Installation Manual

TRIO
Controller

TRIO

Swine Controller

Ag/MIS/ImGB-2845-10/22 Rev 2.2
P/N: 116874

Munters

TRIO Swine Controller

Installation Manual

Rev 2.2, 2/2024

Software Ver: 7.2.40

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

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Index

Chapter *page*

1 INTRODUCTION 7
1.1 Disclaimer 7
1.2 Introduction 7
1.3 Notes 7
2 PRECAUTIONS 8
2.1 Protection Against Corrosion 8
2.2 Electrical Guidelines 8
2.3 Grounding 8
2.4 Filtering 9
2.5 Checking the Battery Level 9
2.6 Safety Precautions - Details 10
2.6.1 Grounding and Shielded Wiring 10
2.6.2 Installation and Electrical Connections 10
3 UNIT INSTALLATION 11
3.1 What Comes in the Package 11
3.2 Mounting the Unit 11
3.2.1 Knockouts 11
3.2.2 Hanging the Unit 12
3.3 Board Layout 13
3.4 Wiring Diagrams 14
3.4.1 High Voltage Relays 14
3.4.2 Alarms and Power 16
3.4.3 Internet Connection 17
3.4.4 Analog Output Devices 18
3.4.5 Digital Devices 19
3.4.6 Analog Input Devices 20
3.4.6.1 CO2 Sensor Wiring 20
3.4.6.2 Temperature Sensor Wiring 22
3.4.6.3 Humidity Sensor Wiring 24
3.4.6.4 Potentiometer Device Wiring 25
3.4.6.5 Ammonia Sensor Wiring 26
3.4.7 TRIO RPS 28
3.4.8 Silo Wiring 30
3.4.9 RSU Wiring 32

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3.5 Termination 33
3.6 Pressure Sensor Hoses 34
3.7 Locking the Trio 34
3.8 Product Symbols 35
3.9 Tech Support/Wi-Fi 36
4 TRIOAIR 37
4.1 Trio Air Accounts 37
4.2 Pairing a Trio 38
5 SPECIFICATIONS 42
5.1 Trio Specifications 42
5.2 External Devices Specifications 43
6 USING THE TRIO TOUCH SCREEN 45
7 MAPPING AND DEFINING THE INPUT OUTPUT DEVICES 47
7.1 Using the Mapping Screen 47
7.2 Mapping Sensors 50
7.2.1 Enabling/Disabling Analog Input Sensors 50
7.2.2 Temperature Sensors 51
7.2.2.1 Defining the Temperature Sensors 51
7.2.2.2 Mapping the Temperature Sensors 51
7.2.2.3 Enabling a Weather Station 52
7.2.3 Defining the Ammonia Sensor 53
7.2.4 Defining the CO2 Sensor 53
7.2.5 Defining the Humidity Sensor 54
7.2.6 Defining the Water Meter Sensors 54
7.2.7 Defining the Gas Meter Sensors 55
7.2.8 Defining the Power Meter Sensors 56
7.2.9 Defining the Feeder Active Sensor 56
7.2.10 Defining the Feeder Line Sensor 57
7.3 Mapping Devices 57
7.3.1 Defining the Fans 57
7.3.1.1 On-Off Fans 58
7.3.1.2 0 – 10 Volt Fans 58
7.3.2 Defining the Stir Fan 60
7.3.2.1 On Off Stir Fan 60
7.3.2.2 0 – 10 Volt Stir Fan 60
7.3.3 Heating Devices 61
7.3.3.1 Defining the On/Off Heaters 61
7.3.3.2 Defining the Variable Heaters 62
7.3.4 Defining the Cooling Devices 62
7.3.5 Potentiometers, Inlets, Tunnel Doors, Outlets 63

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7.3.5.1 Mapping the Potentiometers 63
7.3.5.2 Defining the Inlets/Tunnel Doors 64
7.3.5.2.1 Potentiometer Calibration 64
7.3.5.2.2 Calibrating the Inlets/Tunnel Door 65
7.3.5.3 Defining the Outlet 66
7.3.6 Defining the Sprinkler 67
7.3.7 Defining the Same As Relays 68
7.3.8 Defining the Same As Analog Ports 68
7.3.9 Defining the Timers 69
7.3.10 Defining the Auxiliary Input 70
7.3.11 Defining the Measuring Fan 70
7.3.12 Defining the Feeder Relay 71
7.4 Mapping the Weighing Devices 71
7.4.1 Defining the Silos 72
7.4.1.1 Mapping the Silo Scales 72
7.4.1.2 Configuring the Silo Scale 73
7.4.1.3 Testing the Silo 77
7.4.2 Defining the RSU 78
7.5 TRIO RPS 79
7.5.1 Define the Sensor 79
7.5.2 Static Pressure Calibration 79
7.6 Testing Devices 81
8 APPENDIX A: EXTERNAL DEVICE (PREVIOUS VERSIONS) 83
9 APPENDIX B: SERVICE MANUAL 87
9.1 Maintenance 87
9.2 Trouble Shooting 88
9.2.1 Internet 88
9.2.2 Electronic Components 89
9.3 Spare Parts 90
9.3.1 Preliminary Information 90
9.3.2 TRIO 20 Container Spare Parts 91
9.3.3 TRIO 20 Door Cards Spare Parts 93
9.3.4 TRIO 20 Main Container Spare Parts 95
9.3.5 Additional Options 96
9.3.6 Cards 97
9.3.6.1 Door Cards 97
9.3.6.2 Main Container Cards 100
10 APPENDIX C: TRIO EXPANSION 10 102
10.1 Expansion Layout 102
10.2 Expansion Wiring Diagrams 103

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10.2.1 TRIO to TRIO Expansion Wiring 103
10.2.1.1 Wiring 103
10.2.1.2 Address 104
10.2.1.3 Restart 104
10.2.2 High Voltage Relays 105
10.2.3 Power 106
10.3 Key 107
10.4 Product Symbols 107
10.5 Mapping Devices in Expansion 108
10.6 Expansion Specifications 109
10.7 Expansion Spare Parts 110
10.7.1 Preliminary Information 110
10.7.2 TRIO 10 Expansion Container Spare Parts 110
10.7.3 TRIO 10 Expansion Main Container Spare Parts 112
10.7.4 Main Container Card Spare Parts 113
11 APPENDIX D: LAN CABLE INFORMATION 114
11.1 Wire/Optical Ethernet Infrastructure Basics 114
11.2 Trio Connectivity: 100/1000Gbps Ethernet Switch 114
12 WARRANTY 115

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1 Introduction

1.1 Disclaimer

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1.2 Introduction

Congratulations on your excellent choice of purchasing a TRIO 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.

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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.*

- Protection Against Corrosion
- Electrical Guidelines
- Grounding
- Filtering
- Checking the Battery Level
- Safety Precautions - Details

2.1 Protection Against Corrosion

To prevent against corrosion of electrical components:

- Installation location: If possible, install the Trio in a well-ventilated area.
- Keep the Trio closed at all times when a litter or passel is present in the building. In situations where maintenance or repairs are required, close the controller when you finish the work.
- After running the cables through the knockouts, seal the holes with a silicon sealant. If you use silicon sealant with acetic acid cure, keep the controller open and ventilated until cured. Otherwise, the acetic acid will attack metal components, including circuitry.

2.2 Electrical Guidelines

- Munters strongly recommends that only panel mount controllers be installed directly in an electrical closet.
- If the plastic enclosure unit is installed in an electrical closet, ensure that no contactors are in that closet. Placing this unit in proximity to contactors results in severe signal interference.
- **Review the guidelines given in** Safety Precaution**, page 10** These are vital to ensuring both personal safety and proper controller functioning.

2.3 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.

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- 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.
- Refer to Grounding and Shielded Wiring, page 10 for more information.

2.4 Filtering

If this installation includes a power inverter to drive variable speed fans, install an EMI filter in front of the inverter (see Figure 1, page 9), according to the specifications provided by the inverter manufacturer.

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

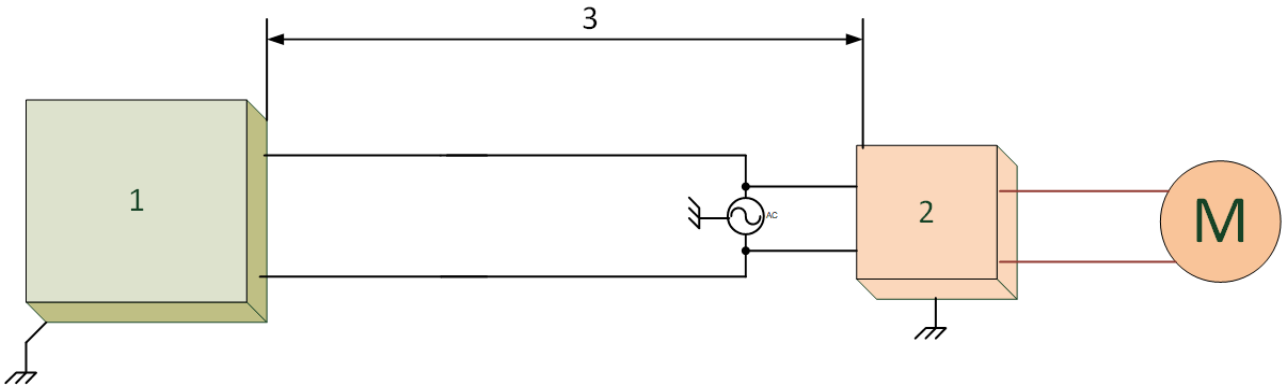

Figure 1: Inverter Placement

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

2.5 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.

2.6 Safety Precautions - Details

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 10 amp circuit breaker.
- All electrical connections should comply with National Electrical code (NEC).

2.6.1 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.

2.6.2 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 controller open and ventilated until cured. Otherwise, the acetic acid will attack the metal parts, including circuitry.**

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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.

- What Comes in the Package
- Mounting the Unit
- Board Layout
- Wiring Diagrams
- Termination
- Pressure Sensor Hoses
- Locking the Trio
- Product Symbols
- What Comes in the Package

3.1 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.

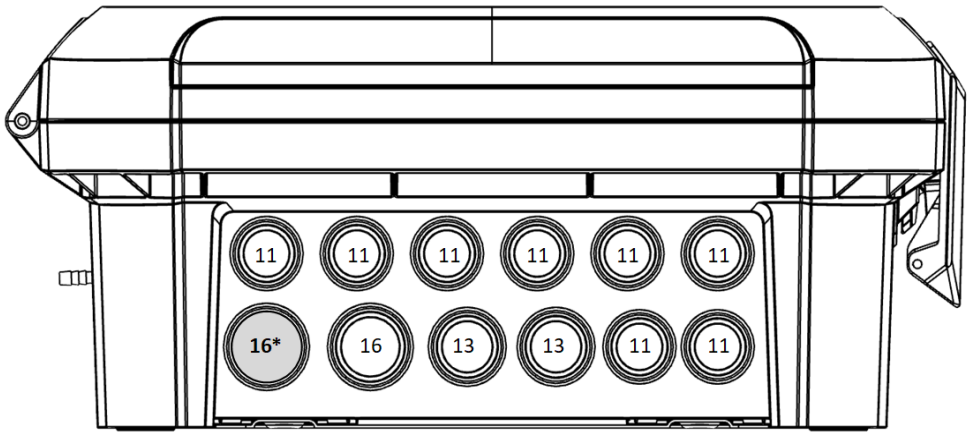

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Figure 2: TRIO Knockouts and PG Size

- Using a screwdriver and a hammer, gently apply pressure to the knockouts.
- **Only open 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).

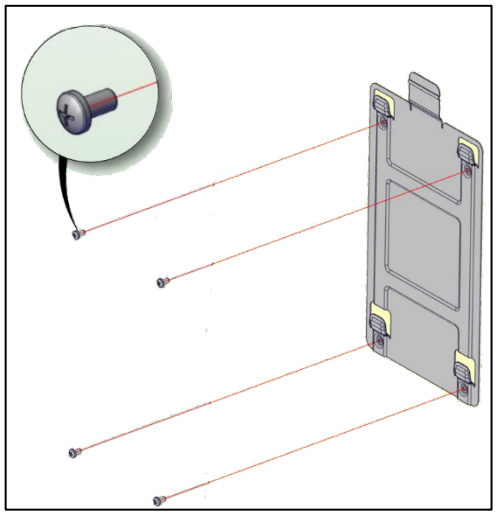

Figure 3: Hang the Bracket

2. Hang the TRIO on the bracket.

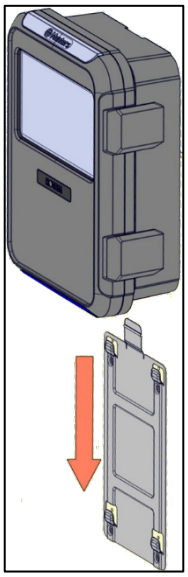

Figure 4: Hanging the Unit

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

3.3 Board Layout

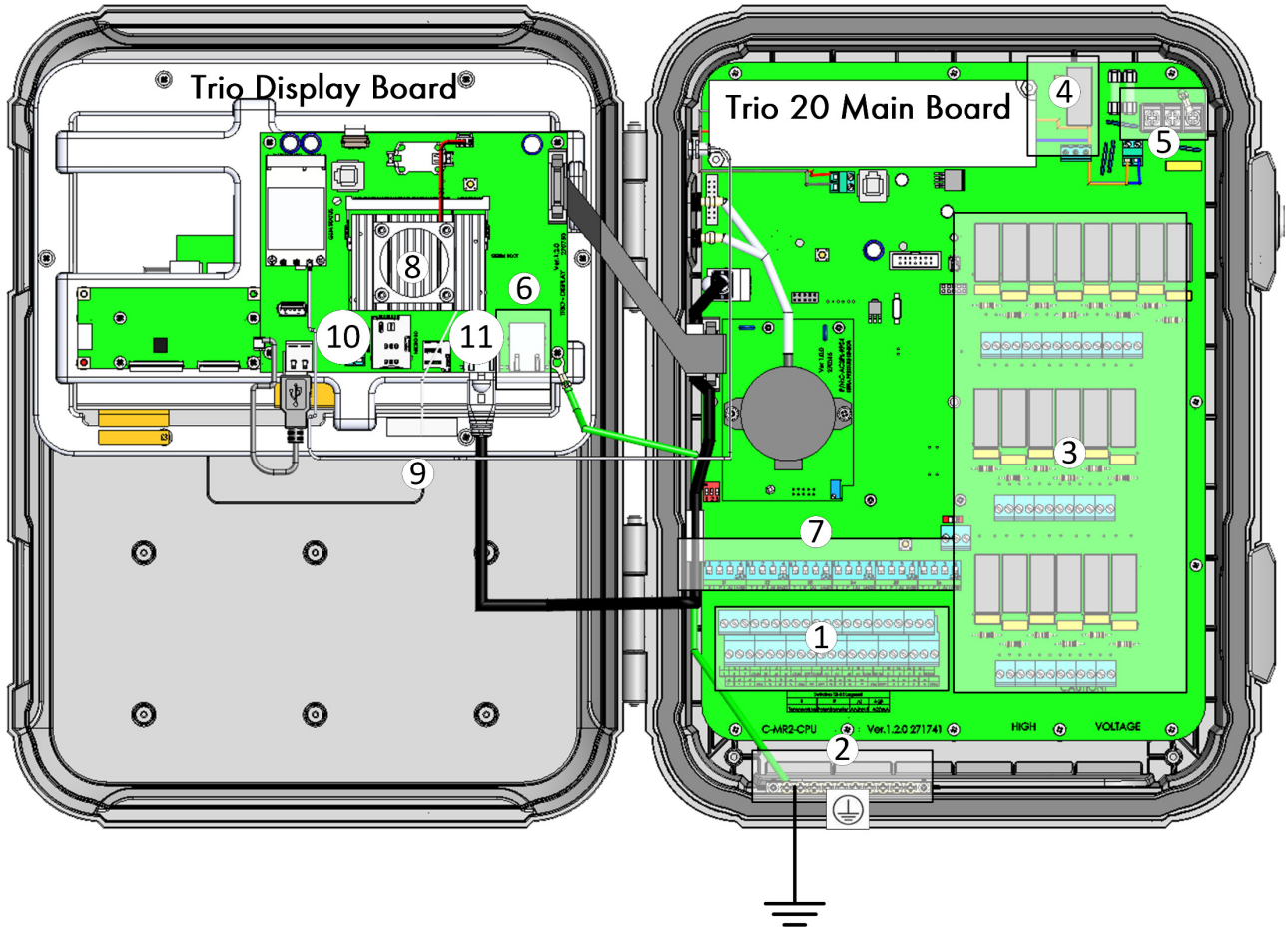

Figure 5: Board layout

1	Analog/digital ports	7	Dipswitches
2	Ground strip	8	Fan/heat sink
3	20 relays	9	Wireless antenna
4	Alarm relay	10	SIM card
5	Power ports	11	SD port
6	Ethernet port		

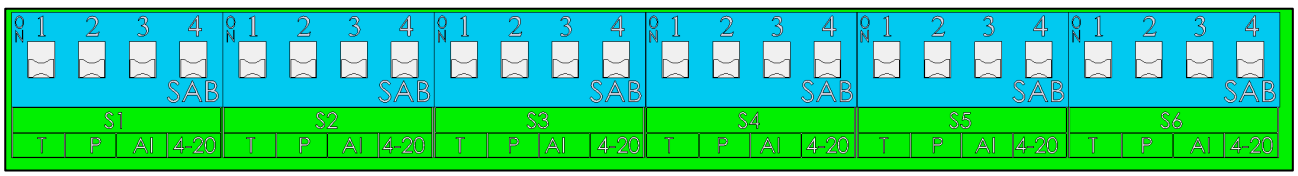

Figure 6: Dipswitches, expanded

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

3.4 Wiring Diagrams

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

NOTE After physically installing and connecting the external input/output devices, perform a Cold Start (System › General Settings › About › Reset Factory Default). Only after the Cold Start do you map the devices.

3.4.1 HIGH VOLTAGE RELAYS

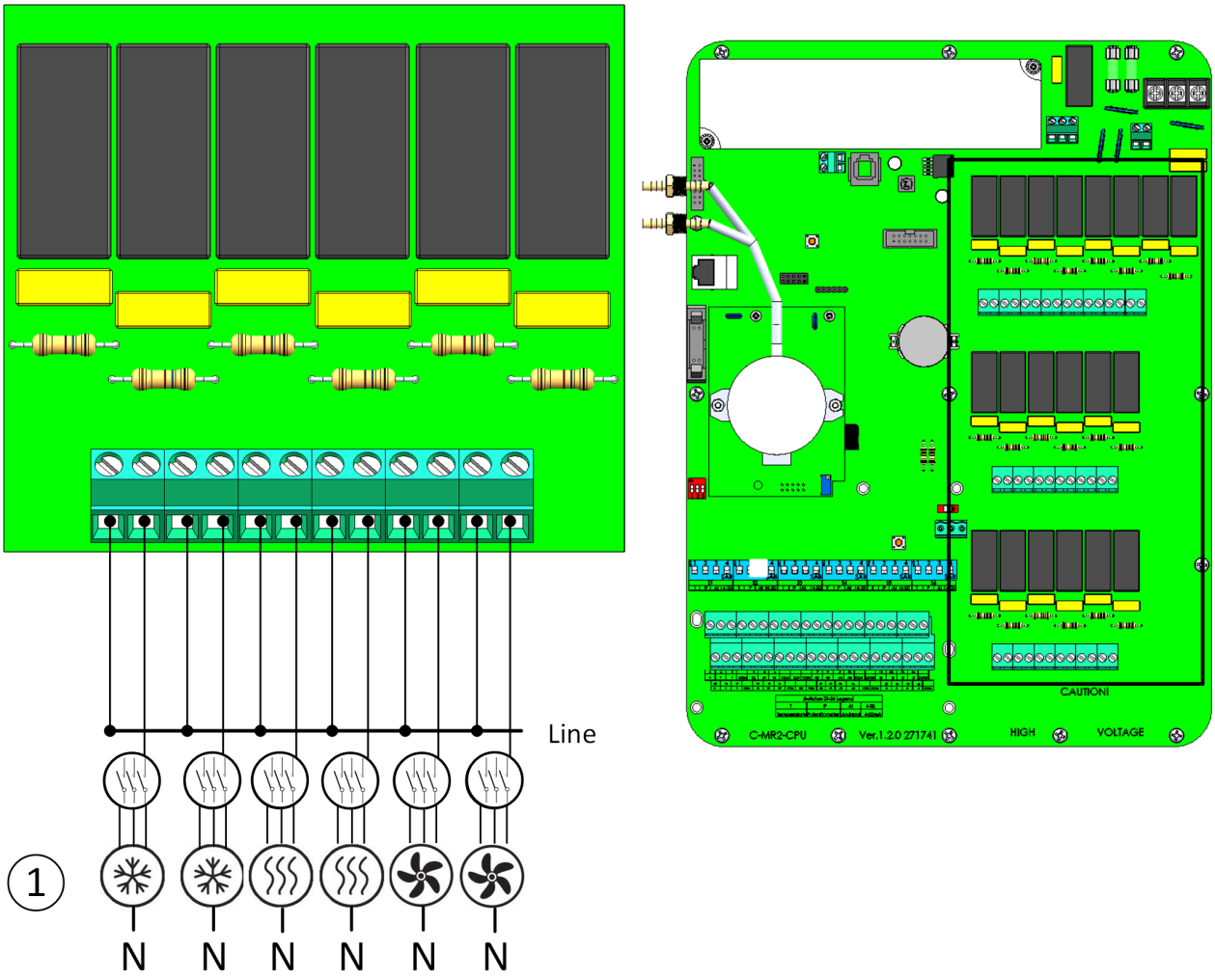

Figure 7: High voltage devices (examples)

1	Example of devices

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

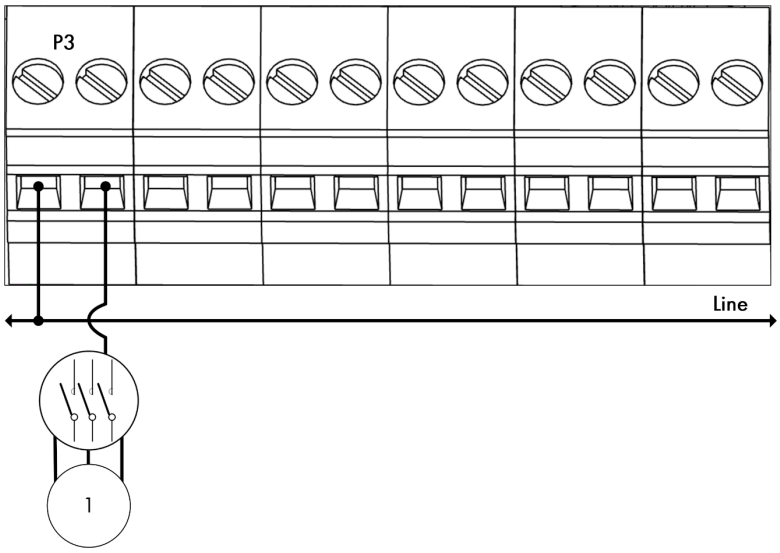

Figure 8: Relay wiring detailed view

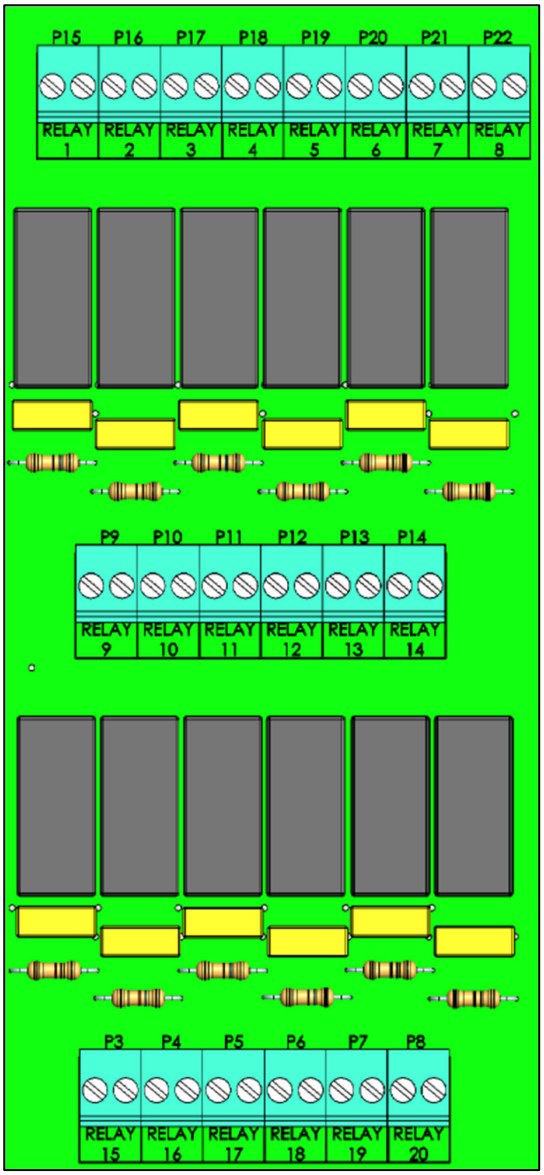

Figure 9: Relay and port numbering

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3.4.2 ALARMS AND POWER

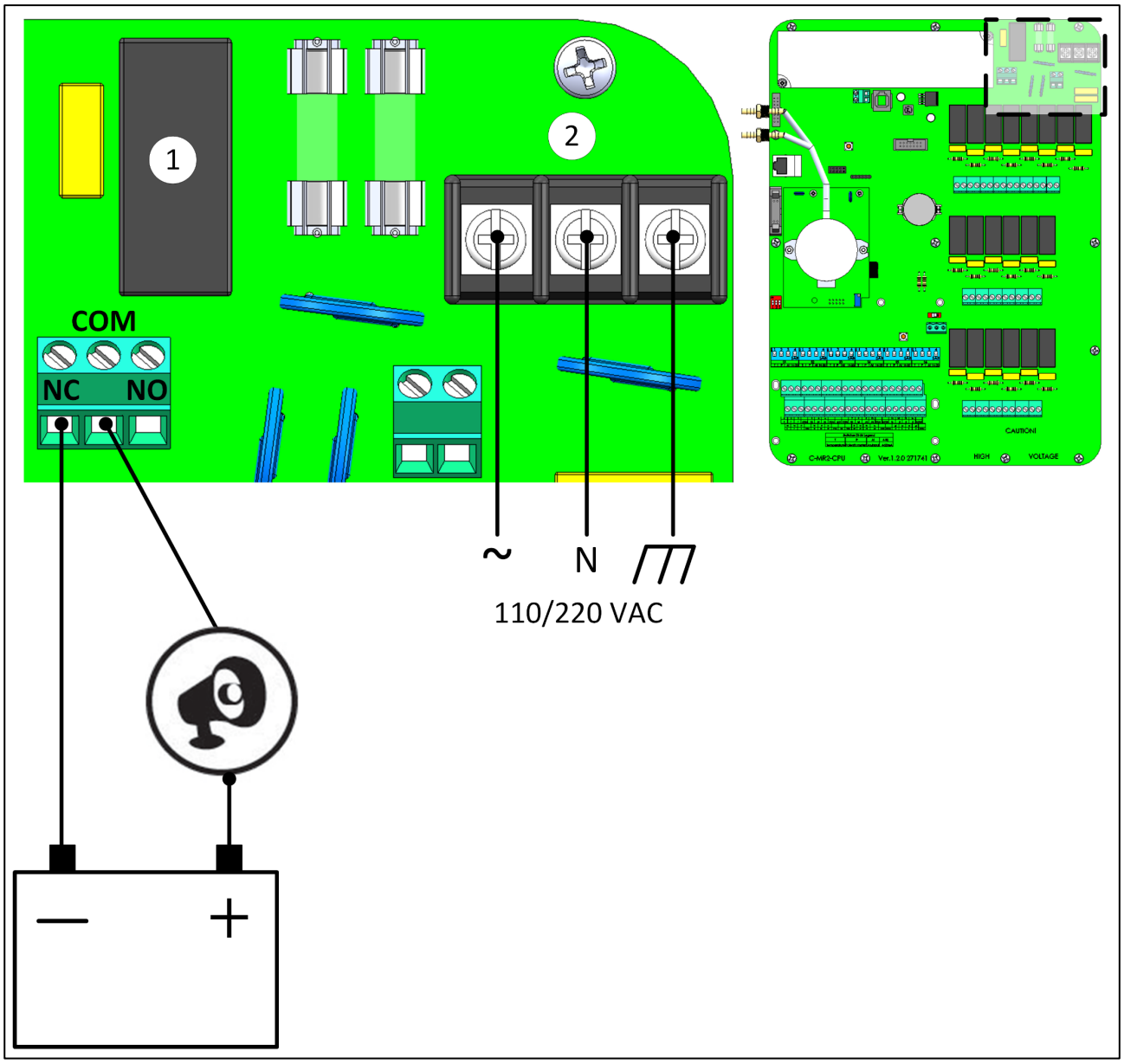

Figure 10: Alarm relay and power ports

1	Alarm relay
2	Power ports

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

3.4.3 INTERNET CONNECTION

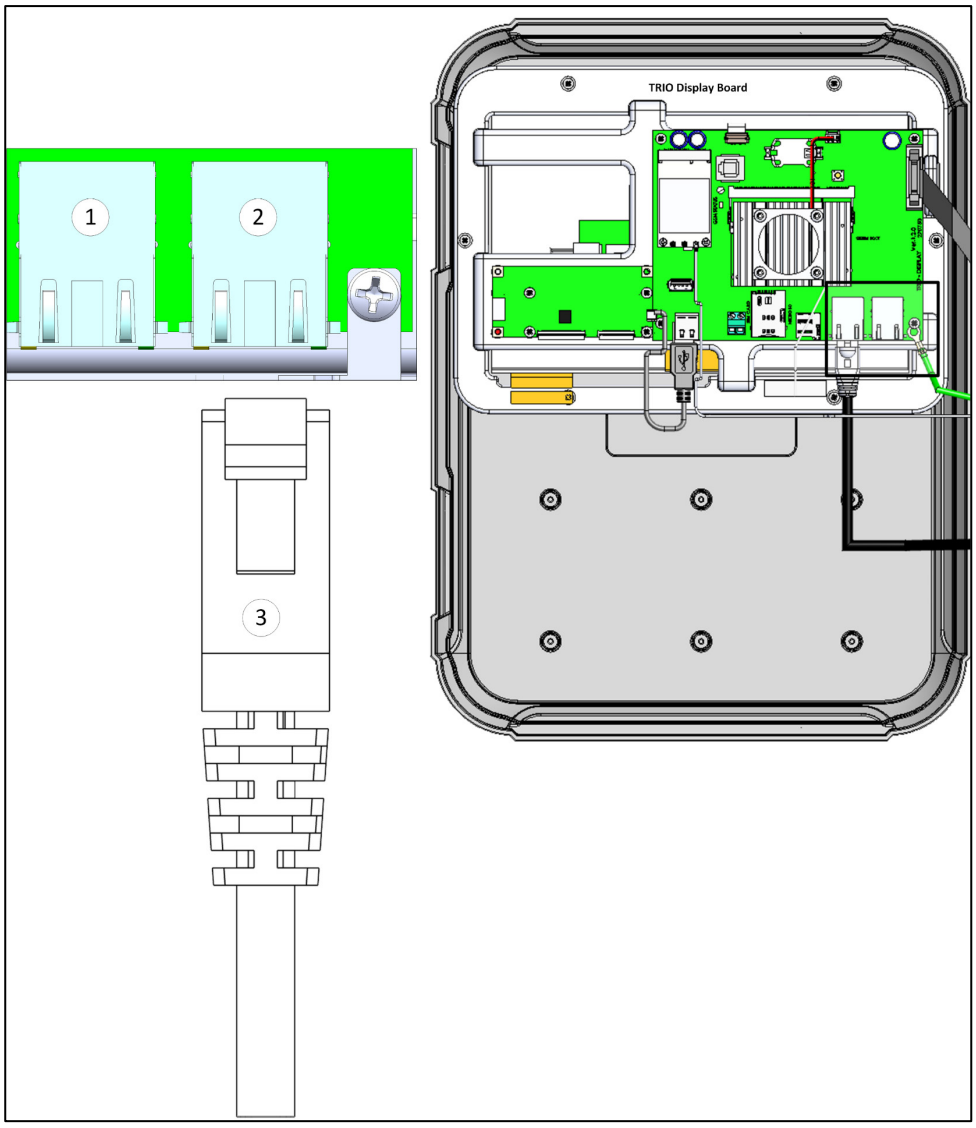

Figure 11: Ethernet port

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.

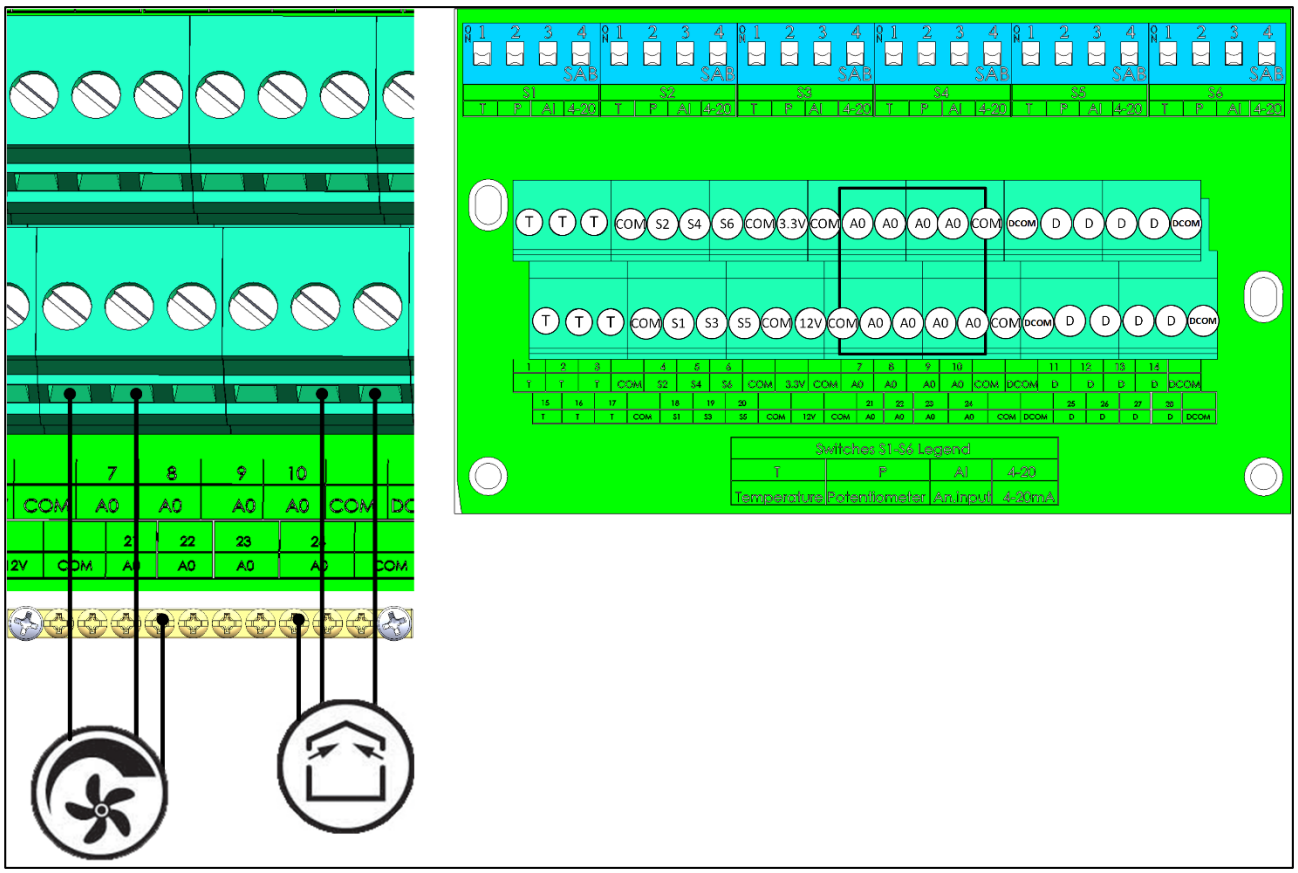

Figure 12: Analog Output devices (examples)

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

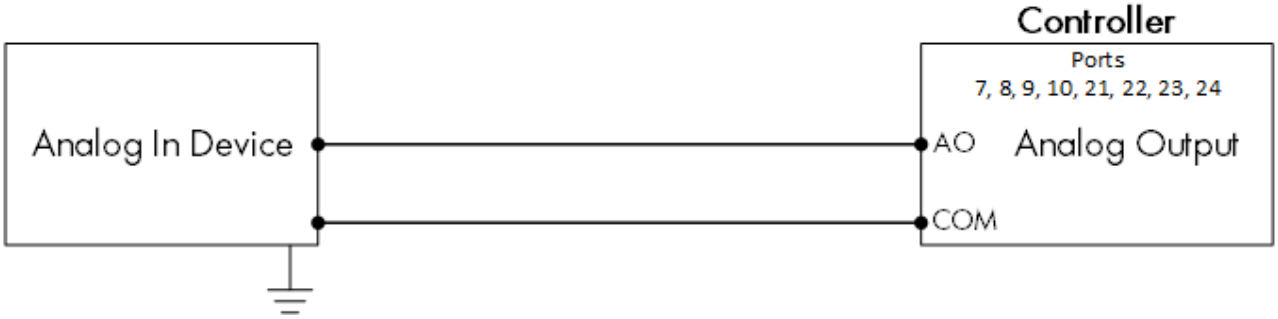

Figure 13: Analog Device Wiring Schematic

CAUTION *These devices must be wired to a COM port, not a DCOM port.*

3.4.5 DIGITAL DEVICES

Trio supports power meters, gas meters, water meters, auxiliary inputs, and feeder line sensors.

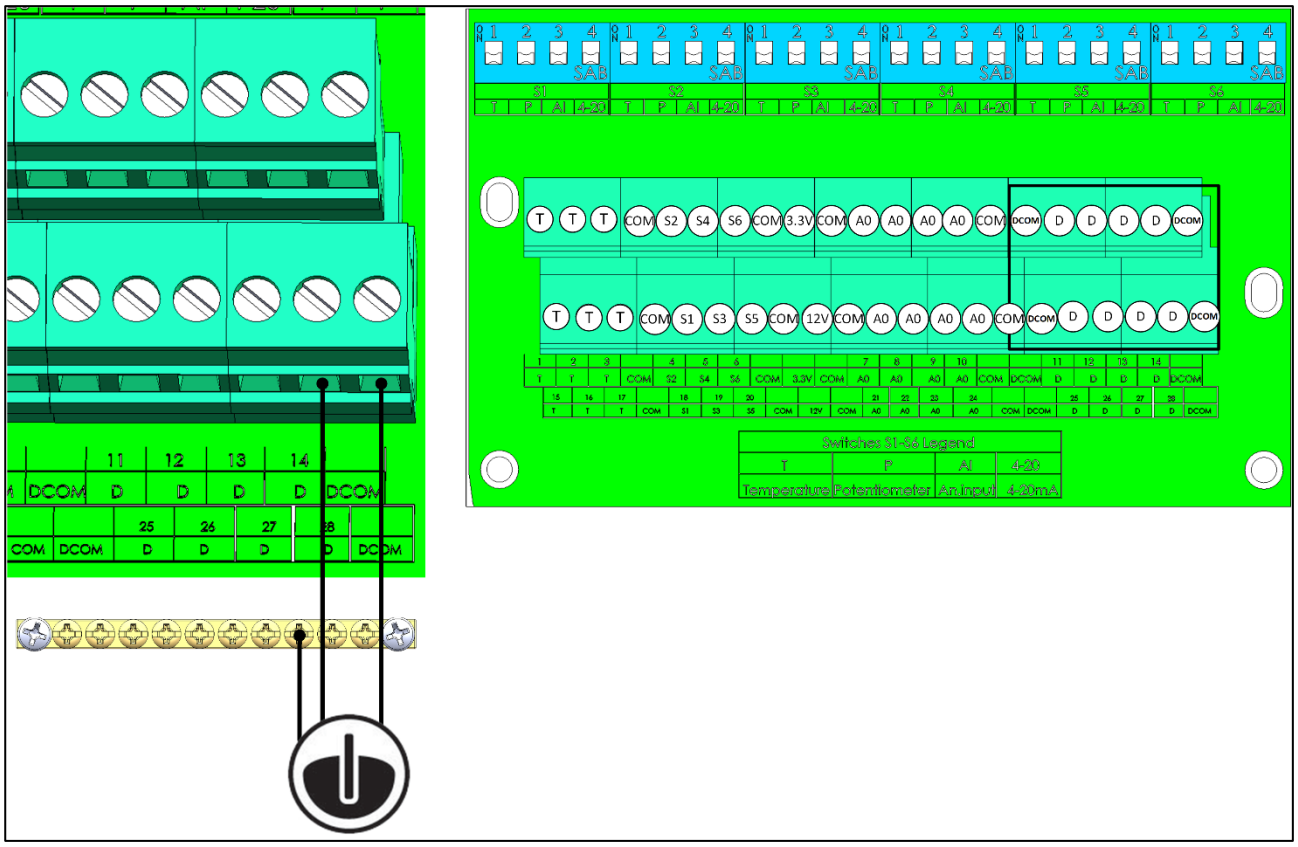

Figure 14: Digital Input devices (examples)

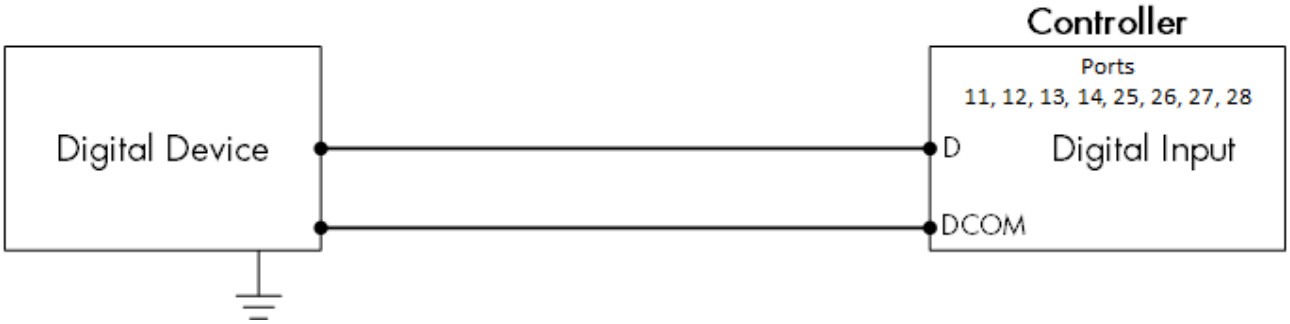

Figure 15: Digital Device Wiring Schematic

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

CAUTION *These devices must be wired to a DCOM port, not a COM port.*

3.4.6 Analog Input Devices

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

CAUTION *These devices must be wired to a COM port, not a DCOM port.*

3.4.6.1 CO2 Sensor Wiring

Refer to the CO2 Sensor Manual for details on installing this unit.

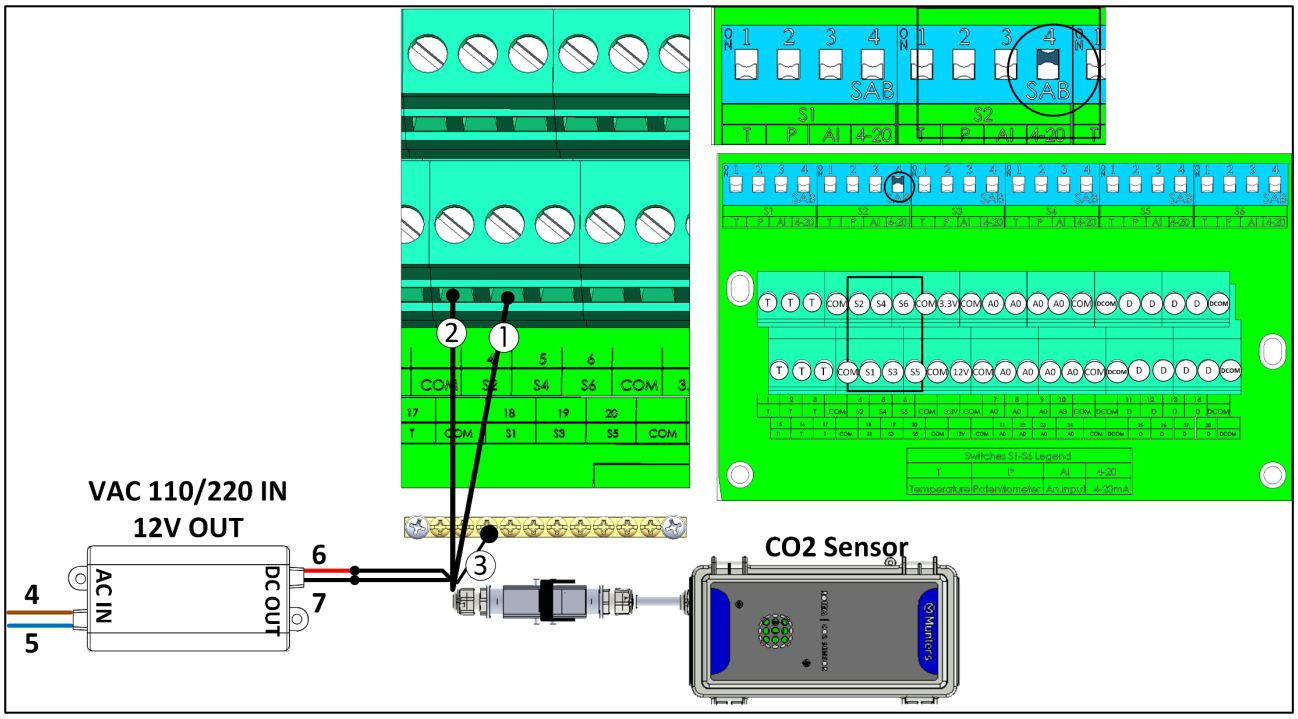

Figure 16: CO2 Sensor Wiring

Number	Function
1	S port
2	COM port
3	Shield wire
Power Supply	
4	COM port Brown wire: phase
5	Blue wire: Neutral
6	Red wire: +12V
7	Black wire: -12V (Sig COM)

CAUTION *Connect the shield to the safety ground.*

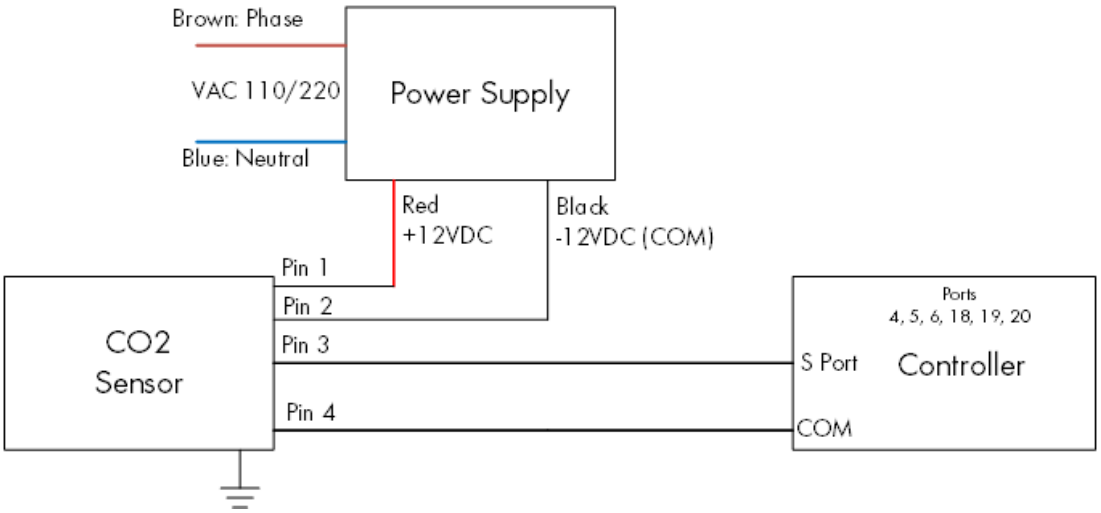

Figure 17: CO2 Sensor Wiring Schematic

- 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

Refer to the RTS-2 Manual for details on this sensor.

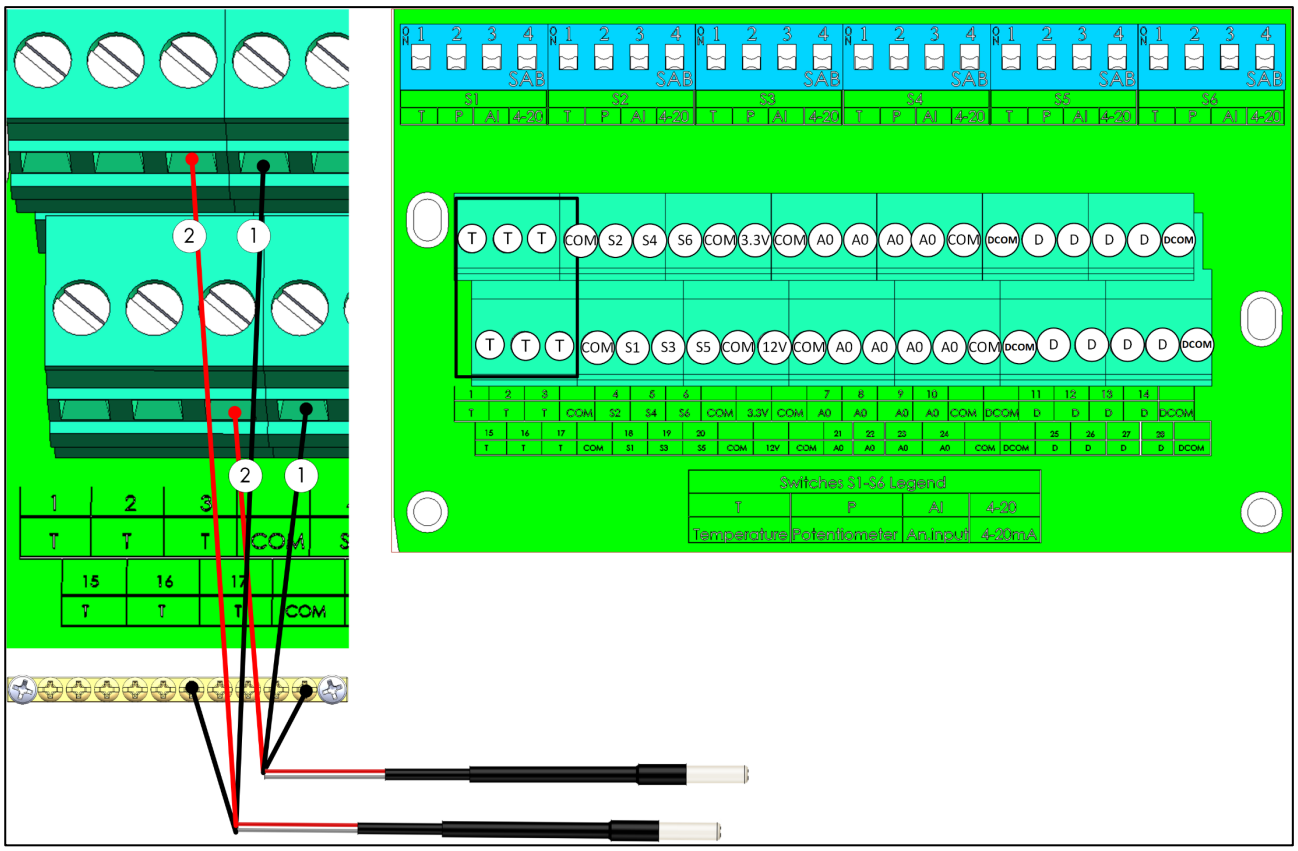

Figure 18: RTS Wiring

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

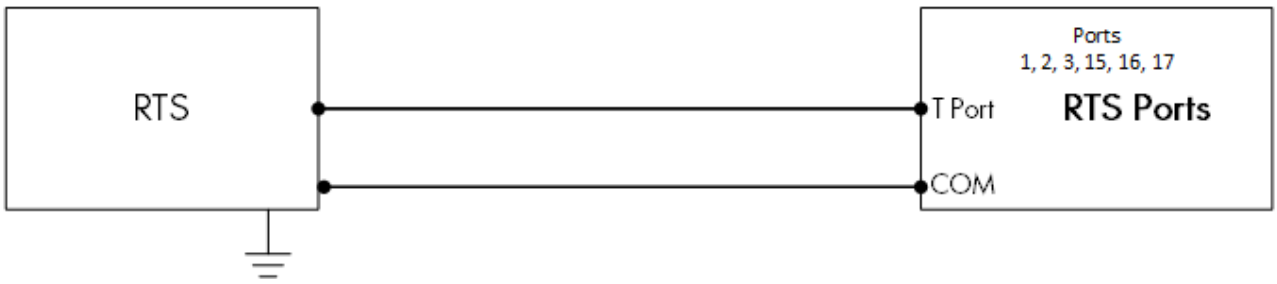

Figure 19: RTS Wiring Schematic

- Connect each RTS sensor to a:
  - T port
  - COM port
  - Grounding strip!
- Notes:
  - Wire all designated T ports before wiring the RTS sensors to the S ports.
  - Connect the black wire to a COM port, not a DCOM port.

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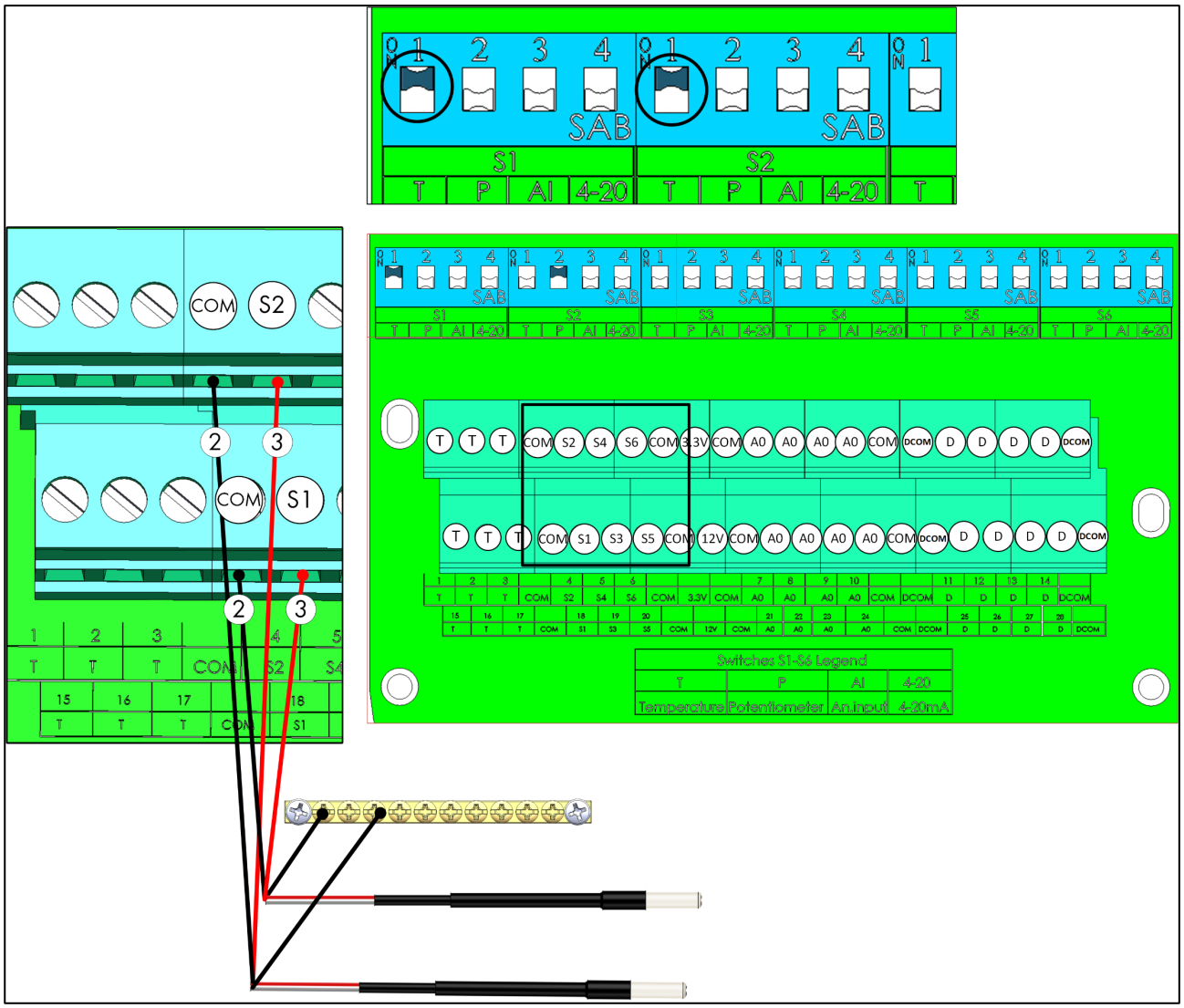

Figure 20: RTS S Port Wiring

Number	Function
2	COM port (black wire)
3	S port (red wire)

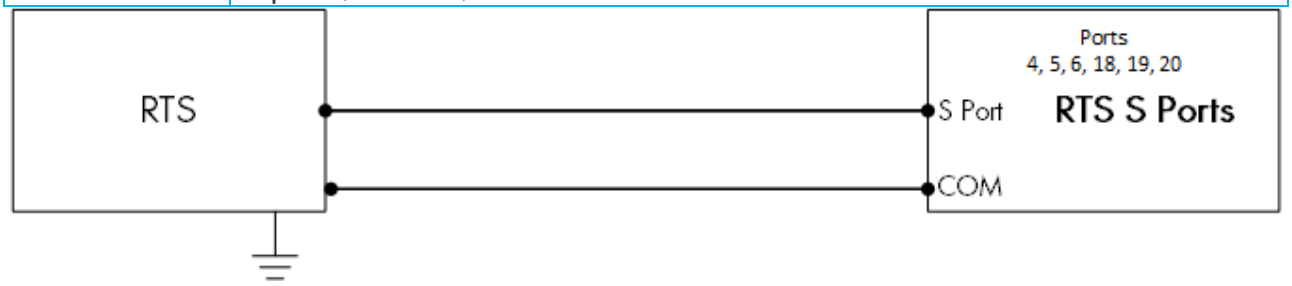

Figure 21: RTS S Port Wiring Schematic

- Connect each RTS sensor to a:
  - S port. In the corresponding dipswitch, raise dipswitch 1 (temp)
  - COM port
  - Grounding strip!
- Note:
  - Wire all designated T ports before wiring the RTS sensors to the S ports.
  - Connect the black wire to a COM port, not a DCOM port.

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3.4.6.3 Humidity Sensor Wiring

Refer to the RHS+ SE Manual for further information.

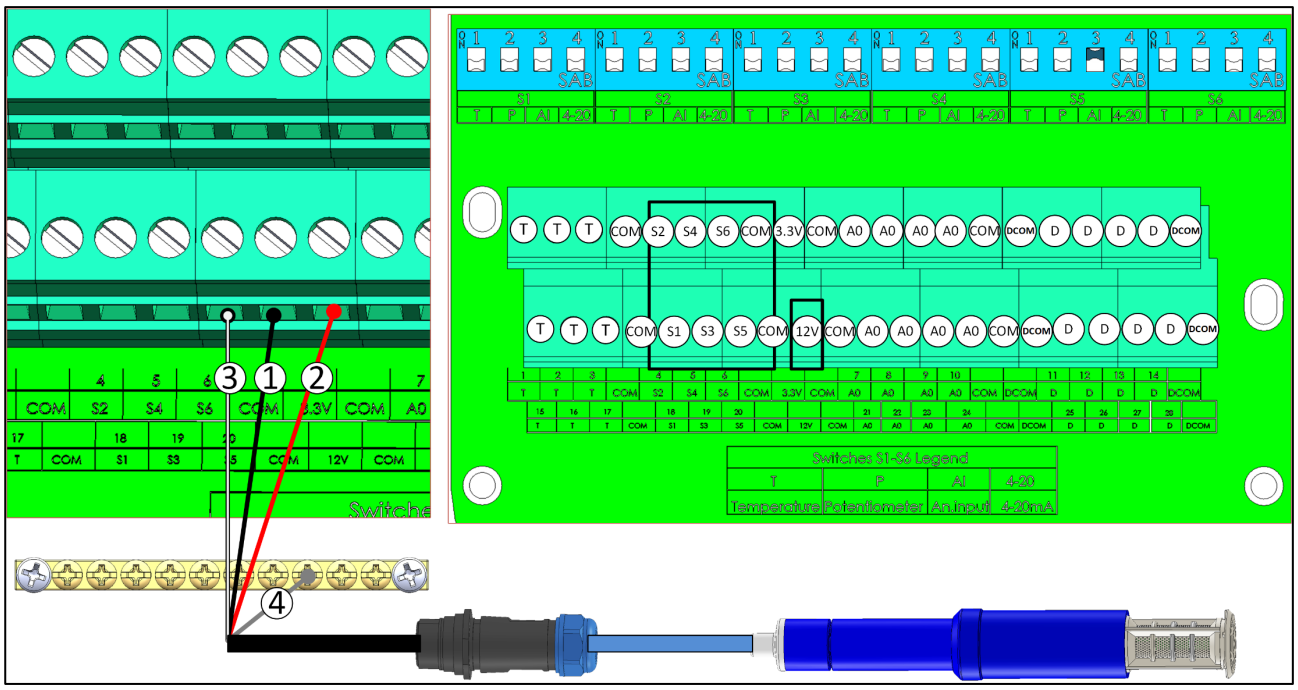

Figure 22: RHS+ Wiring

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

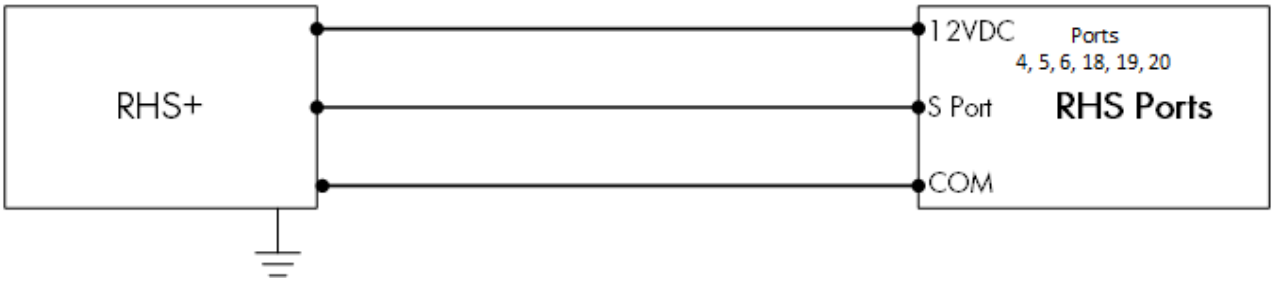

Figure 23: RHS+ Sensor Wiring Schematic

- 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

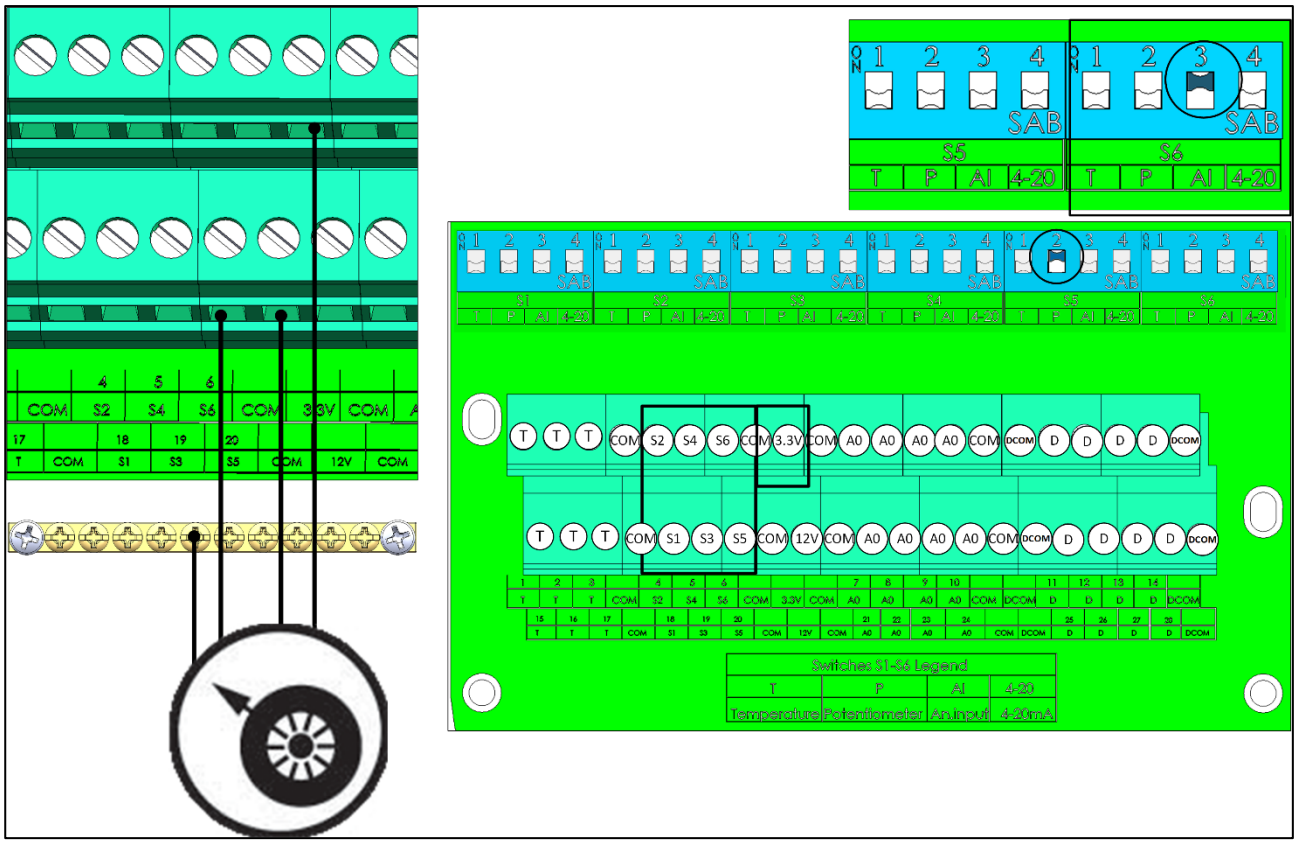

Figure 24: Potentiometer Wiring

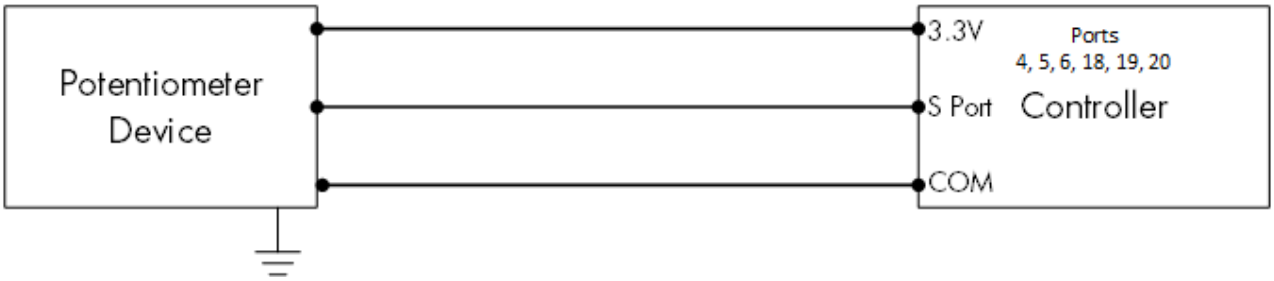

Figure 25: Potentiometer Wiring Schematic

- 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

Refer to the Ammonia Sensor manual for further information.

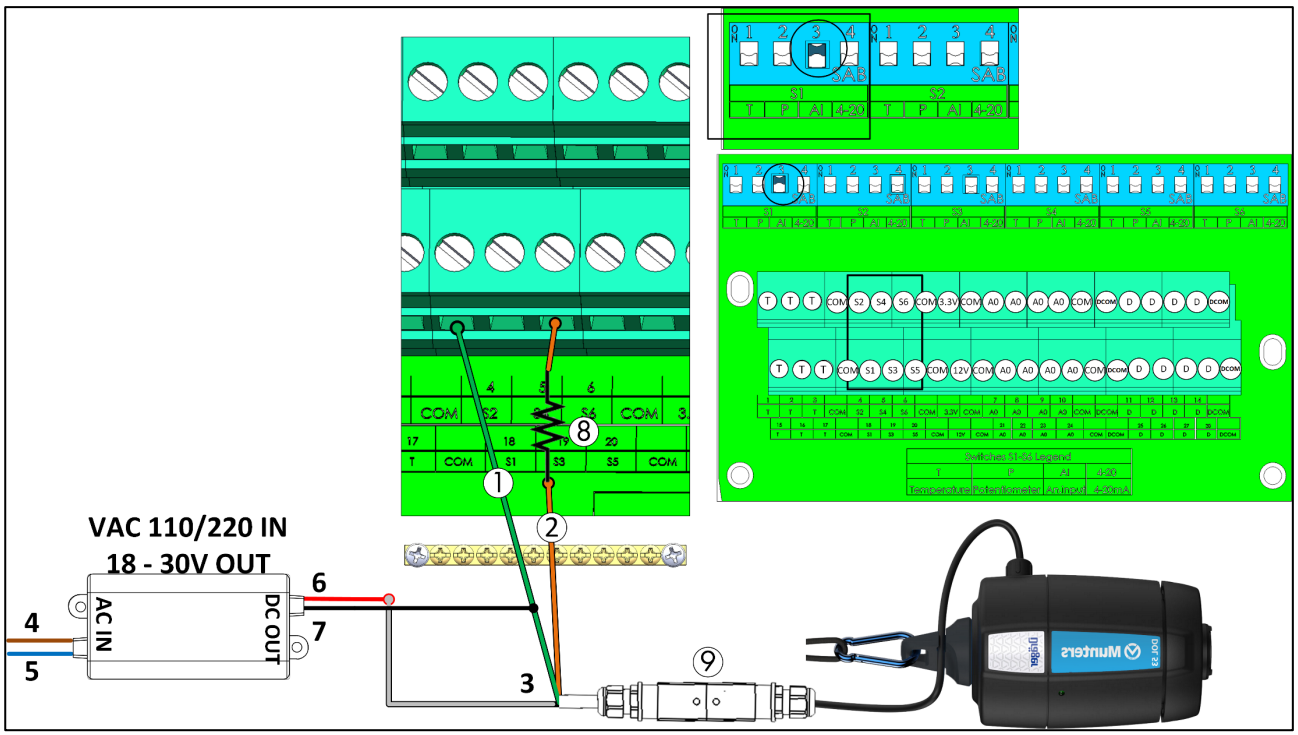

Figure 26: Ammonia Sensor Wiring

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

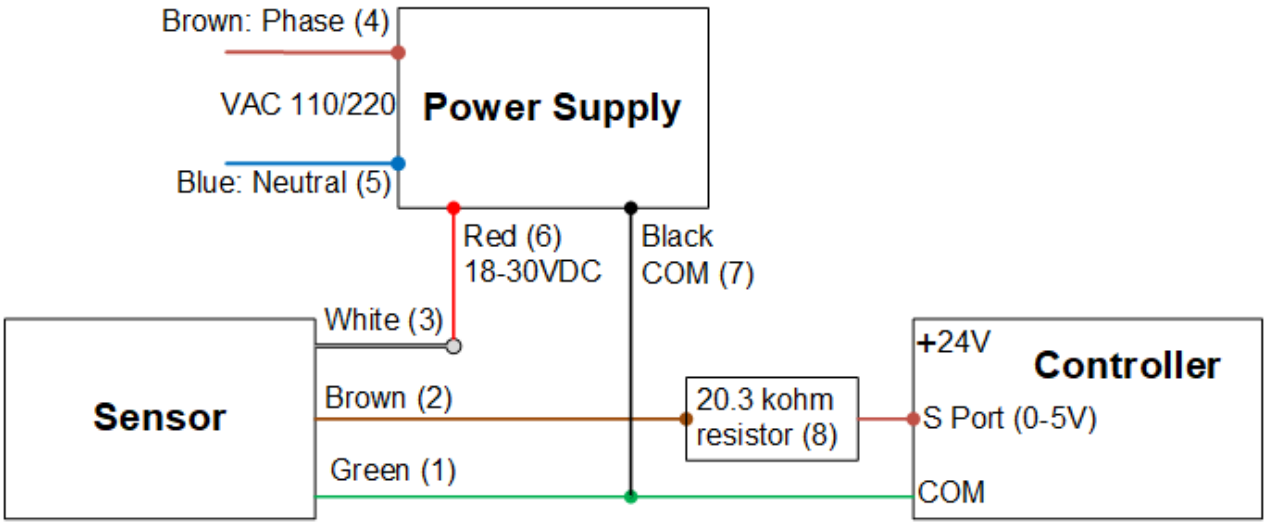

Figure 27: Ammonia Wiring Schematic

- 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. Refer to the RPS Manual for more information. TRIO supports up to two static pressure sensors, one built in and one external. Install the RPS in the second room.

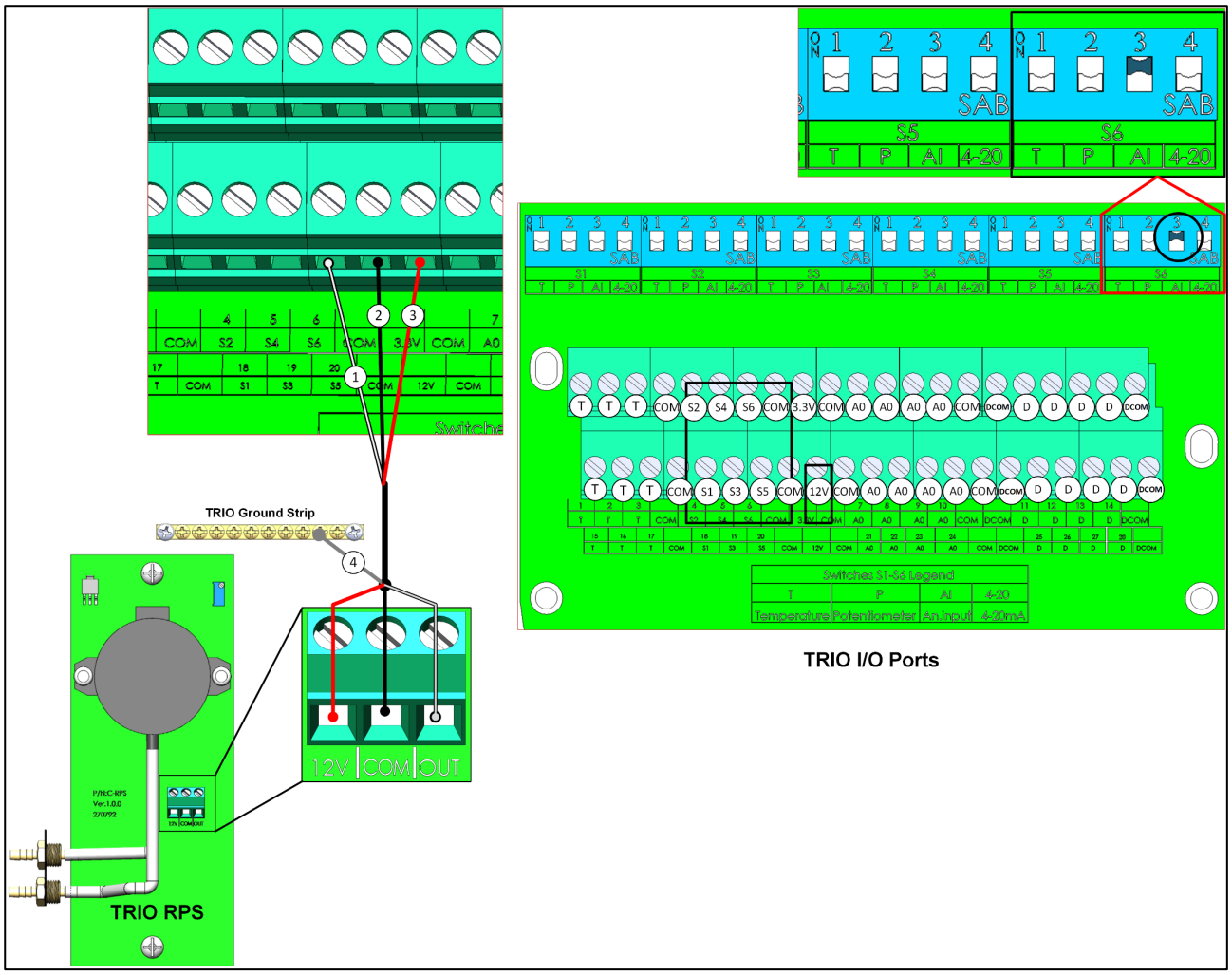

Figure 28: RPS Wiring

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

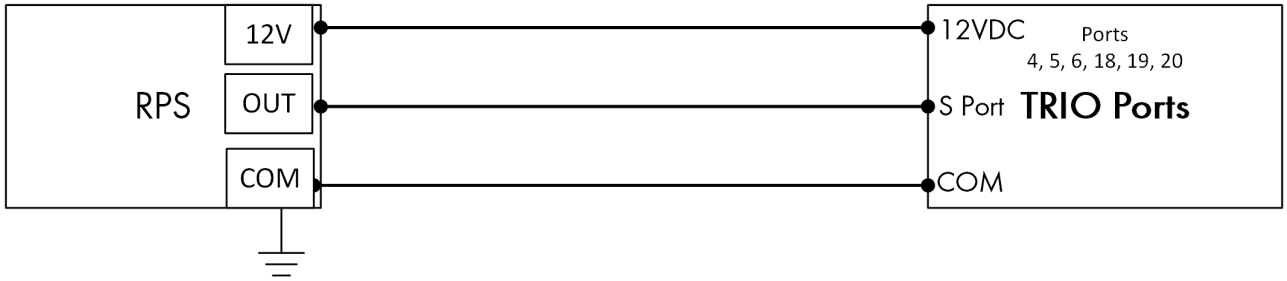

Figure 29: RPS Wiring Schematic

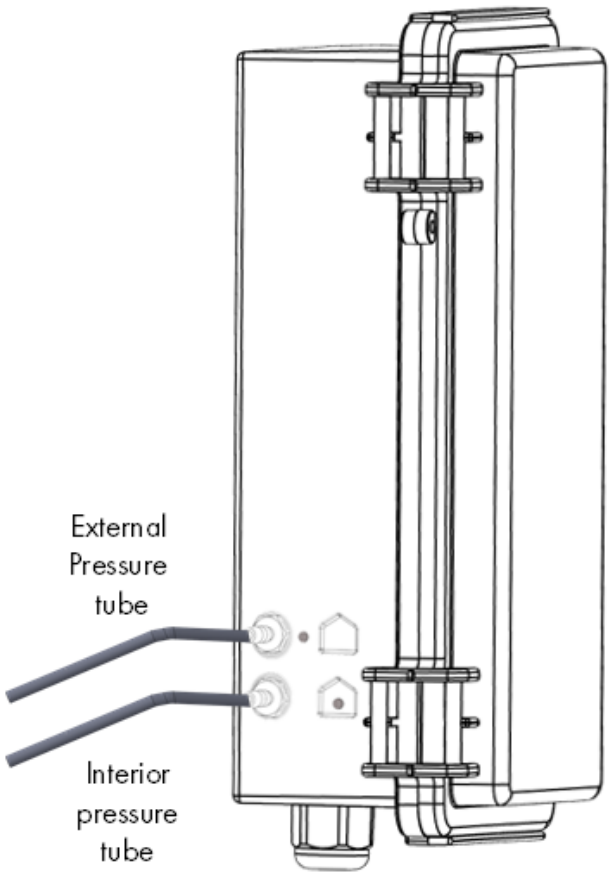

Figure 30: RPS Static Pressure Tubes

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

3.4.8 SILO WIRING

Wire the Trio to an RJB Junction Box and power supply. For details on how to wire the Junction Box to the load cells, refer to the RJB manual.

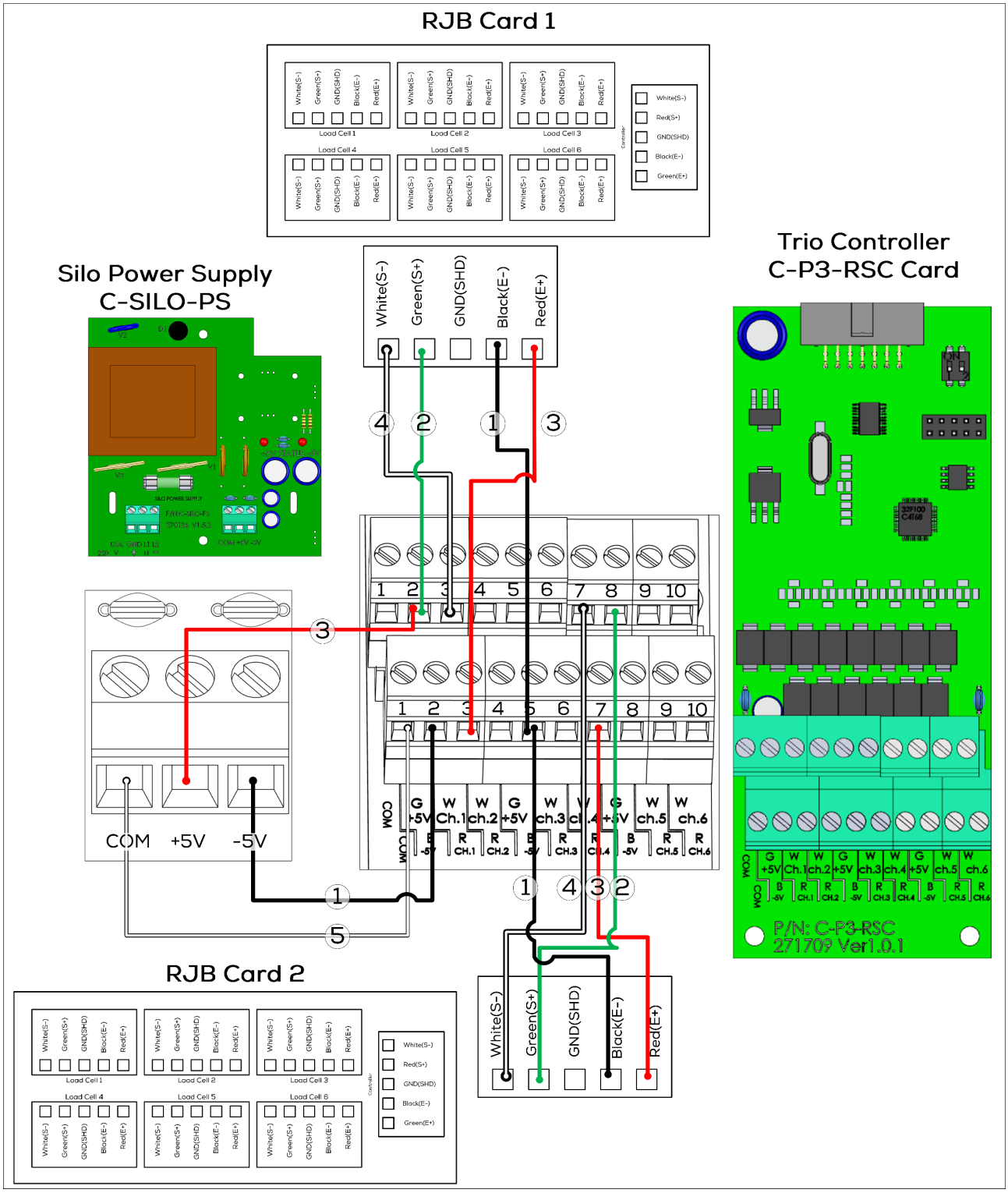

Figure 31: Scale Card Wiring to Power Supply and RJB-6

NOTE Connect each RJB-6 white and red wire to matching RSC ports; for example White Ch.1 and Red Ch. 1.

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Number	Function
1	Black wire, -5V
2	Green wire, +5V
3	Red, Channel 1 - 6
4	White, Channel 1 - 6
5	COM

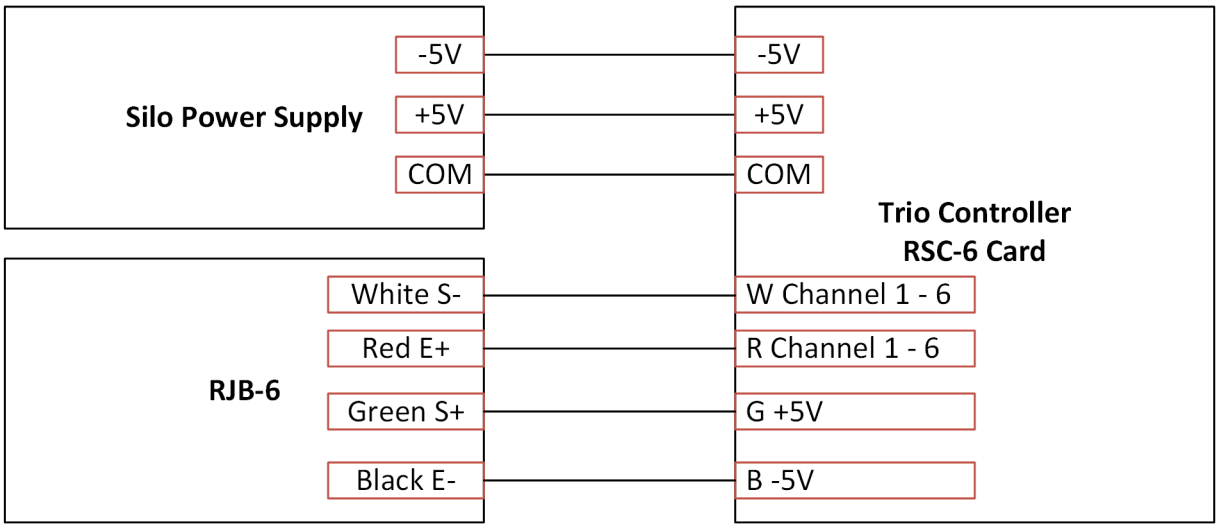

Figure 32: RSC Card to Silo Power Supply/RJB-6 Schematic

RJB Wire	RSC Ports	
Green	2, 5, 8 (Upper)	
Black	2, 5, 8 (Lower)	
White	3, 4, 6, 7, 9, 10 (Upper)	Note: Connect each RJB white and red wire to matching ports. For example White Ch.1 and Red Ch.1

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3.4.9 RSU WIRING

Refer to the RSU Manual for further information.

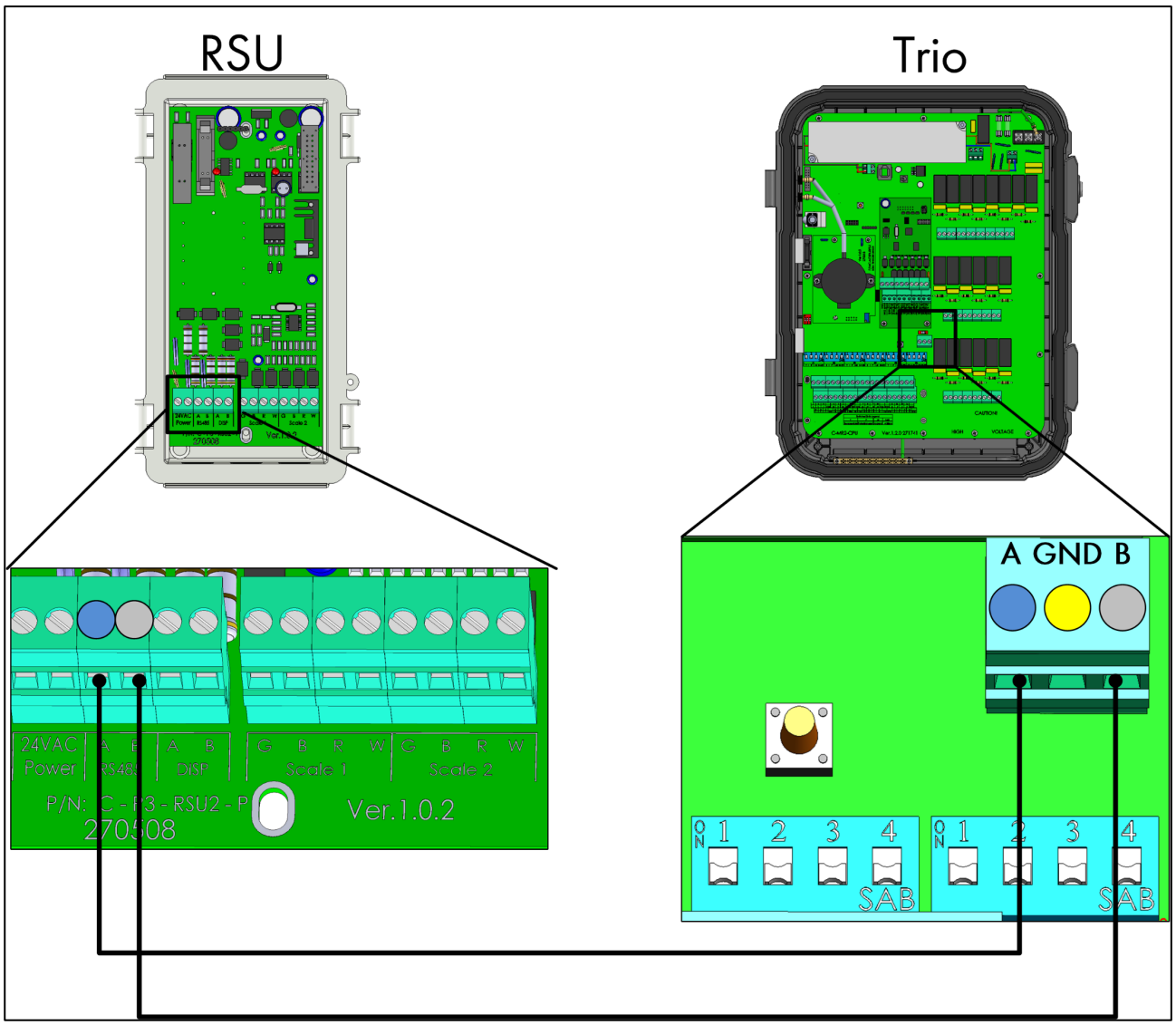

Figure 33: Trio – RSU Wiring

3.5 Termination

Termination, installing or enabling 120-ohm termination resistors at the beginning and end units of a chain, ensures reliable communication in RS-485 infrastructures.

Termination is recommended when the distance between Trio and the final device in the chain is more than 50 meters/165 feet. Trio and Trio Expansion come with a switch to enable termination; an external resistor must be installed on the RSU communication card. Termination may not be required in shorter installations.

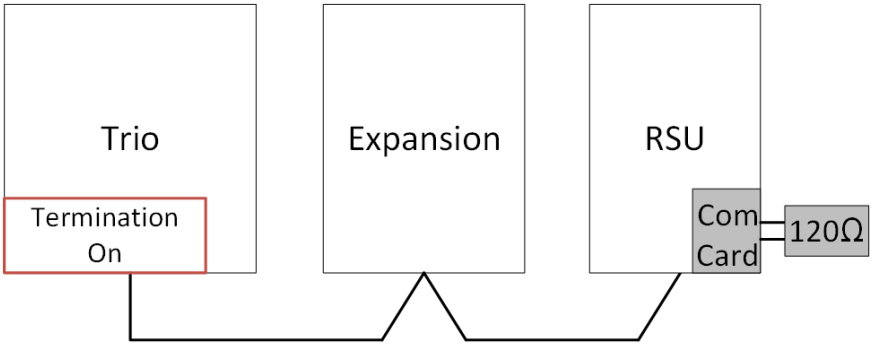

Figure 34: Termination Sample Topology

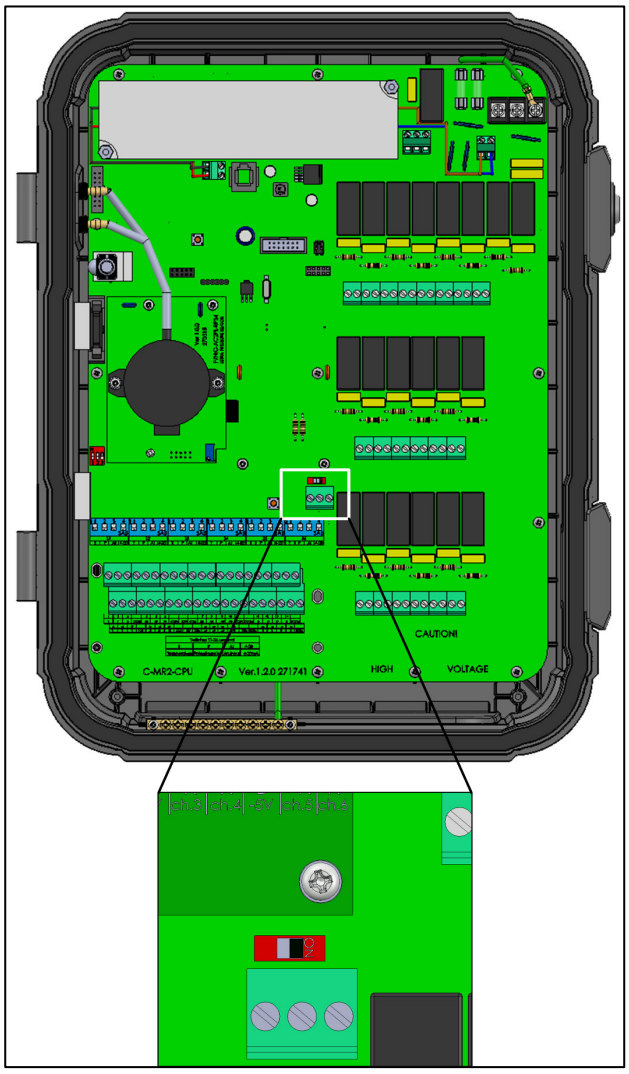

Figure 35: Termination Switch

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3.6 Pressure Sensor Hoses

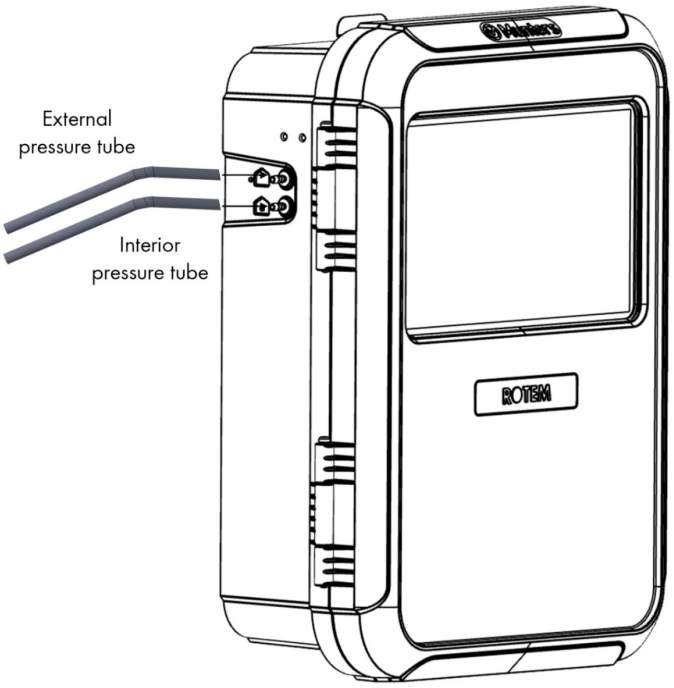


Figure 36: Static Pressure Hoses

3.7 Locking the Trio

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

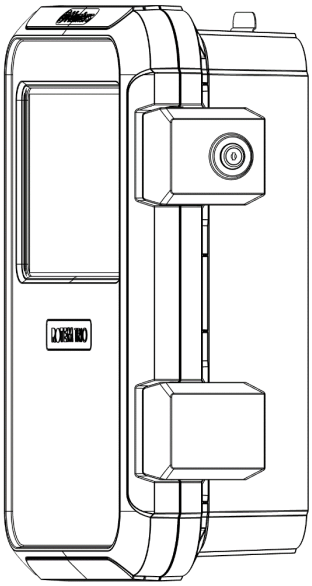


Figure 37: TRIO Lock

3.8 Product Symbols

The following labels appear on your controller:

: Caution! Hazardous voltage

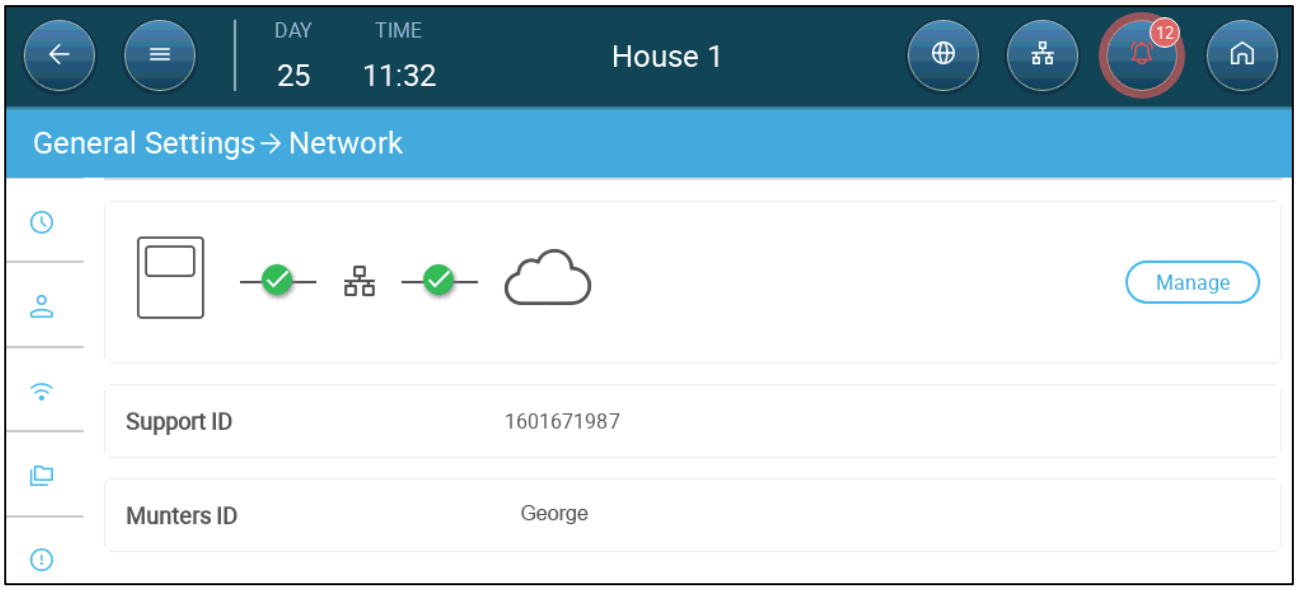
: Caution: Refer to the manual

: Main Protective Earthing Terminal

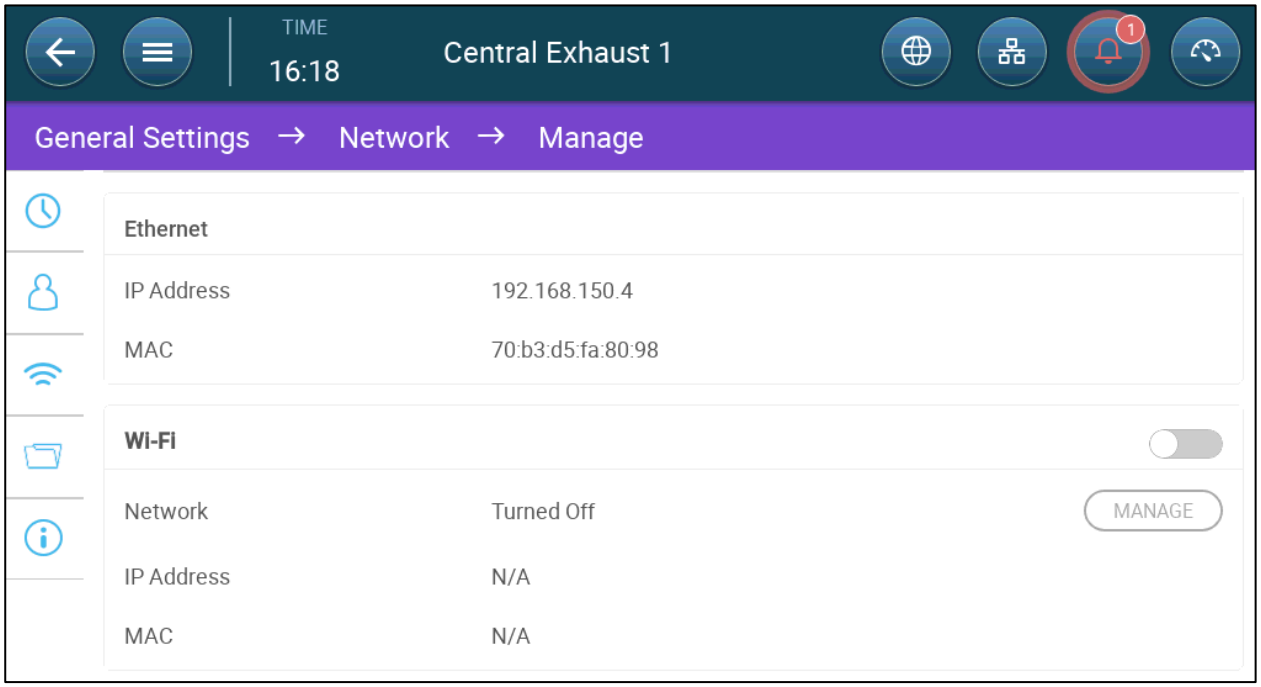
CAUTION *IF THE UNIT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.*

3.9 Tech Support/Wi-Fi

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



- Click Manage.



  - Ethernet fields are read-only information.
  - Enable Wi-Fi if required.

4 TrioAir

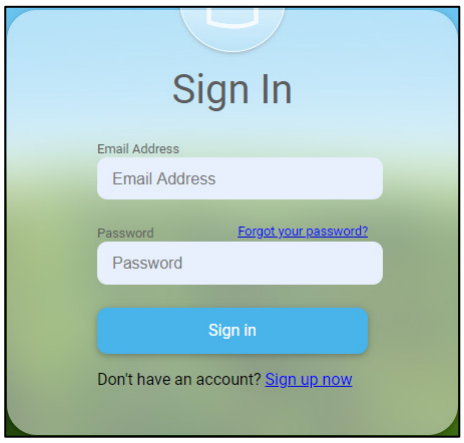
Refer to the TrioAir manual for further information.

4.1 Trio Air Accounts

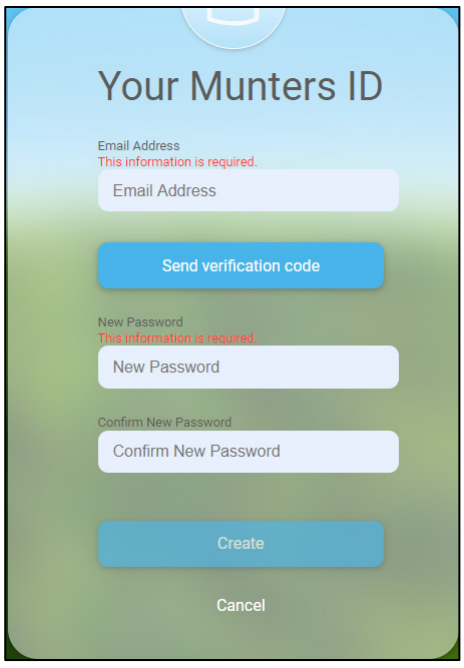
To manage and control your farm, including all Trio units in these farms, set up an account on the trioair.net website. Once an account is set up, you can manage the farms and users from this site or from the TrioAir app. The process is similar to any standard account opening.

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.*

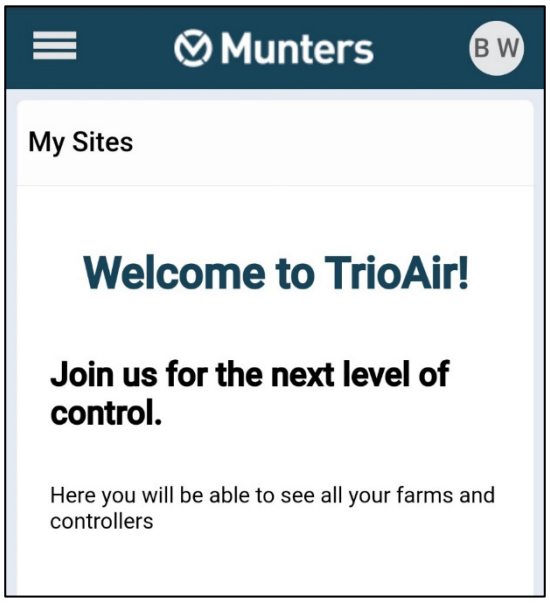


2. Click **Sign Up Now**.



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 and click **Confirm**.
5. Type in and confirm your password.
6. Click **Create**.

An account is created.

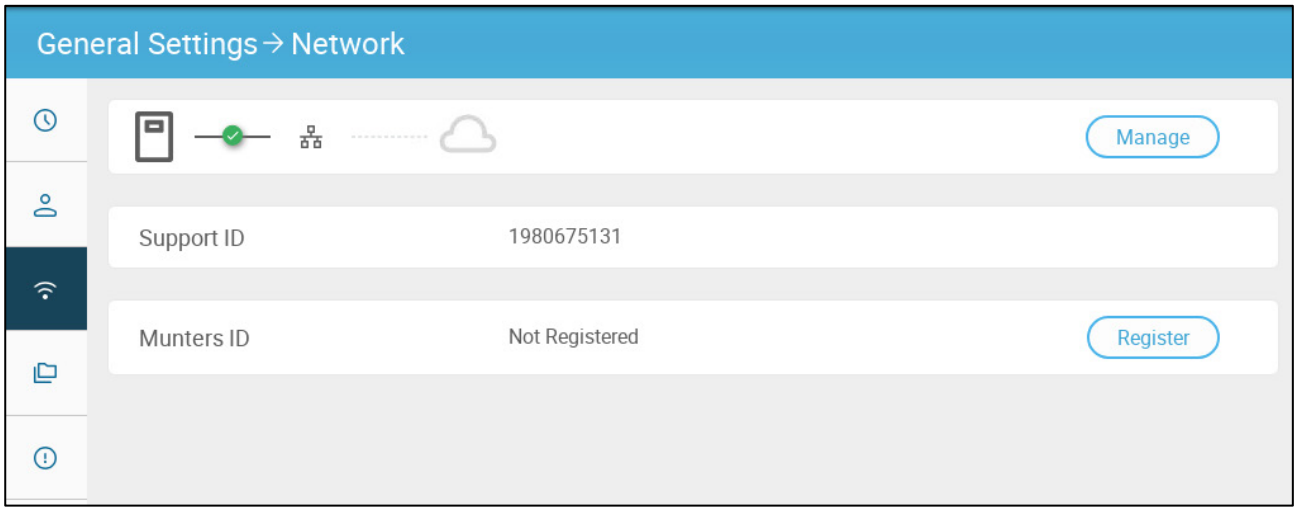


4.2 Pairing a Trio

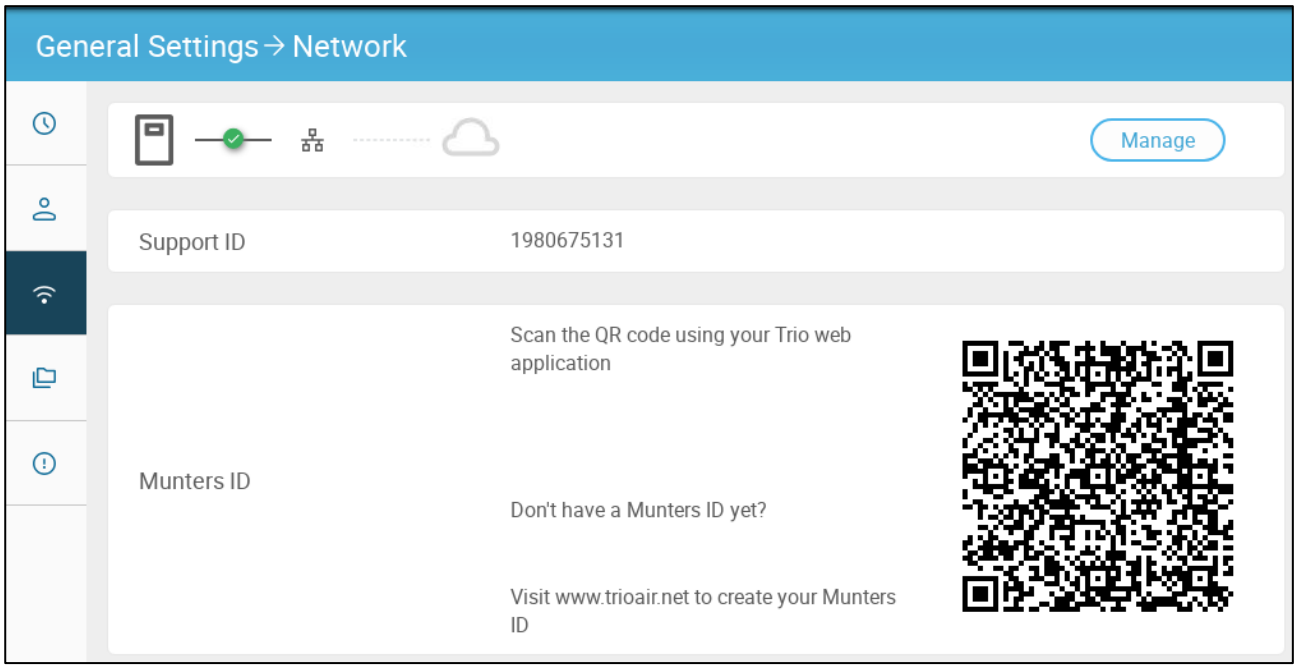
Pairing a Trio unit to an account enables connecting to the unit via the web/app and managing it remotely. Each Trio unit has a unique ID code (a QR code). This code is used to register the device and pair it to an account. This procedure explains how to pair the device to an account.

NOTE Before attempting to register a Trio, verify that the time and date are correctly set (refer to General Settings › Time and Date) In the event that the time and date are incorrect, registration is disabled and an error message appears if attempted.

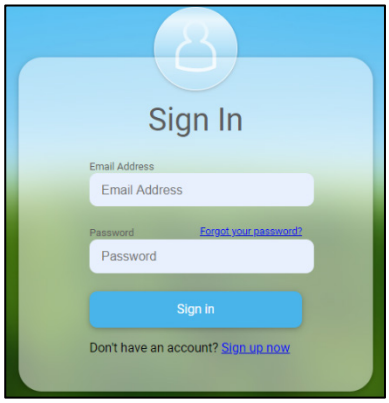
1. Go to System › General Settings › Network .



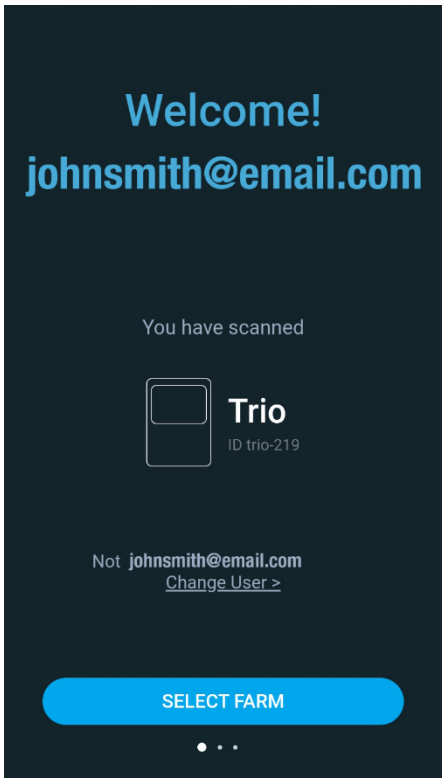
2. Click Register.



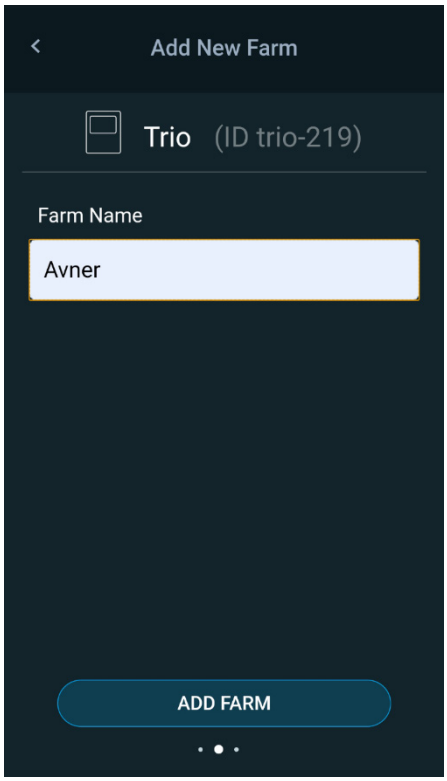
3. Using the TrioAir App (Scan New Device) or a QR reader, scan the QR code. The Trio AIR sign in page appears.



4. Following the online 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.

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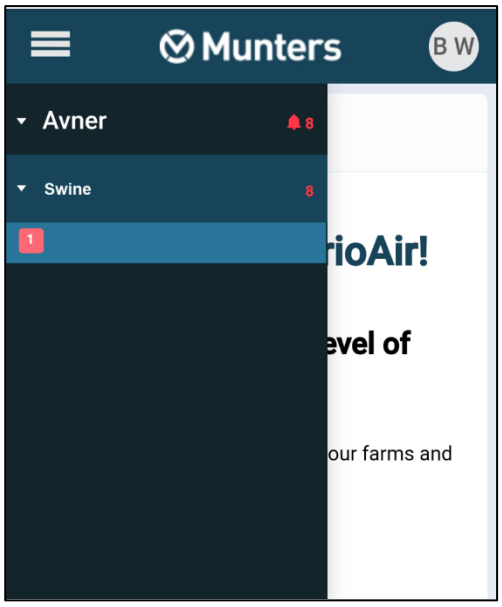
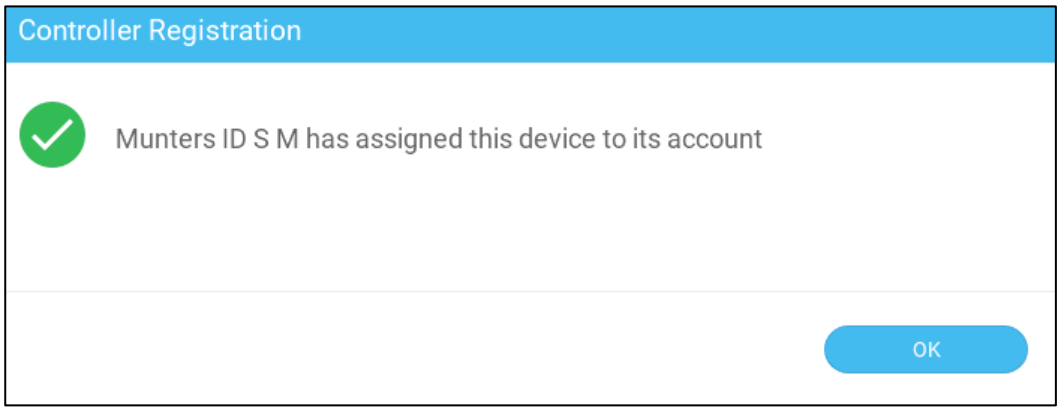


7. Click Register. The Trio unit is now paired with an account.



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5 Specifications

- Trio Specifications
- External Devices Specifications

5.1 Trio 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 & F4 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.

5.2 External Devices Specifications

Table 1: Summary

I/O type	Qty
Analogue Output	8
Analogue Input	6
Digital Input	8
Temperature Sensors	12 maximum (6 dedicated, 6 optional)
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
Feeder	1	1	N/A
As Relay	20	20	N/A
As Analog Out	8	NA	8
Alarm	1	1	N/A

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Table 3: Sensors

Device type	Analog Sensors	Digital Sensors
Temperature Sensors	12	N/A
Humidity Sensors	2	N/A
Outside Humidity Sensor	1	N/A
CO2 Sensor	1	N/A
Ammonia Sensor	1	N/A
Pressure Sensors	2	N/A
Potentiometers	4	N/A
Silos	3	N/A
Power Meters	N/A	2
Water Meters	N/A	4
Gas Meters	N/A	3
Aux. Input	N/A	4
Feed Active Sensor	N/A	1
Feeder Line Sensor	N/A	1
Measuring Fan	N/A	1

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6 Using the Trio Touch Screen

	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
Settings	Function settings
Testing	Function test
	Replace the dashboard battery with a standard 3V battery.
	Click this icon to delete data stored on that page.

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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.

7 Mapping and Defining the Input Output Devices

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

- Using the Mapping Screen
- Mapping Sensors
- Mapping Devices
- TRIO RPS
- Testing Devices

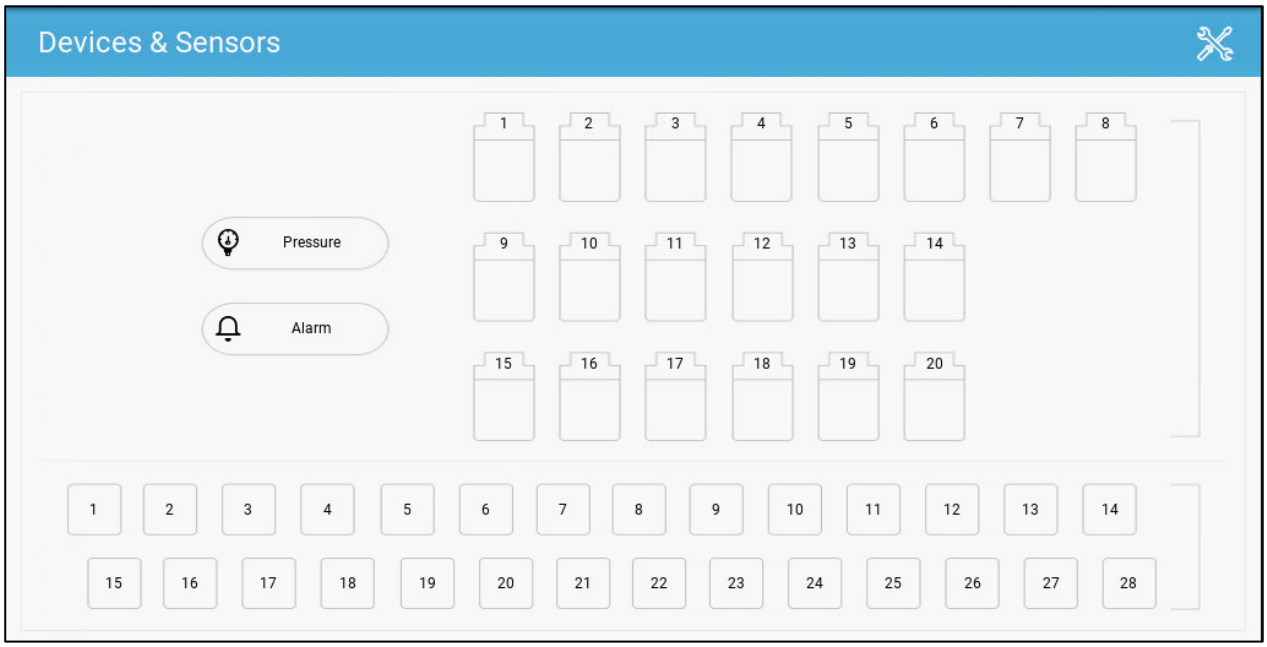
7.1 Using the Mapping Screen

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.*

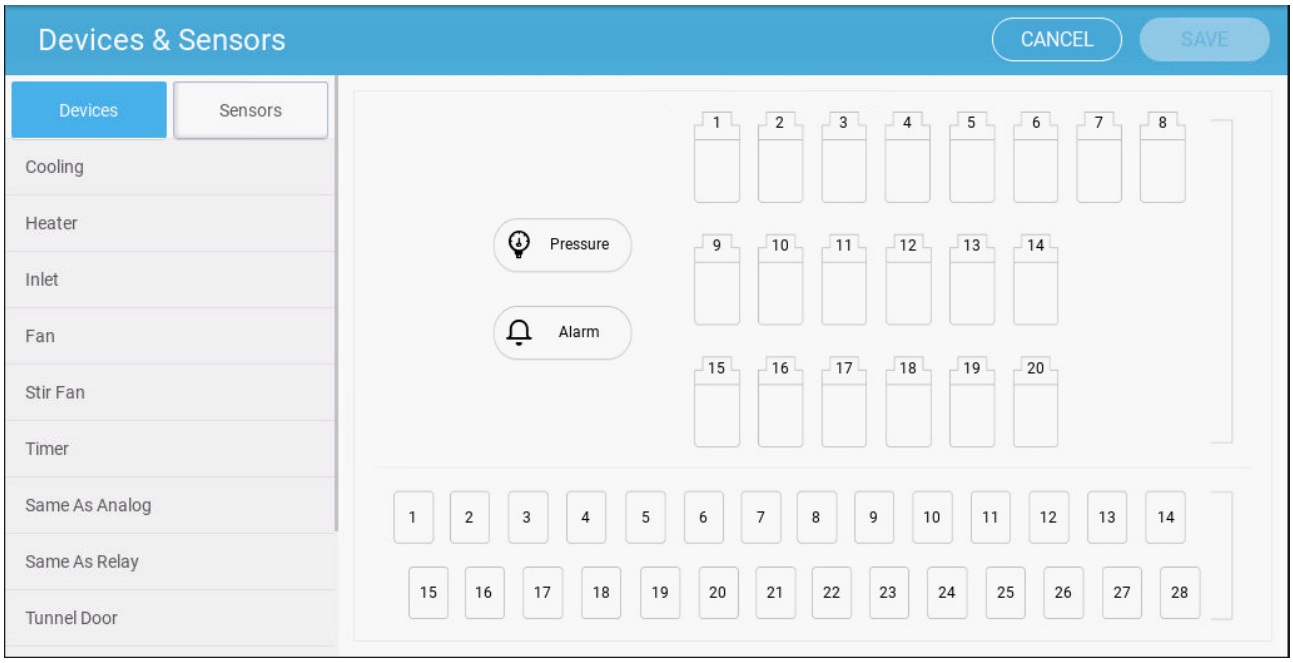
To map the devices:

1. Go to System > Device and Sensors.



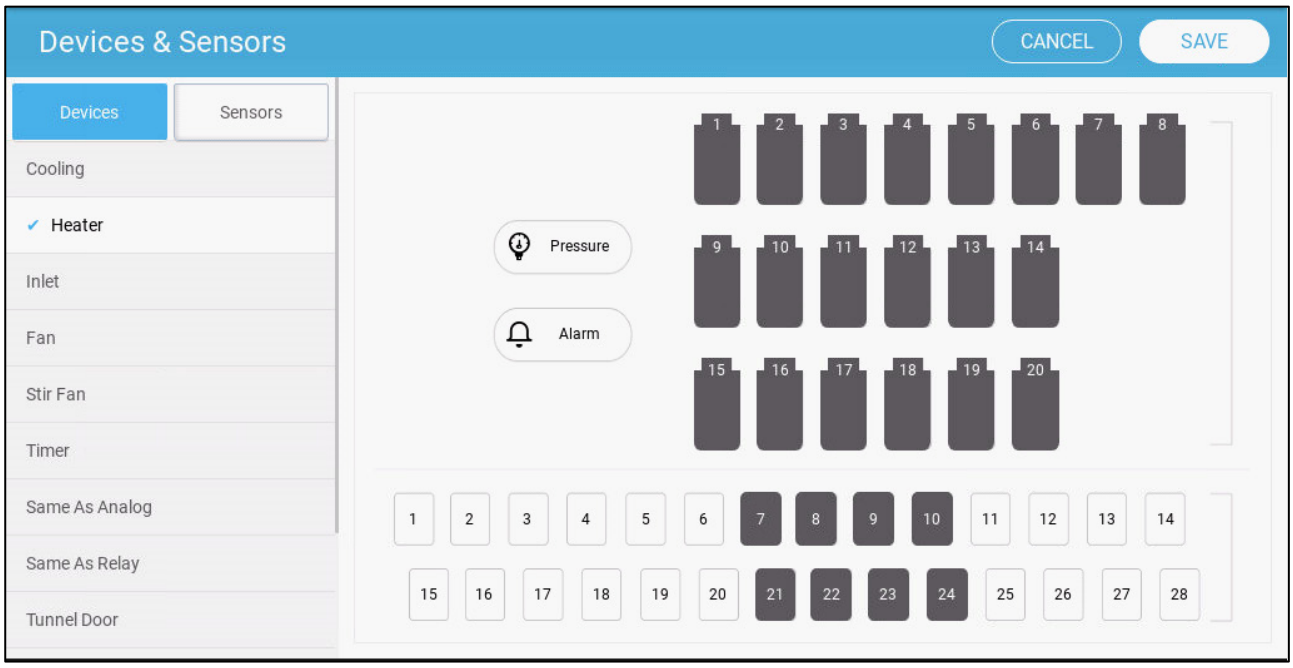
This screen displays the relays and analog/digital ports. At this point all, icons are undefined.

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 screen 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.

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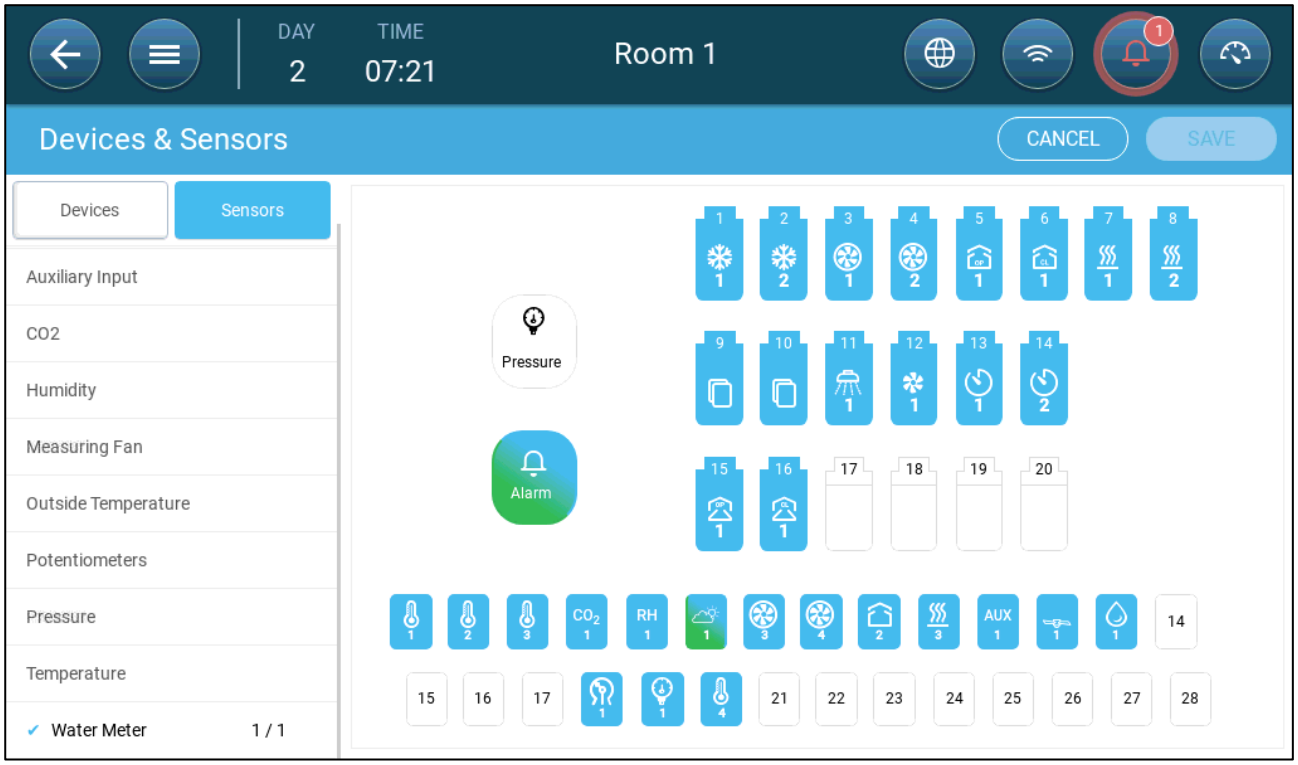
- Devices having opening and closing relays require mapping of both relays.

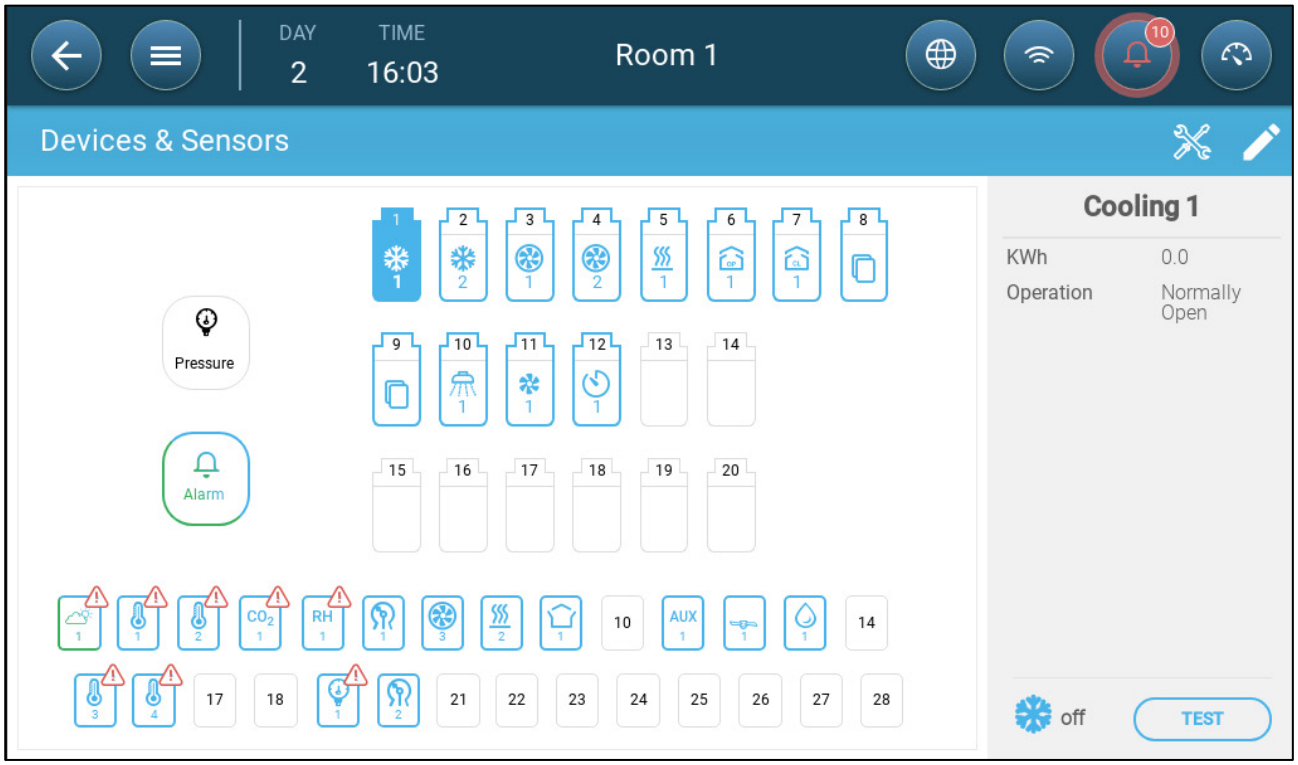
5. Repeat steps 3 and 4 four all the connected devices.



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 Mapping Sensors

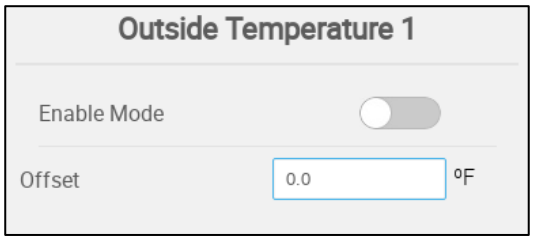
- Temperature Sensors
- Defining the Ammonia Sensor
- Defining the CO2 Sensor
- Defining the Humidity Sensor
- Defining the Water Meter Sensors
- Defining the Gas Meter Sensors
- Defining the Feeder Active Sensor
- Defining the Feeder Line Sensor

7.2.1 Enabling/Disabling Analog Input Sensors

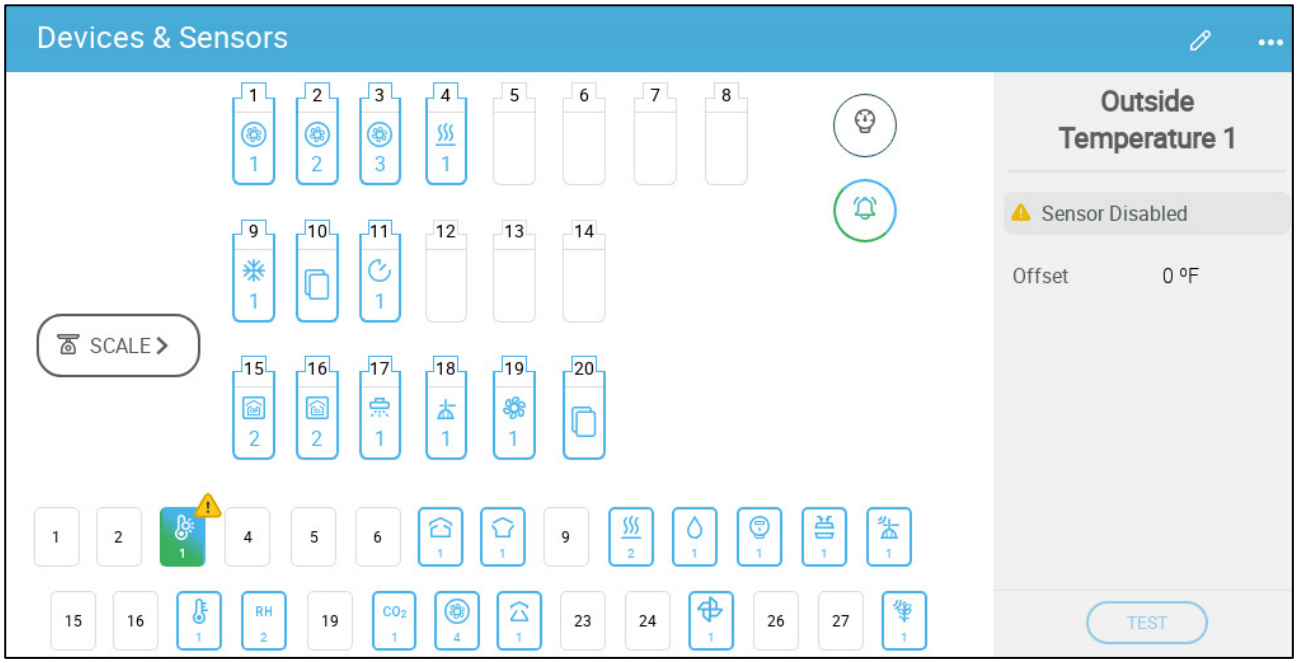
By default, when the user maps an analog input sensor, the sensor is enabled. To disable a sensor:

1. Go to the device and click edit .

2.Move the enable mode icon to off and click Save..



3.On the dashboard, the disabled sensor is marked.

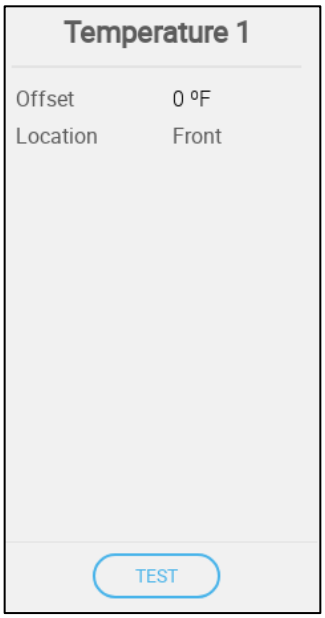


7.2.2 TEMPERATURE SENSORS

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

7.2.2.1 Defining the Temperature Sensors

➲ **Define up to 12 analog input ports as temperature sensors (and if required one port as an outside temperature sensor) (refer to Using the Mapping , page 47).**



- Define:
  - Offset: This is an optional correction for the temperature sensor. Range: -10° C to +10° C
  - Location: Designate the area in the room where the sensor is located (front/back/center) or designate the sensor as a Piglet Zone sensor.
- The temperature reading shows the measured temperature, including the offset.

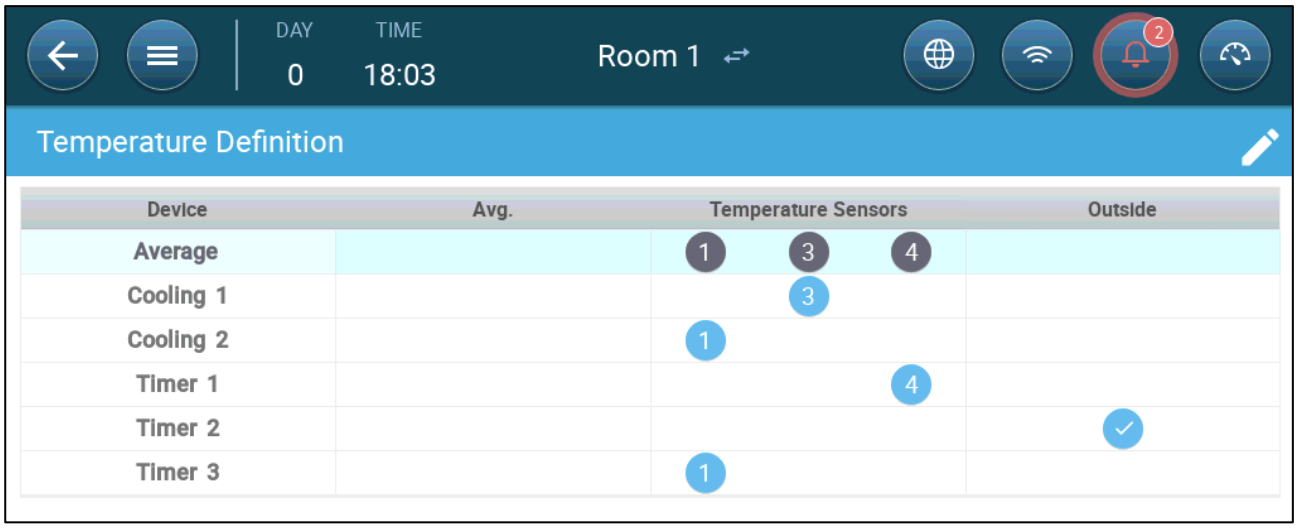
7.2.2.2 Mapping the Temperature Sensors

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.



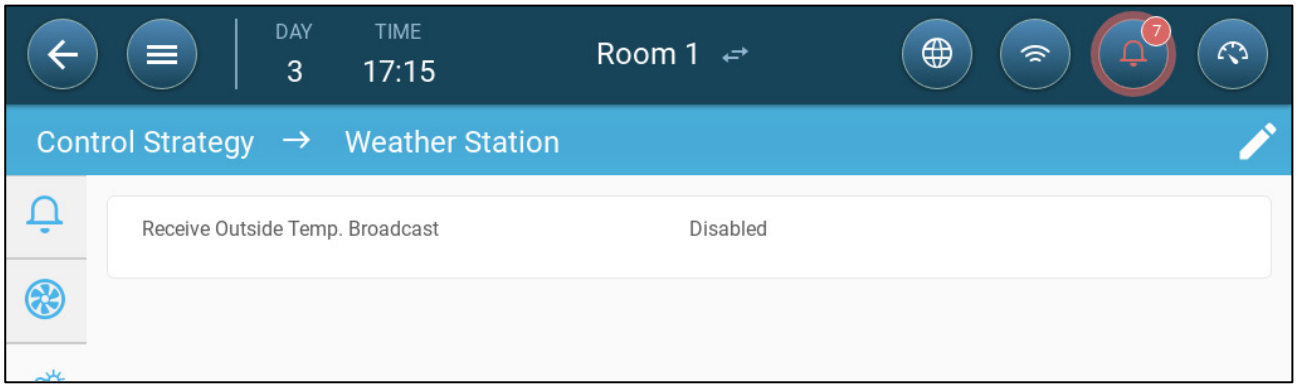
- Map the sensors to devices.
  - Define which sensors are used to calculate the average temperature.
  - If an outside temperature sensor is enabled, map timers to it (if required).

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

7.2.2.3 Enabling a Weather Station

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

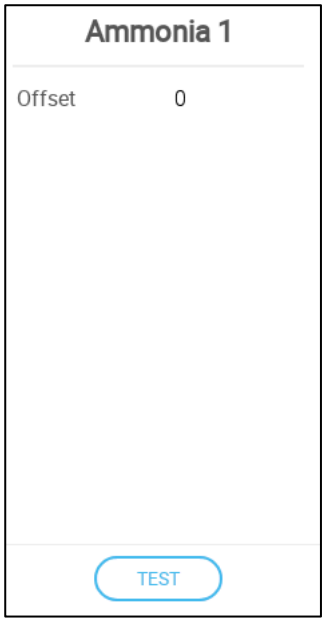
1. In System › Device and Sensors, define one sensor as Outside Temperature.
2. Go to System › Control Strategy › Weather Station .



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

7.2.3 DEFINING THE AMMONIA SENSOR

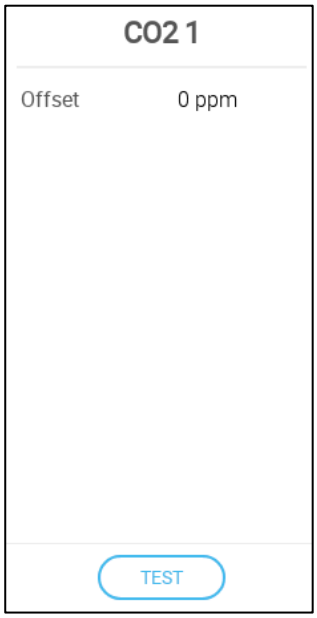
➲ **Define one analog input port as an ammonia sensor (refer to Using the Mapping , page 47)).**



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

7.2.4 DEFINING THE CO2 SENSOR

➲ **Define one analog input port as a CO2 port (refer to Using the Mapping , page 47)).**

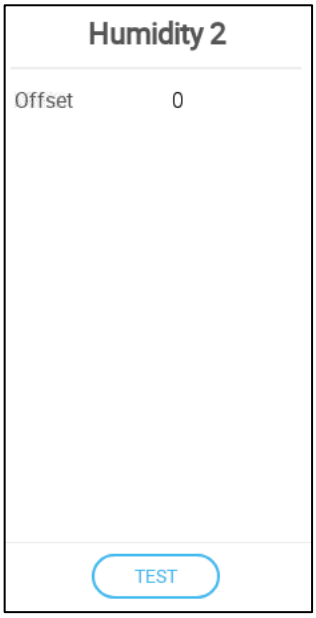


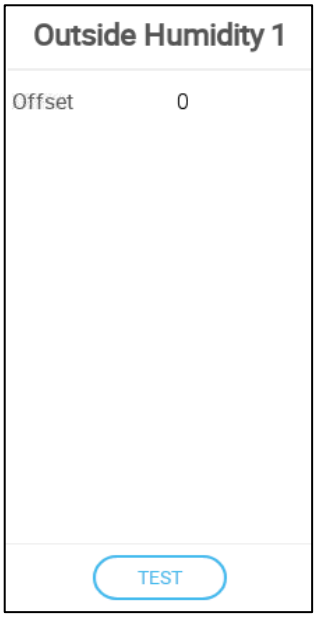
- Define:
  - Offset: This is an optional correction for the CO2 sensor. Range: -500 to +500 ppm
- The CO2 reading shows the measured amount, including the offset.

7.2.5 DEFINING THE HUMIDITY SENSOR

➲ **Define (refer to Using the Mapping , page 47)).**

- One or two analog input ports as a humidity sensor
- One analog input port as an outside humidity sensor

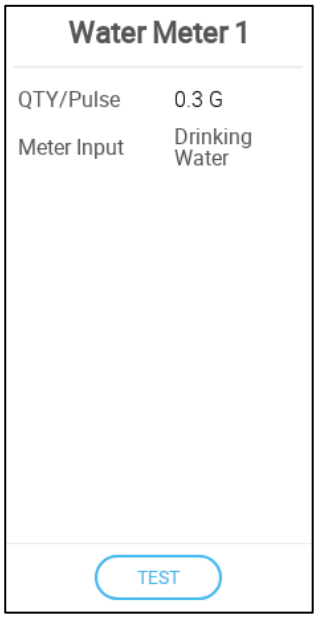




- Define:
  - Offset: This is an optional correction for the humidity sensor. Range: -10 to +10%
  - Enable Mode: Enable/disable the sensor.
- The humidity reading shows the measured level, including the offset.

7.2.6 DEFINING THE WATER METER SENSORS

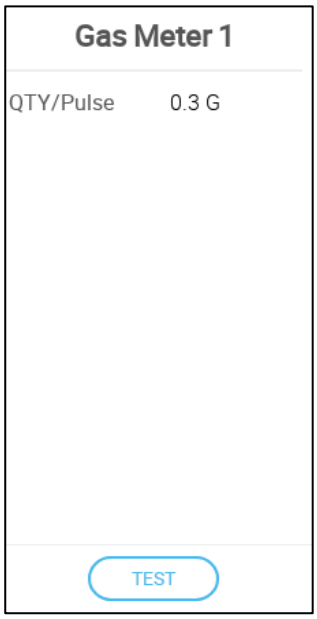
➲ **Define up to four digital input ports as a water meter (refer to Using the Mapping , page 47).**



- Define:
  - Quan/Pulse: Set the water meter's water flow per pulse. Range: 0.0 to 99.9 (unit depends General Settings › User).
  - Meter input: Chose drinking water or cooling.

7.2.7 DEFINING THE GAS METER SENSORS

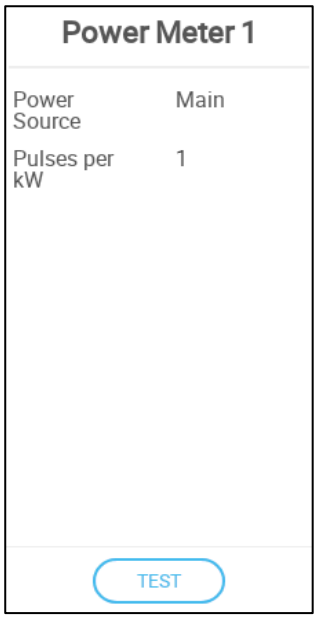
➲ **Define up to three digital input ports as a gas meter (refer to Using the Mapping , page 47).**



  - Quan/Pulse: Set the gas meter's flow per pulse. Range: 0.0 to 999 (unit depends on General Settings › User).
  - Enable Mode: Enable/disable the sensor.

7.2.8 DEFINING THE POWER METER SENSORS

➲ **Define up to two digital input ports as a power meter (refer to Using the Mapping , page 47).**



- Power Source:
  - Main: Power meter measures the amount of electricity used by the system.
  - Heat: Power meter measures the amount of electricity used by the heaters.
- Pulses kW: Set the number of pulses per kilowatt. Range: 1 to 1000.

7.2.9 DEFINING THE FEEDER ACTIVE SENSOR

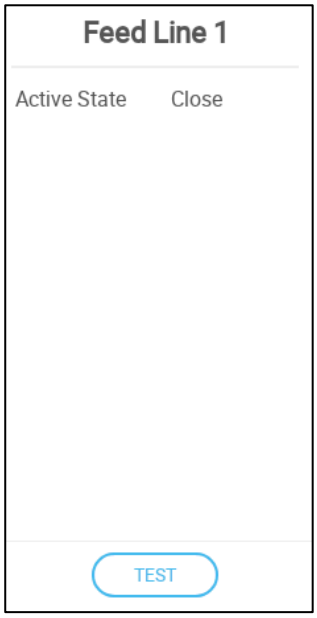
➲ **Define one digital input port as feeder active (refer to Using the Mapping , page 47).**

- Define
  - Active State: Select if the relay is normally open or normally close.

- Quantity Per Minute: Define the amount (weight per minute) of feed to be distributed.

7.2.10 Defining the Feeder Line Sensor

➲ **Define one digital input port as feeder line (refer to Using the Mapping , page 47).**



- Active state: Select if the port is normally open or normally closed.

7.3 Mapping Devices

- Defining the Fans
- Defining the Stir Fan
- Heating Devices
- Defining the Cooling Devices
- Potentiometers, Inlets, Tunnel Doors, Outlets
- Defining the Sprinkler
- Defining the Same As Relays
- Defining the Same As Analog Ports
- Defining the Timers
- Defining the Auxiliary Input
- Defining the Measuring Fan
- Defining the Feeder Relay

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 General Settings › User define the measurement unit.

➲ Define up to 20 relays or analog output ports as On/Off or 0 – 10 V fans, respectively (refer to Using the Mapping , page 47)).

- On-Off Fans
- 0 – 10 Volt Fans

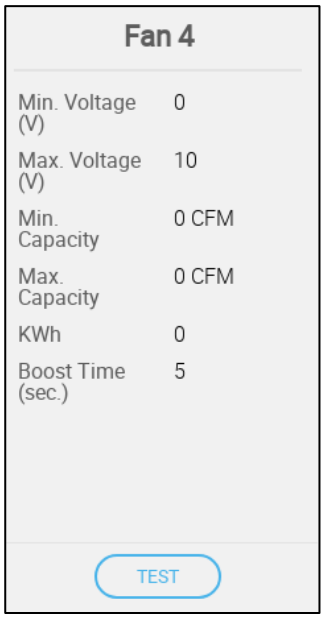
7.3.1.1 On-Off Fans

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. For example, if the minimum voltage is set to 2V and the maximum to 8V the controller applies the calculated 0-100% output over a 2V-8V signal.
    - Minimum/Maximum Capacity: Enter the fan's minimum and maximum 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.

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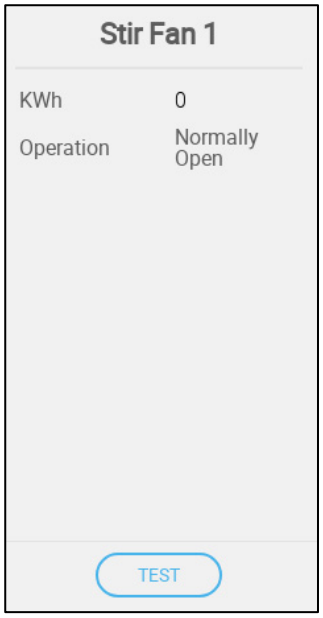
7.3.2 DEFINING THE STIR FAN

➲ **Define one relay as a stir fan (refer to Using the Mapping , page 47)).**

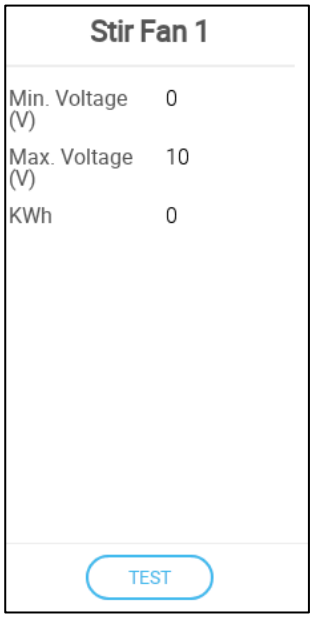
- On Off Stir Fan
- 0 – 10 Volt Stir Fan

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. For example, if the minimum voltage is set to 2V and

the maximum to 8V the controller applies the calculated 0-100% output over a 2V-8V signal.

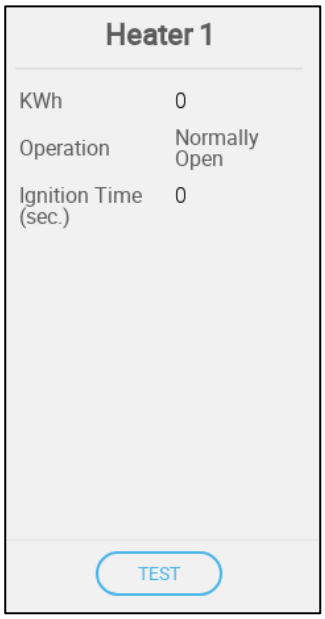
- KWh: This field displays the amount of kilowatts used. Read-only.

7.3.3 HEATING DEVICES

➲ **Define up to six relays and/or analogue output ports as heaters in Using the Mapping , page 47.**

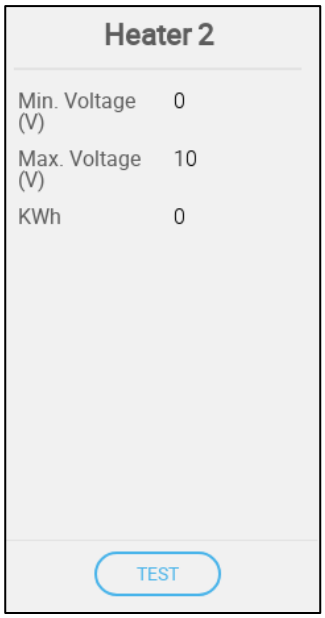
- On-Off Fans
- 0 – 10 Volt Fans

7.3.3.1 Defining the On/Off Heaters



- Define:
  - Operation: Define the relay mode.
  - Ignition Time (sec.): Define the delay time between when the heater is turned on and when the gas is ignited.
  - Test checks the relay functionality.

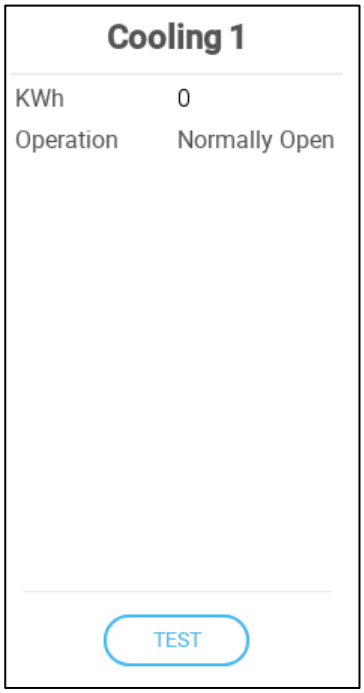
7.3.3.2 Defining the Variable Heaters



- Define:
  - Min./Max Voltage: Define the voltage in the analogue output port that corresponds to the 0% and 100% output, respectively. For example, if the minimum voltage is set to 2V and the maximum to 8V the controller applies the calculated 0-100% output over a 2V-8V signal.
  - KWh: This field displays the amount of kilowatts used. Read-only.

7.3.4 DEFINING THE COOLING DEVICES

➲ **Define up to two relays as cooling devices (refer to Using the Mapping , page 47).**



- 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.

7.3.5 POTENTIOMETERS, INLETS, TUNNEL DOORS, OUTLETS

- Mapping the Potentiometers
- Defining the Inlets/Tunnel Doors
- Defining the Outlet

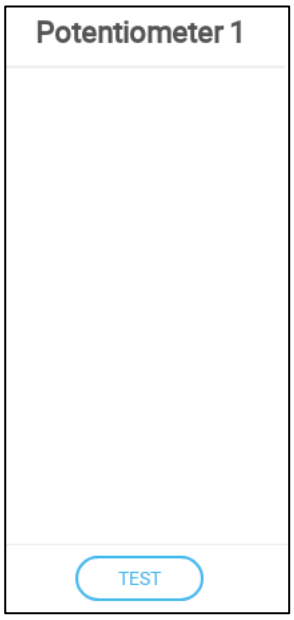
7.3.5.1 Mapping the Potentiometers

➲ **Define up to four analogue ports as potentiometers.**

As an option, potentiometers enable exact positioning of **relay-controlled** inlets\tunnel doors when calibrating. If:

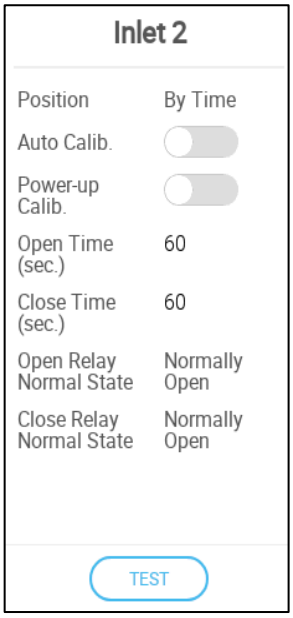
- potentiometers are not employed or
- there is a potentiometer failure

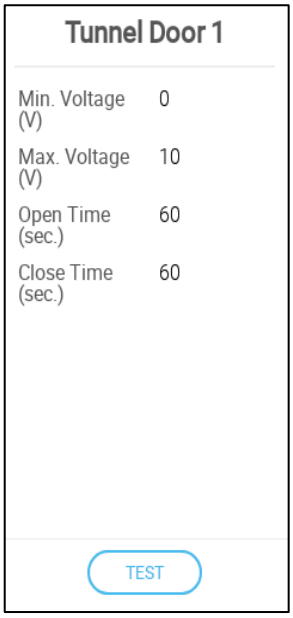
opening and closing times are used to calibrate the inlets/tunnel doors.



7.3.5.2 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 Using the Mapping , page 47).**





- Define:
  - Normal State
  - Position: Define how the inlet opening is controlled:
    - By time
    - Potentiometer
  - Auto Calib.: Enable automatic calibration. Relay-controlled inlets/tunnel doors only.
  - 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.

7.3.5.2.1 Potentiometer Calibration

If used, a potentiometer can control the opening and closing with a high degree of precision. When there is no potentiometer, positioning accuracy tends to degrade after the inlets go through several opening and closing cycles.

In order to calibrate the inlets/vents using a potentiometer:

- Install and map at least one potentiometer.
- Define the position as By Potentiometer.
- Click Calibrate. Calibration must be successful.

In for any reason potentiometer calibration does not function:

- calibration is by time (auto and/or at power up). Time calibration does not fail.
- A potentiometer alarm is generated (if alarms are enabled) . The alarm must be reset to enable potentiometer calibration to function.

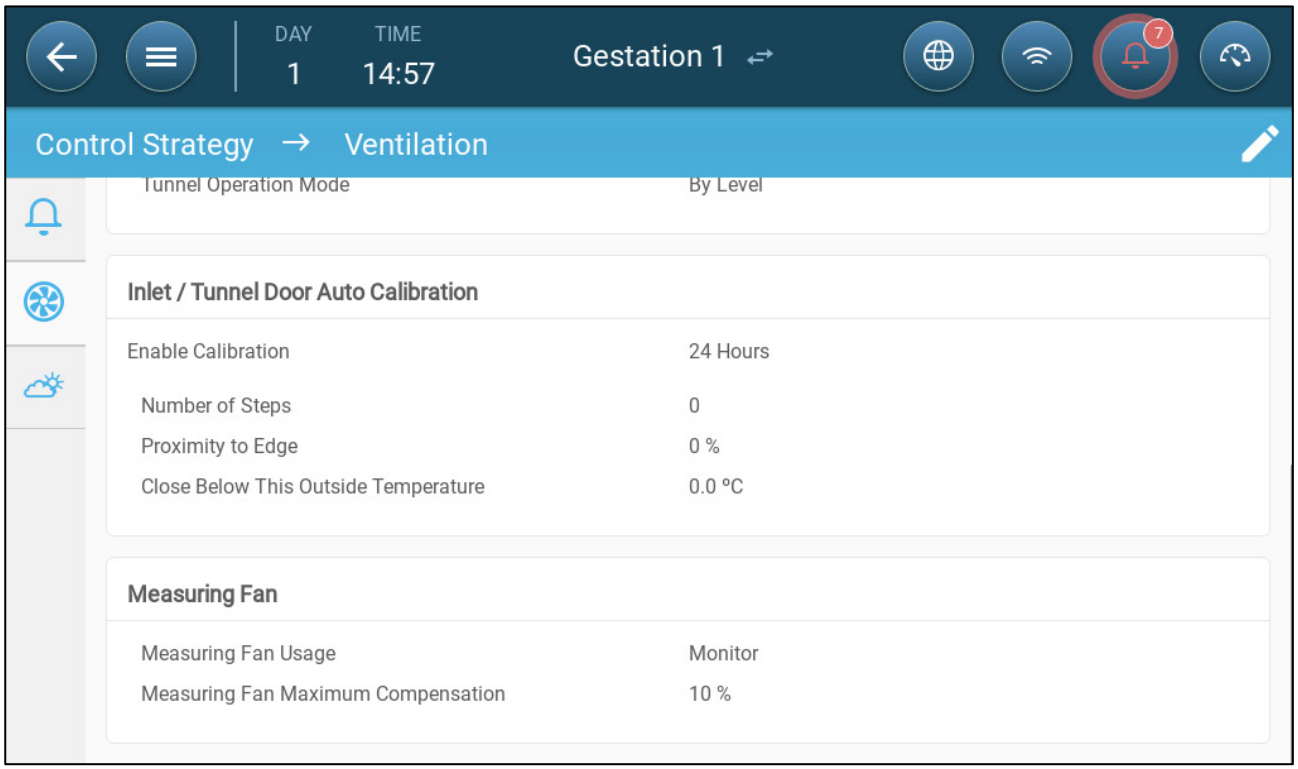
7.3.5.2.2 Calibrating the Inlets/Tunnel Door

During installation, the user enables auto-calibration or power up calibration in digital output (relay) inlets. Calibration automatically takes place after the number of inlet movements equals the number of movements required to start calibration or at Trio power up..

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

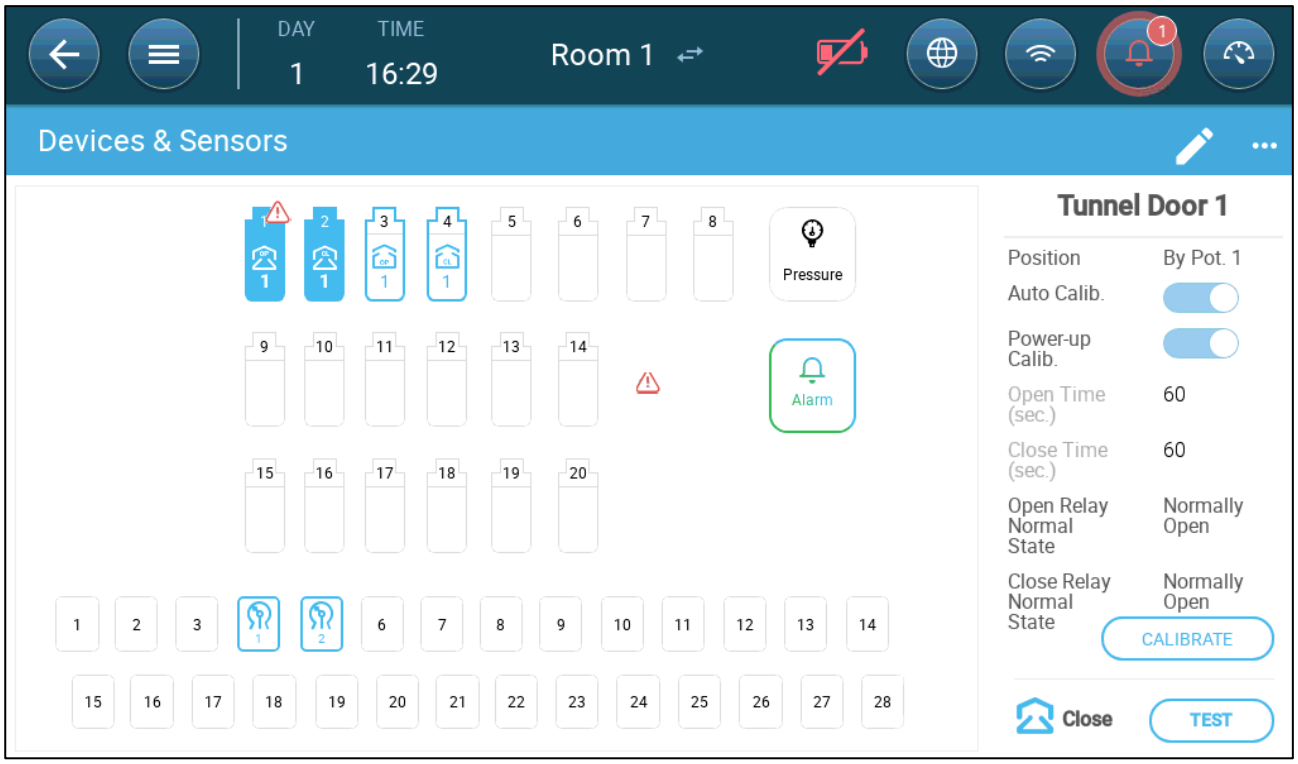
- Relay open occurs when the target position is 100%.
- Relay close occurs when the target position is 0%.

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%.
    - **Potentiometer-controlled calibration failure**: If calibration fails (during auto or power up calibration) in a potentiometer-controlled calibration, an error symbol appears in the Devices and Sensor screen.

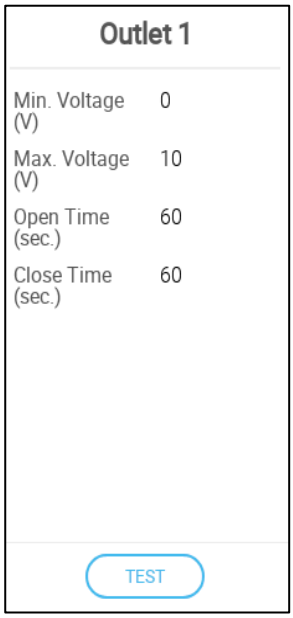


In this situation, click **Calibrate** to run the Calibration Wizard. If the calibration fails again, check:

- Potentiometer wiring
- Potentiometer
- Inlets' and curtains' opening and closing position. There must be a minimum distance between the two, equivalent to 300 A2D points.

7.3.5.3 Defining the Outlet

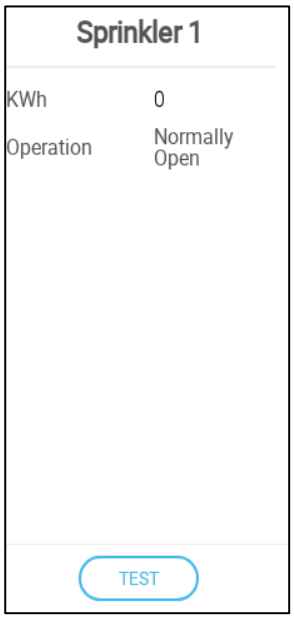
➲ **Define one analog output port as an outlet (refer to Using the Mapping , page 47).**



- Define:
  - Min./Max Voltage: Define the voltage in the analogue output port that corresponds to the 0% and 100% output, respectively. For example, if the minimum voltage is set to 2V and the maximum to 8V the controller applies the calculated 0-100% output over a 2V-8V signal.
  - Open/Close Time: Enter the amount of time required to fully open or fully close the inlet.

7.3.6 DEFINING THE SPRINKLER

➲ **Define one relay as a sprinkler (refer to Using the Mapping , page 47).**

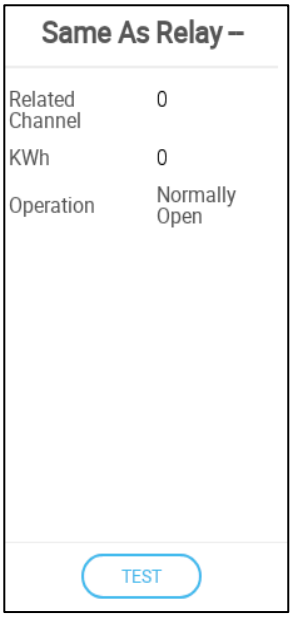


- Define:
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.3.7 DEFINING THE SAME AS RELAYS

➲ **Define up to 20 relays as Same as Relay (refer to Using the Mapping , page 47).**

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

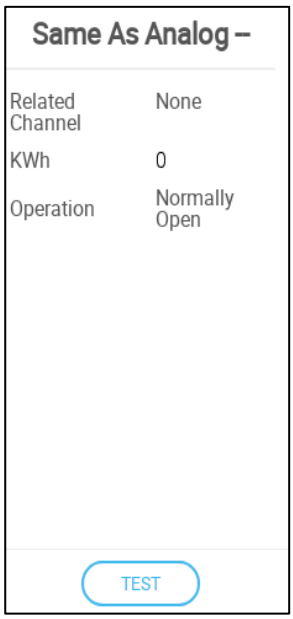


- Define:
  - Related Channel: Define which relay number to follow. Range: 1 – 20
  - KWh: This field displays the amount of kilowatts used. Read-only.
  - Operation: Define the relay mode.

7.3.8 DEFINING THE SAME AS ANALOG PORTS

➲ **Define up to eight relays as Same as Analog Ports (refer to Using the Mapping , page 47).**

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



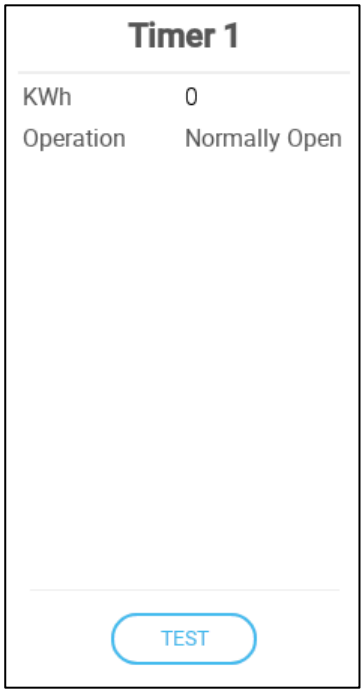
- Define:
    - Related Channel: Define which port number to follow.

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.

7.3.9 DEFINING THE TIMERS

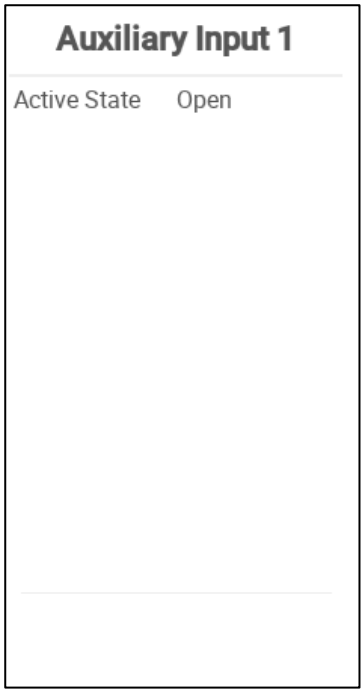
➲ **Define up to five relays as timers (refer to Using the Mapping , page 47).**



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

7.3.10 DEFINING THE AUXILIARY INPUT

➲ **Define up to four digital inputs as auxiliary inputs (refer to Using the Mapping , page 47).**



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

7.3.11 DEFINING THE MEASURING FAN

➲ **Define one digital input sensor as a measuring fan (refer to Using the Mapping , page 47).**

- Define:

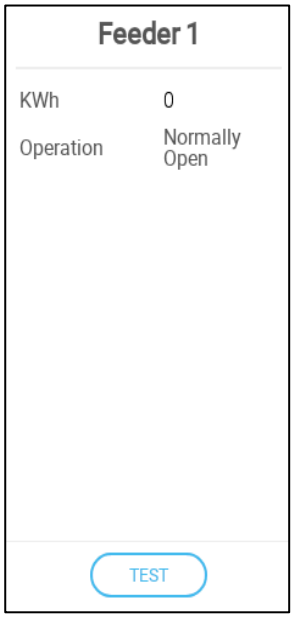
- Operation: Define the logical state (normally open or close) which corresponds to the input idle/off state.
- Brand: Select the fan manufacturer.
- Inner: Select the fan circumference.
- Related Fan: If the measuring fan is to be used for compensation, define the fan to be used to provide the extra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

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

- Enable Mode: Enable/disable the sensor.

7.3.12 DEFINING THE FEEDER RELAY

➲ **Define one relay as feeder (refer to Using the Mapping , page 47).**



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

7.4 Mapping the Weighing Devices

- Defining the Silos
- **Error! Reference source not found.**
- **Error! Reference source not found.**
- Defining the RSU

7.4.1 DEFINING THE SILOS

- Mapping the Silo Scales
- Configuring the Silo Scale
- Testing the Silo

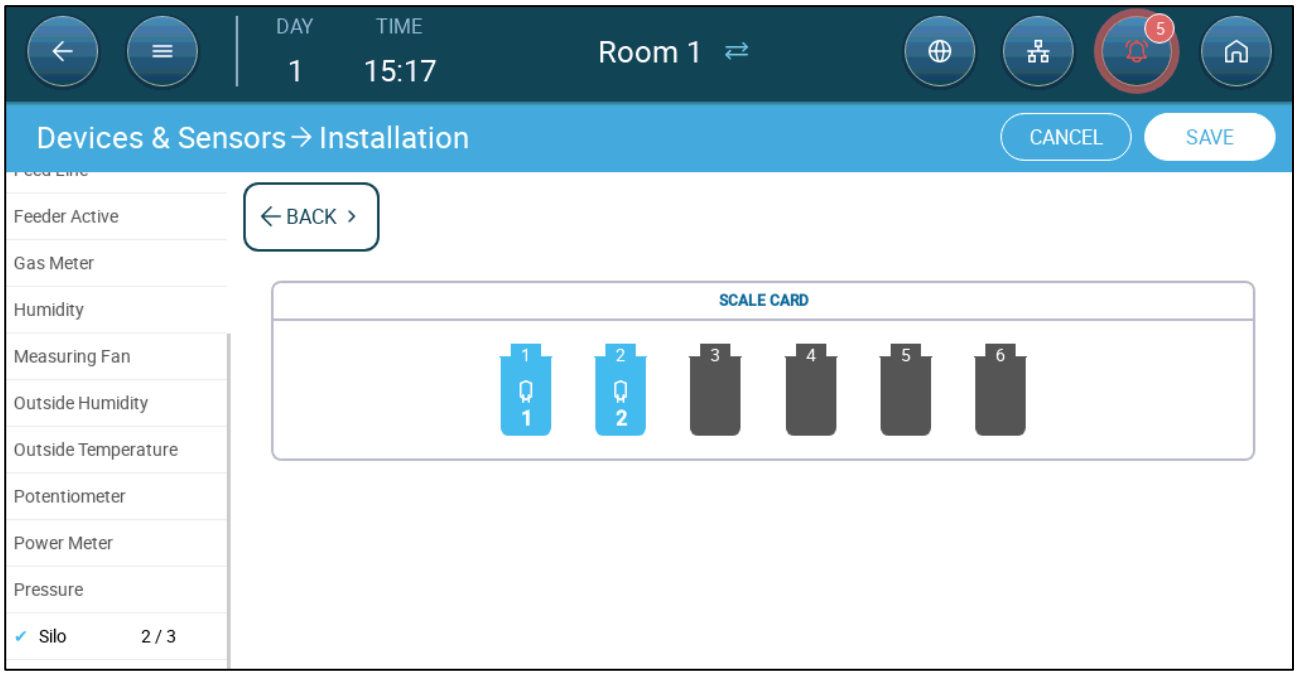
7.4.1.1 Mapping the Silo Scales

Trio can support up to three silo scales.

➲ **This function requires a scale card.**

1. On the Devices & Sensors › Sensors screen, click **Silo**. The Scale icon turns brown.

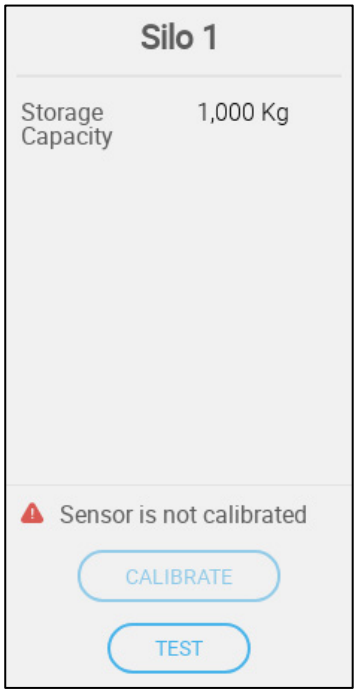
2. Click the Scale icon.
3. Select up to three channels and click **Save**.

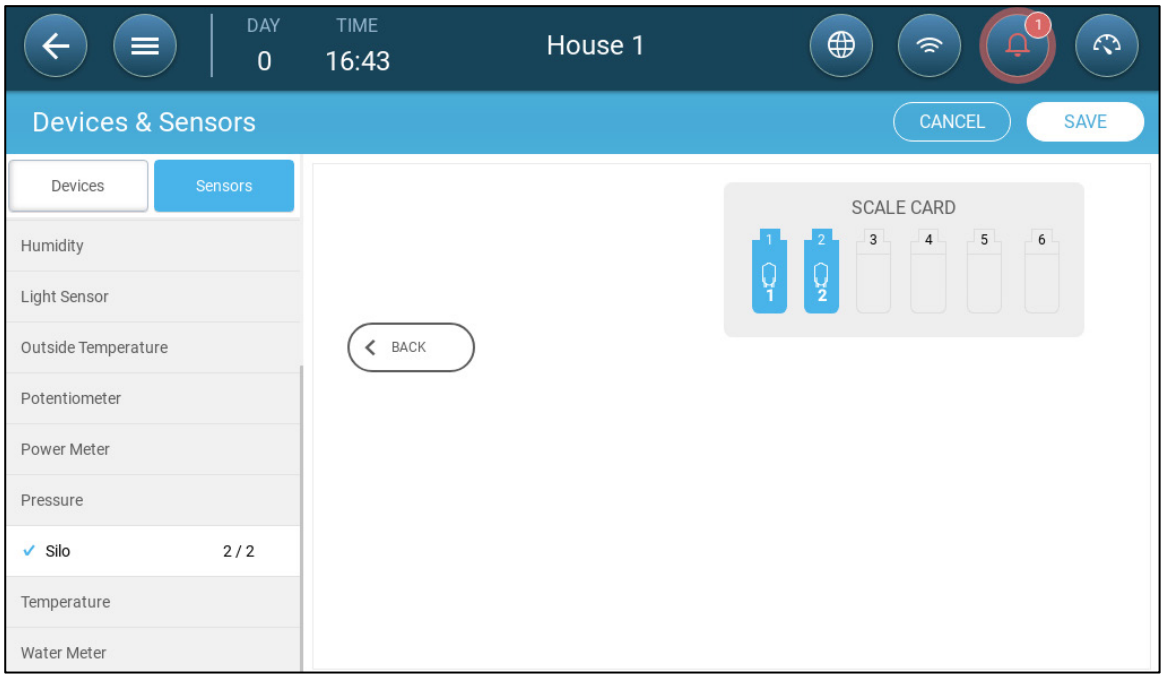


7.4.1.2 Configuring the Silo Scale

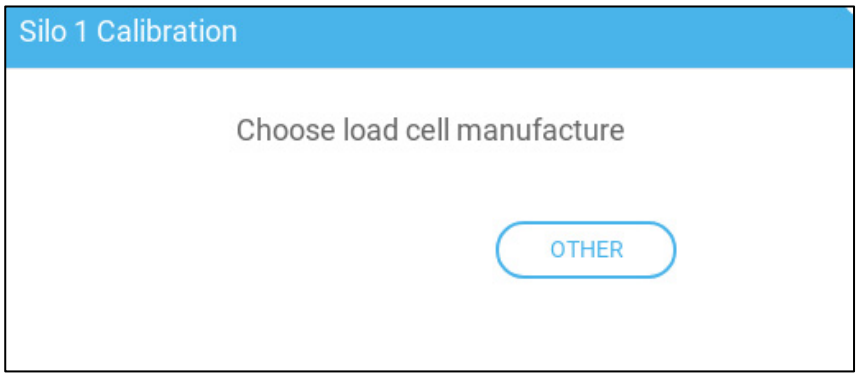
The following procedure details how to "zero out" the Trio silo scales. Zeroing out is way to ensure that the unit's A2D number is accurate (shown in the Silo Icon; 430 in the picture below). To summarize the procedure:

- The user enters the correct amount of feed in the silo while calibrating the silo scale. In the Silo management screen, the user enters "0" (zero). Trio then defines the current A2D signal to be the A2D signal for an empty bin.

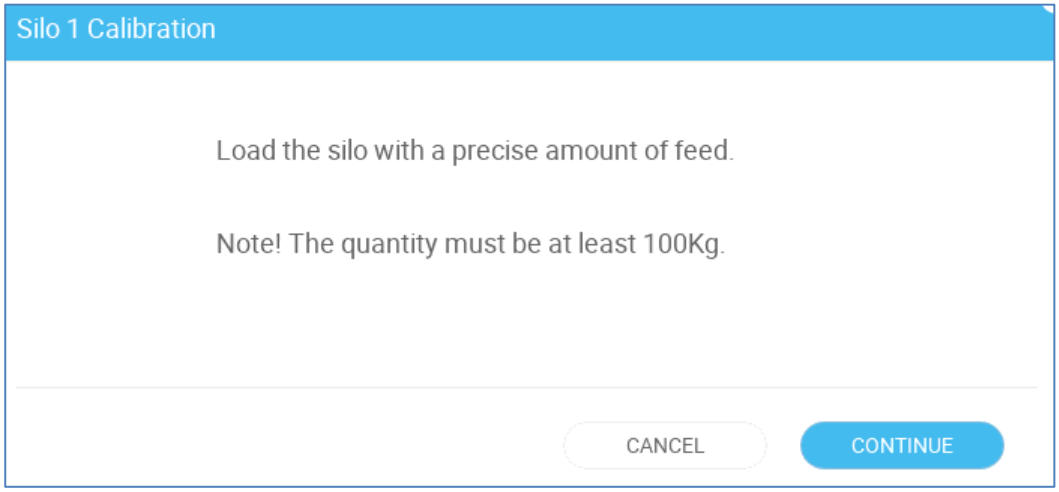




1. Define each silo's storage capacity.
2. Click on the silo icon and click **Calibrate**. The following screen appears:



3. Click **Other**. The following screen appears:



4. Fill up the silo with a known amount of feed. **Munters recommends either a truck filling or a minimum of 500 kilograms.**
5. Enter the amount of feed in the silo and press **Continue**.

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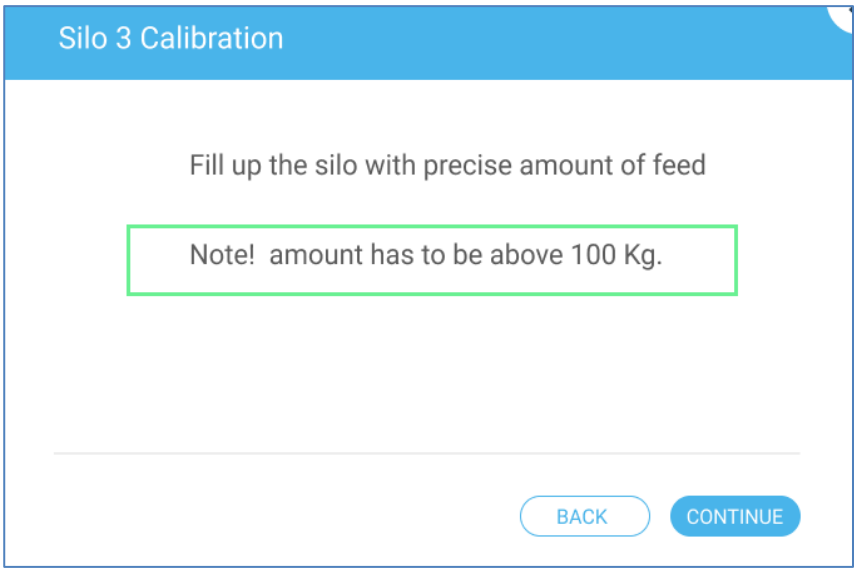
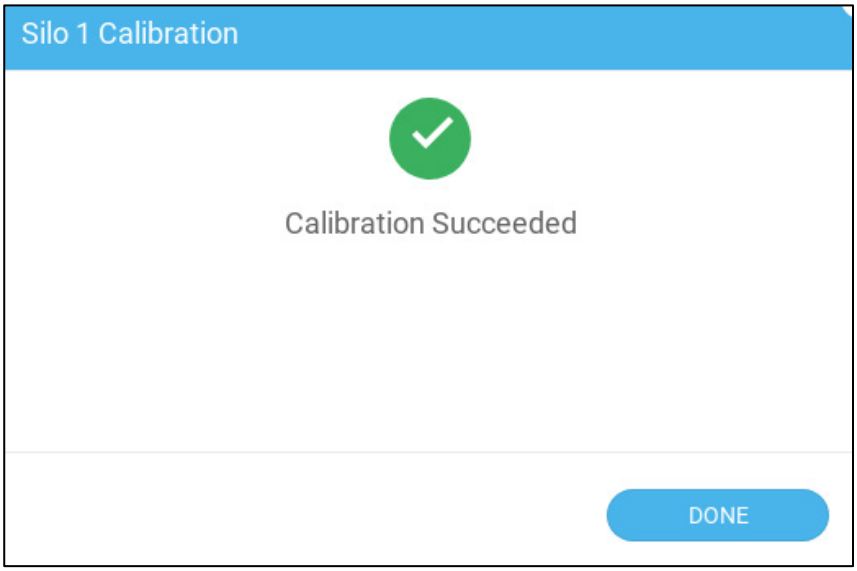


The following screen should appear.



6. Go to Batch › Silo Management.

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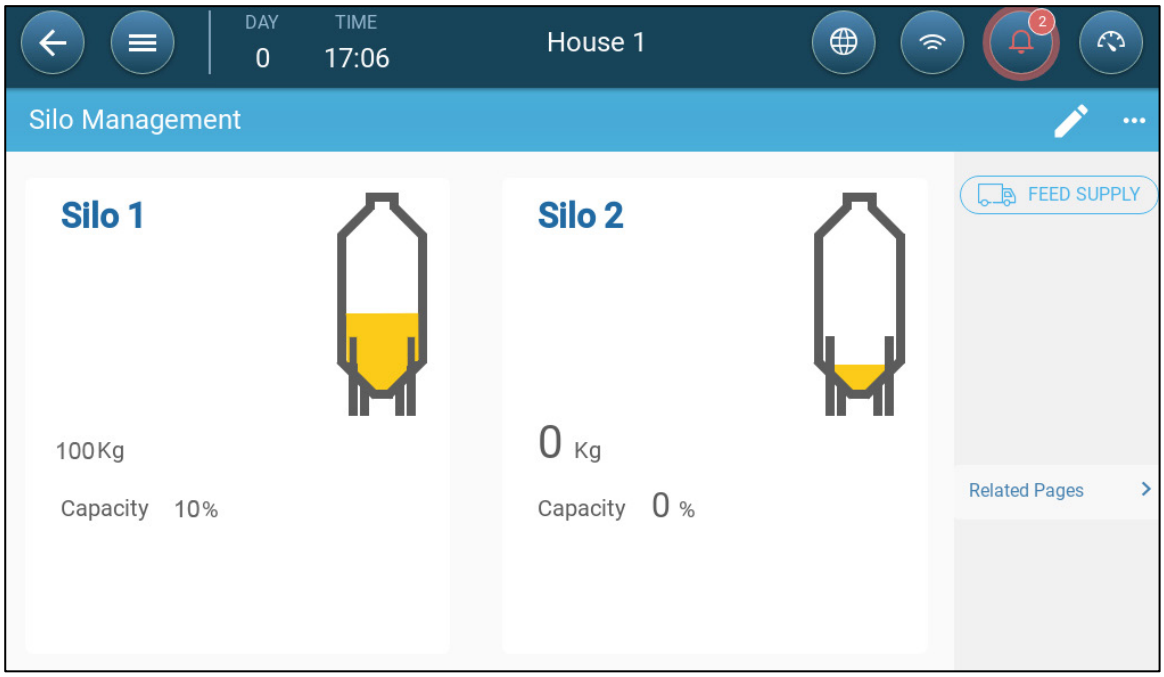
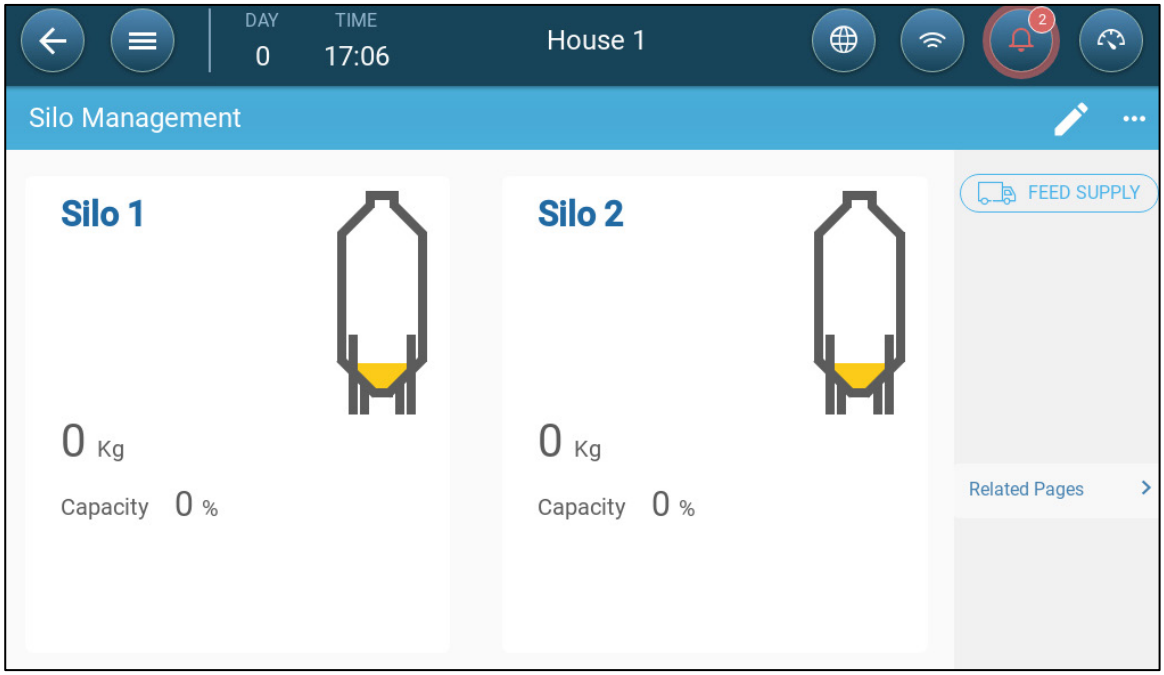


7. Click and change the feed weight to **0**.



8. Click **Save**.

The Trio now displays an accurate A2D number on the silo icon screen.

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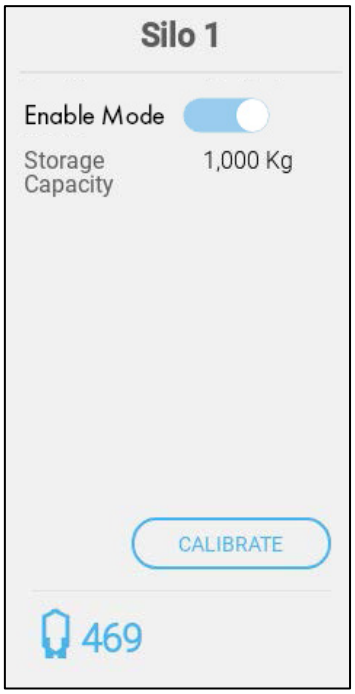
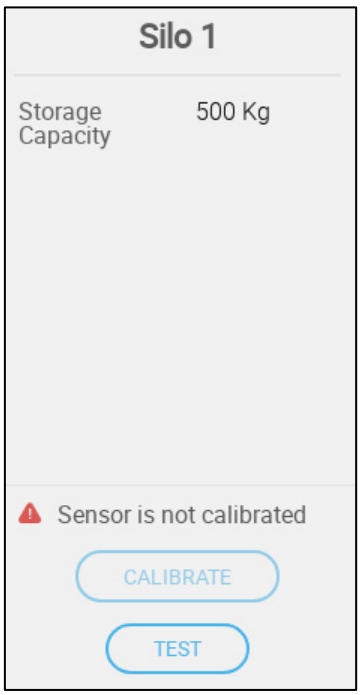
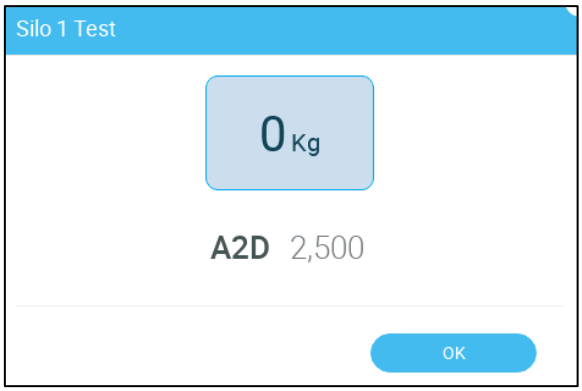


7.4.1.3 Testing the Silo

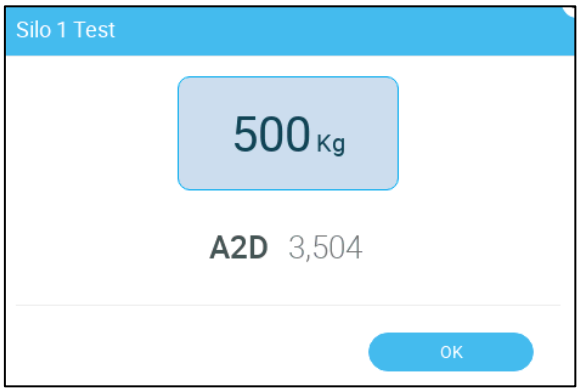
1. After calibrating the silo, go to the Silo relay.



2. Click **Test**.



3. Place a known weight in the silo.



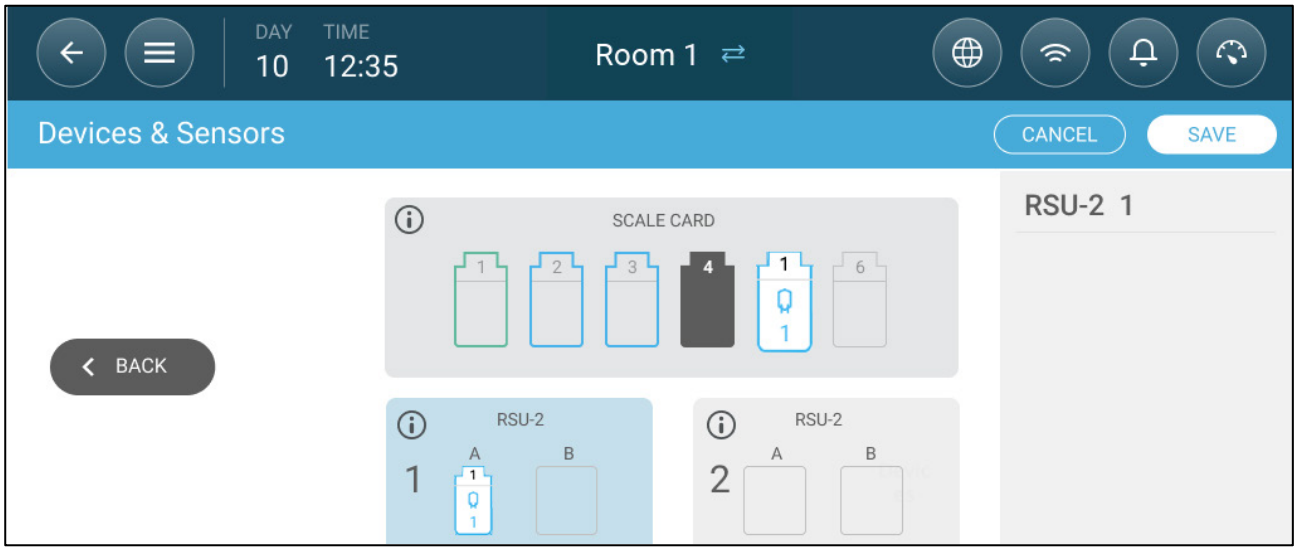
The weight should appear on the screen and the A2D level should rise.

7.4.2 DEFINING THE RSU

The following section details how to define up to two RSU units connected to the Trio (optional). For detailed information on using the RSU, refer to the product manual.

➲ **Wire the RSU to the Trio as shown in Figure 33, page 32.**

1. Reset the Trio, as shown in General Settings › About.
2. Go to Device & Sensors › Installation › Scale.



3. Click the RSU icon.
4. Click Calibrate.

Follow the instructions given in Configuring the Silo Scale, page 73.

7.5 TRIO RPS

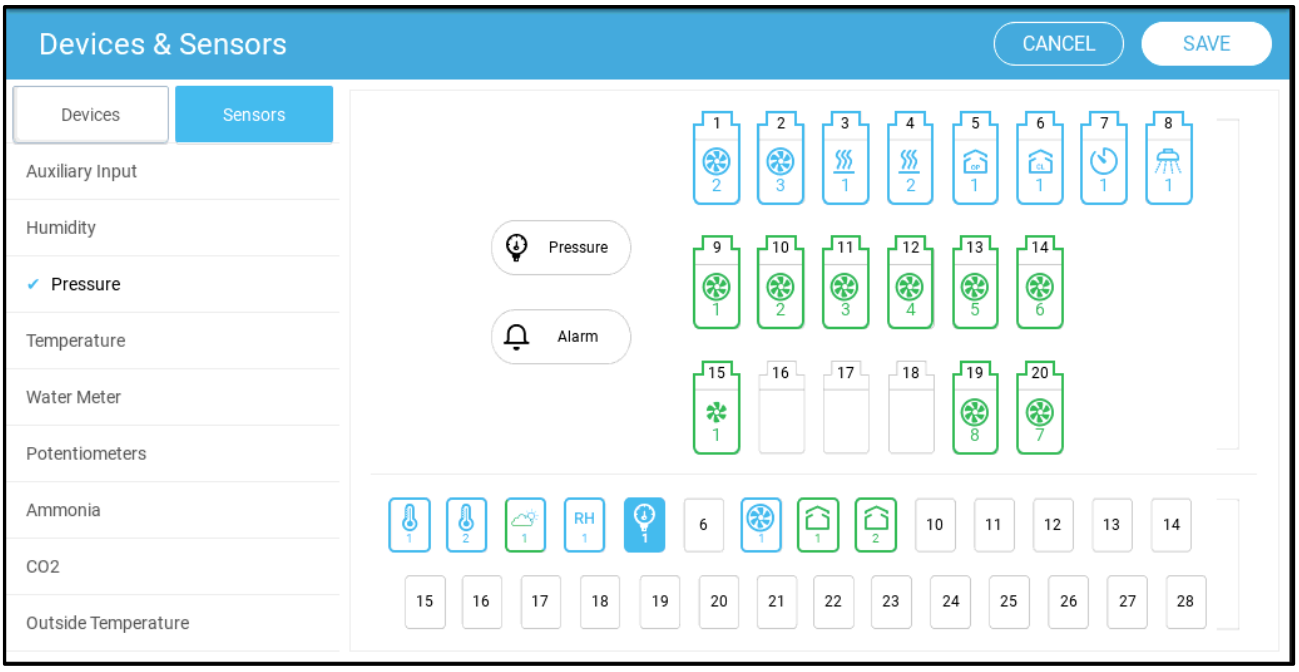
- Define the Sensor
- Static Pressure Calibration

7.5.1 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.

7.5.2 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 if the pressure changes! The sensor is sensitive and blowing air can cause irreparable damage.*

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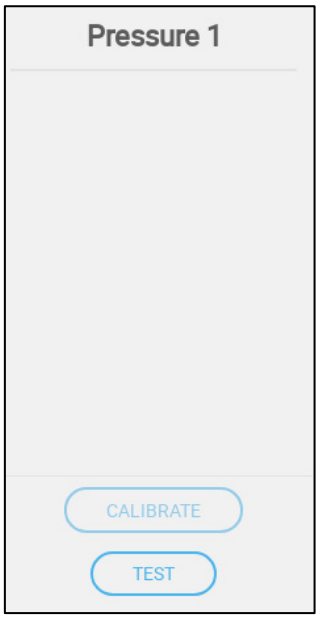
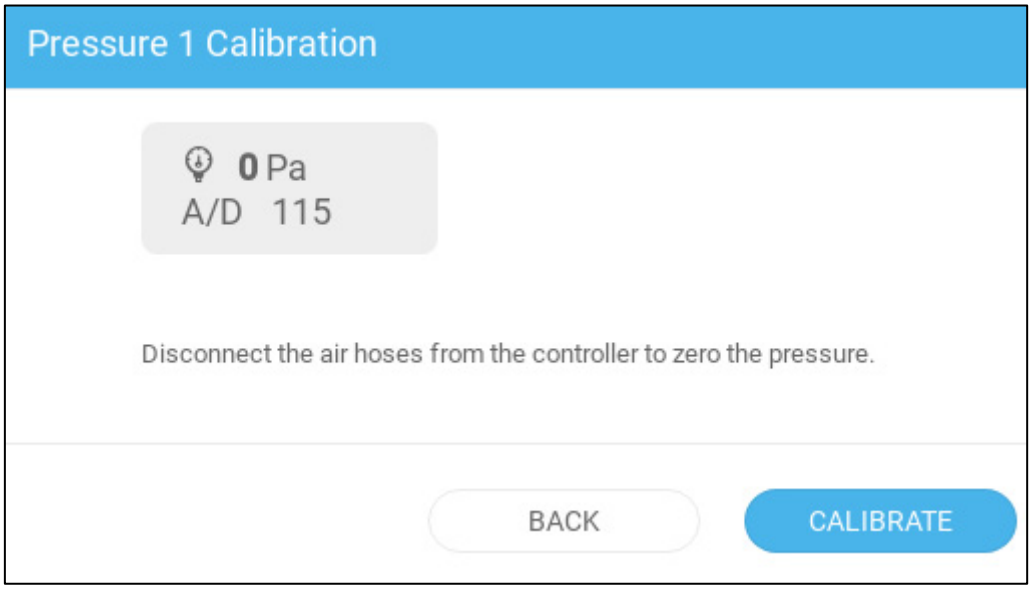
To calibrate the Static Pressure Sensor:

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.

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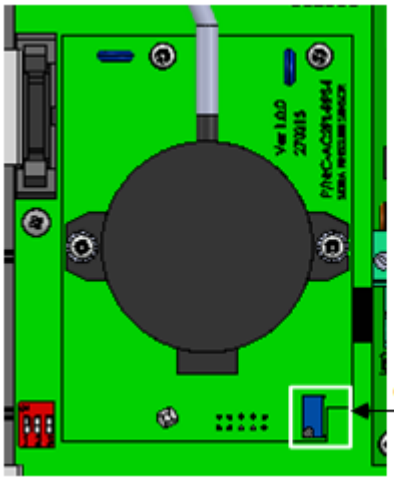


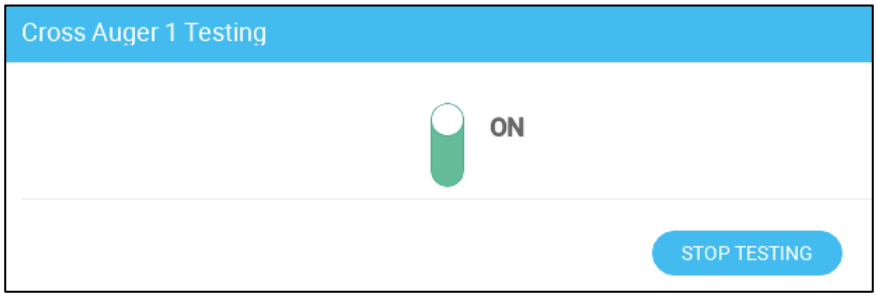
c. Adjust the zero-pressure reading to approximately 100 by turning the calibration screw.

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

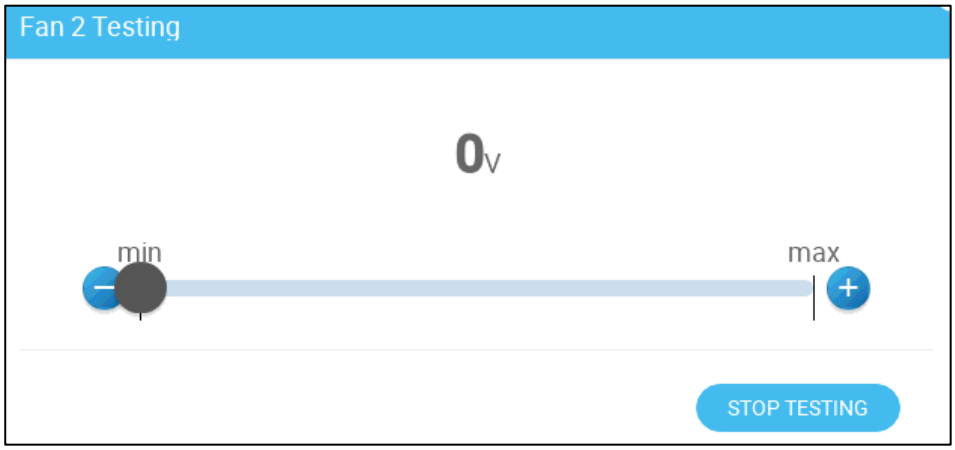
7.6 Testing Devices

After mapping a device, Trio provides a testing function that enables checking the device's performance.

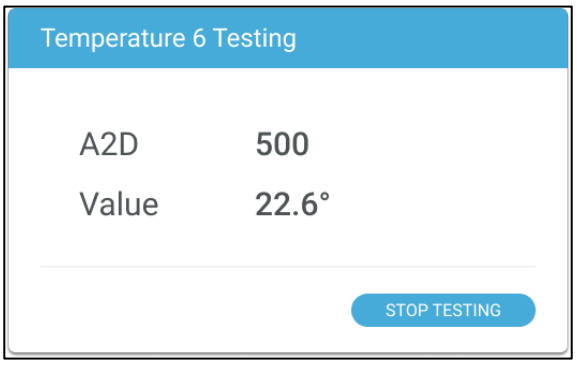
- Relay devices: Click Test › On to ensure that the device turns on.

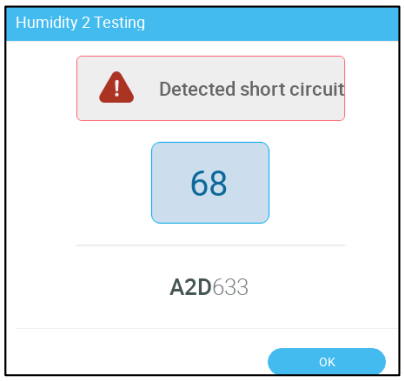


- Analog output devices: Click Test and move the voltage scale to ensure that the device operates at the proper minimum and maximum voltage levels.

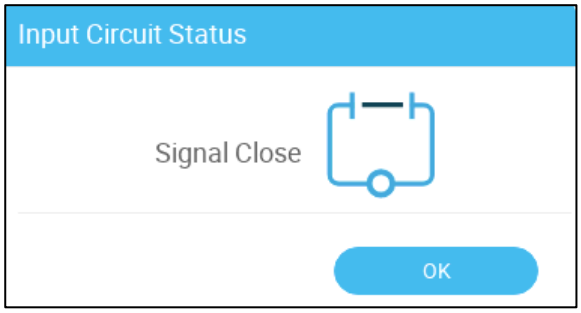


- Analog input devices: Click Test to view the current input results and A2D value. The test function also displays an error message when the input signal is weak or non-existent.





    - Acceptable ranges:
        - RTS-2: 200 – 600.
- Digital input devices: Click Test to view the current circuit status (signal close or signal open).



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8 Appendix A: External Device (Previous Versions)

Table 4: 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

Table 5: Sensors

Device type	Analog Sensors	Digital Sensors
Temperature Sensors	12	N/A
Humidity Sensors	2	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	4

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Device type	Analog Sensors	Digital Sensors
Gas Meters	N/A	3
Aux. Input	N/A	4
Feeder Line Sensor	N/A	1
Measuring Fan	N/A	1

Table 6: Trio 20 Swine STD – R4

	Output			Measurements	
Devices/Sensors	Total	Relay	0-10V	Analog	Digital
Cooling	2	2			
Heaters	6	6	6		
Inlets	2	2	2		
Outlets	1	NA	1		
Tunnel Doors/Curtains	2	2	2		
Fans Exhaust/Tunnel	20	20	8		
Stir Fan	1	1	NA		
Sprinkler	1	1			
Timer	5	5			
Feeder	1	1			
As Relay	30	30	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					2
Gas Meter					2
Water Meters					1
Aux. Input					4
Feeder Line Sensor					1

Table 7: 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		

	Output			Measurements	
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 8: **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	

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	Output			Measurements	
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

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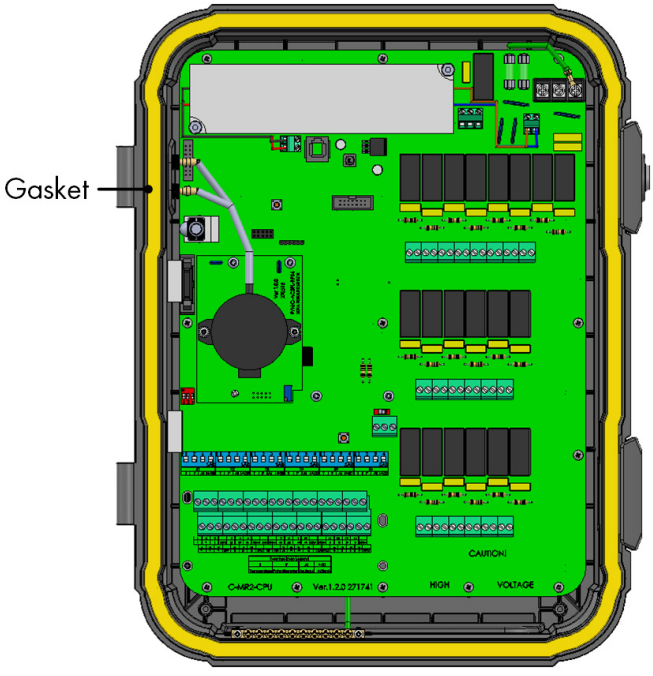
9 Appendix B: Service Manual

- Maintenance
- Trouble Shooting
- Spare Parts

9.1 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.	

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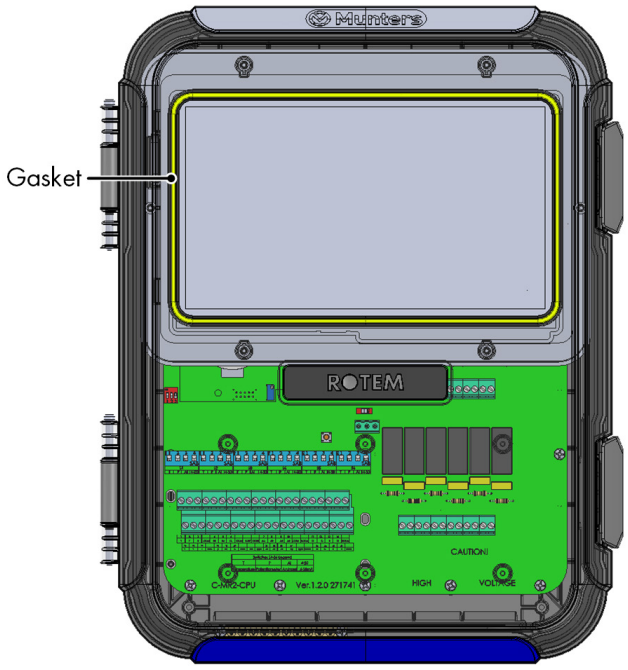
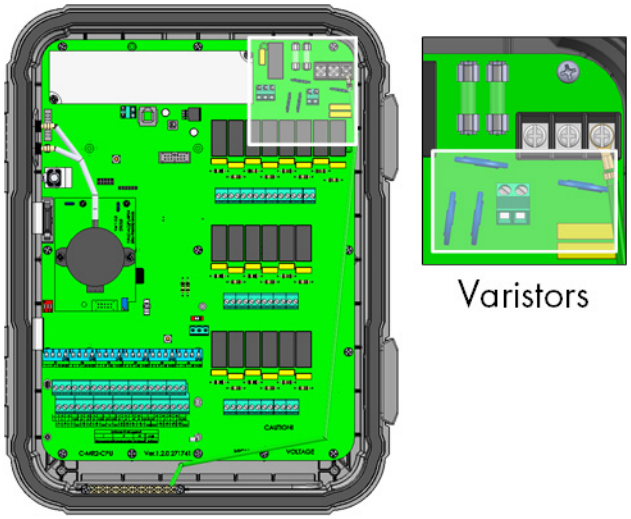
• Check that the gasket around the touch screen is not cracked.	
• Look for any signs of burns or browning around the varistors.	
• Inspect the shield wiring and main grounding cable; ensure that they are properly connected to the proper ports.	

9.2 Trouble Shooting

- Internet
- Electronic Components

9.2.1 INTERNET

The following section describes how to trouble shoot internet problems. If 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.

9.2.2 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.

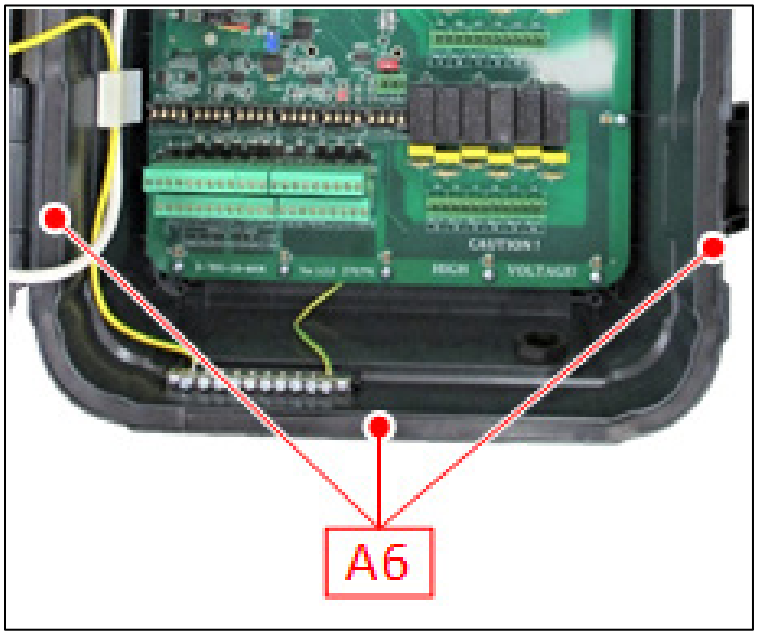
9.3 Spare Parts

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

9.3.1 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

9.3.2 TRIO 20 CONTAINER SPARE PARTS



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

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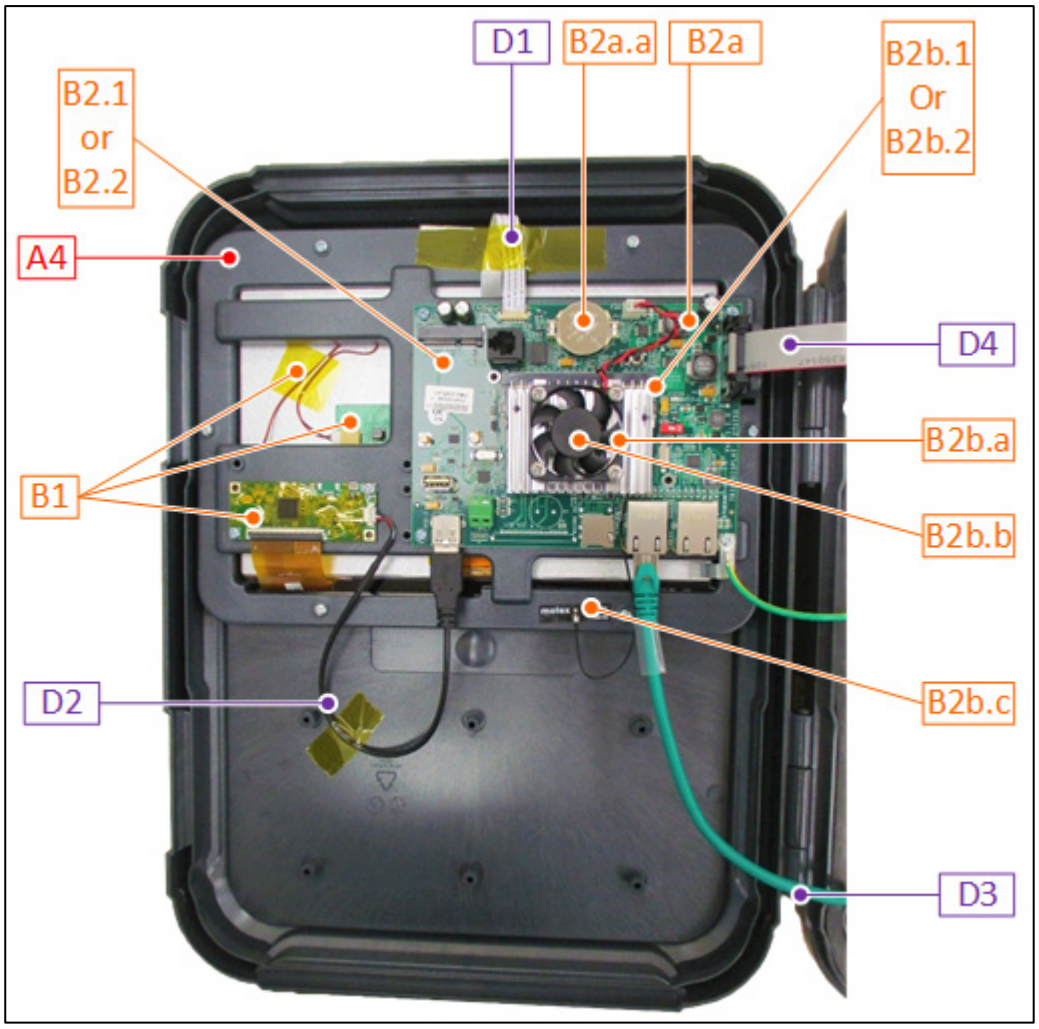
9.3.3 TRIO 20 DOOR CARDS SPARE PARTS



© Munters AB, 2020

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:

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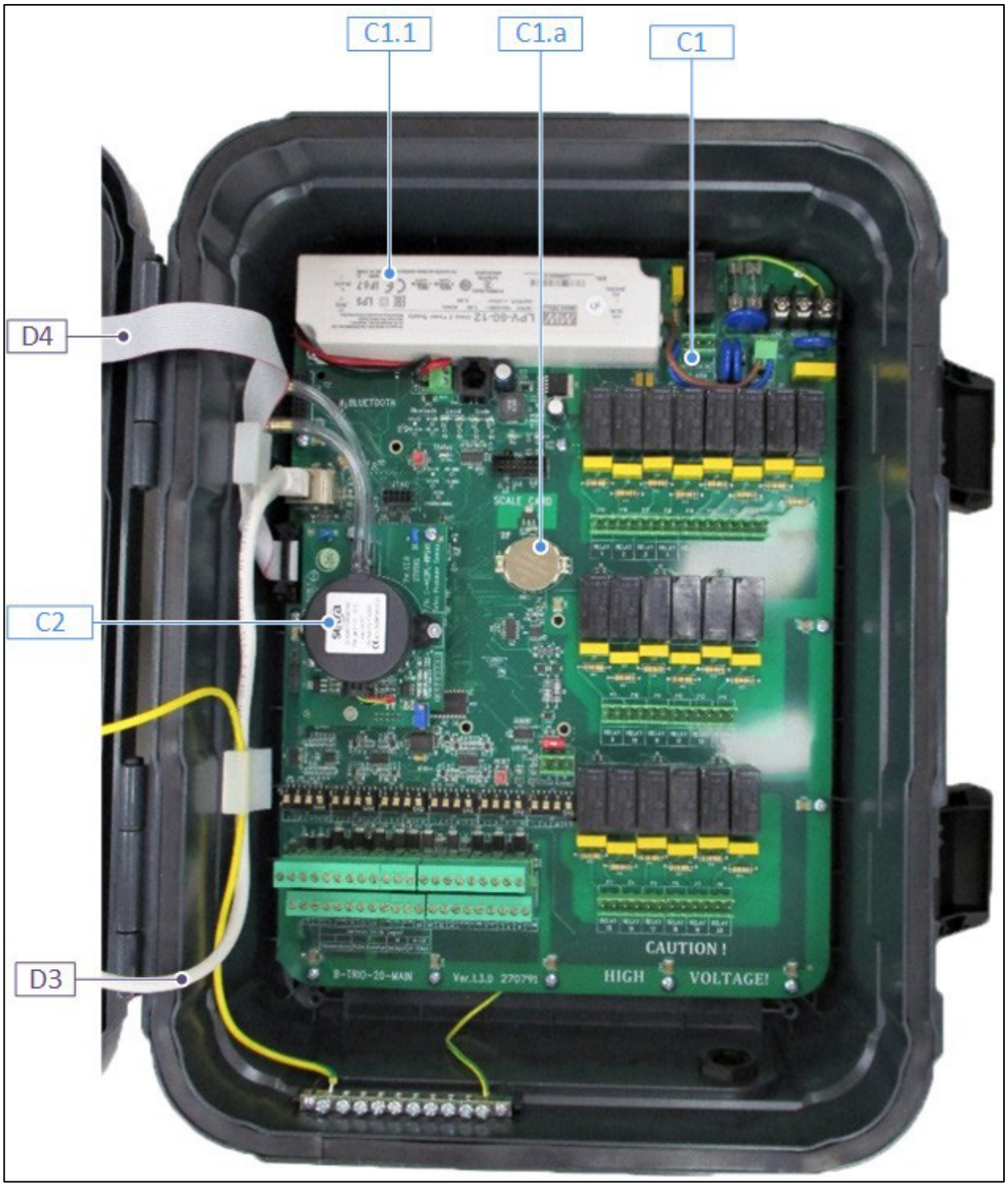
9.3.4 TRIO 20 MAIN CONTAINER SPARE PARTS



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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:

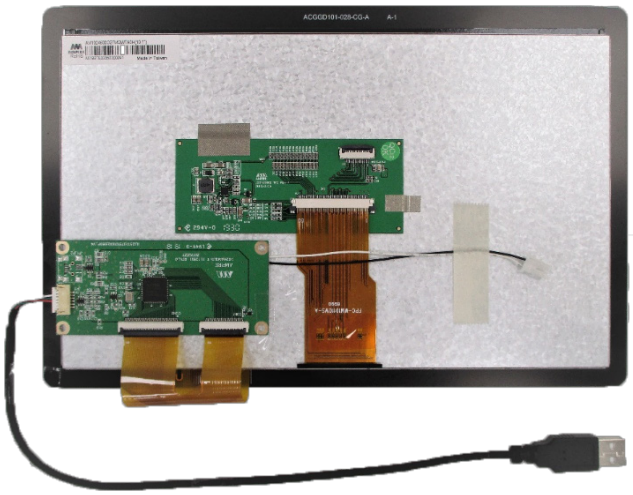
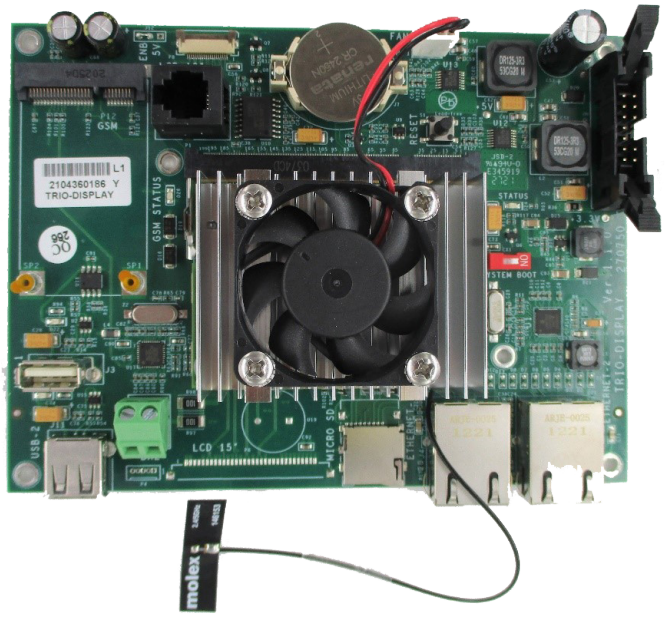
9.3.5 ADDITIONAL OPTIONS

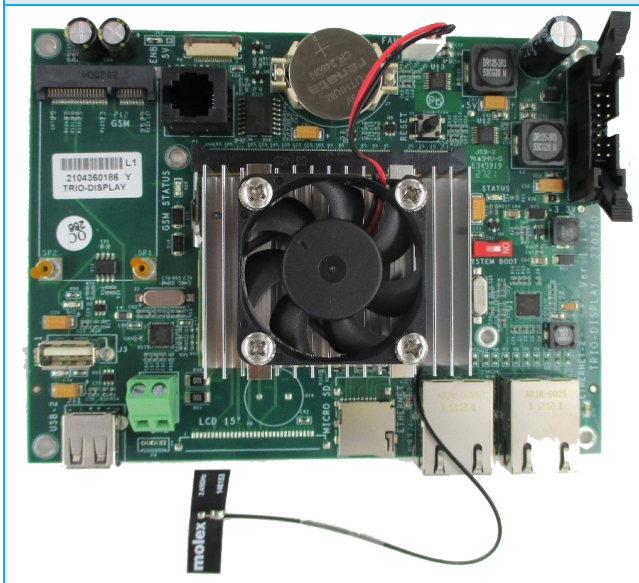
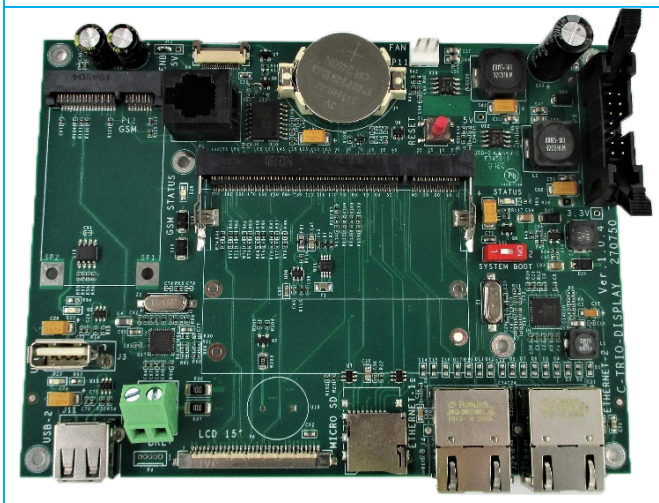
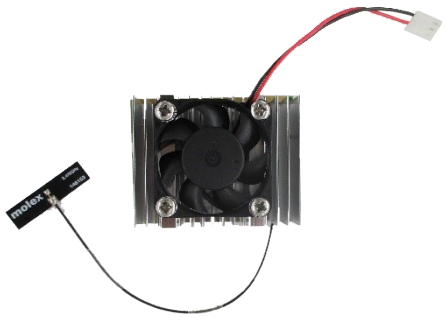
ID No.	Description	Order CatalogNumber
ADO 1	TEMPERATURE SENSOR BLACK-RTS-2-POU	MPN: 918-01-00001
		DPN:
ADO 2	HUMIDITY SENSOR-RHS-POU-ROT-SE-10PL	MPN: 917-02-00003
		DPN:
ADO 3	STATIC PRESSURE SET - AC3G/SE/PL/TRIO - PIG	MPN: 901-99-00028
		DPN:
ADO 3.a	TUBES AND FILTERS FOR RPS (NO RPS CARD)	MPN: 999-99-00503
		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:

9.3.6 CARDS

- Door Cards
- Main Container Cards

9.3.6.1 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

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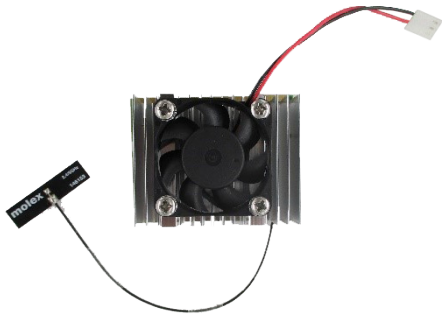
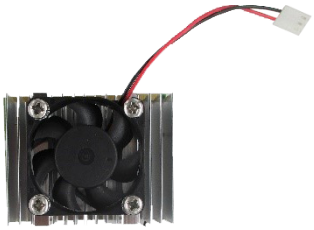
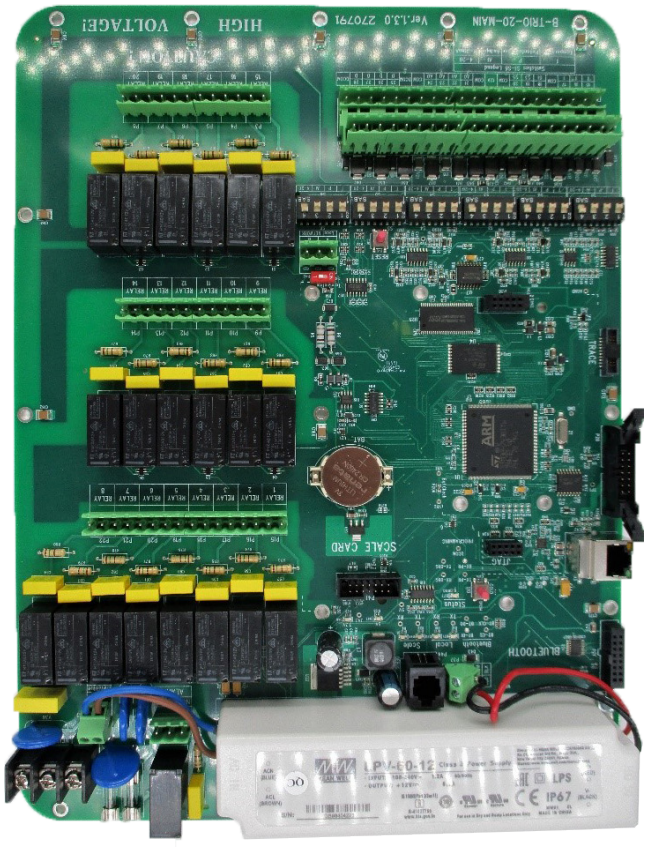
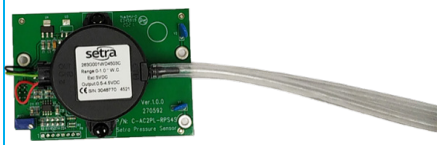
Card	Description	Munters Ordering Number
	TRIO 20 -PIG-CN- SOM VARISCITE CARD WITH HEATSINK AND FAN NOTE: CHINA ONLY	940-99-00042
	TRIO 20 HEATSINK AND FAN FOR SOM CARD	940-99-00026
	204152: FAN FOR SOM CARD HEATSINK	940-99-00025
	491009: ANTENNA WI-FI MOLEX 1461530150 15cm CABLE, U.FL/I-PEX MHF	940-99-00035

9.3.6.2 Main Container Cards

Card	Description	Munters Ordering Number
	R-TRIO-20-MAIN: MUNTERS ROTEM MIDDLE 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

10 Appendix C: TRIO Expansion 10

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

10.1 Expansion Layout

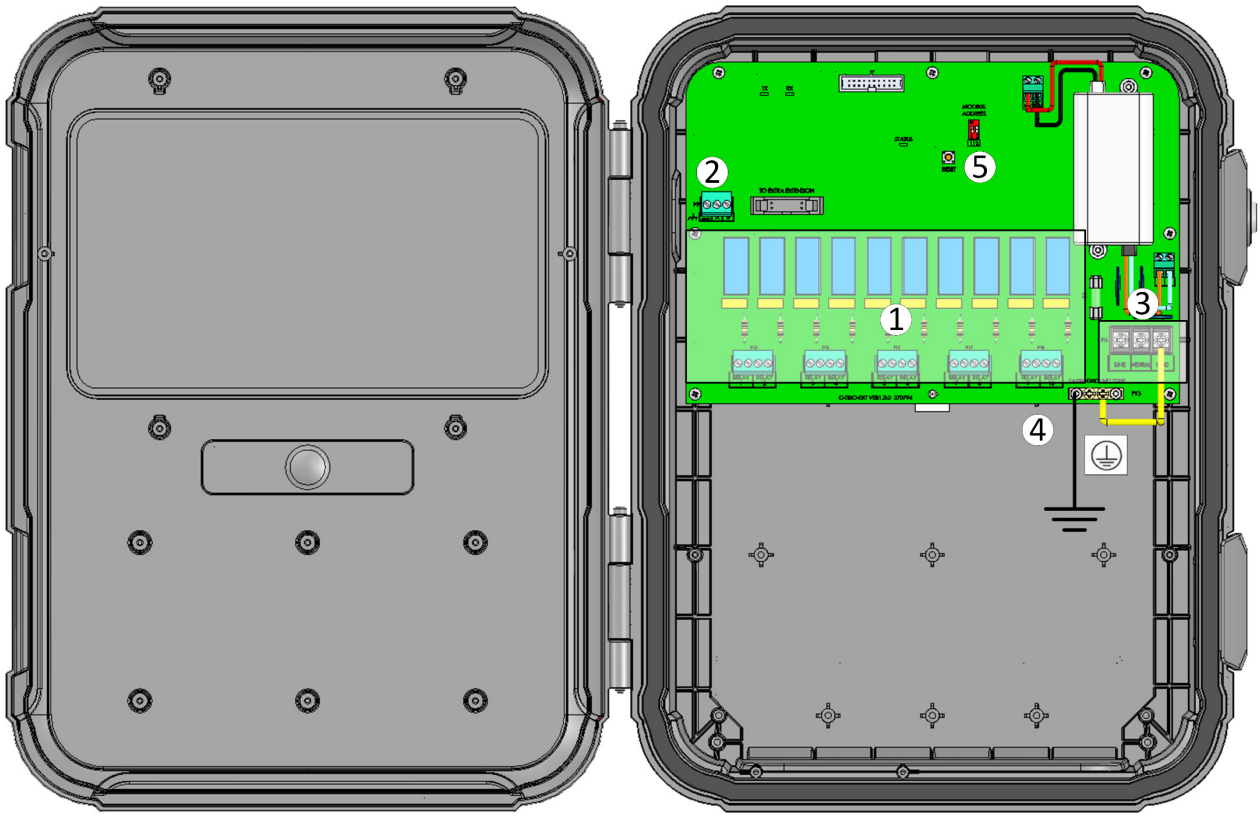


Figure 38: Board layout

1	10 relays
2	RS-485 ports
3	Power ports
4	Ground strip
5	Address dipswitch (refer to Address, page 104)

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10.2 Expansion Wiring Diagrams

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

10.2.1 TRIO TO TRIO EXPANSION WIRING

Connecting the Trio to its Expansion Unit consists of three steps:

- Wiring
- Address
- Restart

10.2.1.1Wiring

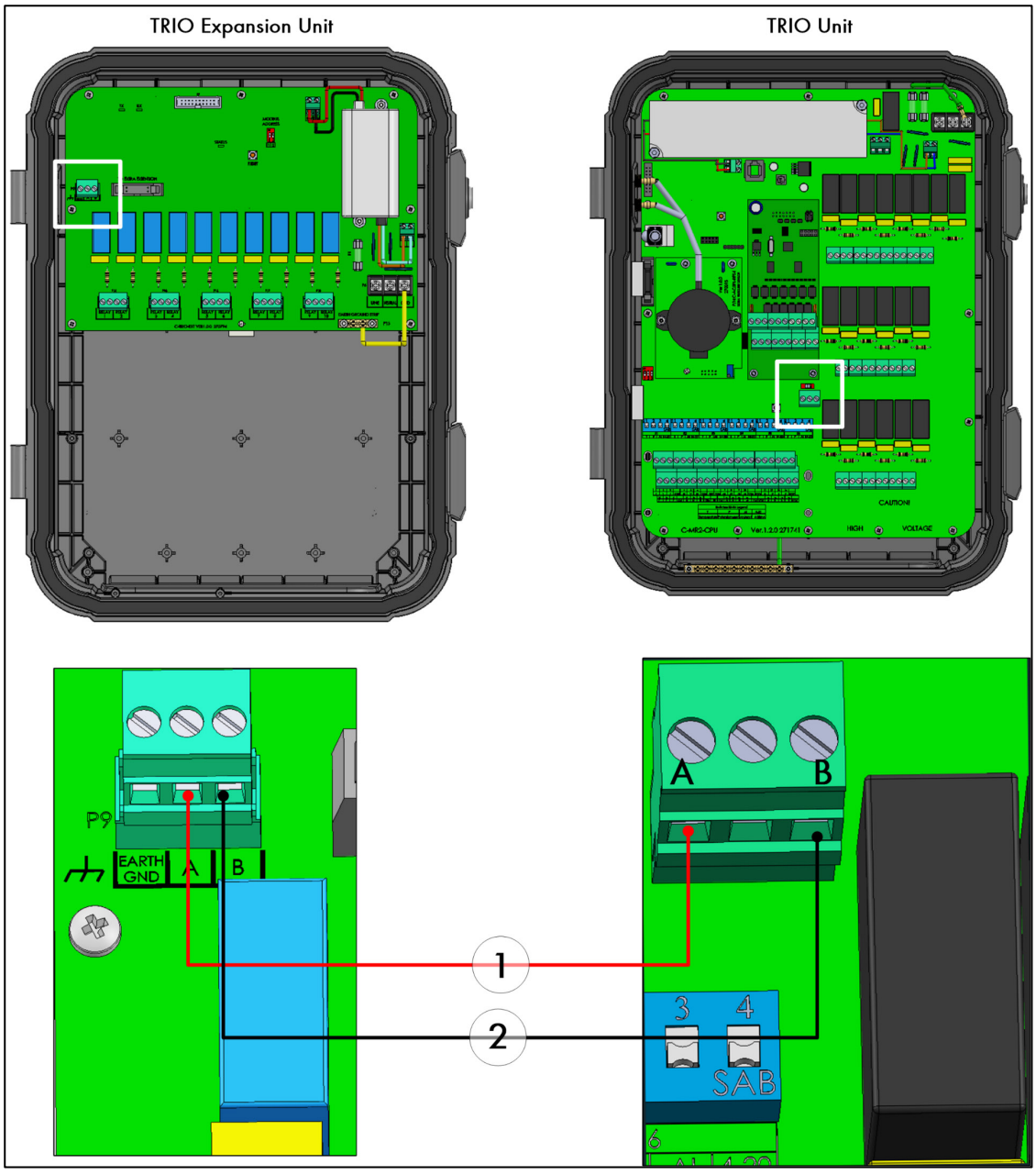

Figure 39: Wiring diagram

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- 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

10.2.1.2 Address

The Trio can support one expansion unit. Verify that both dipswitches in the Modbus Address are set to **ON**.

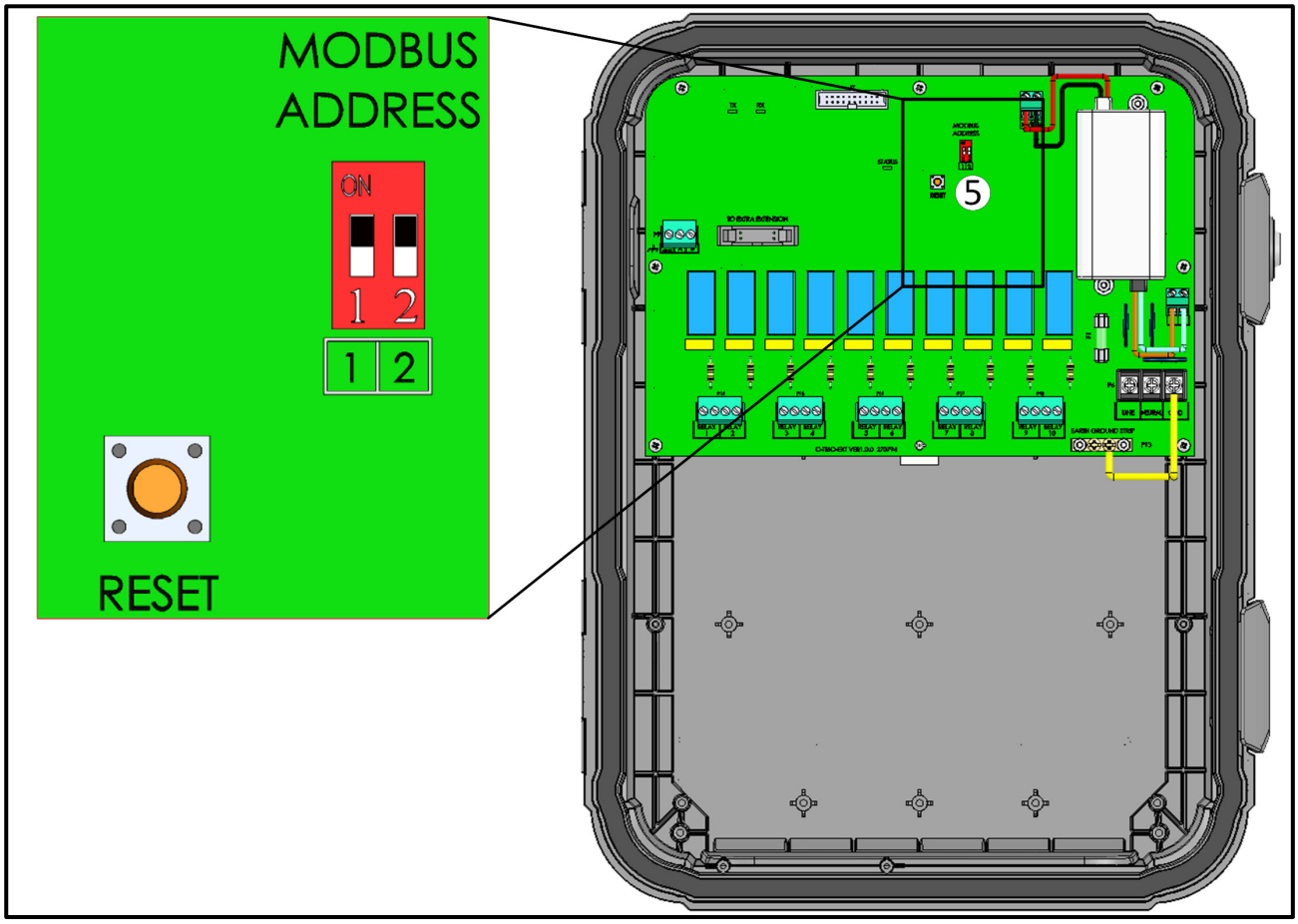

Figure 40: Expansion Address

10.2.1.3 Restart

After connecting the units and verifying the Modbus address, reset the factory settings.

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

.
3. Follow the on-line instructions. You have the option of backing up the settings. Refer to the User Manual for more information.

10.2.2 HIGH VOLTAGE RELAYS

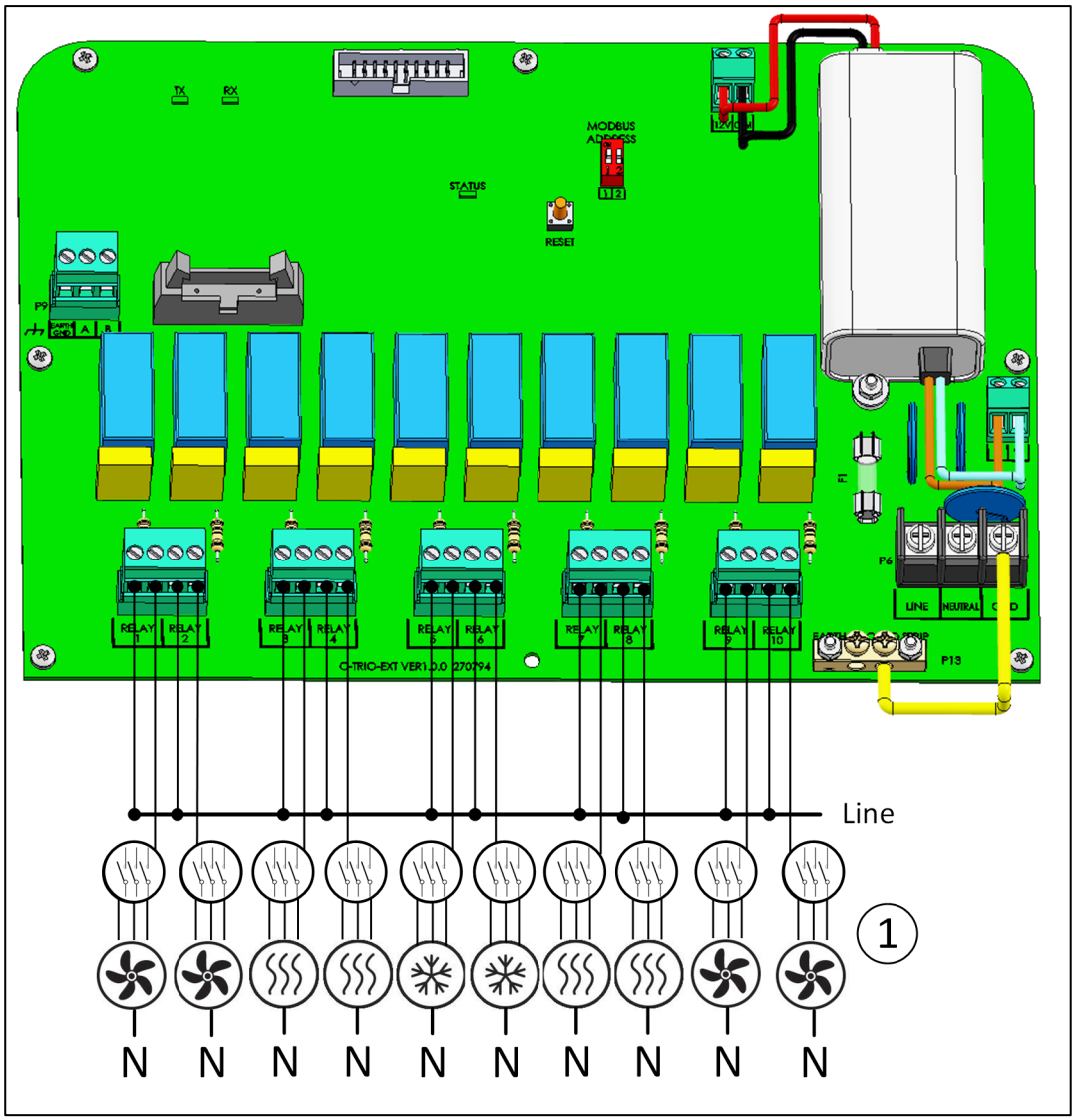

Figure 41: High voltage devices (examples)

1	Example of devices

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

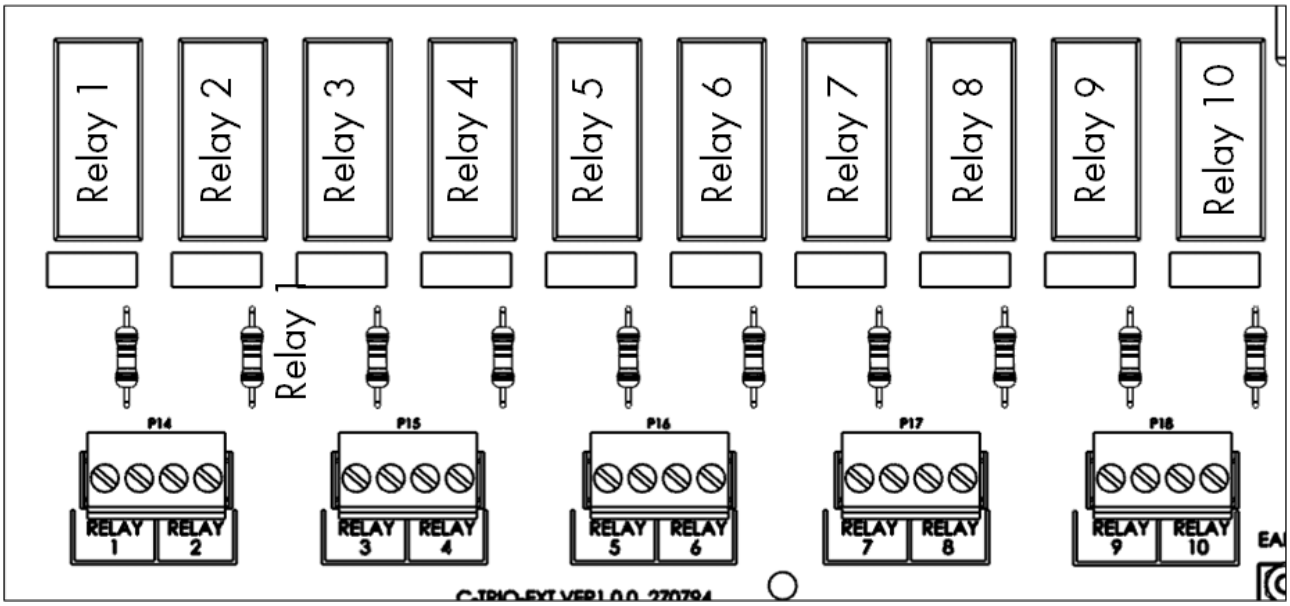

Figure 42: Relay and port numbering

10.2.3 POWER

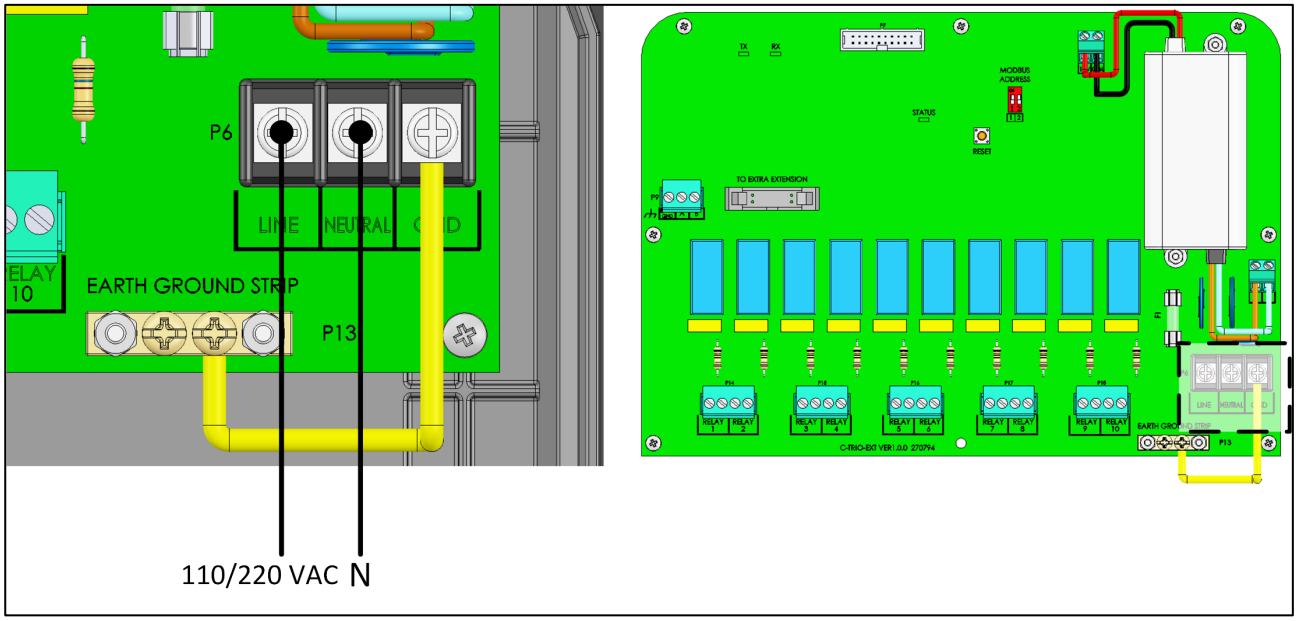

Figure 43: Power ports

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10.3 Key

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

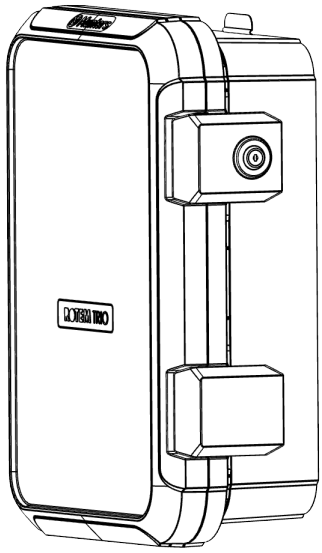


Figure 44: Expansion Unit Lock

10.4 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.*

10.5 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

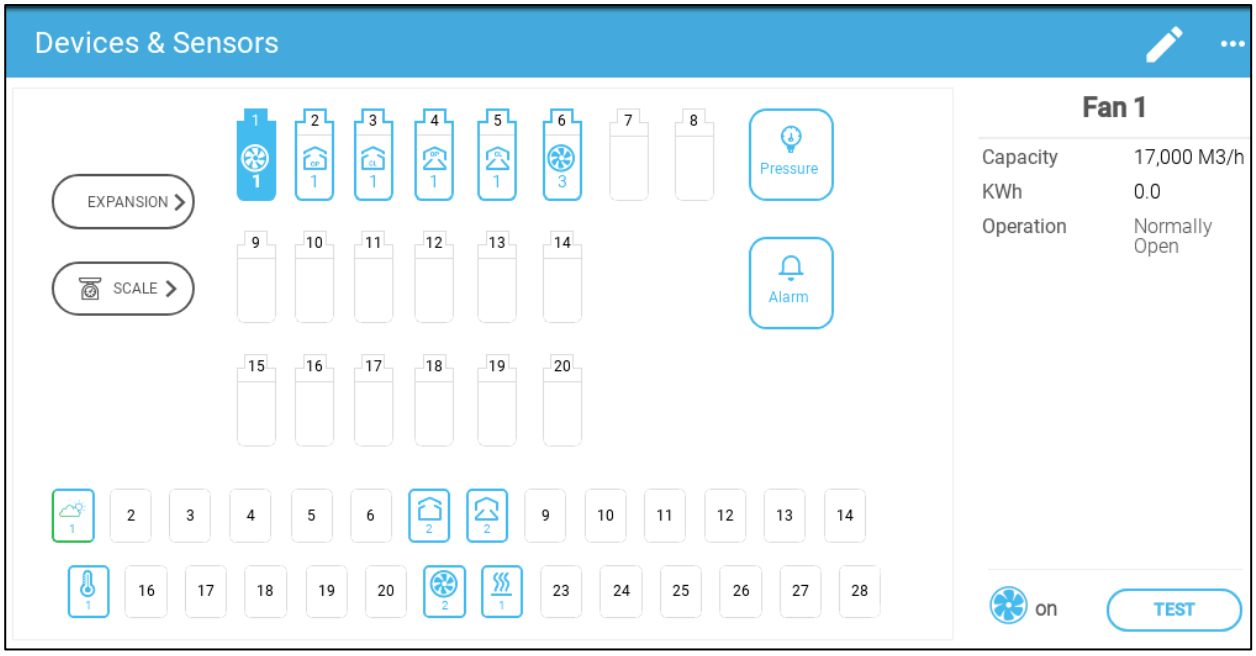
. Follow the online instructions. TRIO will not recognize the Expansion until this step is performed.

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.

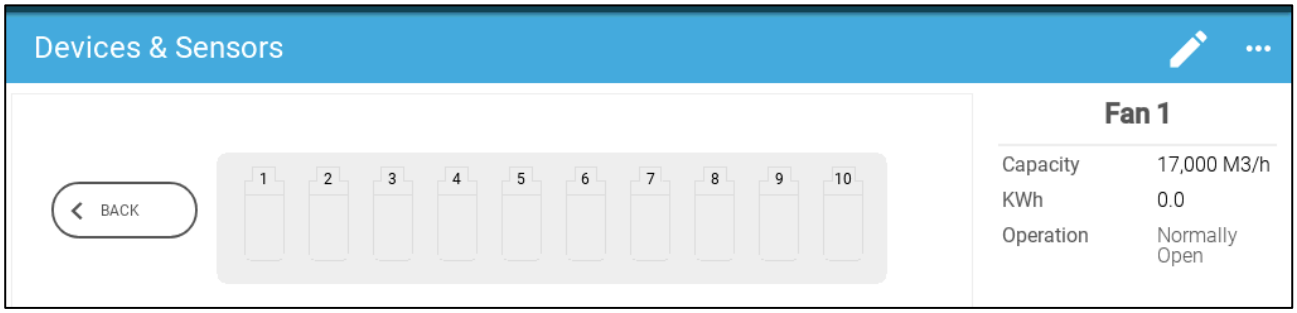
CAUTION *Mapping MUST match the physical wiring! An error message appears if the physical device is not wired to the relay or port as defined on the mapping screen..*

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 Using the Mapping , page 47 for more information.

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10.6 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.

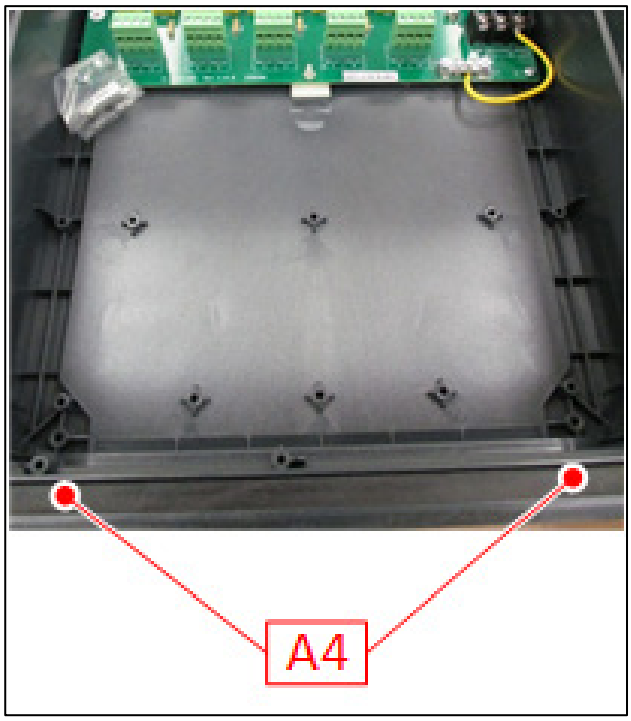
10.7 Expansion Spare Parts

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

10.7.1 PRELIMINARY INFORMATION

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

10.7.2TRIO 10 EXPANSION CONTAINER SPARE PARTS



ID No.	Description	Order Catalog Number
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	TRIO-20 PLASTIC BLUE PANEL (MUNTERS LOGO)	MPN: 940-99-00001
		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:

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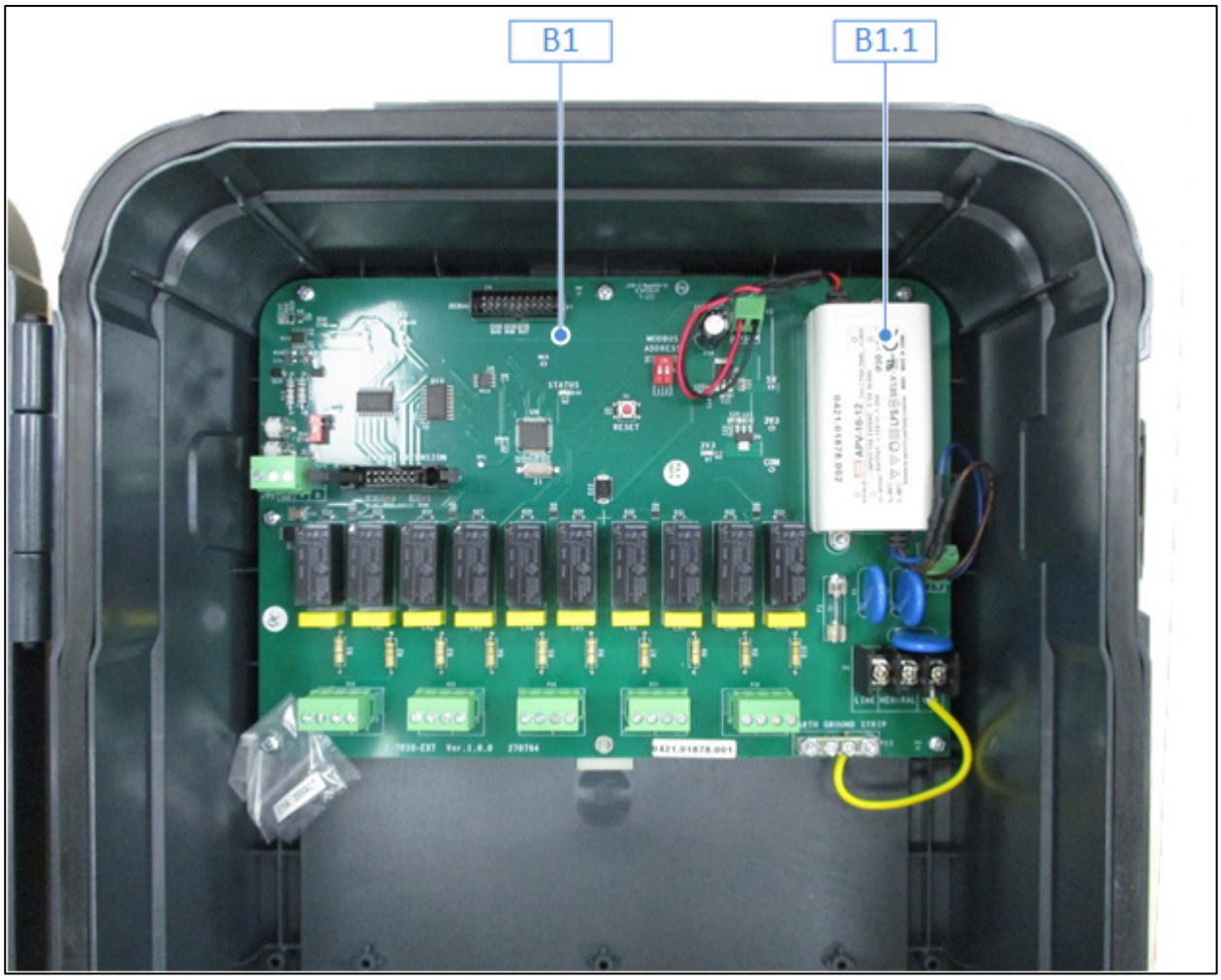
10.7.3TRIO 10 EXPANSION MAIN CONTAINER SPARE PARTS



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:

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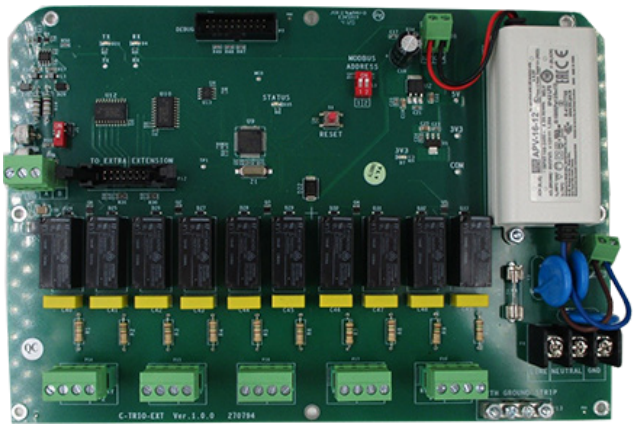
10.7.4 Main Container Card Spare Parts

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

11 Appendix D: LAN Cable Information

11.1 Wire/Optical Ethernet Infrastructure Basics

- Wire Ethernet 1100/1000 BaseT Copper
  - Media – CAT5E or CAT6 Cable with maximum segment length of 100 meters
- Optical Ethernet 1000Base-X Optical
  - 1000Base-SX Media – Short Haul multi-mode optic fiber (MMF) with maximum segment length of 220 meters (62.5/125µm type) or 550 meters (50/125µm type)
  - 1000Base-LX Media – Long Haul single-mode optic fiber (SMF) with maximum segment length of 10000 meters
- Connectivity
  - Connectivity is Point-to-Point using 100/1000 Switches
  - Low latency network
- Equipment
  - Wire Switch serves for Ethernet switching over wire connectivity
    - Could be with preinstalled specific Optic Transceiver (short or long haul)
    - Could be with the SFP port, serving for pluggable SFP Optic Transceiver
  - SFP Transceiver pluggable device serving to transmit data over optic fiber
    - 1000Base-SX SFP serves for multi-mode optic fiber (MMF) of 62.5/125µm type or 50/125µm type
    - 1000Base-LX SFP serves for single-mode optic fiber (SMF)
  - Media Converters server for converting from optics to wire and vice versa. This is used for segments over 100 meters / 330 feet.

11.2 Trio Connectivity: 100/1000Gbps Ethernet Switch

- The switch is wired to the router and modem to access the Internet.
- Switches can be wired to each other by Ethernet cables, each one splitting off to other devices.
- Gigabit switches support 100 and 1,000 Mbps.

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12 Warranty

Warranty and technical assistance

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

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

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

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

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

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

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

- dismantling the safety devices;

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

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

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

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

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

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

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

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