Climate Sensor for Mushroom Culture

Specifications

Power, GrowNET/MODBUS	24Vdc 1W average, 2W peak
Power, Analog/4-20mA	24Vdc ~5W
Max Cable Distance	1000 ft
Aspirator	None
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% 0-85% typ ±4% max
Light Irradiance Range	0 - 1000W/m2
Light Accuracy	±10%
CO2 Range	0 - 40,000ppm (optional)
CO2 Accuracy	±50ppm + 3% of reading
Protocols	GrowNET™ or MODBUS RTU 4-20mA (with LX4 module)

Contents

KEEP THESE INSTRUCTIONS

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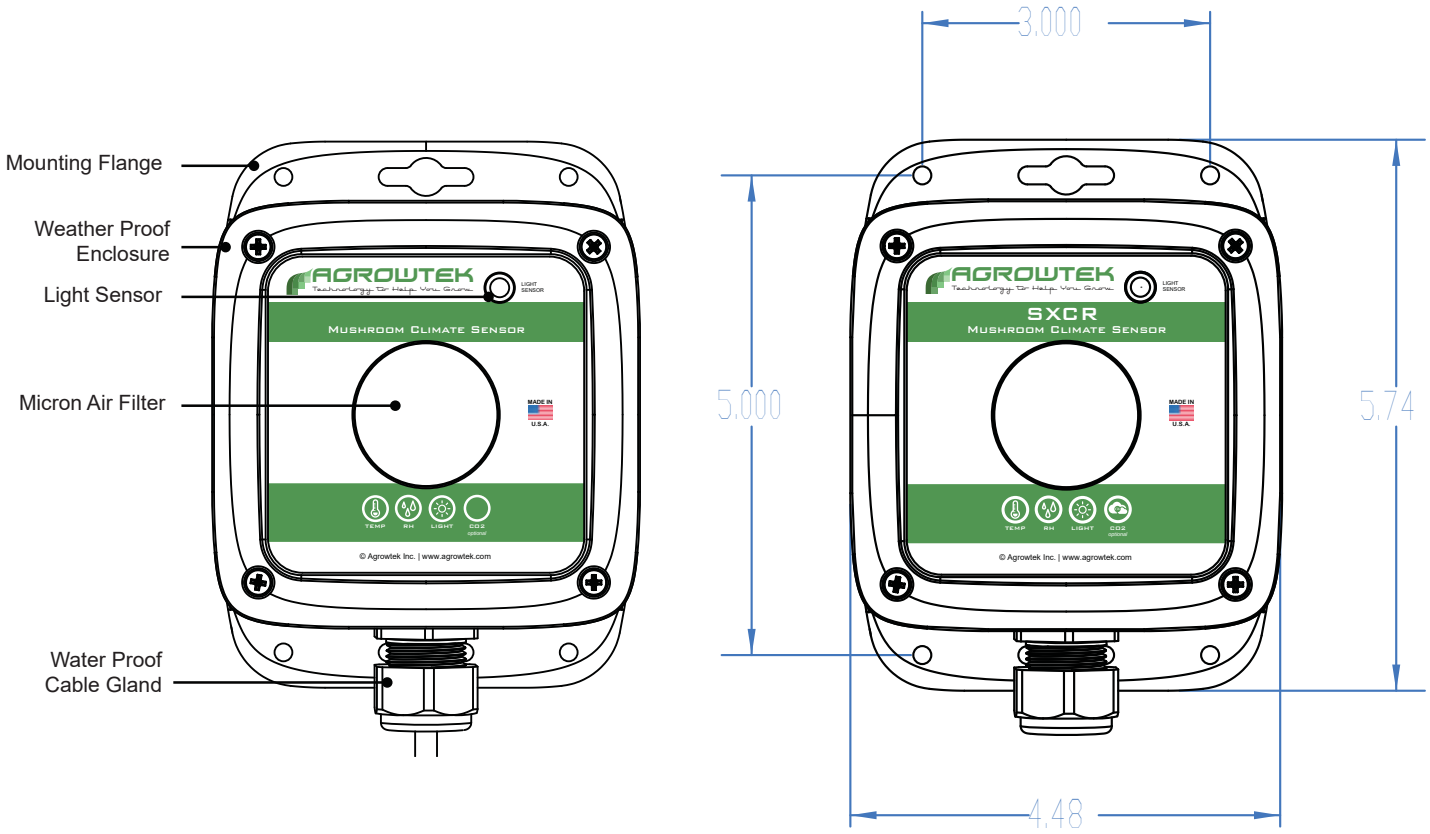
Features

GrowControl™ SXCR is a precision digital environment sensor designed for use in high humidity mushroom culture applications. Sealed enclosure with micron filter protects sensor electronics and prevents droplets of water from entering the enclosure while still allowing CO2 and water molecules to pass through the filter.

Features temperature, humidity, and ambient light sensors standard. Optional CO2 ppm sensor allows accurate readings up to 10,000 ppm with reliable NDIR sensor technology. Sensor is passive (no aspirator fan) and should be shielded from intense radiation.

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.



Dimensions

SXCR sensors are approximately 5-3/4" high x 4-1/2" wide x 2-1/2" deep.

Mounting hole pattern: 5.00" high x 3.00" wide

Installation Instructions

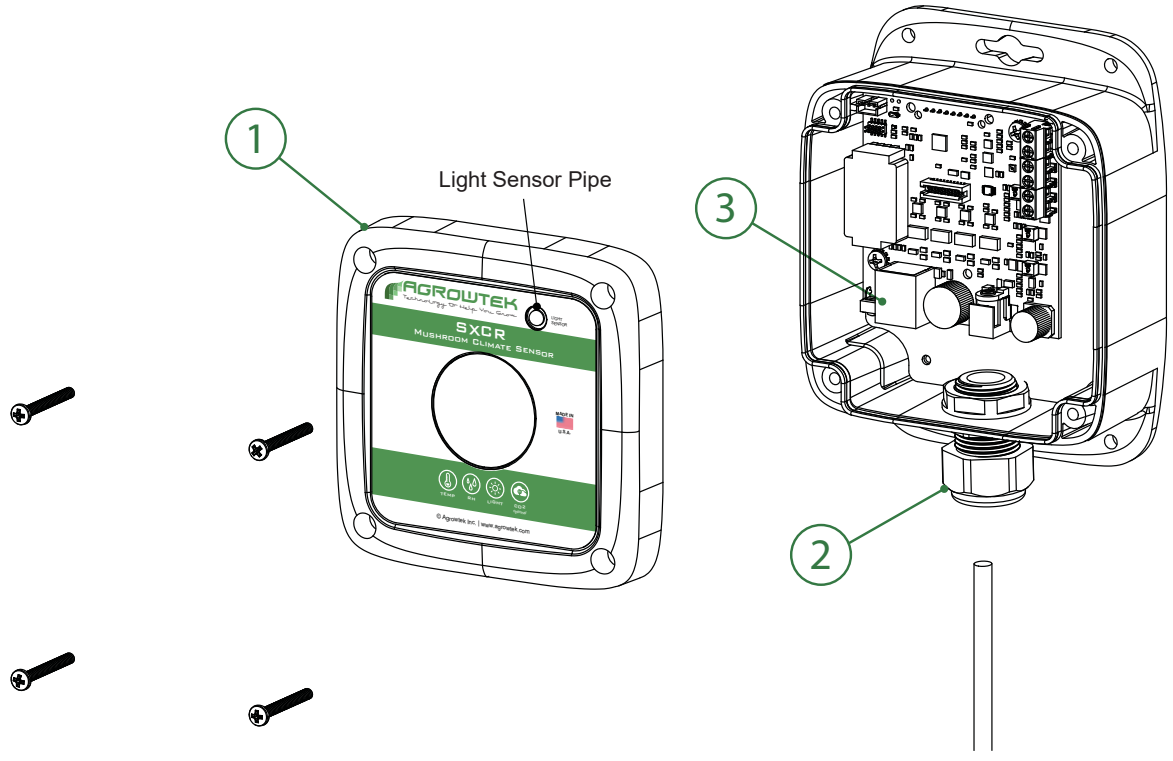
Sensor should be installed in a location that has good air circulation and is not in direct sunlight.

Installation Location Requirements:
- Air must adquately circulated to the sensor and be representative of the environment.
- Away from undue influence such as ventilation ducts, doorways/windows, lights or hot equipment.
- Shielded from direct sunlight or radiant energy sources (no aspirator fan.)
- In a location away from chemcial mists or sprays.

Mount the sensor using the mounting flanges, or suspend the sensor from the cable once the cable gland has been adequately tightened and secured from tension on the connector.

Cable Installation
It is necessary to terminate the RJ-45 connector after installing the CAT5/6 cable through the cable gland.

1. Remove the front cover (1) set the cover and screws aside.
2. Install the CAT5/6 cable through the cable gland (2).
3. Terminate the CAT5/6 cable with an RJ-45 connector.
4. TEST the cable with a RJ-45 tester.
5. Connect the cable to the RJ-45 jack (3) on the SXCR circuit board.
6. Tighten the cable gland (2) to seal the cord connection and provide strain relief to the cable.
7. Re-install the front cover (1) check orientation to ensure light sensor pipe is in correct orientation.



⚠ **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.

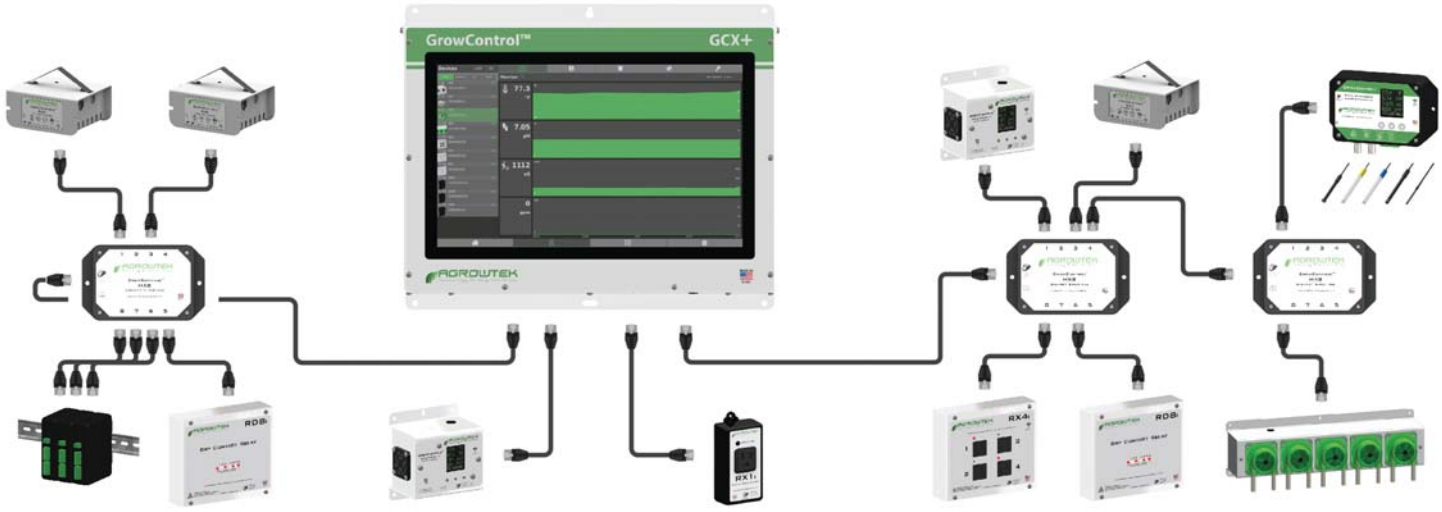
⚠ DIELECTRIC GREASE
Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port.
Non-conductive grease is designed to prevent corrosion from moisture in electrical connectors.

- 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

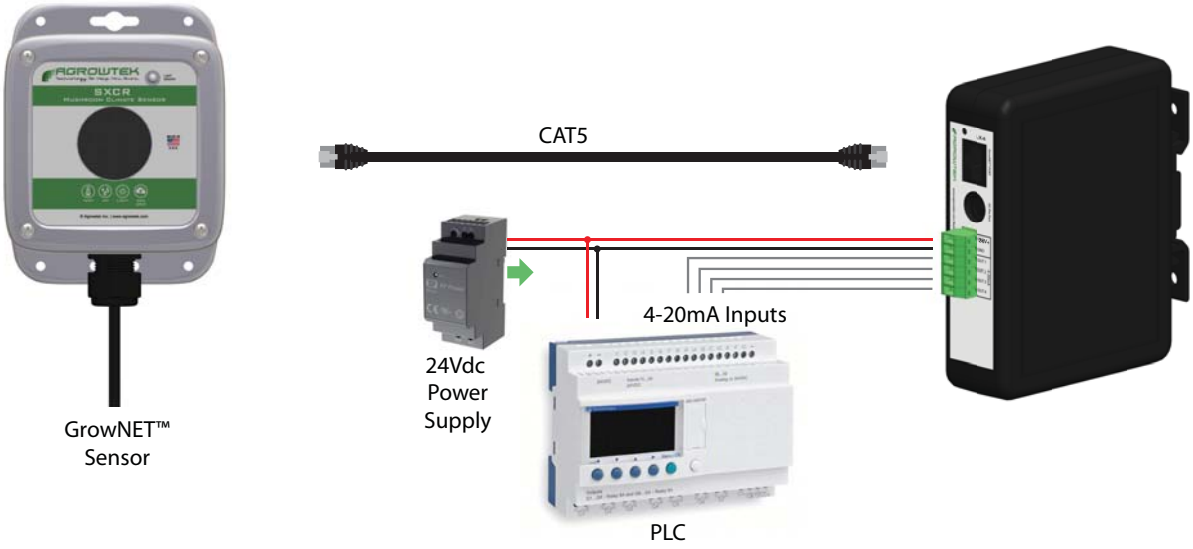
HX8 GrowNET ™ hubs expand a single port into eight more ports. Hubs can be daisy-chained to form a network of up to 100 devices per GrowNET™ bus. Individually buffered port transcievers provide excellent signal integrity and extended communication strength and range.

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 4-20mA Outputs

Converting sensors to current output requires the LX4 4-20mA Analog Module.

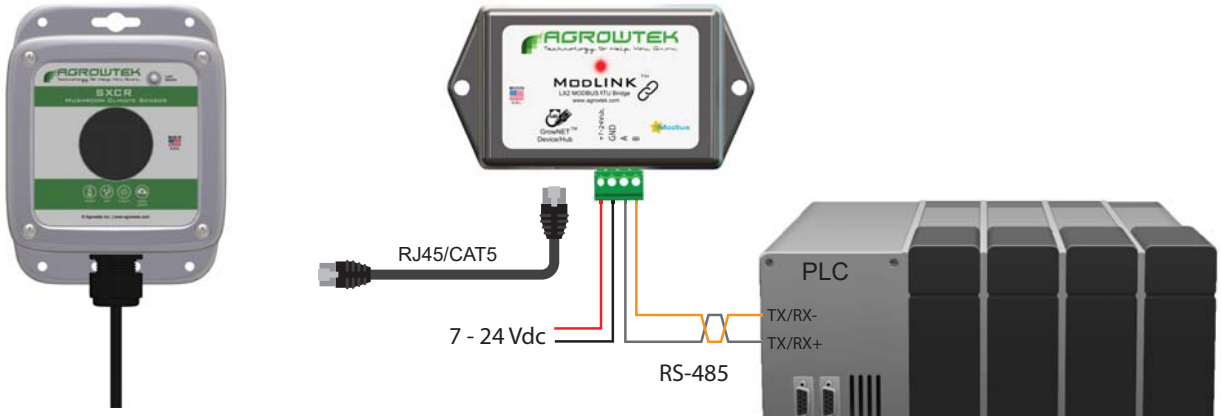
The LX4 module will convert any Agrowtek GrowNET™ sensor device into an analog output signal for 4-20mA PLC inputs. The LX4 features four channels of output for sensors with up to four values. Simply plug into the Agrowtek device and the LX4 will begin transmitting sensor data. See LX4 manual for more detail.



Connection to MODBUS RTU

RS-485

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



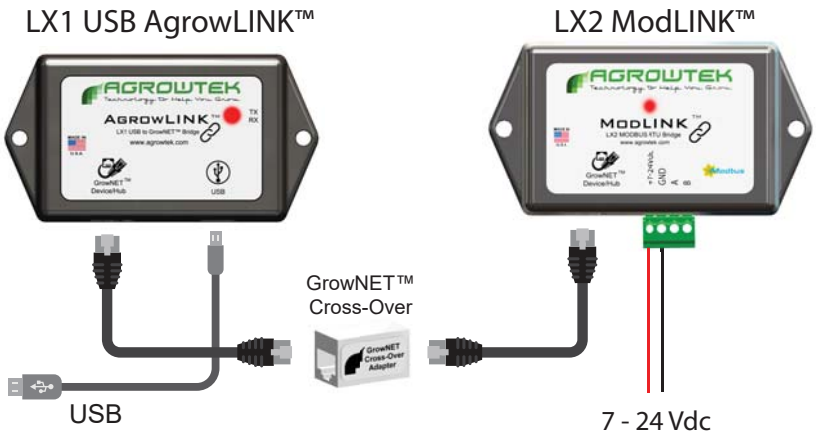
3.3/5Vdc Serial Bus Compatible.
Include required bus terminating resistors per EIA standard.

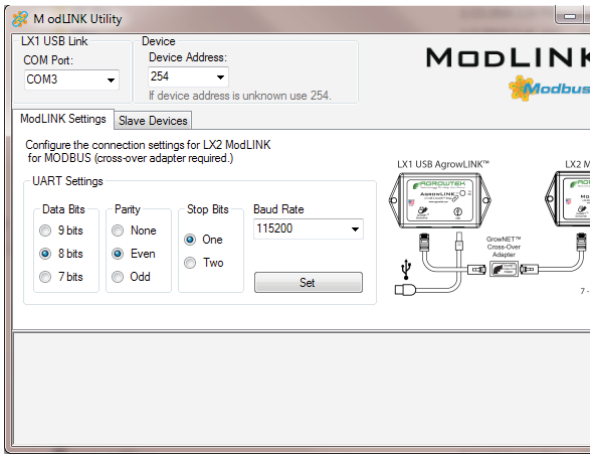
HX8 GrowNET ™ hubs are compatible with LX2 ModLINK™ and MODBUS. Connect multiple devices to a single LX2 and benefit from the superior buffered communication of the HX8 hub.

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 - 40,000 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 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 arithmatic 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."

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 - 40,000ppm			40104
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 - 40,000ppm			40207
Calibration Input, Offset (Zero)	Temperature	See integer ranges above.	16 bit, signed	W	41101
	Humidity				41102
	Light				41103
	CO2				41104
Reset to Factory Calib.	Clear Calibration	Write "1" to clear calibration.	16 bit, unsigned	W	41401

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

Notes:

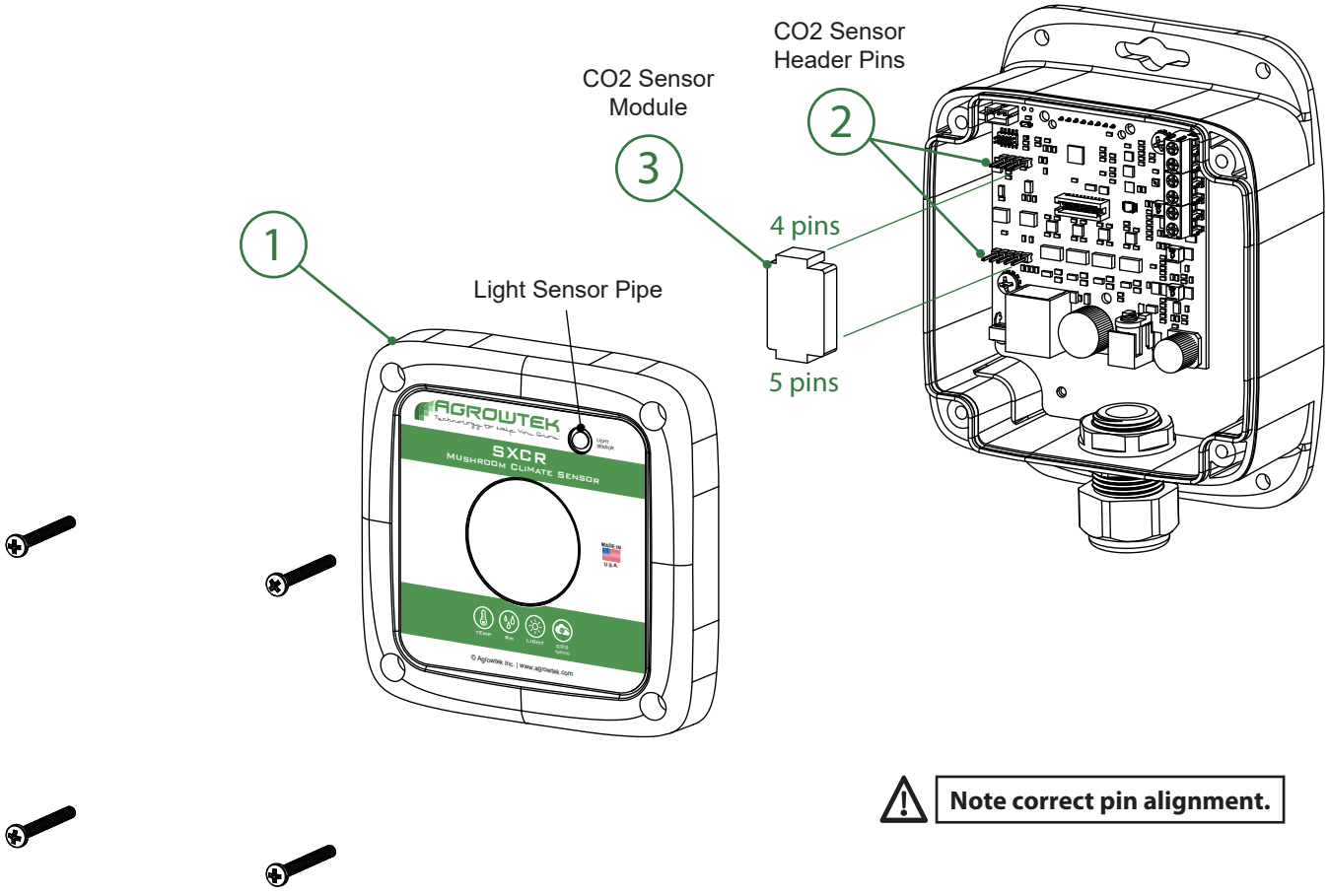
1) Sensor heater power will reset to default (0) on a power cycle. Use sensor heater to test the temperature/RH sensor, drive off condensation or recondition the RH sensor element from saturation. Use full power (16) for 24 hours to bake the sensor. *Not available on some sensor elements.*

2) CO2 calibration can only be performed at 400ppm (outdoor air) and no other values will be accepted.

CO2 ppm Sensor Upgrade

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

1. Remove the front cover (1) by removing the four screws and set them aside.
2. Take note the orientation of the light sensor pipe on the cover.
3. Disconnect the RJ-45 cable from the circuit board (or the opposite end of the cable) to remove power.
4. Locate the CO2 headers (2) on the circuit board.
5. Position and install the CO2 sensor module (3) ensuring the sensor is oriented with the correct pins.
   One header is 4-pins and the other is 5-pins. Installing the sensor backwards will damage the module.
6. Re-connect the RJ-45 cable to the circuit board.
7. Re-install the top cover ensuring the light pipe is in the correct orientation.
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 wish mild dish detergent, then wiped dry. Avoid spraying the sensor with chemicals.

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.