Precision Electronic Water Flow Meter

Shown with optional LCD Display Interface

Modbus

Contents

KEEP THESE INSTRUCTIONS

This product is intended for commercial use only.

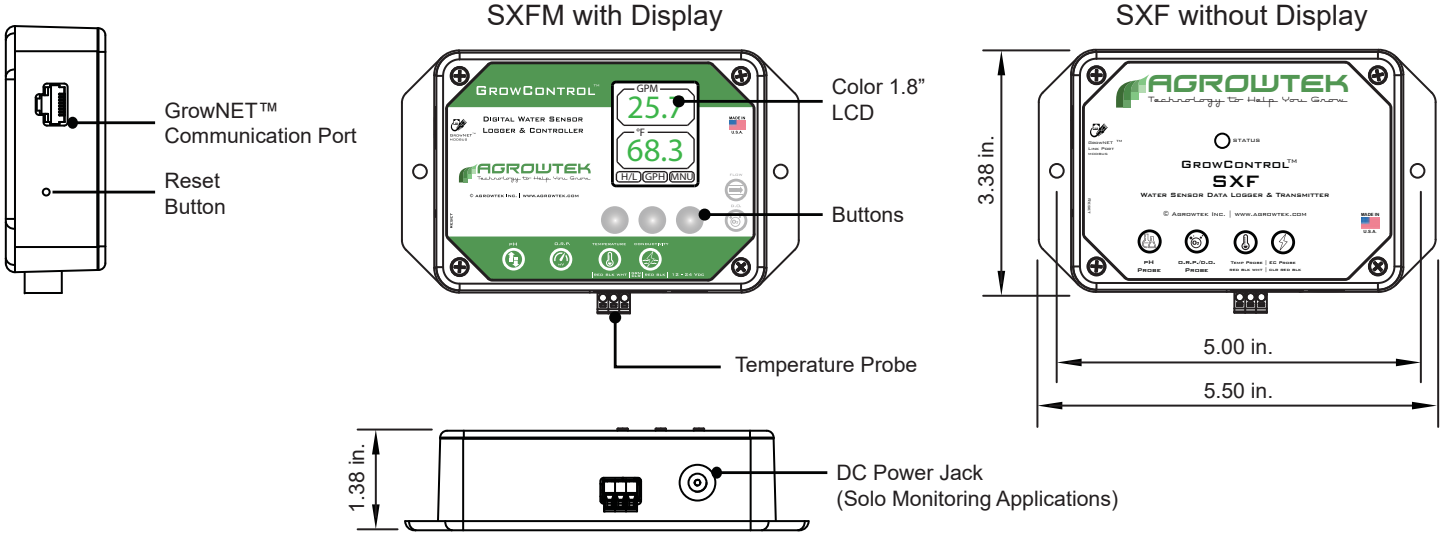
REV 03/26

Description

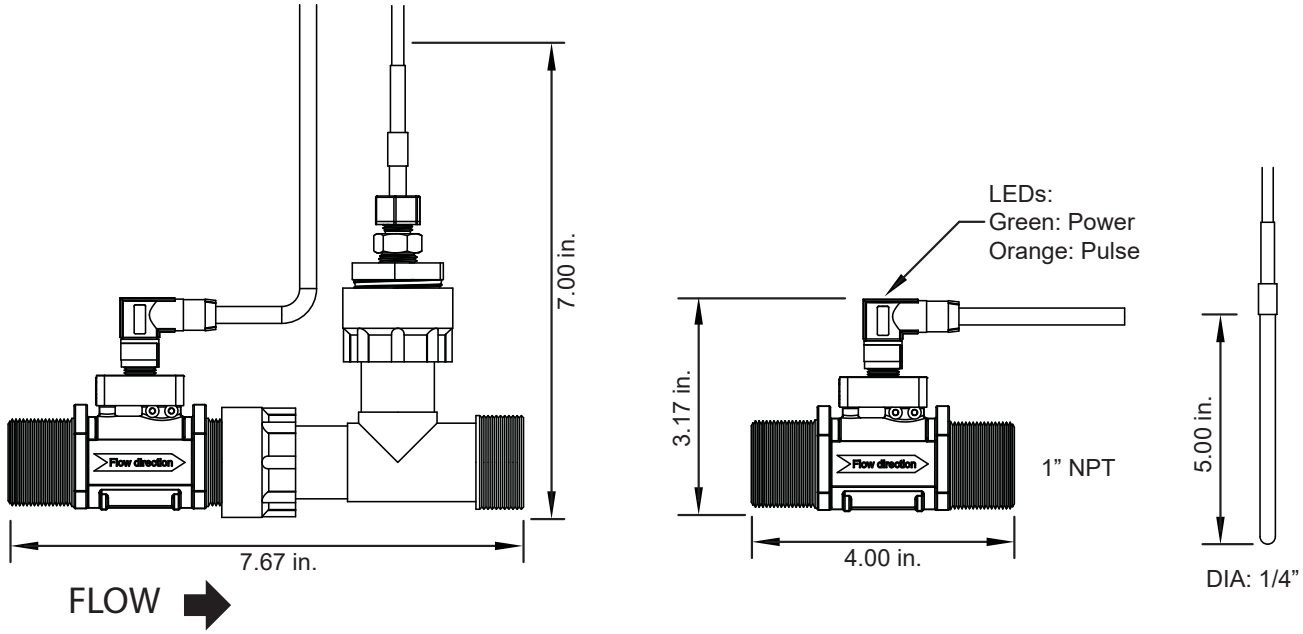
GrowControl™ SXF series precision digital sensor transmitters and controllers for inline flow and temperature feature an advanced flow sensor with no moving parts. Vortex flow meters create eddys as water flow through which are picked up and converted to a flow reading by an accoustic sensor. SXF flow meters have no moving parts and won't jam or clog with small debris and minor sludge.

Color LCD display and button interface model allows instant access to sensor readings, guided calibration, alarms, historical graphing and more. Internal memory logs over 20,000 data points per sensor. Connects to Agrowtek's GrowControl™ GCX Cultivation Controllers as part of a complete facility control solution, or via MODBUS for custom PLC applications.

Dimensions



Do NOT connect the GrowNET port to Ethernet networks.



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
pH Range	0 - 14pH
pH Accuracy	±0.02pH, 0.01pH resolution
Conductivity Range	0 - 7,000 uS (0 - 3500ppm) 0 - 80,000 uS (high salinity / salt water model)
Conductivity Accuracy	< 2000uS ±20uS, >2000uS ±50uS; 2uS resolution
+ORP Range	-1000 - +1000mV
+ORP Accuracy	±10mV, 1mV resolution
4-20mA Output Resolution	12 bit , 0.005mA
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 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.

Installation Instructions

Install with the transmitter in the orienatation shown in dimention drawings with the temperature probe 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 in an enclosure is recommended in extreme humidity or splash/spray locations.

Mounting the Transmitter

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.

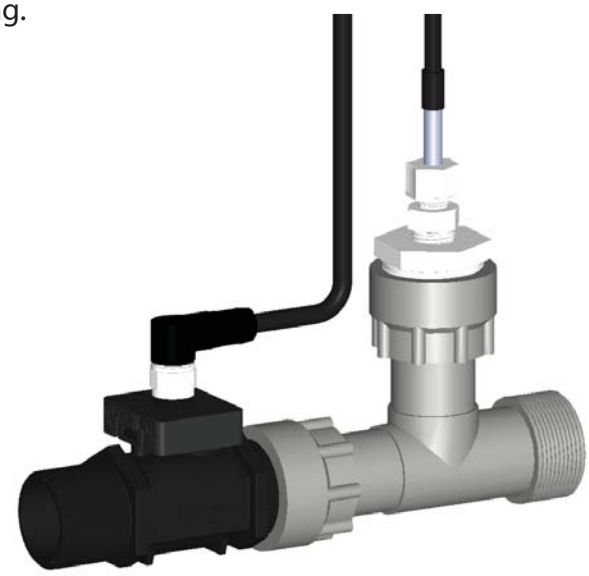
DIN Rail Mounting Kit

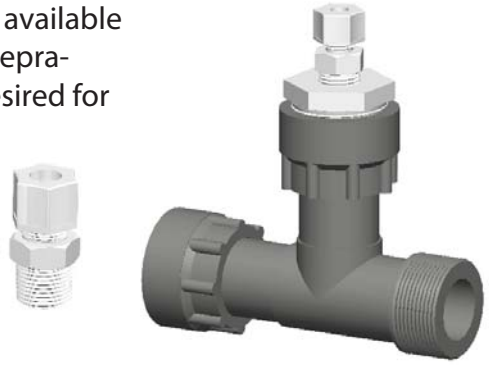
A DIN rail mounting kit installs onto the mounting flanges with the provided hardware for mounting the device on a standard DIN rail.

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.

PBX Probe Manifold

A compression gland fitting or a complete probe manifold (PBX-110) is available for the temperature sensor probe. It is recommended to install the temepra-ture sensor downline from the flow meter unless another location is desired for monitoring.

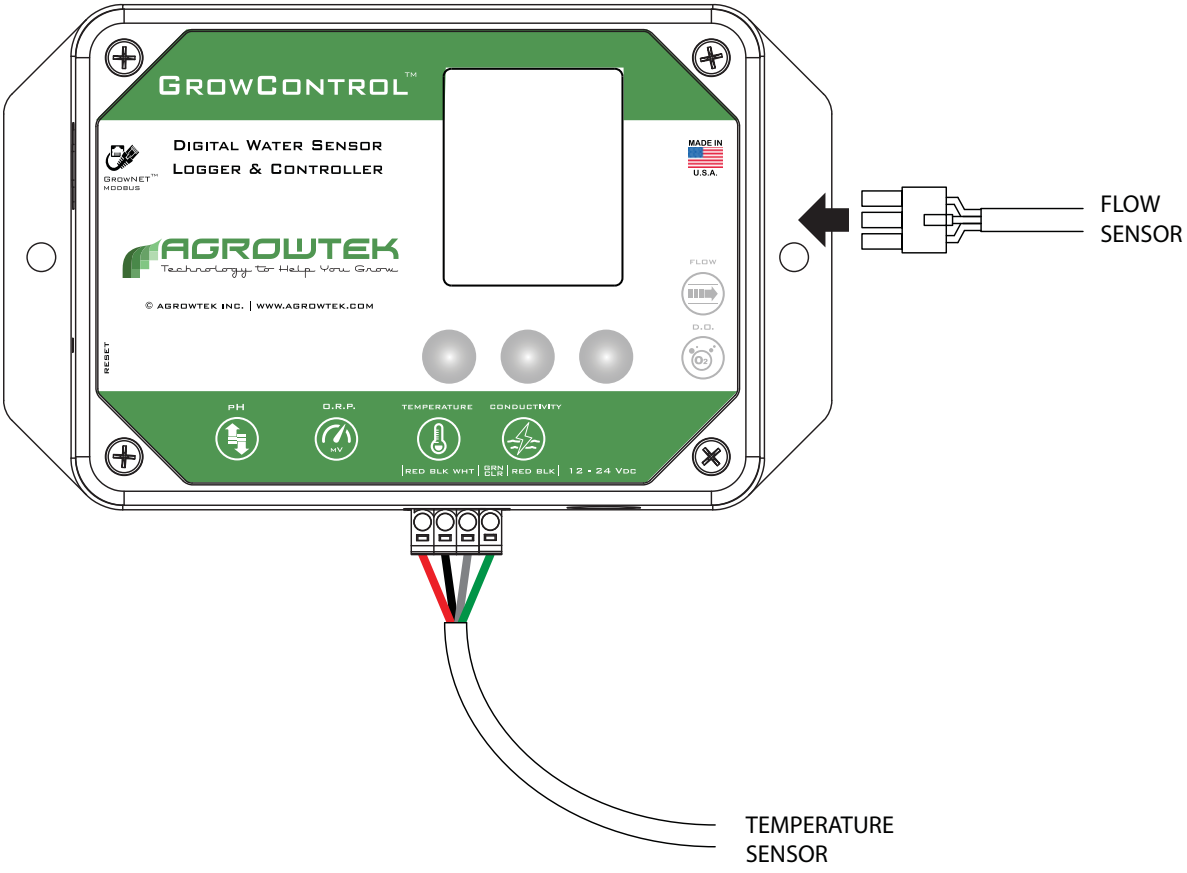




Connecting Sensor Probes

The temperature probe is connected by a screw terminal block on the bottom of the unit; make the connections according to the label on the transmitter. The terminal block may be removed for easier wire installation or for service.

The flow sensor plugs into the right side of the unit. Depress the latch on the plug to release and remove the cable from the unit.



NOTE:

1. Temperature probes with **green wire** connect to the "CLR" terminal.

LCD Menu Operation Instructions

SXF models with the optional 3-button/LCD display interface may be used for stand-alone monitoring applications or as part of a control solution.

Connect to Agrowtek's GrowControl™ GCX Cultivation Control Systems for advanced monitoring, logging, alerting and 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 it's 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.

LOW	HIGH	
68.4	72.0	°F
0.00	21.8	gpm

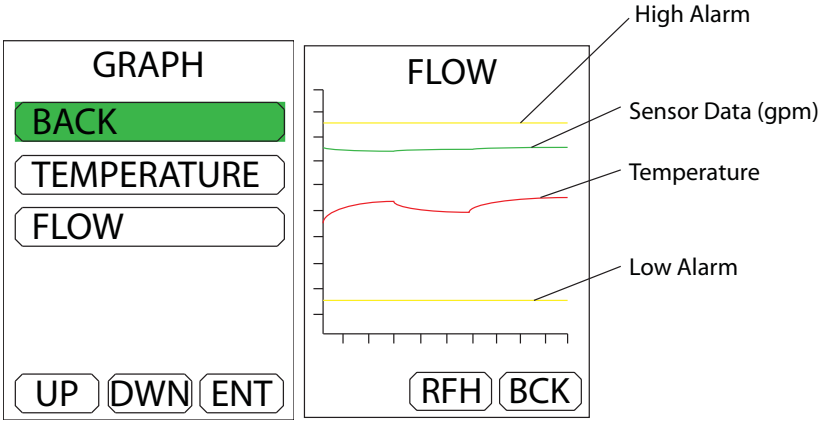
EXIT RST

Graphing

GPH

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

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



Main Menu

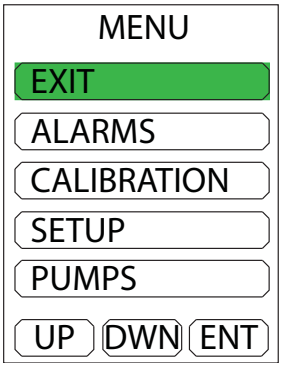
MNU

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

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

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

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



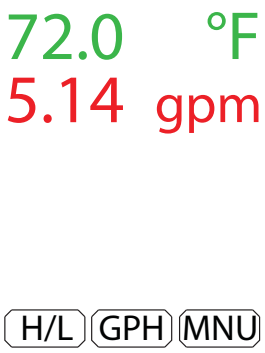
Alarms Menu

MNU ▶ ALARMS

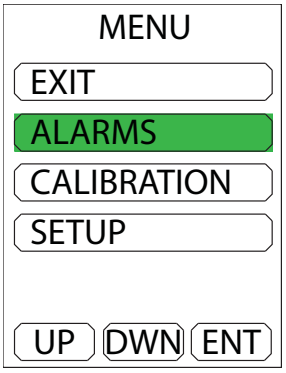
High and low alarm set points may be configured for each sensor value to activate an internal buzzer or send alerts with the optional wifi module.

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

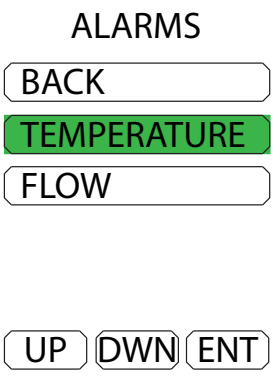
Additionally, alarm limits are plotted on the graphs to indicate values are within the desired range.



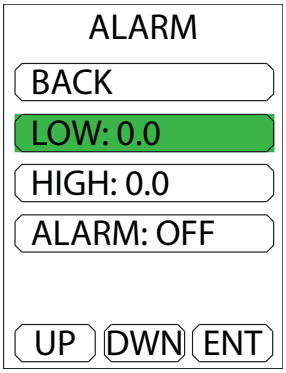
Alarms Configuration



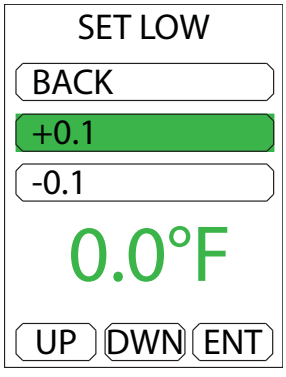
1. Select **ALARMS** from the main menu.



2. Select a sensor to configure set points.

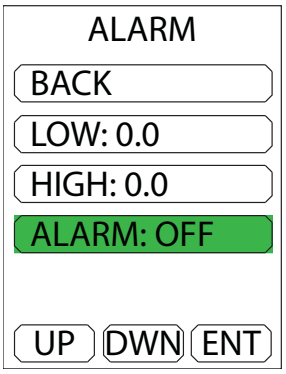


3. Select the setting to adjust.

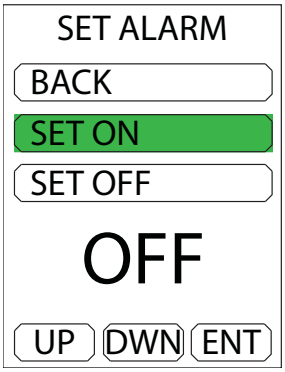


4. Adjust to the desired value. Hold **UP** or **DWN** to jog the value.

Alarm Buzzer



1. Select **ALARM: OFF**



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

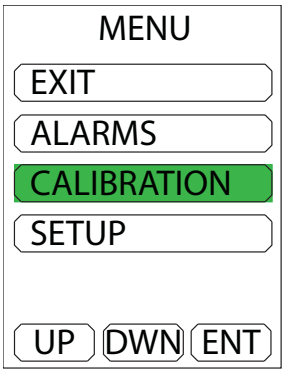
To disable the alarm buzzer, set the alarm to OFF.

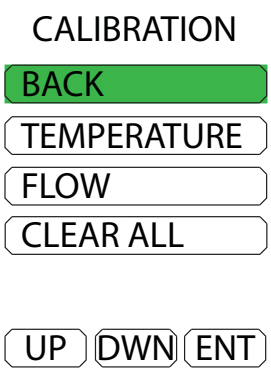
Calibration Menu

MNU ▶ CALIBRATION

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

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

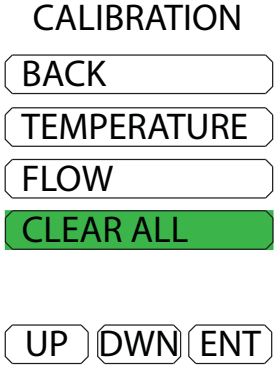




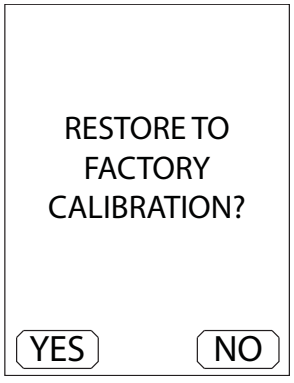
Clear Calibration

MNU ▶ CALIBRATION ▶ NEXT

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



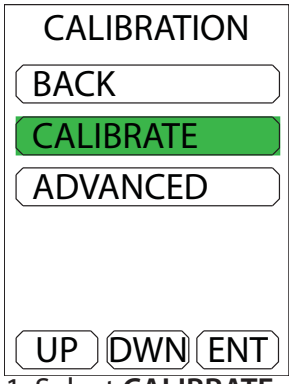
1. Select **CLEAR ALL** from the calibration menu.



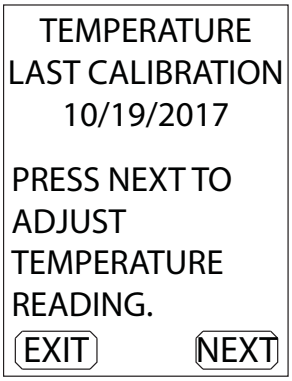
2. Press **YES** to restore factory calibration.

Temperature Calibration

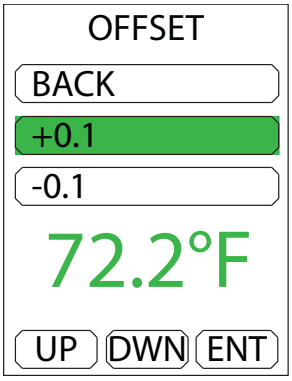
MNU ▶ CALIBRATION ▶ TEMPERATURE



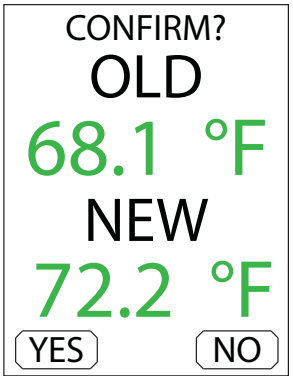
1. Select **CALIBRATE** from calibration menu.



2. Press **NEXT** to continue.



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

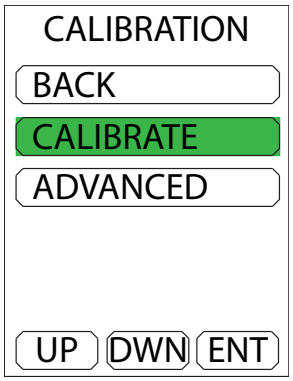


4. Confirm the new reading or press **NO**.

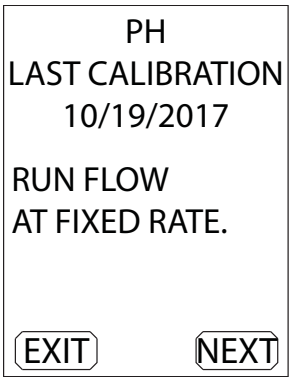
Flow Calibration

MNU ▶ CALIBRATION ▶ FLOW

Flow calibration is done on the LCD by running the flow at a known rate and setting the value in the calibration field to match.

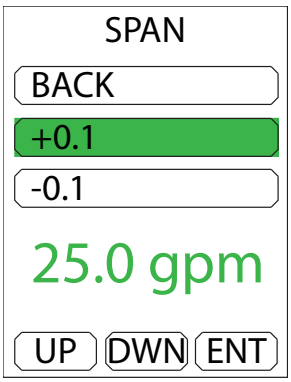


1. Select **CALIBRATE** from calibration menu.



2. Follow the instructions then press **NEXT.**

Turn on water flow at a known fixed flow rate.



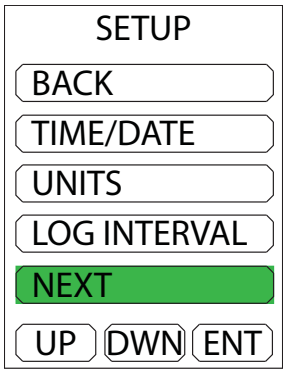
3. Use the +0.1 and -0.1 field to adjust to the correct value, then select **BACK.**

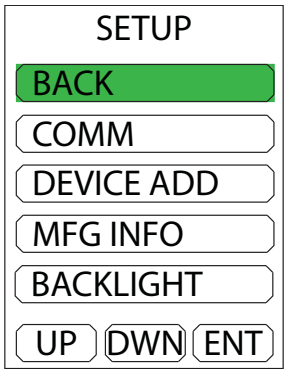
4. Use the +0.1 and -0.1 field to adjust to the correct value, then select **BACK.**

Setup Menu

MNU ▶ SETUP

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

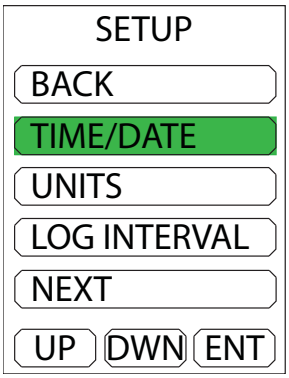




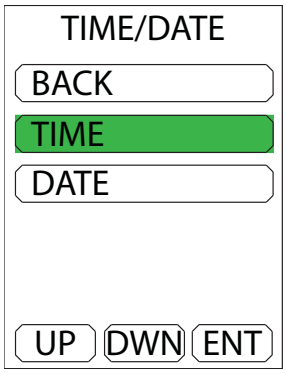
Time / Date

MNU ▶ SETUP ▶ TIME/DATE

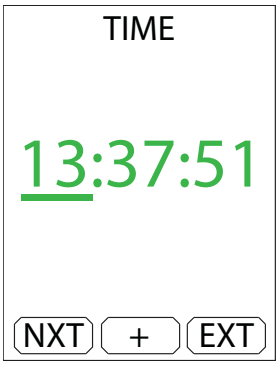
Sensors include a precision real-time clock with battery back-up for time-stamping the data log information with the time and date. The last calibration for each sensor is also time stamped.



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



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



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

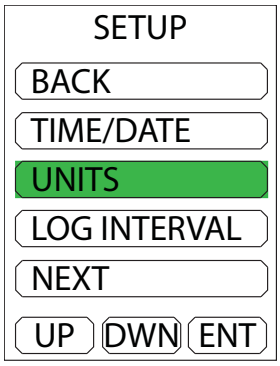
4. Use EXT to exit the menu.

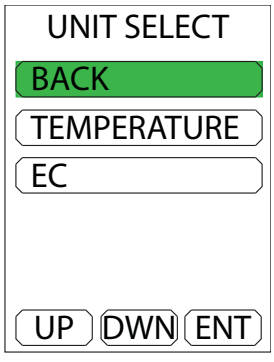
Units

MNU ▶ SETUP ▶ UNITS

Temperature and Conductivity may be displayed in alternate units.

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

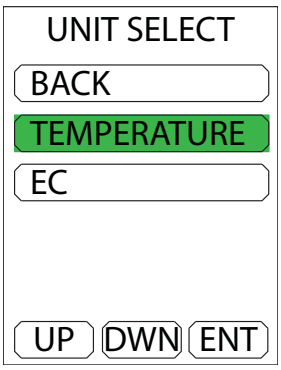




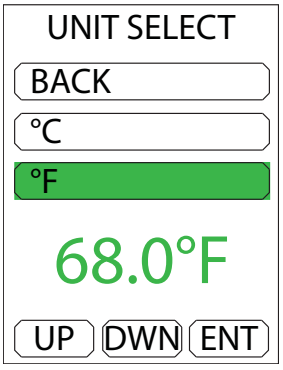
Configure temperature units:

Temperature may be displayed in °F or °C.

Note: Check alarm settings when converting temperature units.



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



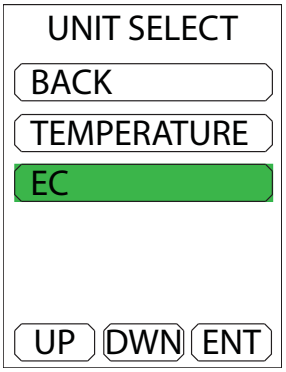
2. Select the desired units and press **ENT**.

Configure conductivity units:

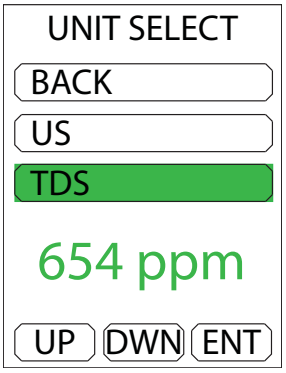
Conductivity may be displayed in default units of microSiemens (uS) or total dissolved solids in parts per million (ppm.)

The TDS conversion factor used by this meter is 500.

TDSppm = uS x 0.5



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



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

Logging Interval

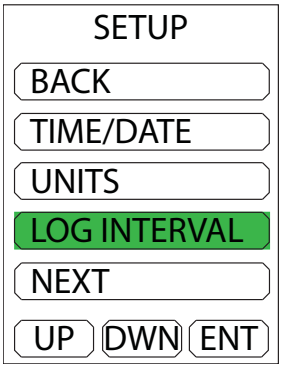
MNU ▶ SETUP ▶ LOG INTERVAL

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

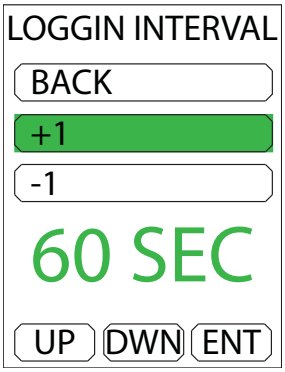
21,600 data points can be stored for each sensor value. The most recent 120 data points are shown on the graphical history.

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

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



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



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

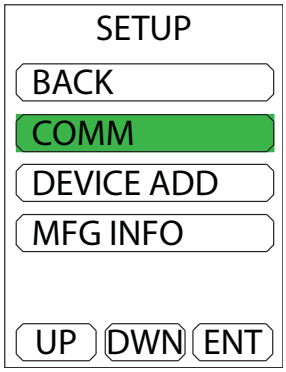
COMM Mode

MNU ▶ SETUP ▶ NEXT ▶ COMM

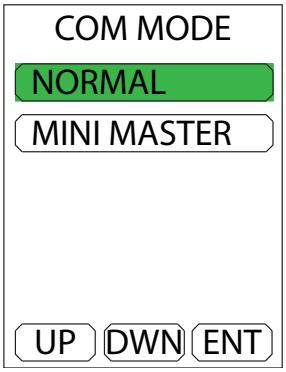
COMM mode specifies whether the sensor is a normal passive device or "mini-master" device.

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

MINI-MASTER Use with MDX mini-dosing system. (GrowNET cross-over adapter required.)



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



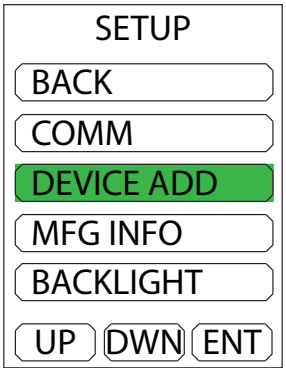
2. Select a mode and press **ENT**.

Device Address

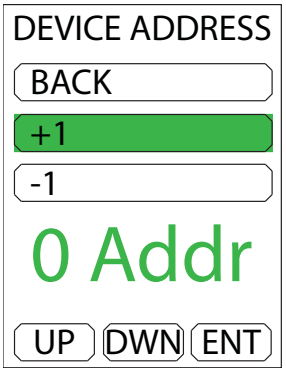
MNU ▶ SETUP ▶ NEXT ▶ DEVICE ADD

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

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



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

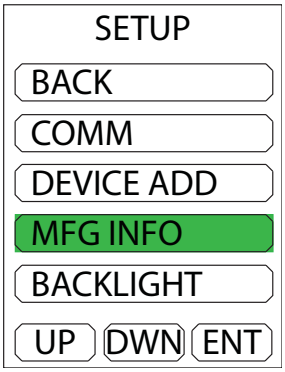


2. Adjust the value then select **BACK**.

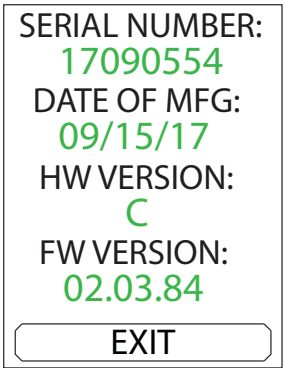
Manufacturing Info

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.



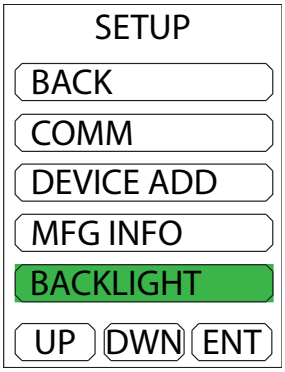
2. Press **EXIT** to return.

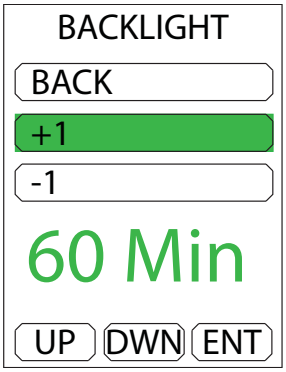
Display Back Light Timer

MNU ▶ SETUP ▶ NEXT ▶ BACKLIGHT

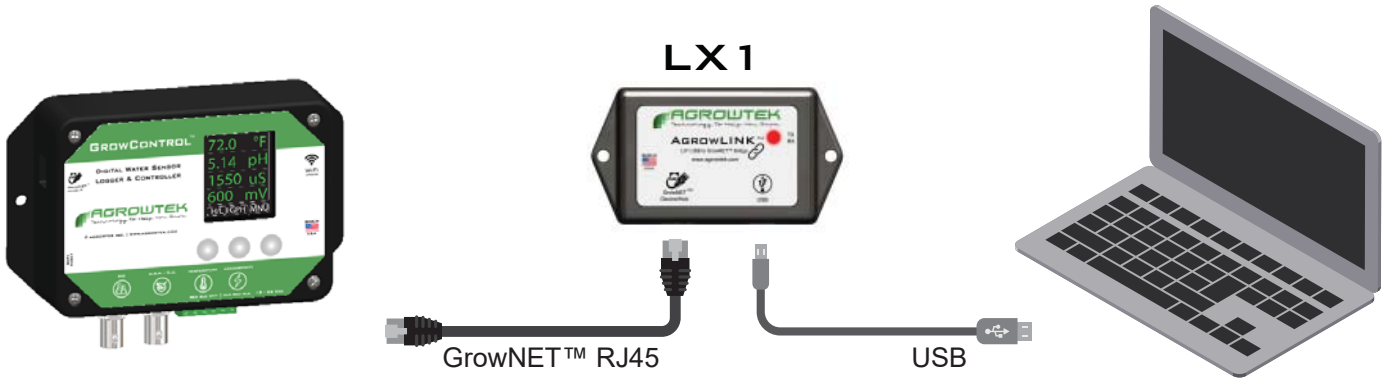
The display back light can be programmed to turn off after a specified time of inactivity from the last time a button is pressed.

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.





Connection to USB AgrowLINK



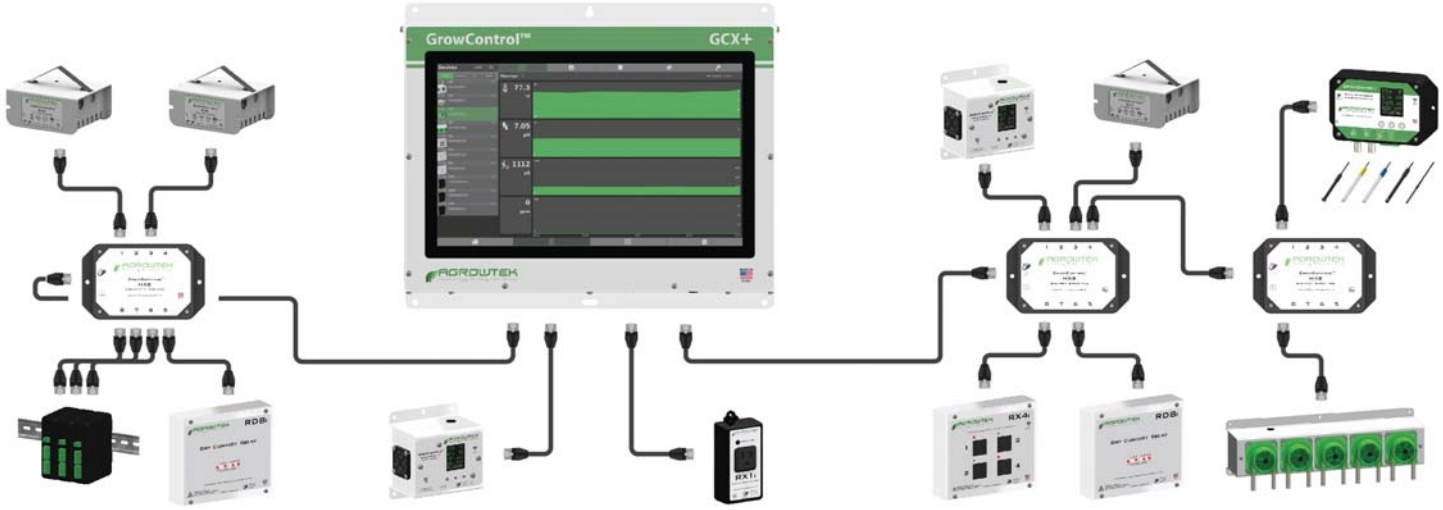
LX1 USB AgrowLINK connects Agrowtek's devices to a computer's USB port for:

- Firmware Updates
- Calibration
- Configuration
- Data Logging Download
- More

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.

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

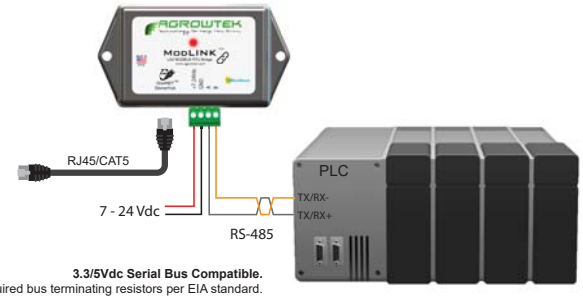
Dielectric grease is recommended on RJ-45 GrowNET™ connections when used in humid environments. Place a small amount of grease onto the RJ-45 plug contacts before inserting into the GrowNET™ port. *Non-conductive grease is designed to prevent corrosion from moisture in electrical connectors.*

- 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 MODBUS RTU

RS-485

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

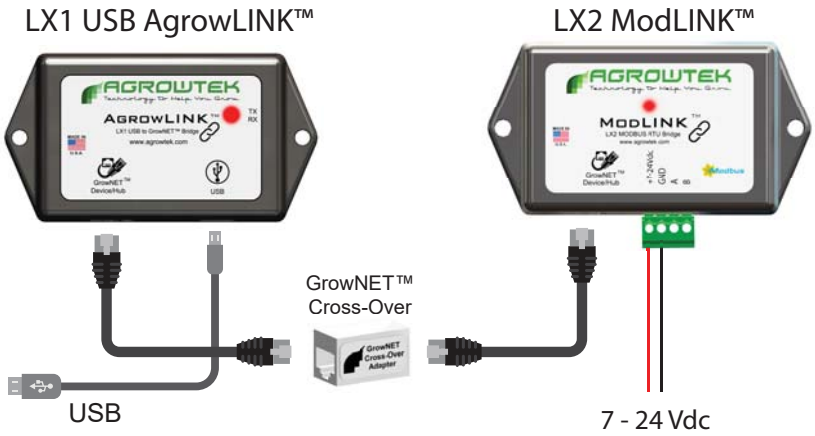


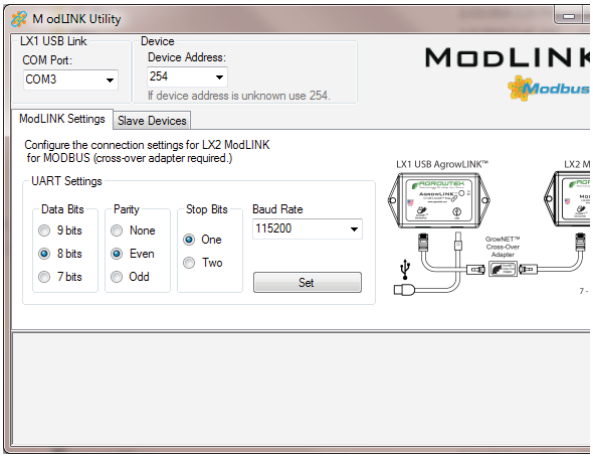
3.3/5Vdc Serial Bus Compatible.
Include required bus terminating resistors per EIA standard.

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

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

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	Flow	x10	0 - 400 (0 - 40 gpm) / 0 - 1500 (0 - 150 lpm)

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

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.

Zero (Offset) Calibration
Zero calibration is an arithmatic positive or negative correction to the sensor reading.

Operations performed using the offset register are:
-Temperature calibration

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

Span Calibration
Span, or slope calibration, corrects the slop of the sensor reading at a second point, away from the zero calibration. Operations performed using the span register are:

-Flow Calibration

To set the flow rate, write the calibrated flow rate (x10) to the 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
	Flow	0 - 400 / 0 - 1500			40102
Sensor Reading, Float	Temperature	-20.00- 60.00 °C	32 bit, floating pt	R	40201
	pH	0 - 40 gpm / 0 - 150 lpm			40203
Calibration Input, Zero	Temperature	See integer ranges above.	16 bit, signed	W	41101
Calibration Input, Span Point	Flow	See integer ranges above.	16 bit, signed	W	41202
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 exception.

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 one (1) year from the date of purchase. 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.