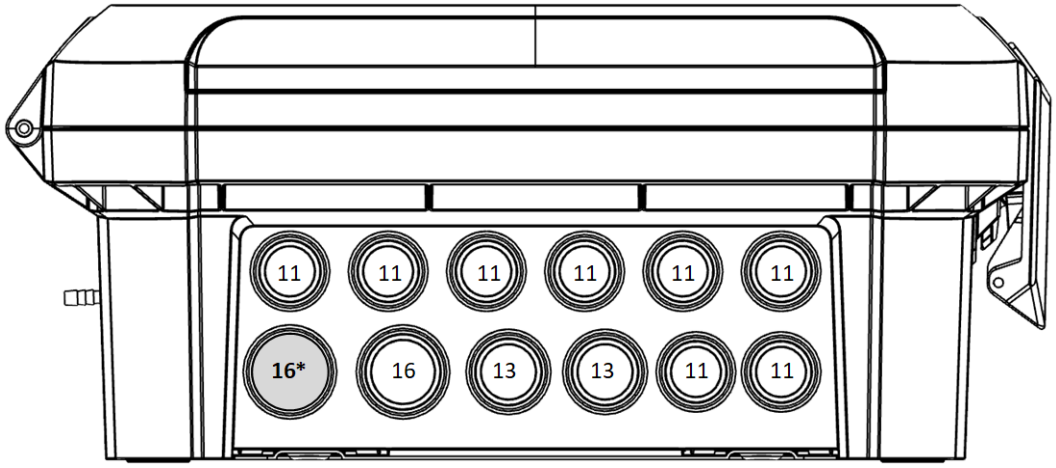


Figure 1: TRIO Knockouts and PG Size

   - Using a screwdriver and a hammer, gently apply pressure to the knockouts.
   - **Only open up the holes that you require**.
   - Munters recommends removing the knockouts before mounting the unit.
   - 16*: Use this knockout for the Ethernet cable.
3. Place the required cables through the cable holders at the bottom of the unit.

CAUTION Run low voltage cables through one knockout and high voltage relay cables through a separate knockout. Do not place them in the same knockout!

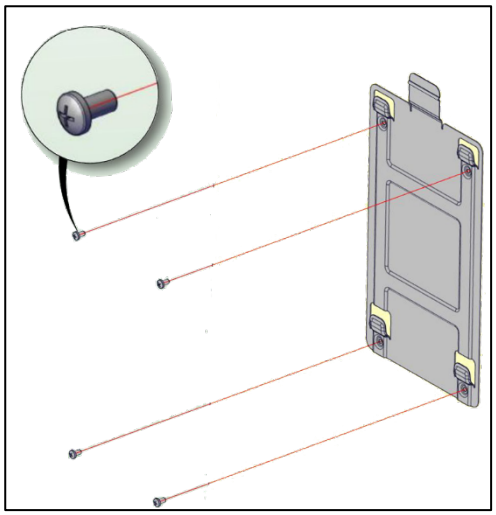
4. Close the TRIO enclosure lid carefully and tightly. Use RTV silicon or equivalent sealant to seal the cable holders.

CAUTION *Munters strongly recommends that you seal all entry spots with RTV silicon. Failure to do so can lead to damage to the unit.*

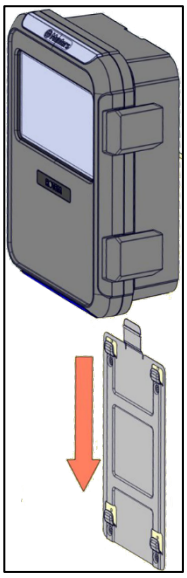
5. After installation is completed, operate the TRIO for a few hours and re- check for proper operation.

3.2.2 HANGING THE UNIT

1. Attach the bracket to the wall (customer supplies the screws).



2. Hang the TRIO on the bracket.



3. Secure the unit to the wall using the two screws provided (optional).

3.3 Layout

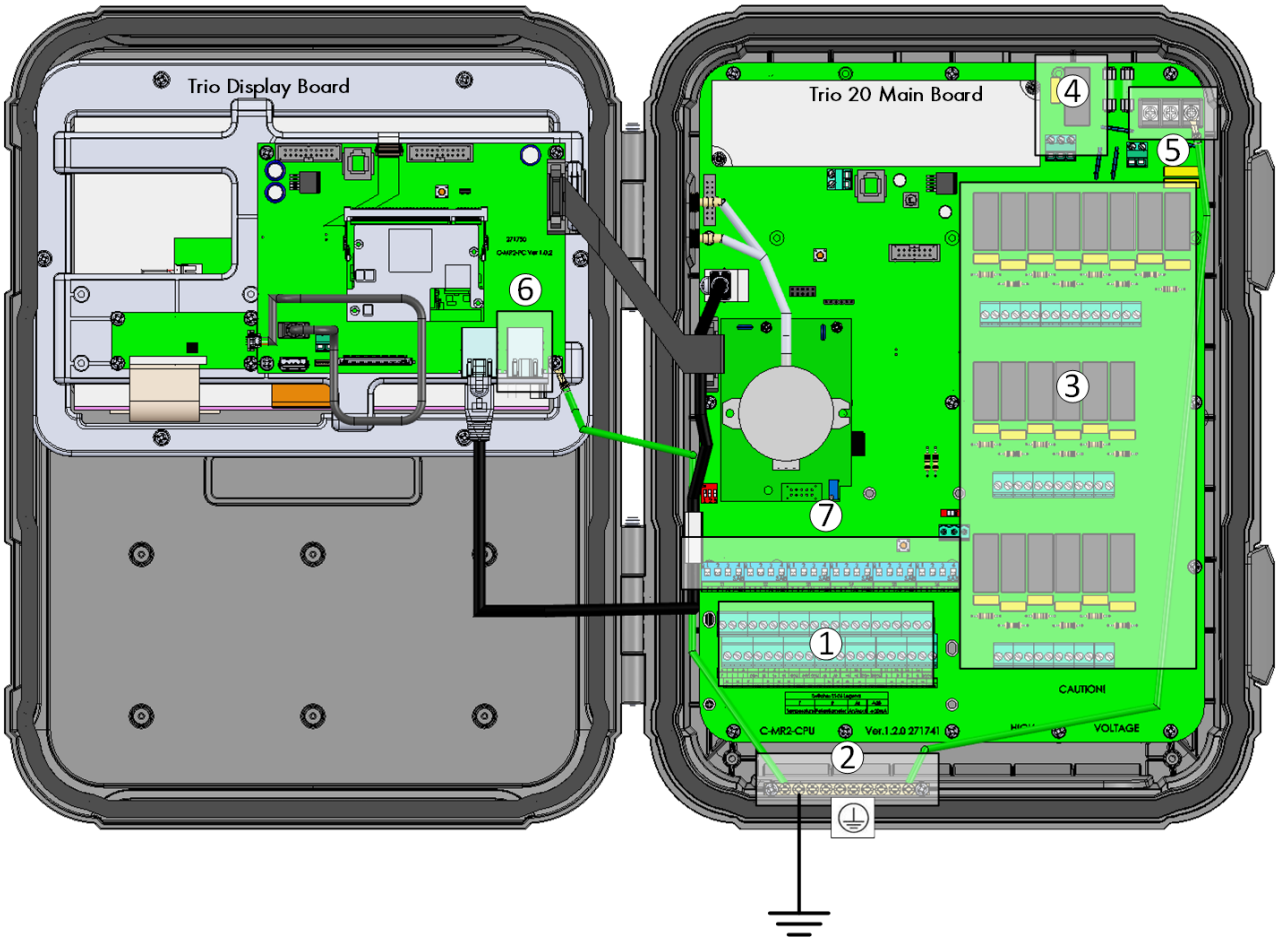


Figure 2: Board layout

1	Analog/digital ports	5	Power ports
2	Ground strip	6	Ethernet port
3	20 relays	7	Dipswitches
4	Alarm relay		

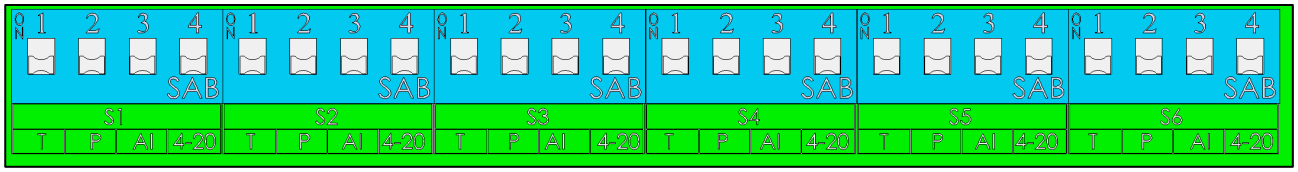


Figure 3: Dipswitches, expanded

- **One dipswitch only** in each set is raised.
- Only raise a dipswitch if a device is wired to an **S port**.

3.4 Wiring Diagrams

- High Voltage Relays
- Alarms and Power
- Internet Connection
- Analog Output Devices
- Digital Devices
- Analog Input Devices

3.4.1 HIGH VOLTAGE RELAYS

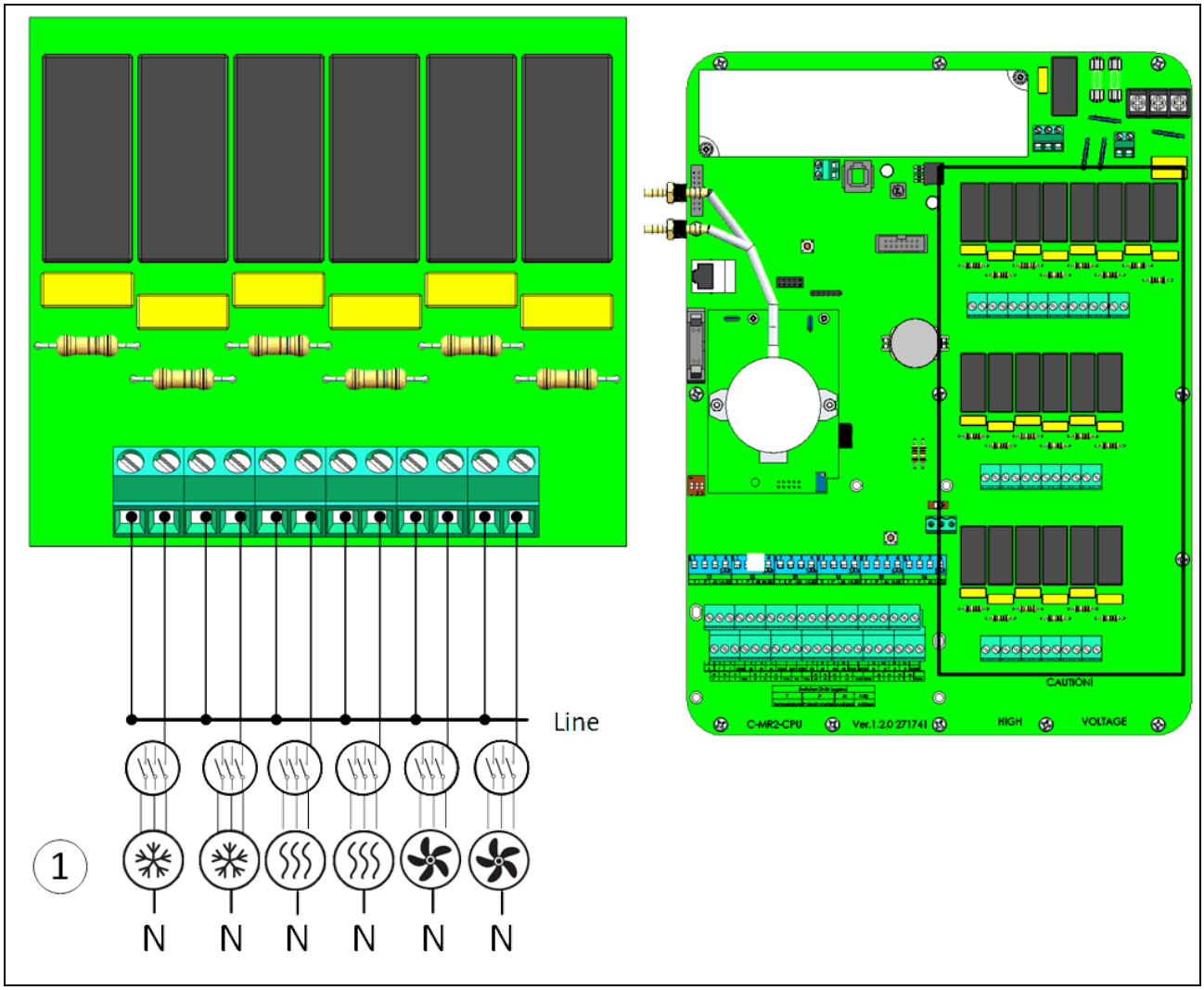


Figure 4: High voltage devices (examples)

1	Example of devices

NOTE The relays control motors and heating devices via contactors, not directly.

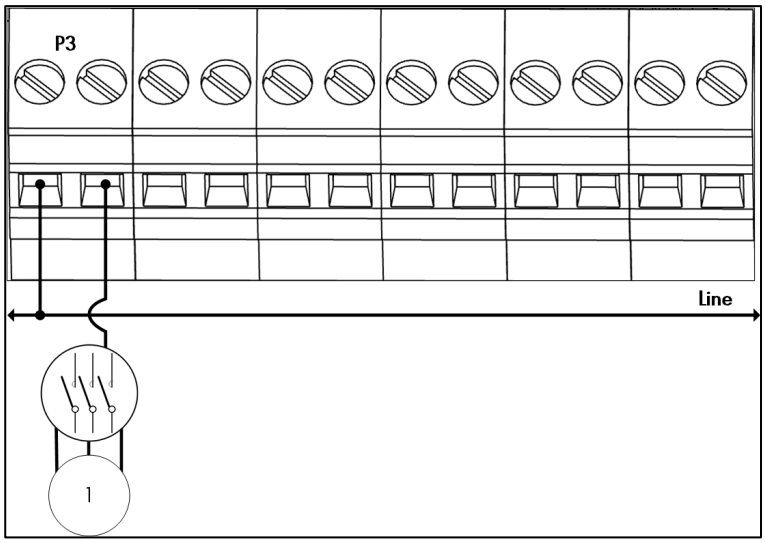


Figure 5: Relay wiring detailed view

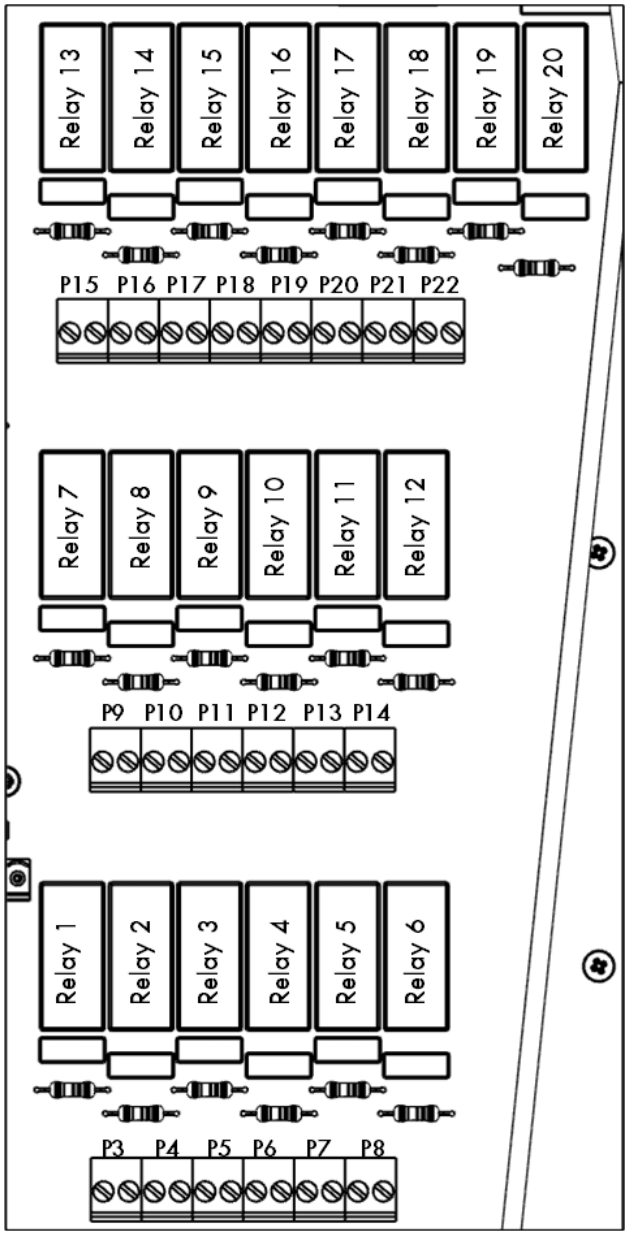


Figure 6: Relay and port numbering

3.4.2 ALARMS AND POWER

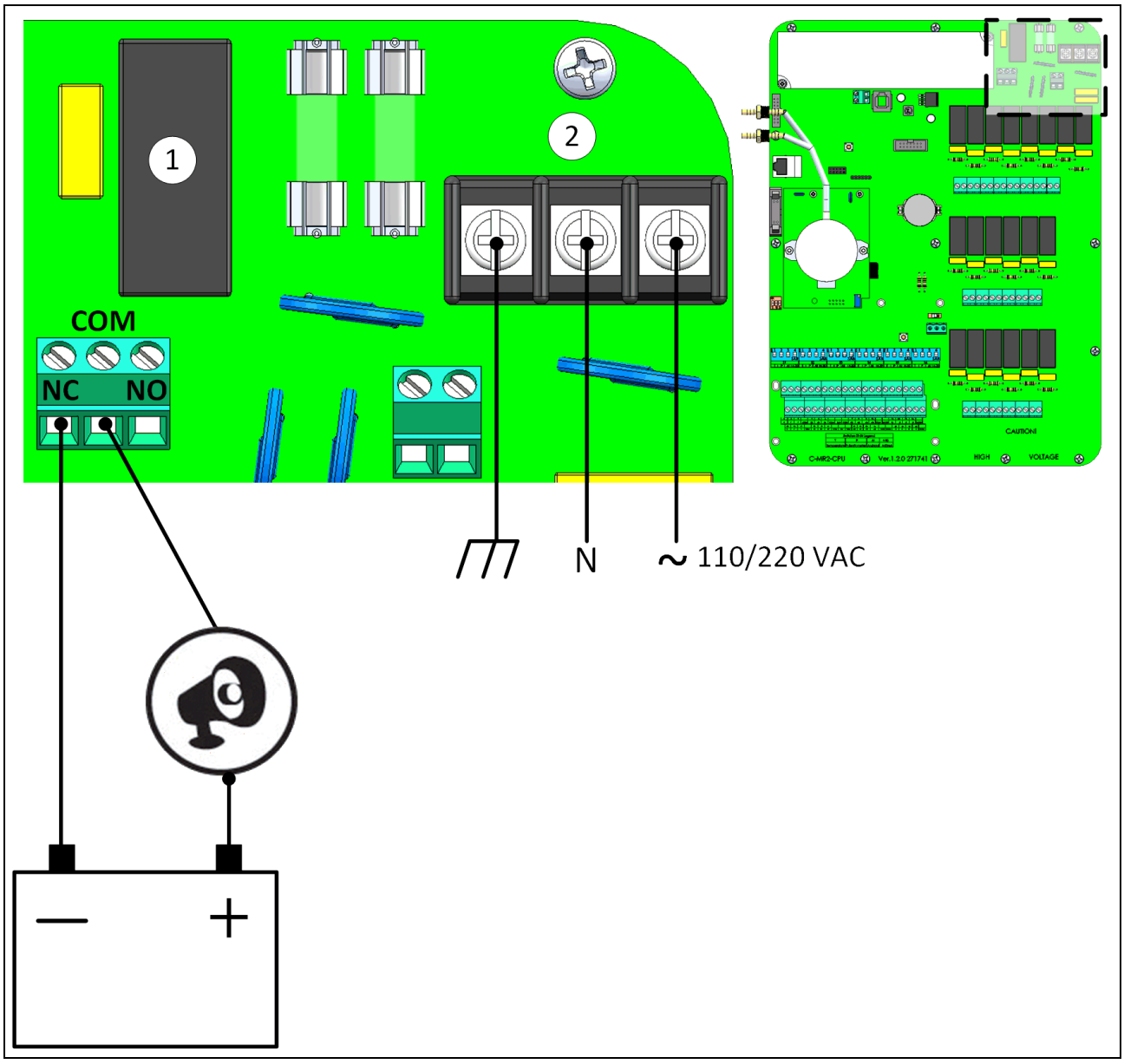


Figure 7: Alarm relay and power ports

1	Alarm relay
2	Power ports

- Connect the light or siren device to the alarm relay.

3.4.3 INTERNET CONNECTION

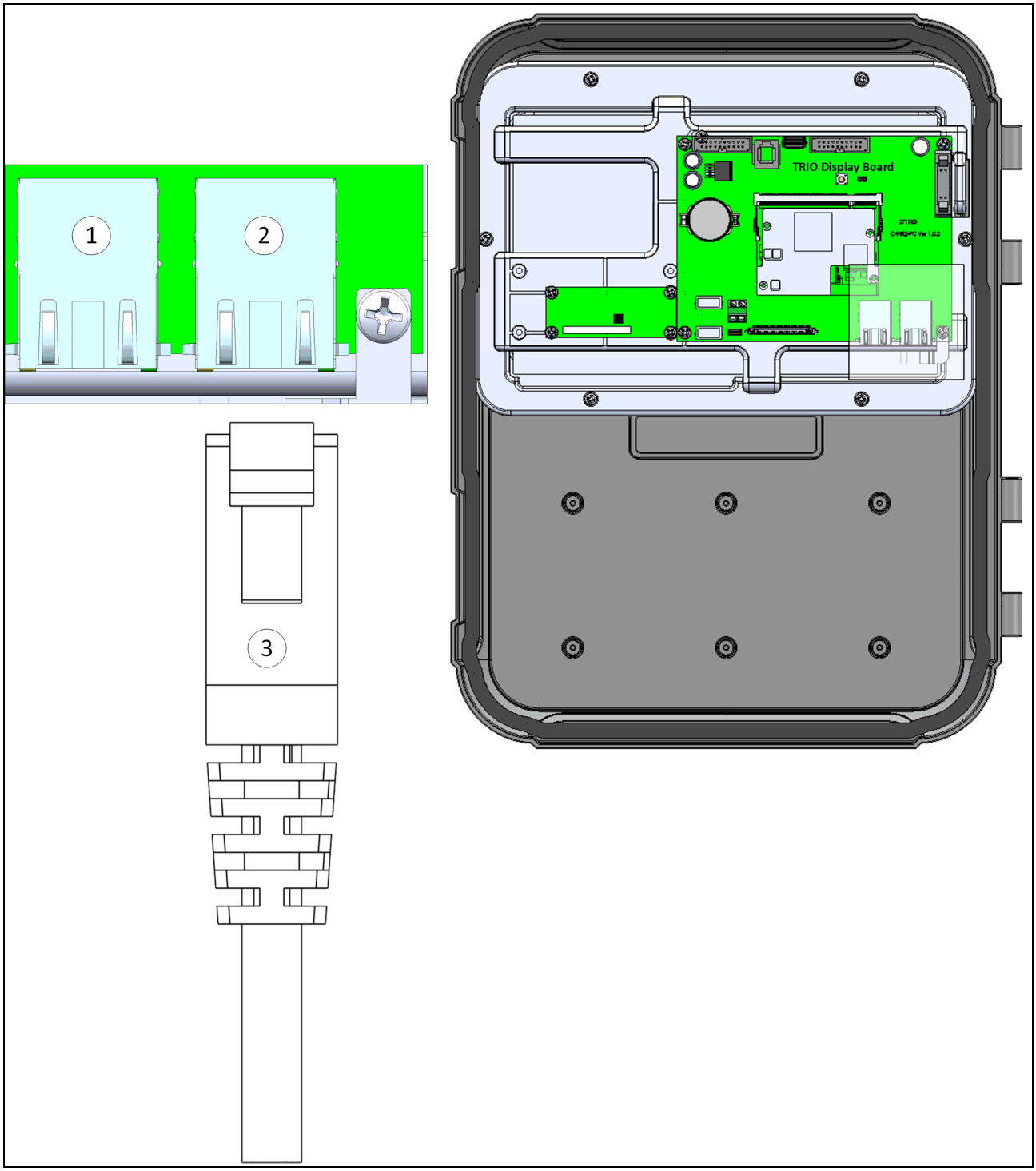


Figure 8: Ethernet port

CAUTION Connect the internet cable to port 2. Do not connect the cable to port 1.

1	Internal port (do not use this port)
2	Ethernet port
3	RJ-45 cable

3.4.4 ANALOG OUTPUT DEVICES

TRIO supports analog control over a variety of devices.

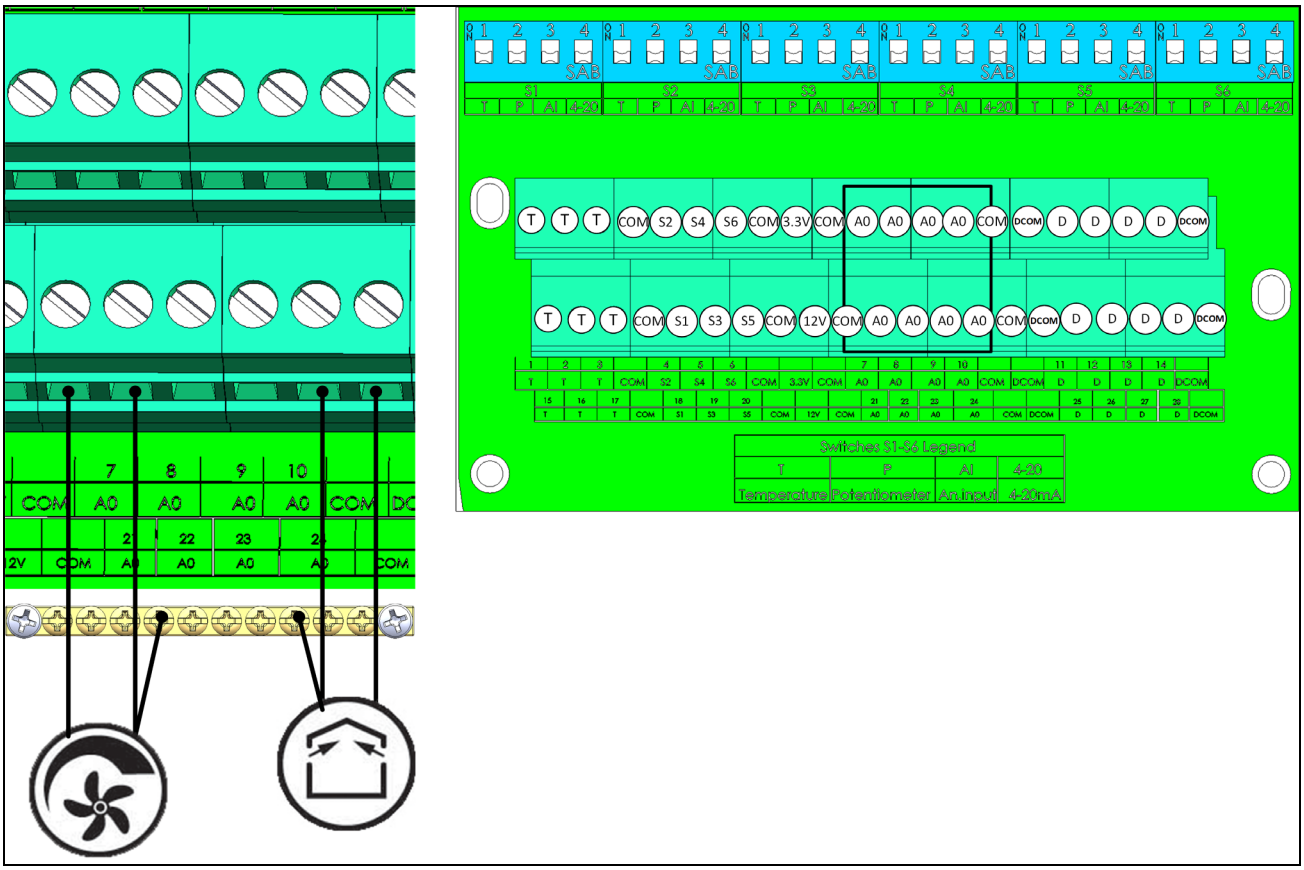


Figure 9: Analog Output devices (examples)

Connect analog output devices to an AO and a COM port. **Ground these devices!**

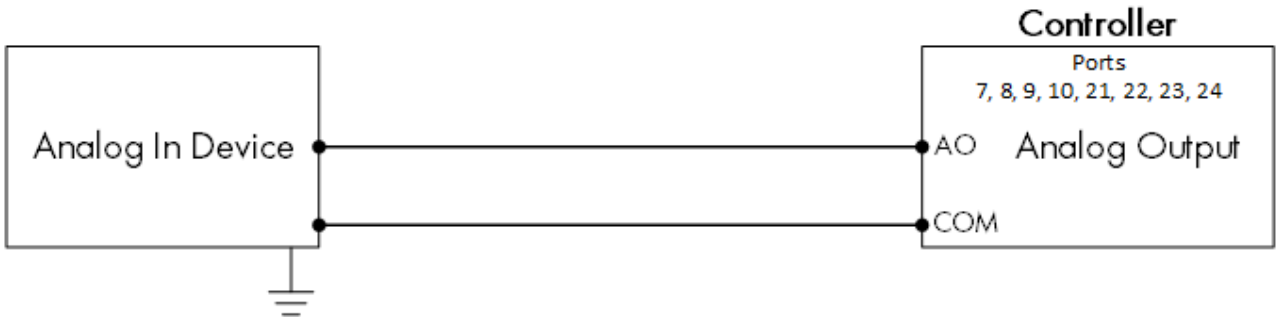


Figure 10: Analog Device Wiring Schematic

3.4.5 DIGITAL DEVICES

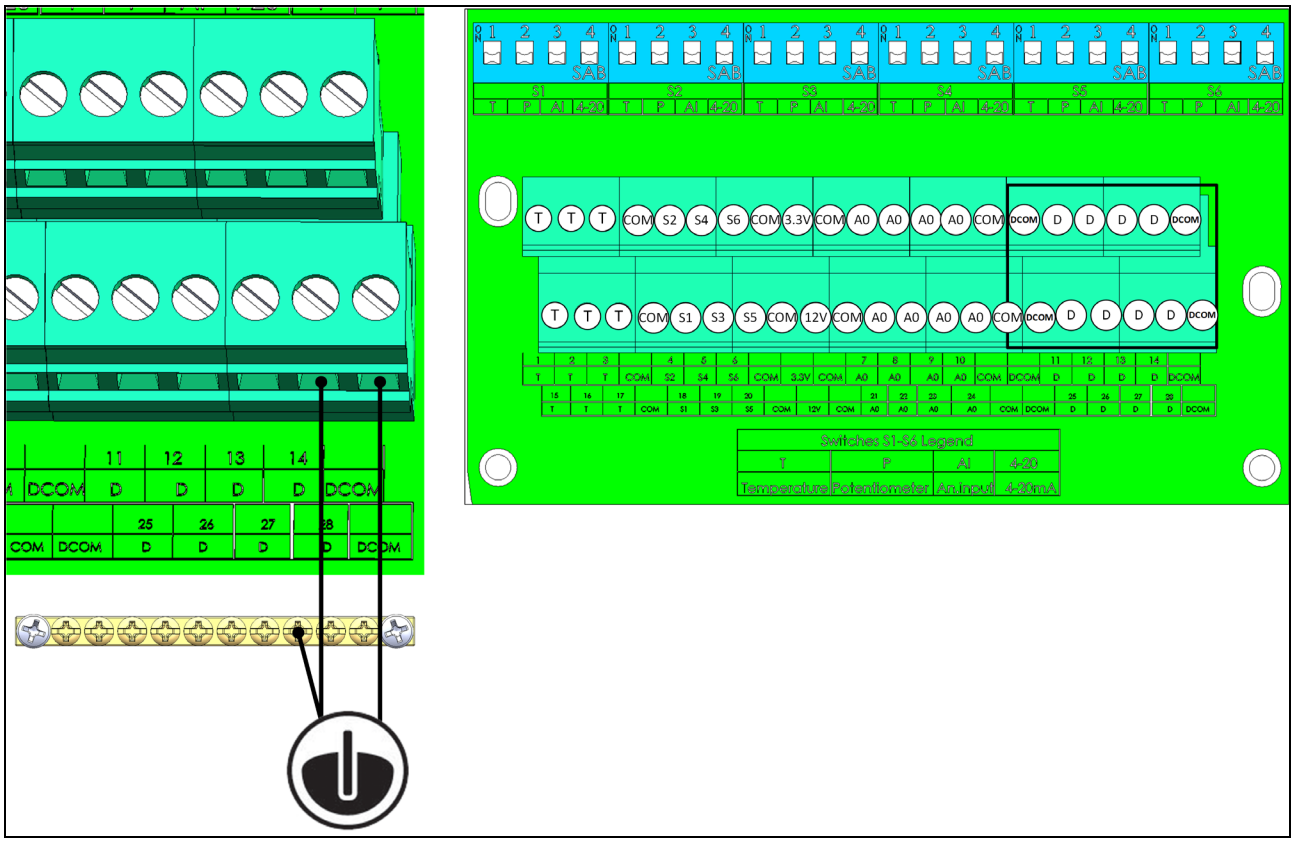


Figure 11: Digital Input devices (examples)

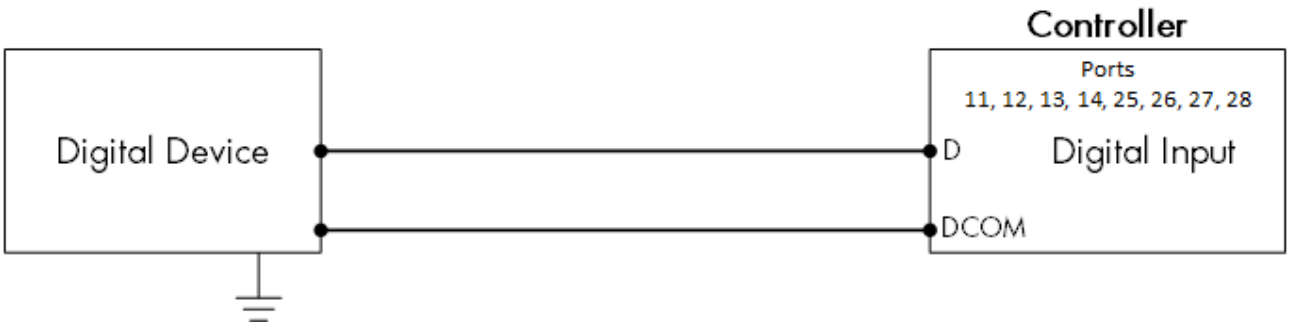


Figure 12: Digital Device Wiring Schematic

- Connect digital devices to a D port and a DCOM port.
- TRIO supports water meters and auxiliary inputs.

3.4.6 ANALOG INPUT DEVICES

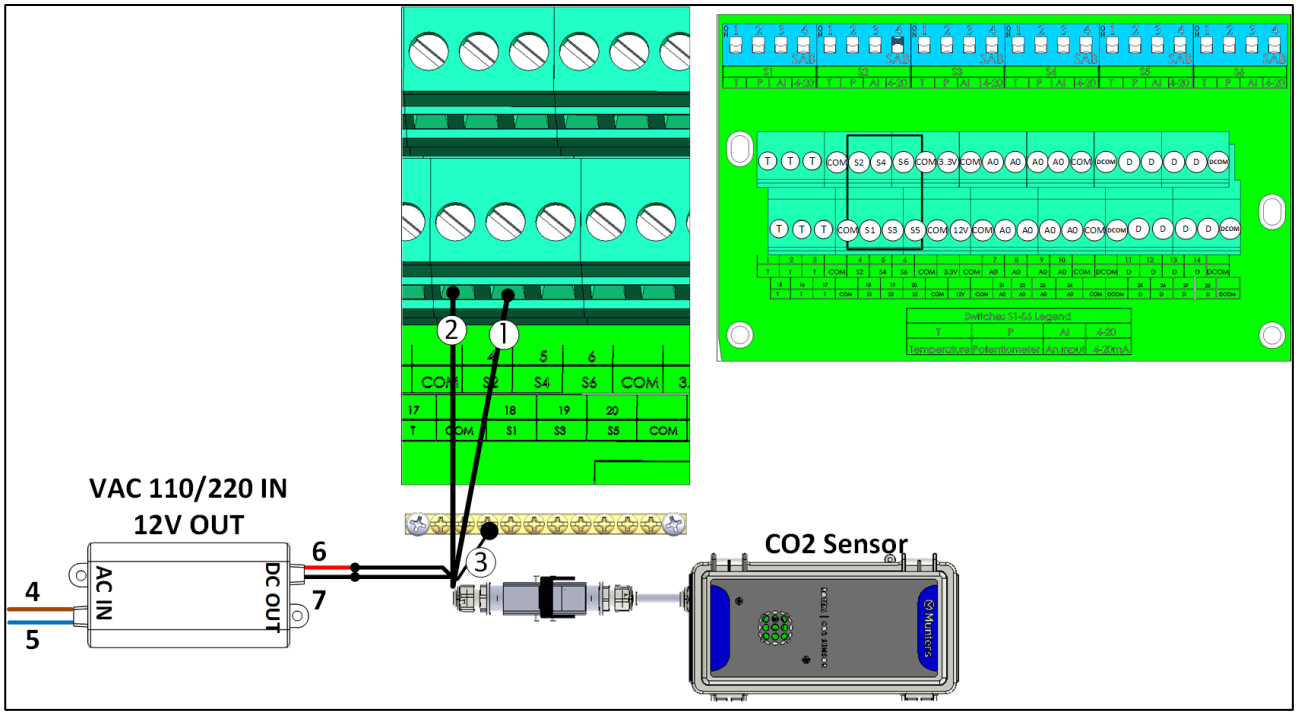


Figure 13: CO2 Sensor Wiring

Number	Function
1	S port
2	COM port
3	Shield wire
4	Brown wire: phase
5	Blue wire: neutral
6	Red wire: +12VDC
7	Black wire: -12VDC

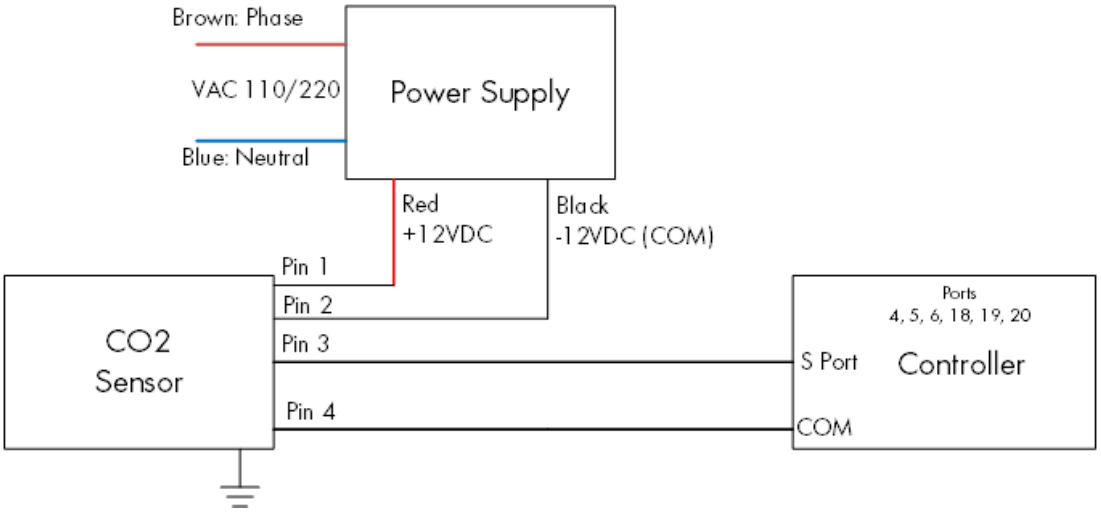


Figure 14: CO2 Sensor Wiring Schematic

- Connect the CO2 device to:
  - Controller:
    - S port. In the corresponding dipswitch, raise dipswitch 4 (4-20 mA).
    - COM port
  - Power supply
    - +12V
    - -12V

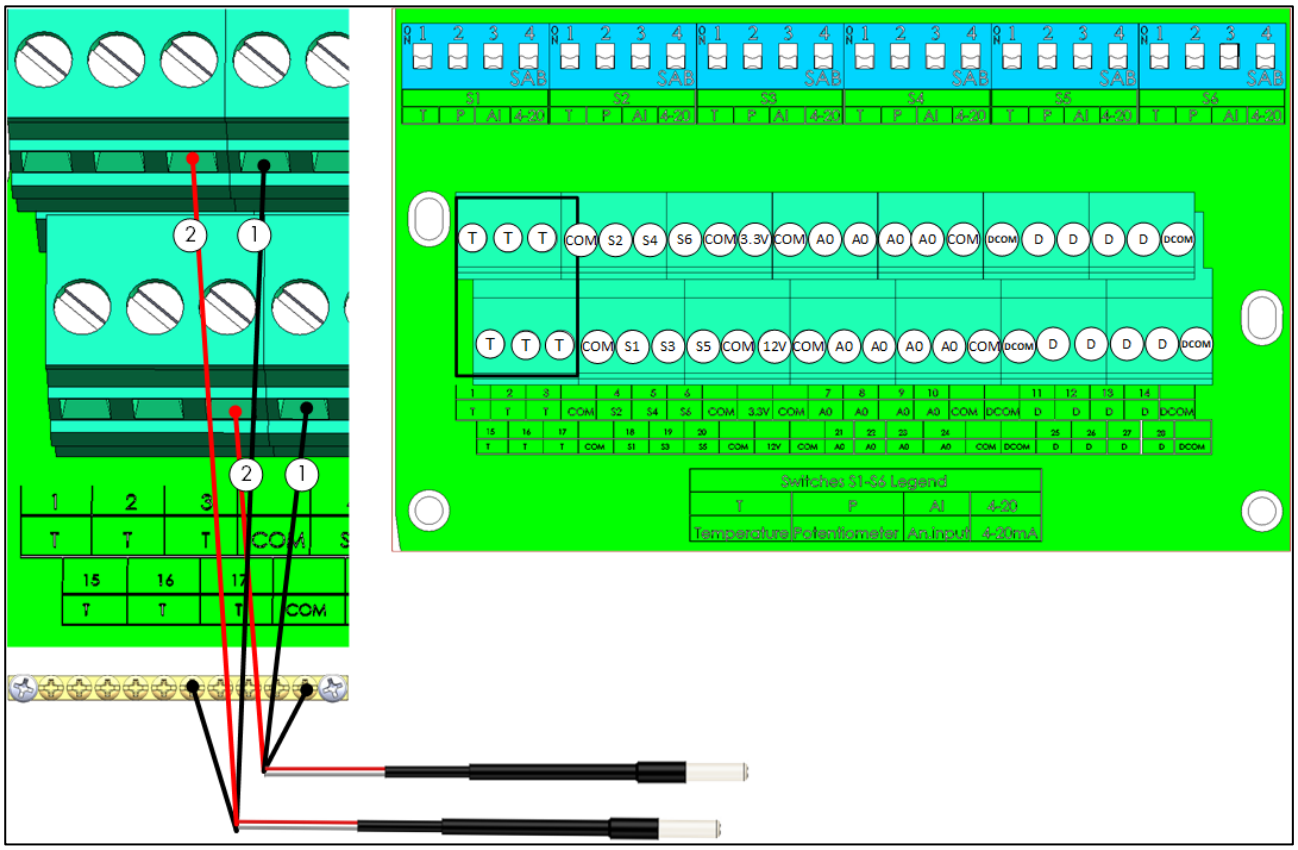


Figure 15: RTS Wiring

Number	Function
1	COM port (black wire)
2	T port (red wire)

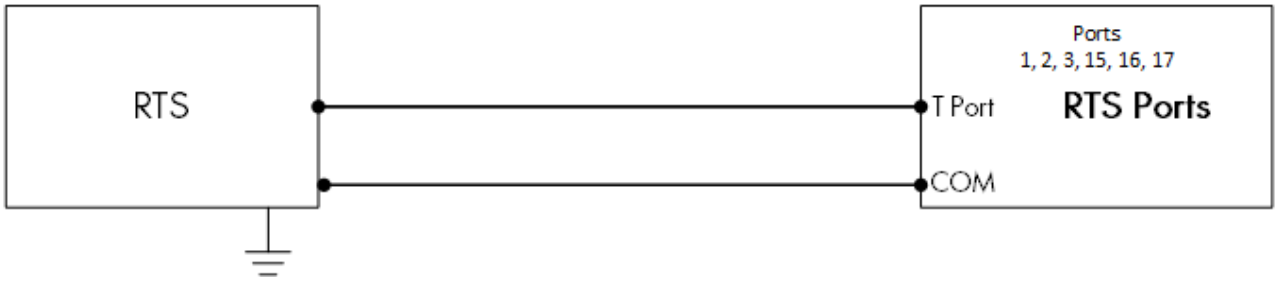


Figure 16: RTS Wiring Schematic

- Connect each RTS sensor to a:
  - T port
  - COM port
  - Grounding strip!

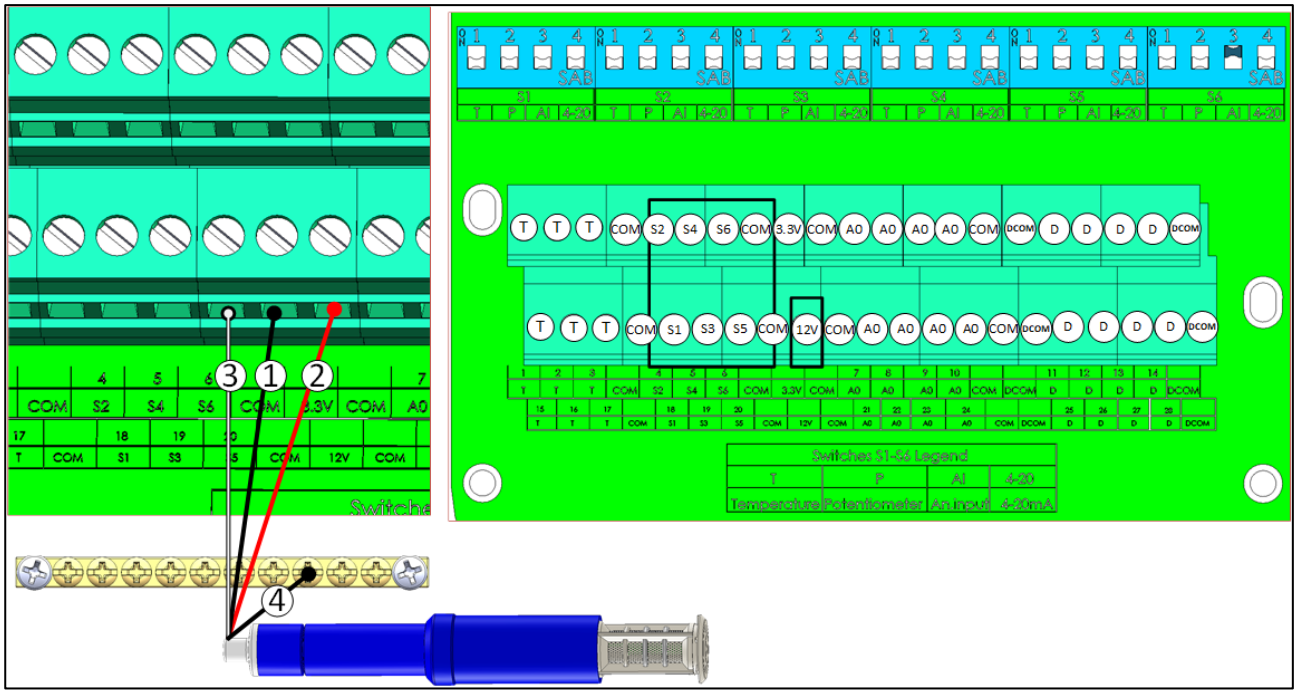


Figure 17: RHS+ Wiring

Number	Function
1	COM port (black wire)
2	12V (red wire)
3	S port (white wire)
4	Shield wire

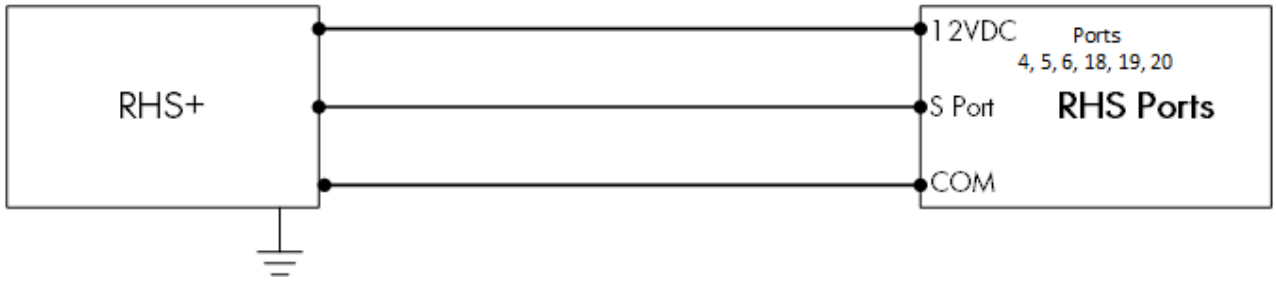


Figure 18: RHS+ Sensor Wiring Schematic

- Connect each RHS+ sensor to a:
  - S port. In the corresponding dipswitch, raise dipswitch 3 (analog input).
  - COM port.
  - 12VDC port.
  - Grounding strip!

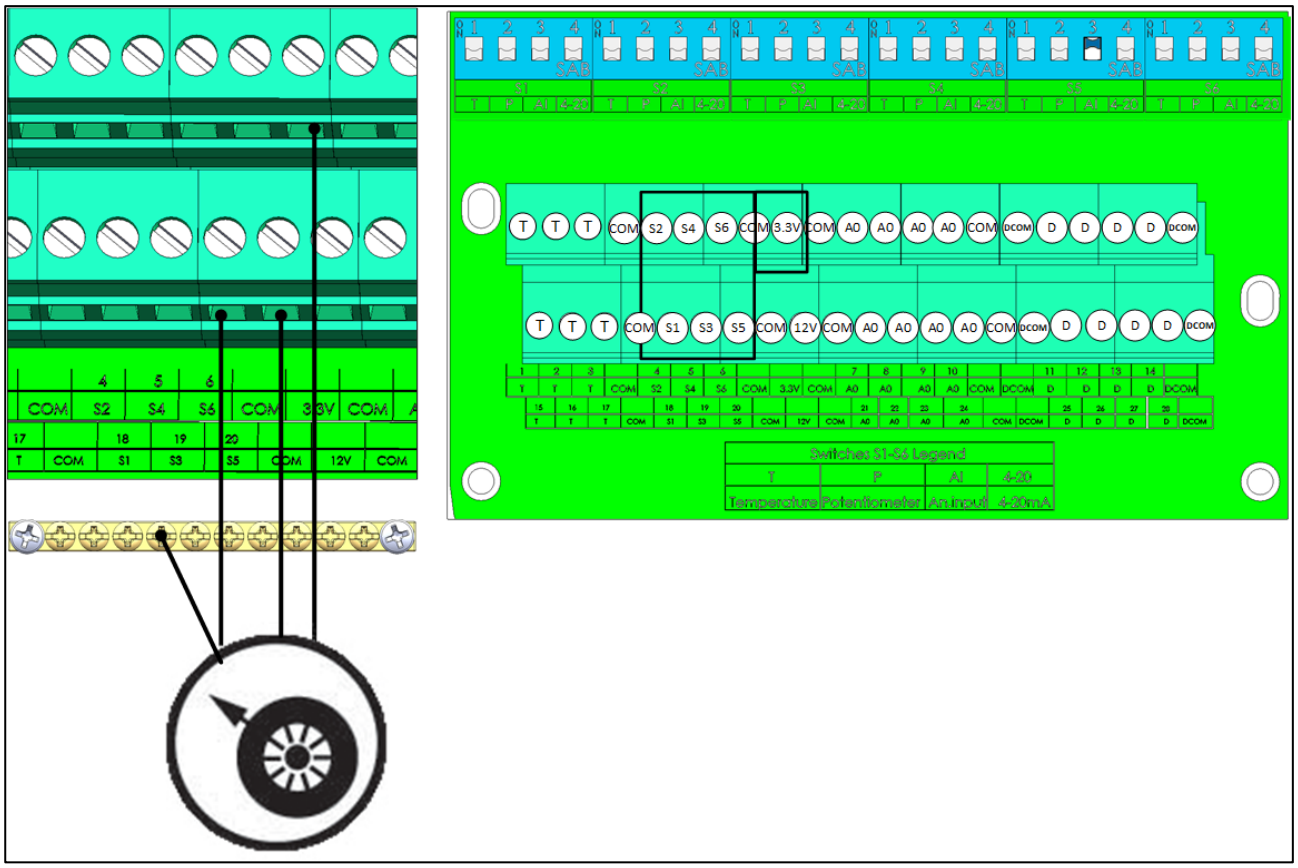


Figure 19: Potentiometer Wiring

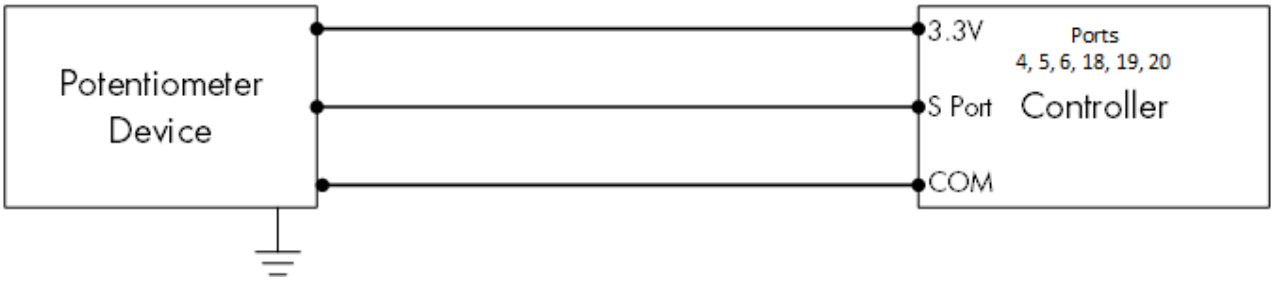


Figure 20: Potentiometer Wiring Schematic

- Connect each potentiometer to a:
  - S port. In the corresponding dipswitch, raise dipswitch 2 (potentiometer).
  - COM port.
  - 3.3V port.

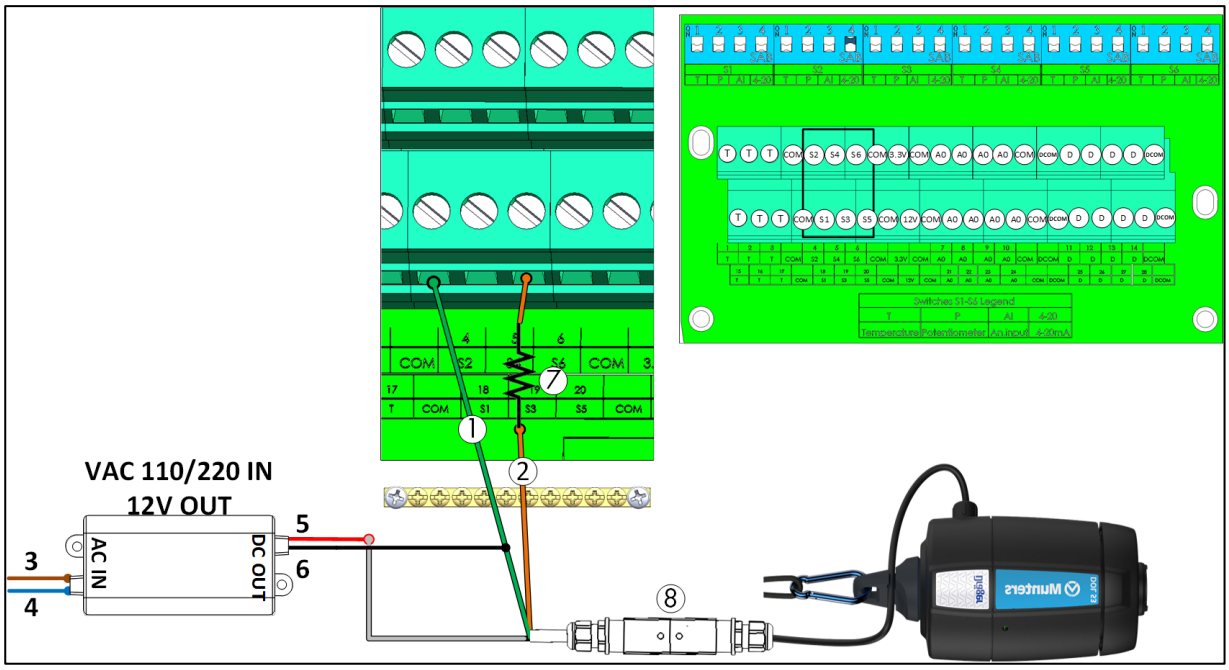


Figure 21: Ammonia Sensor Wiring

Number	Function
1	COM port (Green wire)
2	S port (Brown wire)
3	Phase (Brown wire)
4	Neutral (Blue wire)
5	12VDC (Red wire)
6	COM (Black wire)
7	10 kohm resistor (comes installed)
8	Quick connector

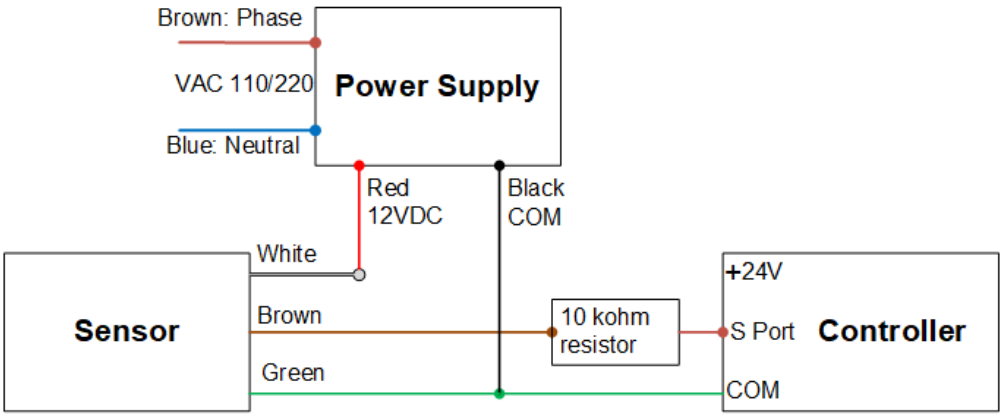


Figure 22: Ammonia Wiring Schematic

- Connect an ammonia sensor to a:
  - S port. In the corresponding dipswitch, raise dipswitch 3 (analog input).
  - COM port.

3.5 Pressure Sensor Hoses

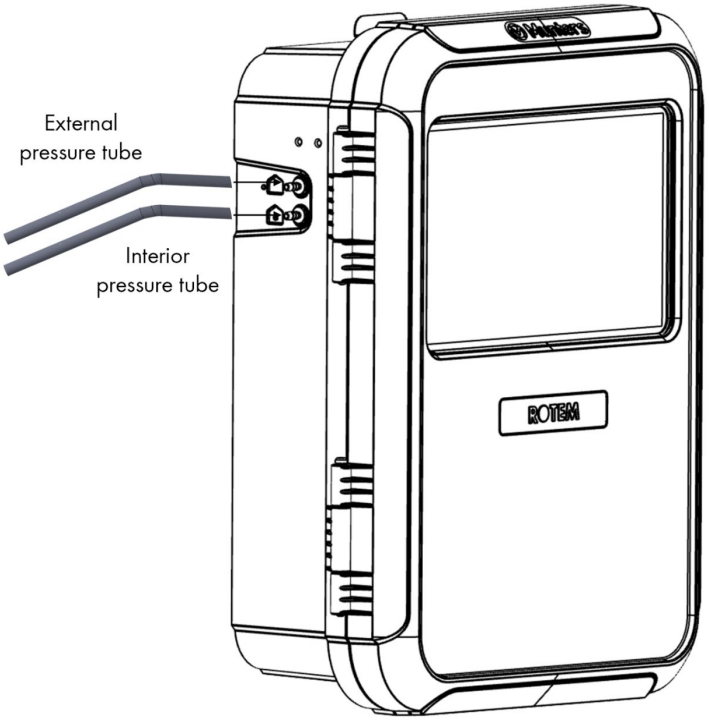


Figure 23: Static pressure hoses

3.6 Key

Ensure that the unit remains locked to prevent unauthorized access to internal components.

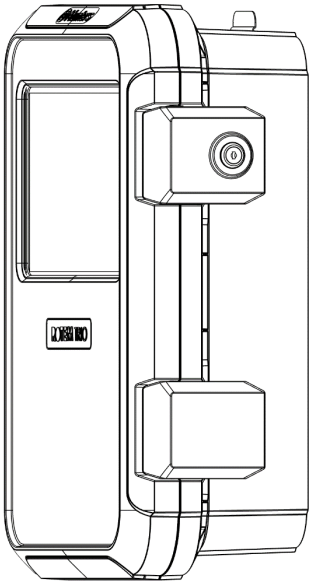


Figure 24: TRIO Lock

3.7 Product Symbols

The following labels appear on your controller:

 : Caution! Hazardous voltage

 : Caution: Refer to the manual

 : Main Protective Earthing Terminal

CAUTION IF THE UNIT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.

4 TrioAir

The following sections provides information on the hardware requirements as well has how to control and manage your farms via the web.

- Hardware
- Network Information
- Using TRIO Air App and Website
- TRIO Air Accounts
- Pairing a TRIO
- Users

4.1 Hardware

- Internet Infrastructure
- Topology

4.1.1 INTERNET INFRASTRUCTURE

- Required cable: CAT5E or CAT6, shield cable
- Maximum distance between the TRIO and router/switch: 100 meters (330 feet)

4.1.2 TOPOLOGY

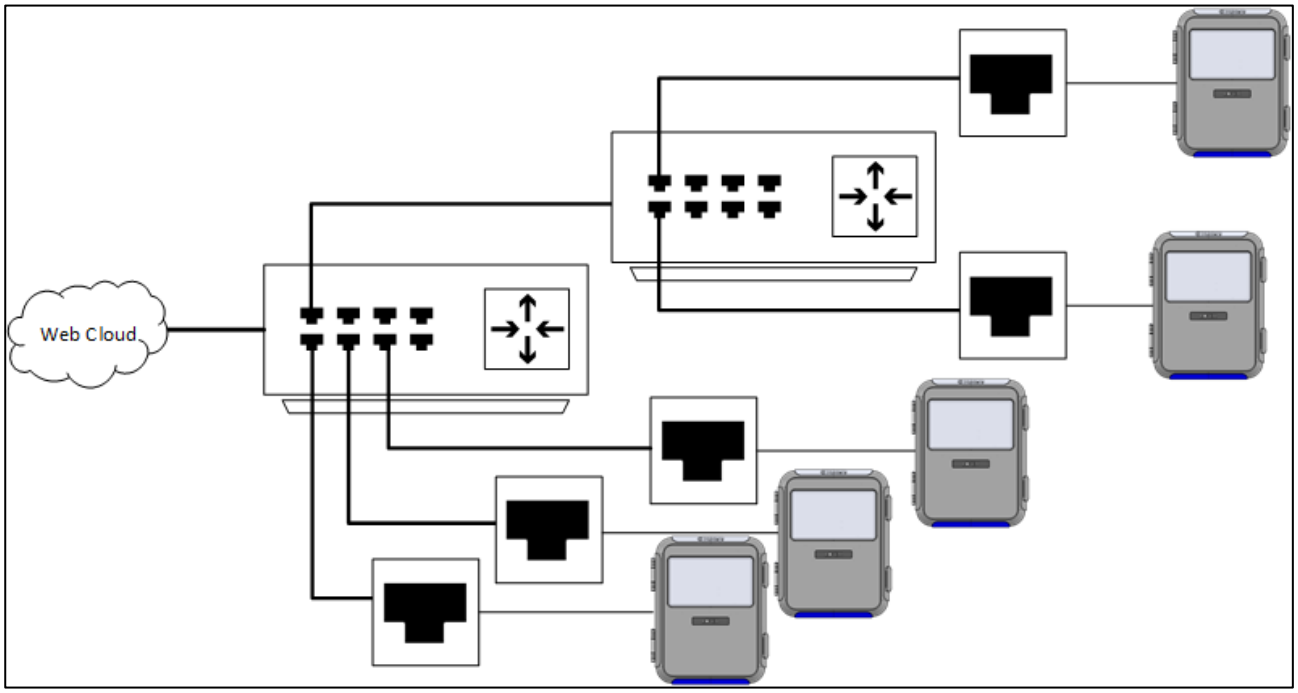


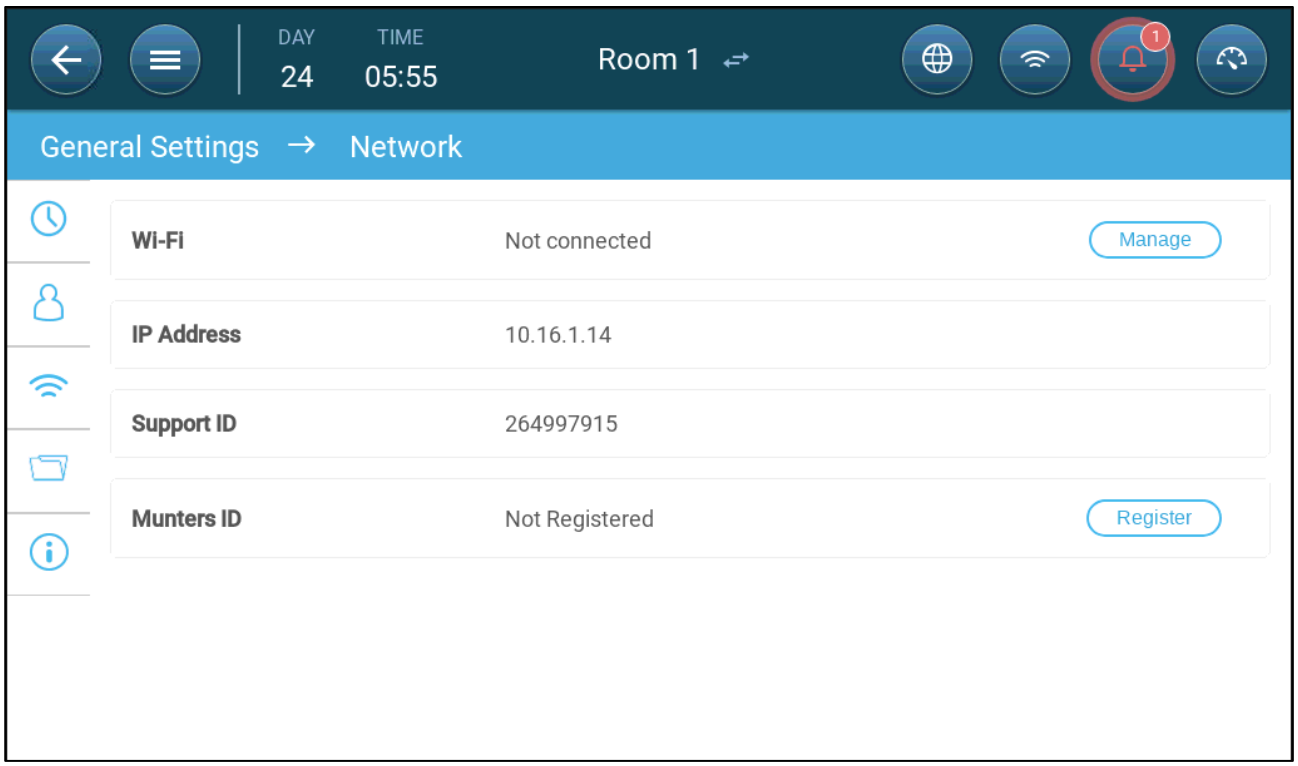
Figure 25: Example topology

- Topology is point to point, from the router. All addressing is automatic.

4.2 Network Information

NOTE All TRIO units are mapped automatically to the switch/router.

1. Go to System > General Settings > Network Screen.
2. Click  .



3. Define:
    - Wi-Fi: Click **Manage** to enable a Wi-Fi connection.

        - Enable Wi-Fi and then select a network.
    - IP Address (read only)
    - Support ID: Use this address when contacting technical support or when connecting to the TRIO via TeamViewer.
    - Munters ID: Use this to pair the unit to a farm. Refer to Using TRIO Air App and Website.

4.3 Using TRIO Air App and Website

The following section describes how to control and manage the units via the TRIO Air app or via a web browser. To control the units remotely, perform the following steps:

- Open an account

- Pair units to the account
- Invite users (including assigning permission levels)

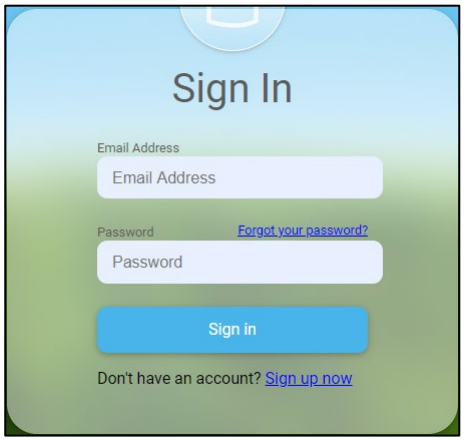
4.4 TRIO Air Accounts

- Opening an Account
- Editing the Page

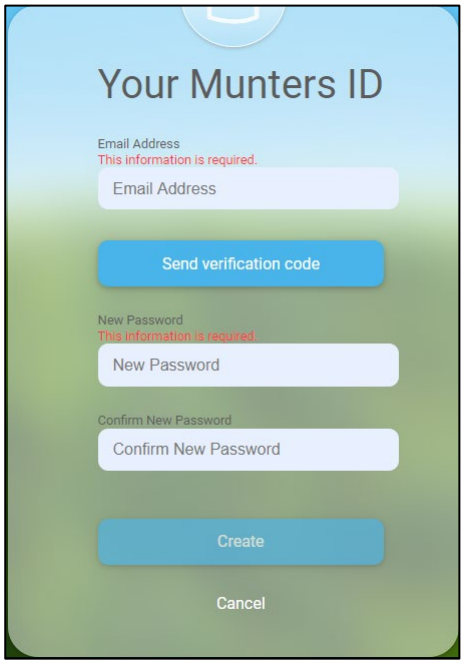
4.4.1 OPENING AN ACCOUNT

In order to manage and control your farm, including all TRIO units in these farms, set up an account on the trioair.net website. Once an account is setup, you can manage the farms and users from this site or from the TrioAir app. The process is similar to any standard account opening.

1. Go to www.trioair.net or open the app.



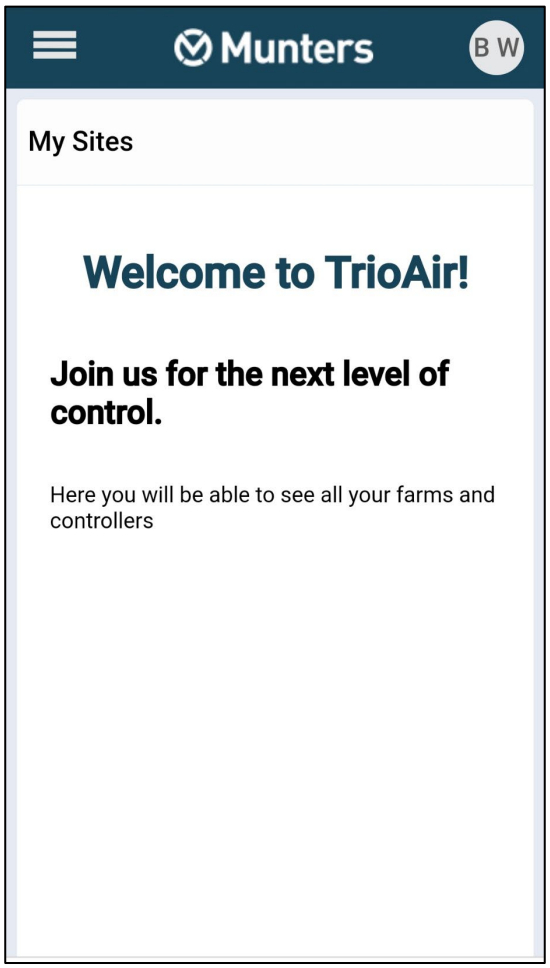
2. Click **Sign Up Now**.



3. Type in your email address and click **Send verification code**. A code is sent to the email address.
4. Type in the verification code that and click Confirm.
5. Type in and confirm your password.

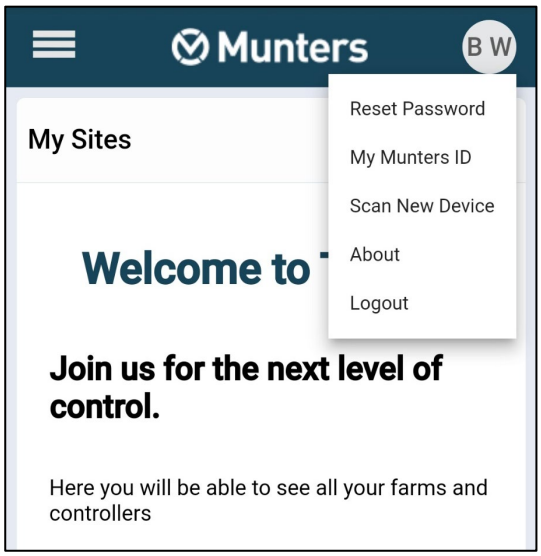
6. Click **Create**.

An account is created.



4.4.2 EDITING THE PAGE

- Click the circle in the upper right corner. The following options appears.



  - Reset Password: Change your password.
  - My Munters ID: Select this option to edit your email address, how you name appears on the screen, language and units preferences. In addition, you can change a PIN code.

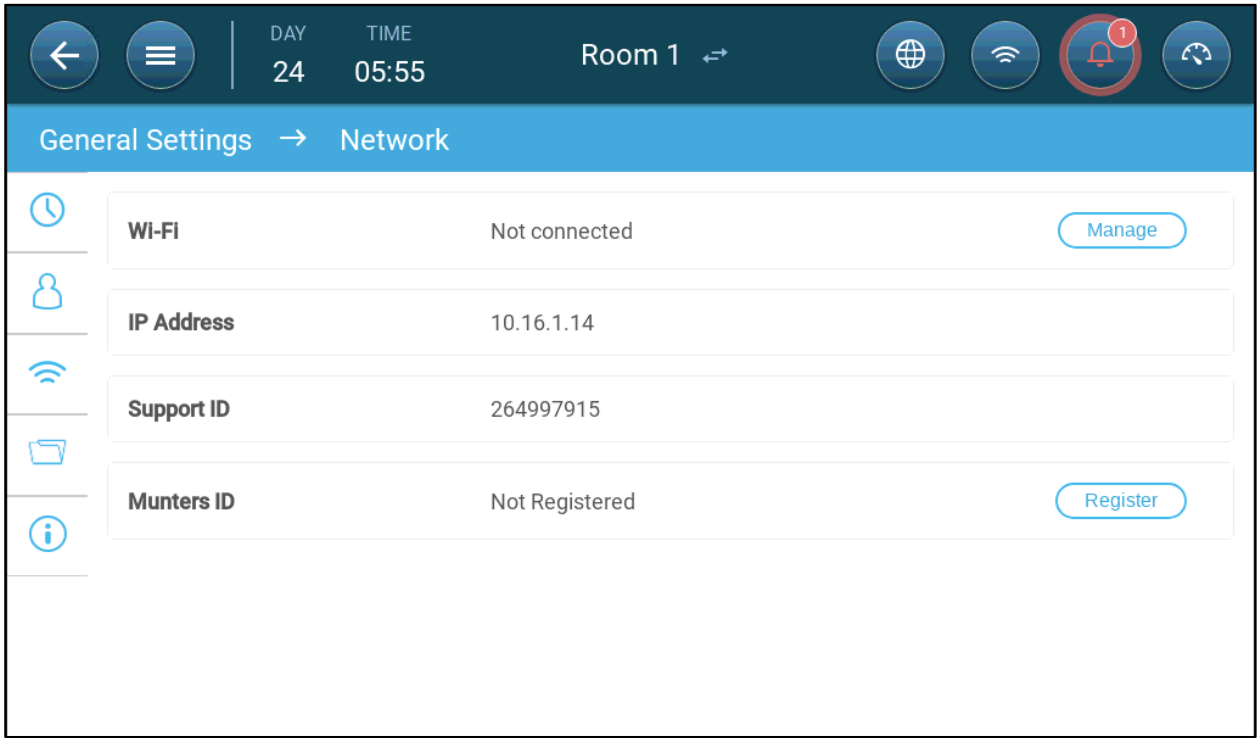
- Scan New Device: Used when paring a TRIO unit to the farm. Refer to Pairing a TRIO.
- About: When contacting tech support, click this to view the web software version.

4.5 Pairing a TRIO

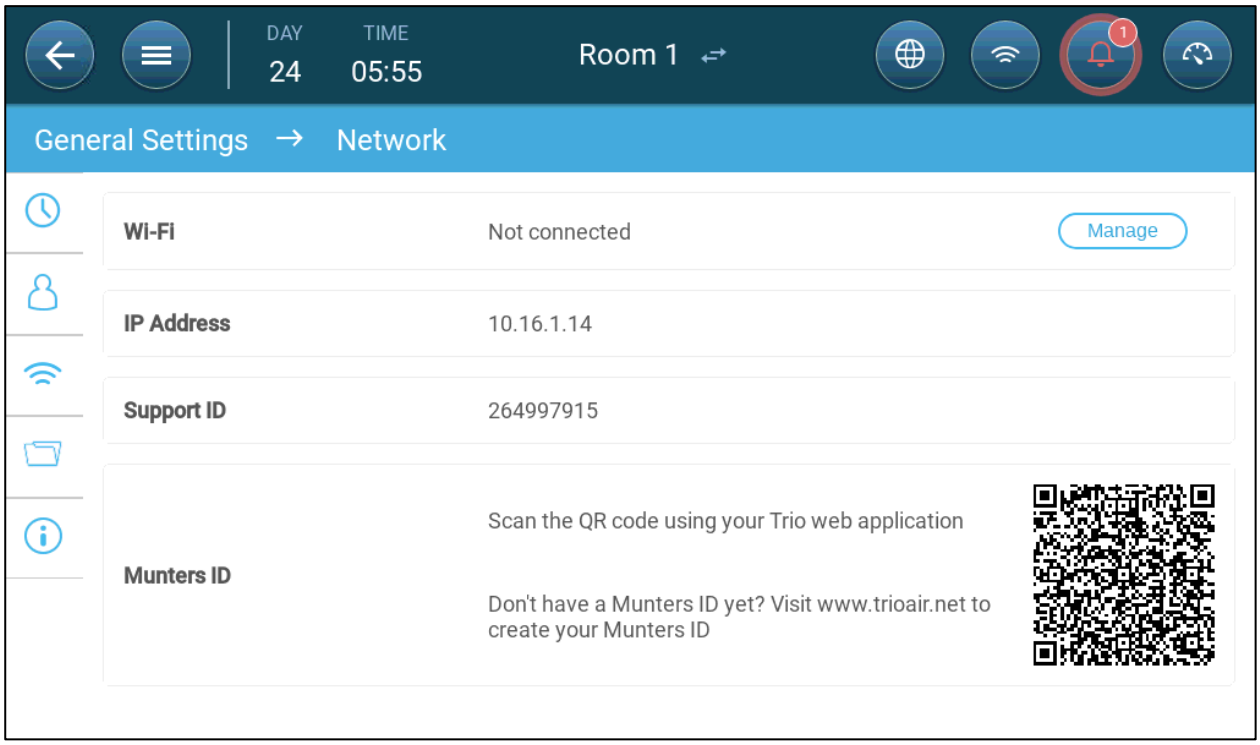
Pairing a TRIO unit to an account enables connecting to the unit via the web/app and managing it remotely. Each TRIO unit has a unique ID code (a QR code). This code is used to register the device and pair it to an account. This procedure explains how to pair the device to an account.

NOTE Before attempting to register a TRIO, verify that the time and date are correctly set (refer to Defining the Time/Date, page 73). In the event that the time and date are incorrect, registration is disabled and an error message appears if attempted.

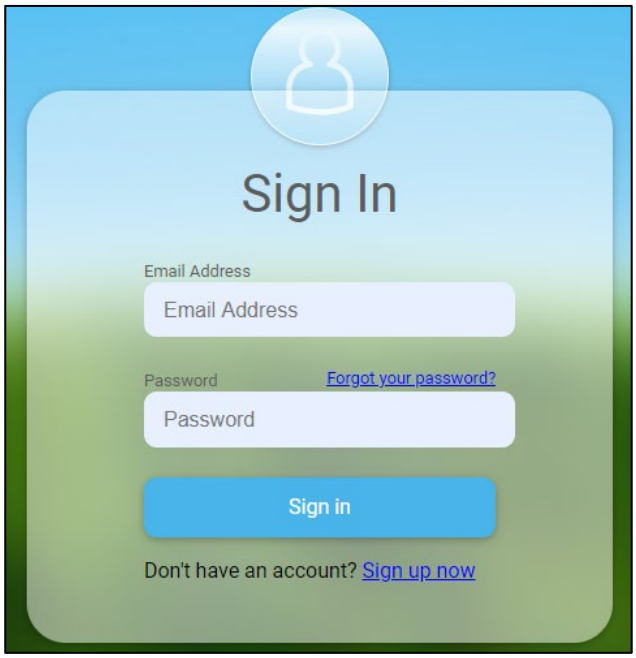
1. Go to System > General Settings > Network  .



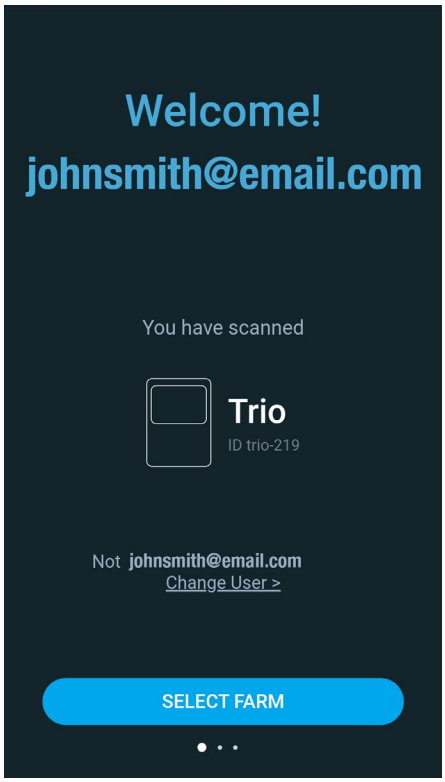
2. Click Register.



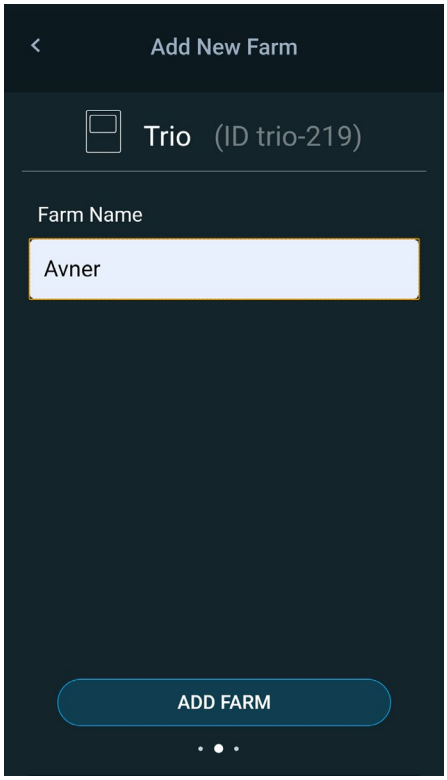
3. Using the TrioAir App (Scan New Device) or a QR reader, scan the QR code. The TRIO AIR sign in page appears.



4. Following the on line instructions, sign in or create a new account. After signing in, the TRIO Air app or web site opens.

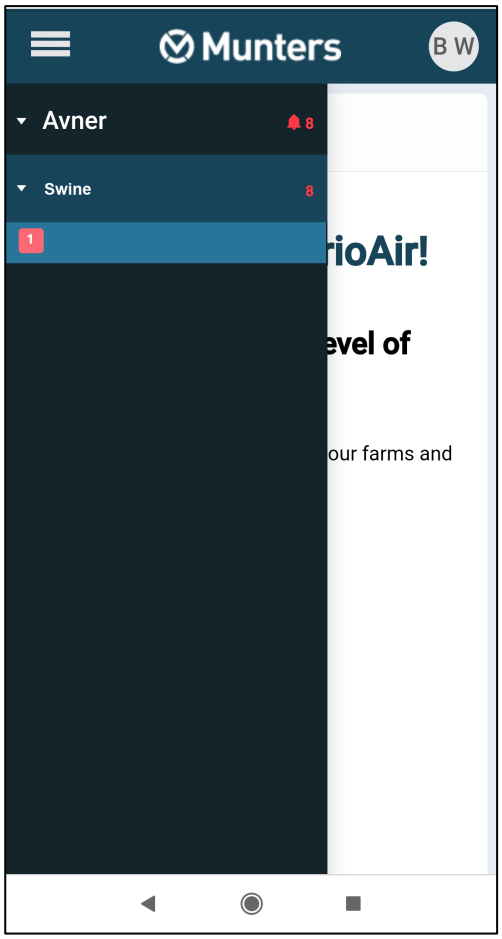


5. Click Select Farm.

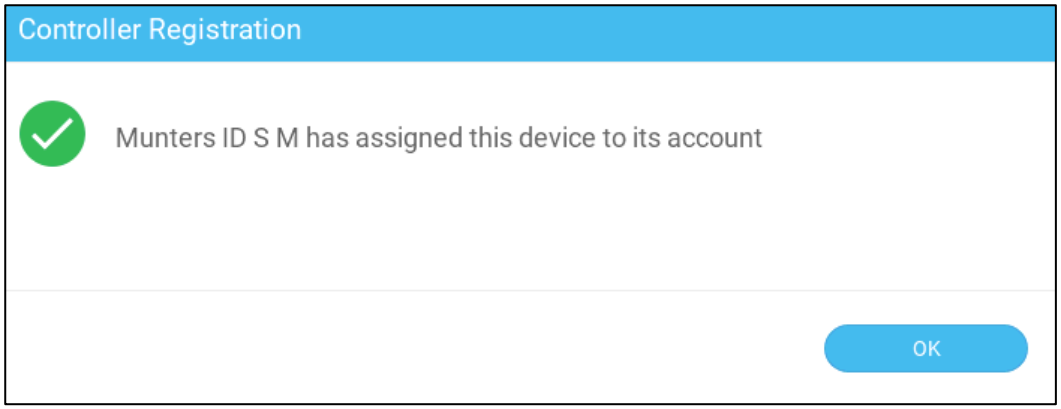


6. Click on an existing account (if there are) or click Add New Farm (follow the online instructions for creating a new farm).

NOTE The person who creates a new farm is automatically defined as the owner. Munters recommends that the person responsible for the farm create the account, and then invite and assign roles to other people.



7. Click Register. The TRIO unit is now paired with an account.



4.6 Users

- Permission Levels
- Inviting Users

4.6.1 PERMISSION LEVELS

There are four permission levels:

- Owner: The person who creates the farm. There can be one owner only. The owner:
  - has full access to and control of all TRIO units
  - can invite users and define permission levels

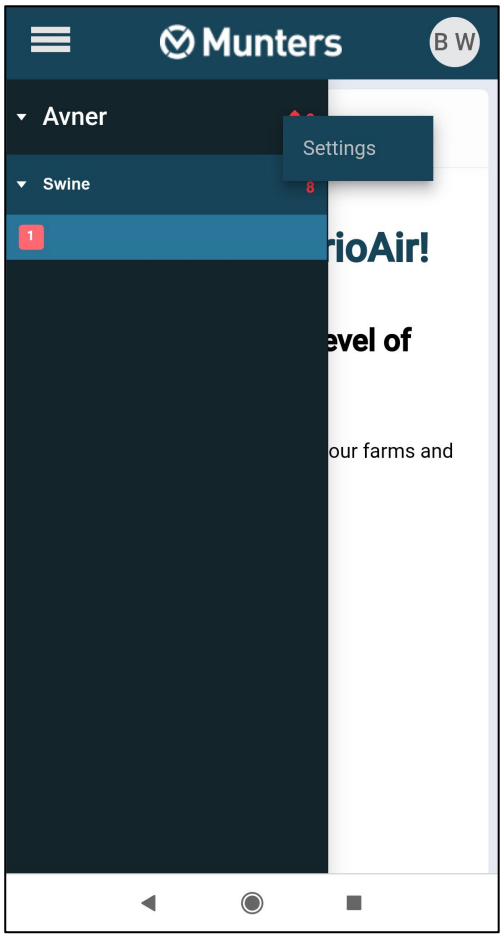
- disable users/delete/removes
- view activity status

- Managers have the same capabilities as the owner. There can be multiple managers.
- Operators can manage specific TRIO units.
- View: View only.

4.6.2 INVITING USERS

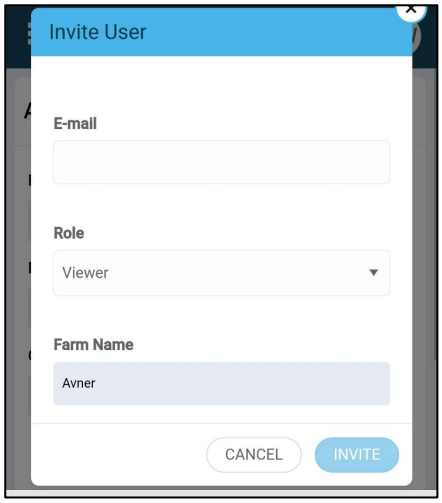
Once a farm is set up, you can invite people to connect to the farm using the TRIO Air app (only).

1. Press down on the farm name. The Setting popup appears.



2. Click Settings.

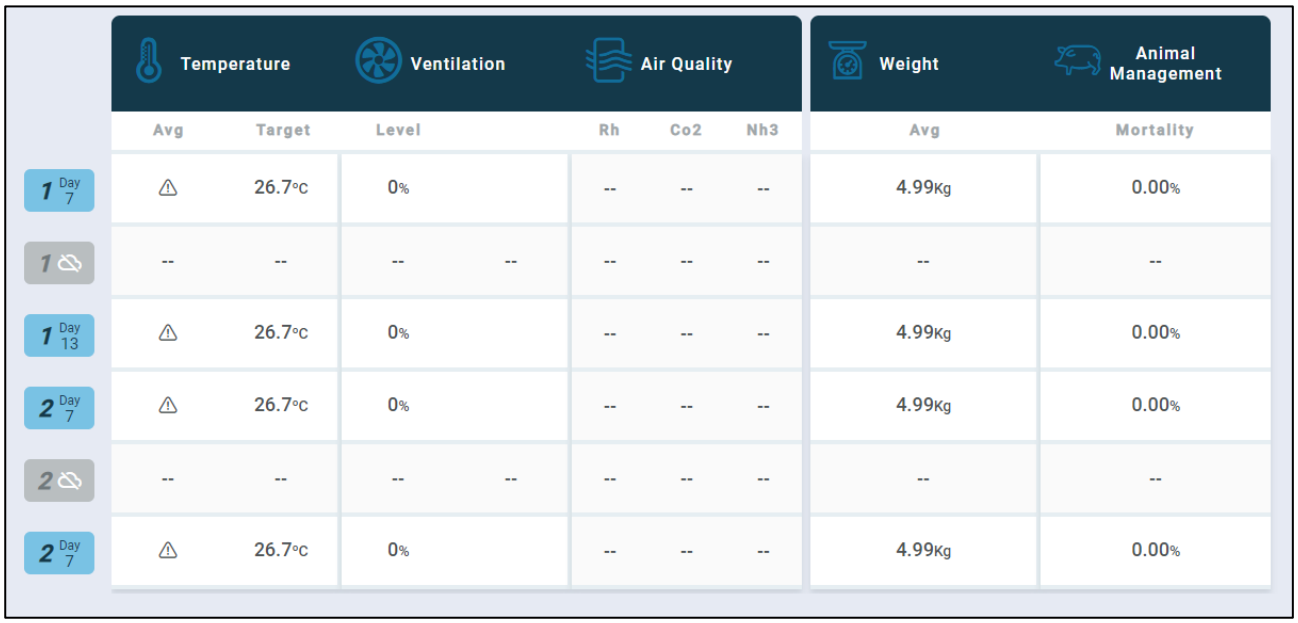
3. Click Invite New User.



4. Type in the invitee's email address and select a role. Click Invite. An email is sent to the address.
    - The invitee must accept the invitation. A confirmation message is then returned to the owner/manager.
    - Once a person accepts the invitation, the user can go to the website or app, see the relevant farms, and perform any permitted operations.
    - An invitation are valid for three days; at that point it expires.
    - An owner can resend an expired invitation.

Once a user accepts the invitation, the user can go to the web site or app and view and manage the farms (according to the user's permission level).

- Click on the room category (Boar 01 in the above picture) to go to the Comparison Page. This page summarizes the rooms' data. Place the cursor the items to view details.



	Temperature			Ventilation	Air Quality			Weight	Animal Management
	Avg	Target	Level		Rh	Co2	Nh3	Avg	Mortality
1 Day 7	⚠	26.7°c	0%		--	--	--	4.99Kg	0.00%
1	--	--	--	--	--	--	--	--	--
1 Day 13	⚠	26.7°c	0%		--	--	--	4.99Kg	0.00%
2 Day 7	⚠	26.7°c	0%		--	--	--	4.99Kg	0.00%
2	--	--	--	--	--	--	--	--	--
2 Day 7	⚠	26.7°c	0%		--	--	--	4.99Kg	0.00%

5 Specifications

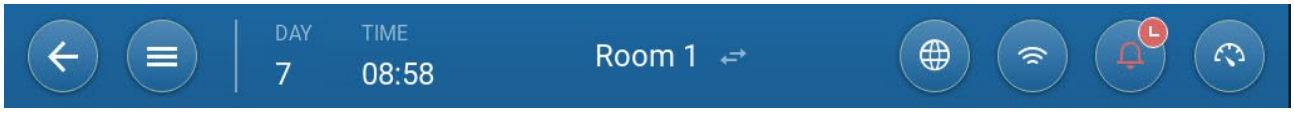
Description	Specification
Input Power Voltage	• 100 – 240 VAC • 50/60 Hz
Input AC Power	• 0.75A (at full load (meaning wi-fi, internet, cell phone, and 20 relays ON))
Relays	• 1 Amp. Up to 60% of the relays can operate at any given time.
Note: Running relays at the above current levels provides between 50,000 – 100,000 switching operations.	
Analog Inputs	0 – 3.3 Volts
Analog Output	0 - 10 Volts; maximum load: 20 mA
Digital Inputs	3.3 Volts, 1.5 mA, dry contact
Communication	• LAN – Standard 10/100 BaseT • Expansion – RS-485: 115 Kbps, 8 bit, even parity
Operating and Storage Temperature Range	-10° to +50° C (+14° to +125° F)
Environmental Specifications	• Altitude: -400 m to 2000 m • Relative Humidity: 20% - 70% • Main supply voltage fluctuation up to 5% • Overvoltage category II
Enclosure	• Water and dust tight • Indoor use only
Dimensions (H/W/D)	403 x 324 x 141 mm/16 x 13 x 5.6 inches
Fuses	Fuse F2 on PS card: 3.15A, 250V
Certification	

- **Disconnection device/overcurrent protection**: In the building installation, use a certified 2-pole circuit breaker rated 10A, certified in accordance with the IEC standard 60947-2 (in the US and Canada use a Listed Brach Circuit protective circuit breaker). This step is required to provide overcurrent protection and mains disconnection. The circuit breaker must be easily accessible and marked as the controller disconnect device.
- **Main Supply Voltage**: Permanently connect the controller to the mains in accordance with the relevant national code. Provide fixed wiring inside a flexible conduit. Relays must be suitably protected against overcurrent, using a circuit breaker rated at 10A.

6 Using the TRIO Touch Screen

- Icons
- Dashboard

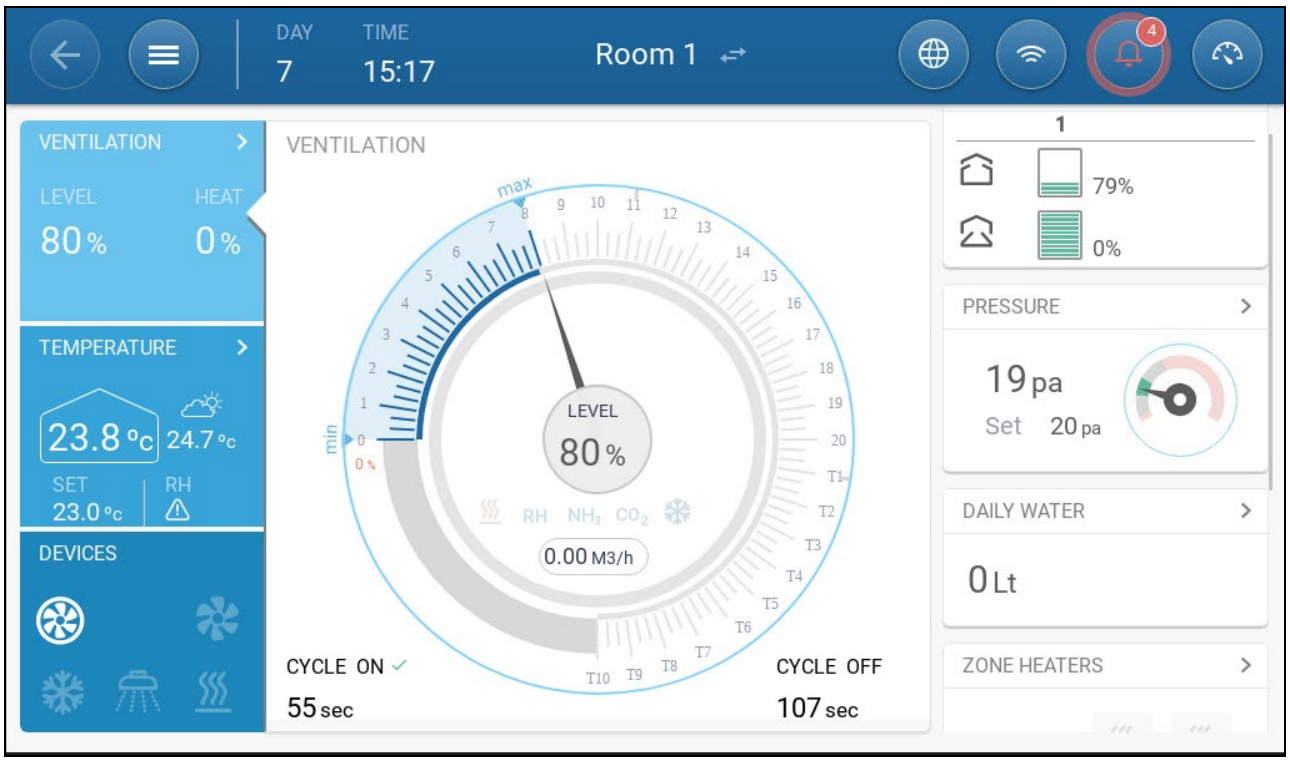
6.1 Icons



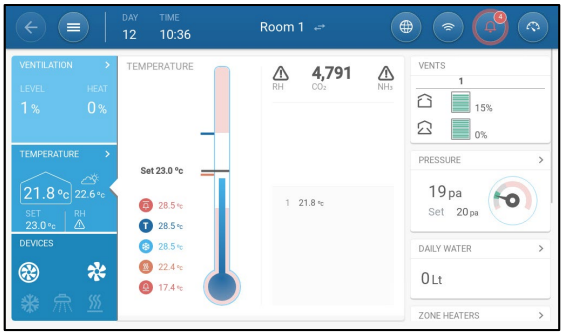
	Go back to the previous screen
	View the Main menus
	Choose language
	Network settings
	View alarms
	Go back to the main screen
	Settings icon
	Edit parameters

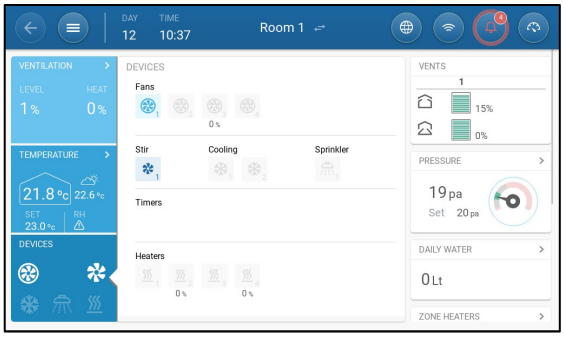
6.2 Dashboard

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.





7 Mapping and Defining the Input Output Devices

NOTE Munters recommends that a trained technician perform the following operations.

- Mapping Devices
- Temperature Sensors
- Ventilation Devices
- Sensors
- Heating Devices
- Defining the Cooling Devices
- Inlets, Tunnel Doors, Outlets
- Defining the Sprinkler
- Defining the Same As Relays
- Defining the Same As Analog Ports
- Defining the Timer
- Defining the Auxiliary Input
- Defining the Measuring Fan
- Feeding Devices

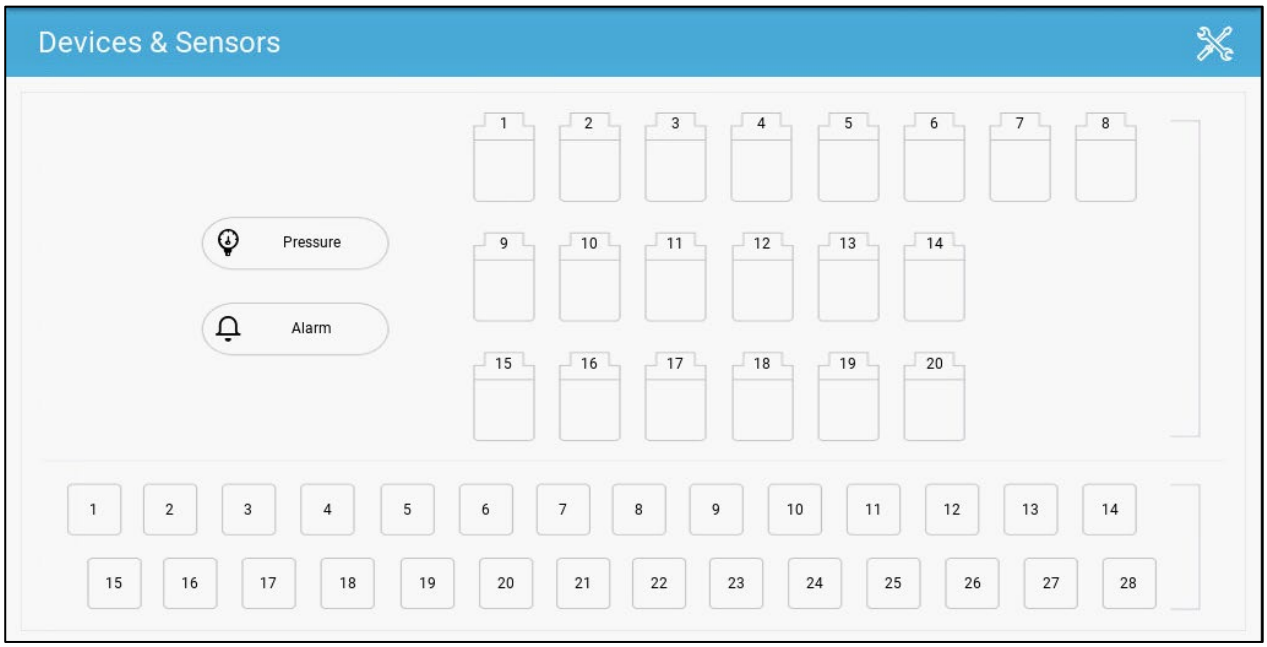
7.1 Mapping Devices

After wiring devices to the TRIO, each device must be mapped and then defined. Mapping and defining devices enables the system software to control each device's functionality.

CAUTION Mapping MUST match the physical wiring! An error message appears if the physical device is not wired to the relay or port as defined on the mapping screen..

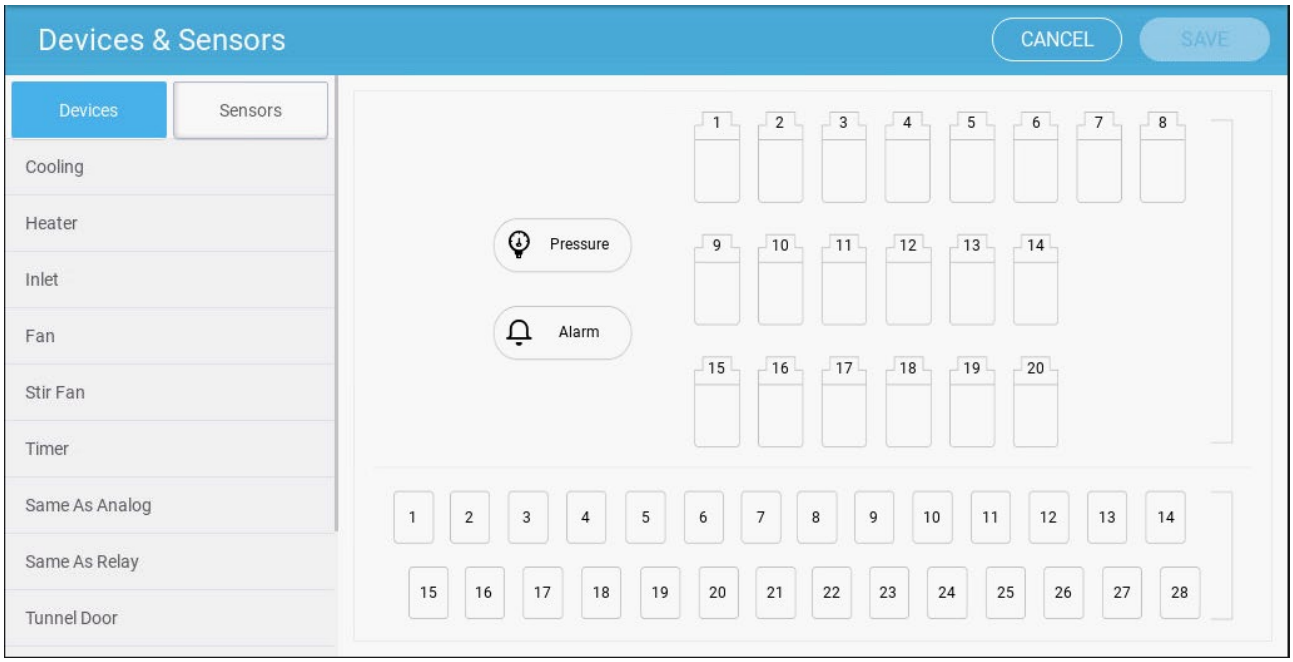
To map the devices:

1. Go to System > Device and Sensors.



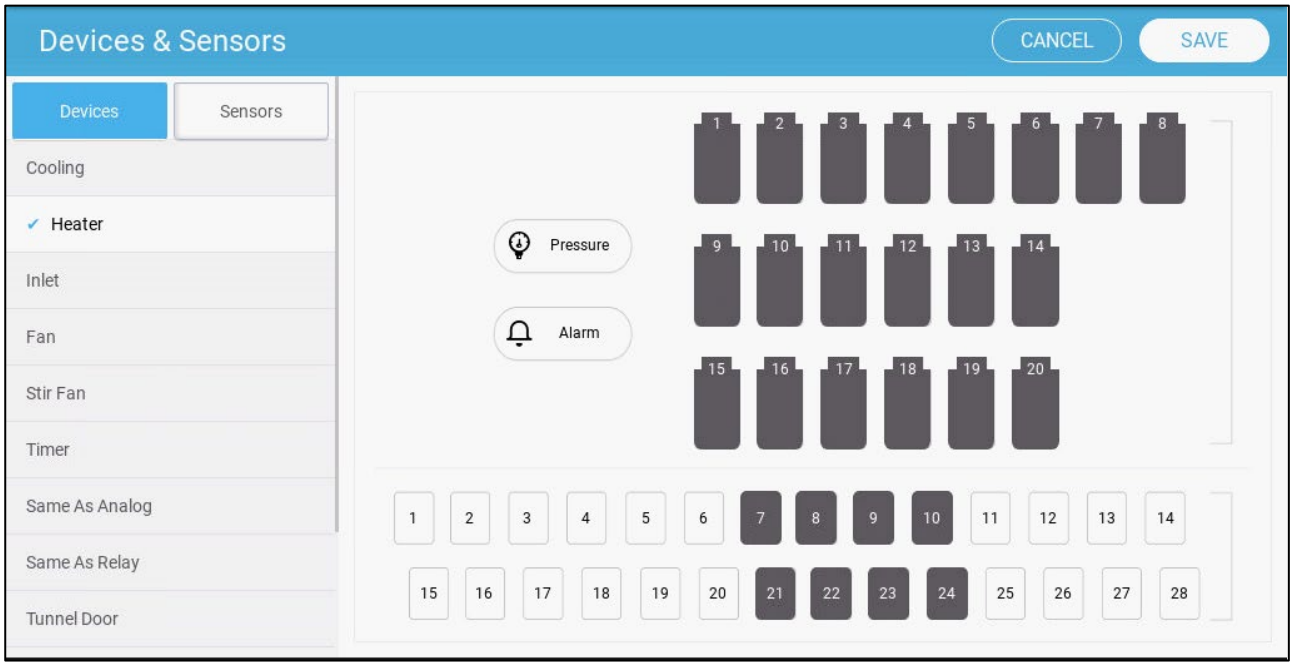
This screen displays the relays and analog/digital ports. At this point all, icons are undefined.

2. Click  .



- Click Devices to map cooling devices, heaters, inlets, fans, stir fans, timers, tunnel doors, outlets, or the alarm relay.
- Click Sensors to map auxiliary inputs, sensors (humidity, pressure, temperature, CO2, ammonia), water meter, and potentiometers.

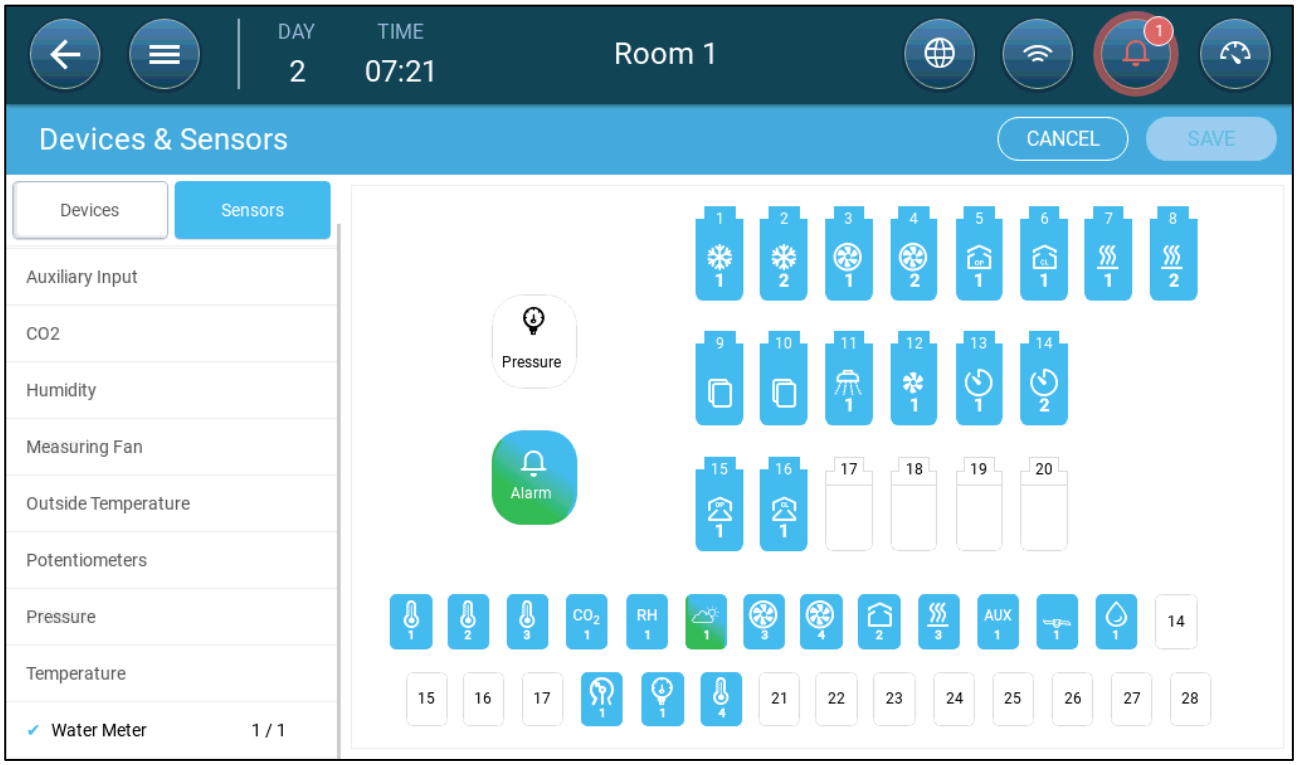
3. Under Devices or Sensors, click the type of device that you want to map. In the following example, Heater is selected. The displays the relays and ports that can be defined as heaters.



4. Click on the relays and/or ports that you wired to heaters.

- TRIO automatically numbers the devices.
- TRIO enables selecting up to the maximum number of each device.
- Devices having opening and closing relays require mapping both relays.

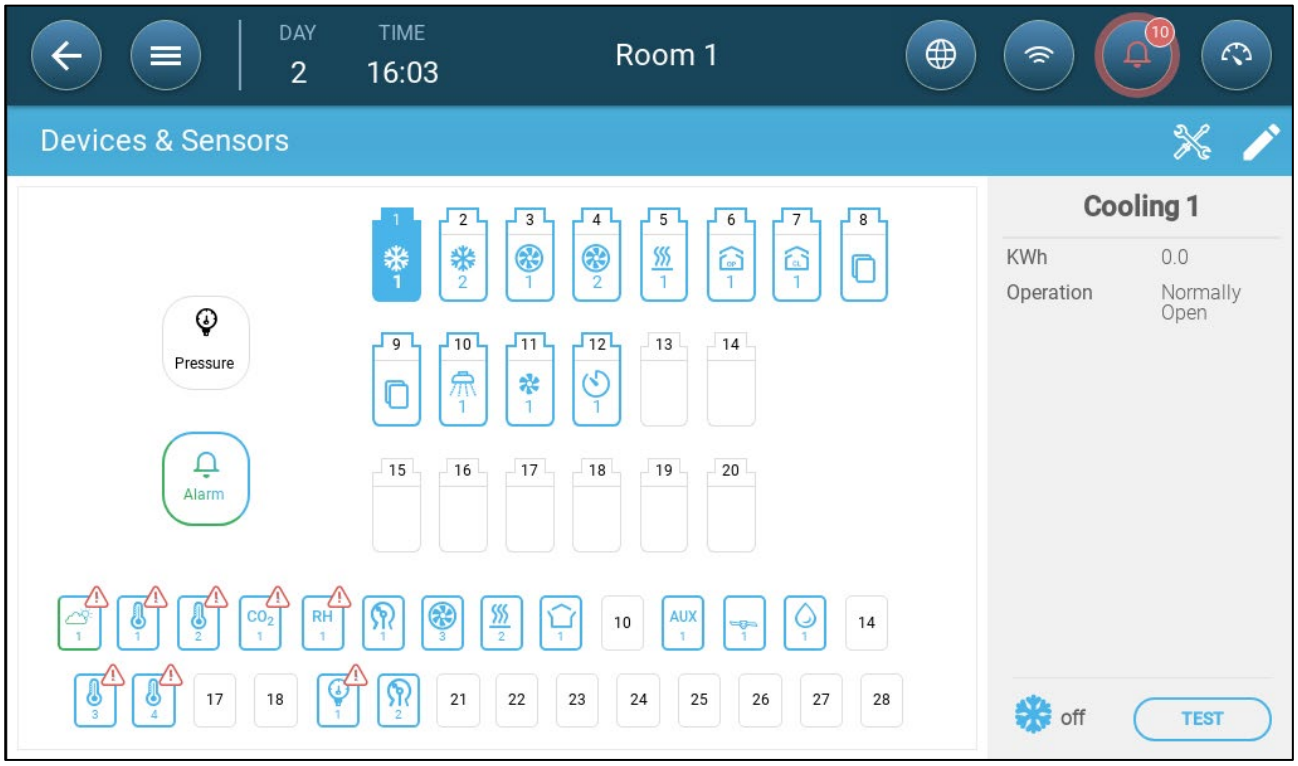
5. Repeat steps 3 and 4 four all the connected devices.



6. After mapping all installed devices, click SAVE.

NOTE To un-map a device, click on the required device and hold the icon down.

NOTE If you map a sensor that is not physically connected to the TRIO, an error symbol appears on the designated analog port.

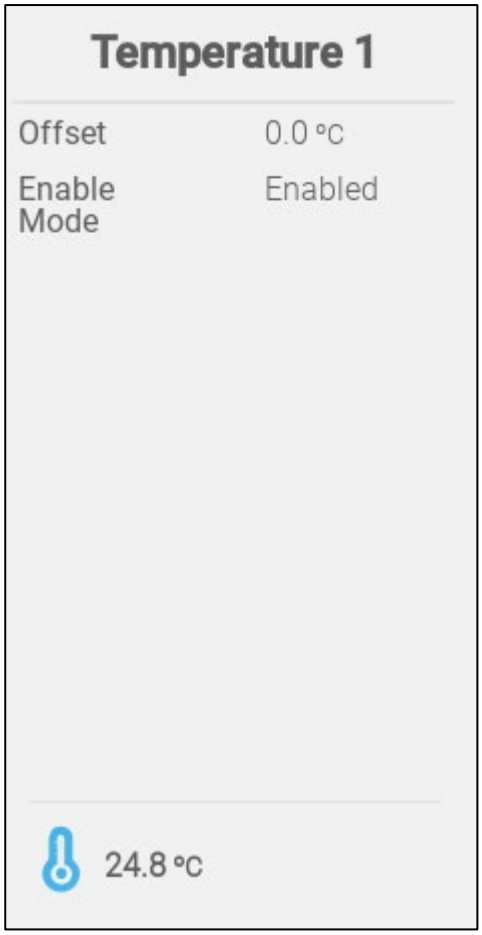


7.2 Temperature Sensors

- Defining the Temperature Sensors
- Mapping the Temperature Sensors
- Enabling a Weather Station

7.2.1 DEFINING THE TEMPERATURE SENSORS

➲ **Define up to 12 analog input ports as temperature sensors (and one port as an outside temperature sensor) (refer to Mapping Devices, page 43).**



- Define:
  - Offset: This is an optional correction for the temperature sensor. Range: -10⁰ C to +10⁰ C
  - Enabled: enable/disable the sensor.
- The temperature reading shows the measured temperature, including the offset.

7.2.2 MAPPING THE TEMPERATURE SENSORS

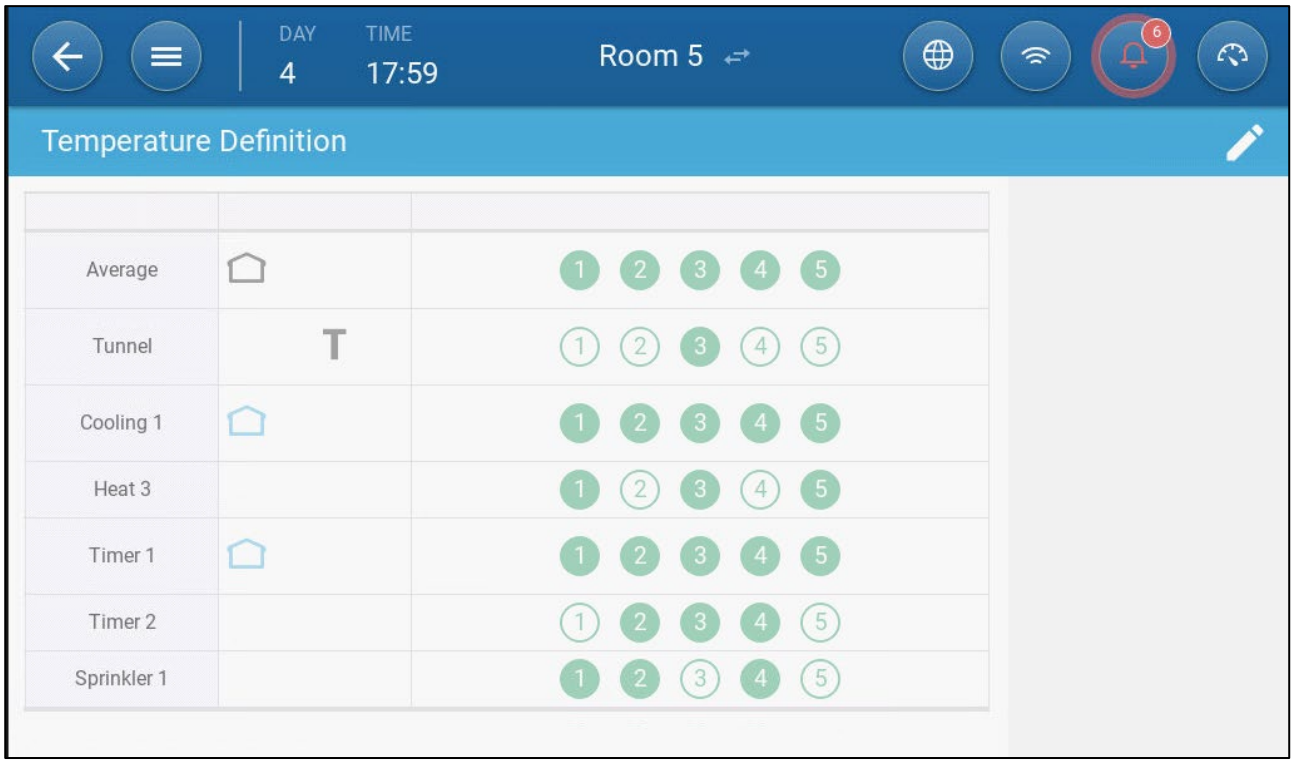
Calculating the temperature data, TRIO takes the following into consideration:

- Tunnel temperature: Select a sensor or a group of sensors to determine the tunnel temperature readings or select if the tunnel run according to the average temperature reading.
- Average temperature: Data from multiple sensors can be averaged. If a sensor fails, the sensor's data is removed from any calculations.
- Device temperature: A sensor (or sensors) can be mapped to a specific device.

- Outside temperature: The temperature sensor defined as an outside temperature is not included in any average calculation.

Map specific temperature sensors to specific devices.

- Go to System > Temperature Definition.



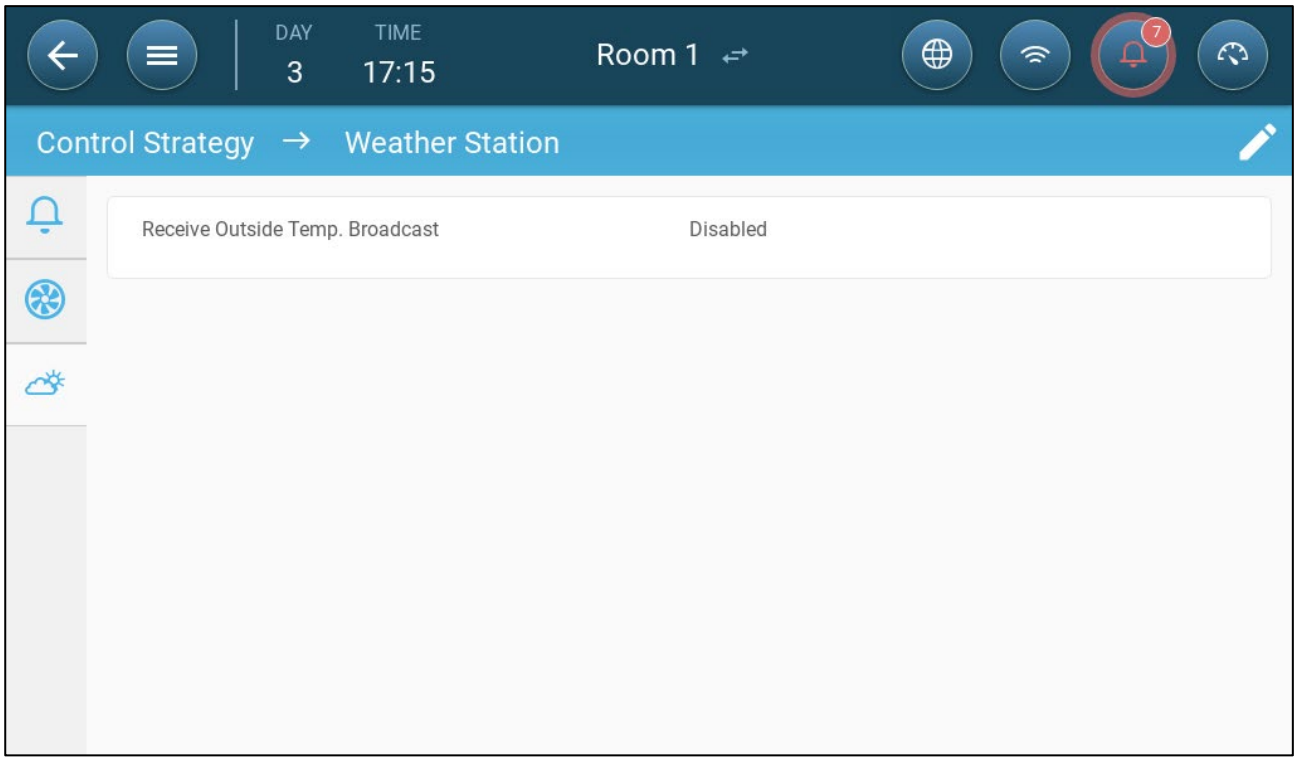
- Map the sensors to devices.
  - Define which sensors are used to calculate the average temperature.
  - Define an outside temperature sensor (if required).

NOTE Uninstalling a device in the Relay Layout, Analog Output or TRIAC tables removes the device from this screen.

7.2.3 Enabling a Weather Station

To say costs on temperature sensors, one outdoor temperature sensor can provide data to the entire TRIO network.

1. In System > Device and Sensors, define one sensor as Outside Temperature.
2. Go to System > Control Strategy > Weather Station  .



3. Enable **Receive Outside Temp. Broadcast**.

7.3 Ventilation Devices

- Defining the Fans
- Defining the Stir Fan

7.3.1 DEFINING THE FANS

The following sections detail how to configure fans.

NOTE These settings should be configured by a technician familiar with the fan and inlet/curtain specifications.

Fan air capacity defines how much air is provided when the fans run at full speed. These numbers are used to calculate minimum air requirements.

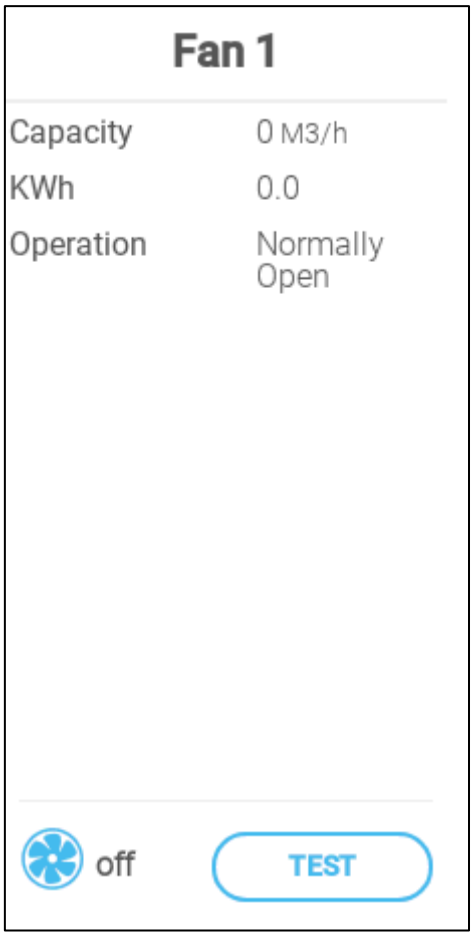
➲ **In Defining the Preferences, page 72 define the measurement unit.**

➲ **Define up to 12 relays or analog output ports as On/Off or 0 – 10 V fans, respectively (refer to Mapping Devices, page 43)).**

- On-Off Fans
- 0 – 10 Volt Fans

7.3.1.1 On-Off Fans

1. On the Device and Sensors screen, click a fan relay.
2. Click  .



3. Edit the parameters.
    - Capacity: Enter the fan capacity.
    - KWh: This field displays the amount of kilowatts used. Read-only.
    - Operation: Select if the relay is normally open or normally close.
4. Click Save.

7.3.1.2 0 – 10 Volt Fans

1. On the Device and Sensors screen, click a fan analog output port.
2. Click  .

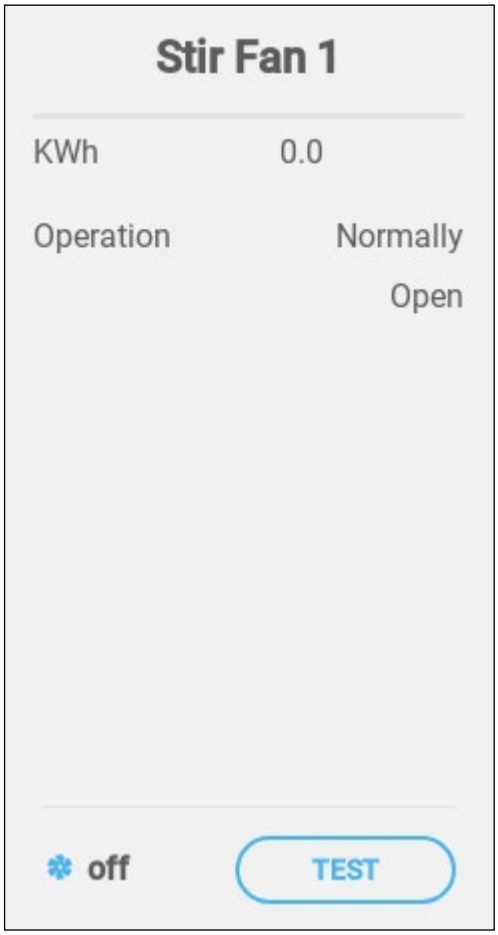
3. Edit the parameters.
    - Minimum/Maximum Voltage: Enter the minimal and maximal voltage used to calibrate the fan speed.
    - Capacity: Enter the fan capacity.
    - KWh: This field displays the amount of kilowatts used. Read-only.
    - Boost Time: During this amount of time, the controller applied full power to the fan motor (100%).
4. Click Save.
5. To test in the minimal and maximum voltages, click Test.

7.3.2 DEFINING THE STIR FAN

➲ **Define one relay as a stir fan (refer to Mapping Devices, page 43)).**

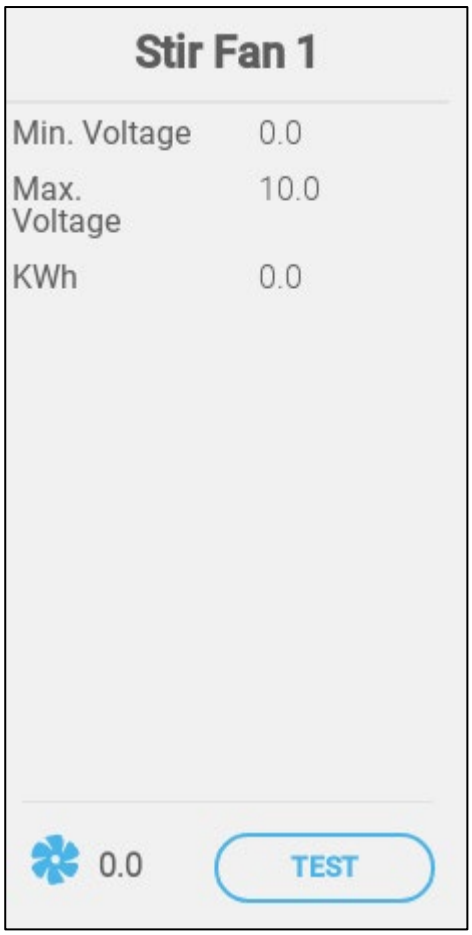
- On Off Stir Fan
- 0 – 10 Volt Stir Fan

7.3.2.1 On Off Stir Fan



- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only
  - Operation: Define the relay mode.
- The status shows if the stir fan is currently operating.

7.3.2.2 0 – 10 Volt Stir Fan



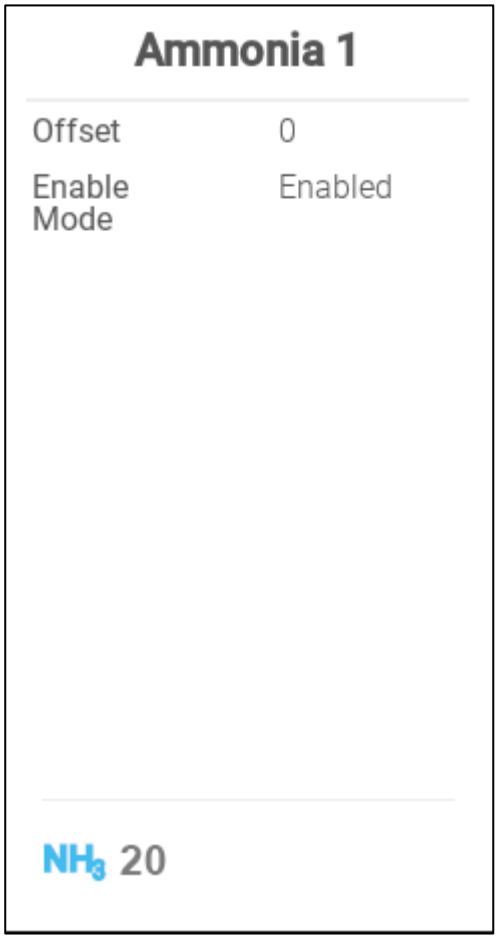
- Minimum/Maximum Voltage: Enter the minimal and maximal voltage used to calibrate the fan speed.
- KWh: This field displays the amount of kilowatts used. Read-only.

7.4 Sensors

- Defining the Ammonia Sensor
- Defining the CO2 Sensor
- Defining the Humidity Sensor
- Defining the Water Meter Sensor

7.4.1 DEFINING THE AMMONIA SENSOR

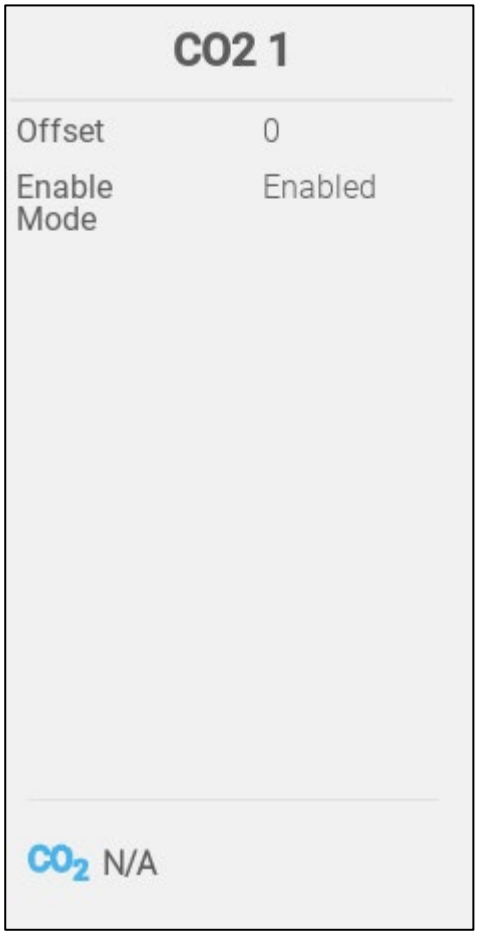
➲ Define one analog input port as an ammonia sensor (refer to Mapping Devices, page 43)).



- Define:
  - Offset: This is an optional correction for the ammonia sensor. Range: -10 to +10 ppm
  - Enable Mode: Enable/disable the sensor.
- The ammonia reading shows the measured amount, including the offset.

7.4.2 DEFINING THE CO2 SENSOR

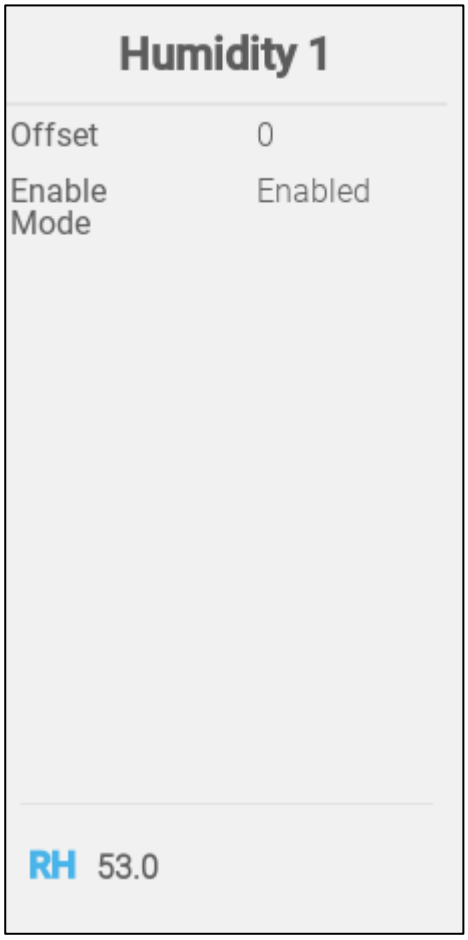
➲ Define one analog input port as a CO2 port (refer to Mapping Devices, page 43)).



- Define:
  - Offset: This is an optional correction for the CO2 sensor. Range: -500 to +500 ppm
  - Enable Mode: Enables/disables the sensor.
- The CO2 reading shows the measured amount, including the offset.

7.4.3 DEFINING THE HUMIDITY SENSOR

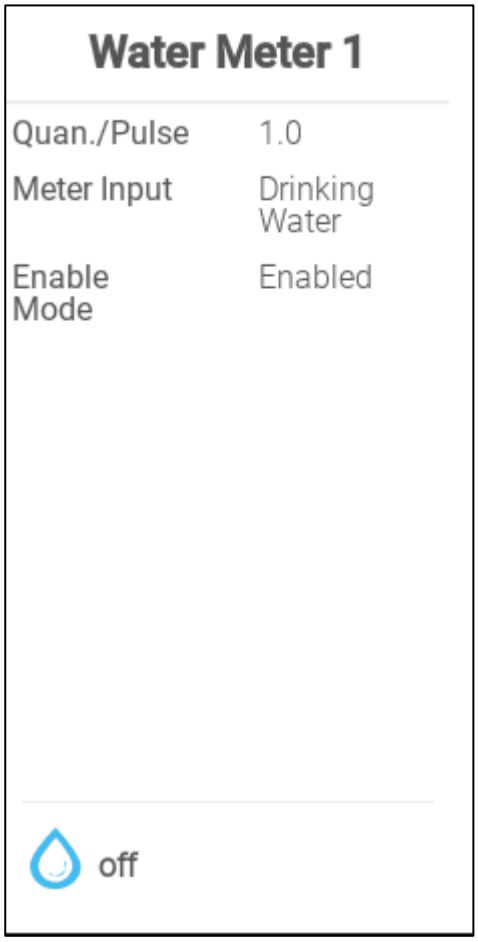
➲ Define one analog input port as a humidity sensor (refer to Mapping Devices, page 43)).



- Define:
  - Offset: This is an optional correction for the humidity sensor. Range: -10 to +10%
  - Enable Mode: Enable/disable the sensor.
- The humidity reading shows the measured level, including the offset.

7.4.4 DEFINING THE WATER METER SENSOR

➲ **Define one analog output port as a water meter (refer to Mapping Devices, page 43)).**



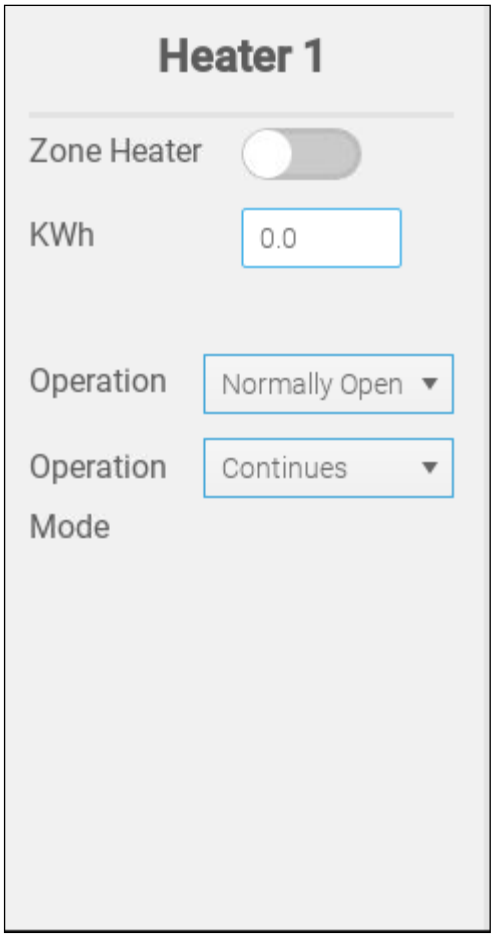
- Define:
  - Quan/Pulse: Set the water meter's water flow per pulse. Range: 0.0 to 99.9 (unit depends on the Defining the Preferences, page 72.)
  - Meter input: Chose drinking water or cooling.
  - Enable Mode: Enable/disable the sensor.

7.5 Heating Devices

➲ **Define up to four relays and/or analogue output ports as heaters in Mapping Devices, page 43.**

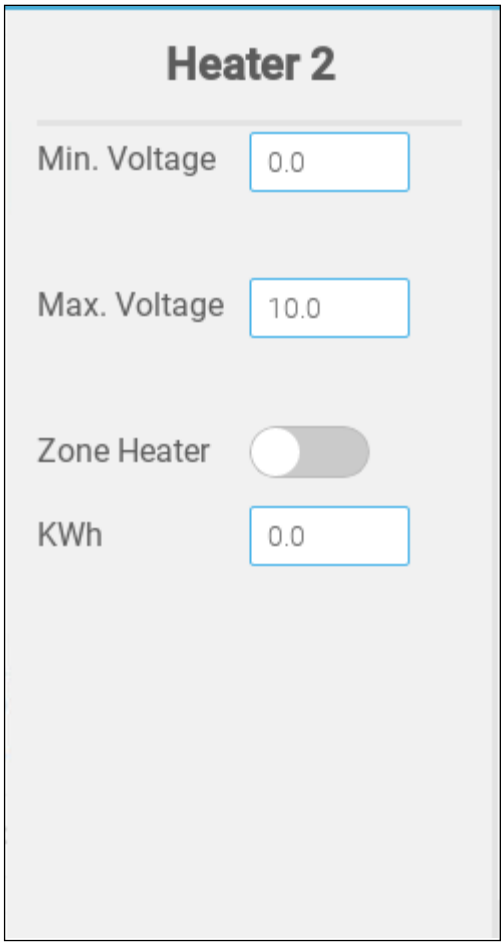
- Defining the On/Off Heaters
- Defining the Variable Heaters

7.5.1 DEFINING THE ON/OFF HEATERS



- Define:
  - Zone Heater:
    - Disable (default): Central Heaters, the heater output is related to the target temperature, these heaters operate according to the average temperature (no temperature sensors can be assign to it).
    - Enable: Zone Heater, the heater output has its own target set-point and its own sensors assign to it. Zone heater will enable the assignment of temperature sensor/s in temperature definition.
  - Operation: Define the relay mode.
  - Operation Modes
    - Continues (default): The heater start to operate continuously
    - Cycle: This option enables the operation of heater in cycles.

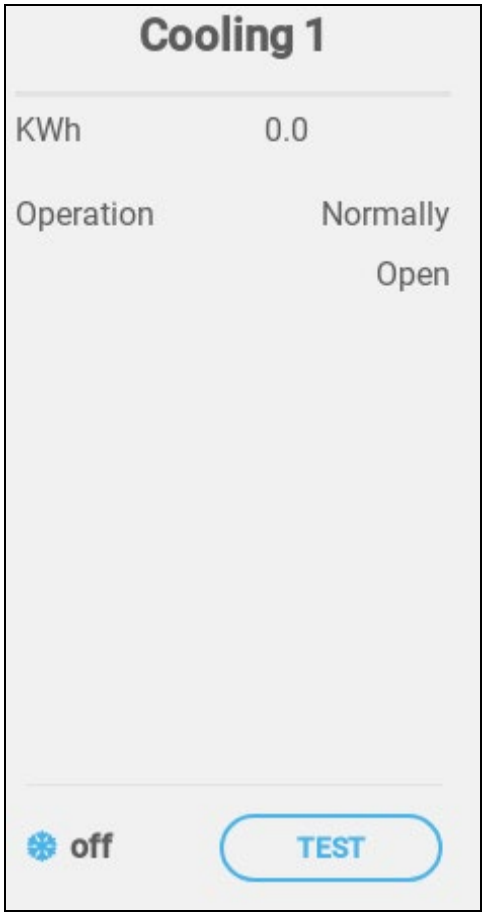
7.5.2 DEFINING THE VARIABLE HEATERS



- Define:
  - Min./Max Voltage: Define the voltage in the analogue output port that corresponds to the 0% and 100% output, respectively.
  - Zone Heater:
    - Disable (default): Central Heaters, the heater output is related to the target temperature, these heaters operate according to the average temperature (no temperature sensors can be assign to it).
    - Enable: Zone Heater, the heater output has its own target set-point and its own sensors assign to it. Zone heater enables the assignment of temperature sensor/s in temperature definition.
  - KWh: This field displays the amount of kilowatts used. Read-only.

7.6 Defining the Cooling Devices

➲ Define up to two relays as cooling devices (refer to Mapping Devices, page 43).



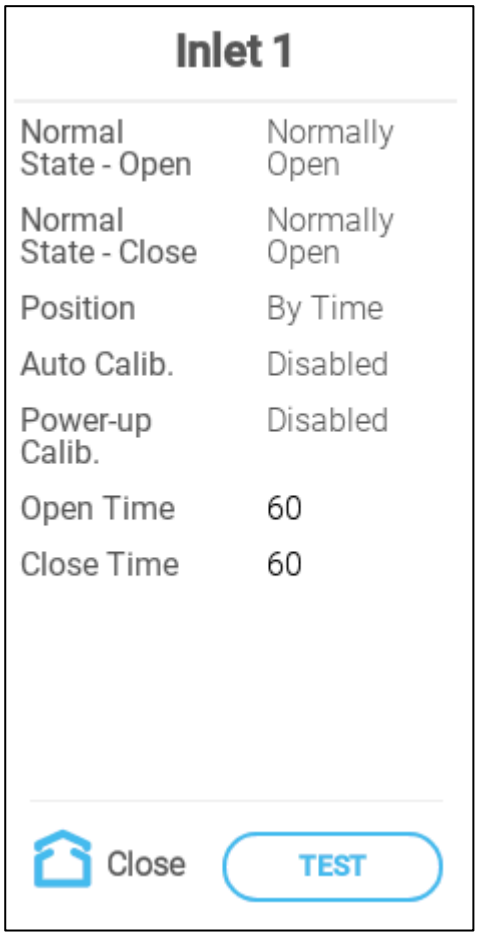
- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.
- The status shows if the cooling device is currently operating.

7.7 Inlets, Tunnel Doors, Outlets

- Defining the Inlets/Tunnel Doors
- Defining the Outlet

7.7.1 DEFINING THE INLETS/TUNNEL DOORS

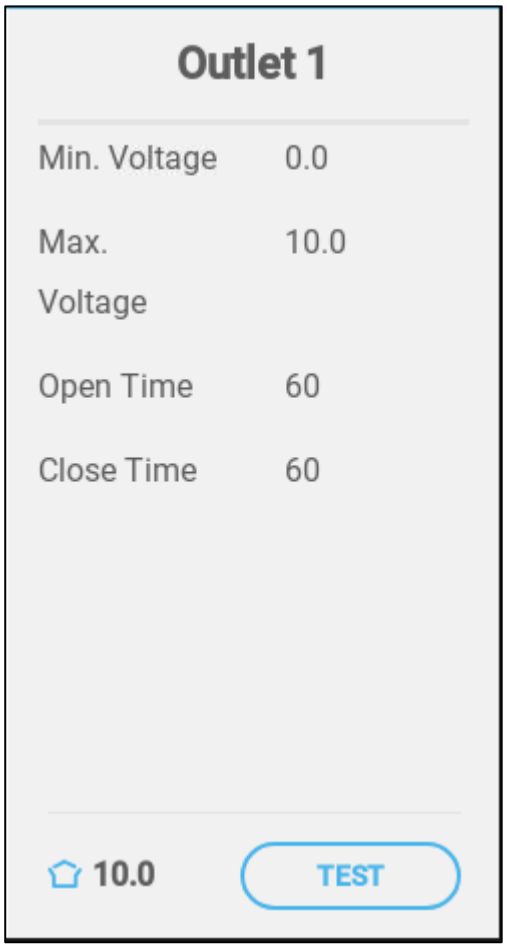
➲ Define up to four relays or analog output ports as inlets or tunnel doors (each device requires two relays or one analogue port) (refer to Mapping Devices, page 43).



- Define:
  - Normal State
  - Position: Define how the inlet opening is controlled:
    - By time
    - Potentiometer
  - Auto Calib.: Enable automatic calibration. Refer to Inlet and Curtain Ventilation, page 106.
  - Power up calibration: Enable this parameter to calibrate inlets each time that TRIO is turned on.
  - Open/Close Time: Enter the amount of time required to fully open or fully close the inlet. These parameters are only enabled when Position/By Time is selected.

7.7.2 DEFINING THE OUTLET

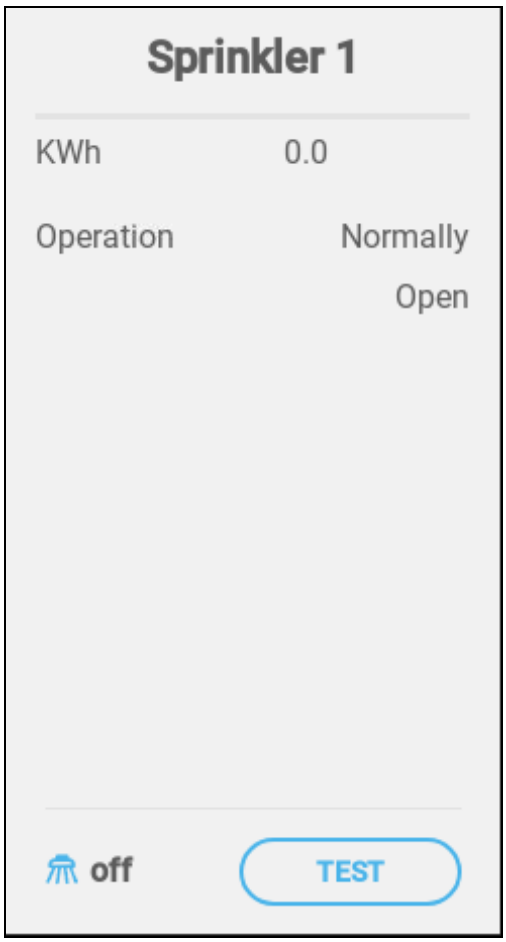
➲ Define one analog output port as an outlet (refer to Mapping Devices, page 43).



- Define:
  - Min./Max Voltage: Define the voltage in the analogue output port that corresponds to the 0% and 100% output, respectively.
  - Open/Close Time: Enter the amount of time required to fully open or fully close the inlet.

7.8 Defining the Sprinkler

➲ Define one relay as a sprinkler (refer to Mapping Devices, page 43).

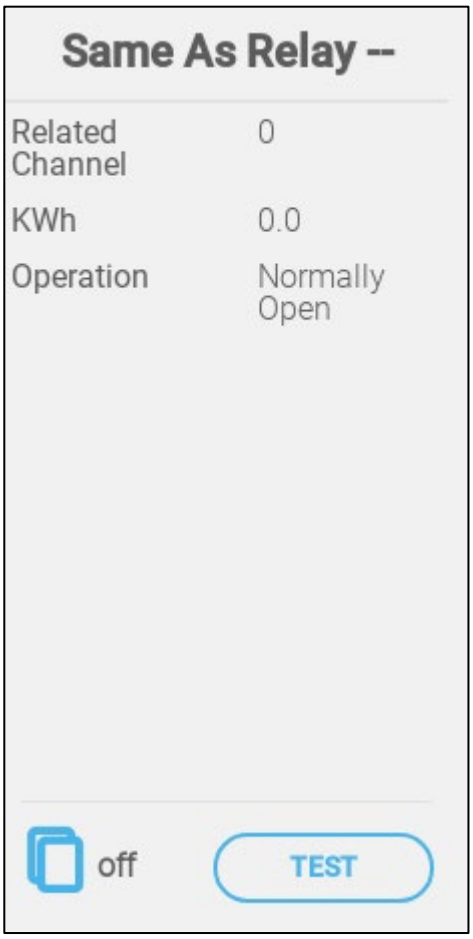


- Define:
  - Operation: Define the relay mode.

7.9 Defining the Same As Relays

➲ **Define up to 20 relays as Same as Relay (refer to Mapping Devices, page 43).**

This functions enables defining a relay to operate using the parameters defined for another relay. A relay can be tied to any other relay.

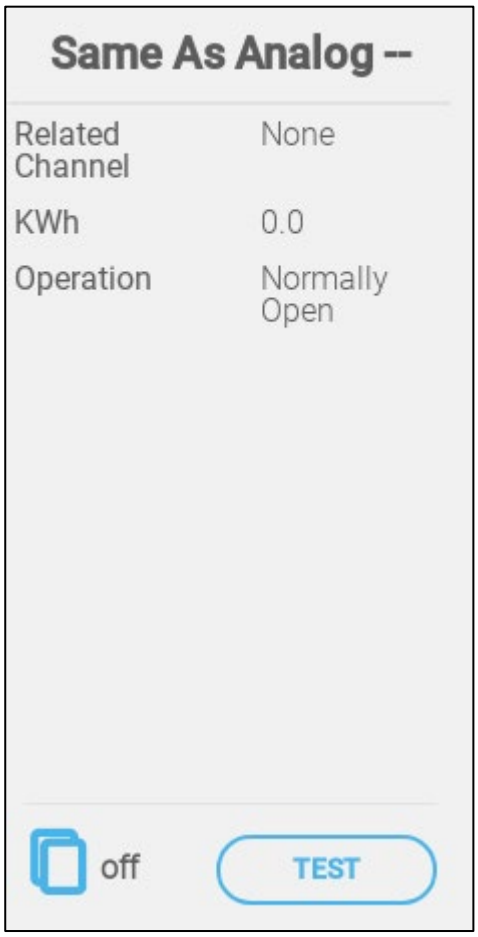


- Define:
  - Related Channel: Define which relay number to follow. Range: 1 – 20
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.10 Defining the Same As Analog Ports

➲ **Define up to eight relays as Same as Analog Ports (refer to Mapping Devices, page 43).**

This functions enables defining a relay to operate using the parameters defined for a corresponding analog port. Relays can be mapped to eight specific ports only.



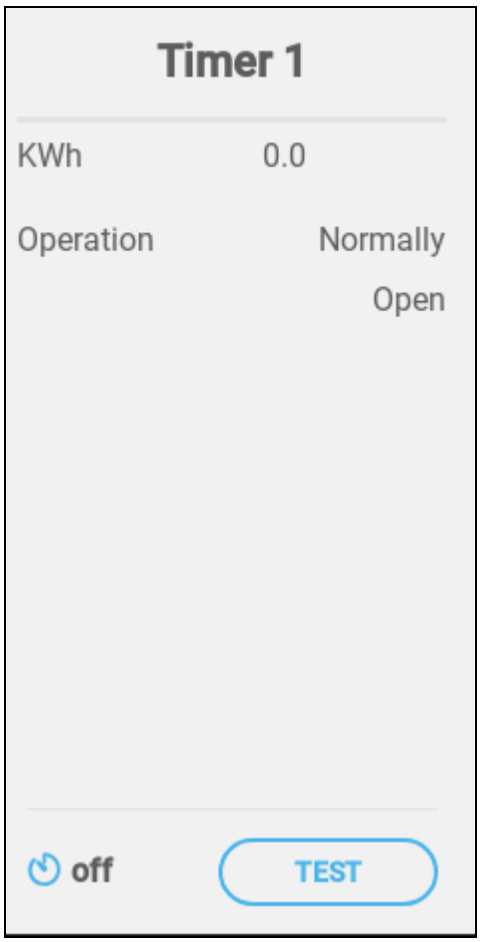
- Define:
  - Related Channel: Define which port number to follow.

Port Number	Related Channel
7	1
8	2
9	3
10	4
21	5
22	6
23	7
24	8

  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.11 Defining the Timer

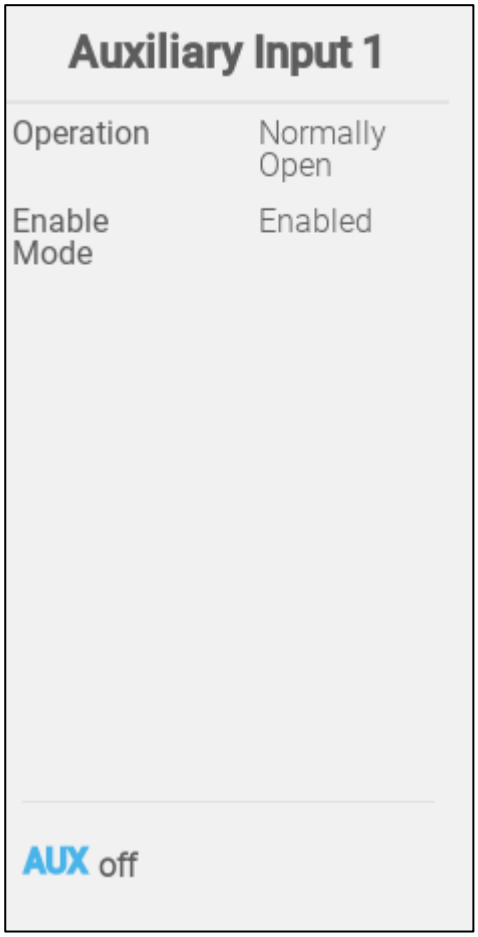
➲ Define up to five relays as timers (refer to Mapping Devices, page 43).



- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.12 Defining the Auxiliary Input

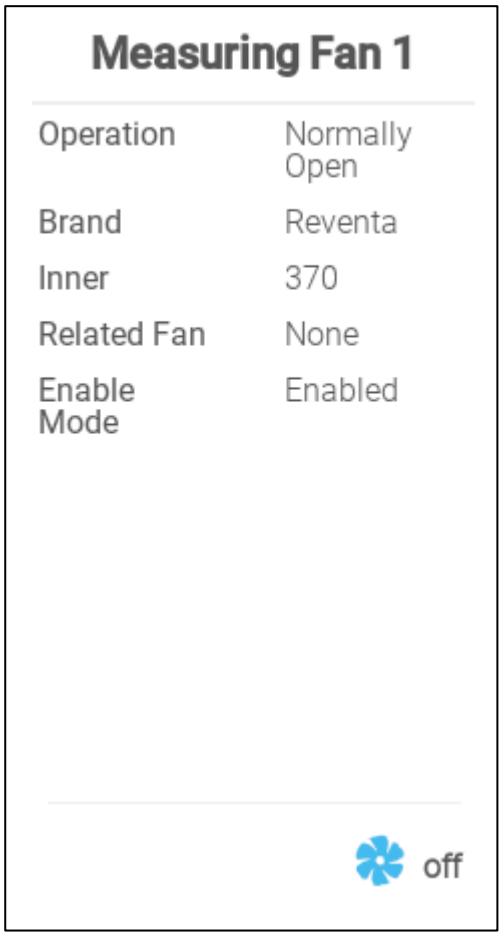
➲ Define up to four relays as auxiliary inputs (refer to Mapping Devices, page 43).



- Define:
  - Operation: Define the relay mode.
  - Enable Mode: Enable/disable the input.

7.13 Defining the Measuring Fan

➲ Define one sensor as a measuring fan (refer to Mapping Devices, page 43).



- Define:
  - Operation: Define the logical state (normally open or close) which corresponds to the input idle/off state..
  - Brand: Select the fan manufacturer.
  - Inner: Select the fan circumference.
  - Related Fan: If the measuring fan is to be for compensation, define the fan to be used to provide the extra air. Refer to Ventilation Compensation, page 91.

NOTE A relay or port must be defined as a fan for this parameter to be enabled.

  - Enable Mode: Enable/disable the sensor.

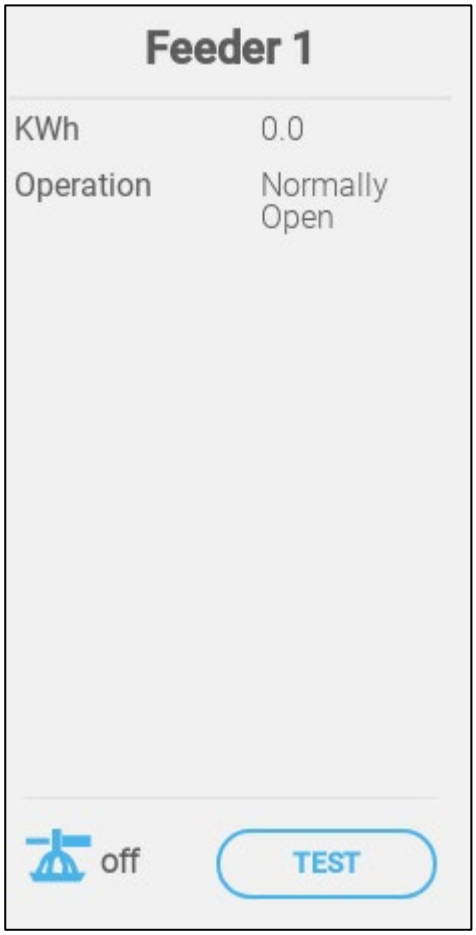
7.14 Feeding Devices

Setting up a feed system requires feeder relays and sensors.

- Defining the Feeder Relay
- Defining the Feeder Active Sensor
- Defining the Feeder Line Sensor

7.14.1 DEFINING THE FEEDER RELAY

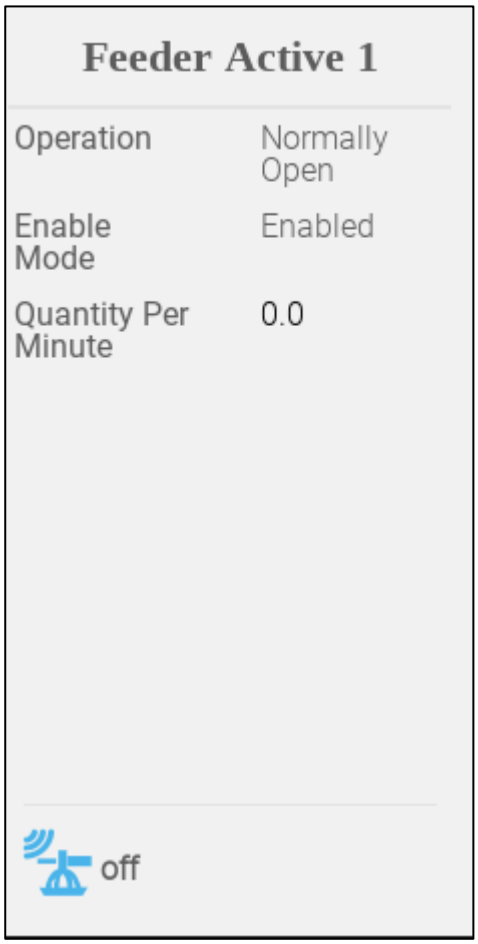
➲ Define one relay as feeder (refer to Mapping Devices, page 43).



- KWh: This field displays the amount of kilowatts used. Read-only.
- Operation: Select if the relay is normally open or normally close.

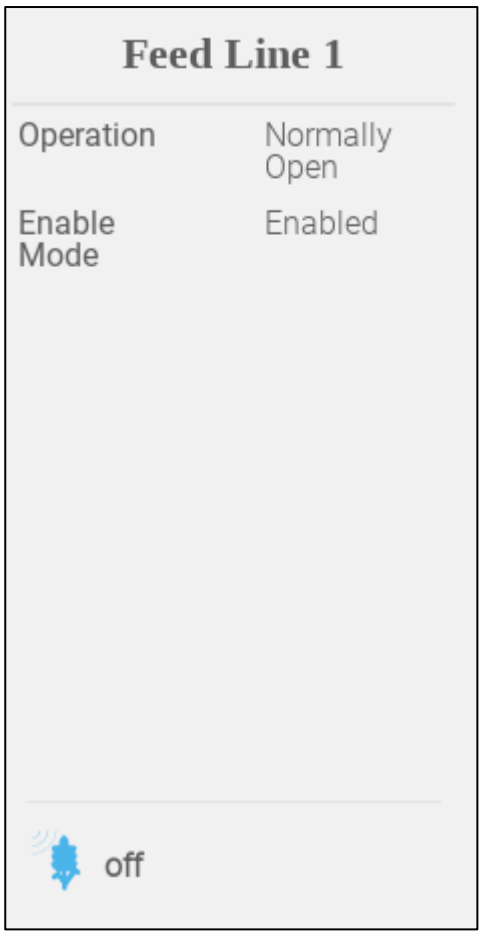
7.14.2 DEFINING THE FEEDER ACTIVE SENSOR

➲ Define one analog port as feeder active (refer to Mapping Devices, page 43).



- Define
  - Operation: Select if the relay is normally open or normally close.
  - Enable Mode: Enable/disable the sensor.
  - Quantity Per Minute: Define the amount (weight per minute) of feed to be distributed.

7.14.3 DEFINING THE FEEDER LINE SENSOR



- Operation: Select if the port is normally open or normally close.
- Enable Mode: Enable/disable the sensor.

8 Basic Setup

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

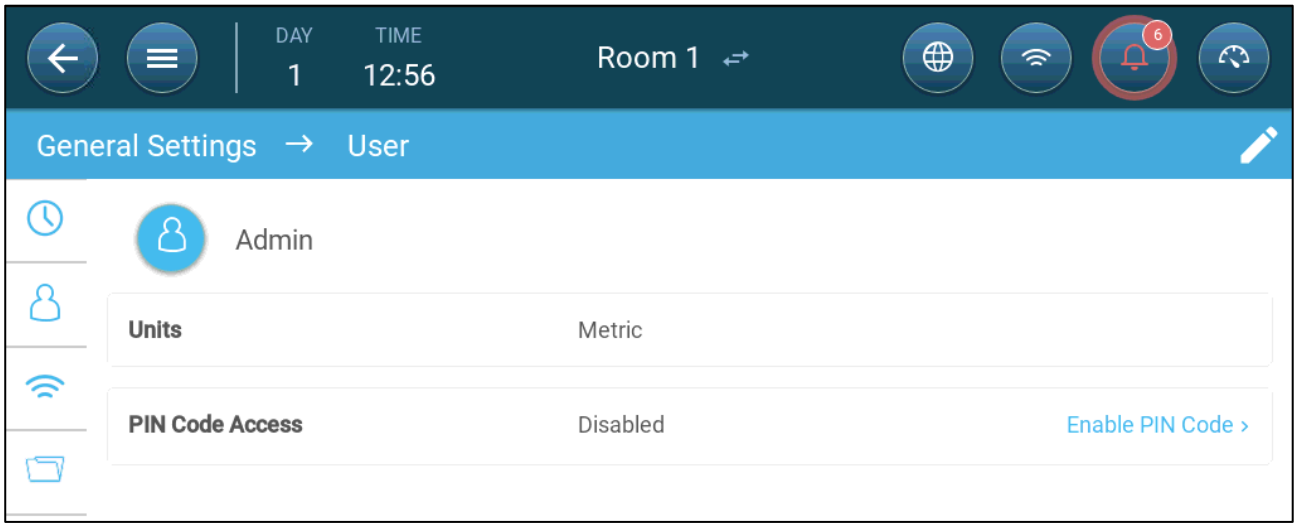
- Defining the General Settings
- Batch Settings
- Defining the Expected Animal Weight
- Adjusting the Animal Count
- Tech Support Information

8.1 Defining the General Settings

- Defining the Preferences
- Defining the Time/Date

8.1.1 DEFINING THE PREFERENCES

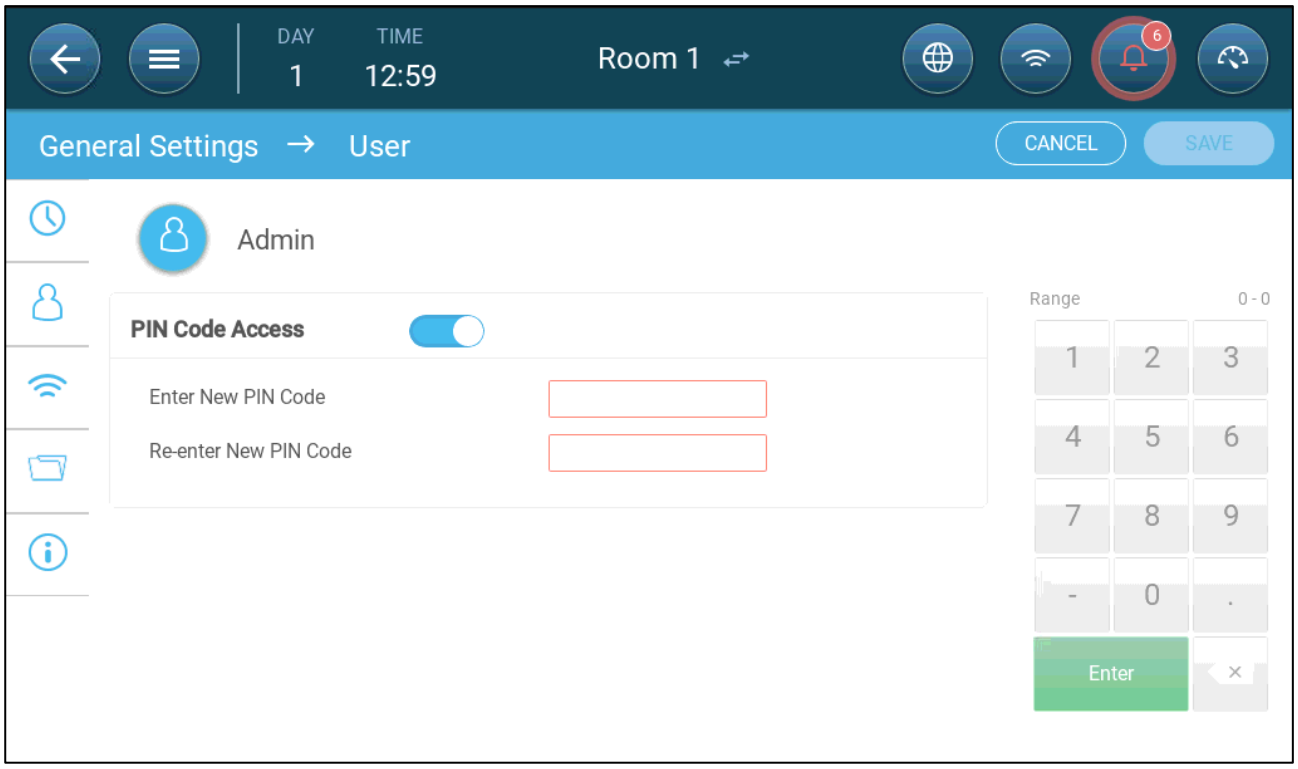
1. Go to System > General Settings > User  .



2. Define the units: There are two options:

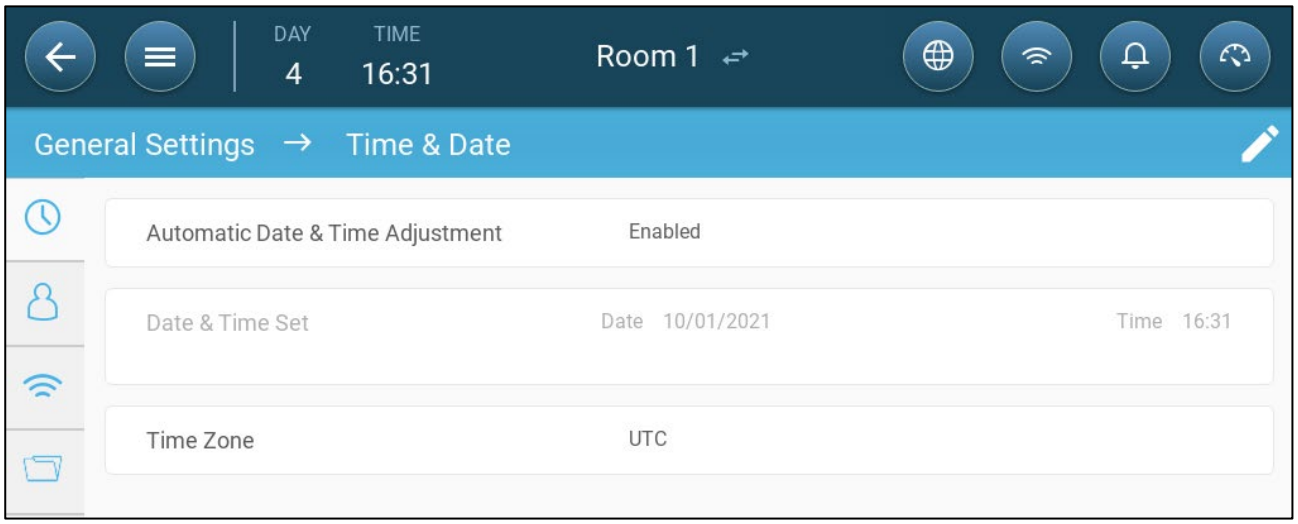
- Define all units as metric or imperial.
- Define each unit. Click Edit > Customize and define:
  - Temperature (Celsius or Fahrenheit)
  - Pressure (Pascal/Inches of Water)
  - Weight (Kilogram/Pounds)
  - Air Flow: Cubic Meter/Hour or Cubic Feet/Minute

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



8.1.2 DEFINING THE TIME/DATE

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



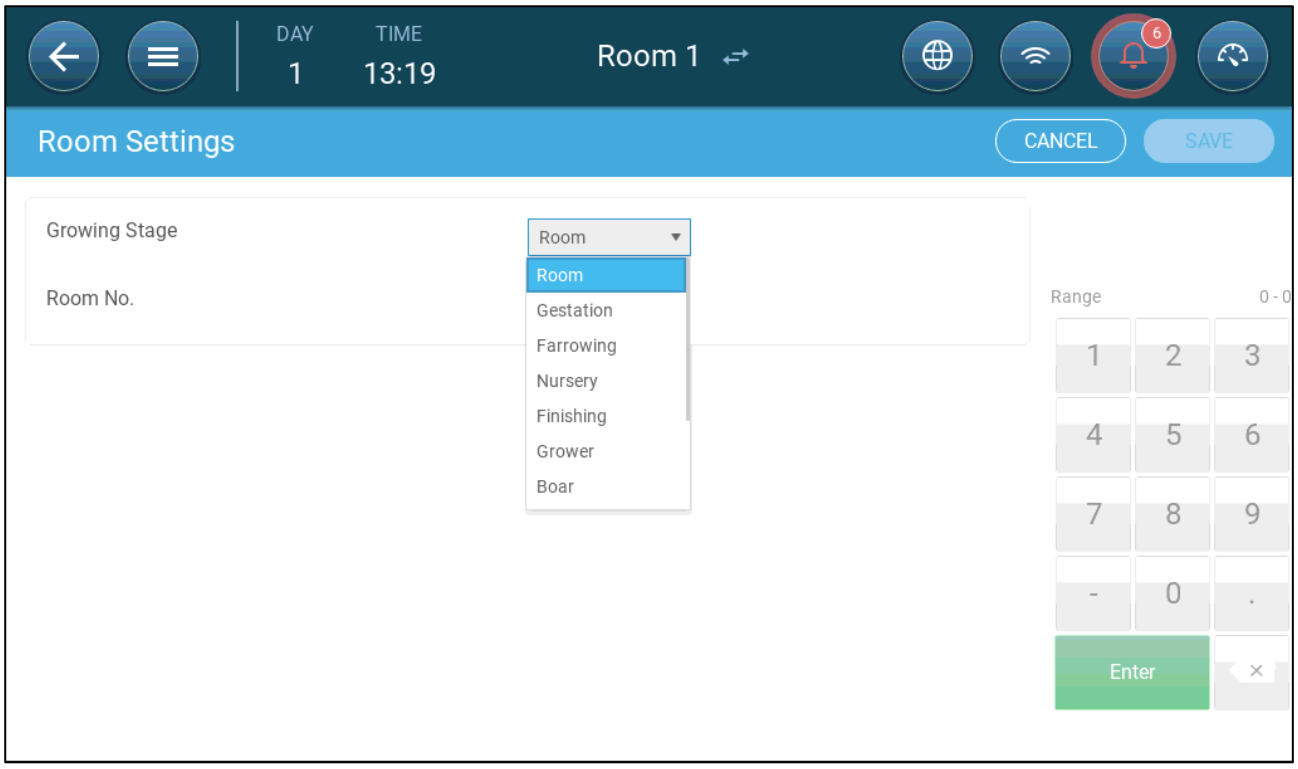
2. Define:
    - Time
        - Automatic Date & Time Adjustment: Enable this option to update date and time automatically
        - Date and Time Set: Manually enter the date and time.
    - Time Zone: Select the zone from the drop down list.

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

8.1.3 DEFINING THE ROOM SETTING

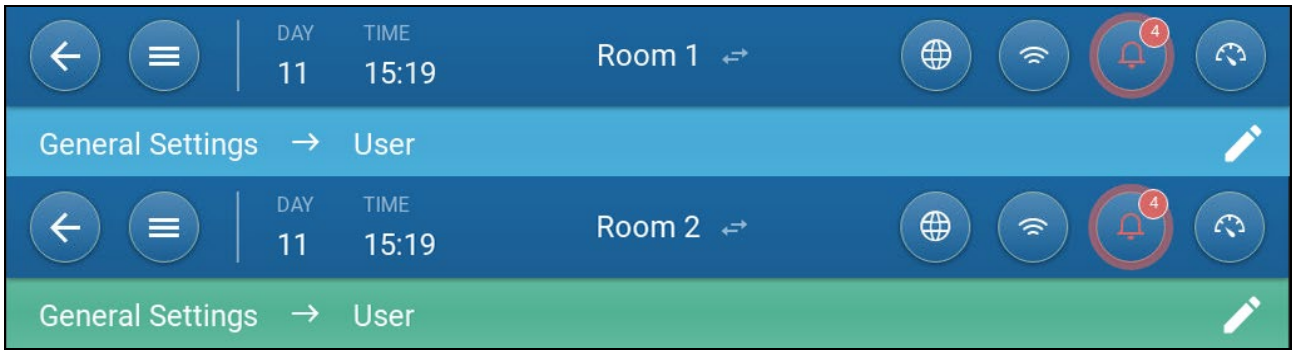
In System > Room Settings, select the growing stage. You can change the stage throughout the growth cycle. The default is Room.

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.
    - Weaners: Same as Nursery
  - Room number

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



8.2 Batch Settings

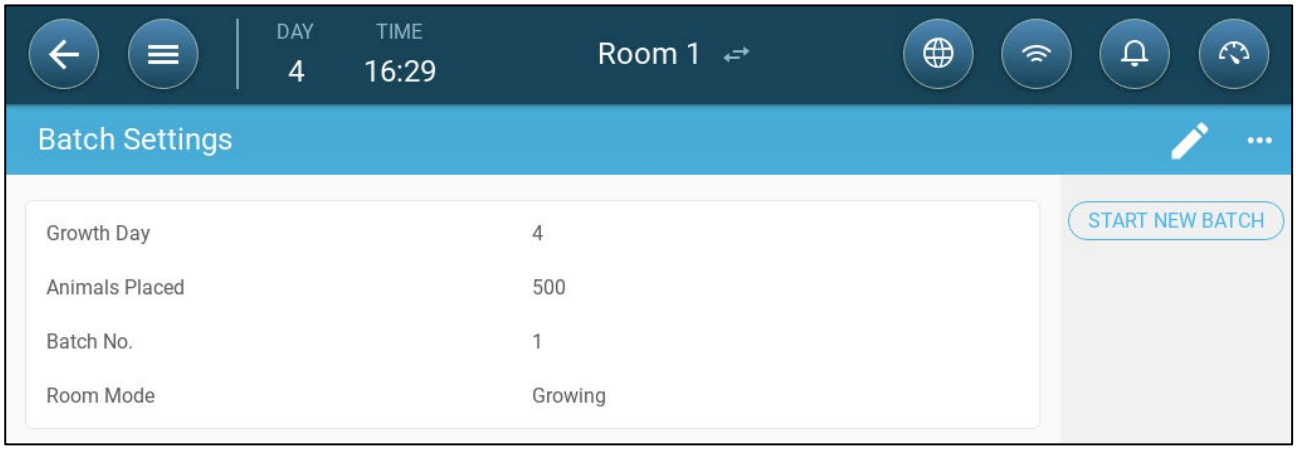
Batch Settings are data points used to define each herd. Define these settings at the beginning of a growth cycle. Batch settings include:

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

- Defining the Batch Settings Parameters
- Defining the Batch Settings

8.2.1 Defining the Batch Settings Parameters

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
    - Animals Placed: 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 78.

    - 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

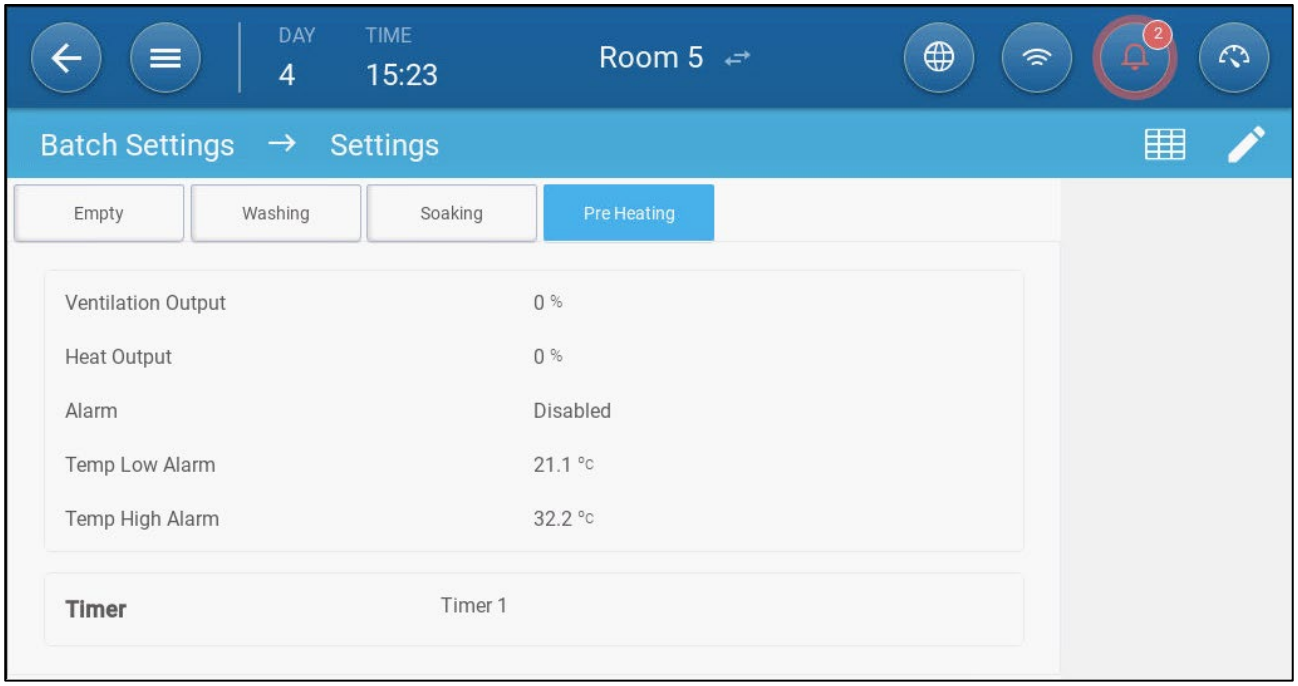
- Empty
  - Provide ventilation according to the output set by the heat and ventilation.
  - Stop growth day progress.
  - Stop water alarm even when the alarm function is enabled.
- Presoaking/Soaking: Between batches the facility is cleaned by pre-soaking and/or soaking.
  - Provide ventilation according to the output set by the heat and ventilation.
  - Stop growth day progress.
- Pre Heating: Pre heat facility before moving the animals in.

- Start New Batch: Batch: Click Start New Batch when placing animals. TRIO:
  - Resets historical data
  - Sets the growth day to zero
  - Increases the batch number by one
  - Records a "New Batch" event

8.2.2 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:
   - Ventilation Output: Define the maximum ventilation output.
   - Heat Output: Define the maximum heat output.
   - Alarm: Enable or disable
   - Temp Low/High Alarm: Set the temperature below/above which the controller activates a temperature alarm.
   - Timer: Enable or disable. This time will activate the room's mode.

8.3 Defining the Expected Animal Weight

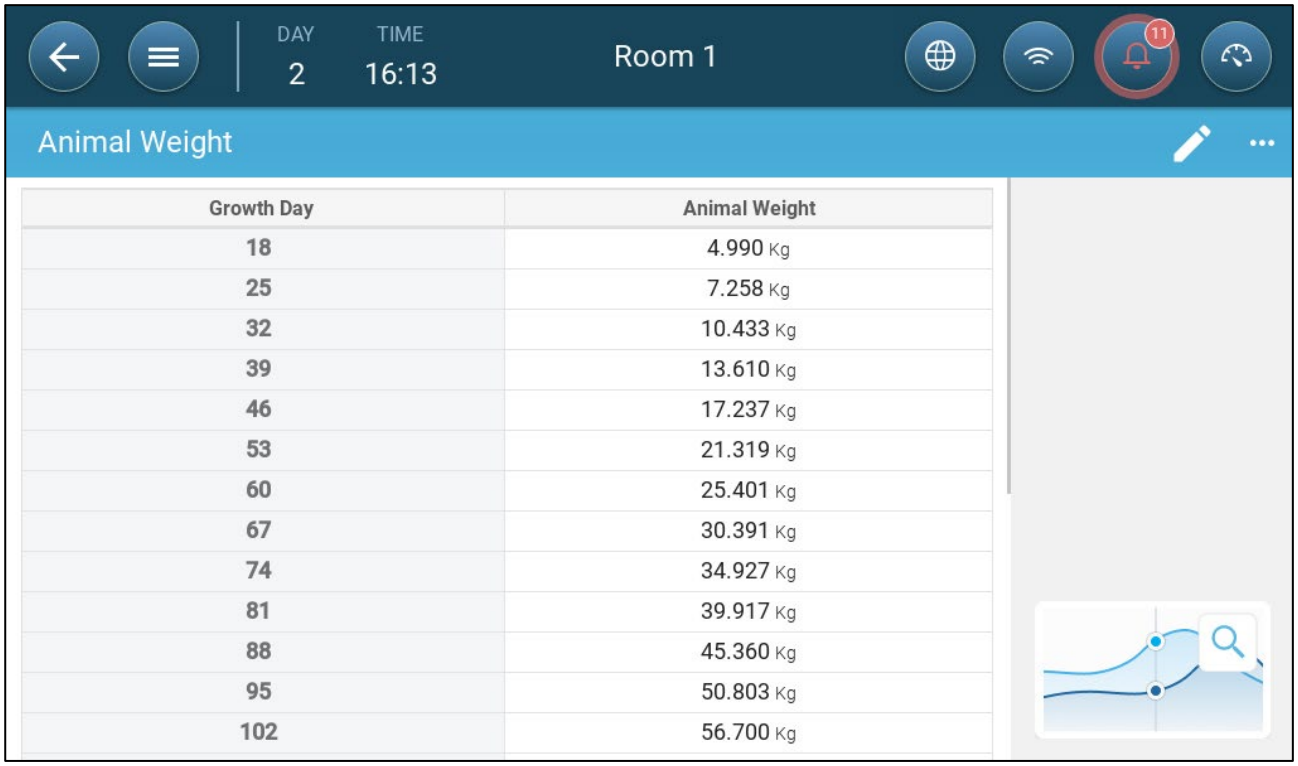
Animal weights are used when calculating the amount of air required when using Ventilation by Weight (page 89). In this screen, define the expected weights over the growth cycle. TRIO provides a default chart which can be edited.

- 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

8.3.1 Animal Weight Main Screen

1. Go to Batch > Animal Weight.



Growth Day	Animal Weight
18	4.990 Kg
25	7.258 Kg
32	10.433 Kg
39	13.610 Kg
46	17.237 Kg
53	21.319 Kg
60	25.401 Kg
67	30.391 Kg
74	34.927 Kg
81	39.917 Kg
88	45.360 Kg
95	50.803 Kg
102	56.700 Kg

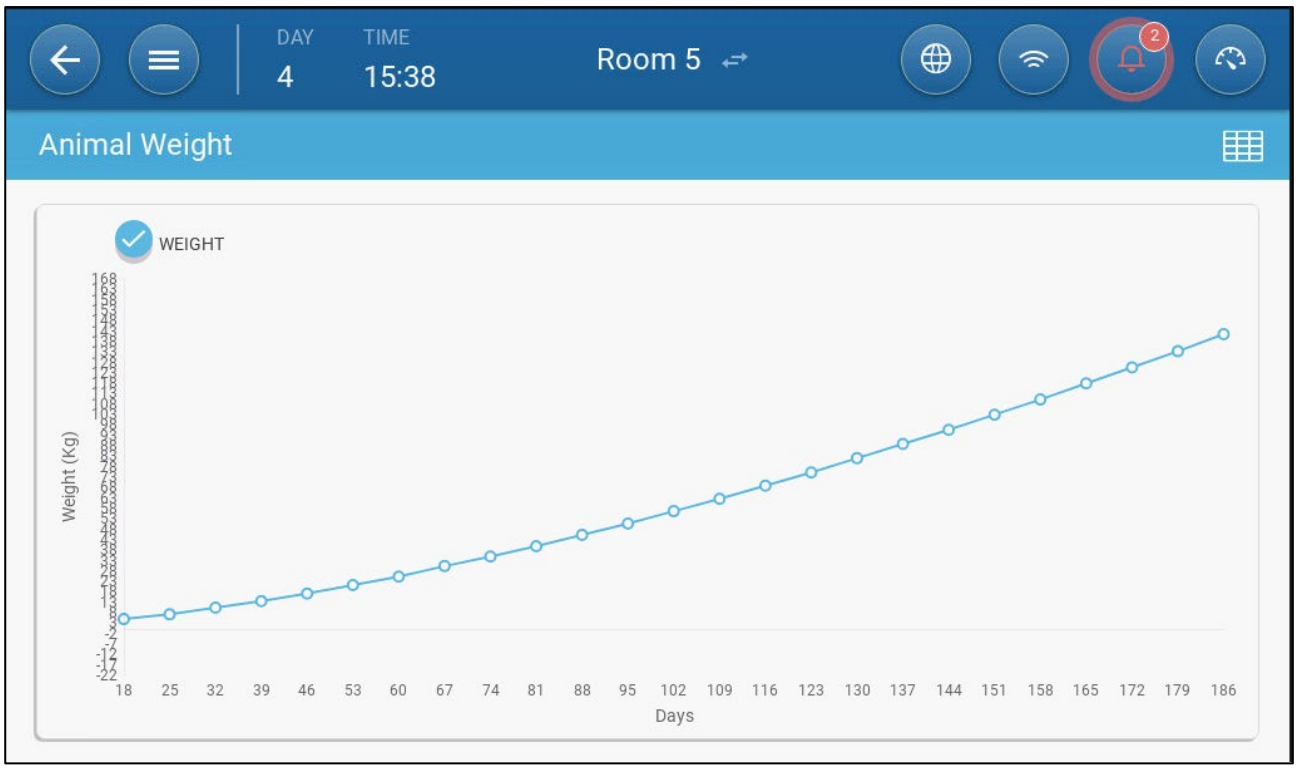
2. Define:

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

- 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

8.3.2 ANIMAL WEIGHT CURVE

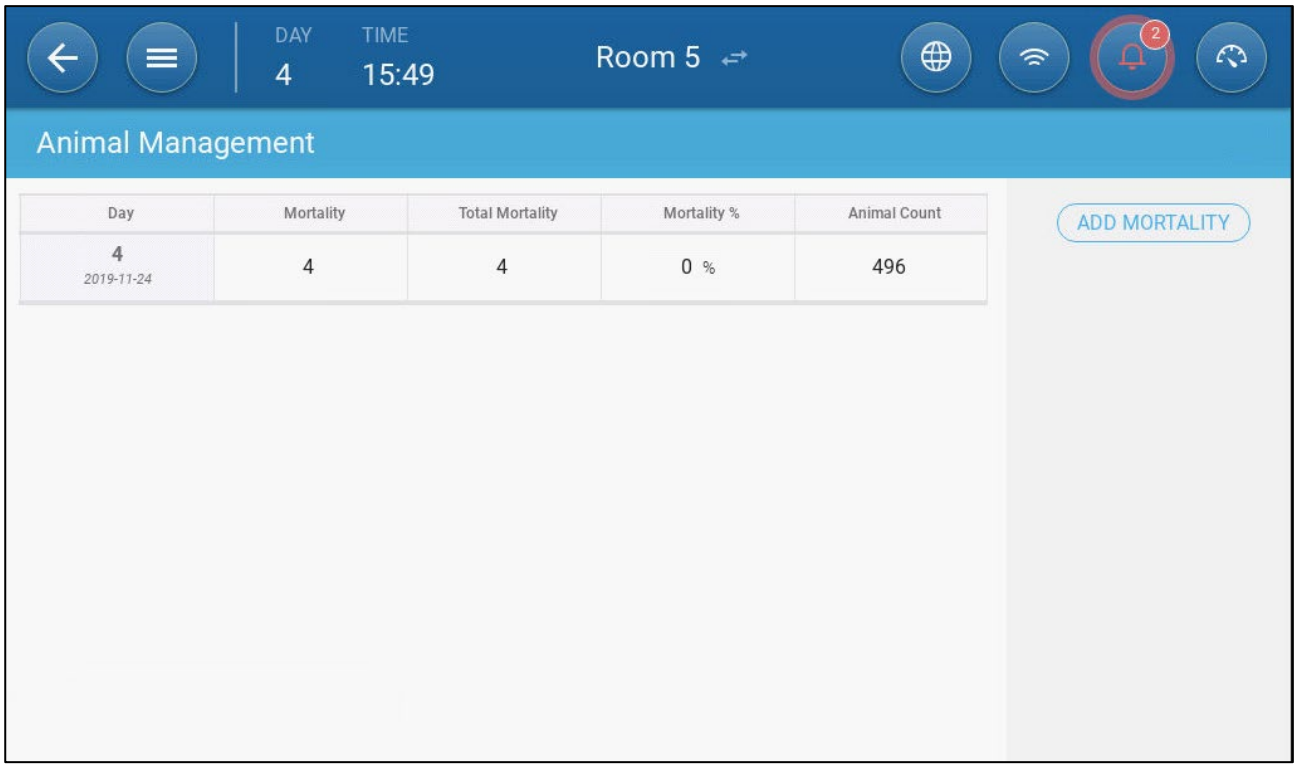
Click  or  to view the weight curve.



8.4 Adjusting the Animal Count

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

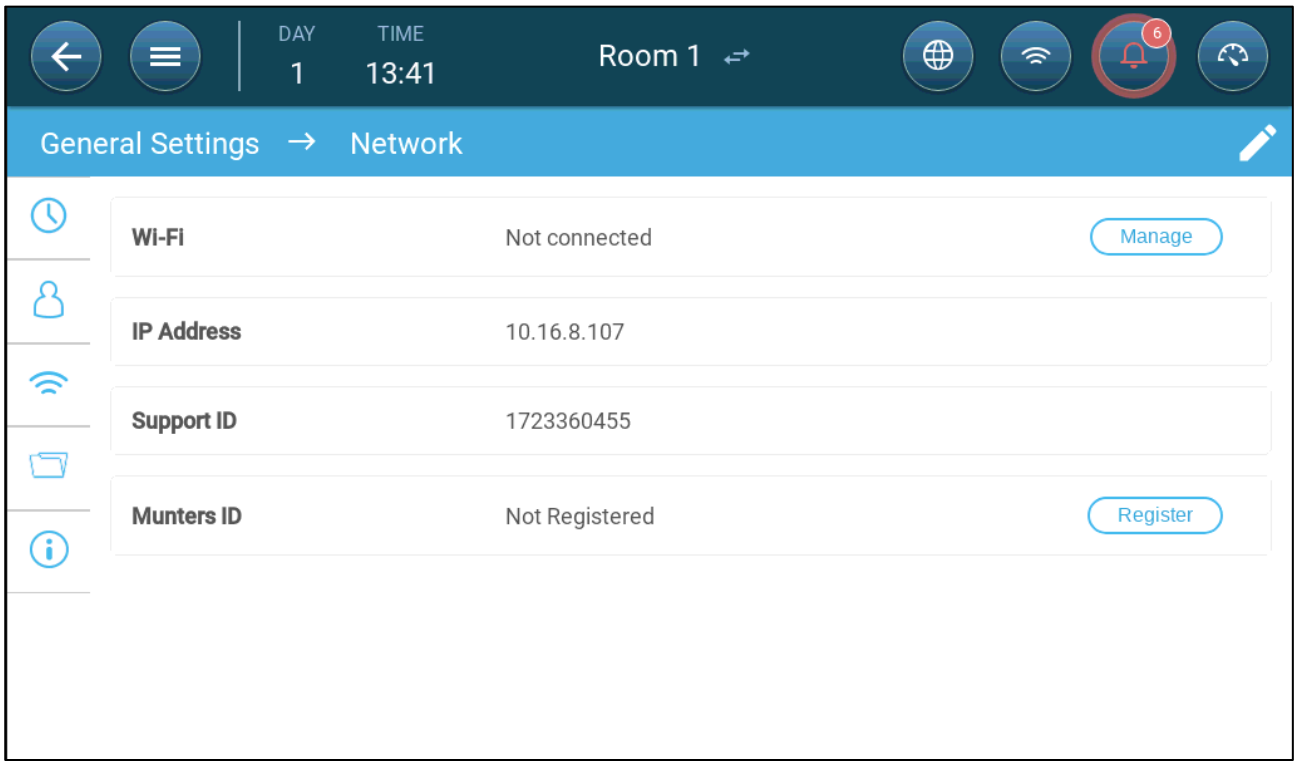
1. Go to Batch > Animal Management. This screen displays the animal mortality data.



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

8.5 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.



9 Feed Management

- Feeding Summary
- Setting up Feeding

9.1 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.

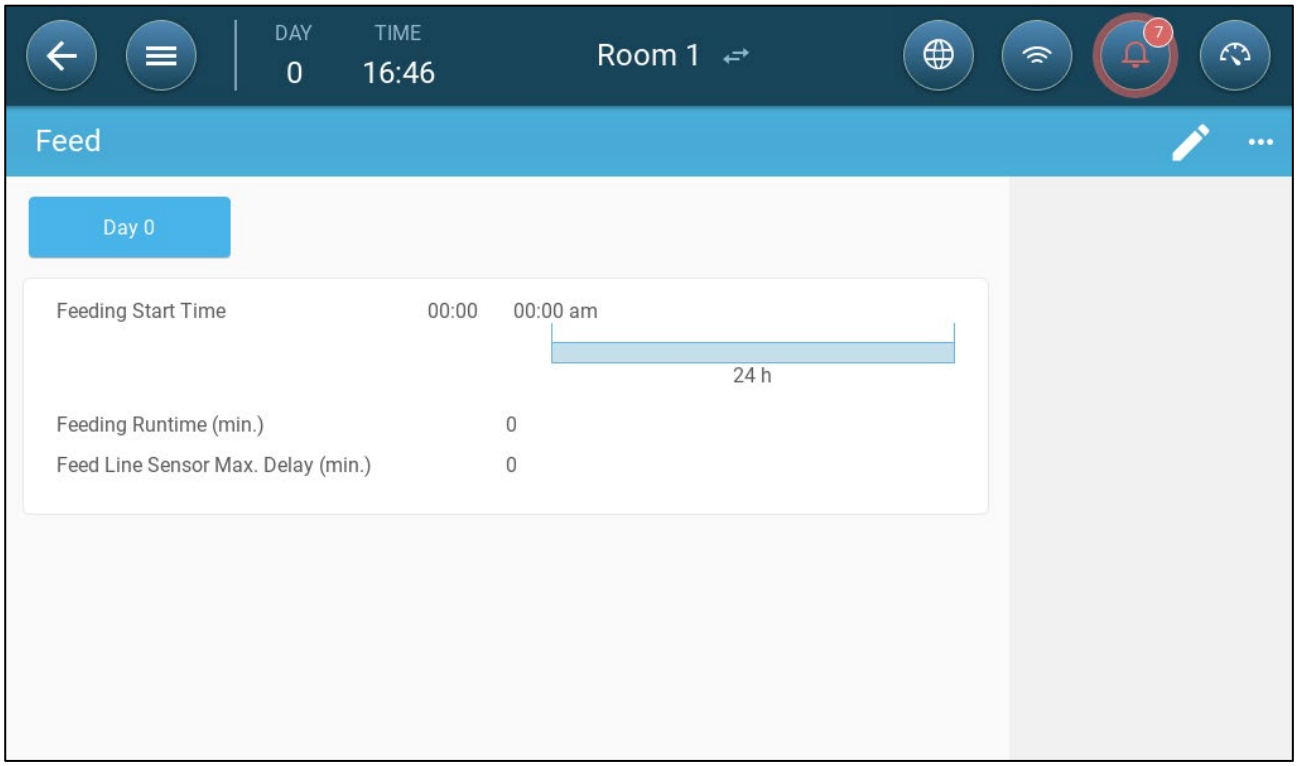
➲ **A feeder relay must be wired, defined, and mapped.**

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

9.2 Setting up Feeding

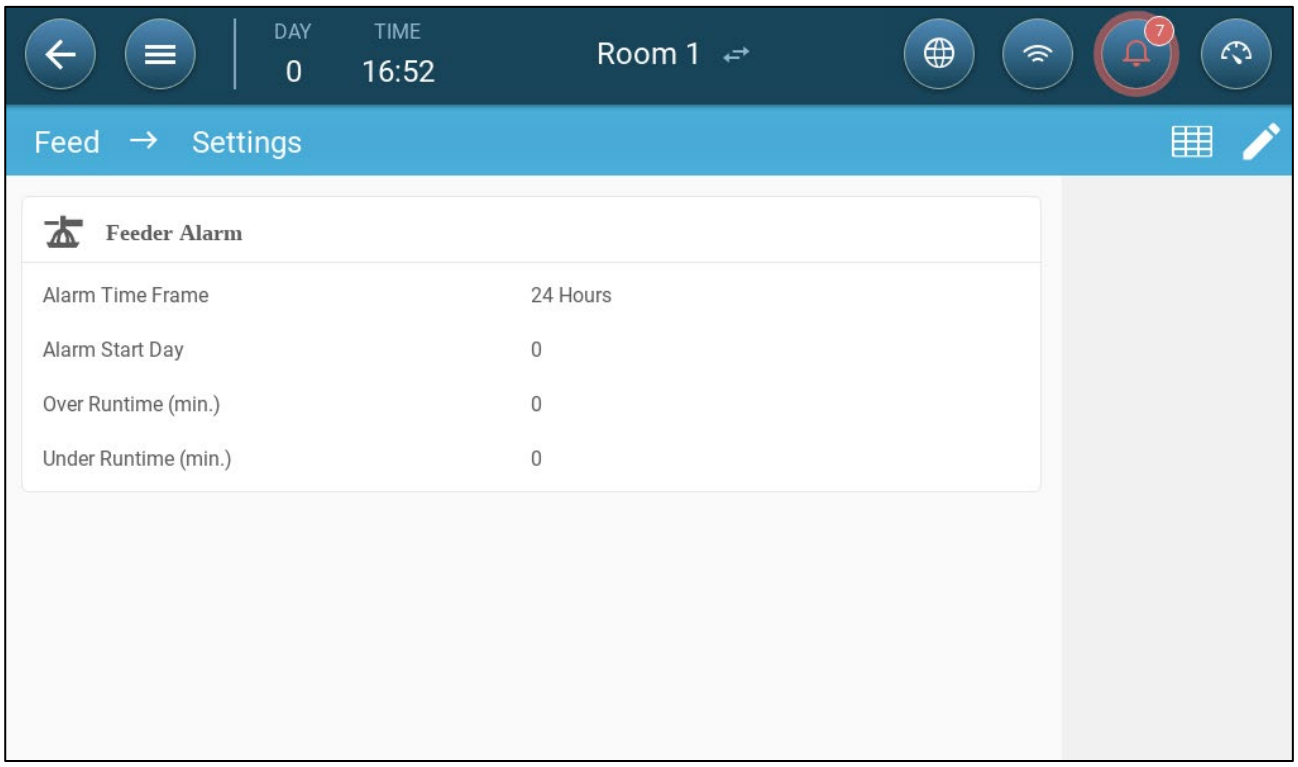
Use the Feed Screen to turn on/off augers and feeders according to the user-designed schedule. All augers operate according to the auger schedule and all feeders work according to the feeder schedule.

1. Go to Control > Feeding.



2. Click  .

3. Define:
    - Day tab: This defines the growth day at which the program runs until the next defined day. Define up to eight days.
    - 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 > Settings to set the alarms. Enable the alarms.



5. Click  and define the feeder:
    - 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.

10 Temperature Settings

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

10.1 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.

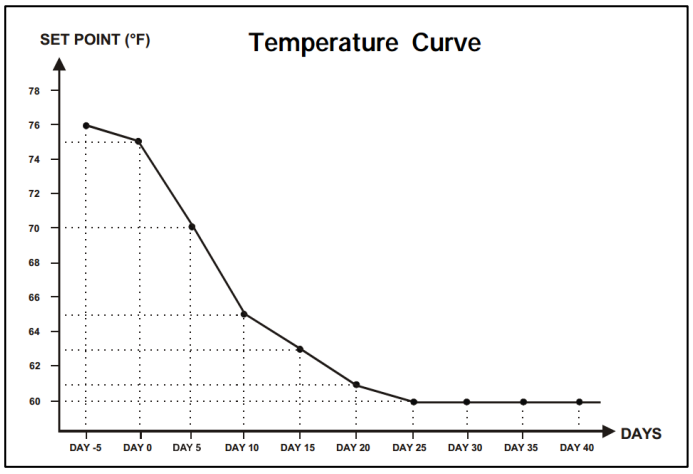


Figure 26: Temperature Curve Example

In addition the Temperature Curve has secondary functions:

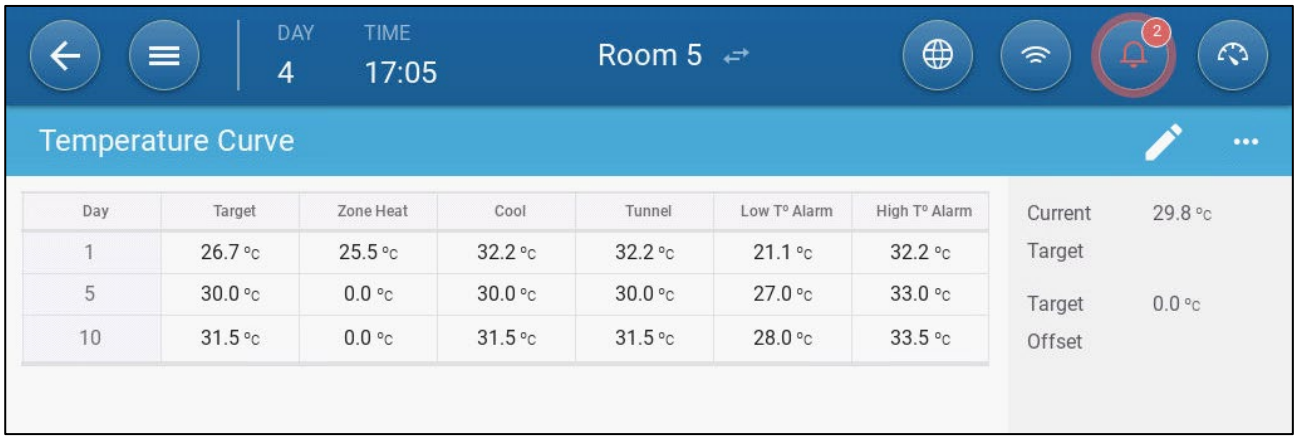
- Defines when heating begins in cases where the actual temperature drops below the target temperature (**Heat**).
- Defines when heating turns off.
- Defines when an alarm is sent when temperatures are too low (**Low Alarm**)
- Defines when an alarm is sent when temperatures are too high (**High Alarm**)

10.2 Configuring the Temperature Curve

- Defining the Temperature Curve
- Defining Temperature Curve Settings

10.2.1 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.
    - Zone Heat: This parameter is the set point at which the zone heaters are activated.
    - Cool: This parameter is the set point at which cooling devices are activated. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C.

NOTE Zone Heat and Cool appear if a zone heater and cooler are defined in Mapping Devices, page 43.

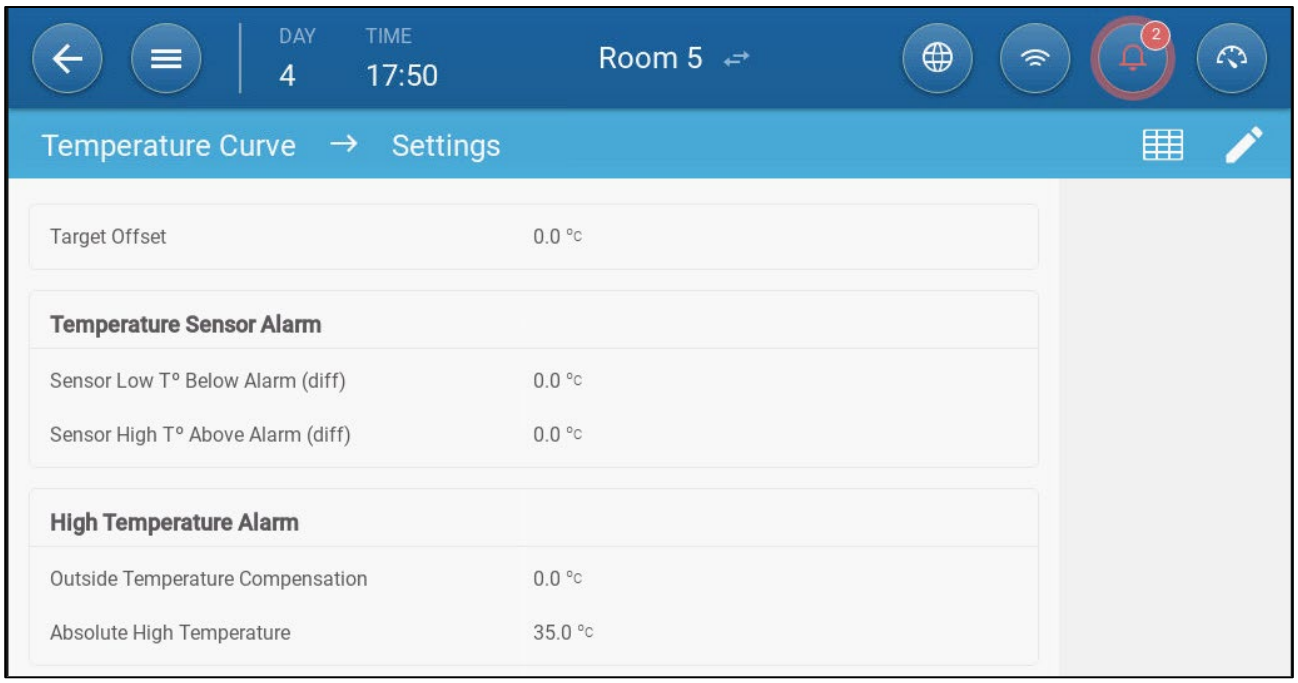
    - Tunnel: This parameter is the set point at which tunnel ventilation begins. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90° C.

NOTE Zone Heat and Cool only appear if relays are defined as Zone Heaters or Cooler (refer to page 43). Tunnel appears if Tunnel Ventilation is enabled in Ventilation Settings (page 103).

    - 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.

10.2.2 DEFINING TEMPERATURE CURVE SETTINGS



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

10.3 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

11 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
- Defining Dynamic Ventilation
- Ventilation by Weight
- Measuring Fan

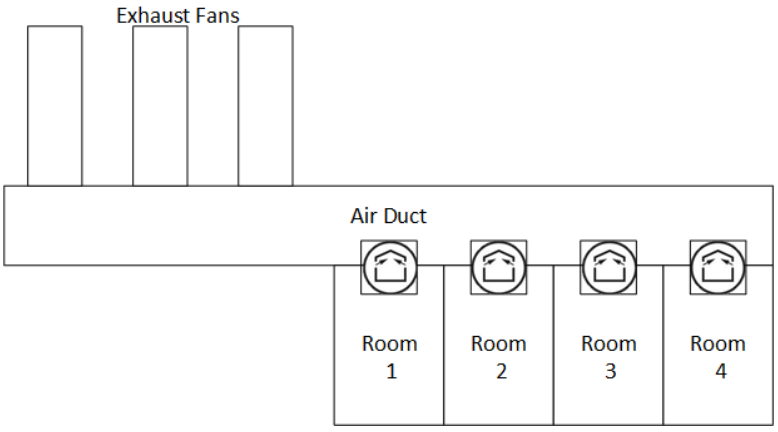
TRIO supports three types of Minimum Ventilation:

- Basic (default option): The Basic option determines the minimum ventilation levels based on the growth day. If more air is required, the level rises to the next setting.
- Dynamic Ventilation: The Dynamic Minimum and Maximum work in a similar manner as the Basic option. However, in cases of extreme cold and extreme warm weather the controller can reduce the ventilation or increase the ventilation, as required by the weather conditions.
- By Weight: Ventilation by Weight determines the ventilation needs based on the temperature, number of animals, and swine weight.
- In addition, you can define Minimum Ventilation to increase in a curve.

11.1 Building Structure Summary

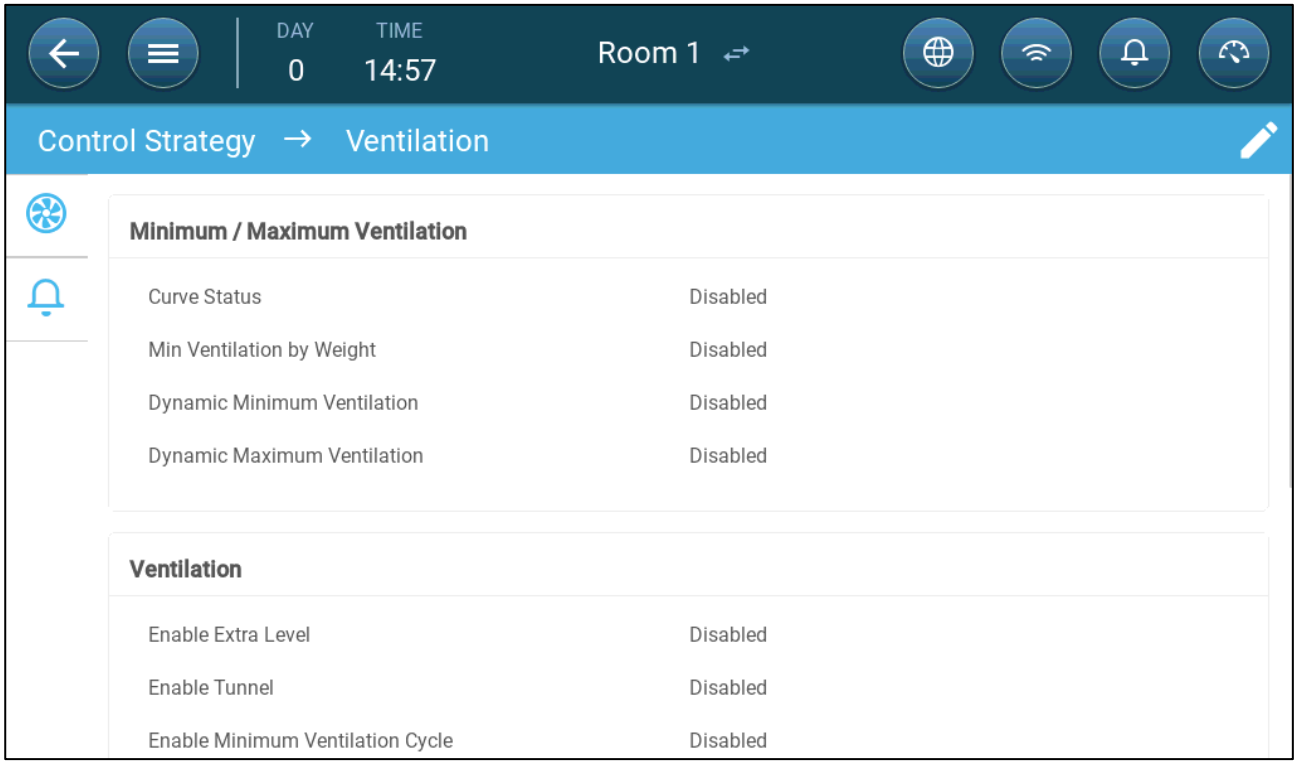
In a typical setup, herds are housed in a building in which all rooms are connected to one central ventilation system. Each room has an inlet which controls the amount of air entering. Centralized fans push air in via the inlet.

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.

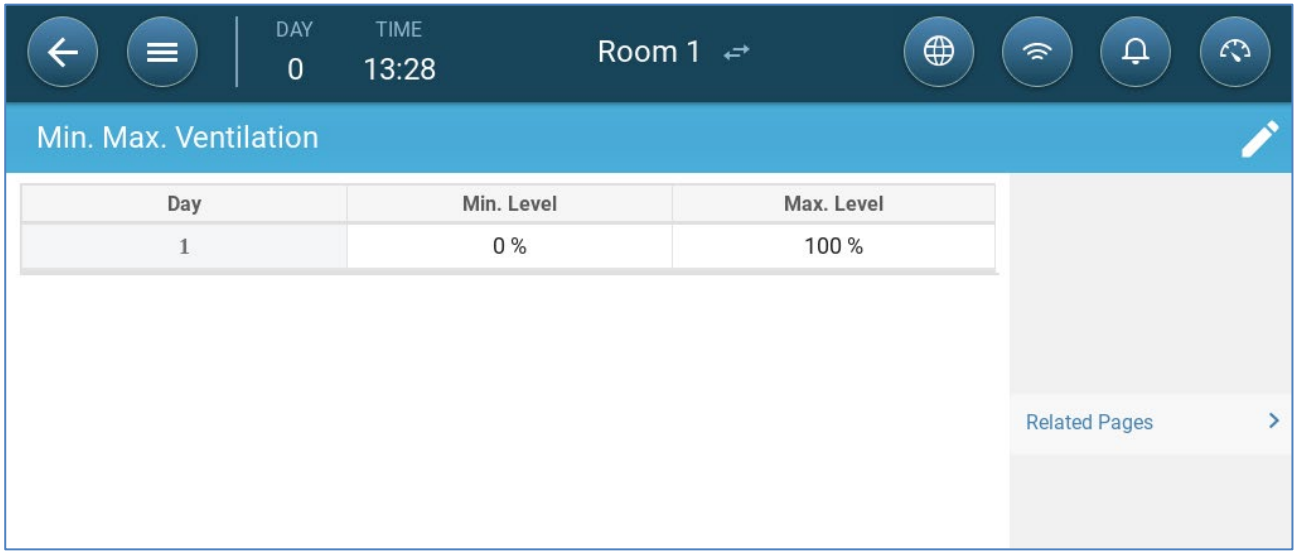


11.2 Defining Basic Ventilation

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.



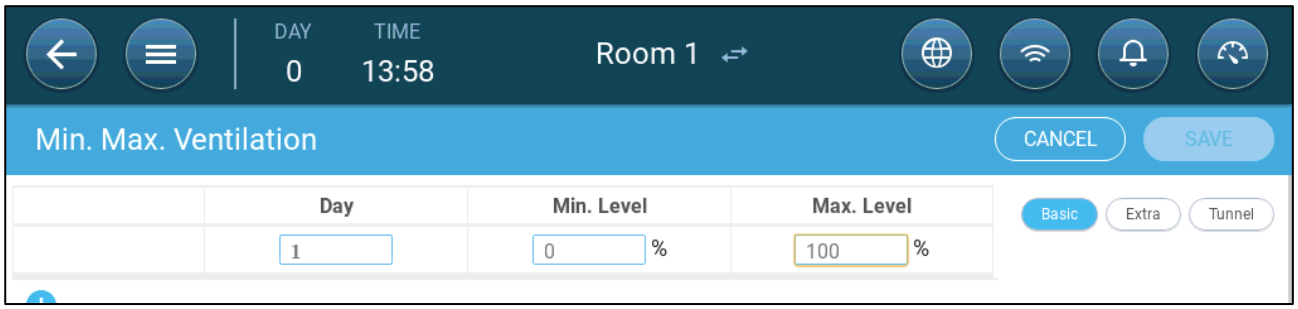
4. Click  .
5. Define:
    - Day: Set the growth day for the required min/max set points. Each day must have a unique number. Add up to ten lines.
    - Min/Max Level: Define the minimum and maximum ventilation levels. TRIO will automatically adjust the ventilation as the temperature changes.

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

6. In System > Control Strategy > Ventilation  , enable Extra Ventilation and/or Tunnel (refer to Defining Extra Ventilation, page 101).

7. In Climate > Min. Max. Ventilation, click  .

8.Place the cursor in Min Level or Max Level. The Basic/Extra/Tunnel icons appear.



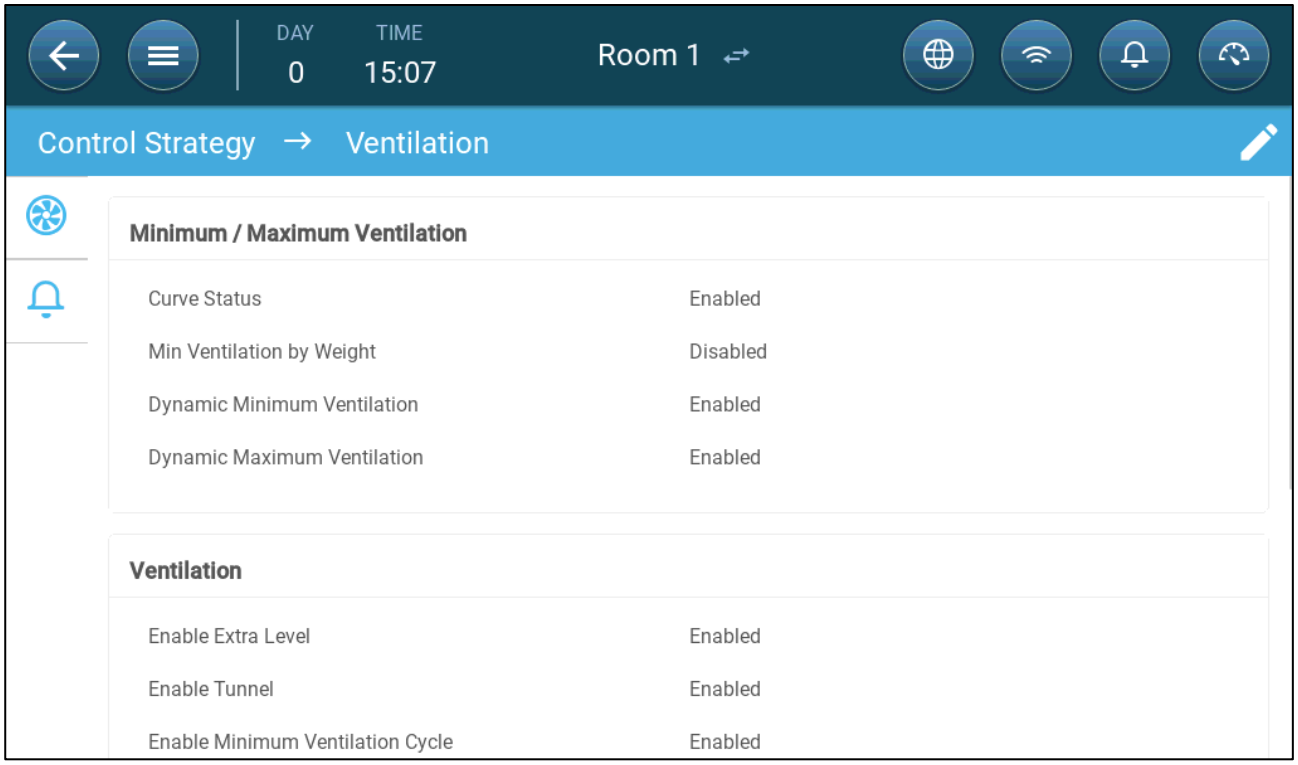
9. Click the required ventilation icon.

10. Define the ventilation as required.

11.3 Defining Dynamic Ventilation

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

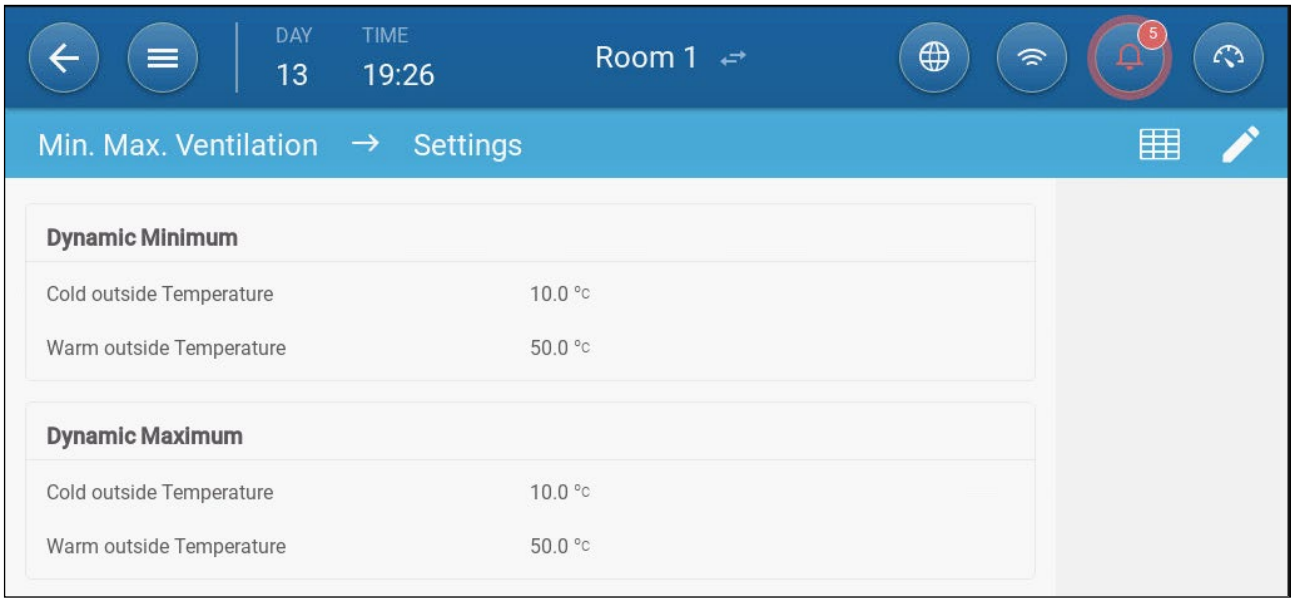
1. Go to System > Control Strategy > Ventilation  .



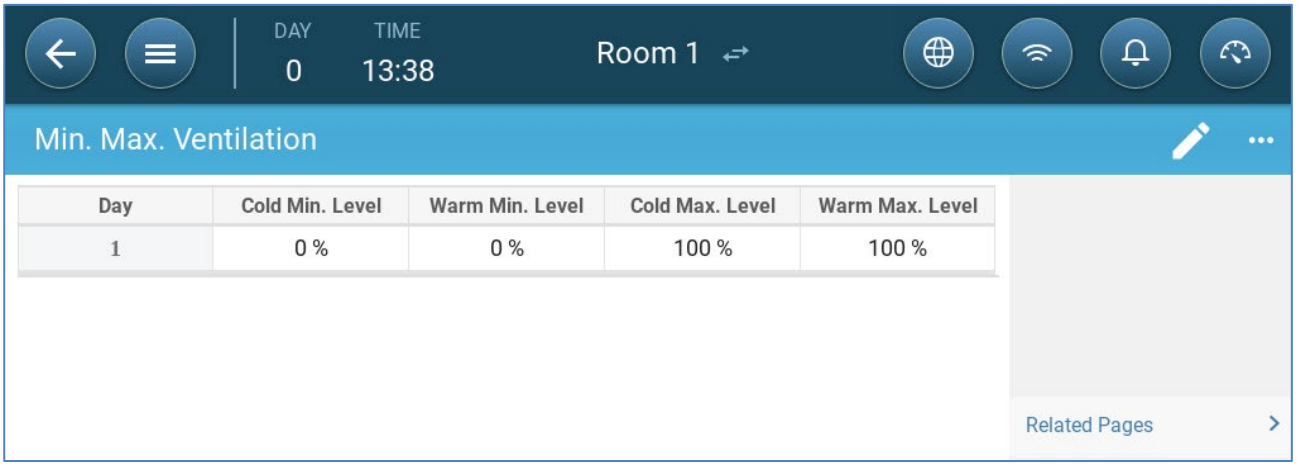
2. Under Minimum / Maximum Ventilation, enable

- Dynamic Minimum Ventilation or
- Dynamic Maximum Ventilation or
- Both. In this example both are enabled.

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



4. Define:
   - Dynamic Minimum Cold/Warm Outside Temperature: Define the cold temperature at which dynamic ventilation begins operating.
   - Dynamic Maximum Cold/Warm Outside Temperature: Define the warm temperature at which dynamic ventilation begins operating.
5. Go to Climate > Min/Max Ventilation.



6. Define:
   - Cold Min.: When the outside temperature reaches the **Dynamic Minimum Cold Outside Temperature**, Minimum Ventilation is **reduced** by this amount.
   - Warm Min: When the outside temperature reaches the **Dynamic Minimum Warm Outside Temperature**, Minimum Ventilation is **increased** by this amount.
   - Cold Max. Level: When the outside temperature reaches the **Dynamic Maximum Cold Outside Temperature**, Minimum Ventilation will not go above this level.

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

11.4 Ventilation by Weight

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

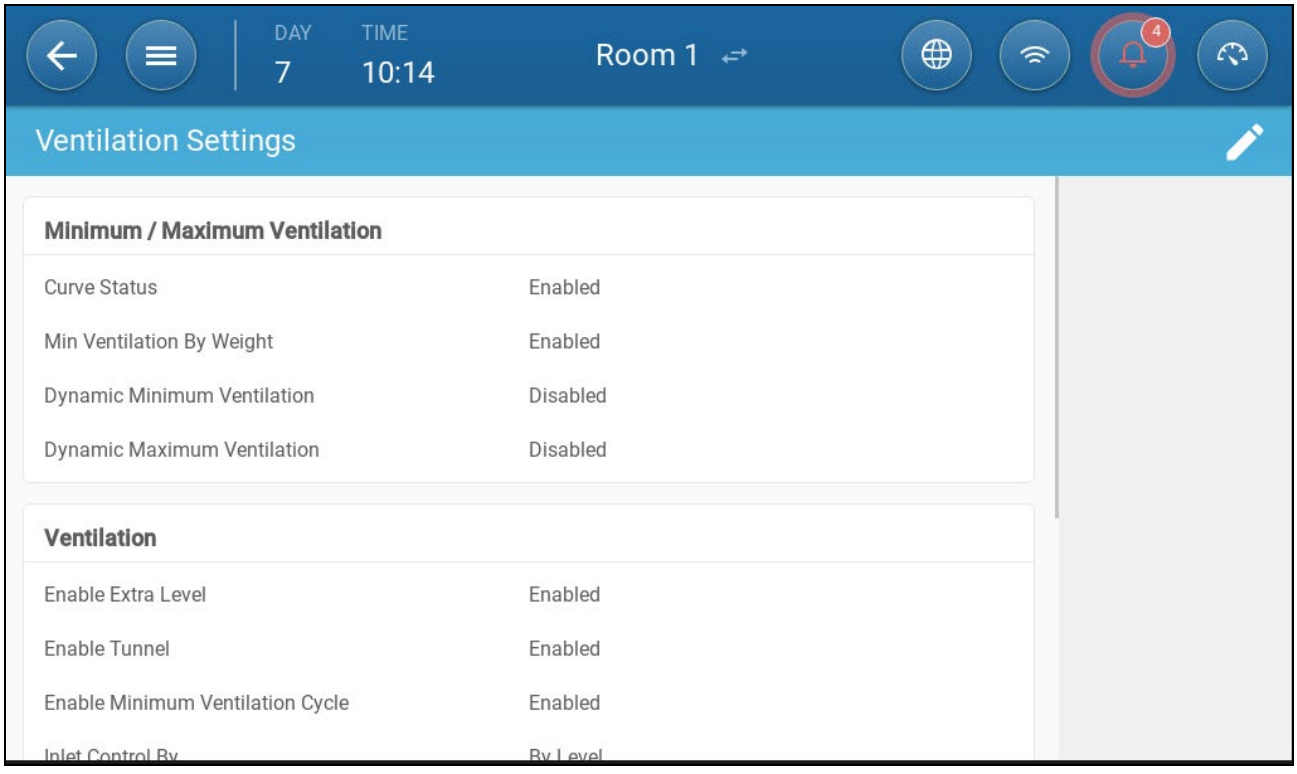
11.4.1 How Does Ventilation by Weight Work

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).

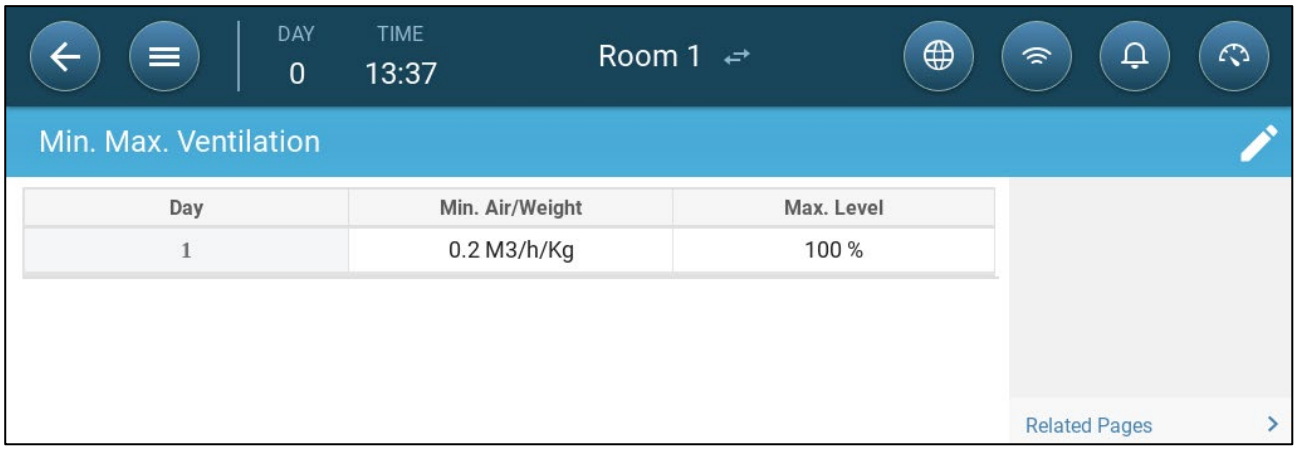
- When using cycle fans, each level has minimum and maximum on times, which determine the minimum and maximum CFM. If the ventilation doesn't provide enough air for the pigs (based on their numbers and weight) TRIO sends an alarm. You will need to redefine the minimum level.
- When using variable speed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

11.4.2 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.



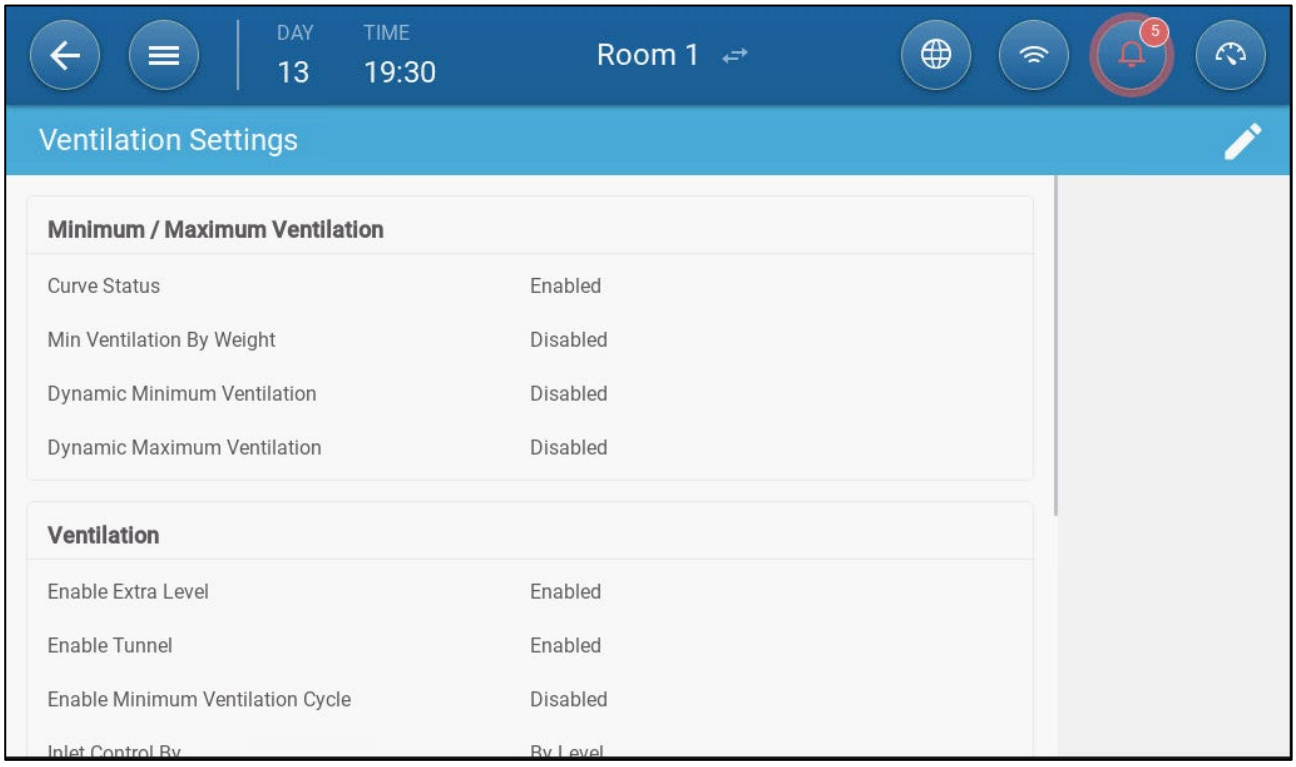
4. Click 
5. Define:
    - Min Air Weight: The amount of air per animal's weight to supplied.
    - Max: The maximum ventilation level by growth day.

NOTE If you enabled Dynamic Ventilation, click Settings and define the parameters. Refer to Defining Dynamic Ventilation, page 87.

11.5 Adding a Curve

The following section shows have to configure your fans to increase in a curve (and not via ramping).

1. Go to System > Control Strategy > Ventilation  .



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

11.6 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:

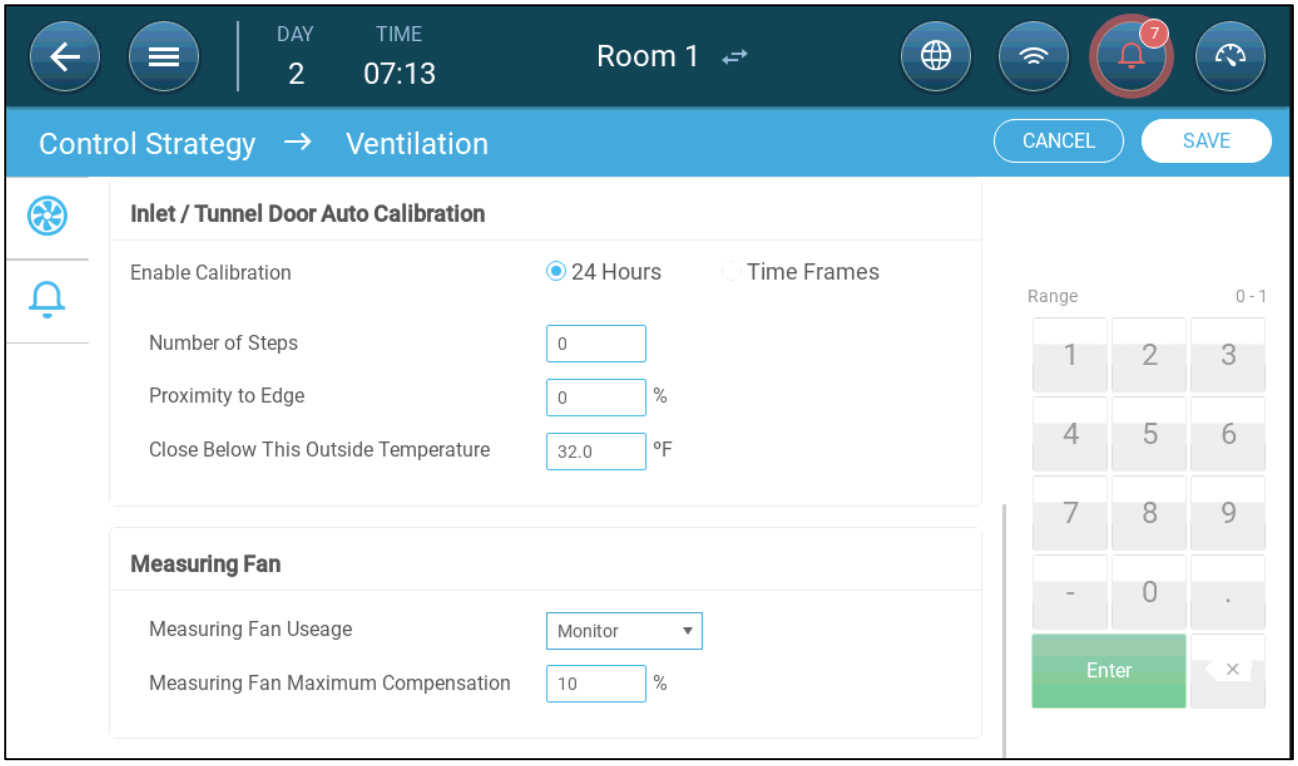
- Measuring real time air speed
- Enable ventilation compensation if the air speed does not meet the calculated minimum ventilation requirements.

➲ **Define a sensor as Measuring Fan. Refer to Mapping Devices, page 43.**

11.6.1 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:
   a. Define the Related Fan as None.
   b. Verify that the measuring fan is enabled.
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.

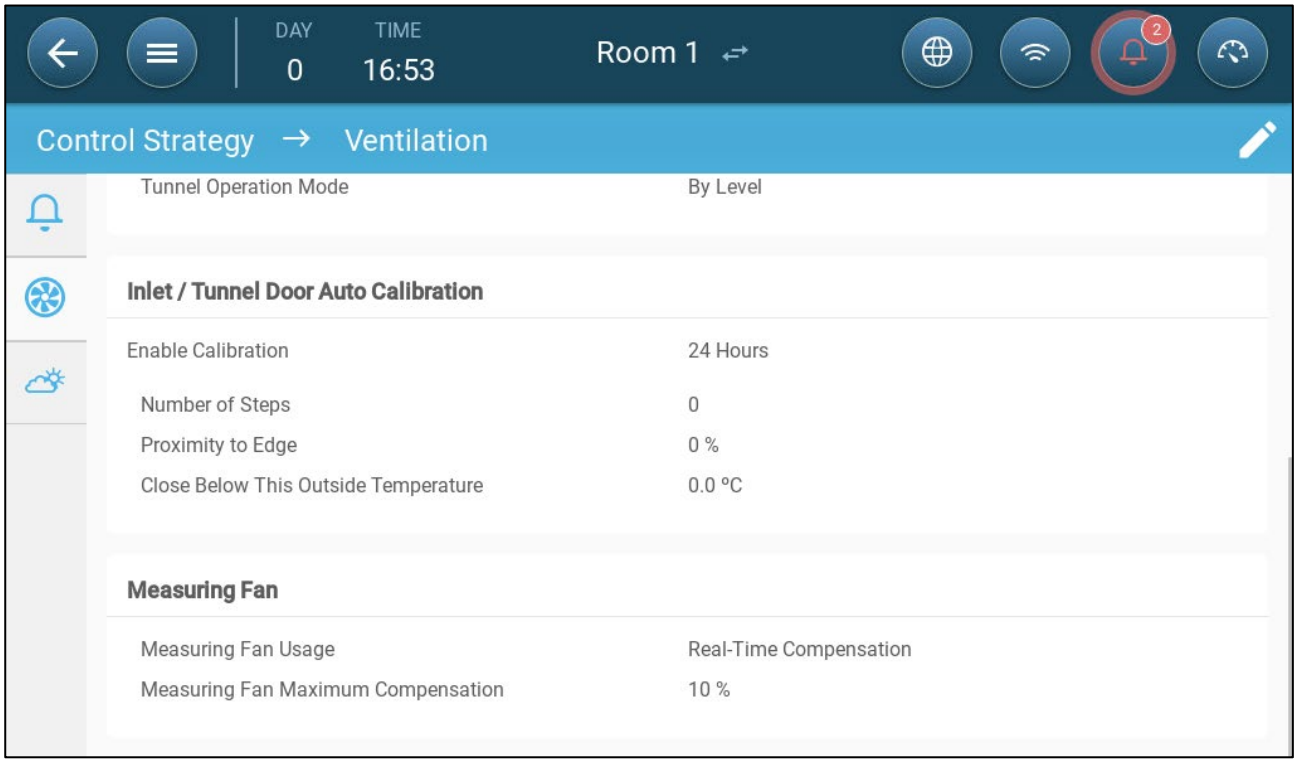
11.6.2 VENTILATION COMPENSATION

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 85. 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 sensor as Measuring Fan. Refer to Mapping Devices, page 43.**

➲ **Define a relay or analog port as a fan. This fan's capacity must be defined. Refer to Defining the Fans, page 49.**

1. Go to System > Devices & Sensor and select the Measuring Fan.
2. In the Related Fan parameter, define the designated compensation fan.
3. Verify that the sensor is enabled.
4. Go to System > Control Strategy > Ventilation  .



5. In the Measuring Fan Usage parameter, define the usage as Real-Time Compensation.
6. In the Measuring Fan Maximum Compensation parameter, define the maximum percentage increase in the Related Fan's speed. Range 0 – 100. Default 10%.

12 Levels of Ventilation

- Understanding Levels of Ventilation
- Configuring the Basic Ventilation Settings
- Basic Ventilation
- Extra Ventilation
- Tunnel Ventilation

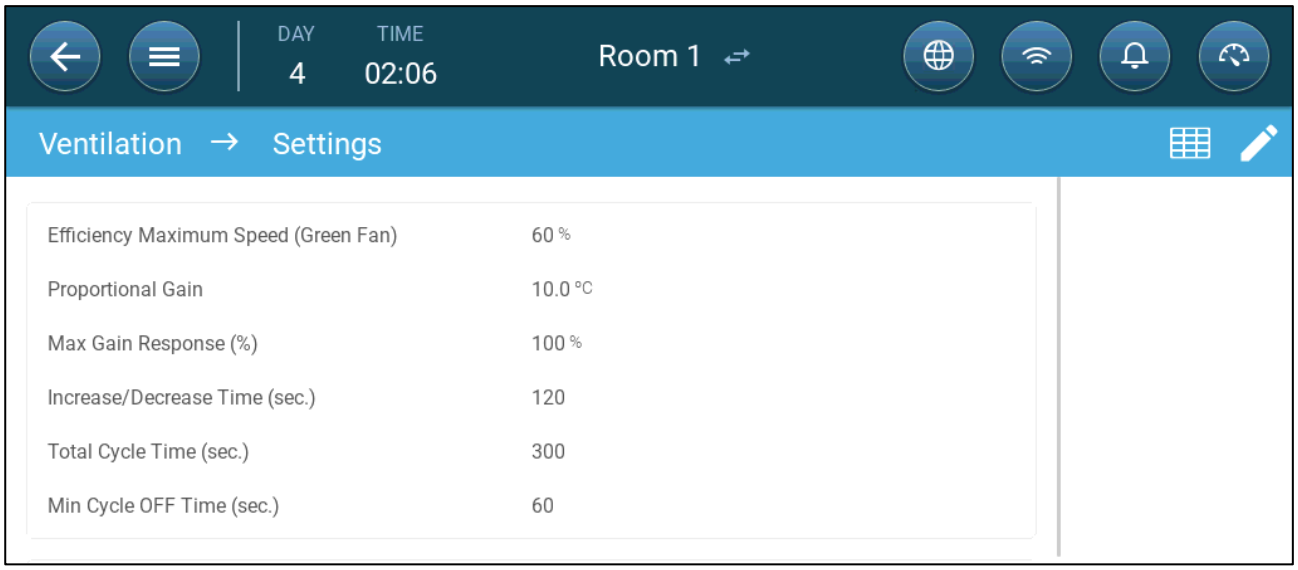
12.1 Understanding Levels of Ventilation

- Minimum ventilation means "air exchange", or the amount of air needed to ensure animal health when the outside temperature is low. 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. If the temperature is above the target temperature by a sufficient amount, the ventilation level increases (after a delay time). If the increase in ventilation doesn't reduce the temperature, the level will continue to increase until the temperature decreases.
    - Once the temperature drops to the Happy Zone the ventilation level remains the same. If for example the ventilation level is level 3 when the temperature reaches the Happy Zone, the ventilation remains at level 3. The level will only decrease if the temperature goes below the target temperature. In that case, the ventilation level will decrease until the temperature rises to the Happy Zone or the ventilation goes down to Minimum.
    - Minimum Ventilation is explained in detail in Chapter 11, Minimum and Maximum Ventilation.
- Extra Level: If the temperature continues rising when TRIO is providing the maximal ventilation, Extra Ventilation begins. In this system, fans produce a large burst of air. Ventilation is then lowered. The temperature is checked; if it has dropped but is still above the target a second but smaller burst is produced. This process continues until the temperature reaches the target temperature. Refer to Extra Ventilation, page 101.
- Tunnel ventilation means that the tunnel fans are turned on. This mode produces the maximum possible amount of ventilation. Refer to Tunnel Ventilation, page 103.

12.2 Configuring the Basic Ventilation Settings

➲ **Map at least one ventilation device before beginning.**

1. Go to Climate > Ventilation and click  .



2. Define:
    - Efficiency Maximum: Refer to Fans (Efficiency Fan)
    - Proportional Gain: When the measured temperature rises this amount above the target temperature, ventilation increases. Range: 2º - 10º C.
    - Max Gain Response (%): When the temperature rises above the target temperature, ventilation increases by this amount. The increase is proportional. Range 10 – 100%.
    - Increase/Decrease Time (sec.): This parameter defines the amount of time between each temperature reading. After this period, during Extra and Tunnel ventilation, TRIO adjusts the ventilation. Range 30 – 999 seconds.
    - Total Cycle Time (sec), define the minimum ventilation cycle time. Range: 60 – 999 seconds.
    - Min Cycle Off Time (sec.): When using cycle time, TRIO automatically adjusts the ON time set in the main screen. This parameter defines the minimum cycle off time. Range: 0 – 600 seconds.

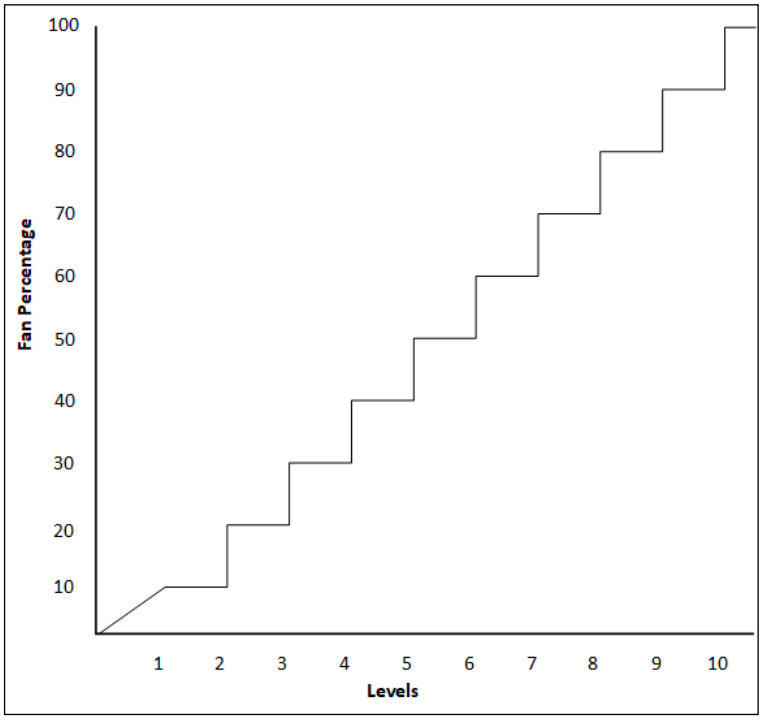
12.3 Basic Ventilation

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 in order to maintain the temperature as close to the target temperature as possible

- Defining Basic Ventilation; No Cycle
- Defining Basic Ventilation; With a Cycle

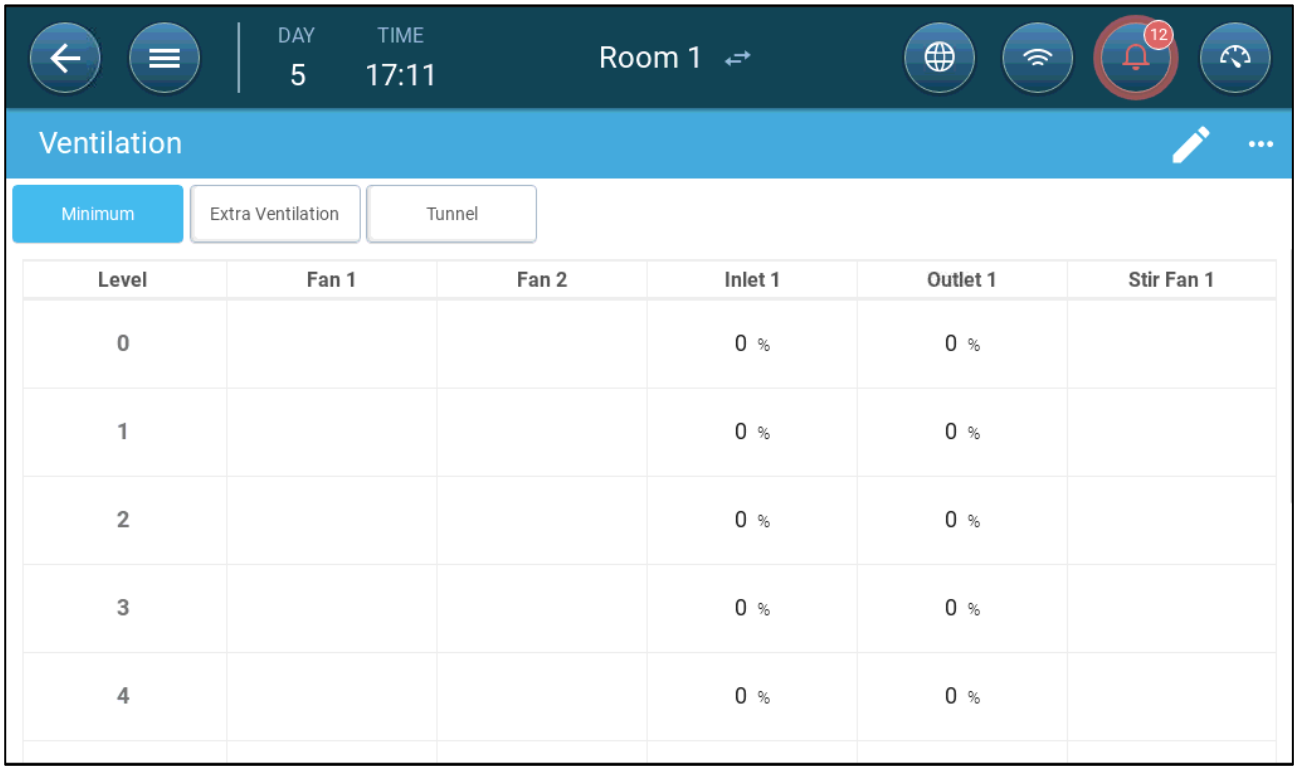
12.3.1 Defining Basic Ventilation; No Cycle

In this configuration, TRIO raises the minimum ventilation from 10% at Level One to 100% at Level 10. There is no curve between levels; each level is a ramp up from the previous level.



➲ In Mapping and Defining the Input Output Devices, page 43 map relays and analog output ports to fans, inlets, and stir fans as required. Only mapped devices show up in the following screens.

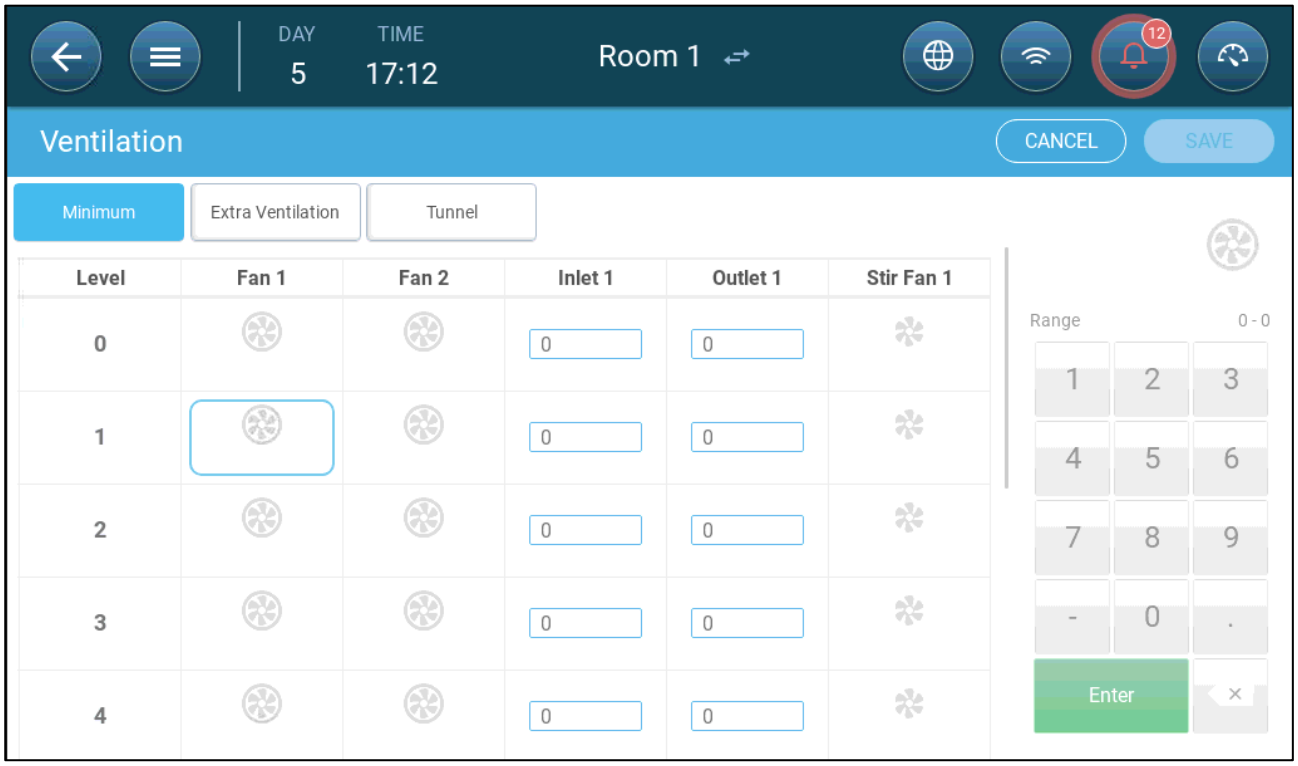
1. Go to Climate > Ventilation.



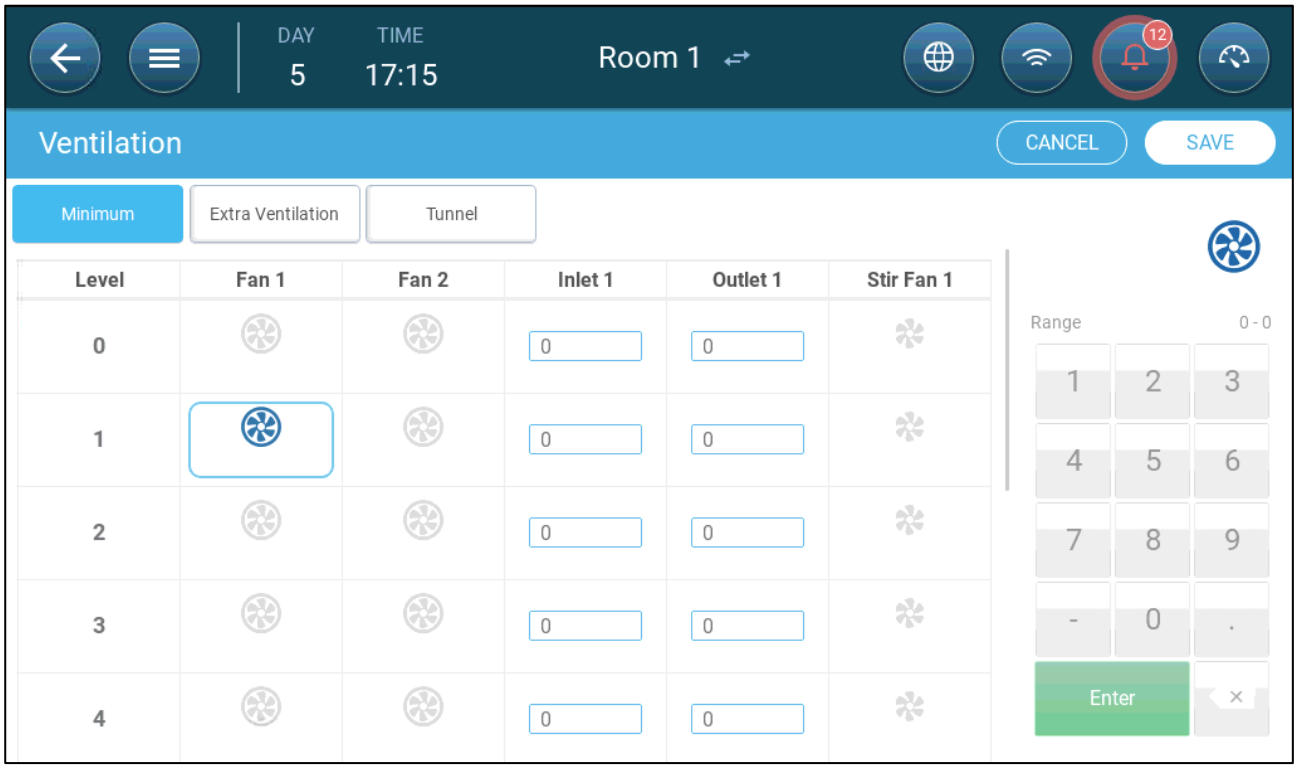
NOTE At this point, fans do not appear.

2. Click  .

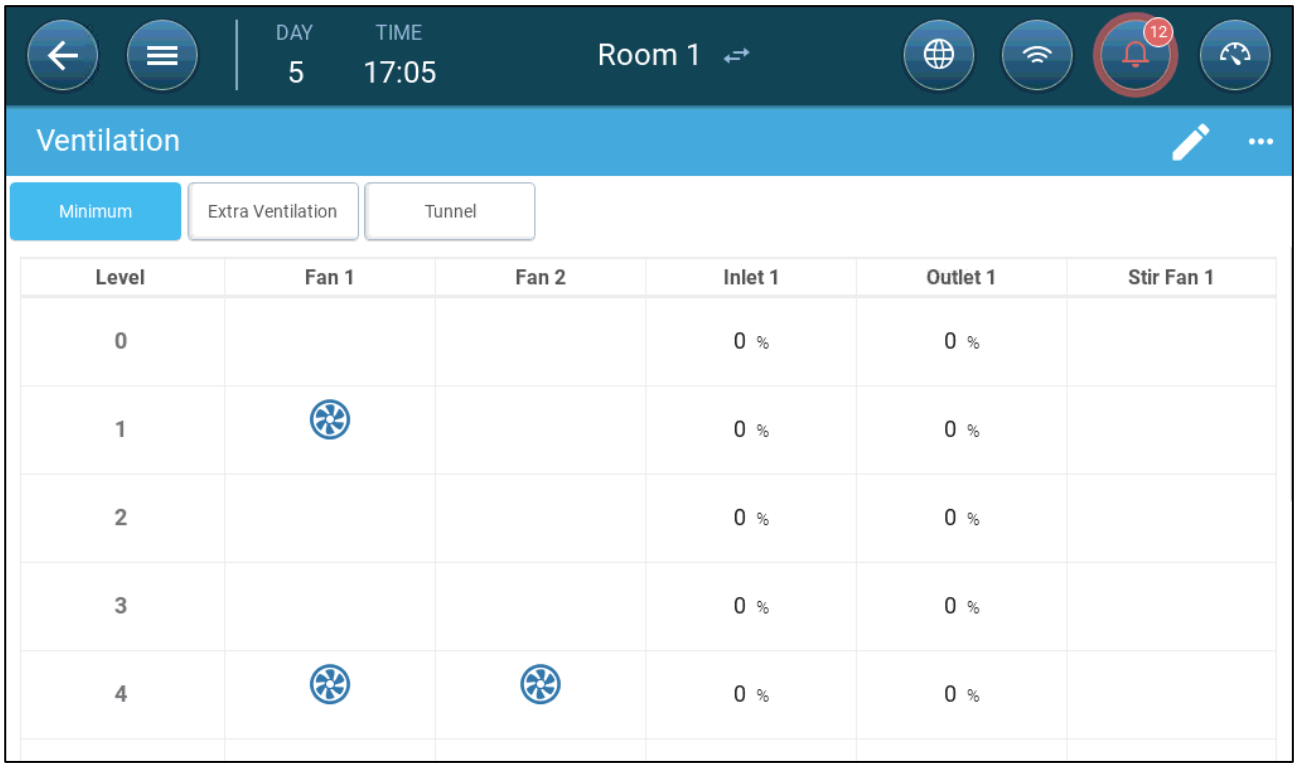
3. Click a relay controlled fan that you want to activate. 1) A box appears around the fan. 2) A fan appears in the upper right.



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



5. Define fans as required.



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

12.3.2 Defining Basic Ventilation; With a Cycle

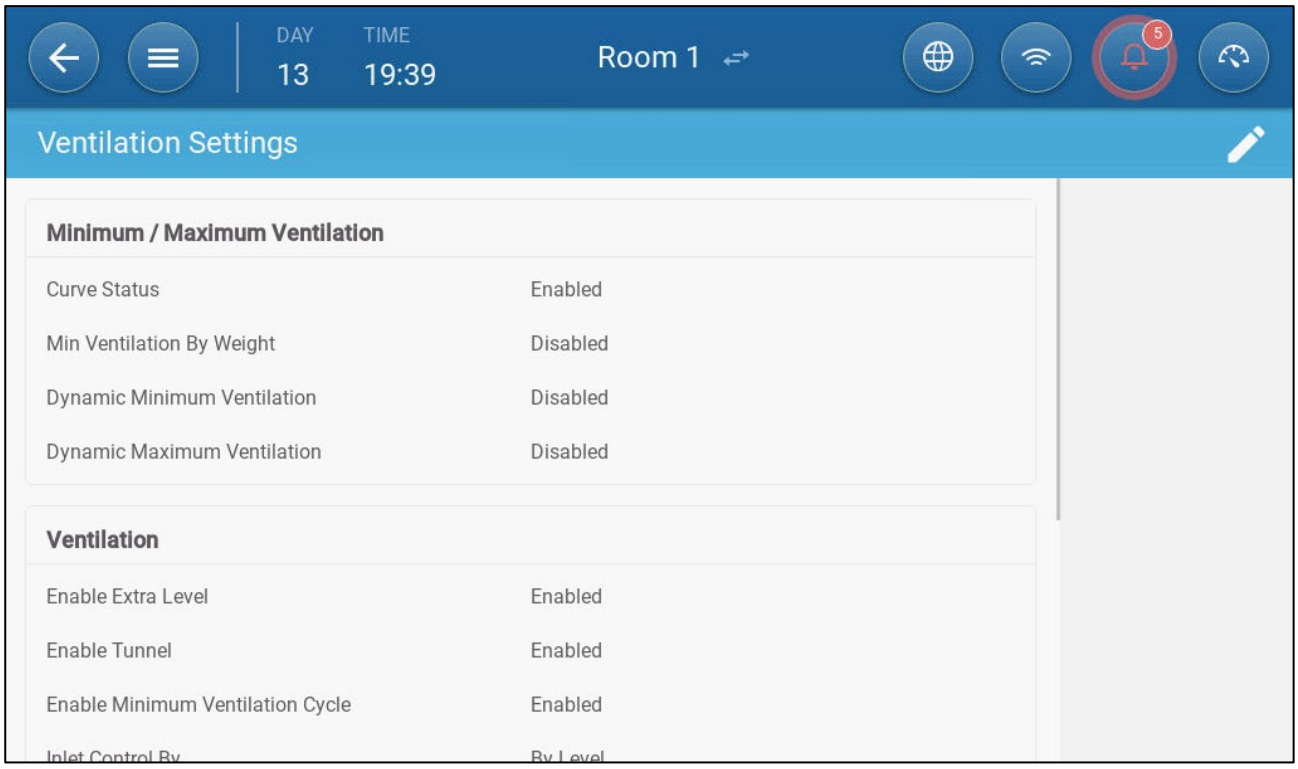
The following sections examples have to enable fans to work in a ventilation cycle.

- Analog fans: Fan speed changes as ventilation requirements change.
- Efficiency fan: Fan runs at a maximum speed percentage defined by the user.

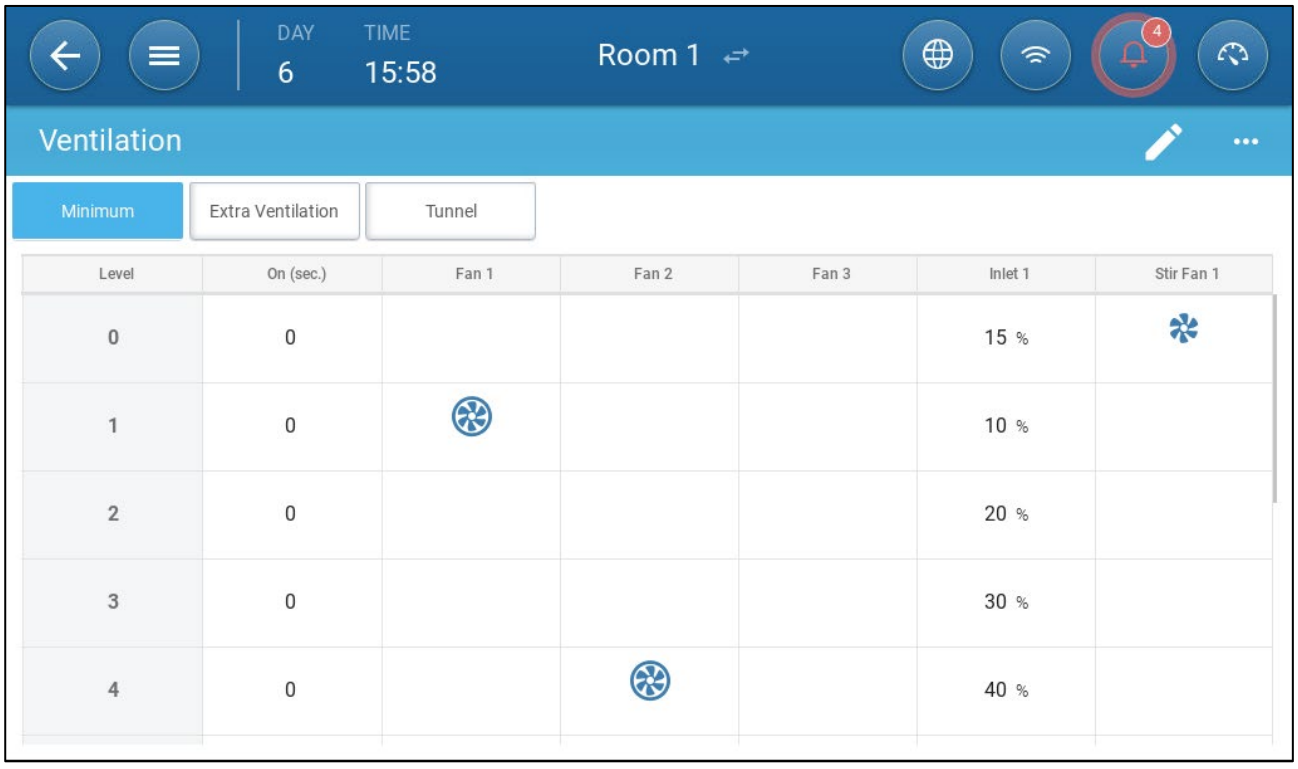
12.3.2.1 Standard Cycle Fans

➲ **In Mapping and Defining the Input Output Devices, page 43 map relays and analog output ports to fans, inlets, and stir fans as required. Only mapped devices show up in the following screens.**

1. Go to System > Control Strategy > Ventilation .



2. Enable Minimum Ventilation Cycle.
3. Go to Climate > Ventilation. The (Fan) On time appears on the screen.



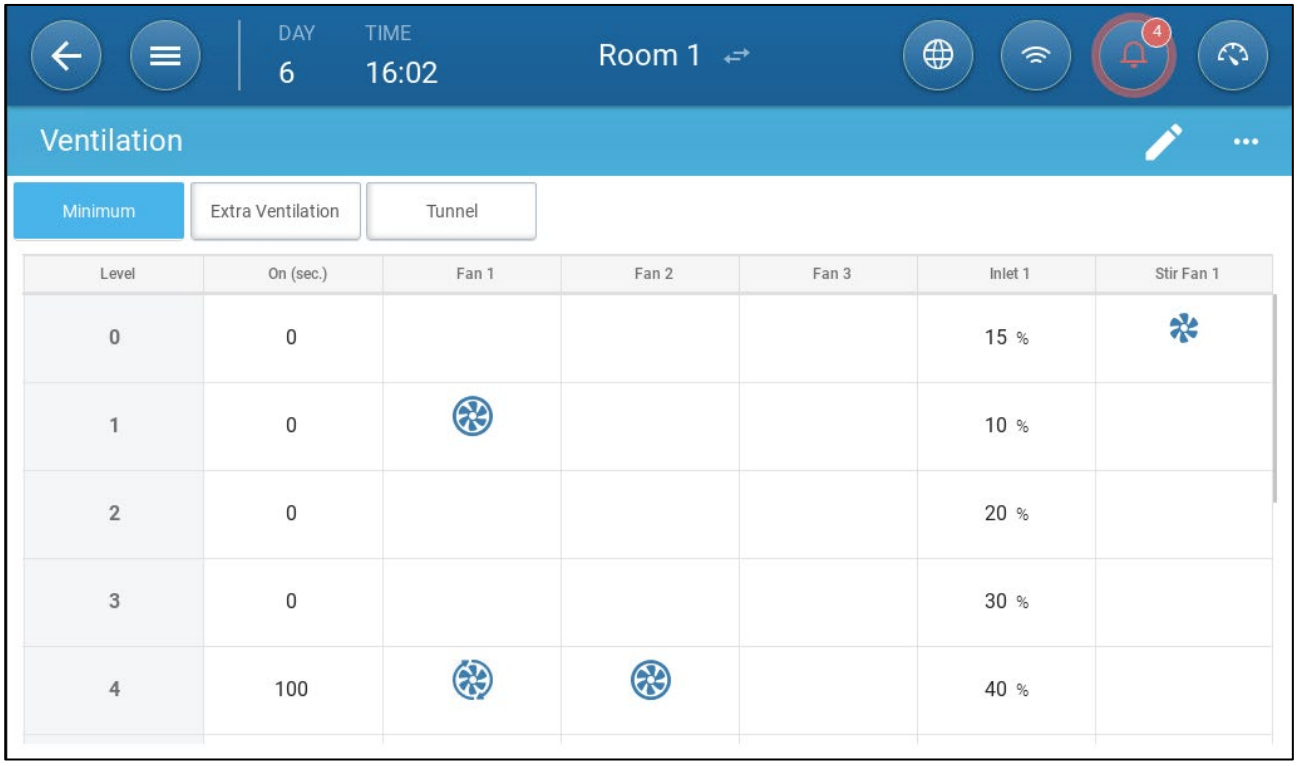
4. To run a fan in cycles:

a. Click 

b. Click a fan. The  symbol appears.

c. Click  . The symbol turns blue  .

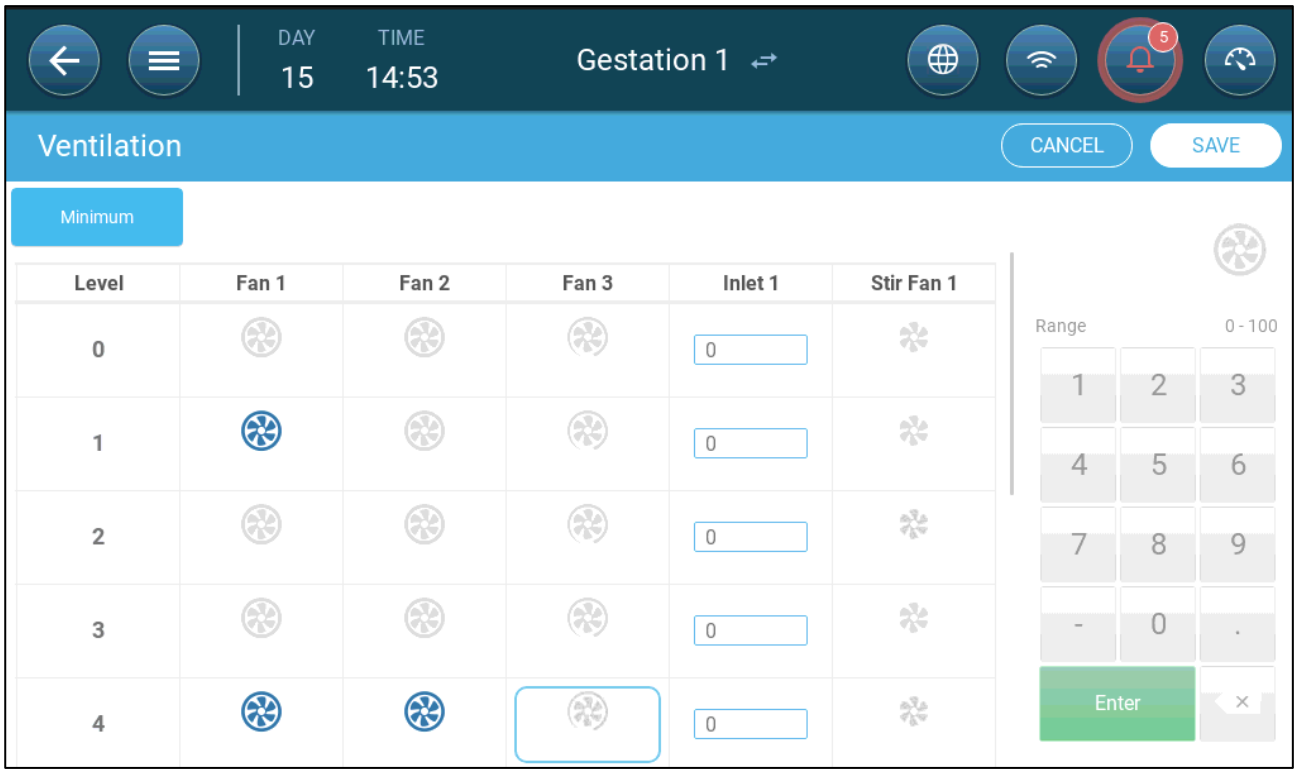
d. Under On (sec), enter the cycle ON time (Go to the Settings to define the Off time).



In this example, at Level 4 Fan 1 runs in cycles (100 seconds on) and Fan 2 runs continuously.

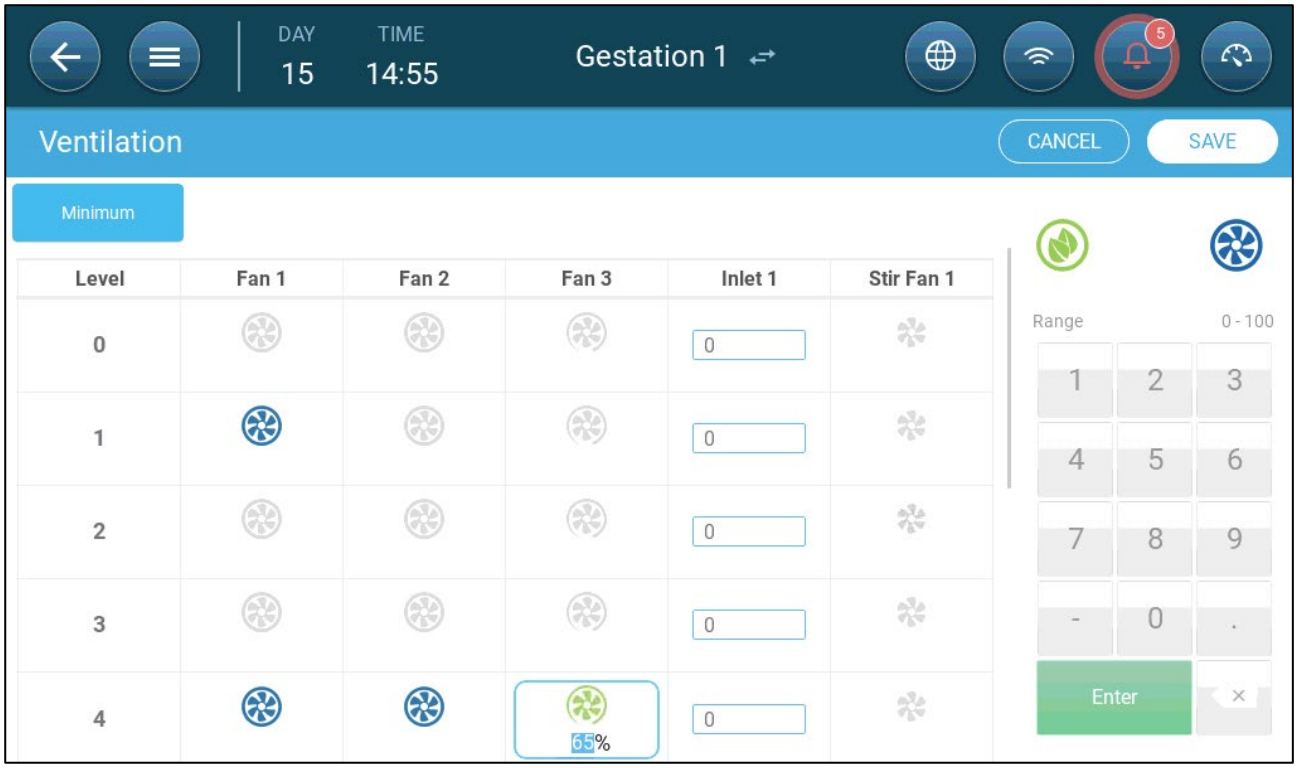
12.3.2.2 Fans (Efficiency Fan)

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

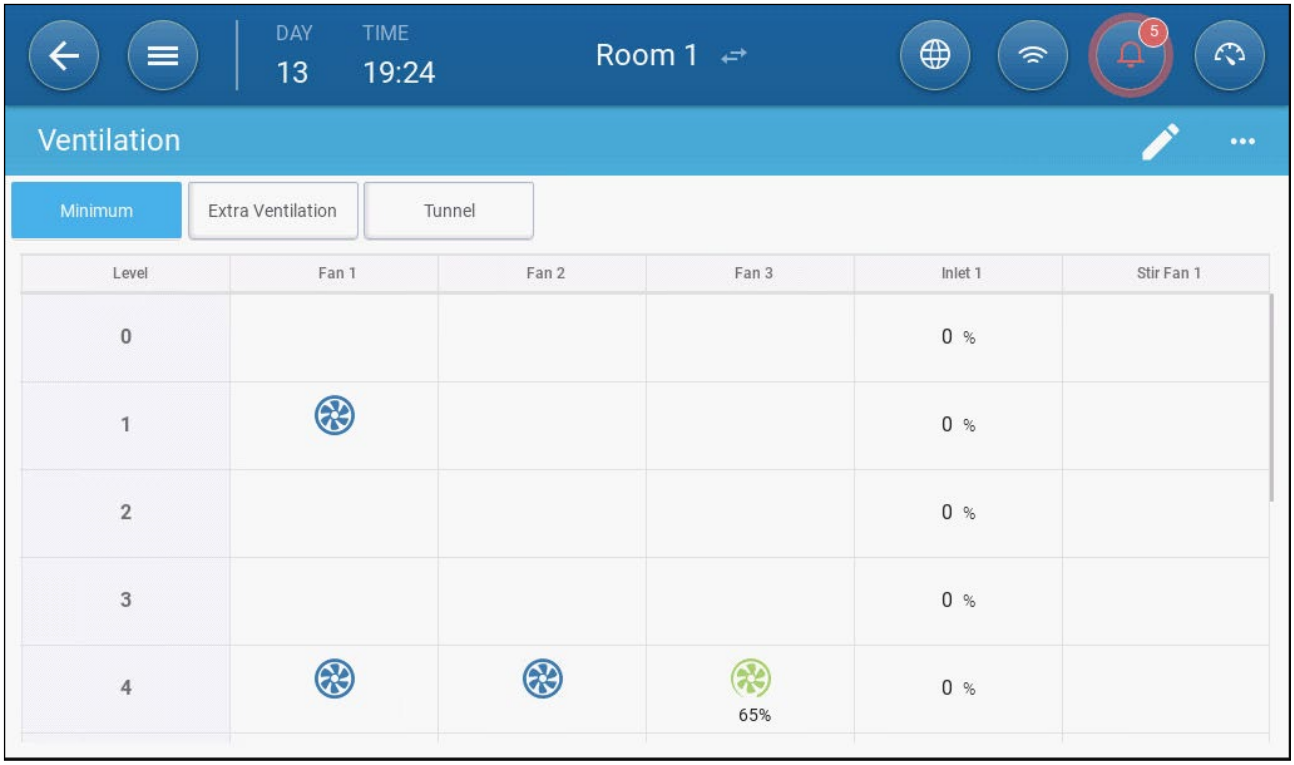


2. Click the fan in the upper right. Both fans turn blue. A percentage appears under the fan.

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



4. In the percentage, enter the fan's maximum speed (in percentage).



5. In this example Fan 1 and Fan 2 work continuously, and Fan 3 is an efficiency fan whose maximum speed is 65% of the fan's possible speed.

12.4 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

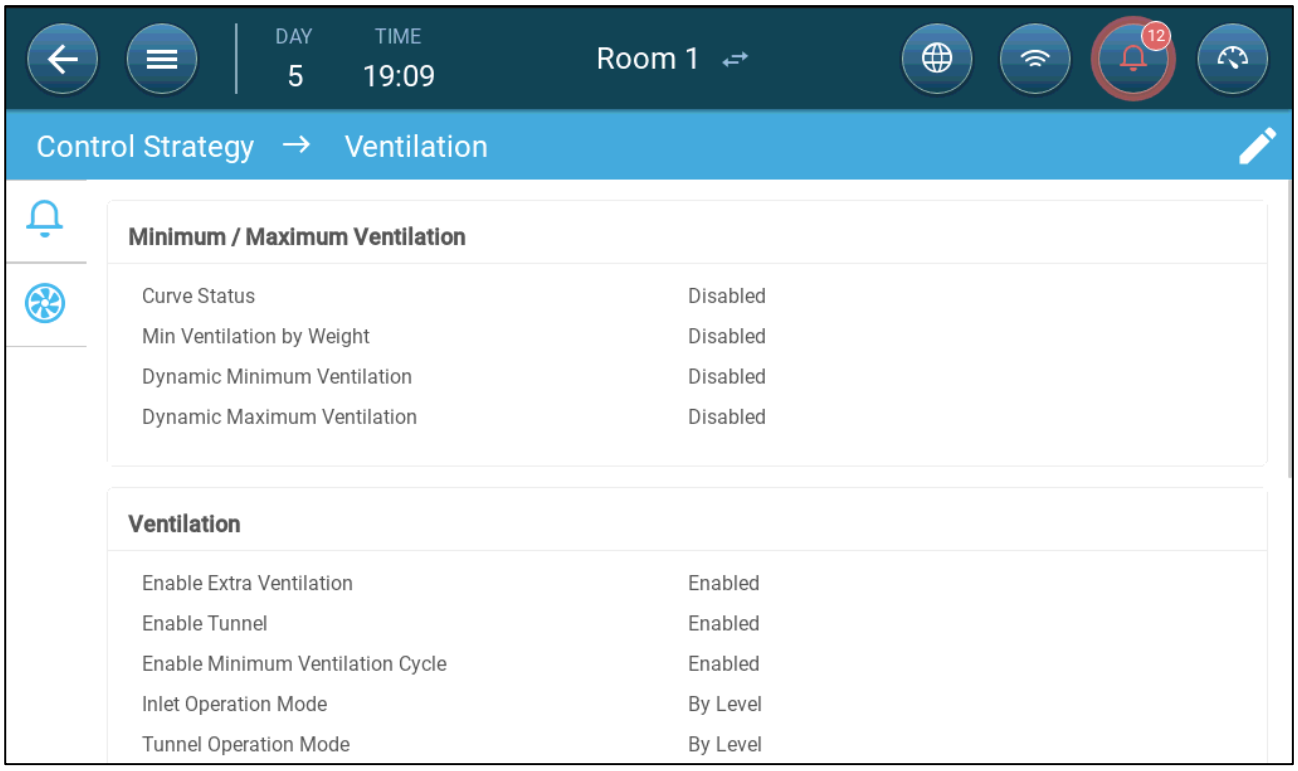
12.4.1 Introduction to Extra Ventilation

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 0.5⁰ C above the target temperature. However you can define a higher differential.

12.4.2 Defining Extra Ventilation

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



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

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

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

- Fan Status. Refer to the following sections on how to configure fans:
    - Defining Basic Ventilation; No Cycle, page 95
    - Defining Basic Ventilation; With a Cycle, page 97

12.5 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 83).

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

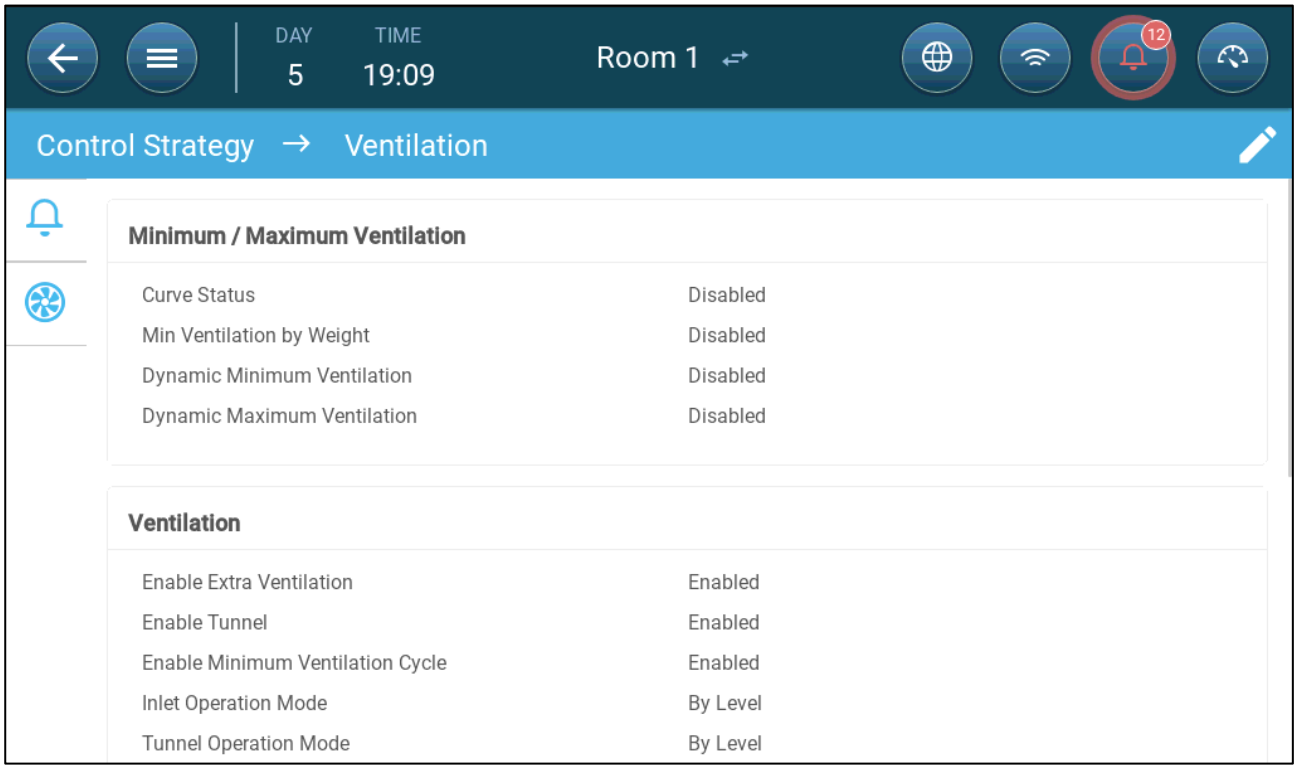
➲ **Configuring Tunnel Ventilation requires mapping at least one fan or one tunnel door.**

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

- Defining the Tunnel Ventilation
- Defining the Tunnel Ventilation Settings

12.5.1 Defining the Tunnel Ventilation Parameters

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



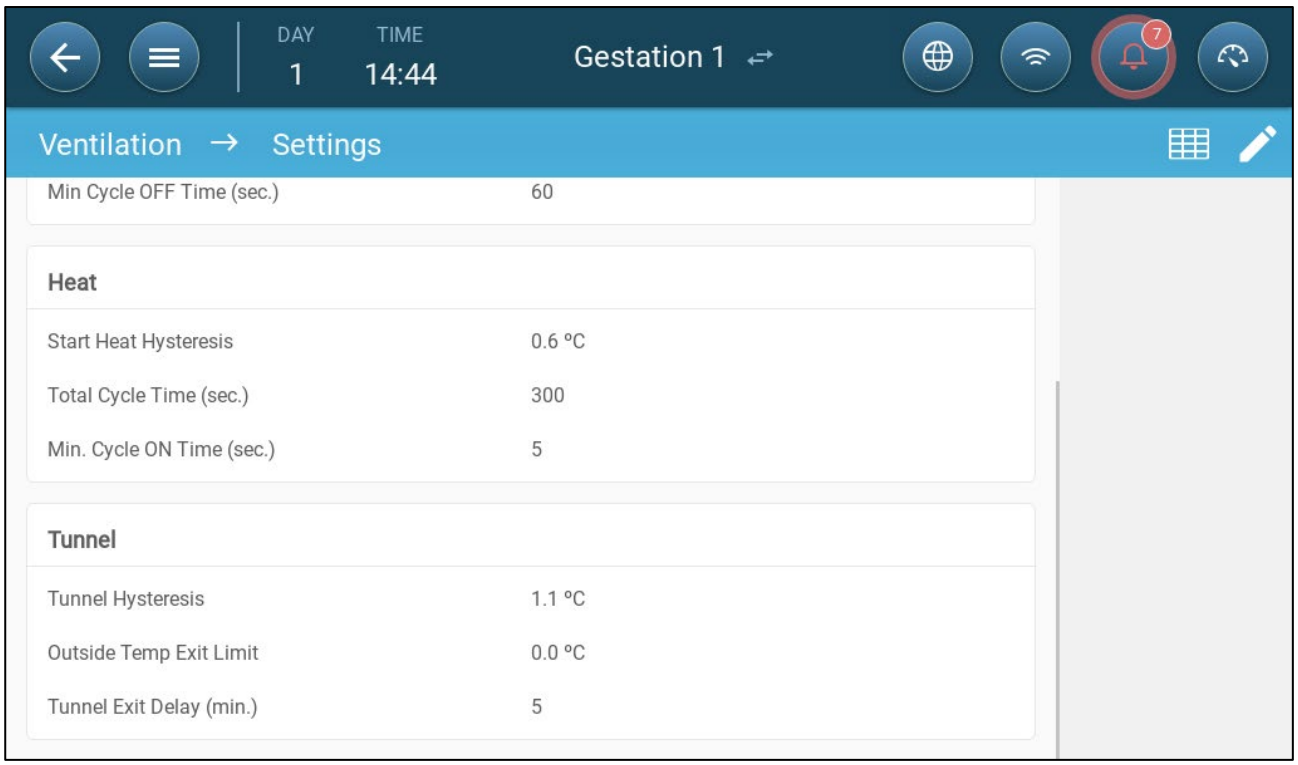
3. Go to Climate > Ventilation and click the Tunnel Tab.

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

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

    - Fan Status. Refer to the following sections on how to configure fans:
        - Defining Basic Ventilation; No Cycle, page 95
        - Defining Basic Ventilation; With a Cycle, page 97

12.5.2 DEFINING THE TUNNEL VENTILATION SETTINGS



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

12.6 Inlet and Curtain Ventilation

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 a potentiometer is used to control the opening and closing with a high degree of precision.

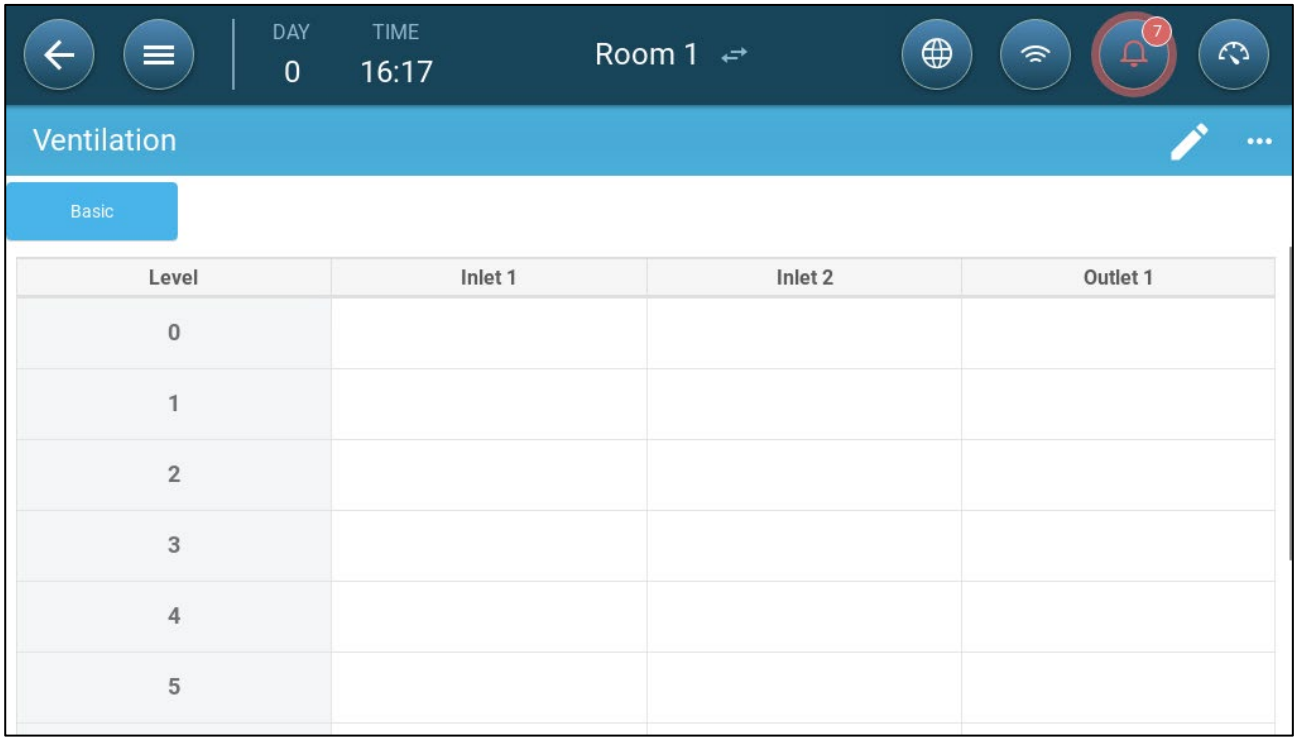
However when there is no potentiometer, positioning accuracy tends to degrade after the inlets go through several opening and closing cycles. The following section describes how to recalibrate the inlets, using a potentiometer or without a potentiometer.

- Defining the Inlet Opening
- Configuring the Inlet Calibration

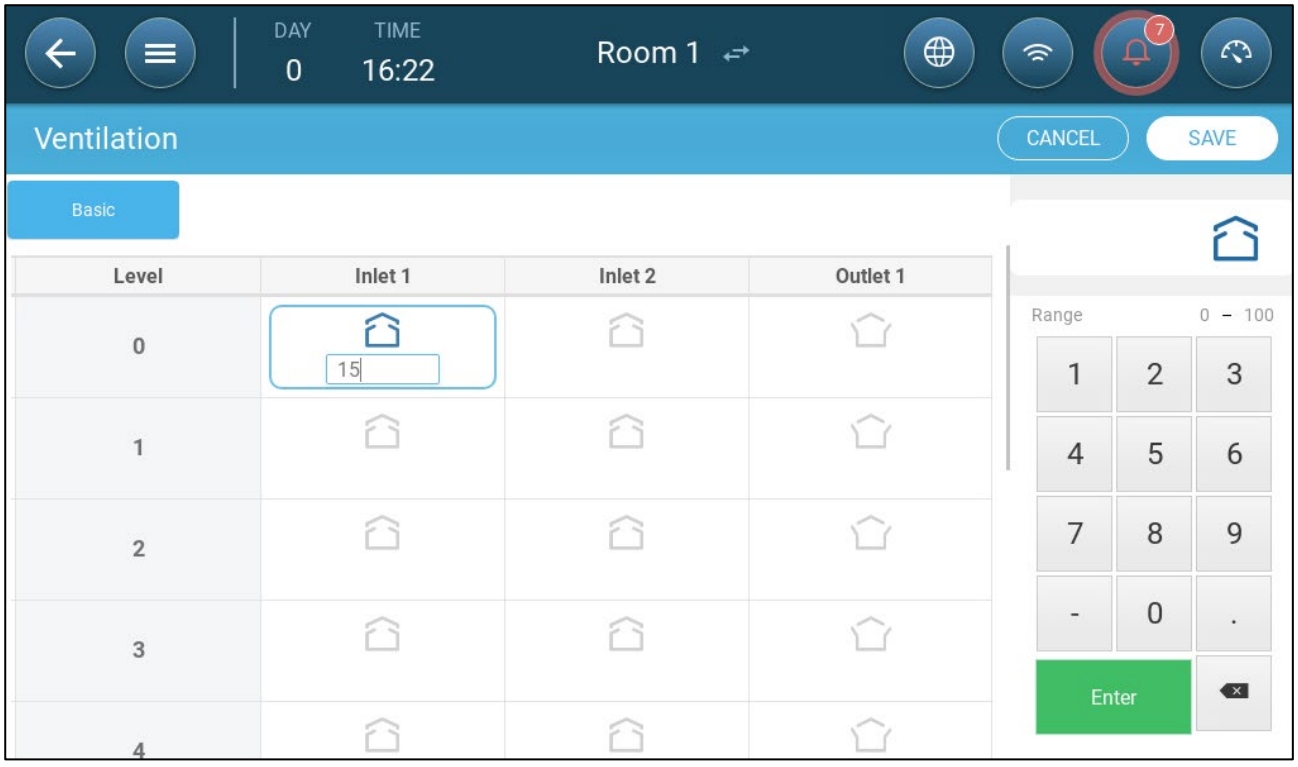
12.6.1 DEFINING THE INLET OPENING

➲ **Go to System > Devices and Sensors and define relays and/or analogue ports as inlets or ventilation door (refer to Mapping Devices, page 43).**

1. Go to Climate > Ventilation.

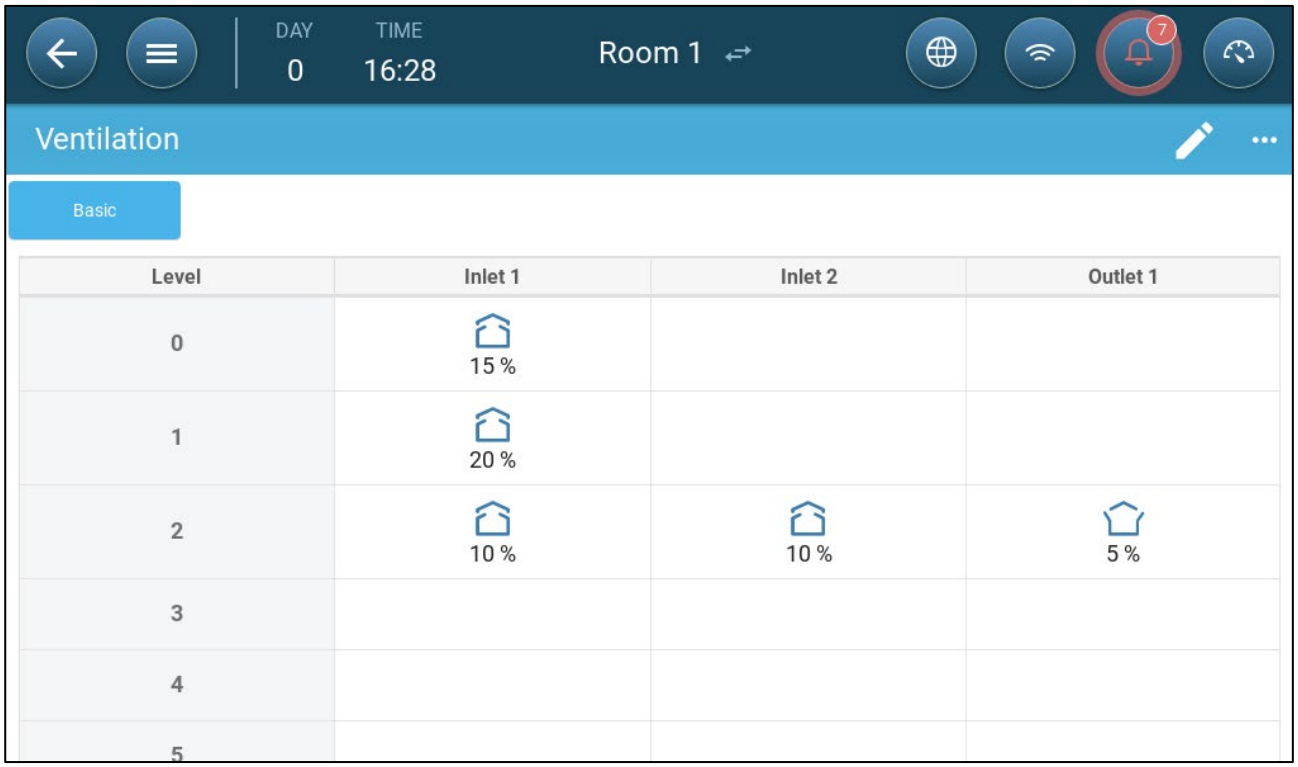


2. Click  .



3. Click on a required inlet/outlet and enable it by clicking on the fan symbol that appears.
4. Define the opening level.

5. Repeat for every required fan at each level.



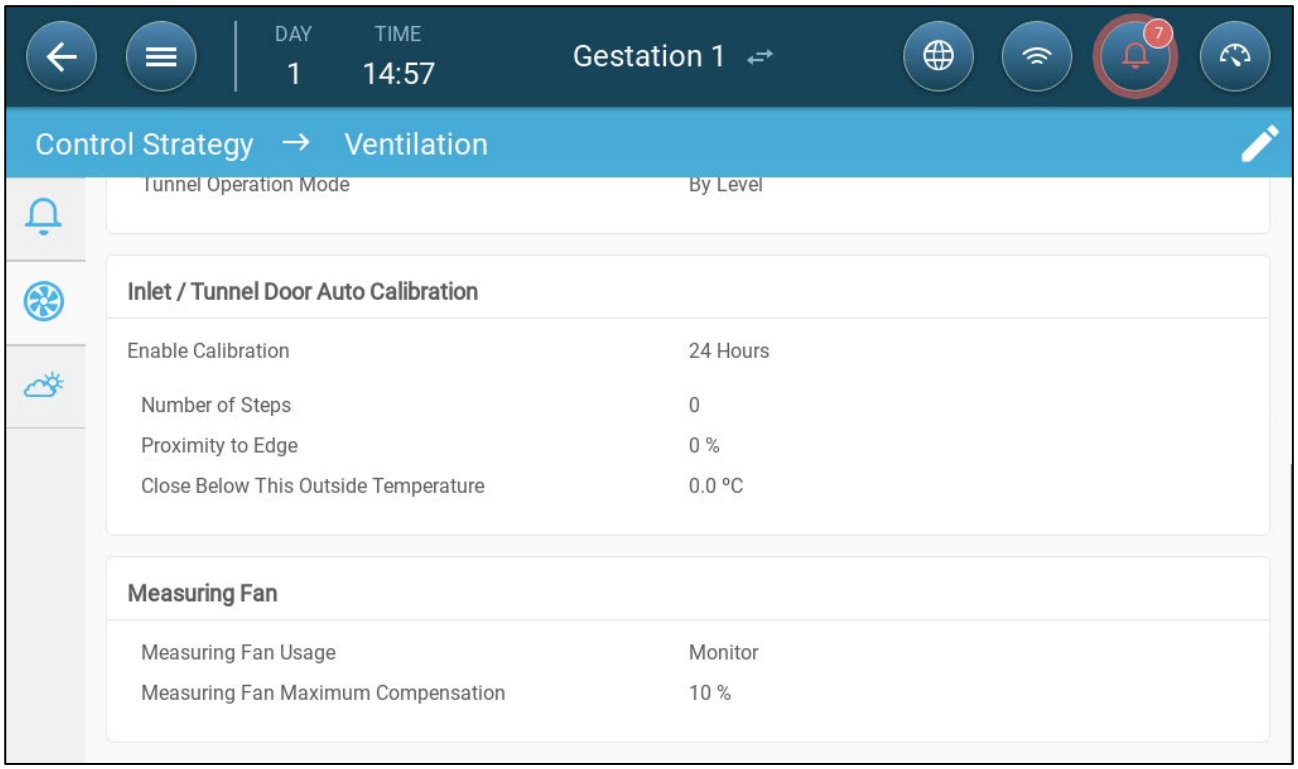
12.6.2 CONFIGURING THE INLET CALIBRATION

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 movement 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).
    - Proximity to Edge: Inlets will open or close based on this proximity to the edge. For example, when set to 10%, the curtain closes when the opening is less than 10% and opens completely when the opening is greater than 90%.
    - Close Below This Temp. (out): Inlets close when the outside temperature reaches this point.

12.7 Static Pressure

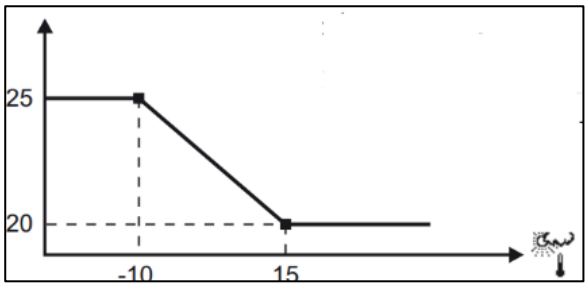
When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Maintaining the proper pressure enables air to enter the rooms at the right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

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

12.7.1 Static Pressure in Minimum Ventilation or Extra Ventilation

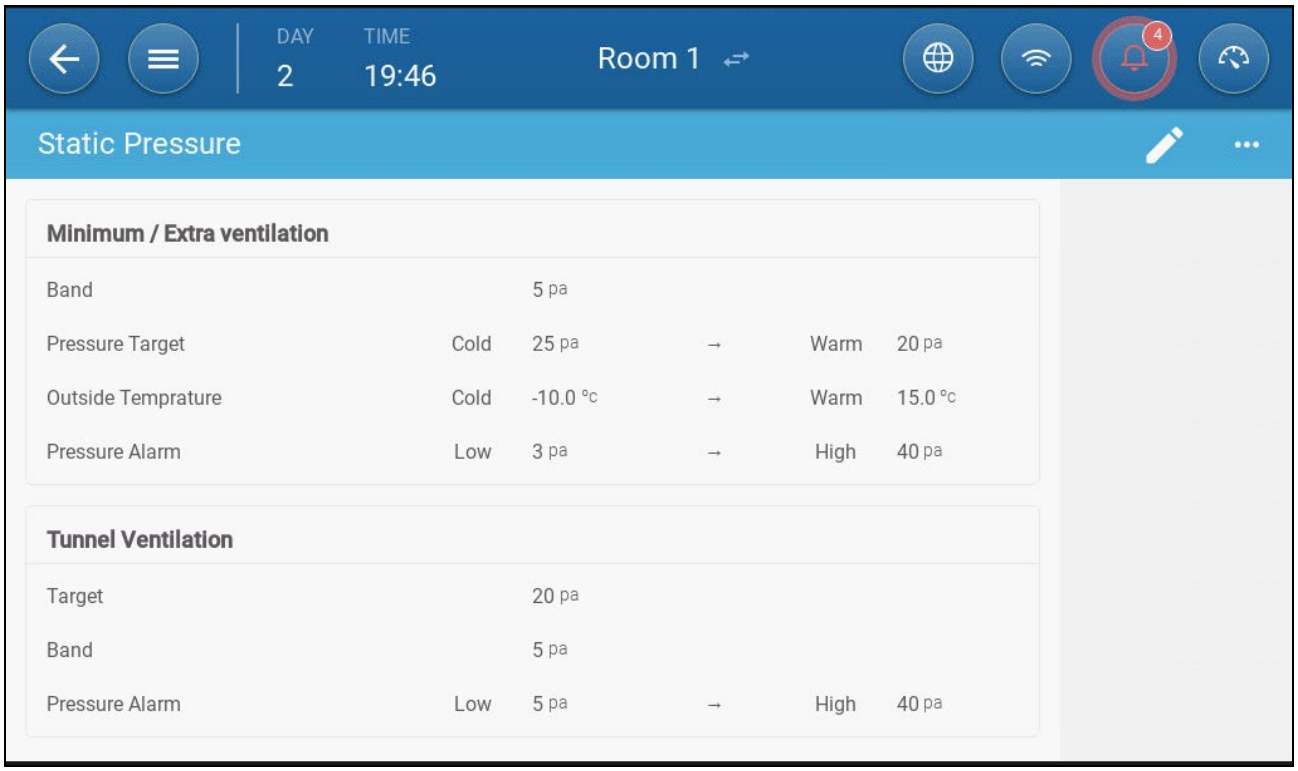
In minimum/extra ventilation the target pressure is adjusted as a function of the outside temperature. TRIO calculates the pressure target according to a curve between low and high temperature target pressure set-points.



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

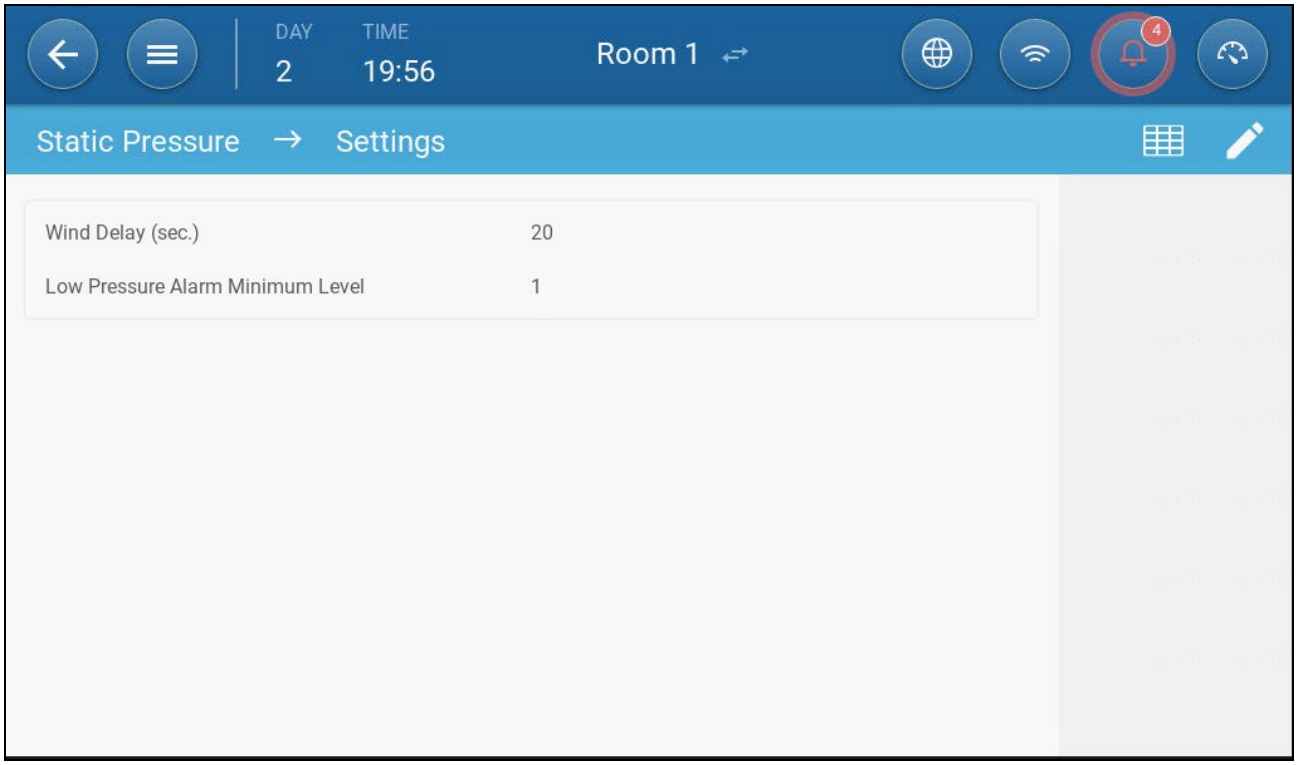
12.7.2 Static Pressure Main Screen

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.

12.7.3 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 pressure drops below this level. Range 1 – 10 pa.

12.7.4 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 continues 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.

13 Cooling Functions

- Cooling Principles
- Cooling

13.1 Cooling Principles

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

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

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

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

- When the temperature reaches the Target Temperature plus the Temperature Difference, cooling begins and continues until the temperature falls below this point (minus the band).
- If the humidity level rises above the To Humidity parameter (plus the Humidity Band), cooling ceases.
- Cooling only takes place between the start and finish times.
- When the minimum OFF time = 0sec, and the temperature reached ON temp + Ramping range the cooling device operates continuously.
- While cycling, the minimum OFF time will never be less than 5 seconds.

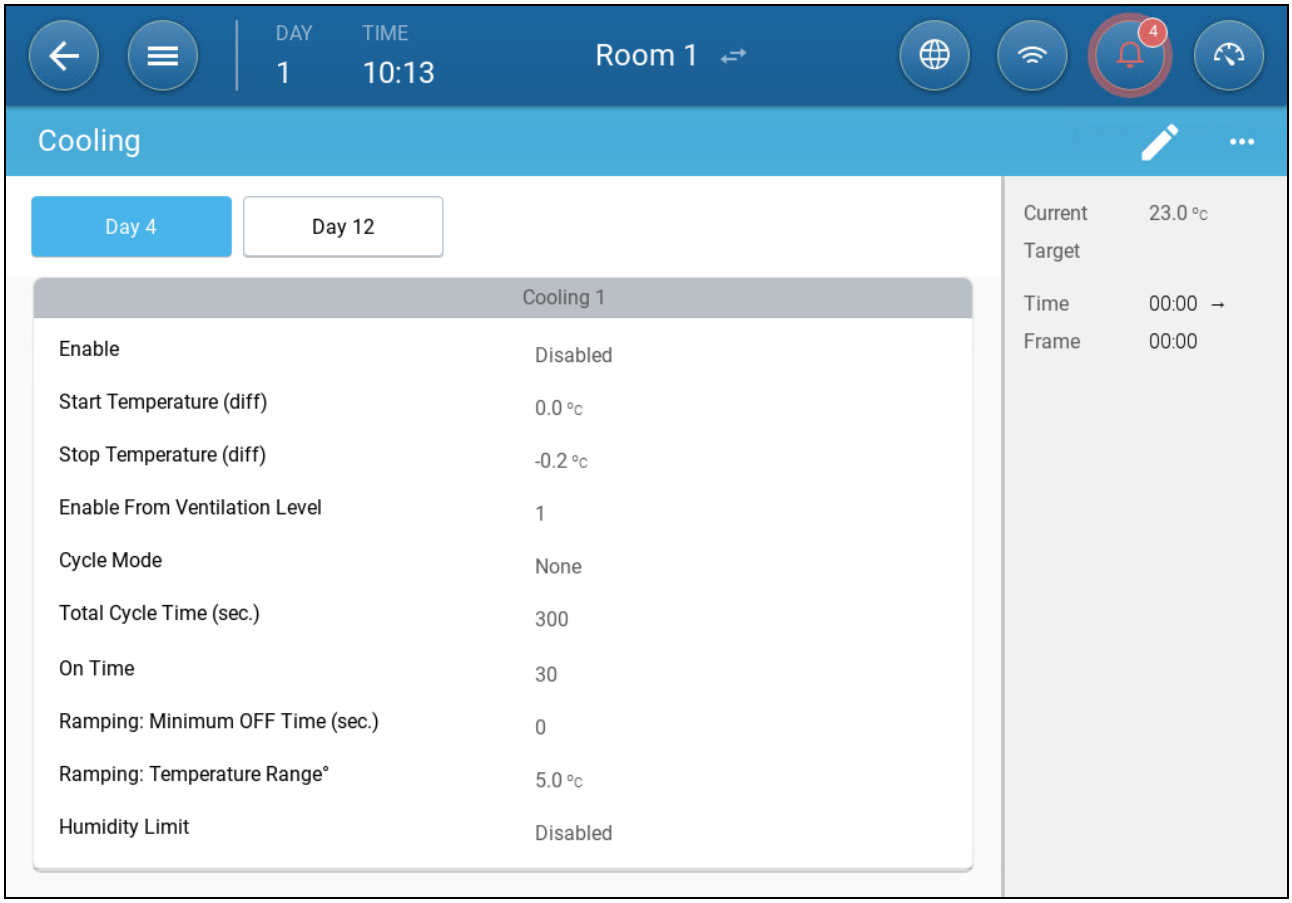
13.2 Cooling

- Defining the Cooling Parameters
- Defining the Cooling Settings

13.2.1 DEFINING THE COOLING PARAMETERS

➲ **Go to System > Devices and Sensors and define relays as cooling (refer to Mapping Devices, page 43).**

1. Go to Climate > Cooling.



NOTE You can add up to four tabs. Define the growth day for each tab.

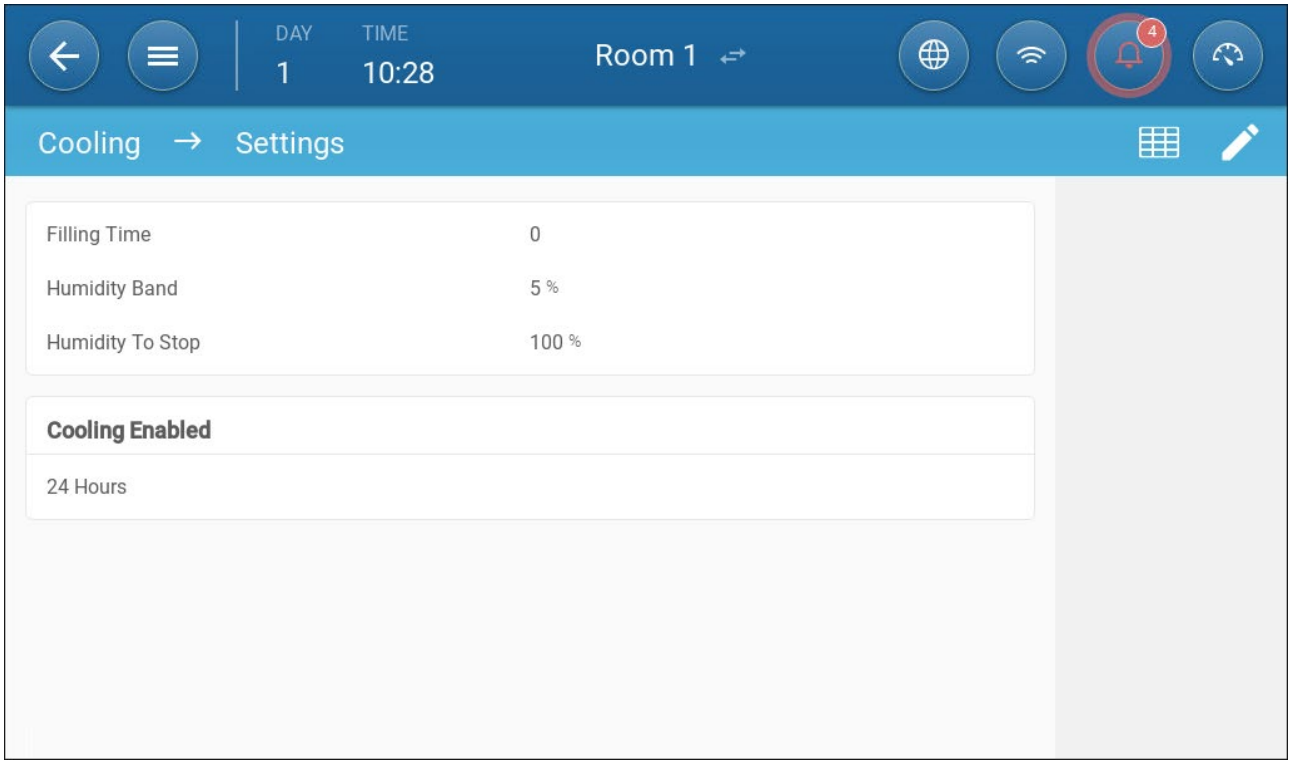
2. Define:
    - Enable: Enable or disable a cooling device.
    - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling. The calculated temperature to start cooling is adjusted according to the growth-days.

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).
    - Cycle Mode: Set cooling cycle mode:
        - None: Disable cycle (device operates continuously)
        - Fixed: Simple on/off control with a fixed cooling cycle.
        - Ramping: Cycle modulation, frequency depends on the error in °C, with respect to the cooling setting (target).
    - ON Time: Describe the amount of time the cycle is ON.

- Total cycle time:_Length of timing which represents the range between the minimum and the maximum cooling output. Total cycle interval = ON+OFF time.
- Ramping Range T°: Sets a temperature range to modulate the cooling device cycle.
- Humidity Limit: Enable stopping cooling at a certain humidity level.

13.2.2 DEFINING THE COOLING SETTINGS



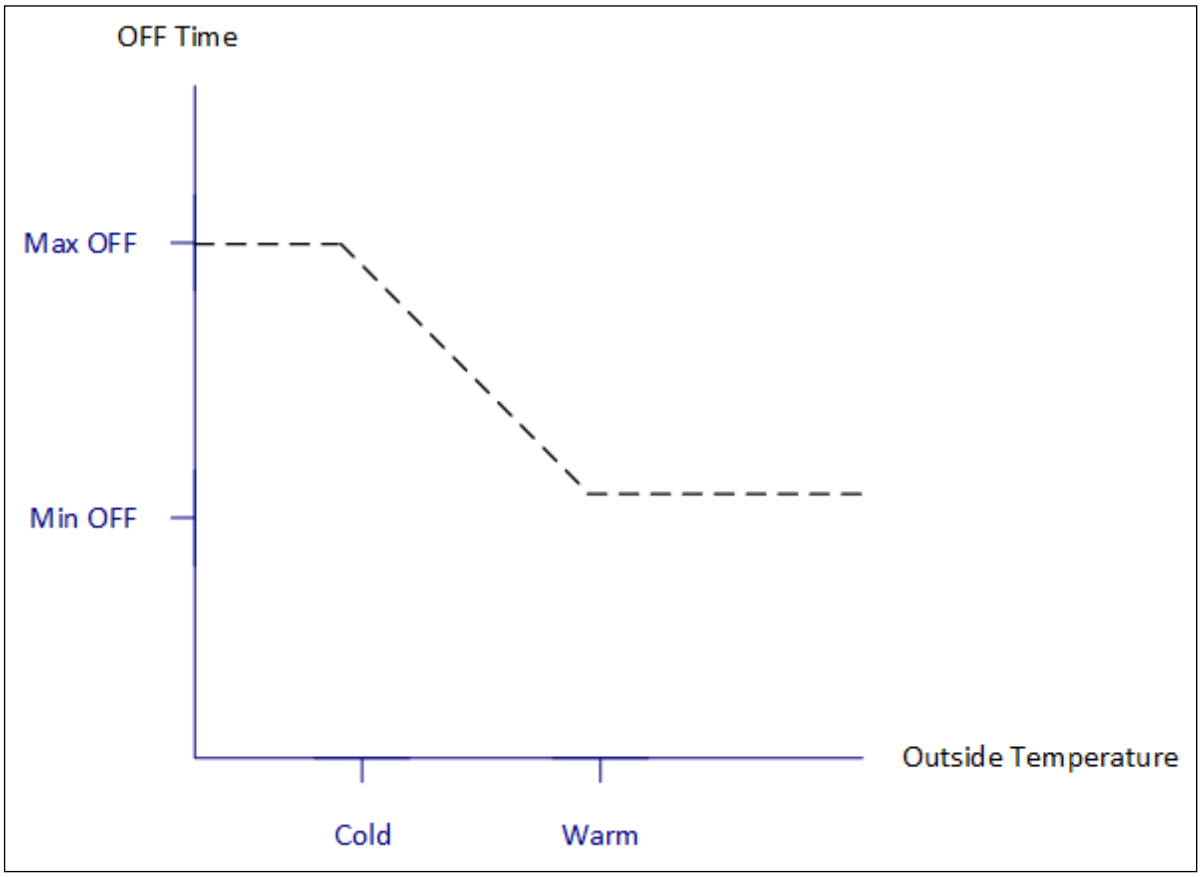
- Define:
  - Filling Time: Sets Humidity level above which the cooling process stops. Default: 100
  - Humidity Band: Set the humidity band to re-enable cooling outputs after it was stopped because of the high humidity level.
  - Humidity to Stop: Define the humidity level at which cooling stops.
  - Cooling Enabled: Define when cooling is enabled, 24 hours a day or time frames.

14 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.



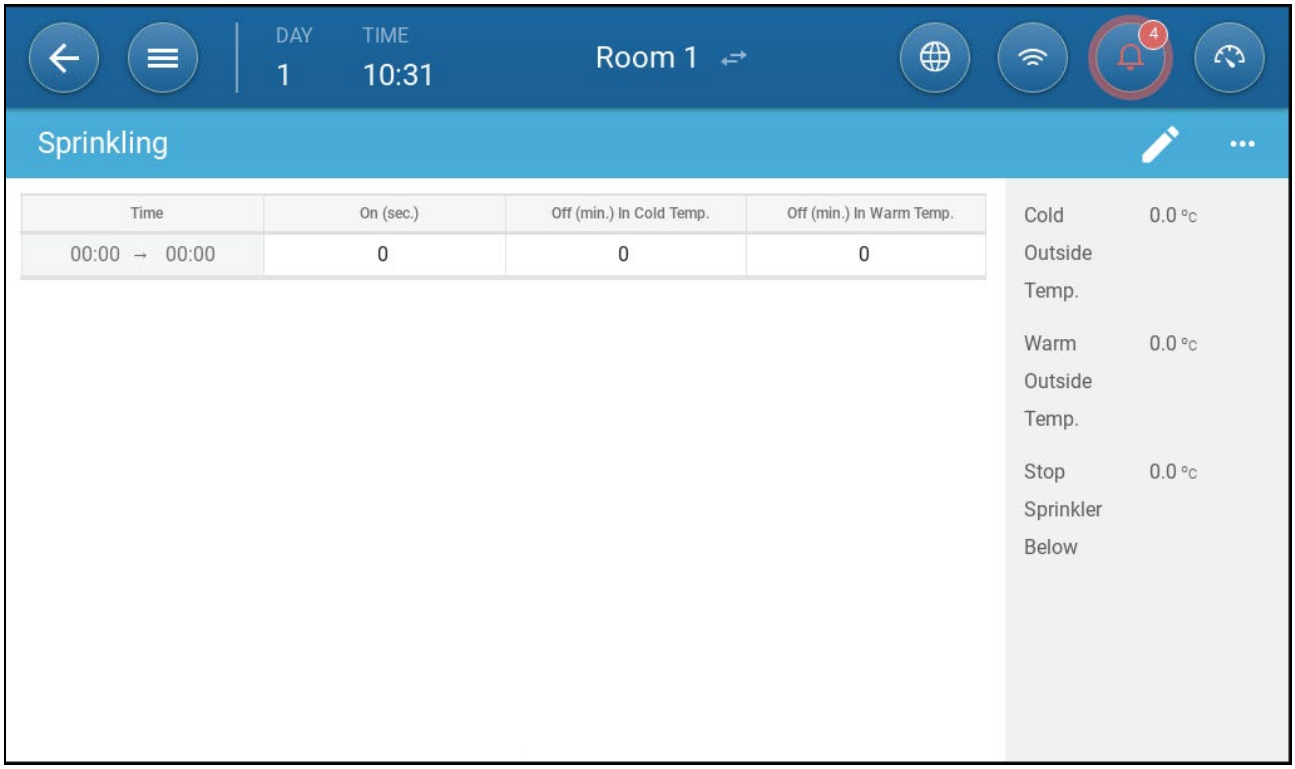
- Defining the Sprinkler Parameters
- Defining the Sprinkler Settings

14.1 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.

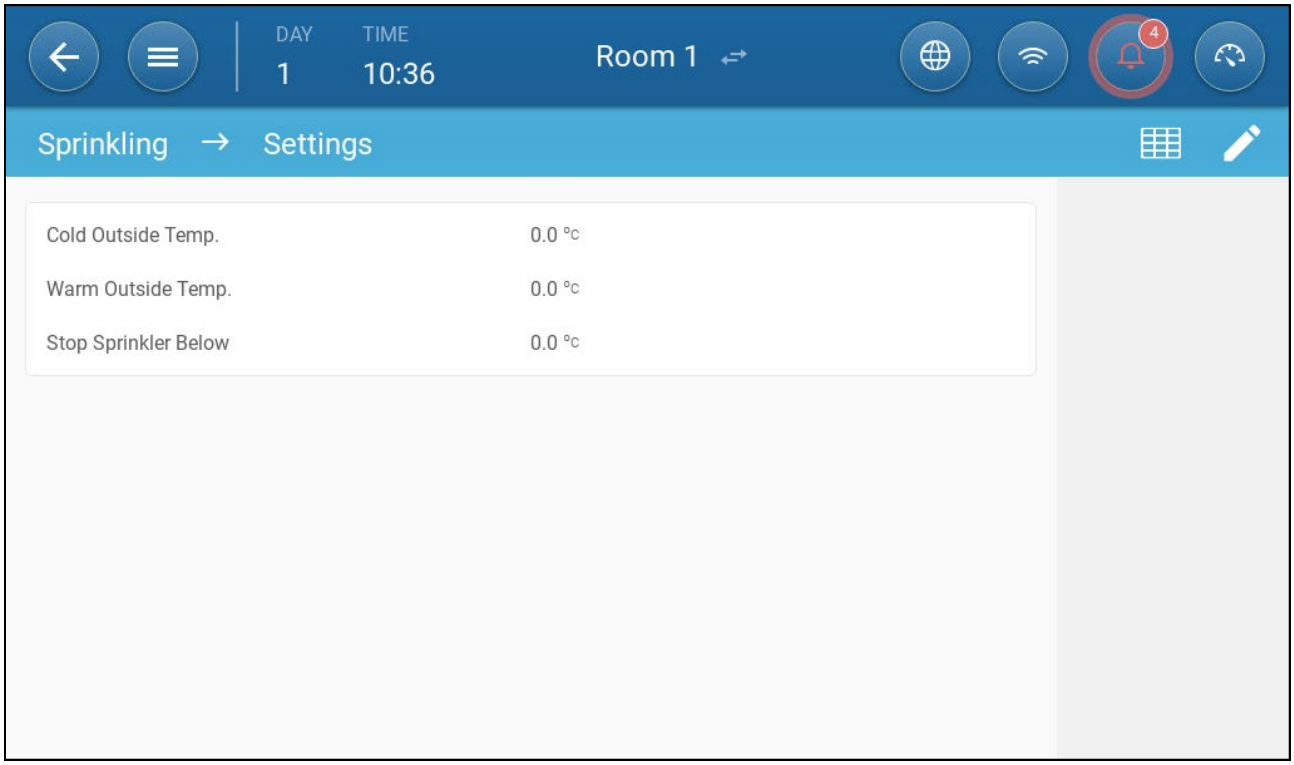
➲ **Go to System > Devices and Sensors and define one relay as sprinkler (refer to Mapping Devices, page 43).**

1. Go to Control > Sprinkling.



2. 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.

14.2 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.

15 Heating Functions

TRIO supports up to four (4) on/off heating devices and variable heaters. To control the heat, TRIO has two different programs, one to maintain the target temperature in the entire house and one program that controls separate heating zones. In the case of the latter, each heater has a dedicated sensor and unique target temperature.

- Defining the Central Heater Parameters
- Zone Heaters

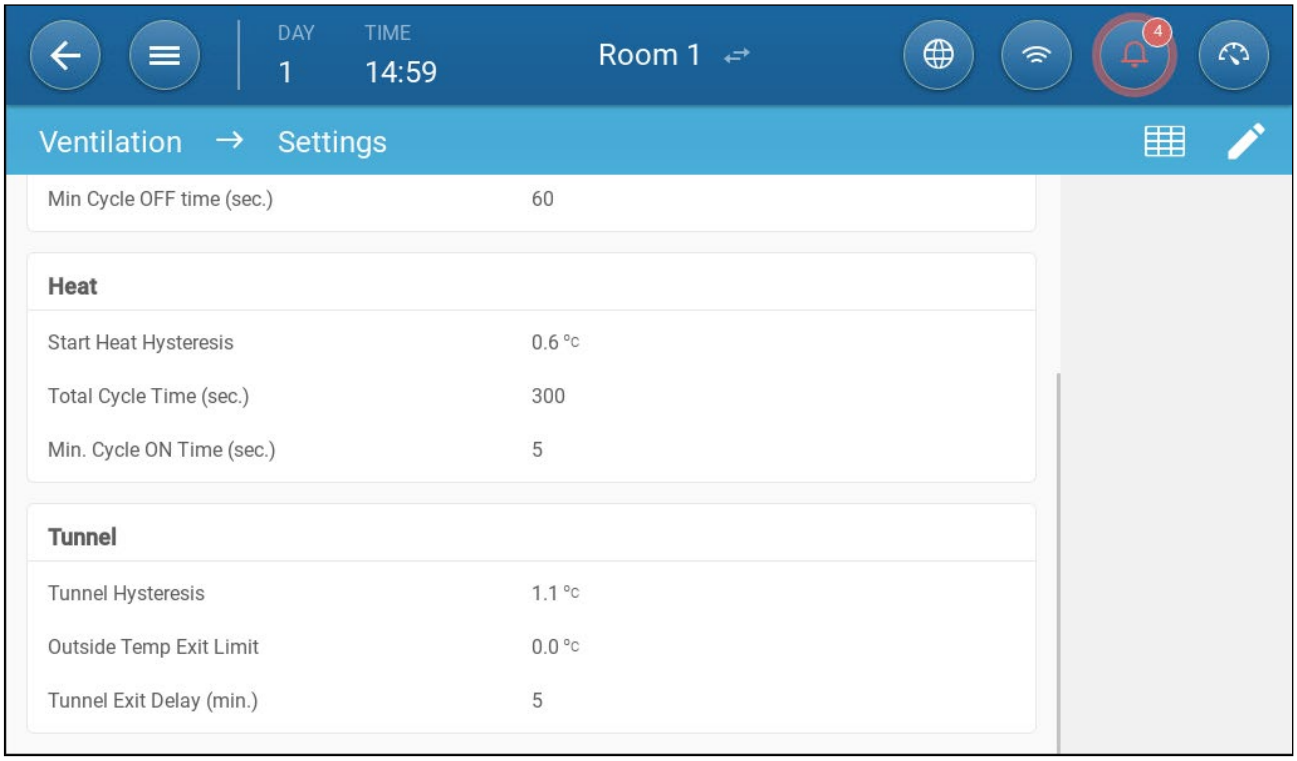
15.1 Defining the Central Heater Parameters

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 (hysteresis).

➲ **Define relays and/or analogue output ports as heaters in Mapping Devices, page 43.**

➲ **Configuring On-Off heaters requires mapping one fan, inlet, or outlet, or tunnel door.**

1. Go to Climate > Ventilation > Settings.



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

- Min Cycle On Time (sec.): For heaters defined as cycle heaters, define the minimum on time.

15.2 Zone Heaters

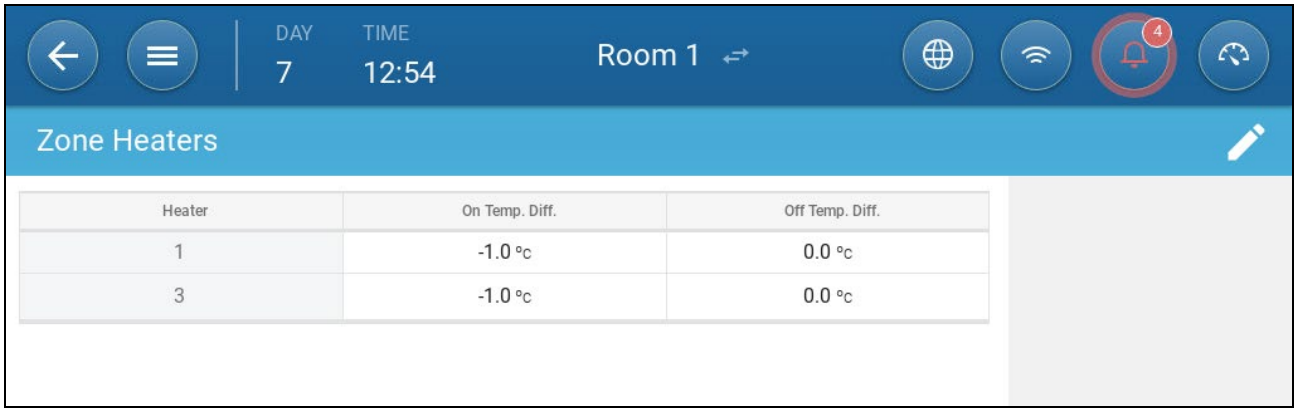
➲ **Define relays and/or analogue output ports as heaters in Mapping and Defining the Input Output Devices, page 43.**

➲ **Define at least one heater as a Zone Heater in Heating Devices, page 57.**

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

15.2.1 Defining Non-Variable Zone Heaters

1. Go to Climate > Zone Heaters.

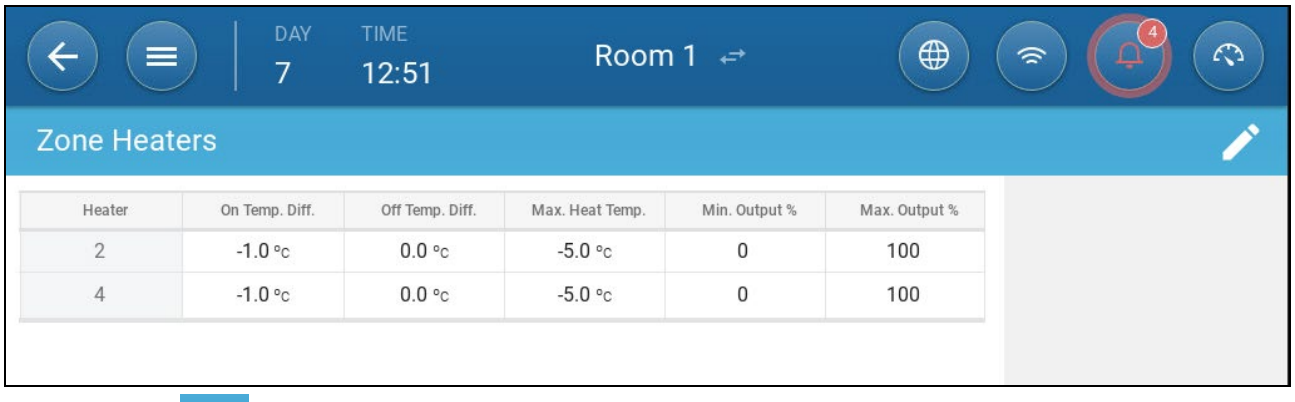


Heater	On Temp. Diff.	Off Temp. Diff.
1	-1.0 °c	0.0 °c
3	-1.0 °c	0.0 °c

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

15.2.2 Defining Variable Zone Heaters

1. Go to Climate > Zone Heaters.



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

2. Click  .

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

16 Air Quality

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

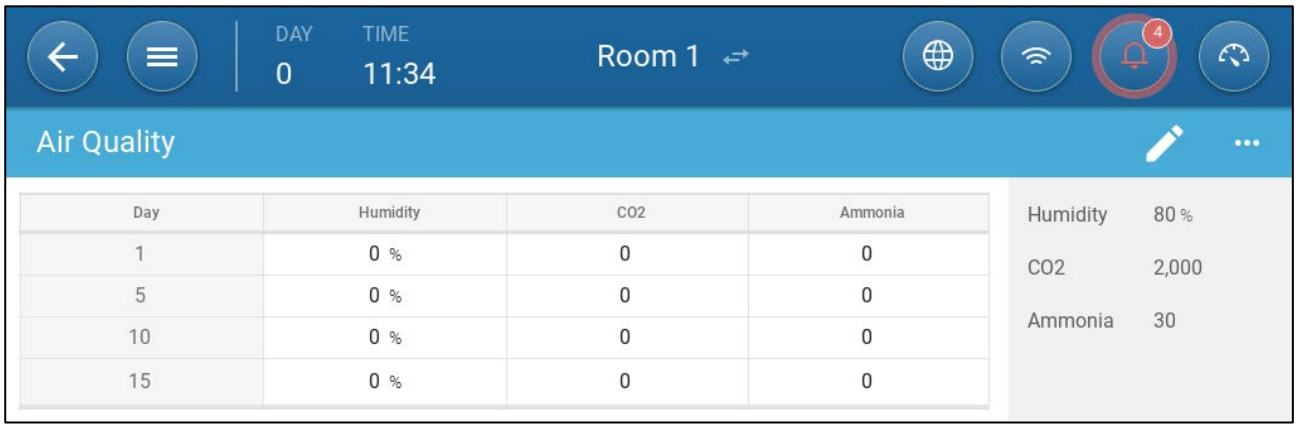
- Ventilation must be running for compensation to begin.
- If one of these factors is above the user defined set point, compensation begins. If two or more factors are above the user-defined set point, compensation continues until both factors are below the required level.
- The user defines which type of compensation is used.
- As compensation takes place, TRIO continually checks the sensors' measurements. As long as the measured RH, CO2, or ammonia remain above the defined levels (levels are checked every 30 seconds), ventilation or heating increases by 2%.
- Once the levels are below the required levels, compensation begins to decrease by 2%. TRIO continues to check the sensors' measurements (every 30 seconds). Treatment continues until the shut off values are reached.

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

16.1 Defining the Air Quality Parameters

1. Go to Climate > Air Quality.

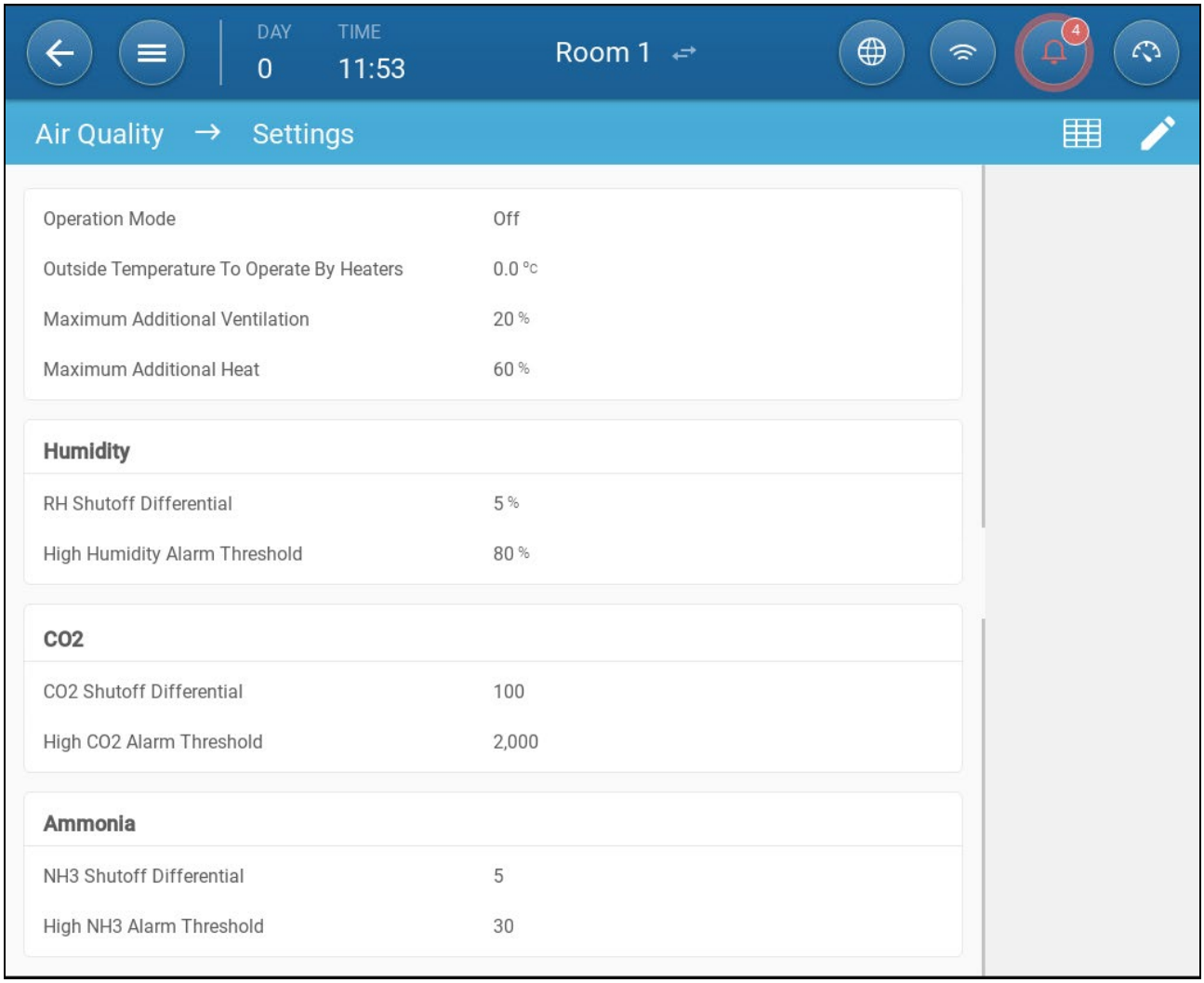
➲ **Each sensor must be defined and map for the sensor to appear in this screen. Refer to Mapping and Defining the Input Output Devices, page 43.heat**



2. Set the values over which the "air treatment" start, these values are adjusted over growth days (no curve).
3. Define:
    - Day: Set the growth day to determine the desired set points for RH, C02 and NH3. Range 0-999

- Humidity: Set the humidity level above which air treatment starts. Range 0%-100%
- Co2: Set the Co2 level above which air treatment starts. Range 0 - 5000 ppm
- NH3: Set the ammonia level above which air treatment starts. Range: 0 - 100 ppm

16.2 Defining the Air Quality Settings



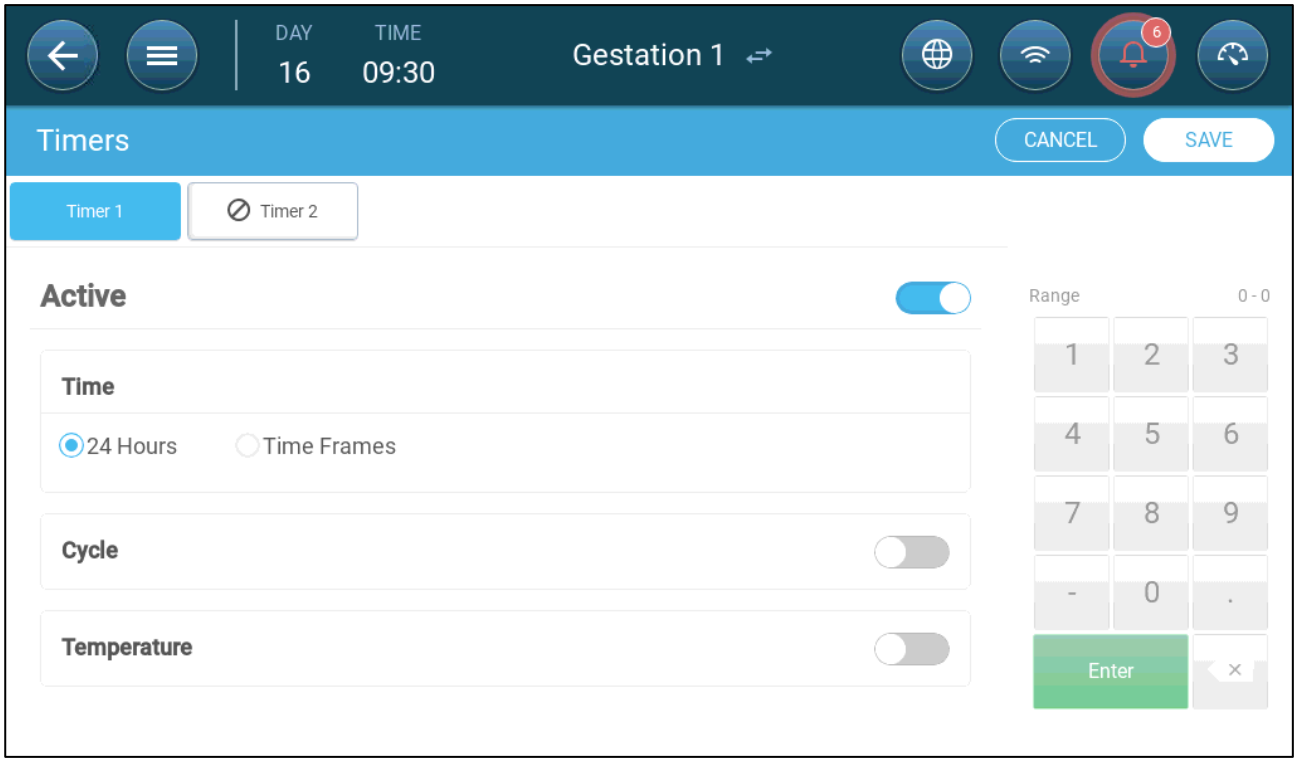
- Define:
  - Mode: Select how to compensate air quality:
    - Off
    - By Ventilation
    - By Heat
    - By Outside Temp (Auto)
  - Outside Temp. To Operate By Heaters: Below this temperature the controller automatically adjusts the heat output to compensate the air quality. Range -40°to +90°
  - Maximum Additional Ventilation (%): The maximum increase in ventilation (maximum compensation). Range: 1% to 100%
  - Maximum Additional Heat (%): The maximum increase in heat (max compensation). Range: 1% to 100%

- RH Shutoff Differential: (%): Below this level, humidity treatment ceases. Range: 0% to 10%
- High RH Alarm Threshold (%): TRIO sends an alarm when the humidity level rises above this level. Range: 0% to 100%
- Co2 Shutoff Differential: (ppm): When CO2 levels are below the target level by this amount, all CO2 treatment stops. Range: 0 to 500 ppm
- 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

17 Timers

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

TRIO supports up to five timers.



➲ **Define at least one relay as a timer in Mapping Devices, page 43.**

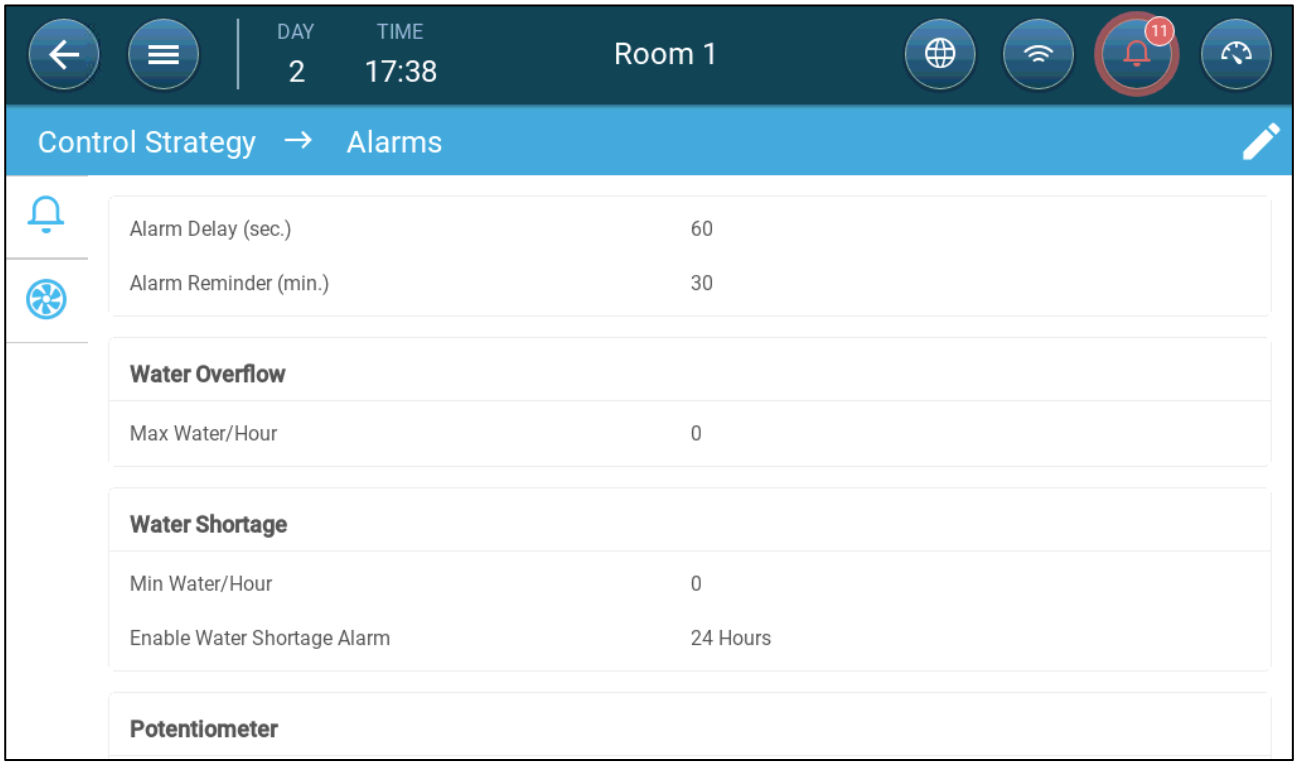
1. In Control > Timers, click edit, define a timer as Active.
2. Define for each timer:
    - Time: Timers can run 24 hours a day or in user-defined time frames. Define up to four time frames for each timer.
    - Cycle: If enabled, define the cycle times. Range: 0 – 999 seconds.
    - Temperature: If enabled, define the temperature range in which the timers operate. Range [-40° - +90°].

18 Alarms

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

18.1 Defining the Alarm Parameters

1. Go to System > Control Strategy > Alarms  .



NOTE Water Overflow, Water Shortage, and Potentiometer only appear if these devices are mapped. Refer to Mapping Devices, page 43.

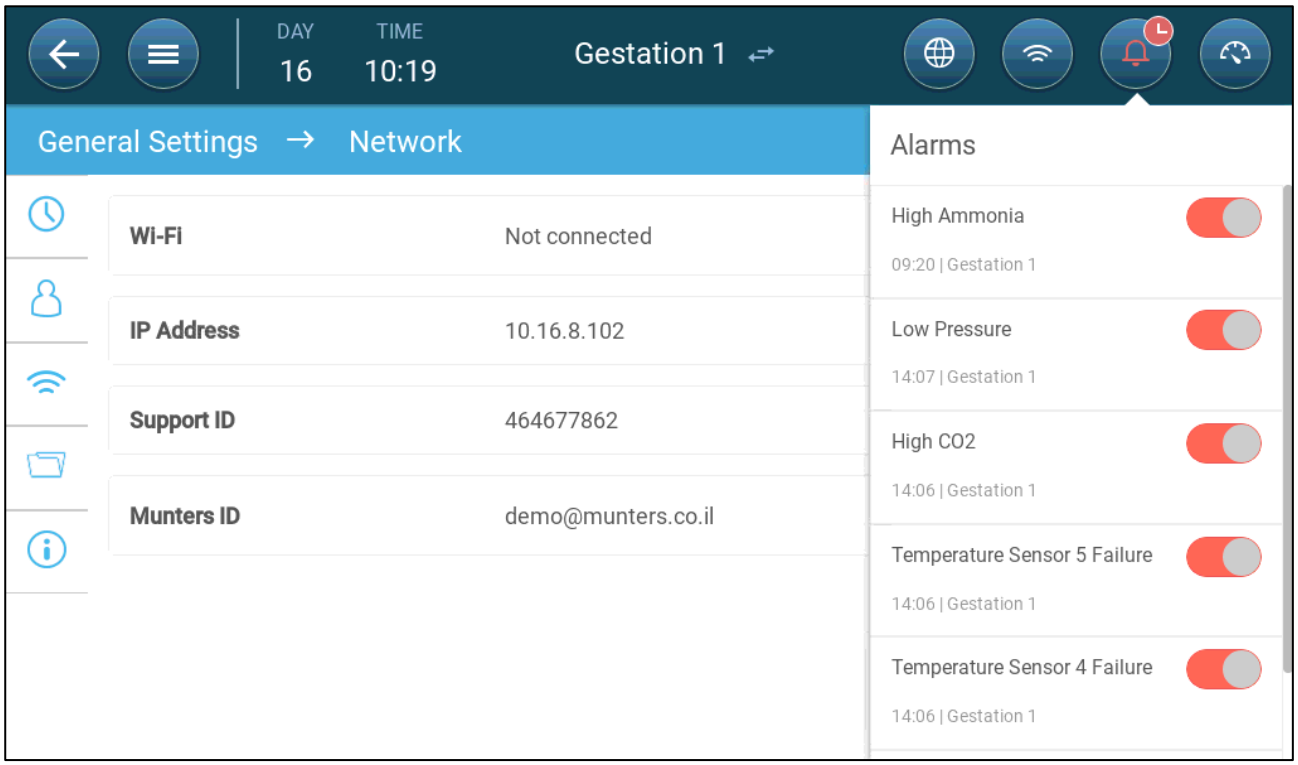
2. Click  .
3. Define:

- 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.

18.2 Viewing the Alarms

- On the Main Menu bar, click  .

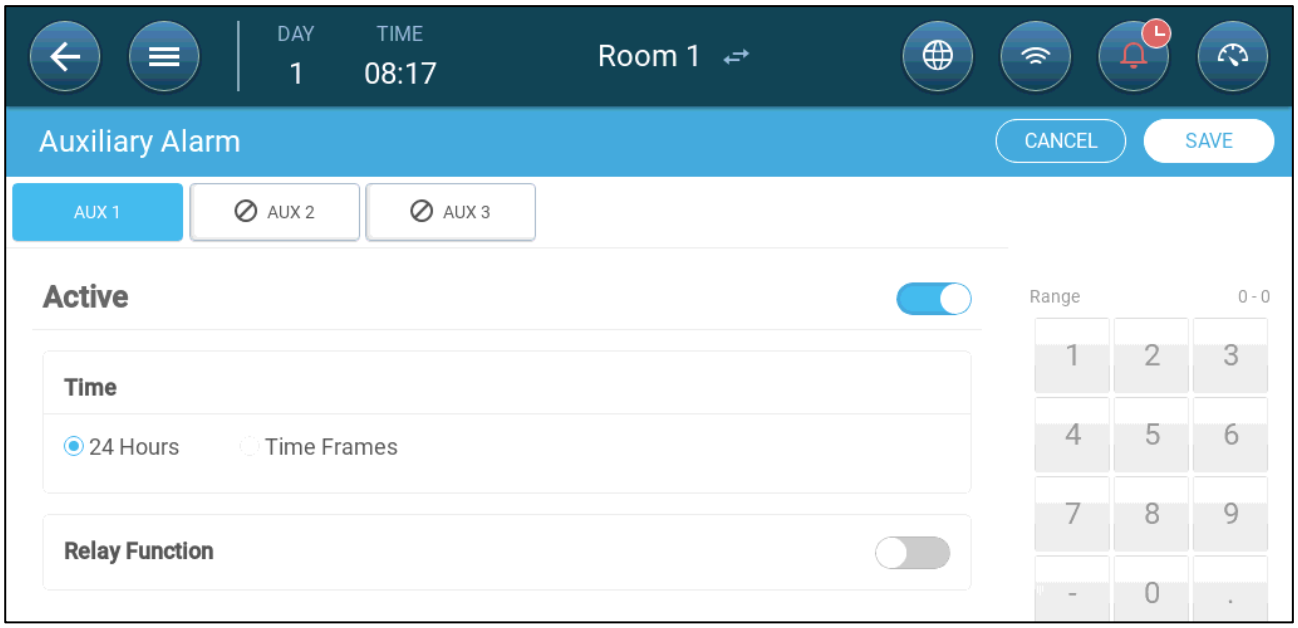


18.3 Defining the Auxiliary Alarms

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

➲ **Define at least one sensor as an auxiliary input in Mapping Devices, page 43.**

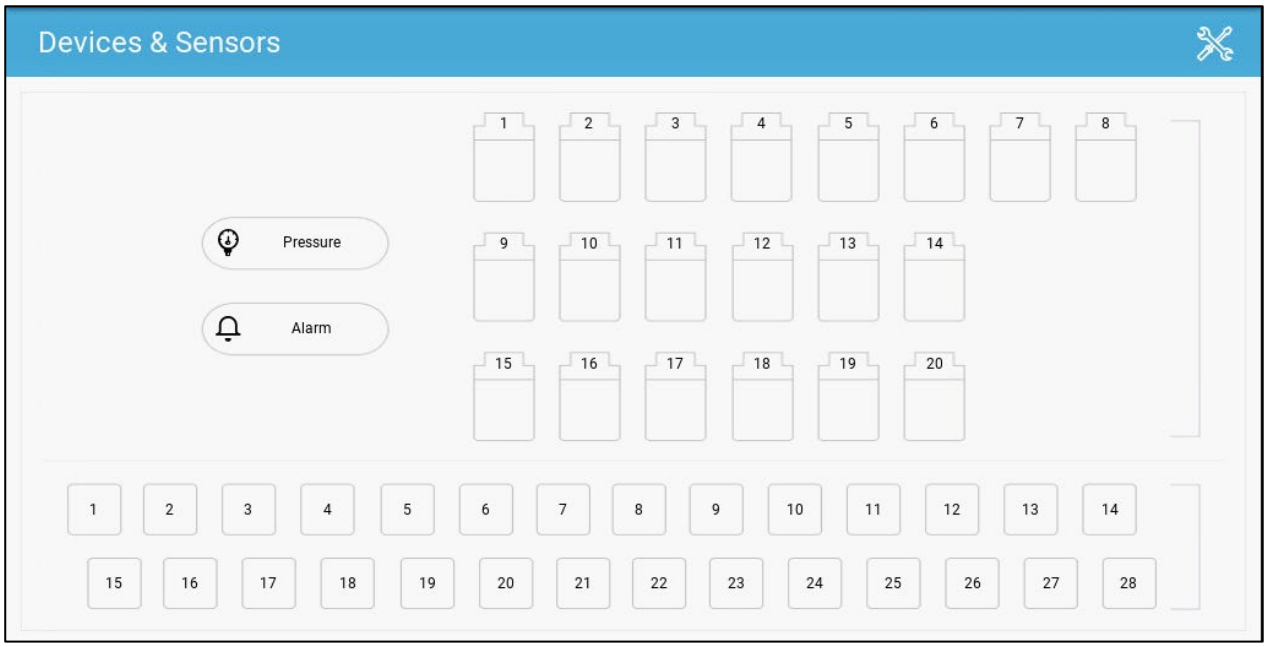
1. Go to Control > Auxiliary Alarm



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.

18.4 Sending a General Alarm

1. Go to System > Device and Sensors.



2. Click 

.

An alarm is sent to everyone on the contact list.

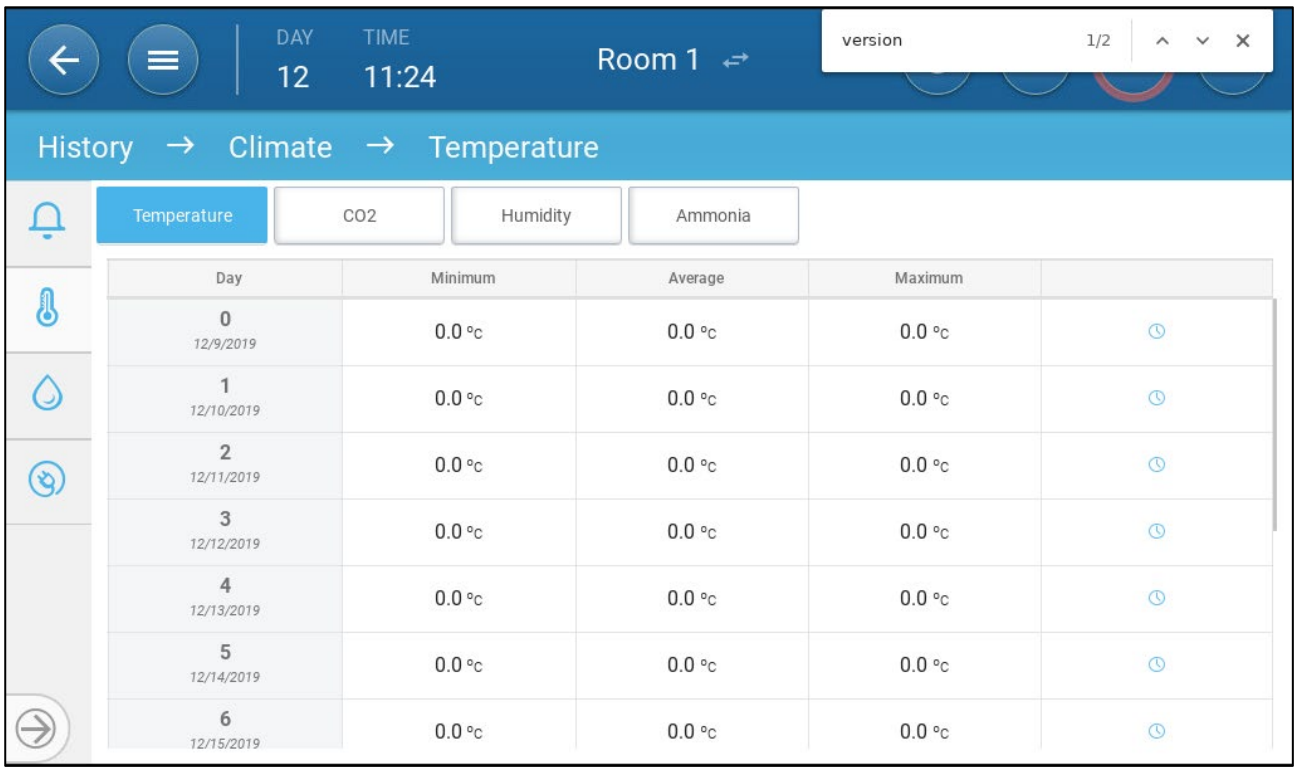
19 History

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

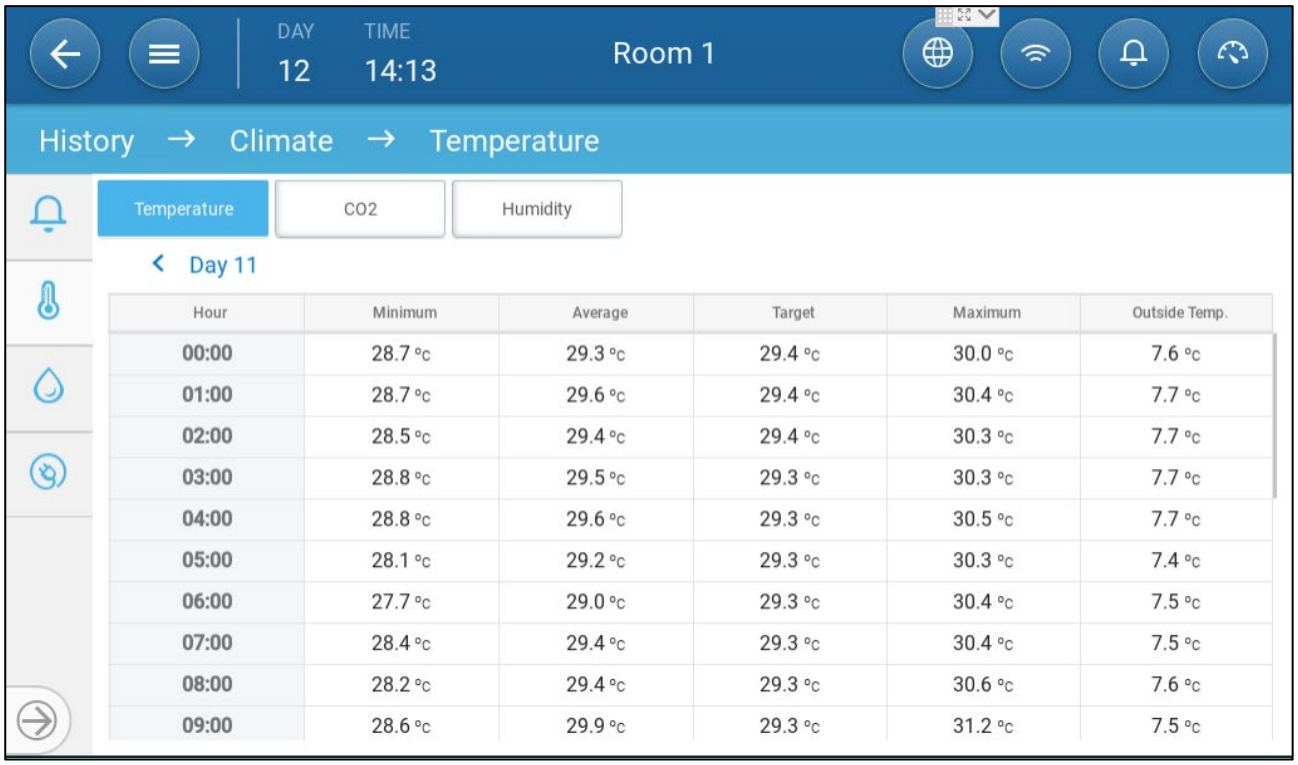
19.1 Climate and Air Quality

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.

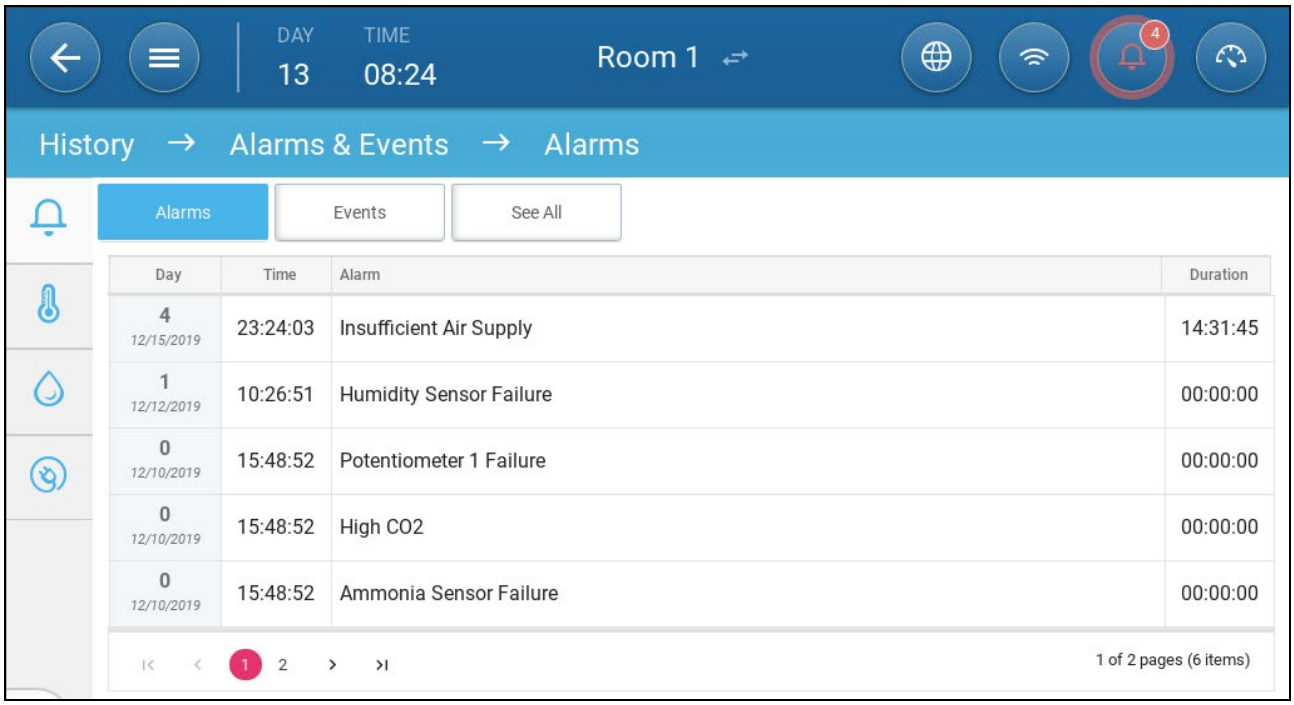


19.2 Alarms and Events

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

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

1. Go to Batch > History > Alarms .
2. Click the relevant tab.

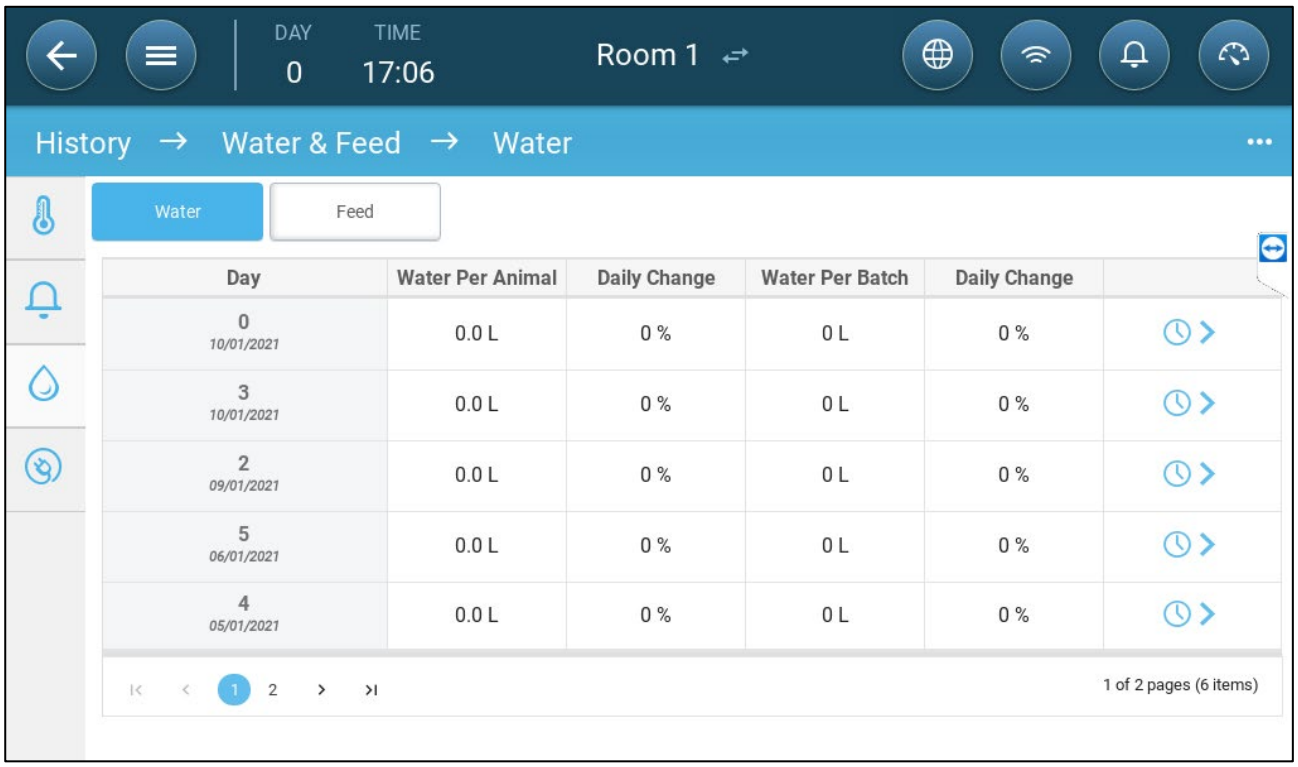


- Alarm Description
    - Unknown Alarm
    - High Temperature
    - Sensor # High Temperature
    - High Co2
    - Low Pressure
    - Water Overflow
    - Outside Temperature Failure
    - Humidity Sensor Failure
    - Ammonia sensor failure
    - Potentiometer # Failure
    - Alarm Test
    - CPU Low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

19.3 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.

19.4 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 perform as expected.

- Go to Batch > History > Devices .

Day	Heater 1	Heater 2	Heater 3	Heater 4	Cooling 1	Cooling 2	
0 12/9/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
1 12/10/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
2 12/11/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
3 12/12/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
4 12/13/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
5 12/14/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
6 12/15/2019	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	
7	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	00:00:00	

- Click the clock symbol to view the hourly breakdown.

NOTE History displays installed devices only.

20 Resetting, Saving and Loading Settings, Updating Software

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

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

20.1 Resetting the Settings

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

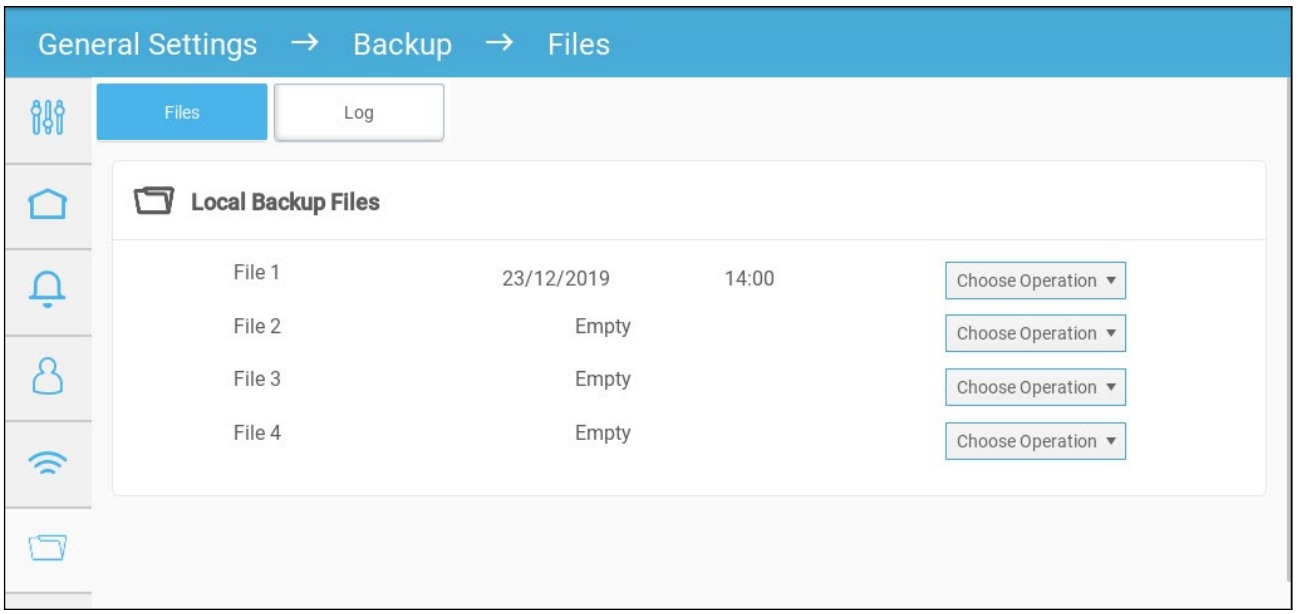
To reset the TRIO:

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

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

20.2 Saving or Loading the Settings

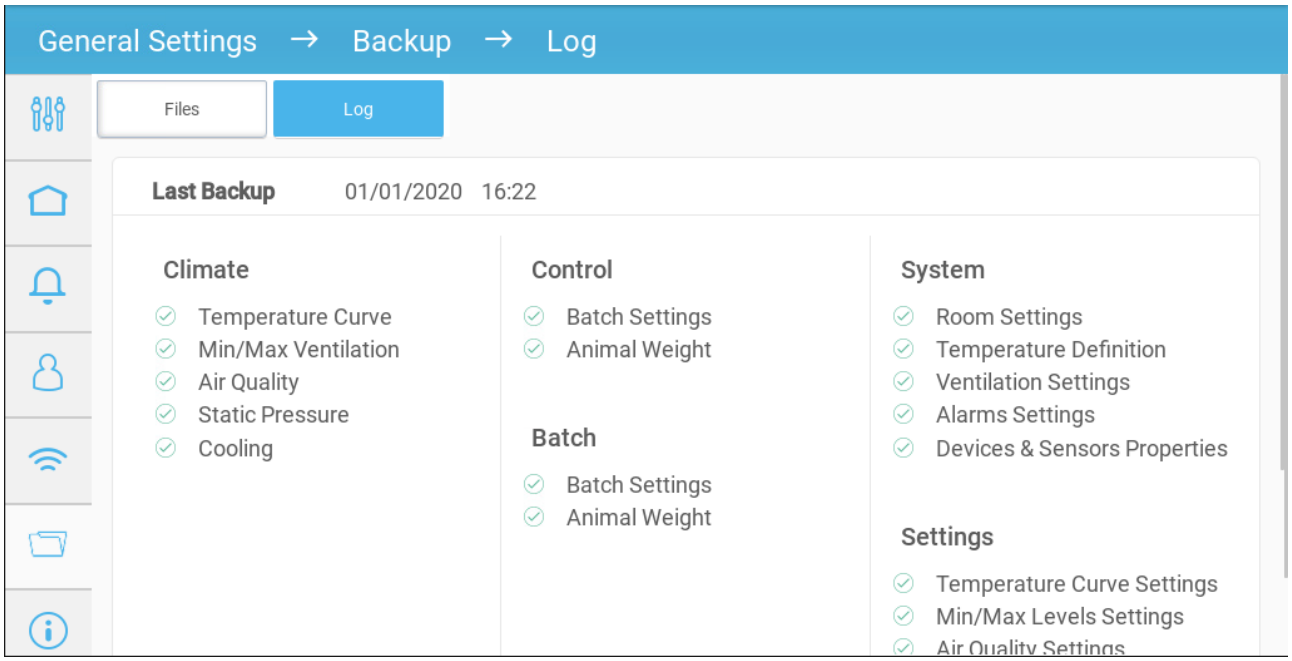
1. Go to System > General Settings and click  .



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

20.3 Viewing the Log

The log displays which tables were successfully saved.



20.4 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.

21 Appendix A: External Device Specifications

Table 1: Low Voltage Devices

Device type	Input	Maximum Number of Devices
Temperature Sensor		12
Outside Temperature Sensor		1
Potentiometers		4
Ammonia Sensor	0 – 3V	1
Humidity Sensor	0 – 3V	1
CO2 Sensor	4 – 20 mA	1
Pressure Sensor		2
Fan	Analog output	8
Stir Fan	Analog output	1
Inlets	Analog output	2
Outlets	Analog output	1
Heaters	Analog output	4
Auxiliary Input	Digital input	4
Water Meter	Digital input	1
Measuring Fan	Digital input	1

Table 2: High Voltage Devices

Device type	Maximum Number of Devices
Heaters	4
Fan	12
Fan (Central Exhaust)	20
Stir Fan	1
Inlets (open)	2
Inlets (close)	2
Tunnel Door (open)	2
Tunnel Door (close)	2
Sprinkler	1

Device type	Maximum Number of Devices
Cooling	2
Timer	5
Same as Relay	20
Same as Analog	8
Alarm	1
Feeder	1

Table 3: Low Voltage Device Attributes

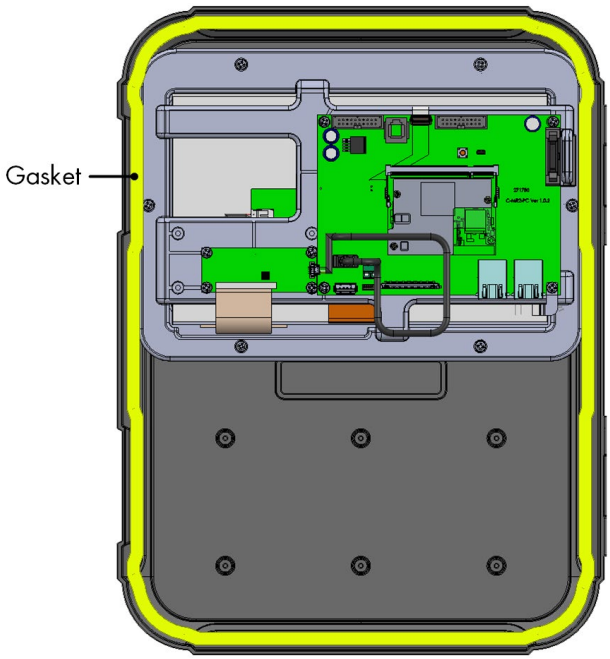
Device type	Maximum Number of Devices
Heaters	4
Fans	12
Fans (Central Exhaust)	8
Stir Fan	1
Inlets	2
Outlet	1
Tunnel Door	2
Sprinkler	1
Cooling	2
Timer	5
Same as Relay	20
Same as Analog	8
Alarm	1

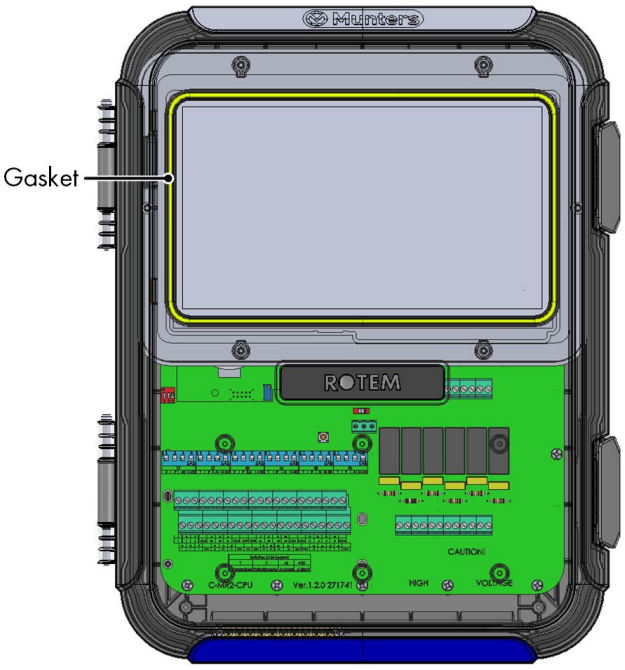
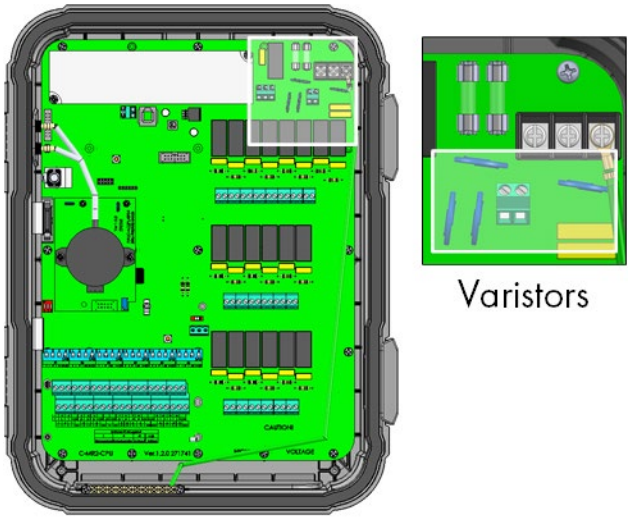
22 Appendix B: Service Manual

- Maintenance
- Trouble Shooting
- Spare Parts

22.1 Maintenance

Perform the following steps to maintain your unit.

• Checking the Battery Level: Check the battery once a year. The output must be 2.7 volts (minimum). Authorized personnel only must replace the battery if the output is below the minimum required level or every five years.	
• Visually inspect your unit once a year. Make sure that there are no signs of corrosion or residue on the PCBs. If these issues appear, it means that:	
○ the TRIO is installed in an environment with high humidity, ammonia content, or some other destructive agent.	
○ There is a lack of (silicon) sealing or that the sealing has degraded.	
• Make sure that the silicon seal around the PGs installed in the knockouts is not cracked.	
• Check that the gasket around the TRIO door is not cracked.	

• Check that the gasket around the touch screen is not cracked.	
• Look for any signs of burns or browning around the varistors.	
• Inspect the shield wiring and main grounding cable; ensure that they are properly connected to the proper ports.	

22.2 Trouble Shooting

- Internet
- Electronic Components

22.2.1 INTERNET

The following section describes how to trouble shoot internet problems. In the event that there is no internet connection:

1. Go to System > General Settings > Network Screen. Verify that there is an IP address.
2. Check the cable connections between the switch and the TRIO.
3. Verify that the unit is powered.

NOTE If there is no internet connection, the Main Menu Internet icon is marked.

22.2.2 ELECTRONIC COMPONENTS

Problem: The touch screen doesn't turn on up after applying 115/230VAC.

Solution: Open the TRIO door and:

1. Check main 115/230VAC 3A fuse F2.
    - If required, replace fuse.
2. Check the 12V terminal voltage (COM & 12V).
    - If there is no voltage, there is a problem with the Switched Power Supply. Replace the power supply.
3. Verify that the 5V and 3.3V indicative LEDs of the I/O power board are lit.
4. Verify that the flat cable connecting the I/O board and the display board is in place.
5. Verify that the Green Status LED is flashing.
6. On the TRIO display board, verify that the:
    - RED Status LED is flashing
    - Display's flat cable is firmly hooked up to its connector.

Problem: The screen doesn't reflect changes made in the analog inputs.

Solution:

1. Verify that the position of Dip Switch (S1-S6) corresponds with the relevant analog input.
2. Verify that the analog input terminals' mapping corresponds to the actual wiring.
3. Check that the terminal wire connection of Analog Input of interest coincides with the analog input chosen on the touch screen.

Problem: The screen doesn't reflect the changes in digital inputs.

Solution: Verify that the digital input terminals' mapping corresponds to the actual wiring.

Problem: The Alarm Relay doesn't operate.

Solution: Check fuse F4.

- By default, alarm relay contacts "NO-COM" should be closed.

Problem: The analog output voltage doesn't correspond to the voltage defined on the corresponding analog output terminal.

Solution: Check the load value. The maximum analog output load is 15 mA.

Problem: An analog output terminal has no output voltage.

Solution: Verify that the analog output terminals' mapping corresponds to the actual wiring.

Problem: The display screen appears but does not respond to any touch.

Solution: Check the USB cable between the touch screen card and the TRIO display card.

Problem: There is no 3.3V output for to power the potentiometer(s).

Solution: There is a PPTC fuse F1 on the 3.3V line. Disconnect the potentiometers and using a DVM, check the resistance on the terminal between the 12V output and common ground (COM). The reading should indicate an open circuit.

- If not, the line is damaged.

Problem: The end user doesn't see changes in the data tables.

Solution:

1. Check the Internet cable, going from RJ-45 connector (marked as Ethernet-2). Verify that the connector's LEDs are flashing.
2. Check the Internet cable, going from the power card to the TRIO display's card RJ-45 connector (marked as Ethernet-1). Verify that the connector's LEDs are flashing.

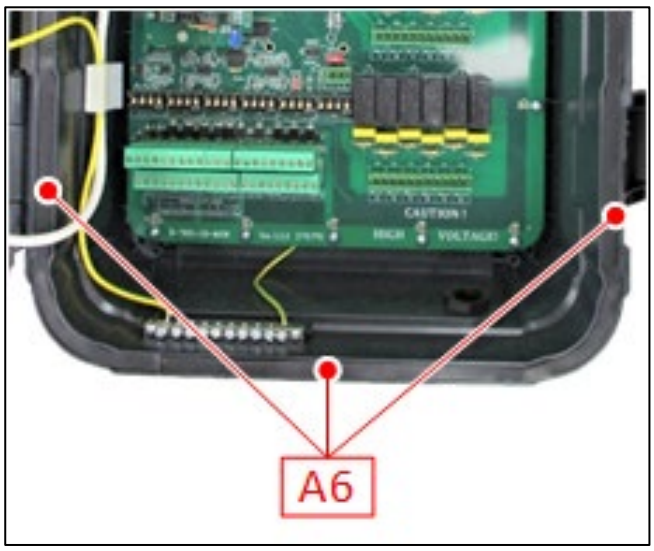
22.3 Spare Parts

- Preliminary Information
- TRIO 20 Enclosure Spare Parts
- TRIO 20 Door/Flat Cable/Harness Spare Parts
- TRIO 20 Main Container Spare Parts

22.3.1 Preliminary Information

	TRIO 20
Container	A
Door Cards	B
Main Container Cards	C
Cables and Harnesses	D
MPN	Munters Part Number
DPN	Dealer Part Number

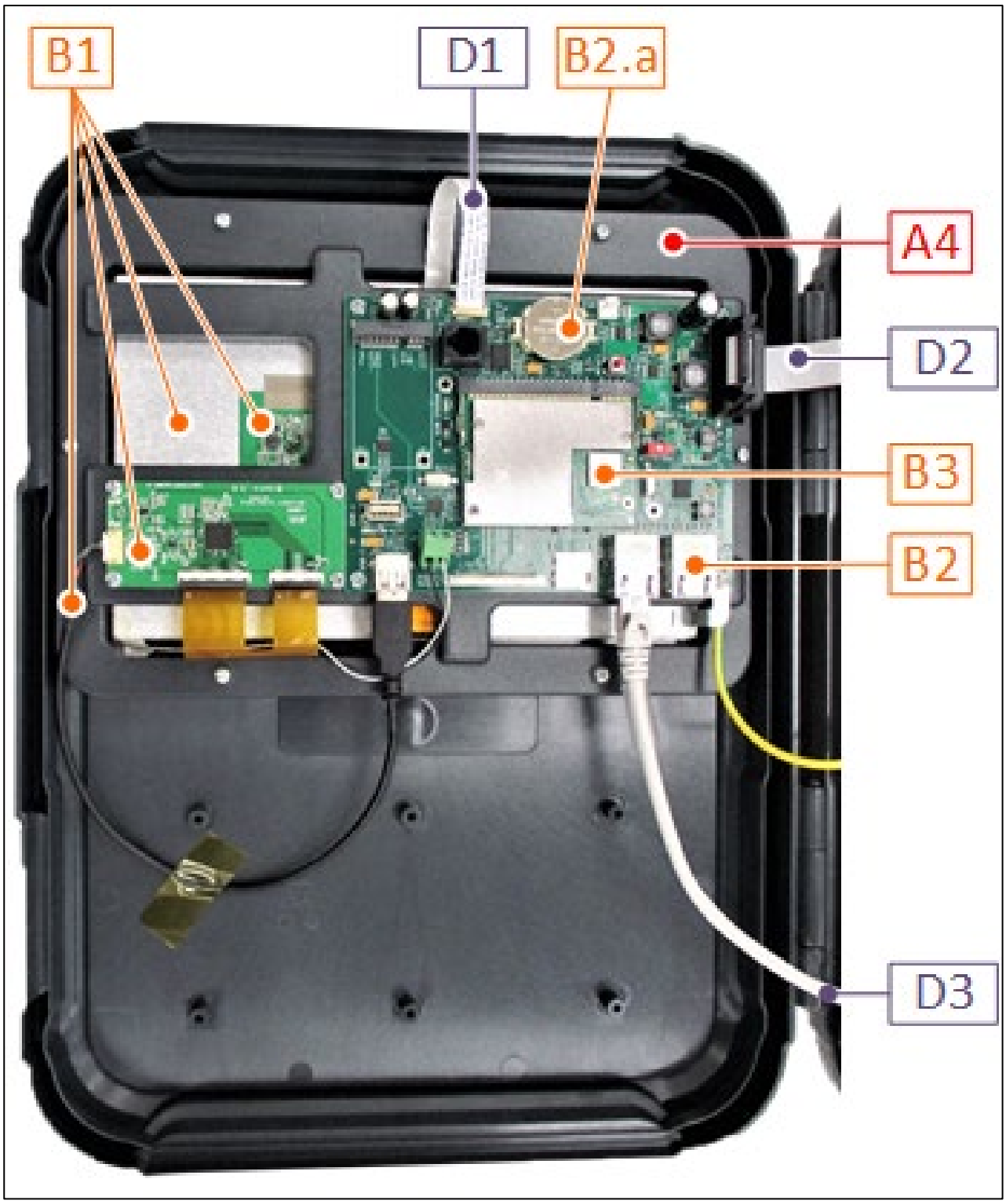
22.3.2 TRIO 20 ENCLOSURE SPARE PARTS



ID No.	Description	Order Catalog Number
A1.1	TRIO-20 FRONT DOOR TOUCH PLASTIC PART	MPN: 940-99-00005
		DPN:
A1.2	TRIO-20 PLASTIC BOX BASE	MPN: 940-99-00007
		DPN:
A1.3	TRIO HINGE PLASTIC PIN V1.0.0 (SP-207128)	MPN: 940-99-00019
		DPN:
A2	TRIO-20 PLASTIC BLUE PANEL (MUNTERS LOGO)	MPN: 940-99-00001
		DPN:
A3	GENERAL PLASTIC LATCH	MPN: 900-99-00216

ID No.	Description	Order Catalog Number
		DPN:
A3.1	ONE / ONE PRO - LATCH GENERAL LOCK PLASTIC PART + LOCK FOR LATCH	MPN: 900-99-00217
		DPN:
A4	TRIO-20 LCD HOLDER V1.0.0	MPN: 940-99-00zz
		DPN:
A5	P4 SCREEN GASKET SILICONE 35 SHORE 75CM (EXTRUSION PROCESS) (SP-204079)	MPN: 940-99-00020
		DPN:
A6	MID-RANGE MAIN GASKET V1.0.0 125CM (SP-207122)	MPN: 940-99-00021
		DPN:

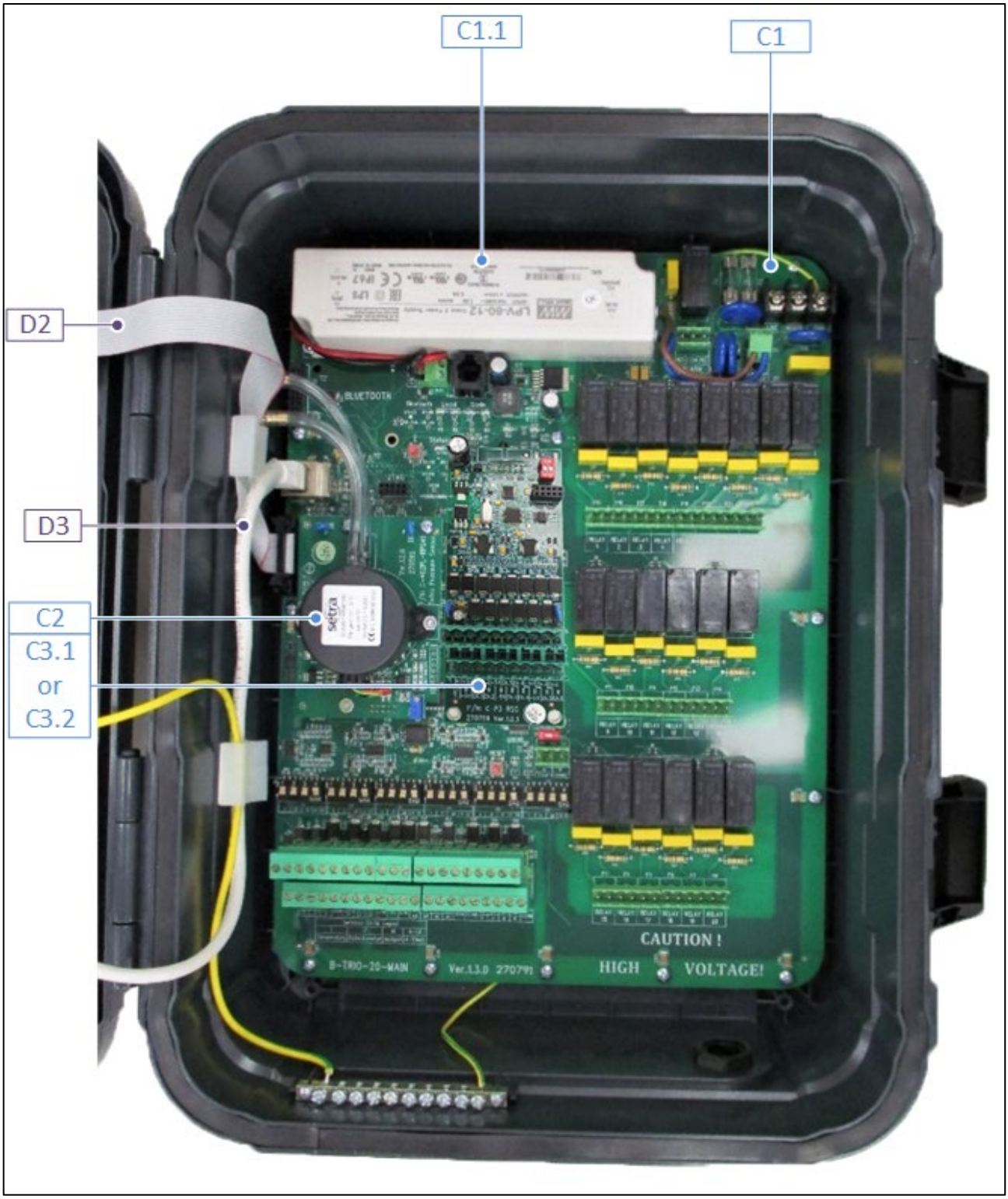
22.3.3 TRIO 20 DOOR/FLAT CABLE/HARNESS SPARE PARTS



ID No.	Description	Order Catalog Number
B1	TRIO-20 LCD KIT (DISPLAY + LVDS CARD + USB CABLE)	MPN: 940-99-00002
		DPN:
B2.a	BAT COIN 3V FOR SOCKET(SP-450009)	MPN: 940-99-00386
		DPN:
B2	TRIO-20 SOM CARD VARISCITE (TRIO DISPLAY)	MPN: 940-99-00004
		DPN:
B3	TRIO-20 SOM CARD VARISCITE	MPN: 940-99-00008
		DPN:

ID No.	Description	Order Catalog Number
D1	VIDEO FLAT CABLE 0.02" (0.50 mm) Type 1,152.4 mm	MPN: 940-99-00012
		DPN:
D2	FLAT FF14P 25CM F"D>_V1.0.0 (SP-141161)	MPN: 940-99-00457
		DPN:
D3	NETWORK CABLE RJ485 (8 WIRES, 0.5 METERS)	MPN: 940-99-00011
		DPN:

22.3.4 TRIO 20 MAIN CONTAINER SPARE PARTS



ID No.	Description	Order Catalog Number	Remarks
C1	TRIO-20 MAIN CARD (TRIO-20 MAIN)	MPN: 940-99-00003 DPN:	
C1.1	SWPS LPV-60-12 Mean Well 100-240V 12V 60W (SP-370193)	MPN: 900-99-00264 DPN:	OR
C2	TRIO-20 POU SETRA PRESSURE CARD	MPN: 901-99-00013 DPN:	
C3.1	TRIO 20 SCALE CARD 2SCL (TRIO-RSC-2)	MPN: 940-99-00013 DPN:	OR
C3.2	TRIO 20 SCALE CARD 2SCL (TRIO-RSC-6)	MPN: 940-99-00014 DPN:	

ID No.	Description	Order Catalog Number	Remarks
C4	BAT COIN 3V FOR SOCKET(SP-450009)	MPN: 940-99-00386	
		DPN:	

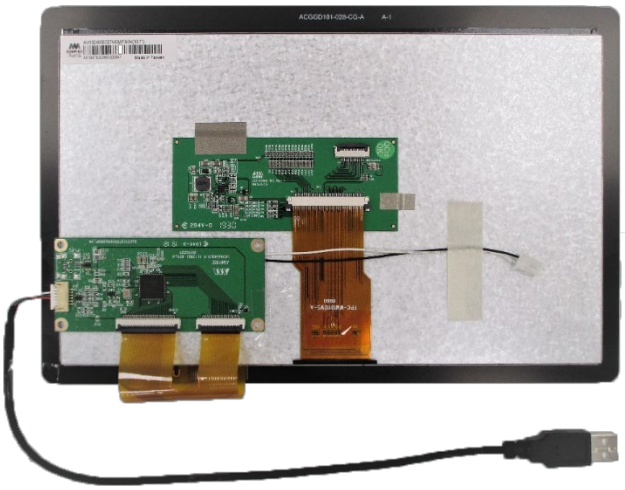
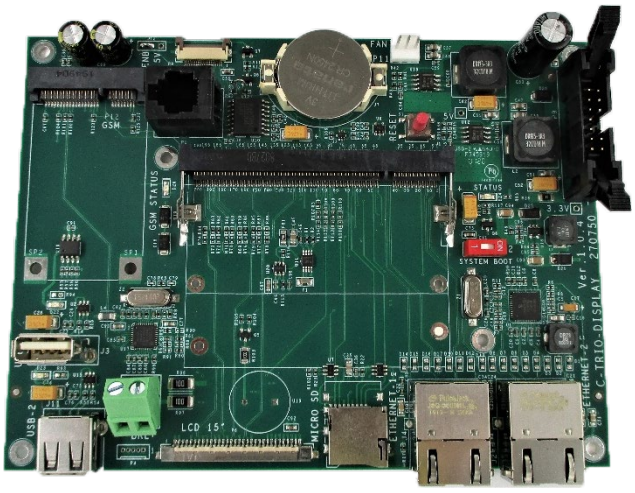
22.3.5 ADDITIONAL OPTIONS

ID No.	Description	Order Cat. No.	Remarks
ADO 1	TEMPERATURE SENSOR BLACK-RTS-2-POU	MPN: 918-01-00001	
		DPN:	
ADO 2	HUMIDITY SENSOR-RHS-PIG-ROT-SE-10PL	MPN: 917-02-00005	
		DPN:	
ADO 3	TRIO-20 CONTROLLER - PRESSURE SENSOR	MPN: 940-99-00010	
		DPN:	
ADO 4.1	TRIO 20 SCALE CARD 2SCL WITH 230V POWER SUPPLY	MPN: 940-99-00015	OR
		DPN :	
ADO 4.2	TRIO 20 SCALE CARD 6SCL WITH 230V POWER SUPPLY	MPN: 940-99-00016	OR
		DPN :	
ADO 4.3	TRIO 20 SCALE CARD 2SCL WITH 115V POWER SUPPLY	MPN: 940-99-00017	OR
		DPN:	
ADO 4.4	TRIO 20 SCALE CARD 6SCL WITH 115V POWER SUPPLY	MPN: 940-99-00018	
		DPN:	
ADO 5	CO2-PIG-EN-ROT	MPN: 919-01-00005	
		DPN:	
ADO 6	STATIC PRESSURE (EXTERNAL) SENSOR-RPS-PIG-MUR	MPN: 920-0-10001	
		DPN:	

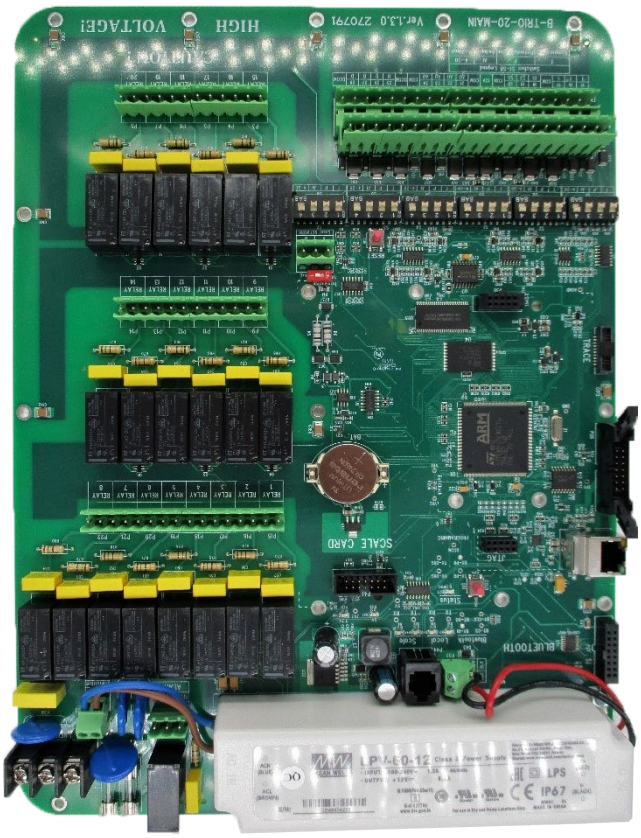
22.3.6 CARDS

- Door Cards
- Main Container Cards

22.3.6.1 Door Cards

Card	Description	Munters Ordering Number
	250061: LCD TFT 10.1' VT101C-KC17-B07A Vitek	940-99-00002
	R-TRIO-DISPLAY: MUNTERS ROTEM MIDDLE RANGE 2 PC	940-99-00004
	204106: MODULE VAR-SOM-MX6Q-V2 VARISCITE	940-99-00008

22.3.6.2 Main Container Cards

Card	Description	Munters Ordering Number
	R-TRIO-20-MAIN: MUNTERS ROTEM MIDDLE RANGE 2 CPU	940-99-00003
	370193: SWPS LPV-60-12 Mean Well 100-240V 12V 60W	900-99-00264
	R-AC2PL-RPS4S: AC2000-3G PRESSURE (SETRA) CARD	901-99-00013

23 Appendix C: Central Exhaust

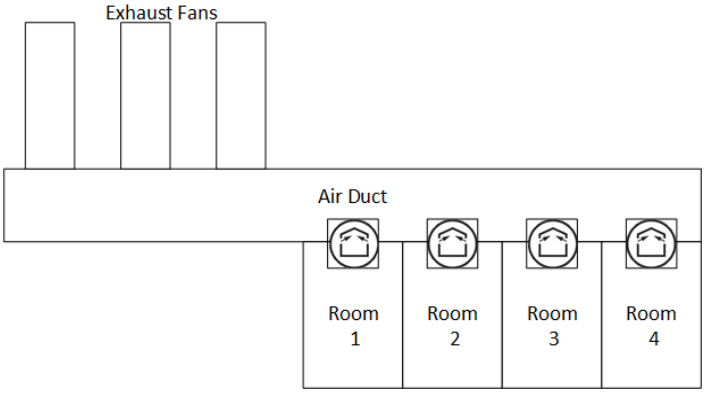
The Central Exhaust Mode uses static pressure levels to determine the ventilation levels. This appendix explains how to set up the Central Exhaust System.

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

23.1 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 on the basis of 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.

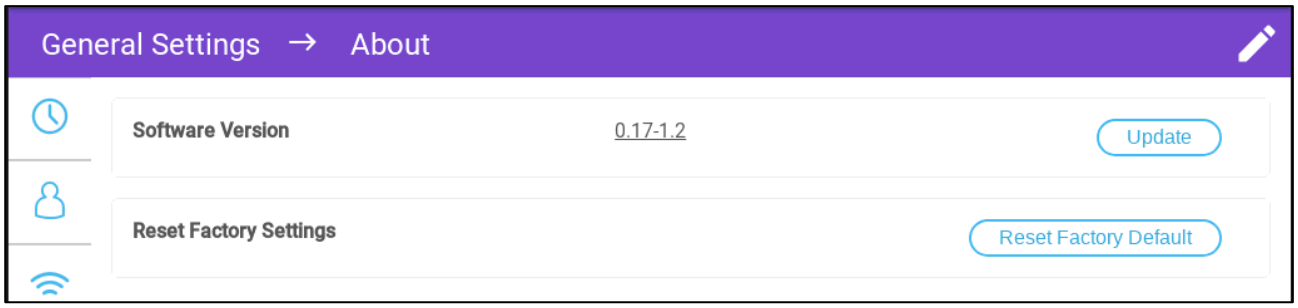


Since Central Exhaust sets the pressure settings for the entire structure, there is only one room in this mode.

23.2 Selecting Central Exhaust

To select the Central Exhaust Mode:

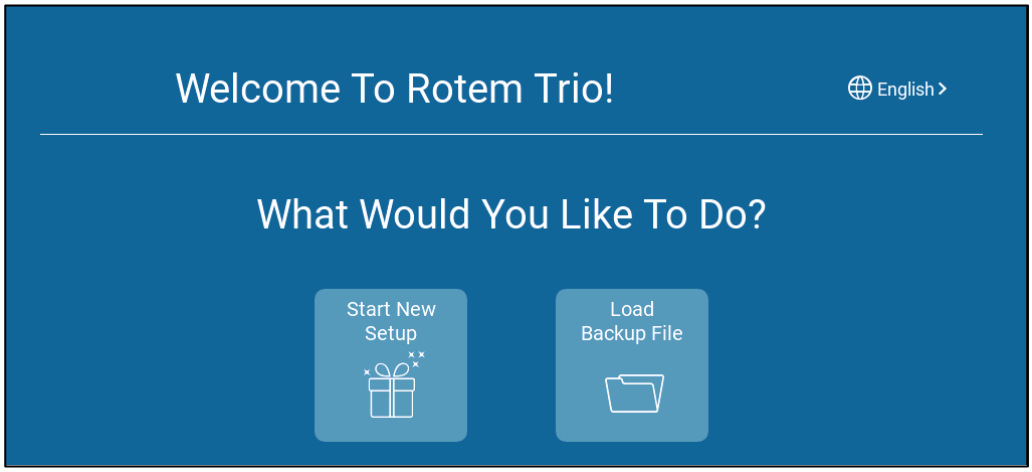
1. Perform a Cold Start. Go to System > General Settings > About.



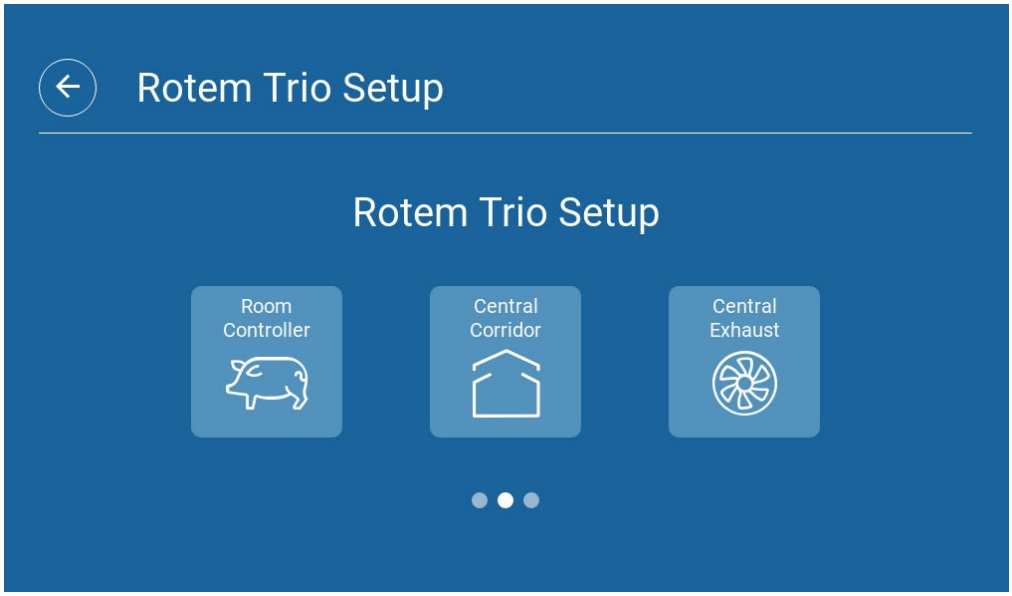
a. Click Reset Factory Default.

b. Create a backup if required.

2. Click Reset.



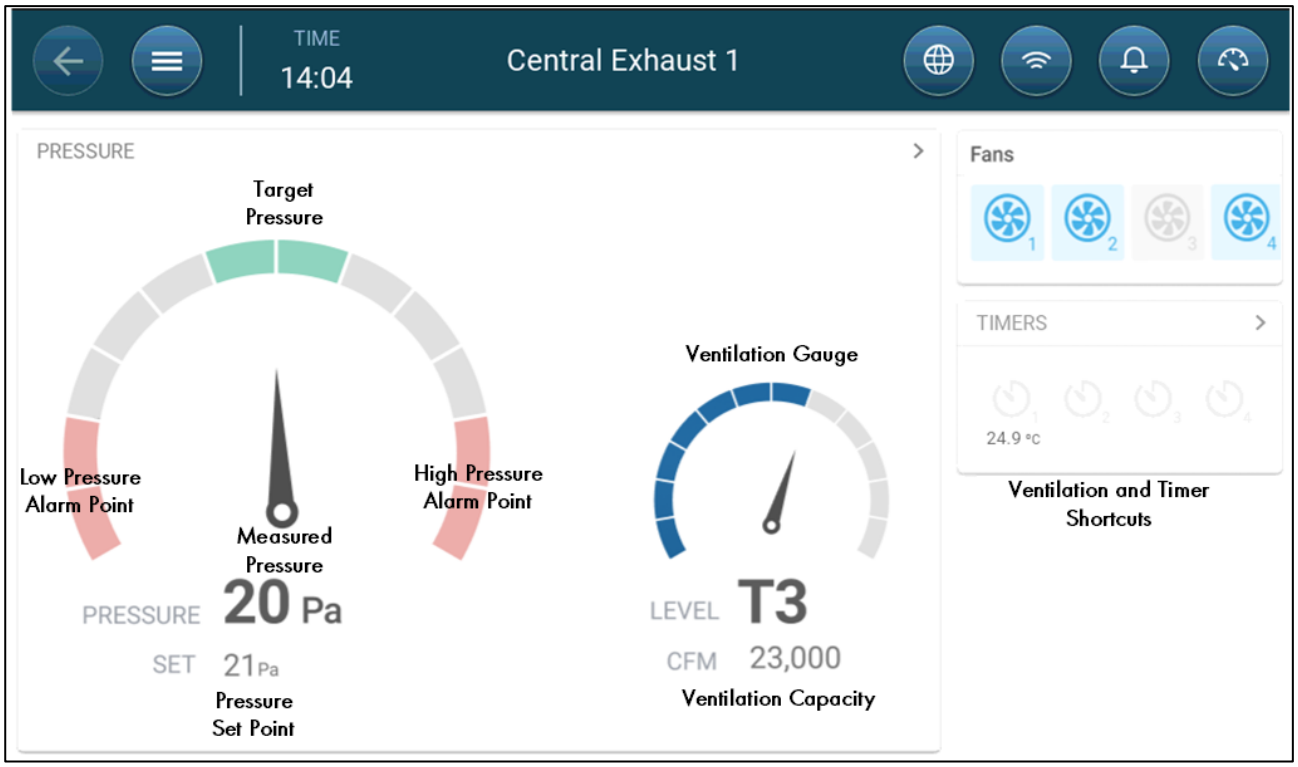
3. Click Start New Setup.



4. Click Central Exhaust.

23.3 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 Mapping and Defining the Input Output Devices, page 43).

23.4 Central Exhaust Functions

Central Exhaust supports the following functions:

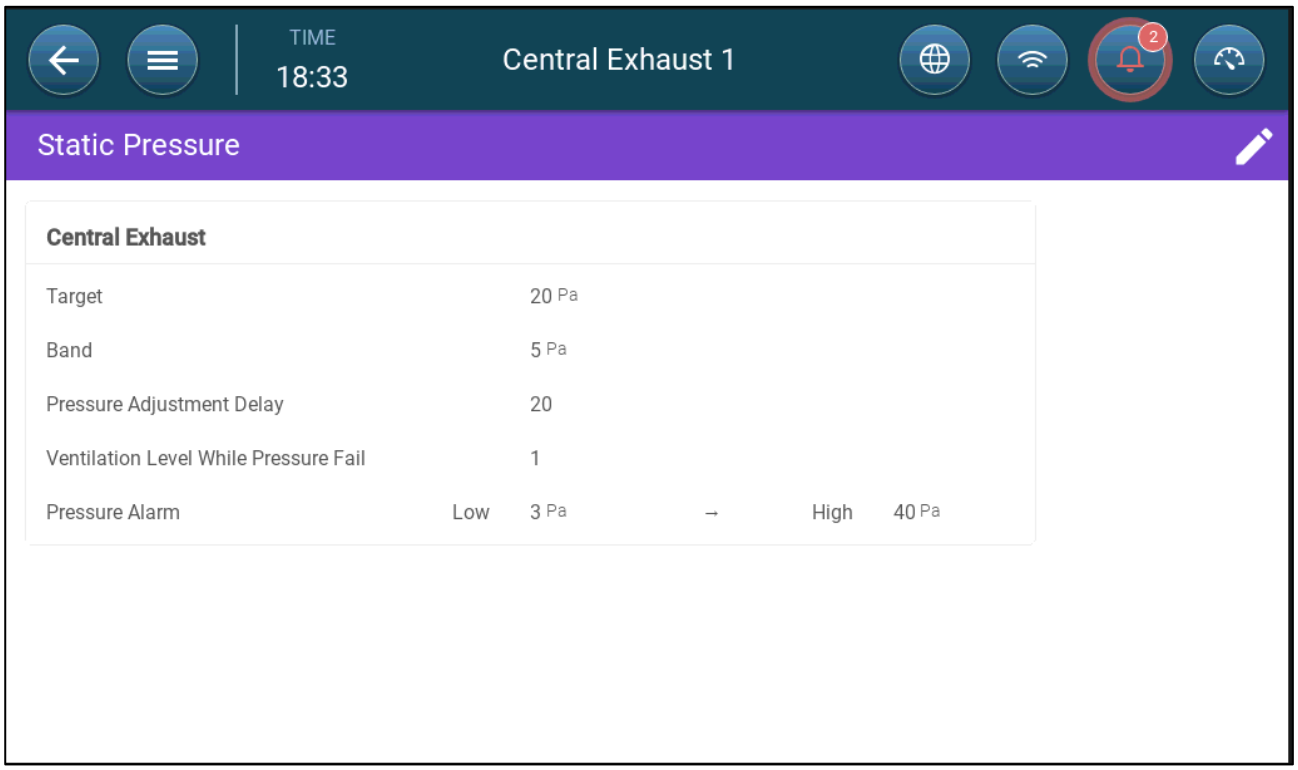
- Control
  - Ventilation Levels
  - Pressure
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition
  - Device & Sensors Definition and Mapping
  - Room Settings
  - Mapping Devices
  - General
    - Time & Date
    - Static Pressure
    - Alarm
    - User
    - Network

- Backup
- About

23.5 Setting the Static Pressure

Enable a static pressure sensor in Devices & Sensors (page 43).

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.

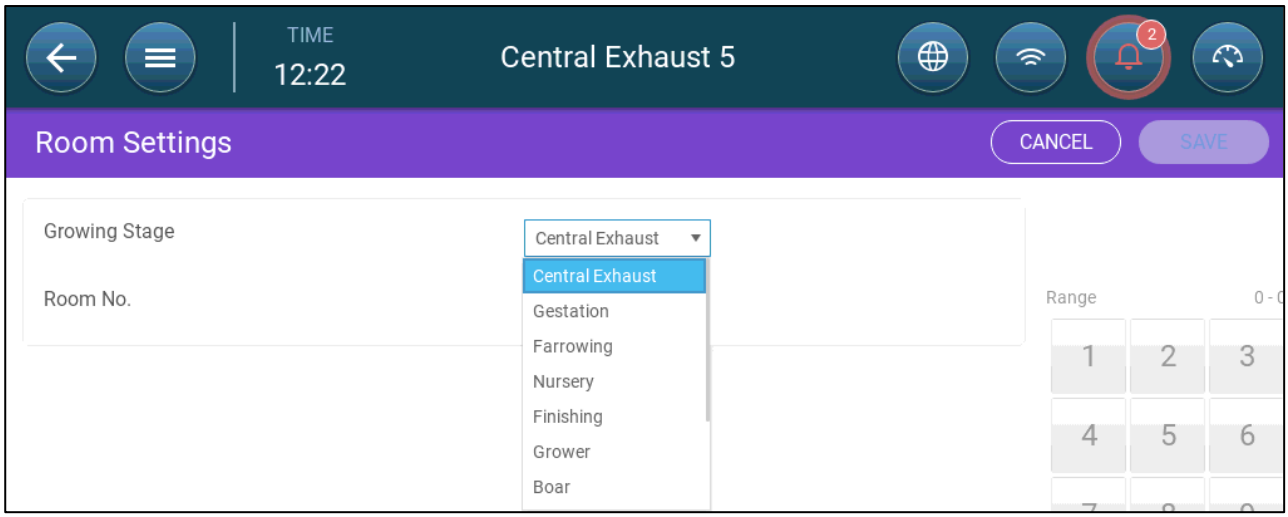
CAUTION *This parameter is extremely important and can ensure animal survival in the event of a sensor failure.*

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

23.6 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

24 Appendix D: 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

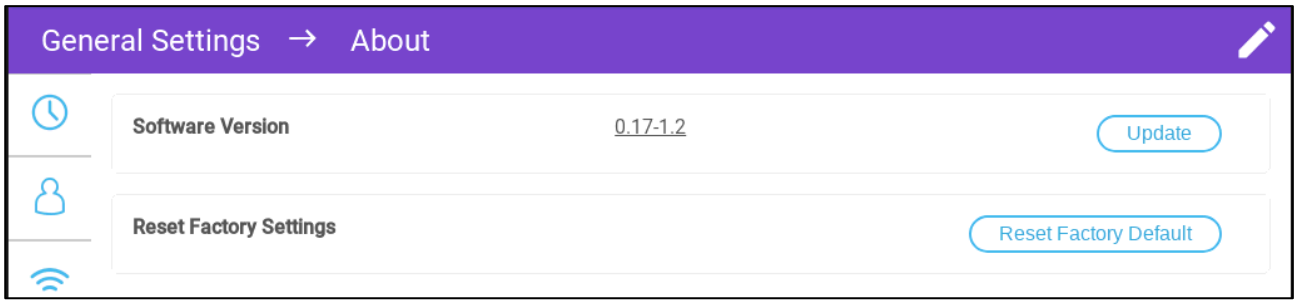
24.1 Introduction to Pressure Control

TRIO adjust 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.

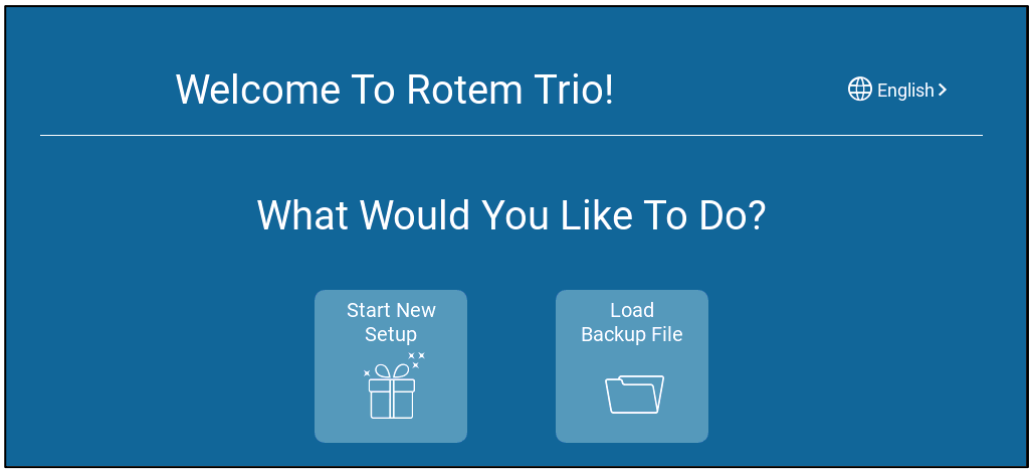
24.2 Selecting Central Corridor

To select the Central Corridor Mode:

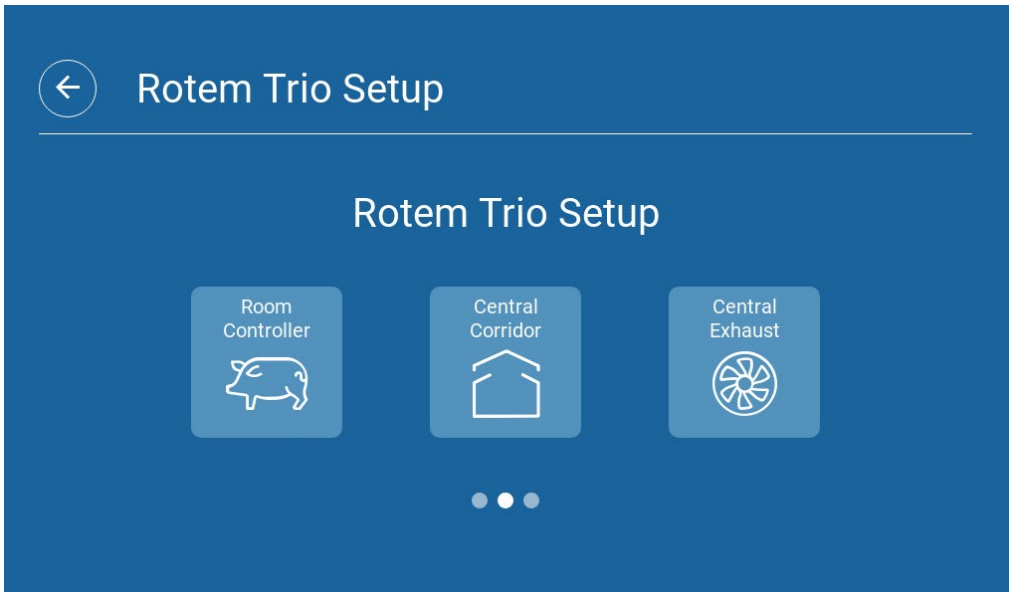
1. Perform a Cold Start. Go to System > General Settings > About.



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



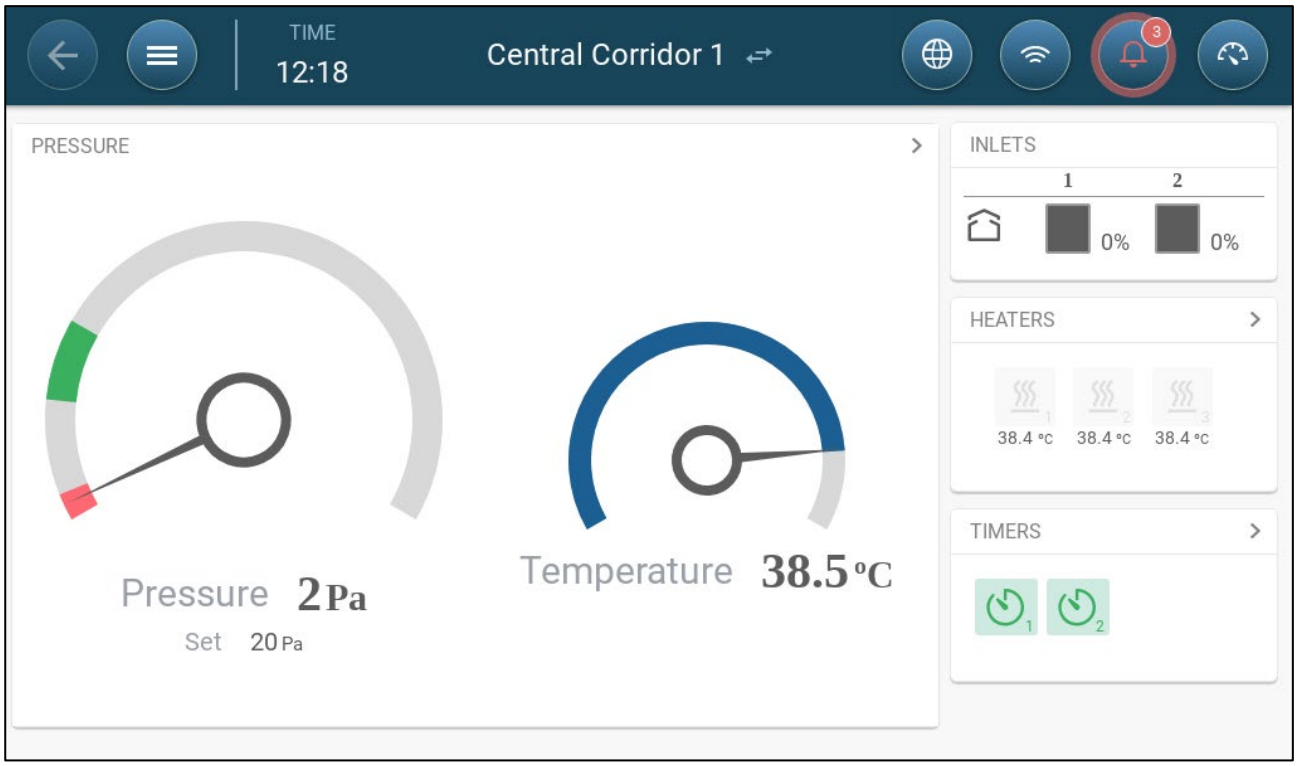
3. Click Start New Setup.



4. Click Central Corridor.

24.3 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 Mapping and Defining the Input Output Devices, page 43).

24.4 Central Corridor Functions

Central Corridor supports the following functions:

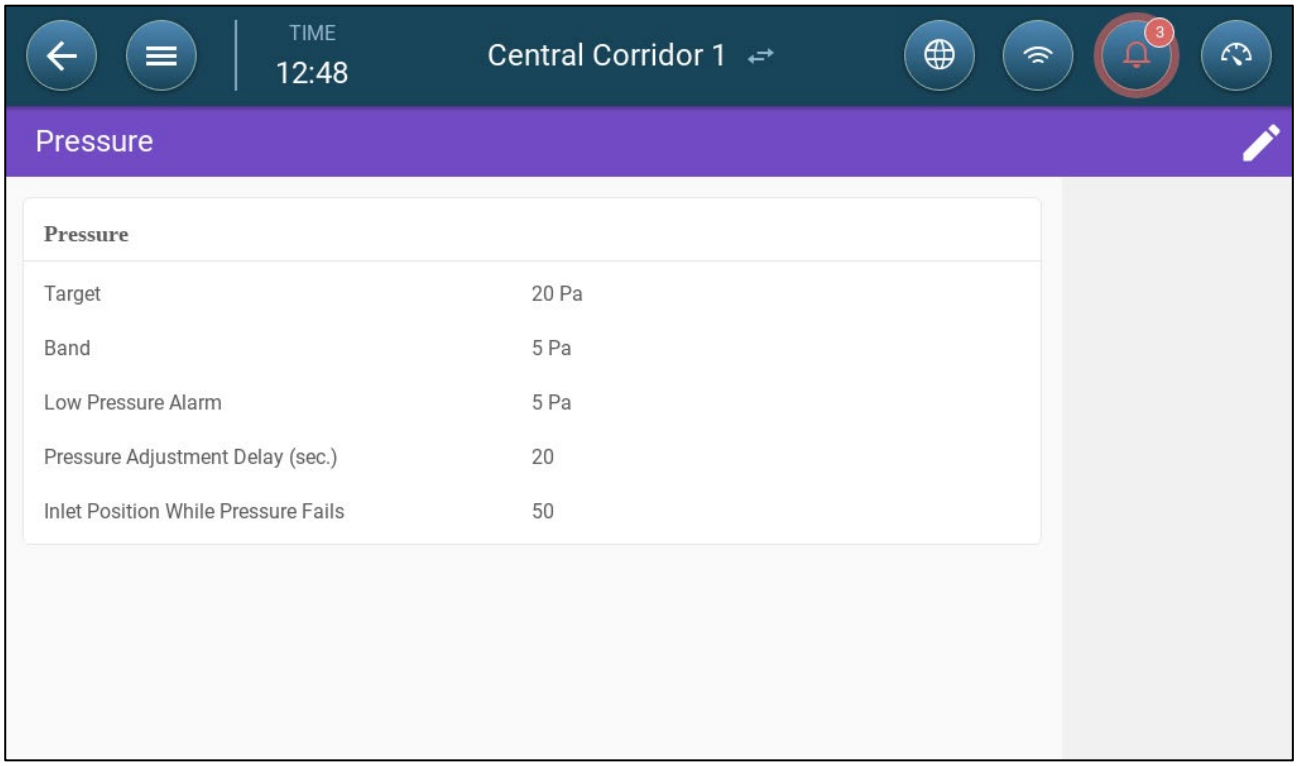
- Control
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition
  - Alarm Settings
  - Device & Sensors Definition and Mapping
  - Room Settings
  - Mapping Devices
  - General
    - Time & Date
    - Alarm
    - User
    - Network
    - File Saving and Loading
 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

24.5 Setting the Pressure Levels

➲ **Define Pressure in Mapping Devices, page 43.**

Enable a static pressure sensor in Devices & Sensors (page 43).

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.*

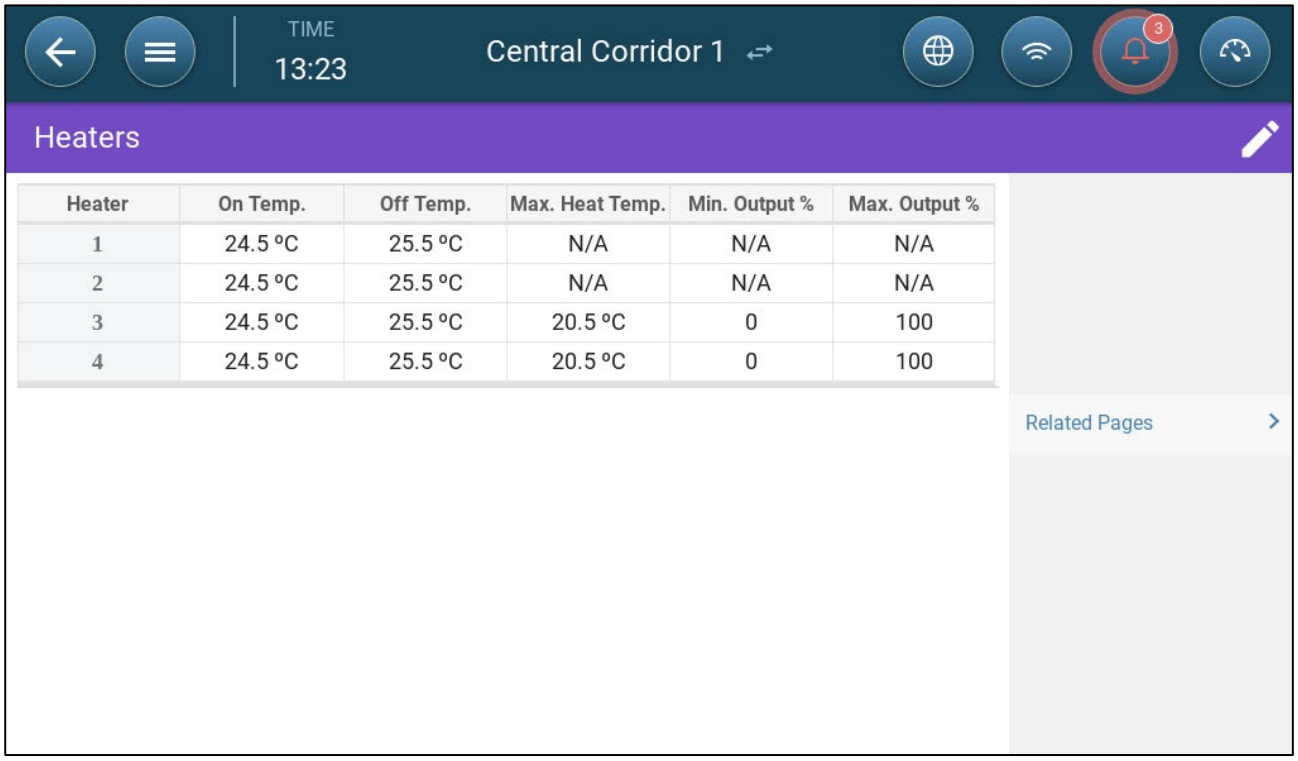
- Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.
- Inlet Position while Pressure Fails: In the event that the pressure sensor fails, define the inlet position to provide emergency ventilation.

24.6 Defining the Heat

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

➲ **Define up to four relays and/or ports as heaters in Mapping Devices, page 43.**

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:

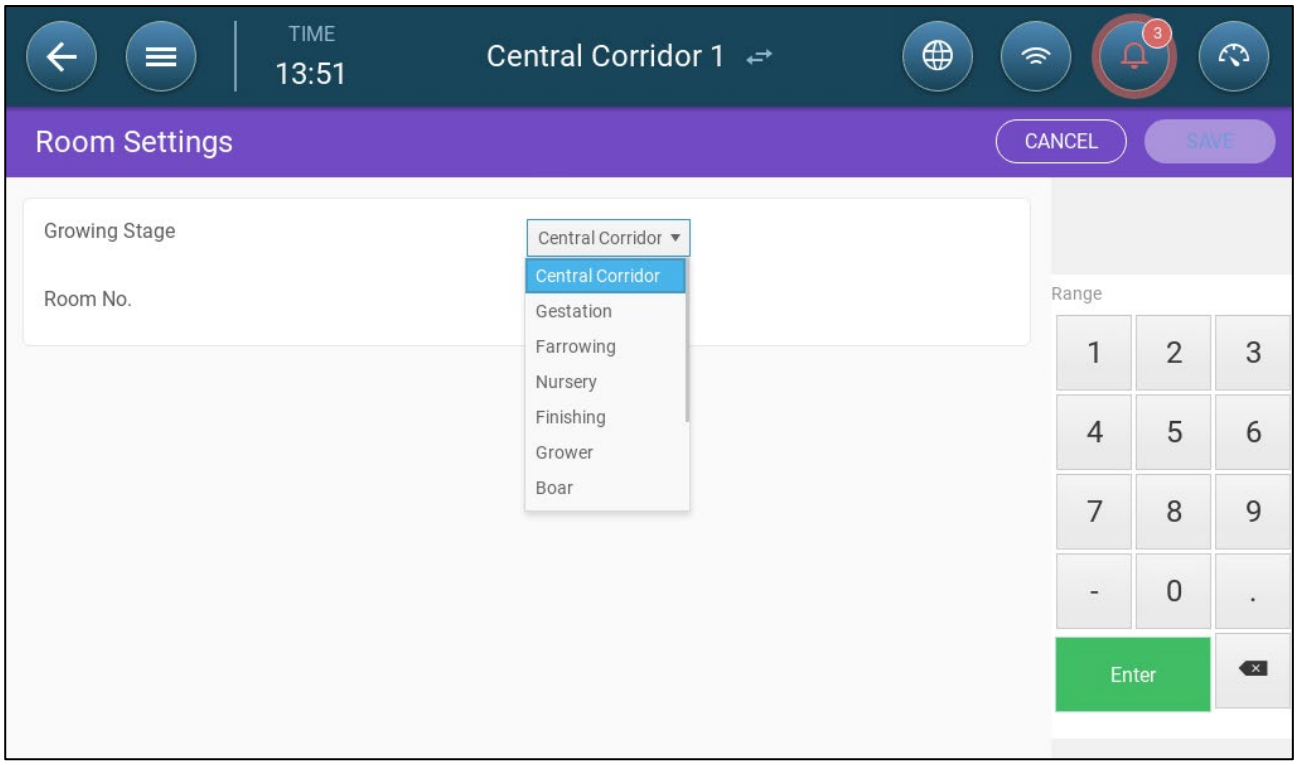
NOTE The temperatures here are absolute temperatures; there is no temperature band.

- On Temperature: Below this temperature, the heaters turn on. Range: -40⁰ to Off temperature
- Off Temperature: Above this temperature, the heaters turn off. Range: Off temperature to 90⁰ C.
- Max Heat Temperature: Set the temperature at which heaters work at maximum capacity. Range: -40⁰ 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 minimum level.

24.7 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.



25 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. A full list of contact details can be found on the back page of this manual.

Munters Israel

18 HaSivim Street

Petach-Tikva 49517, Israel

Telephone: +972-3-920-6200

Fax: +972-3-924-9834

www.munters.com

Australia Munters Pty Limited, Phone +61 2 8843 1594, Brazil Munters Brasil Industria e Comercio Ltda, Phone +55 41 3317 5050, Canada Munters Corporation Lansing, Phone +1 517 676 7070, China Munters Air Treatment Equipment (Beijing) Co. Ltd, Phone +86 10 80 481 121, Denmark Munters A/S, Phone +45 9862 3311, India Munters India, Phone +91 20 3052 2520, Indonesia Munters, Phone +62 818 739 235, Israel Munters Israel Phone +972-3-920-6200, Italy Munters Italy S.p.A., Chiusavecchia, Phone +39 0183 52 11, Japan Munters K.K., Phone +81 3 5970 0021, Korea Munters Korea Co. Ltd., Phone +82 2 761 8701, Mexico Munters Mexico, Phone +52 818 262 54 00, Singapore Munters Pte Ltd., Phone +65 744 6828, South Africa and Sub-Sahara Countries Munters (Pty) Ltd., Phone +27 11 997 2000, Spain Munters Spain S.A., Phone +34 91 640 09 02, Sweden Munters AB, Phone +46 8 626 63 00, Thailand Munters Co. Ltd., Phone +66 2 642 2670, Turkey Munters Form Endüstri Sistemleri A.Ş, Phone +90 322 231 1338, USA Munters Corporation Lansing, Phone +1 517 676 7070, Vietnam Munters Vietnam, Phone +84 8 3825 6838, Export & Other countries Munters Italy S.p.A., Chiusavecchia Phone +39 0183 52 11

Ag/MIS/ImEN-2748-09/19 Rev 1.8