Manual for use and maintenance

Element
Controller

Element

Climate Controller

Ag/MIS/UMGB-2439-02/17 Rev 1.1
P/N: 116584

Element

Manual for use and maintenance

Rev 1.1 09/2019

Ag/MIS/UMGB-2439-02/17 Rev 1.3 (MIS)

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

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

Table of Contents

1 Introduction

1.1 Disclaimer

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

1.2 Introduction

Congratulations on your excellent choice of purchasing an Element 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 fan, 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 2018

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

2 Precautions

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

2.1 Grounding

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

2.2 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.

2.3 Filtering

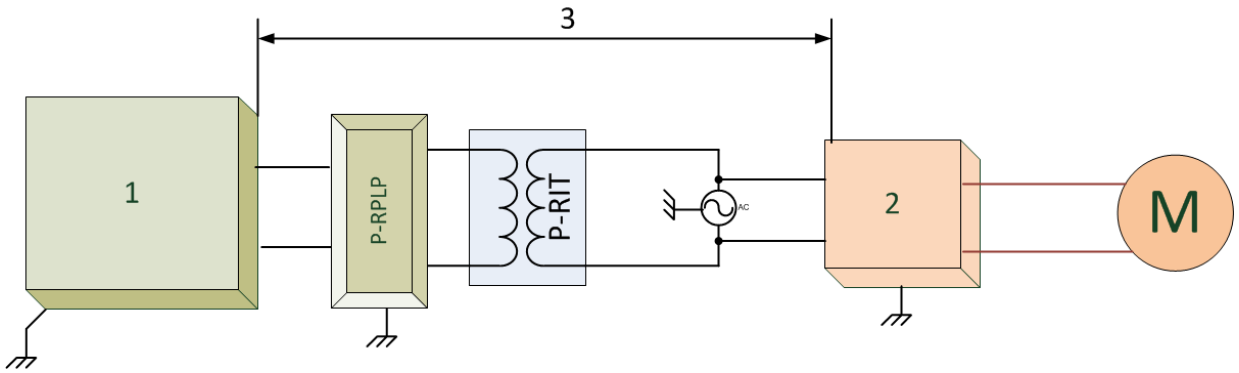
If this installation includes a power inverter to drive variable speed fans, install an EMI filter in front of the inverter, according to the specifications provided by the inverter manufacturer. Refer to the inverter documentation.

2.4 Frequency Inverters

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

In particular, verify:

- that the cable shielding between the inverter and any motor meets industry standards
- proper grounding of the inverter's chassis and motor power cable
- proper grounding of low voltage cable shield wire
- that the controller and inverter cables are kept in separate conduits or wire bundles



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

3 Introduction to the Element

The following section provides an introduction to the Element Controller units.

- General Description
- Components
- Environmental Protection

3.1 General Description

Element is a standalone controller for swine barns. Employing a new hardware package, all programming and relay connections can be carried out from a single controller. As an option, users can install extension units.

Element's color screen and software package enables convenient configuration. Real time alarms are provided 24/7. Element supports a range of analog and digital devices.

3.1.1 Features

- Easy programming
- Graphic user interface screens
- USB data port
- Extensive history of events & alarms
- Real time visual outlook
- Relay, potentiometer, and 0 – 10 volt control over devices
- Swift device and feature selection
- Large numeric keypad
- Data collection
- PC communication

3.1.2 Capabilities

- Minimum Ventilation
- Ventilation
- Static Pressure Ventilation
- Inlet and Curtain Control
- Humidity Treatment
- Heating
- Cooling
- Alarm Management

3.2 Components

- Element
- Extension Box (optional)
- Comm-Box and Communicator / Communicator 2 (optional)

The following diagrams illustrate sample Element – Extension networks.

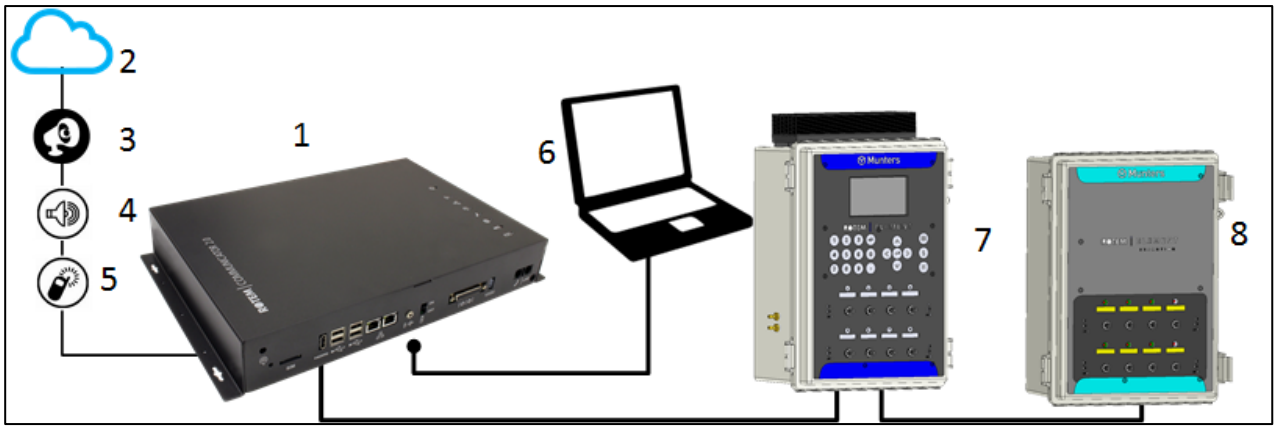


Figure 1: Element – Extension – Communicator 2 Network

Figure 1 key			
1	Communicator 2	5	Cell messages
2	Internet access	6	PC
3	Alarms	7	Element
4	Voice messages	8	Extension Unit (up to three)

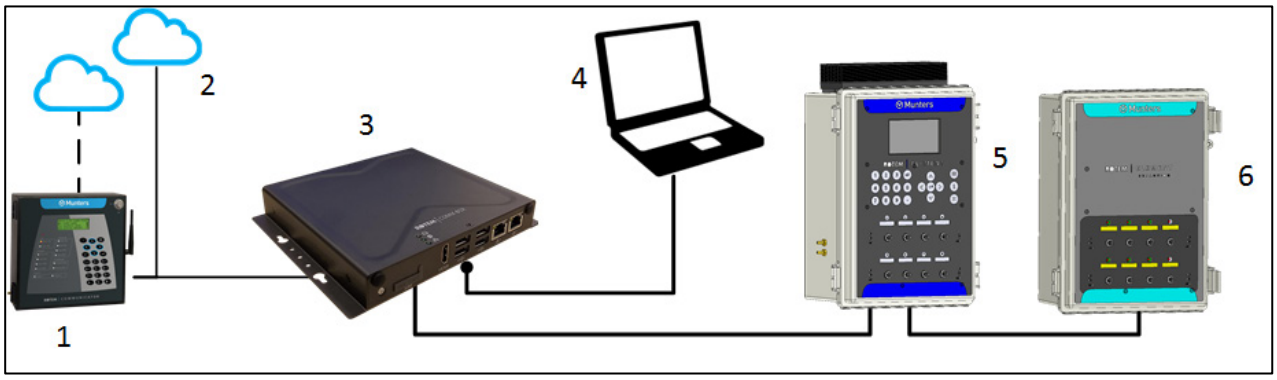


Figure 2: Element – Extension – Comm-Box Network

Figure 2 key			
1	Communicator (option)	4	PC
2	Internet access	5	Element unit
3	Comm-Box unit	6	Extension Units (up to three)

3.3 Environmental Protection

Recycle raw materials instead of disposing as waste. The controller, accessories and packaging should be sorted for environmental-friendly recycling. The plastic components are labeled for categorized recycling.

4 Element Interface

- Key Board
- Main Screen
- Front Switches
- Main Menu

4.1 Key Board

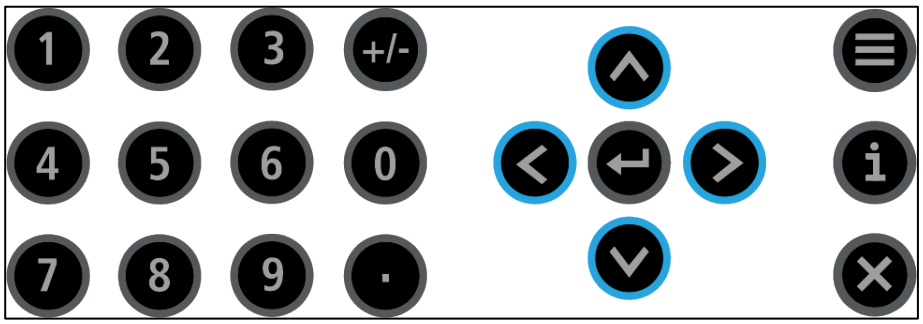
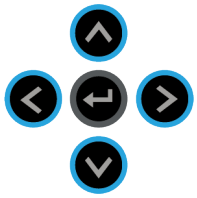
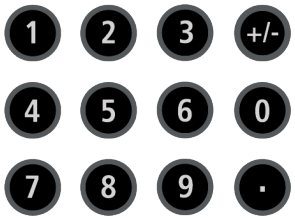


Table 1: Keyboard Functions

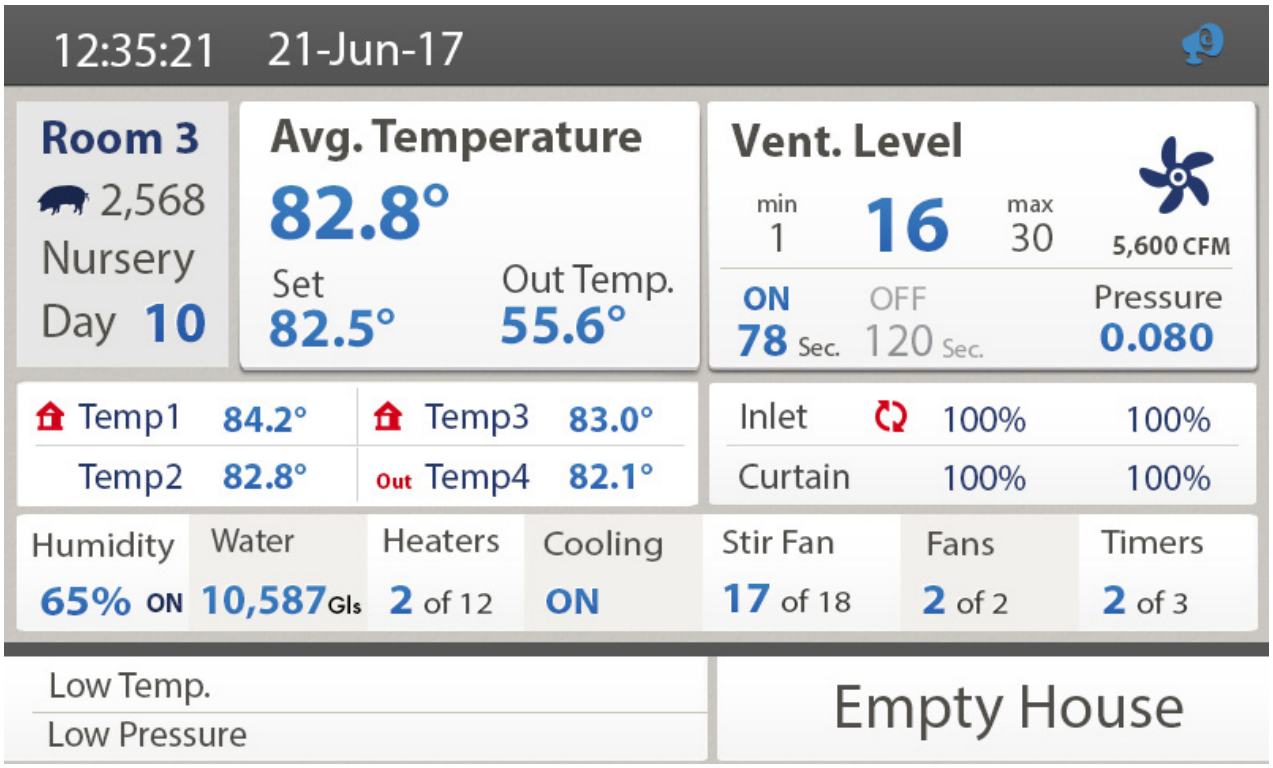
	Menu	Press this button to go to the Element menus (refer to Main Menu, page 14).
	Arrows	Press arrow keys to navigate through the windows.
	+/-	Press the +/- key to switch between options (for example ventilation cycle options).
	Enter	Press Enter to confirm entries (for example, after changing a growth date, press Enter) and to access menu items.
	Numeric Pad	Press Number keys to enter numerical data.

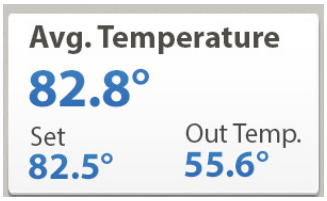
Delete The 'Delete' key erases typing mistakes.

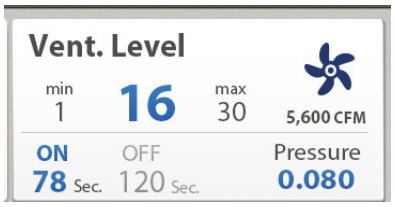
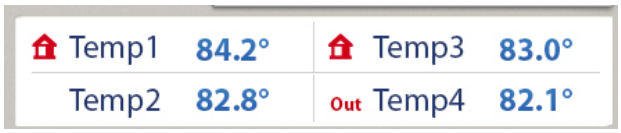
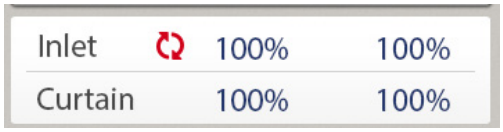
Help Press Help to go to the Set windows. Set windows display additional parameters used to "fine tune" a function.

NOTE Only selected functions have Set parameters.

- Main Screen



Screen area	Graphic	Description
Room		This screen displays the room number, Element mode (for example Hog), and the growth day. *NOTE The mode is TBD.*
Temperature data		This screen displays the average temperature (last 24 hours), the current temperature, and the outside temperature. *NOTE The outside temperature appears on if a temperature sensor is designated to measure the outside temperature.*

Screen area	Graphic	Description
Vent data		The vent screen shows the current ventilation level, the lowest and highest possible level of ventilation, the maximum amount of air supplied by the fans, the amount of time (in seconds) until the ventilation cycle switches on or off, and the current static pressure.
Temperature sensor		This screen displays the current temperature reading of active sensors. A house symbol means that this sensor's data is used to calculate ventilation data.
Curtain/Inlet		This screen displays the current position of the houses curtains and inlets.
Sensor/ Relay Devices		This screen displays: • The current humidity level • Total number of gallons • Number of defined heaters that are operating • Cooling status • Number of defined stir fans that are operating • Number of defined fan that are operating • Number of defined timers that are operating
Alarms		This screen displays any current alarms.

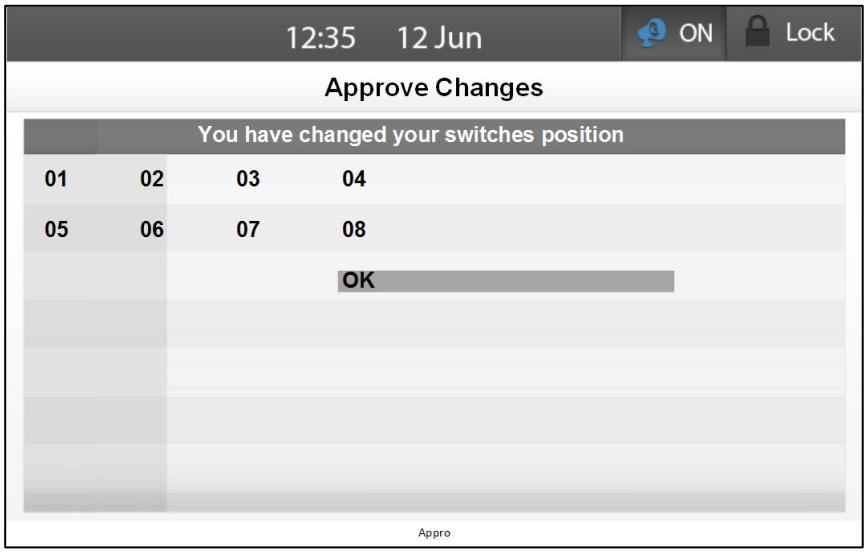
CAUTION *In case of an alarm, a blinking message appears on the main screen in addition to the siren. Resetting the alarm is possible, but it only stops the siren and not the screen message. To stop the message, the problem must be addressed.*

NOTE If communication is off, Element does not accumulate history data.

4.2 Front Switches

- On the front panel are eight relay toggle switches. These switches set the relay control to On, Off, and Auto. When you change the position of a switch, a screen appears. The toggle switched moved is outlined.
  - Press **Enter** to approve the position change.

- Move the switch back to its original position to cancel the change.



4.3 Main Menu

Table 2 and Table 3 detail the complete Element main menu structure. The menu has two levels.

1. Press the left/right arrow keys to scroll between menus.
2. Press Enter to use the menu's items.
3. To enter the second level, scroll to System Menu and press Enter.

Table 2: Menu (Level One)

Control	Management	History	System
Temperature Curve	Alarm Reset	Temperature	Levels of Ventilation
Min/Max Levels	Group Settings	Humidity	Calibration
Humidity	Alarm Settings	Water	Installation
Static Pressure	Animal Weight	Heaters	General
Heaters	Current Sense	Alarms	
Cooling	Save Settings	Events	
Timers	Load Settings		

Table 3: Menu (Level Two)

System			
Levels of Ventilation	**Calibration**	**Installation**	**General**
Ventilation levels	Temperature & Humidity	Relays	General Settings
Inlet & Curtain Levels	Static Pressure	Analog Sensors	About
	Water	Digital Sensors	
	Inlet & Curtain Opening/Closing Time	Analog Output	
		TRIAC	
		Temperature Definition	
		Inlet & Curtain Setup	
		Fan Air Capacity	

5 Unit installation

The following sections detail how to mount and wire the Element and define external devices.

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

- Mounting the Unit
- Wiring Diagrams
- Timers

5.1 Mounting the Unit

- Grounding and Shielded Wiring
- Installation and Electrical Connections

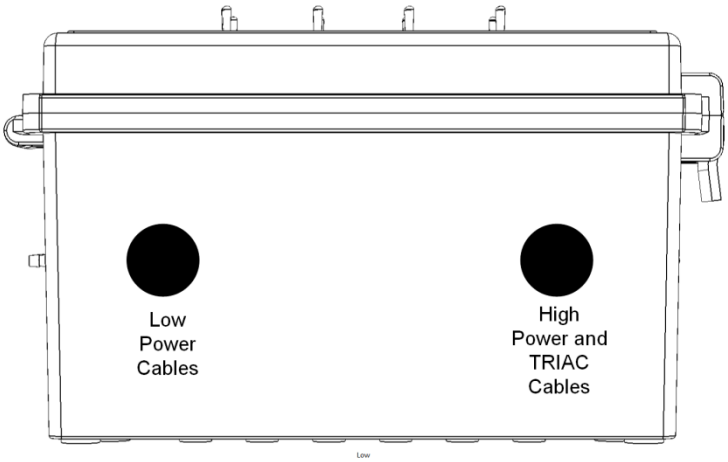
CAUTION *These units must be installed by an authorized electrician. Disconnect the power to avoid electrical shock and damage.*

CAUTION *To avoid exposing the controllers to harmful gases or high humidity, it is recommended to install it in the service room.*

NOTE Installation Category (Over voltage Category) II

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

1. Using the four supplied clips and screws, mount the Element.
2. Drill holes at bottom of the box and place cable holders.
3. Place the required cables through the cable holders at the bottom of the unit.



4. Close the Element enclosure lid carefully and tightly. Use RTV silicon or equivalent sealant to seal the cable holders.
5. After installation is completed, operate the Element for a few hours and re- check for proper operation.

5.1.1 Grounding and Shielded Wiring

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

5.1.2 Installation and Electrical Connections

- Install computerized electronic controls at least three feet (one meter) away from interference sources such as high voltage wiring to motors, variable speed, light dimmers, relays.
- Install electronic controls in a separate ventilated control room that is protected from extreme temperatures and dirty environments. Place the controls so that the operators can conveniently use the control and read indicators and displays.
- Keep low voltage wires separate from high voltage wires.
- Use shielded wiring for low level signals. For buried wiring (building to building runs) use high grade jell filled cables that are impervious to moisture.
- Seal cable entry points and control boxes to prevent contamination and corrosion. If you use silicon sealant with acetic acid cure, keep the control open and ventilated until cured. Otherwise, the acetic acid will attack the metal parts, including circuitry.
- Drill cable entry holes on the bottom of the box only.

5.2 Wiring Diagrams

- Element to Communicator 2
- Element to Element (Termination and 5V Setup)
- Element to Element Extensions
- Element to Relays
- Element to Outputs/Inputs
- Humidity and Temperature Sensors
- TRIAC Setup

5.2.1 Element to Communicator 2

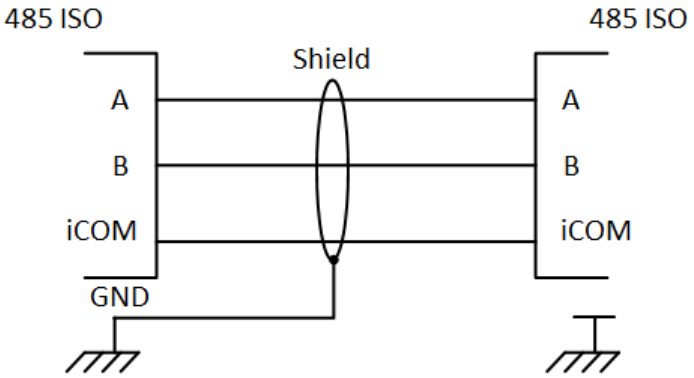


Figure 3: Communicator External Box – Daisy Chain

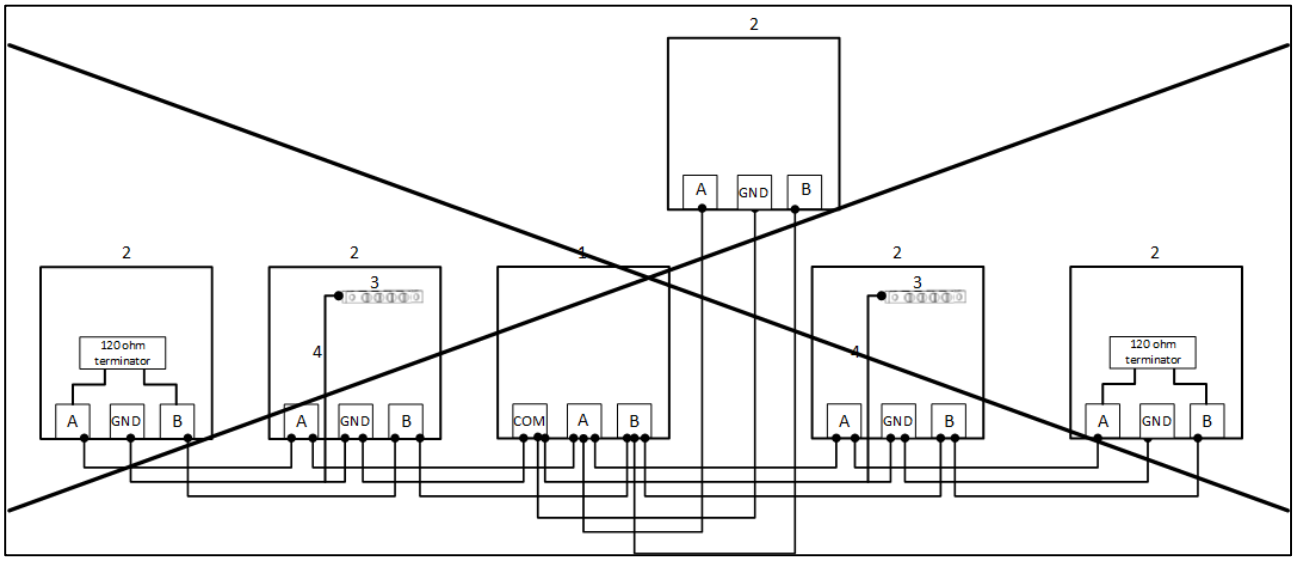


Figure 4: Star Configuration

CAUTION *Do not install the Element in a star configuration!*

5.2.2 Element to Element (Termination and 5V Setup)

The following section provides guidelines on how to set the RNET-485i Card and communication unit dipswitches.

- Termination
  - Termination is required in each chain, in the beginning and in the end units.
  - When the communication unit is a beginning or end unit, enable termination using the dipswitch.
  - When a controller or the communication unit is a beginning or end unit, install an Element has the same RS-485 card with DIP switches; simply define the switches.
- Always enable (5V) in the communication unit.

Below are two common topologies:

- Communicator External Box at one end / controller at one end
- Controllers on both ends with a Communicator External in the middle.

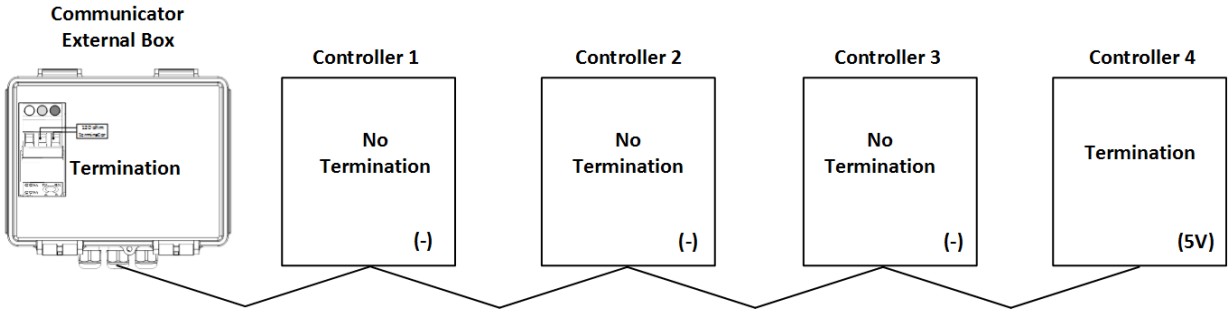


Figure 5: External Box/Controller Termination

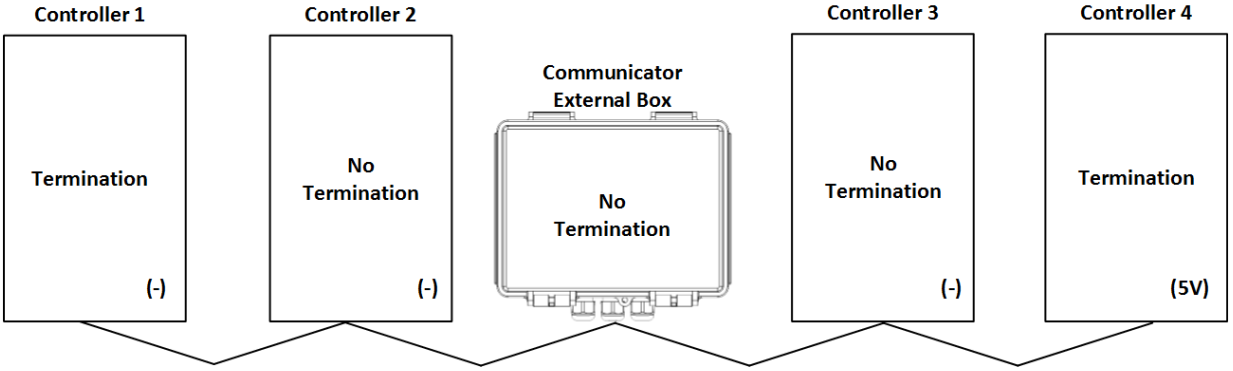


Figure 6: Controller Termination

In any Communicator – controller daisy chain define:

- termination at both end units
- 5V in ONLY ONE end unit

The following diagrams illustrate how to set the dipswitches.

- Figure 7 and Figure 8 do not show the 5V dipswitch setting.
- Figure 9 and Figure 10 do not show the termination dipswitch setting.

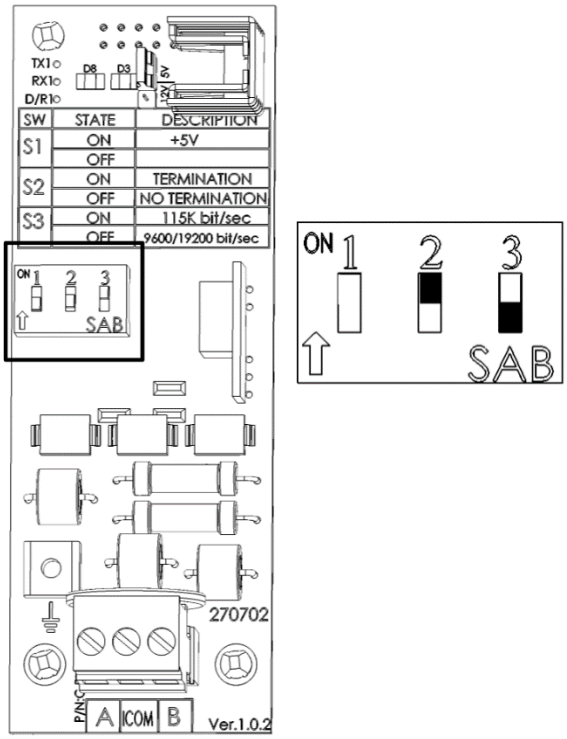


Figure 7: RS-485 Isolated Termination Enabled

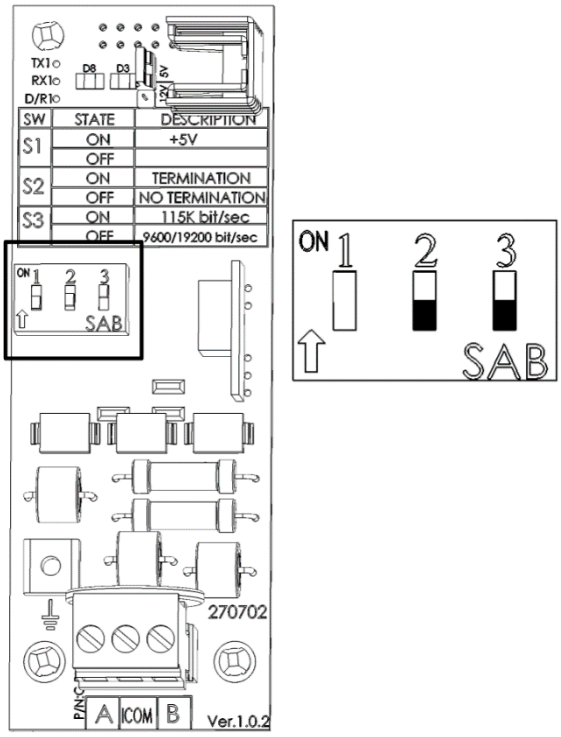


Figure 8: RS-485 Isolated Termination Disabled

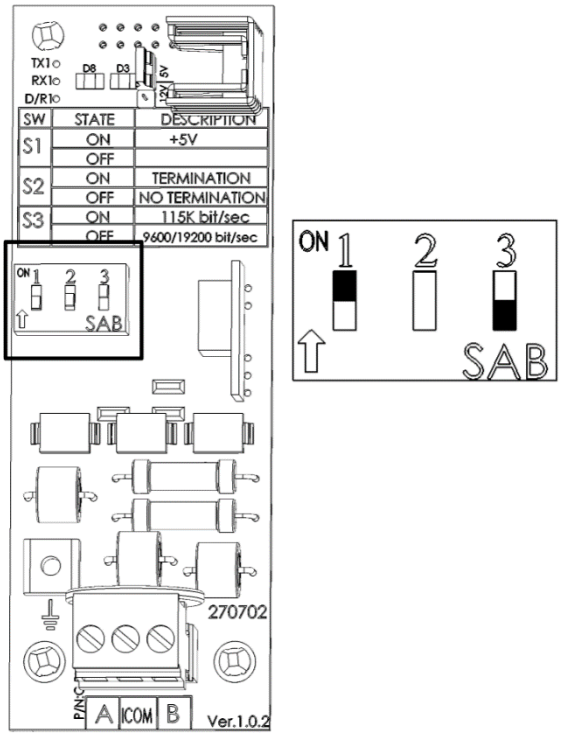


Figure 9: RS-485 5V Enabled

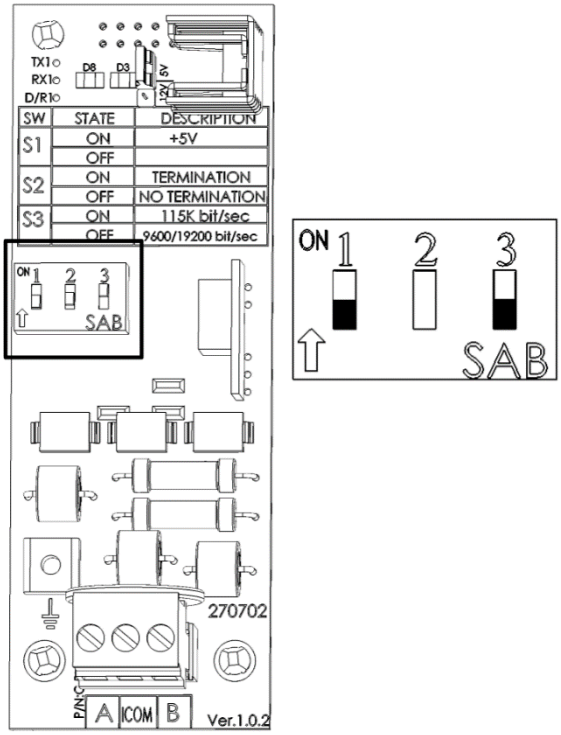


Figure 10: RS-485 5V Disabled

5.2.3 Element to Element Extensions

- Figure 11: Communication Wiring Diagram (Element Extension)
- Figure 12: Element Extension Dipswitches

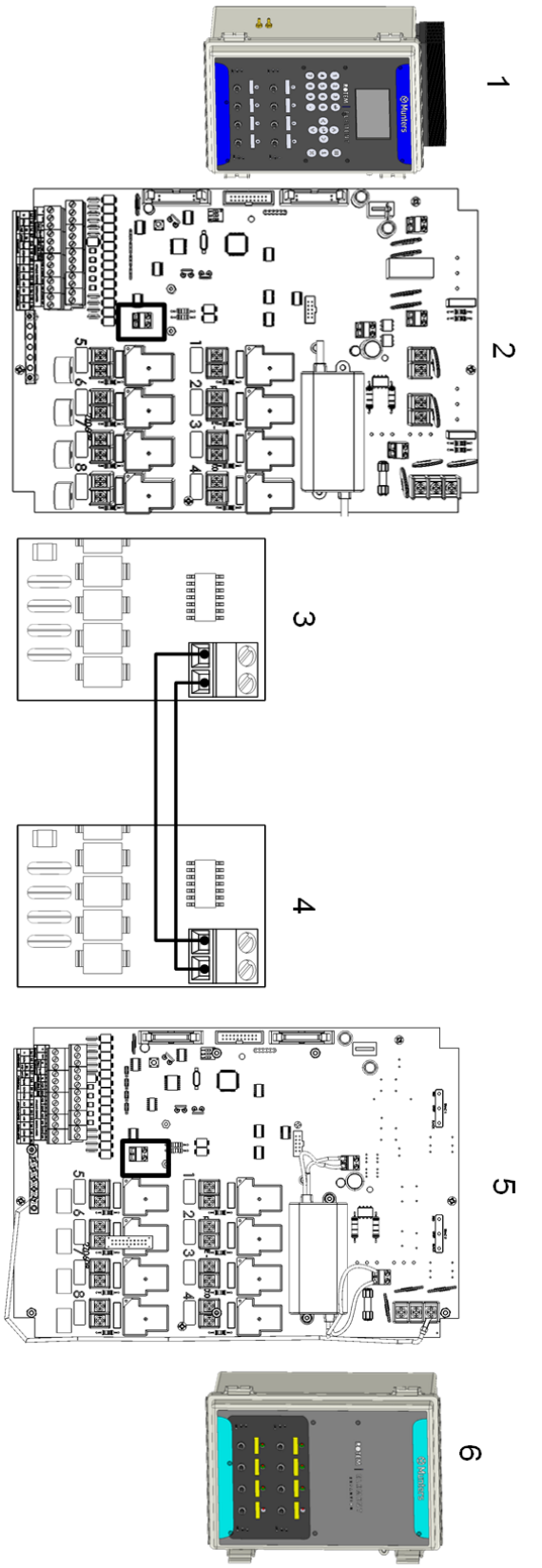


Figure 11 key

1	Element unit	4	Element Extension communication ports
2	Element board	5	Element Extension board
3	Element communication ports	6	Element Extension

Figure 11: Communication Wiring Diagram (Element Extension)

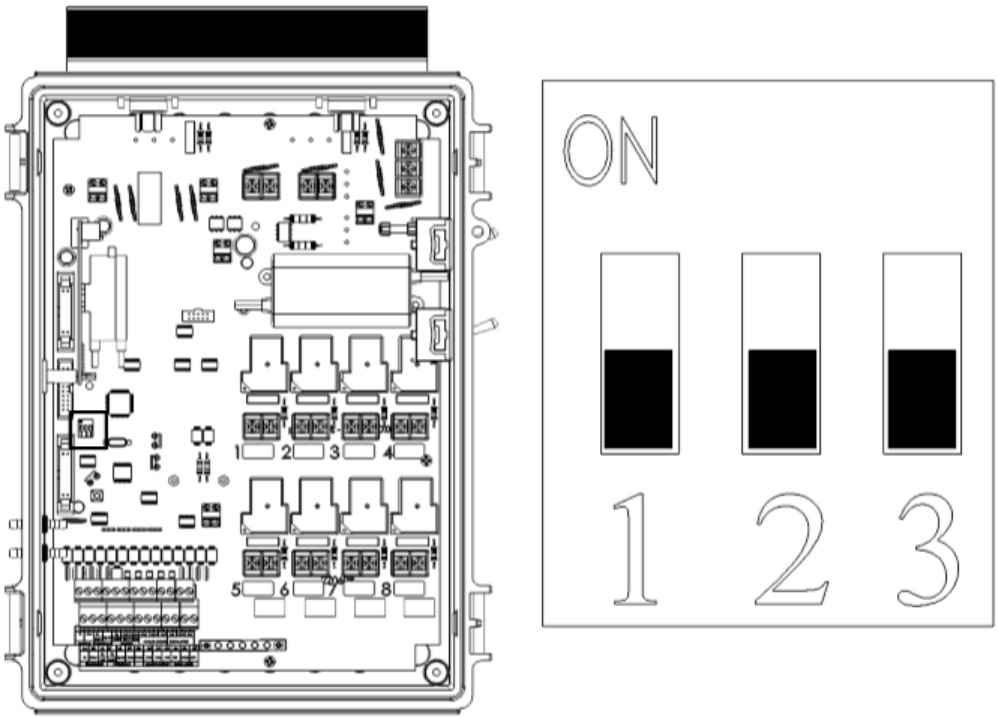


Figure 12: Element Extension Dipswitches

The Element and Element Extension units each have dip switches that define the unit address.

- All Element dipswitches must be off (down).
- Define each Extension units by setting one dipswitch (1, 2, or 3) to ON.
- Each Extension unit MUST have a unique address.

5.2.4 Element to Relays

- Relay Wiring
- Configuring the Relays

5.2.4.1 Relay Wiring

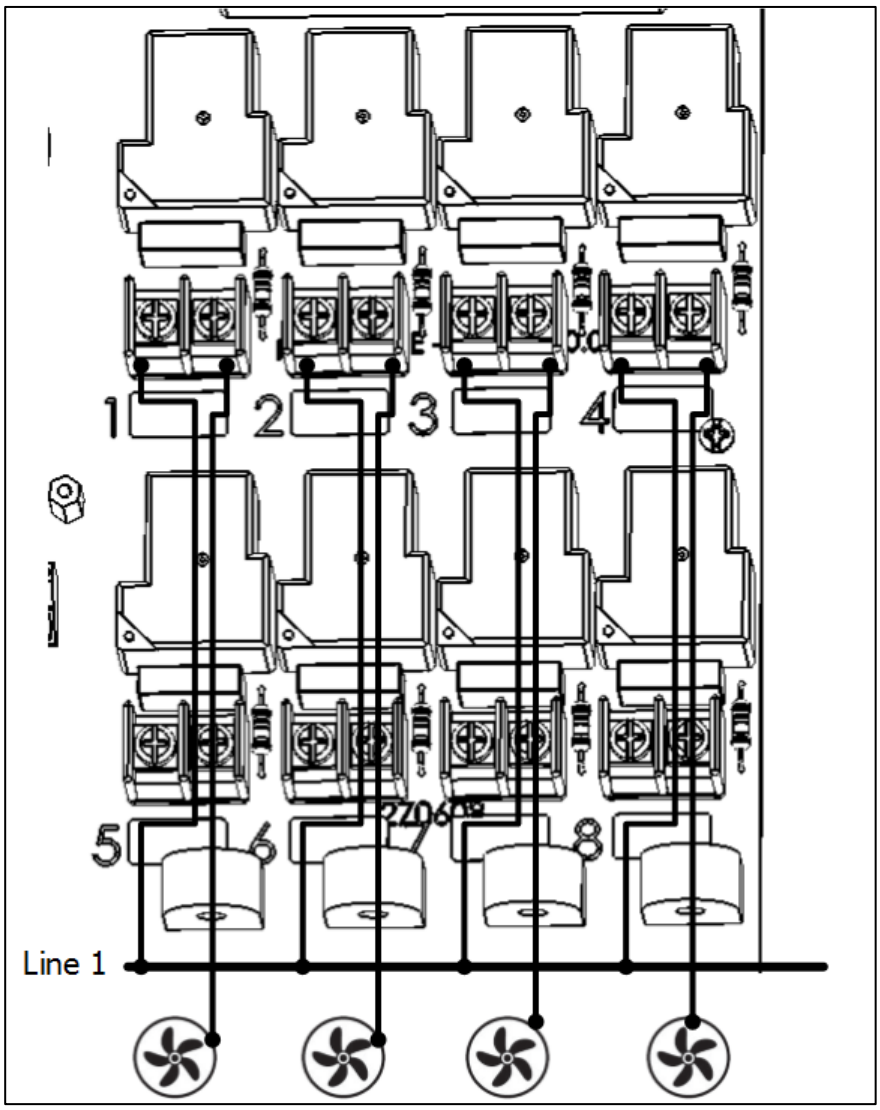


Figure 13: Element Relay Wiring

NOTE Figure 13 is an example. Actual installations can differ.

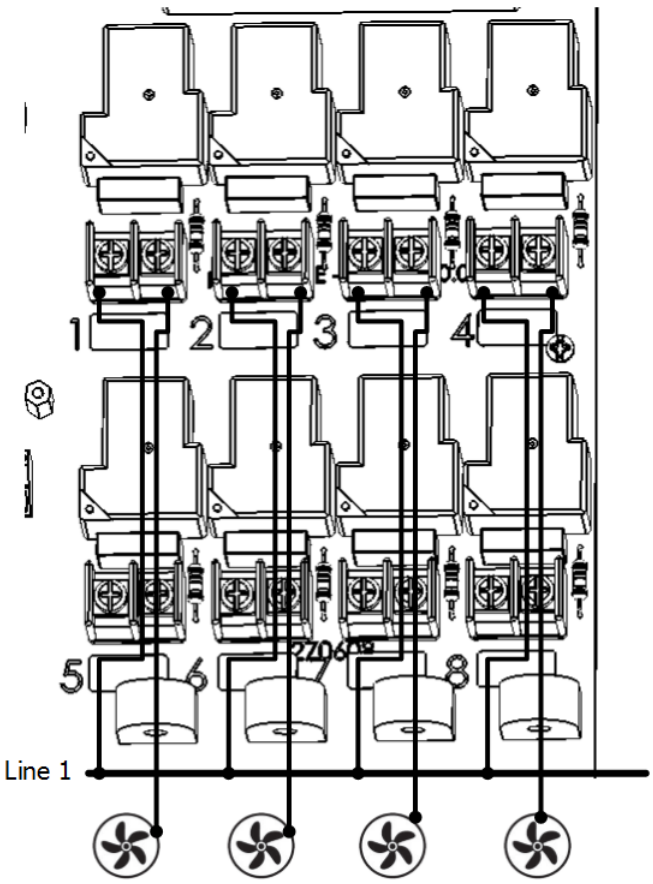


Figure 14: Current Sense Relay Wiring

- Refer to Monitoring the Current Sense, page 81 for details on using the Current Sense relays.

NOTE Any relay can be wired to a current sensor but winches (if used) are wired to the bottom four relays. In general winches don't require current monitoring.

NOTE If a device connected to a current sense relay fails, the relay shows 0 volts.

NOTE To enable current sense monitoring, run the cable connecting a device to the relay.

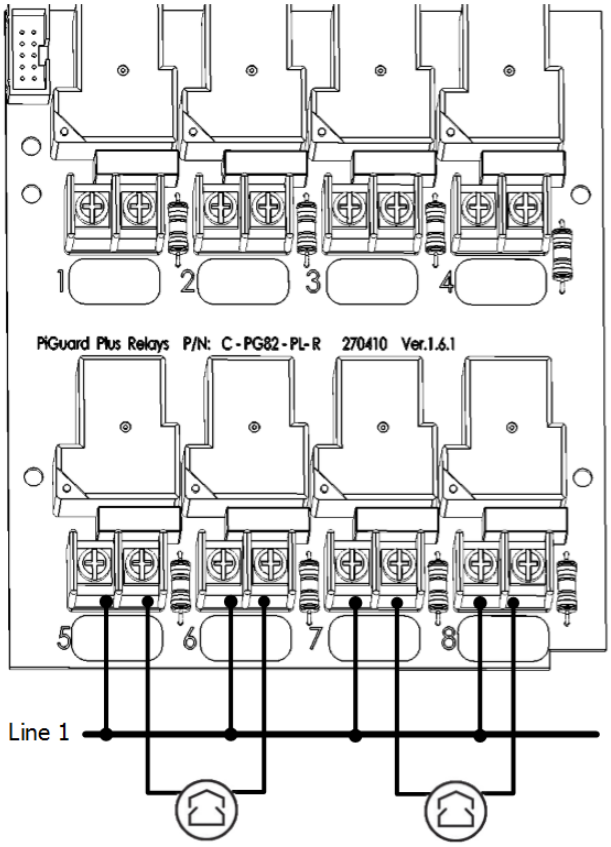


Figure 15: Curtain Relay Wiring

Two relays control each curtain, one to open the curtain and one to close it. To ensure that both relays do not operate simultaneously, set the dipswitches (found on the switch card):

- Relays 5 and 6: dipswitches 1, 2, and 3. Set to OFF.
- Relays 7 and 8: dipswitches 4, 5, and 6. Set to ON.

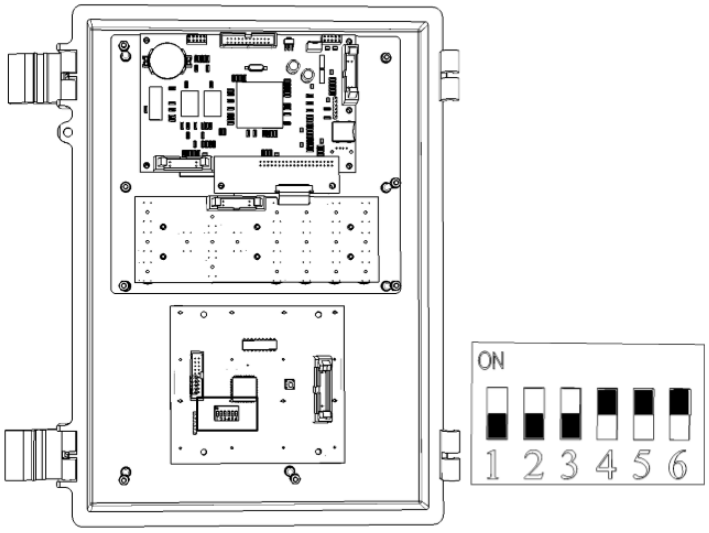


Figure 16: Curtain Dipswitch Wiring

5.2.4.2 Configuring the Relays

➲ **Wire the relay devices to the Element as shown in Figure 13.**

CAUTION *When configuring the relays ensure that no more than 70% of the relays operate simultaneously.*

After physically wiring output devices to the Element, the corresponding relays must be defined. Defining the relays enables the system software to control their functionality.

1. Go to System > Installation > Relays.

Relay	Device	Num.	NO/NC
1	Fan	1	NO
2	Fan	2	NO
3	Curtain Open	1	NO
4	Curtain Close	1	NO
5	Inlet Open	1	NO
6	Inlet Close	1	NO
7	Timer	1	NO

2. Scroll to each relay.
3. From the drop down list, select the device wired to that relay.
   - Element automatically assigns the relay a number, according to the device type. The number of devices supports varies according to the device type.
     - Heater: 6
     - Stir Fan:1
     - Curtains: 2
     - Timer: 5
     - Fan: 8
     - Cooling: 2
     - Inlet: 2
   - Same as Analog (up to 8): This function controls a device using the Element's analog output settings. Assign the relay the number of the analog output device which will control the relay.
     - When the relay switch is set to Auto, the device operates according to the analog device settings.
     - When the relay switch is set to On, the device operates continually at maximum output.
     - When the relay switch is set to Off, the device is shut down.
   - Same as Relay (up to 8): This function controls a device using a relay device's settings. Assign to a relay the number of the 2nd relay that controls the relay. When a relay is defined as "Same as Relay X", the relay copies its state when it is in Auto mode.

- You can edit the number, but any assigned number must be different from an existing number of that device type (for example, you cannot assign two relays to be Heater #2).
- Similar relay, analog output, and TRIAC devices must have different numbers.
- If no relay is available (for example, if you try to define three relays as curtains), an error message appears.

4. Define each device as Normally Open (NO) or Normally Close (NC). Default: NO.
   - NC connections are open when the controller instructs that device to operate or if the controller loses power.
   - NO connections are closed when the controller instructs the device to operate.
5. On the front panel, place the toggle switch in the required position (On, Off, Automatic).

NOTE To uninstall a device, define it as None.

5.2.5 Element to Outputs/Inputs

- Analog Output / Digital Input Wiring
- Configuring the Analog Output Devices
- Configuring the Digital Sensors

5.2.5.1 Analog Output / Digital Input Wiring

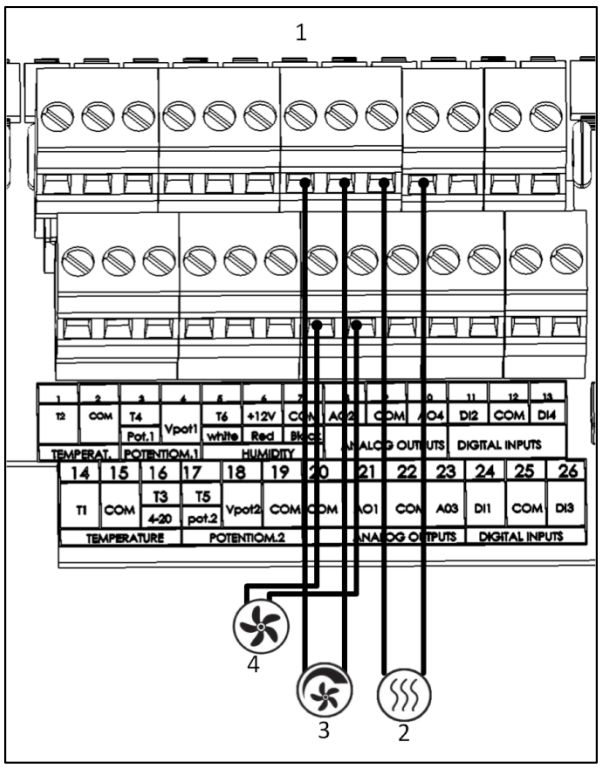


Figure 17: Analog Output Wiring

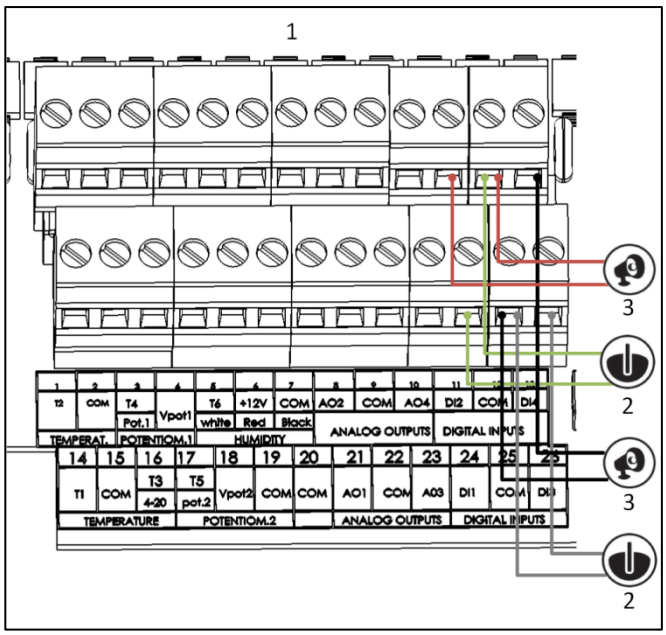


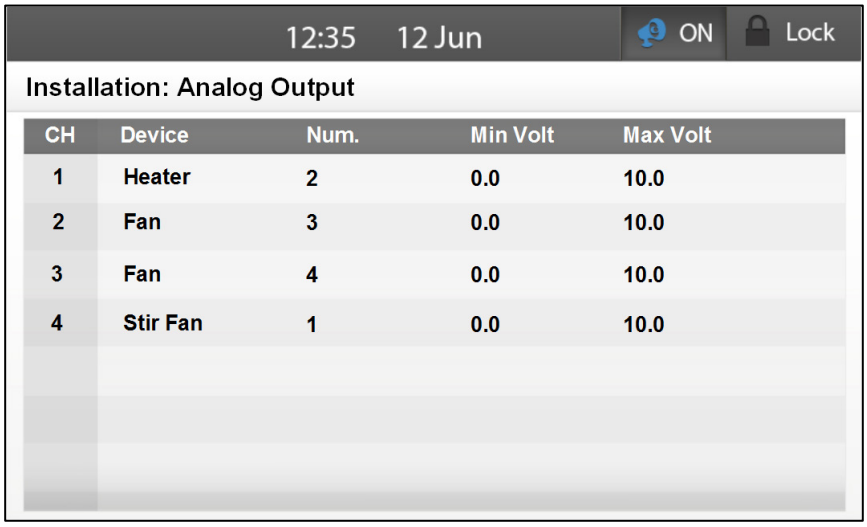
Figure 18: Digital Input Wiring

Figure 17 key			
1	Element low voltage ports	4	Variable fan device
2	Digital sensors (Two devices can be wired to one COM port)	5	Fans
3	Variable heat device		
Figure 18 key			
1	Element low voltage ports		
2	Water meter		
3	Auxiliary alarms		

NOTE Figure 17 and Figure 18 are examples. Actual installations can differ.

5.2.5.2 Configuring the Analog Output Devices

➲ **Wire the analog output devices to the Element as shown in Figure 17.**



1. Go to System > Installation > Analog Out.
2. Scroll to each analog output.
3. From the drop down list, select the device wired to that relay.
   - Element automatically assigns the device a number, according to the device type. The number of devices supports varies according to the device type.
     - Heater: 6
     - Fan: 8
     - Stir Fan:1
   - You can edit the number, but any assigned number must be different from an existing number of that device type (for example, you cannot assign two relays to be Heater #2).
   - Similar relay, analog output, and TRIAC devices must have different numbers.
   - If no relay is available (for example, if you try to define three relays as curtains), an error message appears.

4. In the Minimum Voltage field, define the minimum output value of that device. Range: 0 – 10 volts. Default: 0

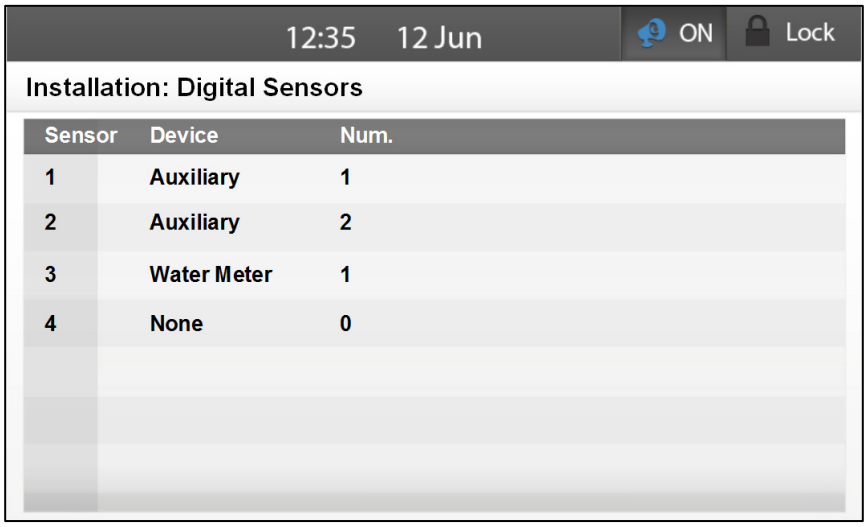
5. In the Maximum Voltage field, define the maximum output value of that device. Range: 0 – 10 volts. Default: 0

NOTE To uninstall a device, define it as None.

5.2.5.3 Configuring the Digital Sensors

➲ **Wire the digital input devices as shown in Figure 18.**

1. Go to System > Installation > Digital Sensors.



2. Scroll to each sensor.
3. From the drop down list, select the device wired to that port.
   - Element automatically assigns the sensor a number, according to the device type. The number of devices supports varies according to the device type.
     - Auxiliary: 2
     - Water Meter: 2
   - You can edit the number, but any assigned number must be different from an existing number of that device type (for example, you cannot assign two devices to be Water Meter #2).

If no sensor is available (for example, if you try to define three sensors as water meters), an error message appears.

5.2.6 Humidity and Temperature Sensors

- Sensor Wiring
- Potentiometer Wiring
- Placing the Analog Input Jumpers
- Configuring the Analog Sensors
- Defining the Temperature Sensors
- Humidity Configuration

5.2.6.1 Sensor Wiring

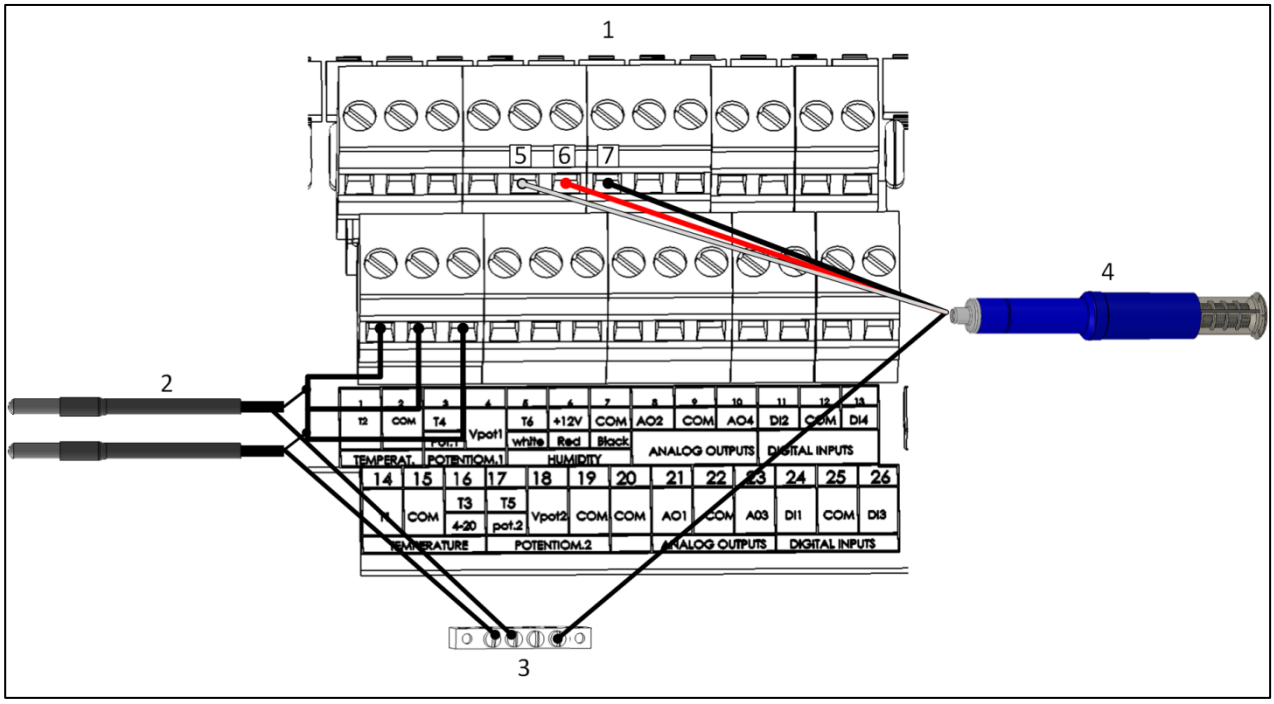


Figure 19: Temperature and Humidity Sensors Wiring

Figure 19 key			
1	Element low voltage ports	5	Sensor white wire
2	Temperature sensors	6	Sensor red wire
3	Grounding strip	7	Sensor black wire
4	Humidity sensor		

- Install up to four temperature sensors.
- Port 5 can be used to connect a temperature sensor or a humidity sensor. A jumper defines which device is installed. Refer to Placing the Analog Input Jumpers, page 31 for details.

5.2.6.2 Potentiometer Wiring

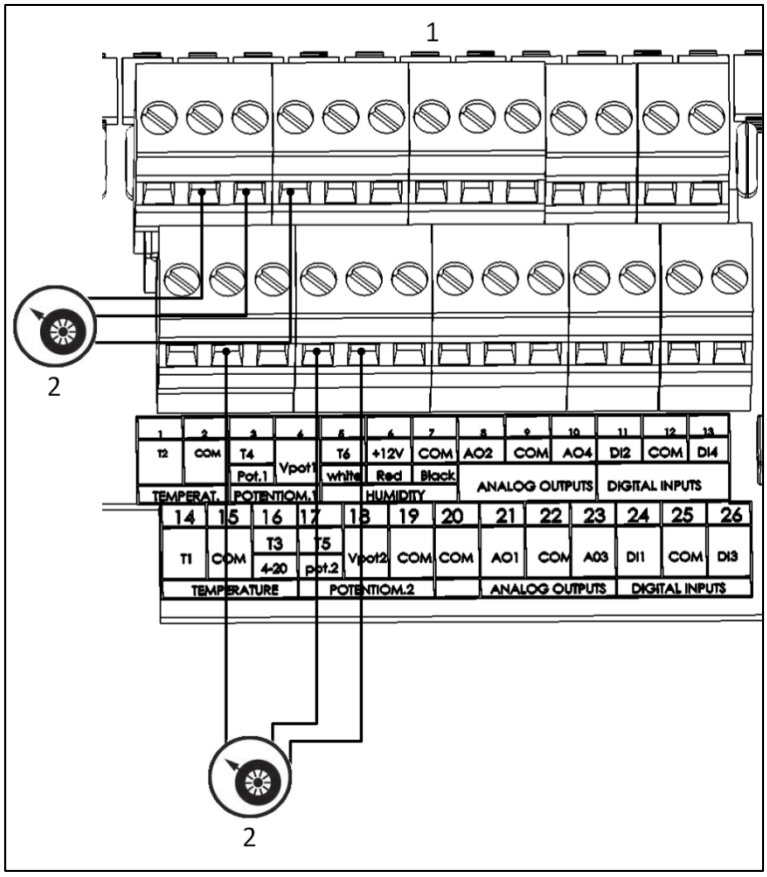


Figure 20: Potentiometers Wiring

NOTE Figure 20 is an example. Actual installations can differ.

Figure 20 key	
1	Element low voltage ports
2	Potentiometer devices

- Ports 3 and 17 can be used to connect a temperature sensor or a potentiometer. A jumper defines which device is installed. Refer to Placing the Analog Input Jumpers, page 31 for details.

5.2.6.3 Placing the Analog Input Jumpers

Temperature sensors can be connected to the ports used for humidity sensors and potentiometers. After wiring the devices to their ports, define each port's function by placing a jumper on the appropriate pins. Figure 21 shows the jumpers' location.

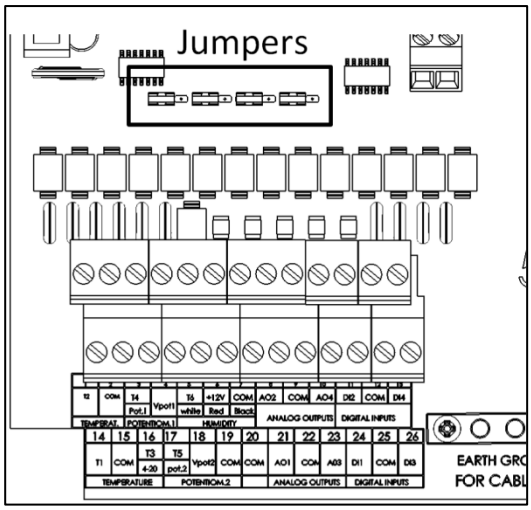


Figure 21: Jumper location

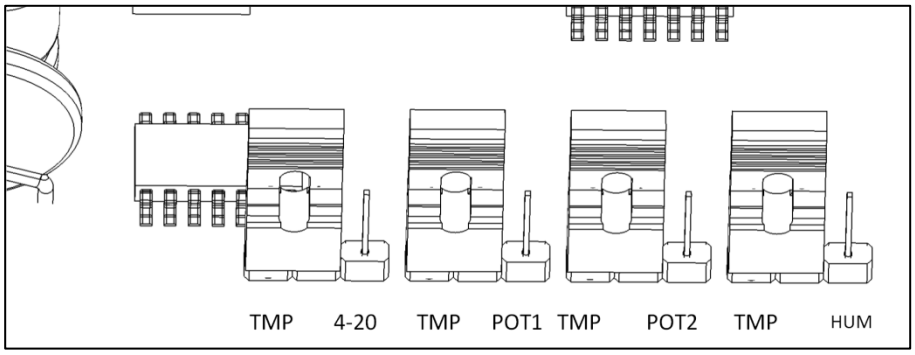


Figure 22: Jumpers expanded view

- T1: Temperature sensor or 4 – 20 mA device (future use)
- T2: Temperature sensor or potentiometer
- T3: Temperature sensor or potentiometer
- T4: Temperature sensor or humidity sensor

In Figure 22, all jumpers are placed on the temperature sensor pins. Figure 23 shows the jumpers placed on the potentiometer and humidity sensor pins.

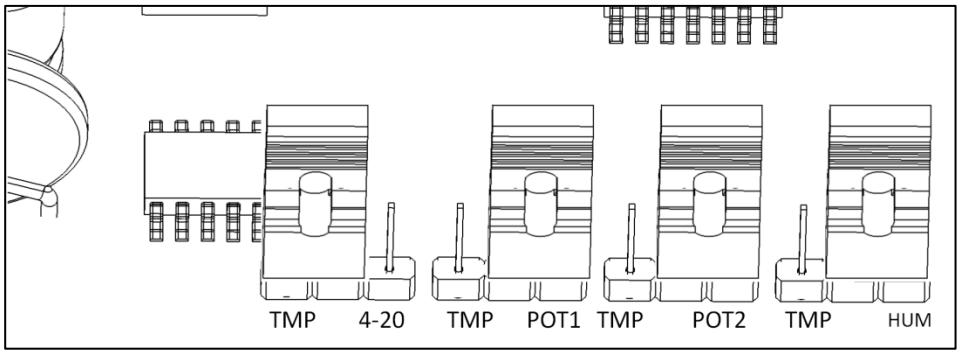
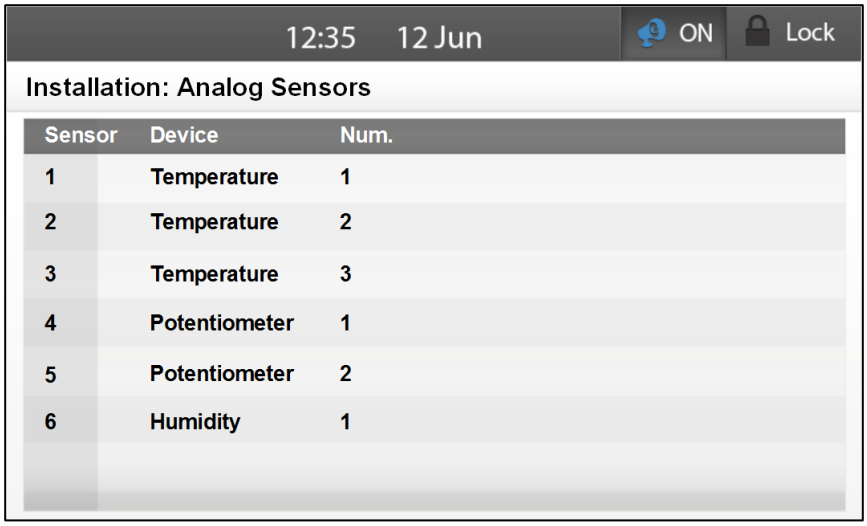


Figure 23: Jumpers expanded view (2)

5.2.6.4 Configuring the Analog Sensors

➲ **Wire the analog input devices as shown in Figure 19.**

1. Go to System > Installation > Analog Sensors.



Sensor	Device	Num.
1	Temperature	1
2	Temperature	2
3	Temperature	3
4	Potentiometer	1
5	Potentiometer	2
6	Humidity	1

2. Scroll to each sensor.
3. From the drop down list, select the device wired to that port.
   - If a humidity sensor is installed, **define sensor 6 only to be the humidity sensor.**
   - Element automatically assigns the sensor a number, according to the device type. The number of devices supports varies according to the device type.
     - Temperature: 6
     - Potentiometer: 2
     - Humidity: 1
   - You can edit the number, but any assigned number must be different from an existing number of that device type (for example, you cannot assign two sensors to be Temperature #2).
   - If no sensor is available (for example, if you try to define three sensors as potentiometers), an error message appears.

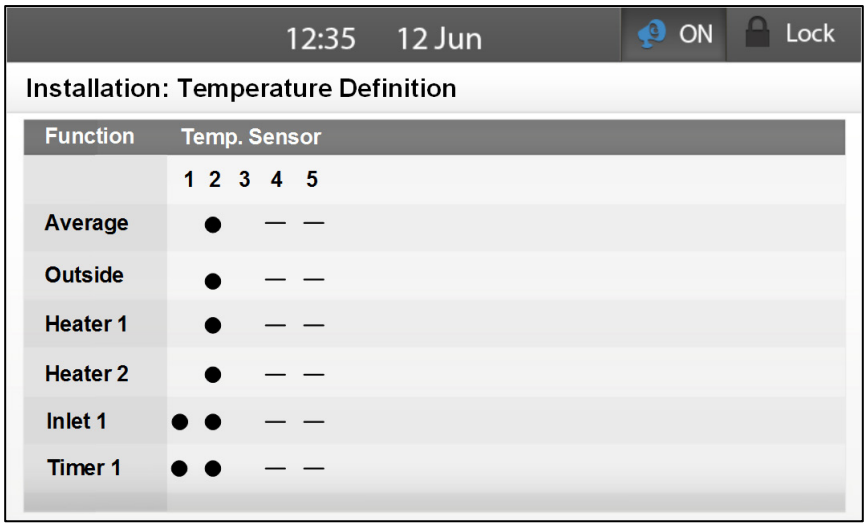
5.2.6.5 Defining the Temperature Sensors

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

- Sensor temperature (including any calibration).
- 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: Temperature sensors defined as an outside temperature is not included in any average calculation.

➲ **Install a temperature sensor(s) as shown in Figure 19.**

1. Go to System > Installation > Temperature Definition.



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

NOTE If no sensor is defined for a device, the device runs on the average temperature.

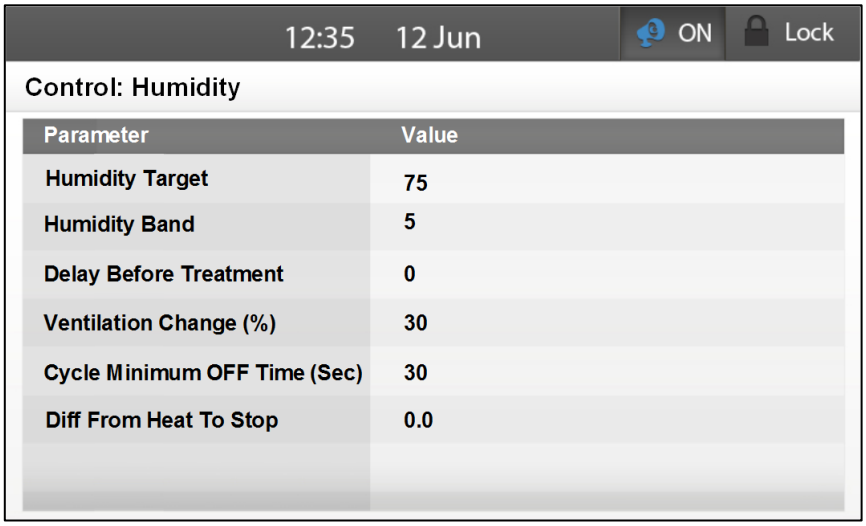
NOTE Uninstalling a device in the Relay Layout, Analog Output or TRIAC tables removes the device from this screen.

5.2.6.6 Humidity Configuration

Element responds to high humidity by increasing the ventilation.

➲ **Install a humidity sensor as shown in Figure 19.**

1. Go to Control > Humidity.



2. Define the parameters:
    - Humidity Target: Define the target humidity.
    - Humidity Band (%): When the humidity drops this amount below the humidity target, humidity treatment stops.
    - Delay Before Treatment (sec): Define the amount of time that Elements delays increasing the ventilation.
    - Ventilation Change (%): Define the increase in the ventilation on time.

- Cycle Minimum OFF Time (Sec): This parameter defines the minimum amount of ventilation off time and acts as a limitation to the ventilation change.
- Diff From Heat to Stop: Define the difference from the heating temperature at which the treatment stops.

5.2.7 TRIAC SETUP

- TRIAC Wiring
- Configuring the TRIAC Variable Speed Fans

5.2.7.1 TRIAC Wiring

- Figure 24: TRIAC Device Wiring
- Figure 25: Power Wiring
- Figure 26: Wiring Diagram of Main Voltage Section Showing Filtering

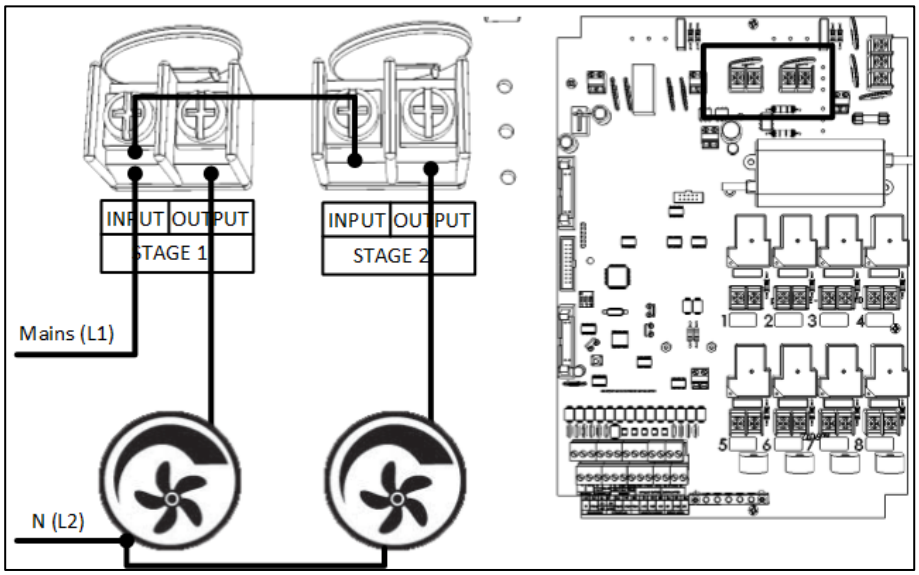


Figure 24: TRIAC Device Wiring

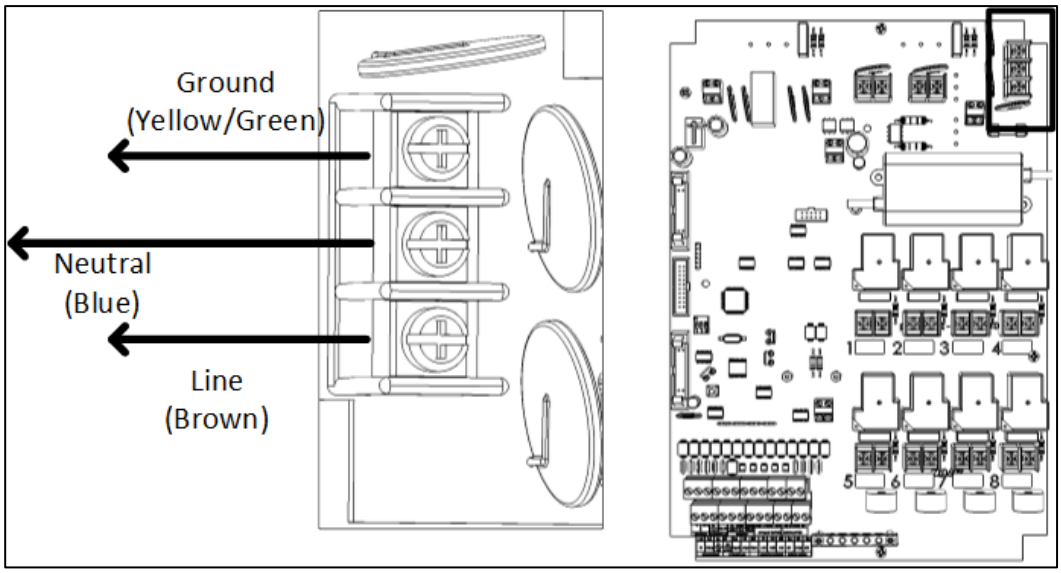


Figure 25: Power Wiring

To ensure compliance with EMC 61000-6-3, install an appropriate filter; for example a Munters' filter (P/N: P-EMI), TDK-RSHN-2016 L or similar devices.

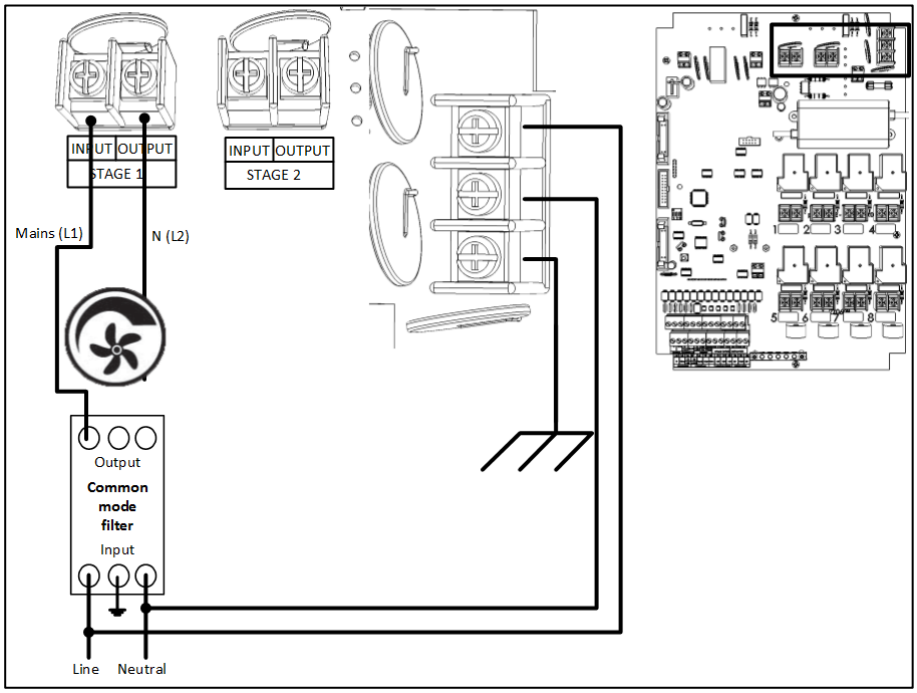
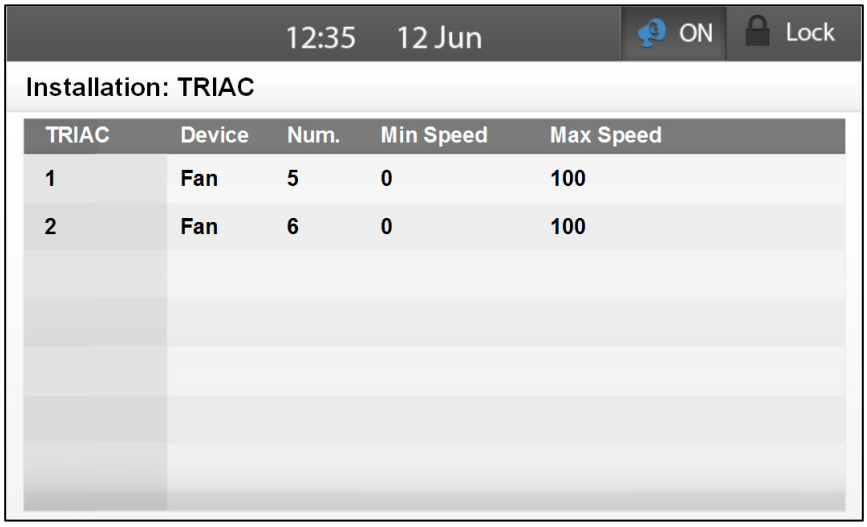


Figure 26: Wiring Diagram of Main Voltage Section Showing Filtering

5.2.7.2 Configuring the TRIAC Variable Speed Fans

➲ **Wire the TRIAC devices to the Element relays as shown in Figure 24.**

1. Go to System > Installation > TRIAC.



TRIAC	Device	Num.	Min Speed	Max Speed
1	Fan	5	0	100
2	Fan	6	0	100

2. Scroll to each TRIAC output.
3. From the drop down list, select the device wired to that TRIAC.
   - Element automatically assigns the relay a number, according to the device type. The number of devices supports varies according to the device type.
     - Fan: 2
     - Stir Fan:2
   - You can edit the number, but any assigned number must be different from an existing number of that device type (for example, you cannot assign two relays to be Fan #2).

- Similar relay, analog output, and TRIAC devices must have different numbers.
- If no relay is available (for example, if no fans are available), an error message appears.

NOTE To uninstall a device, define it as None.

NOTE If a device fails, the device remains on the Analog Output screen and an alarm message is sent.

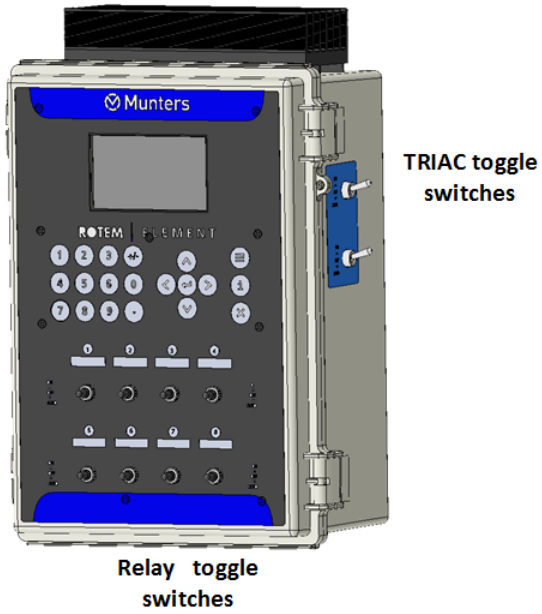


Figure 27: Element Toggle Switches

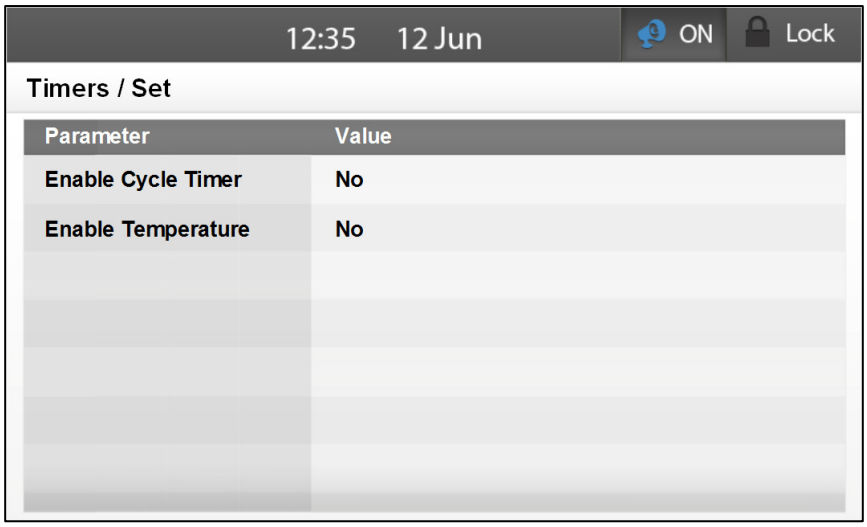
4. On the Element side are two toggle switches. After wiring a TRIAC device (refer to Figure 24), turn a toggle switch to On or Auto to enable the device
    - On: device runs continually
    - Auto: device runs according to the settings

5.3 Timers

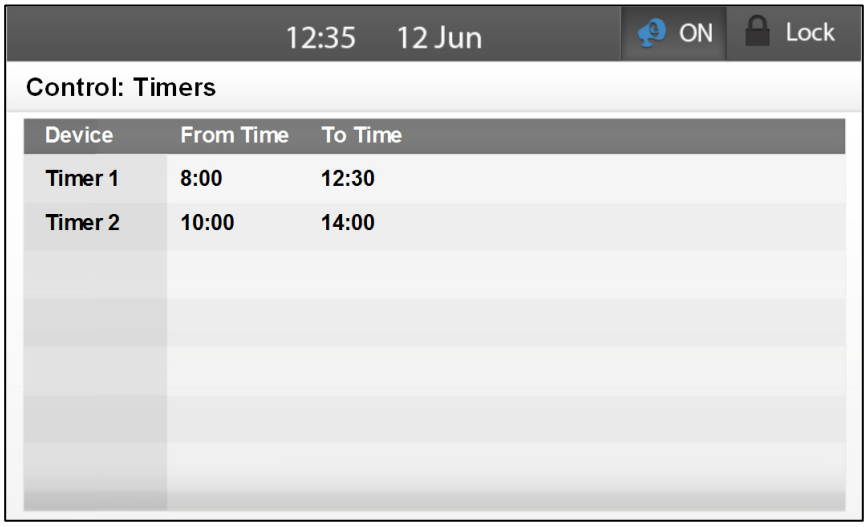
Timers provide an additional method of controlling relay devices, namely setting a time table in which the device can operate. In addition to the time table, Element enables setting up time cycles and temperature ranges in which a device can operate.

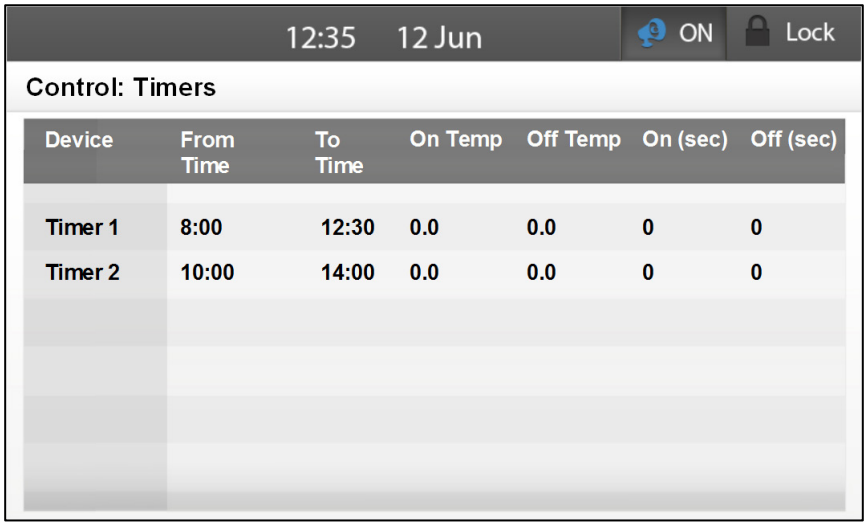
➲ **Define up to two relays as timers.**

1. To enable time cycles and temperature range control, go to Control > Timers > Set (option).



2. Enable the parameters as required. Default: No.
3. Go to Control > Timers.





NOTE On/Off Temp and On/Off (sec) columns appear only if they are enabled in the Timer Set screen.

4. Define the following parameters:

- Timer: Read only.
- From/To Time: Define the beginning and ending time. Range: 00:00 to 23:59. Default 00:00.
- On/Off Temp: Define the temperature range in which the device can operate. Range: -40.0 to 90.0. Default: 0.0
    - If the On temperature is greater than the Off temperature, the device operates when the temperature is higher than the On temperature.
    - If the On temperature is lower than the Off temperature, the device operates when the temperature is lower than the On temperature.
- On/Off sec: Define the on/off cycles. Range: 0 – 999 seconds. Default: 0

6 Technical Specifications

Power Supply	
Mains voltage	Single phase, 115/230 VAC
Main fuse	315 mA
Secondary fuse	1 A
Maximum power consumption	22 VA
Available power for peripheral equipment	
Inputs/Outputs	
6 analog inputs	
• 3 analog inputs for temperature sensors	RTS-2 (Thermistor)
• 1 humidity sensor input	0-:-3V
• 2 additional analog inputs	0-:-5V
4 analog outputs	20 mA, 0-:-10V
4 digital inputs	Dry contact, 5 V/2 mAmp
Static pressure sensor	optional
Relays Outputs	
8 Normally Open power relays	2 HP, 12 Amps, 250 VAC
TRIAC Output (optional)	
Up to 2 TRIACs	
Variable Speed Output: • 2.2 KW 10 Amps, 230 VAC; 2.8 HP • 1.1 KW 10 Amps, 115 VAC; 1.4 HP	
Housing	
Dimensions cm (L x W x H)	40.0 x 27.3 x 16.9

Ambient Climate	
Operating temperature range	32° to 122° F (0° to 50° C)
Storage temperature range	14° to 158° F (-10° to 70° C)
Indoor Applications	
The equipment is designed for use in indoor applications only!	
IP 65	
Certification	
CB CE	

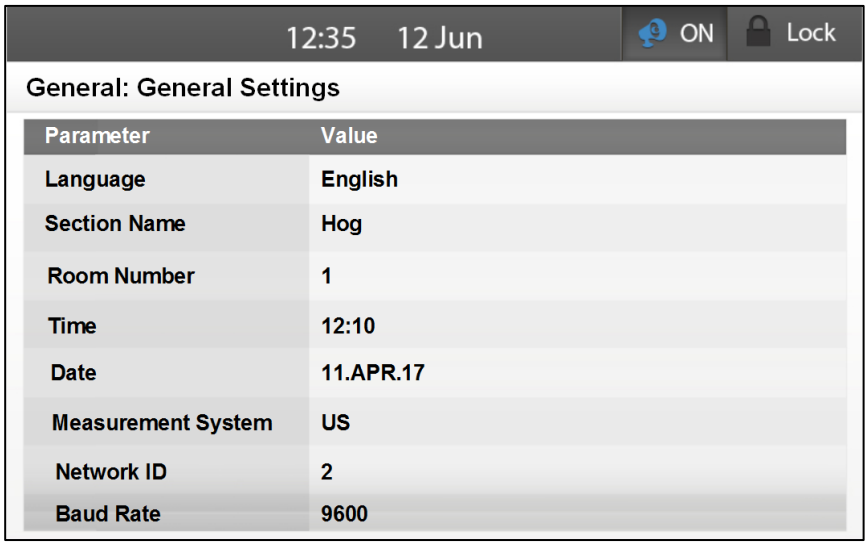
7 Basic Setup

The following section details how to define basic Element parameters. These parameters define the user interface, growth cycle, and system parameters.

- Defining the General Settings
- Defining the Group Settings
- Defining the Expected Animal Weights
- Viewing the Element Version

7.1 Defining the General Settings

The Settings screen defines the Element's user interface.



NOTE Generally, these parameters are set once only, when installing the unit.

1. Go to System > General > General Settings.
2. Define the following parameters:
    - Language: Choose a language from the drop down list: Default: English
    - Section name: TBD.
    - Room Number: Select a number for room which the Element operates. Ensure that this number is unique and not assigned to other Elements.
    - Time: This parameter defines the Element's clock setting. This setting is used in any operation that is based on the time of day (for example, ventilation or event notification).
    - Date: This parameter defines the current day.
    - Measurement System: Select Metric or US (default). This parameter defines the units for the following measurements:

• Temperature (C/F)	• Pressure (Pascal/IN.W.C)
• Weight (Kg/Lb.)	• Length (Meter/Feet)
• Volume (M3/h or CFM)	

- Network ID:
- Baud rate: Baud rate defines the communication rate between Element and any communication device (for example, the Comm-Box) or between Element and the Expansion units. Choose one of the following:

• 4800	• 9600 (default)	• 19200
• 38400	• 57600	• 115200

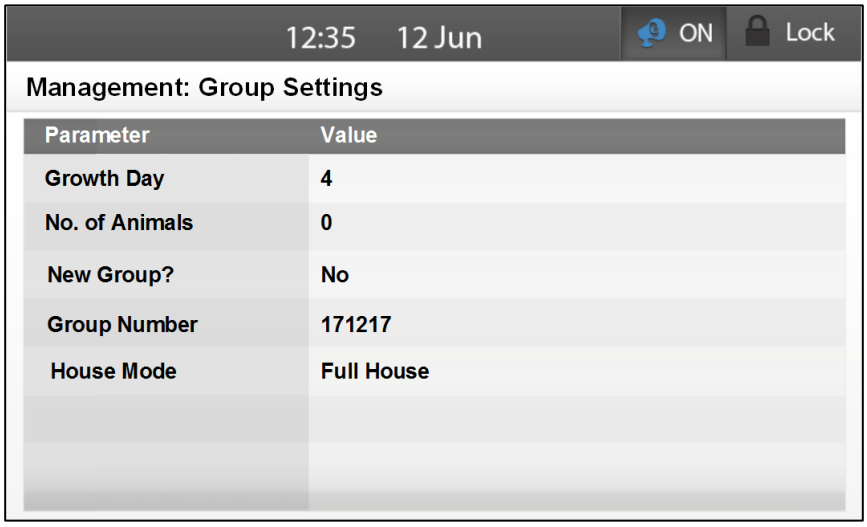
  - Since faster rates and longer transmission distance mean a greater chance of transmission errors, reduce the baud rate as you increase the distance.
  - In any case where there are transmission errors, reduce the baud rate.
  - Elements, Communicator, and RLINKs (if used) must have the same baud rate!
  - Incorrect definitions can result in alarms for missing controllers and communication from unidentified controllers.

7.2 Defining the Group Settings

Group settings define the parameters relevant to a herd.

NOTE Define these parameters at the beginning of a growth cycle.

1. Go to Management > Group Settings.



2. Define the following parameters:
   - Current Growth Day: Enter the current growth day. It is possible to enter negative growth days (up to -2). If you reset the growth day for a new group using this tool, your old history data does not clear. Use the New Group function to clear out old history in preparation for new animals.
   - Number of Animals: Enter the number of pigs in the group.
   - New Group: Use the new group function on arrival of a new set of animals to set the growth day back to 1, 0, -1, or -2.

NOTE Selecting a New Group clears out the alarm history.

- Group Number: The controller automatically increments the herd number each time you choose New Group. Use this parameter to edit the group number.

NOTE Since this field accepts six digits, some producers enter a group number that is made of the day, month and year the animals arrived.

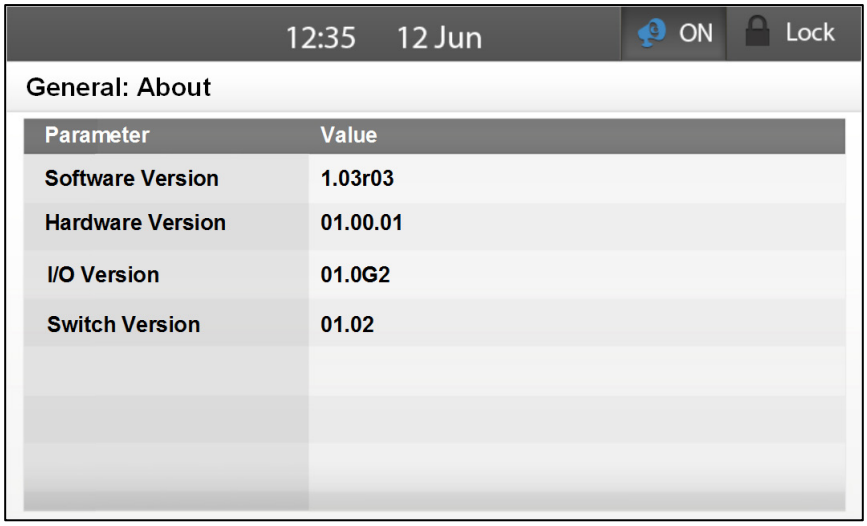
- House Mode: When there are animals in the barn, set this parameter to Full. If the barn is not being used, set the parameter to Empty. Empty mode disables all alarms.

7.3 Defining the Expected Animal Weights

Animal weights are used when calculating the amount of air required when using Ventilation by Weight (page 58). Refer to that section for details.

7.4 Viewing the Element Version

- Go to System > General > About.



8 Saving and Loading Settings

Configuring an Element (which includes defining all system functions) can be a time consuming effort. This section describes how to use a USB flash drive (disc on key) card to save settings in one unit and then load these settings in additional units.

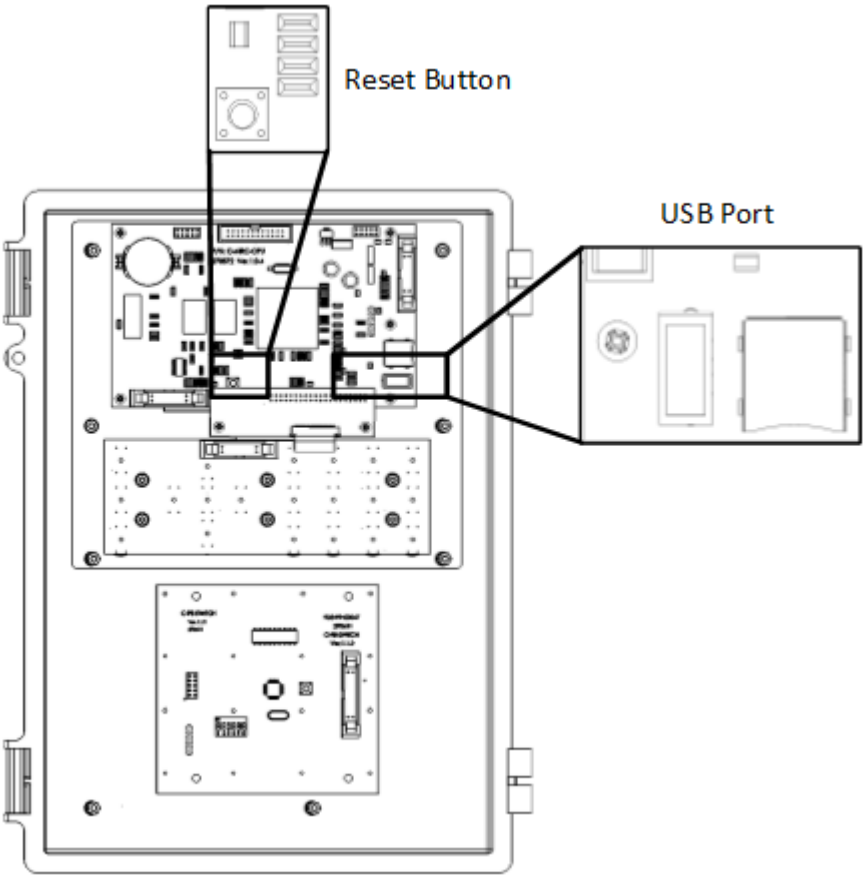


Figure 28: USB Flash Drive Location

- Saving Settings
- Loading Settings
- Resetting the Element to Default Settings
- Upgrading the Product Software

8.1 Saving Settings

Use this menu to download Element settings to an USB flash drive.

1. Insert a USB flash drive containing the settings into place (Figure 28).
2. Go to Management > Save Settings.
3. In the screen that appears, press **YES**.
4. In the screen that appears, select the required settings and press **Enter**.
5. In the screen that appears, press **YES**.

A screen appears when the process is complete.

CAUTION *While saving settings, do not remove the card or interrupt the process in any way!*

NOTE You can save up to four configurations.

8.2 Loading Settings

Use this menu to upload settings from an USB flash drive to an Element.

CAUTION Make sure that the program data is identical to the relay layout of the controller.

1. Insert a USB flash drive into place (Figure 28).
2. Go to Management > Load Settings.
3. In the screen that appears, select the required settings and press Enter.
4. In the screen that appears, press **YES**.

CAUTION *While loading settings, do not remove the USB flash drive or interrupt the process in any way!*

It is possible that not all tables upload to the Element. To view which tables (if any) do not upload:

1. After the loading process is complete, go to the directory on the USB flash drive containing the application data.
2. Open the file called "report.txt".

```
Load Setting Set_2 Report

Failed to Load the Following Tables:
1. Heaters
2. Humidity
3. VentLevelsFullTable
```

Figure 29: Sample Report File

3. If any table did not upload, define those functions manually.

8.3 Resetting the Element to Default Settings

To reset the Element to default settings:

1. Disconnect the power.
2. Press down the button.
3. Apply power.
4. In the screen that appears, select **Yes**.

CAUTION *Only reset the Element settings when advised to do so by a Munters technician.*

8.4 Upgrading the Product Software

1. Insert a USB flash drive containing the firmware into place (Figure 28).
2. Press and hold the Left and Down arrow keys.
3. Press the reset button.
4. Follow the instructions on the screen.

NOTE The password is 1948.

9 Temperature Settings

- What is the Temperature Curve
- Configuring the Temperature Curve

NOTE Temperature setting should be configured by a person familiar with the pigs' growth cycle and temperature requirements.

9.1 What is the Temperature Curve

As animals grow, the required air temperature changes. Element enables setting up a temperature chart in which you set the target temperatures for (up to) 10 days in the growth cycle. **Target temperature** is the ideal temperature for pigs at that growth day. After defining the target temperatures and growth days, Element creates a curve in which the target temperature automatically, gradually adjusts itself. As the growth days increase, the target temperature gradually decreases to the next setting.

For example, if on day 1 the target temperature is 95° F and on day 5 the target temperature is 86° F, Element adjusts the target temperature on days 2 to 4 so that it approaches the day 5 setting.

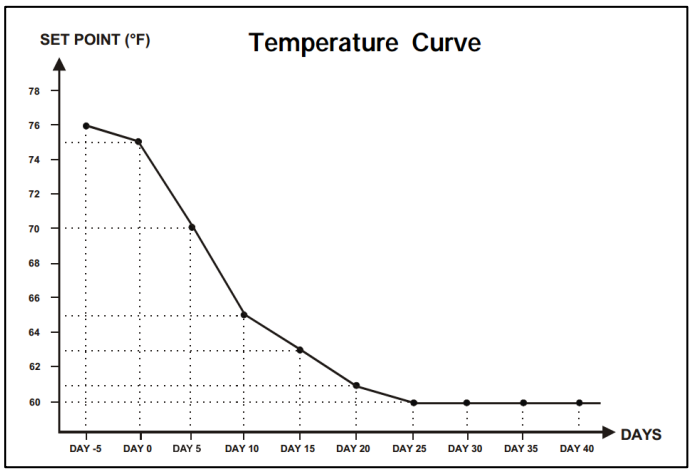


Figure 30: Temperature Curve Example

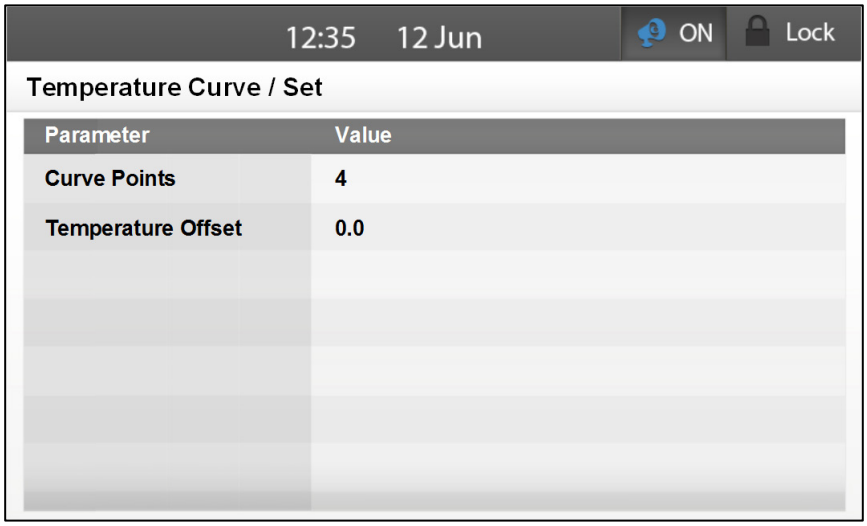
In addition the Temperature Curve has secondary functions:

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

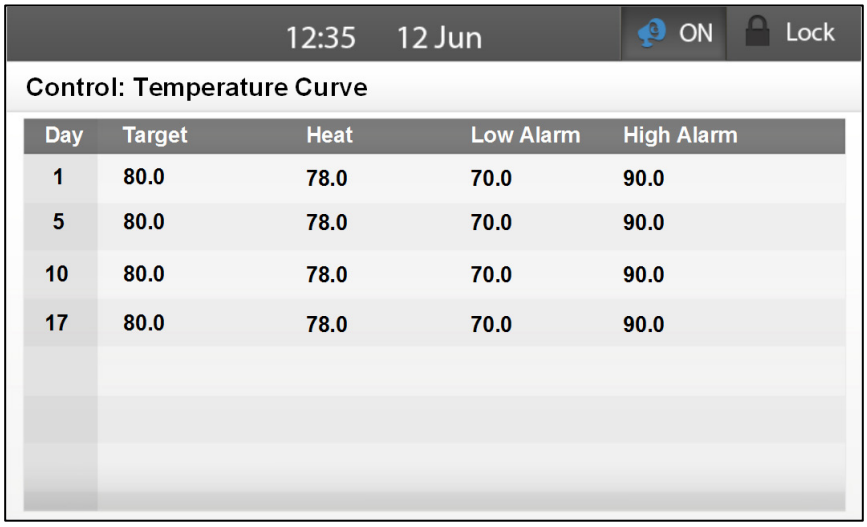
9.2 Configuring the Temperature Curve

The following section details how to configure Element's Temperature Curve function.

1. Go to Control > Temperature Curve > Set.



2. Define the parameters:
   - Curve Points: This parameter defines the number of curve points representing the change of target temperature. The more points, the more gradual the temperature adjustment.
   - Temperature Offset: Use this parameter to change the offset target temperature up or down for any purpose.
3. Go to Control > Temperature Curve.



4. Define the parameters:
   - Day: The growth day on which the target temperature changes. Enter up to 10 growth days. Range -2 to 999. Default: 0

NOTE Do not define the same day twice. If that happens, the second entry is erased.

   - Target: The target temperature for that growth day. Range: 1.0° to 90° C/ 34° to 194 F. Default: 80 (first day). 0 (all other days)

- Heat: The temperature at which the heaters begin to operate. This temperature must be lower than the target temperature (at the target temperature, the heaters turn off). Range: 1.0° to 90° C/ 34° to 194 F. Default: 78 (first day). 0 (all other days)
- Low Alarm: Set the temperature at which an alarm is generated, signaling the barn temperature is too low. The Low Alarm parameter must be lower than that day's target temperature. Range: 1.0° to 90° C/ 34° to 194 F. Default: 70 (first day). 0 (all other days).
- High Alarm: Set the temperature at which an alarm is generated, signaling the barn temperature is too high. The High Alarm parameter must be greater than that day's target temperature. Range: 1.0° to 90° C/ 34° to 194 F. Default: 95 (first day). 0 (all other days).

10 Fan and Ventilation

The following sections detail:

- Defining the Fan Air Capacity
- Levels of Ventilation

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

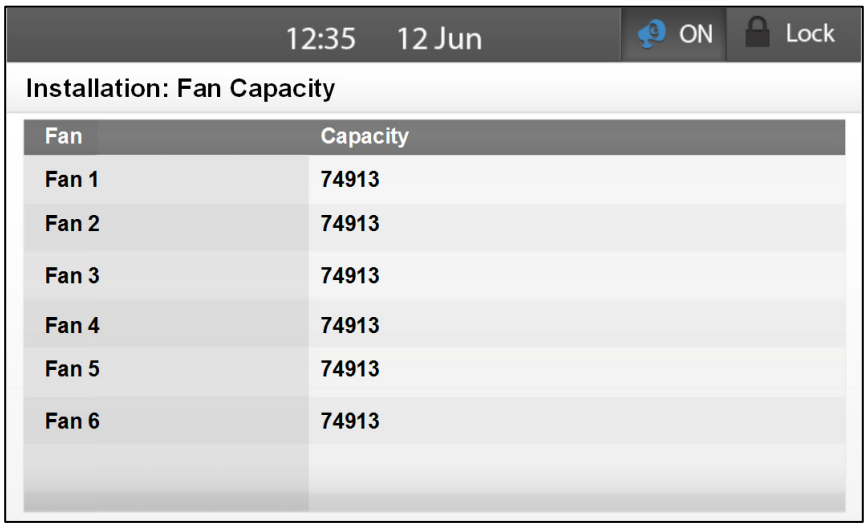
10.1 Defining the Fan Air Capacity

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 Measurement System, page 42, define the measurement unit.**

➲ **Define the fans in System > Installation > Relays or System > Installation > Analog Output.**

1. Go to System > Installation > Fan Air Capacity.



2. Under Air Capacity enter each fan's maximum volume.

10.2 Levels of Ventilation

- Understanding Levels of Ventilation
- Ventilation Guidelines
- Configuring the Levels of Ventilation

10.2.1 Understanding Levels of Ventilation

When minimum ventilation is operating, the ventilation works to ensure that there is sufficient clean air while keeping the air temperature close to the target temperature. If the temperature is above the target temperature by a sufficient amount, the ventilation level increases (after a delay time). If the increase in

ventilation doesn't reduce the temperature, the level will continue to increase until the temperature decreases.

Once the temperature drops to the Happy Zone (the user-defined temperature band close to target temperature) the ventilation level remains the same. If for example the ventilation level is level 3 when the temperature reaches the Happy Zone, the ventilation remains at level 3. The level will only decrease if the temperature goes below the target temperature. In that case, the ventilation level will decrease until the temperature rises to the Happy Zone or the ventilation goes down to Minimum.

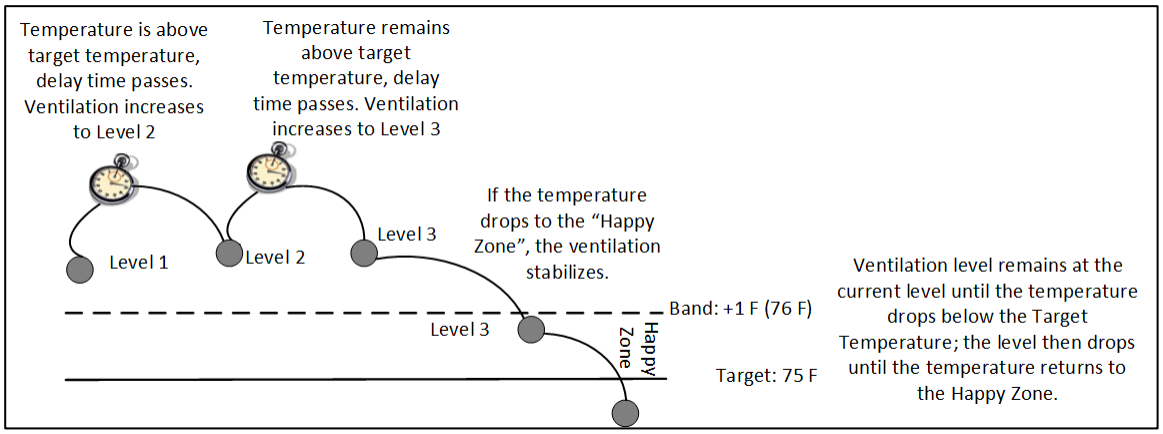


Figure 31: Delay time

Please note: The temperature does not determine the ventilation level. The same temperature can have different levels in different situations. Proper ventilation prevents high or low temperatures.

10.2.2 Ventilation Guidelines

The following are general guidelines to be used in configuring the fans and ventilation levels:

- When building the levels of ventilation, ensure that the increase is a slow, gradual increase. Increase the amount of air by increasing the numbers of fans being used, the fan size, and the time each fan runs.
- Each individual fan can run in one of two manners:
  - Continuous. When used in this mode, the fan air capacity determines how much air is provided.
  - Cycle: When fans run in cycle mode, the Main Screen displays cycle and air quantity.
    - Relay controlled fans operate according to the defined times.

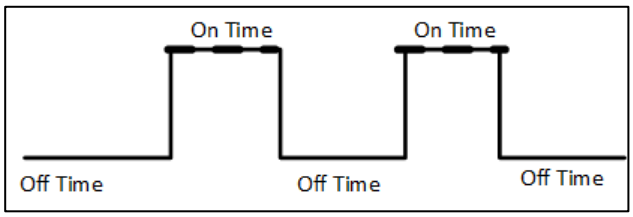


Figure 32: On Time Off Time

    - If variable fans run in cycle time, the fans' output is defined as Low or High.
      - Low output: During the Off Time, fans do not operate. During the On Time, fans operate at the percentage set to the level the control is on.
      - High output: During the Off time, fans operate at the percentage set to the level the control is on. During the On Time, fans operate at 100%.

- Temperature Band and Differential:
  - The band is the number of degrees above the target temperature in which the controller's current level of ventilation is satisfactory. The band is factored into account only when the differential is set to zero. When the average temperature rises above the band, Element increases the ventilation by one level (after waiting the appropriate delay time). Element will continue to increase the level of ventilation until the average temperature falls below the band level or it reaches a level that does have a differential.
  - A differential is the number of degrees above the target at which the ventilation increases to a specific level. When the temperature rises to the level set by the differential, Element increases the ventilation by one level (after waiting the appropriate delay time).
    - Make sure that the differential is greater than the band!
    - Any level's differential of must be greater than the previous level's differential.
    - However, if a differential is set to zero, the differential remains at the previous level.

  For example, if Level One's target temperature is 75° and the band is 1° (with the differential set to zero), ventilation increase begins at 76° (Figure 33)

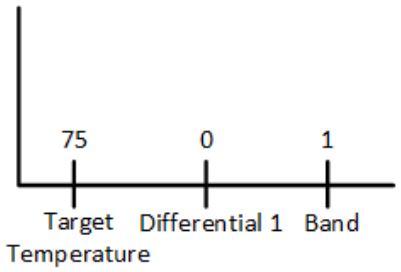


Figure 33: Level One Differential and Band

If the target temperature is 75°, differential is 3°, and the band is 1°, ventilation increase begins at 78° (the band **does not** factor in) (Figure 34).

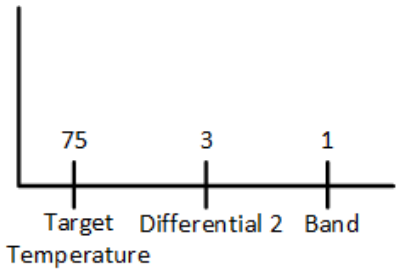


Figure 34: Level Two Differential and Band

However if the target temperature is 75°, differential is 3°, and the band is 1°, **the new Happy Zone is from 78° to 79°.**

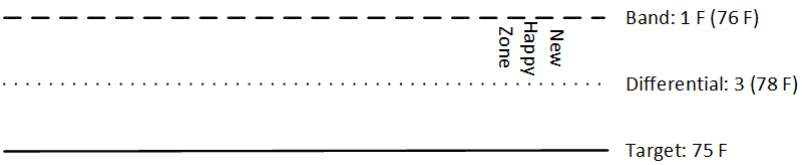


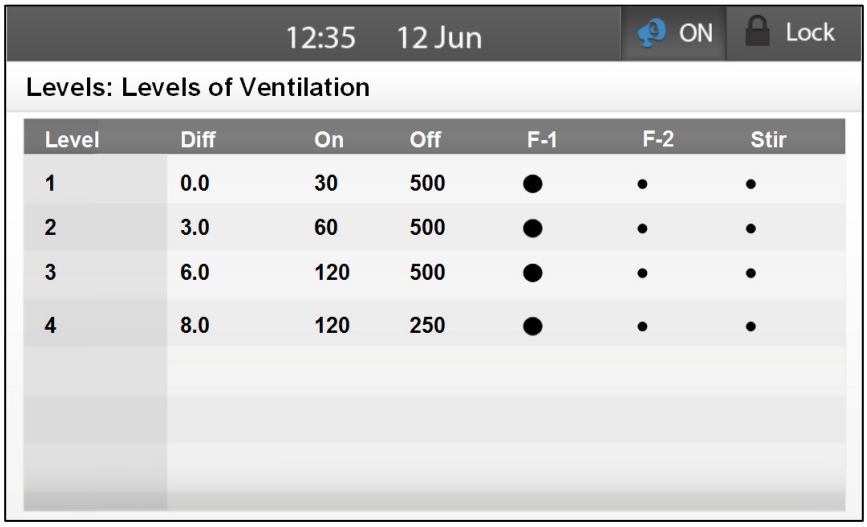
Figure 35: New Happy Zone

10.2.3 Configuring the Levels of Ventilation

This screen defines how fans operate (how long, in which mode, and which fans) at each ventilation level.

➲ **Define up to eight fans in the Analog Output, TRIAC, or Relay Layout screens.**

1. Go to System > Levels of Ventilation > Ventilation Levels.



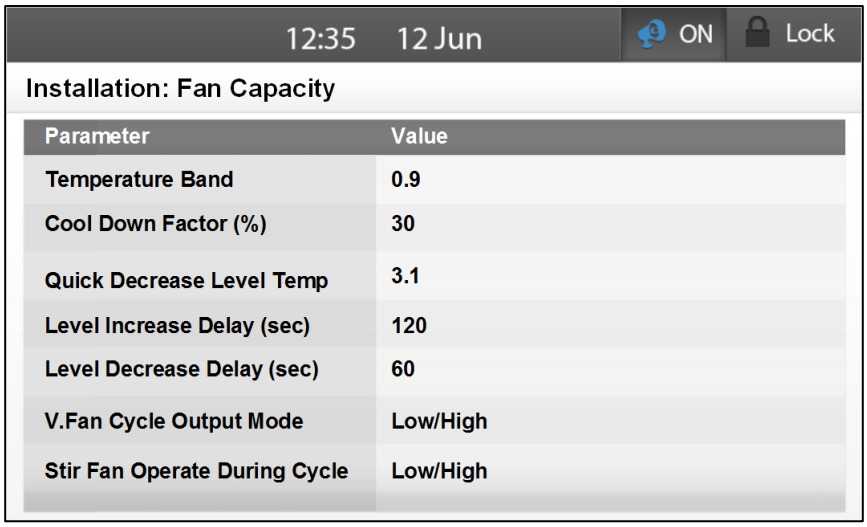
Level	Diff	On	Off	F-1	F-2	Stir
1	0.0	30	500	●	•	•
2	3.0	60	500	●	•	•
3	6.0	120	500	●	•	•
4	8.0	120	250	●	•	•

2. Define the following parameters:
   - Level: This displays the ventilation level. The numbers are read-only.
   - Diff: Define the temperature difference from the target temperature for that ventilation level. Range: 0-15°C Default 0
   - On/Off: Define the fans' on and off times. Range: 0-999 seconds. Default: 0.
     - If a level's diff is defined as 0, ventilation will still continue to rise as the temperature rises above the target temperature.
     - If a level does not have a defined diff parameter, the previous level having a defined parameter will apply.

NOTE If either the On or Off time is defined as 0, the fan runs in continuous mode.

   - Fan Mode: Under F-1 to F-8, define each fans mode:
     ●: Continuous
     ◐: Cycle
     •: Off

3. If required, go to System > Levels > Levels of Ventilation > Set.



4. Define the following parameters:
    - Temperature Band: The temperature defines the temperature range above the target for which the current level of ventilation is satisfactory. The temperature band takes effect only if there is no diff defined for these levels and only after the increase delay time. Ventilation level increases until the temperature returns to the target temperature or a level's diff is defined. Range: 0.2 – 5.0° C
    - Cool Down Factor (%): If
        - the temperature increases enough to push Element to go to the next level
        - but then the average temperature decreases by this percentage within the Level Increase Delay, Element delays the level increase. In effect, this function resets the Level Increase Delay.
    - Quick Decrease Level Temp: If the temperature decreases by this factor, Element decreases the ventilation level even if the Level Decrease Delay Time has not passed. Range: 0 – 20%
    - Level Increase Delay (sec): Define the amount of time that Elements delays increasing the ventilation level.
    - Level Decrease Delay (sec): Define the amount of time that Elements delays decreasing the ventilation level.
    - V.Fan Cycle Output Mode: Element enables limiting the variable fans' output range.
        - Low Mode:
            - Off: Off.

              On: Percentage per level
        - High Mode:
            - Off: Percentage per level.
            - On: 100%
    - Stir Fan Operate During Cycle: While in Cycle mode Element enables the stir fan to work with the fans in a synchronous or asynchronous manner.
        - On: Stir fans operate during the On cycle time.
        - Off: Stir fans operate during the Off cycle time.

11 Minimum Ventilation

The following sections detail how to configure Minimum Ventilation. Minimum ventilation means "air exchange", or the amount of air needed to ensure animal health when the outside temperature is low. As animals grow, the amount of air they need increases.

Element supports three Minimum Ventilation options:

- Basic (default option): The Basic option determines the minimum ventilation levels based on the growth day. If more air is required, the level rises to the next setting.
- Soft Minimum: Soft Minimum determines the minimum ventilation levels based on the growth day. However, in Soft Minimum the minimum ventilation increases in a curve. In addition, in cases of extreme cold, Soft Minimum supports an additional, lower ventilation setting.
- By Weight: Ventilation by Weight determines the ventilation needs based on the temperature, number of animals, and swine weight.

11.1 Basic Ventilation

- How does Basic Ventilation Work?
- Configuring Basic Minimum Ventilation

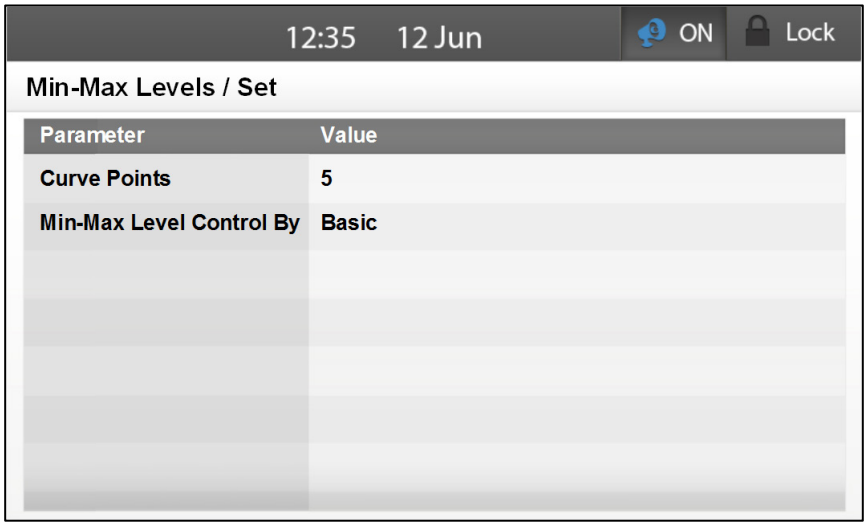
11.1.1 How does Basic Ventilation Work?

Basic ventilation provides ventilation based on the day and the temperature. As the days increase and if the temperature changes, the ventilation level changes accordingly.

11.1.2 Configuring Basic Minimum Ventilation

➲ **Configure the Temperature Curve and the Levels of Ventilation.**

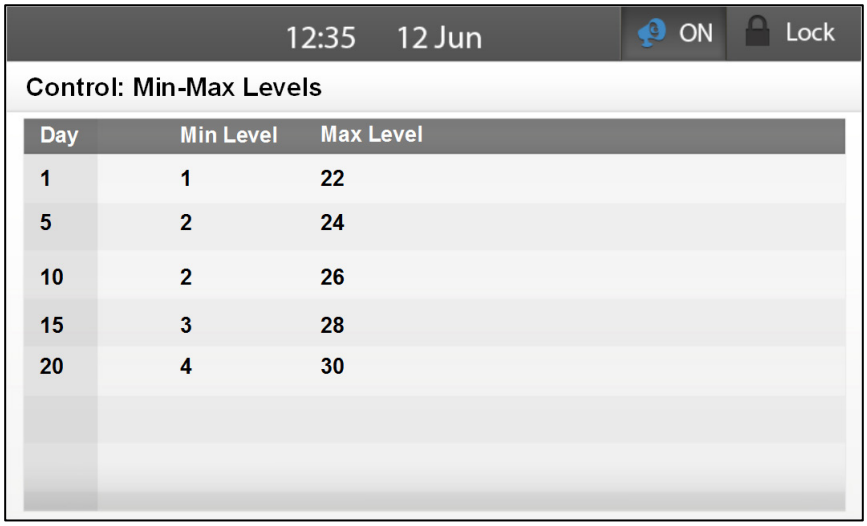
1. Go to Control > Min Max Level > Set.



2. Define the following parameters:

- Curve Points: Define the number of Min-Max levels. Range: 1 – 30. Default: 1
- Min Max Level Control By: Set this parameter to Basic.

3. Go to Control > Min Max Level.



Day	Min Level	Max Level
1	1	22
5	2	24
10	2	26
15	3	28
20	4	30

4. Define the following parameters:
   - **Day**: Define the growth day at which the ventilation levels change. Range 1 – 10. Default: 0
   - **Minimum Level**: Set the controller's minimum ventilation level starting at that day.
   - **Maximum Level**: Set the controller's maximum ventilation level starting at that day.

NOTE Each day's minimum ventilation level must be lower than the corresponding maximum level.

11.2 Soft Minimum Ventilation

- How does Soft Minimum Ventilation Work
- Configuring Soft Minimum Ventilation

11.2.1 How does Soft Minimum Ventilation Work

Soft Minimum ventilation provides ventilation based on the day and the temperature. As the temperature decreases or rises, the ventilation level changes accordingly. However between two parameters, the Soft Minimum and Warm Minimum, Element ramps the ventilation. Meaning, Element adjusts ventilation according to the temperature (to prevent changing the ventilation too frequently any change must be larger than a user-defined amount).

If the temperatures drop below the heat temperature and later begin to rise, ventilation behavior depends on which temperature sensor is being used.

- When using an outside temperature sensor, the ventilation curves functions when the temperature increases or decreases. This prevents excess cold air from entering the barn while allowing for increases to match the rising temperatures.
- When using an inside temperature sensor, the ventilation curve functions when the temperature decreases. However if **inside temperature** increases, the ventilation levels remain at the lowest level reached. This is done to prevent cold **outside** air from entering the barn. When the temperature falls to the heating temperature, only then does the ventilation increase.

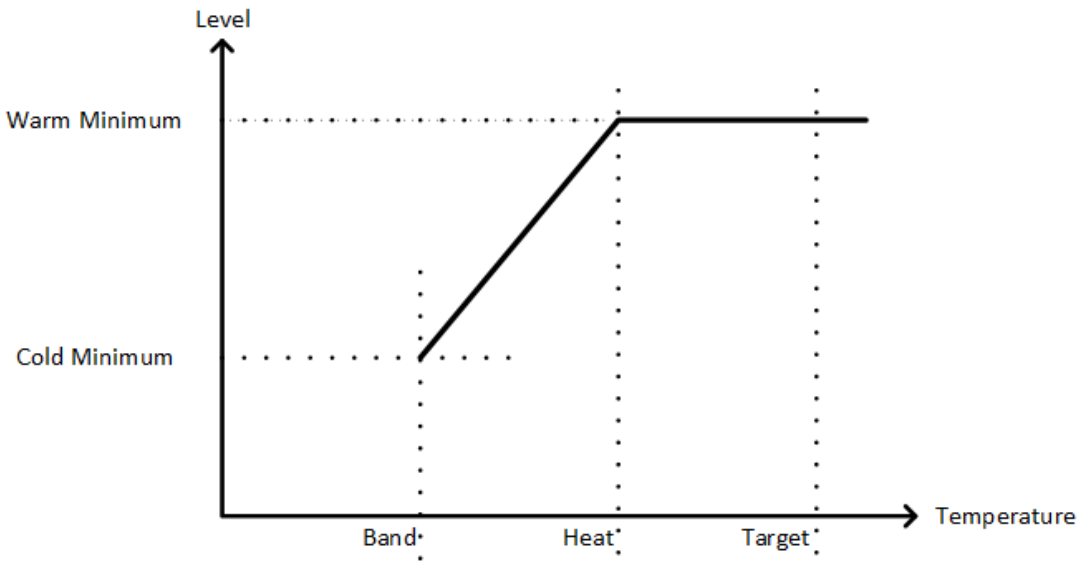
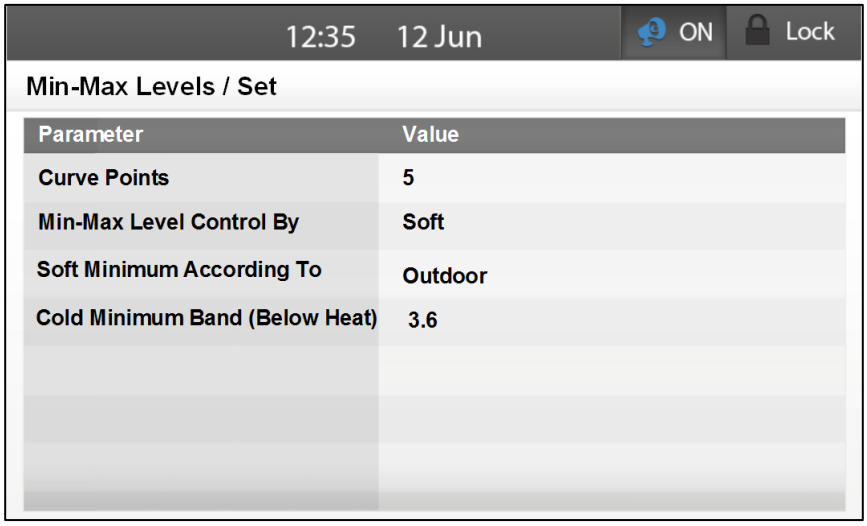


Figure 36: Soft Minimum Example

11.2.2 Configuring Soft Minimum Ventilation

➲ **Configure the Temperature Curve and the Levels of Ventilation.**

1. Go to Control > Min Max Level > Set.



Parameter	Value
Curve Points	5
Min-Max Level Control By	Soft
Soft Minimum According To	Outdoor
Cold Minimum Band (Below Heat)	3.6

2. Define the following parameters:
   - **Curve Points**: Define the number of Min-Max levels. Range: 1 – 30. Default: 1
   - **Min Max Level Control By**: Set this parameter to Soft Min.
   - **Soft Minimum According to**: This parameter defines how the temperature curve functions. See the previous section for details.
   - **Cold Minimum Band (Below Heat)**: Minimum Cold ventilation begins when the temperature drops by the amount of this differential below the heat temperature. Range: -20.0 – 20.0 F/C. Default: 2.0
3. Go to Control > Min Max Level.

4. Define the following parameters:
    - **Day**: Set growth day
    - **Cold Minimum Level**: Set minimum ventilation level for when the temperature is below the heating set point by the amount defined in the Cold Minimum Band.
    - **Warm Minimum Level**: Set minimum ventilation level for when the temperature is above the heating set point.

    Between the Cold Minimum and Warm Minimum the ventilation curves; see Figure 36: Soft Minimum Example.

    - **Maximum Level**: Set the controller's maximum ventilation level starting at that day.

11.3 Ventilation by Weight

- How Does Ventilation by Weight Work
- Configuring Ventilation by Weight
- Ventilation By Weight Alarm

11.3.1 How Does Ventilation by Weight Work

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

However between two parameters, the Cold Minimum and Warm Minimum, Element ramps the ventilation. Meaning, Element adjusts ventilation along a curve. If the temperature rises above the Target Temperature, ventilation increases by levels until it reaches the Maximum Level.

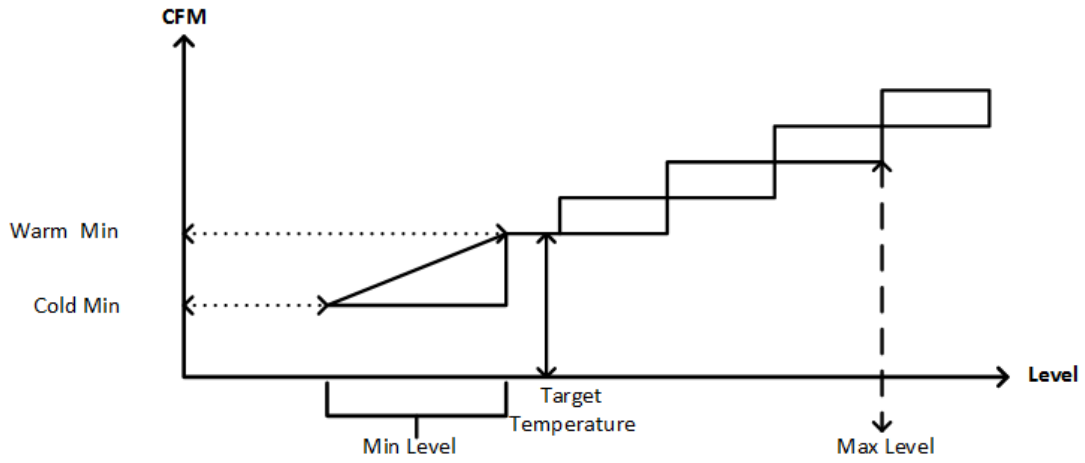


Figure 37: Ventilation by Weight Example

It is important to note that the Warm Minimum can be less than the Minimum Ventilation's output. In that case, the controller will increase the ventilation before raising the ventilation level. This increase is called "Compensation"(Figure 38). In the case where even with the compensation the fans do not supply sufficient air, Element then goes to the next ventilation level.

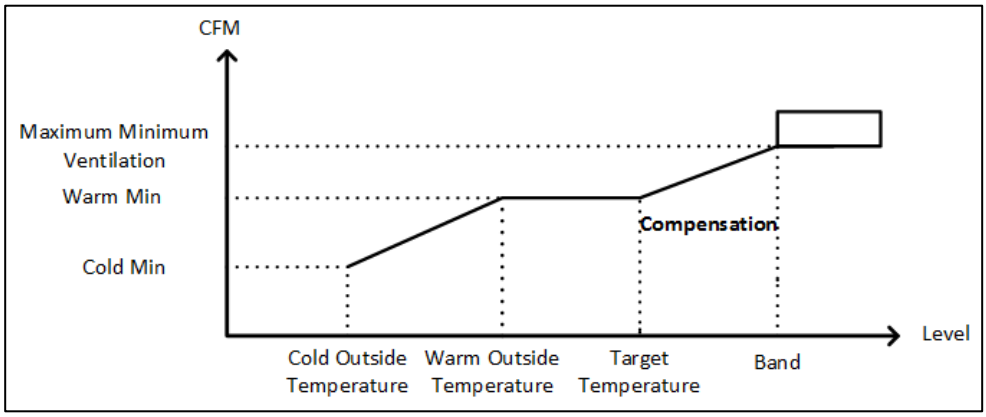


Figure 38: Ventilation by Weight Compensation Example

- When using cycle fans, each level has minimum and maximum on times, which determine the minimum and maximum CFM. If the ventilation doesn't provide enough air for the pigs (based on their numbers and weight) Element sends an alarm. You will need to redefine the minimum level.
- When using variable speed fans, the defined percentages determine the minimum and maximum CFM. However, if a variable fan is set to run in a cycle, the cycle time determines the fan operation, not the user-define fan speed.
- Note that there is no curve between days.

11.3.2 Configuring Ventilation by Weight

➲ **Configure the Temperature Curve and the Levels of Ventilation.**

➲ **Define the number of animals in the herd.**

1. Go to Control > Min Max Level > Set.

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Min-Max Levels / Set

Parameter	Value
Curve Points	5
Min-Max Level Control By	Weight
Soft Minimum According To	
Cold Minimum Band (Below Heat)	3.6
Minimum By Weight	
Warm Outside Temperature	50
Cold Outside Temperature	10

2. Define the following parameters:
   - **Curve Points**: Define the number of Min-Max levels. Range: 1 – 30. Default: 1
   - **Min Max Level Control By**: Set this parameter to By Weight.
   - **Warm Outside Temperature**: This temperature is used to define the largest amount of air that minimal ventilation can provide.
   - **Cold Outside Temperature**: This temperature is used to define the smallest amount of air that minimal ventilation can provide.

Between the Cold Outside Temperature and Warm Outside Temperature the ventilation curves; see Figure 38.

3. Go to Control > Min Max Level.

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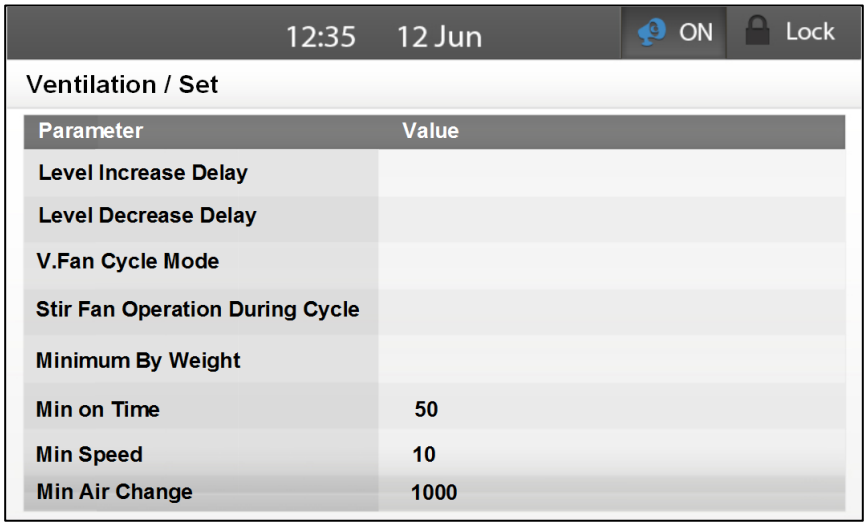
Control: Min-Max Levels

Day	Min Level	Cold Min m3h/kg	Warm Min m3h/kg	Max Level
1	1	10	22	20
5	2	10	24	22
10	2	10	26	25
15	3	10	28	27
20	4	10	30	27

4. Define the following parameters:
   - **Day**: Define the growth day at which the ventilation levels change. Range 1 – 10. Default: 0
   - **Minimum**: Set the controller's minimum ventilation level starting at that day. Ventilation is never less than this level.
   - **Cold Min:** Define the amount of air provided when the outside temperature reaches the Cold Outside Temperature defined in Set.
   - **Warm Min**: Define the amount of air provided when the outside temperature reaches the Cold Outside Temperature defined in Set.
   - **Maximum**: Set the controller's maximum ventilation level starting at that day. Ventilation is never higher than this level.

NOTE Each day's minimum ventilation level must be lower than the corresponding maximum level.

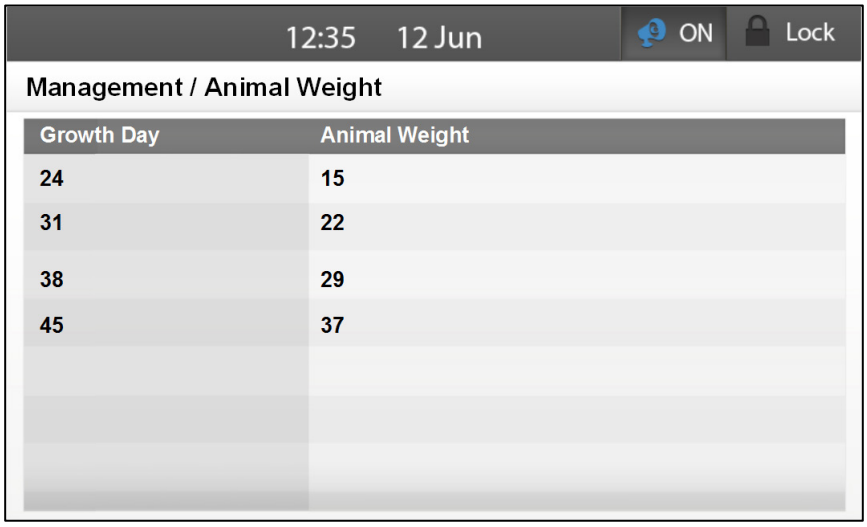
5. Go to Levels of Ventilation > Set.



6. Define the following parameters:
   - **Minimum on Time**: When Element works in Ventilation by Weight, you can ensure that the fan operates for a minimum amount of time each cycle. Define that time here.
   - **Minimum Speed**: When Element works in Ventilation by Weight, you can ensure that **variable** fans operates at a minimum speed. Define that speed here.
   - **Minimum Air Change**: Define the minimum change (in response to changes in temperature, weight, number of pigs) required for ventilation to change.

➲ **Make sure that On and Off times provide sufficient CFM for the fan used!**

7. Go to Management > Animal Weight.



8. Enter the growth days and the expected animal weight.

11.3.3 Ventilation By Weight Alarm

In the event that the maximum ventilation level for any given day does not provide the amount of air required according to the Element's algorithm (taking into account the weight and number of animals), Element sends an alarm "Insufficient Air Supply". Element generates this alarm if the required amount of air is greater than the maximum amount supplied plus the minimum air change (defined in Levels of Ventilation Set). In this situation, reconfigure the Levels of Ventilation table.

12 Inlet and Curtain Ventilation

Air to the barn enters via curtains and inlets, pulled in by the fans. Setting up the curtains and inlets consists of the following:

- Measuring how long it takes to completely open the curtains/inlets
- Defining the curtains/inlets control method.

NOTE When Element determines that more ventilation is required, it opens the inlets before increasing the actual ventilation. This is done to prevent excess pressure from building up when the ventilation increases.

12.1 Calibrating the Opening/Closing

There are two methods you can use to calibrate the inlet and curtain opening and closing times:

- Using a Potentiometer
- Using Time

NOTE Use one method, not both.

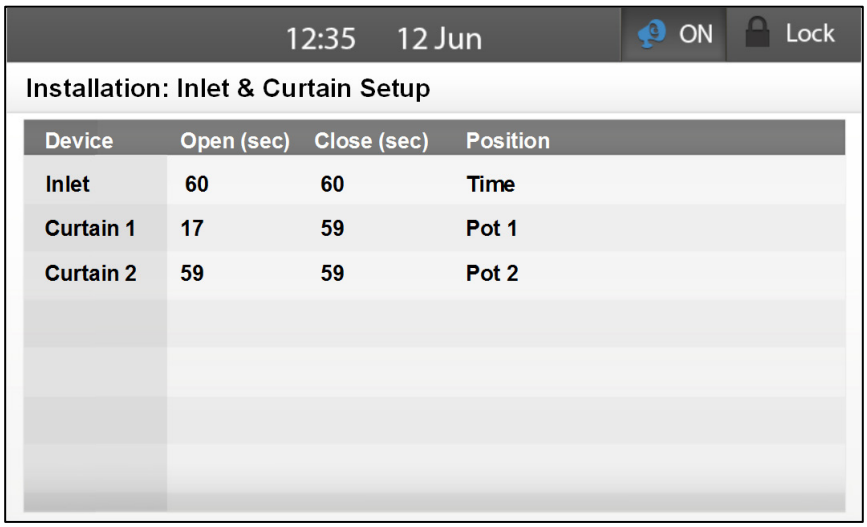
12.1.1 Using a Potentiometer

Map a curtain or vent to a potentiometer to enable automatic opening and closing calibration (and not time).

➲ **In the System > Installation > Relay, define relays as Inlet or Curtain.**

➲ **To enable potentiometer control, in System > Installation > Analog Input define an analog sensor as potentiometer.**

1. Go to System > Installation > Inlet & Curtain Setup.



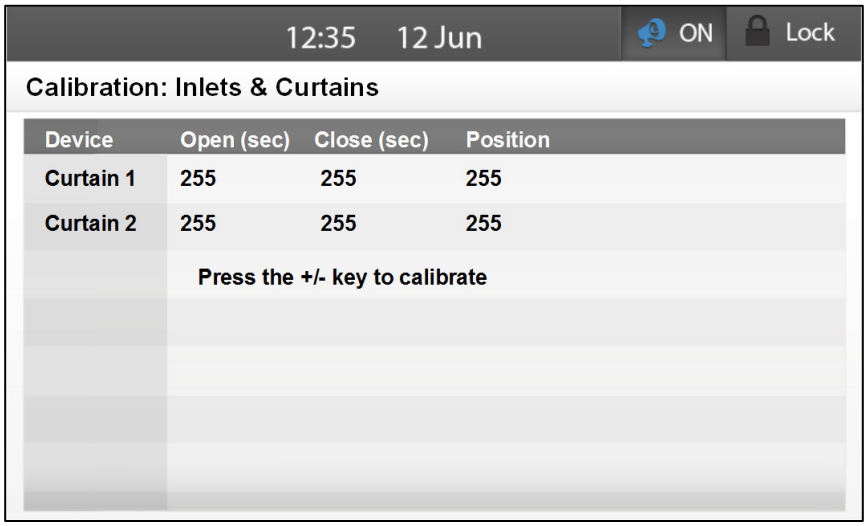
Device	Open (sec)	Close (sec)	Position
Inlet	60	60	Time
Curtain 1	17	59	Pot 1
Curtain 2	59	59	Pot 2

2. Map the inlet(s) or curtain(s) to the potentiometer(s).

NOTE There is no need to enter times into these fields.

3. Go to Calibration > Inlets & Curtains.

NOTE The table displays only those inlets mapped to a potentiometer.



4. Press the +/- key. Element calibrates the inlet or curtains.

A message appears at the end of the process.

Additional information:

- After the potentiometer calibration finishes, Element automatically calculates the opening and closing times and enters these numbers into the Inlet & Curtain Setup screen.
- In the event that the potentiometers fail for any reason, Element will automatically switch to using the time to control the opening and closing.

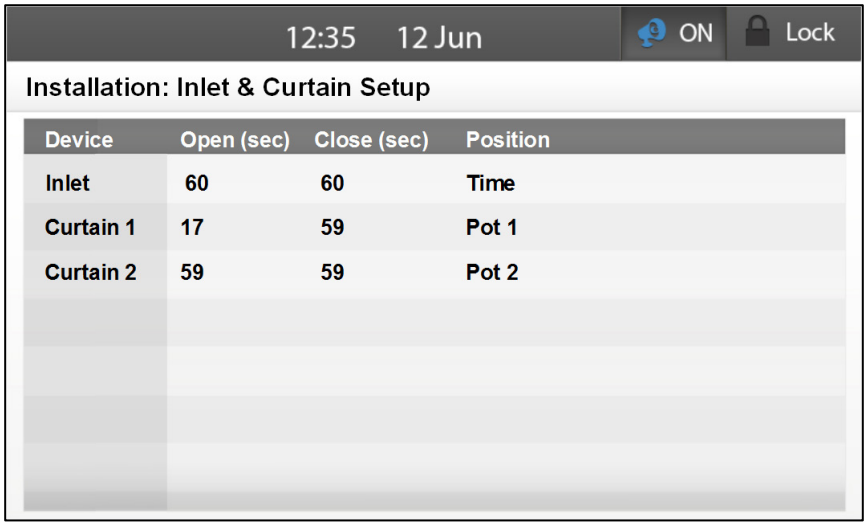
5. Configure the opening control mechanism.

12.1.2 Using Time

➲ **In the System > Installation > Relay, define relays as Inlet or Curtain.**

1. Using a timing device measure the amount of time required to completely open and close the curtains and vents.

2. Go to System > Levels of Ventilation > Inlet & Curtain Setup.



3. Define the following parameters:
   - Inlet 1/2: Enter the time it takes to open from 0% to 100% and to close from 100% to 0%.

- Curtain 1/2: Enter the time it takes to open from 0% to 100% and to close from 100% to 0%.

4. Configure the opening control mechanism.

12.2 Control Method

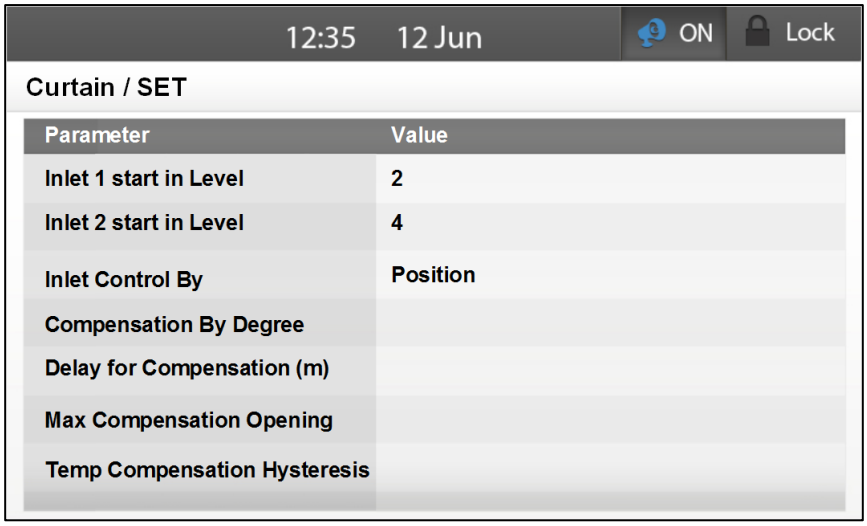
- Position Control
- Pressure Control
- Temperature Control

12.2.1 Position Control

Position control means that the inlets and curtains open to a certain fixed position, based on the ventilation requirements. Element allows configuring two positions.

1. Go to System > Installation > Inlet & Curtain Setup > Set.

Go to System > Levels of Ventilation > Inlet & Curtain Levels > Set.



2. Define the following parameters:
   - Inlet 1 / 2 start in level: Ventilation level at which Inlets 1 and 2 begin to operate.
   - Inlet Control by: Select Position.
3. Go to System > Levels of Ventilation > Inlet & Curtain Levels and define the opening per levels.

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Levels of Ventilation: Inlet & Curtain Levels

Level	Inlet 1	Inlet 2	Curtain 1	Curtain 2
1	15	10	30	30
2	20	15	45	45
3	25	20	30	45
4	30	30	45	45
5	35	30	30	45
6	35	35	45	45

12.2.2 Pressure Control

When set to pressure control, the static pressure (the difference between the interior and exterior air pressures) controls the inlets opening and closing (the opening position is determined in the Inlet & Curtain Levels screen). Air temperature has no effect on them. Maintaining the proper pressure enables air to enter the rooms at the right speed and direction and ensures efficient air exchange. Note that the Element will adjust the inlets' opening only if one or more fan is operating.

NOTE When fans are working in cycles, Element does all calculations based on the cumulative times of the On Cycle.

As an option, Element can send an alarm if the static pressure is too high or too low.

Temperature plays no part in this process.

1. Go to System > Levels of Ventilation > Inlet & Curtain Levels > Set.

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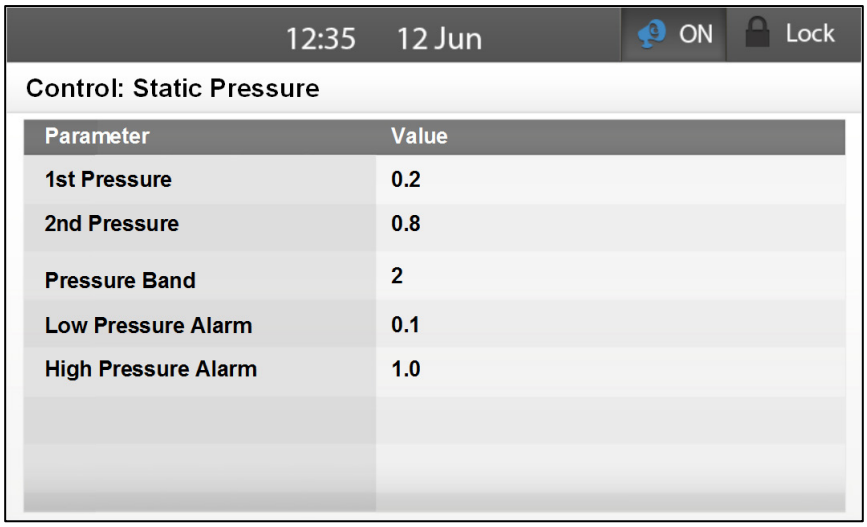
Curtain / SET

Parameter	Value
Inlet 1 start in Level	2
Inlet 2 start in Level	4
Inlet Control By	Pressure
Compensation By Degree	
Delay for Compensation (m)	
Max Compensation Opening	
Temp Compensation Hysteresis	

2. Define the following parameters:
   - Inlet Control by: Select Pressure.
3. Go to Control > Static Pressure.

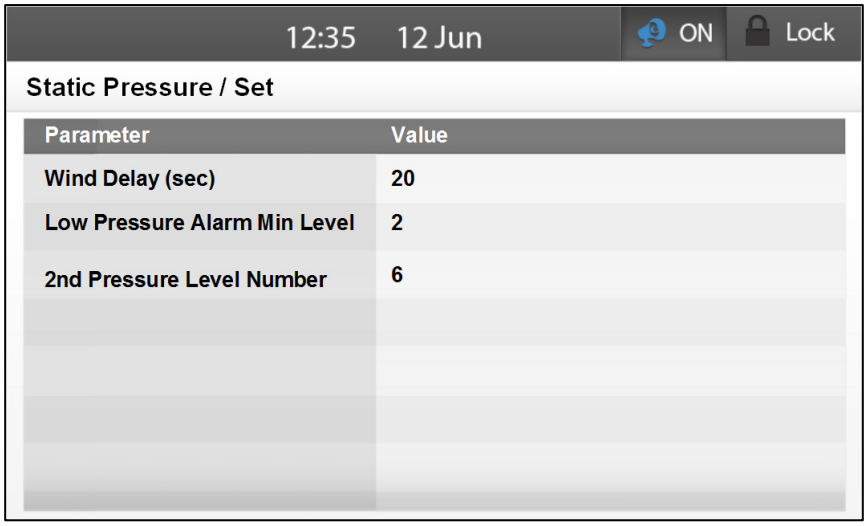


4. Define the following parameters:
    - 1st Pressure: 1st static pressure target that the inlets need to maintain.
    - 2nd Pressure: 2nd static pressure target that the inlets need to maintain.
    - Pressure Band: This defines the acceptable pressure range:
        - Below the band (Pressure – Band), Element closes the inlets.
        - Above the band (Pressure + Band), Element opens the inlets.
        - Inside the band, Element does nothing.

NOTE The number defined is the number used in making all calculations.

    - Low Pressure Alarm: When static pressure is below this level, Element sends an alarm.
    - High Pressure Alarm: When static pressure is above this level, Element sends an alarm.

5. Go to Control > Static Pressure > Set.



6. Define the following parameters.
    - Wind Delay (sec): The amount of time that the air pressure must be outside of the band limit before Element adjusts the opening.
    - Low Pressure Alarm Min Level: Below this ventilation level, Element ceases to send an alarm.
    - 2nd Pressure Level Number: The minimum ventilation level required for Element to enable the 2nd pressure point.

7. Go to System > Levels of Ventilation > Inlet & Curtain Levels and define the minimum opening per levels. The controller will increase the opening according to the static pressure.

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Levels of Ventilation: Inlet & Curtain Levels

Level	Inlet 1	Inlet 2	Curtain 1	Curtain 2
1	15	10	30	30
2	20	15	45	45
3	25	20	30	45
4	30	30	45	45
5	35	30	30	45
6	35	35	45	45

12.2.3 Temperature Control

When set to temperature control, the air temperature controls the inlets' opening and closing. Inlets and curtains open or close based on the difference between the current temperature and the target temperature. Static pressure has no effect on opening or closing.

1. Go to System > Levels of Ventilation > Inlet & Curtain Levels > Set.

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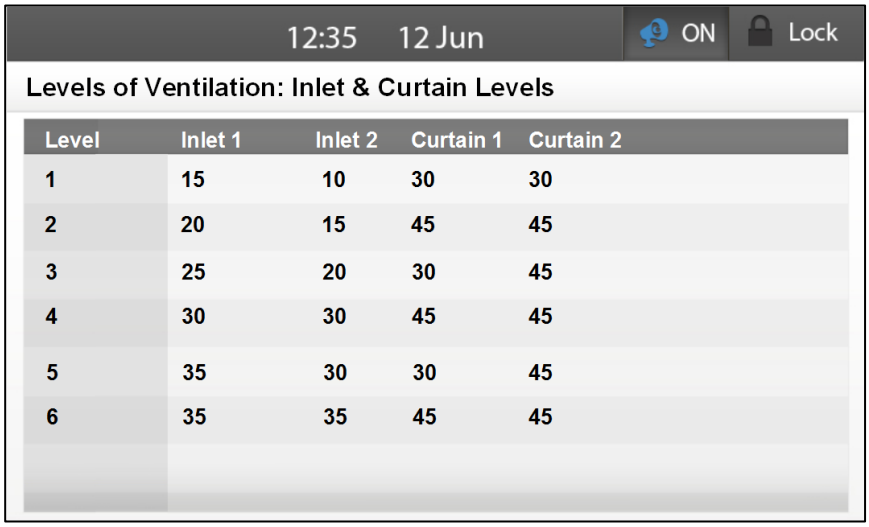
Curtain / SET

Parameter	Value
Inlet 1 start in Level	
Inlet 2 start in Level	
Inlet Control By	
Compensation By Degree	Temperature
Delay for Compensation (m)	1
Max Compensation Opening	5
Temp Compensation Hysteresis	10

2. Define the following parameters:
   - Inlet Control by: Select Temperature.
   - Compensation By Degree: This parameter defines how much the inlets open or close based on the difference between the target temperature and current temperature. If, for example, there is a 2° difference and the compensation is 5%, the inlets open by 10%.
   - Delay for Compensation (min): The divergence in temperatures must continue for this amount of time before any change is made in the inlet openings.
   - Max Compensation Opening: This parameter defines the maximum possible opening. Even if the calculated compensation is greater than this amount, the inlets will not open more than this amount.

3. Go to System > Levels of Ventilation > Inlet & Curtain Levels and define the opening per levels. The controller will increase the opening according to the temperature.



Level	Inlet 1	Inlet 2	Curtain 1	Curtain 2
1	15	10	30	30
2	20	15	45	45
3	25	20	30	45
4	30	30	45	45
5	35	30	30	45
6	35	35	45	45

13 Cooling Functions

- Cooling Principles
- Configuring the Cool

13.1 Cooling Principles

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

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

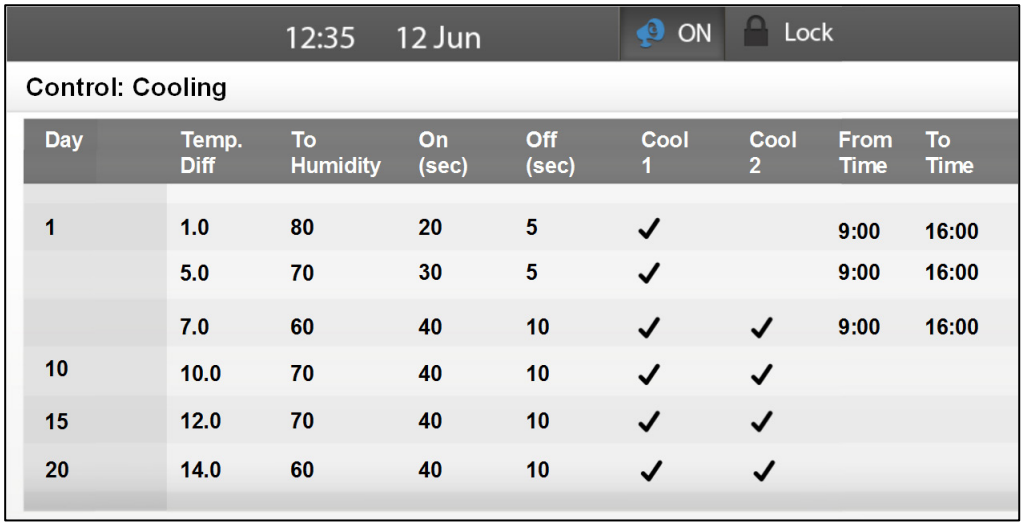
- When the temperature reaches the Target Temperature plus the Temperature Difference, cooling begins and continues until the temperature falls below this point (minus the band) (Figure 39).
- If the humidity level rises above the To Humidity parameter (plus the Humidity Band), cooling ceases.
- Cooling only takes place between the start and finish times.

13.2 Configuring the Cooling

➲ **Wire cooling devices to the relays as shown in Figure 13, page 23.**

➲ **Define Centigrade or Fahrenheit in Measurement System.**

1. Go to Control > Cooling.



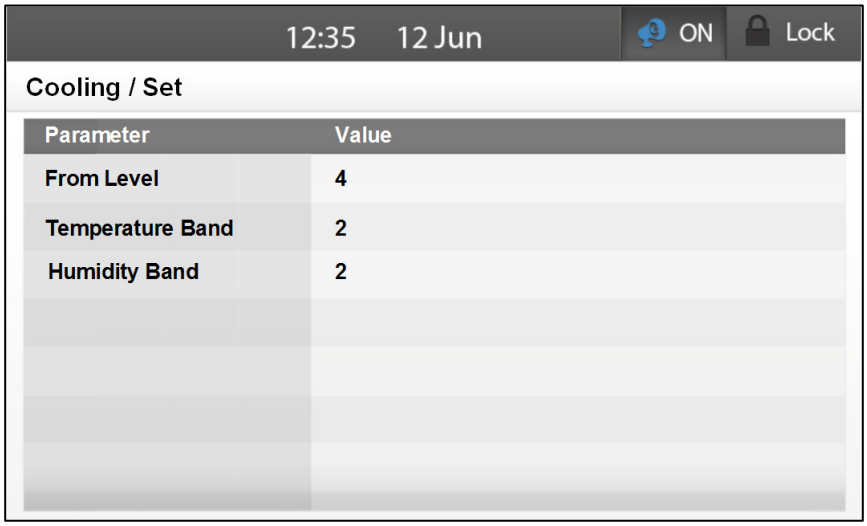
Day	Temp. Diff	To Humidity	On (sec)	Off (sec)	Cool 1	Cool 2	From Time	To Time
1	1.0	80	20	5	✓		9:00	16:00
	5.0	70	30	5	✓		9:00	16:00
	7.0	60	40	10	✓	✓	9:00	16:00
10	10.0	70	40	10	✓	✓		
15	12.0	70	40	10	✓	✓		
20	14.0	60	40	10	✓	✓		

2. Define the following parameters:
   - Day: Define the growth day (You can define up to 999 growth days, including multiple lines for any individual day.) Default 0. These settings remain in effect until the next defined day.

- Target Diff: When the temperature rises to the Target Temperature plus this differential, cooling starts.
- To Humidity: Cooling only operates when the humidity is less than this level. Default: 0.
  - Setting this parameter to 0 or 100 disables the sensor input to this function.
  - If the sensor sends invalid readings, Element will ignore the Humidity settings.
  - In a situation where there are multiple data lines for a single day and the humidity level rises to the temperature setting (plus differential), cooling stops entirely. It does not roll back to the previous setting.
- On/Off: Set timing values (in seconds) for the On/Off cycle. Default: 0
- Cooling: Select cooling device. Default: no cooling device selected
- Start/End Time: Set the cooling operation time. Default: 00:00 – 23:59

NOTE Setting the start/end times to 00:00 to 00:00 disables the function.

3. If required, go to Control > Cooling > Set.



4. Define the following parameters:
   - From Level: Define the minimum ventilation level at which cooling can begin: Default: 1
   - Temperature Band: When the temperature reaches the target temperature plus this differential **minus the temperature band**, cooling stops. Range: 0.2 – 20.0. Default: 1.1 (see Figure 39)
   - Humidity Band (%): Hysteresis band for Humidity Treatment. Range: 1 – 20%: Default: 2%

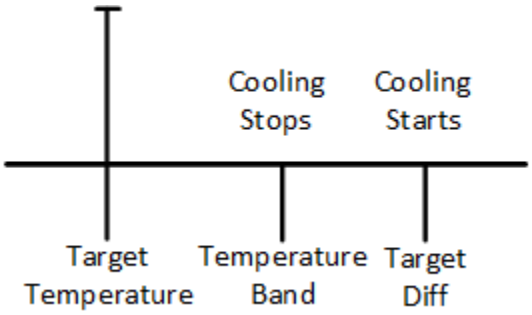


Figure 39: Cooling Temperature On Off

14 Heating Functions

- Heating Principles
- Standard (On/Off) Heating
- Analog Controlled Heating

14.1 Heating Principles

Heaters are independent; each one can work with its own starting and stopping time, relay selection, and temperature sensor. In configuring the heaters, you define the temperatures at which the heaters turn on and off.

- In Figure 40, the On Temperature is below the target temperature. Heaters remain off until the temperature falls to the Heat Parameter. When the temperature then rises to the Heat Temperature, heating stops.

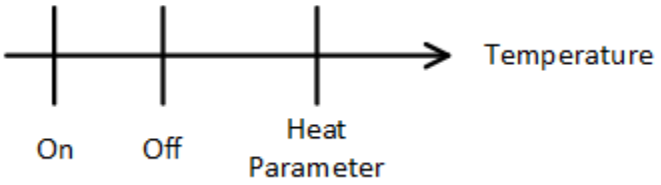


Figure 40: On Temperature below the Target

- Figure 41 shows a scenario in which the On Temperature is above the Target Temperature. Heaters remain on until temperatures rise to the Heat Parameter. This scenario would be used in situations where the animals need extra heat.

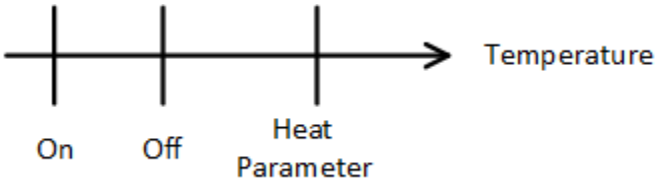


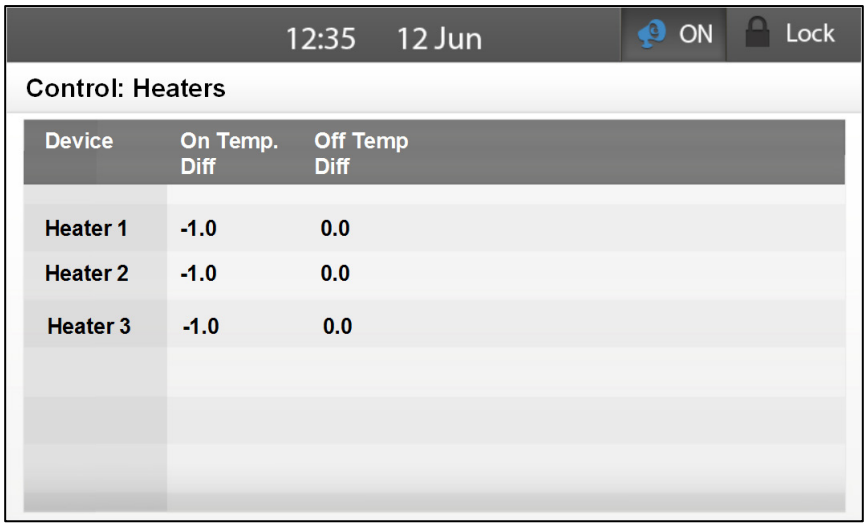
Figure 41: On Temperature above the Target

14.2 Standard (On/Off) Heating

➲ **Wire heaters to the relays as shown in Figure 13, page 23.**

➲ **Define Centigrade or Fahrenheit in Measurement System.**

1. Go to Control > Heaters.



2. Define the following parameters:
   - On Temp Diff: When the actual temperature drops differs from the Heat Parameter by this amount, heaters turn on. Range: -20 to +20. Default: 0
   - Off Temp Diff: When the actual temperature differs from the Heat Parameter by this amount, heaters turn off. Range: -20 to +20. Default: 0.556C° (-1F°).

NOTE If the difference between On/Off Temp Difference is less than 0.1C / 0.2 F, heaters do not operate.

Note that in Standard Heating, once the heaters turn on, they remain at the same temperature until the Off Temperature is reached (Figure 42).

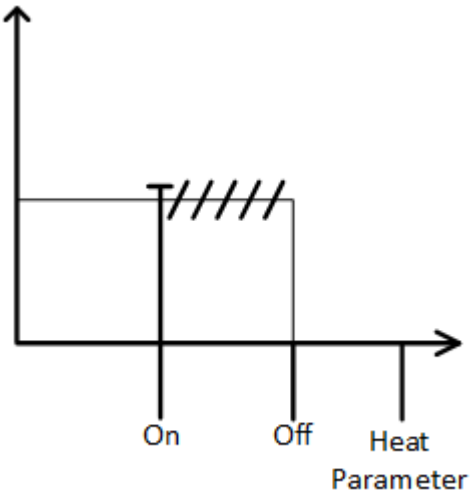


Figure 42: Standard Heating: No Curve

14.3 Analog Controlled Heating

➲ **Wire heaters to the relays as shown in Figure 13, page 23.**
➲ **Define Centigrade or Fahrenheit in Measurement System.**
➲ **Enable at least one analog output as a heater.**

1. Go to Control > Heaters.

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Control: Heaters

Device	On Temp. Diff	Off Temp Diff	Max Heat Temp. Diff	Min. Output (%)	Max Output (%)
Heater 1	-1.0	0.0	-2.8	0	100
Heater 2	-1.0	0.0	-2.8	0	100
Heater 3	-1.0	0.0	-2.8	0	100

2. Define the following parameters:
   - Device: Read only column. Displays the device number.
   - On Temp Diff: When the actual temperature drops differs from the Target Temperature by this amount, heaters turn on. Range: -20 to +20. Default: 0.
   - Off Temp Diff: When the actual temperature differs from the Target Temperature by this amount, heaters turn off. Range: -20 to +20. Default: 0.556C° (-1F°).
   - Max Heat Temp Diff: When the actual temperature differs from the Target Temperature by this amount, heaters operate at their maximum output. Range: -20.0 to 20.0. Default: -2.78C° (-5F°)
   - Min Output %: Define the minimum heater output. Range: 1 – 100%. Default: 0
   - Max Output %: Define the maximum heater output. Range: 1 – 100%. Default: 0
     - After defining the Minimum and Maximum Output Percentages, these numbers become the goalposts for analog control. For example, if the Maximum Output is defined as 80%, that number becomes the maximum amount when calculating the curve.

NOTE On Temp Diff and Off Temp Diff is calculated by average or some sensors of temperature depends on definition in Temperature Definition Tables for each device.

3. If required, go to Control > Heaters > Set.

12:35 12 Jun ON Lock

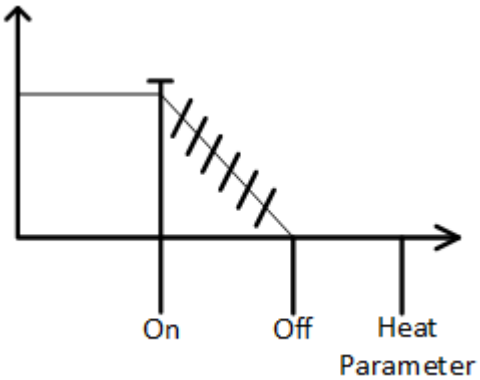
Heaters / Set

Parameter	Value
Heat Curve	Linear
Response Time	15

4. Define:

- Heat Curve: Choose heaters' operating method. Default: Linear
    - Linear: When using an analog output sensor, the variable heater aims to keep the temperature within the Heater Temperature Band.
- Response Time: This parameter defines how often the temperature is sampled and the output updated accordingly. During this time period Heater control is idle, the temperature is not being sampled, and the output doesn't change. Range: [0-999], default 15.

Note that in Variable Heating, the output decreases in a curve as the temperature approaches the Off Temperature (Figure 43).



- Figure 43: Variable Heating: Curve

15 Calibration

- Calibrating the Inlets and Curtains
- Calibrating the Humidity and Temperature Sensor
- Calibrating the Water Meter

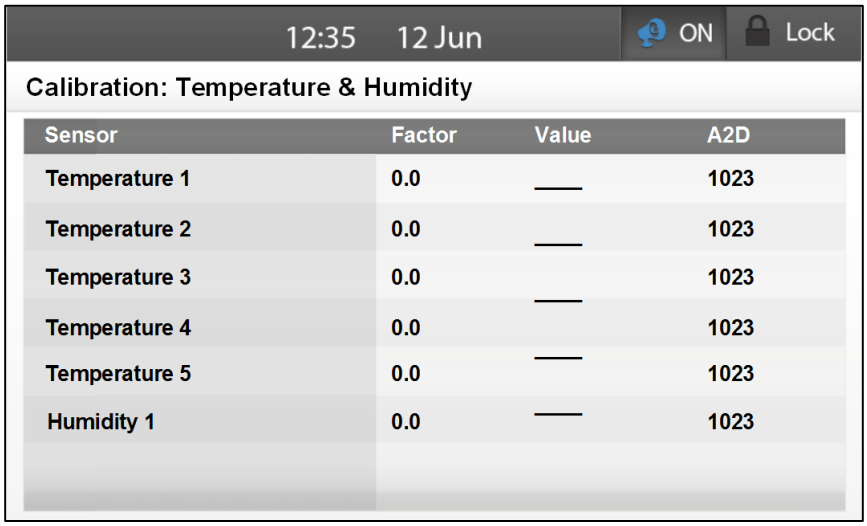
15.1 Calibrating the Inlets and Curtains

- Refer to Calibrating the Opening/Closing, page 62.

15.2 Calibrating the Humidity and Temperature Sensors

CAUTION *The humidity and temperature sensors are very accurate. Only calibrate the sensors if you have reason to believe that they are producing inaccurate results.*

1. If required, go to Calibration > Temperature & Humidity.



2. Calibrate the sensors on this screen.
3. Using the Arrow keys, scroll to the required sensor.
4. Calibrate the sensors by using a very accurate reference instrument and enter the offset number for each sensor under Factor. The system remembers the difference between the system's calculation and the changed calibration value.

- Range:
  - Temperature sensors: 5.0 to 5.0C°/9.0 to 9.0 F°
  - Humidity sensor: ±10
  - Default: 0
- Value: Read only. Displays each sensor's current value
- A/D: Read only. Displays each sensor's current A/D value

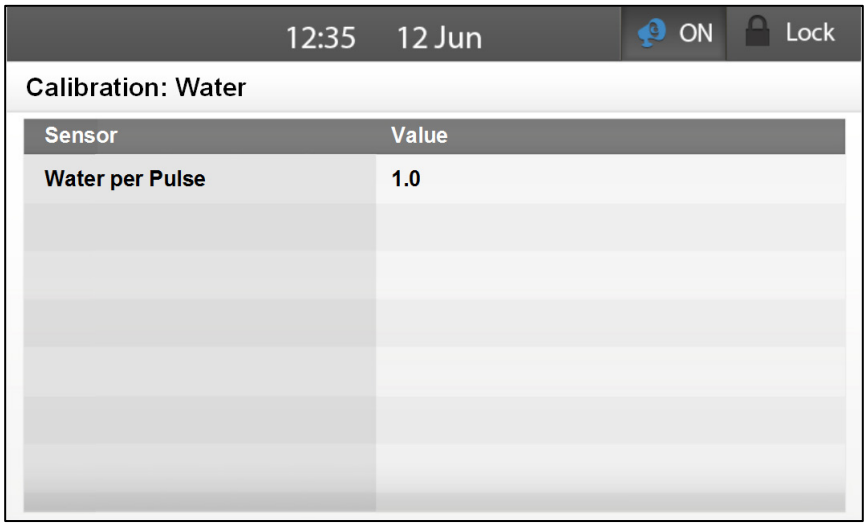
*NOTE If an error occurs with a temperature sensor, the information regarding the specific sensor can be deleted from the **Calibration** menu. This is done by pressing <**PROG**> when an invalid sensor's field appears.*

15.3 Calibrating the Water Meter

➲ **Define a digital sensor as a water meter as shown in Figure 17, page 27.**

The water system operates on a pulse counting system. In this screen, specify how much water flows per pulse.

1. Go to Calibration > Water.



2. Specify the flow rate.
   - Range: 0 – 100 liters per pulse. Default: 0

16 Alarms

The following sections detail:

- Setting the Alarm Parameters
- Alarm Reset

When certain climatic and feed conditions in the barn do not meet user defined specifications, Element triggers an alarm, enabling the user to deal with the problem in real time. Element records all alarms.

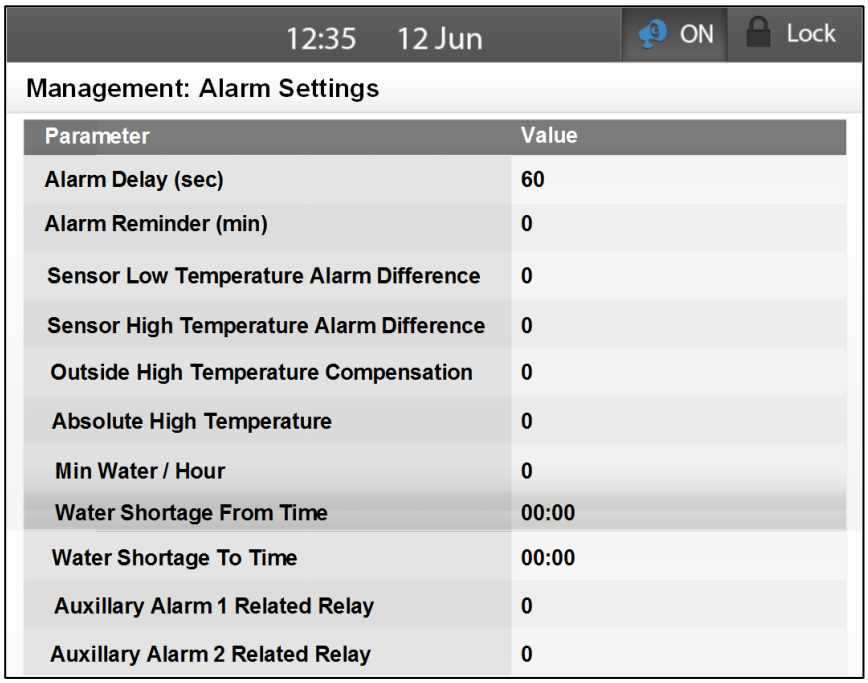
Events are changes in the Elements settings. Element records all events.

NOTE Systems having an auxiliary alarm: Install the alarm as shown in Figure 17, page 27.

16.1 Setting the Alarm Parameters

Use this table to define the Elements alarms' parameters. These parameters define when an alarm is generated.

1. Go to Management > Alarm Settings.



Parameter	Value
Alarm Delay (sec)	60
Alarm Reminder (min)	0
Sensor Low Temperature Alarm Difference	0
Sensor High Temperature Alarm Difference	0
Outside High Temperature Compensation	0
Absolute High Temperature	0
Min Water / Hour	0
Water Shortage From Time	00:00
Water Shortage To Time	00:00
Auxillary Alarm 1 Related Relay	0
Auxillary Alarm 2 Related Relay	0

2. Define the following parameters:
   - **Alarm Delay**: This parameter defines the delay time between the failure detection and alarm operation. If the problem is resolved before the delay time ends, no alarm is recorded in the history log. Default: 0 seconds. Range 0 – 999 seconds.
   - **Alarm Reminder**: This parameter defines the amount of time that must elapse before a second alarm is sent. Acknowledging the alarm negates this function. Default: 0 seconds. Range 0 – 999 seconds.

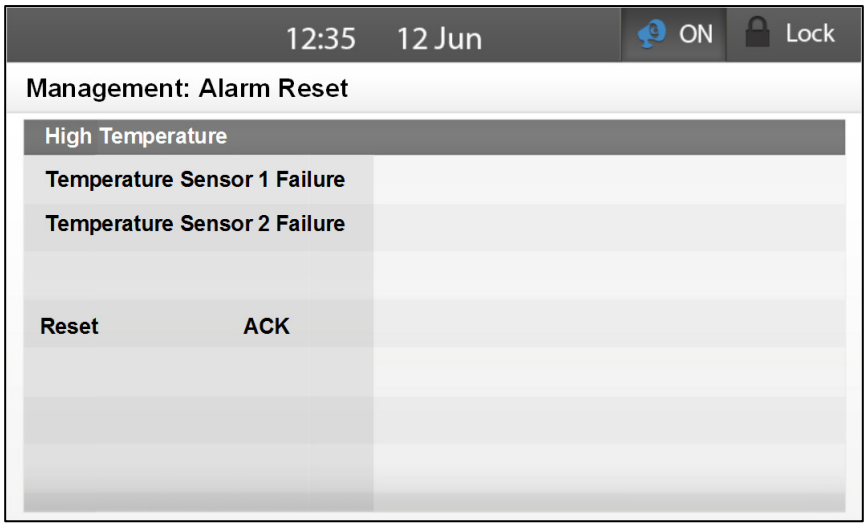
- **Temperature Sensor Alarms**:
    - Low Temperature Alarm Difference: Element sends an alarm when the sensor temperature goes below the low temperature set point (target temperature **minus** this number). Default: 0 degrees. Range 0 – 10.0 degrees.
    - High Temperature Alarm Difference: Element sends an alarm when the sensor temperature goes above the high temperature set point (target temperature **plus** this number). Default: 0 degrees. Range 0 – 10.0 degrees.
- **High Temperature Alarms**:
    - Outside High Temperature Compensation: This parameter defines the number of degrees added to the High Temperature Alarm when outside temperatures are high. This feature ensures an alarm is not triggered just because it is a hot day.
    - Absolute High Temperature (default 35C): Regardless of the Outside High Temperature Compensation, an alarm is sent at this temperature.
- **Min Water /Hour**: Sends an alarm if the minimal water flow per hour is below the value set here.
- **Water Shortage To/From Time**: Set the start and end time for the minimum water per hour alarms to be transmitted.
- **Auxiliary Alarm 1 or 2 Related Relay**: These alarms indicate when a digital sensor input is too high.

16.2 Alarm Reset

Use this table to:

- Rest alarms. Resetting means:
    - Element shuts down any active alarm.
    - Element removes alarms from the alarm table.
- Acknowledge: Acknowledge means:
    - Alarms are noted but not reset.
    - A reminder is sent after a period of time
    - This data is recorded in the Alarm History.

1. Go to Management > Alarm Reset.



2. Enable Alarm Reset.

17 Monitoring Functions

- Viewing the Temperature Data
- Viewing the Humidity Data
- Viewing the Water History
- Viewing the Heater History
- Viewing the Alarm History
- Viewing the Event History

17.1 Viewing the Temperature Data

This screen displays the farms temperature data by growth day. Data on this screen is read only.

NOTE Performing a Cold Start or selecting a New Group erases the data.

17.2 Viewing the Humidity Data

This screen displays the farms humidity data by growth day. Data on this screen is read only.

NOTE Performing a Cold Start or selecting a New Group erases the data.

17.3 Viewing the Water History

Go to this screen to view the amount of water distributed.

17.4 Viewing the Heater History

Go to this screen to view the heater activities.

17.5 Viewing the Alarm History

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

- Unknown Alarm
- Low /High Temperature
- Sensor # Low/High
- Temperature
- High/Low Pressure
- Water Overflow
- Water Shortage
- Outside Temperature Failure
- Temperature Sensor # Failure
- Humidity Sensor Failure

- Pressure Sensor Failure
- Potentiometer # Failure
- Switch Card # Failure
- Relay Card # Failure
- Auxiliary 1 Activated
- Switches Changed
- Alarm Test
- Below Min Air
- CPU Low Battery

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

17.6 Viewing the Event History

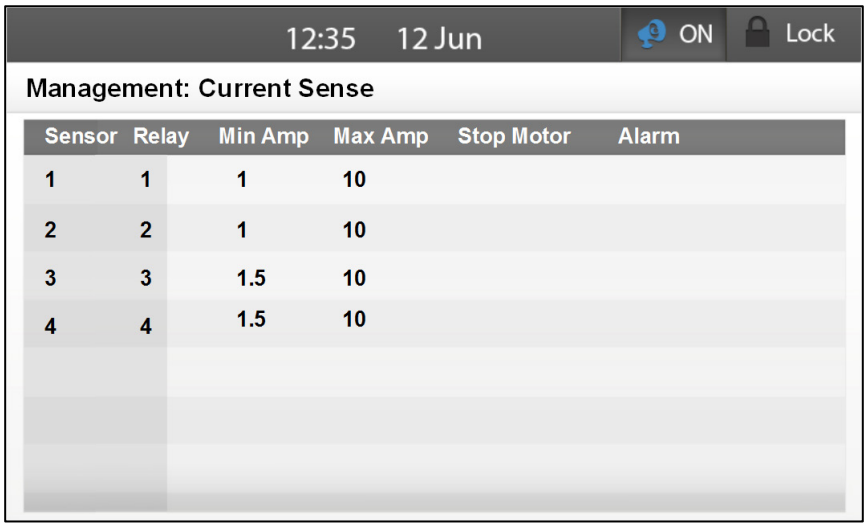
Go to this screen to view the last 999 events.

17.7 Monitoring the Current Sense

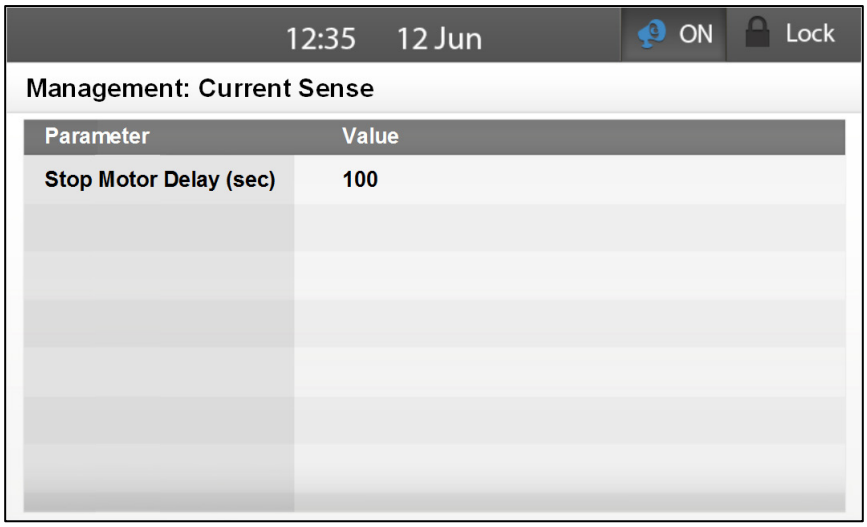
The Current Sense function monitors the current supply, recording the input and sending alarms when the current, going to a specific device that is wired via the current sensor, is too high or too low. Using the function helps prevent excess or insufficient current from damaging motors wired to Element relays.

➲ **Wire the relays to the current sensors as shown in Figure 14.**

1. Go to Management > Current Sense.



2. Define the following parameters:
   - Sensor: Read only number specifying the current sensor relay number.
   - Relay: Relay number wired to the sensor. Range: 1 - 8
   - Min Amp: Current less than this number generates an alarm. Range: Yes/No
   - Max Amp: Current greater than this number generates an alarm. Range: Yes/No
   - Stop Motor: Cease current flow if the current exceeds the levels defined in Min/Max Amp.
   - Alarm: Send an alarm if the current exceeds the levels defined in Min/Max Amp.
3. If required, go to Management > Current Sense > Set.



- Define the following parameters:
  - Stop Motor Delay: Amount of time that needs to pass before shutting down a motor. This parameter prevents shutting down a motor un-necessarily.

NOTE Element sends an alarm if a motor shuts down even though the current is no longer monitored.

18 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 unforeseeable 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 authorization from Munters, or repaired in such a way that, in Munters' judgment, 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 Element, (for example sensors, analog inputs, 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 dispatch 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 dispatch, where the cost of carriage would exceed the value of the parts, Munters may authorize 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 authorized 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 unauthorized materials;
- inadequate maintenance;

- use of non-original spare parts and accessories.

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

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

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.
Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

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

Requests for technical assistance and spare parts can be made directly to the nearest Munters office. A full list of contact details can be found on the back page of this manual.
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Petach-Tikva 49517, Israel
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Fax: +972-3-924-9834
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