

## Climate Sensor & Data Logger with LCD Display

### Specifications

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
Interface	GrowNET, MODBUS or WiFi



Shown with optional WiFi



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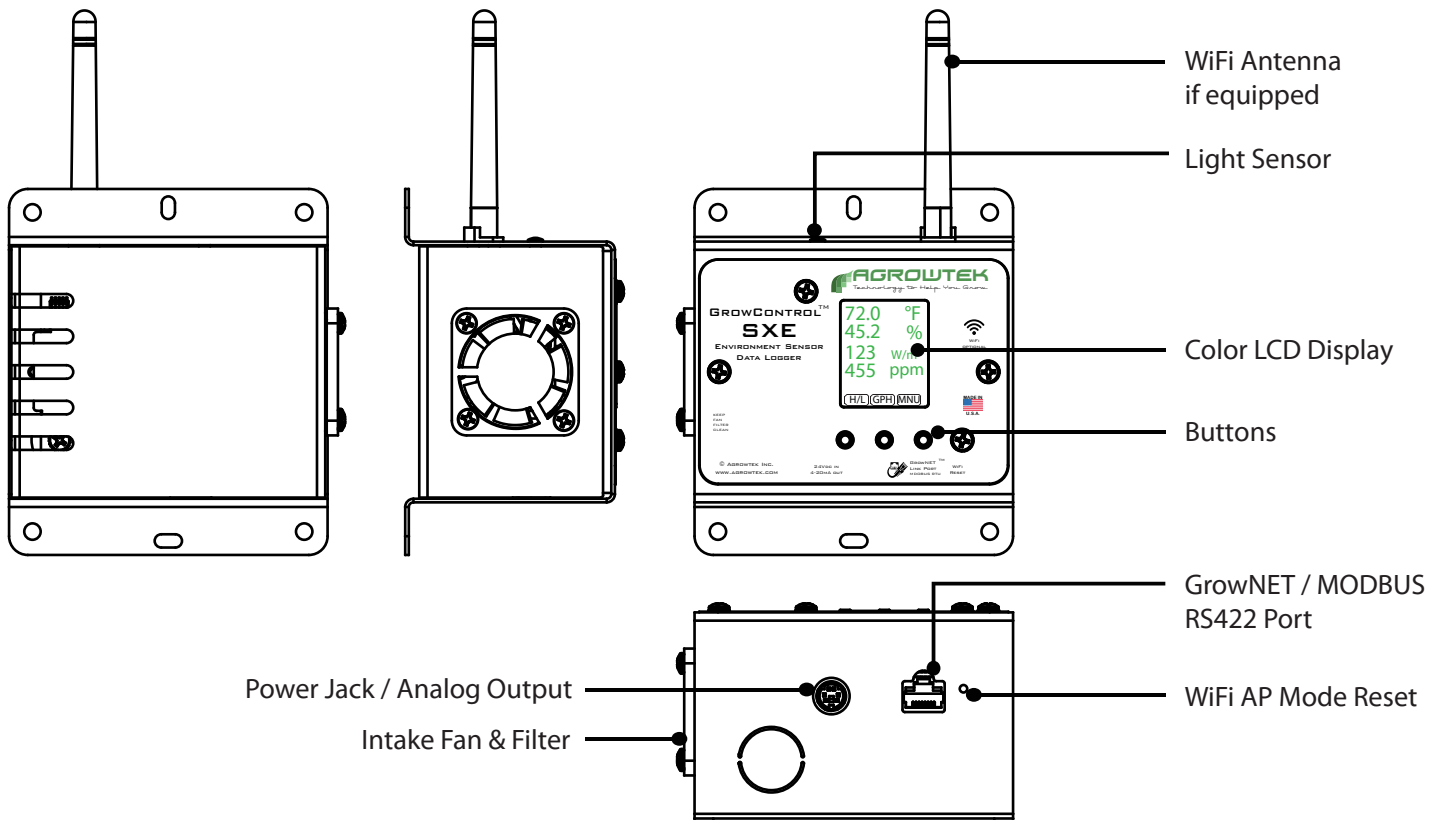
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# Installation Instructions

Intended for wall mounting near eye level using the mounting flanges and holes provided. Do not drill additional holes into the enclosure. Install in locations 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.



**Do NOT connect the GrowNET port to Ethernet networks.**

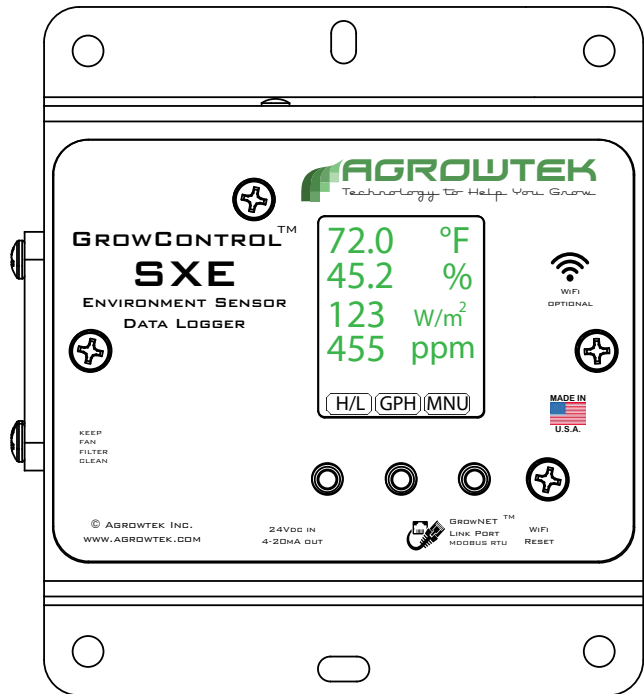
**Disconnect power while making connections to prevent damage to any components.**

# 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.

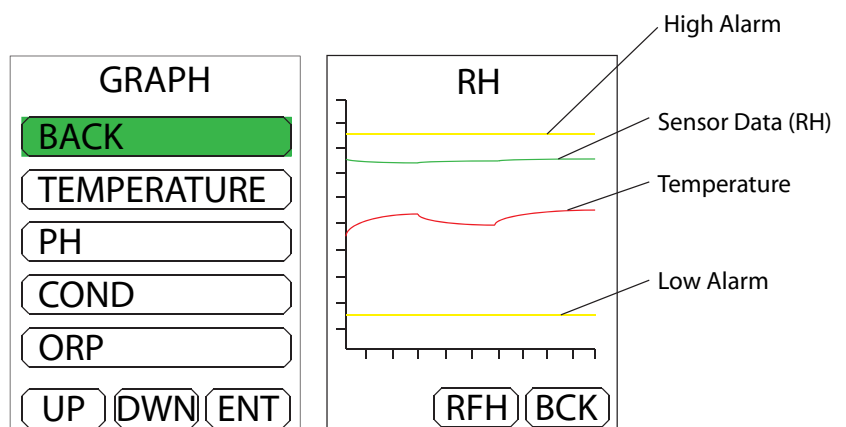
LOW HIGH		
68.4	72.0	°F
23.1	45.2	%
0	123	w/m <sup>2</sup>
455	1255	ppm
<b>EXIT</b>		<b>RST</b>

## 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

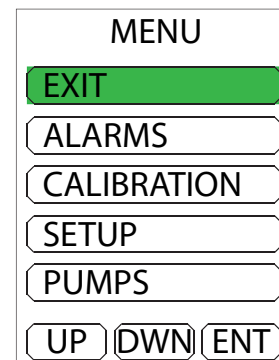
MNU

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.



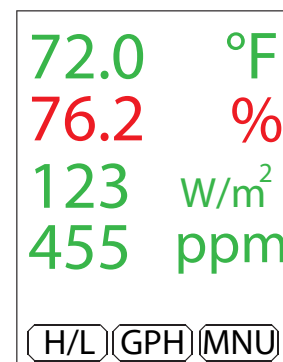
## Alarms Menu

MNU ► ALARMS

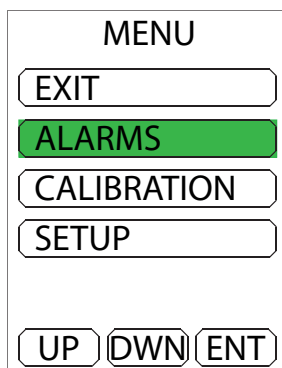
High and low alarm set points may be configured for each sensor value to activate an internal buzzer or send alerts with the optional wifi module.

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

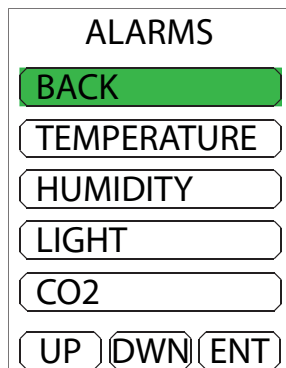
Additionally, alarm limits are plotted on the graphs to indicate values are within the desired range.



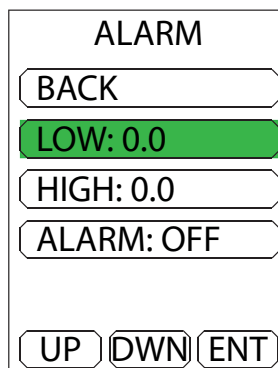
## Alarms Configuration



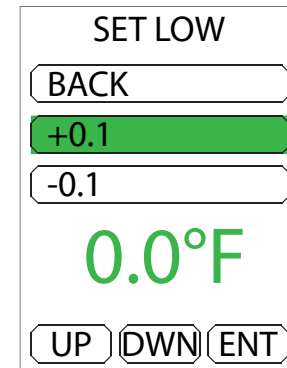
1. Select **ALARMS** from the main menu.



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

ALARM

BACK

LOW: 0.0

HIGH: 0.0

ALARM: OFF

UP DWN ENT

1. Select **ALARM: OFF**

SET ALARM

BACK

SET ON

SET OFF

OFF

UP DWN ENT

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.

MENU

EXIT

ALARMS

CALIBRATION

SETUP

UP DWN ENT

CALIBRATION

BACK

TEMPERATURE

HUMIDITY

CO2

CLEAR ALL

UP DWN ENT

## Temperature or Humidity Calibration

MNU ► CALIBRATION ► TEMPERATURE

CALIBRATION

BACK

CALIBRATE

ADVANCED

UP DWN ENT

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

TEMPERATURE

LAST CALIBRATION

10/19/2017

PRESS NEXT TO ADJUST TEMPERATURE READING.

EXIT NEXT

2. Press **NEXT** to continue.

OFFSET

BACK

+0.1

-0.1

72.2°F

UP DWN ENT

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

CONFIRM?

OLD

68.1 °F

NEW

72.2 °F

YES NO

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

## CO2 Calibration

---

MNU ► CALIBRATION ► TEMPERATURE

CALIBRATION

BACK

CALIBRATE

ADVANCED

UP DWN ENT

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

CO2

LAST CALIBRATION  
10/19/2017

PUT SENSOR IN  
OUTDOOR AIR.

EXIT NEXT

2. Press **NEXT** to continue.


CO2

389 ppm

WAIT FOR READING  
TO STABILIZE THEN  
PRESS DONE.

EXIT DNE

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**.

CALIBRATION

BACK

TEMPERATURE

PH

COND

CLEAR ALL

UP DWN ENT

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

RESTORE TO  
FACTORY  
CALIBRATION?

YES NO

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

## Advanced Calibration

Sensors values may be manually calibrated and if equipped, 4-20mA analog outputs may also be calibrated with a positive or negative offset to compensate for variation in DAC's/ADC's.

### CO2

OFFSET calibration applies a linear offset adjustment to the value and can provide calibration to another meter as an alternative to calibrating in outdoor air. Adjust the value as required and confirm the new reading.

CALIBRATION

BACK

CALIBRATE

ADVANCED

UP

DWN

ENT

## Analog Output Calibration

4-20mA analog outputs may also be calibrated with a positive or negative offset to compensate for variation in DAC's/ADC's. The sensors' current output may be incrementally increased or decreased in steps of 0.005mA over a range of +/-2mA.

1 Offset bit = 0.005mA, Range = +/-400 bits (+/-2mA)

This calibration procedure is optional and only for use with custom PLC applications.

1. Observe the PLC's input or data readings.
2. Increase or decrease the offset value to incrementally adjust the current output until the values match.

ANALOG

BACK

+1

-1

-5

UP

DWN

ENT

## 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.

SETUP		
BACK		
TIME/DATE		
UNITS		
LOG INTERVAL		
NEXT		
UP	DWN	ENT

SETUP		
BACK		
COMM		
DEVICE ADD		
MFG INFO		
BACKLIGHT		
UP	DWN	ENT

## 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.

SETUP		
BACK		
TIME/DATE		
UNITS		
LOG INTERVAL		
NEXT		
UP	DWN	ENT

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

TIME/DATE		
BACK		
TIME		
DATE		
UP	DWN	ENT

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

TIME		
13:37:51		
NXT	+	EXT

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

DATE		
10/20		
2017		
NXT	+	EXT

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.

SETUP		
BACK		
TIME/DATE		
UNITS		
LOG INTERVAL		
NEXT		
UP	DWN	ENT

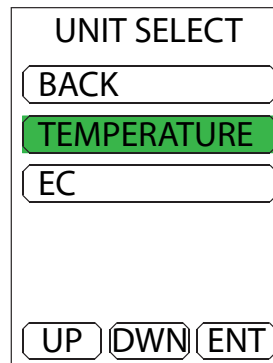
UNIT SELECT		
BACK		
TEMPERATURE		
EC		
UP	DWN	ENT



## Configure temperature units:

Temperature may be displayed in °F or °C.

Note: Check alarm settings when converting temperature units.



UNIT SELECT

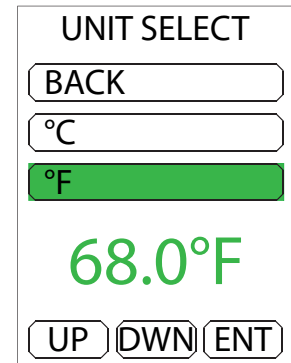
BACK

TEMPERATURE

EC

UP DWN ENT

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



UNIT SELECT

BACK

°C

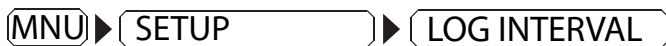
°F

68.0°F

UP DWN ENT

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

## Logging Interval



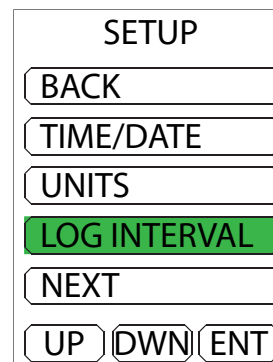
MNU ▶ SETUP ▶ LOG INTERVAL

Adjust the interval for recording data points in the on-board memory. 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.



SETUP

BACK

TIME/DATE

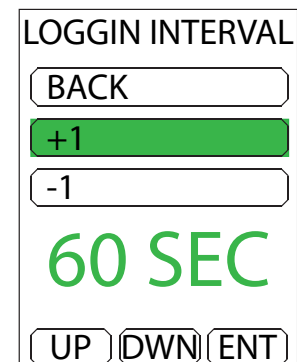
UNITS

LOG INTERVAL

NEXT

UP DWN ENT

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



LOGGIN INTERVAL

BACK

+1

-1

60 SEC

UP DWN ENT

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

## COMM Mode

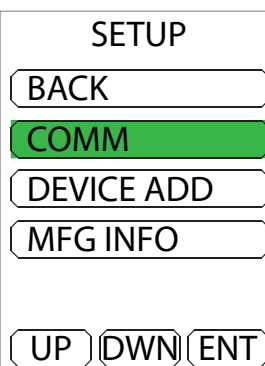


MNU ▶ SETUP ▶ NEXT ▶ COMM

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.)



SETUP

BACK

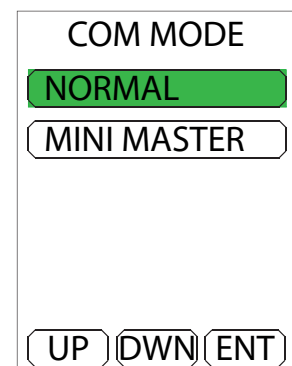
COMM

DEVICE ADD

MFG INFO

UP DWN ENT

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



COM MODE

NORMAL

MINI MASTER

UP DWN ENT

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.

SETUP		
[BACK]		
[COMM]		
[DEVICE ADD]		
[MFG INFO]		
[BACKLIGHT]		
[UP]	[DWN]	[ENT]

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

DEVICE ADDRESS		
[BACK]		
[+1]		
[-1]		
0 Addr		
[UP]	[DWN]	[ENT]

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.

SETUP		
[BACK]		
[COMM]		
[DEVICE ADD]		
[MFG INFO]		
[BACKLIGHT]		
[UP]	[DWN]	[ENT]

SERIAL NUMBER:		
17090554		
DATE OF MFG:		
09/15/17		
HW VERSION:		
C		
FW VERSION:		
02.03.84		
[EXIT]		

## 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.

SETUP		
[BACK]		
[COMM]		
[DEVICE ADD]		
[MFG INFO]		
[BACKLIGHT]		
[UP]	[DWN]	[ENT]

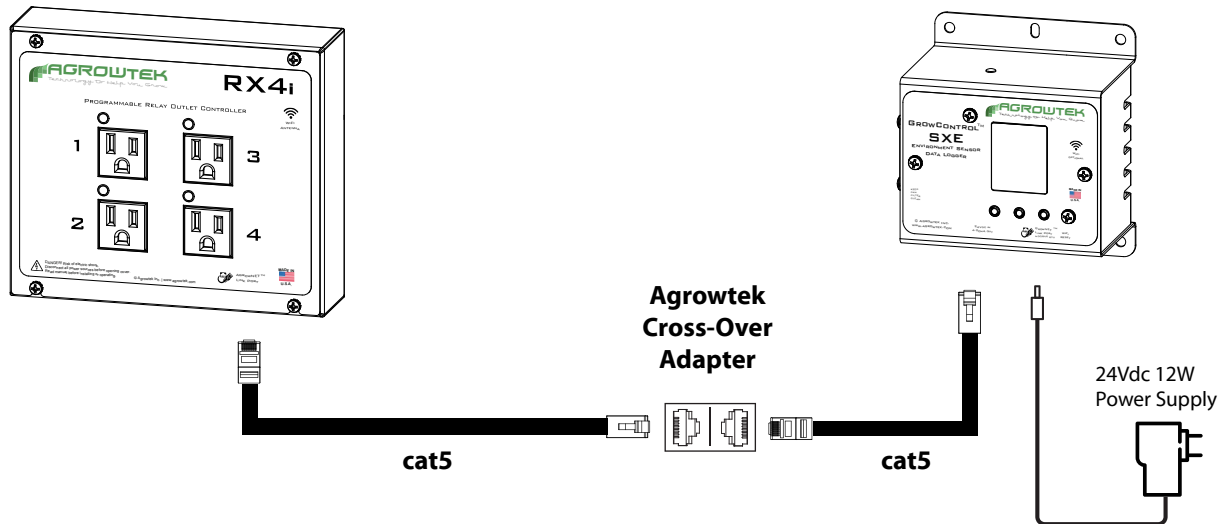
BACKLIGHT		
[BACK]		
[+1]		
[-1]		
60 Min		
[UP]	[DWN]	[ENT]

# Connection to RX4i Intelligent Relay

A direct-link connection between a SXE sensor and RX4i relay requires Agrowtek's cross-over adapter.



**IMPORTANT! ONLY use cross-over adapters provided by Agrowtek.** Do not use other cross-over adapters or cross-over cables unless they are constructed exactly as diagramed on the cross-over diagram. Incorrect cross-over adapters or cables can cause damage to the equipment.



Create a "mini" control system by linking a sensor directly to a relay with a cross-over (red) cable. Sensor will automatically connect and communicate with the relay on power-up. Relays do not provide power over the Ethernet cable, so a power supply is required with the sensor. An internal battery backup maintains the time during a power outage for un-interrupted operation.

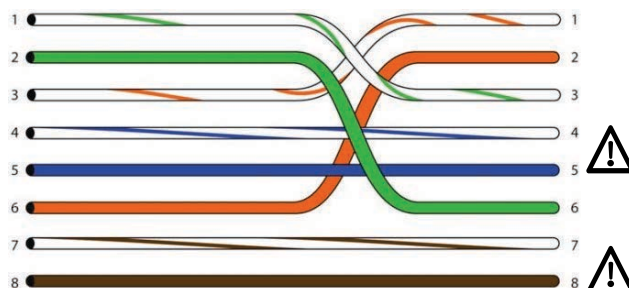
Control relays individually based on:

- Temperature (heat or cool)
- Humidity (humidify or dehumidify)
- CO2 (add or exhaust)
- Repeat Cycle Timer (1 - 65535 seconds)
- 24-Hour Timer
- Light sensor for day & night set-points

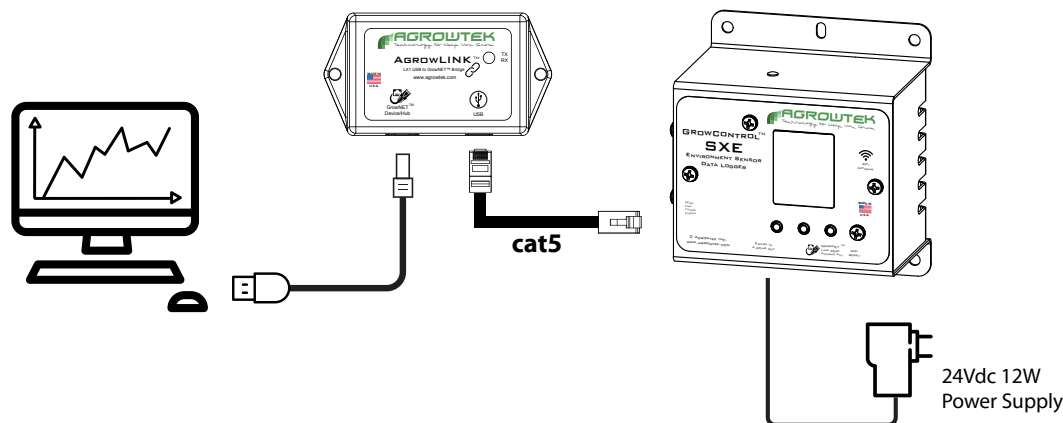
## Cross-Over Cable

A custom cross-over cable can be constructed as an *alternative* to using the cross-over adapter and two standard, straight Ethernet cables as shown in the diagram above. **The cross-over wiring MUST match the diagram below.**

Pins 7 & 8 carry 24Vdc power and must be straight through or damage may result to the equipment.



# Connection to USB AgrowLINK



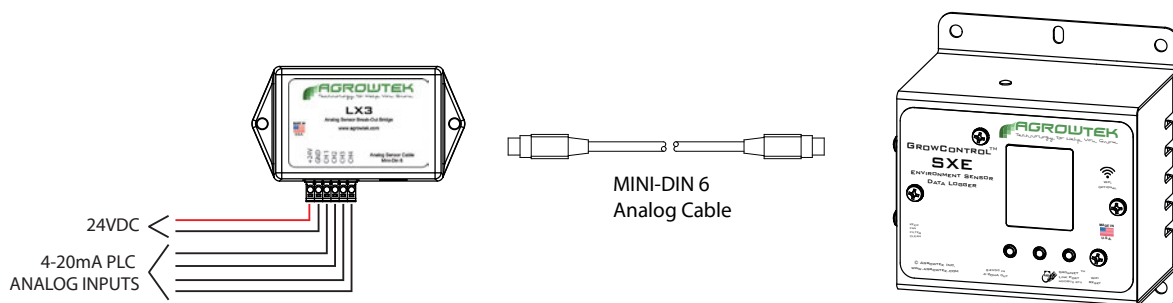
LX1 USB AgrowLINK connects Agrowtek's devices to a computer's USB port for:

- Firmware Updates
- Calibration
- Configuration
- Data Logging Download
- Live Graphing
- Email Alerts
- More

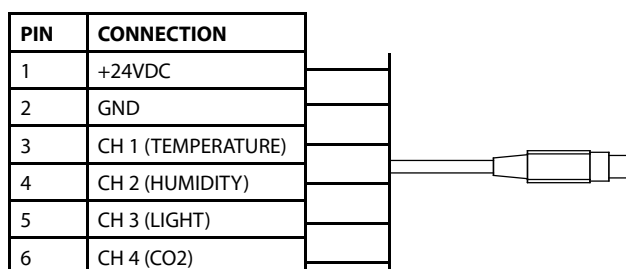
Sensor devices may be powered either by the power jack on the sensor, or by the power jack on the Agrow-LINK. These options allow a single connection to the sensor through the Ethernet cable simplifying installation. Standard drivers automatically install in Windows. GrowNET protocol available for custom software applications; sample C# code available. See software manual for more information.

## Connection to 4-20mA Outputs

Option 1: Use the LX3 Analog Bridge with Mini-Din 6 analog sensor port connection and removable terminal block for wire connections. Terminal block includes 24V power terminals and four terminals for the analog channels. 4-20mA linear outputs correspond to the ranges in the specifications table.



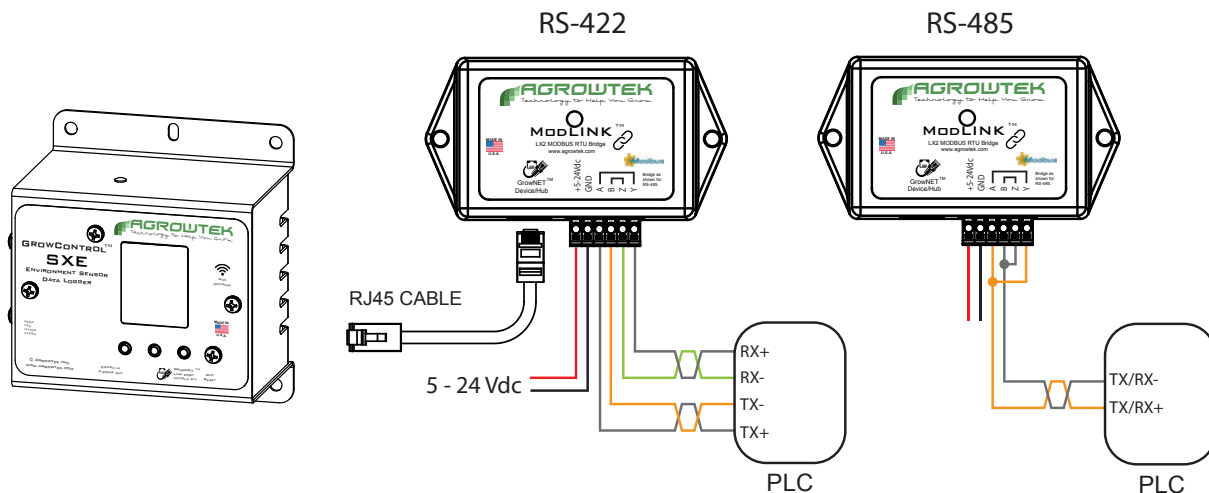
Option 2: Create a cable for direct connection to a PLC from a Mini-Din 6 cable.



# Connection to MODBUS RTU

## RS-485 / RS-422

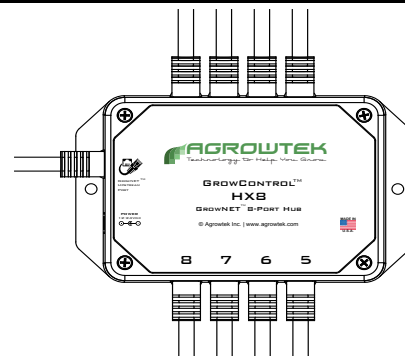
Use the LX2 ModLINK to connect MODBUS devices to the GrowNET™ port.



## HX8 8-Port Hubs

HX8 GrowNET™ Hubs allow multiple GrowNET™ sensors, relays and dosing pumps to be connected to a single LX1 or LX2 interface. Individually buffered, full-duplex ports for signal integrity. Hubs can be daisy chained to form a network of up to 247 devices.

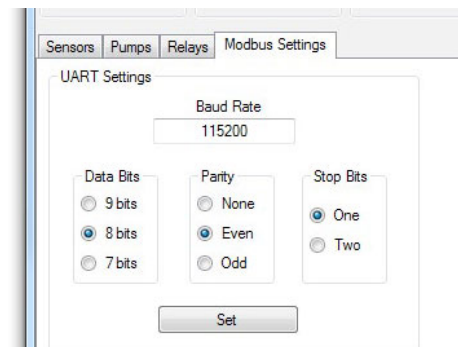
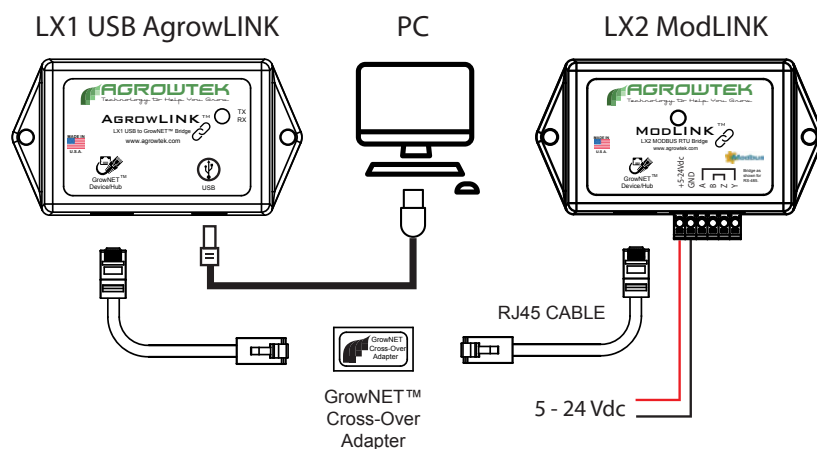
Hubs provide up to 1A of power for operating sensors and some relays directly over the GrowNET cable. A DC jack on the hub provides 24Vdc power to the ports from the included 120V wall power supply.



## Serial Speed & Format

The default serial data format for the LX2 ModLINK interface is: **19,200 baud, 8-N-1**.

Alternate speeds and formats between 9,600 - 115,200 baud may be configured with the free AgrowLINK PC utility using a LX1 USB AgrowLINK and the cross-over adapter supplied with the LX2 ModLINK.



See MODBUS manual for more information.



[MODBUS Manual](#)

## Supported Commands

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0x03 Read Multiple Registers  
0x06 Write Single Register  
0x10 Write Multiple Register

## Register Types

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All registers are 16 bits wide with addresses using the standard MODICON protocol. Floating point values use the standard IEEE 32-bit format occupying two contiguous 16 bit registers. ASCII values are stored with two characters (bytes) per register in hexadecimal format.

## Sensor Value Registers

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Sensor values are available in integer or floating point formats depending on the register requested (see map.)

Sensor #	Type	Integer Scale	Range
1	Temperature	x100	-2000 - 6000 (-20 - 60°C)
2	Humidity	x10	0 - 1000 (0 - 100%)
3	Light	x1	0 - 1000 W/m2
4	CO2	x1	0 - 2000 ppm

For example: an integer temperature value of 2417 is equal to a temperature reading of 24.17°C.

## Calibration Registers

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Calibration registers are 16-bit signed integers for the purpose of calibrating the sensor values or analog output channels. Calibration may be achieved by writing the desired calibrated value to the associated register. Writing to the calibration registers automatically invokes the calibration routine for that register.

### Offset Calibration

Offset, or zero calibration, is an arithmetic positive or negative correction to the sensor reading and is the only type of sensor calibration available on climate/environmental sensors.

To perform a sensor offset calibration, simply write the corrected sensor value to the offset calibration register (taking into account the integer scale as shown above.)

For example: to set the temperature to a calibrated value of 25°C, write the value "2500."

### Analog Calibration

Analog output calibration sends a positive or negative offset to the respective output channel's digital to analog converter (DAC.) The DAC has a resolution of 0.005mA/bit.

$\pm 1$  calibration bit =  $\pm 0.005$ mA adjustment

For example: to shift the analog output up by 0.1mA, set the analog offset value to +20. ( $0.1 / 0.005 = 20$ )

# MODBUS Register Map

Parameter	Function	Type	Scale	Access	Address
Device Address	Slave Address	Value, 1-247	8 bit	R/W	40001
Serial#	Serial Number	ASCII	8 Char	R	40004
DOM	Date of Manufacture	ASCII	8 Char	R	40008
HW Version	Hardware Version	ASCII	8 Char	R	40012
FW Version	Firmware Version	ASCII	8 Char	R	40016
Sensor 1 Value	Sensor output	Signed Int	16 bit	R	40101
Sensor 2 Value	Sensor output	Signed Int	16 bit	R	40102
Sensor 3 Value	Sensor output	Signed Int	16 bit	R	40103
Sensor 4 Value	Sensor output	Signed Int	16 bit	R	40104
Sensor 1 Value	Sensor output	Float	32-bit	R	40201
Sensor 2 Value	Sensor output	Float	32-bit	R	40203
Sensor 3 Value	Sensor output	Float	32-bit	R	40205
Sensor 4 Value	Sensor output	Float	32-bit	R	40207
Sensor 1 Offset Cal	Calibration Input	Signed Int	16 bit	W	41101
Sensor 2 Offset Cal	Calibration Input	Signed Int	16 bit	W	41102
Sensor 3 Offset Cal	Calibration Input	Signed Int	16 bit	W	41103
Sensor 4 Offset Cal	Calibration Input	Signed Int	16 bit	W	41104
Sensor 1 Span Cal	Calibration Input	Signed Int	16 bit	W	41201
Sensor 2 Span Cal	Calibration Input	Signed Int	16 bit	W	41202
Sensor 3 Span Cal	Calibration Input	Signed Int	16 bit	W	41203
Sensor 4 Span Cal	Calibration Input	Signed Int	16 bit	W	41204
Sensor 1 Analog Cal	Calibration Input	Signed Int	16 bit	W	41301
Sensor 2 Analog Cal	Calibration Input	Signed Int	16 bit	W	41302
Sensor 3 Analog Cal	Calibration Input	Signed Int	16 bit	W	41303
Sensor 4 Analog Cal	Calibration Input	Signed Int	16 bit	W	41304

# Maintenance & Service

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Sensors require periodic maintenance to ensure proper performance.

## Cleaning

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

## Fan Filter

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

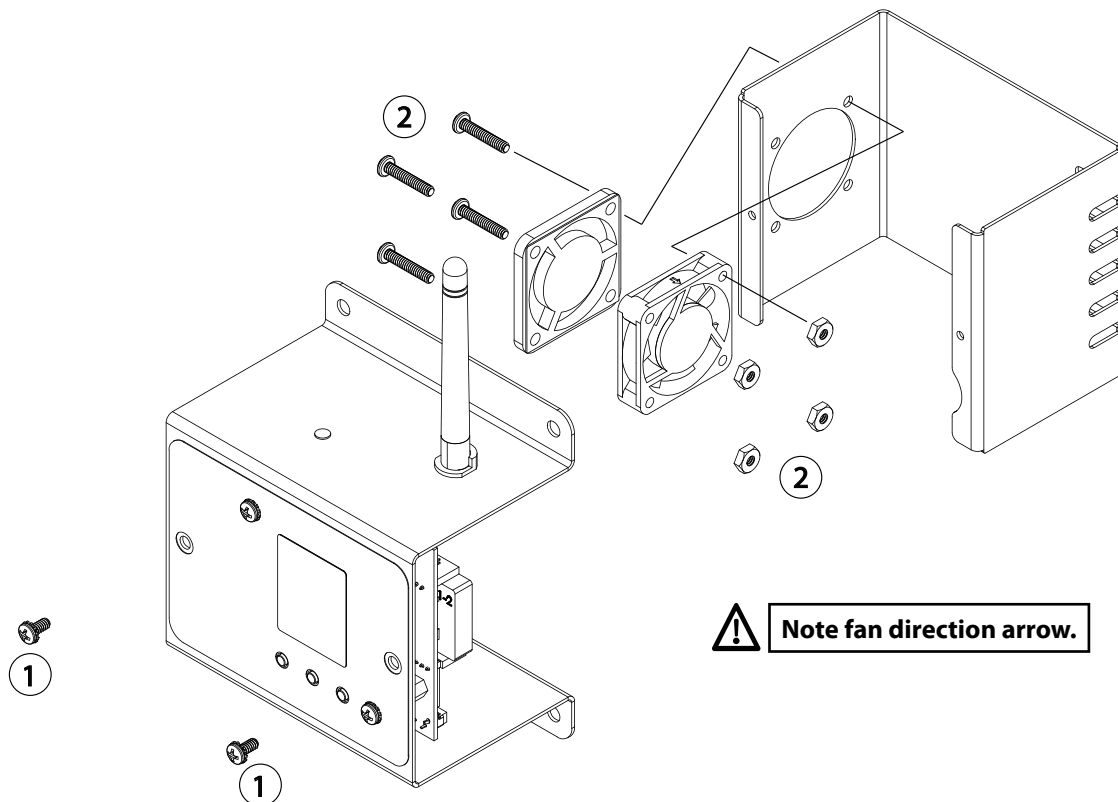
1. Pry the retaining grate out using a small flat blade eye-glass screwdriver or tip of a pocket knife.
2. Remove the foam filter and replace, or clean with mild dish detergent and water, then pat dry.
3. Re-install the foam filter and grate by gently snapping the grate back into place.

## Fan Replacement

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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.

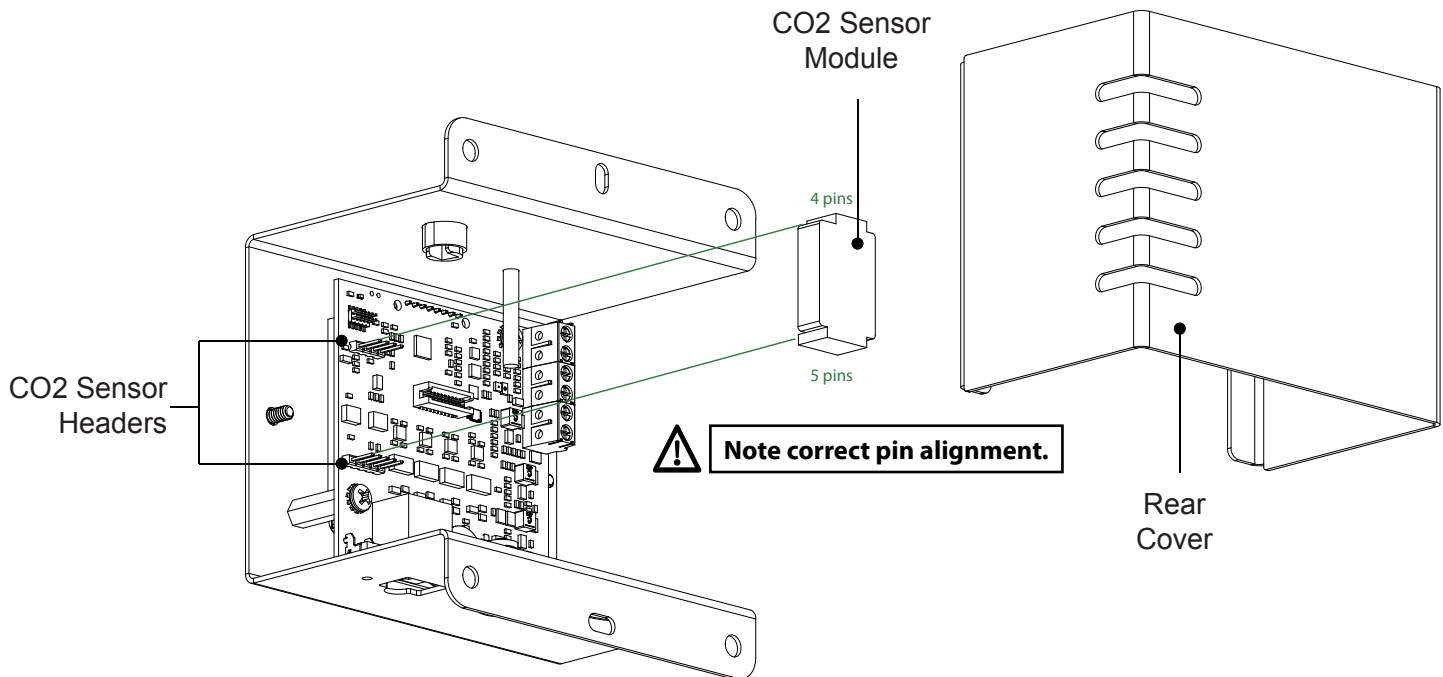




## CO2 Sensor Upgrade

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.



## Storage and Disposal

### Storage

Store equipment in a clean, dry environment with ambient temperature between 10-50°C.

### Disposal

This industrial 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.