User and Installation Manual

TRIO
Controller

TRIO

Swine Controller

Ag/MIS/ImEN-2748-09/19 Rev 2.6
P/N: 116798

Munters

TRIO Swine Controller

User and Installation Manual

Rev 2.6, 05/2022

Software Ver: 4.2.7

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

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

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

Index

Chapter *page*

1 INTRODUCTION 10

1.1 Disclaimer 10
1.2 Introduction 10
1.3 Notes 10

2 PRECAUTIONS 11

2.1 Grounding 11
2.2 Filtering 11
2.3 Checking the Battery Level 11
2.4 Frequency Inverters 11

3 UNIT INSTALLATION 13

3.1 Preliminary Information 13
3.1.1 Safety Precautions 13
3.1.1.1 Grounding and Shielded Wiring 13
3.1.1.2 Installation and Electrical Connections 13
3.1.2 What Comes in the Package 14
3.2 Mounting the Unit 14
3.2.1 Knockouts 14
3.2.2 Hanging the Unit 15
3.3 Layout 16
3.3.1 Board Layout 16
3.3.2 External Devices Specifications 17
3.4 Wiring Diagrams 18
3.4.1 High Voltage Relays 19
3.4.2 Alarms and Power 21
3.4.3 Internet Connection 22
3.4.4 Analog Output Devices 23
3.4.5 Digital Devices 24
3.4.6 Analog Input Devices 24
3.4.6.1 CO2 Sensor Wiring 25
3.4.6.2 Temperature Sensor Wiring 27
3.4.6.3 Humidity Sensor Wiring 28
3.4.6.4 Potentiometer Device Wiring 29
3.4.6.5 Ammonia Sensor Wiring 30

© Munters AB, 2020

3.4.7 TRIO RPS 32
3.5 Pressure Sensor Hoses 33
3.6 Key 34
3.7 Product Symbols 34

4 TRIOAIR 35

4.1 Hardware 35
4.1.1 Internet Infrastructure 35
4.1.2 Topology 35
4.2 Network Information 36
4.3 Using TRIO Air App and Website 36
4.4 TRIO Air Accounts 37
4.4.1 Opening an Account 37
4.4.2 Editing the Page 38
4.5 Pairing a TRIO 38
4.6 Users 42
4.6.1 Permission Levels 42
4.6.2 Inviting Users 42

5 SPECIFICATIONS 46

6 USING THE TRIO TOUCH SCREEN 47

6.1 Icons 47
6.2 Dashboard 48

7 MAPPING AND DEFINING THE INPUT OUTPUT DEVICES 49

7.1 Mapping Devices 49
7.2 Temperature Sensors 53
7.2.1 Defining the Temperature Sensors 53
7.2.2 Mapping the Temperature Sensors 53
7.2.3 Enabling a Weather Station 54
7.3 Ventilation Devices 55
7.3.1 Defining the Fans 55
7.3.1.1 On-Off Fans 55
7.3.1.2 0 – 10 Volt Fans 56
7.3.2 Defining the Stir Fan 57
7.3.2.1 On Off Stir Fan 57
7.3.2.2 0 – 10 Volt Stir Fan 58
7.4 Sensors 58
7.4.1 Defining the Ammonia Sensor 59
7.4.2 Defining the CO2 Sensor 60
7.4.3 Defining the Humidity Sensor 61
7.4.4 Defining the Water Meter Sensor 62

7.5 Heating Devices 63
7.5.1 Defining the On/Off Heaters 63
7.5.2 Defining the Variable Heaters 64
7.6 Defining the Cooling Devices 65
7.7 Inlets, Tunnel Doors, Outlets 65
7.7.1 Defining the Inlets/Tunnel Doors 66
7.7.2 Defining the Outlet 67
7.8 Defining the Sprinkler 68
7.9 Defining the Same As Relays 69
7.10 Defining the Same As Analog Ports 70
7.11 Defining the Timer 71
7.12 Defining the Auxiliary Input 72
7.13 Defining the Measuring Fan 73
7.14 Feeding Devices 74
7.14.1 Defining the Feeder Relay 74
7.14.2 Defining the Feeder Active Sensor 75
7.14.3 Defining the Feeder Line Sensor 76
7.15 TRIO RPS 76
7.15.1 Define the Sensor 76
7.15.2 Static Pressure Calibration 77

8 BASIC SETUP 80

8.1 Defining the General Settings 80
8.1.1 Defining the Preferences 80
8.1.2 Defining the Time/Date 81
8.1.3 Defining the Room Setting 82
8.2 Batch Settings 83
8.2.1 Defining the Batch Settings Parameters 83
8.2.2 Defining the Batch Settings 84
8.3 Defining the Expected Animal Weight 84
8.3.1 Animal Weight Main Screen 85
8.3.2 Animal Weight Curve 86
8.4 Adjusting the Animal Count 86
8.5 Tech Support Information 87

9 FEED MANAGEMENT 88

9.1 Feeding Summary 88
9.2 Setting up Feeding 88

10 TEMPERATURE SETTINGS 90

10.1 What is the Temperature Curve 90
10.2 Configuring the Temperature Curve 91

10.2.1 Defining the Temperature Curve Parameters 91
10.2.2 Defining Temperature Curve Settings 92
10.3 Emergency Temperature Control 92

11 INTRODUCTION TO VENTILATION 93

11.1 Defining the Minimum and Maximum Ventilation 93
11.2 Defining the Fans/Ventilation Scheme 94
11.2.1 Basic Ventilation 94
11.2.2 Extra Ventilation 95
11.2.3 Tunnel Ventilation 95

12 MINIMUM AND MAXIMUM VENTILATION 97

12.1 Building Structure Summary 97
12.2 Defining Basic Ventilation 98
12.2.1 Defining Dynamic Ventilation 99
12.2.2 Ventilation by Weight 101
12.2.2.1 How Does Ventilation by Weight Work 101
12.2.2.2 Defining the Ventilation By Weight Parameters 101
12.2.3 Adding a Curve 102
12.3 Measuring Fan 103
12.3.1 Measuring real time air speed 103
12.3.2 Ventilation Compensation 103

13 LEVELS OF VENTILATION 105

13.1 Configuring the Basic Ventilation Settings 105
13.2 Basic Ventilation 105
13.2.1 Defining Basic Ventilation 106
13.2.2 Fan Options 108
13.2.2.1 Minimum Ventilation Cycle 108
13.2.2.2 Fans (Efficiency Fan) 111
13.2.2.3 Fan Rotation 112
13.2.3 Inlet and Curtain Ventilation 113
13.2.3.1 Level Control 114
13.2.3.2 Static Pressure Control 115
13.3 Extra Ventilation 117
13.3.1 Introduction to Extra Ventilation 118
13.3.2 Defining Extra Ventilation 118
13.4 Tunnel Ventilation 119
13.4.1 Defining the Tunnel Ventilation Parameters 119
13.4.2 Defining the Tunnel Ventilation Settings 121
13.4.3 Tunnel Doors 121
13.5 Calibrating the Inlet/Tunnel Door 122

13.6 Stir Fan — 123

14 COOLING FUNCTIONS — 124

14.1 Cooling Principles — 124
14.2 Selecting the Cooling Mode — 124
14.2.1 Continuous Cooling — 126
14.2.2 Cycle Cooling — 127
14.2.3 Ramping Cooling — 128

15 SPRINKLER — 129

15.1 Defining the Sprinkler Parameters — 130
15.2 Defining the Sprinkler Settings — 130

16 HEATING FUNCTIONS — 131

16.1 Defining the Central Heater Parameters — 131
16.2 Zone Heaters — 132
16.2.1 Defining Non-Variable Zone Heaters — 132
16.2.2 Defining Variable Zone Heaters — 132

17 AIR QUALITY — 133

17.1 Defining the Air Quality Parameters — 133
17.2 Defining the Air Quality Settings — 134

18 TIMERS — 136

19 ALARMS — 137

19.1 Defining the Alarm Parameters — 137
19.2 Viewing the Alarms — 138
19.3 Defining the Auxiliary Alarms — 138
19.4 Sending a General Alarm — 139

20 HISTORY — 140

20.1 Climate and Air Quality — 140
20.2 Alarms and Events — 141
20.3 Water and Feed History — 142
20.4 Devices History — 143

21 RESETTING, SAVING AND LOADING SETTINGS, UPDATING SOFTWARE — 145

21.1 Resetting the Settings — 145
21.2 Saving or Loading the Settings — 146
21.3 Viewing the Log — 146
21.4 Updating the Software — 147

22 APPENDIX A: EXTERNAL DEVICES (PREVIOUS VERSIONS) — 148

23 APPENDIX B: SERVICE MANUAL 150
23.1 Maintenance 150
23.2 Trouble Shooting 151
23.2.1 Internet 151
23.2.2 Electronic Components 152
23.3 Spare Parts 153
23.3.1 Preliminary Information 153
23.3.2 TRIO 20 Container Spare Parts 154
23.3.3 TRIO 20 Door Cards Spare Parts 156
23.3.4 TRIO 20 Main Container Spare Parts 158
23.3.5 Additional Options 159
23.3.6 Cards 160
23.3.6.1 Door Cards 160
23.3.6.2 Main Container Cards 163
24 APPENDIX C: CENTRAL EXHAUST 165
24.1 Introduction to Central Exhaust 165
24.2 Selecting Central Exhaust 166
24.3 Central Exhaust Dashboard 167
24.4 Central Exhaust Functions 167
24.5 Setting the Static Pressure 168
24.6 Room Setting 169
24.7 Levels of Ventilation 169
25 APPENDIX D: CENTRAL CORRIDOR 171
25.1 Introduction to Pressure Control 171
25.2 Selecting Central Corridor 171
25.3 Central Corridor Dashboard 172
25.4 Central Corridor Functions 173
25.5 Setting the Pressure Levels 174
25.6 Defining the Heat 175
25.7 Room Setting 176
26 APPENDIX E: TRIO EXPANSION 10 177
26.1 Expansion Layout 177
26.2 Expansion Wiring Diagrams 178
26.2.1 TRIO to TRIO Expansion Wiring 178
26.2.2 High Voltage Relays 179
26.2.3 Power 180
26.3 TRIO / TRIO Expansion Termination 181
26.4 Key 182
26.5 Product Symbols 182

26.6 Mapping Devices in Expansion 183
26.7 Expansion Specifications 184
26.8 Expansion Spare Parts 185
26.8.1 Preliminary Information 185
26.8.2 TRIO 10 Expansion Container Spare Parts 185
26.8.3 TRIO 10 Expansion Main Container Spare Parts 187
26.8.4 Main Container Card Spare Parts 188
27 WARRANTY 189

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.

All rights reserved. No part of this manual may be reproduced in any manner whatsoever without the expressed written permission of Munters. The contents of this manual are subject to change without notice.

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.

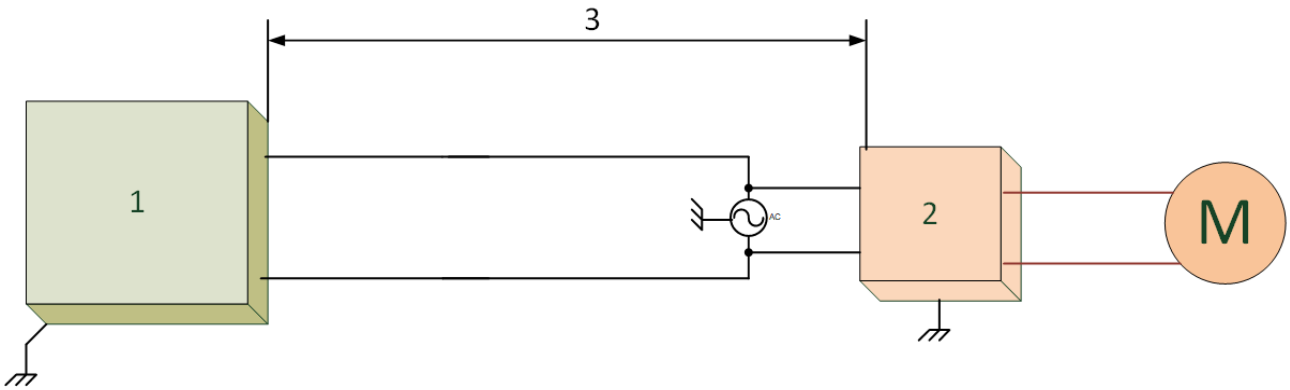
2.4 Frequency Inverters

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.

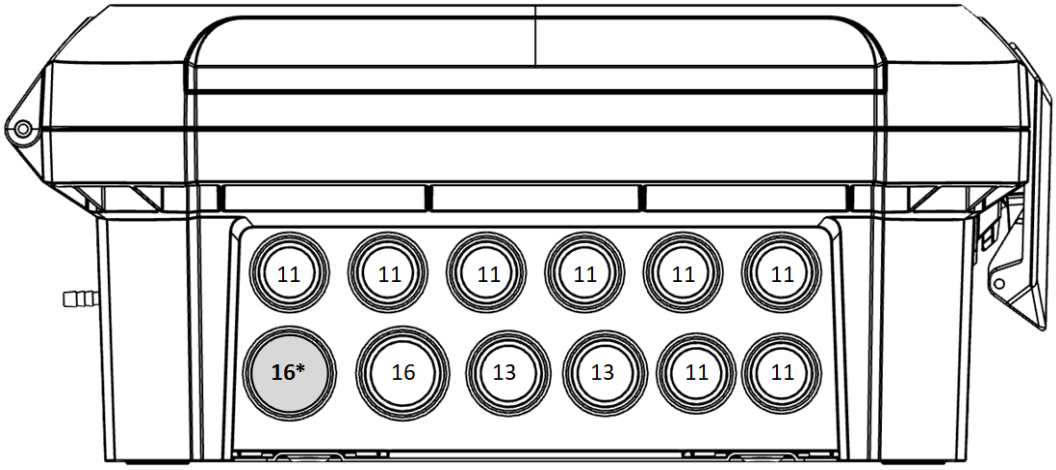


Figure 1: TRIO Knockouts and PG Size

   - 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!*

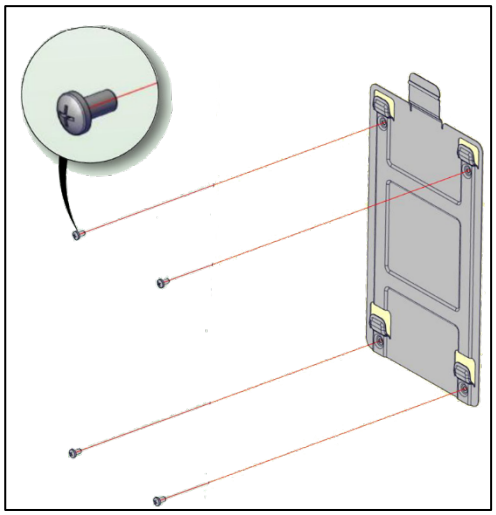
4. Close the TRIO enclosure lid carefully and tightly. Use RTV silicon or equivalent sealant to seal the cable holders.

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

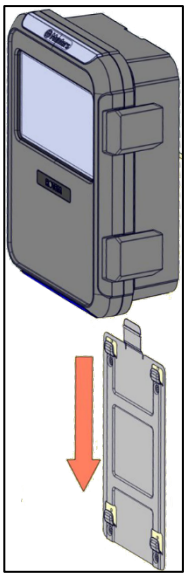
5. After installation is completed, operate the TRIO for a few hours and re- check for proper operation.

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

- Board Layout
- External Devices Specifications

3.3.1 Board Layout

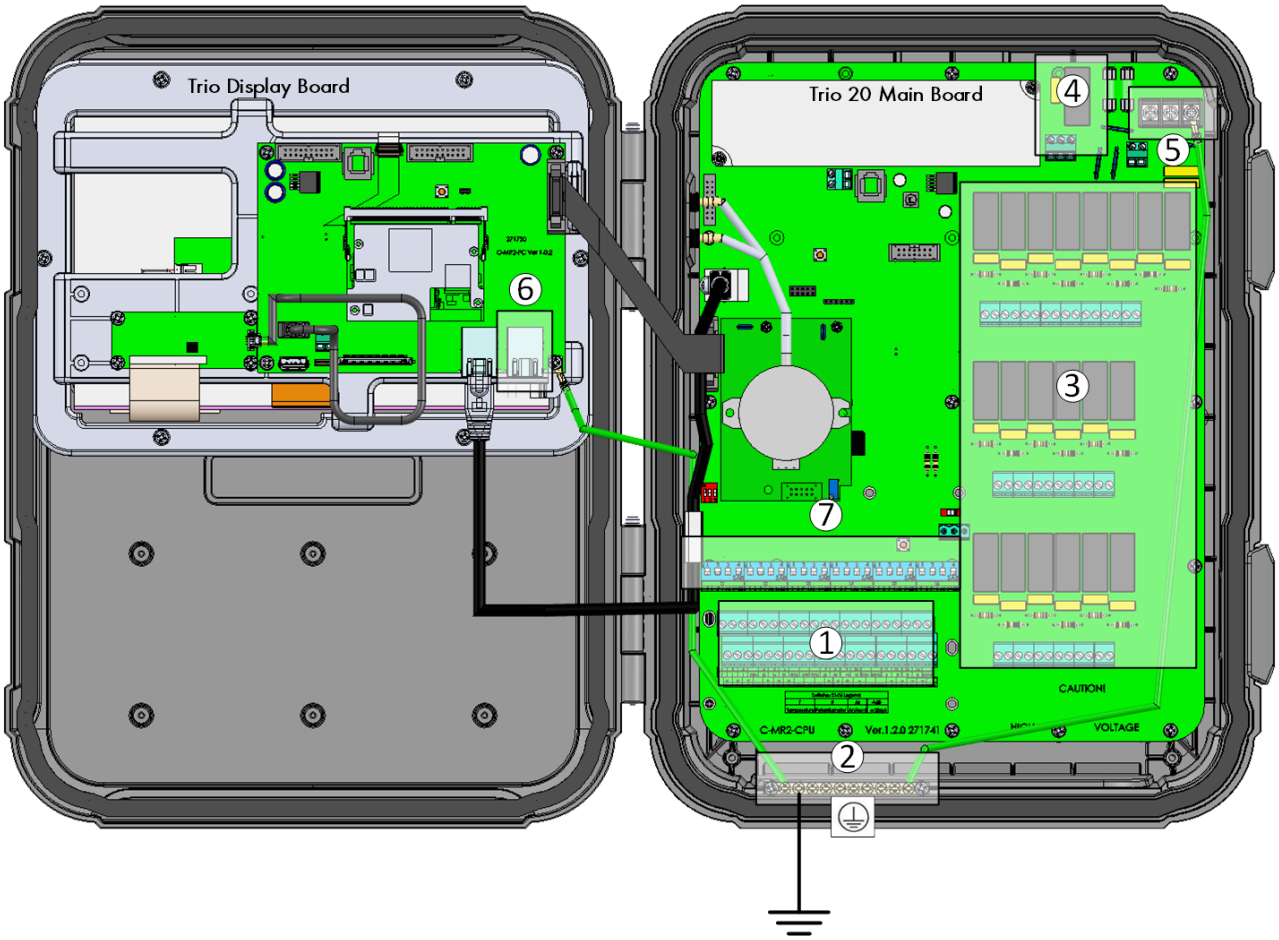


Figure 2: Board layout

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

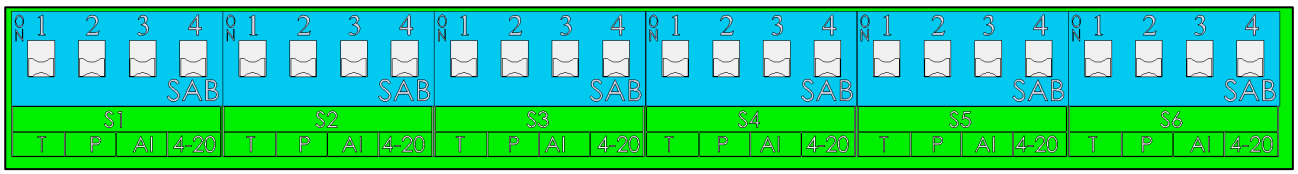


Figure 3: Dipswitches, expanded

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

3.3.2 EXTERNAL DEVICES SPECIFICATIONS

Table 1: Summary

I/O type	Qty
Analogue Output	8
Analugue Input	6
Digital Input	8
Temperature Sensors	12
Total	34

Table 2: Output Devices

Device type	Maximum Number of Devices	Number of Relay Devices	Number of Analog Devices
Cooling	2	2	N/A
Central Exhaust Cooling	2	2	N/A
Heaters	6	6	6
Inlets	2	2	2
Outlets	1	N/A	1
Tunnel Doors/Curtains	2	2	2
Fans Exhaust/Tunnel	20	20	8
Central Exhaust Fans	20	20	8
Stir Fan	1	1	1
Sprinkler	1	1	N/A
Timer	5	5	N/A
Auger	2	2	N/A
Feeder	1	1	N/A
Lighting	4	4	N/A
As Relay	30	30	N/A
As Analog Out	8	NA	8
Alarm	1	1	N/A

© Munters AB, 2020

Table 3: Sensors

Device type	Analog Sensors	Digital Sensors
Temperature Sensors	12	N/A
Humidity Sensors	1	N/A
CO2 Sensors	1	N/A
Ammonia Sensors	1	N/A
Pressure Sensors	2	N/A
Potentiometers	4	N/A
Water Meters	N/A	1
Aux. Input	N/A	4
Feeder Line Sensor	N/A	1
Measuring Fan	N/A	1

NOTE Refer to Appendix A: External Devices (Previous Versions), page 148 to view details on the input/output capacity of previous versions.

3.4 Wiring Diagrams

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

3.4.1 HIGH VOLTAGE RELAYS

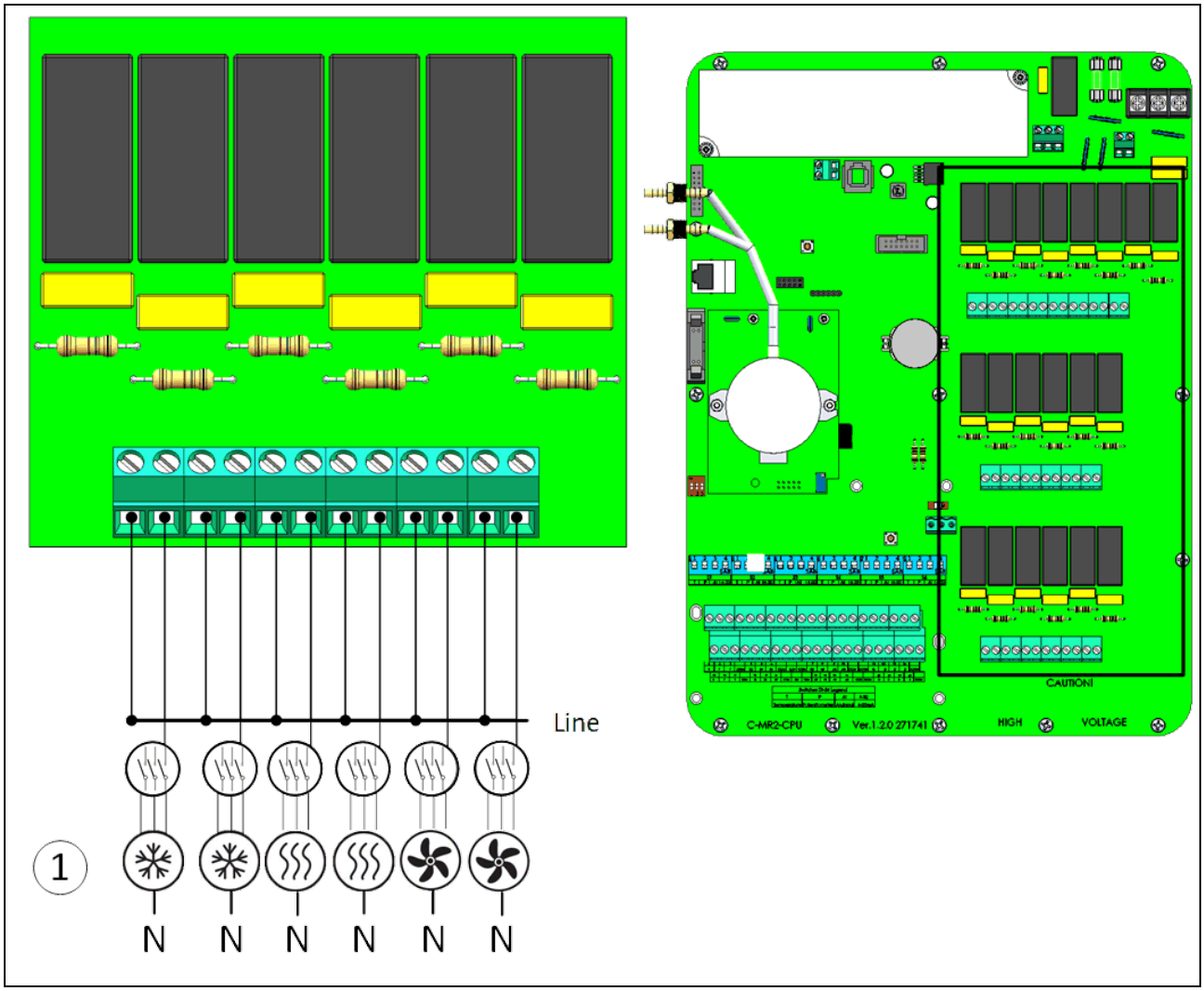


Figure 4: High voltage devices (examples)

1	Example of devices

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

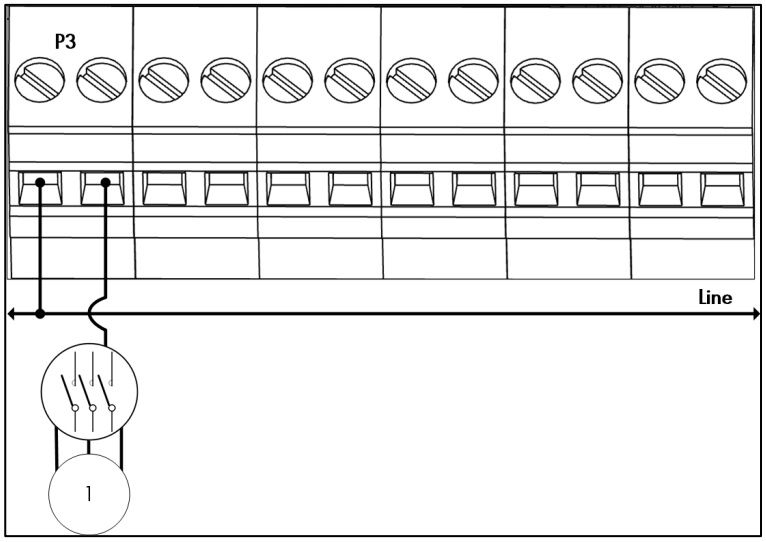


Figure 5: Relay wiring detailed view

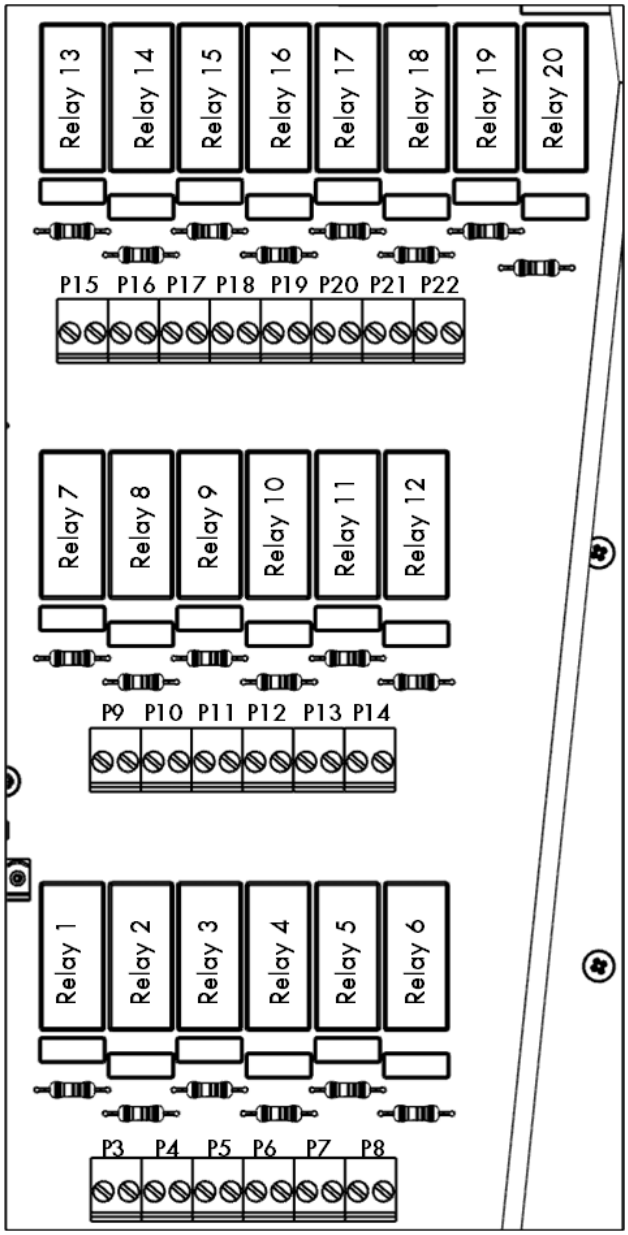


Figure 6: Relay and port numbering

3.4.2 ALARMS AND POWER

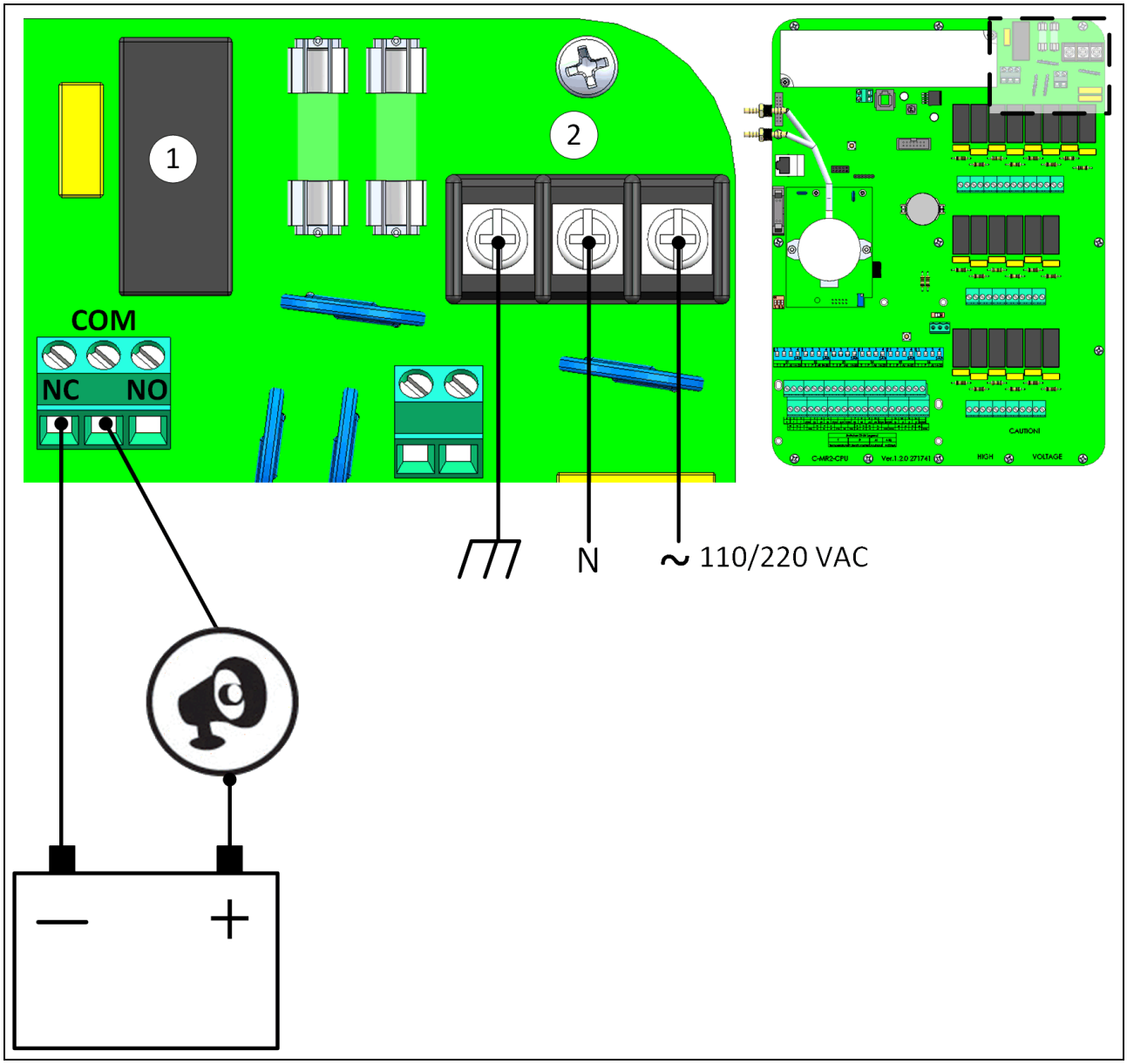


Figure 7: Alarm relay and power ports

1	Alarm relay
2	Power ports

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

3.4.3 INTERNET CONNECTION

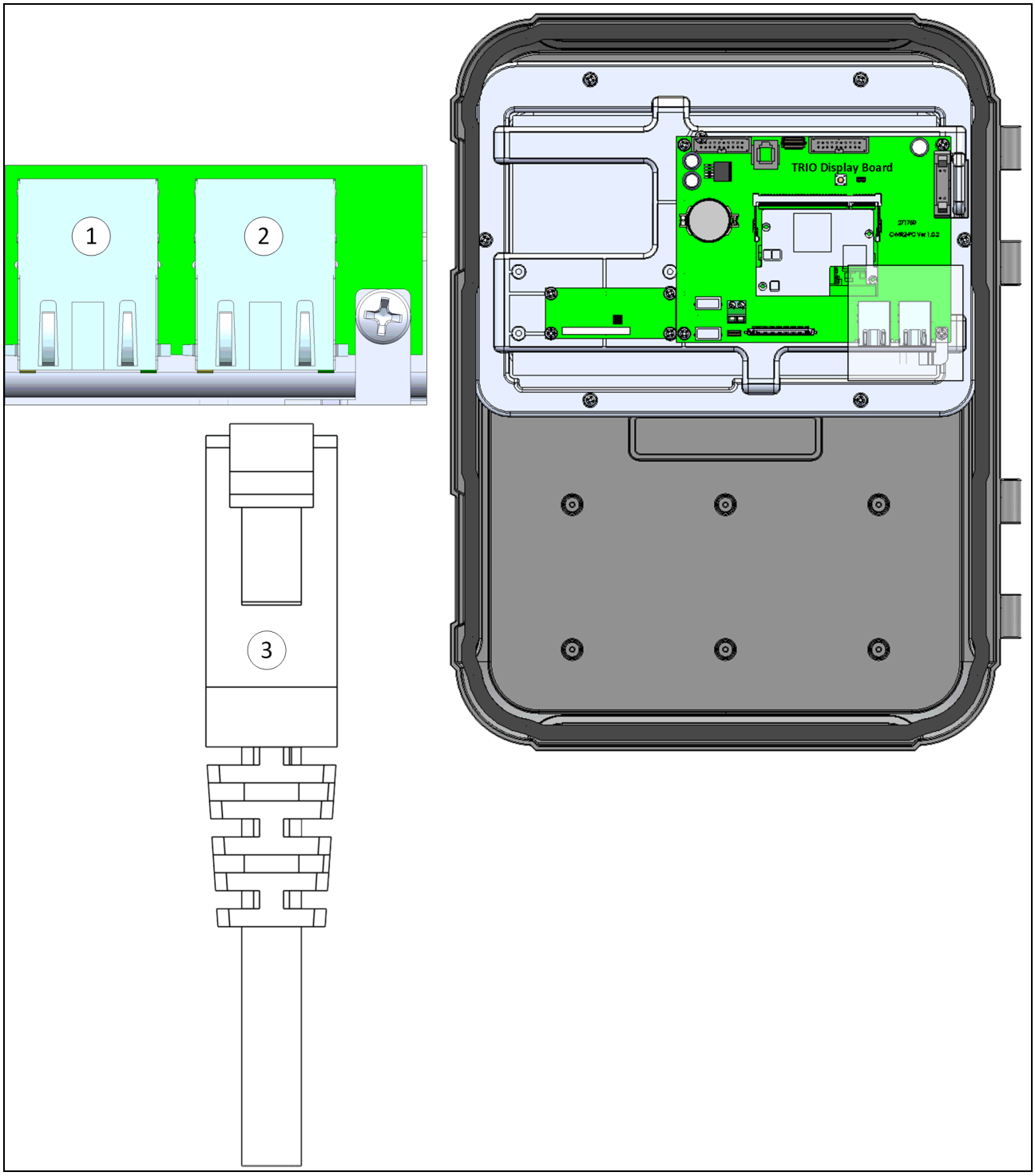


Figure 8: Ethernet port

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.

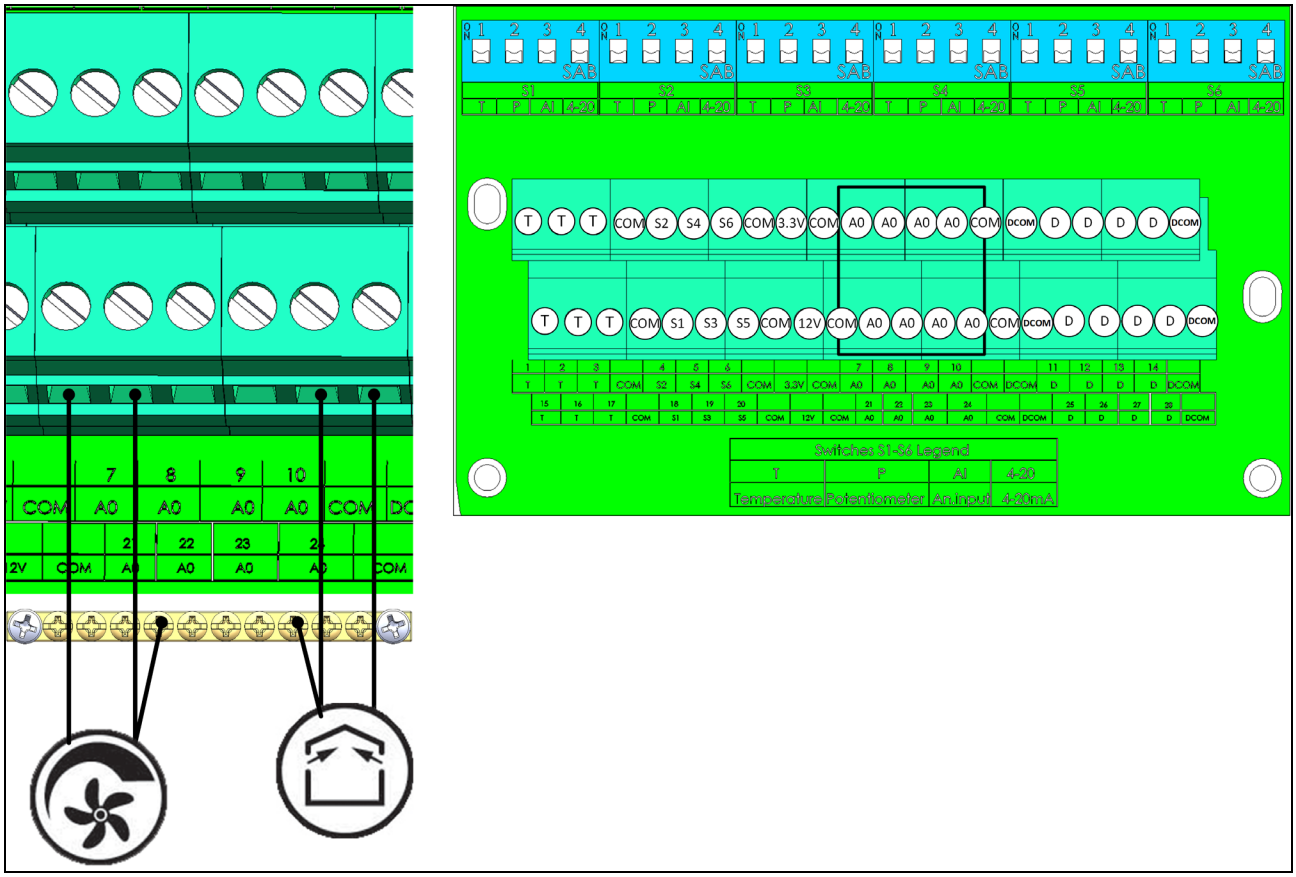


Figure 9: Analog Output devices (examples)

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

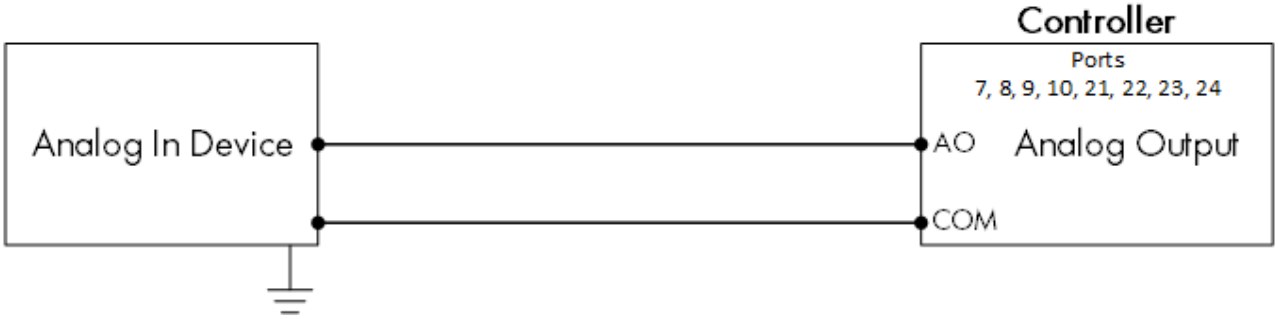


Figure 10: Analog Device Wiring Schematic

3.4.5 DIGITAL DEVICES

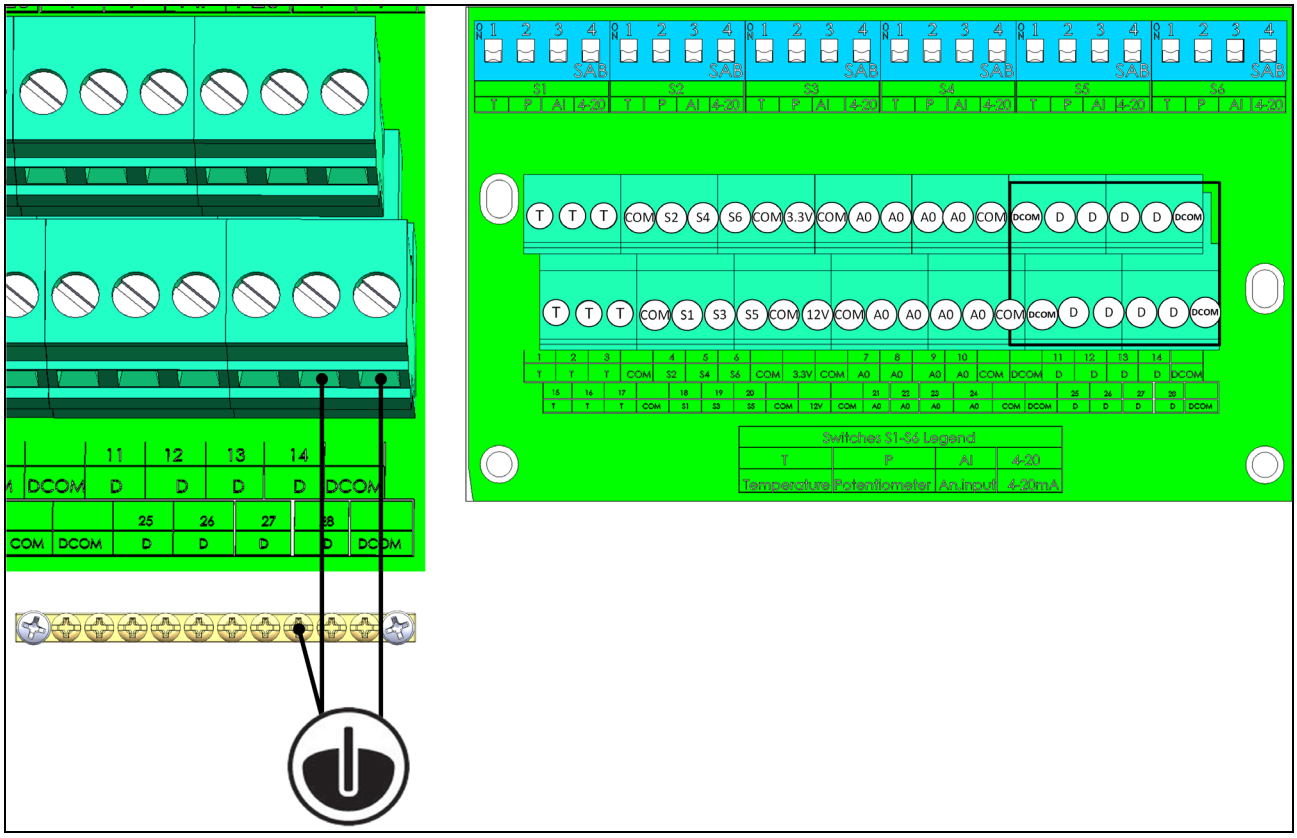


Figure 11: Digital Input devices (examples)

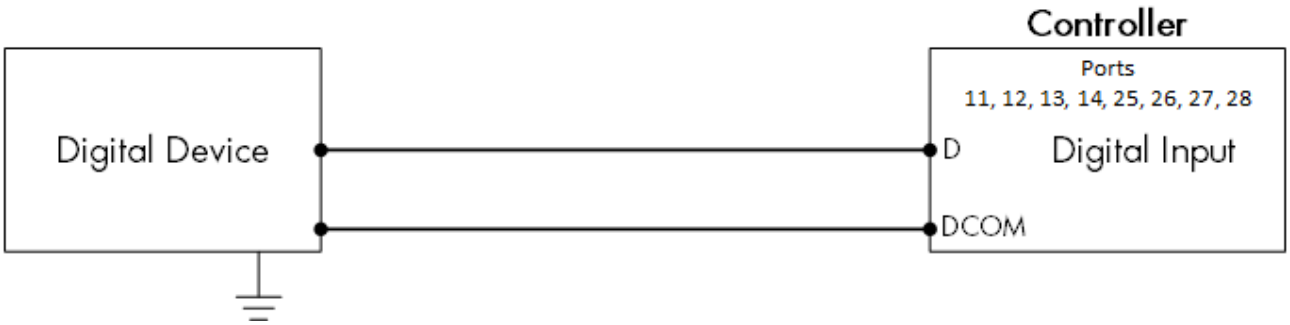


Figure 12: Digital Device Wiring Schematic

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

3.4.6 ANALOG INPUT DEVICES

- CO2 Sensor Wiring
- Temperature Sensor Wiring
- Humidity Sensor Wiring
- Potentiometer Device Wiring
- Ammonia Sensor Wiring

3.4.6.1 CO2 Sensor Wiring

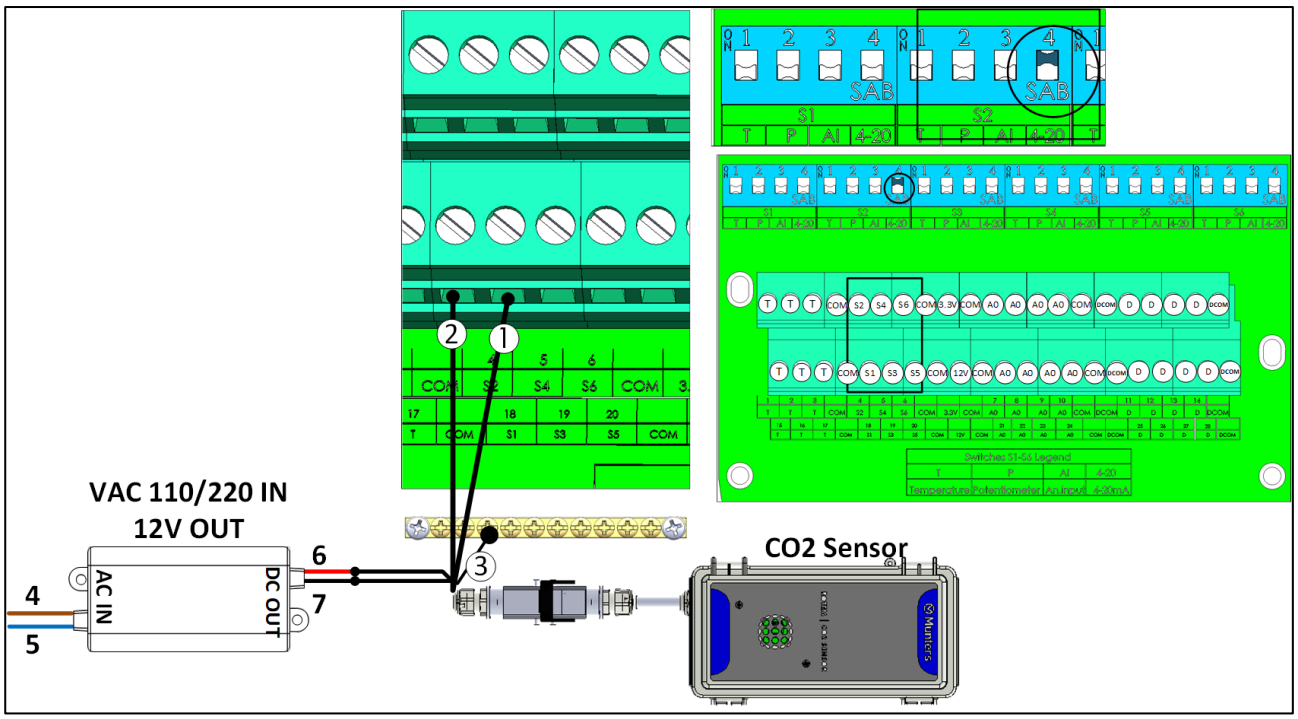


Figure 13: CO2 Sensor Wiring

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

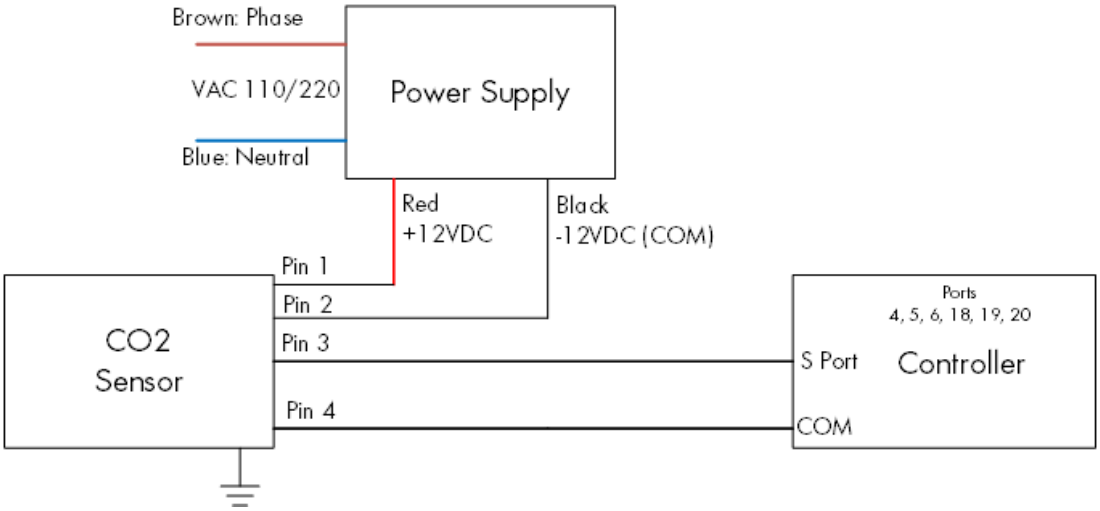


Figure 14: CO2 Sensor Wiring Schematic

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

3.4.6.2 Temperature Sensor Wiring

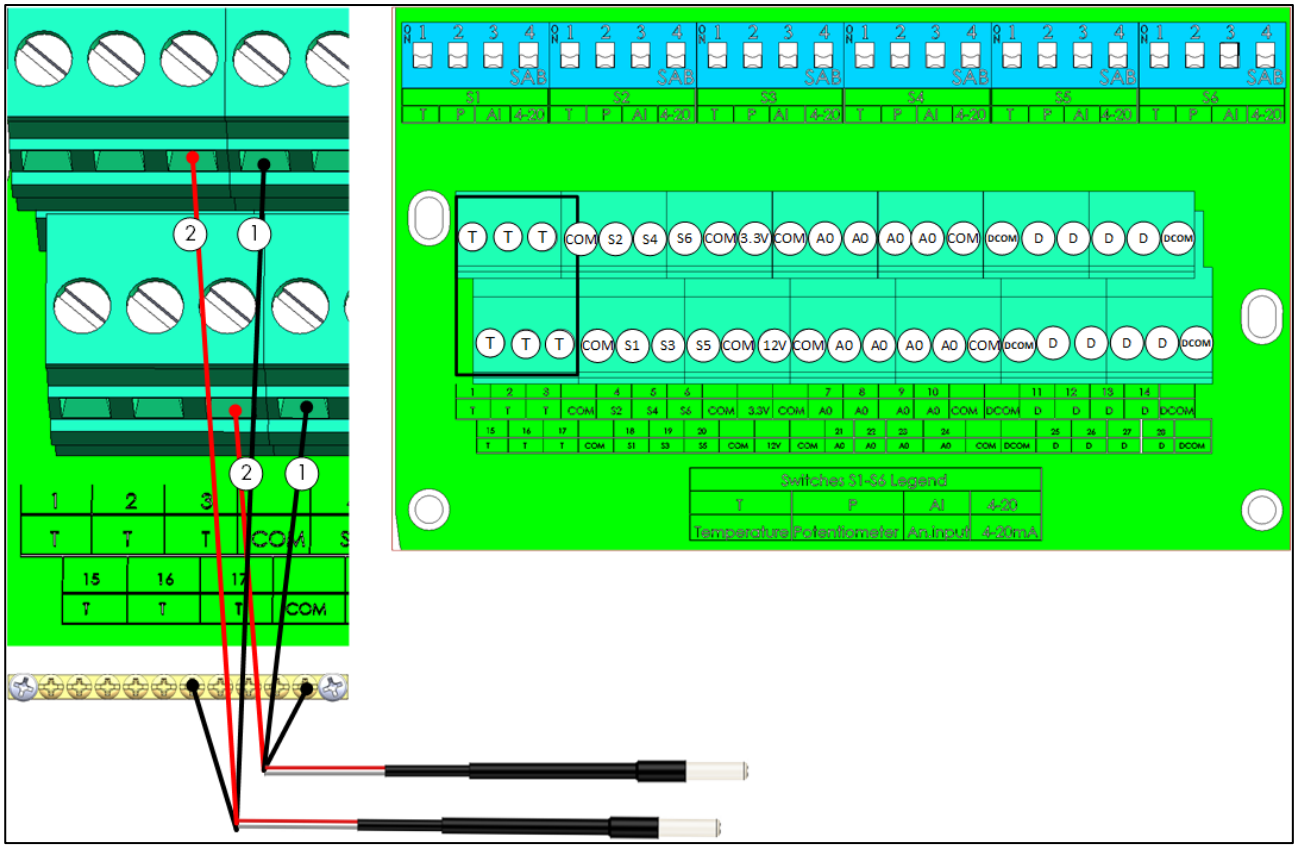


Figure 15: RTS Wiring

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

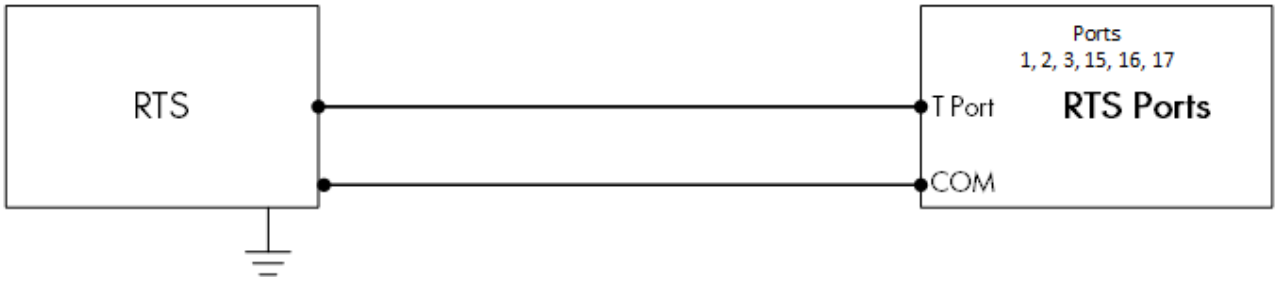


Figure 16: RTS Wiring Schematic

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

3.4.6.3 Humidity Sensor Wiring

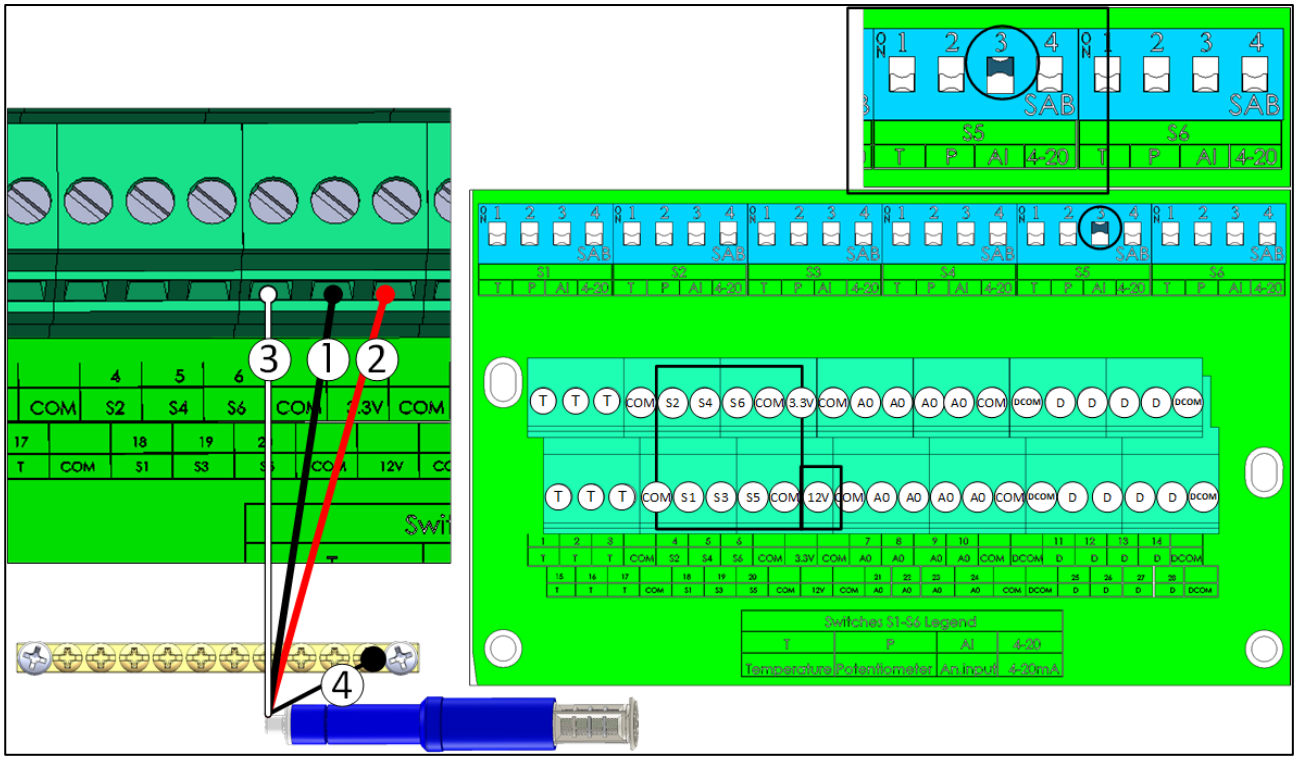


Figure 17: RHS+ Wiring

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

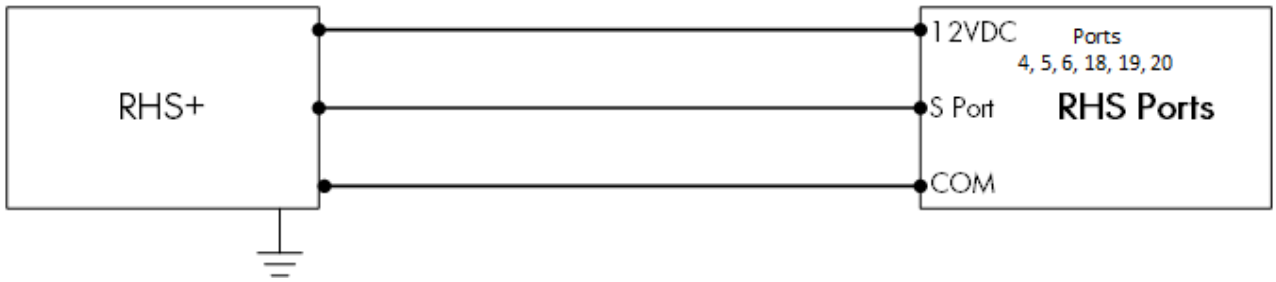


Figure 18: RHS+ Sensor Wiring Schematic

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

3.4.6.4 Potentiometer Device Wiring

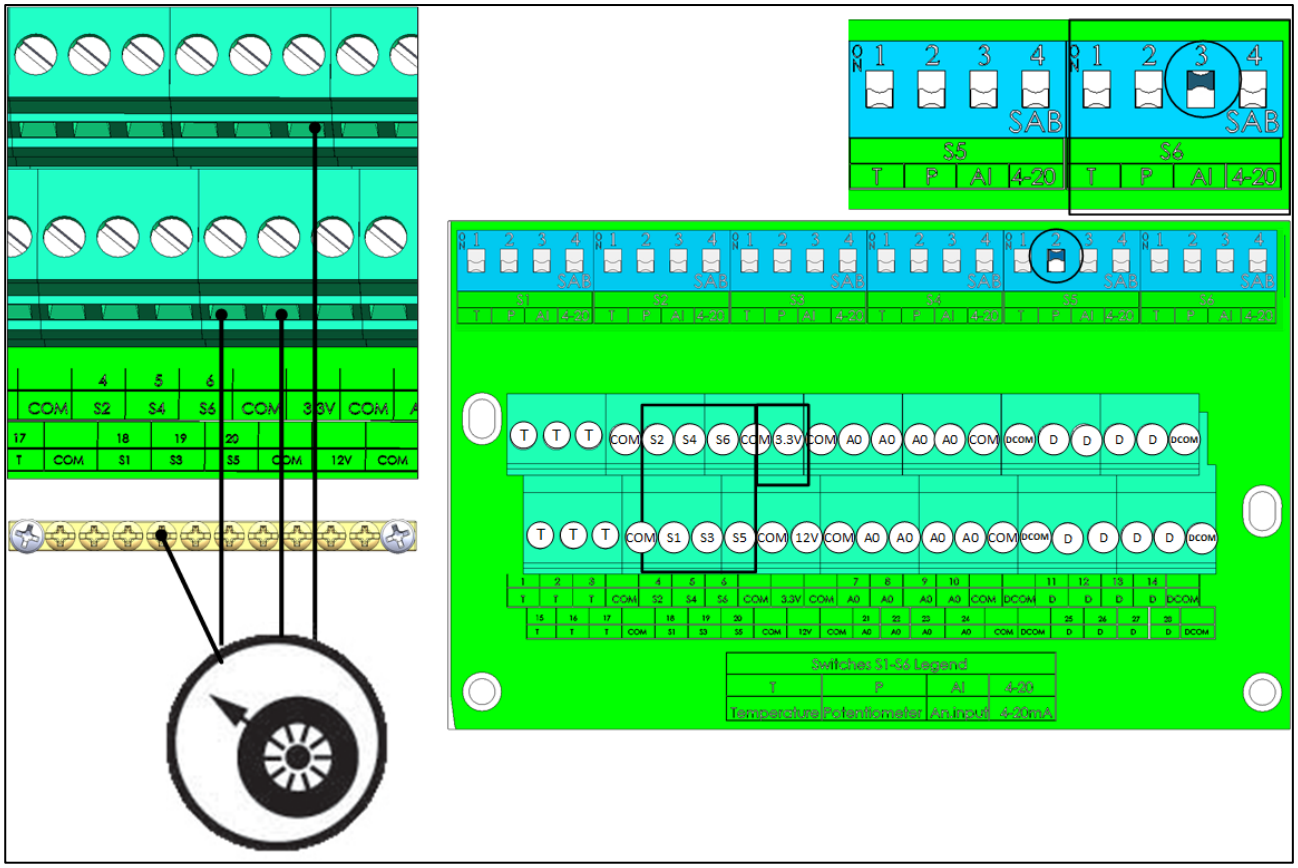


Figure 19: Potentiometer Wiring

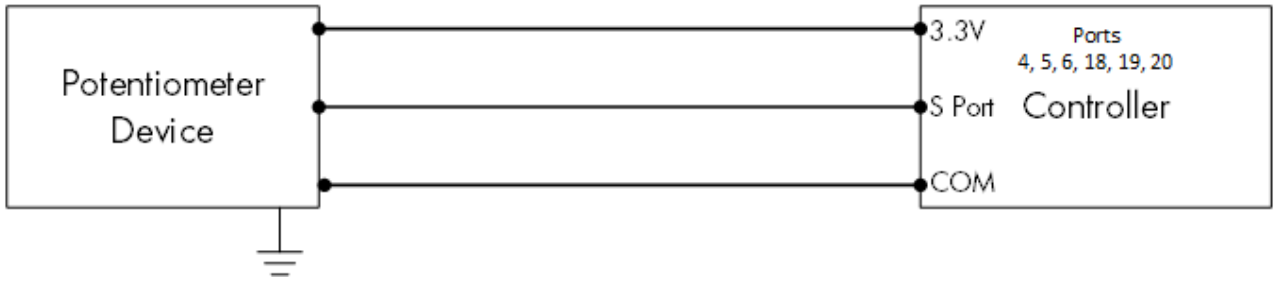


Figure 20: Potentiometer Wiring Schematic

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

3.4.6.5 Ammonia Sensor Wiring

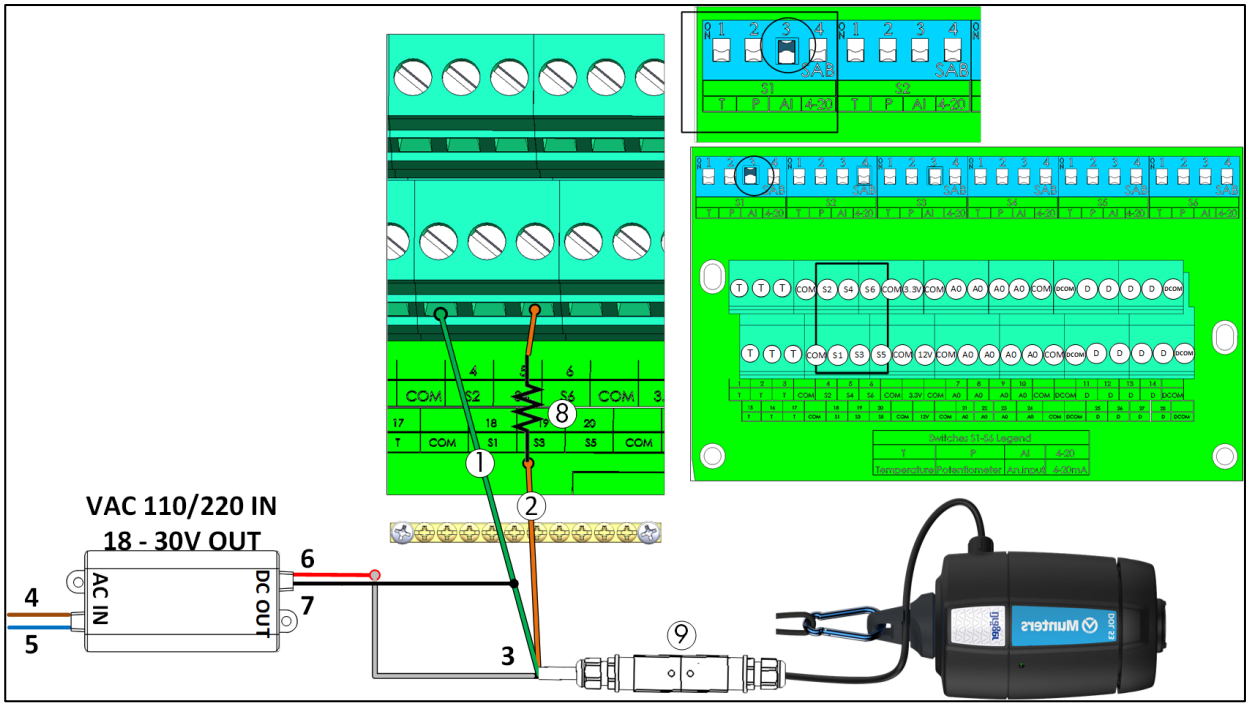


Figure 21: Ammonia Sensor Wiring

Number	Function
1	COM port (Green wire)
2	S port (Brown wire)
3	White wire
4	Phase (Brown wire)
5	Neutral (Blue wire)
6	18-30VDC (Red wire)
7	COM (Black wire)
8	20.3 kohm resistor (Note: The resistor comes supplied with the sensor but must be installed on-site.)
9	Quick connector

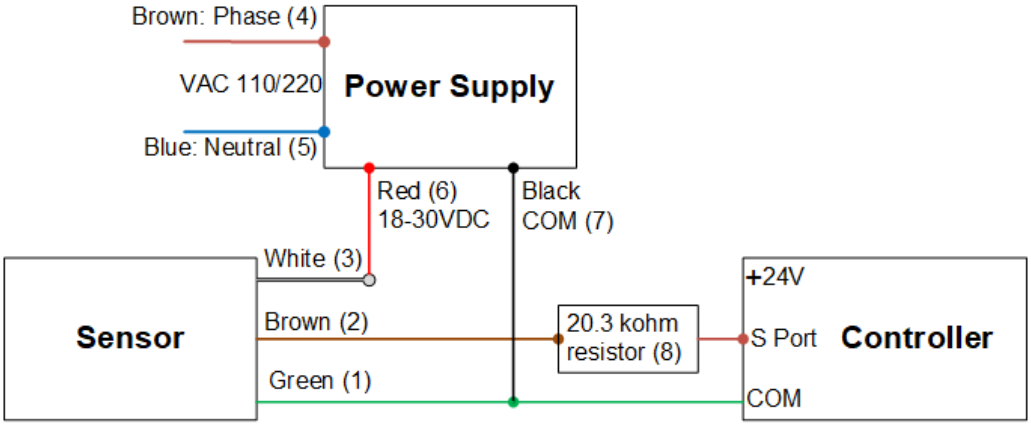


Figure 22: Ammonia Wiring Schematic

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

3.4.7 TRIO RPS

TRIO RPS serves as a second static pressure sensor for the TRIO Controller. The following section details the installation.

TRIO supports up to two static pressure sensors, one built in and one external. Install the RPS in the second room.

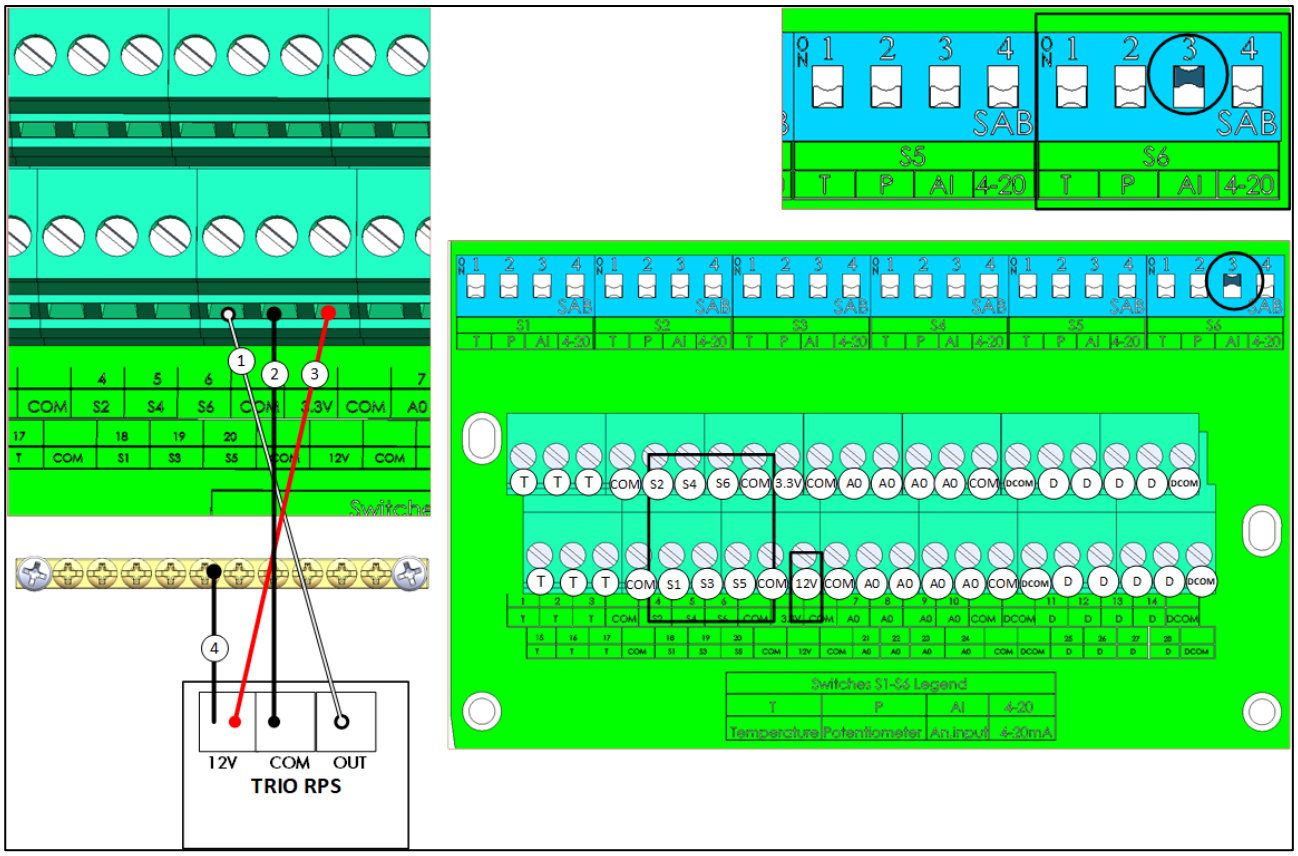


Figure 23: RPS Wiring

Number	Function
1	S port. Raise the corresponding S3 dipswitch.
2	COM port
3	12V
4	Shield wire

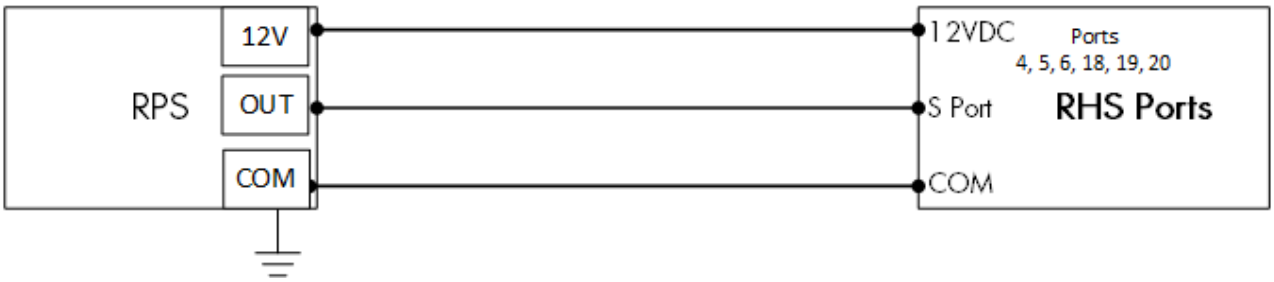


Figure 24: RPS Wiring Schematic

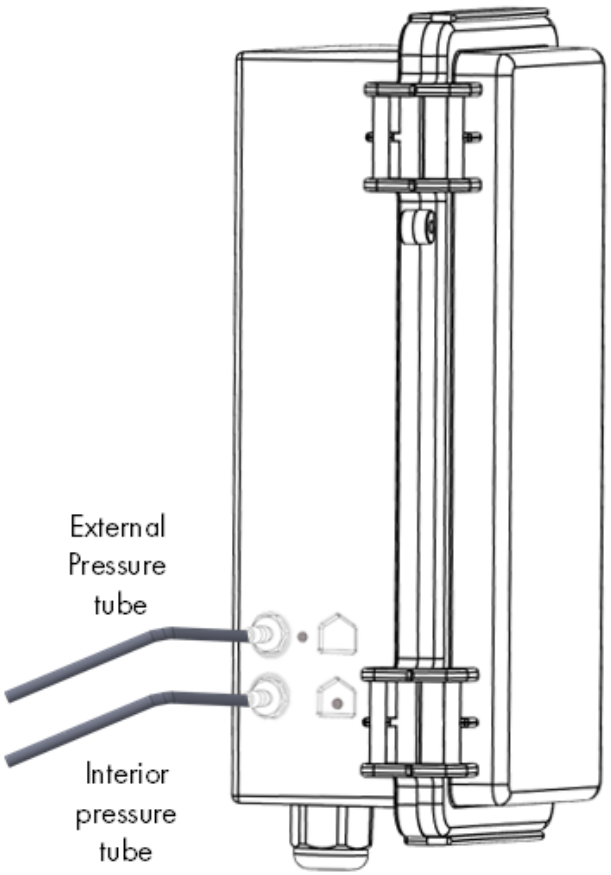


Figure 25: Static pressure tubes

NOTE After installing the RPS, no Cold Start is required.

3.5 Pressure Sensor Hoses

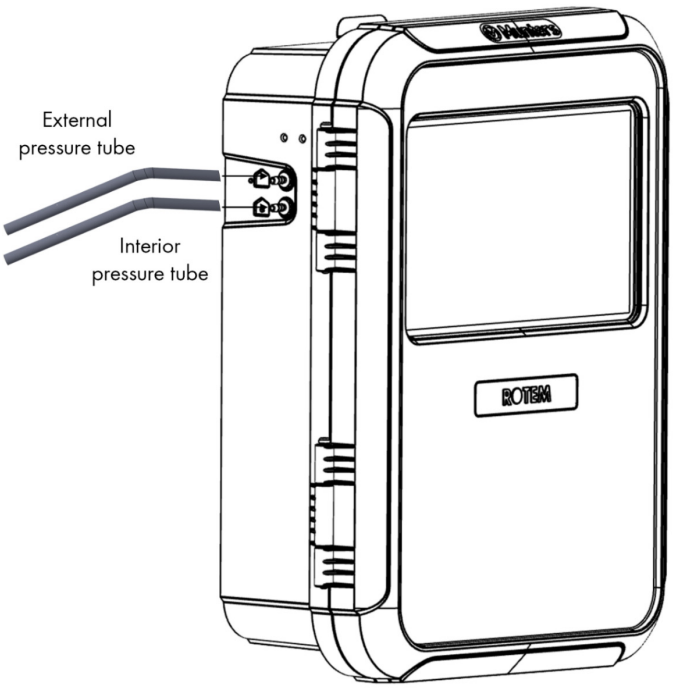


Figure 26: Static pressure hoses

3.6 Key

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

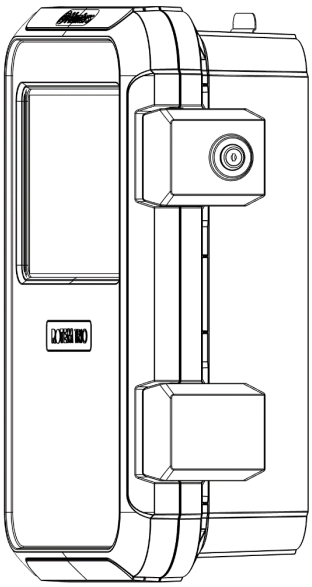


Figure 27: TRIO Lock

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

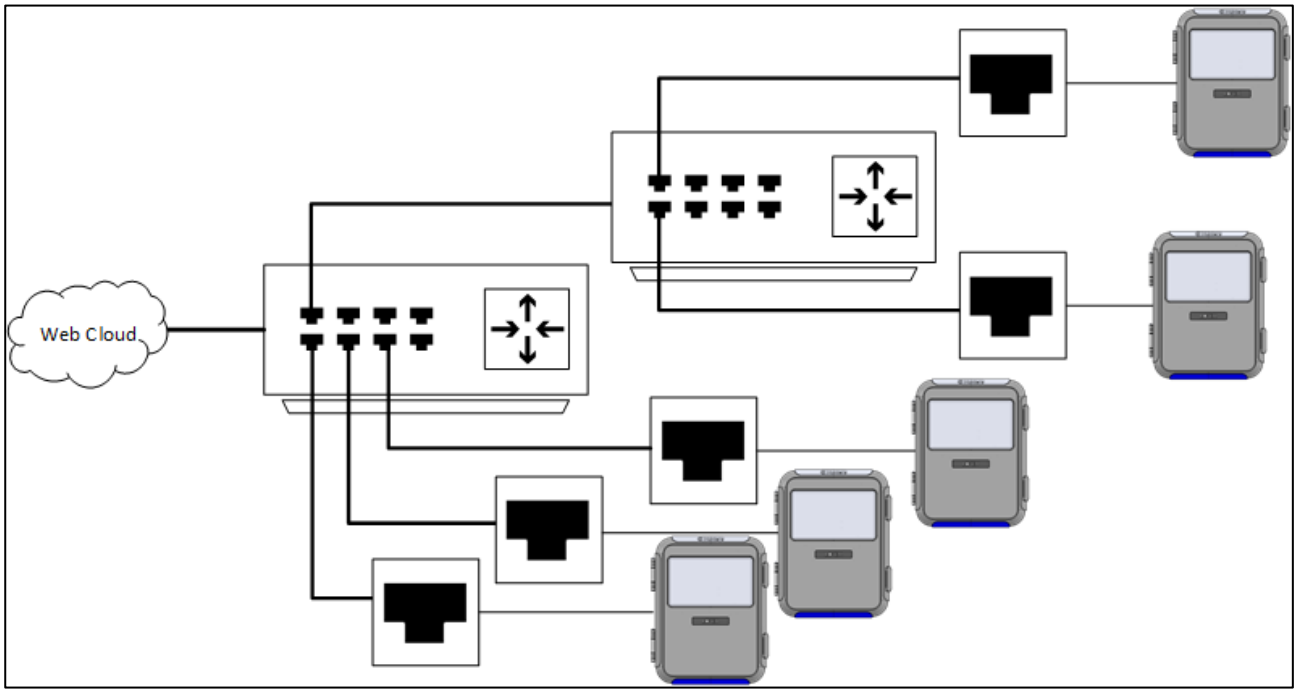


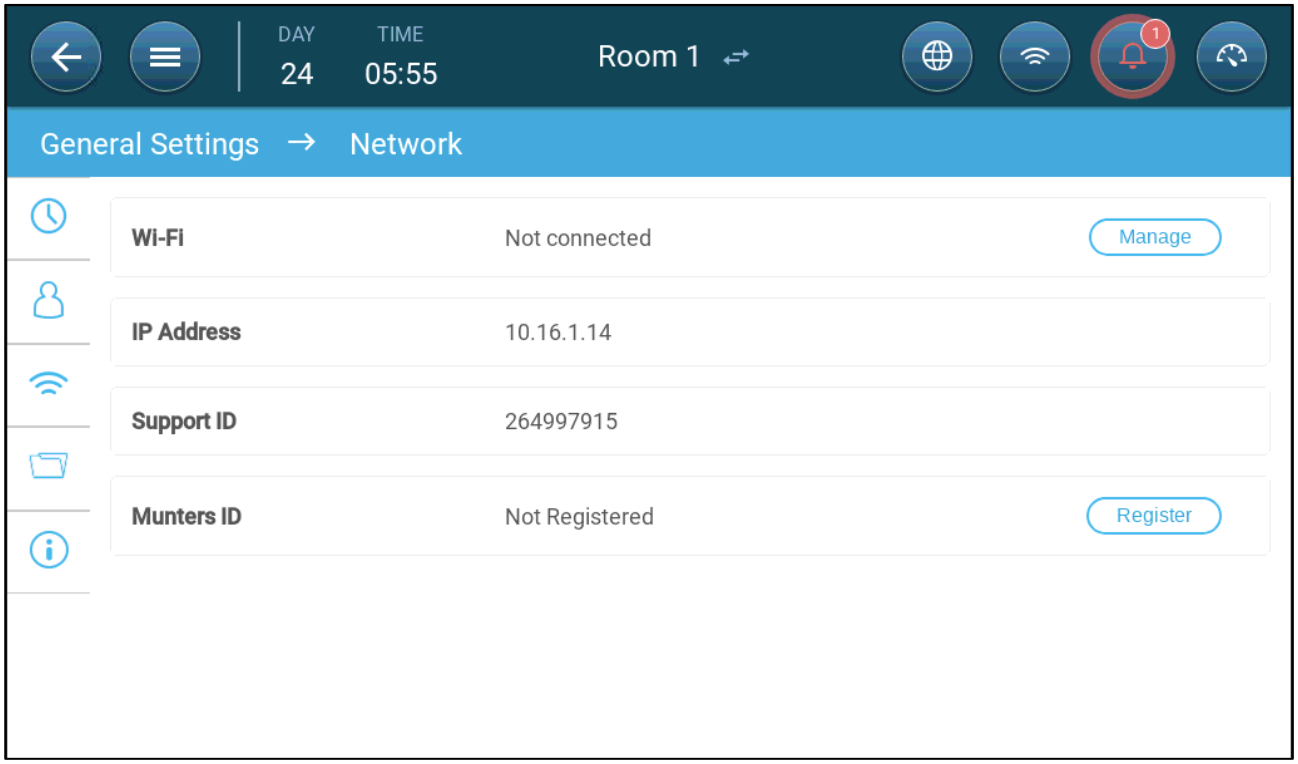
Figure 28: Example topology

- 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

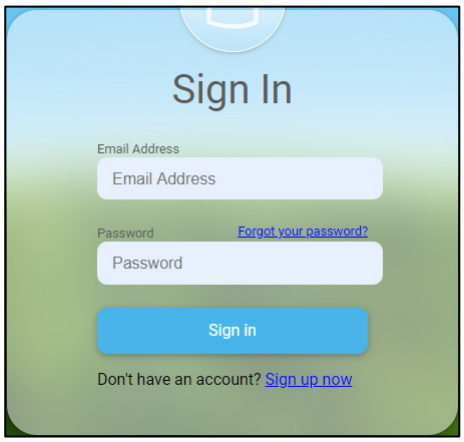
- Opening an Account
- Editing the Page

4.4.1 OPENING AN ACCOUNT

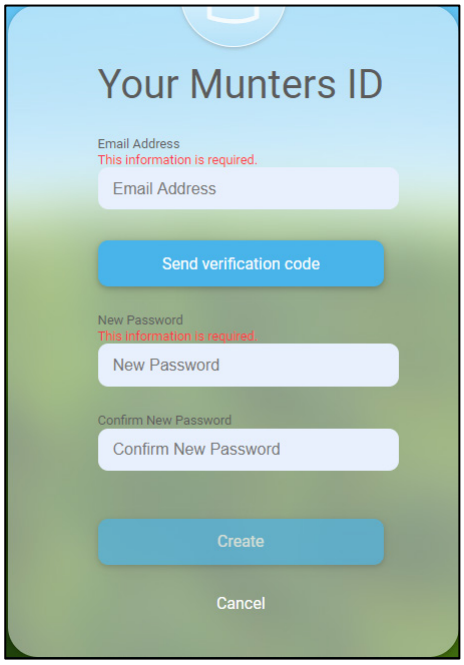
To manage and control your farm, including all TRIO units in these farms, set up an account on the trioair.net website. Once an account is setup, you can manage the farms and users from this site or from the TrioAir app. The process is similar to any standard account opening.

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

*NOTE Munters **strongly** recommends using Google Chrome when going to the www.trio.net page.*



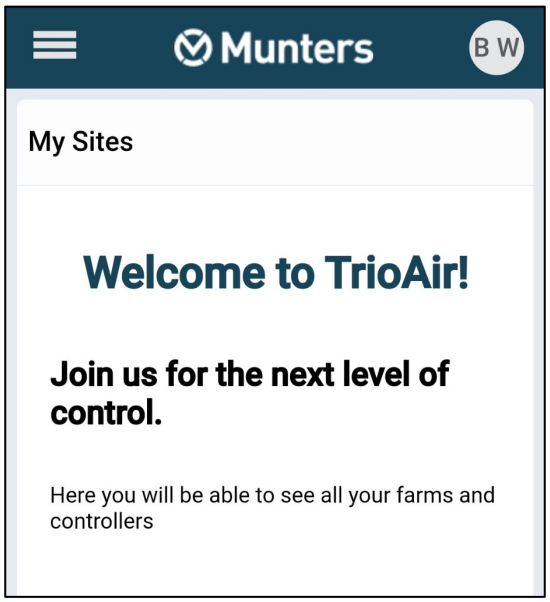
2. Click **Sign Up Now**.



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.

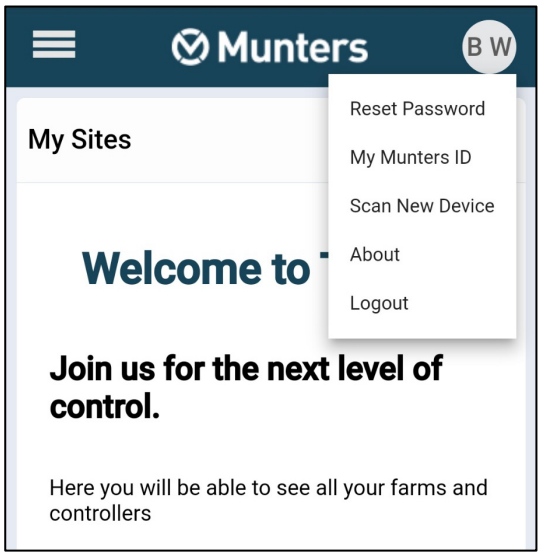
6. Click **Create**.

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.

NOTE This option is only available when using the app.

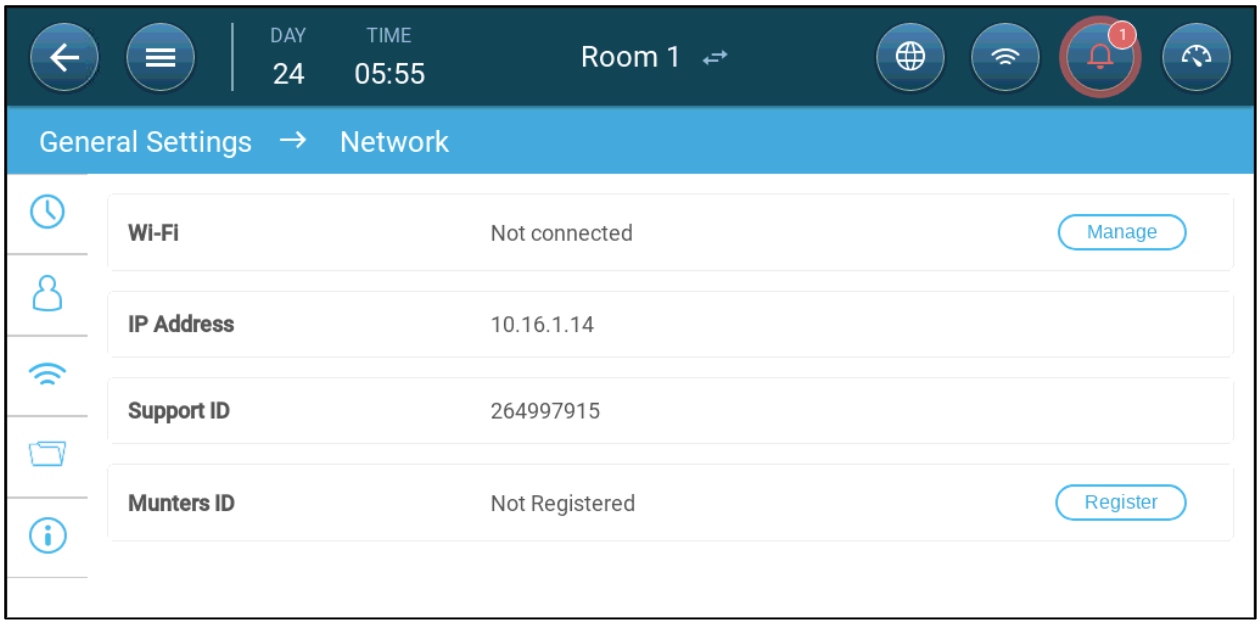
  - About: When contacting tech support, click this to view the web software version.

4.5 Pairing a TRIO

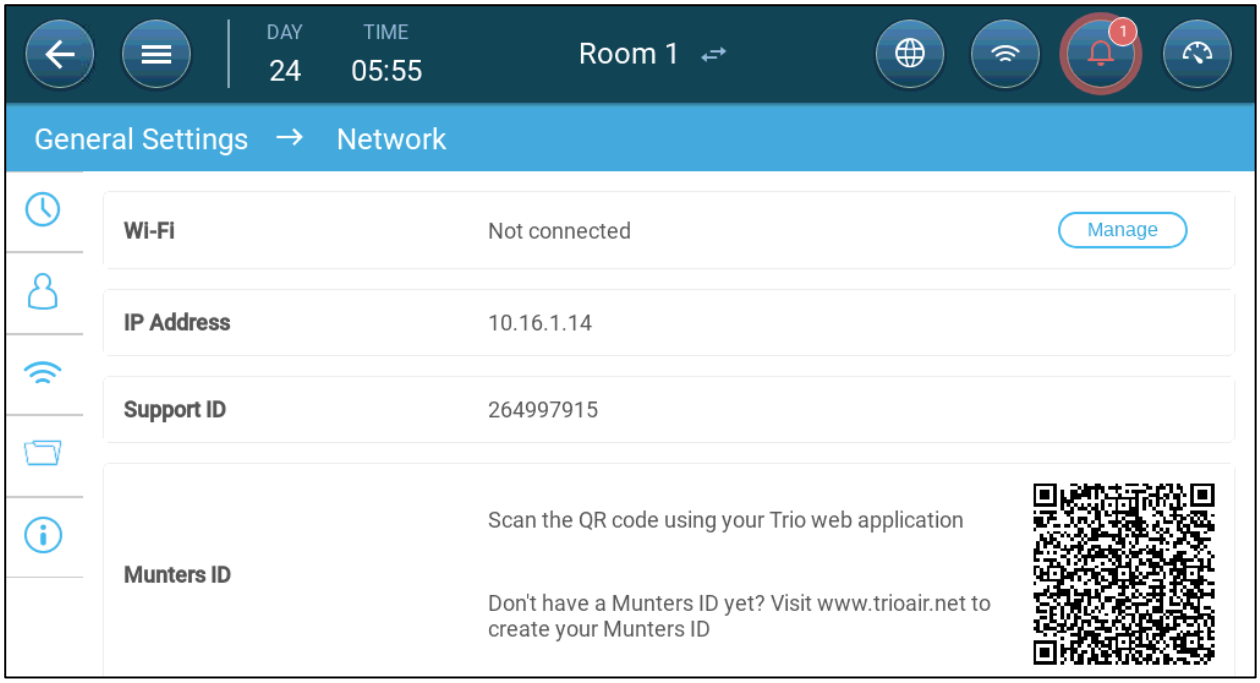
Pairing a TRIO unit to an account enables connecting to the unit via the web/app and managing it remotely. Each TRIO unit has a unique ID code (a QR code). This code is used to register the device and pair it to an account. This procedure explains how to pair the device to an account.

NOTE Before attempting to register a TRIO, verify that the time and date are correctly set (refer to Defining the Time/Date, page 81). In the event that the time and date are incorrect, registration is disabled and an error message appears if attempted.

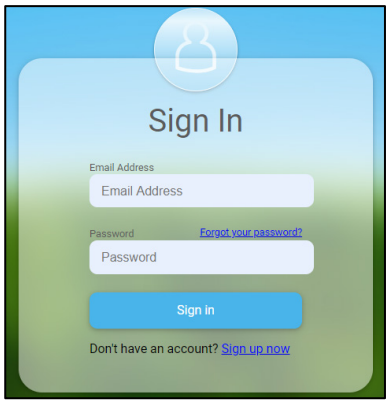
1. Go to System > General Settings > Network .



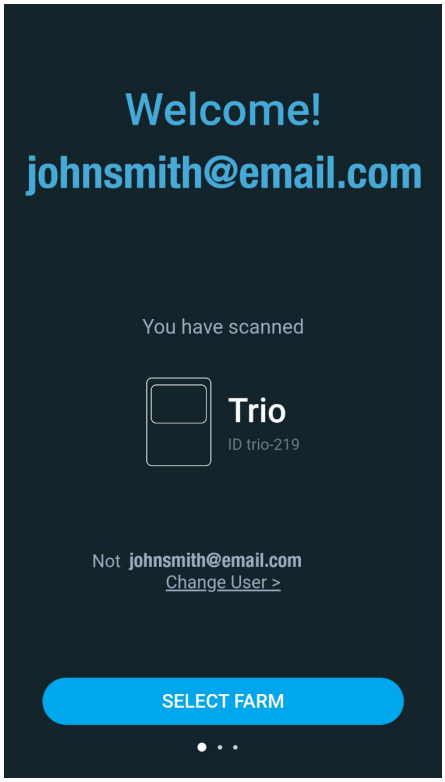
2. Click Register.



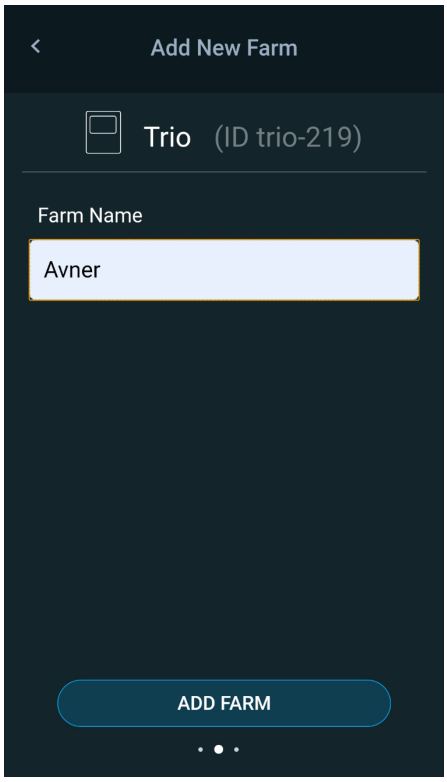
3. Using the TrioAir App (Scan New Device) or a QR reader, scan the QR code. The TRIO AIR sign in page appears.



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

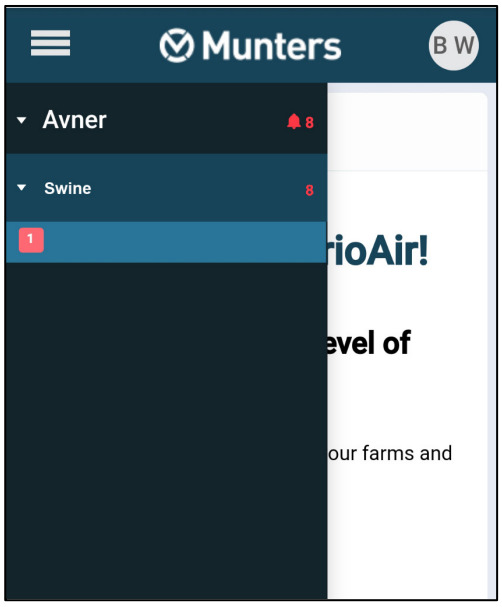


5. Click Select Farm.

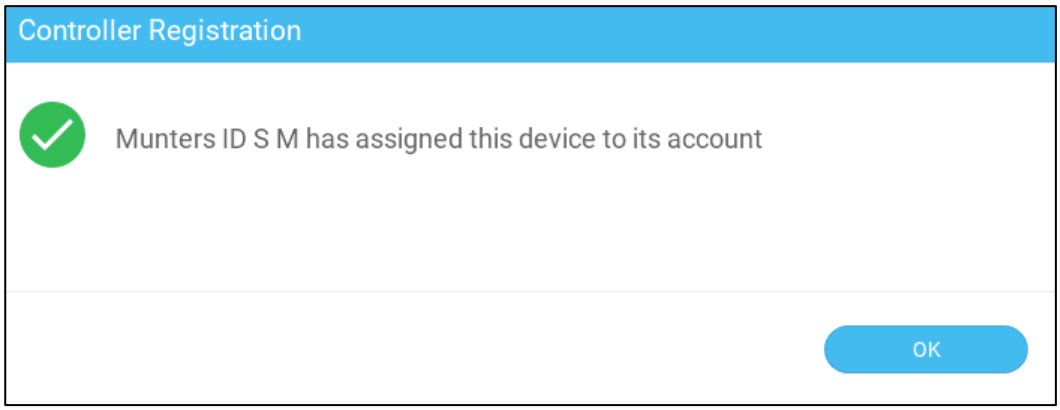


6. Click on an existing account (if there are) or click Add New Farm (follow the online instructions for creating a new farm).

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:

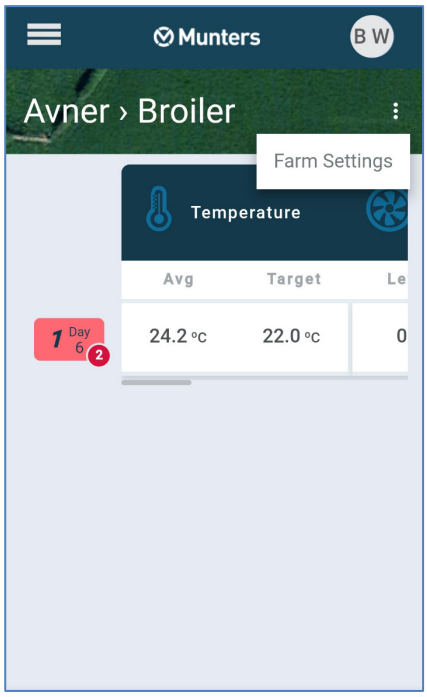
- Owner: The person who creates the farm. There can be one owner only. The owner:
  - has full access to and control of all TRIO units
  - can invite users and define permission levels
  - disable users/delete/removes
  - view activity status
- Managers have the same capabilities as the owner. There can be multiple managers.
- Operators can manage specific TRIO units. An operator does not have access to the Farm Settings function nor can an operator invite users.
- View: View only.

NOTE TRIOAir and the webpage cannot be used to map relays and sensors or define the General Settings. Perform these functions locally, on the TRIO unit itself.

4.6.2 Inviting Users

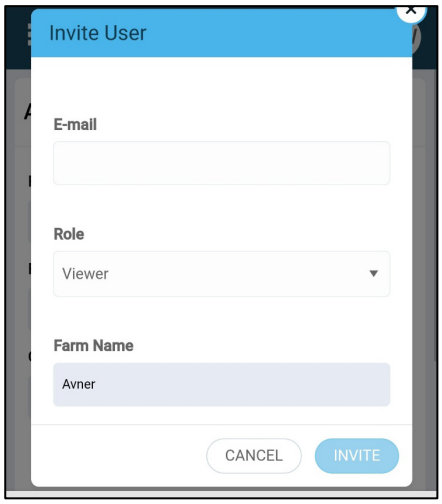
Once a farm is set up, you can invite people to connect to the farm using the TRIO Air app (only).

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

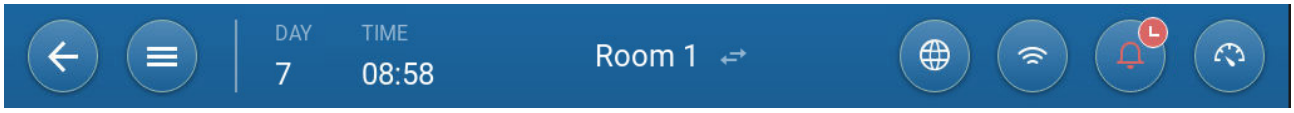
Description	Specification
Input Power Voltage	• 100 – 240 VAC • 50/60 Hz
Input AC Power	0.75A (at full load (meaning Wi-Fi, internet, cell phone, and 20 relays ON))
Relays	1 Amp. Up to 60% of the relays can operate at any given time.
Note: Running relays at the above current levels provides between 50,000 – 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

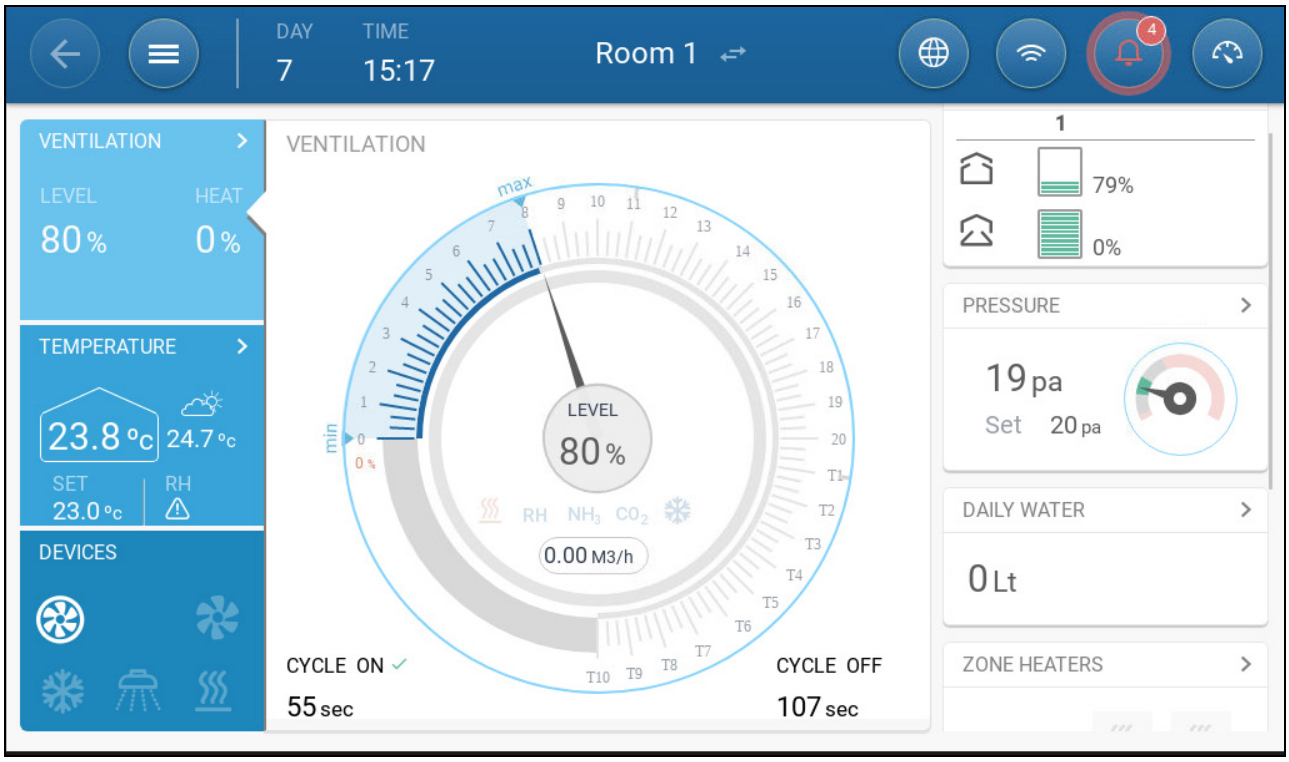


	Go back to the previous screen
	View the Main menus
	Choose language
	Network settings
	View alarms
	Go back to the main screen
	Settings icon
	Edit parameters

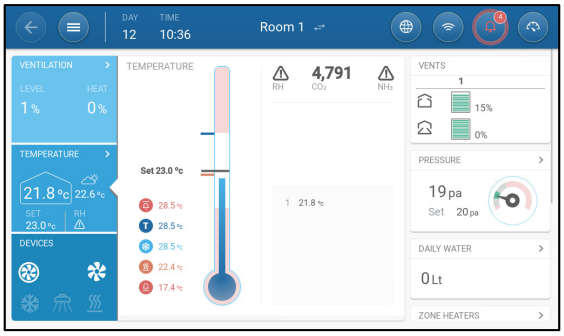
Phone App	
	Click the circle containing the user name to edit personal preferences such as the language, units, name, and more.
	When the Trio controls two or more rooms or there are two or more houses on a farm, Send to All enables updating certain functions in more than one room or house. Click **Send to All** and select the required Trios.

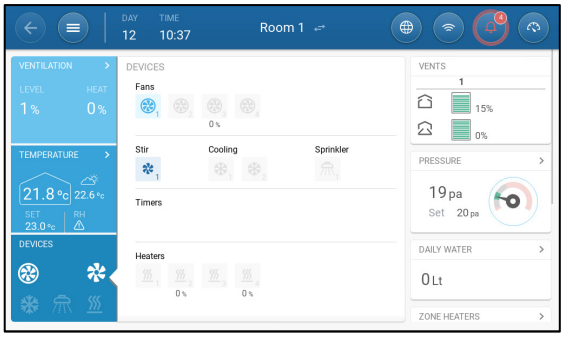
6.2 Dashboard

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
- TRIO RPS

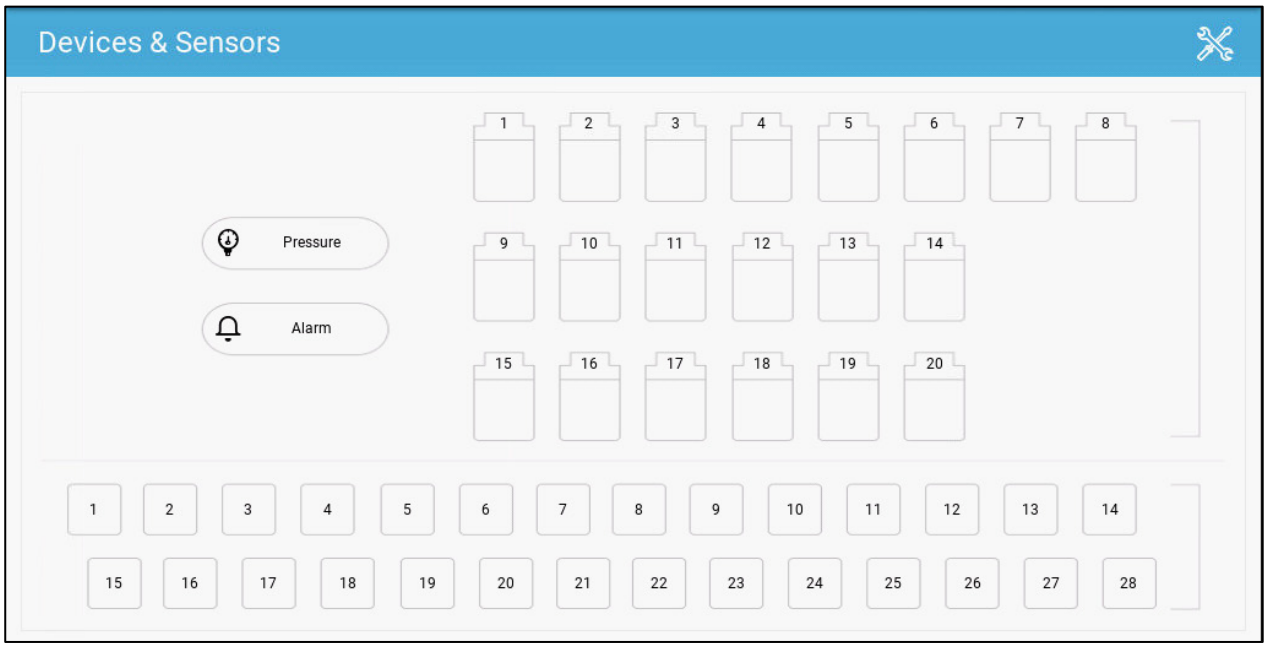
7.1 Mapping Devices

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.

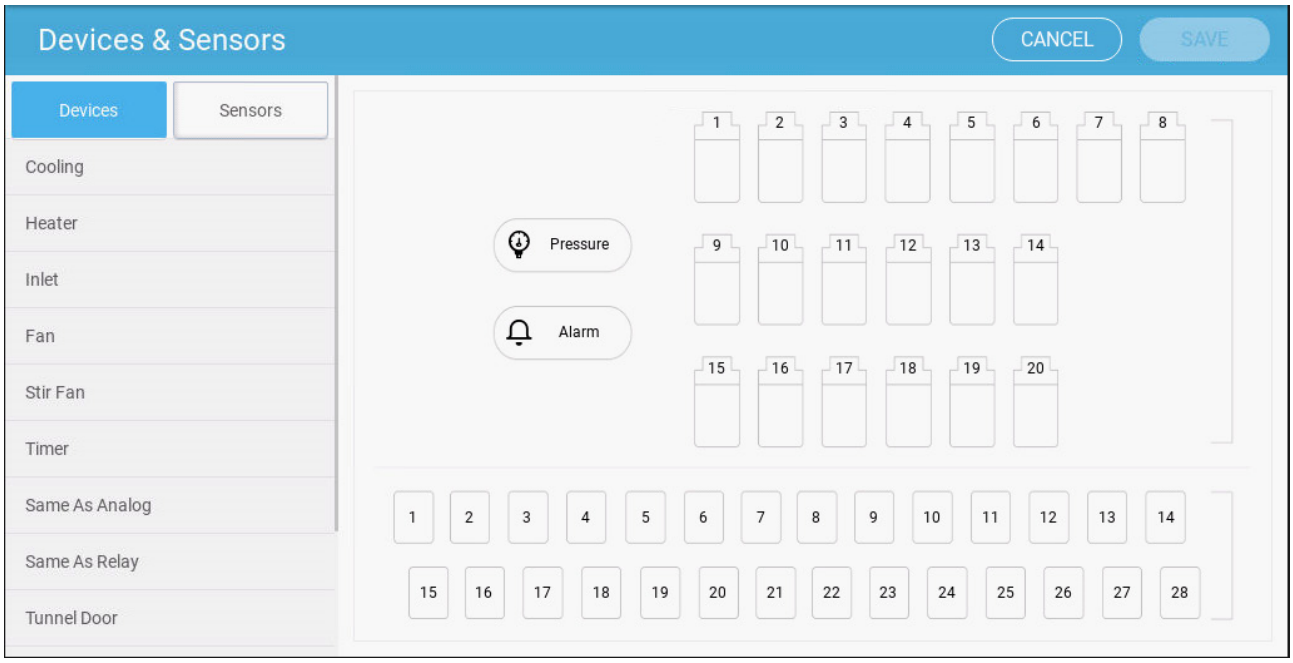
To map the devices:

1. Go to System > Device and Sensors.



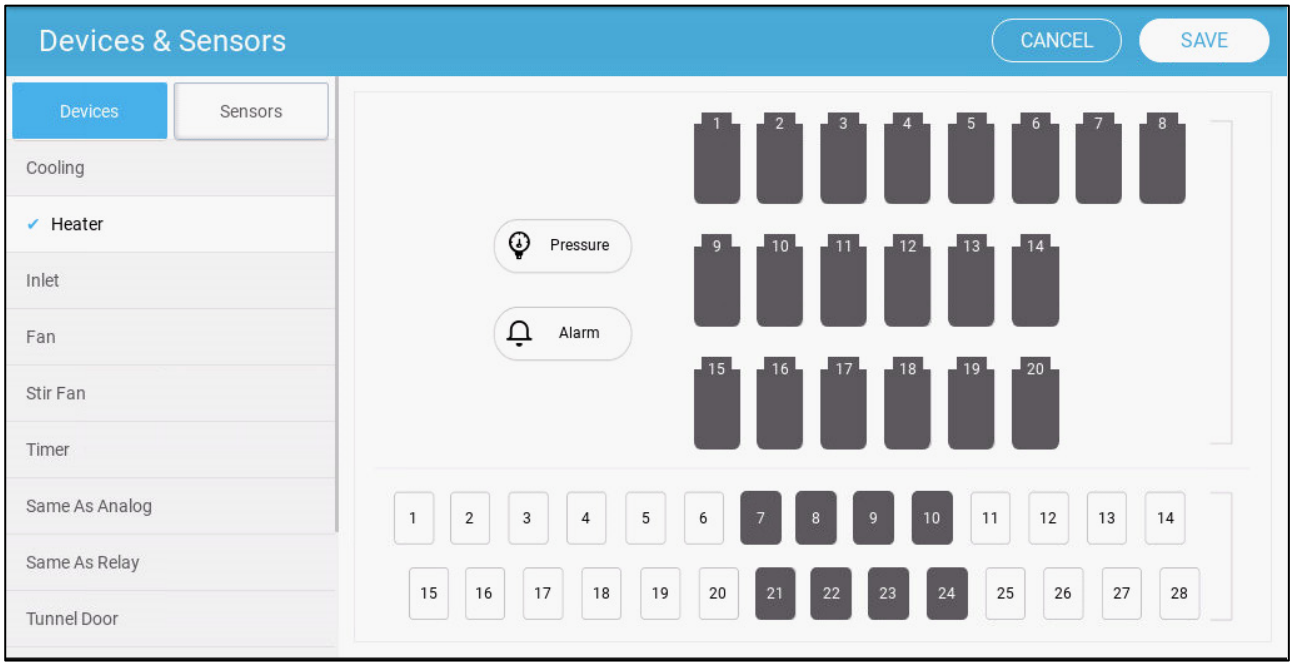
This screen displays the relays and analog/digital ports. At this point all, icons are undefined.

2. Click .

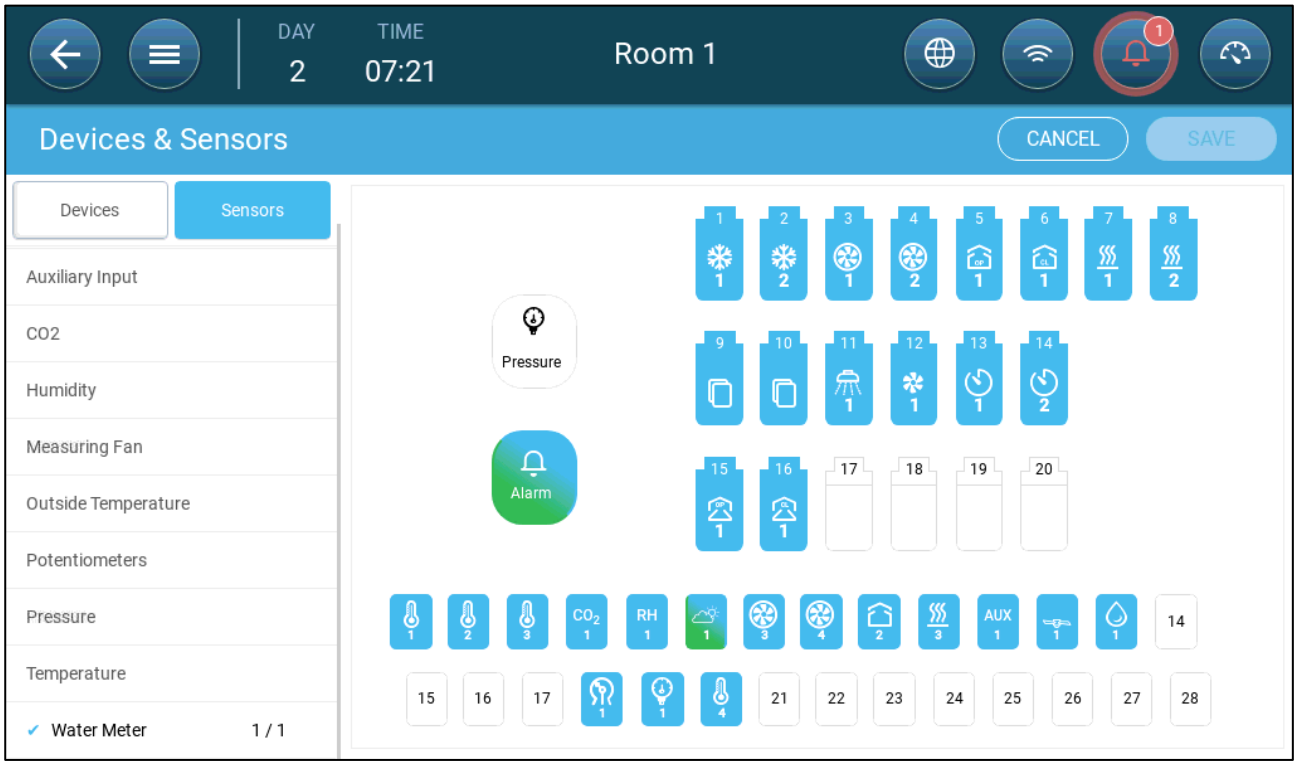


- Click Devices to map cooling devices, heaters, inlets, fans, stir fans, timers, tunnel doors, outlets, or the alarm relay.
- Click Sensors to map auxiliary inputs, sensors (humidity, pressure, temperature, CO2, ammonia), water meter, and potentiometers.

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.



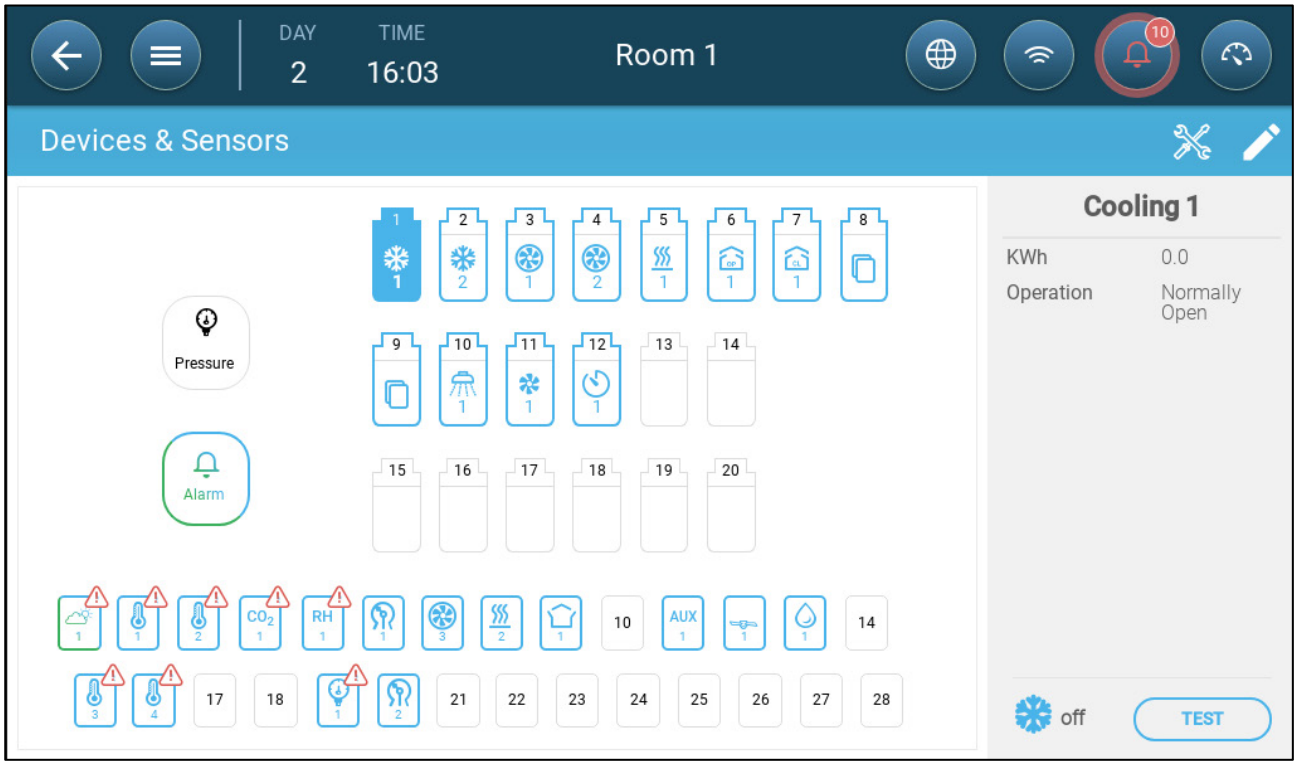
4. Click on the relays and/or ports that you wired to heaters.
   - TRIO automatically numbers the devices.
   - TRIO enables selecting up to the maximum number of each device.
   - Devices having opening and closing relays require mapping both relays.
5. Repeat steps 3 and 4 four all the connected devices.



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.

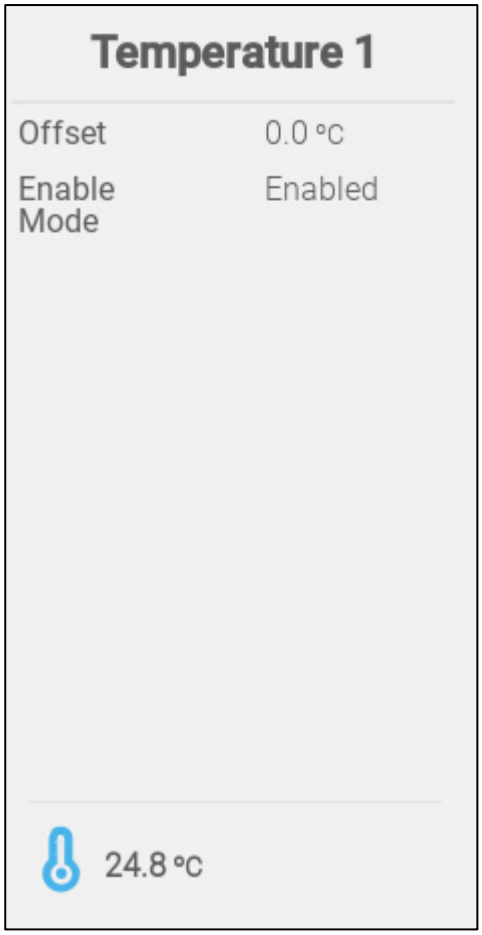


7.2 Temperature Sensors

- 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 49).**



- 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

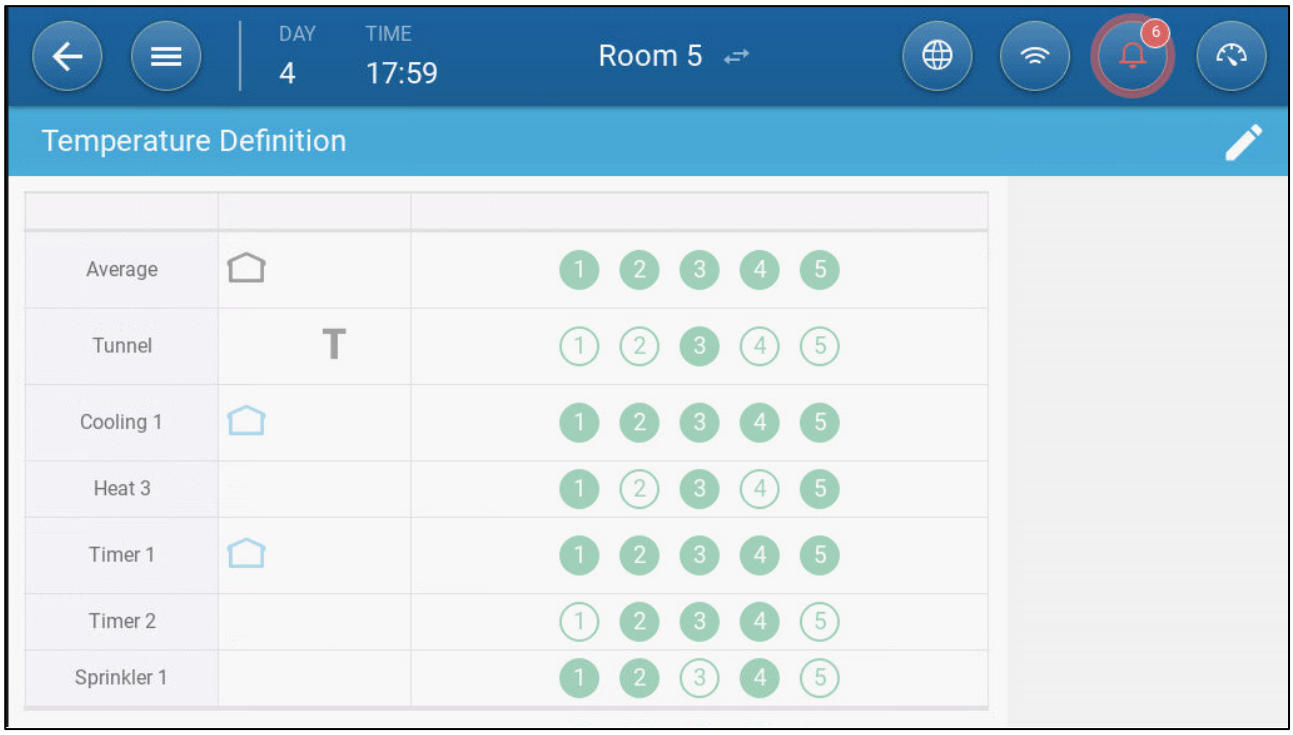
Calculating the temperature data, TRIO takes the following into consideration:

- 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.



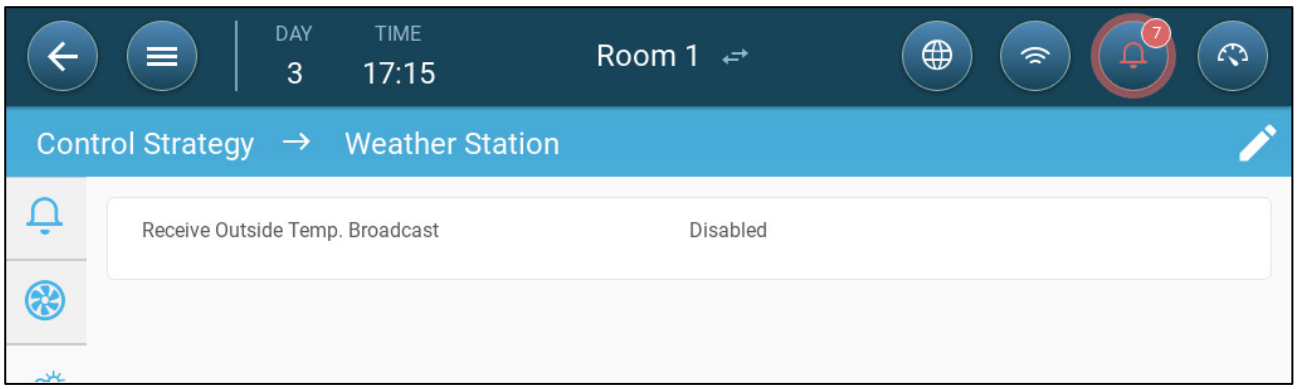
- Map the sensors to devices.
  - Define which sensors are used to calculate the average temperature.
  - Define an outside temperature sensor (if required).

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 save 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.

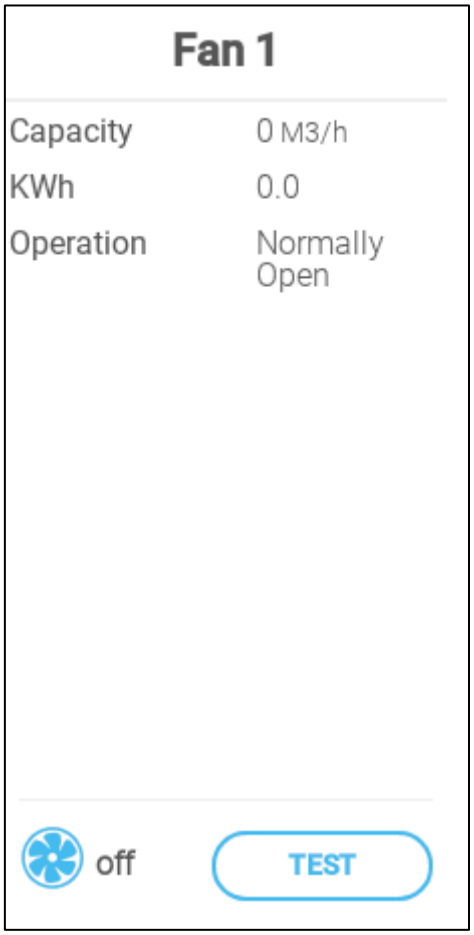
➲ **In Defining the Preferences, page 80 define the measurement unit.**

➲ **Define up to 20 relays or analog output ports as On/Off or 0 – 10 V fans, respectively (refer to Mapping Devices, page 49)).**

- 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 .

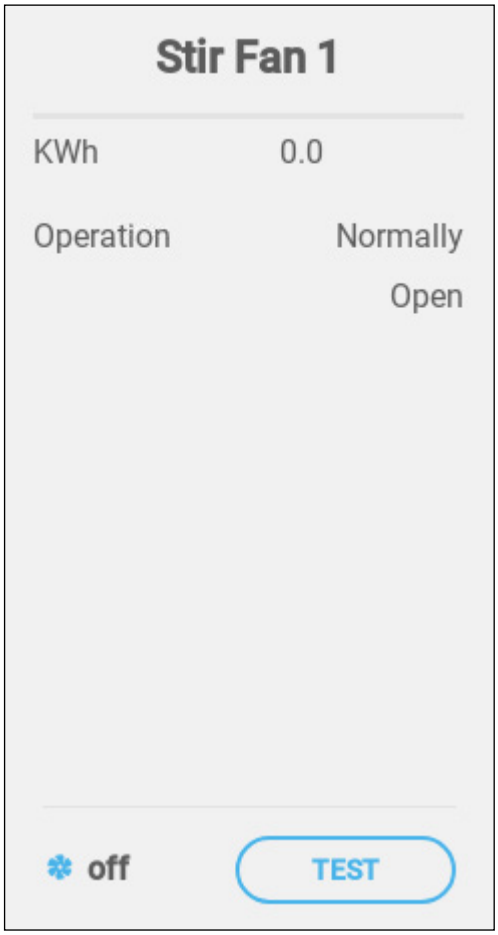
3. Edit the parameters.
    - Minimum/Maximum Voltage: Enter the minimal and maximal voltage used to calibrate the fan speed.
    - Capacity: Enter the fan capacity.
    - KWh: This field displays the amount of kilowatts used. Read-only.
    - Boost Time: During this amount of time, the controller applied 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 49)).**

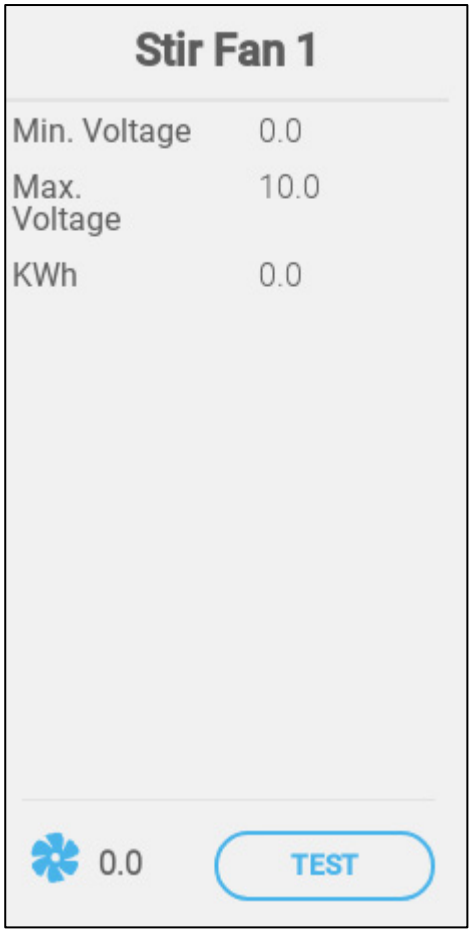
- On Off Stir Fan
- 0 – 10 Volt Stir Fan

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



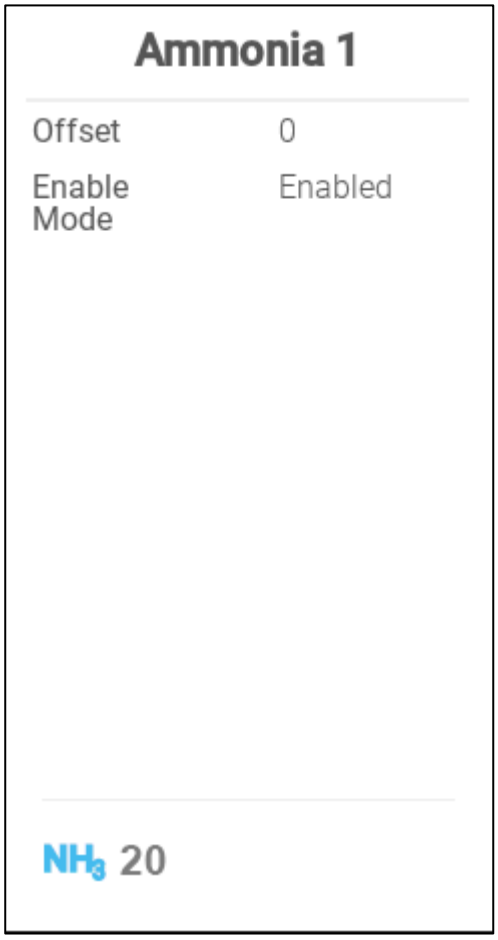
- Minimum/Maximum Voltage: Enter the minimal and maximal voltage used to calibrate the fan speed.
- KWh: This field displays the amount of kilowatts used. Read-only.

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

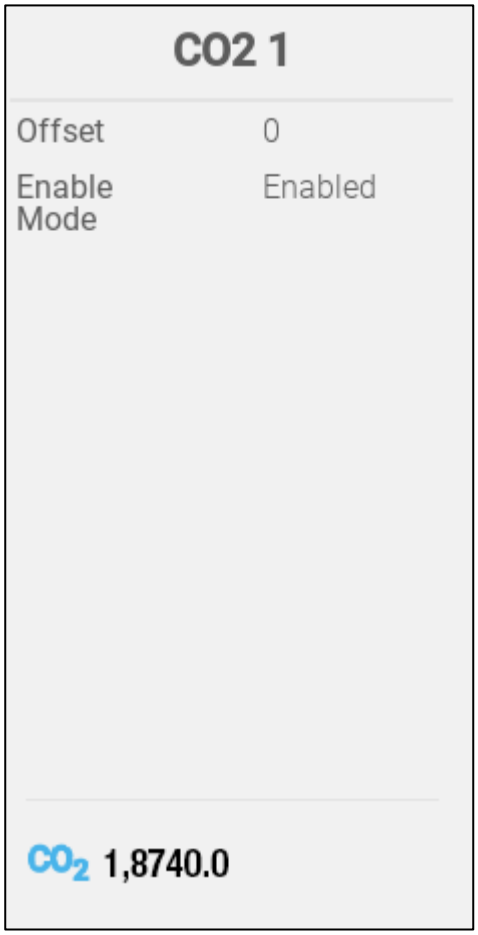
➲ Define one analog input port as an ammonia sensor (refer to Mapping Devices, page 49)).



- 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

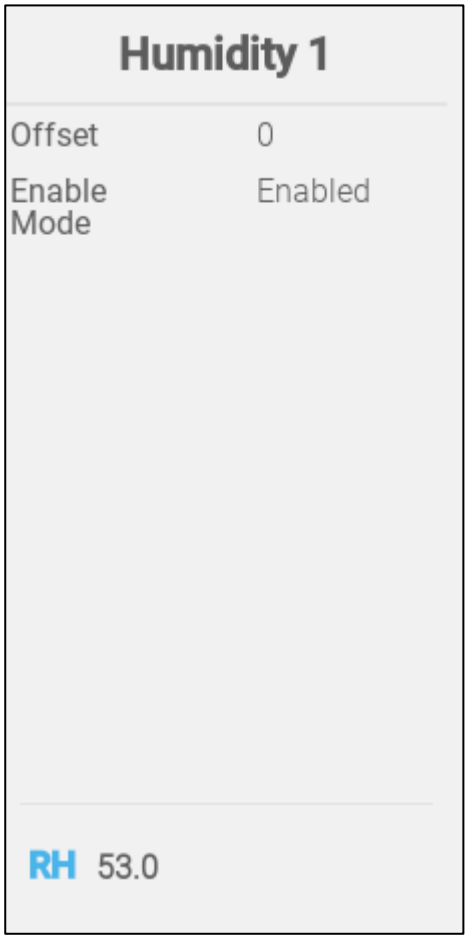
➲ Define one analog input port as a CO2 port (refer to Mapping Devices, page 49)).



- 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

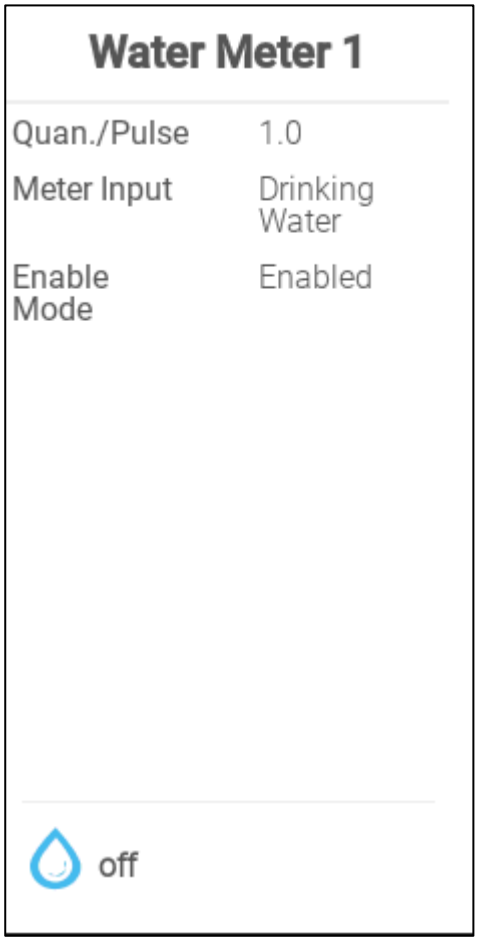
➲ Define one analog input port as a humidity sensor (refer to Mapping Devices, page 49)).



- 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 digital input port as a water meter (refer to Mapping Devices, page 49)).



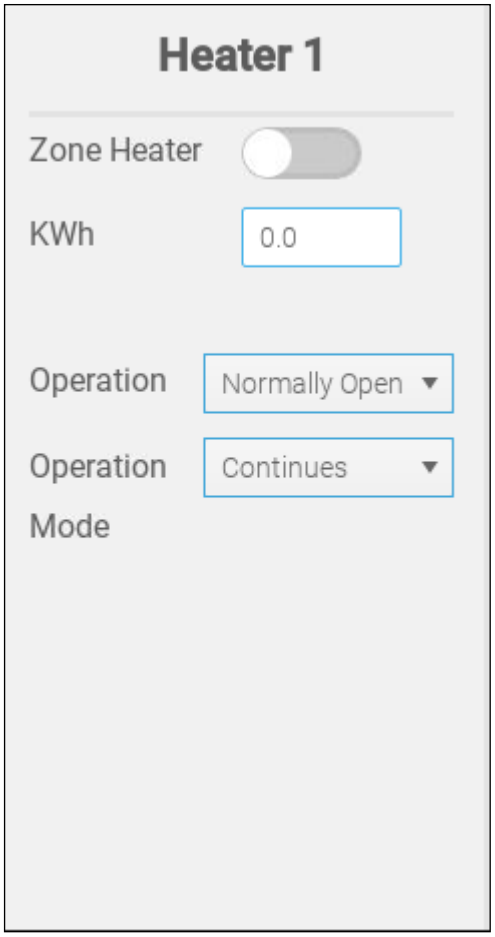
- Define:
  - Quan/Pulse: Set the water meter's water flow per pulse. Range: 0.0 to 99.9 (unit depends on the Defining the Preferences, page 80.)
  - Meter input: Chose drinking water or cooling.
  - Enable Mode: Enable/disable the sensor.

7.5 Heating Devices

➲ **Define up to six relays and/or analogue output ports as heaters in Mapping Devices, page 49.**

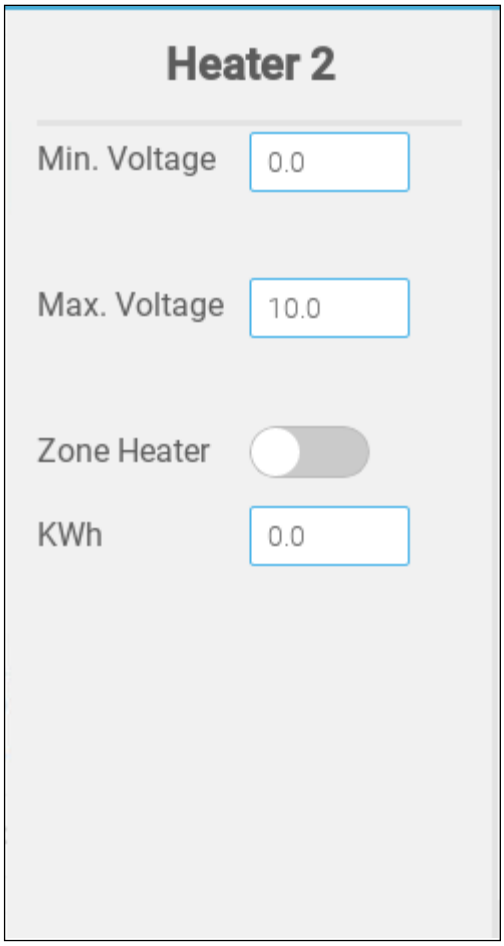
- Defining the On/Off Heaters
- Defining the Variable Heaters

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.

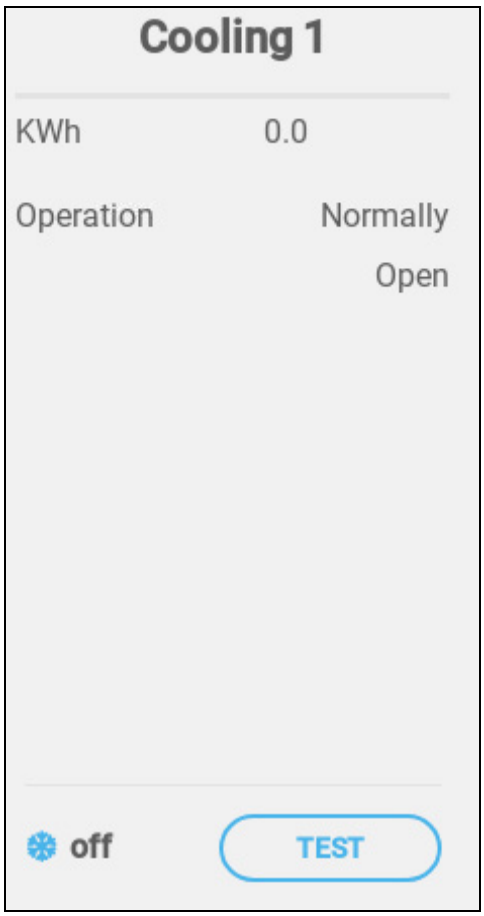
7.5.2 DEFINING THE VARIABLE HEATERS



- 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 49).



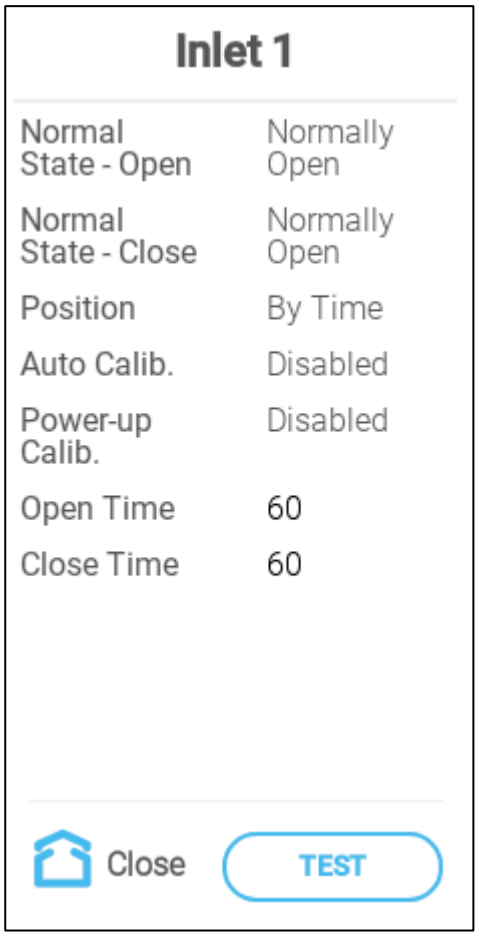
- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.
- The status shows if the cooling device is currently operating.

7.7 Inlets, Tunnel Doors, Outlets

- Defining the Inlets/Tunnel Doors
- Defining the Outlet

7.7.1 DEFINING THE INLETS/TUNNEL DOORS

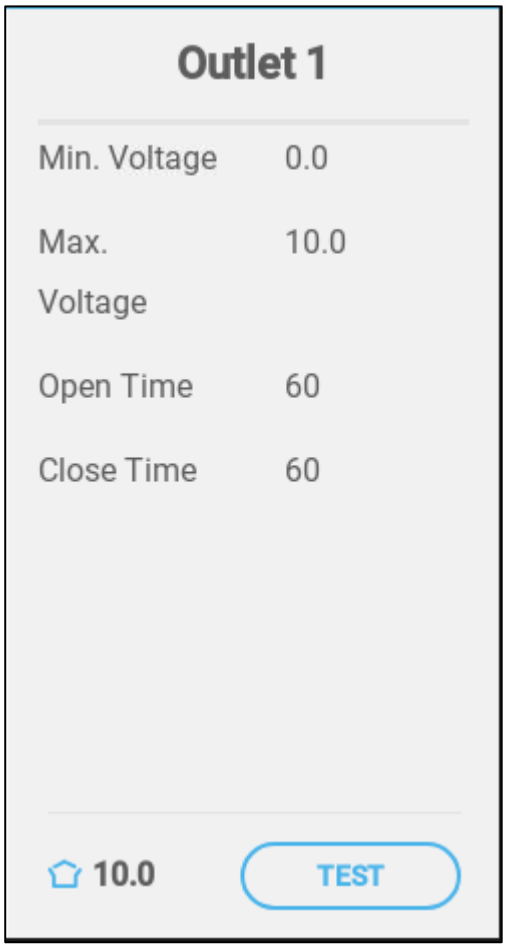
➲ Define up to four relays or analog output ports as inlets or tunnel doors (each device requires two relays or one analogue port) (refer to Mapping Devices, page 49).



- 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 113.
  - 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

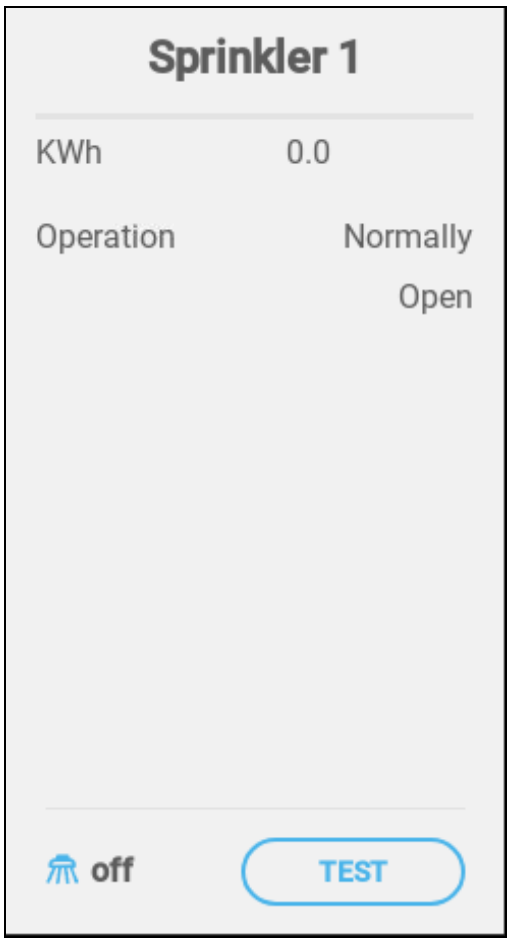
➲ Define one analog output port as an outlet (refer to Mapping Devices, page 49).



- 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 49).

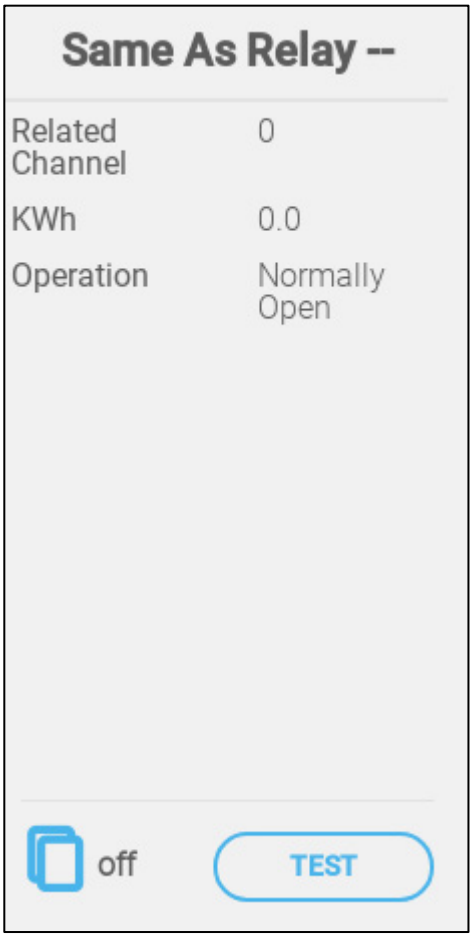


- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.9 Defining the Same As Relays

➲ **Define up to 20 relays as Same as Relay (refer to Mapping Devices, page 49).**

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

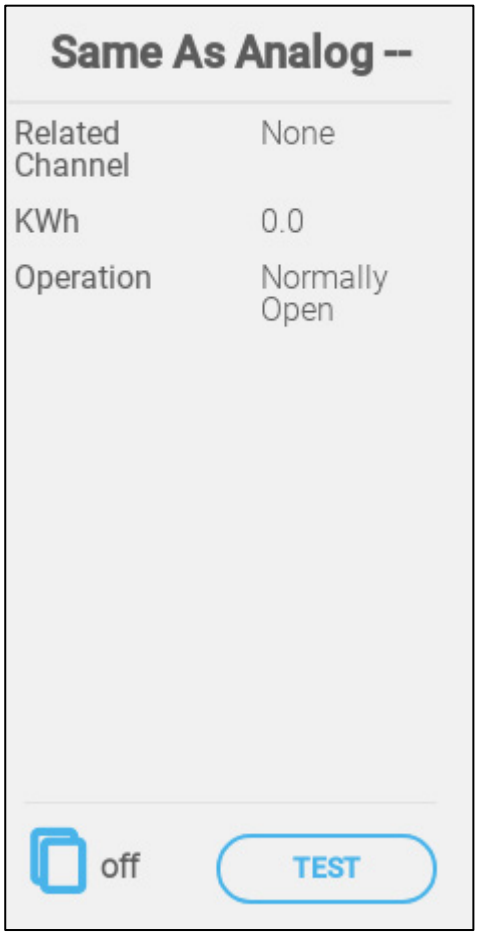


- Define:
  - Related Channel: Define which relay number to follow. Range: 1 – 20
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.10 Defining the Same As Analog Ports

➲ **Define up to eight relays as Same as Analog Ports (refer to Mapping Devices, page 49).**

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.



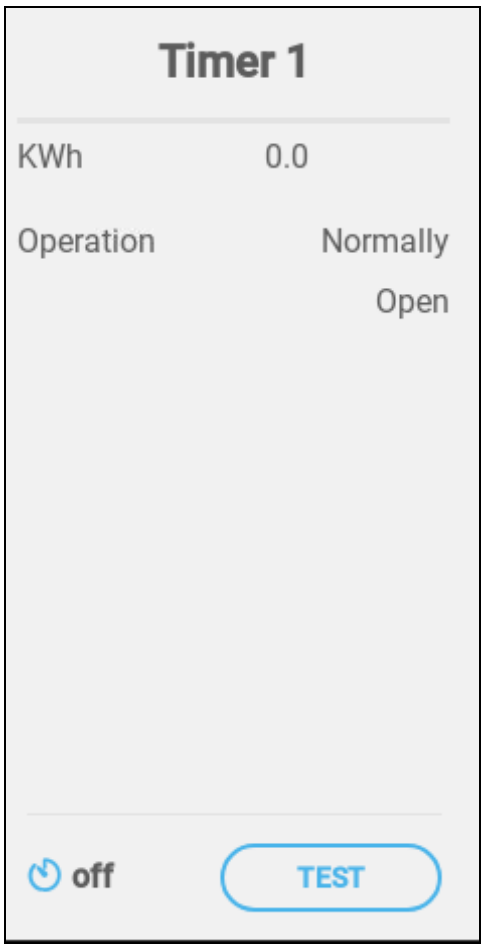
- Define:
  - Related Channel: Define which port number to follow.

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

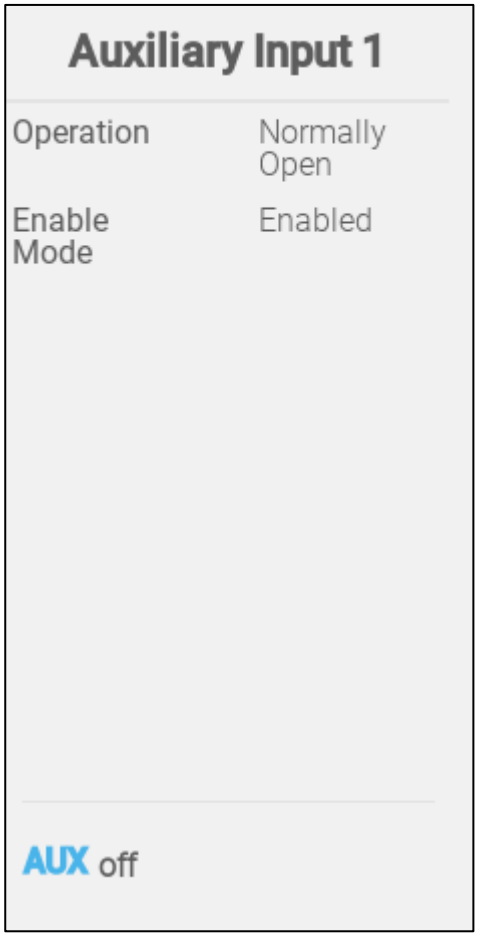
➲ Define up to five relays as timers (refer to Mapping Devices, page 49).



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

7.12 Defining the Auxiliary Input

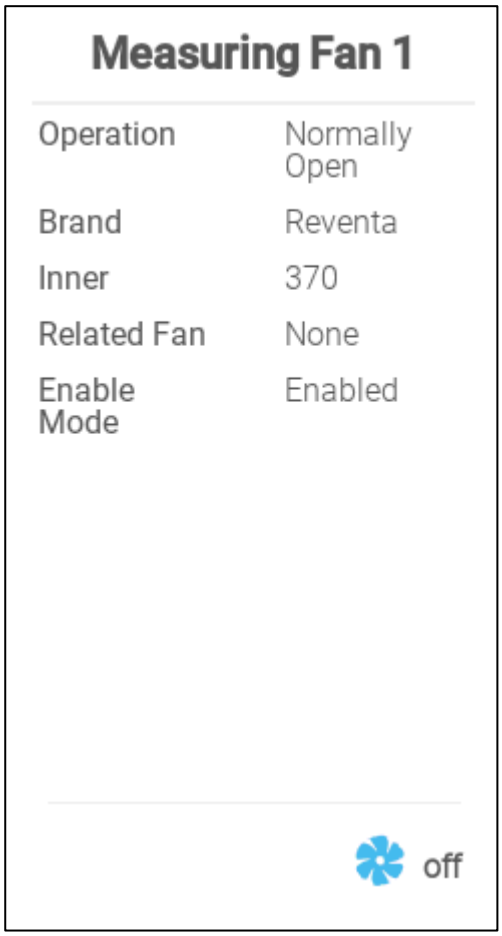
➲ Define up to four digital input sensors as auxiliary inputs (refer to Mapping Devices, page 49).



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

7.13 Defining the Measuring Fan

➲ Define one digital input sensor as a measuring fan (refer to Mapping Devices, page 49).



- 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 103.

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

  - Enable Mode: Enable/disable the sensor.

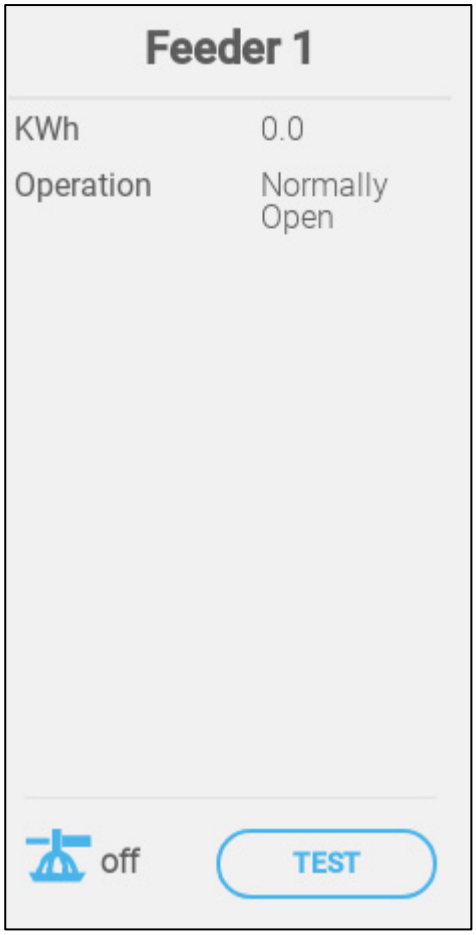
7.14 Feeding Devices

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

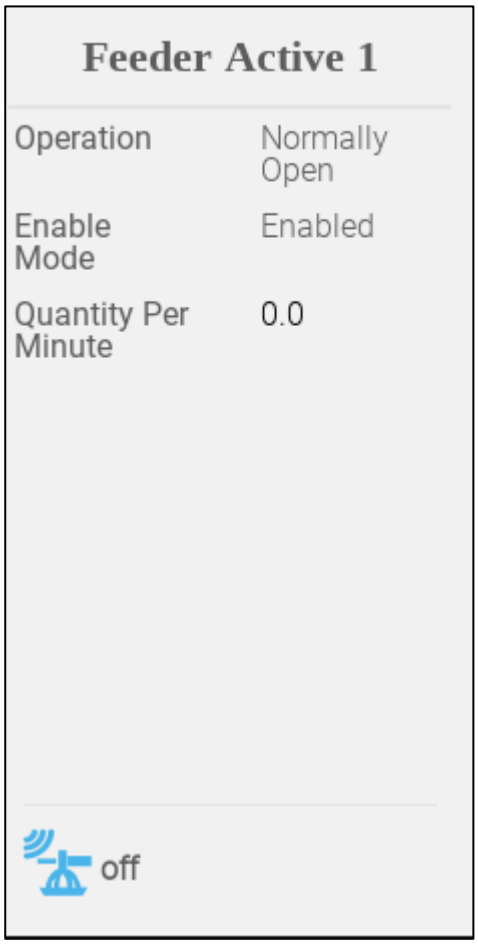
➲ **Define one relay as feeder (refer to Mapping Devices, page 49).**



- 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

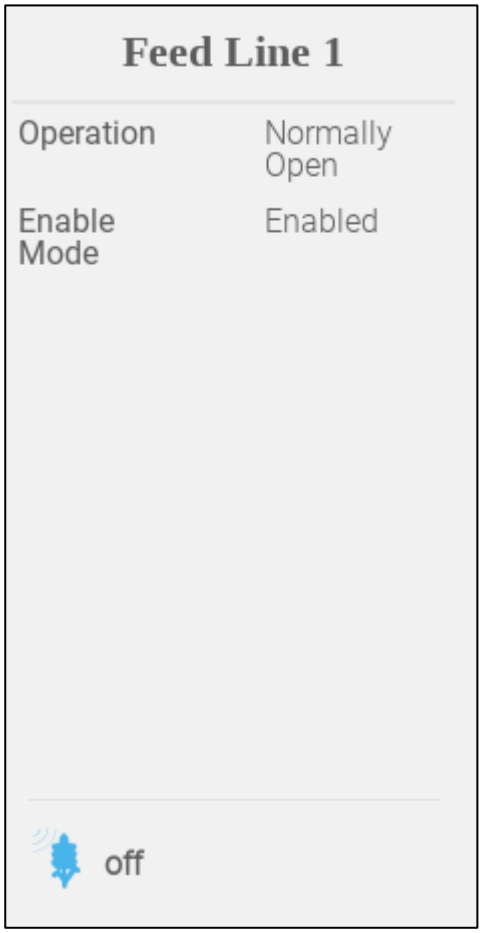
➲ Define one digital input port as feeder active (refer to Mapping Devices, page 49).



- 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

➲ Define one digital input port as feeder active (refer to Mapping Devices, page 49).



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

7.15 TRIO RPS

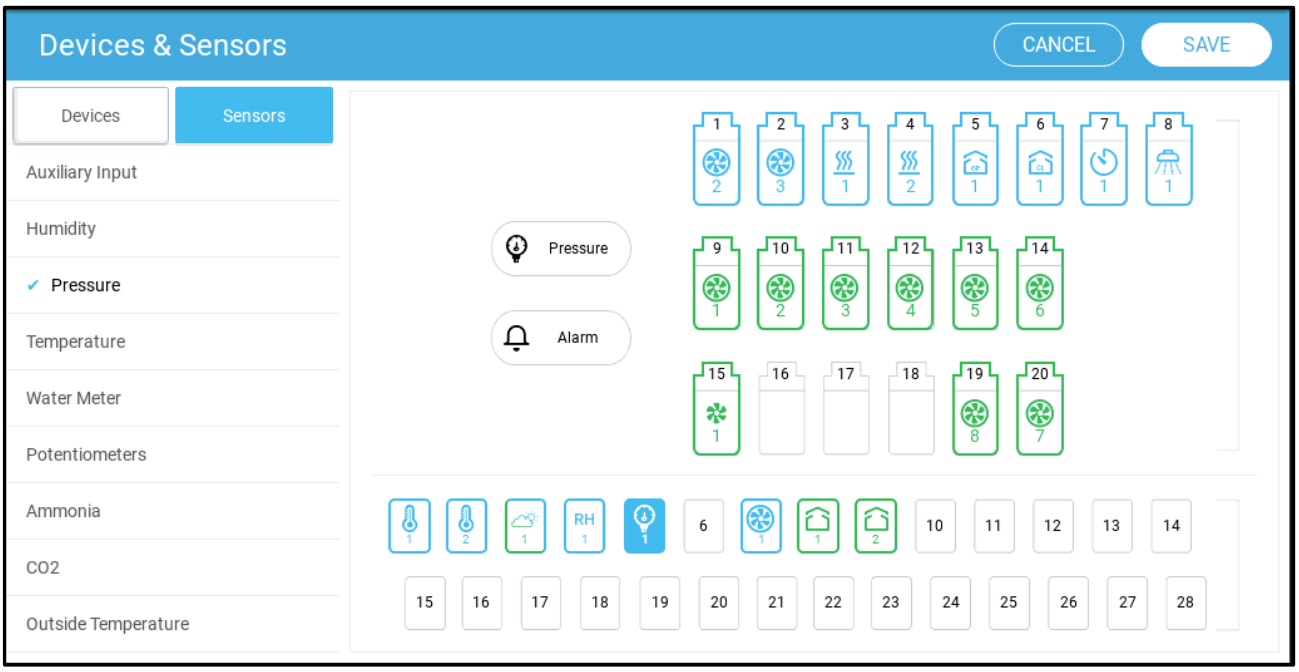
- Define the Sensor
- Static Pressure Calibration

7.15.1 Define the Sensor

The following section details how to configure the RPS device.

1. Go to System > Devices & Sensors.
2. Click . The Devices & Sensor screen appears.
3. Click

.
4. Click **Pressure**.
5. Define an analog input port as the pressure sensor. In the following screen, ports 5 is defined as the pressure sensor.



6. Go to Climate > Static Pressure and define the parameters.

7.15.2 Static Pressure Calibration

CAUTION *The Static Pressure sensor is factory calibrated. Only calibrate the sensor if you have reason to believe that they are producing inaccurate results.*

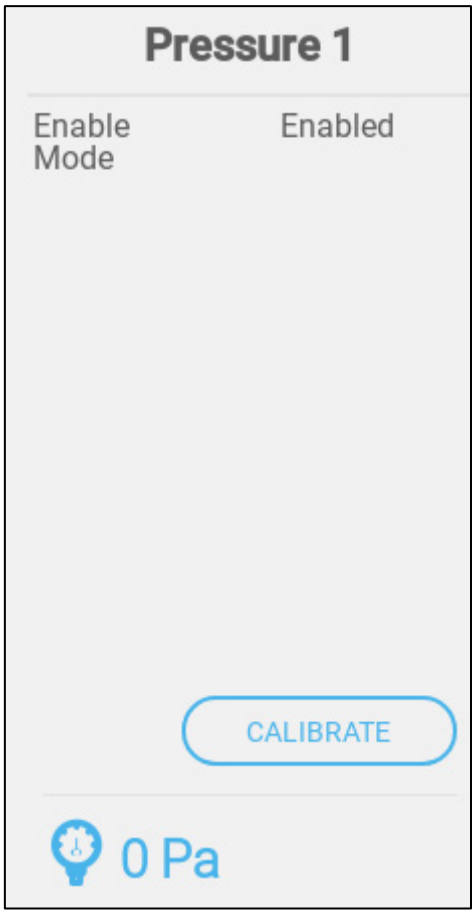
The Static Pressure should be 0 when there is no ventilation and the house is closed. When the controller A/D counts is 100, this means that there is zero (0) static pressure.

NOTE: *Run the controller for a few hours so that the temperature in the box becomes stable and only then calibrate.*

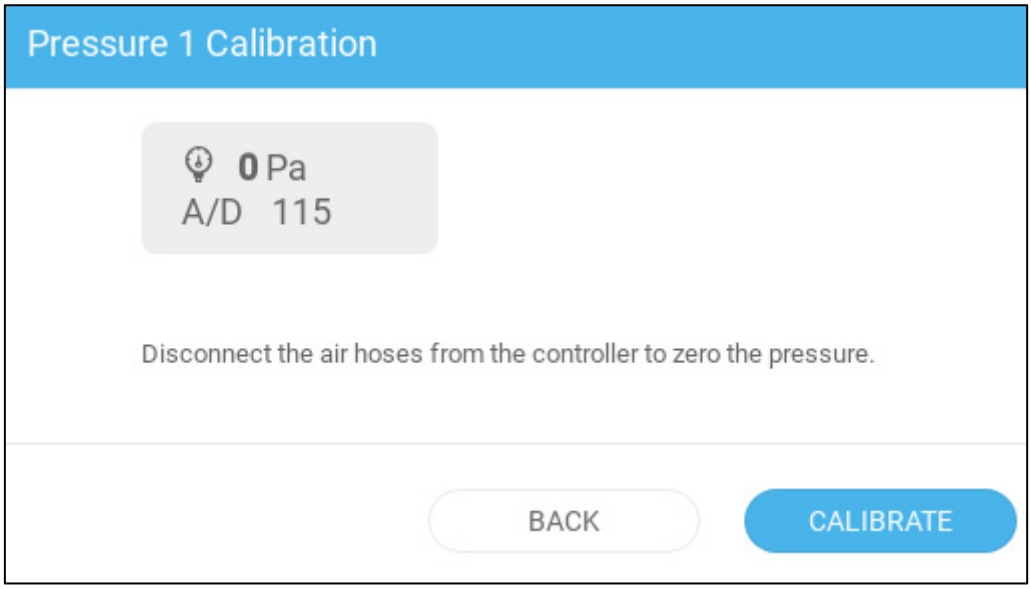
CAUTION *DO NOT blow the air into the hose to see of the pressure changes! The sensor is sensitive and blowing air can cause irreparable damage.*

To calibrate the Static Pressure Sensor:

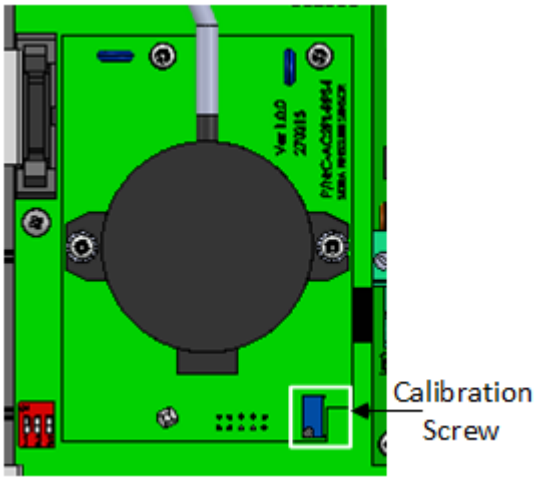
1. Disconnect the air hoses.
2. Go to *System* > *Device & Sensors* > *Pressure*.



3. Click **Calibrate**.



4. If the A/D count is 100 +/- 30 (70 to 130), click **Calibrate**.
5. If the A/D count is less than 70 or greater than 130:
    a. Check for blocked air hoses or wind interference.
    b. Open the Trio. On the Main Board, find the Static Pressure Sensor.



c. Adjust the zero pressure reading to approximately 100 by turning the calibration screw.

d. When the A/D count is within the permitted range, press **Calibrate**.

8 Basic Setup

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

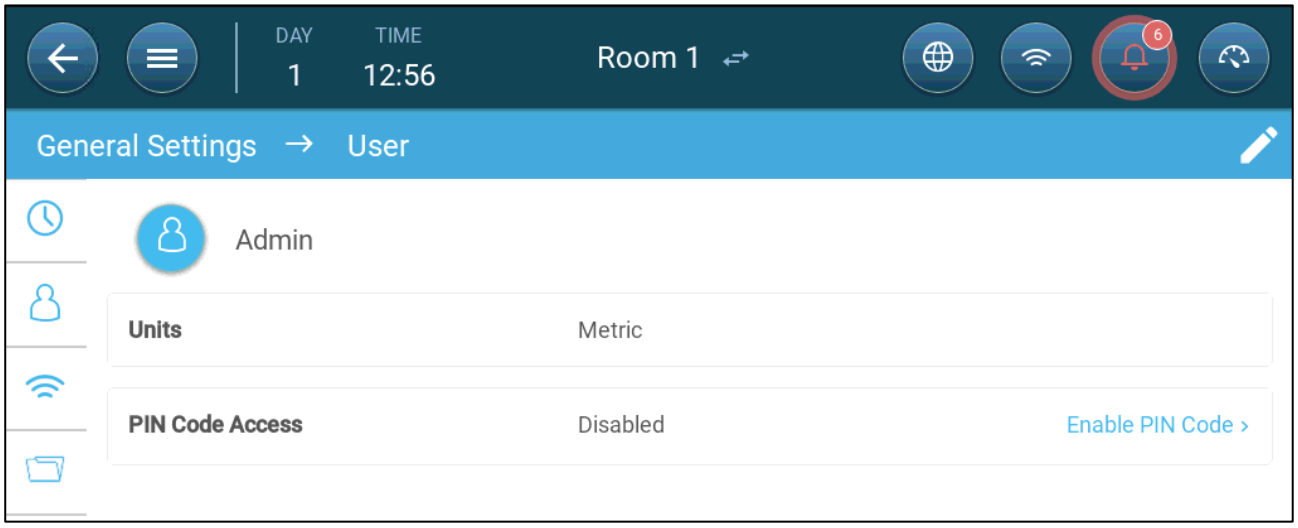
- Defining the General Settings
- Batch Settings
- Defining the Expected Animal Weight
- Adjusting the Animal Count
- Tech Support Information

8.1 Defining the General Settings

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

8.1.1 Defining the Preferences

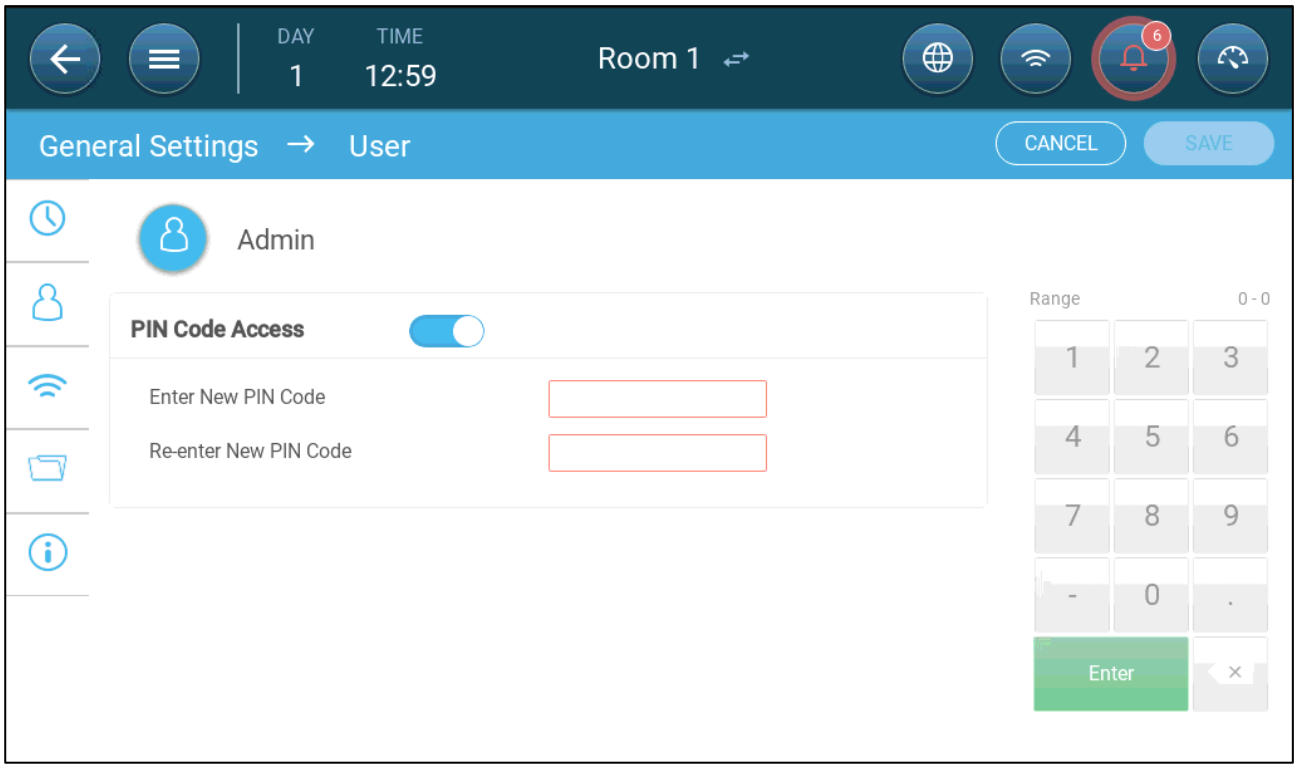
1. Go to System > General Settings > User .



2. Define the units: There are two options:

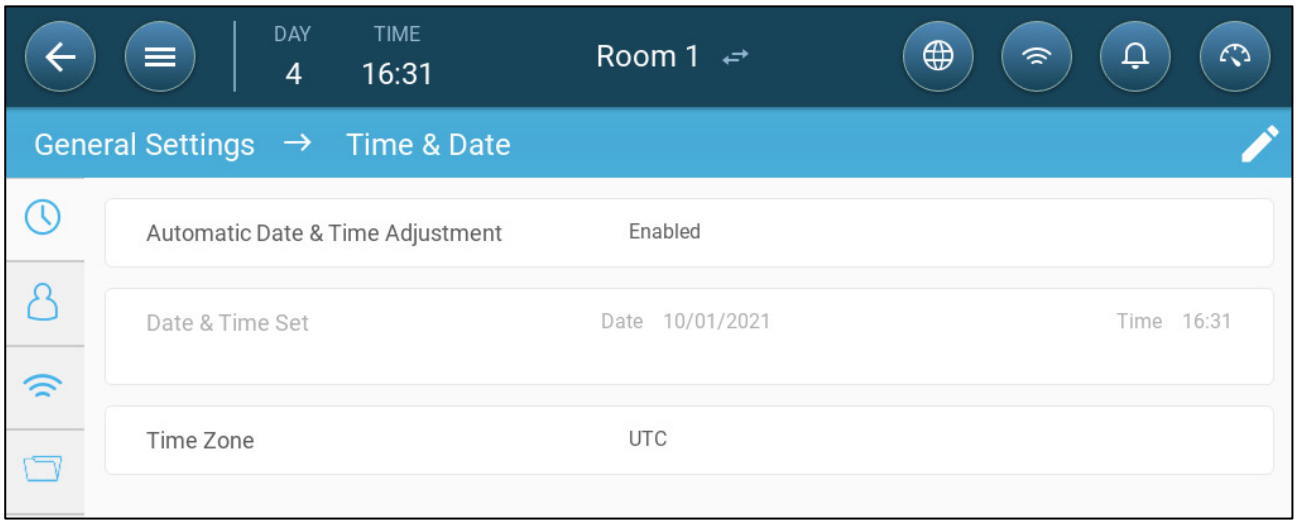
- Define all units as metric or imperial.
- Define each unit. Click Edit > Customize and define:
  - Temperature (Celsius or Fahrenheit)
  - Pressure (Pascal/Inches of Water)
  - Weight (Kilogram/Pounds)
  - Air Flow: Cubic Meter/Hour or Cubic Feet/Minute

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 .



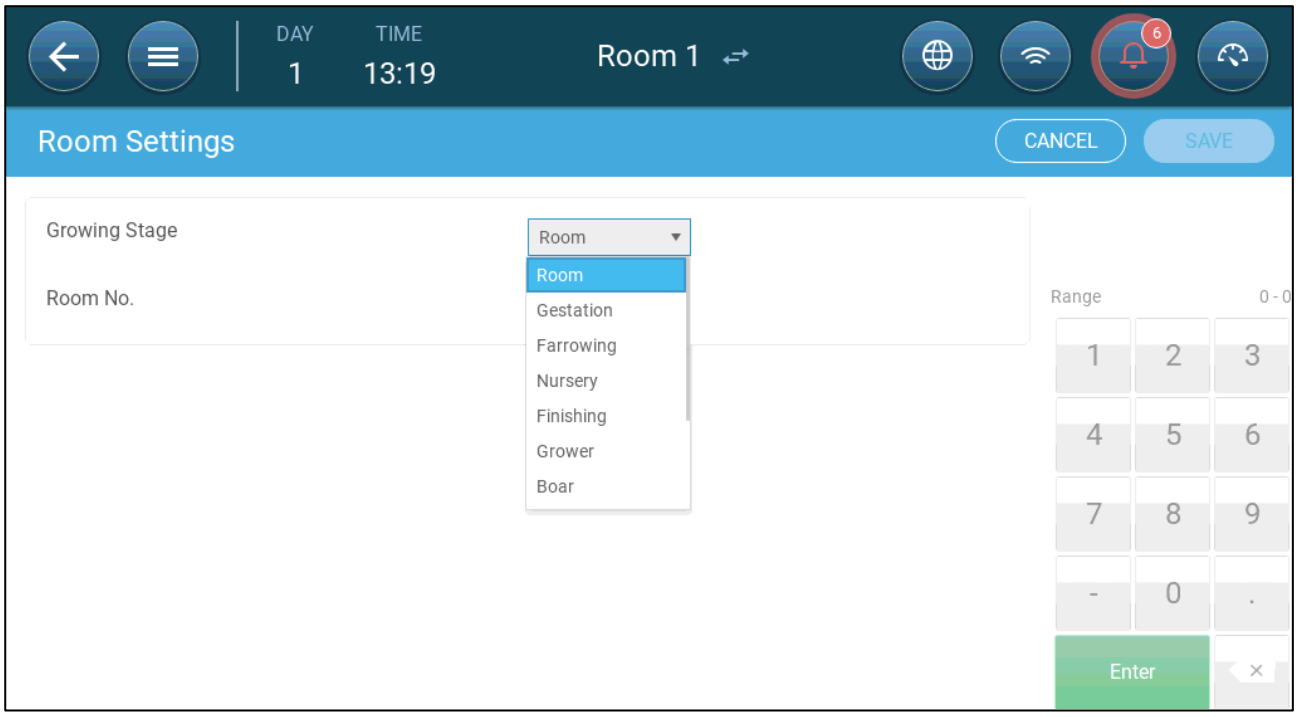
2. Define:
   - Time
     - Automatic Date & Time Adjustment: Enable this option to update date and time automatically
     - Date and Time Set: Manually enter the date and time.
   - Time Zone: Select the zone from the drop down list.

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

8.1.3 DEFINING THE ROOM SETTING

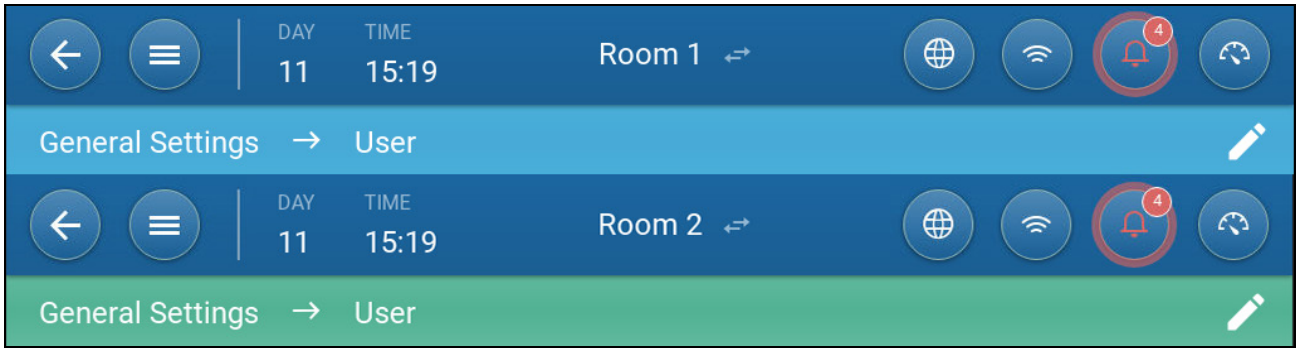
In System > Room Settings, select the growing stage. You can change the stage throughout the growth cycle. The default is Room.

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

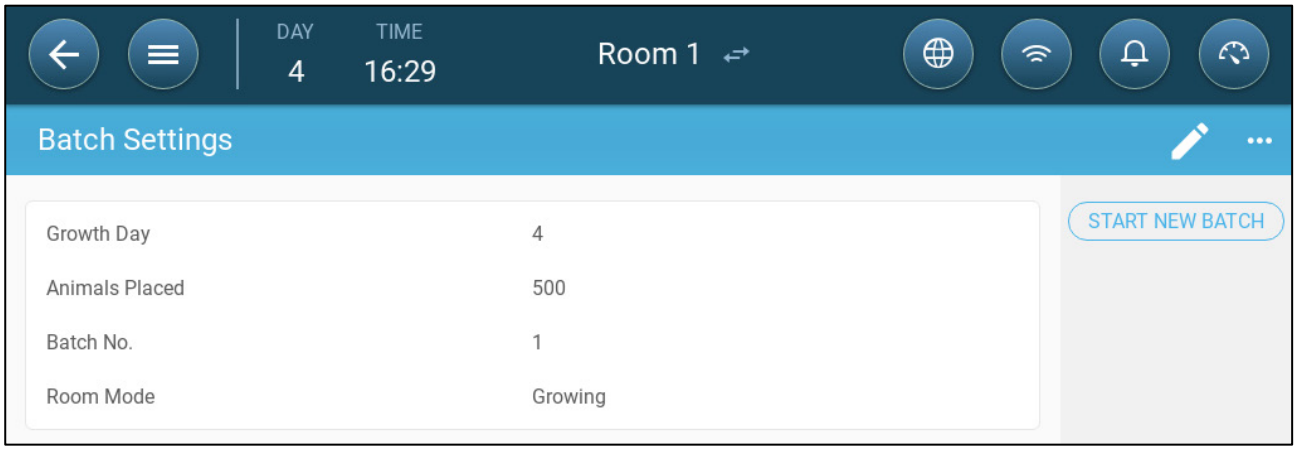
Batch Settings are data points used to define each herd. Define these settings at the beginning of a growth cycle. Batch settings include:

- 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 86.

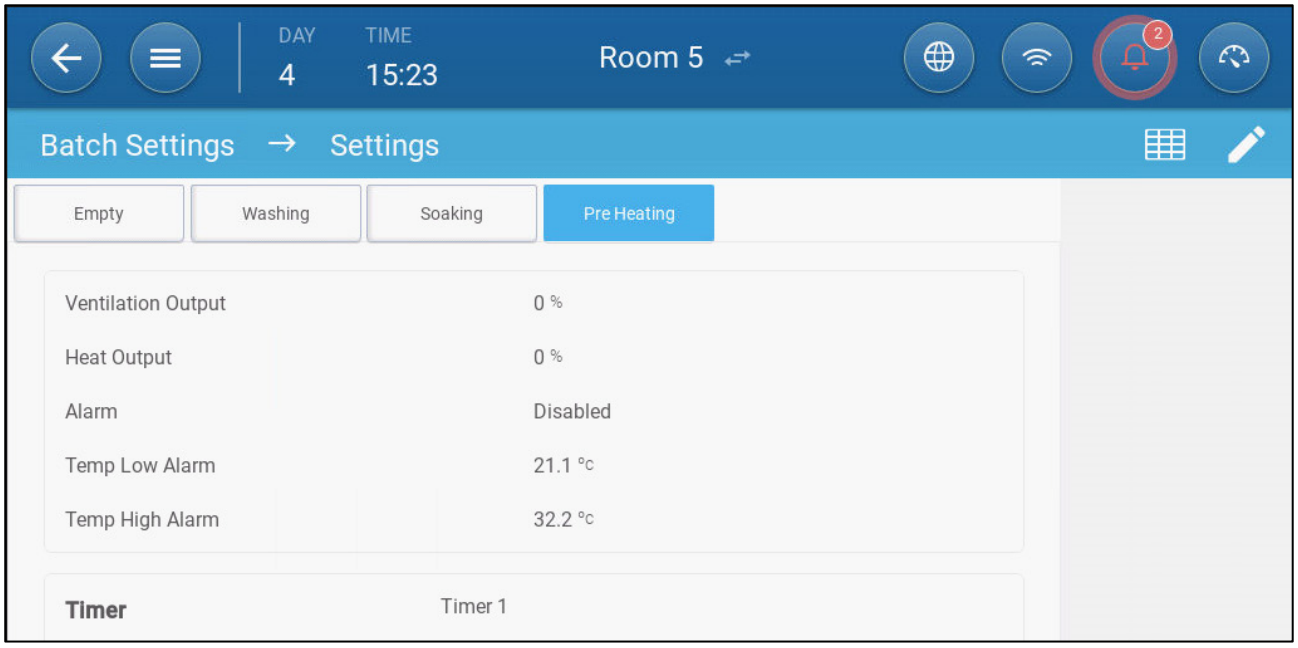
    - Batch No.: Give a unique number for each herd.
- Room Mode: Room mode enables or disables general functionality. When defined as Normal, all functions can be enabled. Growth day is managed as above. If you switch the room to a different mode, growth day stops advancing and only certain, specific functions 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:
  - Erases 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. (Map a timer to enable this function).

8.3 Defining the Expected Animal Weight

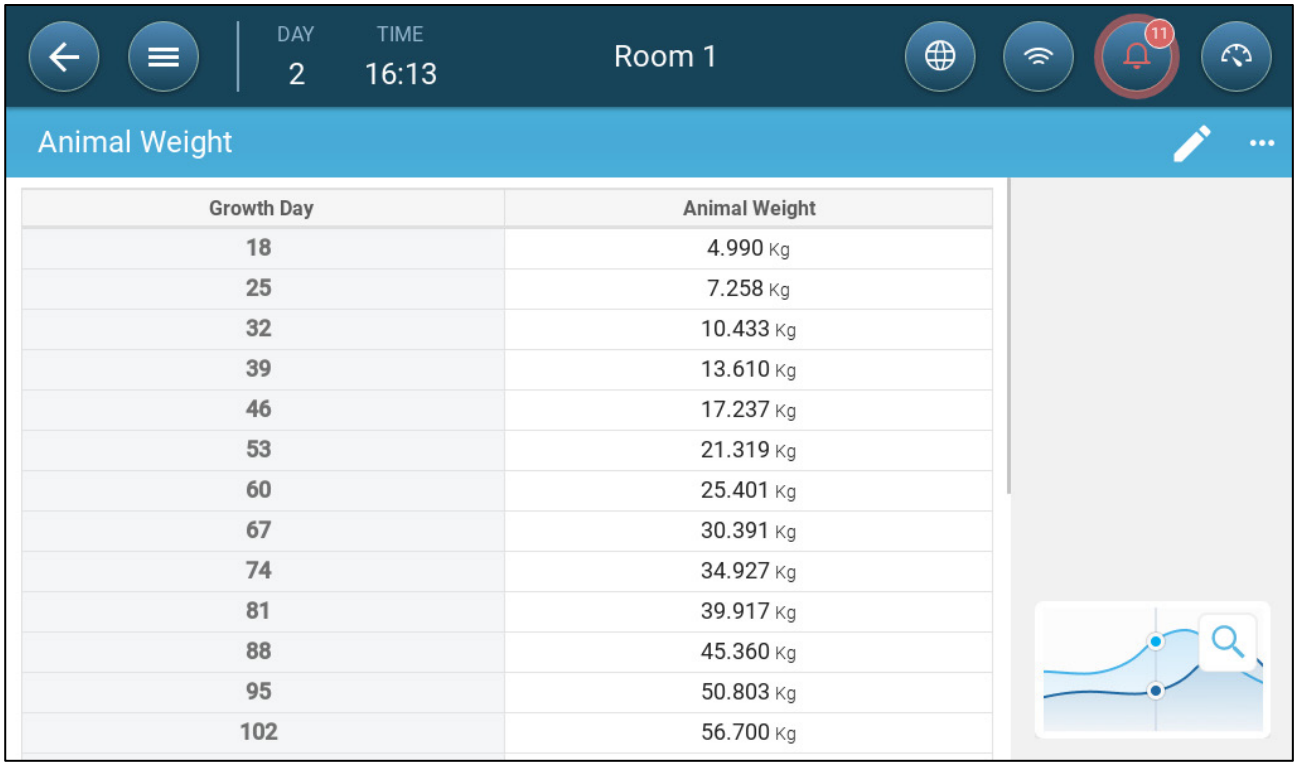
Animal weights are used when calculating the amount of air required when using Ventilation by Weight (page 101). In this screen, define the expected weights over the growth cycle. TRIO provides a default chart which can be edited.

- 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

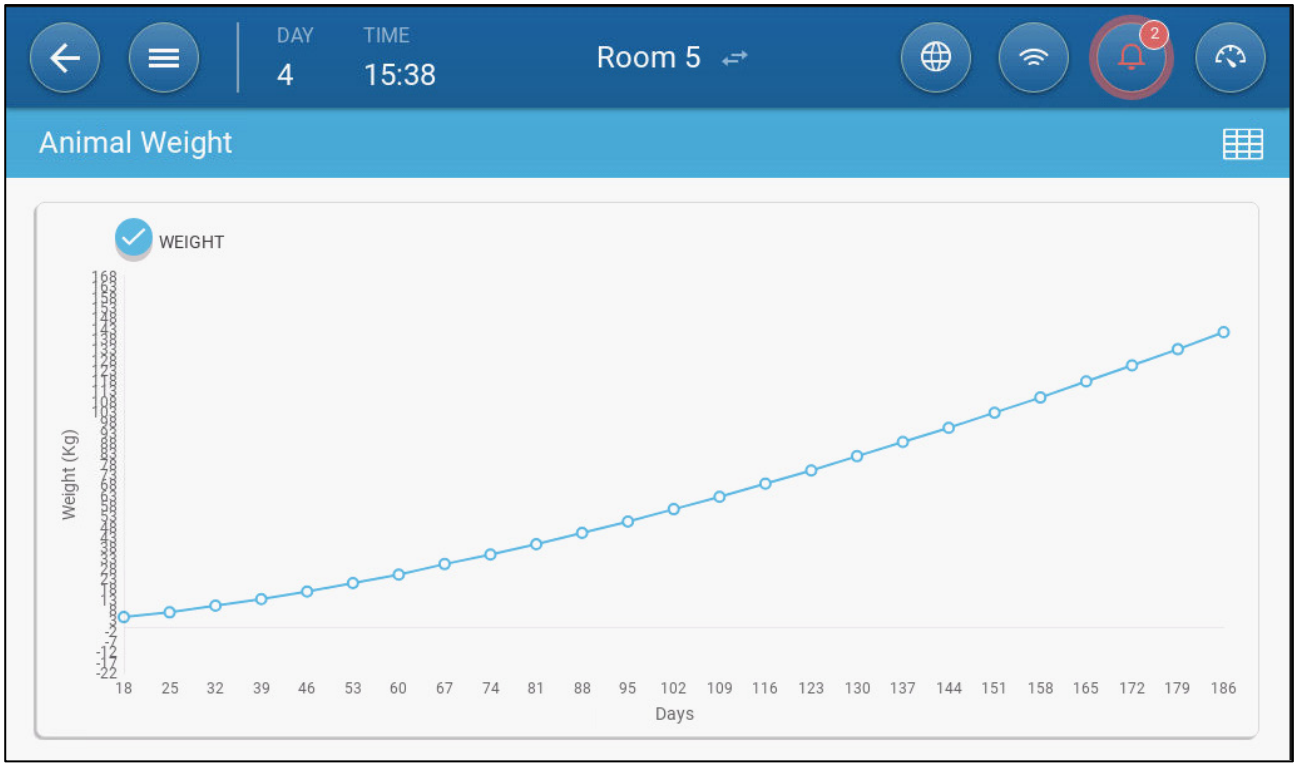
2. Define:

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

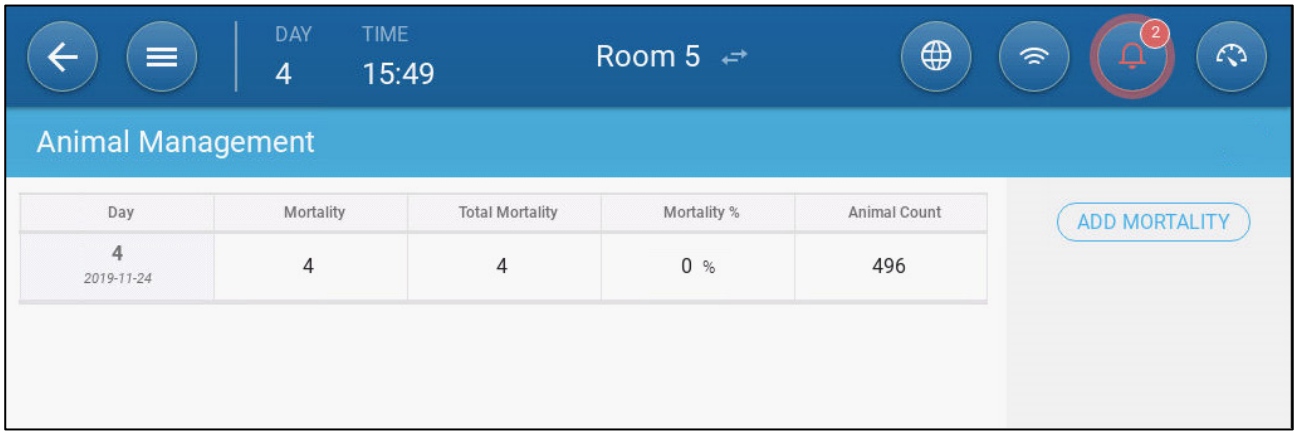
Click or to view the weight curve.



8.4 Adjusting the Animal Count

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

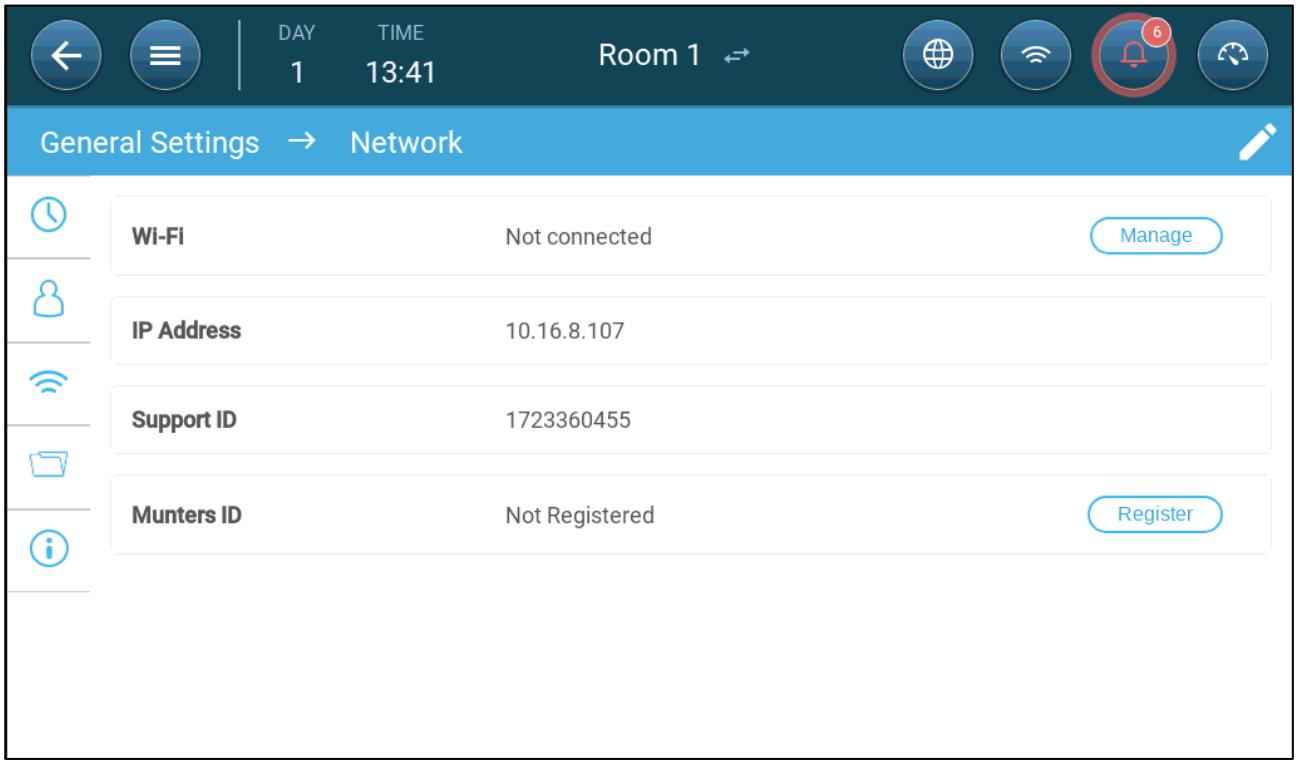
1. Go to Batch > Animal Management. This screen displays the animal mortality data.



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.

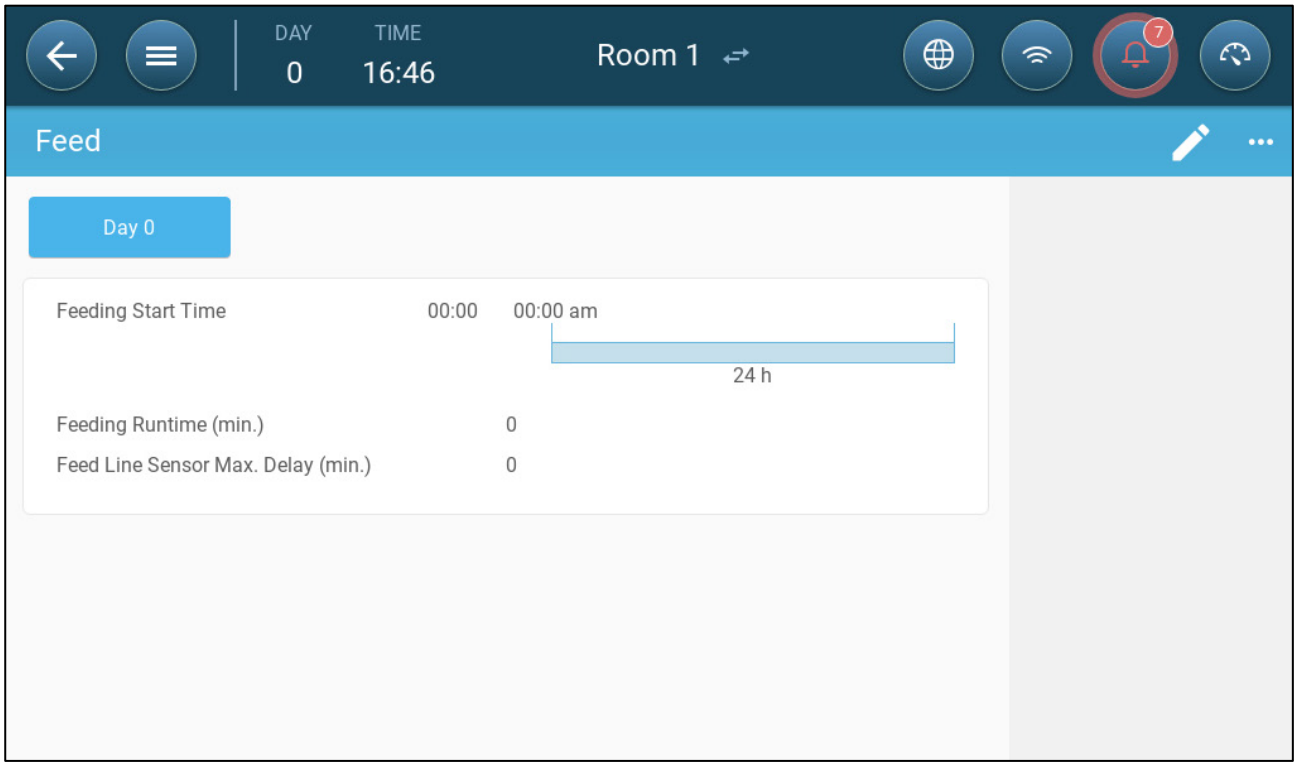
➲ **A feeder relay must be wired, defined, and mapped.**

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

9.2 Setting up Feeding

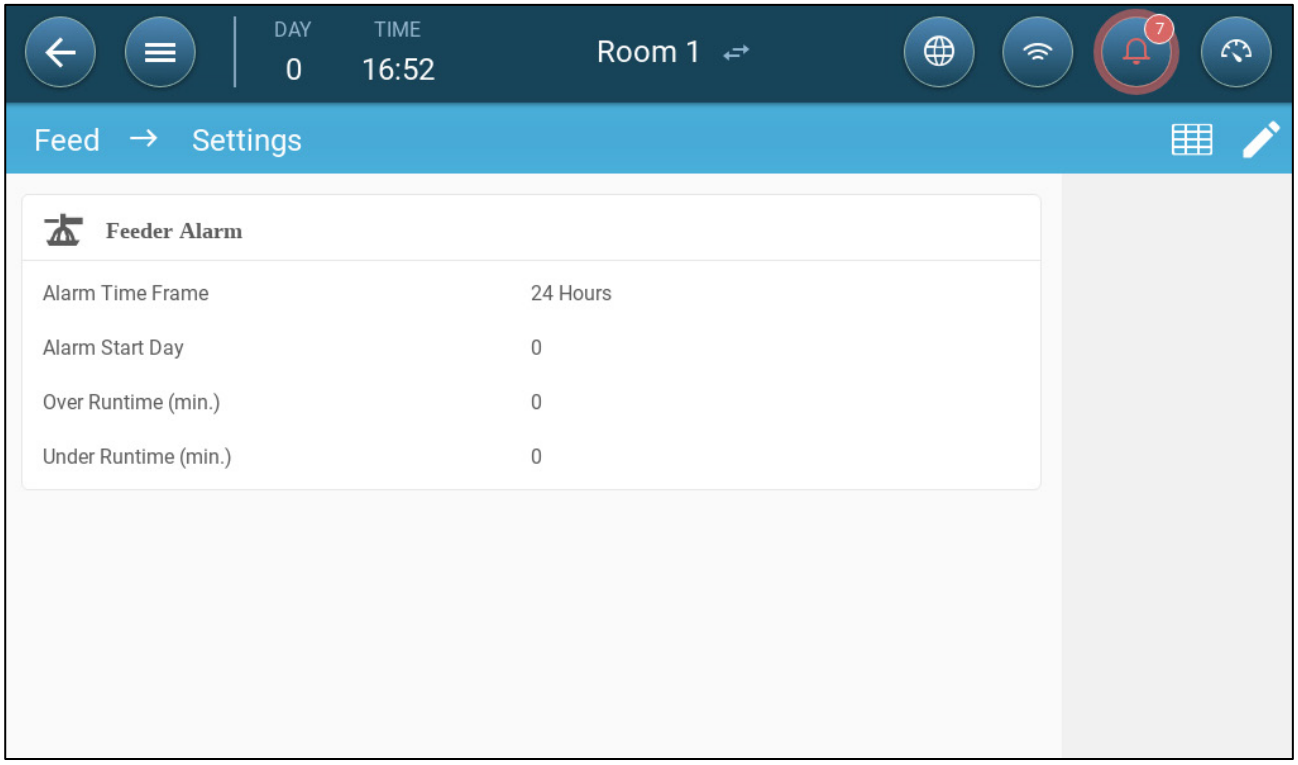
Use the Feed Screen to turn on/off augers and feeders according to the user-designed schedule. All augers operate according to the auger schedule and all feeders work according to the feeder schedule.

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.

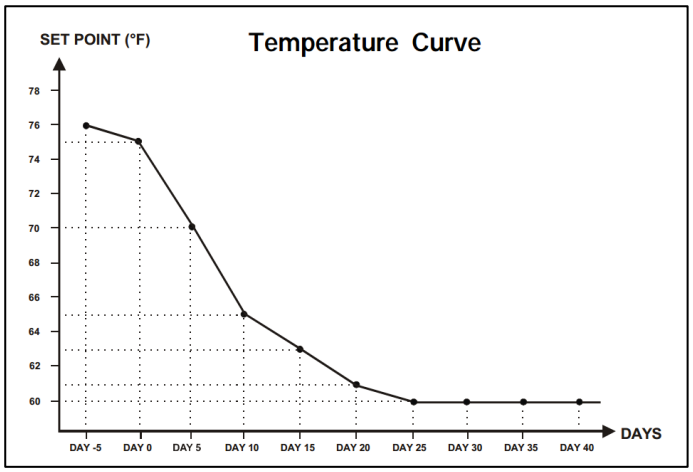


Figure 29: Temperature Curve Example

In addition the Temperature Curve has secondary functions:

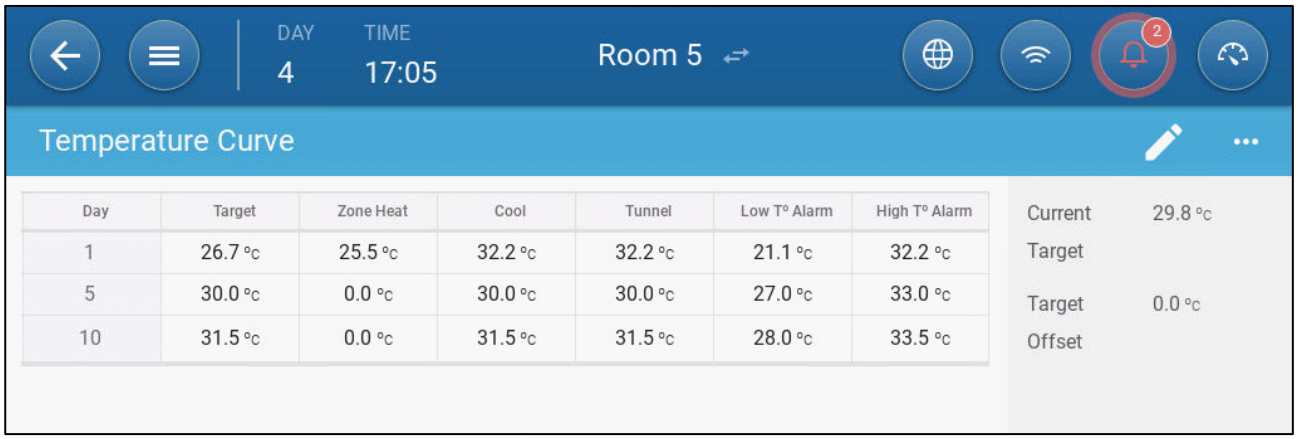
- Defines when heating begins in cases where the actual temperature drops below the target temperature (**Heat**).
- Defines when heating turns off.
- Defines when an alarm is sent when temperatures are too low (**Low Alarm**)
- Defines when an alarm is sent when temperatures are too high (**High Alarm**)

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.



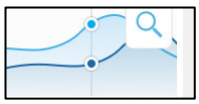
2. Configure up to 10 points in the curve.
3. Define:
   - Day: Define the growth day at which each temperature spec applies. Each day must have a unique number. Range: 0 – 999.
   - Target: Target temperature is the required temperature for the pig house. All ventilation calculations are based on this specification. Range -40⁰ to +90⁰ 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 +90⁰ C.

NOTE Zone Heat and Cool appear if a zone heater and cooler are defined in Mapping Devices, page 49.

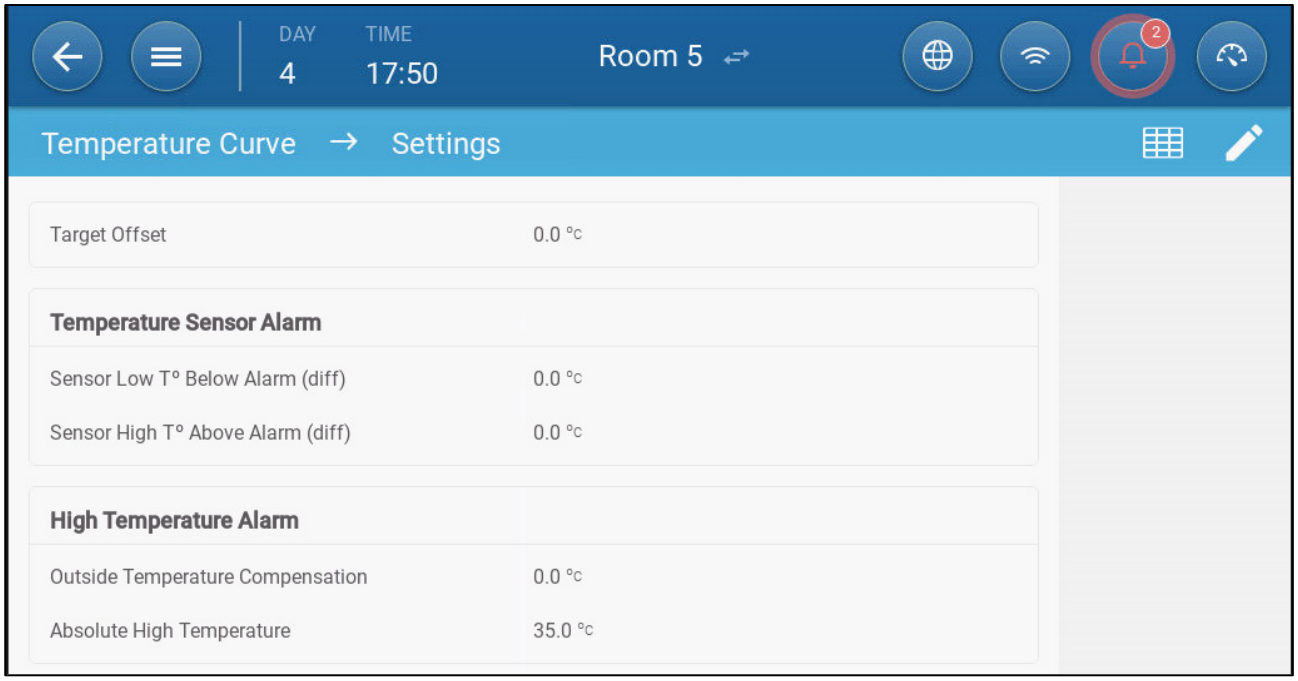
   - Tunnel: This parameter is the set point at which tunnel ventilation begins. When the target temperature changes, this number changes accordingly. Range: Target temperature to +90⁰ C.

NOTE Zone Heat and Cool only appear if relays are defined as Zone Heaters or Cooler (refer to page 49). Tunnel appears if Tunnel Ventilation is enabled in Ventilation Settings (page 119).

   - 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 Introduction to Ventilation

Defining Munters' TRIO ventilation consists of three elements:

- Defining the Minimum and Maximum Ventilation: Defining the minimum and maximum ventilation defines how much air is required for any given growth day. Based on these requirements, TRIO determines which fans run.
- Defining the Fans/Ventilation Scheme: Defining the fans/ventilation determines how much air the fans provide and which fans provide the air.
- In addition, TRIO controls the inlets and tunnel doors.. There are two ways to control the inlets and tunnel doors:
    - Static pressure: Based on the difference in the interior and exterior air pressures, TRIO continually calculates the inlets'/doors' opening positions. When inlets/doors change to another level, they do so before the fans increase/decrease to that level. Note that TRIO uses the positions assigned to the inlets/tunnel doors levels as the minimum position.
    - Position control: The user can define the opening positions of the inlets, outlets, and tunnel doors by level. Note that when inlets/doors change to another level, they do so before the fans increase/decrease to that level.
    - Inlet control is fully explained in Inlet and Curtain Ventilation, page 113.

11.1 Defining the Minimum and Maximum Ventilation

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

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

Options:

- Day curve only.
- Dynamic Ventilation: This option enables increasing or decreasing the minimum/maximum ventilation based on the outside temperature.
    - Dynamic minimum: The controller adjusts the minimum between the cold and warm set points according to the warm and cold outside temperature set points.
    - Dynamic maximum: The controller adjusts the maximum between the maximum cold and max warm set points according to the warm and cold outside temperature set points.

For more information, refer to Defining Dynamic Ventilation, page 99.

- Ventilation by Weight: The user defines the amount of air to be supplied to the birds, based on their cumulative weight. For more information, refer to Ventilation by Weight, page 101.
- Curve: TRIO calculates a curve between growth days; the increase between days is steady. If a curve is not enabled, ventilation increases at the next defined growth day. For more information, refer to Adding a Curve, page 102.

11.2 Defining the Fans/Ventilation Scheme

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

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

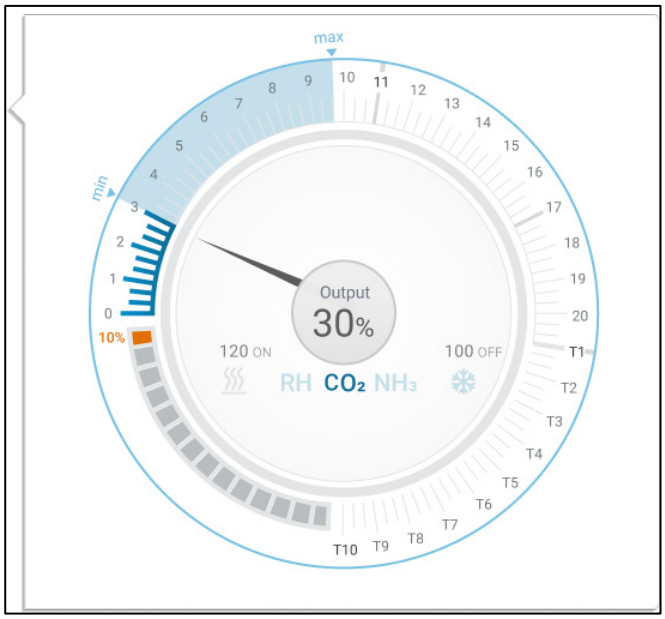
11.2.1 BASIC VENTILATION

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

- Depending on the type of fans installed, Basic Ventilation supports on-off fans, variable fans, and efficiency fans. In addition, fans can run in a cycle (option).
- If the Basic Ventilation runs at 100% (the highest amount of air defined) and the temperature continues to rise, TRIO switches to Extra or Tunnel Ventilation (if enabled).

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

Refer to Basic Ventilation, page 105 for more details.

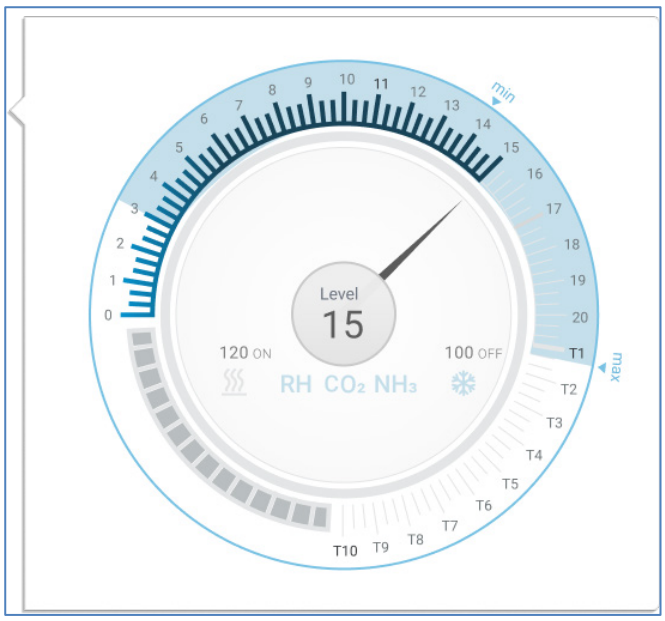


11.2.2 EXTRA VENTILATION

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

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

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



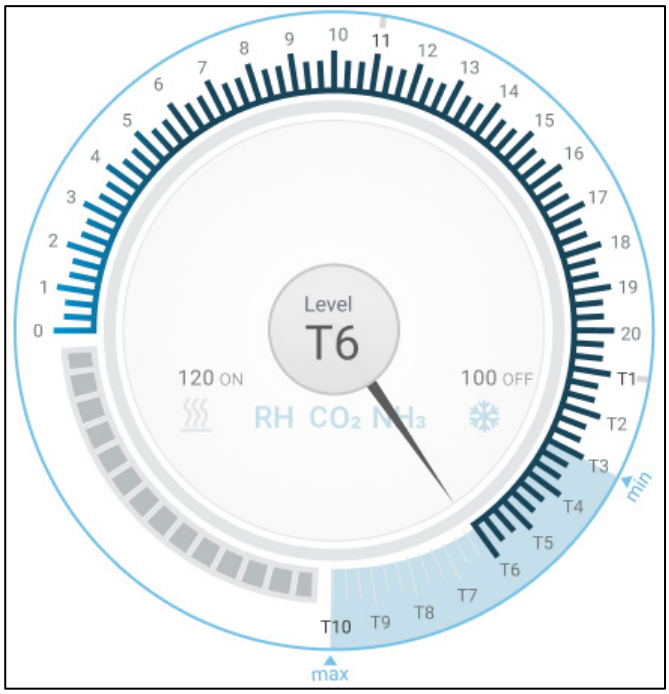
Refer to Extra Ventilation, page 117 for more details.

11.2.3 TUNNEL VENTILATION

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

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

In this example, tunnel fans are at level T6.



Refer to Tunnel Ventilation, page 119 for more details.

12 Minimum and Maximum Ventilation

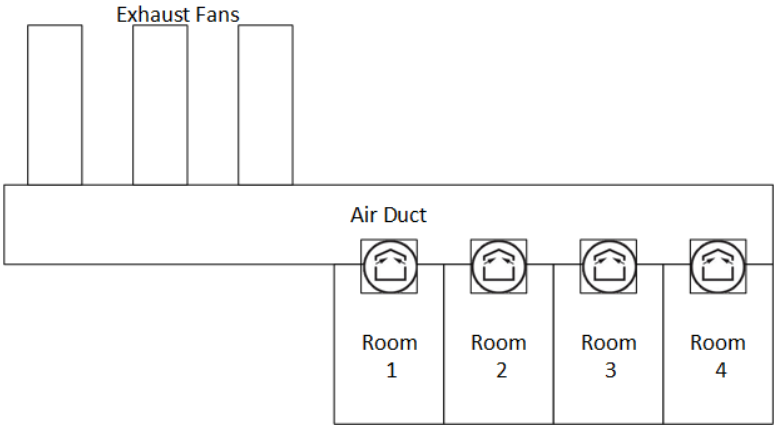
The following sections detail how to configure the minimum and maximum ventilation levels by growth day. As the temperature rises above the target temperature, TRIO gradually increases ventilation level using a combination of increased fan speeds, cycle times, opening the inlets and more.

- Building Structure Summary
- Defining Basic Ventilation
- Measuring Fan

12.1 Building Structure Summary

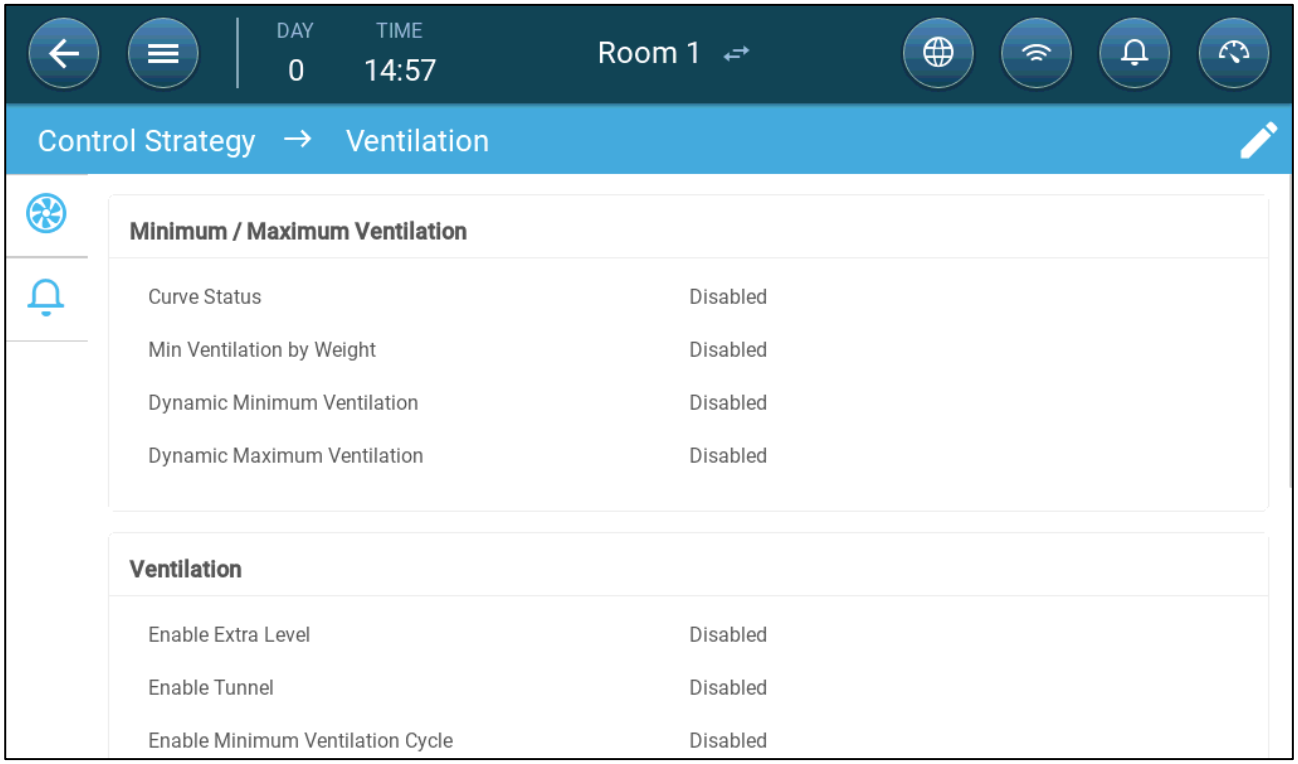
In a typical setup, herds are housed in a building in which all rooms are connected to one central ventilation system. Each room has an inlet which controls the amount of air entering. Centralized fans push air in via the inlet.

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.

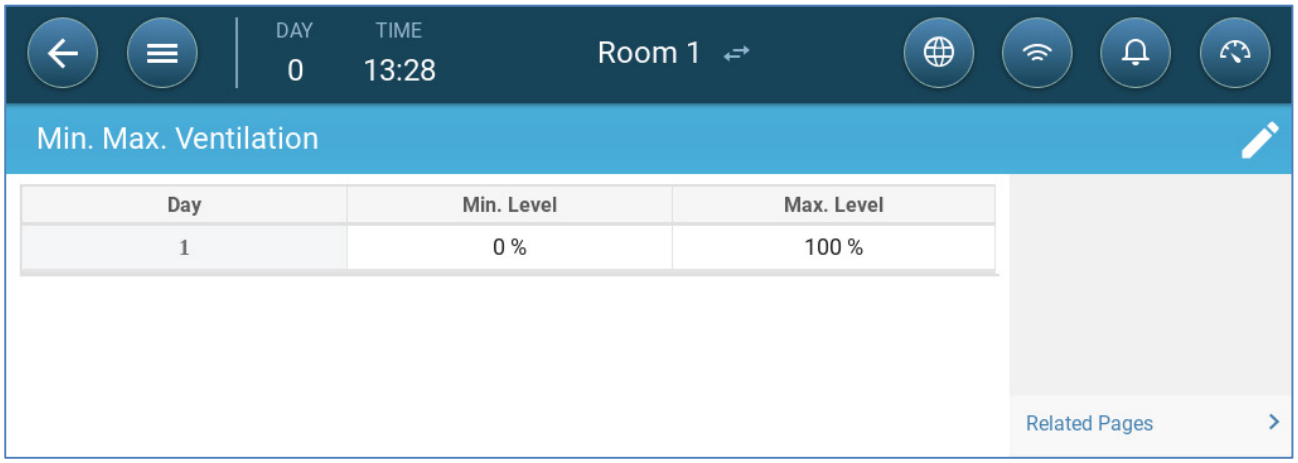


12.2 Defining Basic Ventilation

1. Go to System > Control Strategy > Ventilation .



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



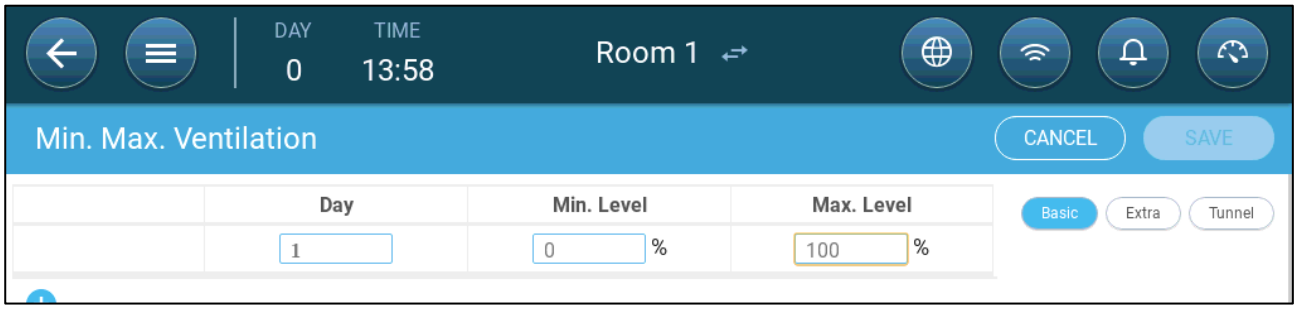
4. Click .
5. Define:
   - Day: Set the growth day for the required min/max set points. Each day must have a unique number. Add up to ten lines.
   - Min/Max percentage: Define the minimum and maximum ventilation percentages. TRIO will automatically adjust the ventilation as the temperature changes.

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

6. In System > Control Strategy > Ventilation , enable Extra Ventilation and/or Tunnel (refer to Defining Extra Ventilation, page 118).

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

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



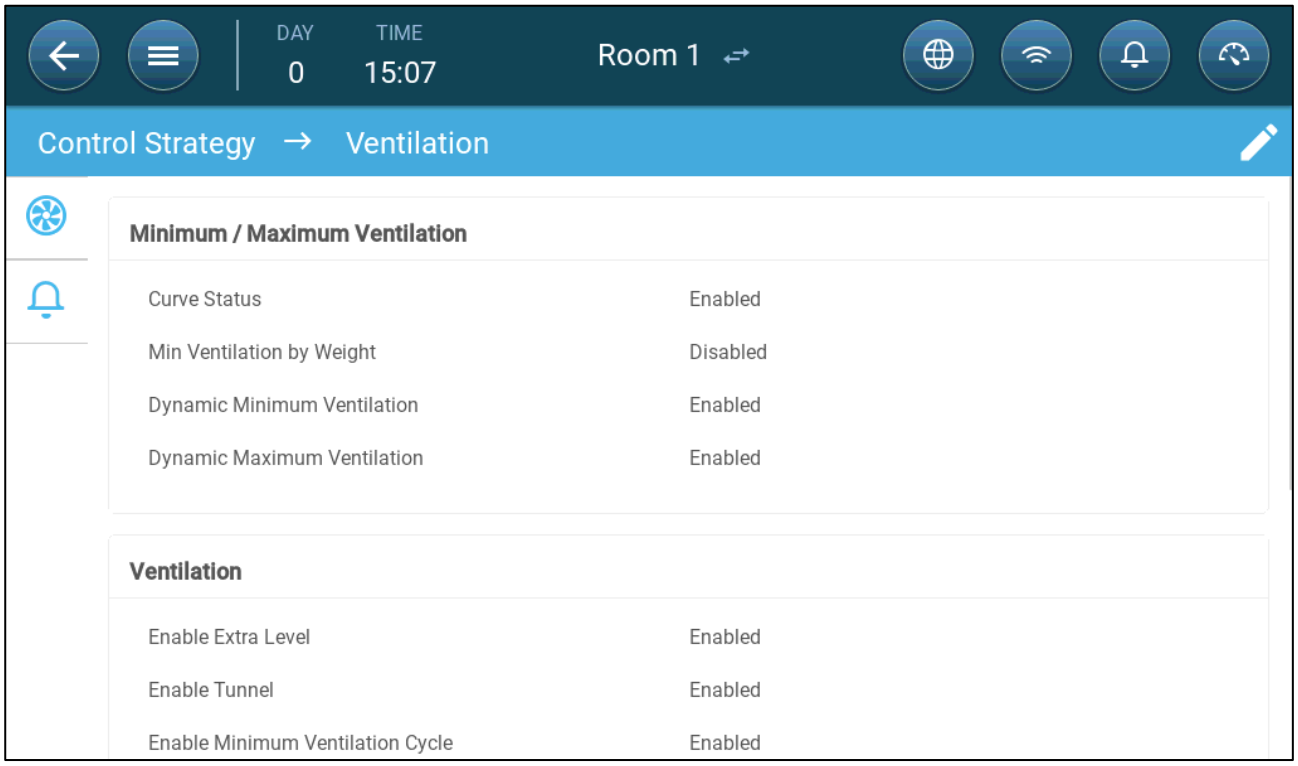
9. Click the required ventilation icon.

10. Define the ventilation as required.

12.2.1 Defining Dynamic Ventilation

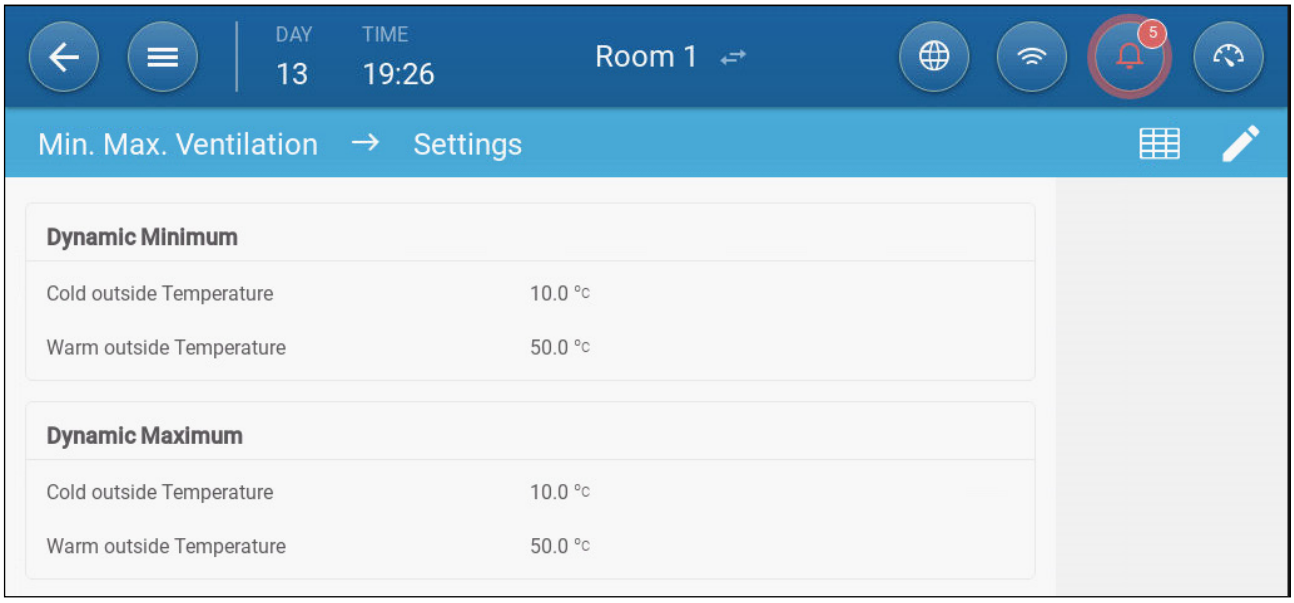
Dynamic Ventilation means that at extreme temperatures (which the user defines), ventilation can be increased or decreased.

1. Go to System > Control Strategy > Ventilation .

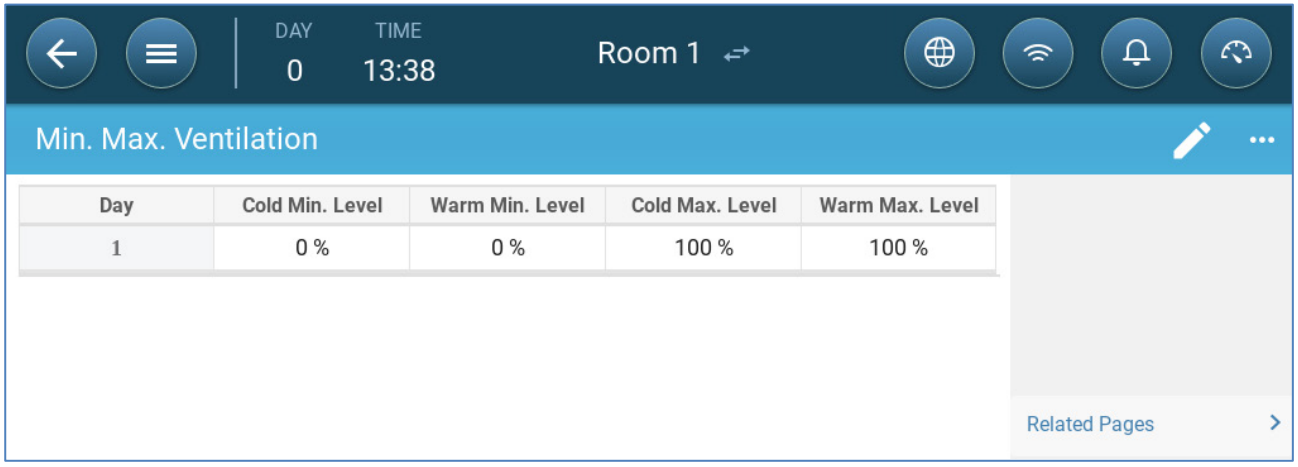


2. Under Minimum / Maximum Ventilation, enable:
   - Dynamic Minimum Ventilation or
   - Dynamic Maximum Ventilation or
   - Both. In this example both are enabled.

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



4. Define:
   - Dynamic Minimum Cold/Warm Outside 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.



Day	Cold Min. Level	Warm Min. Level	Cold Max. Level	Warm Max. Level
1	0 %	0 %	100 %	100 %

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.

12.2.2 VENTILATION BY WEIGHT

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

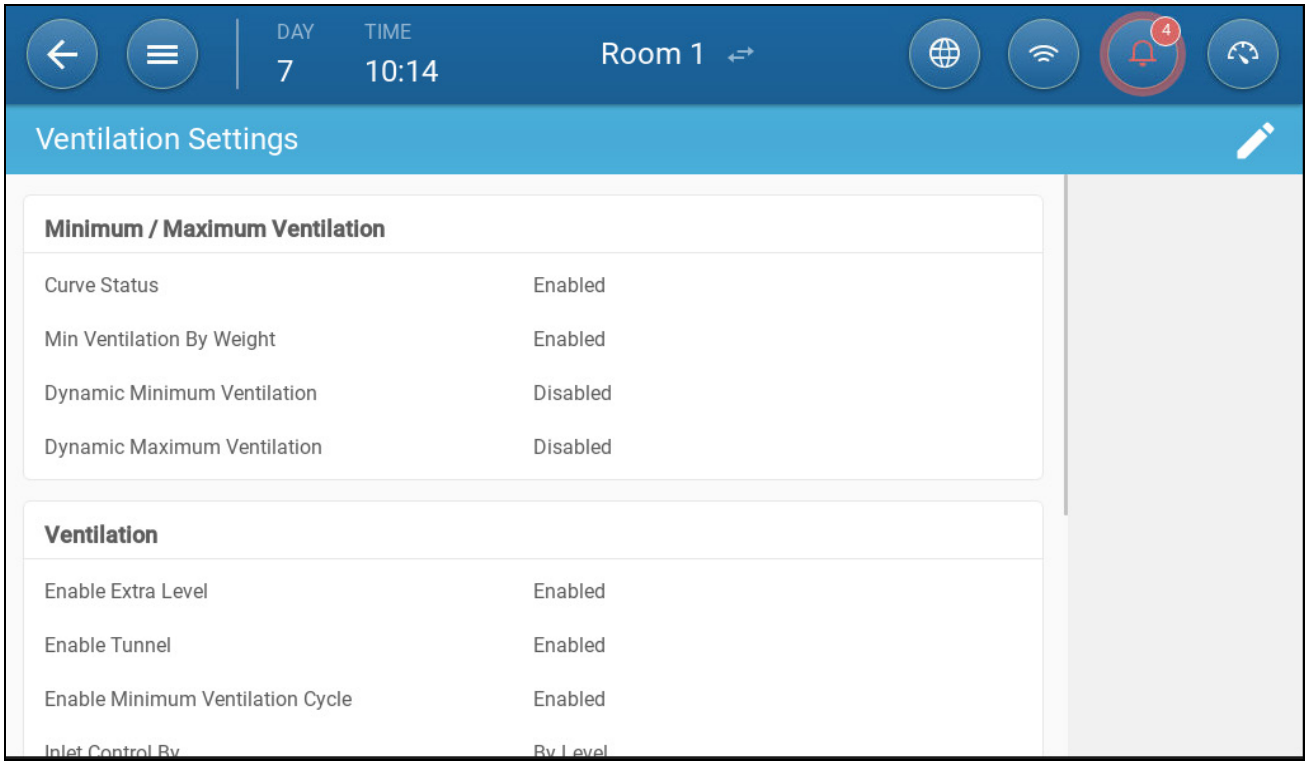
12.2.2.1 How Does Ventilation by Weight Work

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

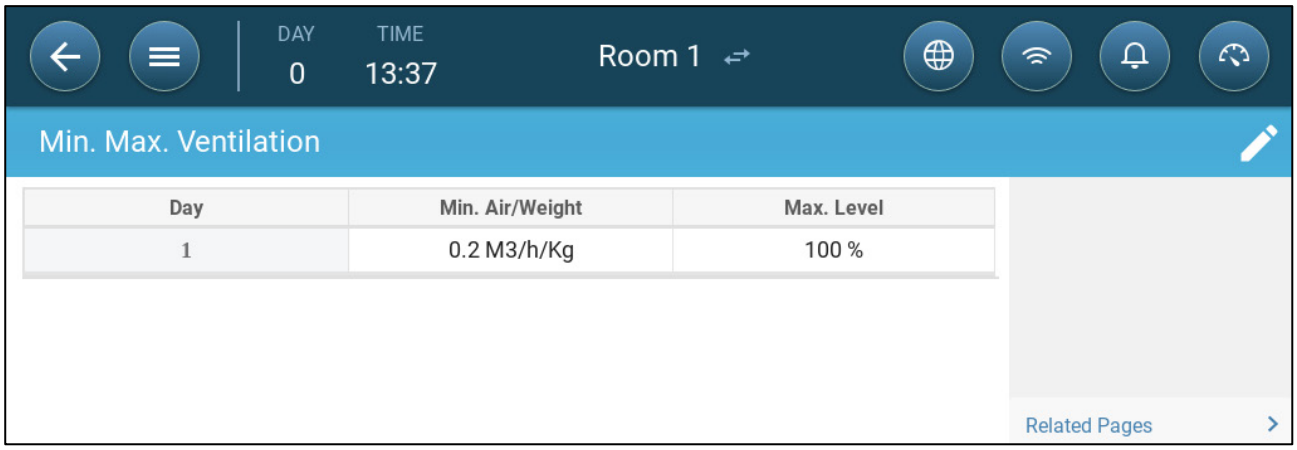
- When using cycle fans, each level has minimum and maximum on times, which determine the minimum and maximum CFM. If the ventilation doesn't provide enough air for the pigs (based on their numbers and weight) TRIO sends an alarm. You will need to redefine the minimum level.
- When using variable speed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

12.2.2.2 Defining the Ventilation By Weight Parameters

1. Go to System > Control Strategy > Ventilation .



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



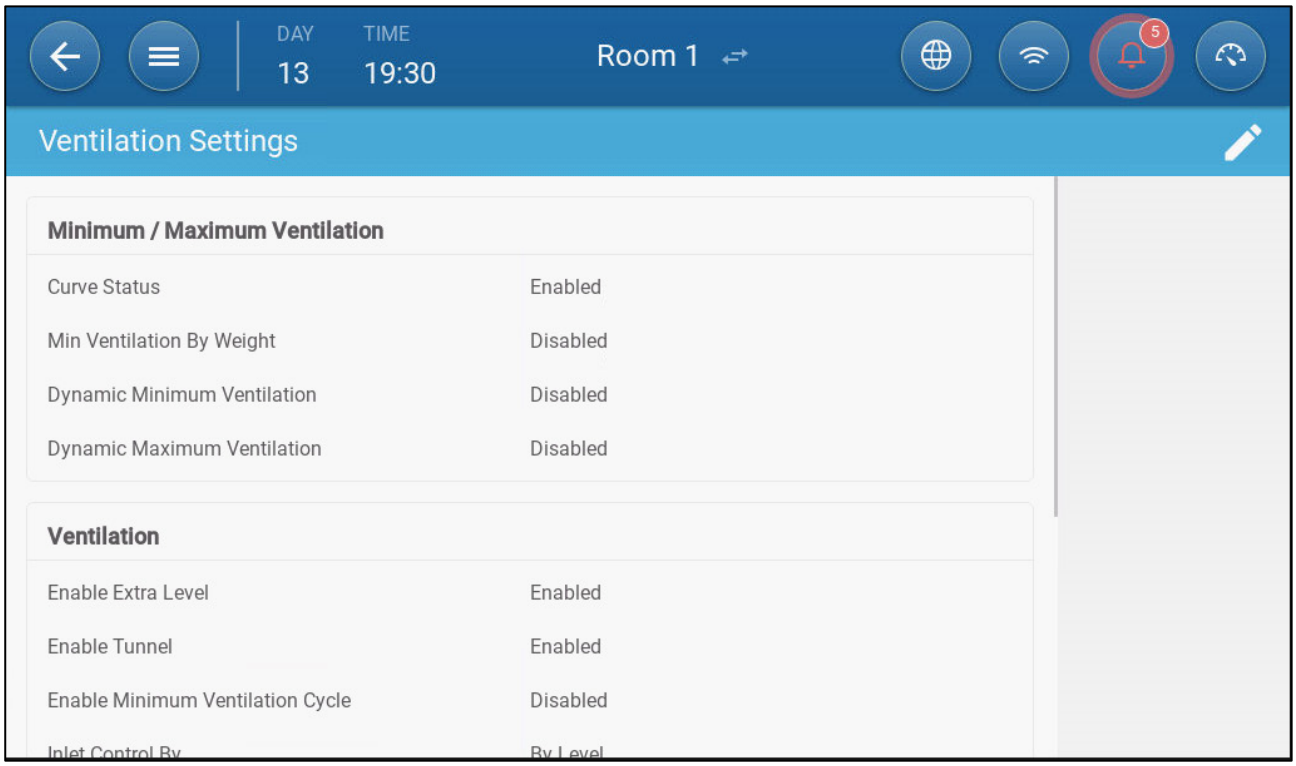
4. Click
5. Define:
    - Min Air Weight: The amount of air per animal's weight to supplied.
    - Max: The maximum ventilation level by growth day.

NOTE If you enabled Dynamic Ventilation, click Settings and define the parameters. Refer to Defining Dynamic Ventilation, page 99.

12.2.3 Adding a Curve

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

1. Go to System > Control Strategy > Ventilation .



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

12.3 Measuring Fan

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

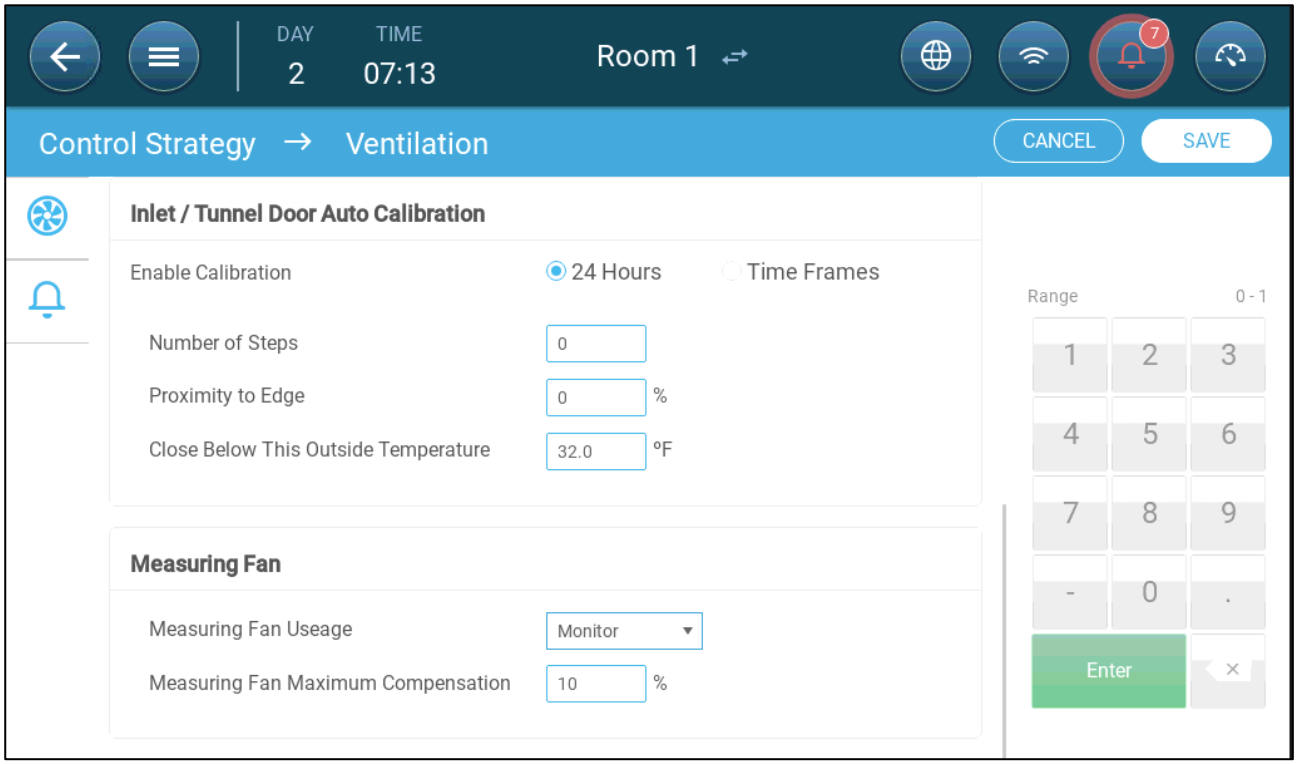
- Measuring real time air speed
- Enable ventilation compensation if the air speed does not meet the calculated minimum ventilation requirements.

➲ **Define a sensor as Measuring Fan. Refer to Mapping Devices, page 49.**

12.3.1 Measuring real time air speed

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

1. Go to System > Devices & Sensor. On the Measuring Fan port:
   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.

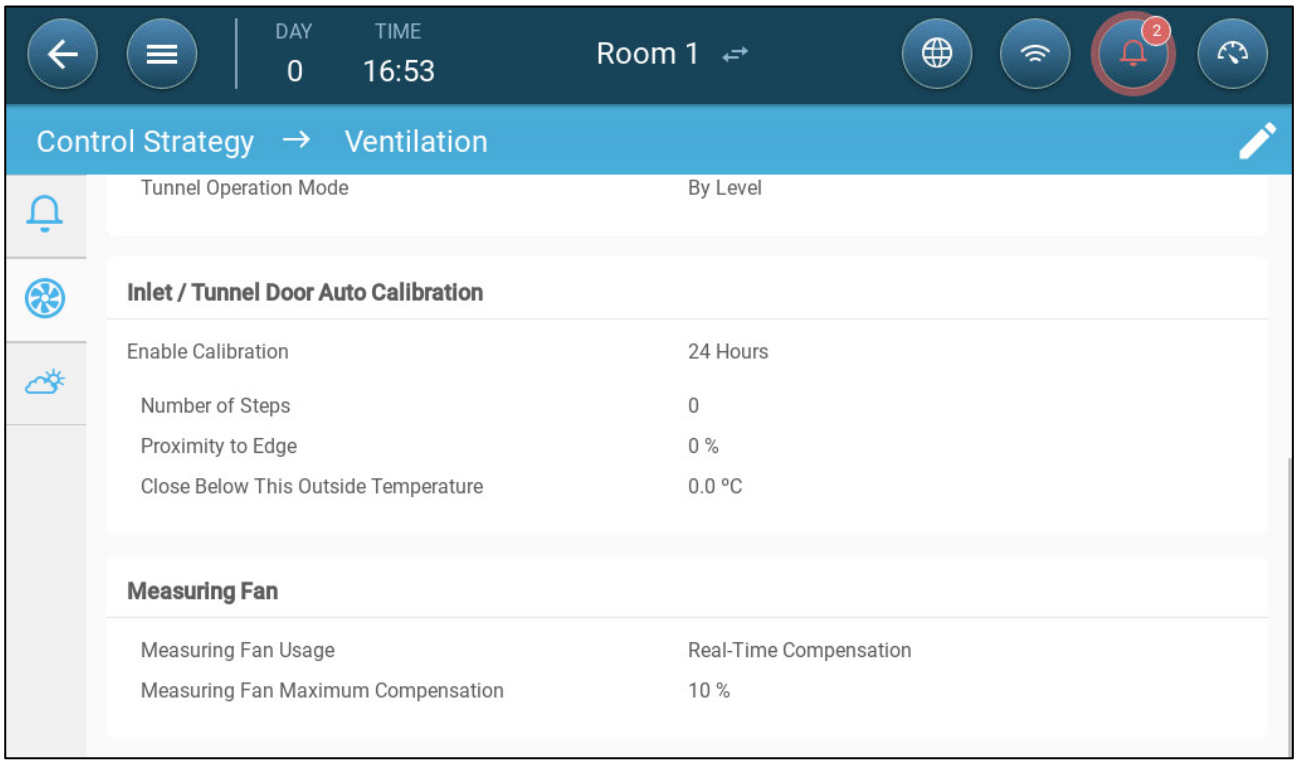
12.3.2 Ventilation Compensation

In this option, the measuring fan is used to ensure that the air volume meets the minimum defined in the Minimum and Maximum Ventilation, page 97. 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 49.**

➲ **Define a relay or analog port as a fan. This fan's capacity must be defined. Refer to Defining the Fans, page 55.**

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%.

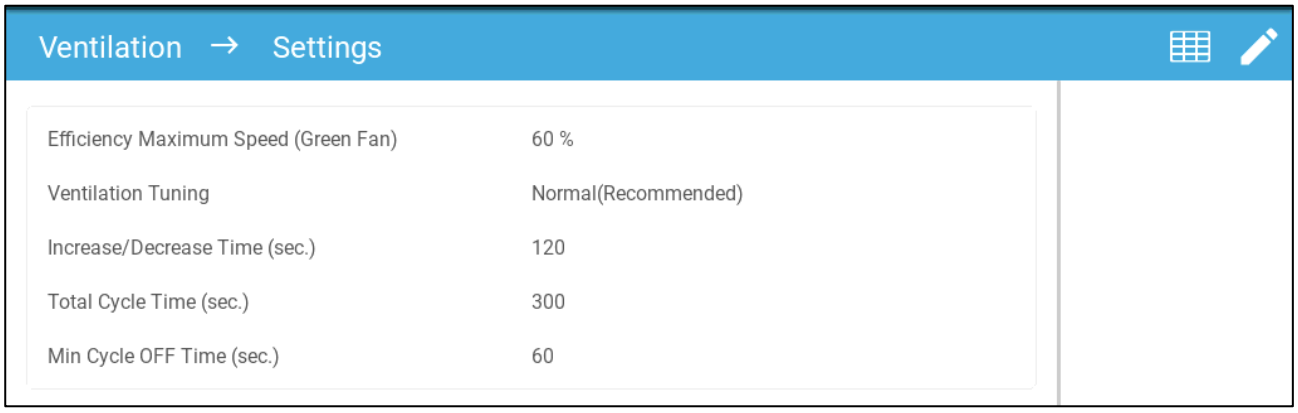
13 Levels of Ventilation

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

13.1 Configuring the Basic Ventilation Settings

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

1. Go to Climate > Ventilation and click .



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

CAUTION *Munters recommends leaving this paramter at Normal.*

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

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

13.2 Basic Ventilation

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

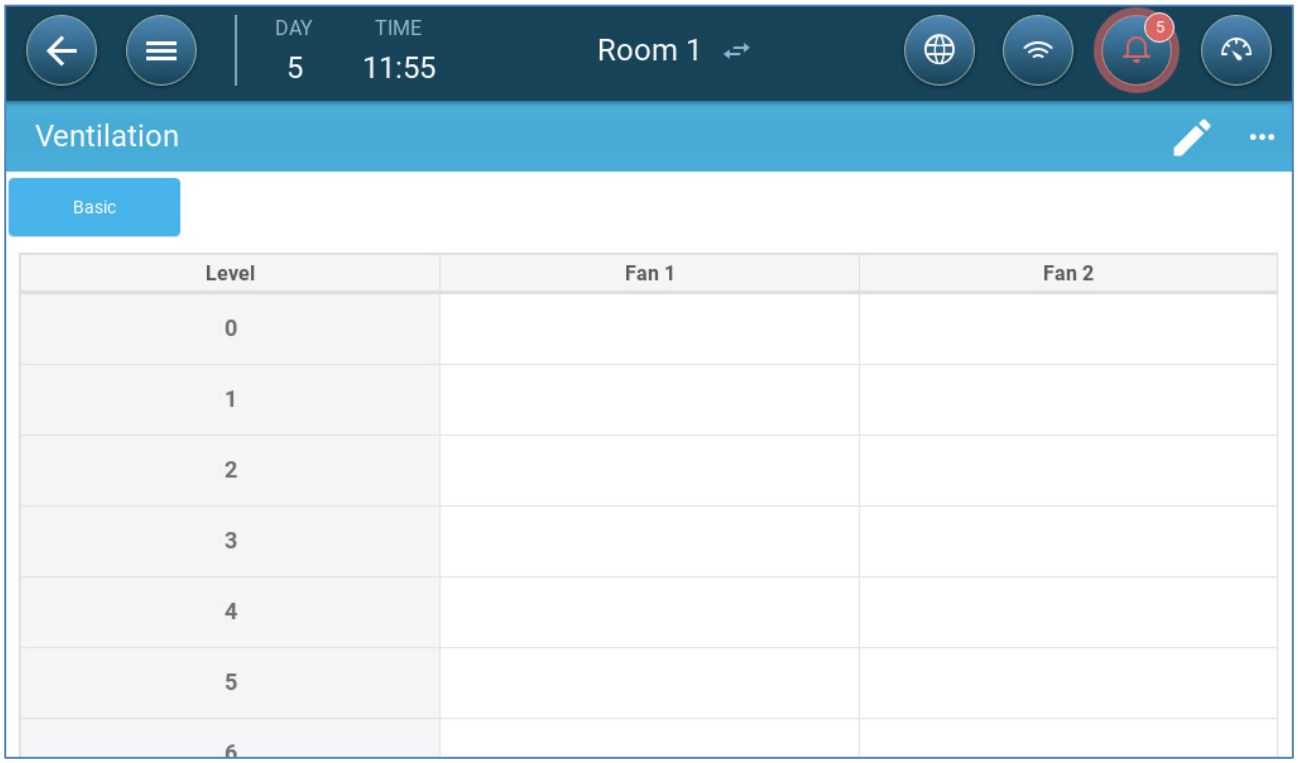
- Defining Basic Ventilation
- Fan Options
- Inlet and Curtain Ventilation

13.2.1 Defining Basic Ventilation

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

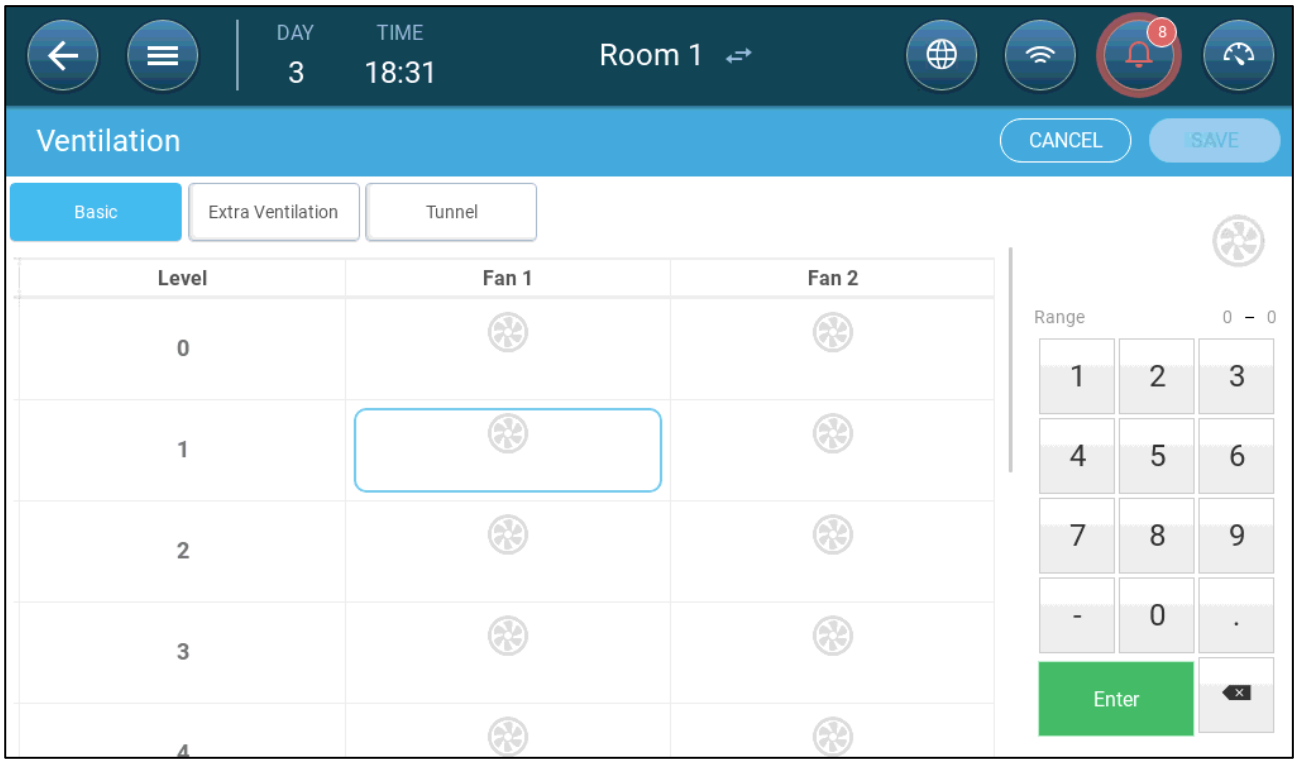
➲ **In Mapping and Defining the Input Output Devices, page 49 map relays and analog output ports to fans, inlets, and stir fans as required. Only mapped devices show up in the following screens.**

1. Go to Climate > Ventilation.

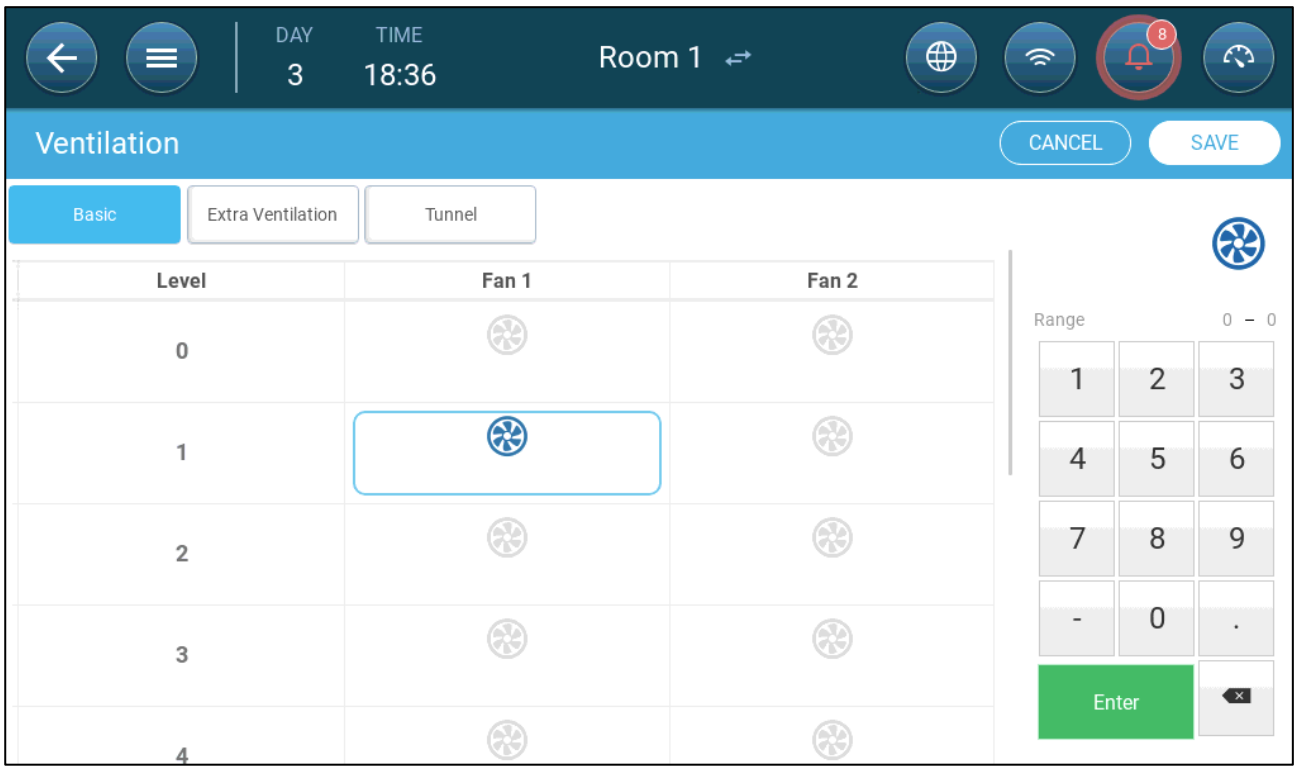


NOTE At this point, fans do not appear.

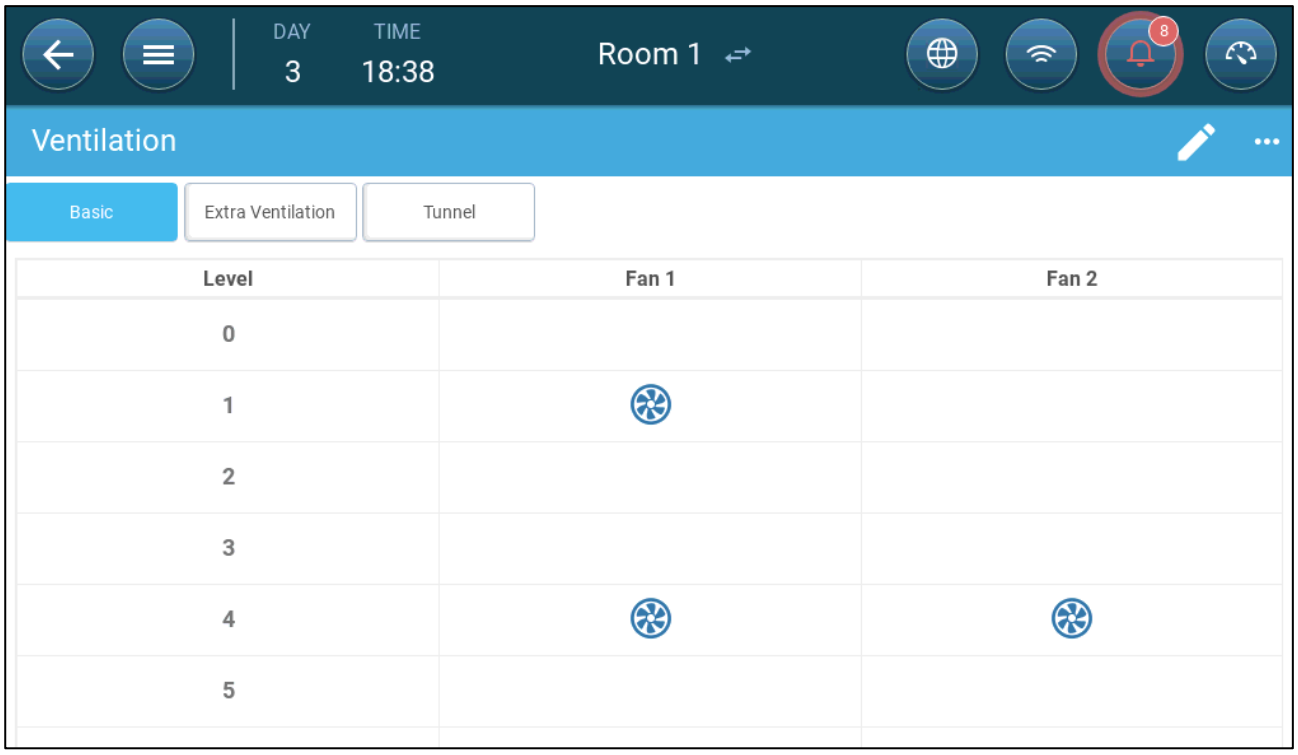
2. Click .
3. Click a relay controlled fan that you want to activate. 1) A box appears around the fan. 2) A fan appears in the upper right.



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.

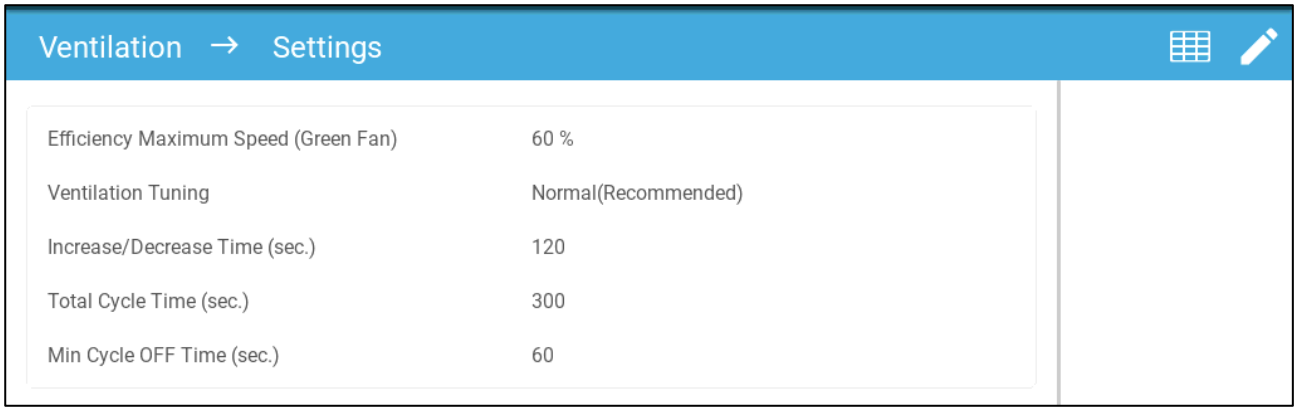
13.2.2 Fan Options

The following sections shows examples of different ventilation options.

- Minimum Ventilation Cycle
- Fans (Efficiency Fan)
- Fan Rotation

13.2.2.1 Minimum Ventilation Cycle

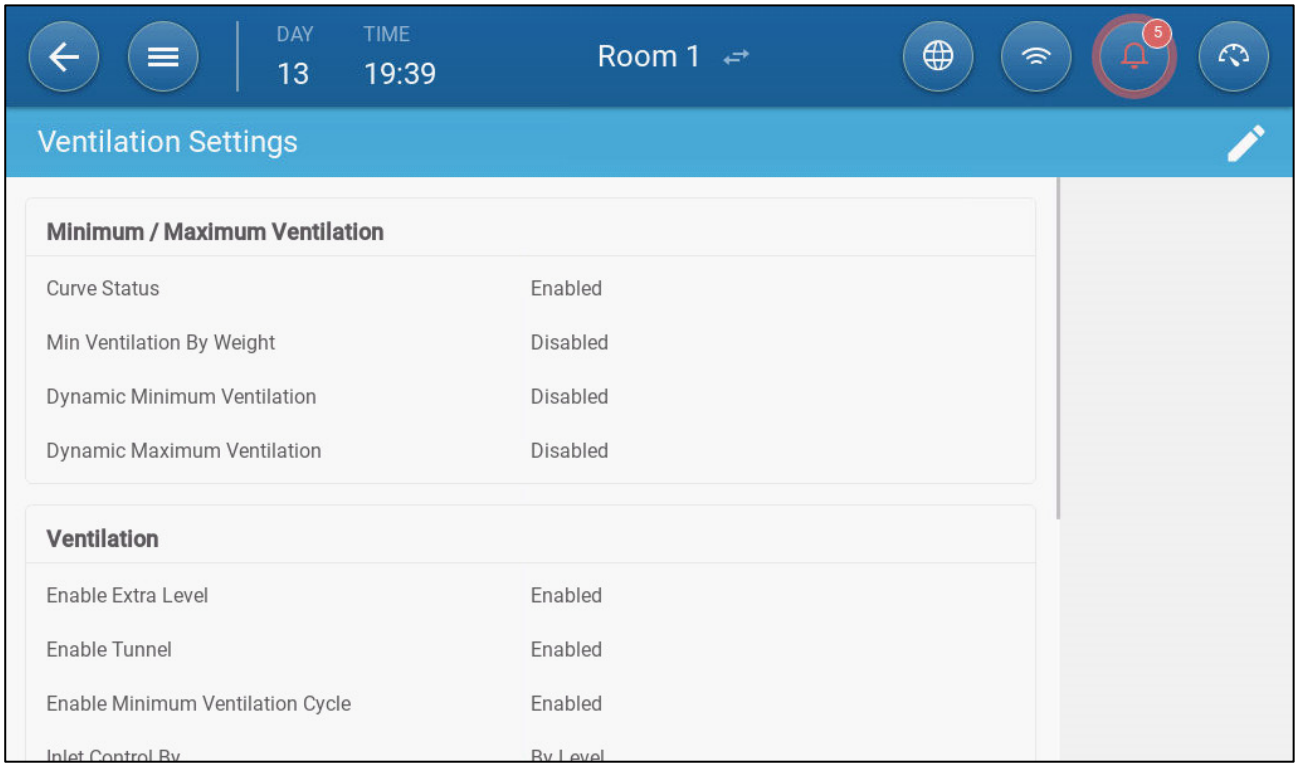
1. Go to Climate > Ventilation > Settings.



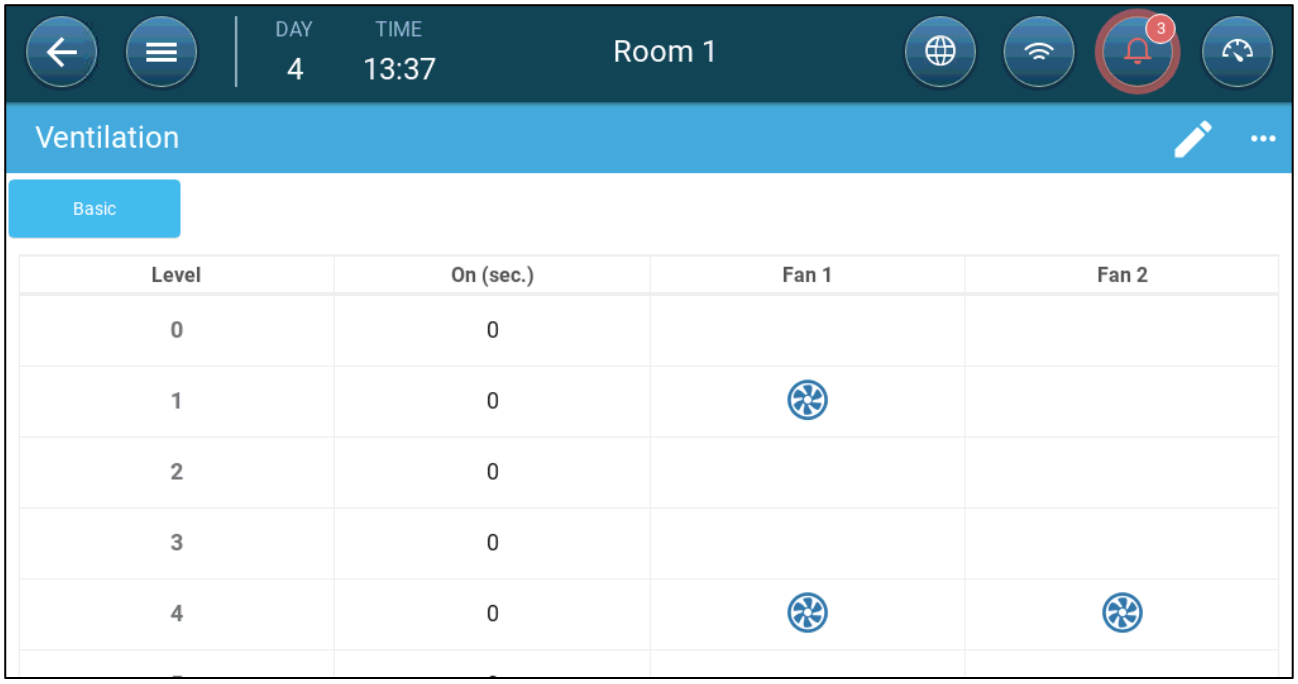
2. Define:
    - Total Cycle Time (sec): Define the minimum ventilation cycle time. Range: 60 – 999 seconds.

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

3. Go to System > Control Strategy > Ventilation .



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



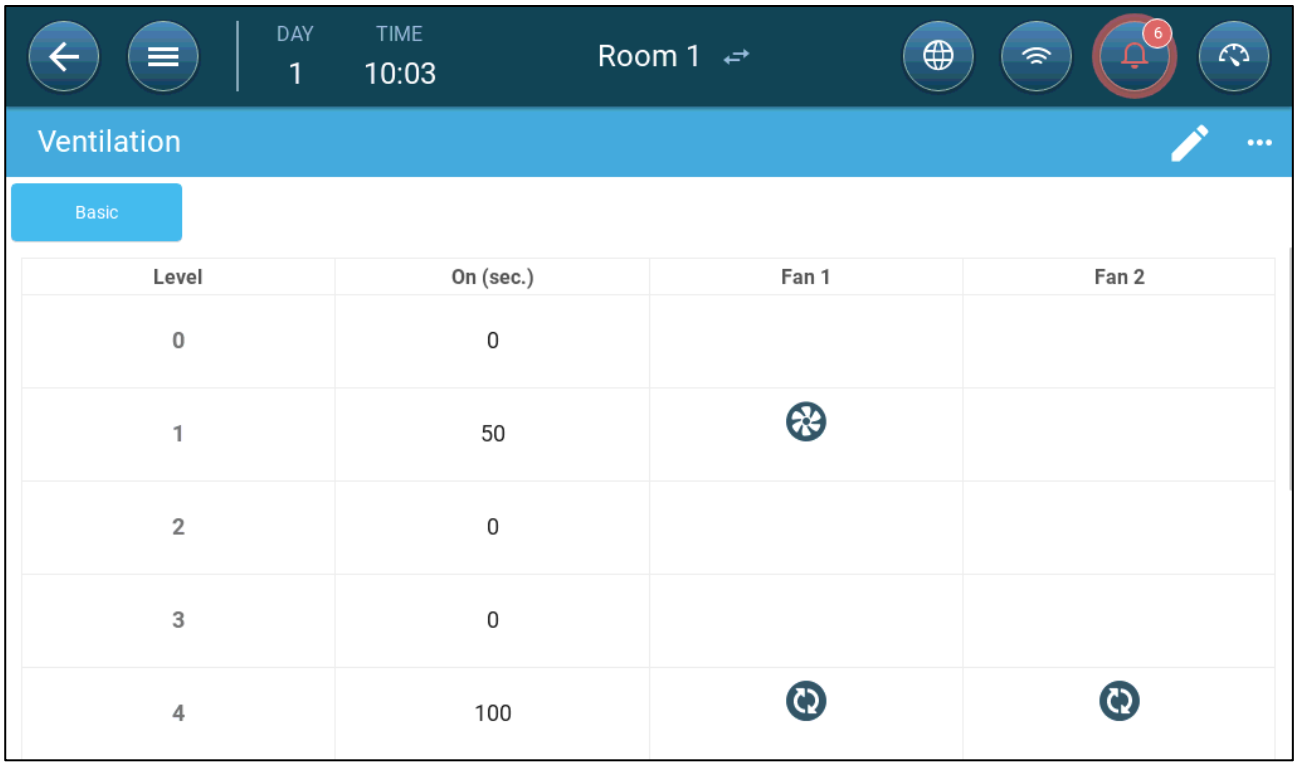
6. To run a fan in cycles:

a. Click .

The symbol appears.

b. Click . The symbol turns blue .

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

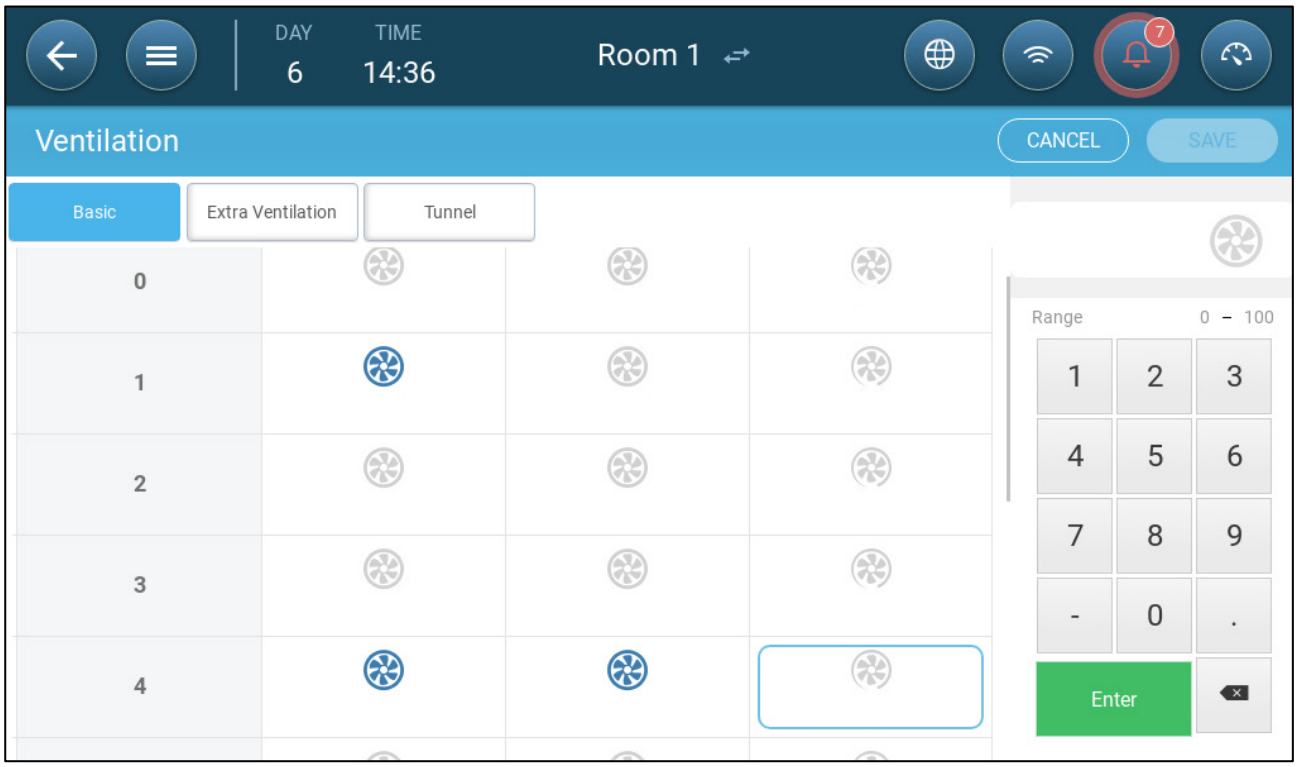


Level	On (sec.)	Fan 1	Fan 2
0	0		
1	50		
2	0		
3	0		
4	100		

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

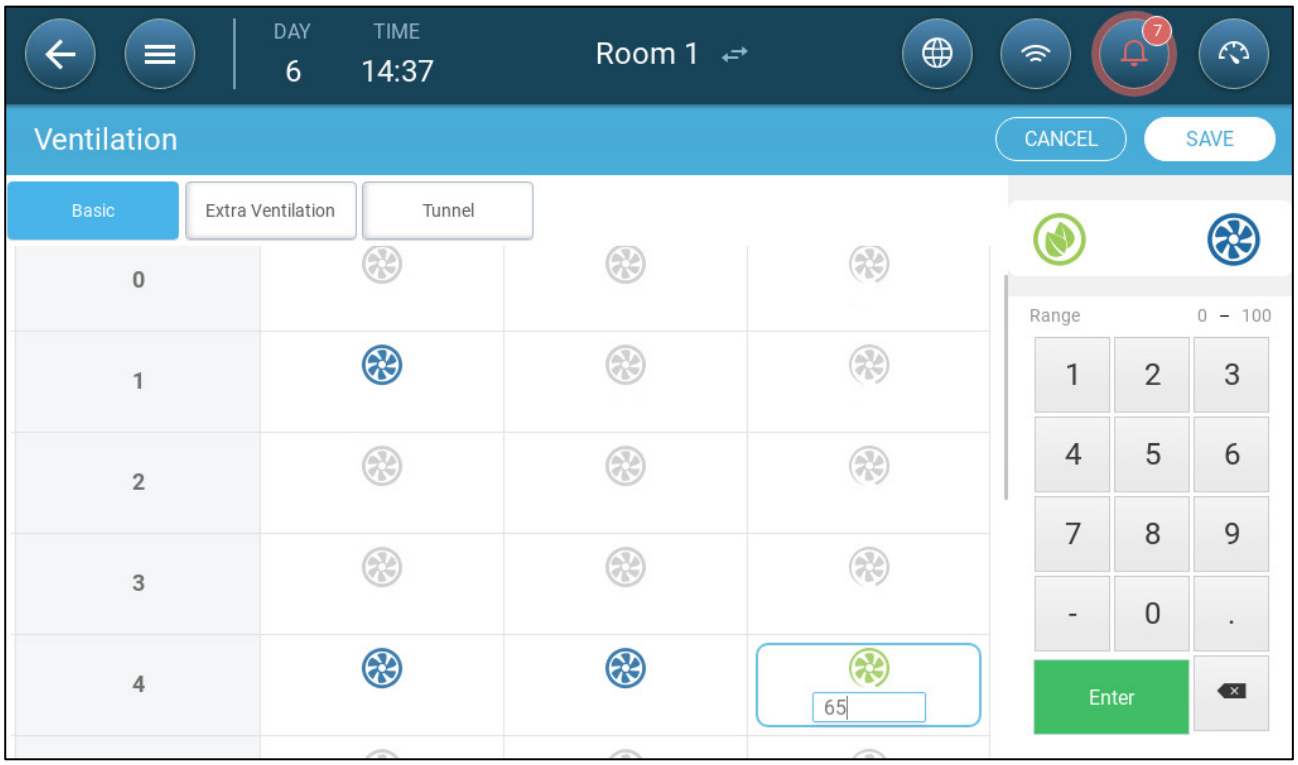
13.2.2.2 Fans (Efficiency Fan)

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

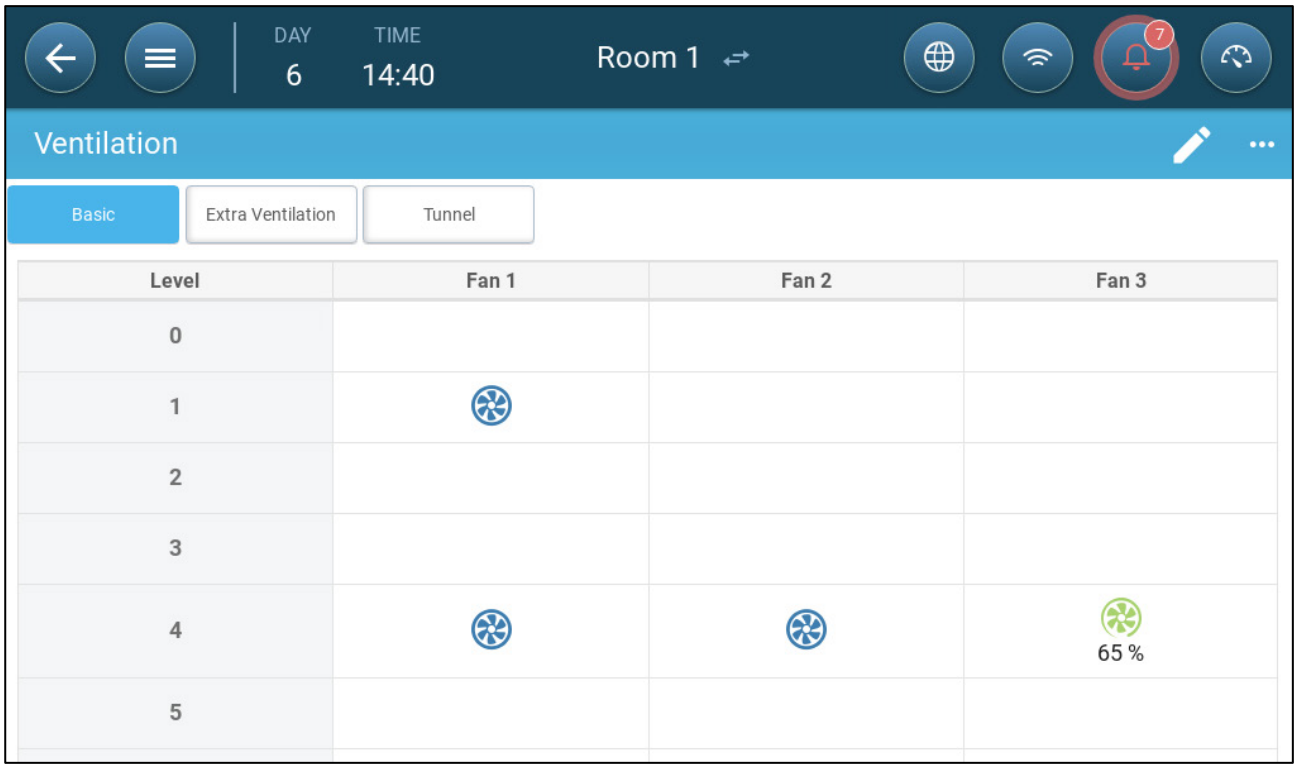


2. Click the fan in the upper right. Both fans turn blue. A percentage appears under the fan.

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



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



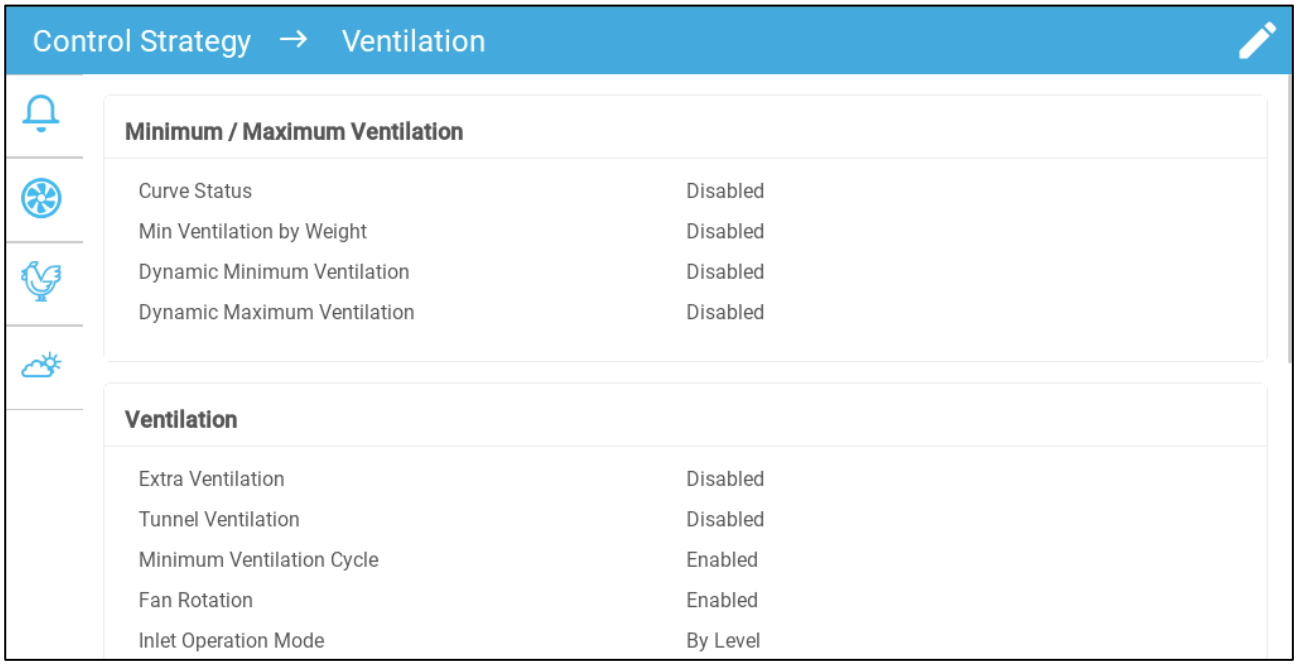
5. In this example Fan 1 and Fan 2 work continuously, and Fan 3 is an efficiency fan whose maximum speed is 65% of the fan's possible speed.

13.2.2.3 Fan Rotation

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

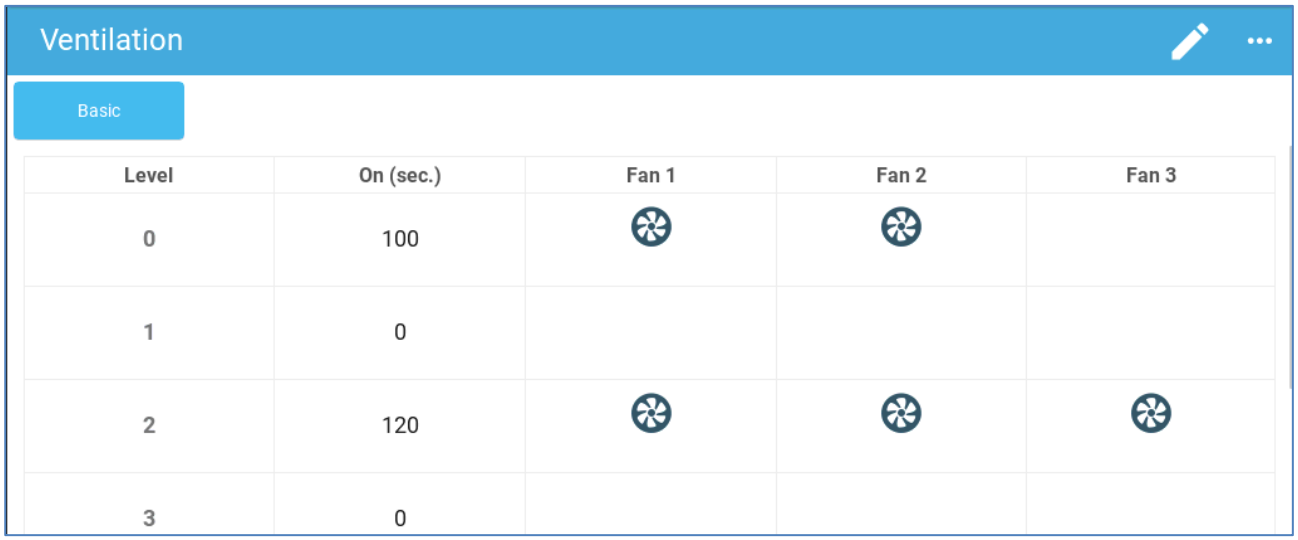
To enable fan rotation:

1. Go to System > Control Strategy > Ventilation.

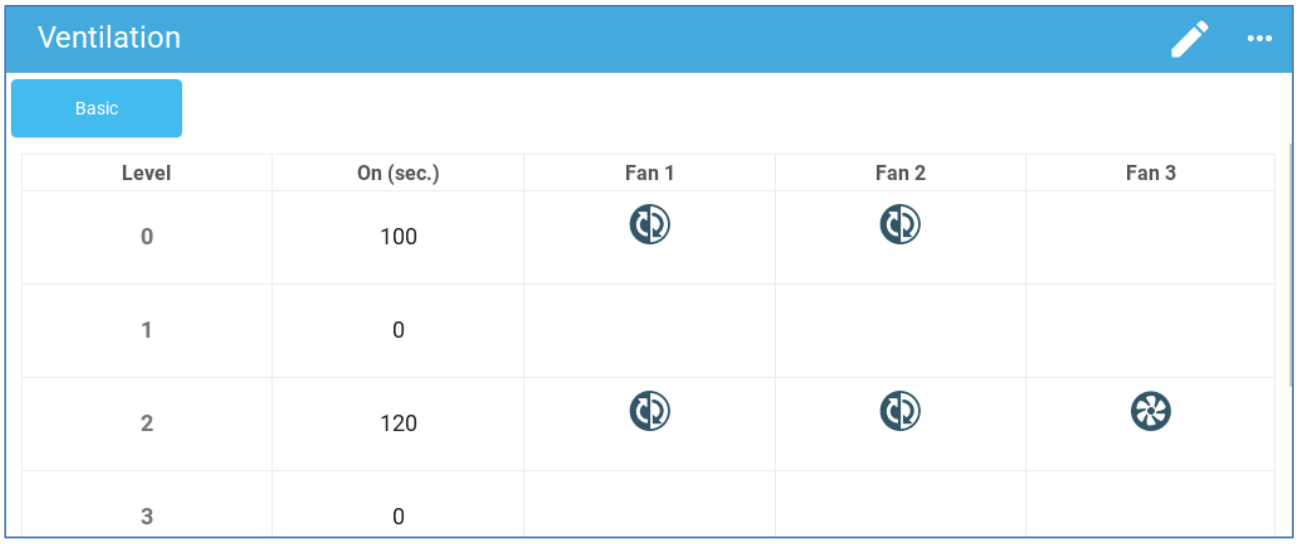


2. Enable Fan Rotation and Minimum Ventilation Cycle.

3. Go to Climate > Ventilation.



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



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

13.2.3 Inlet and Curtain Ventilation

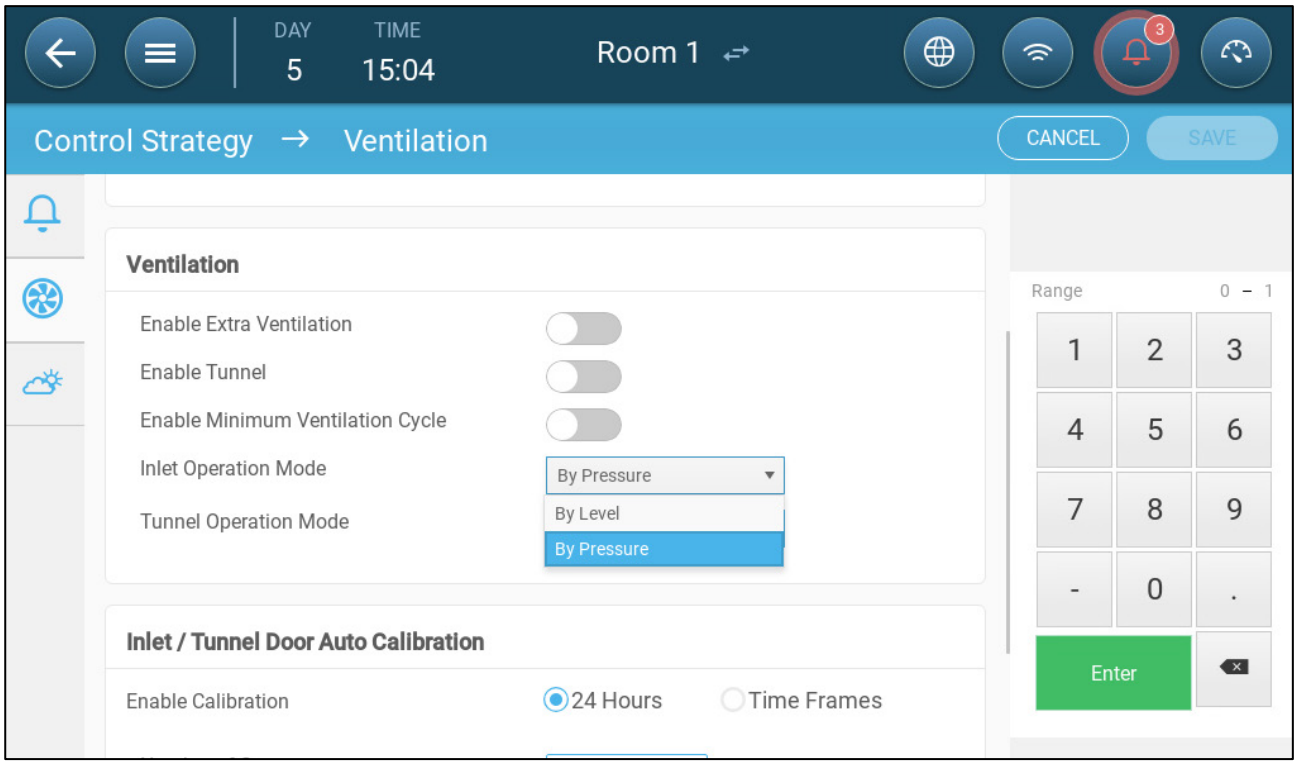
In Basic Ventilation, TRIO enables control over the inlets using one of two methods:

- Level
- Static Pressure

NOTE Outlet control is by level only.

To select the inlet control method:

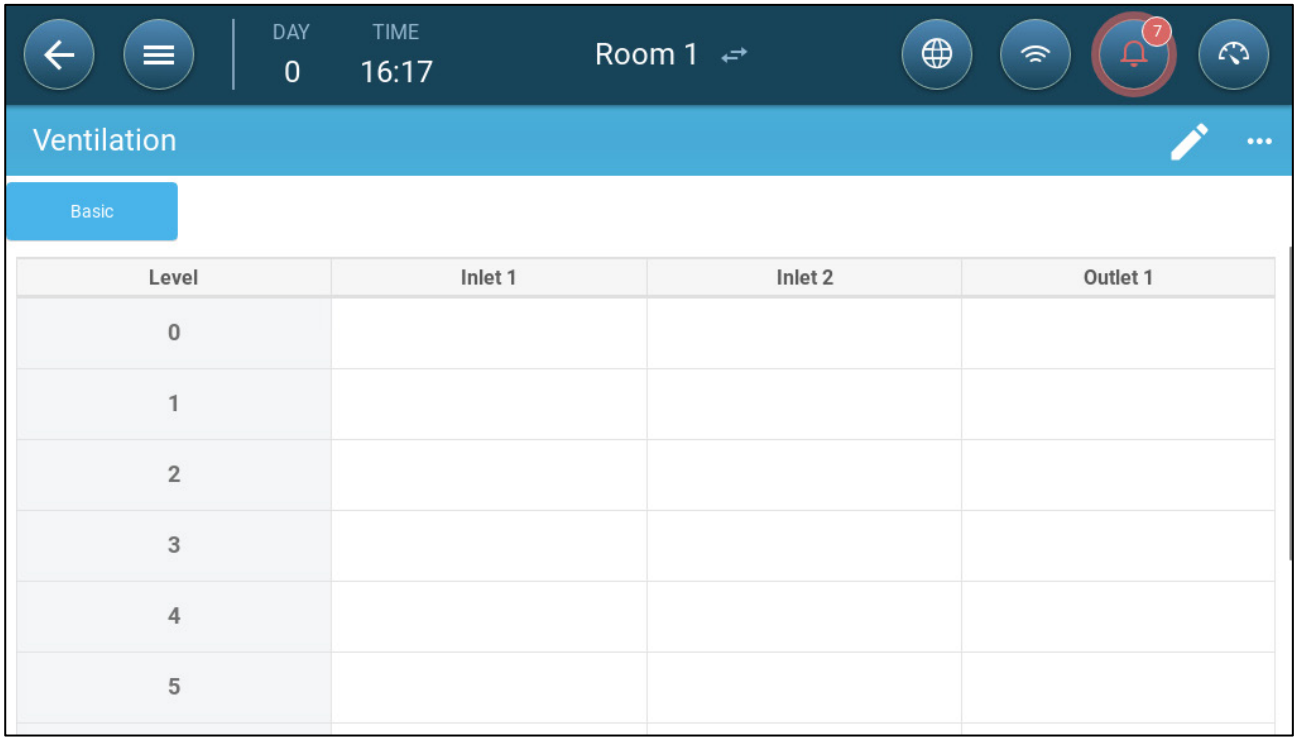
1. Go to System > Control Strategy > Ventilation .



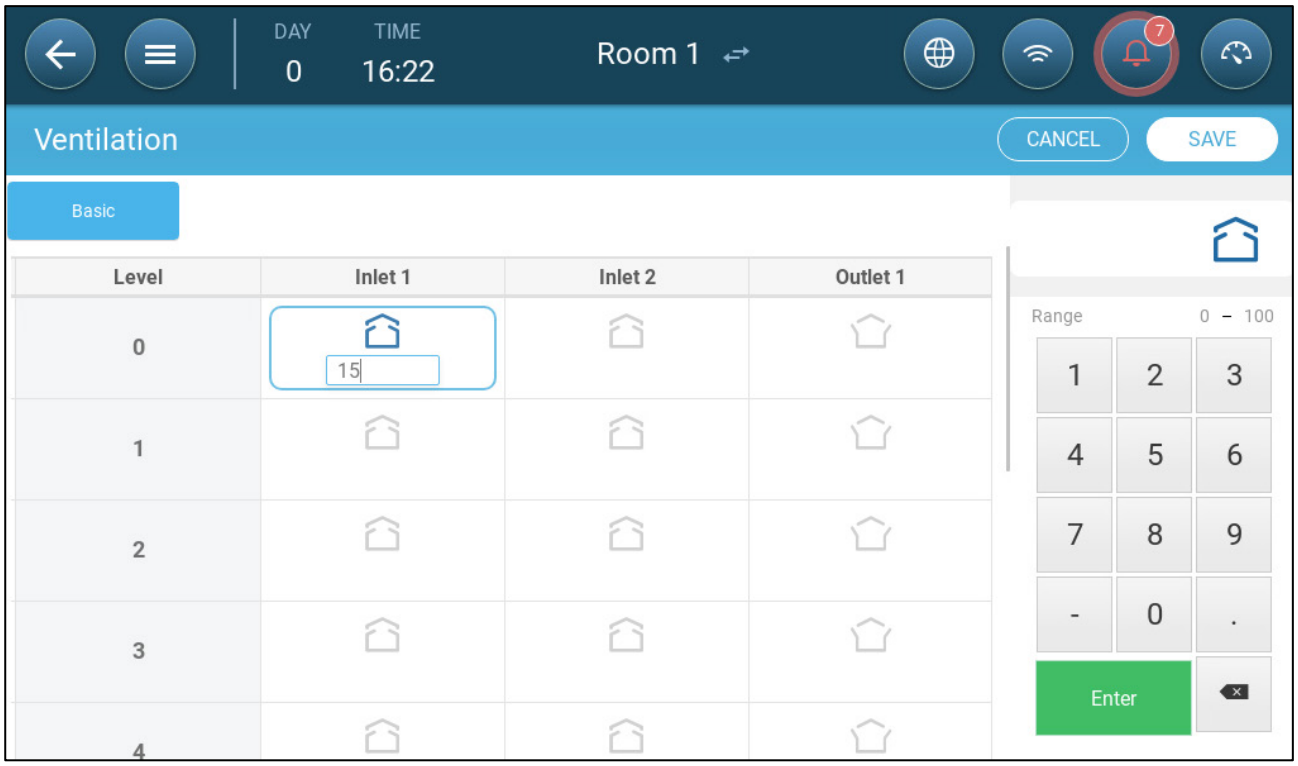
2. Under Inlet Operation Mode, select **Level** or **Pressure**.

13.2.3.1 Level Control

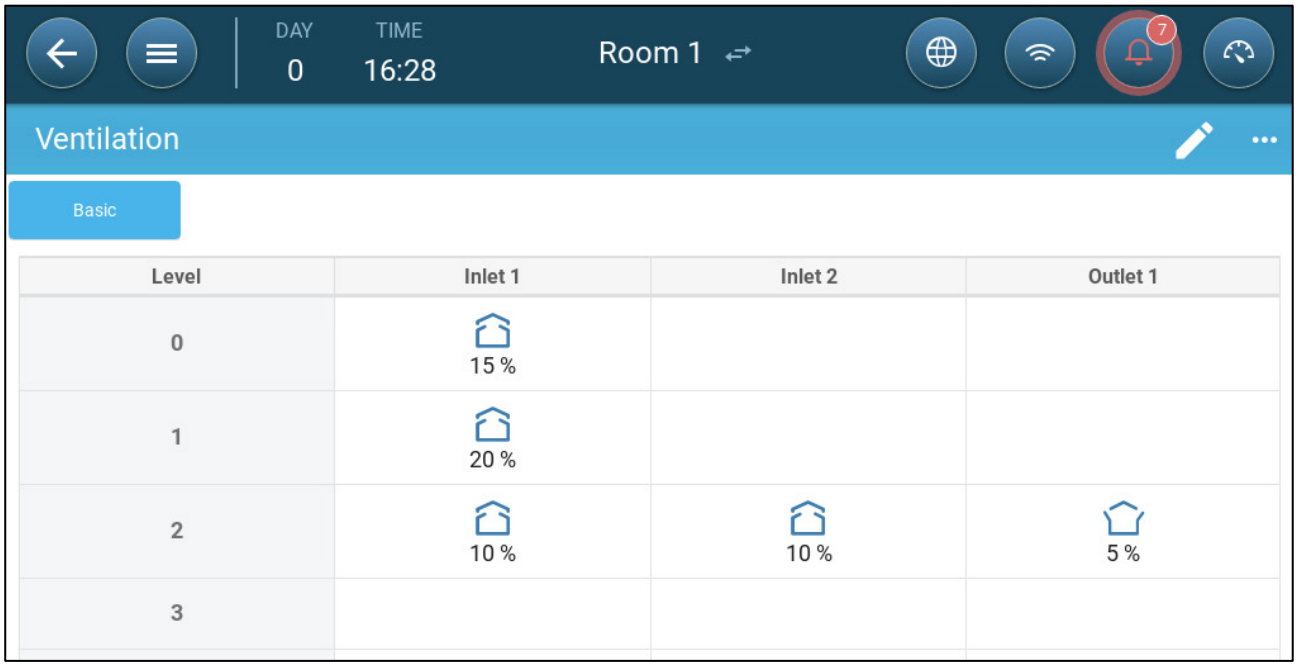
1. Go to Climate > Ventilation.



2. Click .



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



13.2.3.2 Static Pressure Control

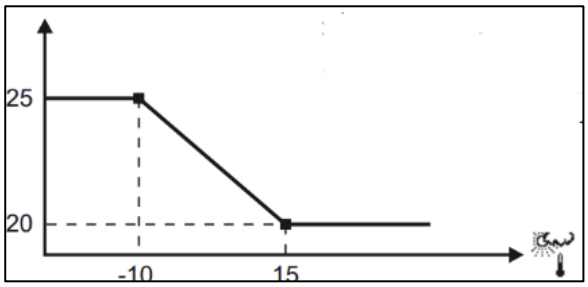
When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Maintaining the proper pressure enables air to enter the rooms at the right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

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

13.2.3.2.1 Static Pressure in Minimum Ventilation or Extra Ventilation

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

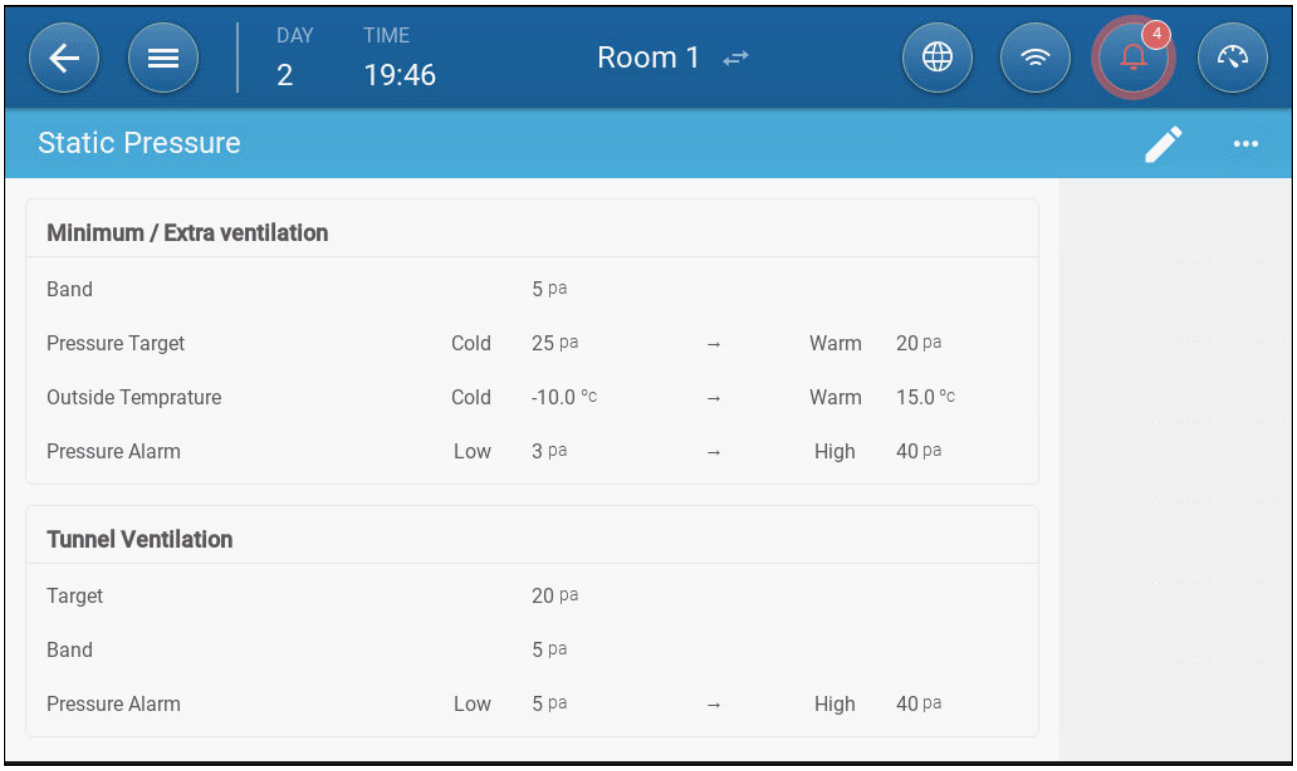


The curve is adjusted according to the outside temperature, in order to maintain the pressure. If the outside temperature is warm, large amounts of slow moving air is allowed to enter the house (low static pressure). When the outside air is cold, the Vent Master adjusts the inlets to allow a low volume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

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

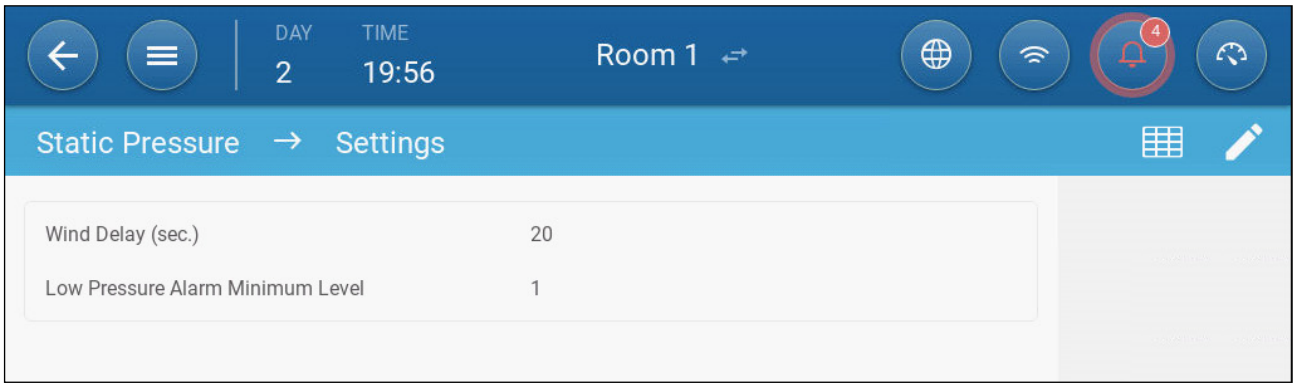
13.2.3.2.2 Static Pressure Main Screen

1. Go to Climate > Static Pressure.



2. Define:
    - Band: The static pressure level below or above which the controller must close or open the inlets to minimize or maximize the ventilation. Range: 0 – 20 Pascal.
    - Pressure Targets: Set the required pressure level for the cold and warm outside temperatures.
    - Outside Temperatures: Set the temperatures at which the inlets open or close. (This parameter requires an outside temperature sensor).
    - Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.

13.2.3.2.3 Static Pressure Settings Screen



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

13.2.3.2.4 High Static Pressure Alarm State

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

- TRIO triggers a High Pressure Compensation event that is recorded.
- Other inlets are opened by 10%. This step is repeated if the pressure does not go down.
- The high static pressure alarms 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.

13.3 Extra Ventilation

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

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

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

- Introduction to Extra Ventilation
- Defining Extra Ventilation

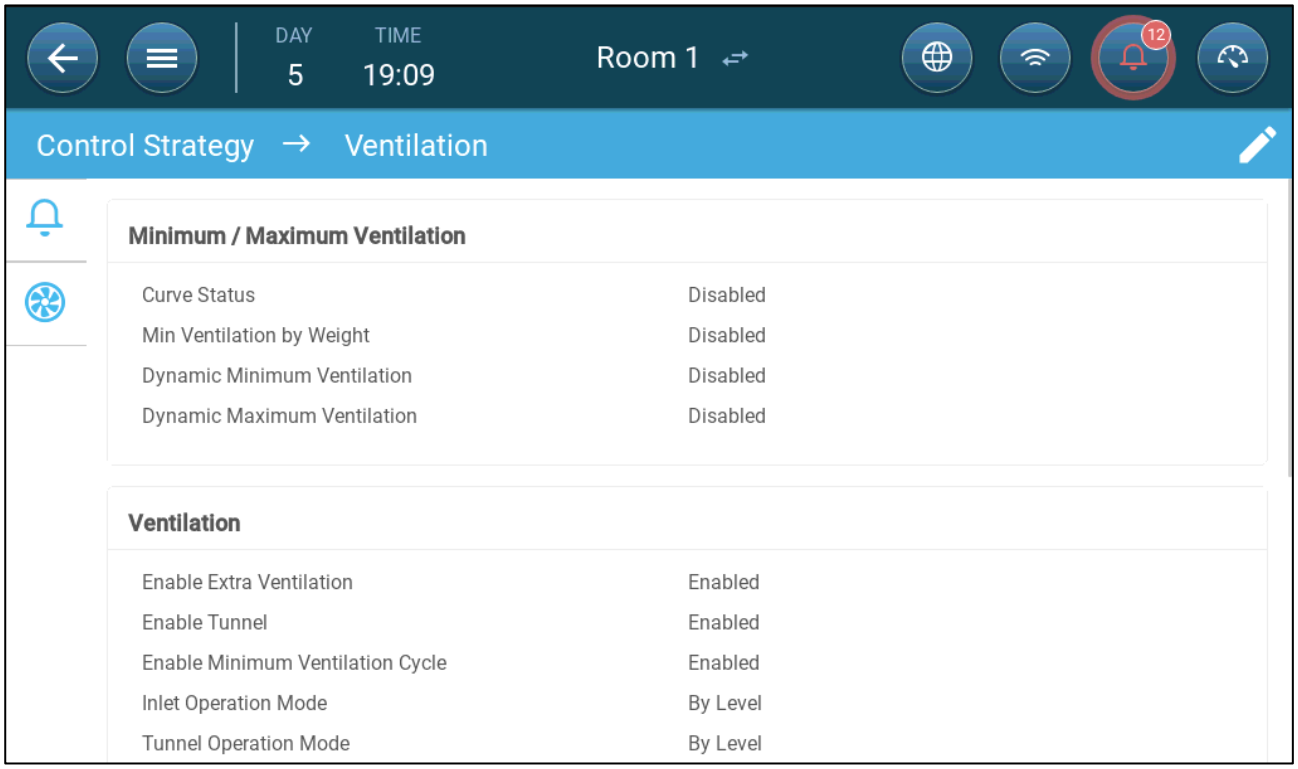
13.3.1 Introduction to Extra Ventilation

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

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

13.3.2 Defining Extra Ventilation

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



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

5. On each level, define:
    - Level: Read-only.
    - Diff: Define the temperature differential. When the temperature rises above the target temperature by this amount at each level, Extra Ventilation begins. Range: 0.0°C >15.0°C. By default, there is a 0.5°C/F minimum differential, even if 0.0°C appears. Any differential must be higher than 0.5°C to take effect.

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

    - Fan Status. Refer to Defining Basic Ventilation, page 106 on how to configure fans.

13.4 Tunnel Ventilation

When enabled, you can:

- Set Tunnel levels in the ventilation program.
- Define tunnel set points in the ventilation program.
- Define Pressure settings for tunnel.
- Define Tunnel temperature set point in the temperature curve (refer to Configuring the Temperature Curve, page 91).

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

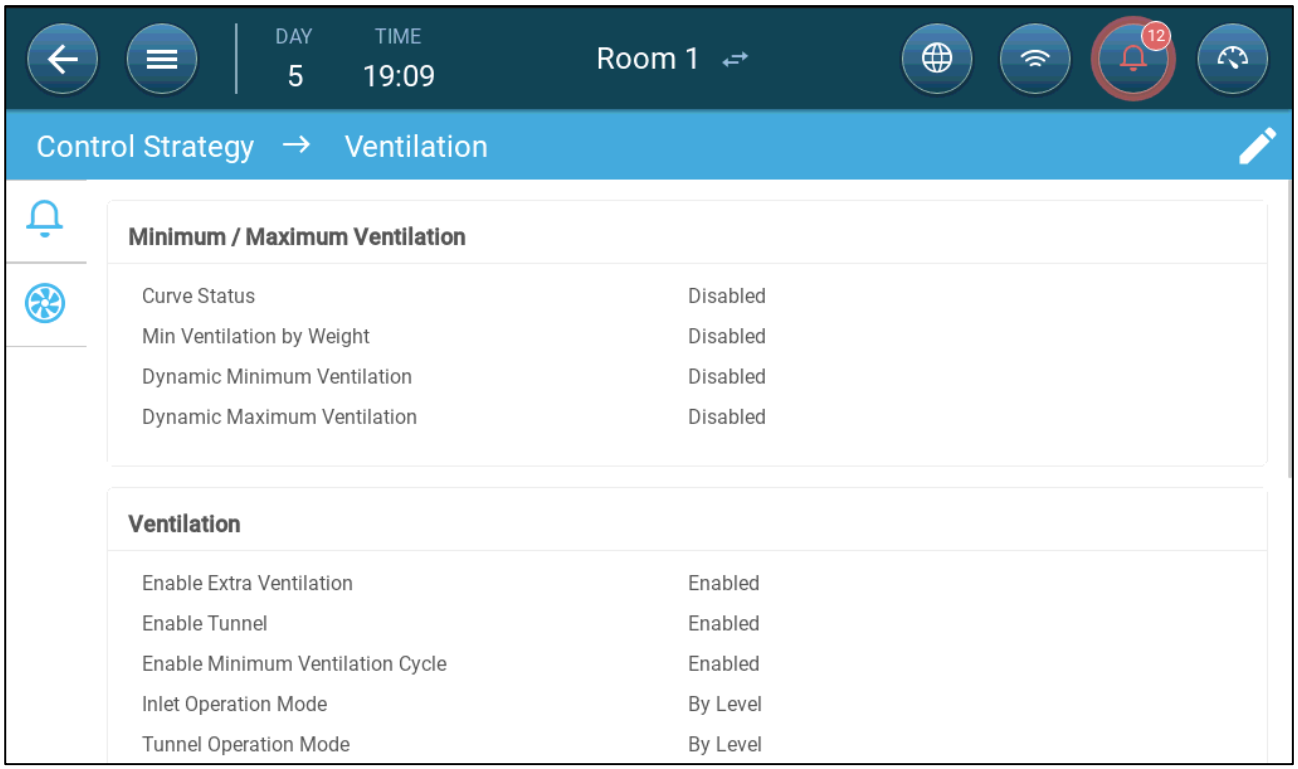
➲ **Configuring Tunnel Ventilation requires mapping at least one fan or one tunnel door.**

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

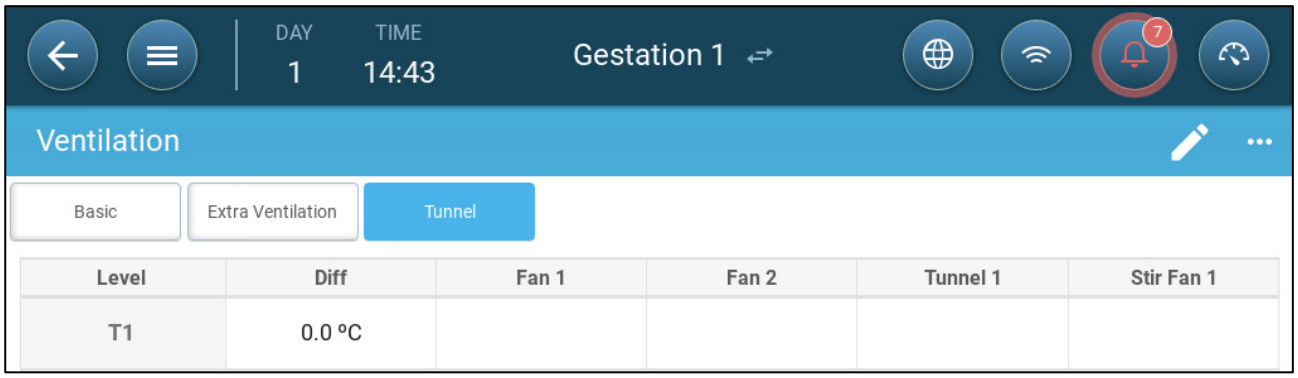
- Defining the Tunnel Ventilation
- Defining the Tunnel Ventilation Settings
- Tunnel Doors

13.4.1 DEFINING THE TUNNEL VENTILATION PARAMETERS

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



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

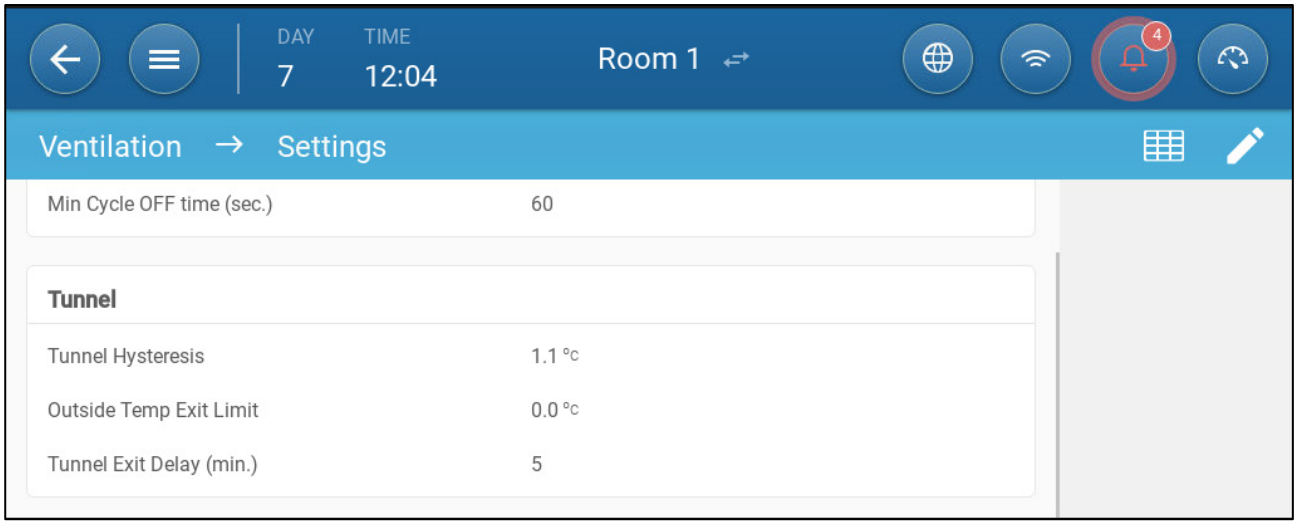


4. On each level, define:
   - Level: Read-only.
   - Diff T: Define the temperature differential. When the temperature rises above the target temperature by this amount at each level, Extra Ventilation begins. Range: 0.0°C >10.0°C.

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

   - Fan Status. Refer to Defining Basic Ventilation, page 106 on how to configure fans.

13.4.2 Defining the Tunnel Ventilation Settings

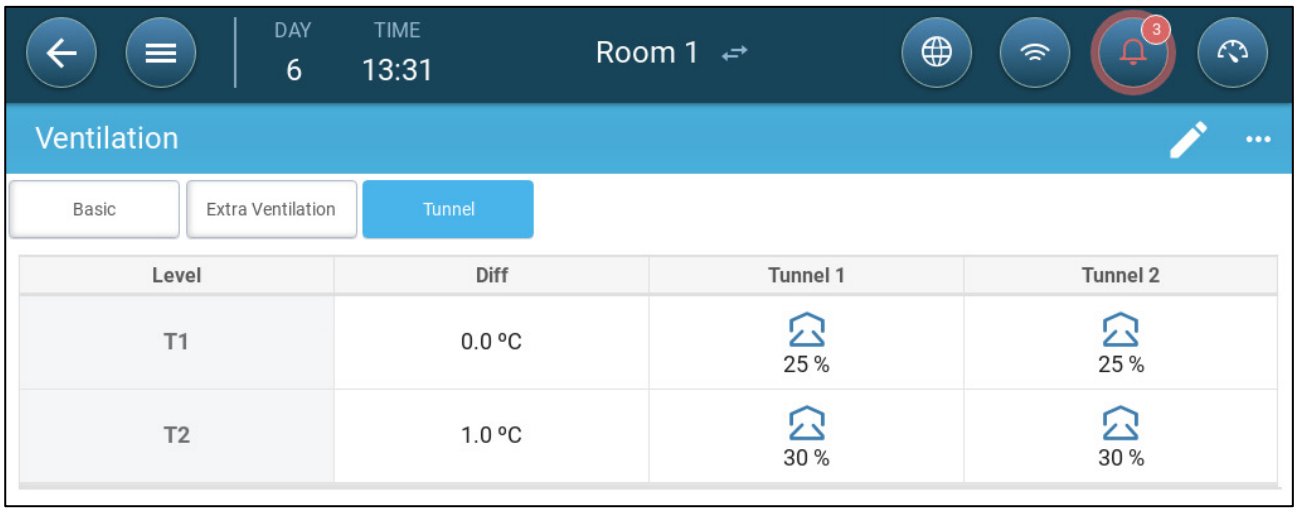


- Define:
  - Tunnel Hysteresis: This is a differential. When the temperature reaches the tunnel temperature minus this differential, ventilation goes down to Extra Ventilation (if enabled) or Minimum Ventilation.
  - Outside Temp Exit Limit: This is a differential. When the outside temperature reaches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

13.4.3 Tunnel Doors

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

- Level Control
- Static Pressure Control



13.5 Calibrating the Inlet/Tunnel Door

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

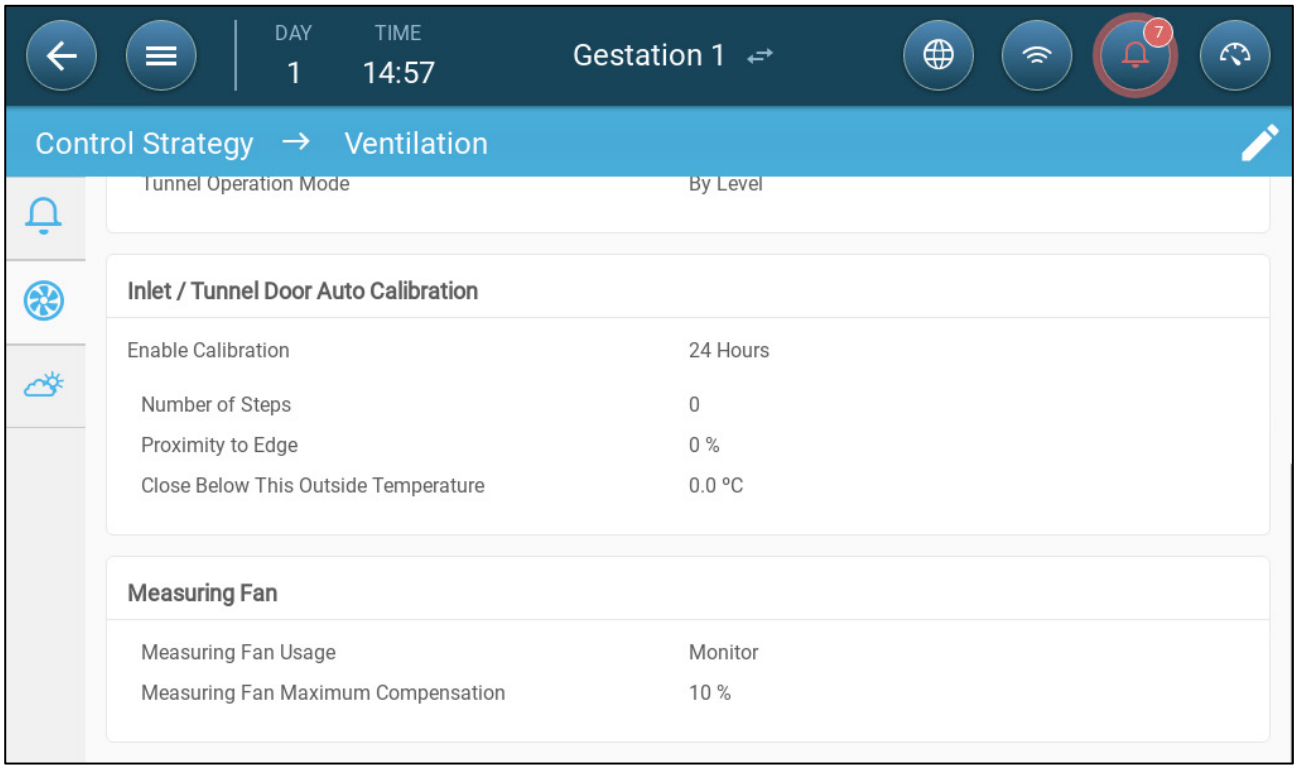
However when there is no potentiometer, positioning accuracy tends to degrade after the inlets go through several opening and closing cycles. The following section describes how to recalibrate the inlets, using a potentiometer or without a potentiometer.

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

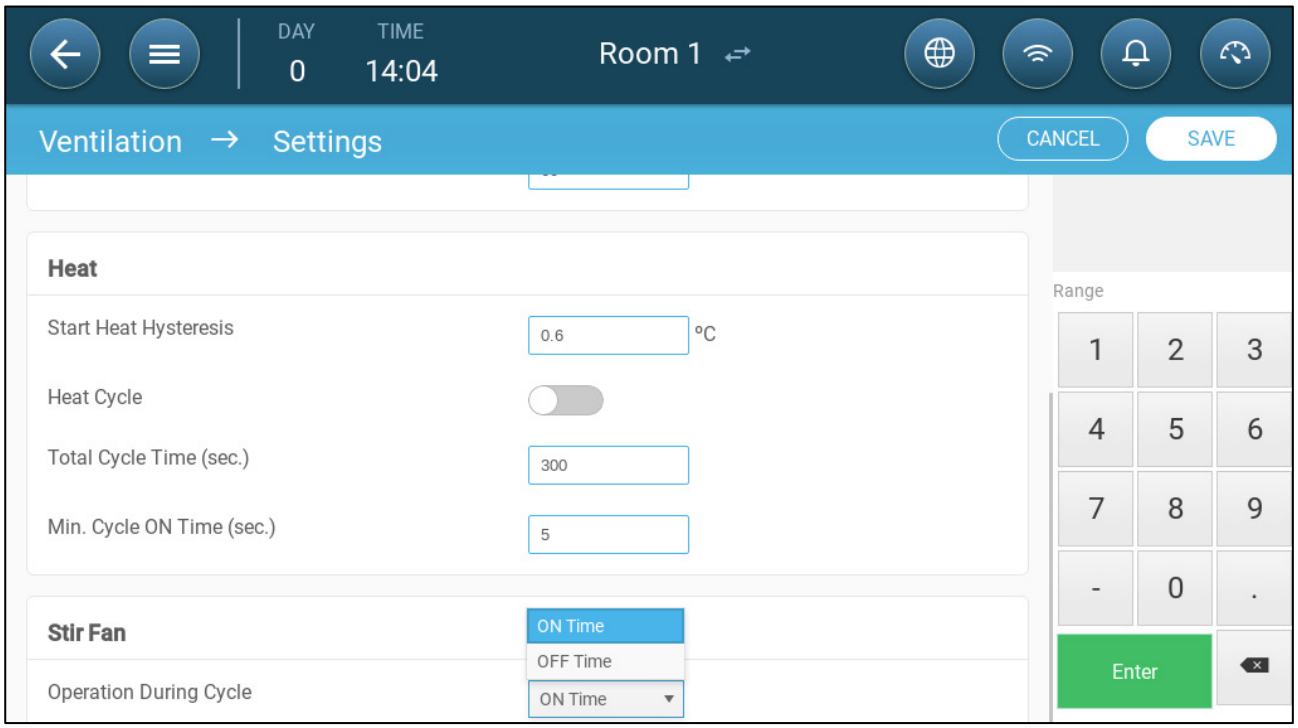


2. Click .
3. Define:
    - Enable Calibration: Select 24 hours a day or define a specific time frame.
    - Number of steps: Set up the number of steps (number of movements).
    - Proximity to Edge: Inlets will open or close based on this proximity to the edge. For example, when set to 10%, the curtain 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.

13.6 Stir Fan

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

1. Define a relay or analog port as a stir fan (refer to Mapping Devices, page 49).
2. Define the stir fan parameters (refer to Defining the Stir Fan, page 57).
3. Option: Define the stir fan cycle time (refer to Minimum Ventilation Cycle, page 108)
4. If the ventilation fans are running in a cycle, go to Climate > Ventilations > Settings.



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

14 Cooling Functions

- Cooling Principles
- Selecting the Cooling Mode

14.1 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:

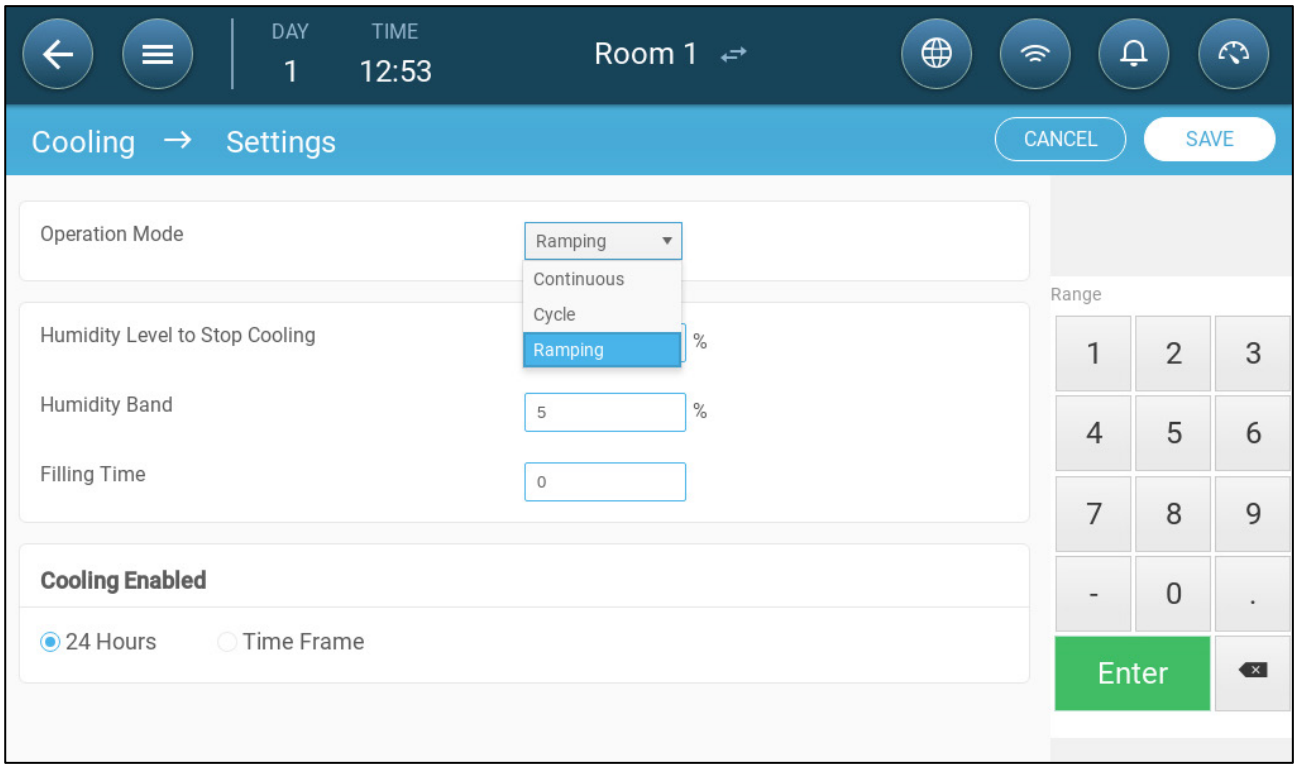
- When the temperature reaches the Target Temperature plus the Temperature Difference, cooling begins and continues until the temperature falls below this point (minus the band).
- If the humidity level rises above the To Humidity parameter (plus the Humidity Band), cooling ceases.
- Cooling only takes 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.

14.2 Selecting the Cooling Mode

TRIO enables running the cooling device in three different modes:

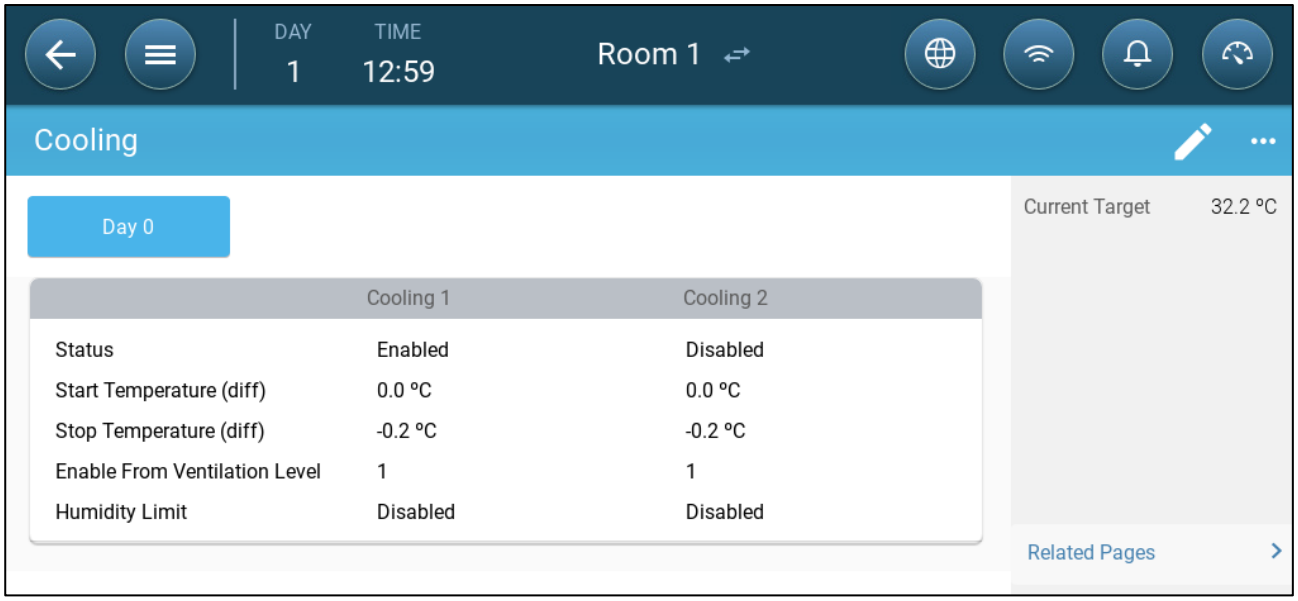
- Continuous: When activated, the cooling devices operate continuously.
- Cycle: When activated, the cooling device operate according to user-defined an on/off cycle.
- Ramping: Cycle modulation, frequency depends on the error in °C, with respect to the cooling setting (target).

1. Go to Go to Climate > Cooling.> Settings.



2. Define:
    - The operation mode.
    - Humidity to Stop: Define the humidity level at which cooling stops.
    - Humidity Band: Set the humidity band to re-enable cooling outputs after it the process ceases because of the high humidity level.
    - Filling Time: Define the amount of time required to distribute water over the pad.
    - Cooling Enabled: Define when cooling is enabled, 24 hours a day or time frames.
3. Go to Climate > Cooling. The screen that appears depends on the operation mode chosen.
    - Continuous Cooling
    - Cycle Cooling
    - Ramping Cooling

14.2.1 Continuous Cooling

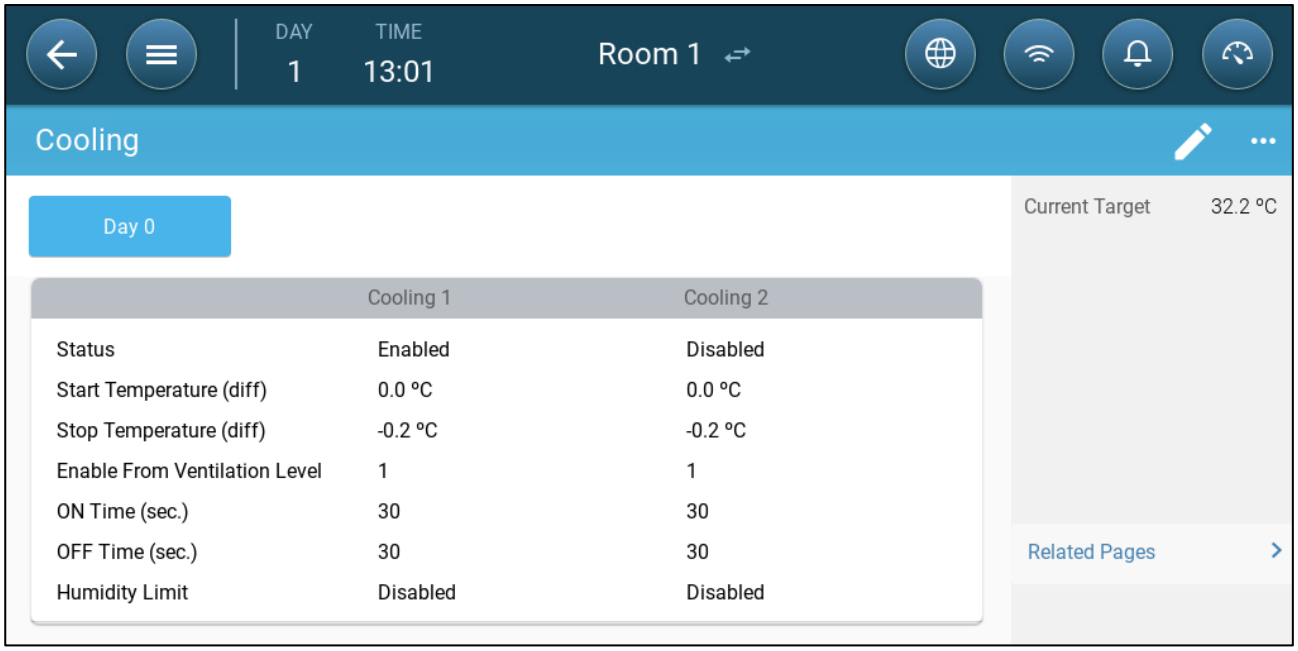


- Define:
  - Growth days at which the settings change (Note: When using Central Exhaust, growth days are not defined).
  - Status: Enable or disable a cooling device.
  - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling.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

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

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

14.2.2 CYCLE COOLING

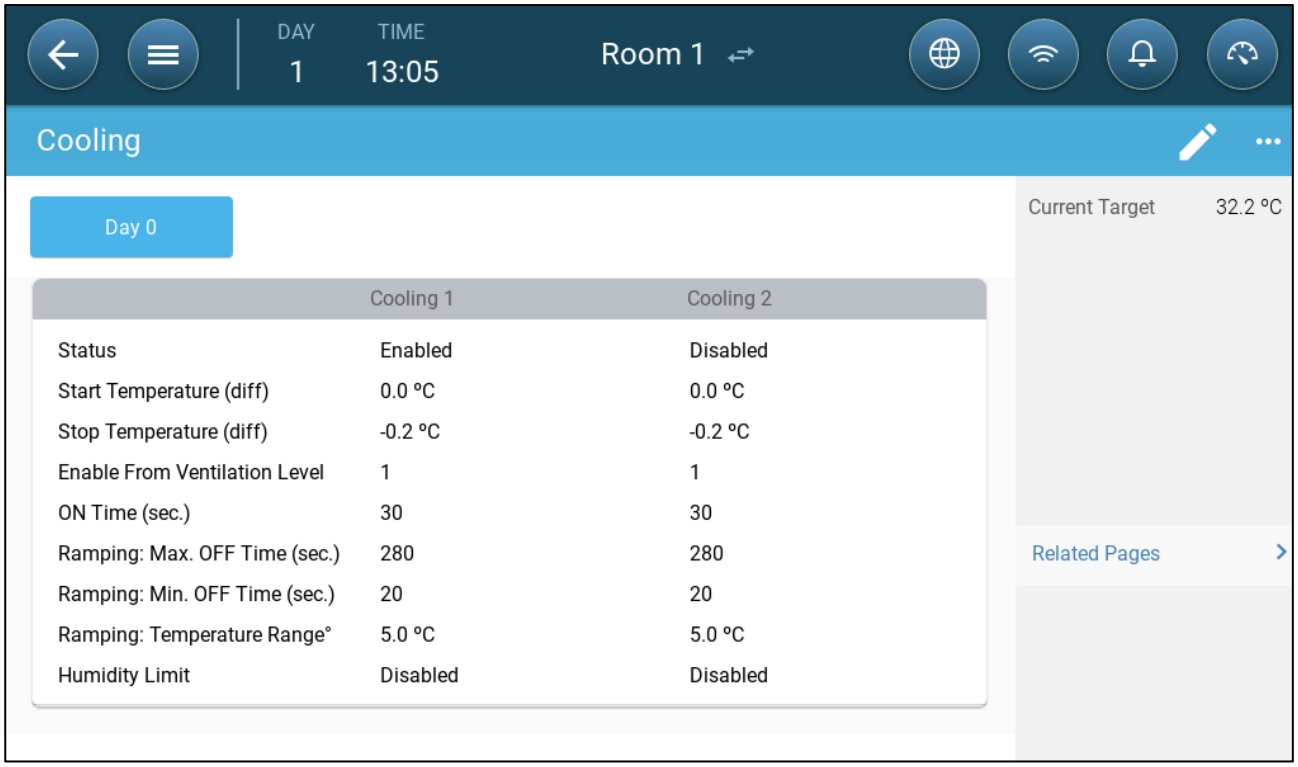


- Define:
  - Growth days at which the settings change (Note: When using Central Exhaust, growth days are not defined).
  - Status: Enable or disable a cooling device.
  - Start temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to activate cooling.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

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

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

14.2.3 RAMPING COOLING



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

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

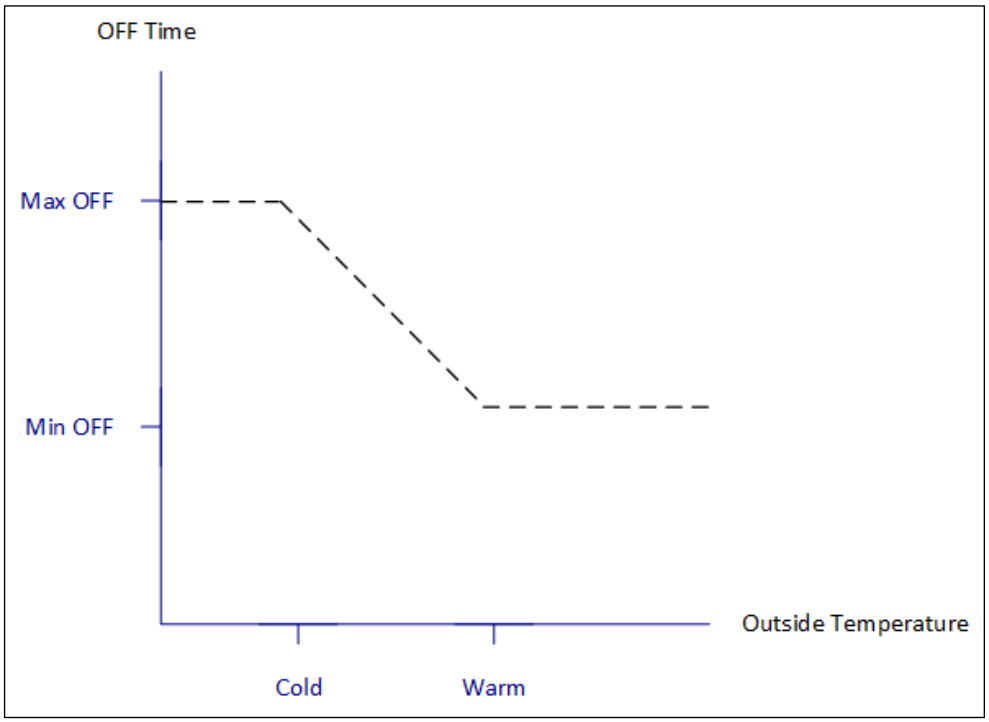
  - Stop temperature (diff): Sets the temperature differential from the cooling temperature (Temperature Curve) to stop cooling device.
    - Stop cooling device temperature = Cooling Target ± Stop temperature
  - Enable from ventilation Level: Select the level (ventilation output) to enable cooling operation.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

15 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.



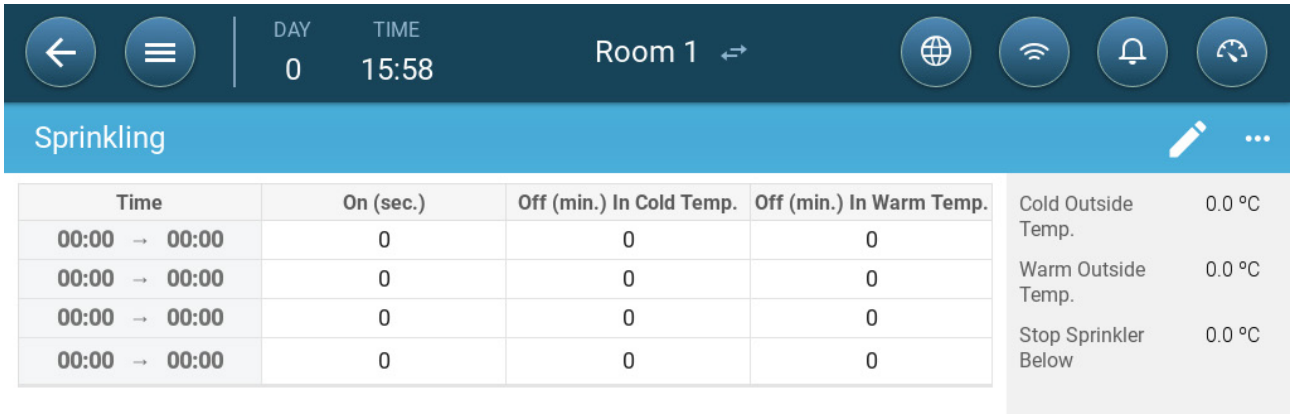
- Defining the Sprinkler Parameters
- Defining the Sprinkler Settings

15.1 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.

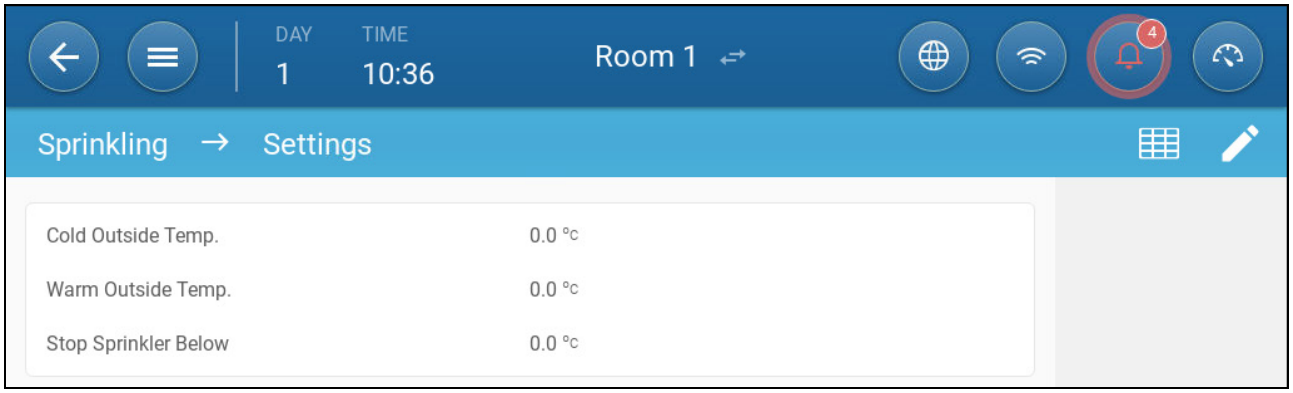
➲ **Go to System > Devices and Sensors and define one relay as sprinkler (refer to Mapping Devices, page 49).**

1. Go to Control > Sprinkling.



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

15.2 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.

16 Heating Functions

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

- Defining the Central Heater Parameters
- Zone Heaters

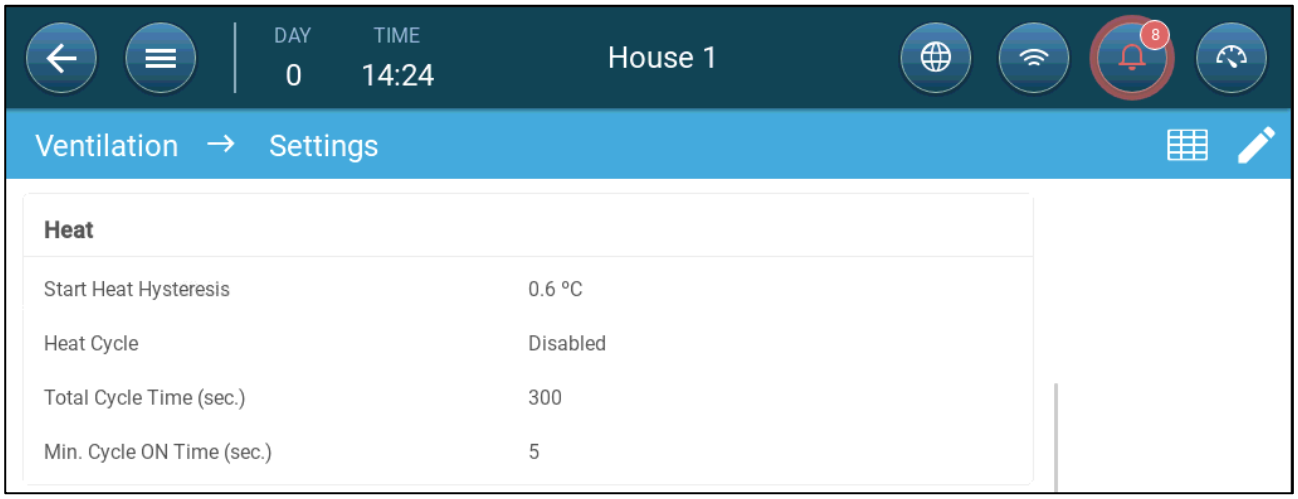
16.1 Defining the Central Heater Parameters

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 49.**

➲ **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.
   - Heat Cycle: Enable central heaters to work in a cycle.
   - 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.

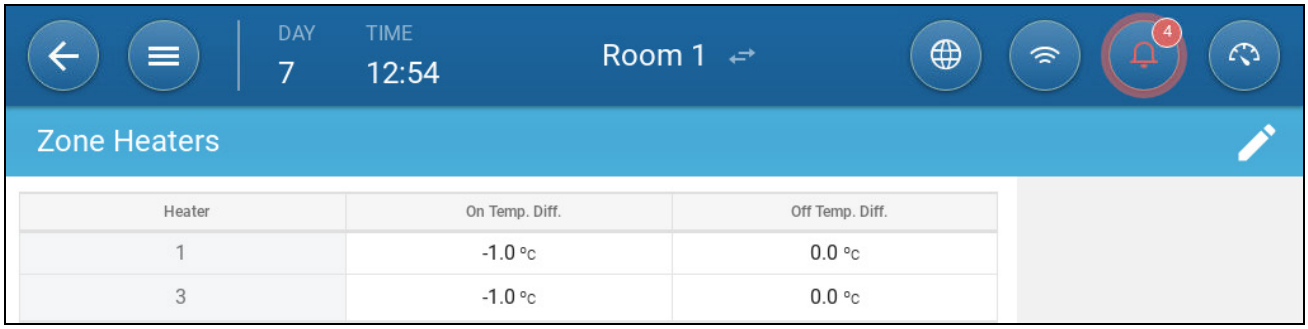
16.2 Zone Heaters

➲ **Define at least one heater as a Zone Heater in Heating Devices, page 63.**

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

16.2.1 Defining Non-Variable Zone Heaters

1. Go to Climate > Zone Heaters.

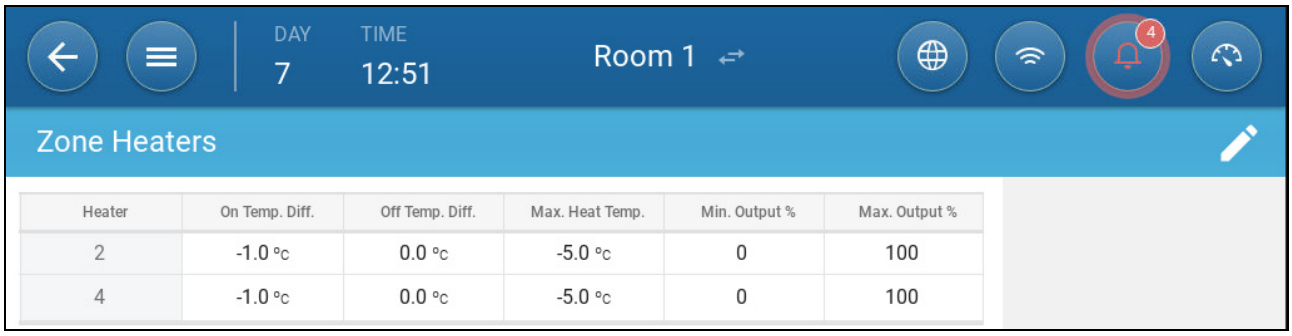


Heater	On Temp. Diff.	Off Temp. Diff.
1	-1.0 °c	0.0 °c
3	-1.0 °c	0.0 °c

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.

16.2.2 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.

17 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.

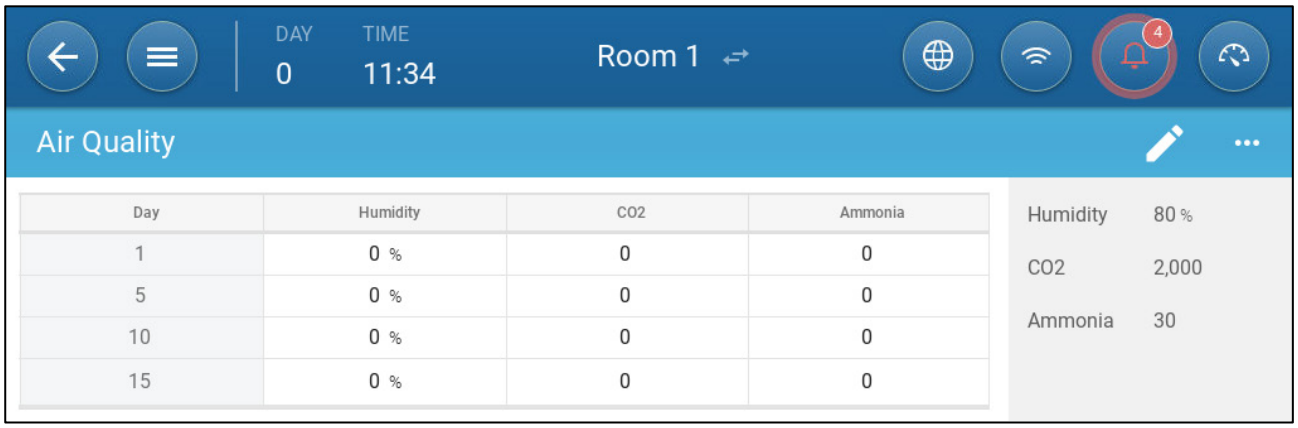
- Ventilation must be running for compensation to begin.
- If one of these factors is above the user defined set point, compensation begins. If two or more factors are above the user-defined set point, compensation continues until both factors are below the required level.
- The user defines which type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

17.1 Defining the Air Quality Parameters

1. Go to Climate > Air Quality.

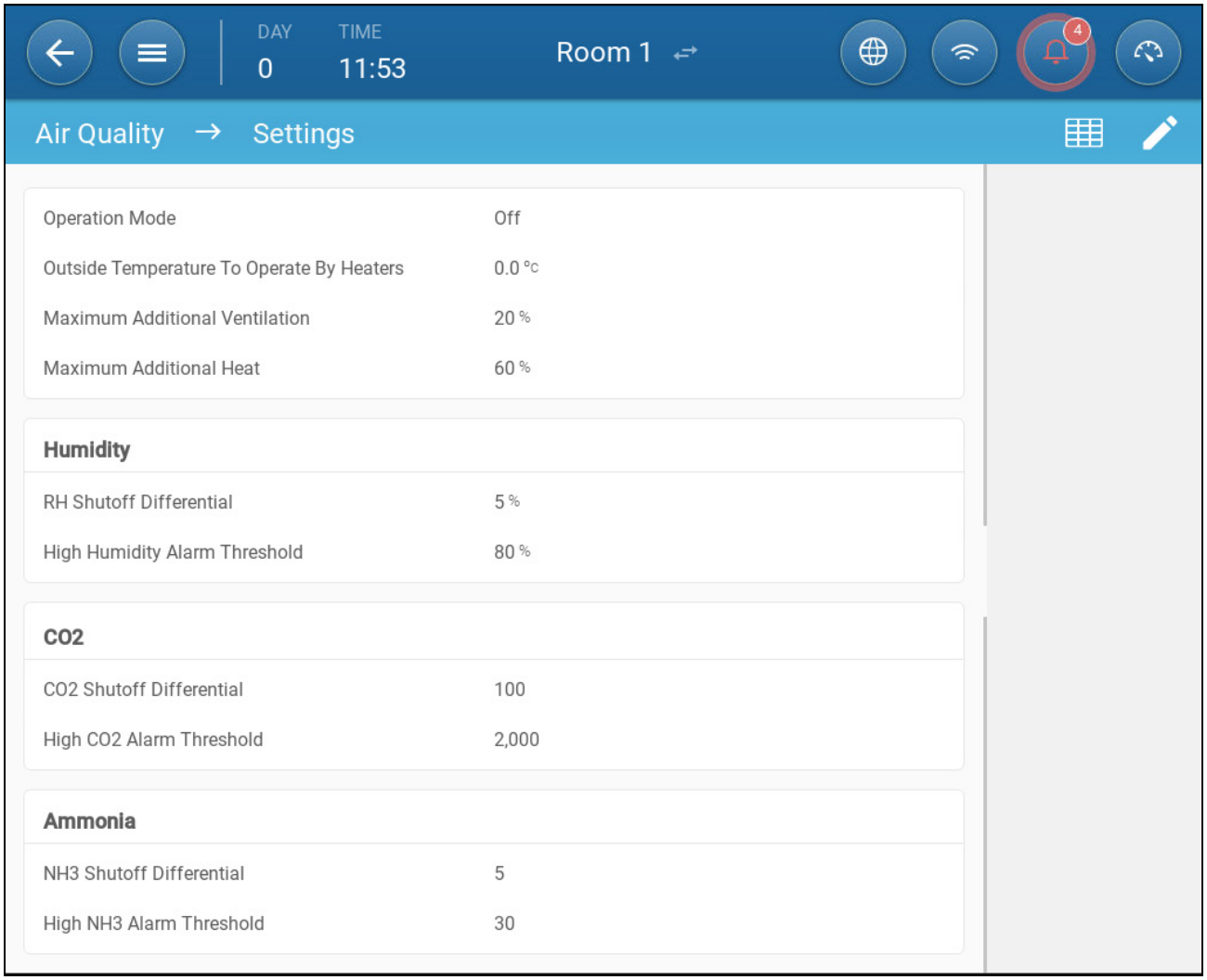
➲ **Each sensor must be defined and map for the sensor to appear in this screen. Refer to Mapping and Defining the Input Output Devices, page 49.heat**



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

17.2 Defining the Air Quality Settings



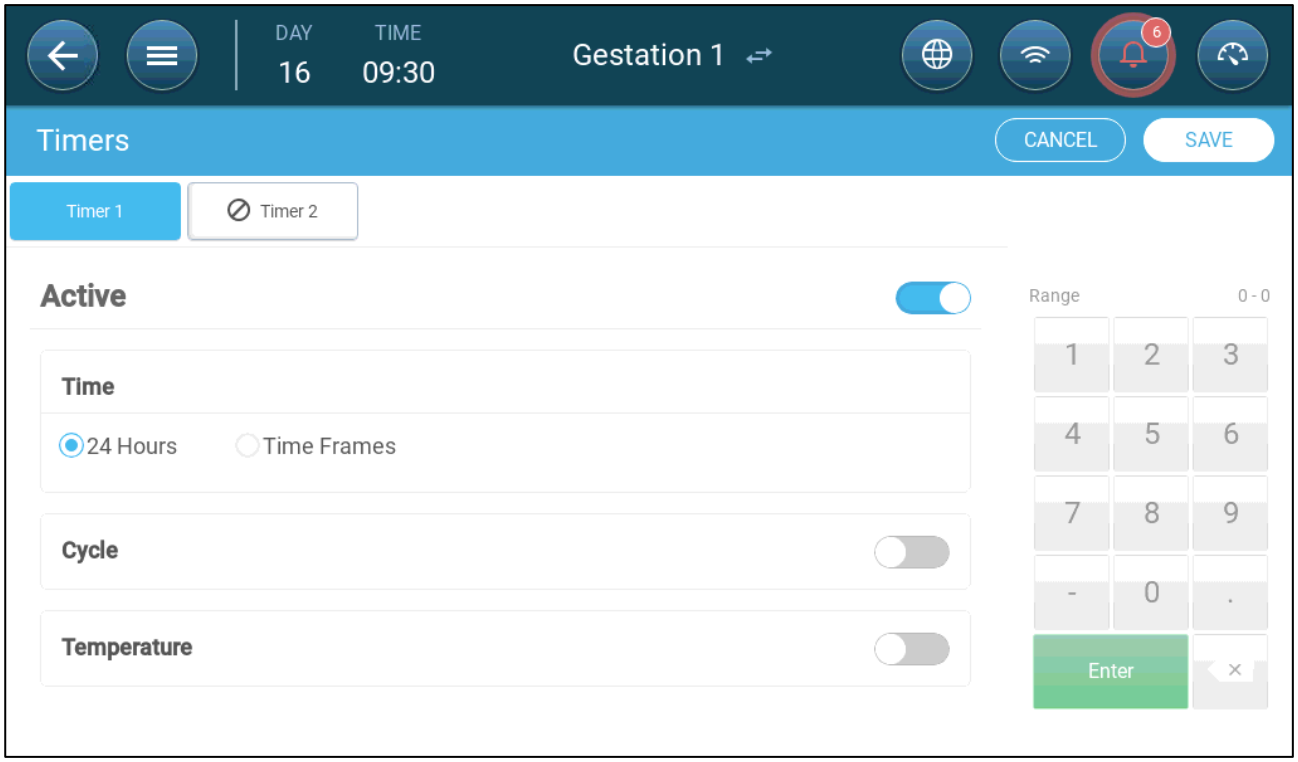
- Define:
  - Mode: Select how to compensate air quality:
    - Off
    - By Ventilation
    - By Heat
    - By Outside Temp (Auto)
  - Outside Temp. To Operate By Heaters: Below this temperature the controller automatically adjusts the heat output to compensate the air quality. Range -40°to +90°
  - 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

18 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 49.**

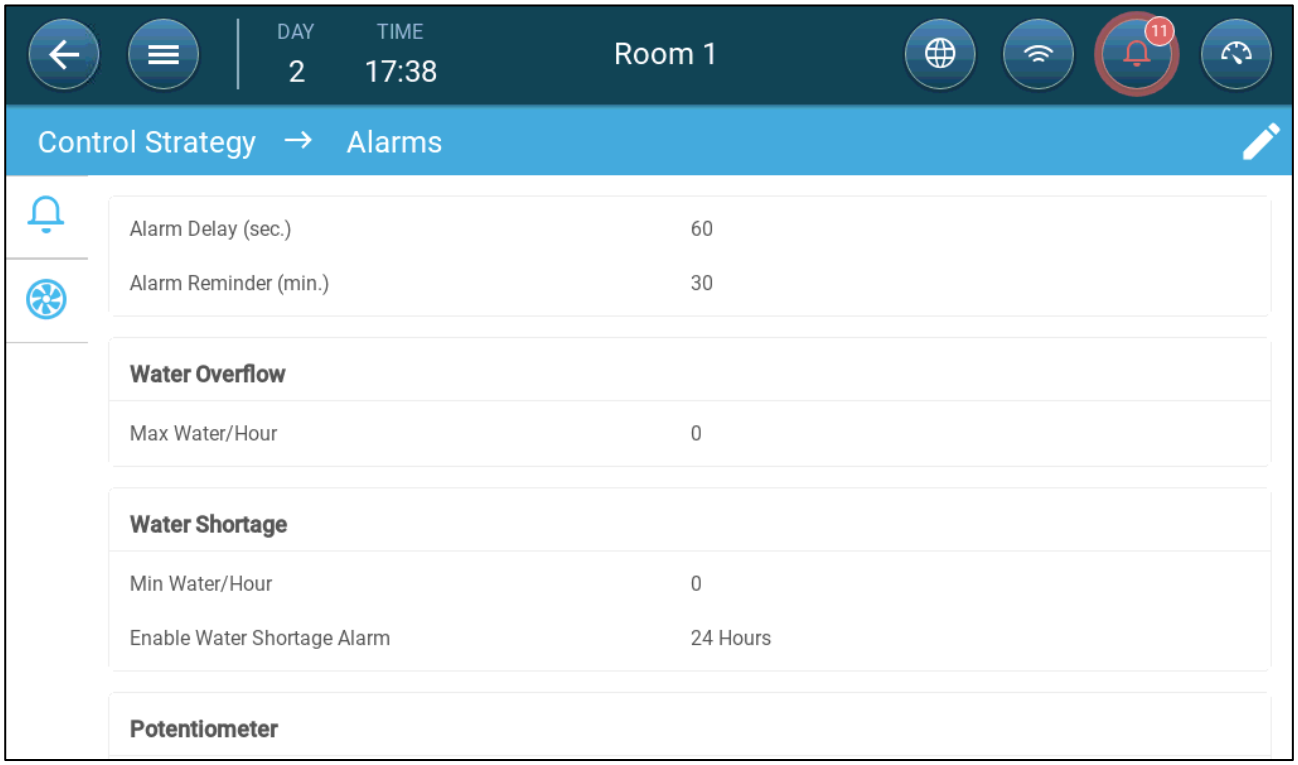
1. In Control > Timers, click edit, define a timer as Active.
2. Define for each timer:
   - Time: Timers can run 24 hours a day or in user-defined time frames. Define up to four time frames for each timer.
   - Cycle: If enabled, define the cycle times. Range: 0 – 999 seconds.
   - Temperature: If enabled,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

19 Alarms

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

19.1 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 49.

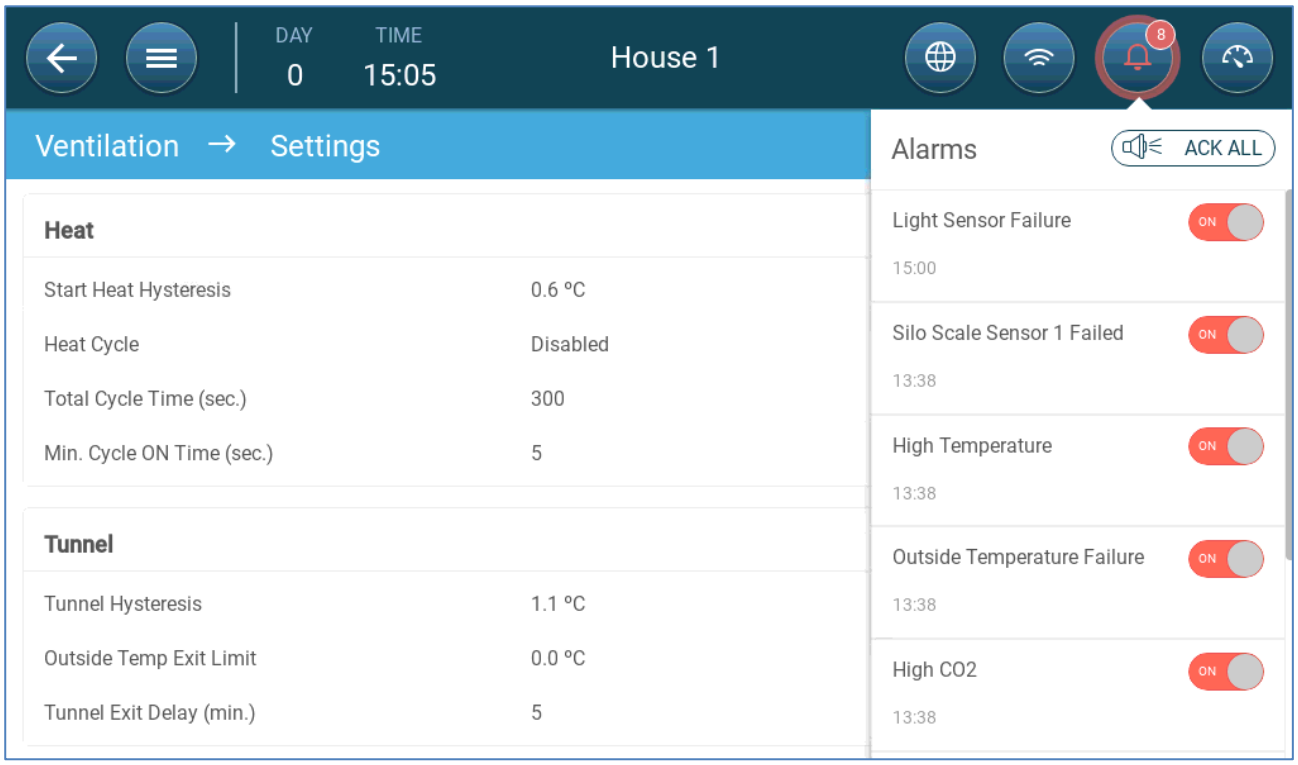
2. Click .
3. Define:

- 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.

19.2 Viewing the Alarms

- On the Main Menu bar, click .



- Click

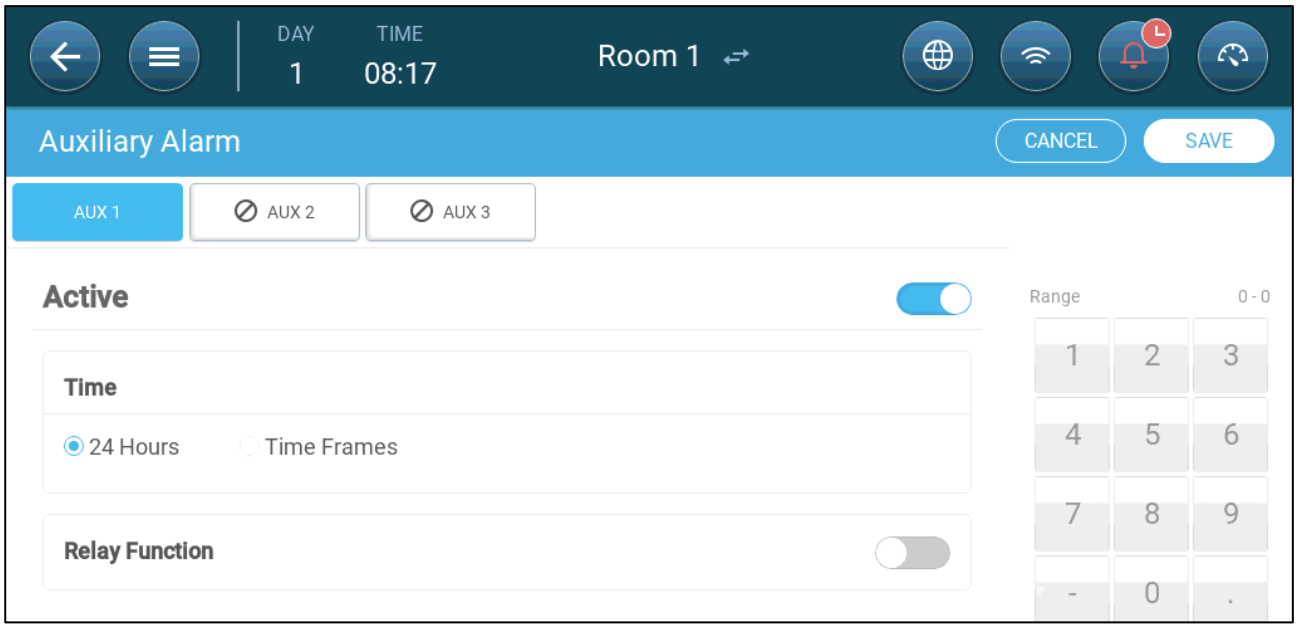
to acknowledge all alarms or acknowledge each one as required.

19.3 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 49.**

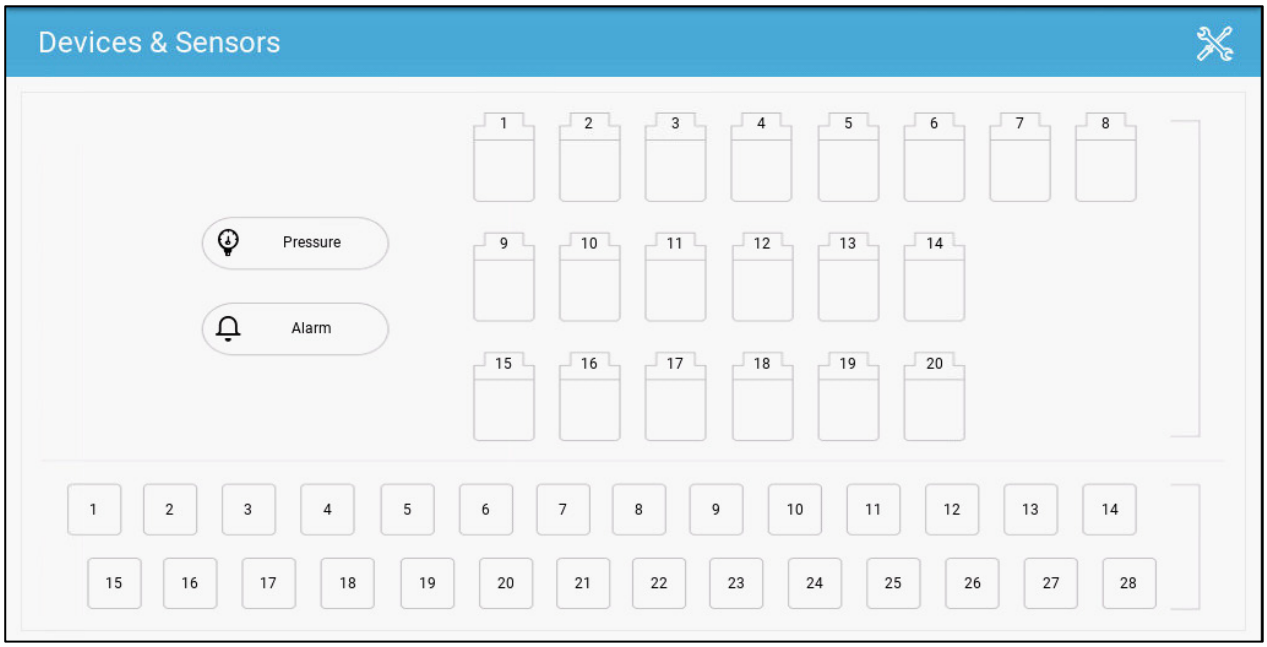
1. Go to Control > Auxiliary Alarm.



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.

19.4 Sending a General Alarm

1. Go to System > Device and Sensors.



2. Click

.

An alarm is sent to everyone on the contact list.

20 History

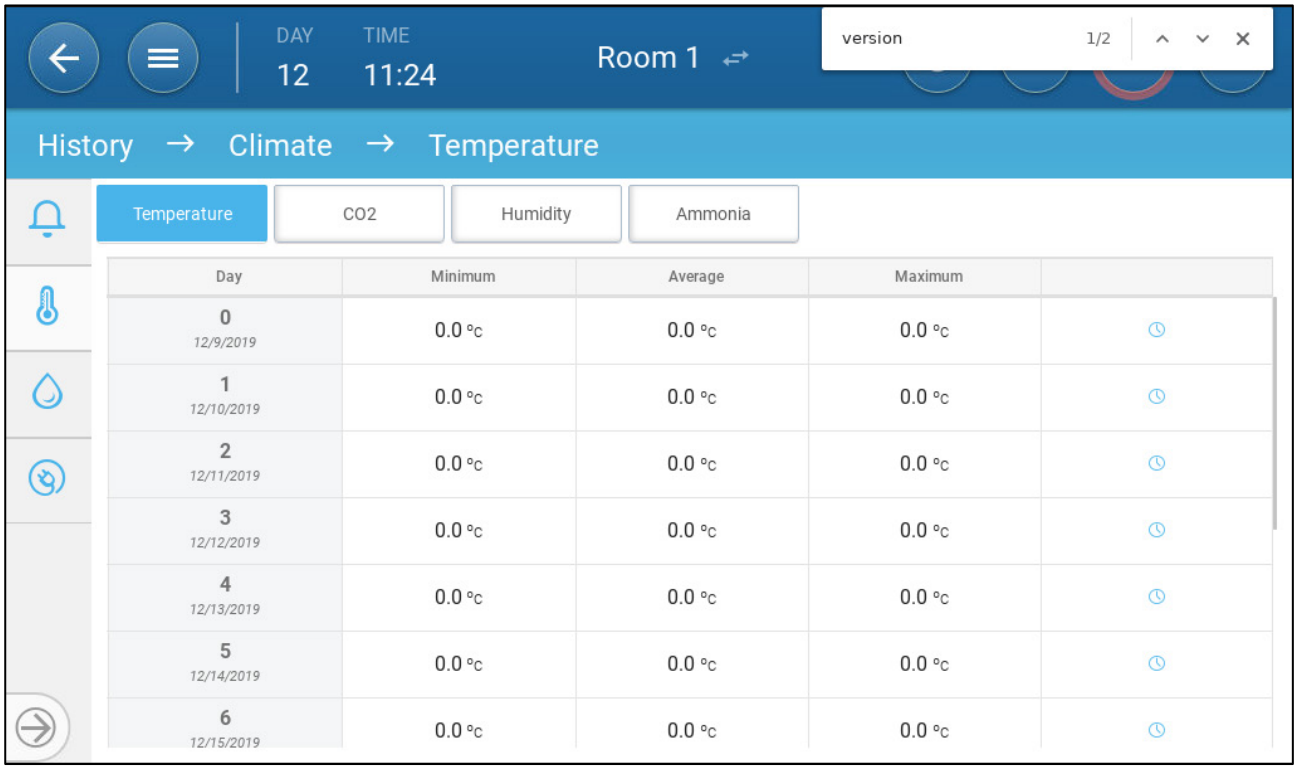
- A Trio controller saves:
  - 150 growth days of history data (minimum)
  - Up to 365 growth days of history data (estimated maximum)
- TrioAir saves data on the server for an unlimited amount of time.
- Starting a new batch/flock erases all history data.
- The alarm and events history table can store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

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

20.1 Climate and Air Quality

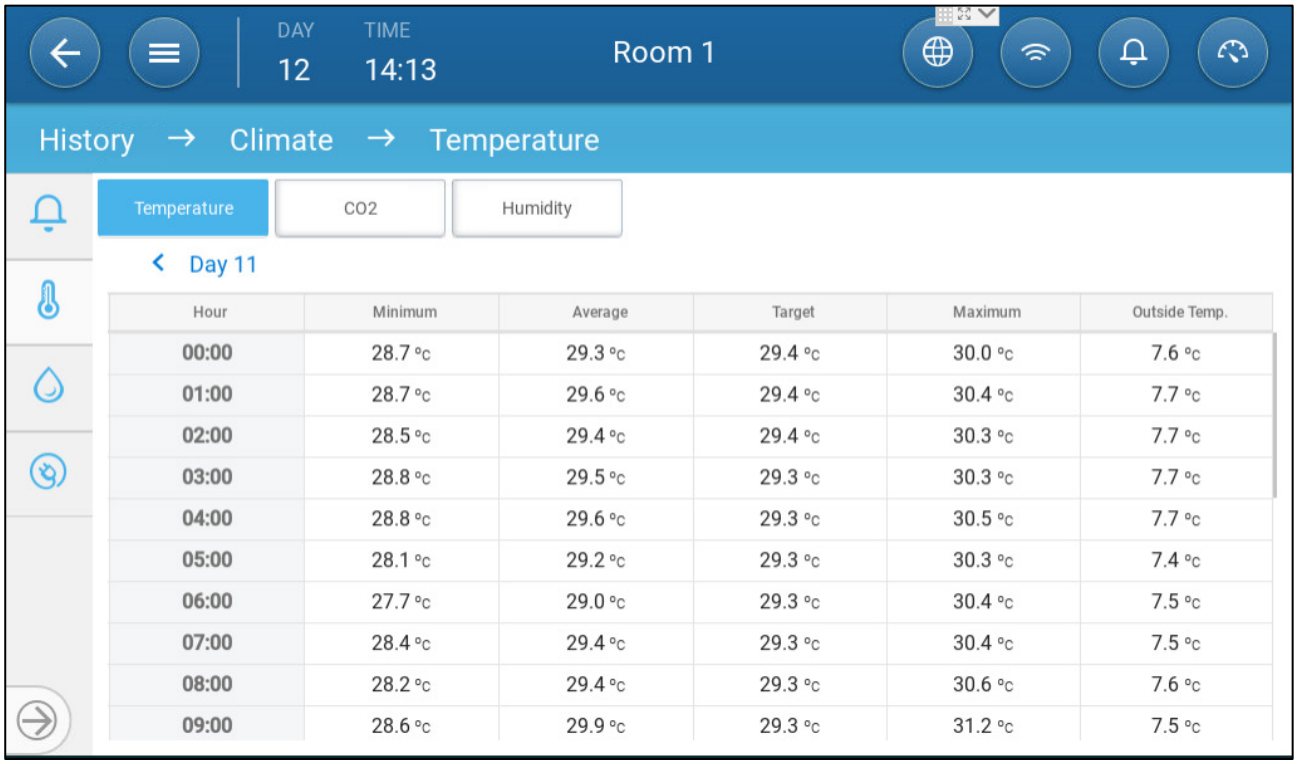
1. Go to Batch > History > .
2. Click the relevant tab to see its history.

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.



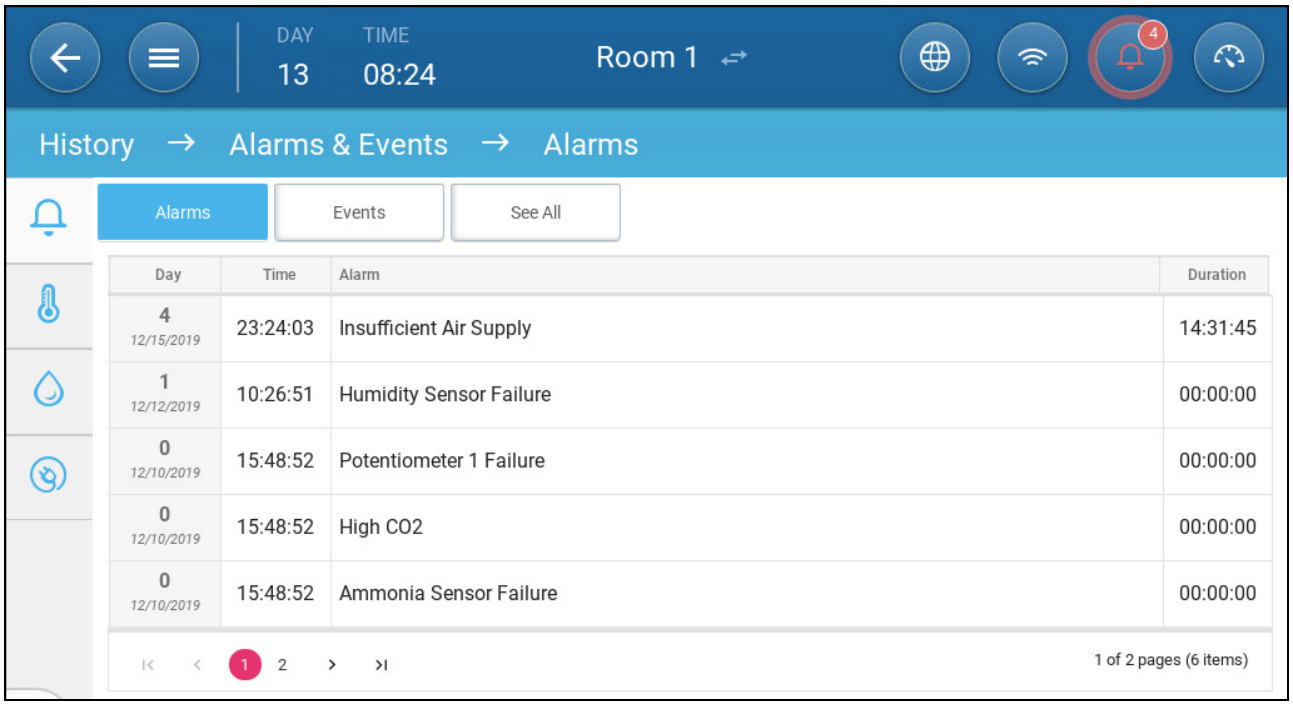
Hour	Minimum	Average	Target	Maximum	Outside Temp.
00:00	28.7 °c	29.3 °c	29.4 °c	30.0 °c	7.6 °c
01:00	28.7 °c	29.6 °c	29.4 °c	30.4 °c	7.7 °c
02:00	28.5 °c	29.4 °c	29.4 °c	30.3 °c	7.7 °c
03:00	28.8 °c	29.5 °c	29.3 °c	30.3 °c	7.7 °c
04:00	28.8 °c	29.6 °c	29.3 °c	30.5 °c	7.7 °c
05:00	28.1 °c	29.2 °c	29.3 °c	30.3 °c	7.4 °c
06:00	27.7 °c	29.0 °c	29.3 °c	30.4 °c	7.5 °c
07:00	28.4 °c	29.4 °c	29.3 °c	30.4 °c	7.5 °c
08:00	28.2 °c	29.4 °c	29.3 °c	30.6 °c	7.6 °c
09:00	28.6 °c	29.9 °c	29.3 °c	31.2 °c	7.5 °c

20.2 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.

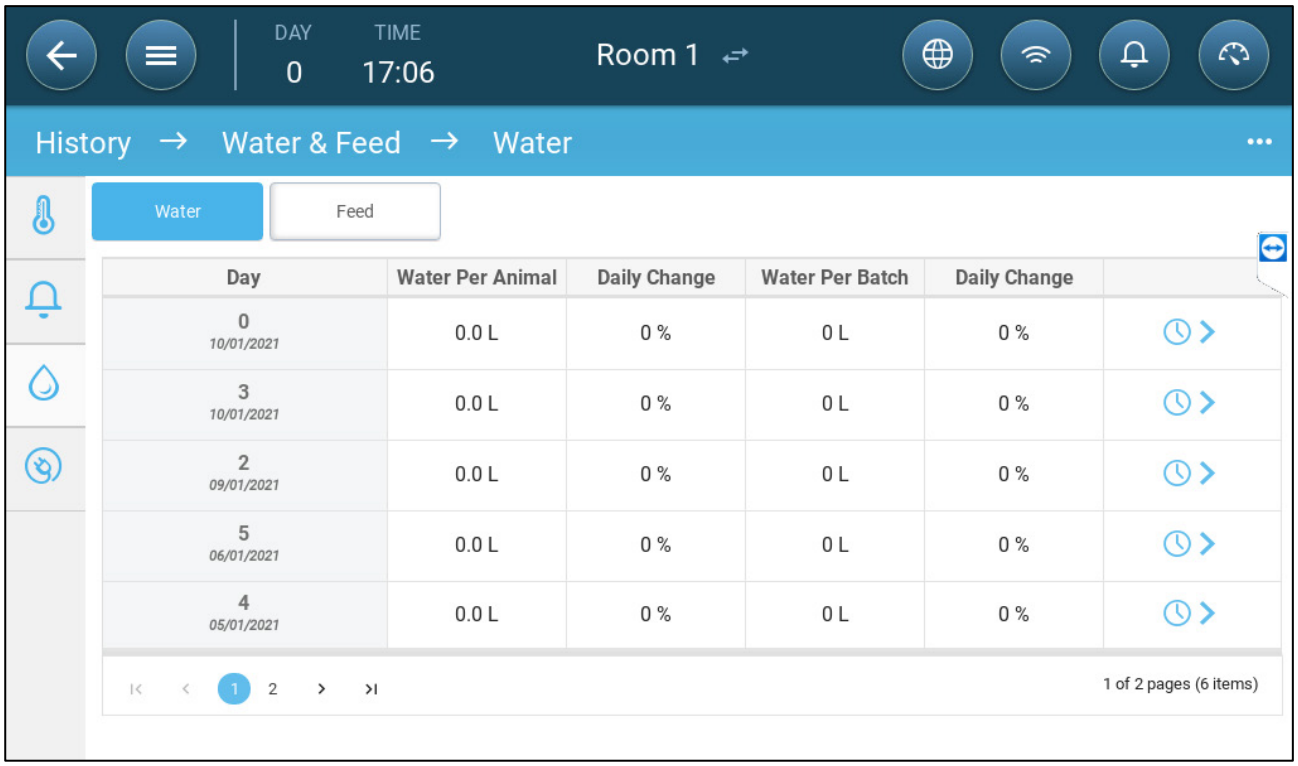


- Alarm Description
  - Unknown Alarm
  - High Temperature
  - Sensor # High Temperature
  - High Co2
  - Low Pressure
  - Water Overflow
  - Outside Temperature Failure
  - Humidity Sensor Failure
  - Ammonia sensor failure
  - Potentiometer # Failure
  - Alarm Test
  - CPU Low Battery
  - Low Temperature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

20.3 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.

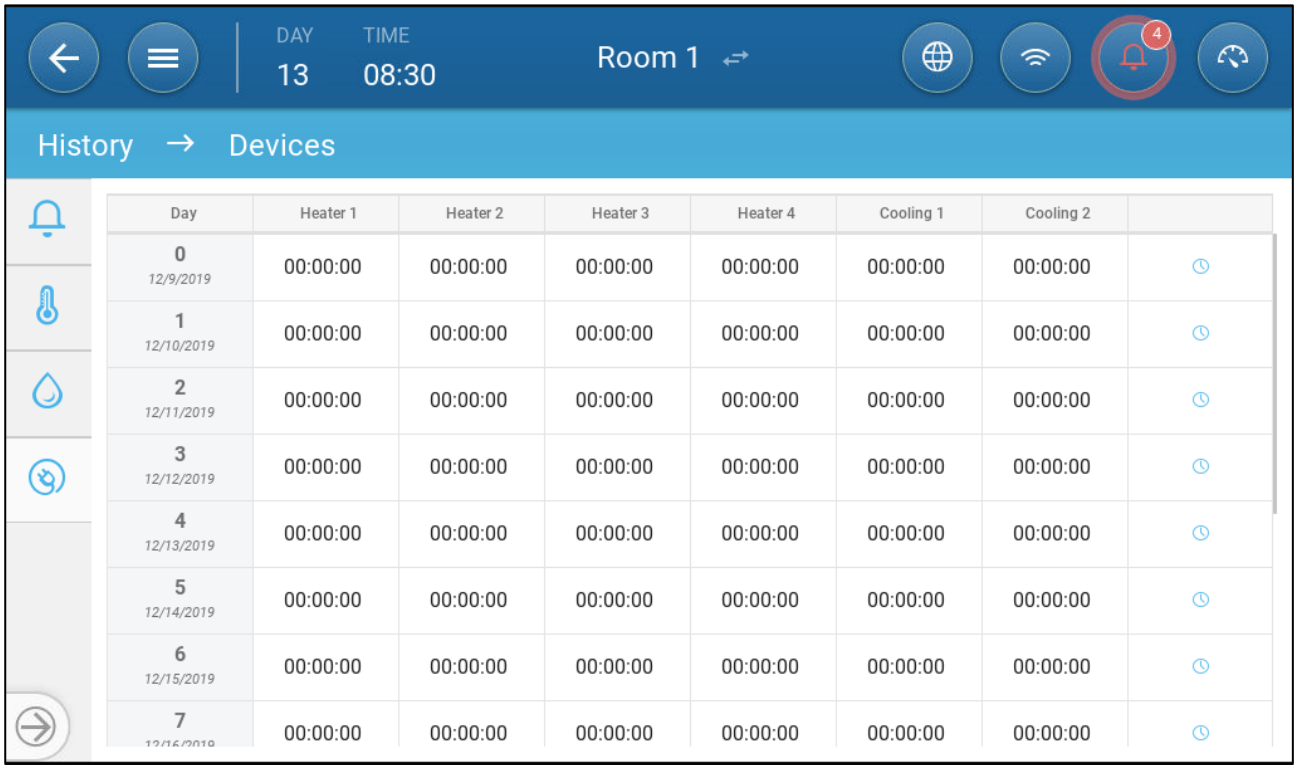


- Click the clock symbol to view the hourly breakdown.

20.4 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 .



- Click the clock symbol to view the hourly breakdown.

NOTE History displays installed devices only.

21 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

21.1 Resetting the Settings

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

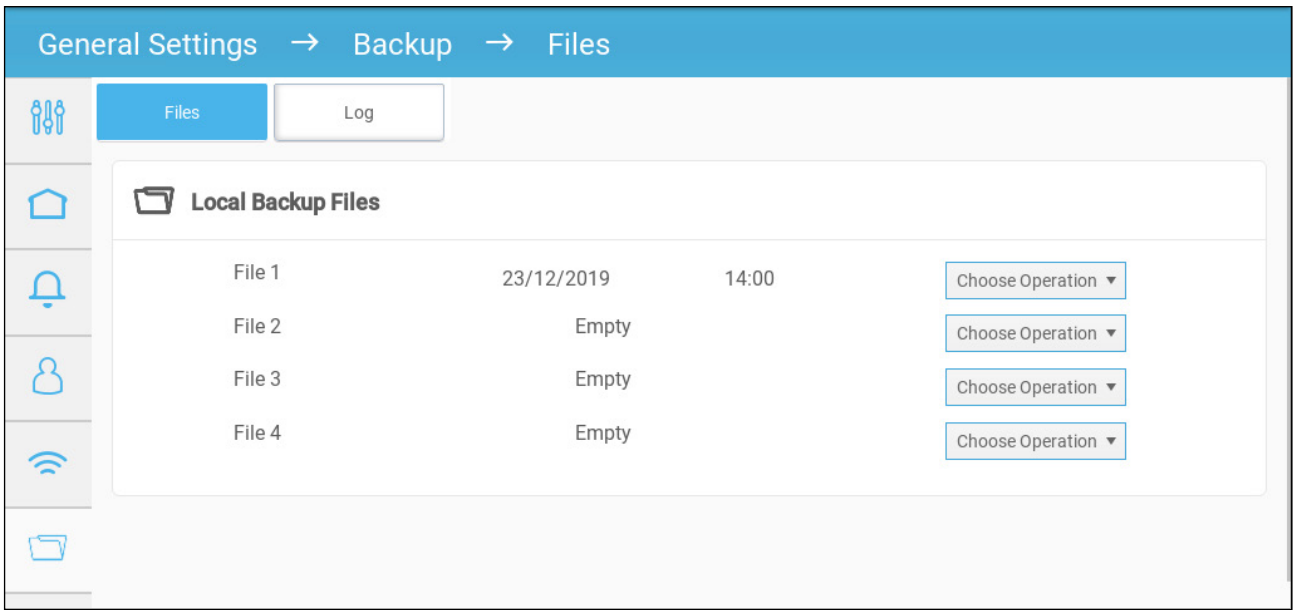
To reset the TRIO:

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.

21.2 Saving or Loading the Settings

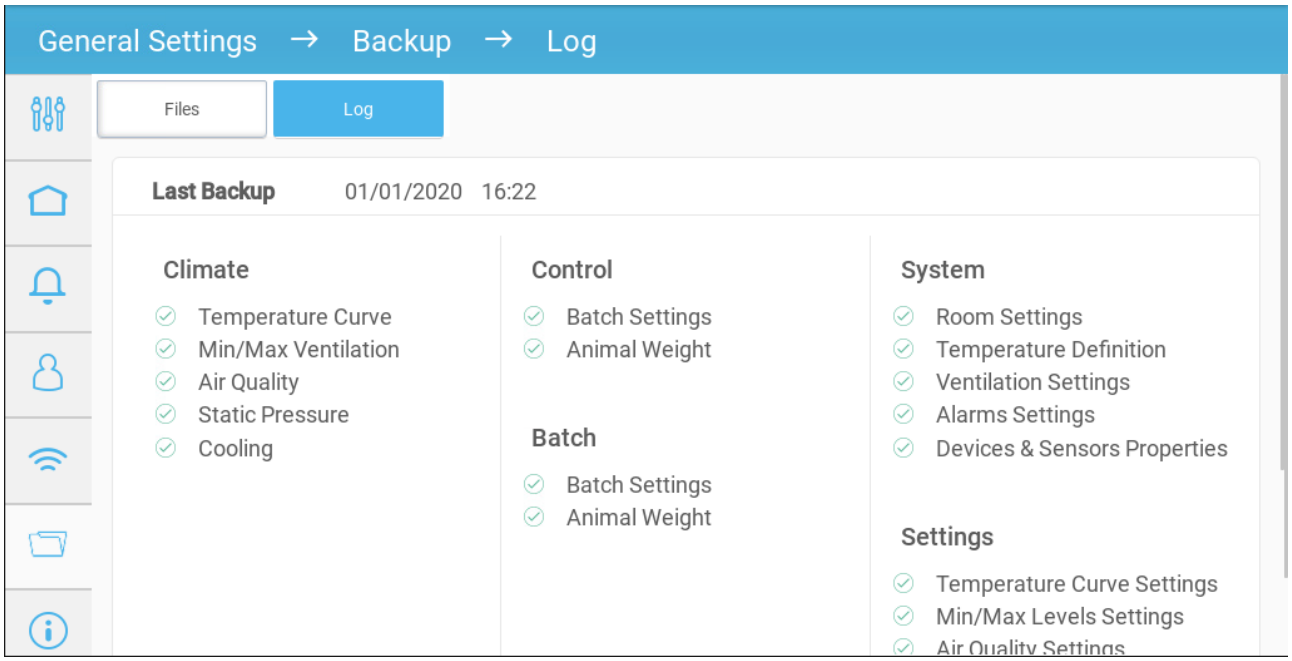
1. Go to System > General Settings and click .



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

21.3 Viewing the Log

The log displays which tables were successfully saved.



21.4 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.

22 Appendix A: External Devices (Previous Versions)

The following section details the relays and analog/digital ports found in previous software versions.

*Table 4: **Trio 20 Swine STD - R3***

	Output			Measurements	
Devices/Sensors	**Total**	**Relay**	**0-10V**	**Analog**	**Digital**
Cooling	2	2			
Heaters	4	4	4		
Inlets	2	2	2		
Outlets	1	N/A	1		
Tunnel Doors/Curtains	2	2	2		
Fans Exhaust/Tunnel	12	12	8		
Stir Fan	1	1	1		
Sprinkler	1	1			
Timer	5	5			
Feeder	1	1			
As Relay	20	20	N/A		
As Analog Output	8	N/A	8		
Alarm	1	1			
Temperature Sensors				12	
Humidity Sensors IN				1	
CO2 Sensors				1	
Ammonia Sensors				1	
Pressure Sensors				2	
Potentiometers				4	
Power Meter				X	
Gas Meter				X	
Water Meters					1
Aux. Input					4
Feeder Line Sensor					1

Table 5: *Trio 20 Swine STD – R2*

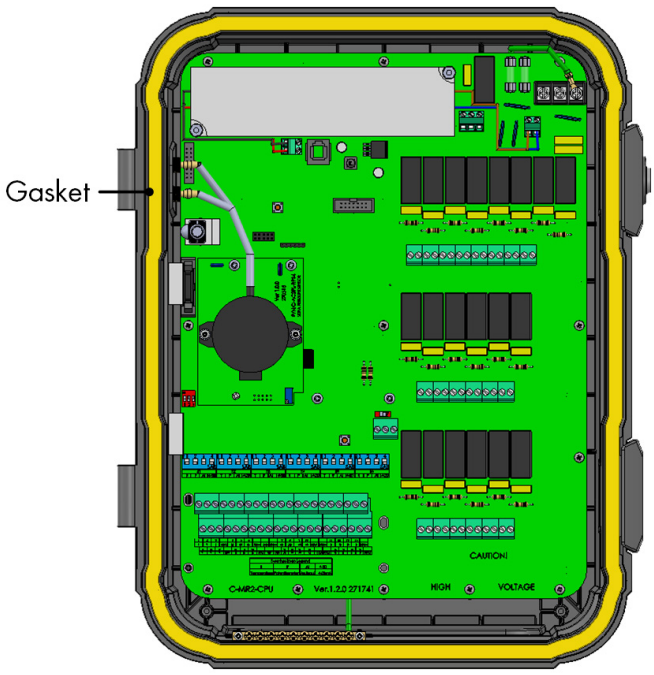
	Output			Measurements	
Devices/Sensors	**Total**	**Relay**	**0-10V**	**Analog**	**Digital**
Cooling	2	2			
Heaters	4	4	4		
Inlets	2	2	2		
Outlets	1	NA	1		
Tunnel Doors/Curtains	2	2	2		
Fans Exhaust/Tunnel	8	8	8		
Stir Fan	1	1	NA		
Sprinkler	1	1			
Timer	5	5			
Feeder	X	X			
As Relay	20	20	NA		
As Analog Output	8	NA	8		
Alarm	1	1			
Temperature Sensors				12	
Humidity Sensors IN				1	
CO2 Sensors				1	
Ammonia Sensors				1	
Pressure Sensors				2	
Potentiometers				4	
Power Meter				X	
Gas Meter				X	
Water Meters					1
Aux. Input					4
Feeder Line Sensor					X

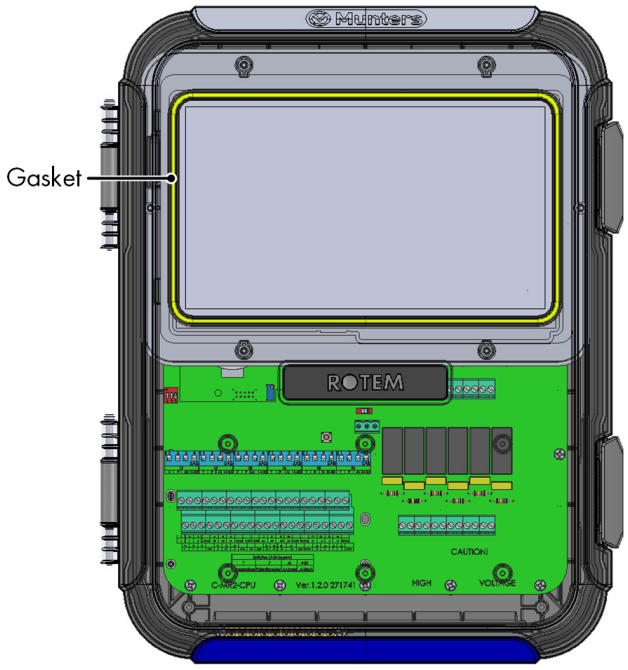
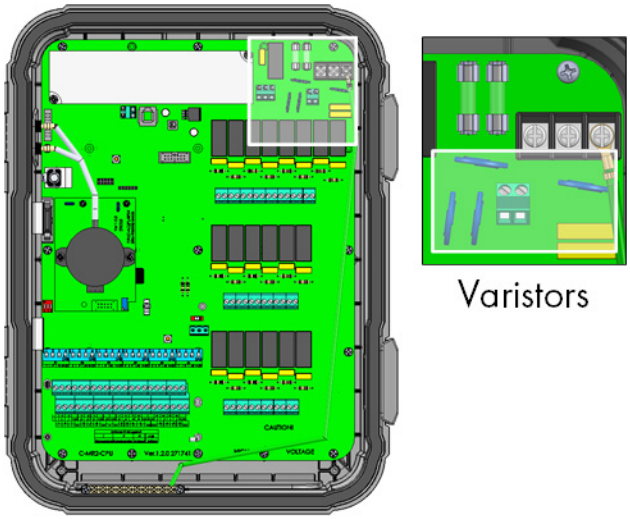
23 Appendix B: Service Manual

- Maintenance
- Trouble Shooting
- Spare Parts

23.1 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 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.	

23.2 Trouble Shooting

- Internet
- Electronic Components

23.2.1 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.

23.2.2 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.

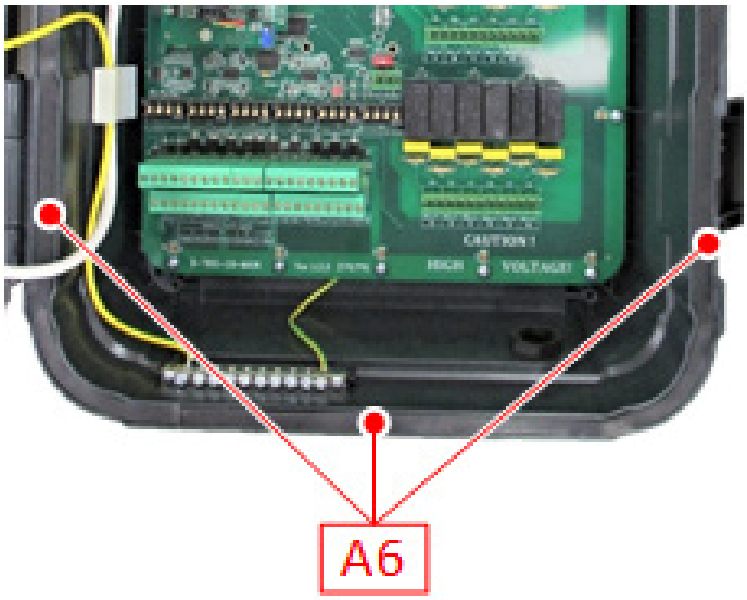
23.3 Spare Parts

- Preliminary Information
- TRIO 20 Container Spare Parts
- TRIO 20 Door Cards Spare Parts
- TRIO 20 Main Container Spare Parts
- Additional Options
- Cards

23.3.1 Preliminary Information

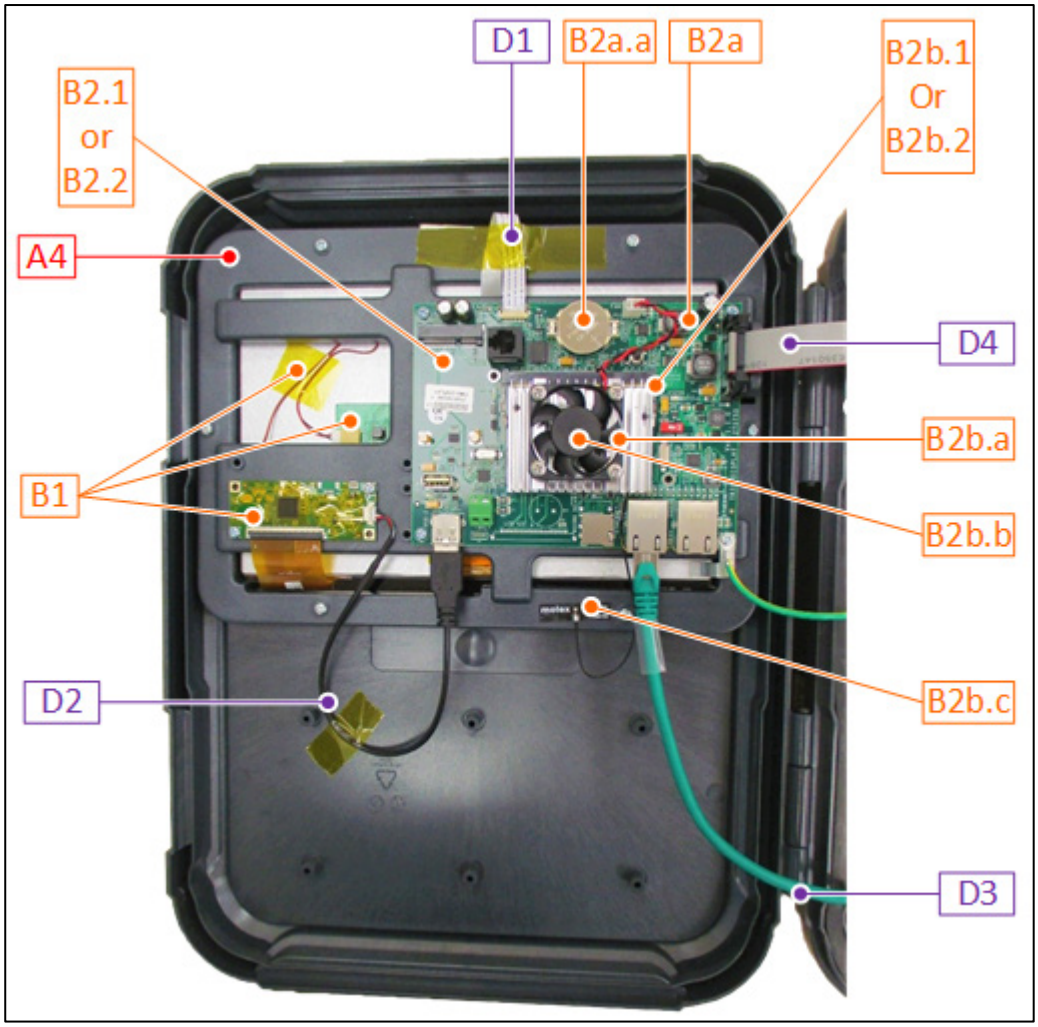
	TRIO 20
Container	A
Door Cards	B
Main Container Cards	C
Cables and Harnesses	D
MPN	Munters Part Number
DPN	Dealer Part Number

23.3.2 TRIO 20 Container Spare Parts



ID No.	Description	Order Catalog Number	Note
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:	
A2.1	TRIO-20 PANEL PLASTIC PART BLUE LOGO MUNTERS + PART BLUE	MPN: 940-99-00001	OR
		DPN:	
A2.2	TRIO PANEL PLASTIC PART RED RAL 3020 NO LOGO (SP-207138)	MPN: 940-99-00045	
		DPN:	
A3.1	ONE / ONE PRO - LATCH GENERAL LOCK PLASTIC PART +LOCK FOR LATCH	MPN: 900-99-00217	
		DPN:	
A3.2	GENERAL PLASTIC LATCH	MPN: 900-99-00216	
		DPN:	
A4	TRIO-20 LCD HOLDER V1.0.0 (SP-207125)	MPN: 940-99-00024	
		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 (SP-207122)	MPN: 940-99-00021	
		DPN:	

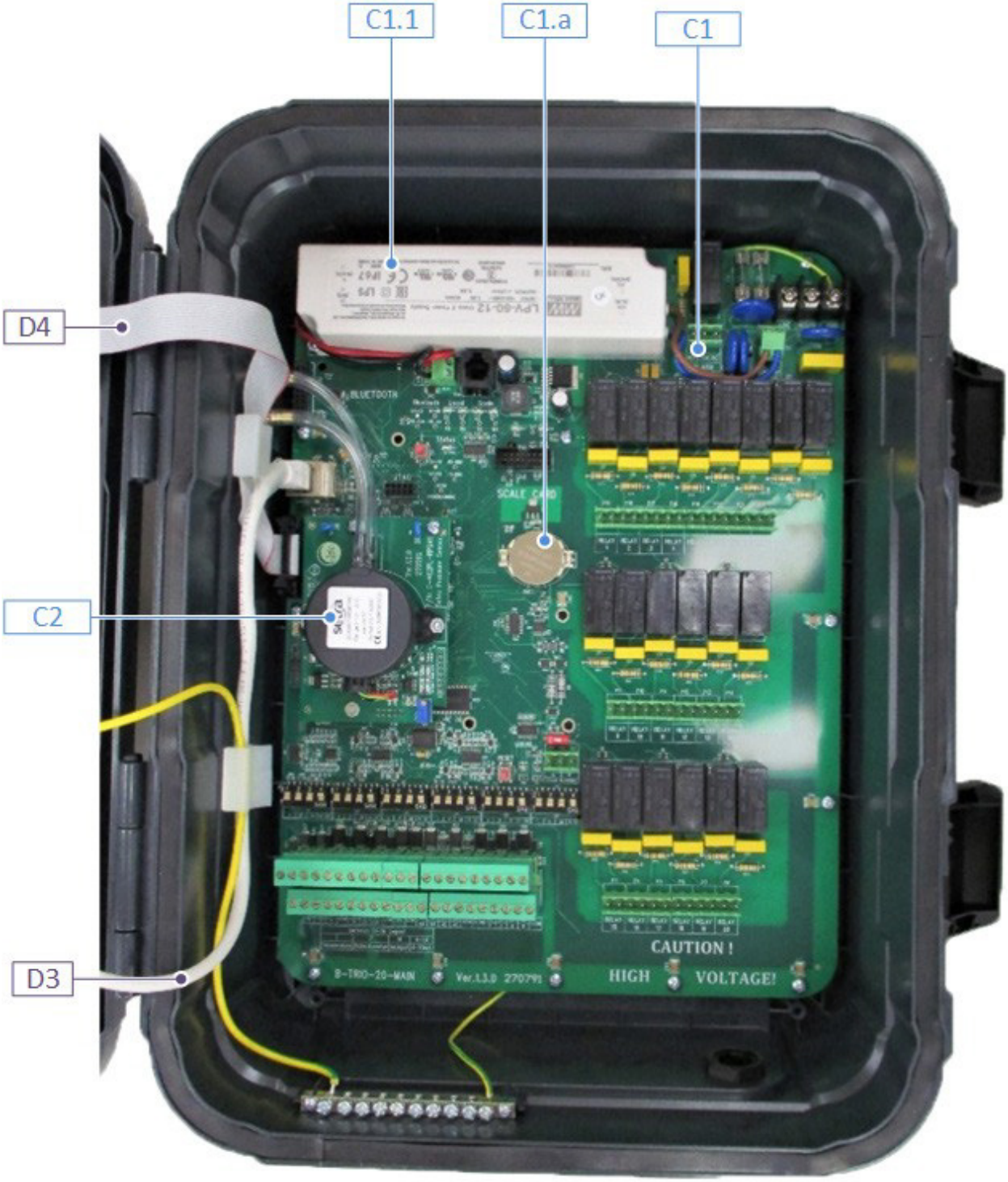
23.3.3 TRIO 20 DOOR CARDS SPARE PARTS



ID No.	Description	Order Catalog Number	
B1	TRIO-20 LCD KIT (DISPLAY + LVDS CARD), [+ USB CABLE *]	MPN: 940-99-00002	
		DPN:	
B2.1	TRIO 20 -PIG- DISPLAY CARD AND SOM VARISCITE CARD WITH HEATSINK AND FAN	MPN: 940-99-00041	OR
		DPN:	
B2.2	TRIO 20 -PIG-CN- DISPLAY CARD AND SOM VARISCITE CARD WITH HEATSINK AND FAN	MPN: 940-99-00043	CHINA ONLY
		DPN:	
B2a	TRIO 20 DISPLAY CARD (TRIO-DISPLAY)	MPN: 940-99-00004	
		DPN:	
B2a.a	BAT COIN 3V FOR SOCKET(SP-450009)	MPN: 999-99-00386	
		DPN:	
B2b.1	TRIO 20 -PIG- SOM VARISCITE CARD WITH HEATSINK AND FAN	MPN: 940-99-00040	OR
		DPN:	
B2b.2	TRIO 20 -PIG-CN- SOM VARISCITE CARD WITH HEATSINK AND FAN	MPN: 940-99-00042	CHINA ONLY
		DPN:	
B2b.a	TRIO 20 HEATSINK AND FAN FOR SOM CARD	MPN: 940-99-00026	
		DPN:	
B2b.b	FAN FOR TRIO SOM (SP-204152)	MPN: 940-99-00025	
		DPN:	
B2b.c	TRIO 20 ANTENNA WIFI MOLEX 15cm CABLE U.FL/I-PEX MHF 2.4GHz 2.8dBi 50ohm (SP-491009)	MPN: 940-99-00035	
		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	USB CABLE FOR Vitek DISPLAY (SP-140672)	MPN: 940-99-00027
		DPN:
D3	NETWORK CABLE RJ485 (8 WIRES, 0.5 METERS)	MPN: 940-99-00011
		DPN:
D4	FLAT FF14P 25CM F"D>_V1.0.0 (SP-141161)	MPN: 999-99-00457
		DPN:

23.3.4 TRIO 20 MAIN CONTAINER SPARE PARTS



ID No.	Description	Order CatalogNumber
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:
C1.a	BAT COIN 3V FOR SOCKET(SP-450009)	MPN: 999-99-00386
		DPN:
C2	TRIO-20 POU SETRA PRESSURE CARD	MPN: 901-99-00013
		DPN:

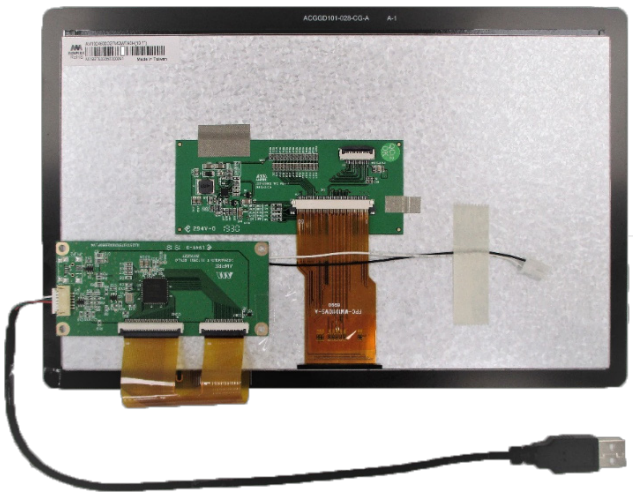
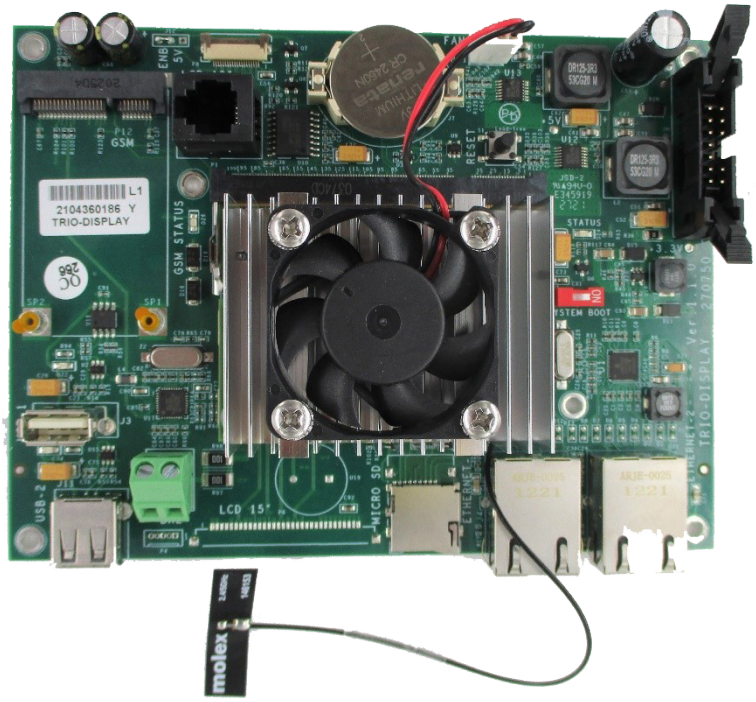
23.3.5 Additional Options

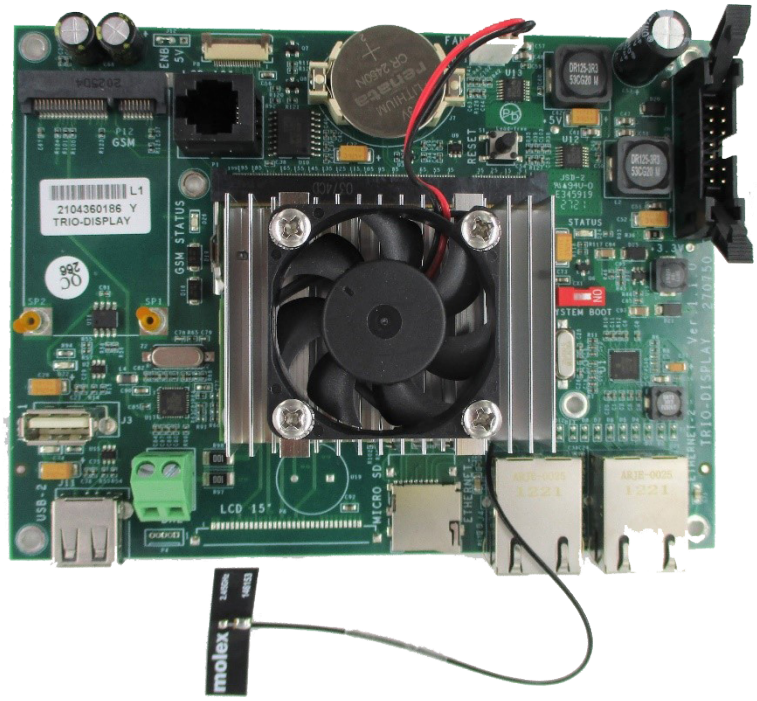
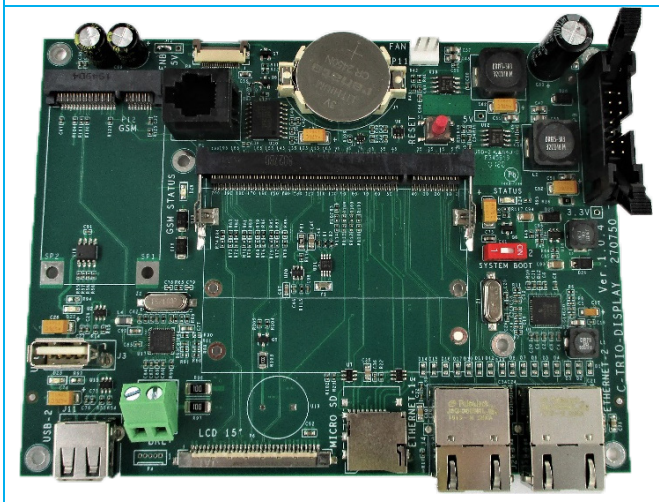
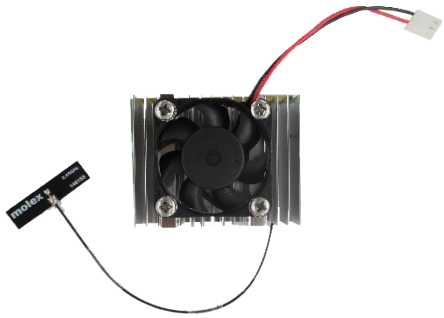
ID No.	Description	Order Cat. No.
ADO 1	TEMPERATURE SENSOR BLACK-RTS-2-POU	MPN: 918-01-00001
		DPN:
ADO 2	HUMIDITY SENSOR-RHS-POU-ROT-SE-10PL	MPN: 917-02-00003
		DPN:
ADO 3	STATIC PRESSURE SET - AC3G/SE/PL/TRIO - PIG	MPN: 901-99-00028
		DPN:
ADO 3.a	TUBES AND FILTERS FOR RPS (NO RPS CARD)	MPN: 999-99-00503
		DPN:
ADO 4	STATIC PRESSURE (EXTERNAL) SENSOR-RPS-PIG-MUR	MPN: 920-03-10001
		DPN:
ADO 5	CO2-PIG-EN-MUR	MPN: 919-01-10005
		DPN:
ADO 6	AMMONIA-POU-MUN	MPN: 929-01-00002
		DPN:

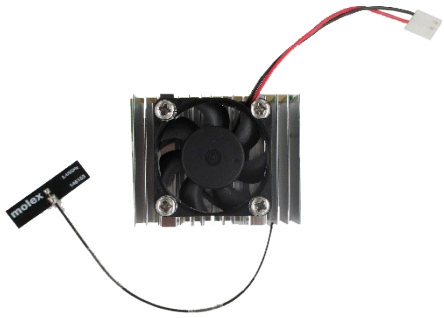
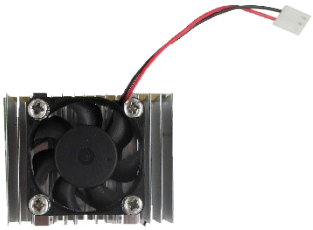
23.3.6 CARDS

- Door Cards
- Main Container Cards

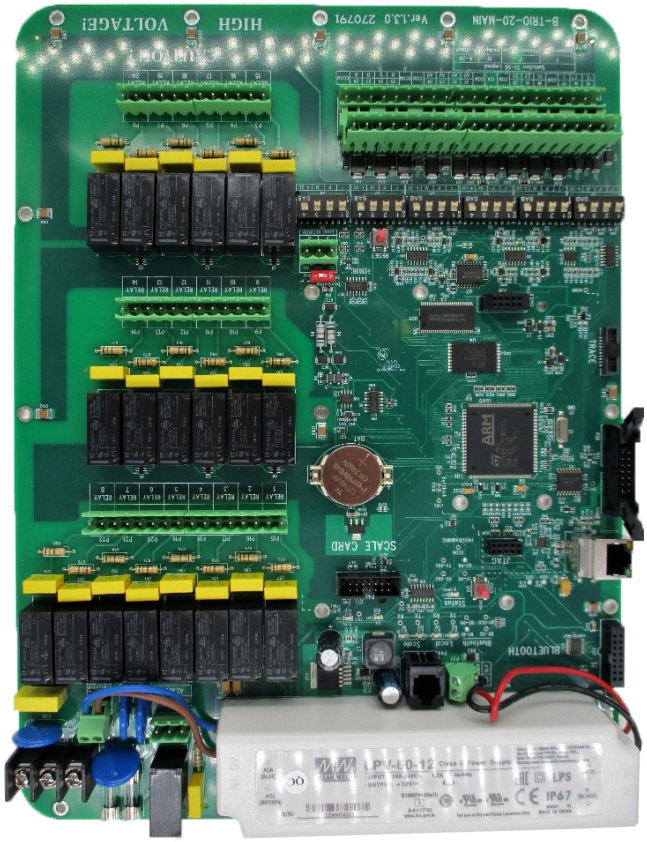
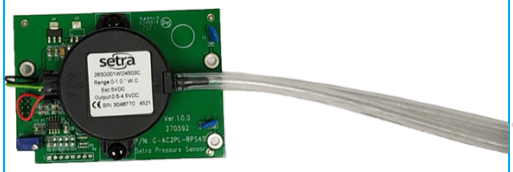
23.3.6.1 Door Cards

Card	Description	Munters Ordering Number
	250061: LCD TFT 10.1' VT101C-KC17-B07A Vitek Or AM-1024600O2TMQW-TA0H AmpireOr TWS2101RBTV20C APEX	940-99-00002
	140672: USB CABLE FOR Vitek\Ampire DISPLAY	940-99-00027
	TRIO 20 -PIG- DISPLAY CARD AND SOM VARISCITE CARD WITH HEATSINK AND FAN	940-99-00041

Card	Description	Munters Ordering Number
	TRIO 20 -PIG-CN-DISPLAY CARD AND SOM VARISCITE CARD WITH HEATSINK AND FAN NOTE: CHINA ONLY	940-99-00043
	R-TRIO-DISPLAY: TRIO 20 DISPLAY CARD (TRIO-DISPLAY)	940-99-00004
	TRIO 20 -PIG- SOM VARISCITE CARD WITH HEATSINK AND FAN	940-99-00040

Card	Description	Munters Ordering Number
	TRIO 20 -PIG-CN-SOM VARISCITE CARD WITH HEATSINK AND FAN NOTE: CHINA ONLY	940-99-00042
	TRIO 20 HEATSINK AND FAN FOR SOM CARD	940-99-00026
	204152: FAN FOR SOM CARD HEATSINK	940-99-00025
	491009: ANTENNA WI-FI MOLEX 1461530150 15cm CABLE, U.FL/I-PEX MHF	940-99-00035

23.3.6.2 Main Container Cards

Card	Description	Munters Ordering Number
	R-TRIO-20-MAIN: MUNTERS ROTEMMIDDLE RANGE 2CPU	940-99-00003
	370193: SWPS LPV-60-12 Mean Well 100-240V 12V 60W	900-99-00264
	STATIC PERSSURE SET-AC3G/SE/PL/TRIO-PIG	901-99-00028

Card	Description	Munters Ordering Number
	TUBES AND FILTERS FOR RPS (NO RPS CARD)	999-99-00503

24 Appendix C: Central Exhaust

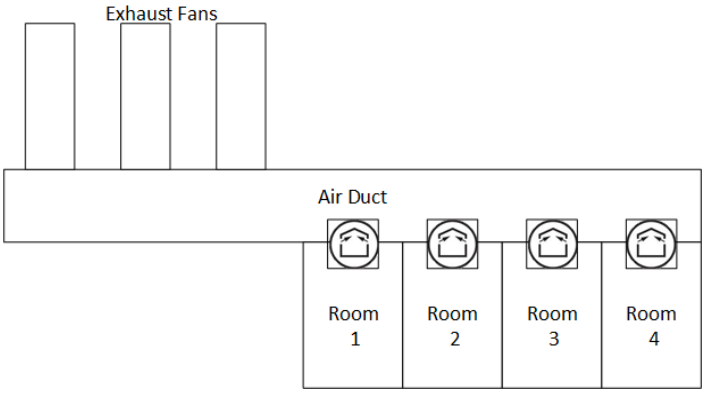
The Central Exhaust Mode uses static pressure levels to determine the ventilation levels. This appendix explains how to set up the Central Exhaust System.

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

24.1 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.

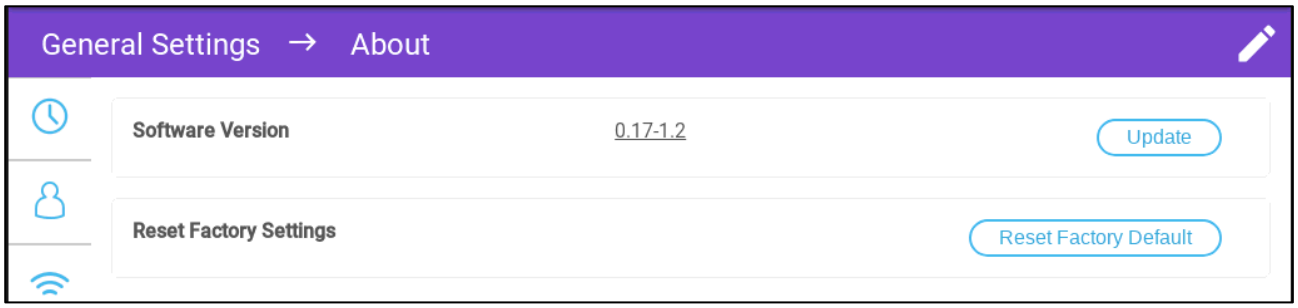


Since Central Exhaust sets the pressure settings for the entire structure, there is only one room in this mode.

24.2 Selecting Central Exhaust

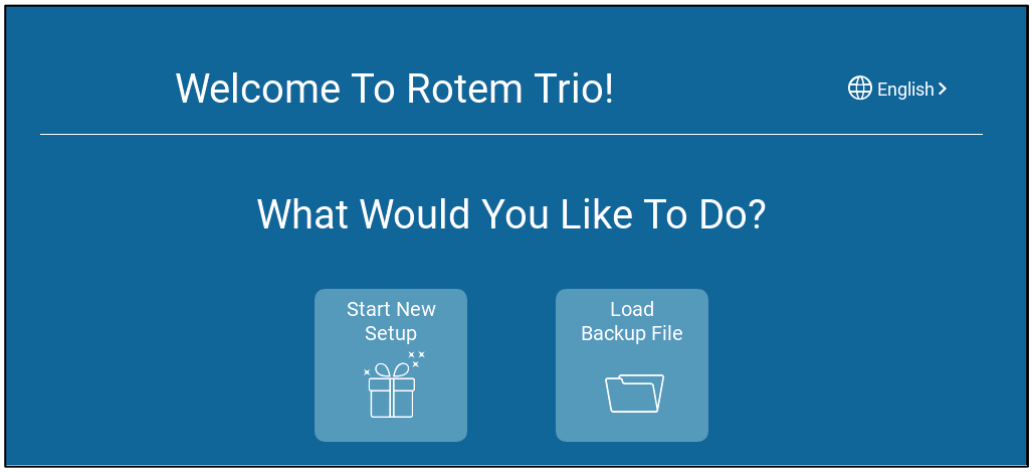
To select the Central Exhaust Mode:

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

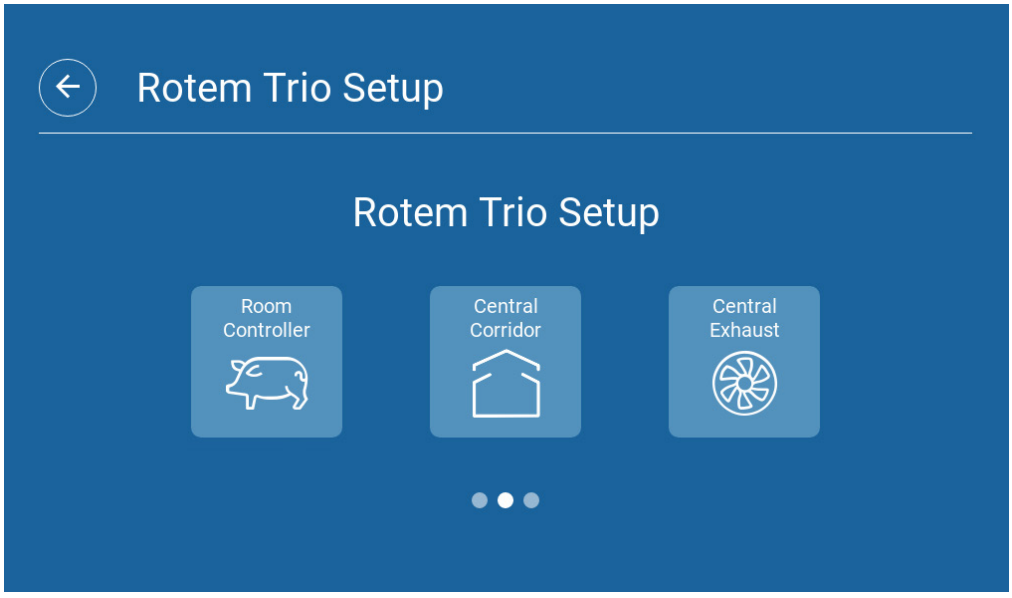


   a. Click Reset Factory Default.
   b. Create a backup if required.

2. Click Reset.



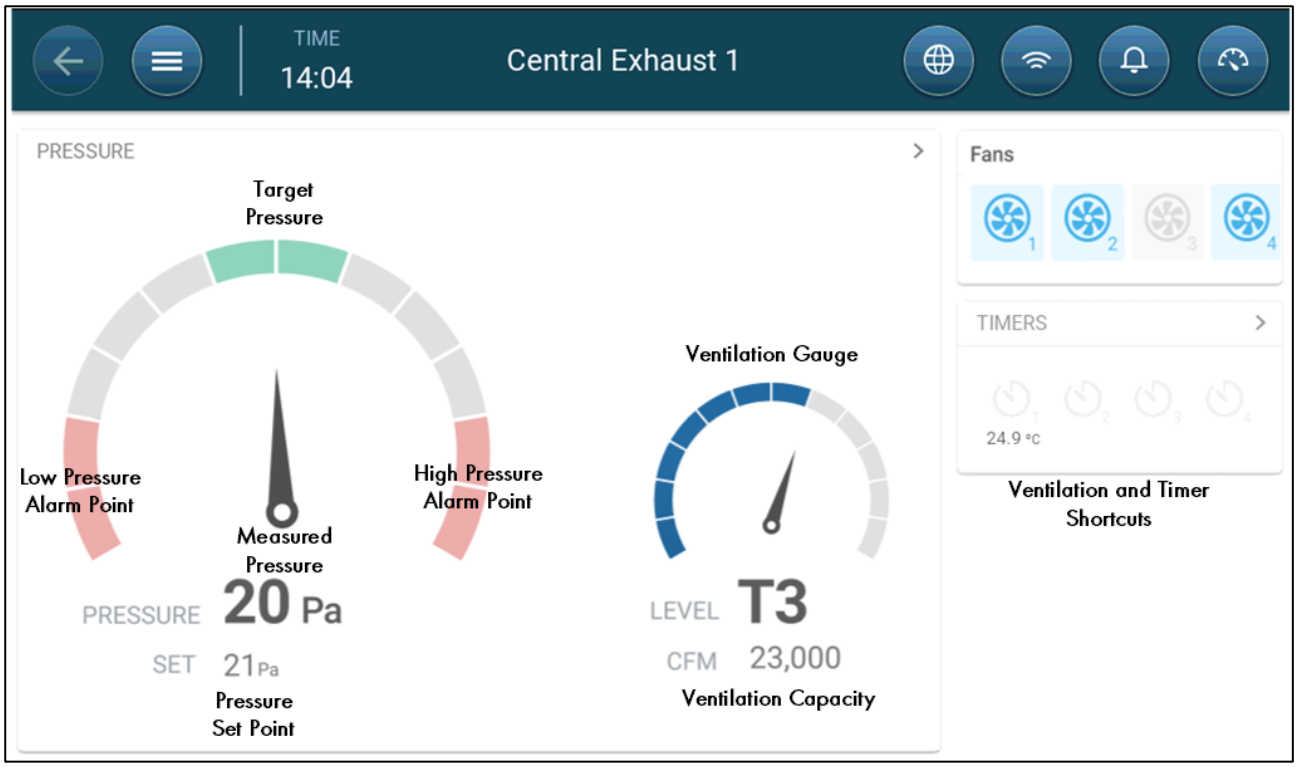
3. Click Start New Setup.



4. Click Central Exhaust.

24.3 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 49).

24.4 Central Exhaust Functions

Central Exhaust supports the following functions:

- Control
  - Ventilation Levels

NOTE Central Ventilation (Version 4.1.10) supports 30 levels of ventilation. Refer to Levels of Ventilation, page 169.

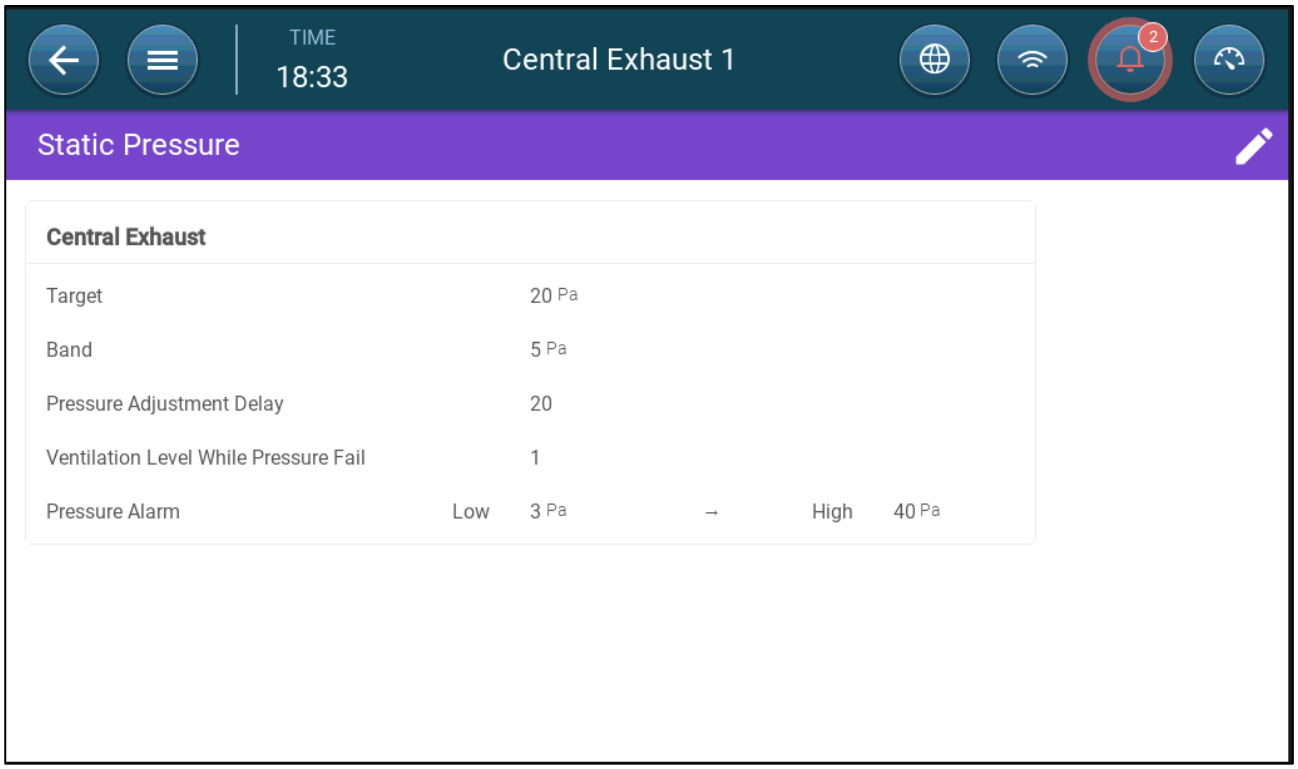
  - Cooling (Version 4.2.3 and above)
  - Pressure
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition
  - Device & Sensors Definition and Mapping
  - Room Settings

- Mapping Devices
- General
  - Time & Date
  - Static Pressure
  - Alarm
  - User
  - Network
  - Backup
  - About

24.5 Setting the Static Pressure

Enable a static pressure sensor in Devices & Sensors (page 49).

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.

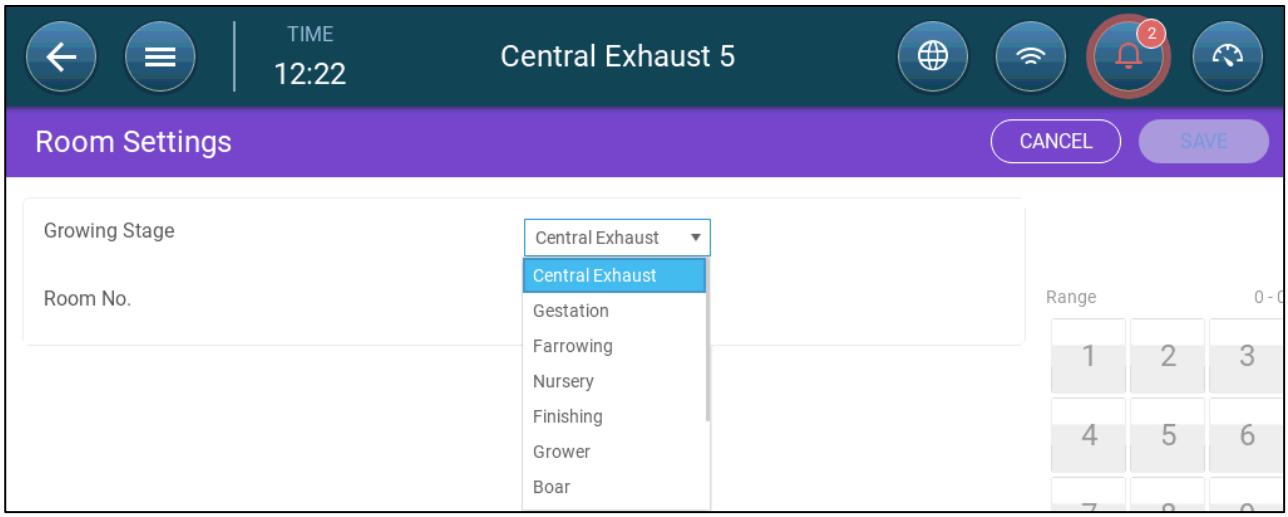
CAUTION *This parameter is extremely important and can ensure animal survival in the event of a sensor failure.*

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

24.6 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.



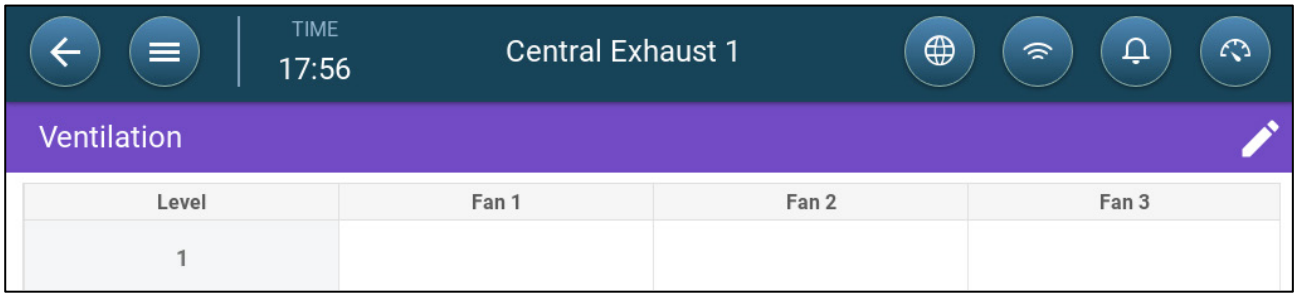
- Gestation: Pregnancy period (114 days)
- Farrowing: From the piglets' birth until day 21 (when they are weaned).
- Nursery: This is the period when they are separated from their mothers.
- Finishing: Pigs are moved from the nursery to a finishing barn for 115 – 120 days.
- Grower: Same as Finishing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

24.7 Levels of Ventilation

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

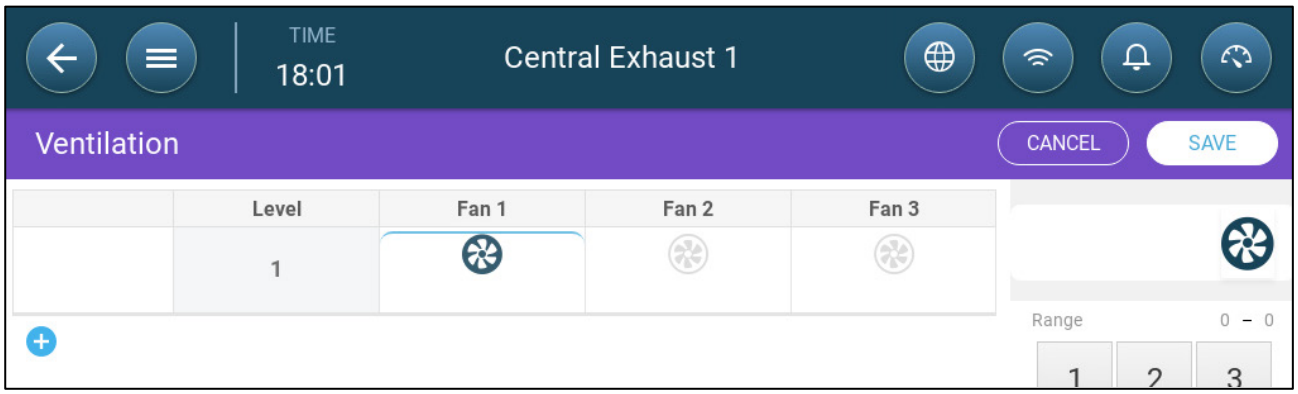
To set up the ventilation levels:

1. Go to System > Devices & Sensors and define the fans. Refer to Mapping Devices, page 49 for details.
2. Go to Control > Ventilation.

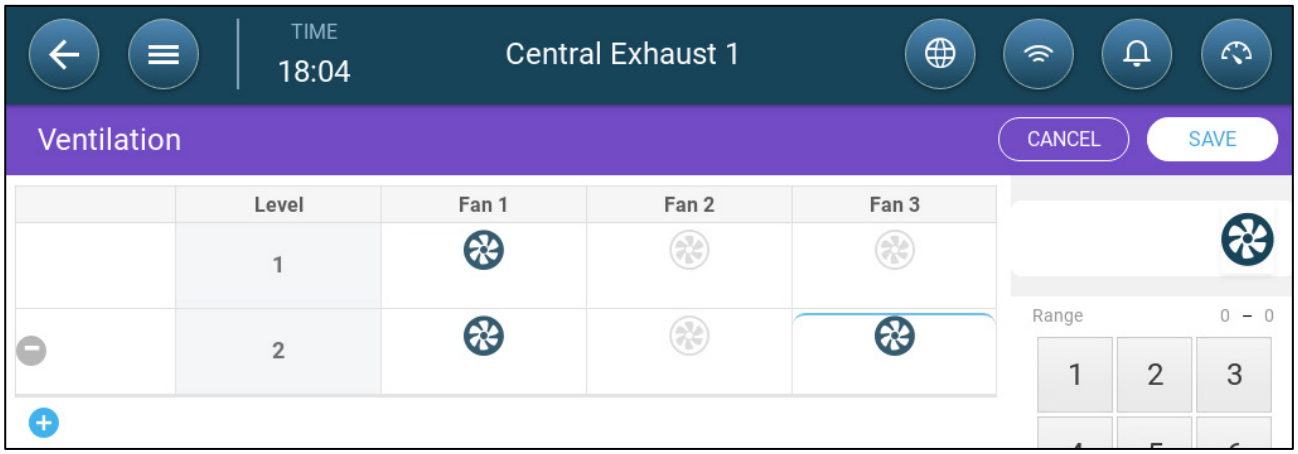


3. Click .

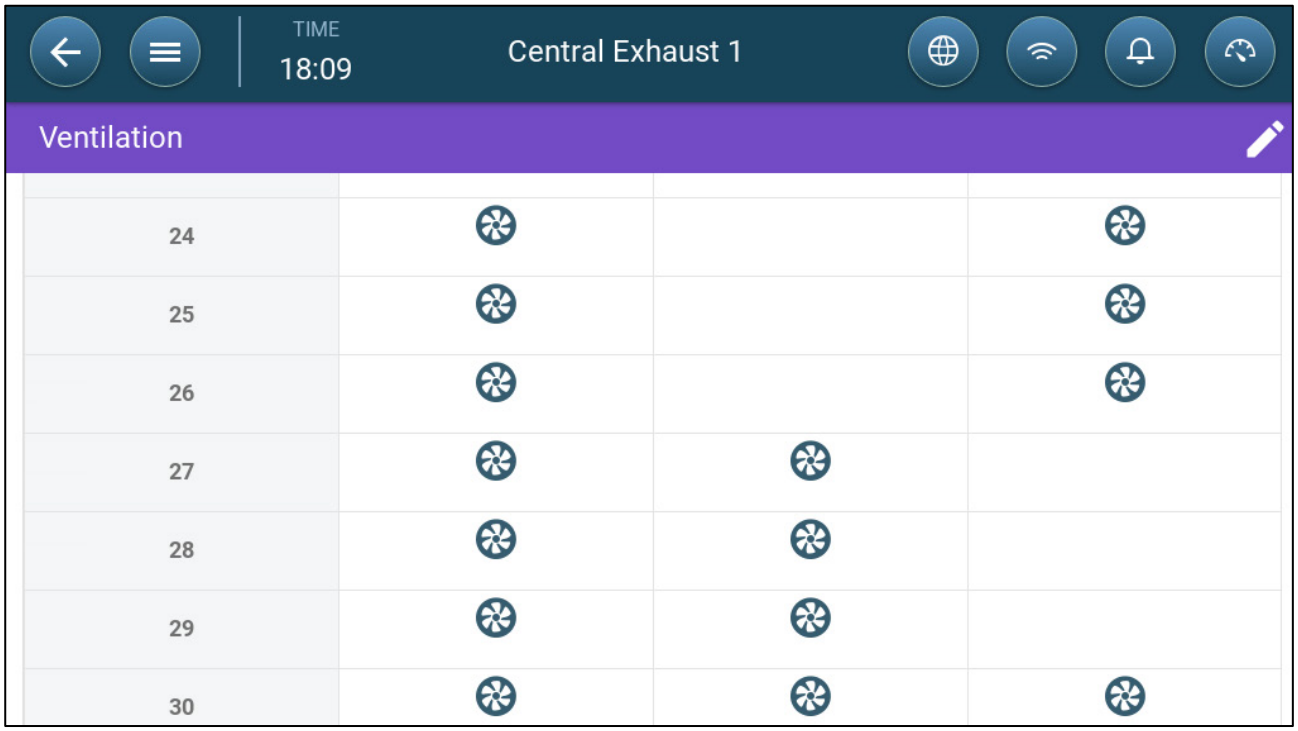
4. Enable the fan(s) in Level 1 as required. Refer to Defining the Fans/Ventilation Scheme, page 94 for details.



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



6. Repeat these steps, up to 30 levels.



7. Click **Save**.

25 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

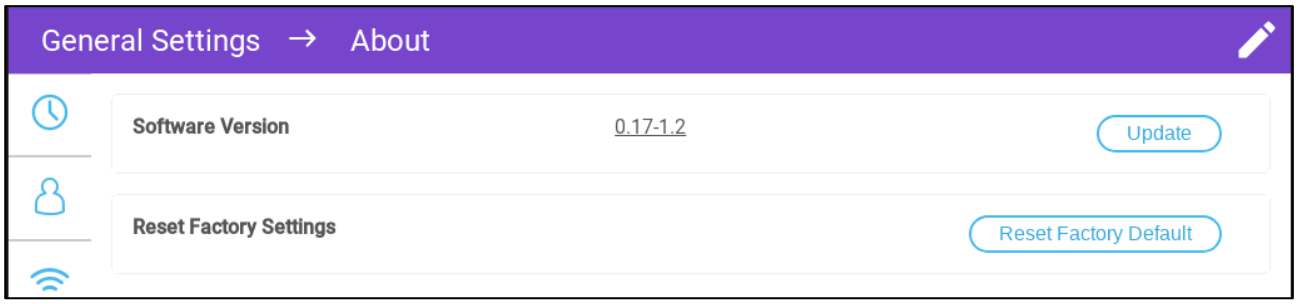
25.1 Introduction to Pressure Control

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.

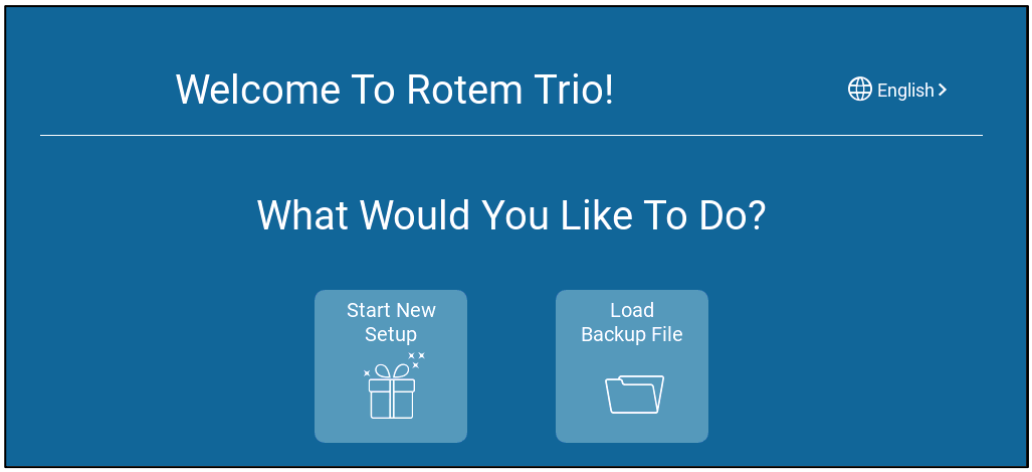
25.2 Selecting Central Corridor

To select the Central Corridor Mode:

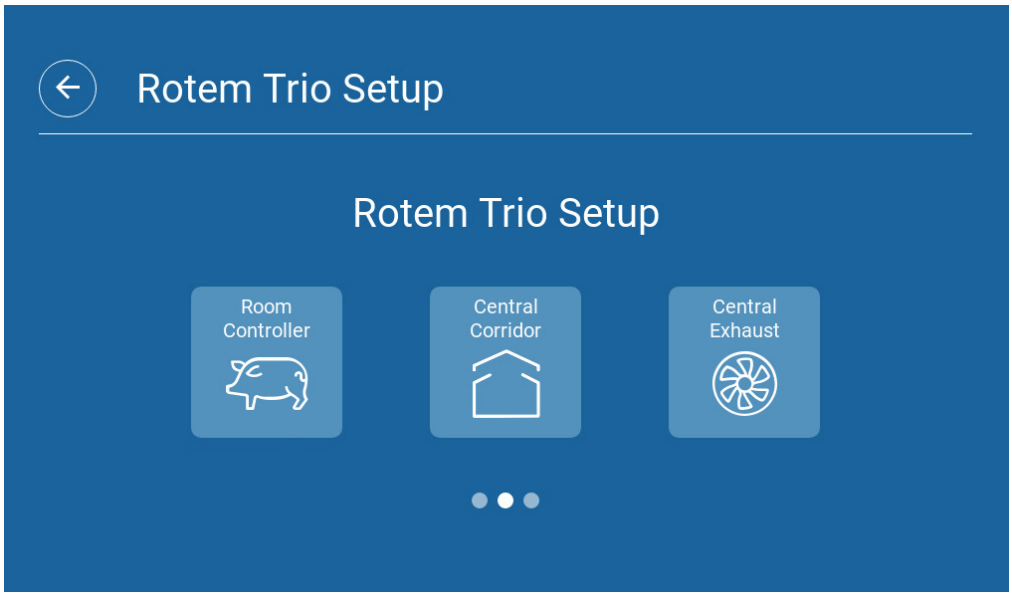
1. Perform a Cold Start. Go to System > General Settings > About.



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



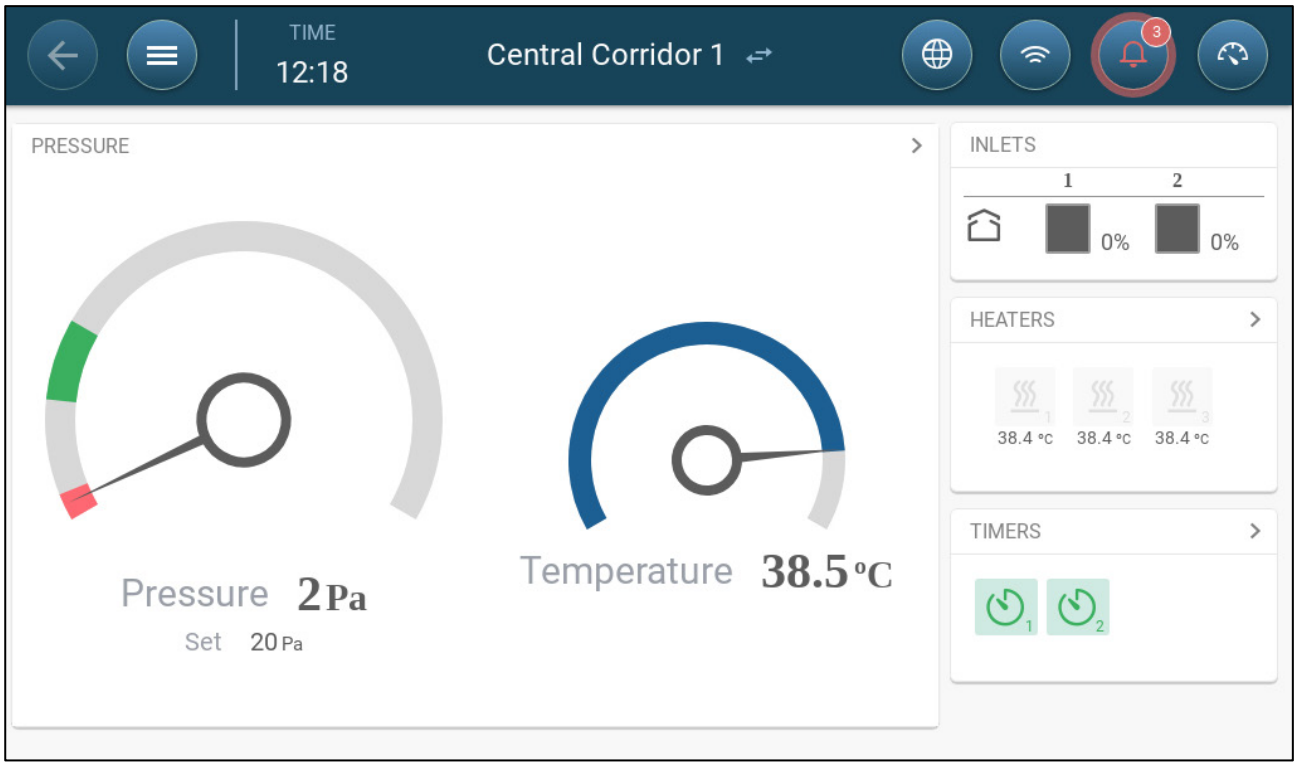
3. Click Start New Setup.



4. Click Central Corridor.

25.3 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 49).

25.4 Central Corridor Functions

Central Corridor supports the following functions:

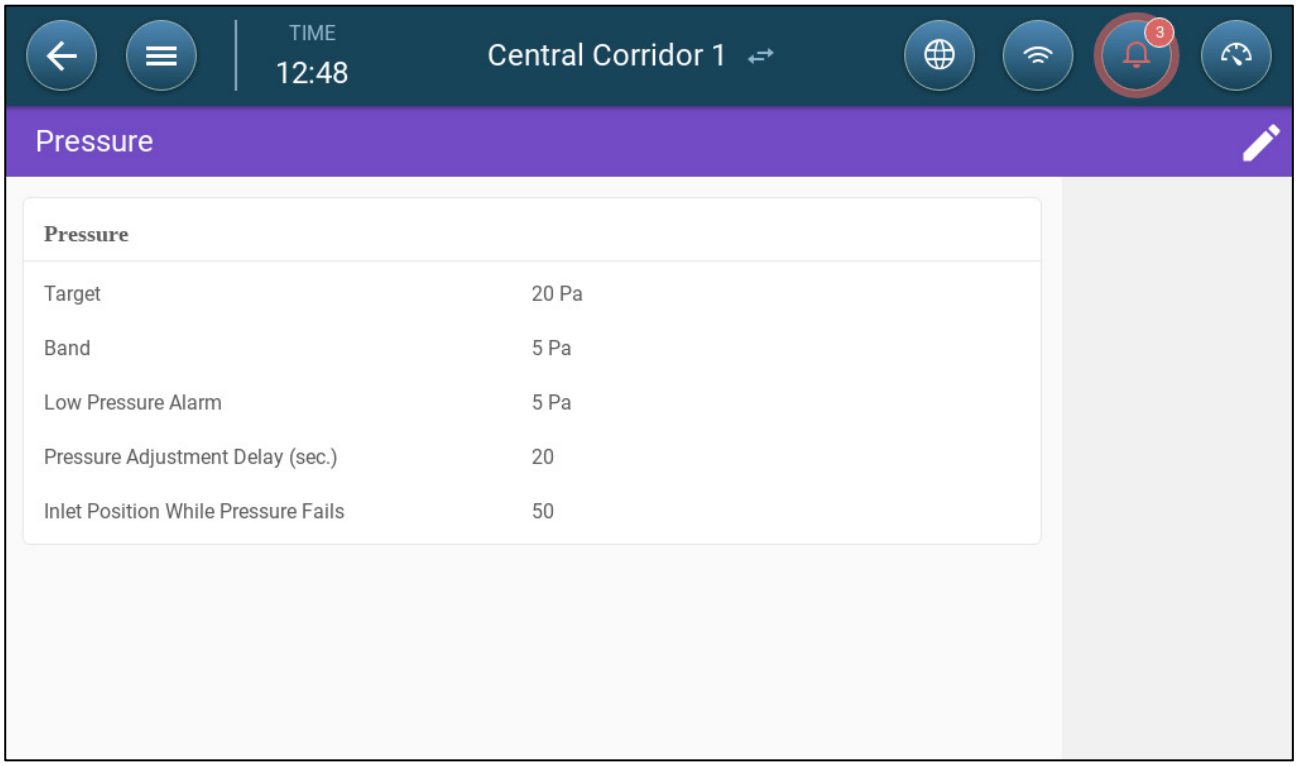
- Control
  - Timers
  - Aux Alarm
- History
  - Alarms & Events
- System
  - Temperature Definition
  - Alarm Settings
  - Device & Sensors Definition and Mapping
  - Room Settings
  - Mapping Devices
  - General
    - Time & Date
    - Alarm
    - User
    - Network
    - File Saving and Loading
 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

25.5 Setting the Pressure Levels

➲ **Define Pressure in Mapping Devices, page 49.**

Enable a static pressure sensor in Devices & Sensors (page 49).

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.*

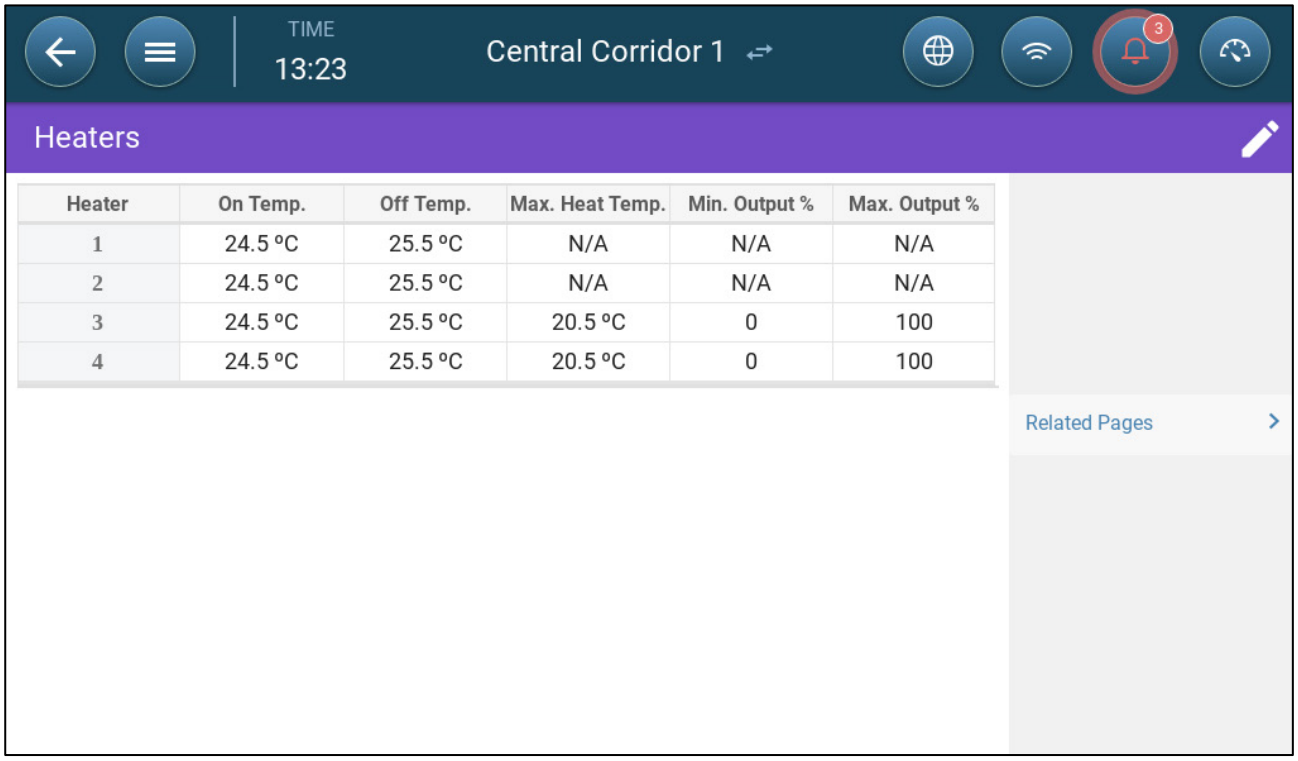
   - Pressure Alarm: Set the low and high pressures, at which an alarm is transmitted.
   - Inlet Position while Pressure Fails: In the event that the pressure sensor fails, define the inlet position to provide emergency ventilation.

25.6 Defining the Heat

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

➲ **Define up to six relays and/or ports as heaters in Mapping Devices, page 49.**

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



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

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

2. Define:

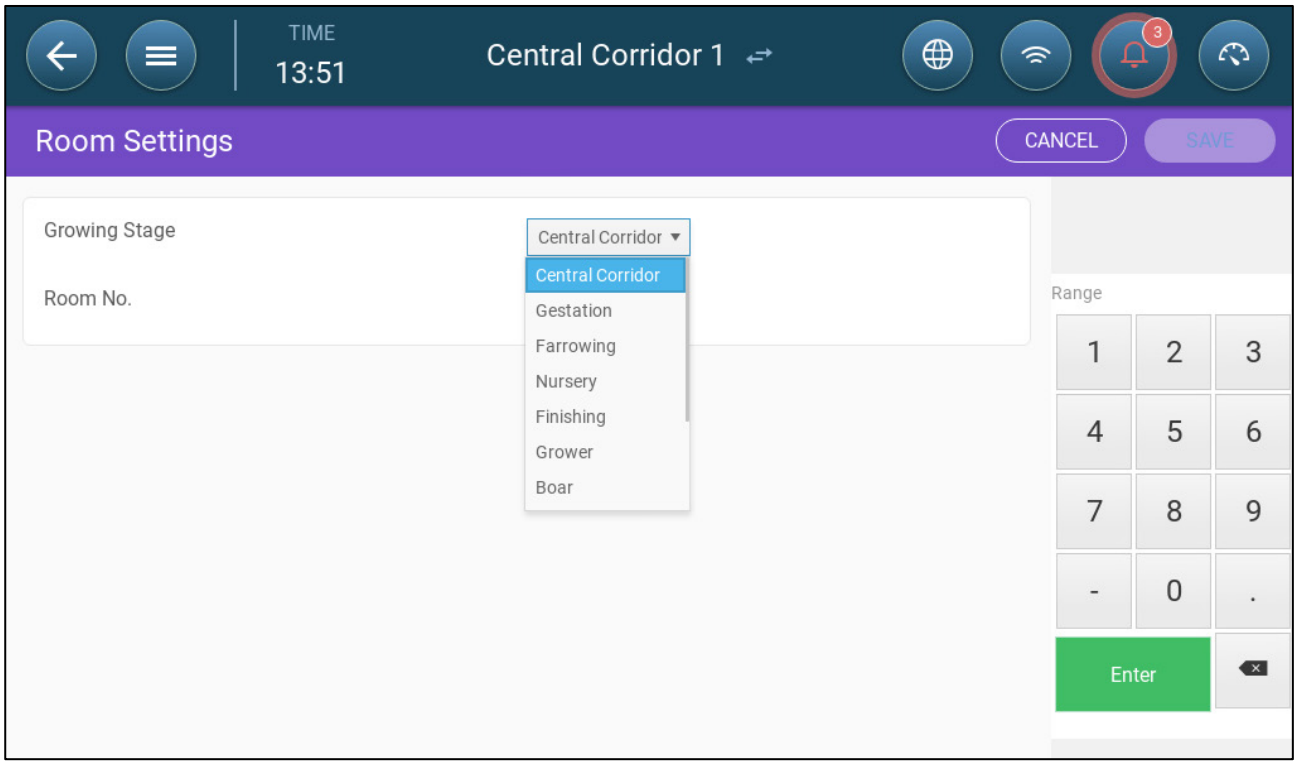
NOTE The temperatures here are absolute temperatures; there is no temperature band.

- On Temperature: Below this temperature, the heaters turn on. Range: -40^0 to Off temperature
- Off Temperature: Above this temperature, the heaters turn off. Range: Off temperature to 90^0 C.
- Max Heat Temperature: Set the temperature at which heaters work at maximum capacity. Range: -40^0 to On temperature
- Minimum Output: Set the voltage at which heaters work at their minimum level.
- Maximum Output: Set the voltage at which heaters work at their maximum level.

25.7 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.



26 Appendix E: TRIO Expansion 10

- Expansion Layout
- Expansion Wiring Diagrams
- TRIO / TRIO Expansion Termination
- Key
- Product Symbols
- Mapping Devices in Expansion
- Expansion Specifications
- Expansion Spare Parts

26.1 Expansion Layout

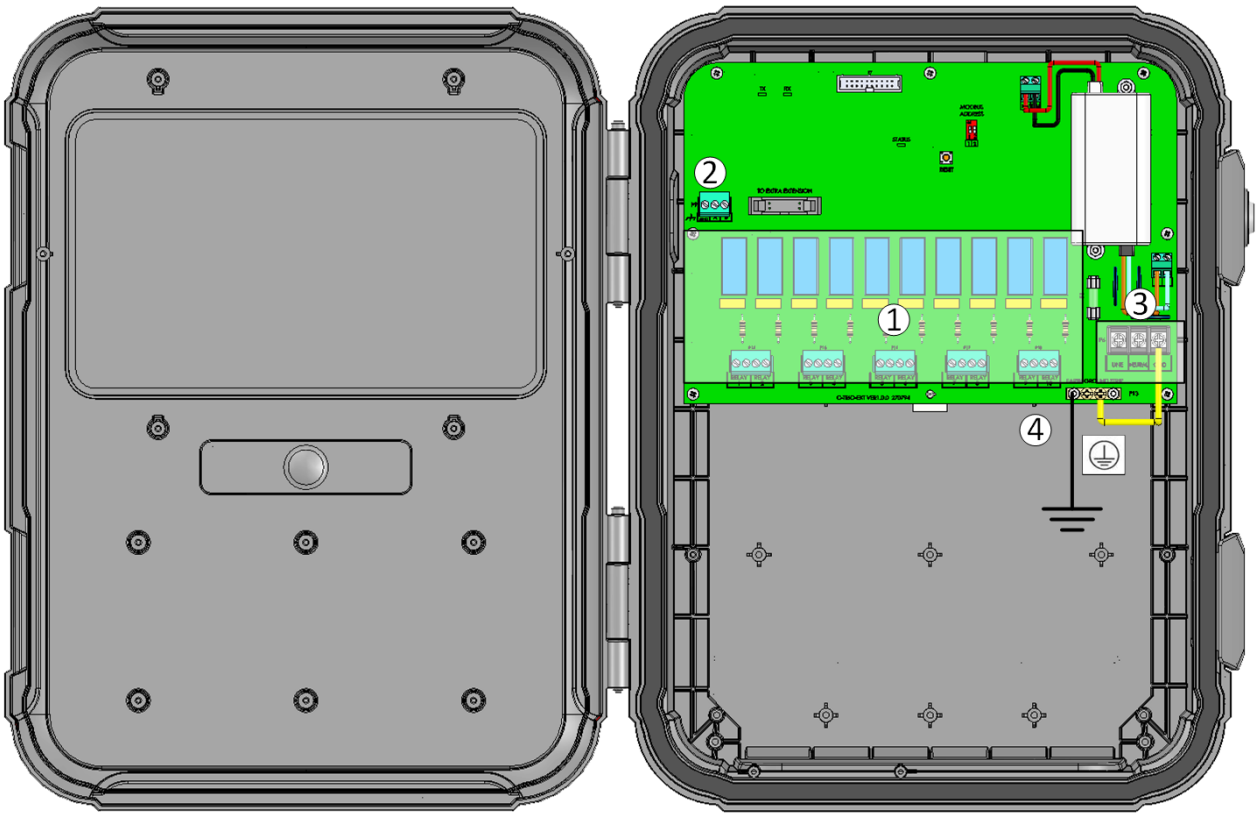


Figure 30: Board layout

1	10 relays
2	RS-485 ports
3	Power ports
4	Ground strip

26.2 Expansion Wiring Diagrams

- TRIO to TRIO Expansion Wiring
- High Voltage Relays
- Alarms and Power

26.2.1 TRIO TO TRIO EXPANSION WIRING

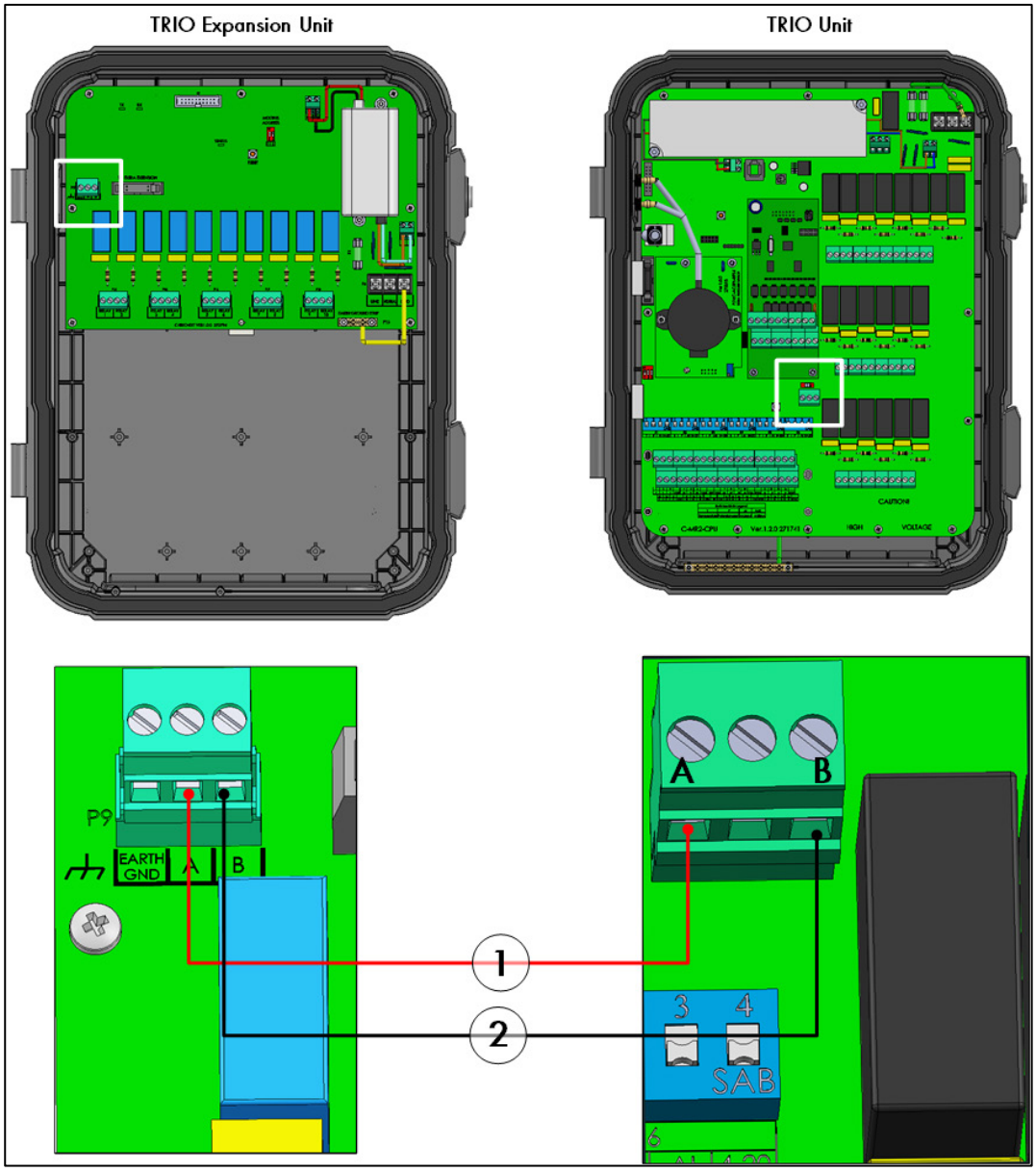


Figure 31: Wiring diagram

- The cable between the controller and the expansion unit should be a 4 wire twisted shielded cable (22 or 24 AWG).
- 1 – red wire
- 2 – black wire

26.2.2 HIGH VOLTAGE RELAYS

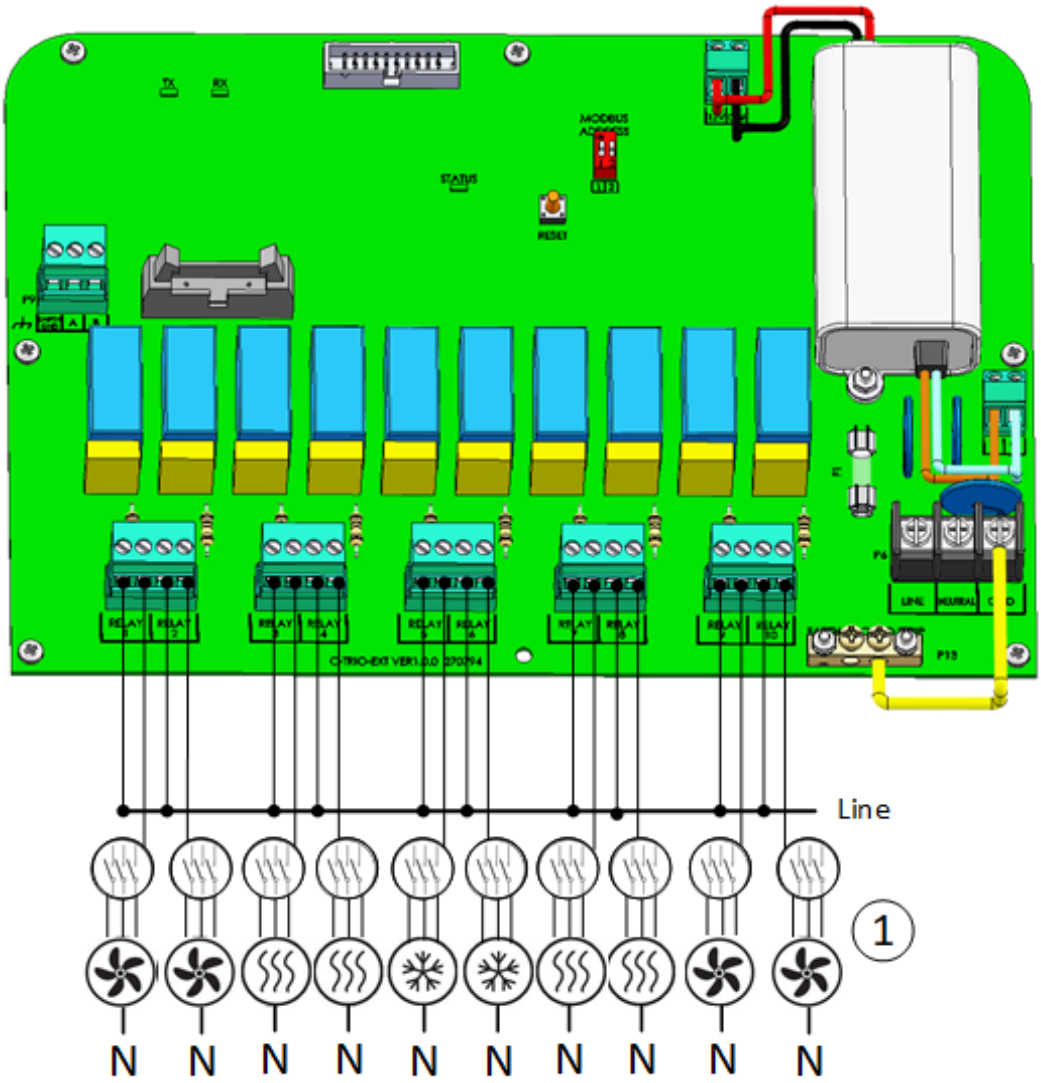


Figure 32: High voltage devices (examples)

1	Example of devices

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

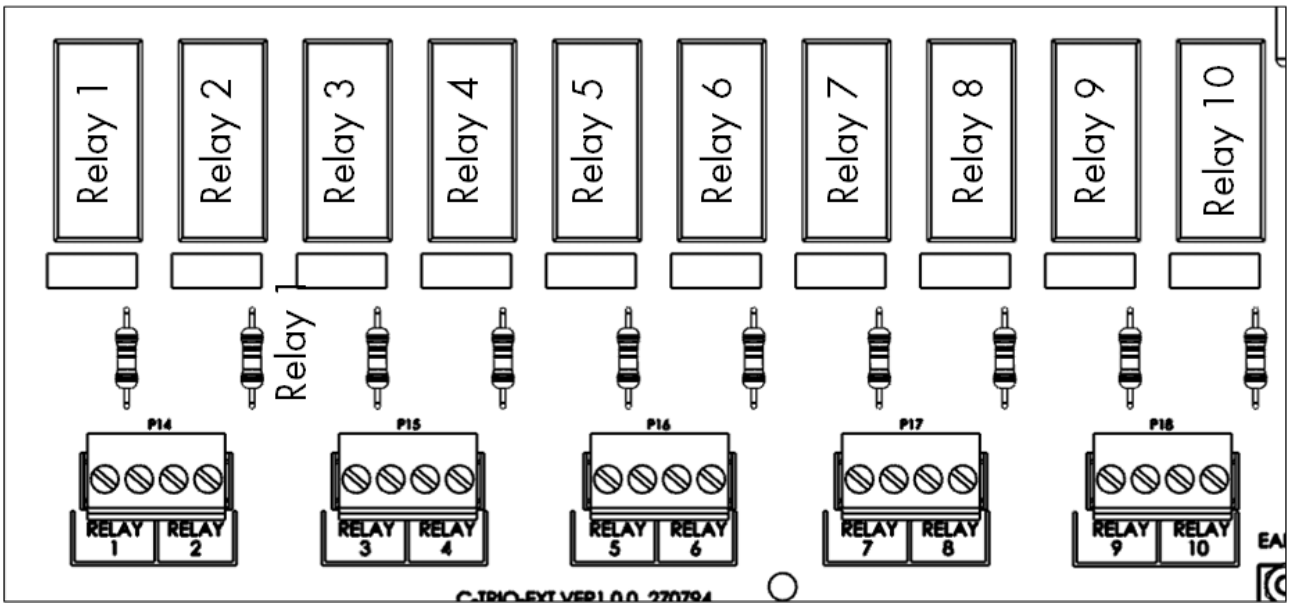


Figure 33: Relay and port numbering

26.2.3 POWER

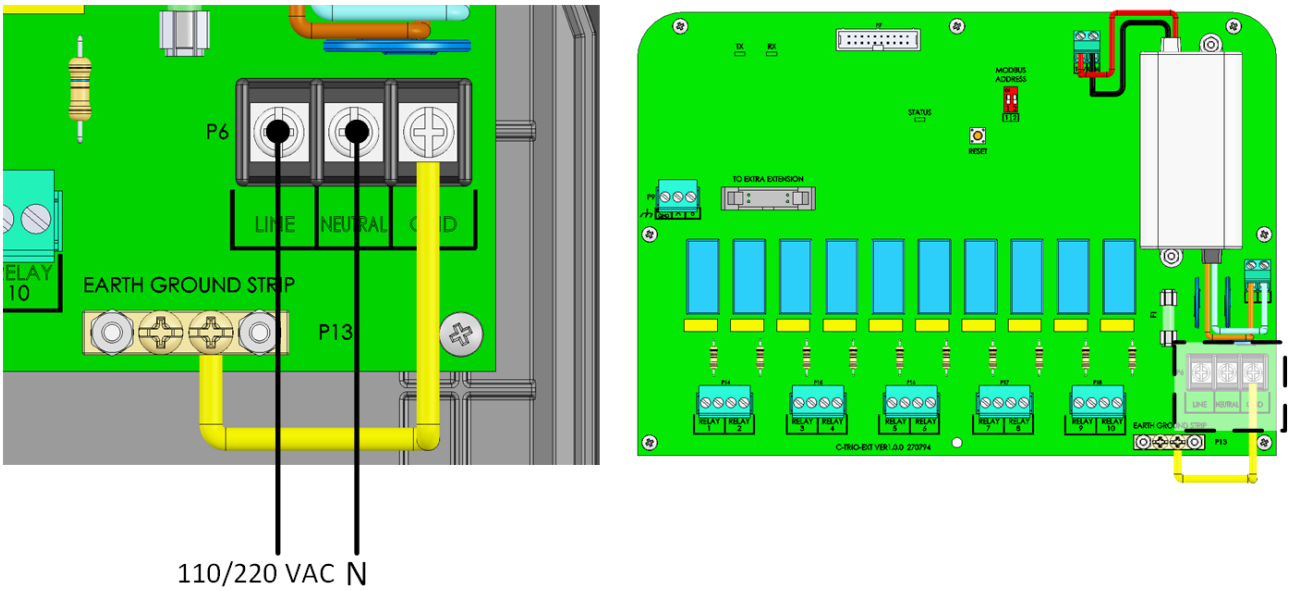
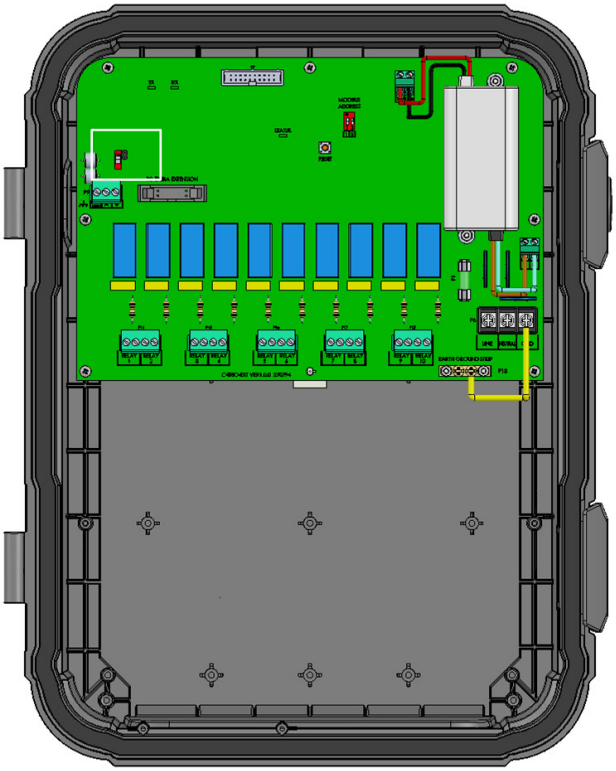
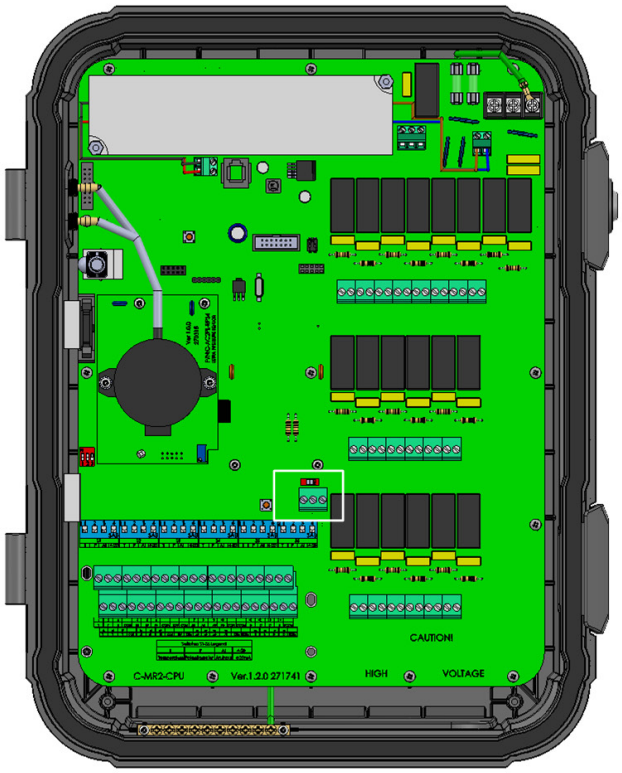


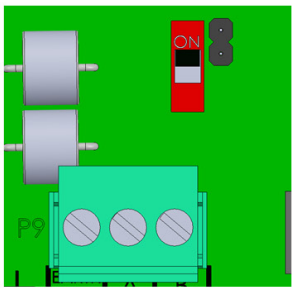
Figure 34: Power ports

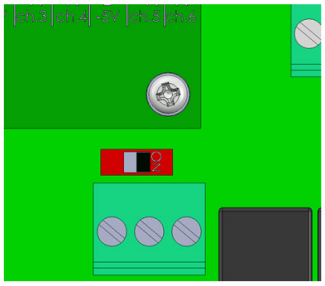
26.3 TRIO / TRIO Expansion Termination

When TRIO is wired to a TRIO Expansion unit, the termination dipswitch in both units must be set to ON.









NOTE When the TRIO is not wired to an Expansion device, the termination dipswitch position is irrelevant.

26.4 Key

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

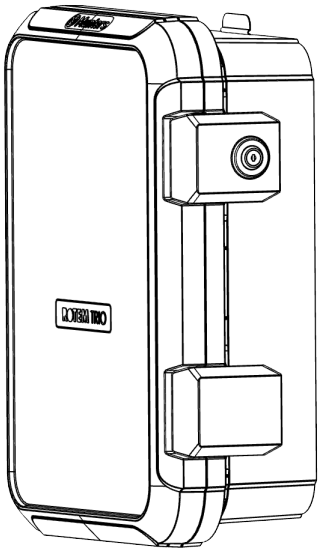


Figure 35: Expansion Unit Lock

26.5 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.*

26.6 Mapping Devices in Expansion

➲ Install and wire the Expansion unit to the TRIO and to the external devices before beginning.

➲ After wiring the Expansion unit to TRIO, go to System > General Settings > Info and click

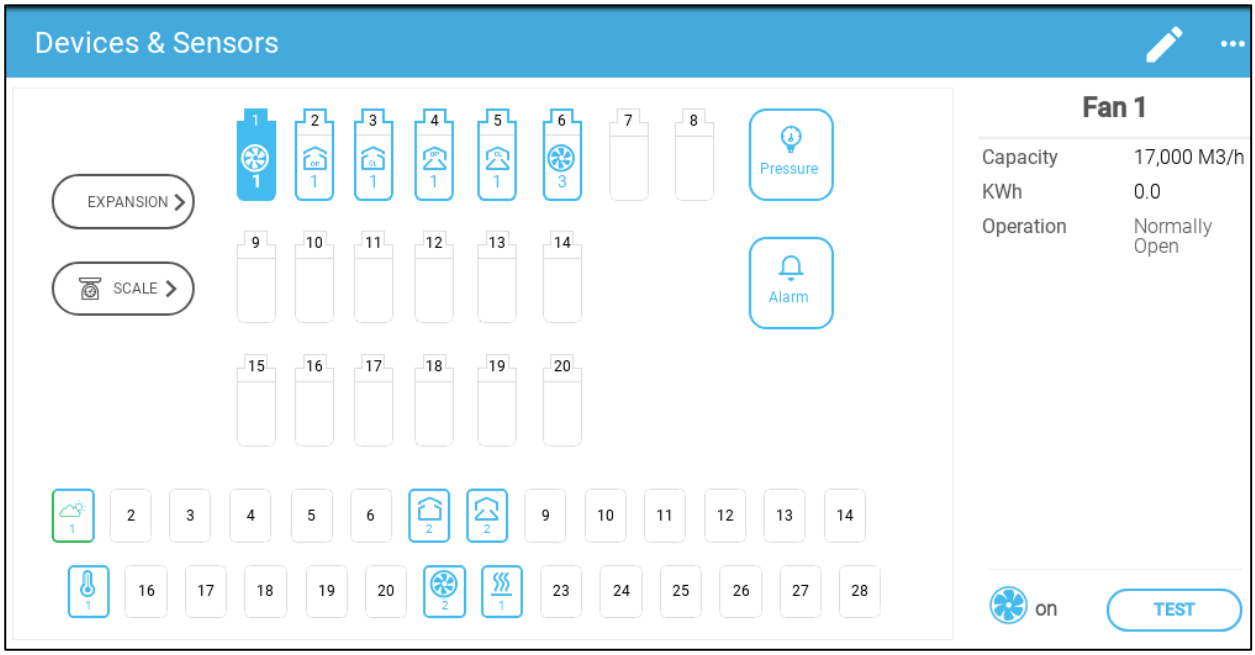
. Follow the online instructions. TRIO will not recognize the Expansion until this step is performed.

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

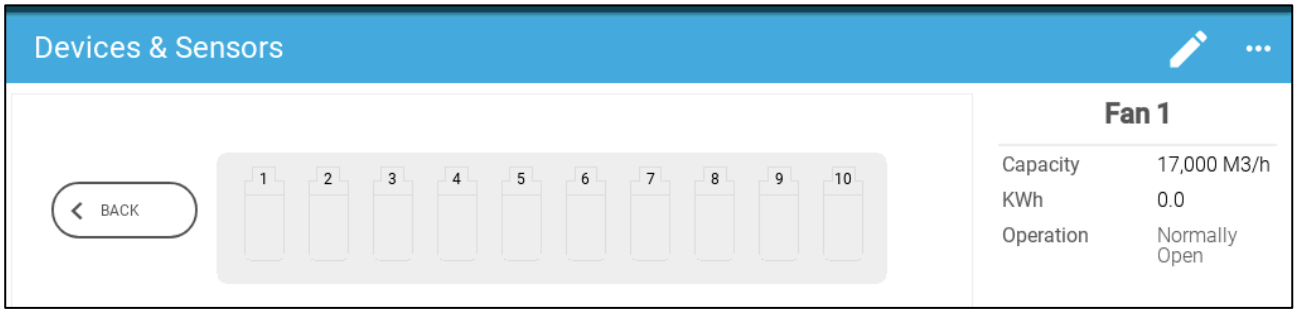
CAUTION *Mapping MUST match the physical wiring! An error message appears if the physical device is not wired to the relay or port as defined on the mapping screen..*

To map the devices:

1. Go to System > Device and Sensors.



2. Click **Expansion**.



3. Map the devices as detailed in the TRIO manual. Refer to Mapping Devices, page 49 for more information.

26.7 Expansion Specifications

Parameter	Specifications
Input Power Voltage	115/230 VAC, 50/60 Hz
Input AC Power	0.2A
Maximum number of relays operating simultaneously	10
Note: Running relays at the above current levels provides between 50,000 – 100,000 switching operations.	
Communication	RS-485: 115 Kbps, 8 bit, even parity
Operating Temperature Range	-10° to +50° C (+14° to +125° F)
Storage Temperature Range	-20° to +80° C (-4° to +176° F)
Environmental Specifications	• Altitude: -400 m to 2000 m • Relative Humidity: 20% - 90% • Main supply voltage fluctuation up to +10 - 20% • 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.

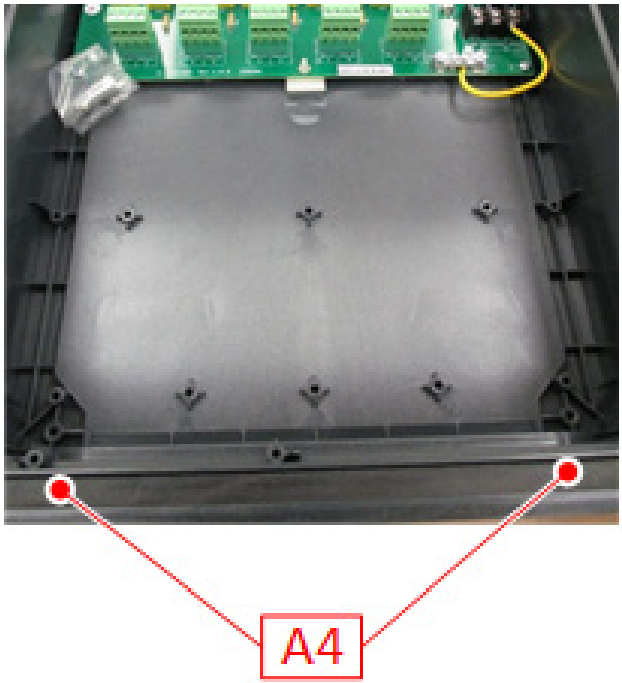
26.8 Expansion Spare Parts

- Preliminary Information
- TRIO 10 Expansion Container Spare Parts
- TRIO 10 Expansion Main Container Spare Parts
- Main Container Card Spare Parts

26.8.1 Preliminary Information

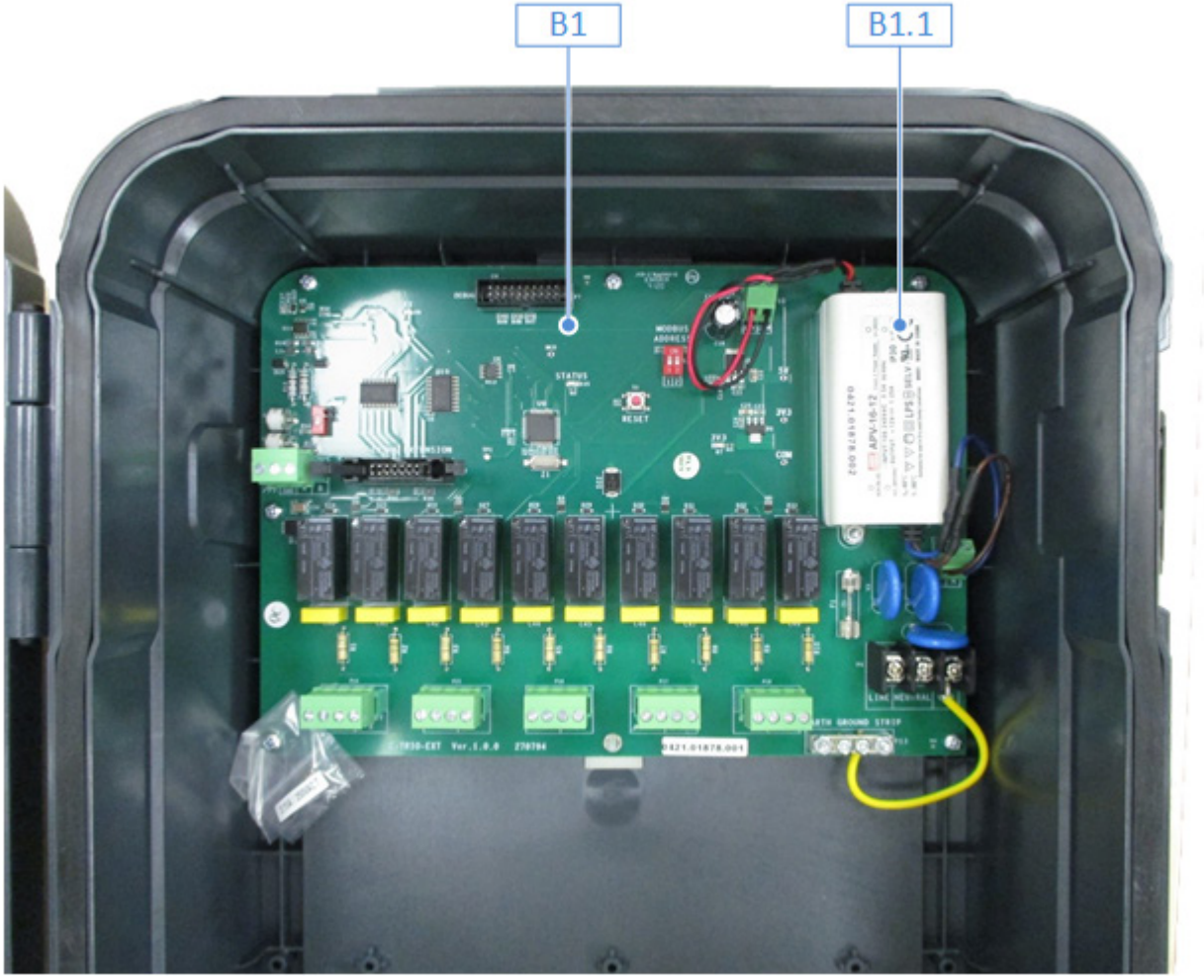
	TRIO 10 EXP
Container	A
Main Container Cards	B
MPN	Munters Part Number
DPN	Dealer Part Number

26.8.2 TRIO 10 Expansion Container Spare Parts



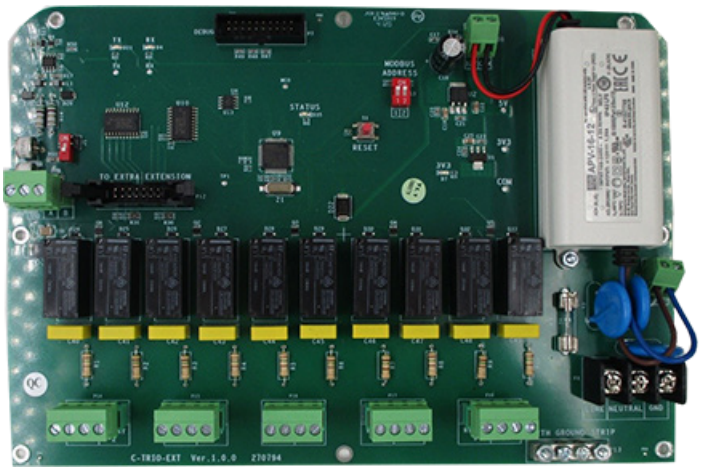
ID No.	Description	Order Catalog Number	Note
A1.1	TRIO FRONT DOOR EXP PLASTIC PART V1.0.0 (SP: 207129)	MPN: 940-99-00028	
		DPN:	
A1.2	TRIO-20 PLASTIC BOX BASE	MPN: 940-99-00007	
		DPN:	
A1.3	TRIO HINGE PLASTIC PIN V1.0.0 (SP-207128)	MPN: 940-99-00019	
		DPN:	
A2.1	TRIO-20 PANEL PLASTIC PART **BLUE** LOGO MUNTERS + PART **BLUE**	MPN: 940-99-00001	OR
		DPN:	
A2.2	TRIO PANEL PLASTIC PART **RED** RAL 3020 NO LOGO (SP-207138)	MPN: 940-99-00045	
		DPN:	
A3.1	GENERAL PLASTIC LATCH	MPN: 900-99-00216	
		DPN:	
A3.2	ONE/ONE PRO LATCH GENERAL LOCK PLASTIC PART + LOCK FOR LATCH	MPN: 900-99-00217	
		DPN:	
A4	MID-RANGE MAIN GASKET V1.0.0 (SP-207122)	MPN: 940-99-00021	
		DPN:	

26.8.3 TRIO 10 Expansion Main Container Spare Parts



ID No.	Description	Order Catalog Number
B1	TRIO-EXP 10 CARD (SP: R-TRIO-EXP10)	MPN: 940-99-00029
		DPN:
B1.1	SWPS APV-16-12 Mean Well 115V/230V 12V 16W (SP: 370153)	MPN: 999-99-00338
		DPN:

26.8.4 Main Container Card Spare Parts

Card	Description	Munters Ordering Number
	R-TRIO-EXP10: TRIO EXP 10 CARD	940-99-00029
	370153: SWPS APV-16-12 Mean Well 115V/230V 12V 16W	999-99-00338

27 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.

© Munters AB, 2020

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.

Munters

Ag/MIS/ImEN-2748-09/19 Rev 2.55

© Munters AB, 2020