AGROWTEK
Technology to Help You Grow
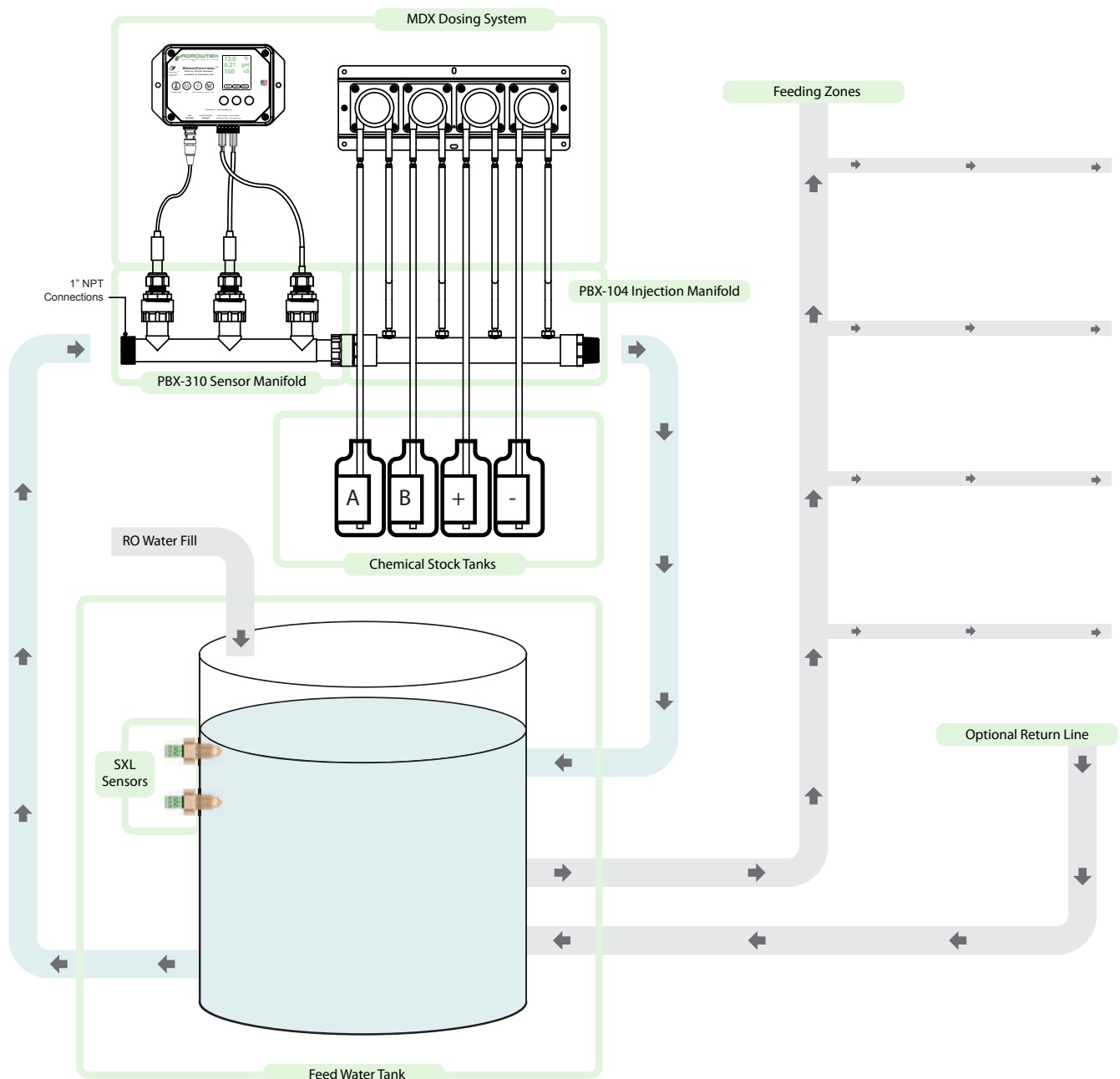
Mini pH Dosing System

Contents

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Overview

The MPX dosing system is designed to automatically dose pH buffers into stock feed tanks to maintain target pH and conductivity levels. The mixed solution is then drawn off of the tank to feed plants in a recirculating or drain-to-waste system. The MPX system operates independently of other systems and doses on demand automatically.

SXL liquid level sensors are an ideal addition to automatically maintain the feed tank water level with fresh water from an RO or filter water supply. SXL sensors are available in auto-fill kits and do not require any controller to operate.

Fertigation Layout

MDX Dosing System

Feeding Zones

1" NPT Connections

PBX-104 Injection Manifold

PBX-310 Sensor Manifold

A B + -

RO Water Fill

Chemical Stock Tanks

Optional Return Line

SXL Sensors

Feed Water Tank

Quick-Start Guide

1. Connect Sensor Probes

pH sensors are equipped with "BNC" style connectors; push on and then turn to lock in place.

Temperature 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.
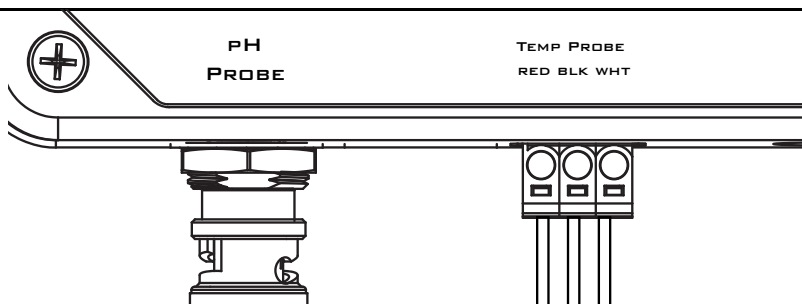
2. Connect Dosing Pump

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

⚠ **IMPORTANT! ONLY use cross-over adapters provided by Agrowtek.**
Incorrect cross-over adapters or cables can cause damage to the equipment.

Agrowtek
Cross-Over
Adapter

12Vdc 1A
Power Supply

cat5   cat5
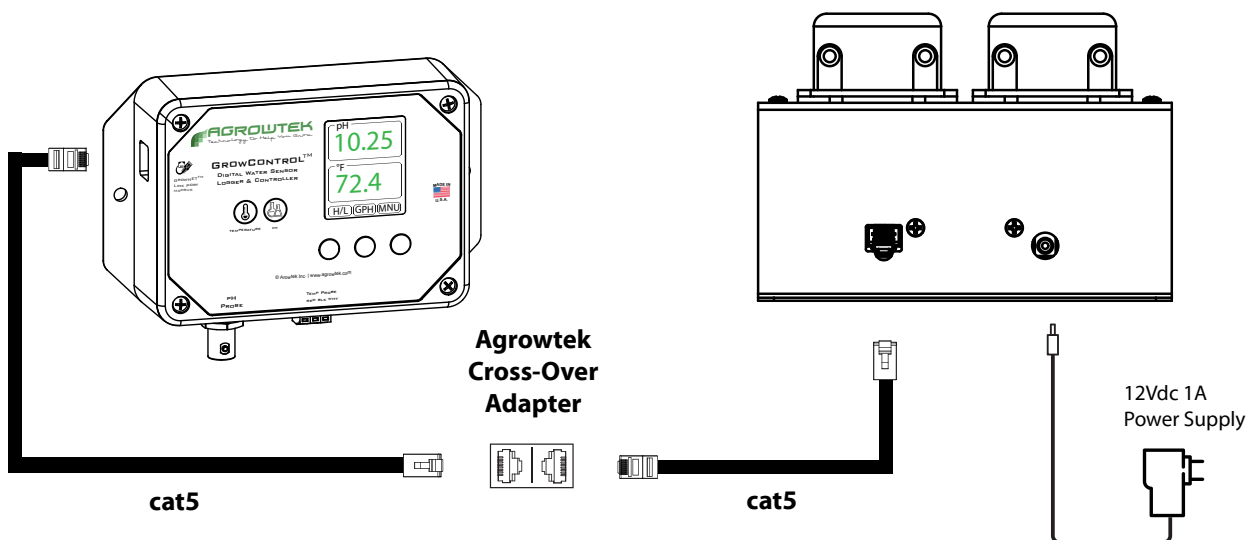
3. Connect Tubing & Configure Pumps

Normal pump rotation is CW. The left tube is inlet (suction) and the right tube is outlet (pressure.)

Connect tubing with barbed fittings as shown. Tubing lenths may be as long as 50ft. Check for proper flow with the prime function.

Use the LCD menus to configure each pump and the the system parameters and then put the pumps into RUN mode to begin auto dosing.

Installation Instructions

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.

A probe manifold with recirulating pump (3-30gpm) is recommended for best sensor accuracy.

IMPORTANT NOTE: For flow rates above 5 gpm, ensure probe tips are raised out of the flow path to prevent turbulence altering the sensor readings.
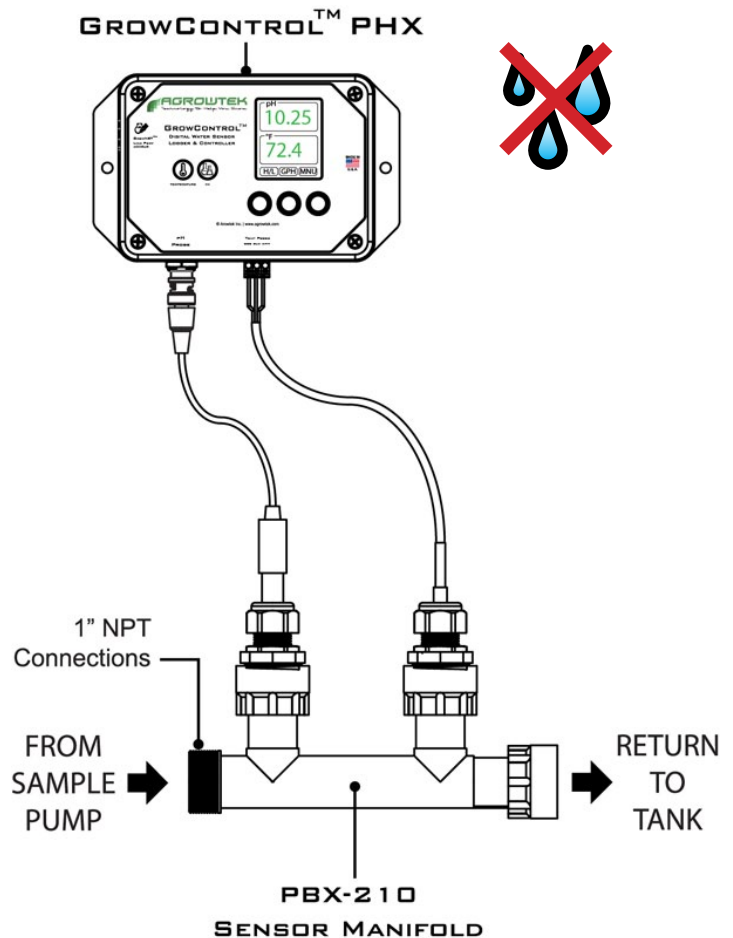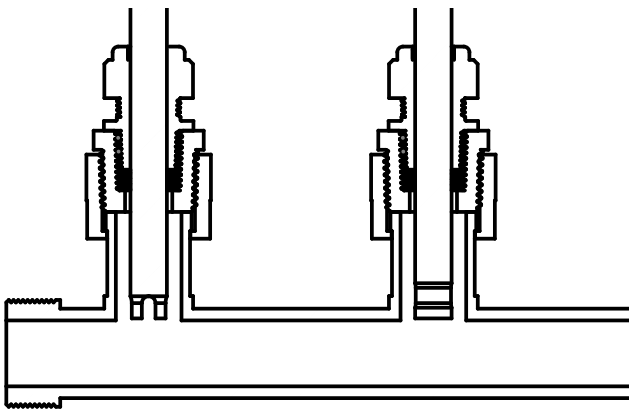
Mounting the Transmitter

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.

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.
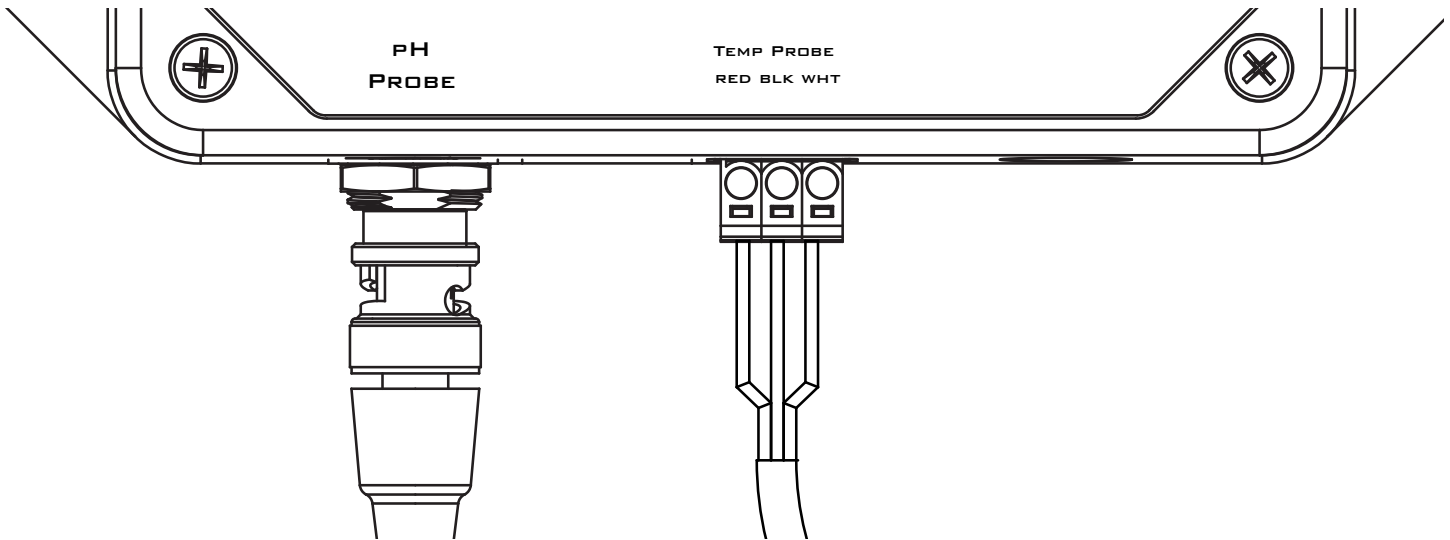

⚠ **pH & ORP probes must remain wet to avoid damage. Do not allow probe tips to dry.**

GrowNET Connection to ADi Intelligent Pump

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

⚠ **IMPORTANT! ONLY use cross-over adapters provided by Agrowtek.**
Incorrect cross-over adapters or cables can cause damage to the equipment.

Agrowtek Cross-Over Adapter

cat5

cat5

12Vdc 1A Power Supply

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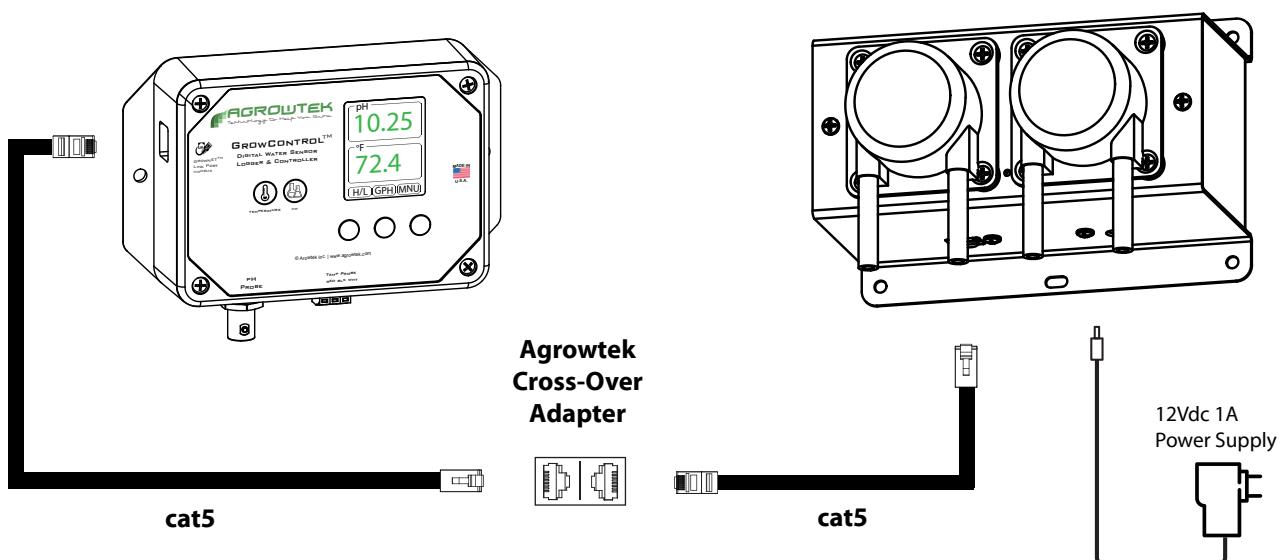
Operation Instructions

The SXH/M hydro sensor continuously monitors the sensor probes and compares the readings to "target" set points for pH and conductivity (EC). If the readings are outside of the allowed range, the pumps will sequentially dose according to the configured recipe, then wait a set delay time before repeating until the targets are achieved.

Definitions

Target
A "target" is a set-point that the system is looking to achieve such as maintaining 1000uS or 6.00pH.

Dead Band
A "dead band" is the amount of drift allowed from the target before starting dosing. To allow a drift of 100uS below the target, set the EC deadband value to "100uS". Similartly, to allow a drift of 0.20 pH above or below the target, enter a pH deadband of "0.20."
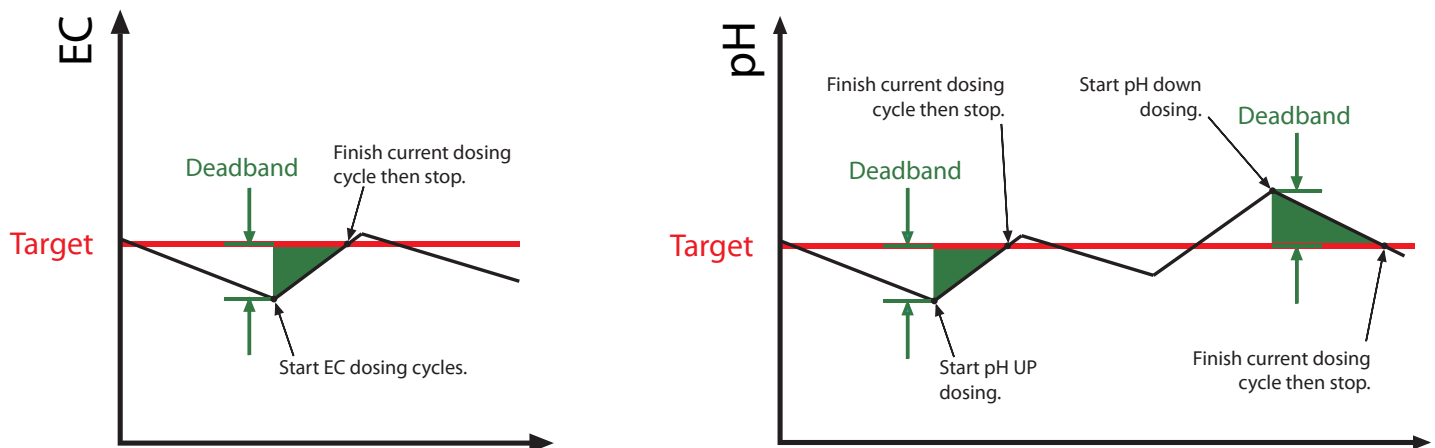
Recipe
Each pump is assigned a mode (EC/pH Up/pH Down) and a dose size.

EC Mode: Pump will dose in sequence with other EC mode pumps according to EC targets.
pH Up Mode: Pump will dose when pH is below taget.
pH Down Mode: Pump will dose when pH is above taget.

EC LOCK
EC LOCK is a menu option that appears on pumps assigned to pH control. EC LOCK prevents pH dosing while EC targets are not satisfied and nutrient dosing is on-going.

EC/pH Delay
Both EC and pH dosing loops contain a "delay" time setting. If a dosing cycle is required, the delay time begins after the cosing cycle has completed, preventing the system from beginning another dosing cycle before the previous cycle has had time to mix into the system.

If you are unsure of what time delay to use, begin with something large such as 600 seconds (10 minutes.) Observe the graphical history on the screen to determine if the reading has leveled off before the dosing pump begins another cycle. Adjust the delay time to ensure the sensor reading has leveled off sufficiently before another dosing cycle begins to prevent over-dosing of the tank.

Dosing Cycles

pH & ORP Dosing
The system checks the pH value to see if it is with the target range. If the pH requires adjustment, each pump is checked for the appropriate pH up or down assignment and the recipie dose is administered. ORP dosing (if equipped) is completed next. A delay time follows each pump as set.

```
                                           START

   Check pH Target ──pH is OK──→ System has ORP? ──Yes──→ Check ORP Target ──ORP is OK──→
        │                              │ No                      │
   pH is High or Low                   │                  ORP is High or Low
        │                              │                         │
   Start at Pump 1                     │                  Start at Pump 1
        │                              │                         │
   Pump # in pH Up/Down Mode? ──No──   │     Pump # in ORP Up/Down Mode? ──No──
        │ Yes                          │              │ Yes
   EC LOCK Activated? ──Yes──          │     pH LOCK Activated? ──Yes──
        │ No                           │              │ No
   Run Pump # for mL per Recipe        │     Run Pump # for mL per Recipe
        │                              │              │
   Wait Pump Delay Time                │     Wait Pump Delay Time
        │                              │              │
   More Pumps? ──Yes──                 │     More Pumps? ──Yes──
        │ No ───────────────────────────              │ No
```

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Controller Operation, Sensors

3-button/LCD display interface allows easy monitoring of sensor values.

Simple menu driven setup for configuring pump recipes, system settings, sensor calibration and more.

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.
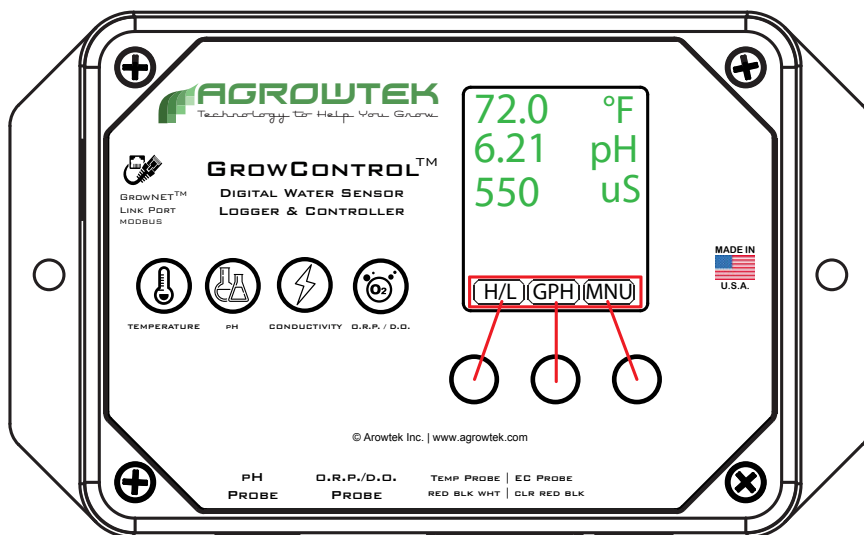
High / Low History

[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
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.

GRAPH
BACK
TEMPERATURE
PH
COND
ORP
[UP] [DWN] [ENT]

PH
High Alarm
Sensor Data (pH)
Temperature
Low Alarm
[RFH] [BCK]

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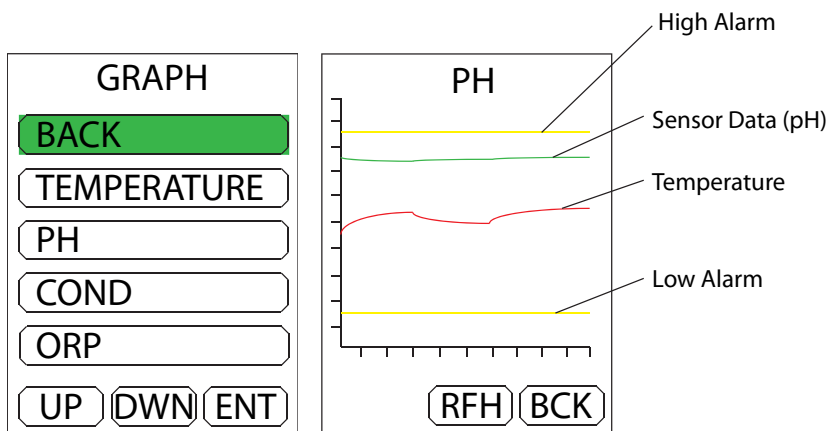
Main Menu

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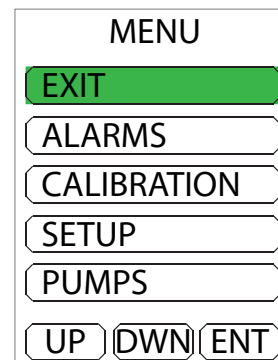
Use the **ENT** button to enter a selection.

```
        MENU
   [ EXIT        ]
   [ ALARMS      ]
   [ CALIBRATION ]
   [ SETUP       ]
   [ PUMPS       ]

   [ UP ][ DWN ][ ENT ]
```

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.

```
   72.0    °F
   5.14    pH
   1550    uS
   600     mV

   [ H/L ][ GPH ][ MNU ]
```
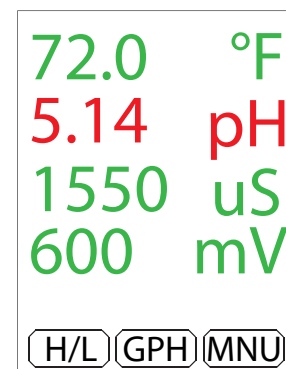
Alarms Configuration
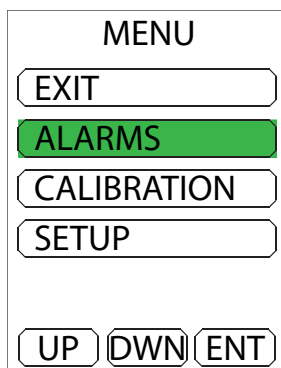
```
        MENU
   [ EXIT        ]
   [ ALARMS      ]
   [ CALIBRATION ]
   [ SETUP       ]



   [ UP ][ DWN ][ ENT ]
```
1. Select **ALARMS** from the main menu.
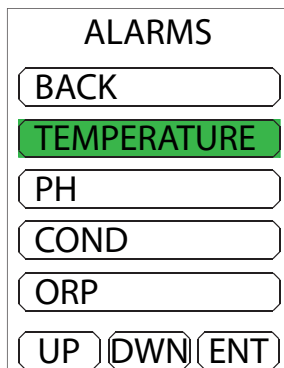
```
       ALARMS
   [ BACK        ]
   [ TEMPERATURE ]
   [ PH          ]
   [ COND        ]
   [ ORP         ]

   [ UP ][ DWN ][ ENT ]
```
2. Select a sensor to configure set points.
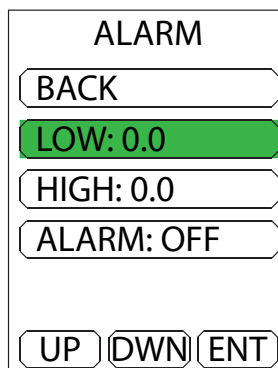
```
        ALARM
   [ BACK       ]
   [ LOW: 0.0   ]
   [ HIGH: 0.0  ]
   [ ALARM: OFF ]


   [ UP ][ DWN ][ ENT ]
```
3. Select the setting to adjust.
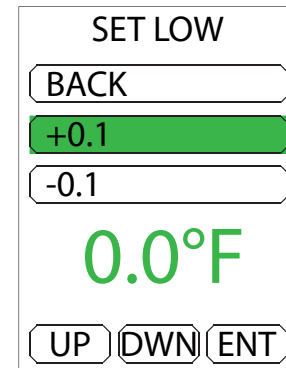
```
       SET LOW
   [ BACK  ]
   [ +0.1  ]
   [ -0.1  ]

     0.0°F

   [ UP ][ DWN ][ ENT ]
```
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       │ (highlighted)
   └──────────────────┘

   ( UP )(DWN)(ENT)
```

```
      SET ALARM
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ SET ON           │ (highlighted)
   ├──────────────────┤
   │ SET OFF          │
   └──────────────────┘

        OFF

   ( UP )(DWN)(ENT)
```

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

1. Select **ALARM: OFF**

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

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      │ (highlighted)
   ├──────────────────┤
   │ SETUP            │
   └──────────────────┘

   ( UP )(DWN)(ENT)
```

```
      CALIBRATION
   ┌──────────────────┐
   │ BACK             │ (highlighted)
   ├──────────────────┤
   │ TEMPERATURE      │
   ├──────────────────┤
   │ PH               │
   ├──────────────────┤
   │ COND             │
   ├──────────────────┤
   │ CLEAR ALL        │
   └──────────────────┘

   ( UP )(DWN)(ENT)
```

Temperature Calibration

MNU ▶ CALIBRATION ▶ TEMPERATURE

```
      CALIBRATION
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ CALIBRATE        │ (highlighted)
   ├──────────────────┤
   │ ADVANCED         │
   └──────────────────┘

   ( UP )(DWN)(ENT)
```

```
      TEMPERATURE
   LAST CALIBRATION
       10/19/2017

   PRESS NEXT TO
   ADJUST
   TEMPERATURE
   READING.
   (EXIT)      (NEXT)
```

```
        OFFSET
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ +0.1             │ (highlighted)
   ├──────────────────┤
   │ -0.1             │
   └──────────────────┘
        72.2°F

   ( UP )(DWN)(ENT)
```

```
       CONFIRM?
        OLD
      68.1 °F
        NEW
      72.2 °F
   (YES)      (NO)
```

1. Select **CALIBRATE** from the temperature 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** to cancel.

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pH Calibration

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.

```
CALIBRATION

[ BACK ]
[ CALIBRATE ]
[ ADVANCED ]



[ UP ][ DWN ][ ENT ]
```

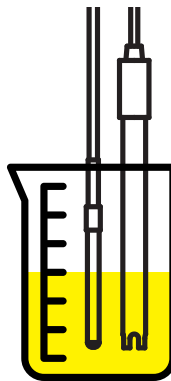1. Select **CALIBRATE** from the pH calibration menu.

```
PH
LAST CALIBRATION
10/19/2017

STEP 1:
PUT TEMPERATURE
AND PH PROBE IN
PH7 SOLUTION.
[ EXIT ]     [ NEXT ]
```

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

pH 7 Calibration Solution

```
PH

7.12 pH

WAIT FOR READING
TO STABILIZE THEN
PRESS NEXT.

[ EXIT ]     [ NEXT ]
```

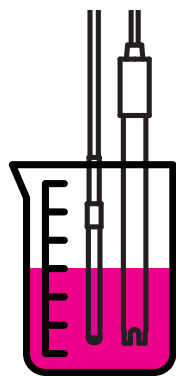3. When the reading is stable, press **NEXT** to calibrate pH 7.

```
PH

7.00 pH

STEP 2:
PUT TEMPERATURE
AND PH PROBE IN
PH4.01 SOLUTION.
[ EXIT ]     [ NEXT ]
```

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

pH 4.01 Calibration Solution

```
PH

4.14 pH

WAIT FOR READING
TO STABILIZE THEN
PRESS DONE.

[ EXIT ]     [ DNE ]
```

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

```
     RESTORE TO
       FACTORY
    CALIBRATION?




  YES          NO
```

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

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.

```
     CALIBRATION
  BACK
  CALIBRATE
  ADVANCED



  UP   DWN  ENT
```

Analog Output Calibration

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.

```
       ANALOG
  BACK
  +1
  -1
        -5
  UP   DWN  ENT
```

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.

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

TIME/DATE
BACK
TIME
DATE
UP DWN ENT

TIME
13:37:51
NXT + EXT

DATE
10/20 2017
NXT + EXT

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.

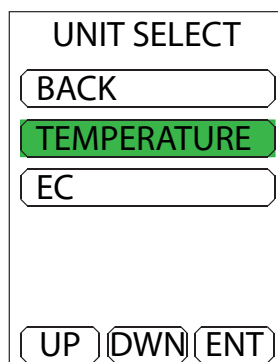Select a sensor value to change the default display and working units.

SETUP
BACK
TIME/DATE
UNITS
LOG INTERVAL
NEXT
UP DWN ENT

UNIT SELECT
BACK
TEMPERATURE
EC
UP DWN ENT

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Configure temperature units:

Temperature may be displayed in °F or °C.

Note: Check alarm settings when converting temperature units.
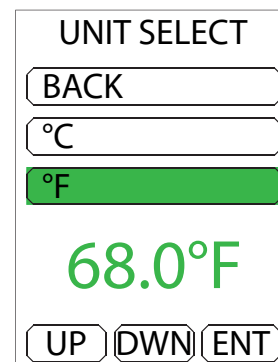
```
        UNIT SELECT
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ TEMPERATURE      │
   ├──────────────────┤
   │ EC               │
   └──────────────────┘

   ( UP )(DWN)(ENT)
```

```
        UNIT SELECT
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ °C               │
   ├──────────────────┤
   │ °F               │
   └──────────────────┘
        68.0°F
   ( UP )(DWN)(ENT)
```

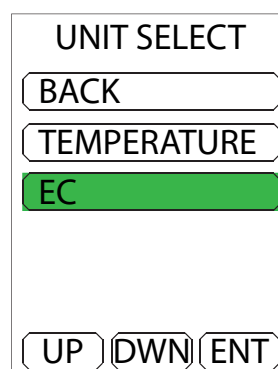1. Select **TEMPERATURE** from the units menu.

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

Configure 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

```
        UNIT SELECT
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ TEMPERATURE      │
   ├──────────────────┤
   │ EC               │
   └──────────────────┘

   ( UP )(DWN)(ENT)
```
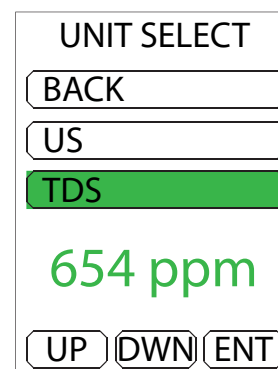
```
        UNIT SELECT
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ US               │
   ├──────────────────┤
   │ TDS              │
   └──────────────────┘
        654 ppm
   ( UP )(DWN)(ENT)
```

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

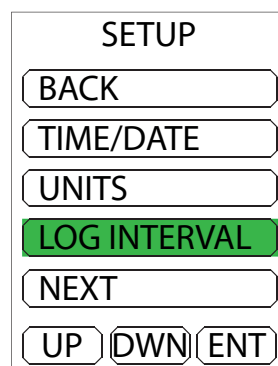2. Select the desired units and press **ENT**.

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.

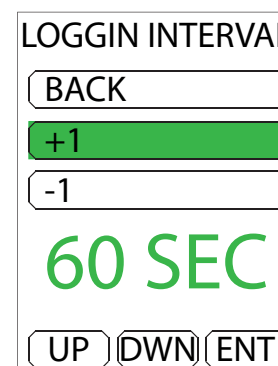Note: 60 second intervals = 15 days of data storage.

```
          SETUP
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ TIME/DATE        │
   ├──────────────────┤
   │ UNITS            │
   ├──────────────────┤
   │ LOG INTERVAL     │
   ├──────────────────┤
   │ NEXT             │
   └──────────────────┘
   ( UP )(DWN)(ENT)
```

```
      LOGGIN INTERVAL
   ┌──────────────────┐
   │ BACK             │
   ├──────────────────┤
   │ +1               │
   ├──────────────────┤
   │ -1               │
   └──────────────────┘
        60 SEC
   ( UP )(DWN)(ENT)
```

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

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

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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]
```

```
       COM MODE
     [  NORMAL      ]
     [  MINI MASTER ]




     [UP] [DWN] [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]
```

```
     DEVICE ADDRESS
     [  BACK        ]
     [  +1          ]
     [  -1          ]

       0 Addr

     [UP] [DWN] [ENT]
```

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

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

⚠ **NOTE: Address must be set to 0 for Dosing Pump control.**
The "PUMPS" menu item will not appear unless the device address is set to 0.

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]
```

```
   SERIAL NUMBER:
      17090554
    DATE OF MFG:
      09/15/17
    HW VERSION:
         C
    FW VERSION:
      02.03.84
     [   EXIT    ]
```

Display Back Light Timer

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.

SETUP

BACK

COMM

DEVICE ADD

MFG INFO

BACKLIGHT

UP DWN ENT

BACKLIGHT

BACK

+1

-1

60 Min

UP DWN ENT

Controller Operation, Pumps

MDX dosing systems have a "PUMPS" menu for configuring the control settings for peristaltic pumps.

Dosing Pump Control Menu

MNU ▶ PUMPS

The PUMPS menu is displayed when the hydro sensor is connected to a dosing pump and contains all of the configuration, target and recipe settings pages for controlling the pumps.

MENU	PUMPS	PUMPS
EXIT	**BACK**	**BACK**
ALARMS	RUN/STOP	CONFIGURE
CALIBRATION	RECIPE	PRIME
SETUP	TARGETS	
PUMPS	PRIME	
UP DWN ENT	UP DWN ENT	UP DWN ENT

⚠ The "Pumps" menu item will not appear unless the communication mode is set to "MINI-MASTER" and the device address is set to "0" (see COMM MODE and DEVICE ADDRESS.)

Priming

MNU ▶ PUMPS ▶ PRIME

Pumps may be manually operated to prime the lines or for other maintenance reasons. From the Prime menu, select a pump to prime. Pumps may be operated in the forward or reverse direction.

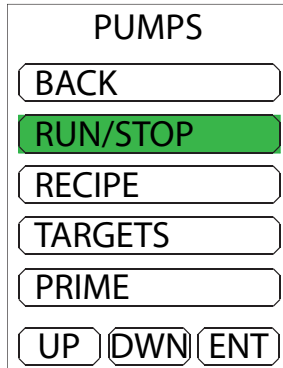| PUMPS	PRIME	PUMP 1
BACK	BACK	BACK
RUN/STOP	**PUMP 1**	**FORWARD**
RECIPE	PUMP 2	REVERSE
TARGETS	PUMP 3	
PRIME	PUMP 4	
UP DWN ENT	UP DWN ENT	UP DWN ENT

1. Select **NEXT** from the PUMPS menu.

2. Choose a pump to operate.

3. Select a direction and HOLD the **ENT** button. Release the button to stop.

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Run/Stop

[MNU] ▶ [PUMPS   ] ▶ [RUN/STOP   ]

The dosing pumps must be placed into RUN mode for autonomous dosing to take place. The dosing pumps may be immediately disabled to stop a dosing operation due to an error, nutrient outage, or maintenance requirement. To stop all dosing pumps and prevent autonomous operation, place the pump into STOP mode.

```
       PUMPS
  [ BACK            ]
  [ RUN/STOP        ]
  [ RECIPE          ]
  [ TARGETS         ]
  [ PRIME           ]
  [ UP ][DWN][ENT]
```
The RUN/STOP menu enables or disables the pumps
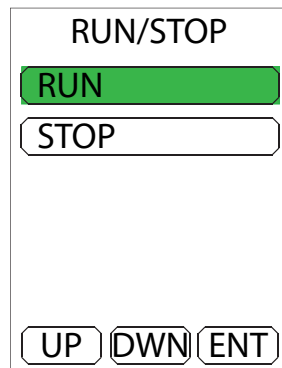
```
      RUN/STOP
  [ RUN             ]
  [ STOP            ]



  [ UP ][DWN][ENT]
```
Select **RUN** to allow the pumps to operate based on your settings.
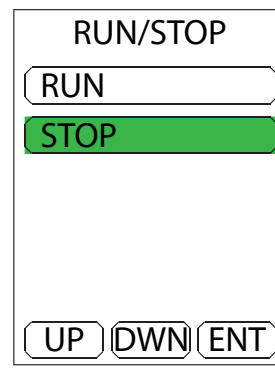
```
      RUN/STOP
  [ RUN             ]
  [ STOP            ]



  [ UP ][DWN][ENT]
```
Select **STOP** to disable the pumps from running automatically and to abort any current operation.

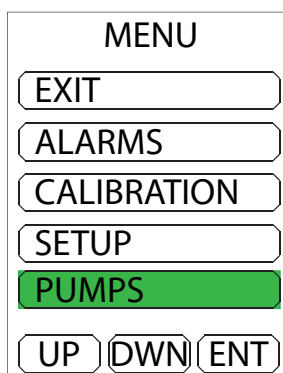# Recipe Menu

[MNU] ▶ [PUMPS   ] ▶ [RECIPE   ]

Each pump is configured with a "recipe" containing the pump mode (EC or pH) and dose volume (mL.)
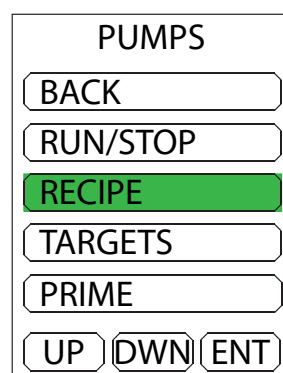
MDX systems are available with 1, 2 or 4 dosing pump heads and each may be configured for EC or pH control in any order or combination.

NOTE: Dosing will occur from the lowest to the highest numbered pump when more than one pump is in the same mode.
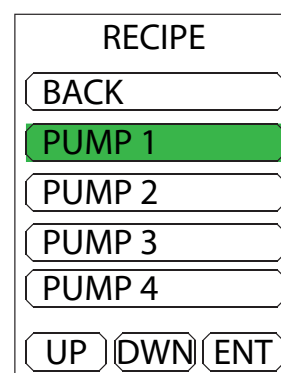
Select a pump number to configure the recipe settings as described below.

```
       MENU
  [ EXIT            ]
  [ ALARMS          ]
  [ CALIBRATION     ]
  [ SETUP           ]
  [ PUMPS           ]
  [ UP ][DWN][ENT]
```
1. Select **PUMPS** to configure the pumps.

```
       PUMPS
  [ BACK            ]
  [ RUN/STOP        ]
  [ RECIPE          ]
  [ TARGETS         ]
  [ PRIME           ]
  [ UP ][DWN][ENT]
```
2. Select **RECIPE** to configure the pump parts.

```
      RECIPE
  [ BACK            ]
  [ PUMP 1          ]
  [ PUMP 2          ]
  [ PUMP 3          ]
  [ PUMP 4          ]
  [ UP ][DWN][ENT]
```
3. Select a pump to configure the its mode and dose size.

Pump Mode

Pumps may be configured for pH or ORP, up or down.

If the pump is not in use, select OFF mode to disable it from autonomous control.

RECIPE	PUMP 1	PUMP MODE	PUMP TYPE
BACK	BACK	BACK	**OFF**
PUMP 1	**PUMP MODE**	**TYPE**	PH
PUMP 2	DOSE SIZE	MODE	ORP
PUMP 3	DELAY		
PUMP 4			
UP DWN ENT	UP DWN ENT	UP DWN ENT	UP DWN ENT

1. Select a pump.   2. Select **PUMP MODE.**   3. Select **TYPE** to choose the sensor type.   4. Set the pump to the desired sensor type.

PUMP MODE	PUMP MODE
BACK	**DOSE UP**
TYPE	DOSE DOWN
MODE	
UP DWN ENT	UP DWN ENT

3. Select **MODE** to choose the dose mode.   4. Select **UP** or **DOWN** dosing mode.

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Dose Size

Each pump can be assigned a unique dose volume in mL to be injected in sequence. It is recommended to set the volumes to amounts that will cause a change of 20-30% of the deadband range. This would mean that 3-5 dosing cycles would be required to reach the target value. Some experimentation with dose sizes may be required to determine the best settings for your process. Select a dose size that will not cause over-dosing of the reservoir if one extra cycle is performed.

MENU	RECIPE	PUMP 1	DOSE SIZE
EXIT	BACK	BACK	BACK
ALARMS	PUMP 1	PUMP MODE	+1
CALIBRATION	PUMP 2	DOSE SIZE	-1
SETUP	PUMP 3	DELAY	
PUMPS	PUMP 4		100 mL
UP DWN ENT	UP DWN ENT	UP DWN ENT	UP DWN ENT

1. Select **PUMPS** to configure the pumps.

2. Select a pump.

3. Select **DOSE SIZE.**

4. Set the pump to the desired mode.

Delay Time

Each pump may have a delay time set after it to separate parts and to pause between cycles to allow a sensor reading to take place. It is recommended to set at least 5 minutes after the last pump of each sensor type to allow mixing time of the previous dose. Adjust the delays according to your system size and water usage.

PUMPS	RECIPE	PUMP 1	DELAY
BACK	BACK	BACK	BACK
RUN/STOP	PUMP 1	PUMP MODE	+1
RECIPE	PUMP 2	DOSE SIZE	-1
TARGETS	PUMP 3	DELAY	
PRIME	PUMP 4		90 SEC
UP DWN ENT	UP DWN ENT	UP DWN ENT	UP DWN ENT

1. Select **RECIPE** from the **PUMPS** menu.

2. Select a pump.

3. Select **DELAY.**

4. Set the delay time after the pump doses.

Target Value

The target pH, ORP or EC set point is what the system will attempt to maintain by following the dosing "re-ceipe" settings. Set the desired ideal target values for EC and pH.

1. Select **TARGETS** in the **PUMPS** menu.

2. Select a sensor to setup the target value.

3. Select **TARGET.**

4. Set the target value for the sensor.

PUMPS
- BACK
- RUN/STOP
- RECIPE
- TARGETS
- PRIME

UP DWN ENT

TARGETS
- BACK
- EC
- PH
- ORP

UP DWN ENT

TARGETS
- BACK
- EC
- PH
- ORP

UP DWN ENT

TARGETS
- BACK
- TARGET
- DEADBAND

UP DWN ENT

TARGET
- BACK
- +0.01
- -0.01

6.00 pH

UP DWN ENT

TARGET
- BACK
- +1
- -1

600 mV

UP DWN ENT

pH Lock-Out

If PUMP TYPE is set to ORP, the PH LOCK option will appear in the recipe menu for that pump. If the lock is set to "ON" the system will lock-out this pump until pH dosing has completed.

MENU
- EXIT
- ALARMS
- CALIBRATION
- SETUP
- PUMPS

UP DWN ENT

RECIPE
- BACK
- PUMP 1
- PUMP 2
- PUMP 3
- PUMP 4

UP DWN ENT

PUMP 1
- BACK
- PUMP MODE
- DOSE SIZE
- DELAY
- PH LOCK

UP DWN ENT

EC LOCK
- BACK
- LOCK
- UNLOCK

ON

UP DWN ENT

1. Select **PUMPS** to configure the pumps.

2. Select a pump.

3. Select **EC LOCK.**

4. Set the pump to the desired mode.

Deadband

Deadband is the amount of change or drift from the target before the system takes action. Set the dead band for EC and pH with the amount of drift that is allowed by your process requirements.
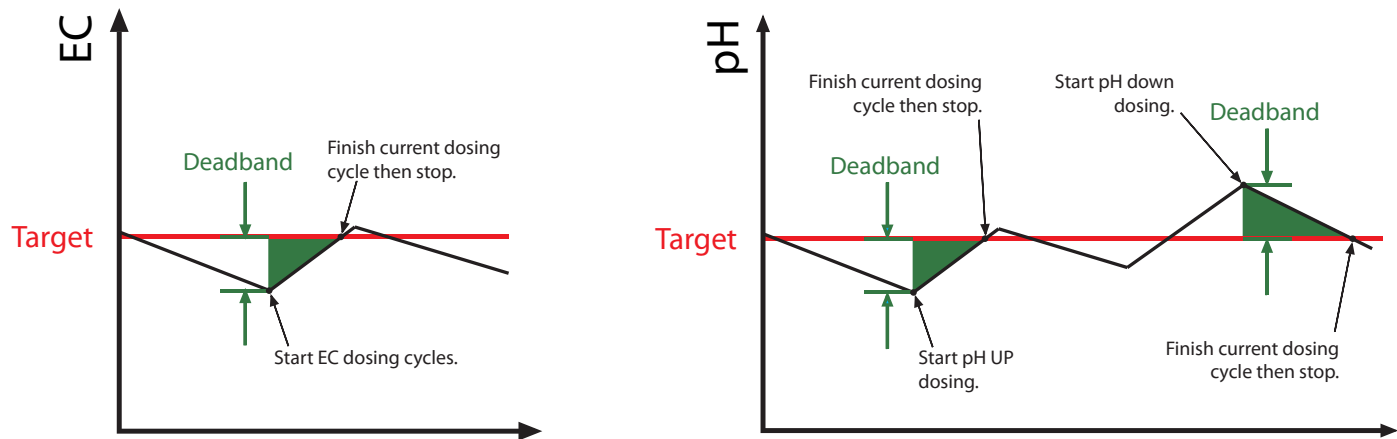
1. Select a sensor to set the deadband value.

2. SelectDEADBAND

3. Set the deadband value for the sensor.

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Maintenance

Exterior Cleaning
Exterior may be wiped with a damp cloth wish mild dish detergent, then wiped dry.

Probes
Probes must be calibrated periodically according to use. pH probes should be calibrated every two to four weeks. pH, EC and ORP probes may be cleaned in HCL. pH probes should be replaced every 12-24 months.

Pumps
Pump heads are replaceable when the tubing wears out from extended use. Pump heads typically last 12-24 months depending on the volumes being dispensed. Replacement is a simple process of rotating the pump head counter-clockwise 1/8 turn and sliding the head off of the motor shaft. Replace in reverse order.

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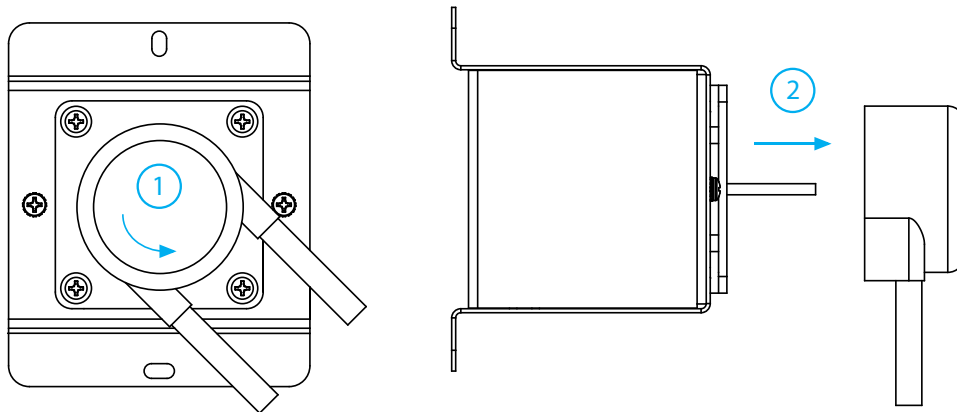
Technical Information

Specifications

Sensor

Power	12-24Vdc, ~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
4-20mA Output Resolution	12 bit , 0.005mA

Pump

Power	12Vdc, 1Amp
Pump Heads	Single/Dual/Quad
Flow Rate	Variable, 15-50mL/min
Tubing Material	FDA Approved Norprene
Tubing Size	1/4" O.D. x 3/16" I.D.
Max Outlet Pressure	20psi
Minimum Dose Size	1mL

Storage and Disposal

Storage
Store equipment in a clean, dry environment with ambient temperature between10-50°C.

Disposal
This indsutrial control equipment may contain traces of lead or other metals and environmental contaminants and must not be discarded as unsorted municipal waste, but must be collected separately for the purpose of treatment, recovery and environmentally sound disposal. Wash hands after handling internal components or PCB's.

Warranty

Agrowtek Inc. warrants that all manufactured products are, to the best of its knowledge, free of defective material and workmanship and warrants this product for 1 year from the date of purchase. This warranty is extended to the original purchaser from the date of receipt. This warranty does not cover damages from abuse, accidental breakage, or units that have been modified, altered, or installed in a manner other than that which is specified in the installation instructions. Agrowtek Inc. must be contacted prior to return shipment for a return authorization. No returns will be accepted without a return authorization. This warranty is applicable only to products that have been properly stored, installed, and maintained per the installation and operation manual and used for their intended purpose. This limited warranty does not cover products installed in or operated under unusual conditions or environments including, but not limited to, high humidity or high temperature conditions. The products which have been claimed and comply with the aforementioned restrictions shall be replaced or repaired at the sole discretion of the Agrowtek Inc. at no charge. This warranty is provided in lieu of all other warranty provisions, express or implied. It is including but not limited to any implied warranty of fitness or merchantability for a particular purpose and is limited to the Warranty Period. In no event or circumstance shall Agrowtek Inc. be liable to any third party or the claimant for damages in excess of the price paid for the product, or for any loss of use, inconvenience, commercial loss, loss of time, lost profits or savings or any other incidental, consequential or special damages arising out of the use of, or inability to use, the product. This disclaimer is made to the fullest extent allowed by law or regulation and is specifically made to specify that the liability of Agrowtek Inc. under this limited warranty, or any claimed extension thereof, shall be to replace or repair the Product or refund the price paid for the Product.

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