

## Dissolved Oxygen Transmitter & Data Logger



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**KEEP THESE INSTRUCTIONS**

This product is intended for commercial use only.

REV 04/26

# Warnings & Notices

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This is a precision electronic instrument which requires proper installation and care to maintain reliability.

## **READ & UNDERSTAND ENTIRE MANUAL PRIOR TO INSTALLATION OR OPERATION.**

Failure to read, understand and comply with warnings and installation requirements may result in property damage, personal injury or death.

## **WARNING**

Do not use a power supply other than the intended or included power supply. Do not exceed the maximum ratings on the product serial label or specifications listed in this manual. Any power supply with energy levels exceeding the specifications must be current limited or fused to prevent overcurrent to the device.

## **INDOOR LOCATIONS ONLY**

This product is designed for indoor mounting only and must be protected from weather and direct sunlight.



**WARNING** Wear skin and eye protection when working with hazardous chemicals.

## **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**

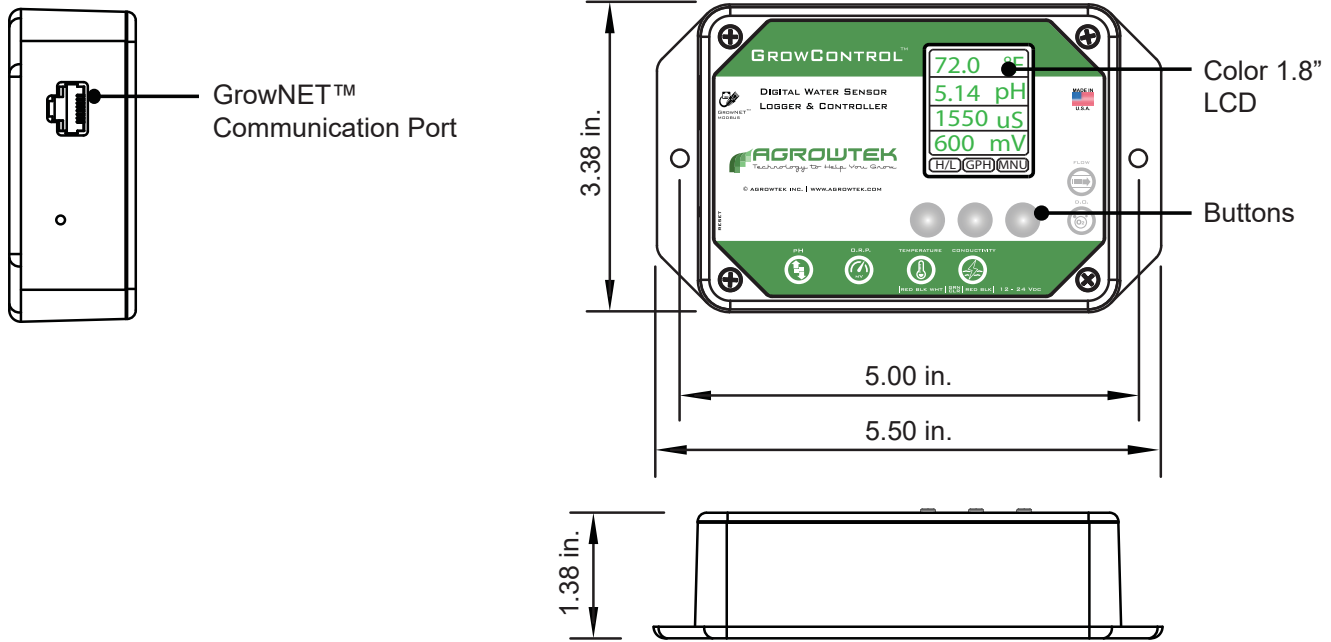
Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port. *Non-conductive grease is designed to prevent corrosion from moisture in electrical connectors.*

- 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

## **WARNING**

This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

# Features



# Technical Information

## Specifications

Power	5-24Vdc, ~2W (5W w/LCD)
Max Cable Distance	1000ft
Optional Interface	LCD w/3 Buttons
Temperature Range	-20 - 60°C
Temperature Accuracy	±2°C, 0.01° resolution
DO Range	0 - 50 mg/L
Interface	GrowNET™ or MODBUS RTU

## 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.

# Installation Instructions

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Install with the connections facing down to reduce the risk of water permeating the enclosure.

Avoid locations with dripping water or heavy splash risk; the transmitter is best kept dry for longest life and highest accuracy.

## Mounting the Transmitter

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Wall mounting tabs are provided for installing against a vertical wall surface.

1. Measure out the hole locations per the dimensions, or mark the holes using the transmitter as a template.
2. Drill holes and install anchors (if required, not included.) Keep the transmitter away from dust during work.
3. Install the transmitter to the wall surface using appropriate screws.

## DIN Rail Mounting Kit

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A DIN rail mounting kit installs onto the mounting flanges with the provided hardware for mounting the device on a standard DIN rail.

1. Screw the DIN rail brackets onto the flanges using the provided screws.
2. Snap the transmitter into place on a DIN rail.
3. Use the latches on the DIN brackets to release the transmitter from the DIN rail.



## Install the ODO Probe

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The ODO probe comes equipped with a plug-in connector at the end of the probe cable; plug the cable into the right side of the transmitter unit.

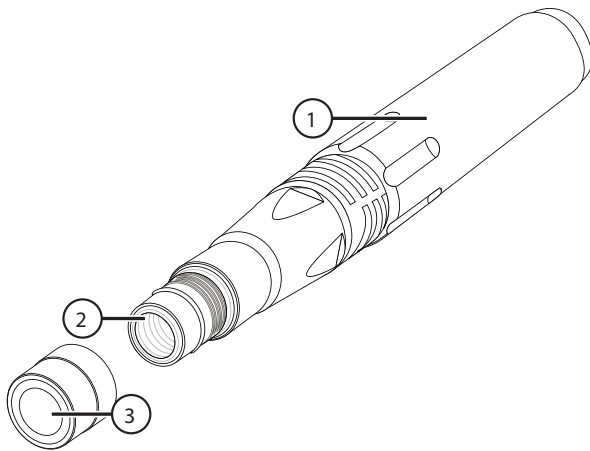
The ODO probe is designed for full submersion in tanks; simply drop the probe into the water solution after probe preparation is complete.

Sensor probe assemblies feature integral sensors — this means that these sensors cannot be removed from the probe and cable. Sensor caps are user-replaceable and need to be changed out about once per year.

## Probe Preparation

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1. Remove the metal probe guard from the probe by turning it counterclockwise.
2. Remove the red storage cap which, contains a moist sponge, from the end of the probe by pulling it straight off the sensor. Save this to use later for long-term storage.
3. Reinstall the probe guard by sliding it carefully over the sensor and then threading it onto the cable assembly with a clockwise rotation.



1 Probe
2 Sensor
3 Sensor Cap

### CAUTION:

It is important to always store your sensor in a moist environment so the sensor cap does not dry out. A gray calibration/storage sleeve is shipped with your cable assembly for an easy storage option. Simply moisten the sponge with a small amount of clean water and slide the sleeve over the probe guard to create a moist atmosphere for the sensor.

# Optional Power Supply

If the PHX will not be connected to a control system with the GrowNET™ RJ-45 jack, the device will need power from the optional external power supply. The external power supply plugs into the DC barrel jack on the bottom of the unit.

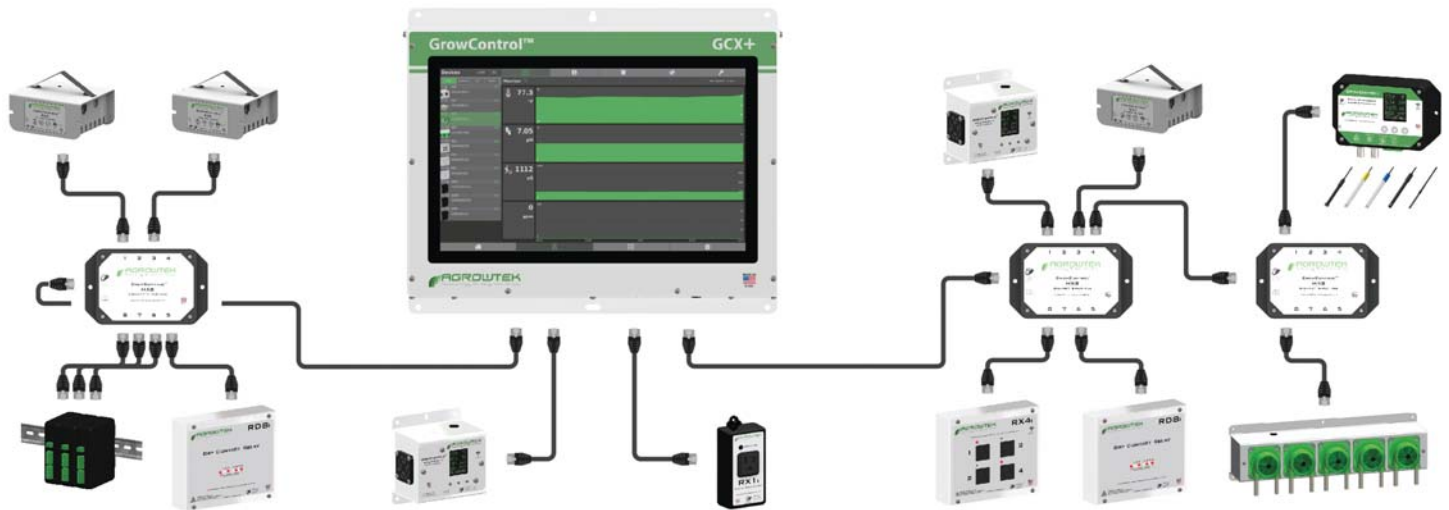
Power Supply: 24Vdc 1Amp max



# 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.



# LCD Menu Operation Instructions

The SXO2 monitor includes a display and three-button interface for reporting sensor values, data logging and other functions. Three buttons are located below the display.



Connect to Agrowtek's GrowControl facility control systems for advanced monitoring, alerts and equipment control.

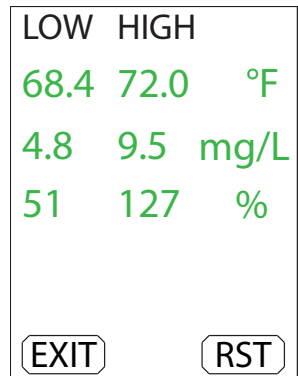
The main screen displays the real-time sensor readings from the attached sensors. Each button is labeled at the bottom of the display to describe its function on the current screen or menu.

## 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.

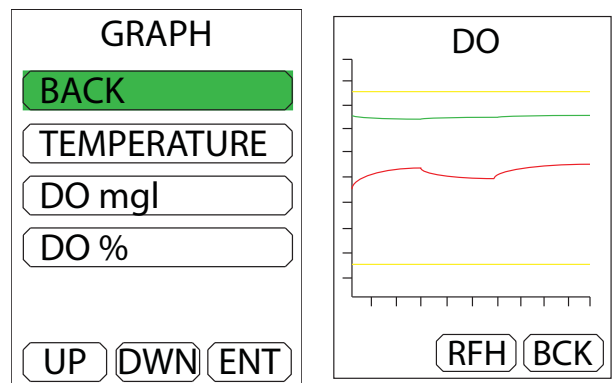


## Graphing

**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.



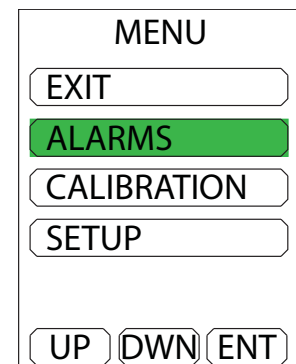
## Main Menu

**MNU**

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

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

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



## Alarms Menu

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MNU ► ALARMS

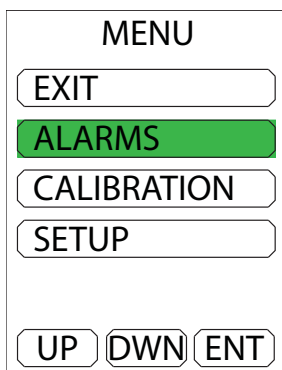
High and low alarm set points may be configured for each sensor value to activate an internal buzzer or send alerts with the optional wifi module.

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

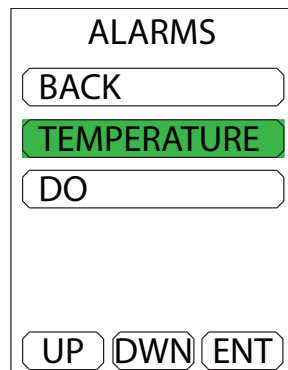
Additionally, alarm limits are plotted on the graphs to indicate values are within the desired range.

## Alarms Configuration

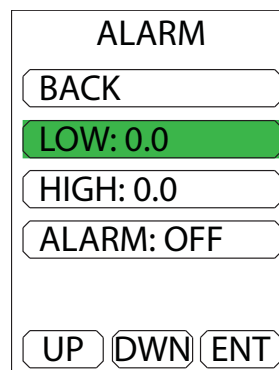
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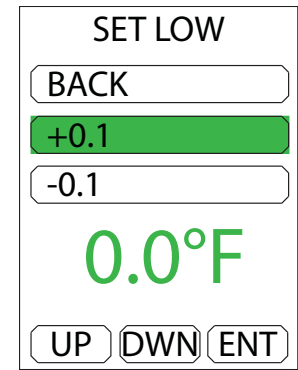
1. Select **ALARMS** from the main menu.



2. Select a sensor to configure set points.



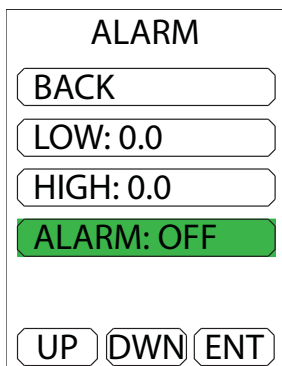
3. Select the setting to adjust.



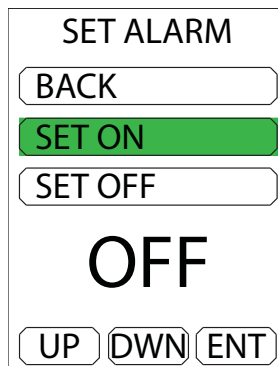
4. Adjust to the desired value. Hold **UP** or **DWN** to jog the value.

## Alarm Buzzer

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1. Select **ALARM: OFF**



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

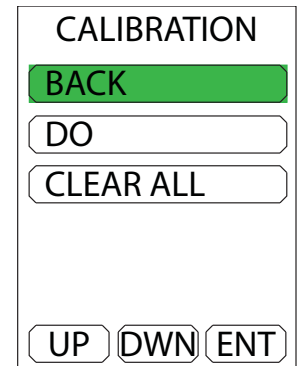
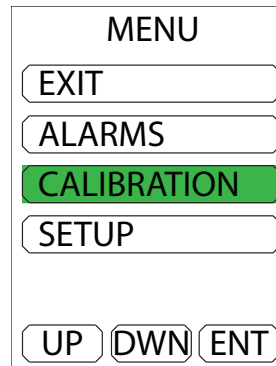
To disable the alarm buzzer, set the alarm to OFF.

# Calibration Menu

MNU ► CALIBRATION

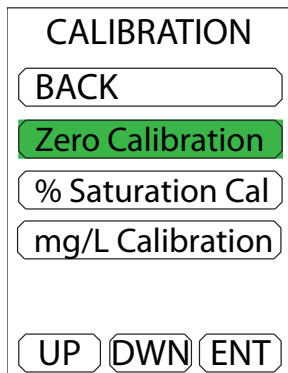
Calibration can be performed for each sensor with the LCD interface using either standard calibration wizards, or advanced manual calibration methods for non-standard calibration solutions.

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

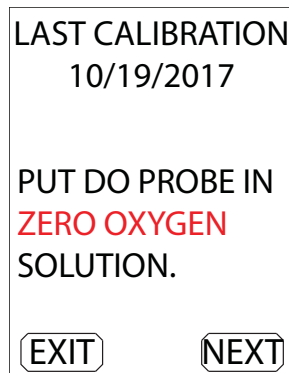


## DO Zero Calibration

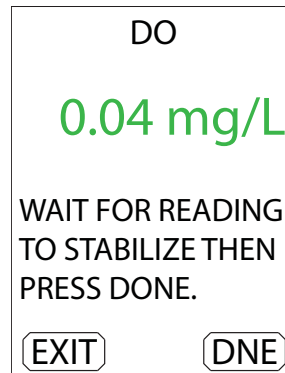
MNU ► CALIBRATION ► Zero Calibration



1. Select **Zero Calibration** from the DO calibration menu.



2. Press **NEXT** to continue.



3. Wait at least 40 seconds and press **DONE** to set the zero.

### **i** NOTE:

See the calibration section for more information.

## % Saturation Calibration

MNU ► CALIBRATION ► % Saturation Cal

% Saturation calibration is performed in 100% saturated water solution.

**i** NOTE: See the calibration section for more information.

CALIBRATION

BACK

Zero Calibration

**% Saturation Cal**

mg/L Calibration

UP DWN ENT

1. Select **Zero Calibration** from the DO calibration menu.

LAST CALIBRATION  
10/19/2017

PUT DO PROBE IN  
**WATER SATURATED**  
AIR SOLUTION.

EXIT NEXT

2. Press **NEXT** to continue.

DO

**19.8 mgl**

WAIT FOR READING  
TO STABILIZE THEN  
PRESS DONE.

EXIT DNE

3. Wait at least 40 seconds and press **DONE** to set the zero.

## mg/L Calibration

MNU ► CALIBRATION ► mg/L Calibration

mg/L calibration is performed in a known solution or against another calibrated/traceable meter.

**i** NOTE: See the calibration section for more information.

CALIBRATION

BACK

Zero Calibration

**% Saturation Cal**

mg/L Calibration

UP DWN ENT

1. Select **Zero Calibration** from the DO calibration menu.

LAST CALIBRATION  
10/19/2017

PRESS NEXT  
TO ADJUST  
OXYGEN READING

EXIT NEXT

2. Wait at least 40 seconds then press **NEXT** to continue.

ADJUST

BACK

**+0.1**

-0.1

**17.1 mgl**

UP DWN ENT

3. Adjust the value to match the calibration solution or instrument.

CONFIRM?  
OLD

**17.1 mgl**

NEW

**20.0 mgl**

YES NO

4. Press **YES** to confirm the new value or **NO** to discard.

## Clear Calibration

MNU ► CALIBRATION ► NEXT

CALIBRATION  
BACK  
TEMPERATURE  
DO  
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.

## 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

DO

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**

DO

UP DWN ENT

UNIT SELECT

BACK

°C

**°F**

**68.0°F**

UP DWN ENT

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

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

## Configure DO units:

Dissolved oxygen may be displayed in either mg/L or % saturation on the home screen.

To change the primary display units, select DO and choose the preferred unit type.

UNIT SELECT

BACK

TEMPERATURE

**DO**

UP DWN ENT

UNIT SELECT

BACK

mg/L

**%**

**76.2 %**

UP DWN ENT

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

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

## Logging Interval

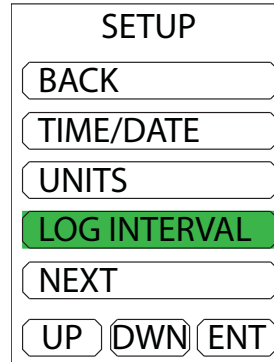
MNU ► SETUP ► LOG INTERVAL

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

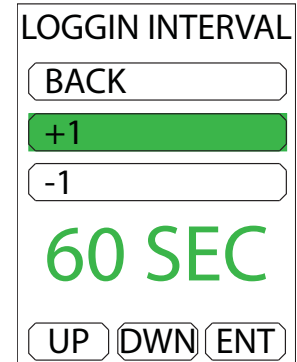
21,600 data points can be stored for each sensor value. The most recent 120 data points are shown on the graphical history.

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**.

## Device Address

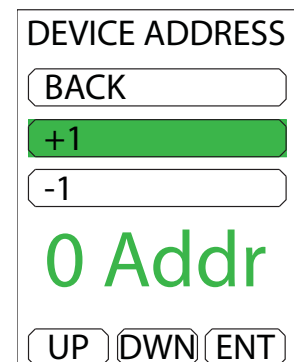
MNU ► SETUP ► NEXT ► DEVICE ADD

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.



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

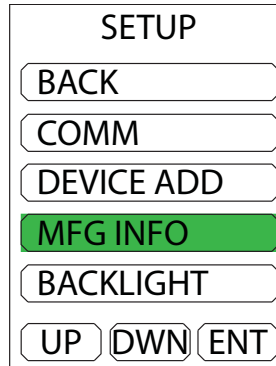


2. Adjust the value then select **BACK**.

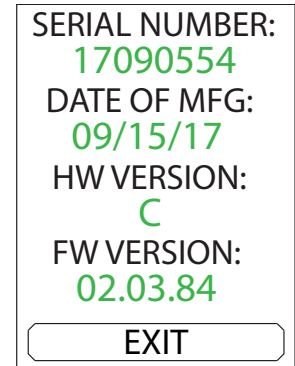
## Manufacturing Info

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.



1. Select **MFG INFO** from the setup menu.



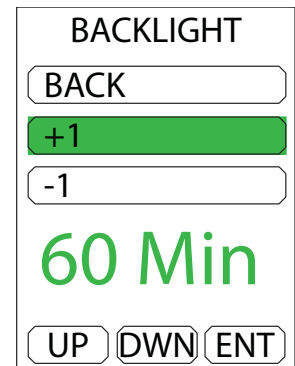
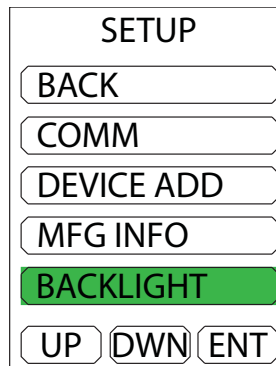
2. Press **EXIT** to return.

## 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.



# Calibration Instructions

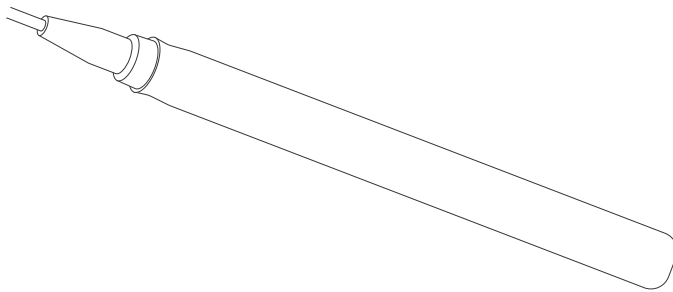
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The SXO2 monitor may be calibrated from the onboard LCD menu, from a Growcontrol™ GCX control system, or from a LX1 USB AgrowLINK tool and a Windows PC.

Make sure the calibration cup, sensor guard, and all sensors are clean. Agrowtek strongly recommends installing the sensor guard before placing the sensors into the calibration cup.

For highest data accuracy, thoroughly rinse the calibration cup and sensors with a small amount of the calibration standard for the sensor to be calibrated. Discard the rinse standard, and proceed with a fresh standard.

Be careful to avoid cross-contamination with other standards between calibrations by thoroughly rinsing with DI water and drying the calibration cup and sensors.



The sensor is equipped with a sleeve and small sponge for calibration and storage.

## Zero Point Calibration

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1. Place the sensor in a solution of zero DO.

NOTE: A zero DO solution can be made by dissolving approximately 8-10 grams of sodium sulfite into 500 mL of tap water. Mix the solution thoroughly. It may take the solution 60 minutes to be oxygen-free.

2. Allow at least 40 seconds for equilibration before writing the calibration value.

3. Thoroughly rinse the bulkhead and sensors in clean water then dry.

4. Perform a ODO % water-saturated air calibration after performing a zero point calibration.

## **ODO% - Water Saturated Air Calibration**

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1. Place a small amount of clean water (5 mL) in the calibration cup or a wet sponge into the calibration sleeve.
2. Make sure there are no water droplets on the ODO sensor cap or temperature sensor.
3. Attach the probe guard and carefully slide into the calibration cup. Make sure a seal is not created around the probe. Atmospheric venting is required for accurate calibration.
4. Turn the instrument on and wait approximately 5 to 15 minutes for the air in the storage container to be completely saturated with water.
5. Allow at least 40 seconds for equilibration before writing the calibration value.

## **ODO% - Water Saturated Air Calibration**

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1. Place the ODO and conductivity/temperature sensor into a water sample that has been titrated by the Winkler method to determine the dissolved oxygen concentration in mg/L.
2. Enter the dissolved oxygen concentration of the sample in mg/L.
3. Allow at least 40 seconds for equilibration before writing the calibration value.
4. Rinse the bulkhead and sensors in clean water then dry.

# Probe Maintenance

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The ODO sensor should be kept clean since some types of fouling may consume oxygen which could affect the dissolved oxygen measurements.

To clean the sensor cap, gently wipe away any fouling with a lens cleaning tissue that has been moistened with water to prevent scratches.

## **WARNING**

Do not clean the ODO sensor with organic solvents as they may damage the cap.

## **NOTICE**

To minimize sensor drift, always store the ODO sensor in a wet or water-saturated air environment.

# Probe Storage

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## **Short-term Storage:**

Store the ODO sensor in a moist air environment. A storage sleeve with a wet sponge or the calibration cup with a small amount of water is recommended.

## **Long-term Storage:**

- Method 1: Submerge the sensing end of the sensor in a container of distilled or deionized water. Periodically check the level of the water to make sure that it does not evaporate.
- Method 2: Wet the sponge located in the cap originally included with the ODO sensor, then install on sensing end of the ODO sensor. Replace the sponge if it becomes dirty.

A grey storage sleeve is shipped with the cable for an easy storage option. Simply moisten the sponge with a small amount of clean water and slide the sleeve over the probe guard to create a moist atmosphere for the sensor.

# Probe Rehydration

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If the ODO sensor has accidentally been left dry for longer than 8 hours, it must be rehydrated. To rehydrate, soak the ODO sensor in room temperature tap water for approximately 24 hours. After the soak, calibrate the sensor.

# Sensor Cap

As the ODO sensor caps ages, deterioration of the dye layer can reduce measurement stability and response time. Periodically inspect the sensor cap for damage and large scratches in the dye layer. Replace the cap when readings become unstable and cleaning the cap and DO recalibration do not remedy the symptoms.

## Replacement

The instruction sheet shipped with the replacement ODO sensor cap includes the calibration coefficients specific to that sensor cap. Make sure to save the ODO sensor cap instruction sheet in case you need to re-load the calibration coefficients.



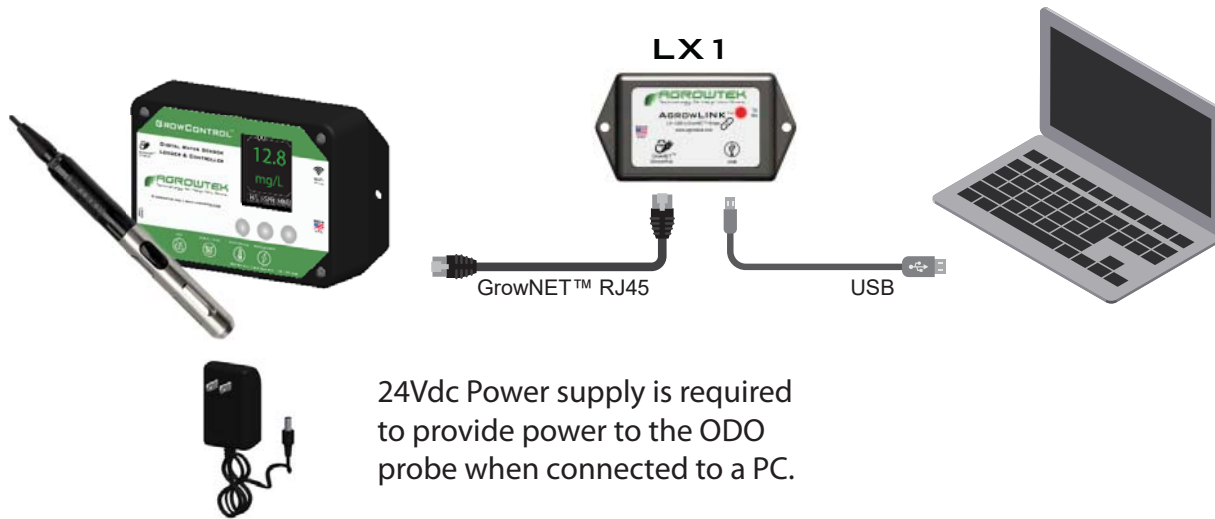
1. Remove the old sensor cap assembly from the probe by grasping the probe body with one hand and rotating the sensor cap counterclockwise until it is completely free. Do not use any tools for this procedure.
2. Carefully remove the o-ring by pinching it with your fingers and rolling it up. Do not use any tools to remove the o-ring. Clean the area of any debris with a lens cleaning tissue.
3. Install the new o-ring that is included with the replacement sensor cap.
4. Apply a thin coat of o-ring lubricant (included with the new cap) to the installed o-ring. Remove any excess o-ring lubricant with a lens cleaning tissue. Be careful to avoid contact with the sensor lens.
5. Inspect the sensor lens for any moisture or debris. If necessary, wipe the lens carefully with a non-abrasive, lint-free cloth to prevent scratches. Do not use organic solvents to clean the ODO sensor lens.
6. Remove the new sensor cap from its hydrated container and dry the inside cavity of the sensor cap with lens cleaning tissue. Make sure the cavity is completely dry before proceeding with the installation.
7. Using clockwise motion, thread the new sensor cap onto the probe assembly until it is finger-tight. The o-ring should be compressed between the sensor cap and probe. Do not over-tighten the sensor cap and do not use any tools for the installation process.
8. After installing the new sensor cap, store the sensor in either water or in the water-saturated air storage chamber.

NOTE: Be sure to update the ODO Sensor Cap Coefficients after replacement.

# Updating the ODO Sensor Cap Coefficients

After installing a new sensor cap, locate the Calibration Code Label on the ODO Sensor Cap Instruction Sheet. This contains the calibration codes for this particular sensor cap. The value of each cap coefficient (K1 through KC) can be written using the PC calibration application and a LX1 USB AgrowLINK tool.

1. Connect the LX1 to your SXO2 and to any windows computer. Drivers should automatically install for the LX1 device.



24Vdc Power supply is required to provide power to the ODO probe when connected to a PC.

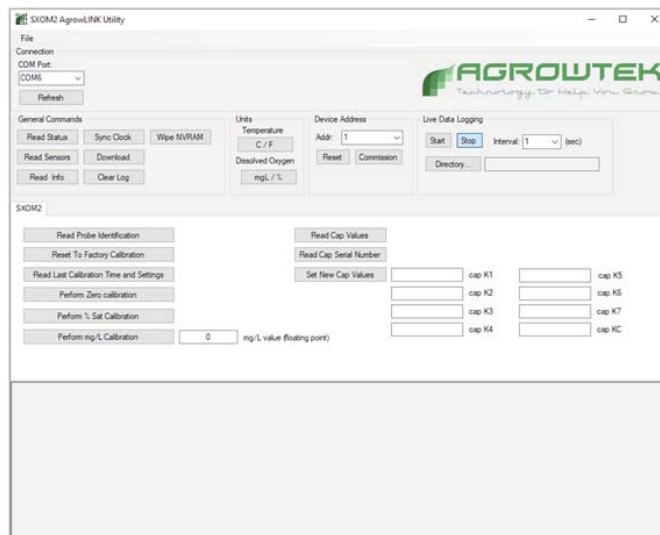
2. Download and launch the SXO Windows Program.

<https://www.agrowtek.com/download/SXO2.exe>

## ⚠ NOTE

If the program cannot detect the LX1, your computer may not have the drivers installed.

<https://agrowtek.com/download/ComDriver.exe>



3. Press the READ STATUS button and confirm that the device give a valid status response with no errors.
4. Enter the cap calibration values from the data sheet included with the cap. then press the SET NEW CAP VALUES button to upload them to the probe's memory.

5. Read the cap values back with the to confirm they got uploaded correctly, the dissolved oxygen probe will reject cap values that do not make sense.

### **IMPORTANT**

After entering the sensor cap coefficients, the ODO sensor must be calibrated.

## Additional Software Commands

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### Read Status

The read status command will return some properties of the SXO2. It contains the device address in hexadecimal format, and the current time that the onboard clock is set to.

### Read Sensors

The Read Sensors command returns the current sensor readings from the SXO2.

### Read Info

The Read info command returns general manufacturing information about the SXO2, including the serial number and firmware version.

### Sync Clock

The Sync clock command sets the SXOM2's internal clock time to the same time as the windows PC.

### Download

The Download command downloads the data being logged within the SXO2 in CSV format, it can take a minute to complete. (This is completely separate from the "Live Data Logging" section.)

### Clear Log

The Clear Log button will clear the entire CSV datalog that is stored within the SXO2.

### Wipe NVRAM

The Wipe NVRAM button will erase the the entire CSV datalog within the SXO2, along with the alarm set-points.

### Temperature Units

Use the “C / F” button to change the units that temperature is reported in.

### Dissolved Oxygen Units

Use the “mgL / %” button to change the units that Dissolved Oxygen is reported in.

### Device Address

Use the device address buttons to set the SXO2’s device address, enter the desired address in the drop down and press commission to set the address.



***The following commands require 24VDC to be supplied to the SXO2 monitor unit.***

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### Read Probe Identification

The read probe identification button returns the probe type, currently there’s only one available probe; ODO-T.

### Reset To Factory Calibration

Use this button to set all calibrations to the factory setting. This removes any user applied calibrations. Calibrations are stored inside the ODO probe, therefore the 24V barrel jack must be plugged in.

### Read Last Calibration Time and Settings

This button will return that last time that the probe was calibrated, and an estimate of the calibration quality. The internal barometer and salinity values used for calculations are shown here. It is recommended to keep them as default, thus you cannot change them. If you wish to adjust them, you may ask Agrowtek for support.

### Perform Zero Calibration

This will execute a zero calibration, refer to the SXOM2 manual for information on the calibration procedure.

### Perform % Sat Calibration

This will execute a percent saturation calibration, refer to the SXOM2 manual for information on calibration procedure.

### Perform mg/L Calibration

This will execute a mg/L calibration, refer to the SXOM2 manual for information on calibration procedure. Enter the desired mg/L value in the box, decimal numbers up to two decimal points are allowed.

### Read Cap Values

This will return the cap coefficients that are currently stored in the dissolved oxygen probe cap.

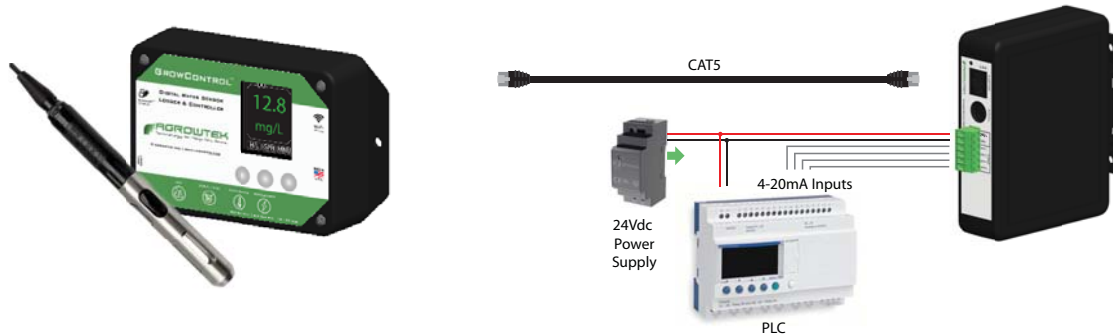
### Read Cap Serial Number

This returns the serial number of the cap installed on the dissolved oxygen probe.

# 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.



# 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.

**LX1 USB AgrowLINK™**

USB

**LX2 ModLINK™**

7 - 24 Vdc

**ModLINK Utility**

LX1 USB Link Device: COM3, Device Address: 254

ModLINK Settings: Slave Devices

Configure the connection settings for LX2 ModLINK for MODBUS (cross-over adapter required.)

**UART Settings**

- Data Bits:  9 bits  8 bits  7 bits
- Parity:  None  Even  Odd
- Stop Bits:  One  Two
- Baud Rate: 115200

Set

See MODBUS manual for more information.



## Supported Commands

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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

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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) / -400 - 14000 (-4 - 140°F)
2	D.O.	x100	0 - 4000 (0 - 50.00 mg/L max, per cal)

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.

### Zero (Offset) Calibration

Zero calibration is an arithmetic positive or negative correction to the sensor reading.

Operations performed using the offset register are:

-DO zero calibration

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

### Span Calibration

-DO calibration to solution standard

**Note: perform any “zero” calibrations prior span calibrations.**

### Reset Calibration to Factory

To reset all calibration values, write a “1” value to the clear calibration register.

## 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
Sensor Reading, Integer	Temperature	-2000 - 6000 (-20 - 60°C)	16 bit, signed	R	40101
	D.O.	0 - 5000 (0 - 50.00 mg/L)			40102
Sensor Reading, Float	Temperature	-20.00- 60.00 °C	32 bit, floating pt	R	40201
	D.O.	0 - 5000 (0 - 50.00 mg/L)			40203
Calibration Input, Zero	Temperature	See integer ranges above.	16 bit, signed	W	41101
	D.O.				41102
Calibration Input, Span Point	Temperature	See integer ranges above.	16 bit, signed	W	41201
	O.R.P. / D.O.				41202
Clear Calibration	Reset All to Factory Default	Signed Int	16 bit	W	41401

A request to read or write a register that is not available will return an illegal address exception.

# Warranty

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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 one (1) year from the date of purchase. This warranty excludes consumables (sensor probes) which are limited to a 120 day warranty period against defects. This warranty is extended to the original purchaser from the date of purchase. Returns not purchased directly from Agrowtek Inc. must include proof of purchase date otherwise purchase date is considered as date of manufacture. This warranty does not cover damages from abuse, accidental breakage, or items that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. 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, excessive humidity or extreme temperature conditions outside of the specified limits. Agrowtek Inc. must be contacted prior to return shipment of any returns for a return authorization. No returns will be accepted without a return authorization. Customer is responsible for return shipment to Agrowtek Inc. for warranty service. Return authorization number(s) must be printed on the outside of the box or the return may be rejected and returned to the sender. Agrowtek Inc. is not responsible for supplying replacement products or parts in advance of return(s) for warranty claim. 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.