

## Climate Sensor & Data Logger

### Specifications

|                         |                                       |
|-------------------------|---------------------------------------|
| Power, GrowNET/MODBUS   | 24Vdc 1.5W average, 2.5W peak         |
| Power, Analog/4-20mA    | 24Vdc ~5W                             |
| Max Cable Distance      | 1000 ft                               |
| Aspirator               | 6cfm Fan with Foam Filter             |
| Temperature Range       | -20 - 60°C ( 0 - 140°F )              |
| Temperature Accuracy    | ±0.2°C typ ±0.4°C max                 |
| Humidity Range          | 0-100% RH (non condensing)            |
| Humidity Accuracy       | ±2% 0-80% typ ±4% max                 |
| Light Irradiance Range  | 0 - 1000W/m2                          |
| Light Accuracy          | ±10%                                  |
| CO2 Range               | 0-10,000ppm (optional)                |
| CO2 Accuracy            | ±50ppm + 3% of reading                |
| PLIR™ Temperature Range | -40 - 85°C ( -40 - 185°F ) (optional) |
| PLIR™ Accuracy          | ±0.3°C typical                        |
| PLIR™ Measurement Angle | 37.5° Cone                            |
| 4-20mA DAC Resolution   | 12 bit, 0.005mA (optional)            |
| Protocols               | GrowNET™ or MODBUS RTU                |



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**KEEP THESE INSTRUCTIONS**

REV 5/23

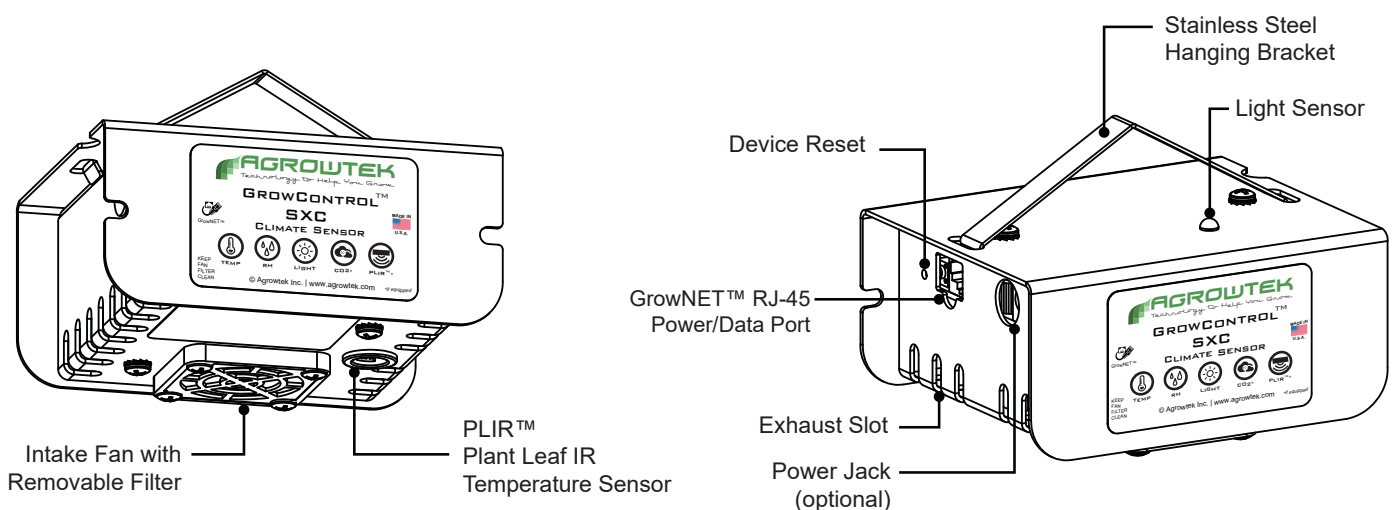


# Features

A GrowControl™ SXC is a precision digital indoor sensor featuring temperature, humidity, and ambient light sensors standard. Optional CO2 ppm sensor allows accurate readings up to 10,000 ppm with reliable NDIR sensor technology. Optional PLIR™ downward-looking plant-leaf infrared sensor provides real-time leaf temperatures for accurate VPD measurements. Fan aspirated for continuous accuracy with removable air filter.

Internal memory logs over 20,000 data points per sensor. Connects to Agrowtek's GrowControl™ Cultivation Controllers as part of a complete facility control solution.

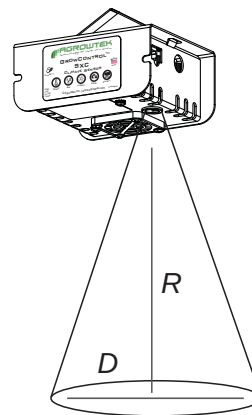
LX1 USB AgrowLink connects the GrowNET™ port to a PC with free PC software for datalog download, graphing, calibration, configuration, firmware updates, etc. LX2 ModLINK connects GrowNET™ devices to RS-422/485 for MODBUS RTU protocol communication.



## PLIR™ Plant Leaf IR Sensor

Units equipped with a PLIR™ sensor should consider the measurement spot size when hanging the sensor above the plant canopy.

The spot size will increase with greater distance to the plant canopy and will be reduced as the canopy grows closer to the sensor unit.



37.5° Sensor Angle

| Range (R) | Spot Diameter (D) |
|-----------|-------------------|
| 12"       | 8"                |
| 24"       | 16"               |
| 36"       | 24"               |
| 48"       | 32"               |

# Installation Instructions

A hanging bracket is available for conveniently suspending the sensor from a wire or cable in the middle of the environment. Note the location of the light sensor (top.) Sensor must be installed with the light sensor facing up and the fan facing down. Do not install with RJ-45 port facing "up." Wall mounting slots are provided for installing against a vertical wall surface if hanging is not preferred.

If equipped, the PLIR™ infrared sensor is located on the bottom (fan) side and should be directed toward the plant canopy. Ensure the sensor is located directly above plants and not above another heat source.

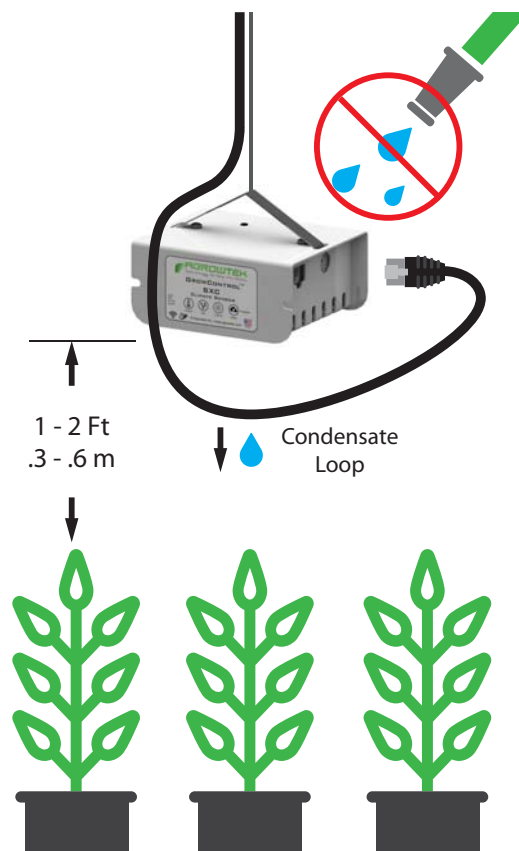
## Installation Location Requirements:

- Air must adequately circulated to the sensor and be representative of the environment.
- Away from undue influence such as ventilation ducts, doorways/windows, lights or hot equipment
- In a dry location away from mists, sprays and rain.
- Ideally above the canopy approximately 1-2 ft. (0.3-0.6m) on adjustable chain or rope.

## Condensate Loop:

A loop or dip is recommended in the connection cable to prevent water from entering the connector or plug jack which could cause short circuits or equipment damage.

- ⚠ **Do not connect the GrowNET™ port to Ethernet networks. Equipment damage may result.**
- ⚠ **Always bag or remove sensors when spraying chemicals or fogging.**
- ⚠ **Do not spray the sensor with water or chemicals. Protect sensor from direct water exposure.**



## Installation Notes

### ⚠ NOTICE

GrowNET™ ports use standard RJ-45 connections but are NOT compatible the Ethernet network equipment. *Do not connect GrowNET™ ports to Ethernet ports or network switch gear.*

### ⚠ DIELECTRIC GREASE

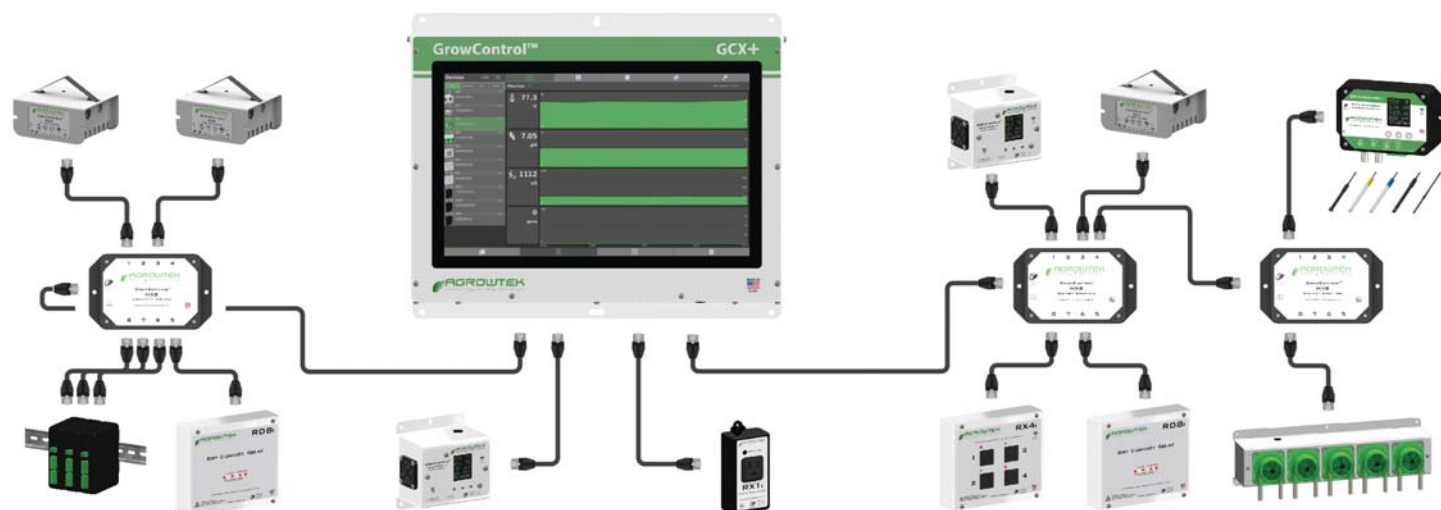
Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port. *Non-conductive grease is designed to prevent corrosion from moisture in electrical connectors.*

- Loctite LB 8423
- Dupont Molykote 4/5
- CRC 05105 Di-Electric Grease
- Super Lube 91016 Silicone Dielectric Grease
- Other Silicone or Lithium based insulating grease

## Connection to GrowControl™ GCX

All GrowNET™ devices are connected using standard CAT5 Ethernet cable with RJ-45 connections.

Devices can be connected directly to the GrowNET™ ports on the bottom of the controller, or through HX8 GrowNET™ hubs. It is typical to simplify cabling by locating hubs centrally in hall ways and rooms allowing single runs from an 8-port device hub back to a central hub or back to the controller.



Refer to the GCX controller manual for details on adding the device to the system.

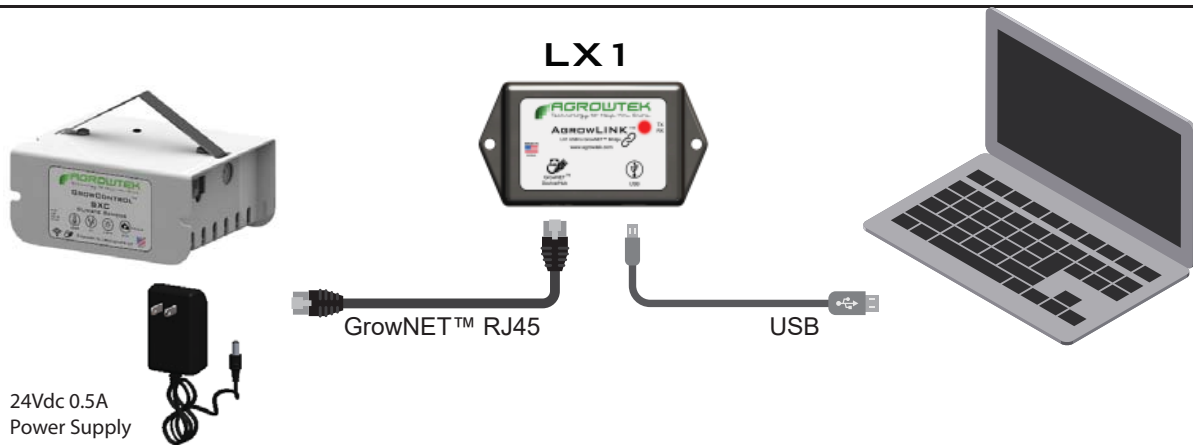
## GrowNET™ Hubs

HX8 GrowNET™ hubs expand a single port into eight more ports. Hubs can be daisy-chained to form a network of up to 100 devices per GrowNET™ bus. Individually buffered port transceivers provide excellent signal integrity and extended communication strength and range.

Hubs provide up to 1A of power for operating sensors and most relays directly over the CAT5 cable. A DC jack on the hub provides 24Vdc power to the ports from the included wall power supply. A terminal block power option is also available.



# 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
- More

Visit [www.agrowtek.com](http://www.agrowtek.com) for free software applications.

Standard FTDI 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

**Only compatible with sensors ordered with analog outputs.**

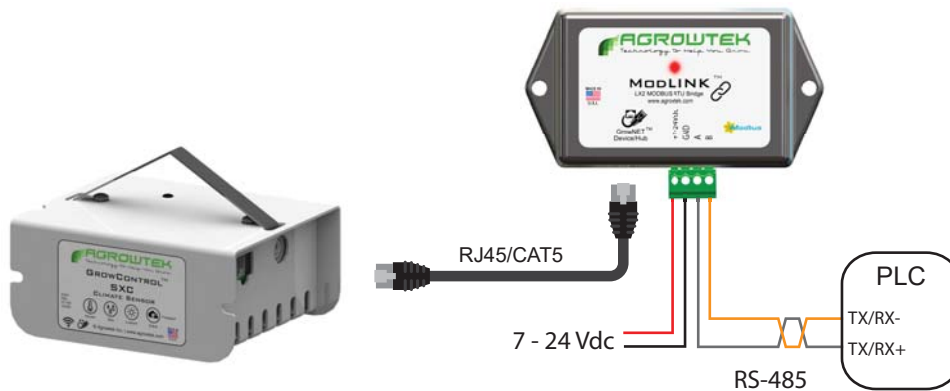
Use the LX3 Analog Bridge with Mini-Din 6 analog sensor port connection and removable terminal block for wire connections. Terminal block includes 24V power terminals and four terminals for the analog channels. 4-20mA linear outputs correspond to the ranges in the specifications table.



# Connection to MODBUS RTU

## RS-485

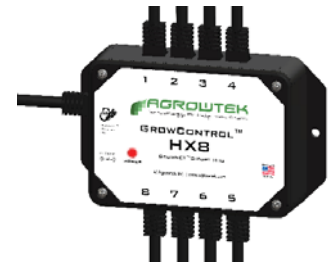
Use the LX2 ModLINK to connect MODBUS devices to the GrowNET™ port.



### 3.3/5Vdc Serial Bus Compatible.

Include required bus terminating resistors per EIA standard.

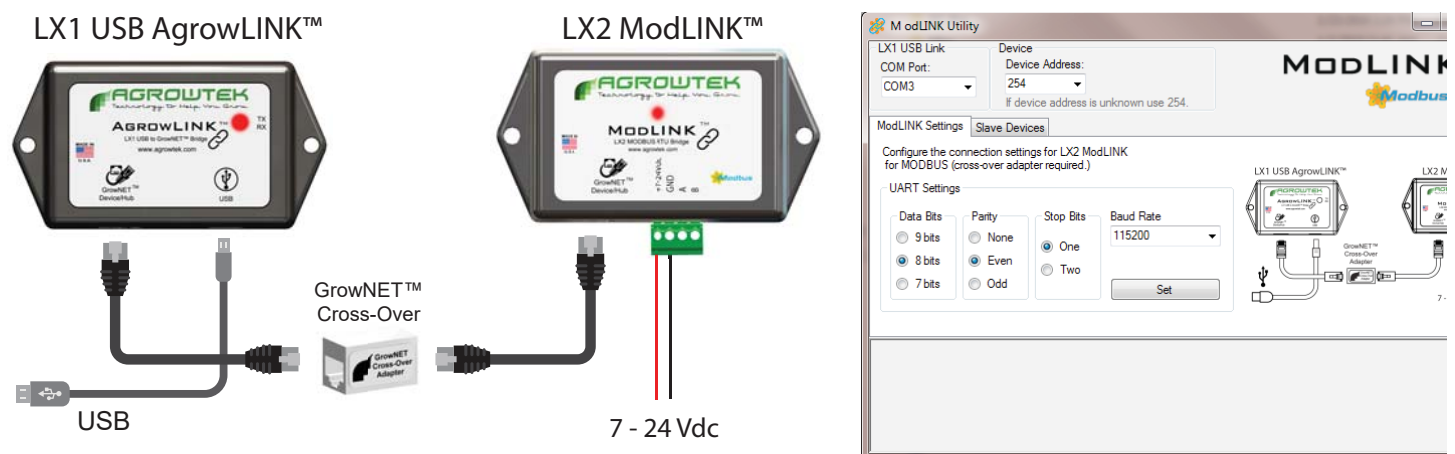
HX8 GrowNET™ hubs are compatible with LX2 ModLINK™ and MODBUS. Connect multiple devices to a single LX2 and benefit from the superior buffered communication of the HX8 hub.



## 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

0x03 Read Multiple Registers

0x06 Write Single Register

A request to use a function that is not available will return an illegal function exception.

## Register Types

Data 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

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) / -400 - 14000 (-4 - 140°F) |
| 2        | Humidity    | x10           | 0 - 1000 (0 - 100%)                                   |
| 3        | Light       | x1            | 0 - 1000 W/m2                                         |
| 4        | CO2         | x1            | 0 - 10,000 ppm                                        |

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

The value "9999" is representative of a failed sensor (with the exception of CO2 which will read 0.)

## Toggle Units Register

Sensors with alternate units may toggle the units using the "toggle units" register. To toggle the units, send the sensor channel number to the toggle register. *This register is write-only.*

For example: to toggle between °F and °C, send a "1" to register 1002.

## Calibration Registers

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 Holding Registers

| Parameter                        | Description          | Range                     | Type                | Access | Address |
|----------------------------------|----------------------|---------------------------|---------------------|--------|---------|
| Address                          | Device Slave Address | 1 - 247                   | 8 bit               | R/W    | 40001   |
| Serial#                          | Device 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   |
| Toggle Units                     | Toggle sensor units  | 1 - 4                     | 16 bit, unsigned    | W      | 41002   |
| Heater Power                     | RH Sensor Heater     | 0 - 16 *                  | 16 bit, unsigned    | W      | 41003   |
| Sensor Reading, Integer          | Temperature          | -2000 - 6000 (-20 - 60°C) | 16 bit, signed      | R      | 40101   |
|                                  | Humidity             | 0 - 1000 (0 - 100%)       |                     |        | 40102   |
|                                  | Light                | 0 - 1000 W/m2             |                     |        | 40103   |
|                                  | CO2                  | 0 - 10,000ppm             |                     |        | 40104   |
|                                  | PLIR™ IR Temperature | -4000 - 8500 (-40 - 85°C) |                     |        | 40105   |
|                                  | Wind Speed           | 0 - 125 mph               |                     |        | 40106   |
|                                  | Wind Direction       | 0 - 359 Degrees           |                     |        | 40106   |
| Sensor Reading, Float            | Temperature          | -20.00- 60.00 °C          | 32 bit, floating pt | R      | 40201   |
|                                  | Humidity             | 0 - 100.0 %               |                     |        | 40203   |
|                                  | Light                | 0 - 1000 W/m2             |                     |        | 40205   |
|                                  | CO2                  | 0 - 10,000ppm             |                     |        | 40207   |
| Calibration Input, Offset (Zero) | Temperature          | See integer ranges above. | 16 bit, signed      | W      | 41101   |
|                                  | Humidity             |                           |                     |        | 41102   |
|                                  | Light                |                           |                     |        | 41103   |
|                                  | CO2                  |                           |                     |        | 41104   |
| Calibration Input, Analog Output | Temperature          | -255 - 255 (bits)         | 16 bit, signed      | W      | 41301   |
|                                  | Humidity             |                           |                     |        | 41302   |
|                                  | Light                |                           |                     |        | 41303   |
|                                  | CO2                  |                           |                     |        | 41304   |

\*Sensor heater power will reset to default (0) on a power cycle. Use sensor heater to test the temperature/RH sensor, drive off condensation or recondition the RH sensor element from saturation. Use full power (16) for 24 hours to bake the sensor. *Not available on some sensor elements.*

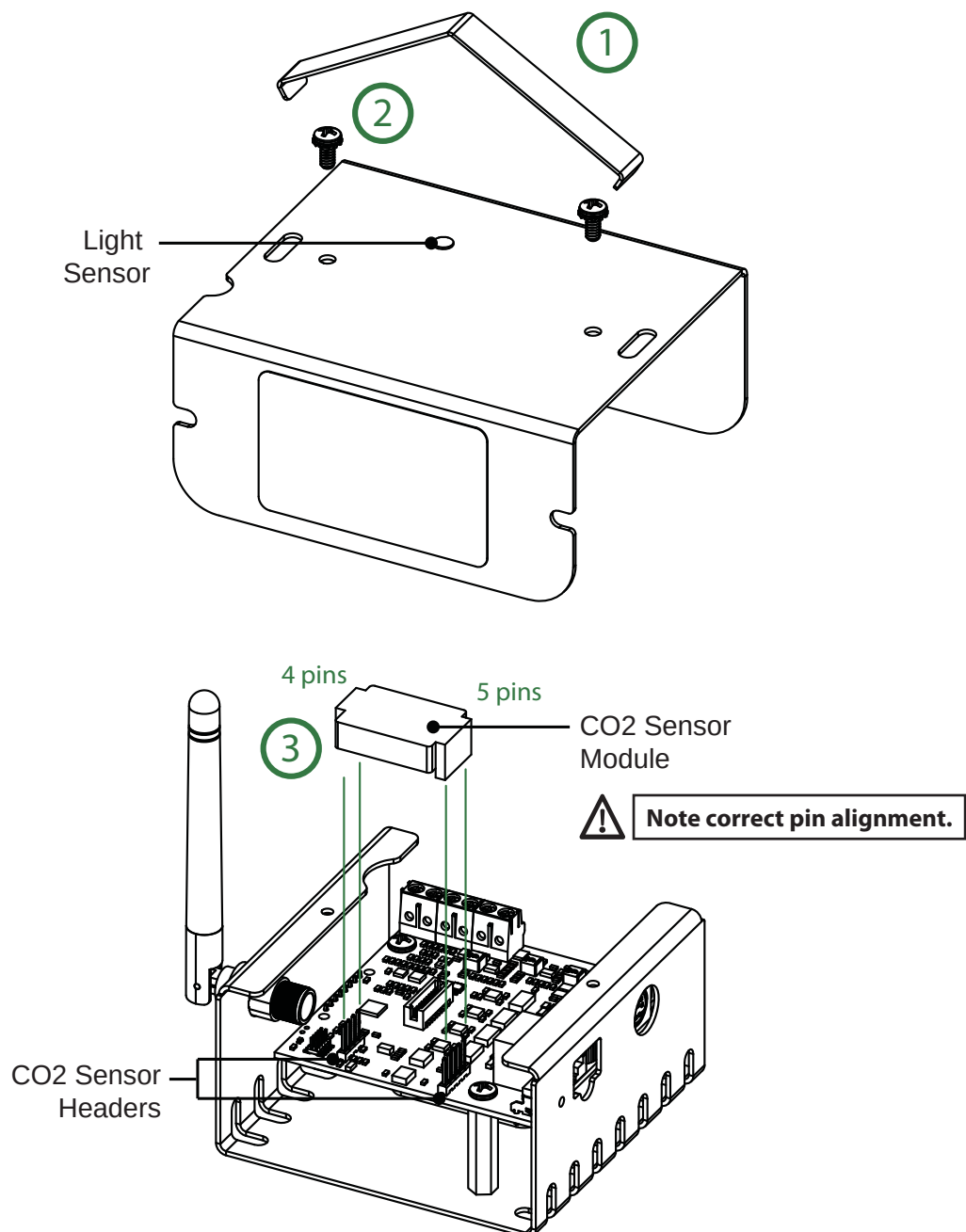
A request to read or write a register that is not available will return an illegal address error (0x02).



# CO2 ppm Sensor Upgrade

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

1. Disconnect cables from the sensor.
2. Remove the hanging bracket (1).
3. Take note the orientation of the light sensor on the cover.
4. Remove the two cover screws (2) and lift off the cover.
5. Locate the CO2 headers on the circuit board.
6. Position and install the CO2 sensor module (3) ensuring the sensor is oriented with the correct pin headers. One header is 4-pins and the other is 5-pins.  
*Installing the sensor backwards will damage the CO2 module.*
7. Re-install the top cover and re-connect cables.
8. Check to ensure the CO2 reading is now working.



# Maintenance & Service

Sensors require periodic maintenance to ensure proper performance.

## Cleaning

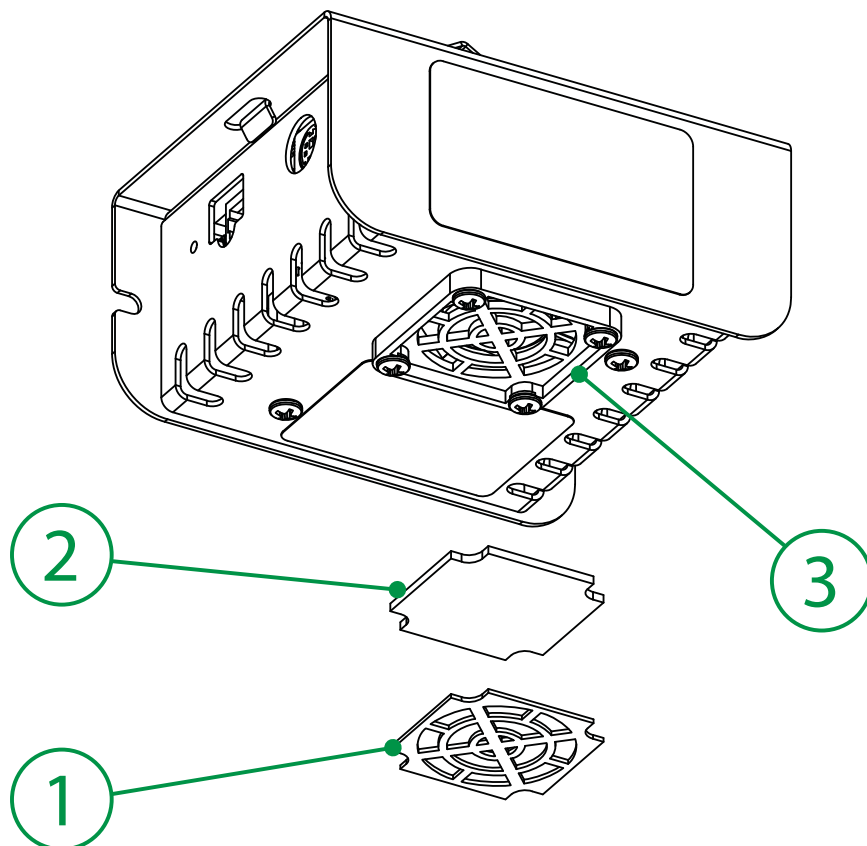
Exterior and label surfaces may be wiped with a damp cloth with mild dish detergent, then wiped dry. Avoid spraying the sensor with chemicals or water spray.

## 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 (1) out of the base (3) using a small flat blade eye-glass screwdriver.
2. Remove the foam filter (2) and replace, or clean with mild dish detergent and water, then pat dry.
3. Check for proper fan operation while the filter is removed.  
If fan is not spinning or is making noise, replace the fan.
4. Re-install the foam filter (2) and grate (1) into the base (3) gently snapping the grate back into place.



# Storage and Disposal

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## 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.

