AGROWTEK
Technology to Help You Grow

INSTRUCTION MANUAL

MCX1

# Mini Climate Control System


Shown with optional WiFi

# Contents

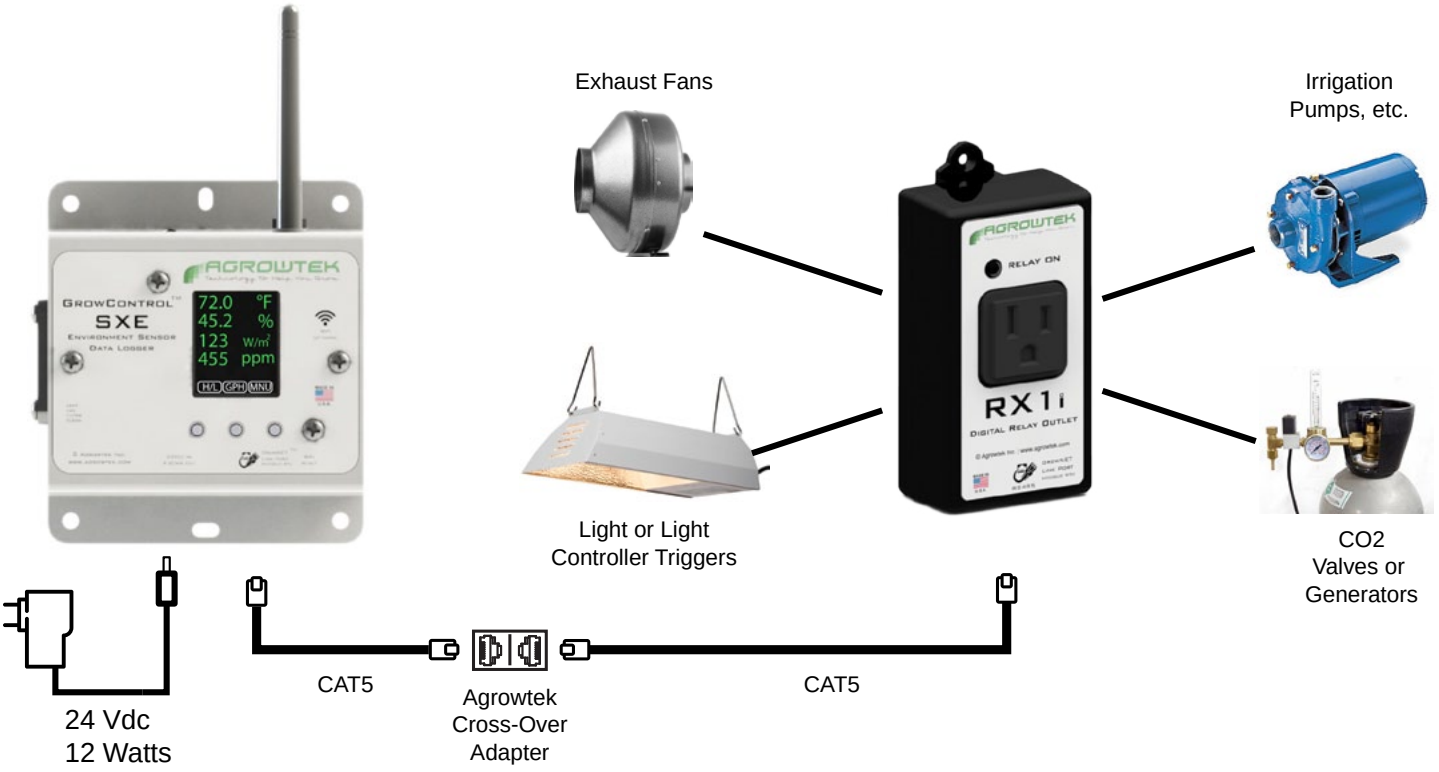
# Introduction

GrowControl MCX climate control systems are powerful, autonomous set-point controllers.

The SXE sensor connects directly to a RX1i single-outlet intelligent relay to operate a single device. Control the outlet based on temperature, humidity or CO2 values as well as 24-hour and repeat cycle timers. Set points have day/night values which are selected based on the reading of the light sensor located on the top of the SXE unit.

A built-in aspirator fan provides a continous flow of air over the sensors for the most accurate readings and fastest response to changing conditions. An air filter is included which is removable and washable.

SXE environment sensor's built-in color display provides an easy to use interface for monitoring the sensor readings and configuring the control settings. Internal data logging memory provides a 120 point graphical history on the screen and the entire 21,600 data point history can be downloaded using the LX1 USB Agrow-LINK and free computer software.

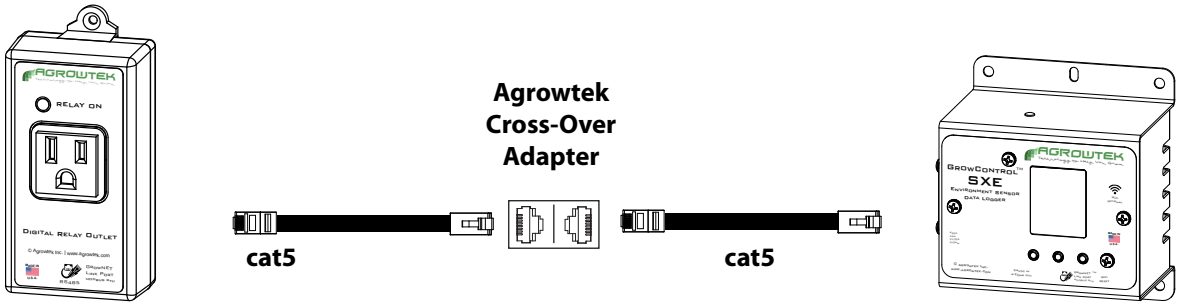


# Quick Start Guide

## 1. Connect the GrowNET Cable

Connect the sensor to the relay using the included cross-over ethernet cable as shown in the diagram.

⚠ **IMPORTANT! ONLY use cross-over adapters provided by Agrowtek.**
Incorrect cross-over adapters or cables can cause damage to the equipment.




## 2. Mount the Sensor & Relay

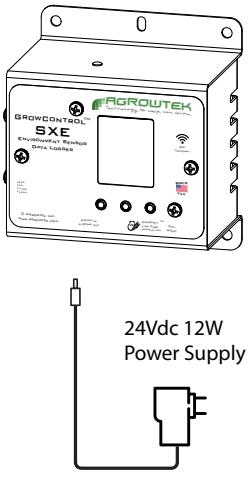
Mount the SXE climate sensor to a wall surface that is accessible and has good air circulation.

Plug the RX1i outlet relay into a 120Vac wall outlet. **Do not remove or circumvent the ground pin.**

## 3. Connect Power to the SXE Sensor

Plug the 24Vdc power adapter into the SXE and a 120Vac wall outlet. The SXE sensor will power-on and connect to the RX1i relay.

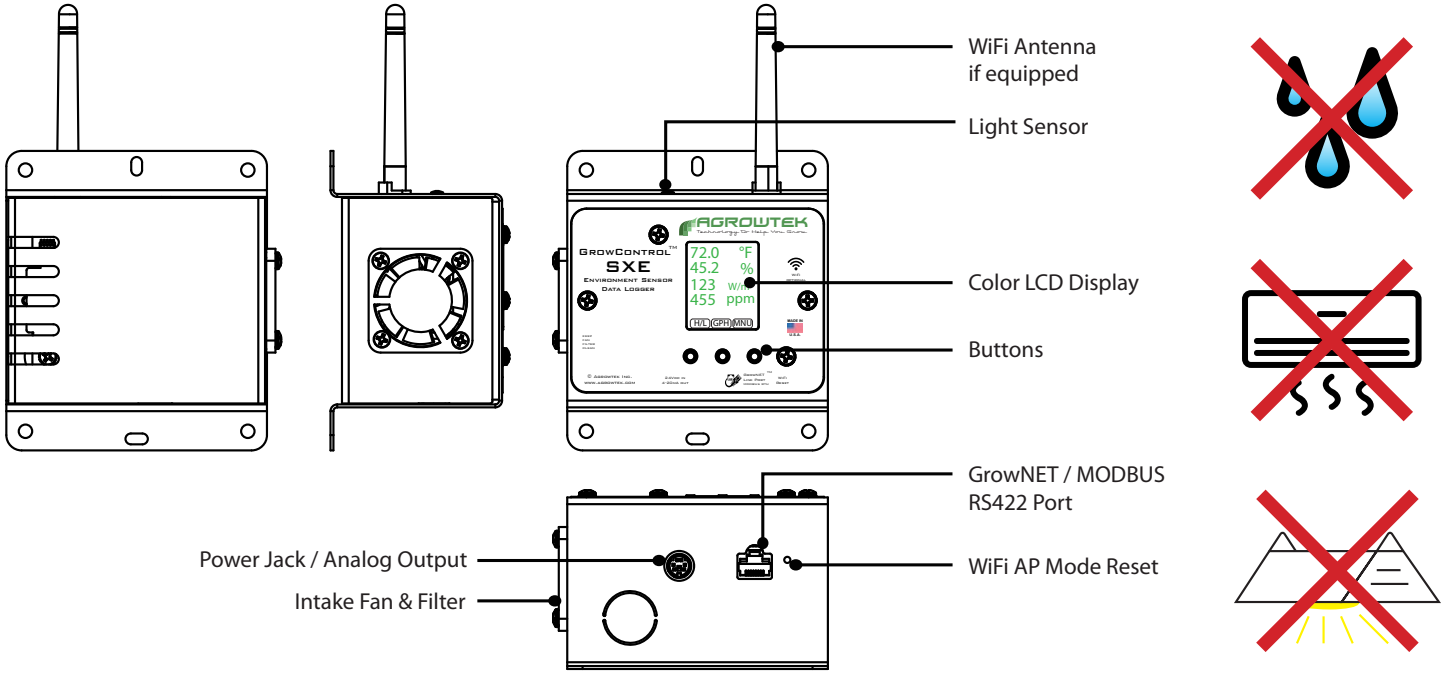
Follow the LCD Menu Operation instructions for details on setting up the relays to operate based on sensor readings and timers.




**General Notes:**
1. Install with the connections facing down to reduce the risk of water permeating the enclosures.
2. For indoor installation only. Enclosures are not water-proof.
3. Do not place sensor in direct sunlight.

# Installation Instructions

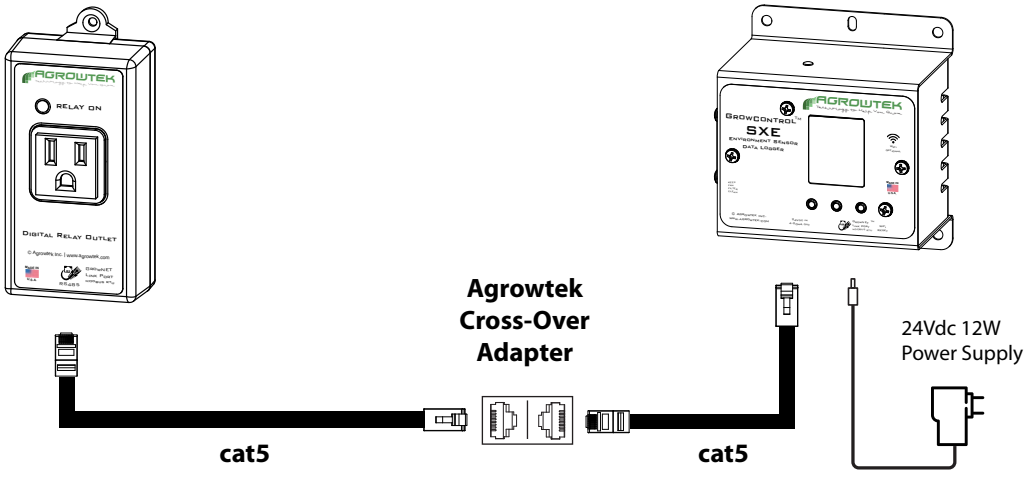
SXE is intended for wall mounting near eye level using the mounting flanges and holes provided. Install in a location with adequate access to the environmental conditions and away from extreme influences such as ventilation ducts, doorways, windows or heat generating equipment such as lights and ballasts. Ensure the unit is easy to see and access for maintenance and adjustments. Do not install in direct sunlight.




## GrowNET Connection to RX4i Intelligent Relay

A direct-link connection between a SXE sensor and RX1i relay requires Agrowtek's cross-over adapter.

**IMPORTANT! ONLY use cross-over adapters provided by Agrowtek.**
Incorrect cross-over adapters or cables can cause damage to the equipment.



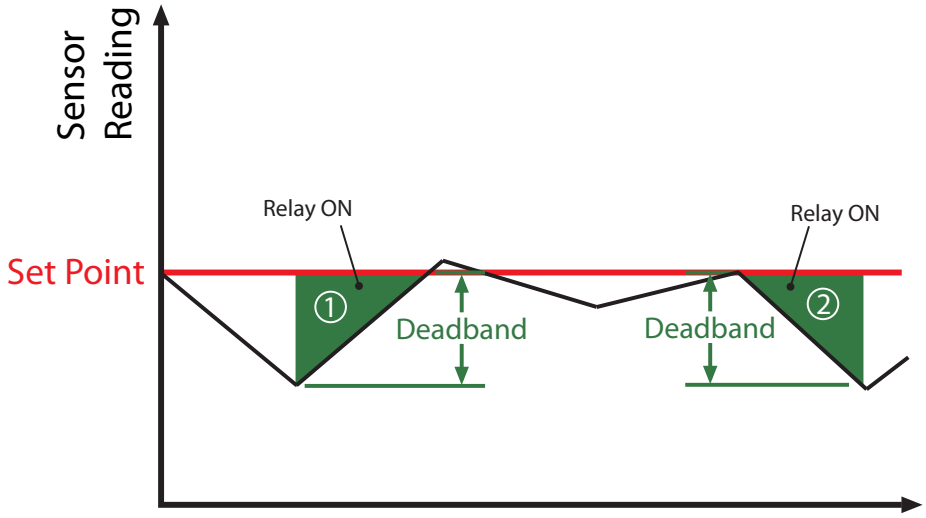
# Operation Instructions

The SXE environment sensor continuously monitors the temperature, humidity and CO2 (if equipped) and a light sensor on the top of the unit detects day or night periods. Each outlet (relay) may be assigned a temperature, humidity or CO2 control function, as well as a timer function if desired. Equipment such as heaters, fans, pumps, CO2 valves, etc. can be directly plugged into the receptacles on the RX4i relay for sensor based control.

## Definitions

**Set Point**
A "set point" is what the system is looking to achieve by controlling the outlet or relay, such as maintaining a temperature of 72°F.

**Dead Band**
The "dead band" is the amount of drift allowed in a sensor reading before the control function activates.




| Sensor Type | ① | ② |
|---|---|---|
| Temperature | Heating | Cooling |
| Humidity | Humidify | Dehumidify |
| CO2 | Inject | Exhaust |

**Mode**
Sensor controls can be used in various control modes such as "HEATING" mode or "COOLING" mode. The available modes depend on the sensor type selected for the control (see chart above.)

**Cycle Timer**
Cycle timers operate in continuous repeating on/off cycles. Separate times are set for the on and off durations such that you may have an on or off period as short as 1 second and as long as 18 hours. Each outlet relay may be configured with a unique cycle timer.

**24hr Timer**
24-hour timers operate on the RTC value based on the time of day. Each timer has one on and one off time. The time is backed-up by an internal rechargable coincell battery backup that keeps the RTC time counting when power is off to the SXE sensor.

# LCD Menu Operation

The main screen displays the real-time sensor readings from the attached sensors.

Three buttons are located beneath the screen. Each button is labeled at the bottom of the display to describe it's function in the current screen or menu.

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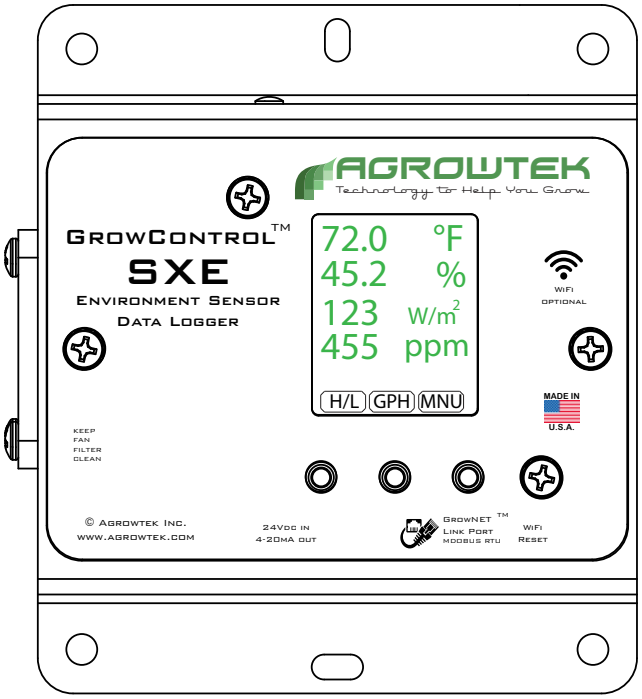
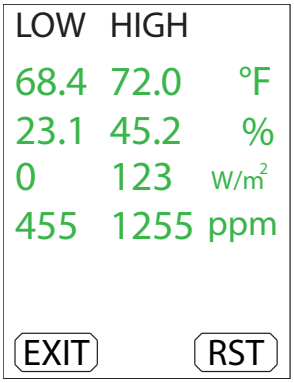



## High / Low History

H/L

Simple minimum and maximum recorded values are stored until the user resets the values to the current readings. To view the minimum and maximum values since the last reset, press the button labeled **H/L**.

To clear the min/max history, press the **RST** button to reset. The min and max values will all be set to the current readings and will update with higher or lower readings as they occur.

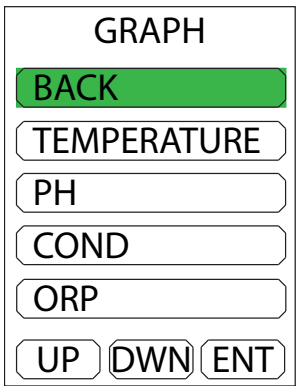


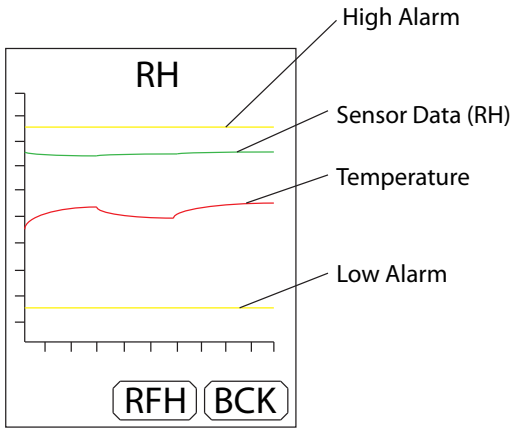

## Graphing

GPH

The display can graph the most recent 120 data points from the sensor's internal data point memory. With the default logging interval of 60 seconds, the graph displays the last two hours of data.

The sensor value is plotted in green. Temperature, if overlaid on the plot, is red. Alarm levels as set by the user are plotted in yellow. Pressing the **RFH** button refreshes the data and replots the graph.



# Main Menu

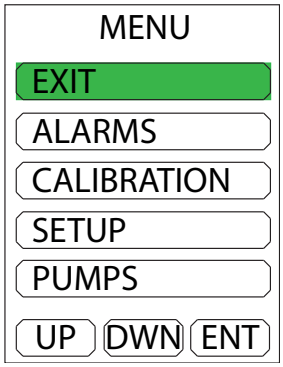
MNU

The main menu is how the alarms are set, sensors are calibrated and general settings such as time, date and units are configured.

If a dosing pump is directly connected to the SXHM GrowNET port, the pump settings are also accessed by the main menu.

Use the **UP** or **DWN** buttons to navigate the menu.

Use the **ENT** button to enter a selection.



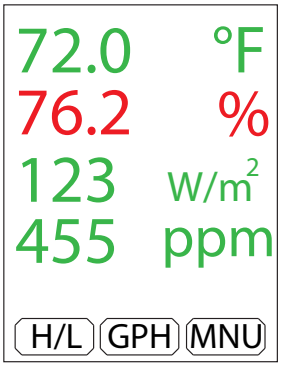

# Alarms Menu

MNU ▶ ALARMS

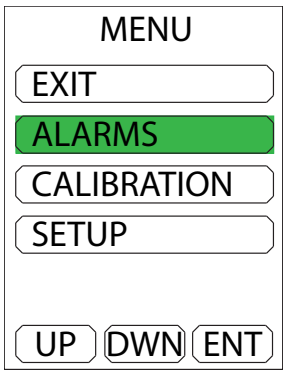
High and low alarm set points may be configured for each sensor value to activate an internal buzzer or send alerts with the optional wifi module.

The out-of-range value will be displayed in red to indicate the cause for the alarm.

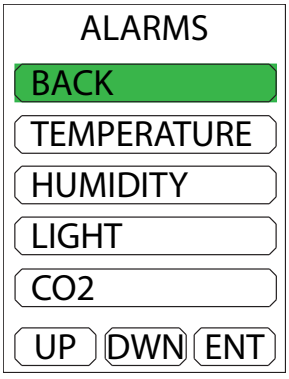
Additionally, alarm limits are plotted on the graphs to indicate values are within the desired range.



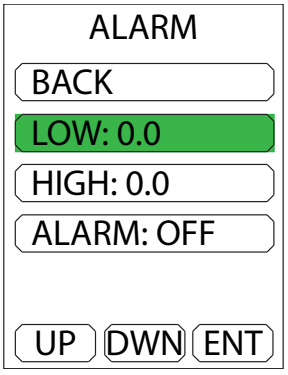

# Alarms Configuration



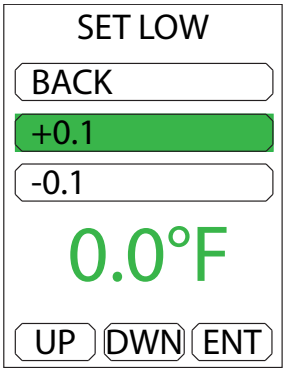

1. Select **ALARMS** from the main menu.




2. Select a sensor to configure set points.

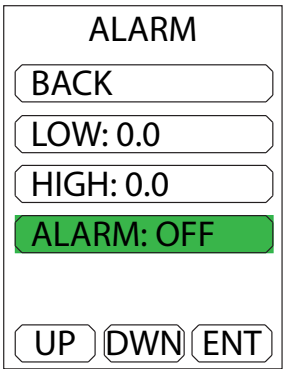



3. Select the setting to adjust.

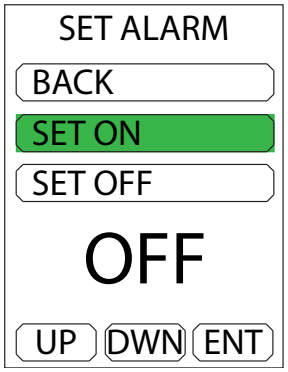



4. Adjust to the desired value. Hold **UP** or **DWN** to jog the value.

## Alarm Buzzer




1. Select **ALARM: OFF**




2. Select **SET ON** then press **BACK** to exit.

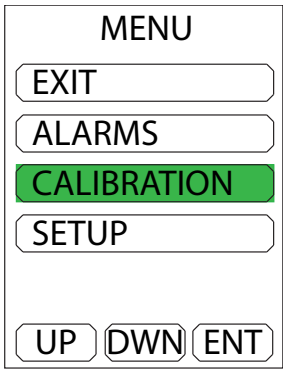
To disable the alarm buzzer, set the alarm to OFF.

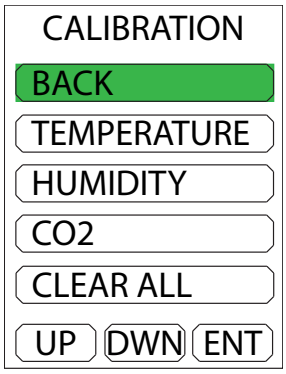
## Calibration Menu

MNU ▶ CALIBRATION

Calibration can be performed for each sensor with the LCD interface using either standard calibration wizards, or advanced manual calibration methods for non-standard calibration solutions.

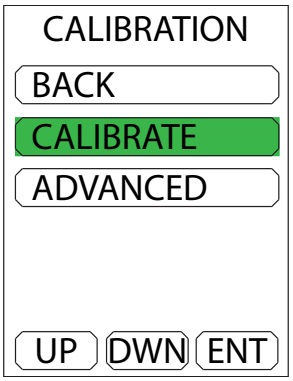
The date of the last calibration for each sensor is stored in memory and displayed at the start of each calibration wizard.



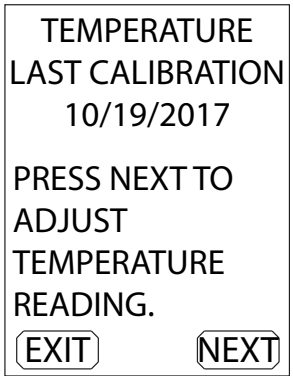




## Temperature or Humidity Calibration

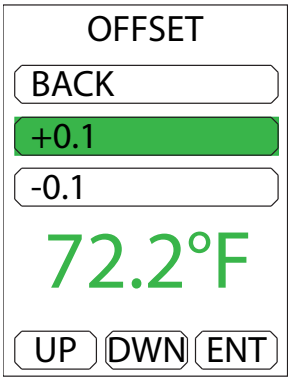
MNU ▶ CALIBRATION ▶ TEMPERATURE



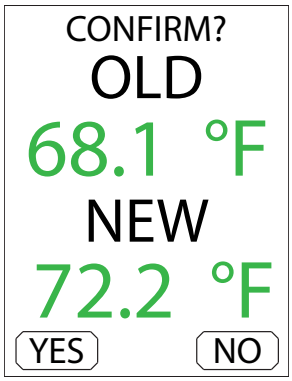

1. Select **CALIBRATE** from the temperature calibration menu.




2. Press **NEXT** to continue.



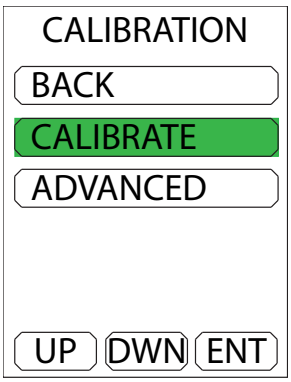

3. Adjust to the desired value. Hold **ENT** to jog the value by 10x.




4. Confirm the new reading or press **NO** to cancel.

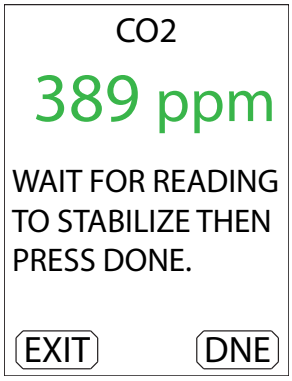
## CO2 Calibration

MNU ▶ CALIBRATION ▶ TEMPERATURE




1. Select **CALIBRATE** from the temperature calibration menu.


2. Press **NEXT** to continue.



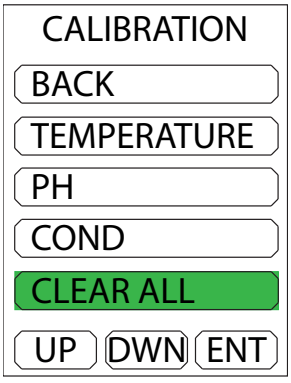

3. Wait 5-10 minutes and allow reading to normalize. Then press done to complete the calibration.

⚠ **Keep away from the sensor during normalization (step 3) and press the done button upon approaching the sensor to avoid disturbing the calibration. Do not breathe near the sensor or locate near individuals, vehicles or other sources of carbon dioxide during calibration.**

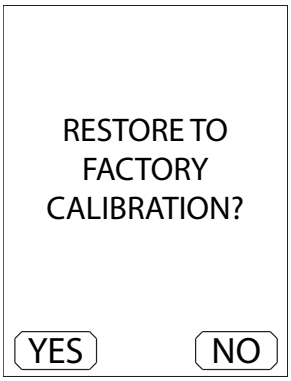
## Clear Calibration

MNU ▶ CALIBRATION ▶ NEXT

Calibration can be restored to factory defaults by selecting **CLEAR ALL**.




1. Select **CLEAR ALL** from the calibration menu.

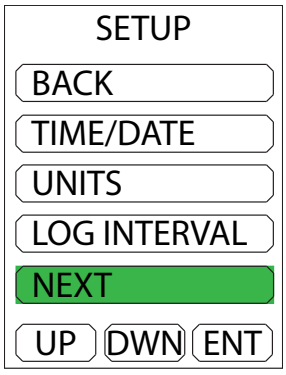


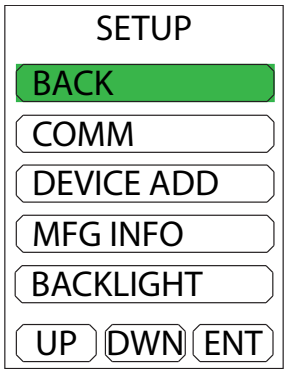

2. Press **YES** to restore factory calibration.

## Setup Menu

MNU ▶ SETUP

The setup menu is where the time and date are set, the units are configured, logging interval is adjusted and advanced communications settings are available.

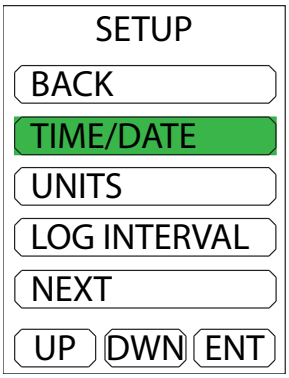


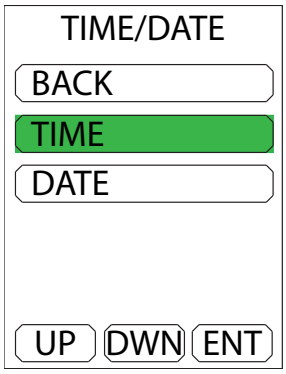

## Time / Date

MNU ▶ SETUP ▶ TIME/DATE

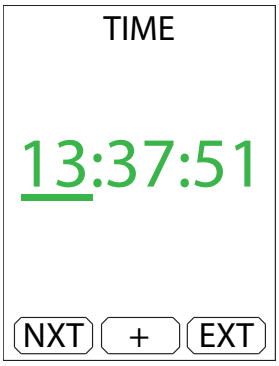
Sensors include a precision real-time clock with battery back-up for time-stamping the data log information with the time and date. The last calibration for each sensor is also time stamped.




1. Select **TIME/DATE** from the setup menu.




2. Select **TIME** or **DATE** to adjust.




3. Use **NXT** to select the value to adjust. Use + to increment the value.

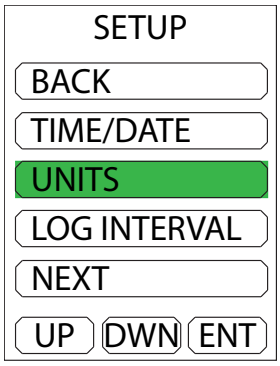

4. Use **EXT** to exit the menu.

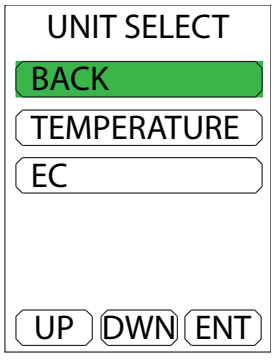
## Units

MNU ▶ SETUP ▶ UNITS

Temperature and Conductivity may be displayed in alternate units.

Select a sensor value to change the default display and working units.

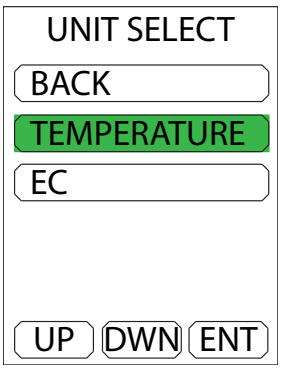


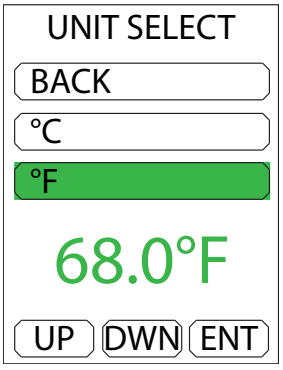
**Configure temperature units:**

Temperature may be displayed in °F or °C.

Note: Check alarm settings when converting temperature units.




1. Select **TEMPERATURE** from the units menu.




2. Select the desired units and press **ENT**.

## Logging Interval

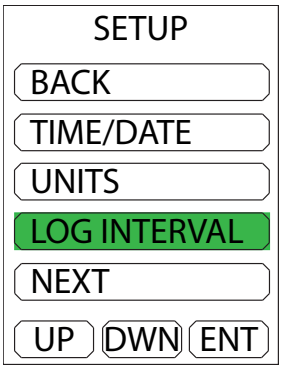
MNU ▶ SETUP ▶ LOG INTERVAL

Adjust the interval for recording data points in the on-board memort. Acceptable values are from 1 - 65535 seconds.

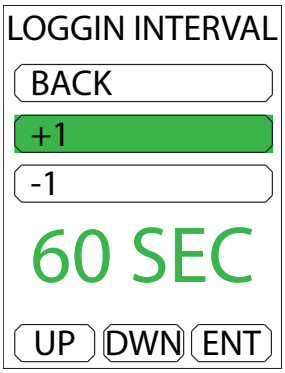
21,600 data points can be stored for each sensor value. The most recent 120 data points are shown on the graphical history.

The entire data history may be downloaded from the sensor to a .csv file with the LX1 USB AgrowLINK and free software.

Note: 60 second intervals = 15 days of data storage.




1. Select **LOG INTERVAL** from the setup menu.




2. Adjust the value then select **BACK**.

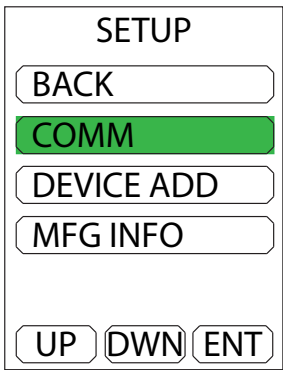
## COMM Mode

MNU ▶ SETUP ▶ NEXT ▶ COMM

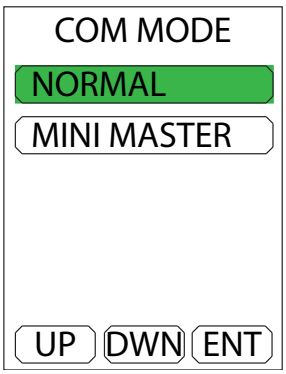
COMM mode specifies whether the sensor is a normal passive device or "mini-master" device.

**NORMAL** Use with GrowControl master controller systems or stand-alone and data logging applications.

**MINI-MASTER** Use with MCX mini-climate control system. (GrowNET cross-over adapter required.)




1. Select **COMM** from the setup menu.




2. Select a mode and press **ENT**.

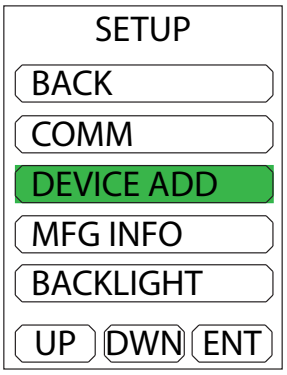
## Device Address

MNU ▶ SETUP ▶ NEXT ▶ DEVICE ADD

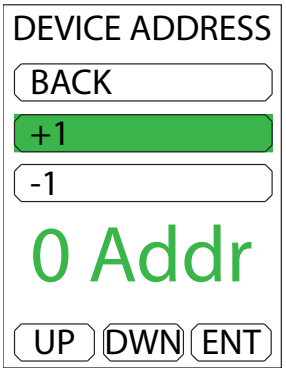
Sensors are digitally addressable from 1-249 and will be assigned an address automatically by Agrowtek's control systems, or can be configured manually for MODBUS applications via the menu.

NOTE: All of Agrowtek's devices use address 254 as a broadcast address.

**NOTE: Address must be set to 0 for Relay control.** The "RELAY" menu item will not appear unless the device address is set to 0.




1. Select **DEVICE ADD** from the setup menu.

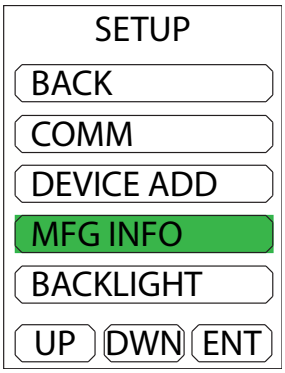


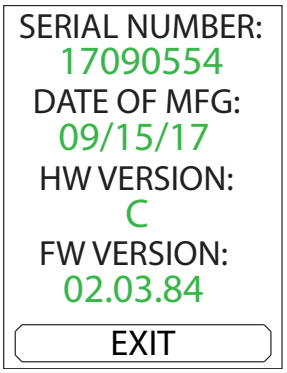

2. Adjust the value then select **BACK**.

## Manufacturing Info

MNU ▶ SETUP ▶ NEXT ▶ MFG INFO

Manufacturer information such as serial number, date of manufacture, hardware and firmware versions can be read from the MFG INFO page.



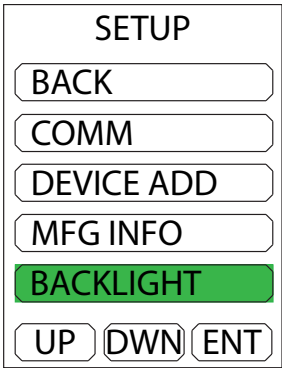



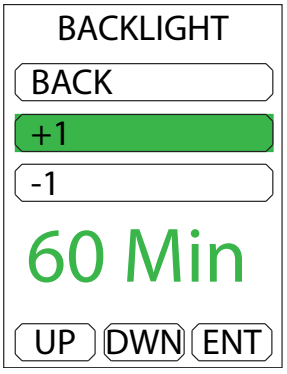

## Display Back Light Timer

MNU ▶ SETUP ▶ NEXT ▶ BACKLIGHT

The display back light can be programmed to turn off after a specified time of inactivity from the last time a button is pressed.

The delay can be set from 1-255 minutes, or set to 0 to disable the back light timer and keep the display on continuously.

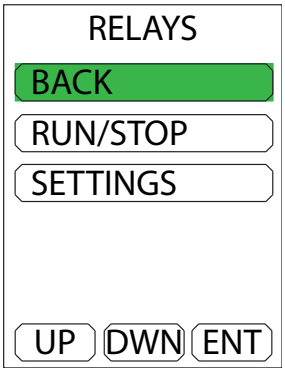


# Outlet / Relay Control

MNU ▶ RELAYS

The RELAYS menu is displayed when the environment sensor is connected to a relay and contains all of the configuration settings pages.


⚠ The "RELAYS menu item will not appear unless the communication mode is set to "MINI-MASTER" and the device address is set to "0" (see COMM MODE and DEVICE ADDRESS.)

# Run/Stop

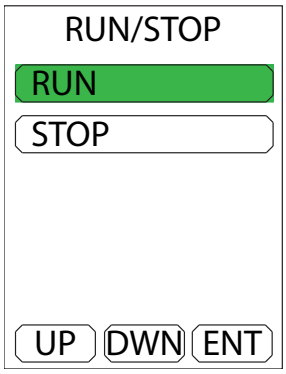
MNU ▶ RELAYS ▶ RUN/STOP

The relay device must be placed into RUN mode for autonomous operation to take place.

All of the relays may be immediately disabled and turned off by placing the relay device into STOP mode.

The relay will operate according to the programmed parameters unless the relay is put into STOP mode or the sensor becomes disconnected from the relay after 10 seconds. If in RUN mode, the relay will continue operating after a power outage when the power is restored.


The RUN/STOP menu enables or disables the pumps



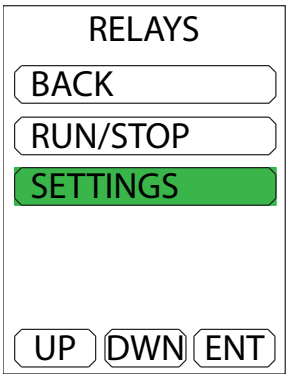

Select **RUN** to allow the erlays to operate based on your settings.


Select **STOP** to disable the relays from running automatically and turn off all relays.

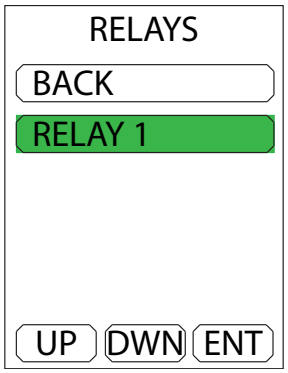
# Setup a Sensor Control

MNU ▶ RELAYS ▶ SETTINGS

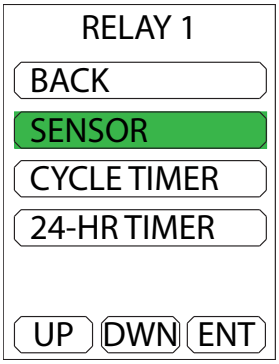
Each relay may be configured for set-point operation based on a sensor value (see "Definitions" section for details.) When light sensor reading = 0 W/m2, it is considered **night**.



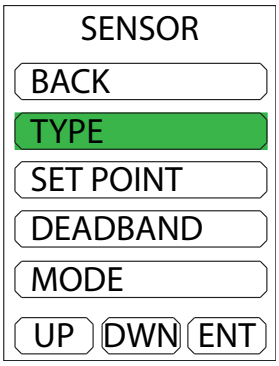

1. Select **SETTINGS** from the relays menu.



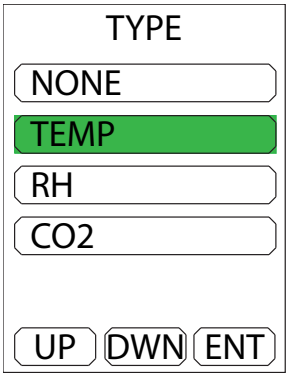

2. Select a relay to configure.



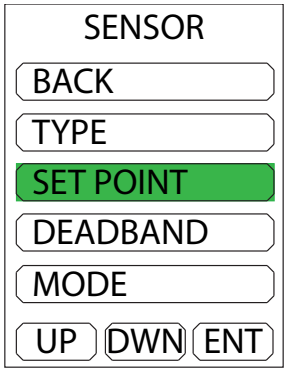

3. Select **SENSOR** to setup a sensor control.



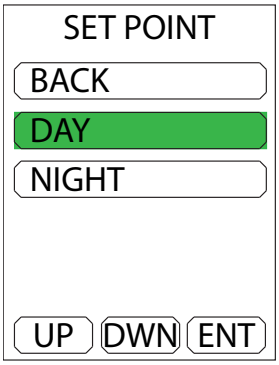

4. Select **TYPE** to choose the sensor type.



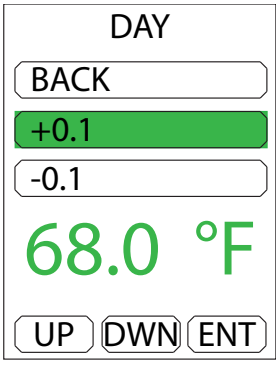

5. Select the desired sensor type.



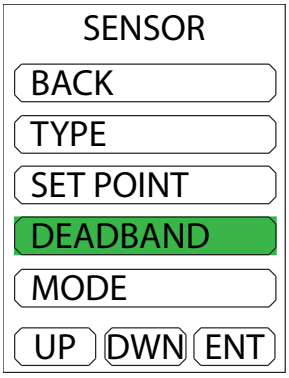

6. Select **SET POINT.**



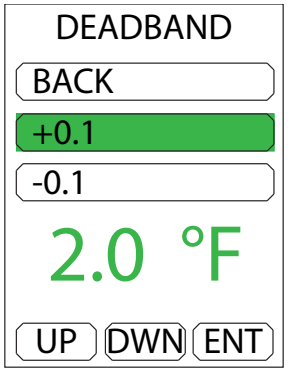

7. Select **DAY** or **NIGHT** to adjust the settings. Enter values for both.



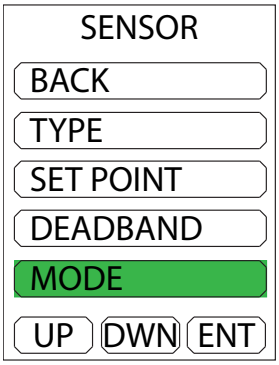

8. Adjust the set points to the desired values.



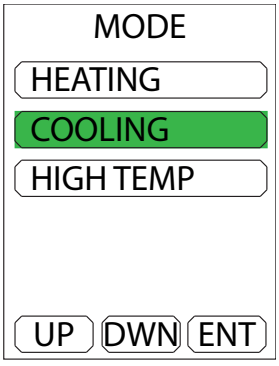

9. Select **DEADBAND** to configure the sensitivity of the control.




6. Set the deadband to the desired value.




11. Select **MODE** to define the control mode for the sensor.

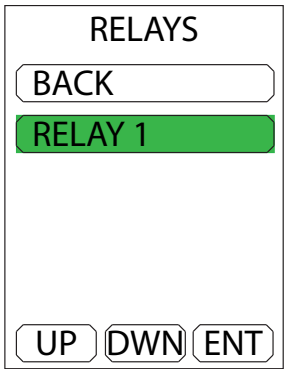



12. Set the desired control mode for the type of sensor selected.

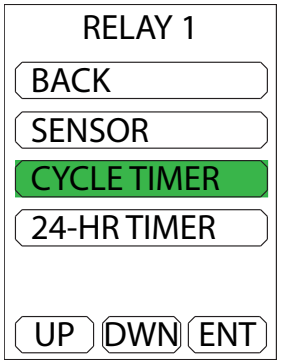
## Setup a Cycle Timer

MNU ▶ RELAYS ▶ SETTINGS

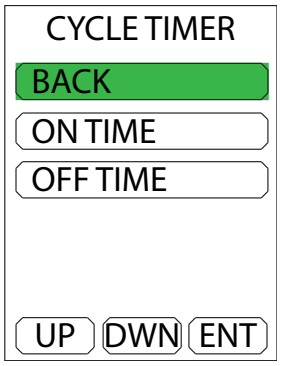
Each relay may be controlled by a "repeat cycle timer" which will turn on the relay for a set time, then off for a set time in a continuously repeating cycle. If a sensor control or 24-hour timer are also configured on the same relay number, they may activate the relay even during the cycle timer's 'off' period.



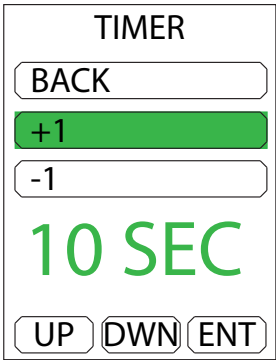

1. Select a relay to configure.




2. Select **CYCLE TIMER** to setup a timer control.




3. Select **ON** or **OFF** to edit the timer values.

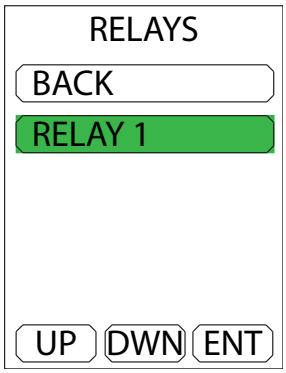



4. Adjust the times to the desired values.

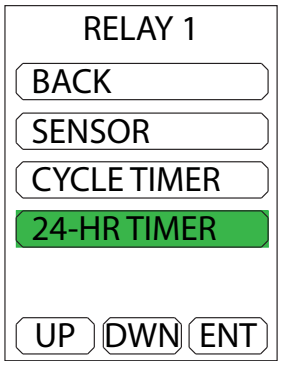
## Setup a 24-Hour Timer

MNU ▶ RELAYS ▶ SETTINGS

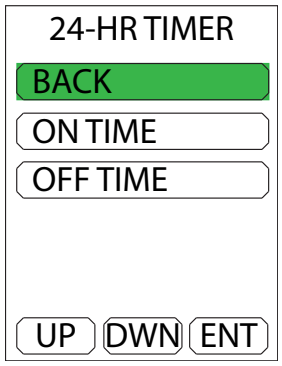
Each relay may be controlled by a "24-hour timer" which will turn the relay on at a set time of day, and off at a later time of day. If a sensor control or cycle timer are also configured on the same relay number, they may activate the relay even during the 24-hour timer's 'off' period.



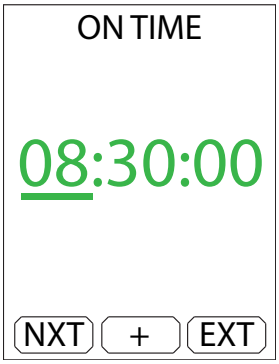

1. Select a relay to configure.




2. Select **24-HR TIMER** to setup a timer control.




3. Select **ON** or **OFF** to edit the timer values.




4. Adjust the times to the desired values.

# Maintenance & Service

Sensors require periodic maintenance to ensure proper performance. Relays do not require maintenance.

## Cleaning

Exterior and label surfaces may be wiped with a damp cloth wish mild dish detergent, then wiped dry.

## Fan Filter

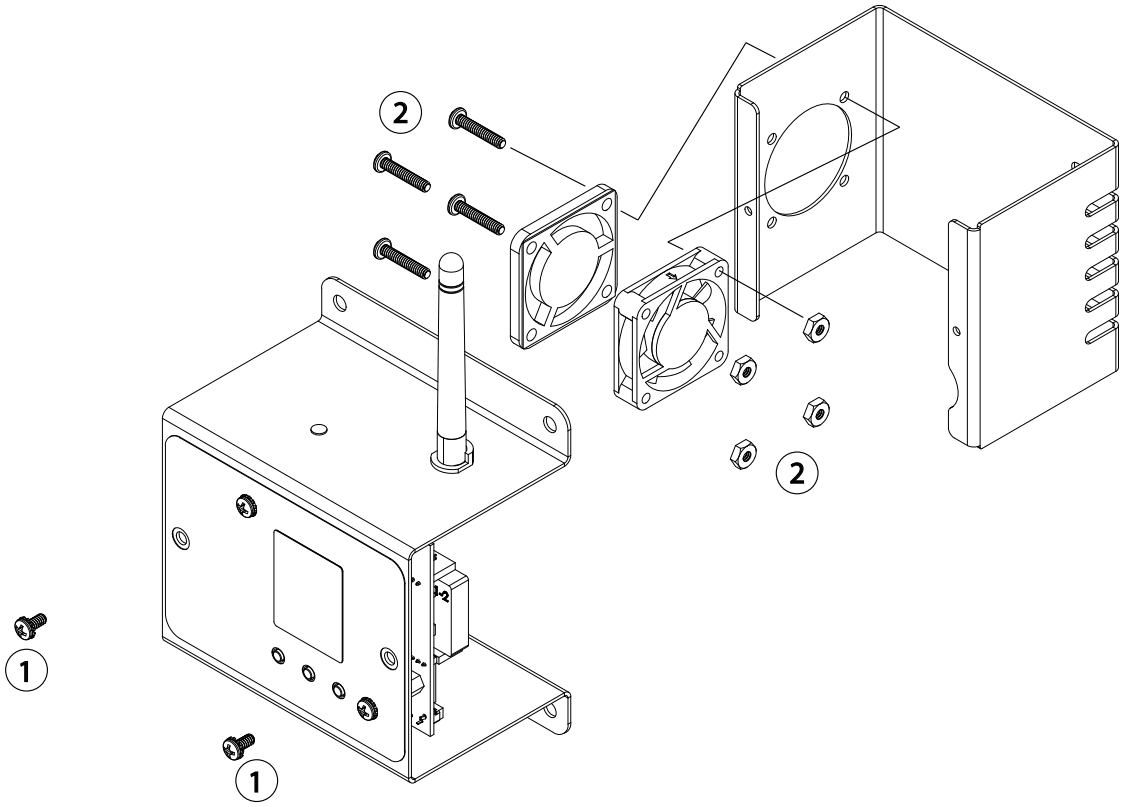
The fan air filter should be periodically removed for cleaning. **It is NOT necessary to remove the fan.**

1. Pry the retaining grate out using a small flat blade eye-glass screwdriver or tip of a pocket knife.
2. Remove the foam filter and replace, or clean with mild dish detergent and water, then pat dry.
3. Re-install the foam filter and grate by gently snapping the grate back into place.

## Fan Replacement

The fan may require replacement in the event of failure.

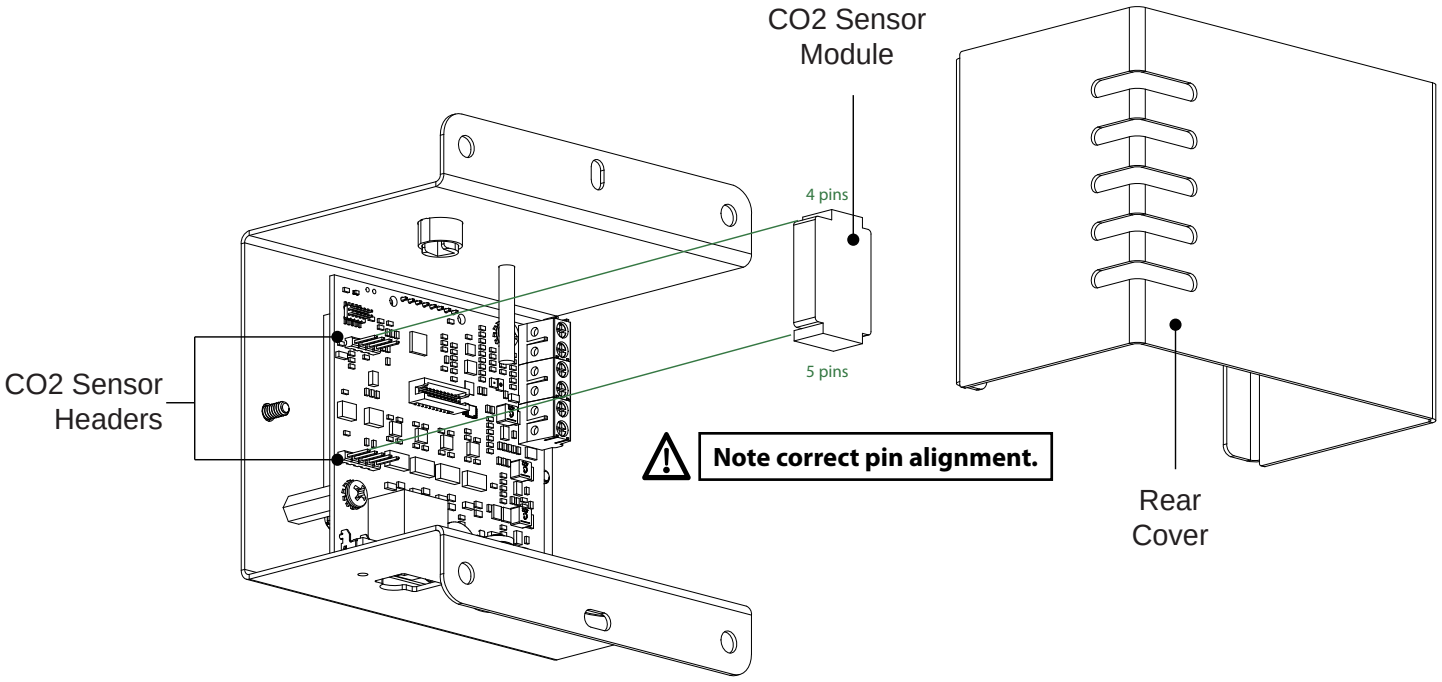
1. Disconnect power from the sensor and un-mount from the wall.
2. Remove the rear cover by removing the two screws marked (1).
3. Remove the four screws and nuts securing the fan and filter assembly to the housing.
4. Disconnect the fan wires from the terminal block and install the new fan leads to match.
5. Clean and re-install the fan filter on the outside, and the new fan on the inside of the rear cover.
6. Hand tighten the four fan screws and re-install the rear cover using the two cover screws.



# CO2 Sensor Upgrade

The SXE sensor may be upgrade to sense and control CO2 ppm with a precision NDIR type CO2 sensor.

1. Disconnect power from the sensor.
2. Remove the rear cover by removing the two screws; use caution not to damage the fan wires.
3. Locate the CO2 headers.
4. Position and install the CO2 sensor module ensuring the sensor is oriented with the correct pin headers.
5. Re-install the rear cover and re-connect power. Check to ensure the CO2 reading is now working.



# Technical Information

## Specifications

### Sensor

| | |
|---|---|
| Power | 24Vdc, ~5W |
| Max Cable Distance | 1000ft |
| Aspirator | 6cfm Fan with Foam Filter |
| Temperature Range | -20 - 60°C |
| Temperature Accuracy | ±2°C |
| Humidity Range | 0-100%RH (non condensing) |
| Humidity Accuracy | ±3% |
| Light Irradiance Range | 0 - 1000W/m2 |
| Light Accuracy | ±10% |
| CO2 Range | 0-10,000ppm |
| CO2 Accuracy | ±50ppm |
| 4-20mA DAC Resolution | 12 bit, 0.005mA |

### Relay

| | |
|---|---|
| Input Voltage | 110-120VAC |
| Max Rating | 12A |
| Receptacle Type | NEMA 5-15 |
| Number of Relays | 4 |
| Enclosure Knock-Outs | (2) dia. 7/8" |
| Enclosure Rating | IP40 |
| Minimum Cycle Time | 1 second |
| Interface | RS485 with MODBUS or WiFi |
| Relay Ratings | 1,000,000 cycles |
| Relay Cycle Counters | Up to 4 billion cycles per relay |

## Storage and Disposal

**Storage**
Store equipment in a clean, dry environment with ambient temperature between10-50°C.

**Disposal**
This indsutrial control equipment may contain traces of lead or other metals and environmental contaminants and must not be discarded as unsorted municipal waste, but must be collected separately for the purpose of treatment, recovery and environmentally sound disposal. Wash hands after handling internal components or PCB's.

# Warranty

Agrowtek Inc. warrants that all manufactured products are, to the best of its knowledge, free of defective material and workmanship and warrants this product for 1 year from the date of purchase. This warranty is extended to the original purchaser from the date of receipt. This warranty does not cover damages from abuse, accidental breakage, or units that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. Agrowtek Inc. must be contacted prior to return shipment for a return authorization. No returns will be accepted without a return authorization. This warranty is applicable only to products that have been properly stored, installed, and maintained per the installation and operation manual and used for their intended purpose. This limited warranty does not cover products installed in or operated under unusual conditions or environments including, but not limited to, high humidity or high temperature conditions. The products which have been claimed and comply with the aforementioned restrictions shall be replaced or repaired at the sole discretion of the Agrowtek Inc. at no charge. This warranty is provided in lieu of all other warranty provisions, express or implied. It is including but not limited to any implied warranty of fitness or merchantability for a particular purpose and is limited to the Warranty Period. In no event or circumstance shall Agrowtek Inc. be liable to any third party or the claimant for damages in excess of the price paid for the product, or for any loss of use, inconvenience, commercial loss, loss of time, lost profits or savings or any other incidental, consequential or special damages arising out of the use of, or inability to use, the product. This disclaimer is made to the fullest extent allowed by law or regulation and is specifically made to specify that the liability of Agrowtek Inc. under this limited warranty, or any claimed extension thereof, shall be to replace or repair the Product or refund the price paid for the Product.