

## pH, Temperature (+ORP) Transmitter & Data Logger



Shown with optional sensor probes

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**KEEP THESE INSTRUCTIONS**

REV 10/24

This product is intended for commercial use only.

# 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.

## **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

## **INDOOR LOCATIONS ONLY**

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

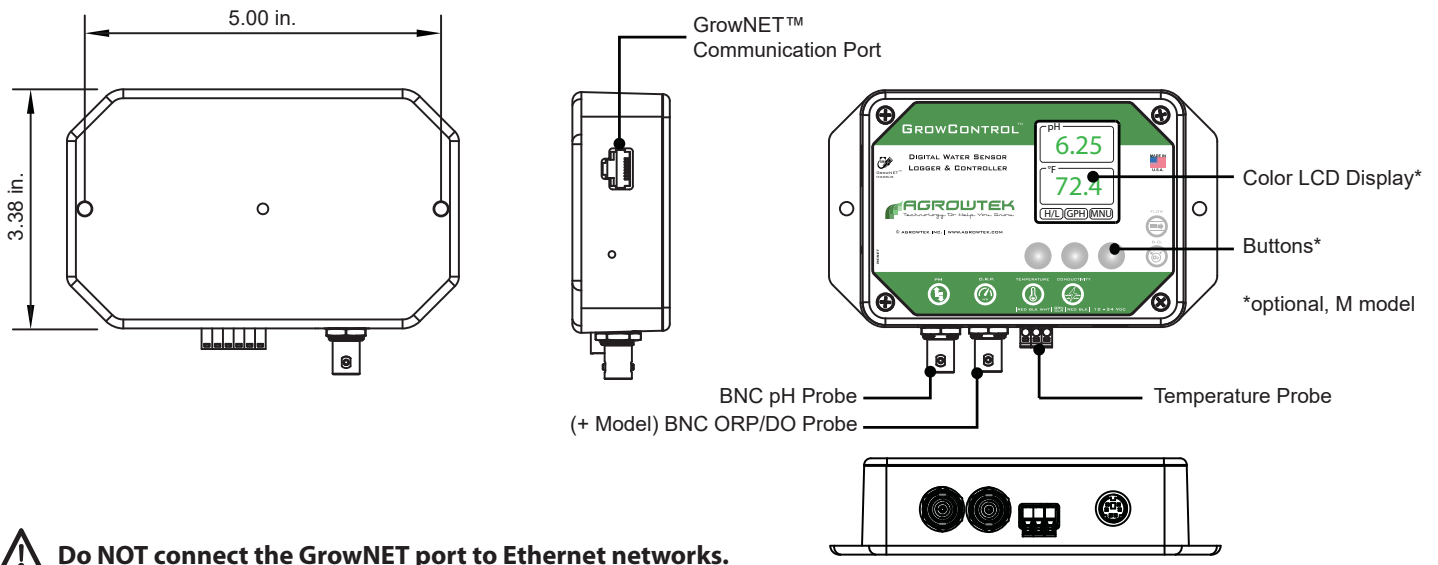
## **WARNING**

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



Wear skin and eye protection when working with hazardous chemicals.

# Features



## Installation Instructions

Install with the transmitter in the orientation shown in dimension 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.

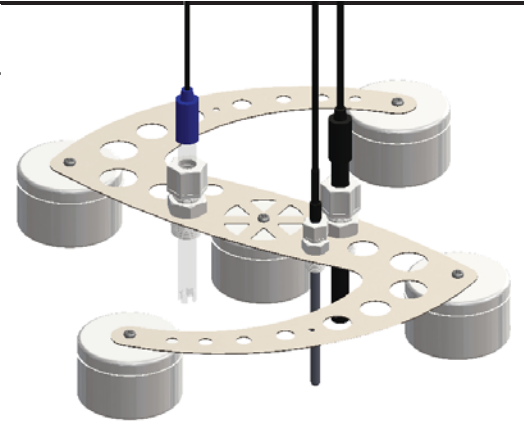
1. Screw the DIN rail brackets onto the flanges using the provided screws.
2. Snap the transmitter into place on a DIN rail.
3. Use the latches on the DIN brackets to release the transmitter from the DIN rail.



## PPX Probe Pontoon

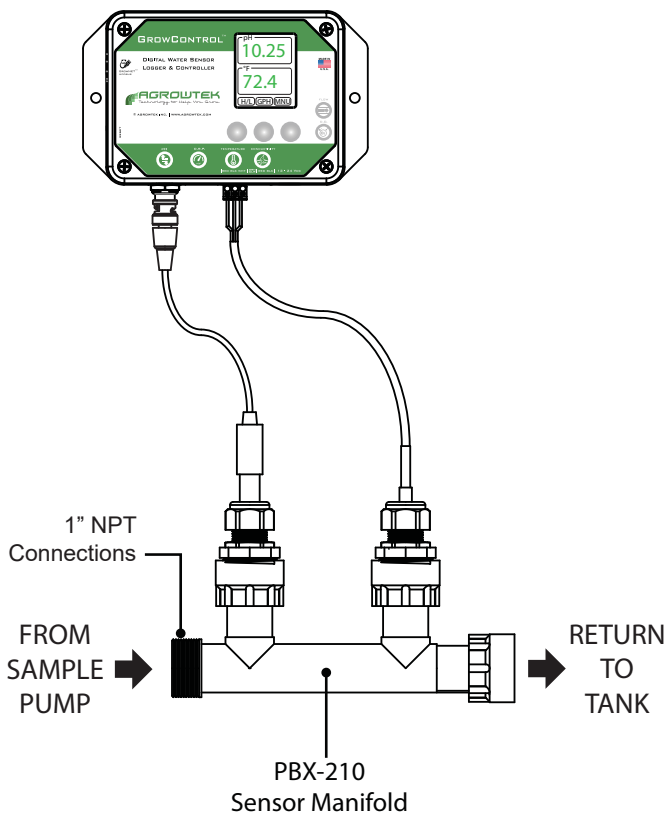
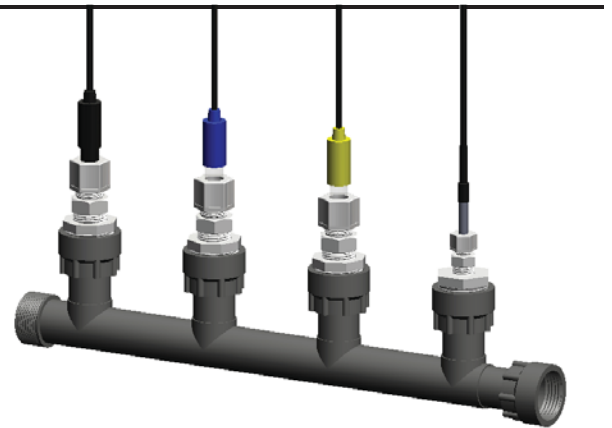
Sensors may be “floated” directly in a water tank using a “probe pontoon” which is designed to keep the probes in contact with the water as the depth changes.

Serpentine shape allows the pontoon to be installed through narrow diameter tank openings.

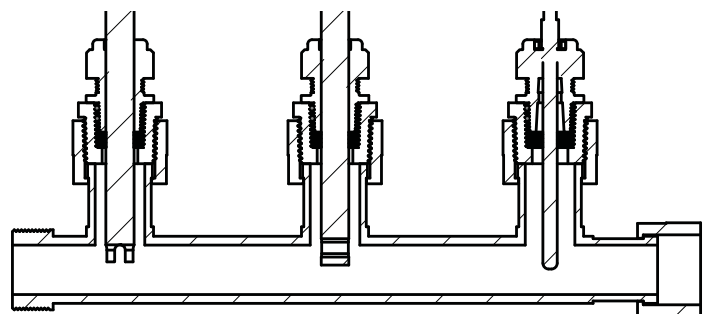


## PBX Probe Manifolds

Sensors may be installed “inline” with flow using 1” PBX series probe manifolds. Manifolds include removable compression fittings to seal the probes, and o-ring seals on the manifolds for easy removal during calibration.



**IMPORTANT NOTE:** For flow rates above 20 gpm, ensure probe tips are raised out of the flow path to prevent turbulence altering the sensor readings.



## Rockwool pH Probe

Spear tipped pH probe is designed for insertion into semi-solid media allowing continuous monitoring of pH in real time with most rockwool media. Typical water content in properly maintained and irrigated rockwool media is sufficient for continuous monitoring.

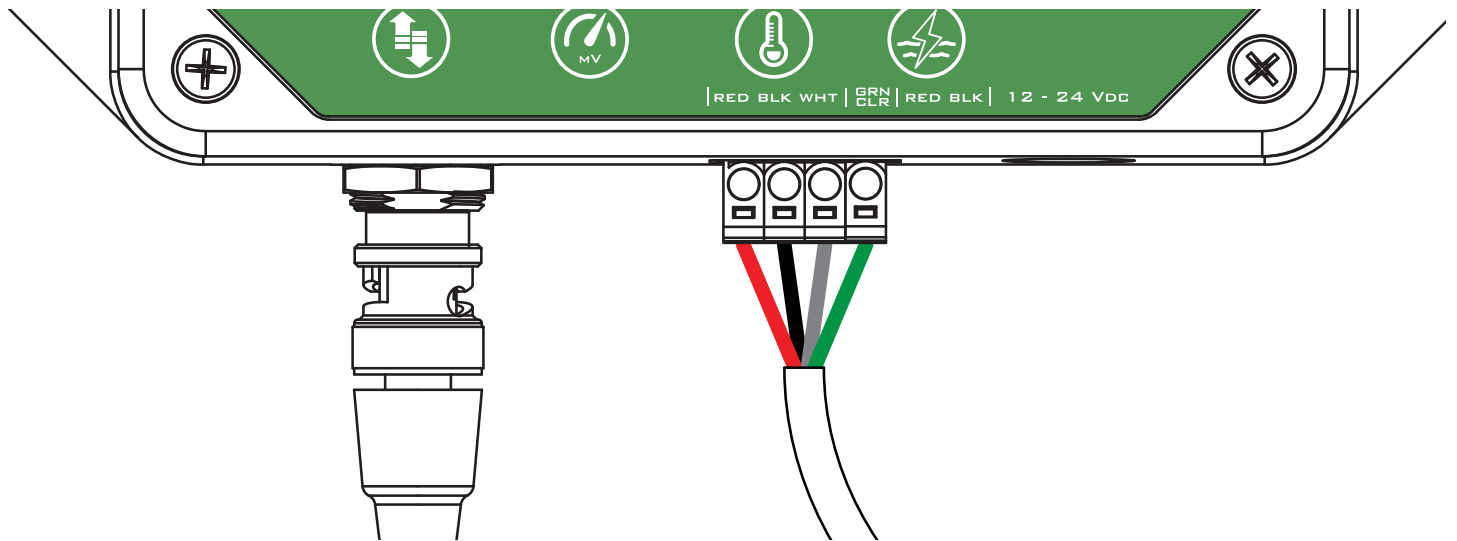
Spear probe may also be used for checking soils and other soilless media, however, these media types can become too dry for continuous monitoring.



Insert the probe to the desired depth or until the depth reaches the wider section of the probe body.

## Connecting Sensor Probes

pH and ORP or DO sensors are equipped with "BNC" style connectors which push on and then turn 1/4 rotation CW to lock them in place. Temperature and EC probes have a screw terminal block; make the connections according to the label on the transmitter. The terminal block may be removed for easier wire installation or for service.



**pH probes must remain wet to avoid damage. Do not allow probe tips to dry.  
Minimum recommended moisture content in rockwool 40% VWC.**

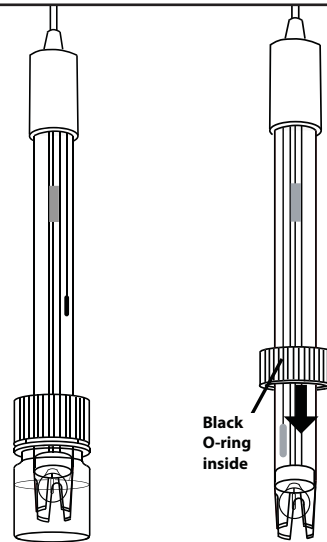
# pH & ORP Probe Preparation

## Probe Shipping & Storage

pH & ORP probes are shipped in a plastic bottle containing a solution of pH 4 buffer and potassium chloride. The electrode should remain in the bottle until it is used.

If the electrode is used infrequently, the bottle and its solution should be saved and the electrode stored in it. If the solution in the soaker bottle is missing, fill the bottle with pH 4 buffer.

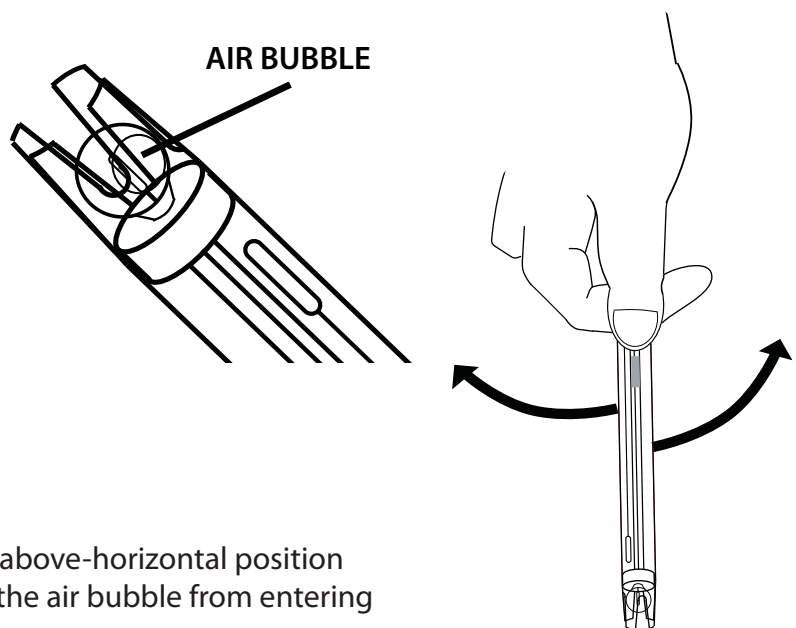
Take out electrode by loosening plastic top on bottle counter-clockwise and pulling electrode out. Slide cap and O-ring off electrode and save.



## Air Bubble

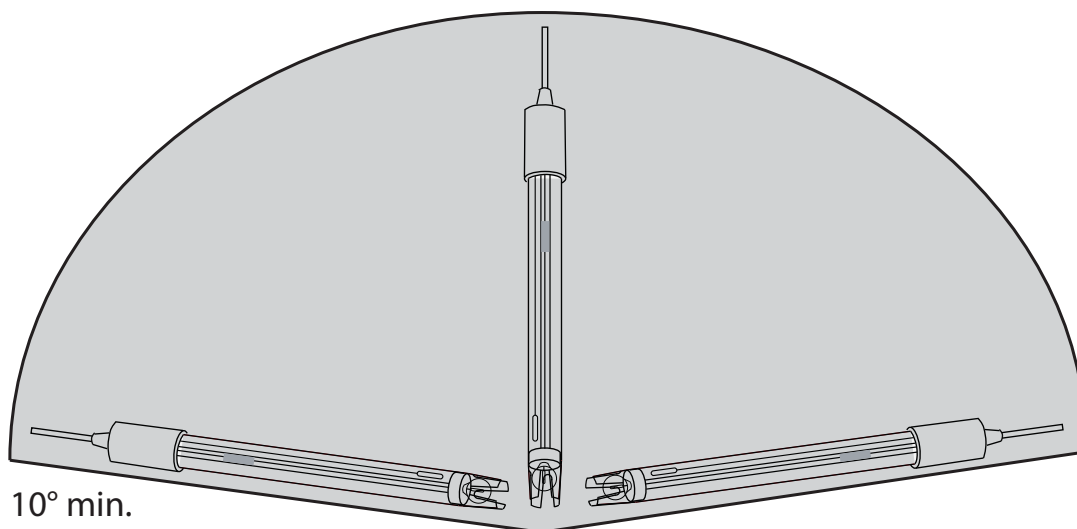
During shipment the air bubble in the electrode's stem may move into the bulb area.

If bubbles are seen in the bulb area, hold the electrode by its top cap and shake while pointed downward.



## ⚠ Installation/Operation Angle

pH & ORP sensor probes must be installed in an above-horizontal position with the probe tip facing downward to prevent the air bubble from entering the the bulb area.



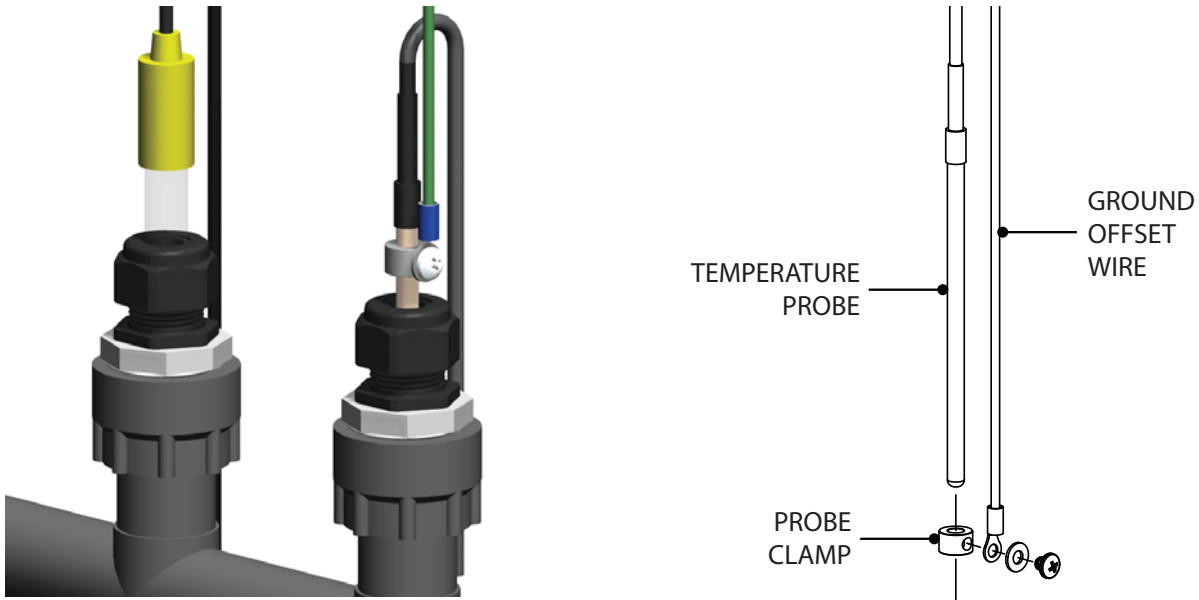
## Ground Offset Prevention

Sensor measurements are sensitive to differences in ground potential. If sensor readings are unstable or change readings in the system vs. in an isolated cup, then there may be a ground potential problem. To prevent errors in readings from ground potential offset, install a ground offset wire.

**Note:**

Temperature sensors with 4-wires have a green wire for ground offset and the external wire is not required.

Connect the ground offset wire from the **“CLR” terminal** to the temperature probe with probe clamp.



## Connection to ADi Pump

A direct-link connection between a PHX sensor and ADi pump requires Agrowtek’s cross-over adapter.

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



# LCD Menu Operation Instructions

SXHM 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 facility control systems, or directly to Agrowtek's AgrowDose pumps for automatic nutrient and pH 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.

LOW	HIGH	
68.4	72.0	°F
4.21	4.85	pH
551	657	uS
404	480	mV

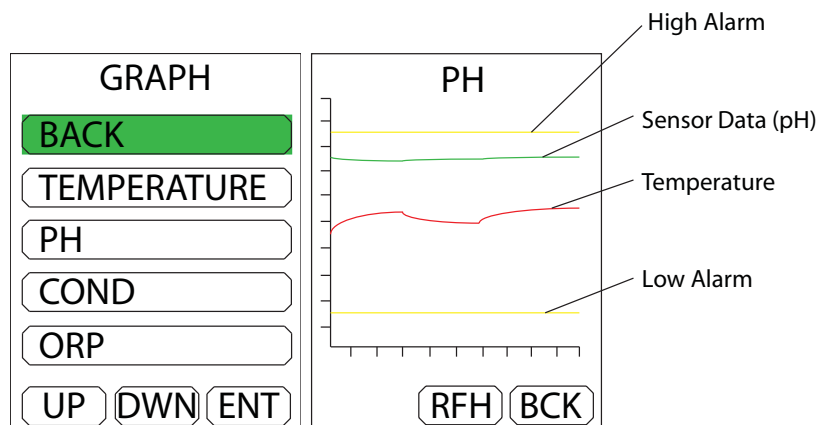
**EXIT** **RST**

## 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

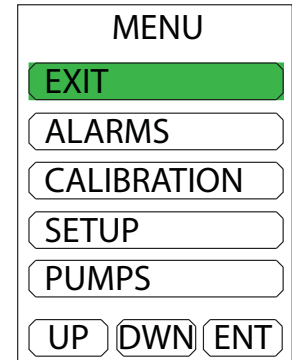
MNU

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.



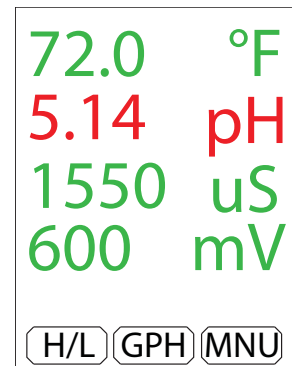
# Alarms Menu

MNU ► ALARMS

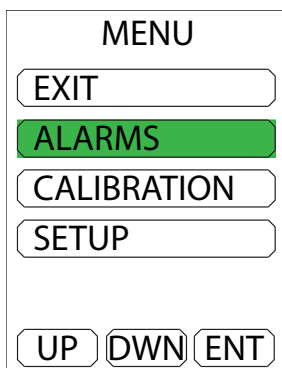
High and low alarm set points may be configured for each sensor value to activate an internal buzzer or send alerts with the optional wifi module.

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

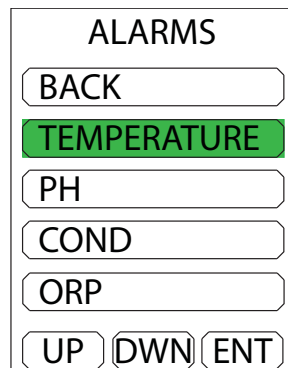
Additionally, alarm limits are plotted on the graphs to indicate values are within the desired range.



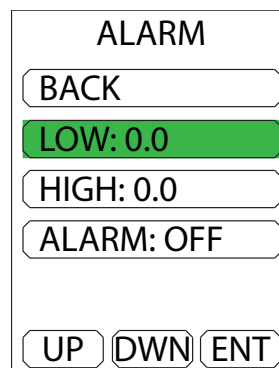
# Alarms Configuration



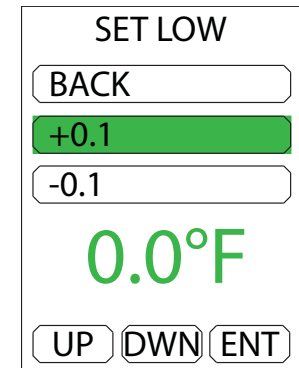
1. Select **ALARMS** from the main menu.



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

ALARM

BACK

LOW: 0.0

HIGH: 0.0

ALARM: OFF

UP DWN ENT

1. Select **ALARM: OFF**

SET ALARM

BACK

SET ON

SET OFF

OFF

UP DWN ENT

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

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

## Calibration Menu

MNU ► CALIBRATION

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

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

MENU

EXIT

ALARMS

CALIBRATION

SETUP

UP DWN ENT

CALIBRATION

BACK

TEMPERATURE

PH

COND

CLEAR ALL

UP DWN ENT

## Temperature Calibration

MNU ► CALIBRATION ► TEMPERATURE

CALIBRATION

BACK

CALIBRATE

ADVANCED

UP DWN ENT

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

TEMPERATURE  
LAST CALIBRATION  
10/19/2017

PRESS NEXT TO  
ADJUST  
TEMPERATURE  
READING.

EXIT NEXT

2. Press **NEXT** to continue.

OFFSET

BACK

+0.1

-0.1

72.2°F

UP DWN ENT

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

CONFIRM?

OLD  
68.1 °F

NEW  
72.2 °F

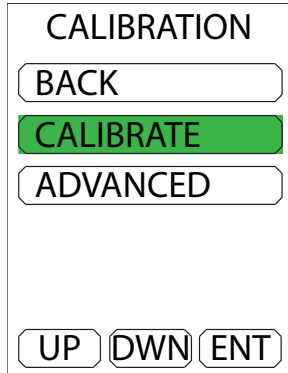
YES NO

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

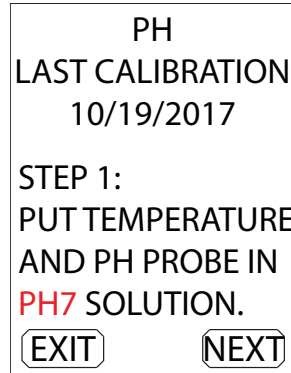
# pH Calibration

MNU ► CALIBRATION ► PH

pH calibration is a two-point process requiring both pH 7 and pH 4.01 calibration solutions. The temperature probe must be inserted into the calibration solution at the same time as the pH probe.



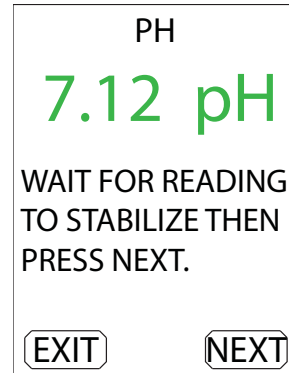
1. Select **CALIBRATE** from the pH calibration menu.



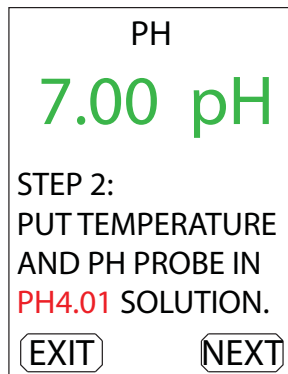
2. Follow the instructions then press **NEXT** to continue.



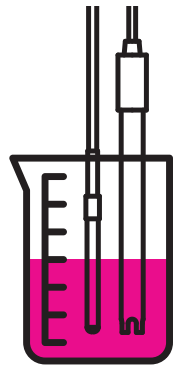
pH 7 Calibration Solution



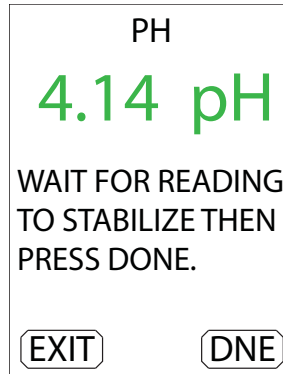
3. When the reading is stable, press **NEXT** to calibrate pH 7.



4. Clean the probes with DI/RO and change calibration solution.



pH 4.01 Calibration Solution



5. When the reading is stable, press **DONE** to calibrate pH 4.01 and finish calibration.

## O.R.P. Calibration

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MNU ► CALIBRATION ► NEXT ► ORP

ORP (optional) calibration is a single point process requiring 470 mV calibration solution.

CALIBRATION

BACK

**CALIBRATE**

ADVANCED

UP DWN ENT

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

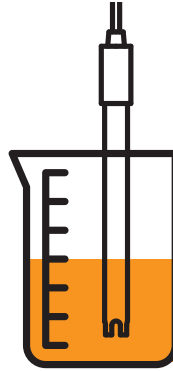
ORP

LAST CALIBRATION  
10/19/2017

PUT ORP PROBE IN  
**470mV** SOLUTION.

EXIT NEXT

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



CONDUCTIVITY

**1440 uS**

WAIT FOR READING  
TO STABILIZE THEN  
PRESS DONE.

EXIT DNE

3. When the reading is stable, press **DONE** to complete the calibration.

## Clear Calibration

---

MNU ► CALIBRATION ► NEXT

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

CALIBRATION

BACK

TEMPERATURE

PH

COND

**CLEAR ALL**

UP DWN ENT

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

RESTORE TO  
FACTORY  
CALIBRATION?

YES NO

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

## Advanced Calibration

---

Sensors values may be manually calibrated to alternate standards using the advance calibration features.

OFFSET calibration applies a linear offset adjustment to the value.  
SPAN calibration applies an adjustment to the slope of the sensor value.

**Note: pH is a temperature compensated (ATC) sensor. For accurate calibration, the temperature probe must be in the pH calibration standard. Allow all readings to stabilize before performing an offset or span calibration operation.**

A screenshot of a terminal-style menu titled "CALIBRATION". It contains three selectable options: "BACK", "CALIBRATE", and "ADVANCED". The "ADVANCED" option is highlighted with a green background. At the bottom of the screen are three buttons: "UP", "DWN", and "ENT".

## Analog Output Calibration

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

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

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

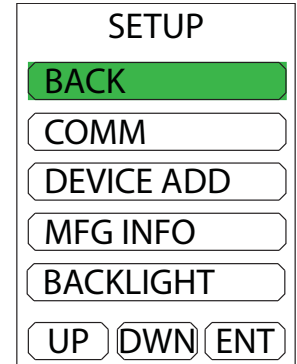
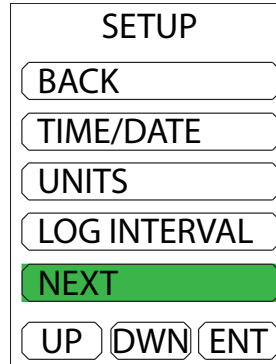
1. Observe the PLC's input or data readings.
2. Increase or decrease the offset value to incremenetally adjust the current output until the values match.

A screenshot of a terminal-style menu titled "ANALOG". It contains three selectable options: "BACK", "+1", and "-1". The "+1" option is highlighted with a green background. In the center of the screen, the number "-5" is displayed in a large green font. At the bottom of the screen are three buttons: "UP", "DWN", and "ENT".

## Setup Menu

MNU ► SETUP

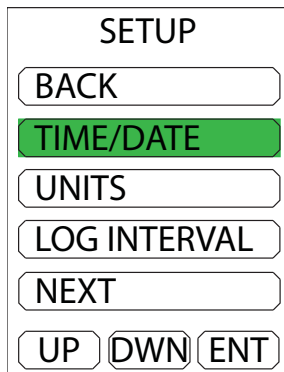
The setup menu is where the time and date are set, the units are configured, logging interval is adjusted and advanced communications settings are available.



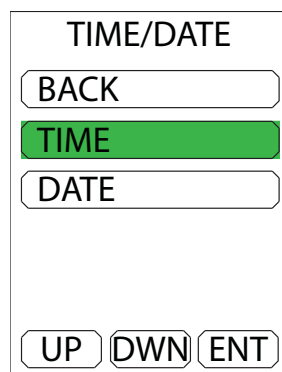
## Time / Date

MNU ► SETUP ► TIME/DATE

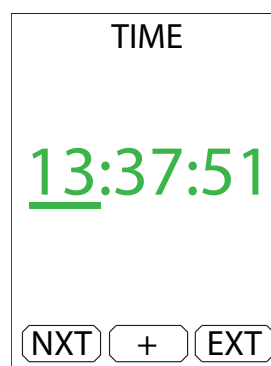
Sensors include a precision real-time clock with battery back-up for time-stamping the data log information with the time and date. The last calibration for each sensor is also time stamped.



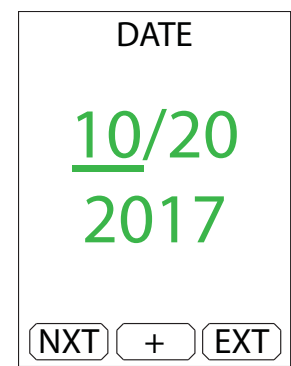
1. Select **TIME/DATE** from the setup menu.



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



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



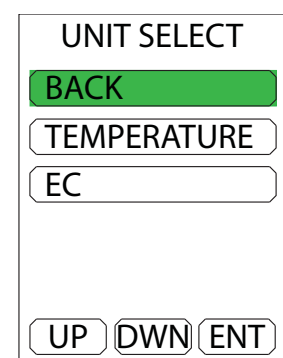
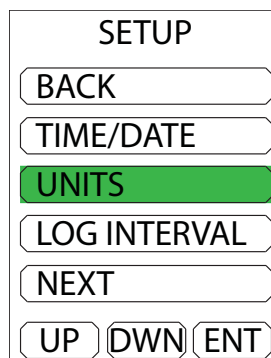
4. Use **EXT** to exit the menu.

## 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.

UNIT SELECT

BACK

TEMPERATURE

EC

UP DWN ENT

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

UNIT SELECT

BACK

°C

°F

68.0°F

UP DWN ENT

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

## Logging Interval

MENU ► SETUP ► LOG INTERVAL

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

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

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

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

SETUP

BACK

TIME/DATE

UNITS

LOG INTERVAL

NEXT

UP DWN ENT

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

LOGGIN INTERVAL

BACK

+1

-1

60 SEC

UP DWN ENT

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

## COMM Mode

MNU ▶ SETUP ▶ NEXT ▶ COMM

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

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

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

SETUP

BACK

COMM

DEVICE ADD

MFG INFO

UP DWN ENT

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

COM MODE

NORMAL

MINI MASTER

UP DWN ENT

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

## Device Address

MNU ▶ SETUP ▶ NEXT ▶ DEVICE ADD

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

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

SETUP

BACK

COMM

DEVICE ADD

MFG INFO

BACKLIGHT

UP DWN ENT

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

DEVICE ADDRESS

BACK

+1

-1

0 Addr

UP DWN ENT

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

## Manufacturing Info

MNU ▶ SETUP ▶ NEXT ▶ MFG INFO

Manufacturer information such as serial number, date of manufacture, hardware and firmware versions can be read from the MFG INFO page.

SETUP

BACK

COMM

DEVICE ADD

MFG INFO

BACKLIGHT

UP DWN ENT

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

SERIAL NUMBER:  
17090554

DATE OF MFG:  
09/15/17

HW VERSION:  
C

FW VERSION:  
02.03.84

EXIT

2. Press **EXIT** to return.

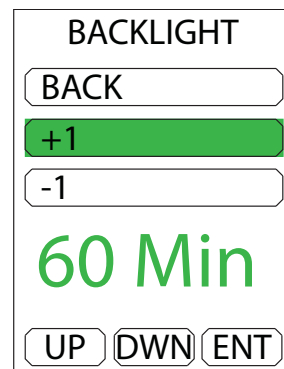
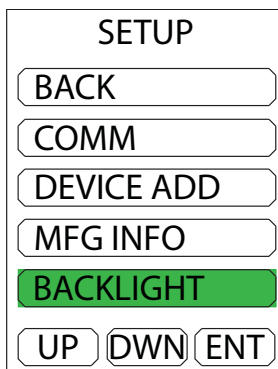


## Display Back Light Timer

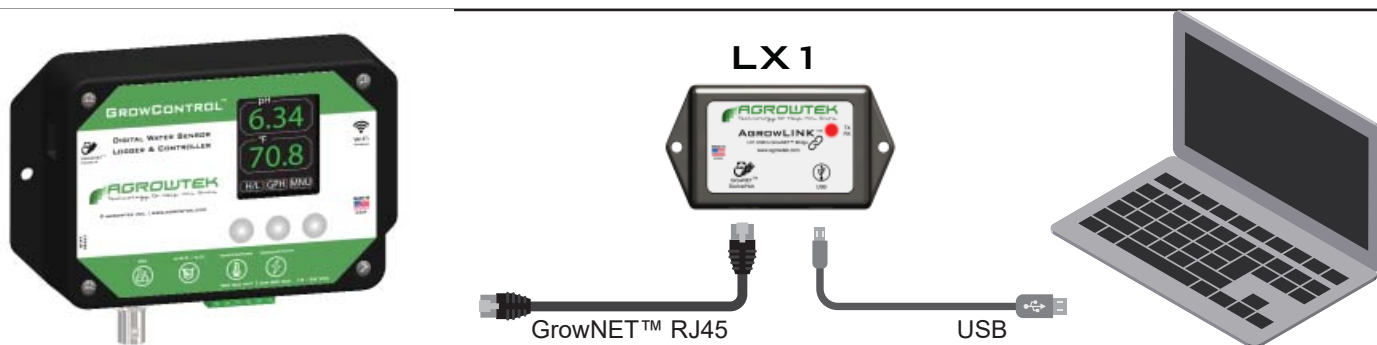
MNU ► SETUP ► NEXT ► BACKLIGHT

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

## Connection to 4-20mA Outputs

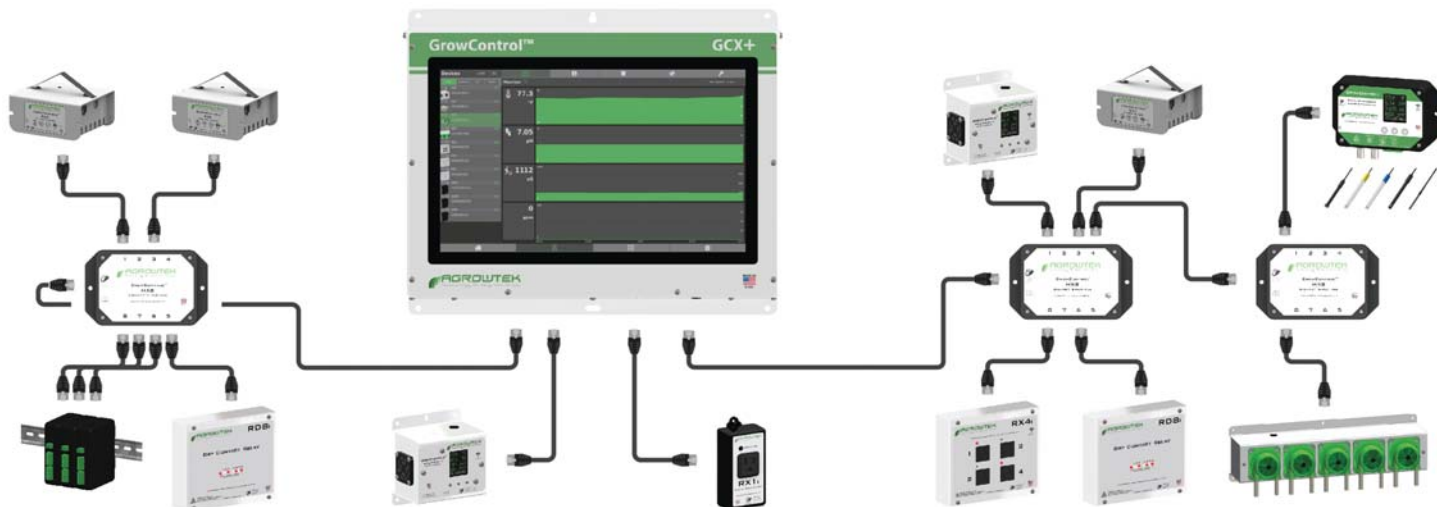
Sensors are available with optional 4-20mA analog outputs. Use the LX3 DinLINK for wire connections. A mini-din 6 connector is included on units with 4-20mA outputs for power and analog connections. LX3 connects the mini-din 6 cable to a terminal block break-out with terminals for 24V power the four analog channels. 4-20mA linear outputs correspond to the ranges in the sensor specifications table.



# 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.



## 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.



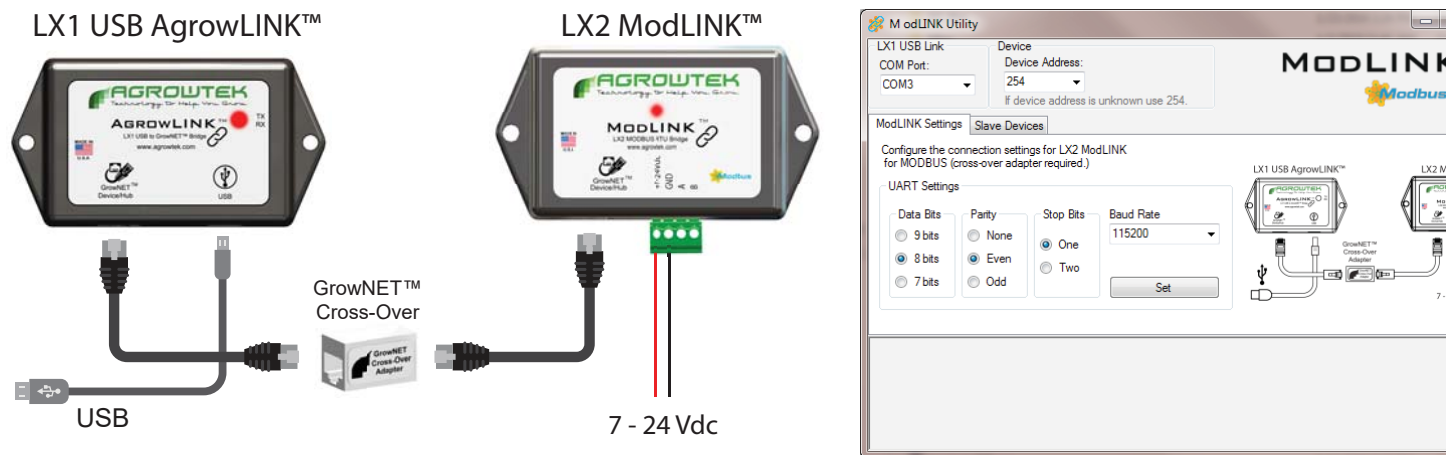
**3.3/5Vdc Serial Bus Compatible.**

Include required bus terminating resistors per EIA standard.

## MODBUS Serial Speed & Format

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

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



See MODBUS manual for more information.

 [MODBUS Manual](#)

## Supported Commands

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0x03 Read Multiple Registers  
0x06 Write Single Register

## 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 (see map.)

Sensor #	Type	Integer Scale	Range
1	Temperature	x100	-2000 - 6000 (-20 - 60°C)
2	pH	x100	0 - 1400 (0 - 14.00pH)
3	O.R.P.	x1	-1000 - +1000 mV
	D.O.	x100	0 - 2000 (0 - 20.00 mg/L)

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

## Calibration Registers

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

### Offset Calibration

Offset, or zero calibration, is an arithmetic positive or negative correction to the sensor reading. Operations performed using the offset register are:

- Temperature calibration
- pH 7 calibration

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.)

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

To set the pH 7 calibration, write the value "700."

## Span Calibration

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

-pH 4.01 or 10.0 calibration

To set the pH 4.01 calibration, write the value "401."

**Note: perform any "offset" calibrations prior span calibrations.**

## 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.

±1 calibration bit = ±0.005mA adjustment

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

## MODBUS Register Map

Parameter	Function	Type	Scale	Access	Address
Device Address	Slave Address	Value, 1-247	8 bit	R/W	40001
Baud Rate	Comm baud rate	Value	16 bit	R	40002
Data Format	Comm data format	Value	16 bit	R	40003
Serial#	Serial Number	ASCII	8 Char	R	40004
DOM	Date of Manufacture	ASCII	8 Char	R	40008
HW Version	Hardware Version	ASCII	8 Char	R	40012
FW Version	Firmware Version	ASCII	8 Char	R	40016
Sensor 1 Value	Sensor output	Signed Int	16 bit	R	40101
Sensor 2 Value	Sensor output	Signed Int	16 bit	R	40102
Sensor 3 Value	Sensor output	Signed Int	16 bit	R	40103
Sensor 1 Value	Sensor output	Float	32-bit	R	40201
Sensor 2 Value	Sensor output	Float	32-bit	R	40203
Sensor 3 Value	Sensor output	Float	32-bit	R	40205
Sensor 1 Offset Cal	Calibration Input	Signed Int	16 bit	W	41101
Sensor 2 Offset Cal	Calibration Input	Signed Int	16 bit	W	41102
Sensor 3 Offset Cal	Calibration Input	Signed Int	16 bit	W	41103
Sensor 1 Span Cal	Calibration Input	Signed Int	16 bit	W	41201
Sensor 2 Span Cal	Calibration Input	Signed Int	16 bit	W	41202
Sensor 3 Span Cal	Calibration Input	Signed Int	16 bit	W	41203
Sensor 1 Analog Cal	Calibration Input	Signed Int	16 bit	W	41301
Sensor 2 Analog Cal	Calibration Input	Signed Int	16 bit	W	41302
Sensor 3 Analog Cal	Calibration Input	Signed Int	16 bit	W	41303

# Maintenance

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Sensor probes require periodic cleaning, reconditioning and calibration for reliable service. See calibration section for details on performing calibration service after cleaning.

## Probe Cleaning

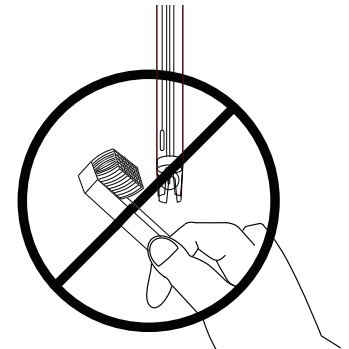
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Coating of the pH or ORP bulbs can lead to erroneous readings including shortened span (slope). Coatings and blockages in the EC sensor can cause incorrect readings. The type of coating will determine the cleaning technique.

Soft coatings can be removed by vigorous stirring or by the use of a squirt bottle.

Organic chemical or hard coatings should be chemically removed. 5-10% hydrochloric acid (HCl) soak for a few minutes and often removes many coatings.

If cleaning does not restore pH sensor performance, reconditioning may be tried.



**Do not use a brush or abrasive on pH or EC probes.**

## pH Probe Reconditioning

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When reconditioning is required due to electrode aging the following chemical treatments can be tried. They are presented in the order of the severity of attack on the pH glass and may not improve (and in some cases actually further deteriorate) electrode performance.

**⚠ DANGER:** Use proper precautions when handling these hazardous chemicals. Ammonium bifluoride and HF (hydrofluoric acid) are extremely hazardous and should only be used by qualified personnel.

### Reconditioning Method 1

Immerse the electrode tip in 0.1 N HCl for 15 seconds, rinse in tap water and then immerse tip in 0.1 M NaOH for 15 seconds and rinse in tap water. Repeat this sequence three times and then recheck the electrode's performance. If performance has not been restored, try method two.

### Reconditioning Method 2

Immerse the tip in a 20% solution of NH<sub>4</sub>F-HF (ammonium bifluoride) for two to three minutes, rinse in tap water and recheck performance. If performance has not been restored, try method three.

### Reconditioning Method 3

Immerse electrode tip in 5% HF for 10-15 seconds, rinse well in tap water, quickly rinse in 5N HCl, rinse well in tap water and recheck performance. If performance has not been restored, it is time to get a new probe.

# Technical Information

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## Specifications

Power	24Vdc, ~2W (5W w/LCD)
Max Cable Distance	1000ft
Optional Interface	LCD w/3 Buttons
Temperature Range	-20 - 60°C
Temperature Accuracy	±2°C, 0.1° resolution
pH Range	0-14pH
pH Accuracy	±0.03pH, 0.01pH resolution
+ORP (DO) Range	-1000 - +1000mV (0-20mg/L)
+ORP (DO) Accuracy	±10mV, 1mV resolution (±0.1mg/L, 0.1 resolution)
4-20mA Output Resolution	12 bit , 0.005mA
Interface	GrowNET, MODBUS or WiFi

## Storage & 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

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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. External sensor probes including pH and ORP probes are consumable items and have a finite shelf life; consequently any sensor probes are restricted to a 120 day warranty period. 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. 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 for a return authorization. No returns will be accepted without a return authorization. Returns not purchased directly from Agrowtek Inc. must include proof of purchase date otherwise purchase date is considered date of manufacture. 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.