

# DX6000

## Dual Base Controller

S Y S T E M   S U P P O R T   M A N U A L





# **DX6000**

# **INSTRUCTION & OPERATING**

# **MANUAL**

Version: 09012004



# DX6000 TABLE OF CONTENTS

DX6000 Table of Contents .....	I
<b>Section 1: First Things To Know .....</b>	<b>1</b>
How to Use this Manual .....	1
Typographic Conventions .....	1
Getting Help .....	1
Operation Specifications .....	2
Theory of Operation .....	4
<b>Section 2: Controller Installation .....</b>	<b>9</b>
Standard System Components .....	9
Mounting the Controller Enclosure .....	10
Electrical Power Information .....	12
Terminal Strip Layout .....	13
<b>Section 3: Controller Functions .....</b>	<b>15</b>
Overview .....	15
To Use The Key Pad .....	15
To Power Up The System .....	16
Operating the Controller .....	17
Menu Overview .....	18
<b>Section 4: Conductivity Setup .....</b>	<b>19</b>
Calibration .....	19
Set Point/Hysteresis .....	20
Alarms .....	21
<b>Section 5: pH/ORP Setup .....</b>	<b>23</b>
Calibration .....	23
Set Point	
On / Off Mode .....	25
Proportional Mode .....	26
Alarms .....	27
Response Rate .....	28
<b>Section 6: Timers Setup .....</b>	<b>29</b>
Time/Date .....	29
Feed Mode .....	30
Biocide Repeat Cycle .....	32
Biocide View .....	33
Biocide Addition .....	34
Biocide Prebleed .....	35
Biocide Lockout .....	36
pH (or ORP) Pump Timer .....	37

# DX6000 TABLE OF CONTENTS

DX6000 Table of Contents ..... II

**Section 7: Advanced Setup ..... 39**

- Flow Alarm ..... 39
- 4-20 mA Output ..... 40
- Pulse Output ..... 41
- Tank 1 Level ..... 42
- Tank 2 Level ..... 42
- Tank 3 Level ..... 42
- Tank 4 Level ..... 42
- Load Defaults ..... 43
- Makeup/Blowdown ..... 43
- Device Serial Number ..... 44
- RS485 Baud Rate ..... 44
- RS485 Address ..... 45
- RS232 Baud Rate ..... 45
- Conductivity Operating Mode ..... 46
- pH/ORP Operating Mode ..... 47
- Temperature ..... 48
- Back Light ..... 48

**Section 8: Manual Operation Mode ..... 51**

**Section 9: Maintenance ..... 53**

- Controller ..... 53
- Probe ..... 53

**Section 10: Troubleshooting ..... 55**

**Appendix A ..... 57**

- Controller Exploded View ..... 57

**Appendix B ..... 63**

- Controller Default Settings ..... 63

# SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000

## How to Use this Manual

The Liquitron™ DX6000 Operations Manual is a step-by-step guide containing the procedures needed to work with the DX6000 Controller.

The DX6000 Controller represents the most advanced technology available in the industry. It is recommended that the technicians working with the DX6000 Controller study the manual prior to initiating work with the controller for the first time.

## Typographic Conventions

To aide in readability, this manual uses several typographic conventions. References to illustrations, photographs, and other related content will appear in *italicized text* along with the location of where to find the item in the manual. Digital versions of the manual, available in Adobe Acrobat™ PDF format, will be highlighted further in *blue italic text* indicating the copy retains a hyperlink to the referenced item.

Measurement units are listed in italic parenthesis text following their US standard equivalent. As an example, for defining a distance, 15' (*4.5 meters*), is how the text will appear throughout the manual.

Items that require action, for example the pressing of a key for programming the controller, will feature the action item in sentence case **Bold Text** followed in normal text by the item such as, the **Up Arrow** key or **Main Power** switch.

## Getting Help

This manual provides solutions to typical questions about the DX6000 system. If the answer can not be found within this manual, contact your local master stocking distributor.

When calling, have this manual close at hand. Whether calling or writing, please include in your communicate the following information:

- The serial number of the DX6000 Controller and the version number of this manual. The serial number is located on the left side panel of the controller. The version number of this manual is located at the bottom of each page.
- A description of the problem and, if applicable the actions of the technical personnel when the problem occurred.

# SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000

## Operation Specifications

<b>Number Pumps Controlled:</b>	Four (4) (2) Biocide (1) Inhibitor (1) Oxidizer or Reducer
<b>Environment Range:</b>	32 to 122 degrees F. (0°C to 50°C)
<b>Power Requirement:</b>	120VAC +/- 15%, 50/60Hz or 220VAC +/- 15%, 50/60Hz 4 Amp
<b>Inputs:</b>	
Flow Switch:	<u>Mechanical</u> - Dry Contact Reed Type Switch must handle 4mA at 26 volts max. or <u>Transistor</u> - Powered Transistor Switch FET must handle 4mA at 26 volts mAx. 60 mA at 18-26 volts mAx power. 4-Terminal interface.
Flow Meters:	Two (2) flow meter inputs are supported (frequencies up to 2kHz).
Dry Contact Input:	Inputs, isolated dry contacts (4 mA at 26 volts mAx.) to support relay, reed switch
Hall Effect Inputs:	15 volts +/- 10% at 10 mA drive current with hall providing 4 mA signal sink capabilities
Tank Level Inputs:	Four (4) allowed and can be either mechanical or 4-20 mA, 0-5 v or switched closure.
Temperature Inputs:	Thermistor resistance 10k Ohms Display 0-50 Degrees C. Resolution +/- 1 Degree C.
Conductivity Probe Input:	Cell constant of 1.5 +/- 10% ESD protection 700 volts Display update every sec. Range 0-20,000 us Resolution 10 us Accuracy 2%

# SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000

## Operation Specifications

### ORP Probe Input

Accuracy:  $\pm 1$  mV (500M Ohm probe ambient cycle 0°F to 122° F (0° C to 50° C))

Resolution:  $\pm 1$  mV

Input ORP Range: -2000 to 2000 mV

Input Impedance Differential:  $10^{13}$  Ohms

Input Impedance Common:  $10^{16}$  Ohms

ESD Protection: 700 V

### pH Probe Input

Accuracy:  $\pm 0.02$  mV (500M Ohm probe ambient cycle 0°F to 122° F (0° C to 50° C))

Resolution: 0.01 pH

Input pH Range: 0-14 pH

Input Impedance Differential:  $10^{13}$  Ohms

Input Impedance Common:  $10^{16}$  Ohms

ESD Protection: 700V

### Outputs:

Pump Control: Each one may be either an AC relay control or a pulsed output control.

Valve Relay Control: (1) Bleed Control Valve Relay, 240 VAC, 4 amp contact relay.

Alarm Relay: (1) Alarm Relay, 240 VAC, 4 amp contact relay.

(2) 4-20 mA: (18-26 volts drive voltage) 600 ohms maximum  
(1) for conductivity  
(1) for pH to repeat probe measurements to chart recorder, PLC, etc.

### Pre-amplifier Output

Voltage:  $\pm 5$  V

Output Voltage Tolerance:  $\pm 5\%$  maximum

Current Output:  $\pm 10$  mA maximum

### User Interfaces:

(2) Line LCD Display: (1) Line-Conductivity  
(1) pH or ORP Measurement

Memory Backup: Non-Volatile memory.

Communications: \*RS485, RS232, and USB via USB to RS232 cable

Algorithm: Simulated cooling tower dual based system with Conductivity/pH, or Conductivity/ORP

\* Requires DataComm Software

# **SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000**

## **Theory of Operation**

The Liquitron™ DX6000 is a microprocessor-based conductivity controller. It is designed for use in a variety of water treatment applications requiring precise control of totally dissolved solids and chemical feed. Among its many uses, the DX6000 will control conductivity and chemical feed in cooling towers and closed loop systems.

The DX6000 conductivity controller allows the greatest programming flexibility for cooling tower system applications. This is accomplished through the use of an extensive options menu that is easy to use.

The DX6000 dual based controller is designed to control either pH or ORP (Oxidation Reduction Potential) applications, including metal finishing, water treatment, printed circuit board manufacturing, and waste treatment.

The DX6000 will control four (4) pumps; biocide 1, biocide 2, inhibitor, and oxidizer or reducer (acid or base). It will also monitor four (4) tank levels, two (2) flow meters, a flow switch, a bleed solenoid valve, and two (2) probes (Conductivity/pH or ORP). It has data download capabilities to via RS485 connection, RS232 port, or a RS232 to USB cable adapter. The DX6000 ships from the factory in the Conductivity/pH configuration, but can be changed to Conductivity/ORP by installing a jumper across the jumper pins (*contact your local LMI Distributor*). This controller operates on a proprietary software program.

# **SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000**

## **Theory Cont.**

The DX6000 has a backlit display and tactile keypad for ease of programming. The DX6000 allows independent programming of control methods (ON/OFF or PROPORTIONAL) for each of the (4) pumps it is capable of controlling. Independently high and low pH, ORP, or conductivity alarms may be set with activation of the Alarm Relays. A third relay output is available for activating a solenoid valve or other devices.

**BLEED or BLOWDOWN** of system water by valve control is based on several setpoint factors:

- Conductivity setpoint
- Hysteresis (deadband) to avoid valve operation chattering
- Rising or Falling conductivity trip points
- pH. ORP exceeding alarm points

**FEED** of chemical (inhibitor) can be based on four (4) different methods and the pump control can be either On/Off or pulsed:

- FEED at the same time system BLEEDS (lockout timer limits maximum FEED time)
- FEED time calculated as a percentage of total BLEED time
- FEED based on a timed cycle (pump is on for a percentage of this timed cycle)
- FEED based on flow meter pulse input

# **SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000**

## **Theory Cont.**

**DUAL BIOCIDES** chemical addition may be accomplished by the use of two (2) individually programmable relays or optocoupler outputs. These outputs provide control of two individual chemical metering pumps based on the following options:

- On/Off or pulse type pump control
- 28-DAY programmable timer (1, 2, 3, or 4 week selectable cycle)

**ALARM** indicators and relay outputs are energized based on the following conditions:

- FOUR tank level input setpoints
- HIGH conductivity set point is reached
- LOW conductivity setpoint is reached
- NO FLOW condition exists (flow switch must be installed)
- HIGH pH/ORP set point is reached
- Low pH/ORP set point is reached

The display is a 32-character, two line backlit LCD (liquid crystal display) which is visible in all light conditions.

A three-key position membrane is used to enter data and settings (see Figure 1).

The conductivity range is 0 - 20,000 mSiemens. The units can be either mSiemens or PPM/TDS (total dissolved solids).

- A Test push button is accessible from the front panel.

# SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000

## Theory Cont.

All setpoints and parameter settings are retained permanently in a special nonvolatile computer chip memory, preventing their loss due to a power outage. This nonvolatile memory chip allows the unit to be programmed before installation. Fifteen seconds of power is required after program change to retain new values. No battery powered backup is required. Built in test circuits are provided to test each individual relay output wiring and to allow for quick field service isolation of faulty probe, circuit cards, pumps, or solenoids for ease of troubleshooting. A display for temperature is also provided. The range is 32° F to 158° F [0° C to 68° C]. The display can be either fahrenheit or centigrade. This reading also provides the basis for temperature compensation which is performed in all modes.

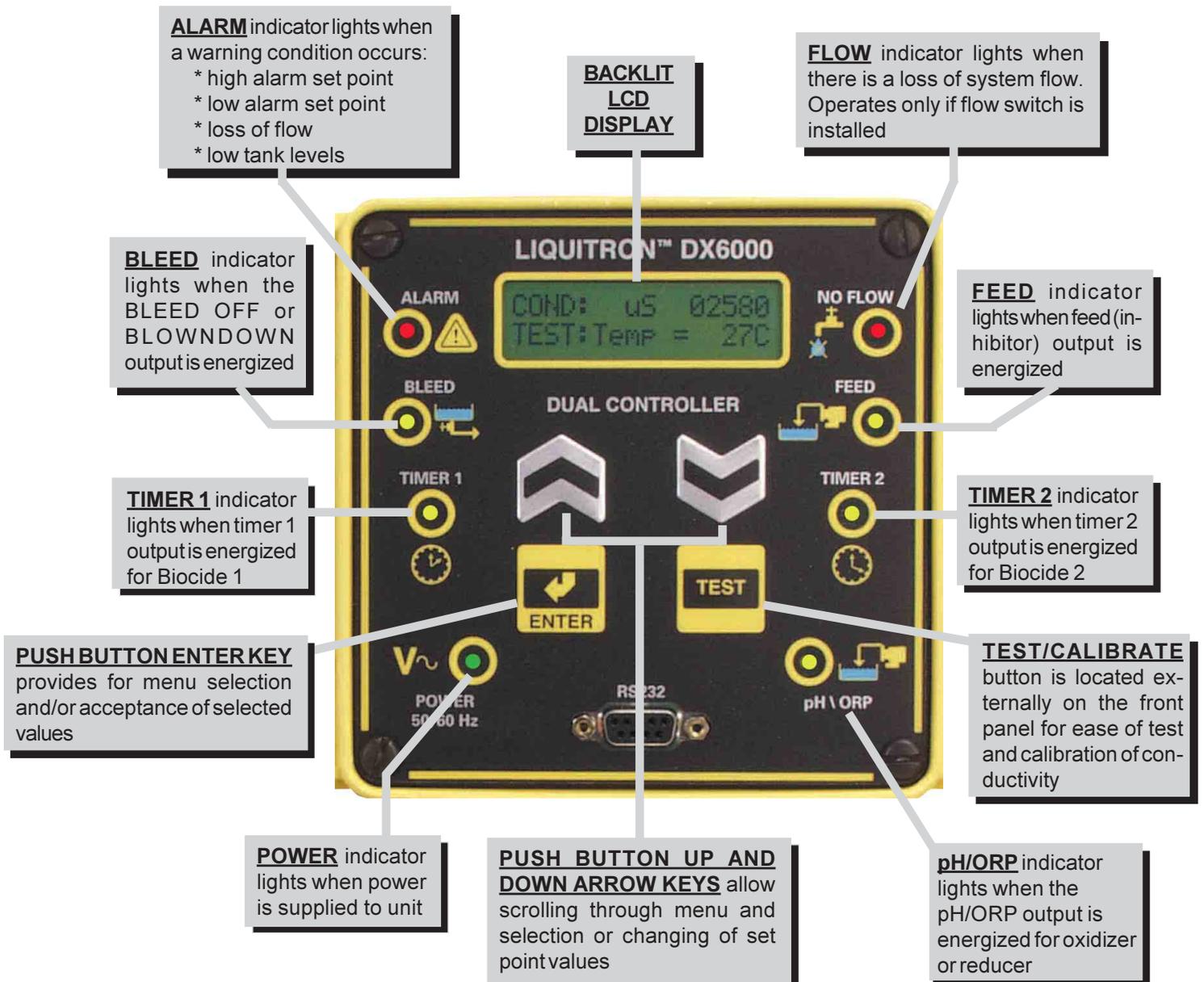


Figure 1

# **SECTION 1: FIRST THINGS TO KNOW ABOUT THE DX6000**

## **Theory Cont.**

There are two analog data (or control) outputs provided. These are a non-isolated 4 - 20 mA signals. One is used for conductivity and the other is used for pH/ORP. The conductivity reading that corresponds to minimum and maximum analog signals is fully adjustable. This signal can be used to power chart recorders or other pumps and devices. If an isolated 4-20 mA output is required, contact your LMI distributor for a signal isolator.

The controller operates in two (2) distinct modes, 'SYSTEM RUN' and 'SYSTEM START-UP' or 'PROGRAMMING MODE'. The unit will be in the 'SYSTEM RUN' mode when it is first turned on. The various program screen menus are used to calibrate the unit, set the control and alarm points, set the inhibitor feed operating parameters, program the biocide [two (2) chemical metering] pumps, and manually test the relays and wiring connections.

In the 'SYSTEM RUN' mode the DX 6000 monitors the conductivity, pH/ORP and activates the appropriate control or alarm relay as necessary based on the set points entered in the 'SYSTEM START-UP' mode.

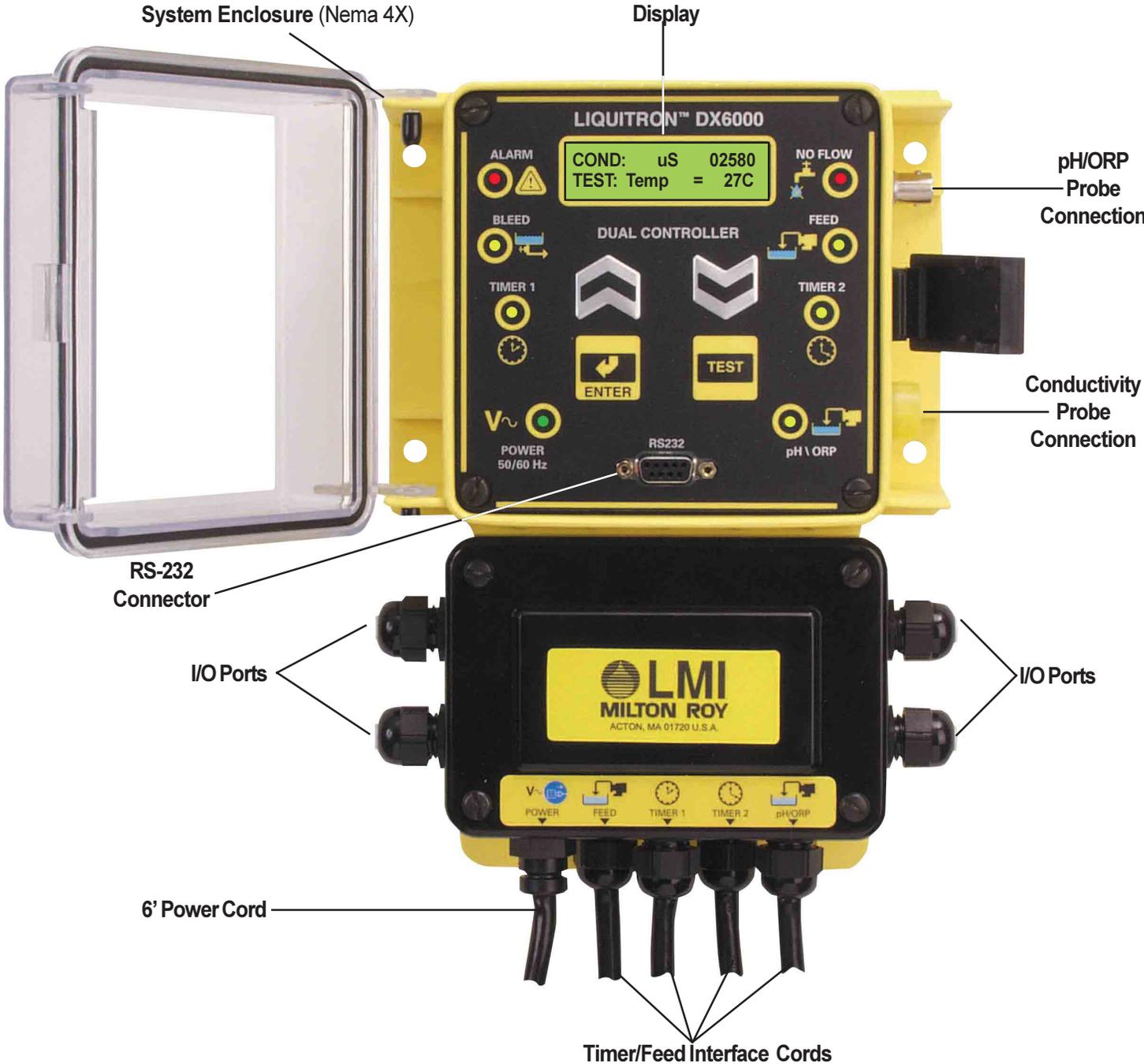
The DX 6000 is packaged in a NEMA 12X, flame-retardant, molded TPE enclosure. When ordered, 115 VAC units come fully wired to include input power cord and relay output pigtailed to allow for simple installation. The unit can be hardwired through conduit to the lower junction box portion of the enclosure when required. Hard wiring makes the unit suitable for NEMA 4X applications.

# SECTION 2: SYSTEM INSTALLATION

## Standard Controller Components

Standard primary components of the DX6000 include the following:

figure 1



## **SECTION 2: SYSTEM INSTALLATION**

### **Mounting The Controller Enclosure**

The DC6000 conductivity controller is supplied with integral wall-mounting flanges. It should be mounted with the display at eye level on a vibration free surface. All accessible mounting holes should be utilized. The maximum allowable ambient temperature is 122° F (50° C). This should be considered if installation is in a high-temperature location. Once the DX 6000 is wall mounted, the metering pumps may be located at any distance from the controller. The conductivity probe should be placed as close to the controller as possible, to a maximum distance of 300 ft (91 m). Under 25 ft (7.6 m) is recommended. Over 25 ft (7.6 m), the conductivity cable may need to be isolated or shielded from background electrical noise. Also if the pH or ORP probe is more than 25 feet from the controller, a pre-amp is required to reduce the effects on electrical noise.

## SECTION 2: SYSTEM INSTALLATION

### Enclosure Mounting Dimensions

When using the prewired unit, the enclosure is configured as NEMA 12X. If the unit is connected through watertight conduit, the enclosure is configured as NEMA 4X.

The following clearances should be observed for proper mounting (see figures 2 and 3).

figure 2

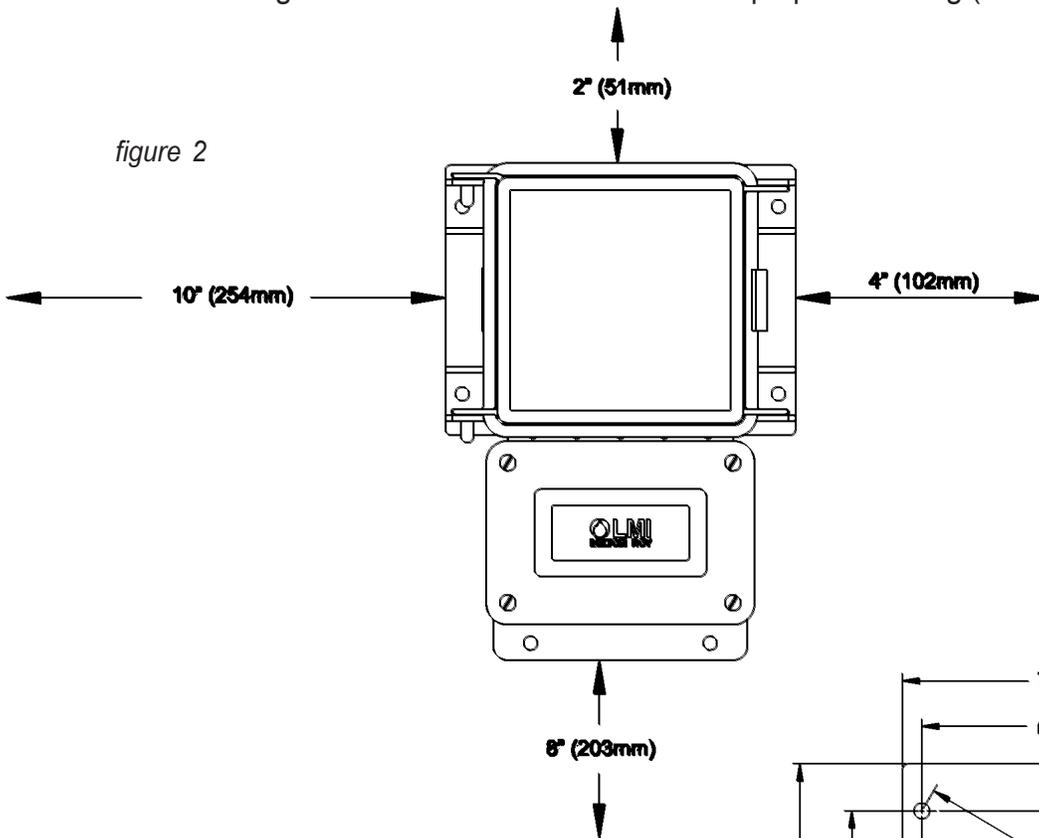
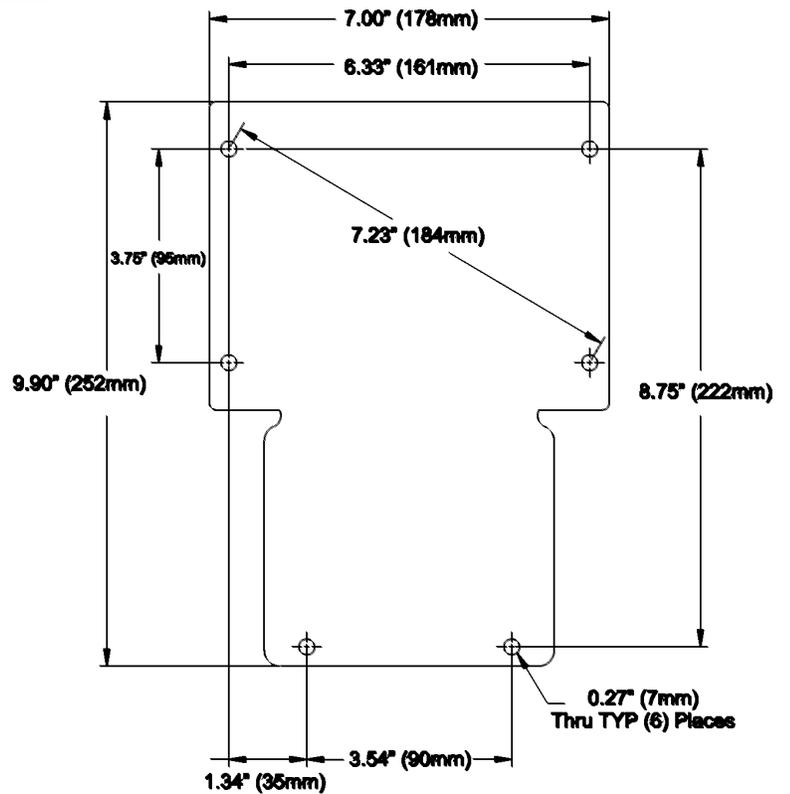


figure 3



## SECTION 2: SYSTEM INSTALLATION

### Electrical Power Information

---

#### **CAUTION:**

To reduce the risk of electrical shock, the controller must be plugged into a grounded outlet with ratings conforming to the specifications on the data nameplate. It must be connected to a viable ground circuit. **DO NOT USE ADAPTERS** (see Figure 4)! All wiring must conform to required electrical codes.

---

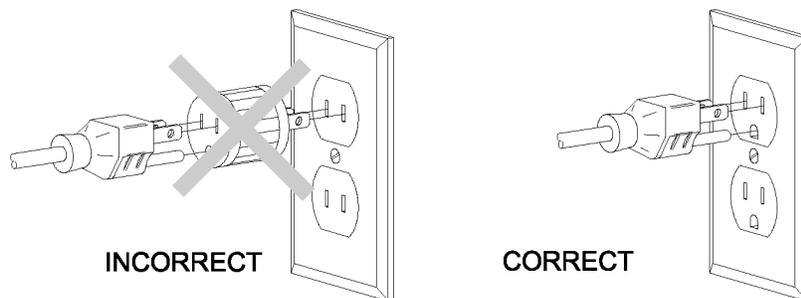


figure 4

The DX 6000 conductivity controller is available in either 115 or 230 VAC 50/60 Hz. The 115 VAC version is supplied with one (1) 6-foot grounded AC power cord and four (4) 12-inch output pigtailed for plug-in connection of controlled devices.

A four-pin connector is provided for the temperature compensated conductivity probe.

---

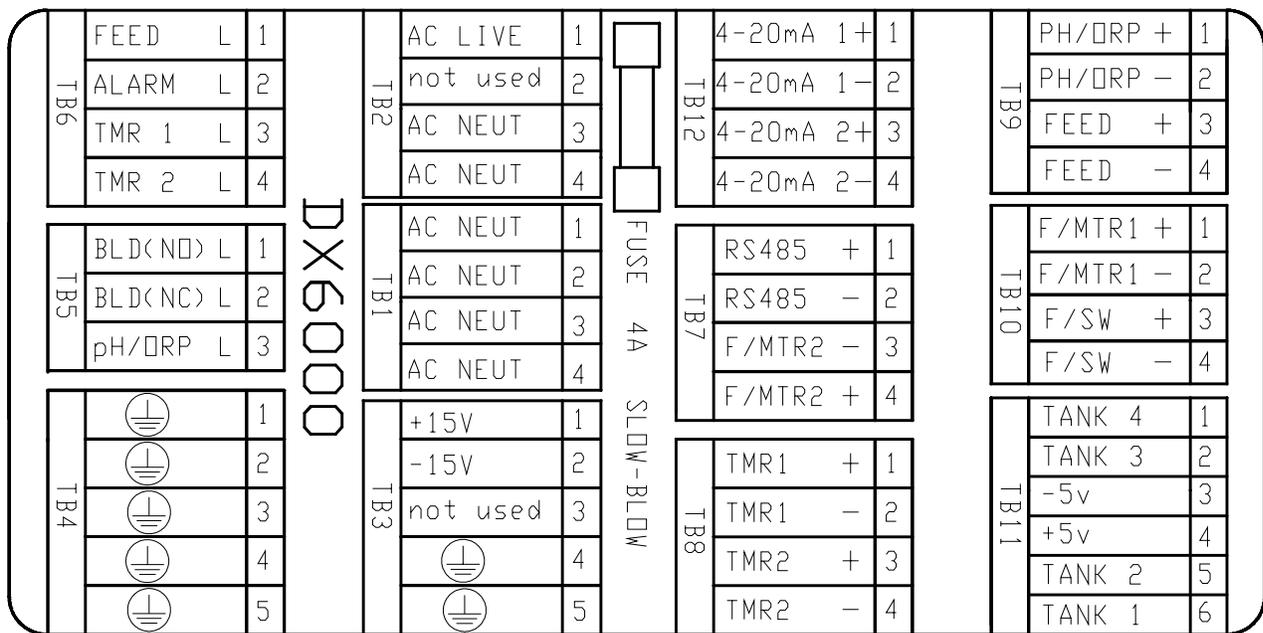
#### **IMPORTANT NOTE:**

*The DX 6000 controller is provided with a voltage selector switch to allow the unit to be used with a 115 VAC or 230 VAC power source. To change the voltage selection, disconnect the unit from the power source and remove the front keypad panel. The selector switch is located on the circuit board attached to the back panel. When switching voltages ensure that power cord and pigtailed are appropriately changed.*

---

## SECTION 2: SYSTEM INSTALLATION

### Terminal Strip Information





# SECTION 3: CONTROLLER FUNCTIONS

## Overview

The DX6000 controller is composed in two sections. The upper section of the controller houses the key pad, function, and alarm indicator lights, and the display. The lower section houses the wiring interface connections, including the power cord, feed cord, and timer cords, as well as wiring I.O. fittings.

### To Use The Key Pad

The four main keys have multiple function capabilities. Each key is labeled with it's primary function used in moving through the menu, they are as follows:



1. Use the  or  keys to move through the various menus, and back to the "System Run" screen.
2. Push both the up and down buttons simultaneously. This will return the unit immediately to the "System Run" screen.
3. The unit will return to the "System Run" screen automatically after three (3) minutes if no keys are pressed.
4. The primary function of the "ENTER" key is to enter data, calibrations, or other settings into memory.
5. The primary function of the "TEST" key is to test the conductivity and temperature circuits with simulated 3000uS and 25° C (77 ° F)
6. Use of keys, or combinations of keys may produce additional functionality of the controller, and will be discussed later in this manual.



## **SECTION 3: CONTROLLER FUNCTIONS**

### **To Power up the Controller**

The controller will be continuously powered on, any time the power cord is connected to an appropriate power supply, *refer to Section 2, page 12*. If your unit is not functioning verify your power connection, or proceed to [Troubleshooting Section](#).

## SECTION 3: CONTROLLER FUNCTIONS

### Operating the Controller

The normal operating display for the DX6000 Series Controller is the conductivity reading screen. This screen is referred to as “System Run” throughout this manual. The Main Screen is the default screen that displays the conductivity reading, the pH or ORP reading, and the temperature. Conductivity readings are displayed on the first line. The pH/ORP readings and temperature are displayed on the second line. This screen may look something like any of the (4) four options shown at the left depending on your system set up configuration. If an alarm occurs, it is displayed on the corresponding line. For example, if a conductivity alarm occurs, then that alarm is displayed on the first line. ORP or pH alarms would be displayed on the second line. Biocide events are also displayed on the first line.

After reviewing or changing the conductivity controller setpoints, the unit must be returned to the “System Run” or conductivity reading screen to allow automatic control to proceed. There are three ways to return to the “System Run” screen and mode:

- At any time, to return to the Main Screen, press both the up and down buttons simultaneously.
- Repeatedly press the  key till the unit is returned to the “System Run” screen, if you are on one of the Main Menu screens.
- Leave the unit alone. The unit will return to the “System Run” screen automatically after (3) minutes if no keys are pressed.

*The controller relay outputs cannot be activated unless the unit is in the “System Run”, conductivity reading mode, or during manual outputs. The only exception is when the unit is in the test mode. When the controller is displaying this screen it is considered to be in the SYSTEM RUN mode. This means that the pumps, solenoids, and alarm outputs will be activated based on the controller’s programmed set points. When the controller is in any other display screen all the outputs are disabled and will not be energized.*

The Conductivity Read Screen or “System Run”:

COND:  $\mu$ S 03000  
pH: 7.00 77F

or

COND: 10000 PPM  
pH: 7.00 77F

or

COND:  $\mu$ S 03000  
ORP -2000mV 77F

or

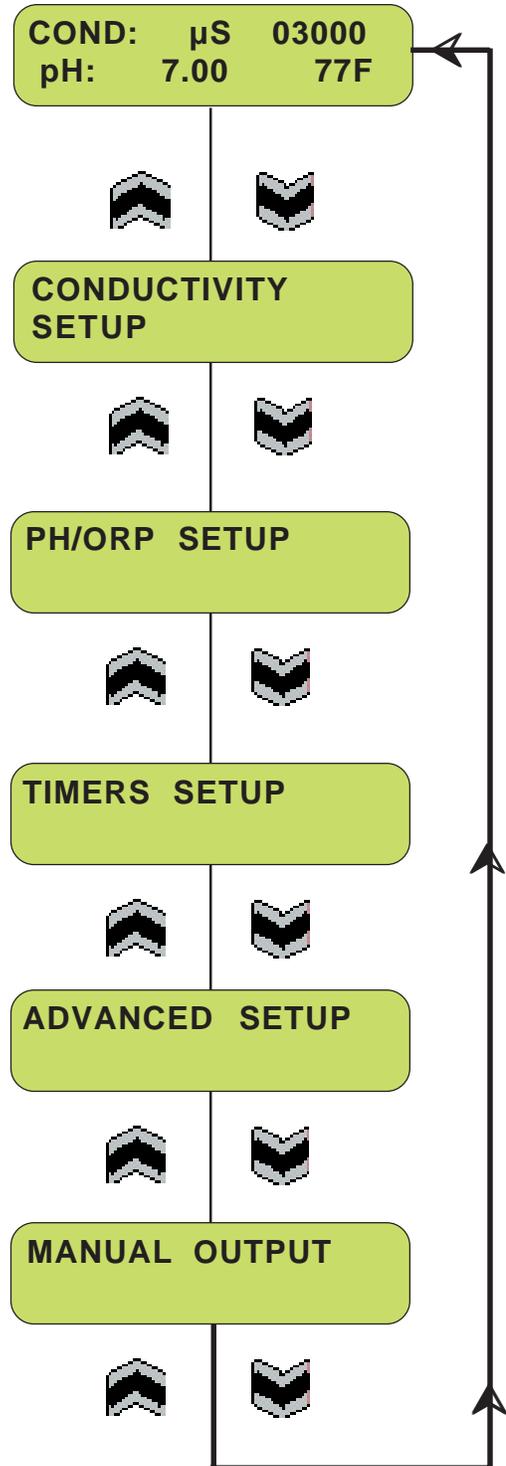
COND: 10000PPM  
ORP -2000mV 77F

# SECTION 3: CONTROLLER FUNCTIONS

## Menu Overview

The controller is Set Up and Operated from a series of five (5) Main Menus, and Multiple Sub Menus that branch off of each of the first (4) four Main Menus. The Main Menus are accessed directly below the “System Run” screen discussed on the previous page. The “System Run” display line is the top menu page item. Pressing the  or  keys will move the display window to another line item. When not in the “System Run” mode the outputs to the control relays are disabled. The Main Menus are listed to the right, and are discussed along with their respective Sub Menus in the following sections, [refer to table of contents](#).

### Main Menu



## SECTION 4: CONDUCTIVITY SETUP

### Calibration

The “CONDUCTIVITY” screen displays the conductivity reading in either  $\mu$ Siemens or PPM/ TDS (parts per million/total dissolved solids). Press the the **down** button.

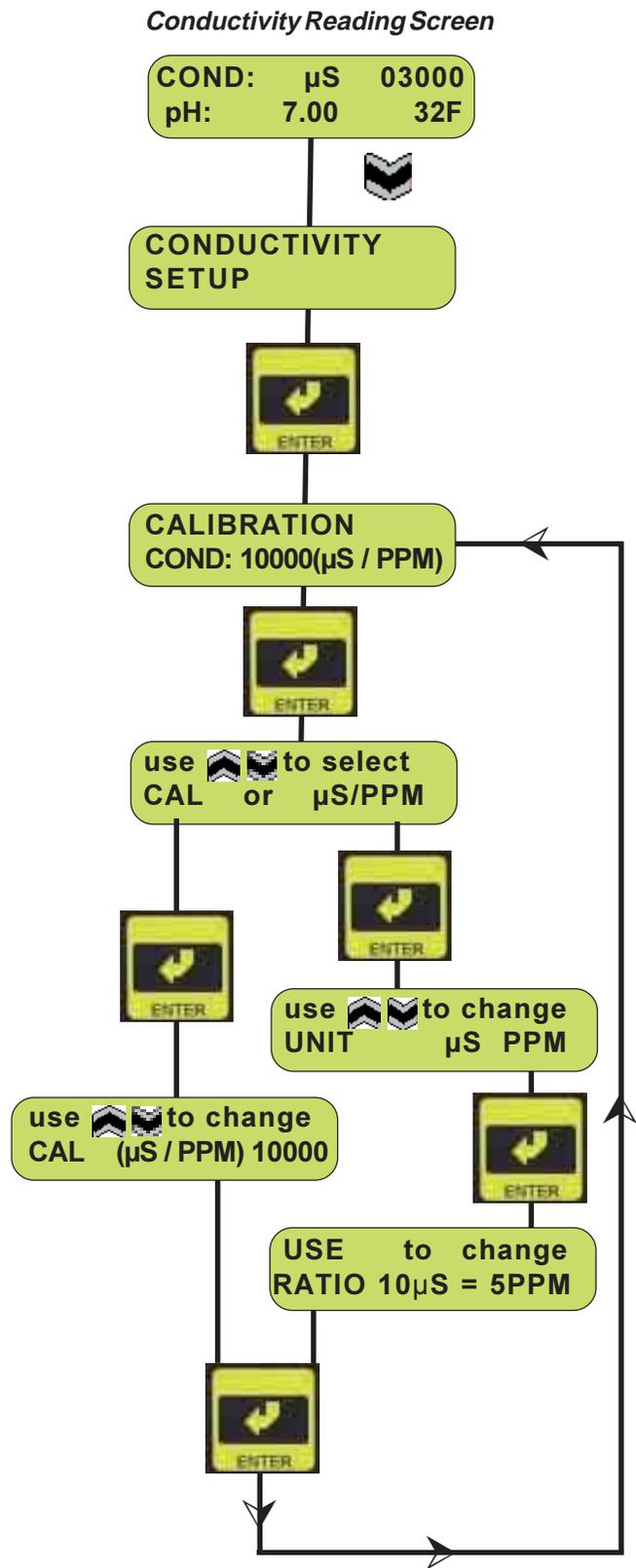
Press “**ENTER**” at the Conductivity SetUp screen to access the calibration mode.

The Conductivity Calibration menu displays the current conductivity. Next “**ENTER**” again, to access the “CAL” or units of measure screen selection.

Next use the **up/down** buttons to select the “CAL” feature or the “uS/PPM” feature. Press “**ENTER**” to select.

The “CAL” feature allows the controller to be calibrated to the solution sample taken near the probe. It could be a known buffer or calibrated to a reading taken by a hand held conductivity meter from a sample point in the system, preferably near the probe. Press “**ENTER**” to access the calibration mode. Verify sample conductivity. Using the **up/down** buttons, change the value to match sample and press “**ENTER**” to retain conductivity reading.

The “uS/PPM” feature allows selection of the units to be displayed. Use the **up/down** buttons to select “uS” or “PPM”. If “PPM” is selected, then use the up/down buttons to set the ratio of uS to PPM. Press “**ENTER**” to save settings. The conductivity reading can be displayed in Microsiemens or Parts Per Million. If “PPM” is selected the user can set the ratio. The user may select a ratio from 10:5 through 10:9 Microsiemens/PPM. Use the **up/down** buttons to select and press “**ENTER**” to retain settings.



# SECTION 4: CONDUCTIVITY SETUP

## Set Point/HYSTERESIS

To access the Conductivity Set Point/Hysteresis screen from the System Run screen, press **down** button.

Press **“ENTER”** at the Conductivity SetUp screen to access the calibration mode.

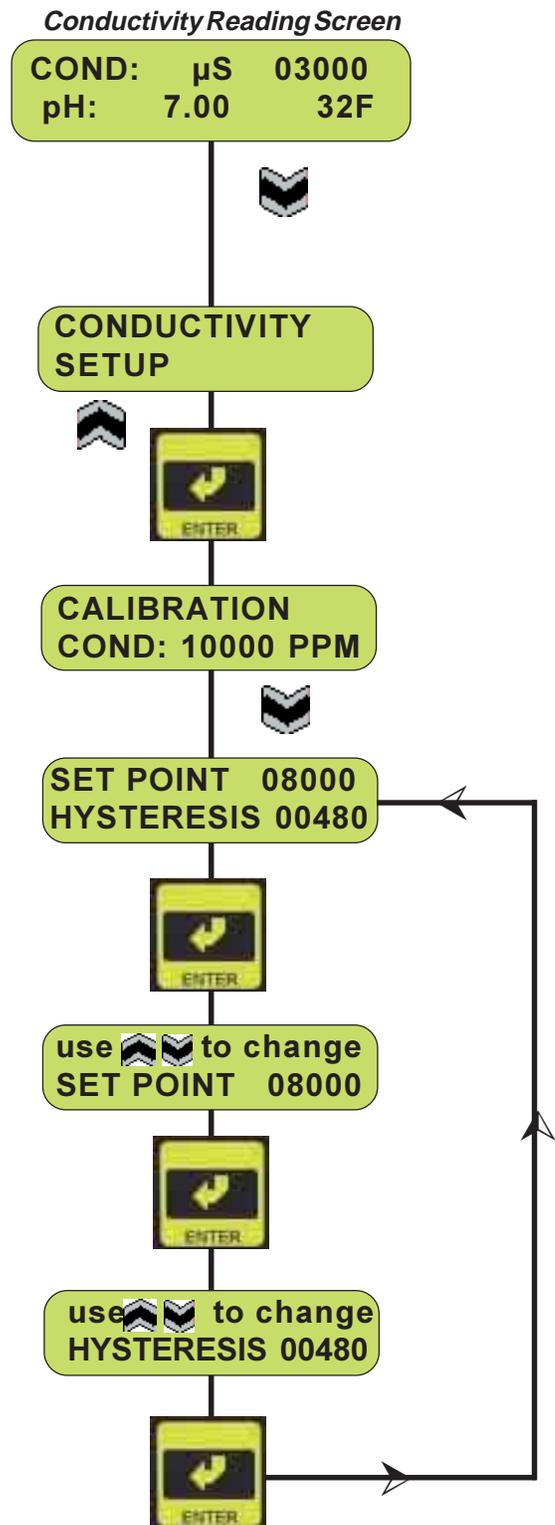
The Conductivity Calibration menu displays the current conductivity. To access the Set Point/Hysteresis programming screen press **the down** button.

The Set Point menu displays the current conductivity set point and the hysteresis.

Next press **“ENTER”**, this will place you at the Set Point programming screen. Using the **up/down** buttons, change the value to your desired Set Point.

Now press **“ENTER”** again to access the HYSTERESIS programming screen. Using the **up/down** buttons, change the value to your desired HYSTERESIS setting.

A final pressing of the **“ENTER”** button will return you to the return you to the Set Point Hysteresis screen.



# SECTION 4: CONDUCTIVITY SETUP

## Alarms

### Low Alarm/High Alarm

To access the Conductivity low or high alarm programming screen from the System Run screen, press **down** button.

Press **“ENTER”** at the Conductivity SetUp screen to access the calibration mode.

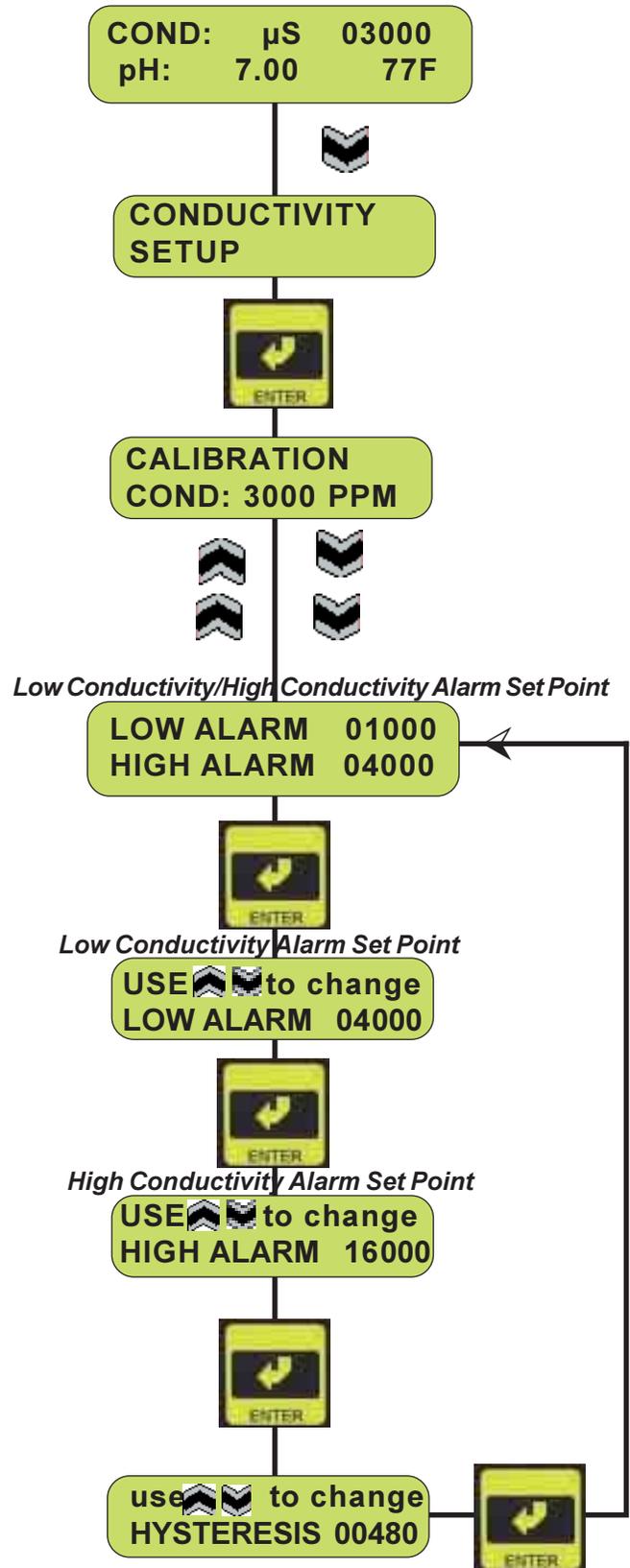
The Conductivity Calibration menu displays the current conductivity. Next press the **up or down** button 2 (two) times to move to Conductivity Alarms programming.

The settings of the **“LOW ALARM”** and **“HIGH ALARM”** can be programmed by pressing the **“ENTER”** key from this menu:

The values for the **“LOW ALARM”** can be changed by using the **up/down** buttons.

Pressing **“ENTER”** will save the values and access the **“HIGH ALARM”** setting. The values for this will be programmed the same way. **“ENTER”** will save the value and return to Low Conductivity/High Conductivity Alarm Set screen.

Now press **“ENTER”** again to access the **HYSTERESIS** programming screen. Hysteresis is the set value of fluctuation that will be allowed before the alarm turns on or off again. Using the **up/down** buttons, change the value to your desired **HYSTERESIS** setting.



# SECTION 4: CONDUCTIVITY SETUP

## Response Rate

To access the Conductivity Response Rate screen from the System Run screen, press the **down** button.

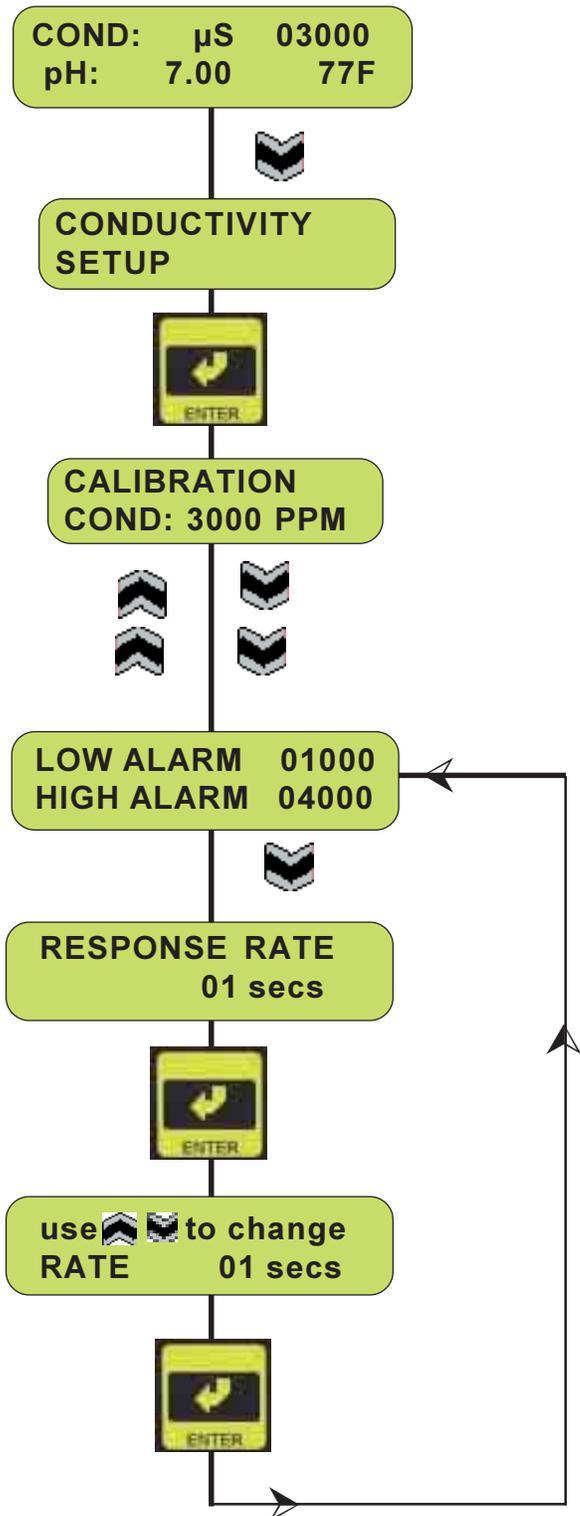
At the Conductivity SetUp menu press the **“ENTER”** button.

At the Calibration menu press the **down** button (2) two times.

At the Low/High Alarm menu press the **down** button.

The RESPONSE RATE menu displays the current set points for the signaling of an alarm after the actual alarm condition is determined. Press **ENTER** to access the programing mode for this feature.

Use the **up/down** arrows to change the RESPONSE RATE to the desired response time, and press **ENTER**.



# SECTION 5: pH/ORP SETUP

## Calibration

To access the Ph/ORP Calibration screen from the System Run screen, press **down** button.

At the Conductivity SetUp menu press the **down** button.

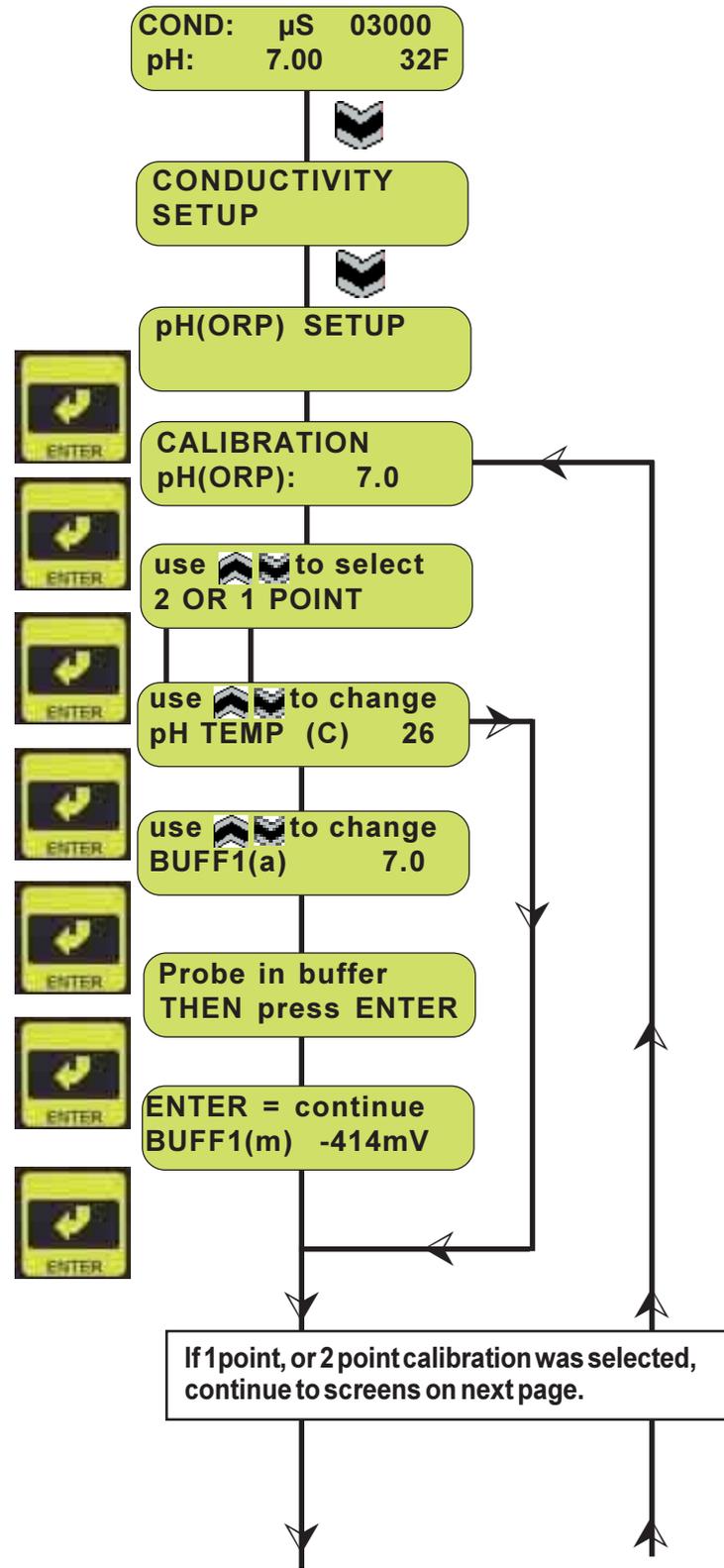
At the pH/ORP SetUp screen press “**ENTER**” to proceed to the pH/ORP Calibration menu.

The pH/ORP Calibration menu displays the current pH (or ORP). Press “**ENTER**” to access the calibration feature.

Use the **up/down** buttons to select 2 or 1 Point calibration. The 2 point calibration uses two different solutions to calibrate and the 1 point uses only one solution, and assumes 7.0 pH as a second point (No calibration values are acceptable between 6-8 pH). Press “**ENTER**” to continue.

Next, use the **up/down** buttons to enter the temperature for this process. Press “**ENTER**” to save.

Next, use the **up/down** buttons to set the actual pH (or ORP) of the first buffer solution. Press “**ENTER**” to save. Now place the probe in the solution and press “**ENTER**” to take the current reading for the buffer solution. Wait for the reading to stabilize before continuing. The voltage should now be displayed on the screen. Press “**ENTER**” to continue.

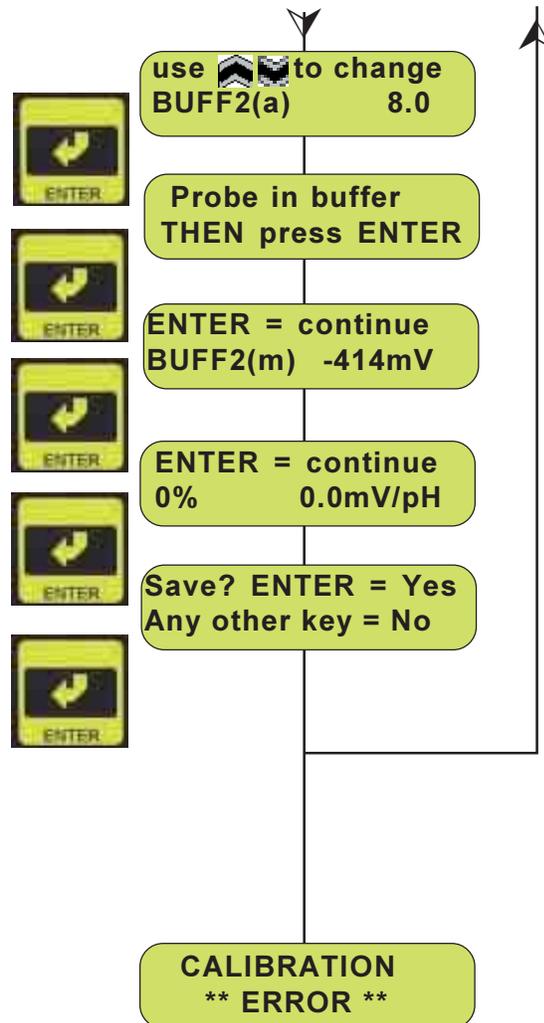


## SECTION 5: pH/ORP SETUP

Assuming the 2 Point calibration was selected, enter the actual pH (or ORP) for the second solution. Press “ENTER” to save. Now place the probe in the second solution and press “ENTER” to take the reading. The voltage of the second solution should now be displayed on the screen. Again wait for the reading to stabilize.

Press “ENTER” to display the percentage slope and the mV/pH. Press “ENTER” to continue. To keep the calibration, press “ENTER”, otherwise, press **any other key**. If the calibration values are out of range, the controller will display an error message and the previous calibration values will be retained. The current calibration values will not be saved.

If the calibration is unsuccessful (slope < 70% or offset > pH ± 30mV, or ORP ± 100 mV ) and **Calibration \*\*ERROR\*\*** is displayed; the calibration should be repeated or else the controller reverts to using the last successful calibration performed. A slope of less than 70% indicates a dirty/faulty probe or contaminated buffer.



# SECTION 5: pH/ORP SETUP

## Set Point (ON / OFF Mode)

To access the Ph/ORP Set Point screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp screen press “**ENTER**” to proceed to the pH/ORP Calibration menu.

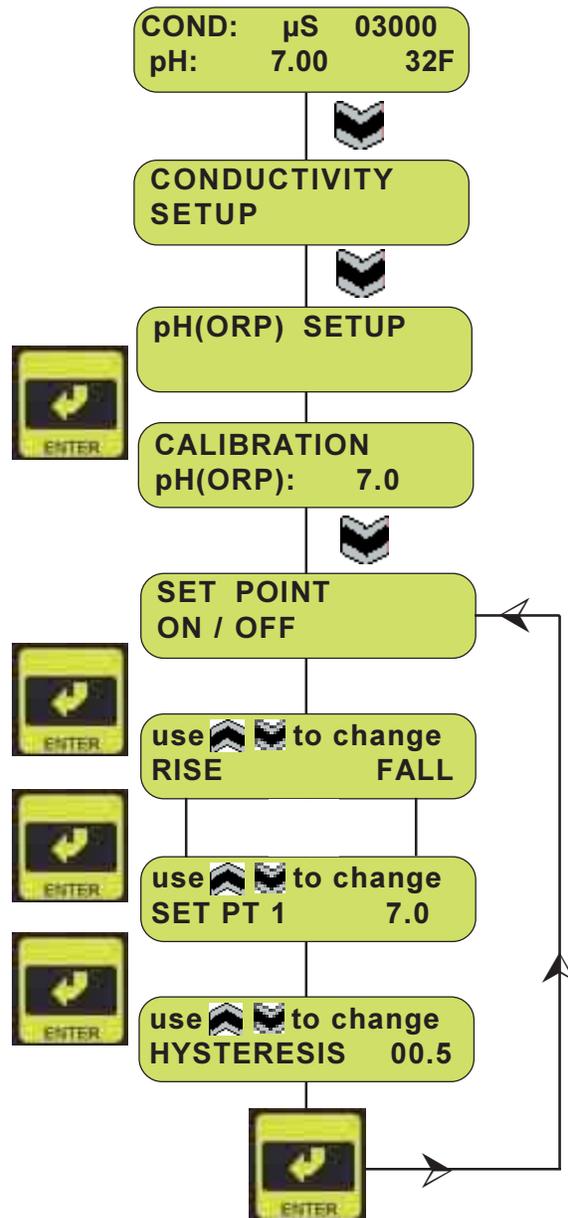
At the Calibration menu press the **down** button.

The pH/ORP Set Point menu displays the selected Operating Mode, which is either ON/OFF or Proportional. [To select the Operating Mode, use the pH/ORP Operating Mode function in the Advanced Setup menu, refer to Section 8, pH (or ORP) Operating Mode.] Press **enter** to access the Set Point feature.

**If the current Operating Mode is ON/OFF**, use the **up/down** buttons to set the set point. The set point is the value at which the pump is turned on. Press **enter** to save the set point. For falling set points, as the pH falls to the set point the pump will turn on. For rising set points, as the pH rises to the set point the pump will turn on.

Use the **up/down** buttons to set the hysteresis value. The hysteresis is the set value of fluctuation that will be allowed before the pump turns on or off again. Press **enter** to save the hysteresis value.

For example, if the pump is intended to handle a rising pH, make the set point 7.0. As the pH rises, the pump will turn on at 7.5. As the pH falls, the pump will turn off when the pH drops below 7.0.



# SECTION 5: pH/ORP SETUP

## Set Point (Proportional Mode)

To access the Ph/ORP Set Point screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

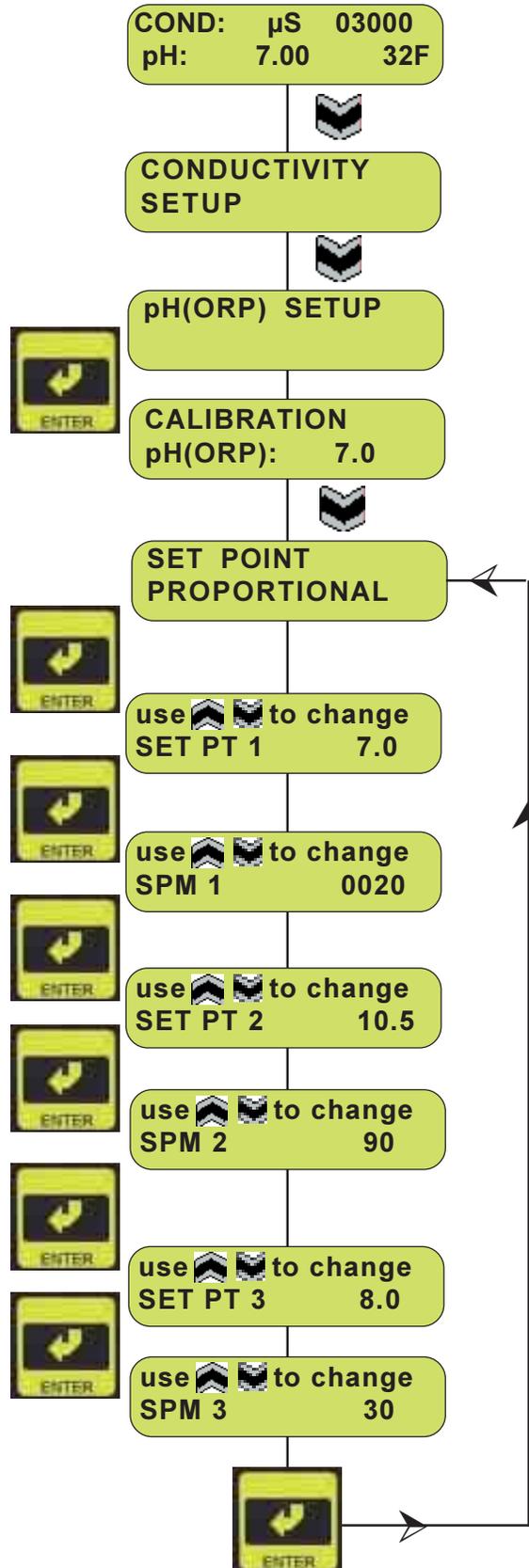
At the pH/ORP SetUp screen press “**ENTER**” to proceed to the pH/ORP Calibration menu.

At the Calibration menu press the **down** button.

The pH/ORP Set Point menu displays the selected Operating Mode, which is either ON/OFF or Proportional. [To select the Operating Mode, use the pH/ORP Operating Mode function in the Advanced Setup menu, refer to [Section 7, pH \(or ORP\) Operating Mode.](#)] Press enter to access the Set Point feature.

**If the current Operating Mode is Proportional**, use the **up/down** buttons to set the first set point and press enter. Then set the stroke per minute for the first set point. Do the same for the second and third set points. The third set point is optional and can be turned on and off in the Operating Mode in the Advanced Setup menu. The third set point should be a value between the first and second set points.

The first set point is the point at which the pump will turn on. As the current reading moves toward the second set point, the strokes per minute will increase linearly between the two points. For handling rising pH levels, the first set point should be a smaller value than the second set point. For handling falling pH levels, the first set point should be larger than the second set point.



# SECTION 5: pH/ORP SETUP

## Alarms

To access the pH/ORP Alarms Set Up screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp screen press “**ENTER**” to proceed to the pH/ORP Calibration menu.

At the Calibration menu press the **down** button.

At the Set Point menu press the **down** button.

The pH/ORP Alarms menu displays the current set points for the Low and High Alarms. Press **ENTER** to access the Alarms feature.

Use the **up/down** arrows to enable (Y) or disable (N) the Low Alarm and press **ENTER**.\*

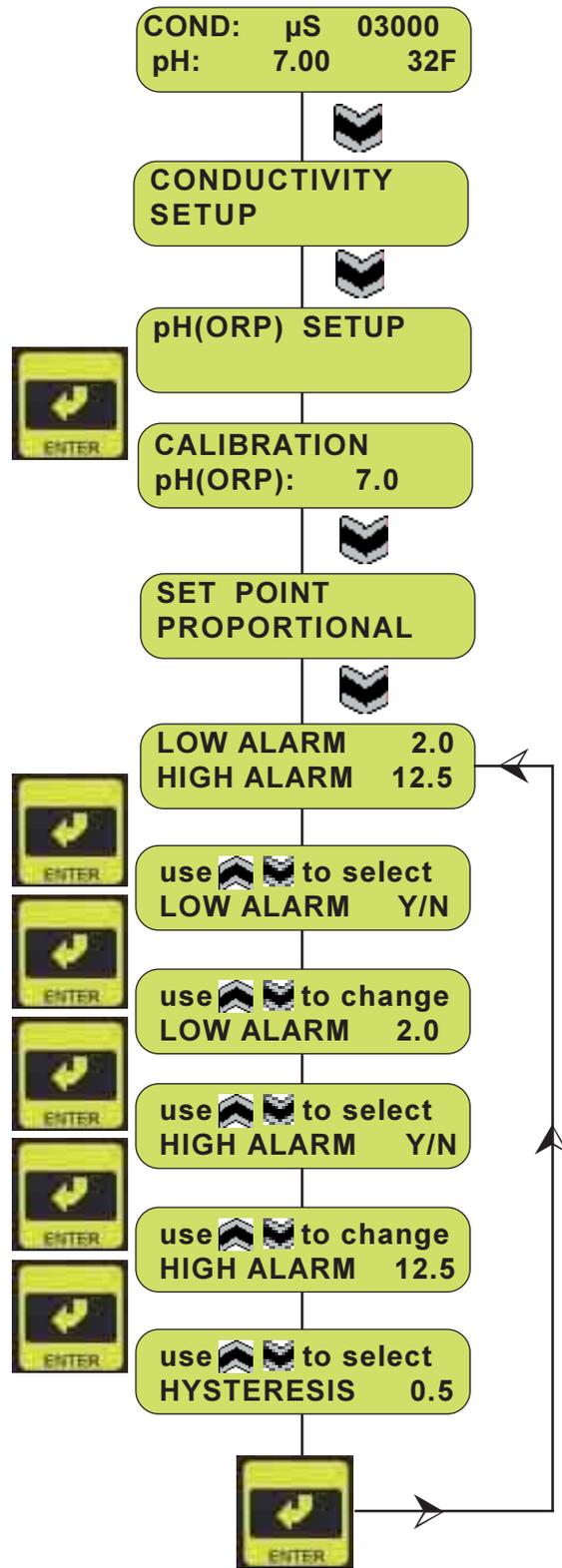
If enabled, set the set point for the alarm and press **ENTER**.

Use the **up/down** arrows to enable (Y) or disable (N) the High Alarm and press **ENTER**.

If enabled, set the set point for the alarm and press **ENTER**.

Next, set the hysteresis using the **up/down** buttons and press **ENTER**.

*\*If either; or, both alarms are disabled, the alarm setpoint values will be displayed. If disabled, pH/ORP alarm menus will display LOW ALARM OFF and/or HIGH ALARM OFF.*



# SECTION 5: pH/ORP SETUP

## Response Rate

To access the pH/ORP Response Rate screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp screen press “**ENTER**” to proceed to the pH/ORP Calibration menu.

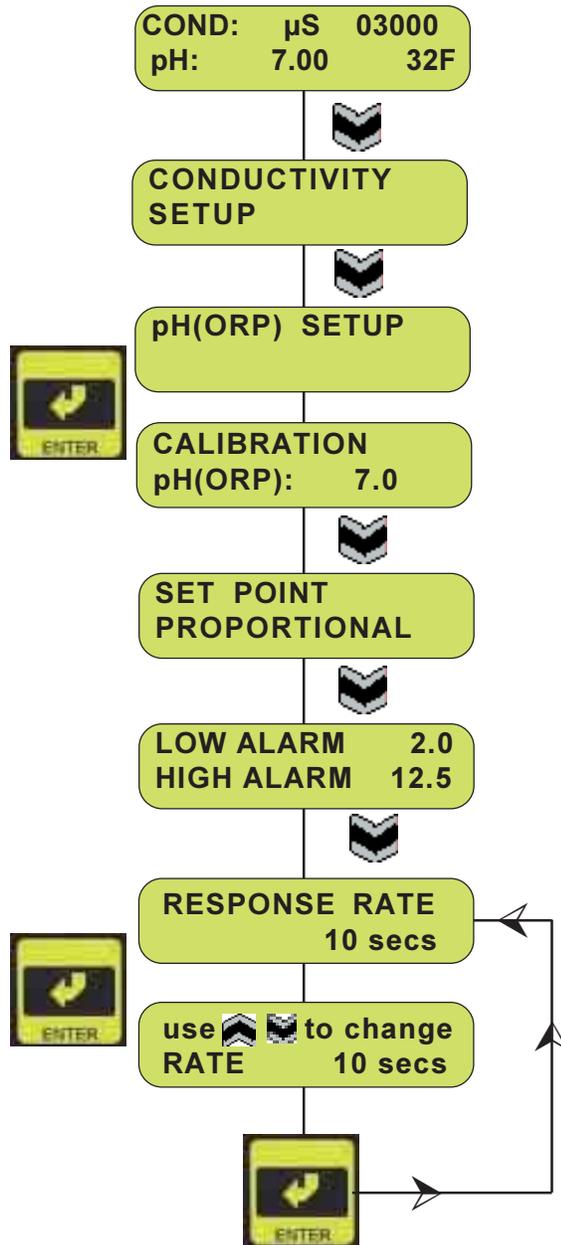
At the Calibration menu press the **down** button.

At the Set Point menu press the **down** button.

At the Low/High Alarm menu press the **down** button.

The RESPONSE RATE menu displays the current set points for the signaling of an alarm after the actual alarm condition is determined. Press **ENTER** to access the programing mode for this feature.

Use the **up/down** arrows to change the RESPONSE RATE to the desired response time, and press **ENTER**.



# SECTION 6: TIMERS SETUP

## Time/Date

To access the Timers SetUp screen from the System Run screen, press the **down** button.

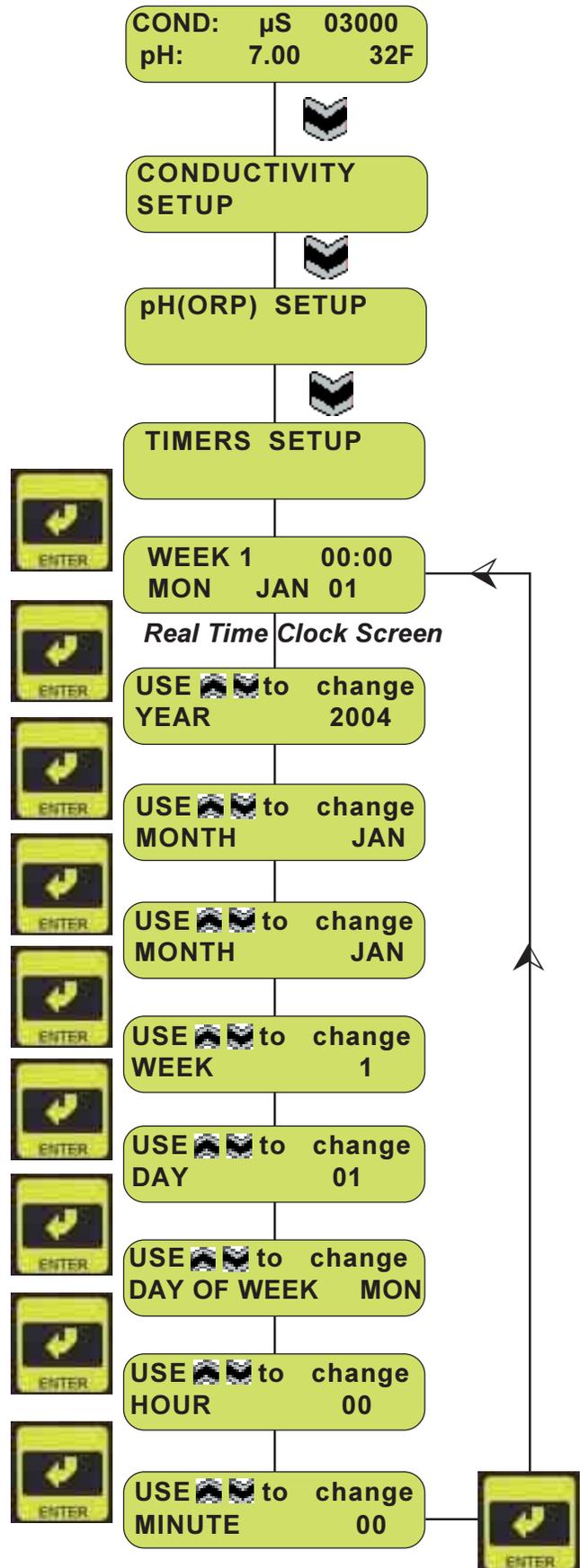
At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp menu press the **down** button.

At the TimersSetUp menu press the **“ENTER”** button.

The **“CLOCK”** screen displays the current week, day, and time. The time is based on a 24-hour clock. The number week that is displayed reflects the current week during the selected biocide programming based on a 1, 2, 3, or 4 week repeating cycle. number, time, day of the week, month, and date. Press **“ENTER”** to change the time and date.

Use the **up/down** buttons to change each setting and press **“ENTER”** to save them.



# SECTION 6: TIMERS SETUP

## Feed Mode

To access the Timers SetUp screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp menu press the **down** button.

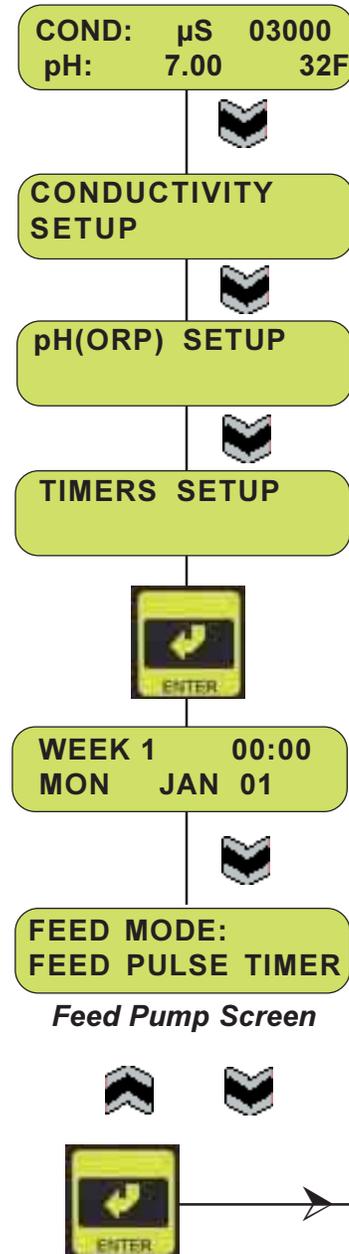
At the TimersSetUp menu press **“ENTER”**.

At the Time SetUp menu press the **down** button.

The Feed Mode menu displays the current Inhibitor Feed Pump mode. Press **“ENTER”** to select the Feed Mode you wish to SetUp. Use the **up/down** buttons to select one of the four modes: *Feed Pulse Timer*, *Feed as a % of Time*, *Feed as a % of Bleed*, *Feed and Bleed*. Press **“ENTER”** to save the mode. The variables and settings that are available for each option are displayed (“m” indicates time in minutes, “s” indicates time in seconds).

Use the **up/down** buttons to change the settings. Press **“ENTER”** to save the setting.

The four modes and programming displays are shown on the next page.



# SECTION 6: TIMERS SETUP

## Feed Mode

**Water Meter Pulse**  
Pump output based on flow meter input.

**FEED PULSE TIMER**  
or to next Menu



USE to change  
**RUN TIME** 010s



USE to change  
**PULSES** 005



**Feed as % of Time**  
Pump output based on a repeating cycle timer.

**FEED AS % TIME**  
or to next Menu



USE to change  
**CYCLE TIME** 010m



USE to change  
**% TIME** 010%



**Feed as % of Bleed**  
Feed after Bleed with a limit timer to control maximum pump run time. Pump output run time is based on a % of the total Bleed time.

**FEED AS % BLEED**  
or to next Menu



USE to change  
**% BLEED** 010%



USE to change  
**TIME LIMIT** 006m



**Feed and Bleed** Feed and Bleed simultaneously with limit timer to control maximum feed pump run time.

**FEED AND BLEED**  
or to next Menu



USE to change  
**FEED LIMIT** 010m



Use the “UP” or “DOWN” key to scroll through the four different modes. Pressing the “ENTER” key from the main menu screen “FEED” (Mode) accesses the FEED sub-menu selections.

When the mode desired is displayed on the screen press “ENTER” to access the particular settings for that mode. The variables and settings that are available for each option are displayed (“m” indicates time in minutes, “s” indicates time in seconds). Use the “UP” or “DOWN” key to change the settings. Press “ENTER” to save that setting.

## SECTION 6: TIMERS SETUP

### Biocide Repeat Cycle

To access the Timers SetUp screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp menu press the **down** button.

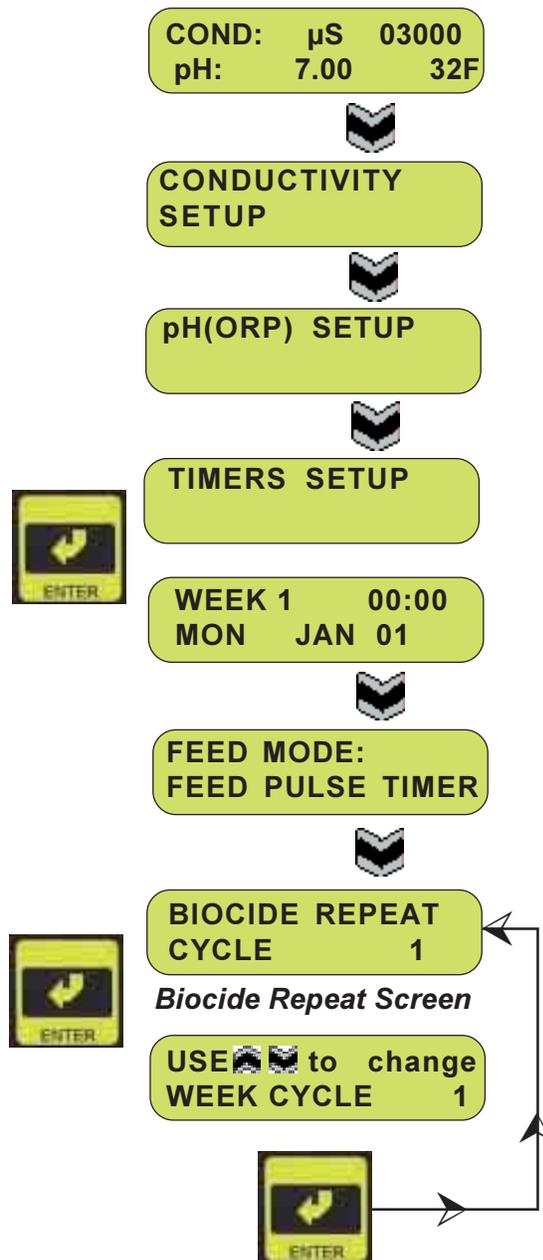
At the Timers SetUp menu press **“ENTER”**.

At the Time SetUp menu press the **down** button.

At the Feed Mode SetUp menu press the **down** button.

The Biocide Repeat Cycle menu displays the current week cycle selected. This menu will select the number of weeks that will occur before a cycle is repeated. The BIOCIDE cycle reflects the number of weeks that repeat in the BIO 1 and BIO 2 programming. For example, if a two-week repeating biocide pumping cycle is desired, then a “BIO WEEK = 2” would be selected. Press **“ENTER”** to modify the week cycle. Use the **up/down** buttons to modify the week cycle. The “weeks” may be selected to be OFF, 1, 2, 3, 4. Selecting “OFF” will result in no biocide feed. Press **“ENTER”** to save the new setting, and return to the main menu.

***The setting for the BIOCIDE weekly repeat cycle can only be modified at the controller. This setting can not be adjusted remotely. The factory default setting is “1 week.”***



# SECTION 6: TIMERS SETUP

## Biocide View

To access the Timers Setup screen from the System Run screen, press the **down** button.

At the Conductivity Setup menu press the **down** button.

At the pH/ORP Setup menu press the **down** button.

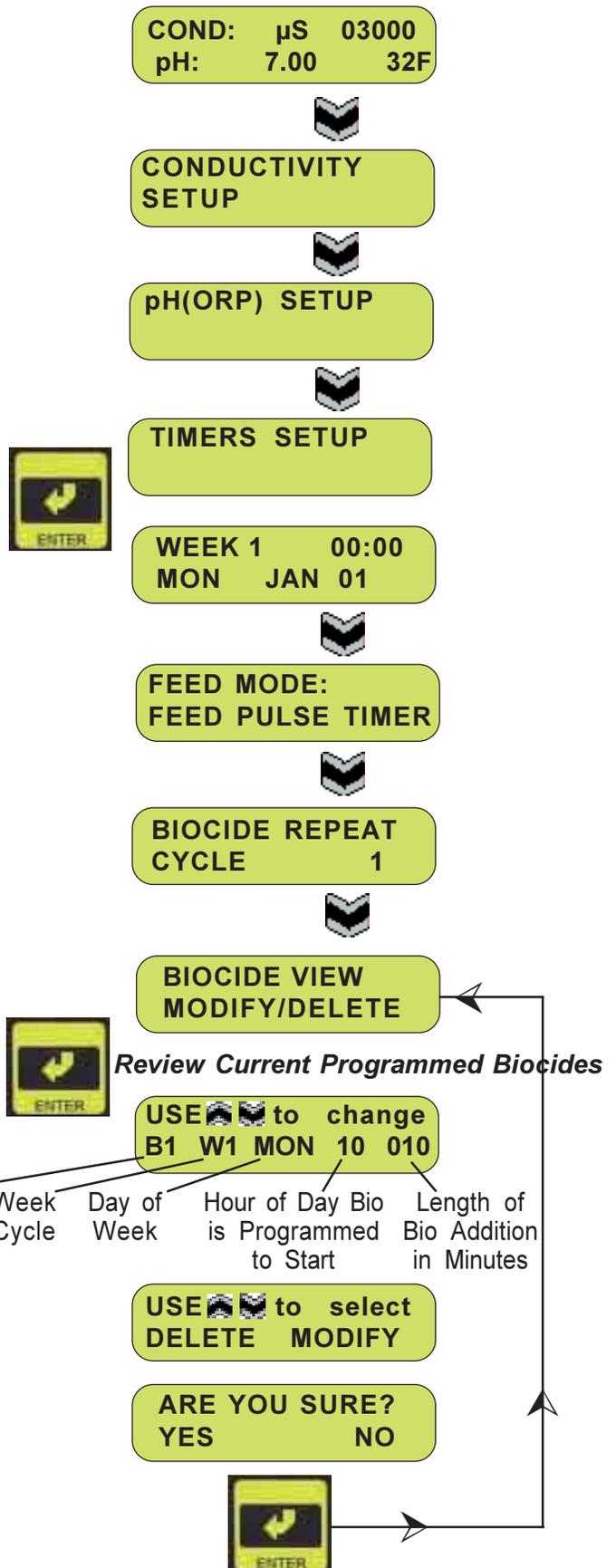
At the TimersSetup menu press **“ENTER”**.

At the Time Setup menu press the **down** button.

At the Feed Mode Setup menu press the **down** button.

At the Biocide Repeat Cycle Setup menu press the **down** button.

The “BIOCIDE VIEW” menu will allow the user to view, modify or delete any biocide events that have previously been programmed. Pressing the **up and down** arrows will allow the user to select the desired beside event. Pressing **“ENTER”** will allow access to changes.



# SECTION 6: TIMERS SETUP

## Biocide Addition

To access the Timers SetUp screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp menu press the **down** button.

At the TimersSetUp menu press **“ENTER”**.

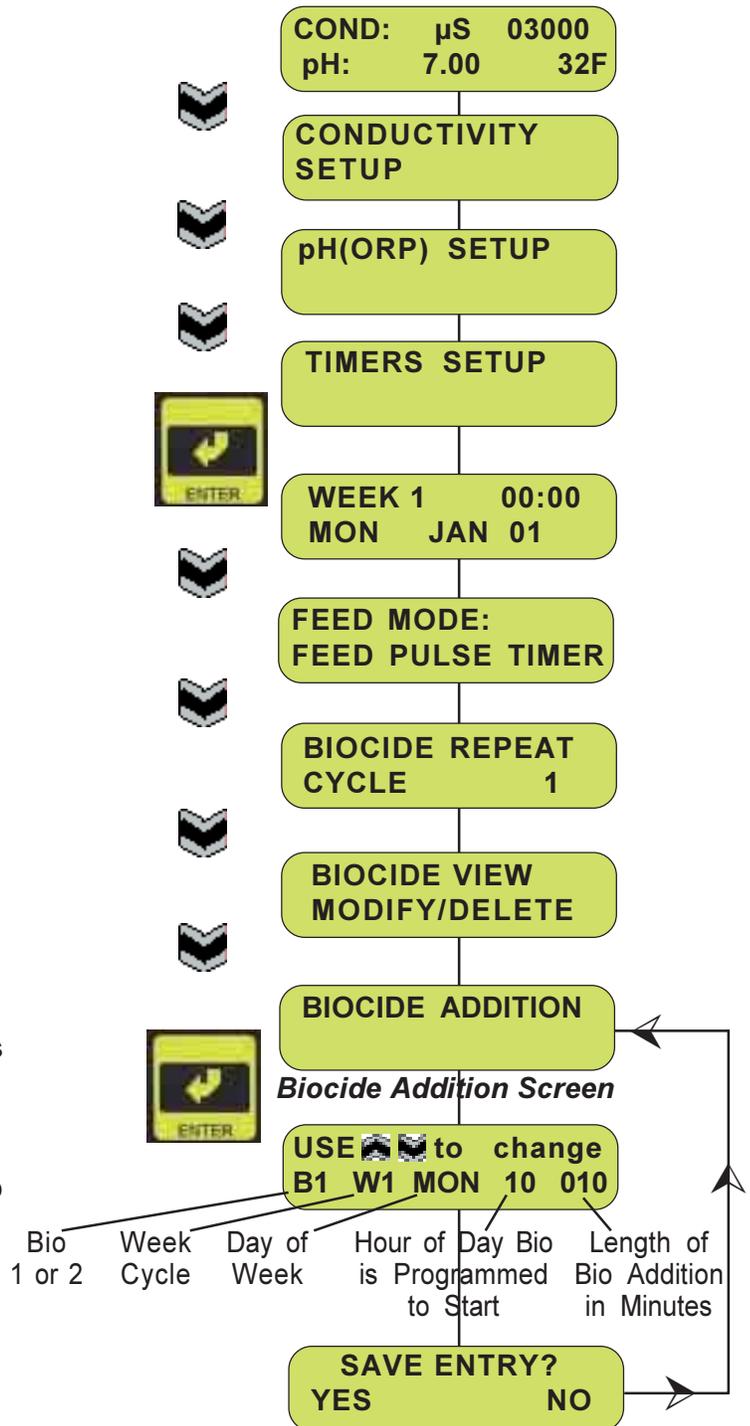
At the Time SetUp menu press the **down** button.

At the Feed Mode SetUp menu press the **down** button.

At the Biocide Repeat Cycle SetUp menu press the **down** button.

At the Biocide View SetUp menu press the **down** button.

Biocide pump events may be programmed or added in this main menu selection screen. Press **“ENTER”** to access the sub-menu screens that allow the programming options for each Biocide pump. Once in these sub-menu selection screens, press the **“UP”** or **“DOWN”** buttons to change each one of the values. The values that may be changed will have a flashing cursor. Press the **“ENTER”** key to save that value and move to the next sub-menu screen. The DX6000 software program will not allow both biocide pumps to operate simultaneously. If two biocides (Bio 1 & Bio 2) are programmed to add at the same time, Bio 1 will be added, then Bio 2.



# SECTION 6: TIMERS SETUP

## Biocide Prebleed

To access the Timers Setup screen from the System Run screen, press the **down** button.

At the Conductivity Setup menu press the **down** button.

At the pH/ORP Setup menu press the **down** button.

At the TimersSetup menu press “ENTER”.

At the Time Setup menu press the **down** button.

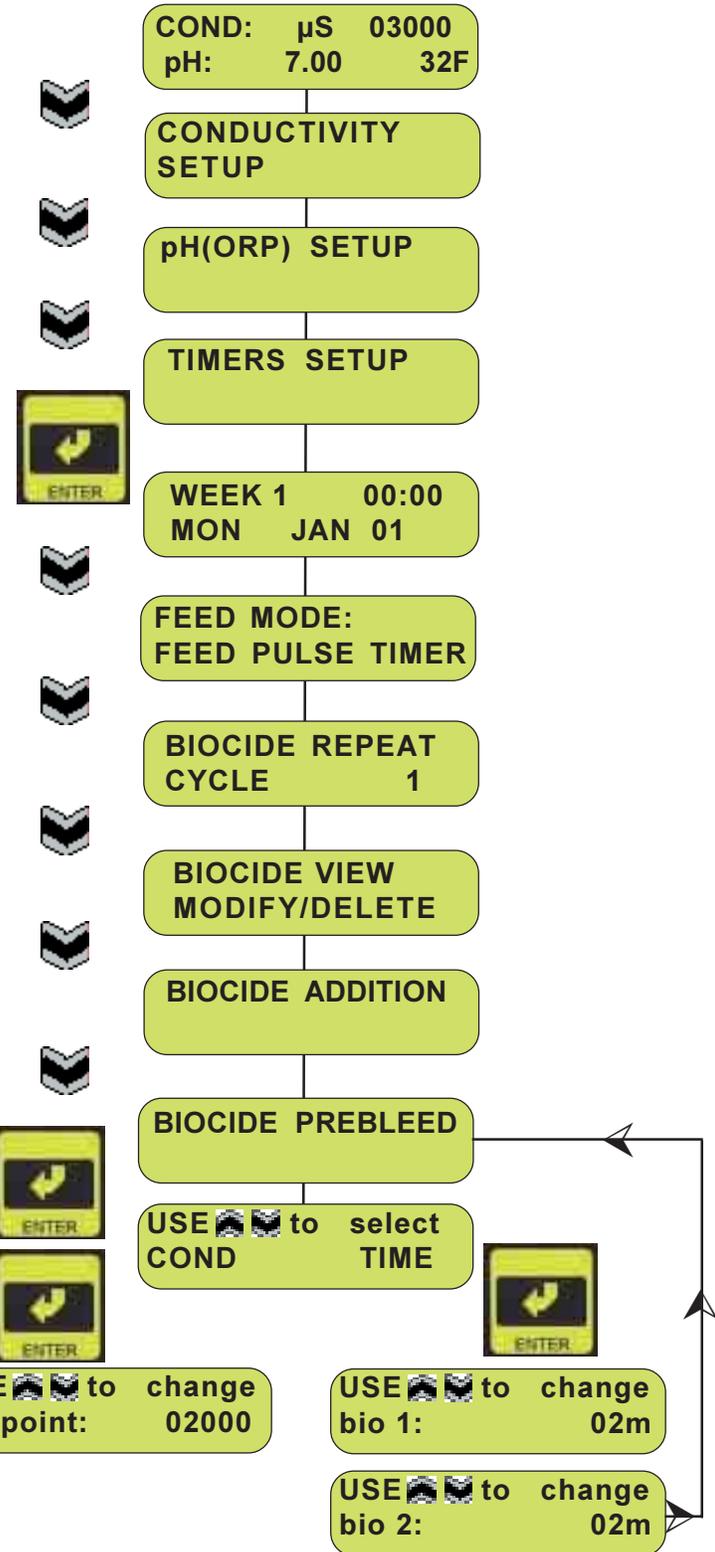
At the Feed Mode Setup menu press the **down** button.

At the Biocide Repeat Cycle Setup menu press the **down** button.

At the Biocide View Setup menu press the **down** button.

At the Biocide Addition menu press the **down** button.

The Biocide Prebleed option is available in order to bleed down the cooling tower to below conductivity limits prior to biocide chemical addition. **This option is programmable in one of two modes.** The prebleed may be selected for either a programmed amount of time or a conductivity set point. **If the time option is selected**, then the cooling tower will be bled down for that programmed amount of time prior to the biocide pump “on” time. **If the conductivity set point is selected**, then the cooling tower will be bled down to this set point prior to the biocide chemical addition. This set point prebleed starts at the programmed biocide pump “on” time. The biocide pump will come on after this conductivity point has been reached.



# SECTION 6: TIMERS SETUP

## Biocide Lockout

To access the Timers Setup screen from the System Run screen, press the **down** button.

At the Conductivity Setup menu press the **down** button.

At the pH/ORP Setup menu press the **down** button.

At the TimersSetup menu press **“ENTER”**.

At the Time Setup menu press the **down** button.

At the Feed Mode Setup menu press the **down** button.

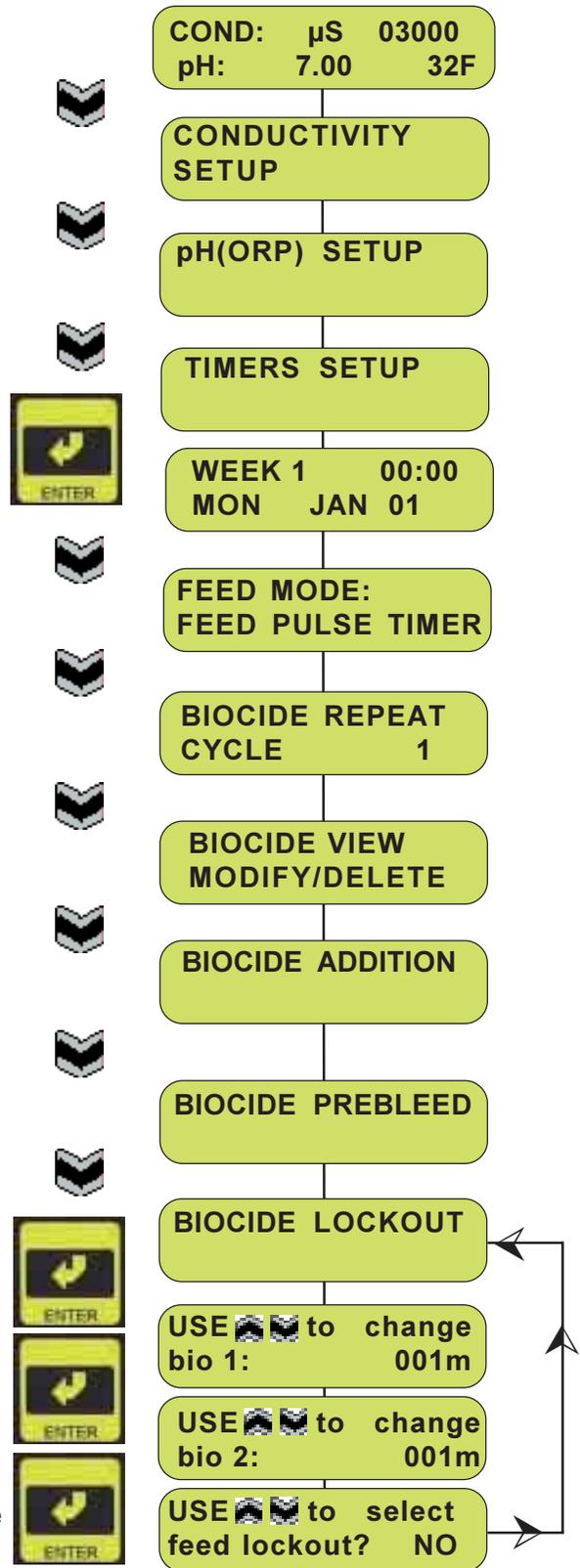
At the Biocide Repeat Cycle Setup menu press the **down** button.

At the Biocide View Setup menu press the **down** button.

At the Biocide Addition menu press the **down** button.

At the Biocide PreBleed menu press the **down** button.

The Biocide Lockout screen selection allows for the programming of a system bleed lockout time. This option prevents the bleed of a cooling tower immediately following biocide addition. Press **“ENTER”** to access the lockout screens where this option is programmed. The number of minutes that the bleed function needs to be disabled can be varied as required. Each biocide pump lockout time can be individually programmed. It also allows lockout of the feed pump during a biocide lockout.



# SECTION 6: TIMERS SETUP

## pH (or ORP) Pump Timer

To access the Timers Setup screen from the System Run screen, press the **down** button.

At the Conductivity Setup menu press the **down** button.

At the pH/ORP Setup menu press the **down** button.

At the TimersSetup menu press **“ENTER”**.

At the Time Setup menu press the **down** button.

At the Feed Mode Setup menu press the **down** button.

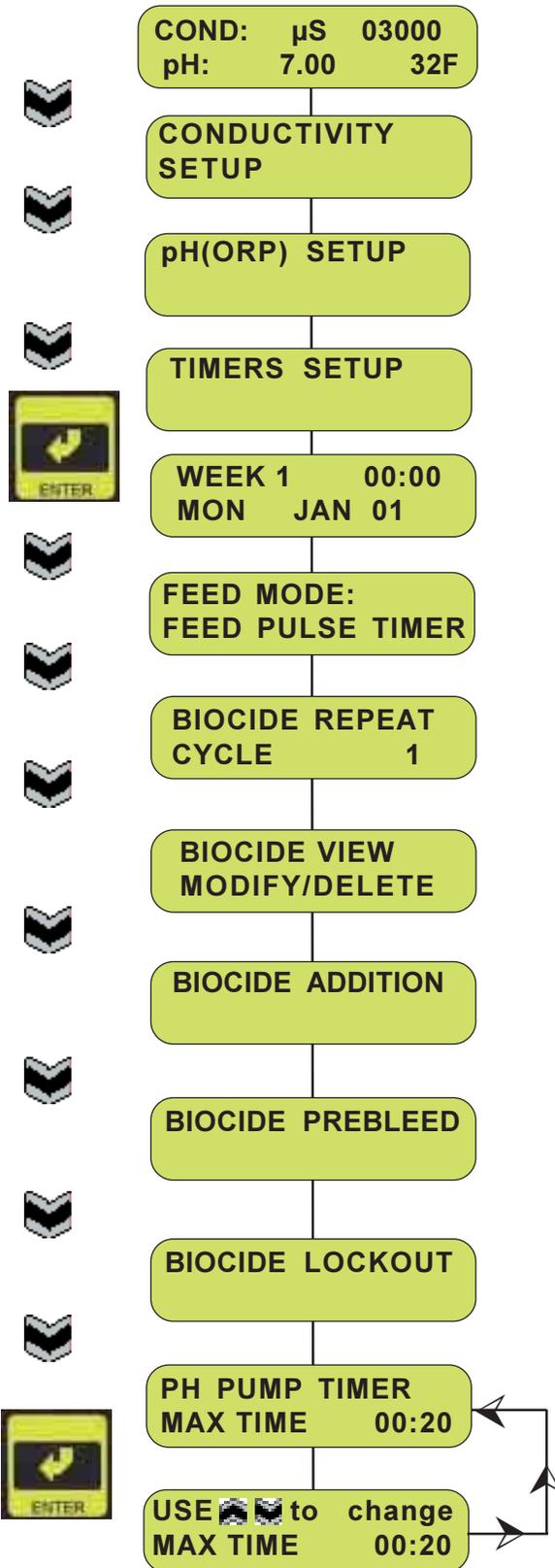
At the Biocide Repeat Cycle Setup menu press the **down** button.

At the Biocide View Setup menu press the **down** button.

At the Biocide Addition menu press the **down** button.

At the Biocide PreBleed menu press the **down** button.

At the Biocide LockOut menu press the **down** button. The pH/ORP Pump Timer menu displays the current setting for the maximum pump run time. Press enter to modify this setting. The maximum pump run time is the maximum allowed time for the pH (or ORP) pump to run without turning off. If this time is reached, the pump will be turned off. The time is displayed in hours and minutes in the format “hh:mm”. Use the **up/down** buttons to change the hours and press enter. The blinking cursor will then move to the minutes. Set the number of minutes and press **“ENTER”** to save.





# SECTION 7: ADVANCED SETUP

## Flow Alarm

To access the Advanced SetUp screen from the System Run screen, press the **down** button.

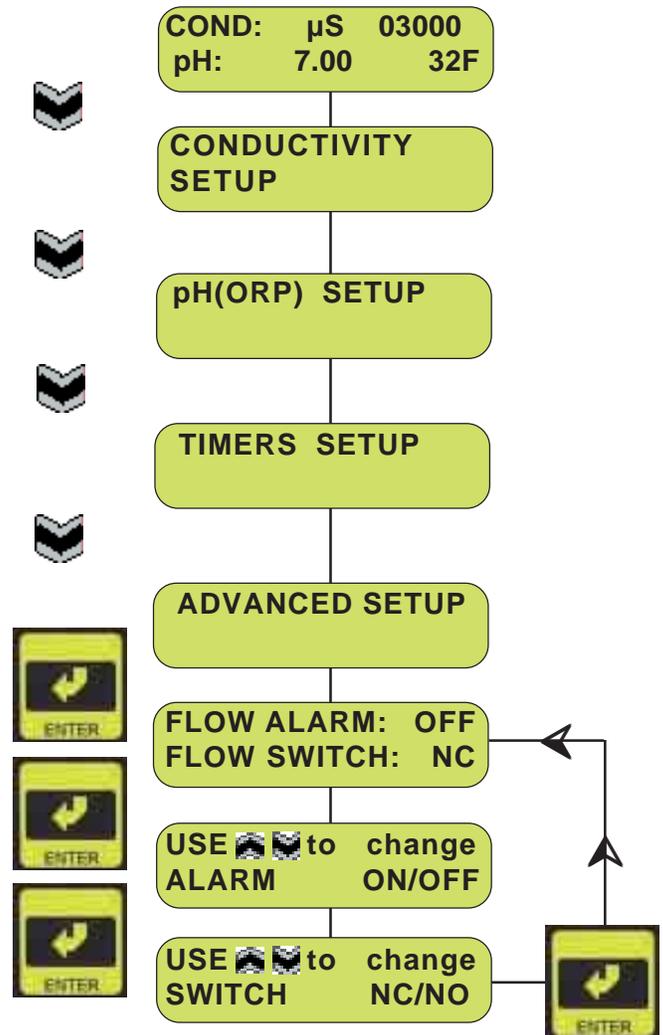
At the Conductivity SetUp menu press the **down** button.

At the pH/ORP SetUp menu press the **down** button.

At the Timers SetUp menu press the **down** button.

At the Advanced SetUp menu press the **“ENTER”** button.

The Flow Alarm can be set in the “ON” or “OFF” position by pressing **“ENTER”** and using the **up/down** buttons to select the desired option. Pressing **“ENTER”** will select that option and bring up the Flow Switch menu. Use the **up/down** buttons to select “NO” (Normally Open) or “NC” (Normally Closed) relay contact and then press **“ENTER”** to save. LMI flow switches are “NC” (Normally Closed).



# SECTION 7: ADVANCED SETUP

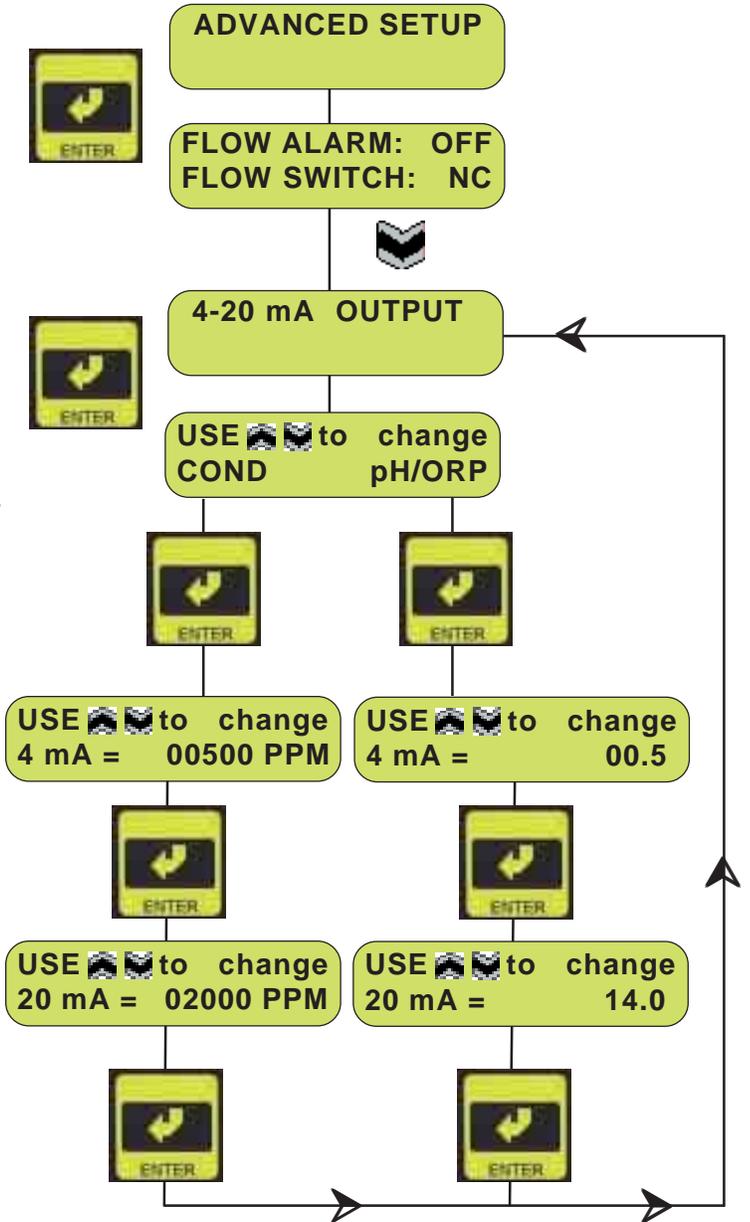
## 4-20 mA Output

From the Advanced SetUp menu press the “ENTER” button.

At the Flow Alarm menu press the **down** button.

At the 4-20 mA menu press the “ENTER” button.

The 4-20mA output menu sets the output scale of the conductivity and pH/ORP readings. Press “ENTER” to set the 4-20ma scaling functions. Select either Conductivity or pH/ORP using the **up/down** buttons. Press “ENTER” to access this menu and use the **up/down** buttons to set the 4 mA output to the desired conductivity or pH readings. The “ENTER” button will save that value and access the 20 mA reading. Use the **up/down** buttons to set the scale and press the “ENTER” button to save the value.



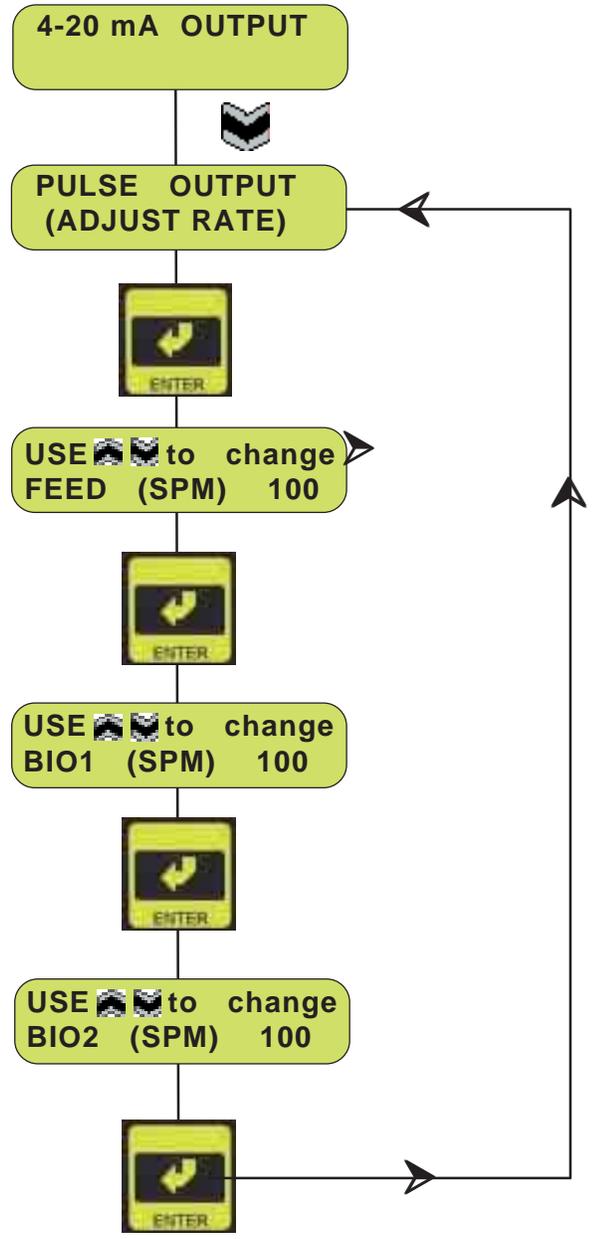
# SECTION 7: ADVANCED SETUP

## Pulse Output

From the 4-20 mA menu press the **down** button.

At the Pulse Output menu press the “**ENTER**” button.

This menu adjusts the rate of the Feed, Bio 1 and Bio 2 pumps in Strokes Per Minute (SPM) if you choose to use the pulse output to control the metering pumps. Pressing “**ENTER**” will access the feed pump setting used for a pulse output. Use the **up/down** buttons to change the speed from 0 – 180 SPM. Pressing “**ENTER**” will save the value. Repeat process for Bio 1 and Bio 2. **Pumps must be wired to pulse output terminals to utilize this feature.**



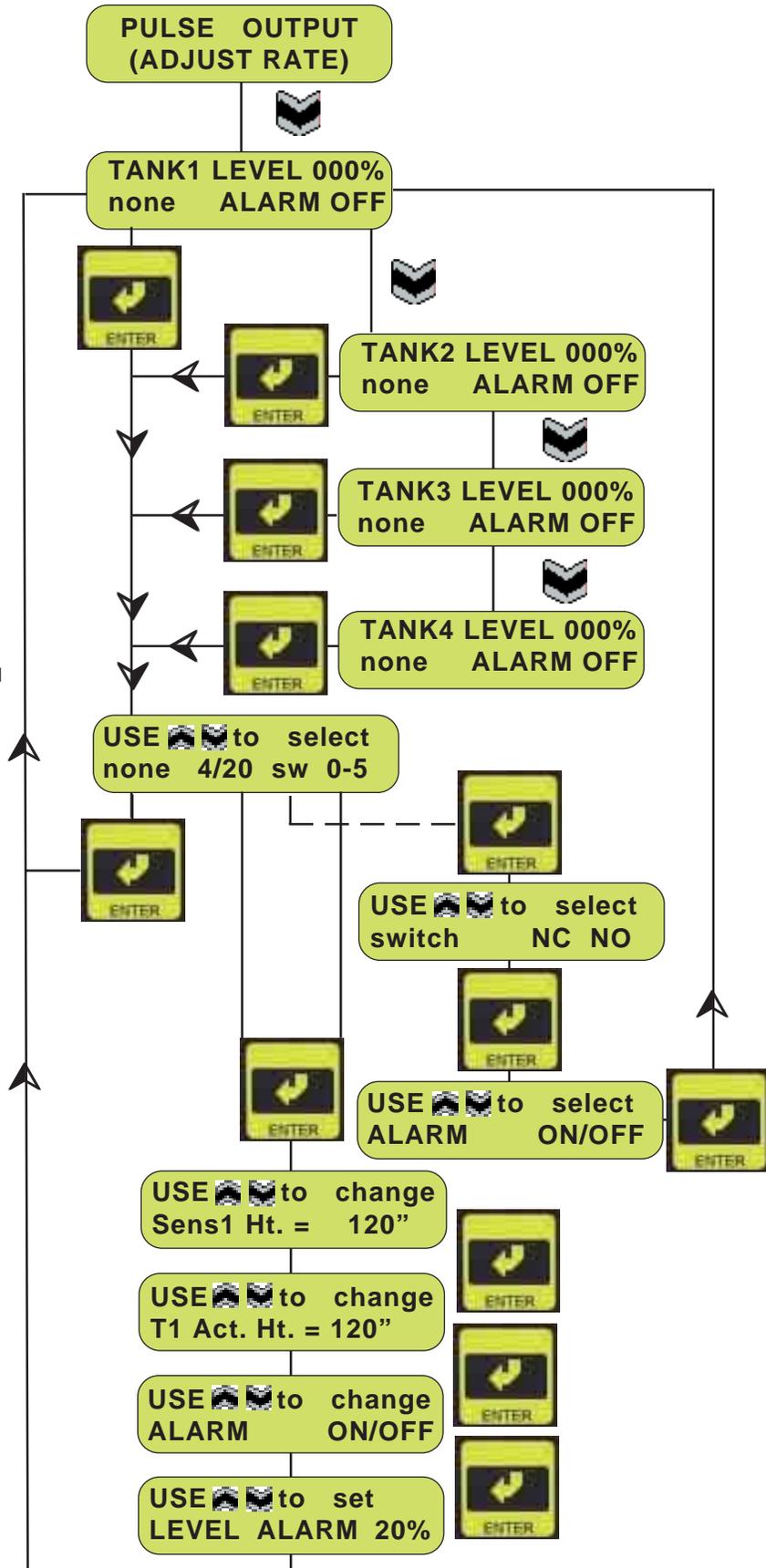
# SECTION 7: ADVANCED SETUP

## Tank 1, 2 3, or 4 Level

From the Pulse Output menu press the **down** button.

At the Tank Level menu press the **“ENTER”** button to access programming for Tank #1 or press the **down** button to scroll to access programming for Tank #2, #3, or #4.

The tank level inputs can be programmed in one of four ways: None, Switch Closure, 4-20 mA or 0-5 VDC. Press **“ENTER”** to access, use the **up/down** buttons to select and **“ENTER”** to save. If “None” is selected, the alarm will be set to the OFF position. If the Switch Closure (sw) is chosen, it will prompt you for the type of switch NO (Normally Open) or NC (Normally Closed). The choice to have the alarm on or off will then be asked. Press **“ENTER”** to select and save. The 4-20 mA and 0-5 VDC menus are the same. Use the **up/down** buttons to access the settings. Choose the alarm type, on or off, press **“ENTER”** then use the **up/down** buttons to set the percentage that you want the level alarm to be activated. Press **“ENTER”** to save.

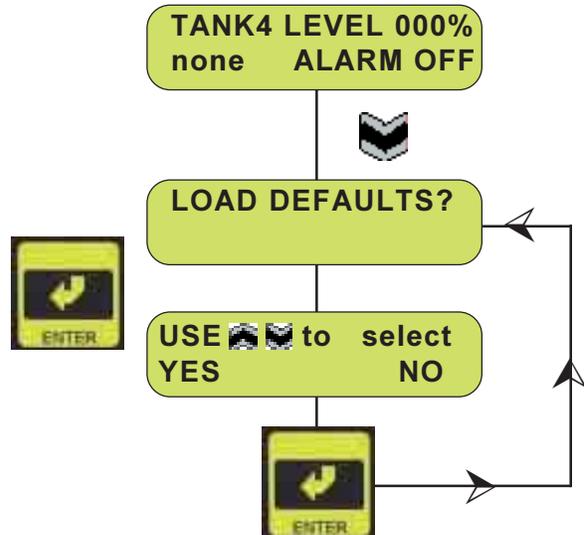


# SECTION 7: ADVANCED SETUP

## Load Defaults

From the Tank 4 menu press the **down** button.

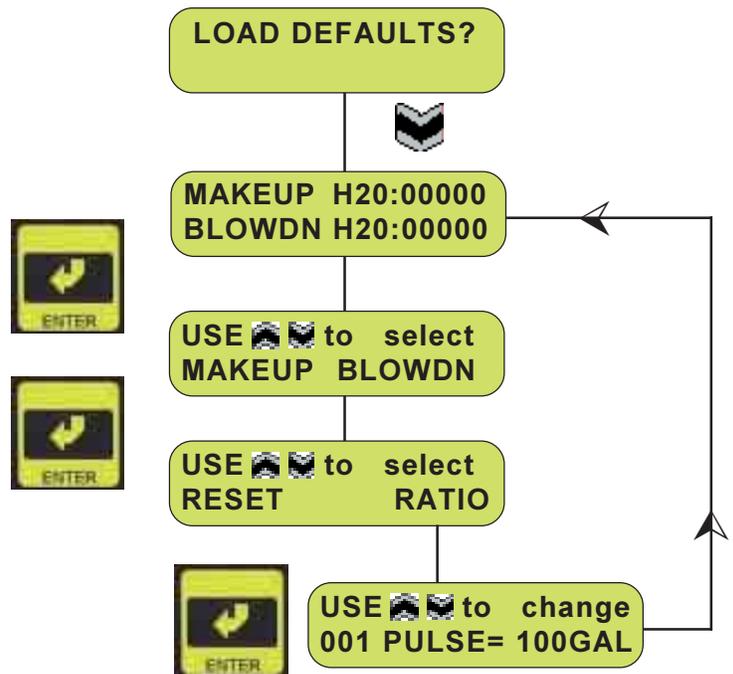
On the Load Defaults screen press **“ENTER”**. Use the **up/down** buttons to select Yes or No. If you select Yes the default parameters that apply as shown in Appendix B of this manual will be programmed into your controller. Press **“ENTER”** to return to the Load Defaults screen.



## Makeup/Blowdown

From the Load Defaults menu press the **down** button.

NOTE: Makeup is for the water meter on the makeup line. Blowdown is for the water meter on the blowdown line. On the Makeup/Blowdown screen press **“ENTER”**. Use the **up/down** buttons to select Makeup or Blowdown. Press **“ENTER”** to access the Reset/Ratio screen. Selecting Reset will zero the totalizers and return you to the Makeup/Blowdown screen. Selecting Ratio will bring you to Gallon/Pulses screen. Use the **up/down** buttons to enter the ratio of pulses per gallon. Press **“ENTER”** to return to the Makeup/Blowdown screen.



# SECTION 7: ADVANCED SETUP

## Device Serial Number

From the Make Up/Blowdown menu press the **down** button.

NOTE: This is a VIEW ONLY menu screen. The device serial number shown in this menu should match the serial number on the outside of the controller enclosure. This electronic serial number will be used to identify the controller, and it's data for communication purposes.



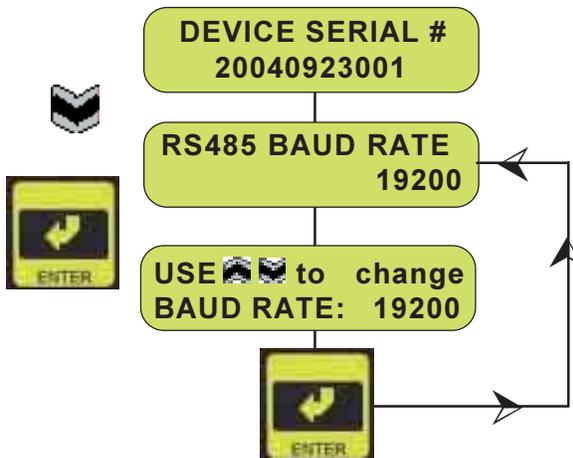
## RS485 Baud Rate

From the Device Serial Number menu press the **down** button.

NOTE: The factory default setting for the baud rate is 19200. The RS485 Baud Rate is the rate at which data will be downloaded from a controller to a remote device. The baud rate is only adjusted if the communications is unreliable or for compatibility with the hardware in the host device. The type of cable, cable length, electrical noise, as well as other factors can limit the rate at which data can accurately be transmitted. Reducing the baud rate will help increase the reliability, however download times will be increased proportionally.

The following settings are recommended:\*

- 1-4000 feet RS485 direct connected 57600.
- 1-2000 feet RS485 modem connected 19200.
- 2000-4000 feet RS485 modem connected 9600.



\* This assumes use of recommended RS-485 interconnect cabling and proper grounding/shielding used.

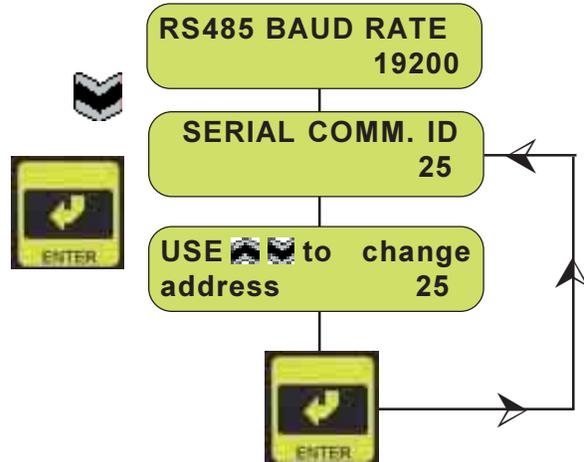
NOTE: Low capacitance, controlled impedance shielded twisted pair cable should be used to ensure the highest data rates and lowest download times. Guidelines for cable selection are capacitance of 16pF/ft. or less, and nominal impedance 100-120 ohms.

# SECTION 7: ADVANCED SETUP

## Serial COMM. ID

From the RS485 Baud Rate menu press the **down** button.

The Serial COMM. ID will identify which one of up to 31 controllers is being dialed up remotely. Press “ENTER” and use the **up/down** buttons to change the address. Press “ENTER” to save.



## RS232 Baud Rate

From the Serial COMM. ID Address menu press the **down** button.

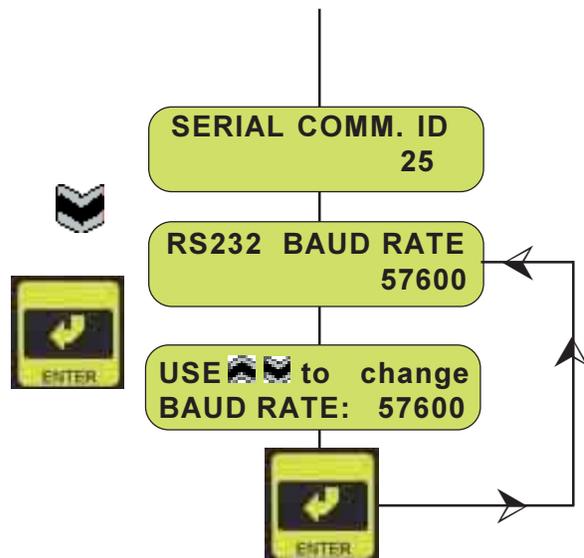
NOTE: The factory default setting for the baud rate is 57,600. The RS232 Baud Rate is the rate at which data will be downloaded from a controller to a remote device. The baud rate is only adjusted if the communications is unreliable or for compatibility with the hardware in the host device. The type of cable, cable length, electrical noise, as well as other factors can limit the rate at which data can accurately be transmitted. Reducing the baud rate will help increase the reliability, however download times will be increased proportionally.

The following settings are recommended:\*

- 1-50 feet 57,600
- 51-80 feet 19,200
- 81-150 feet 9,600
- 151-300 feet 4,800

\* This assumes use of recommended RS-232 interconnect cabling and proper grounding/shielding used.

NOTE: Low capacitance, controlled impedance shielded twisted pair cable should be used to ensure the highest data rates and lowest download times. Guidelines for cable selection are capacitance of 40pF/ft. and DC resistance of 24 ohms/ft or less.



# SECTION 7: ADVANCED SETUP

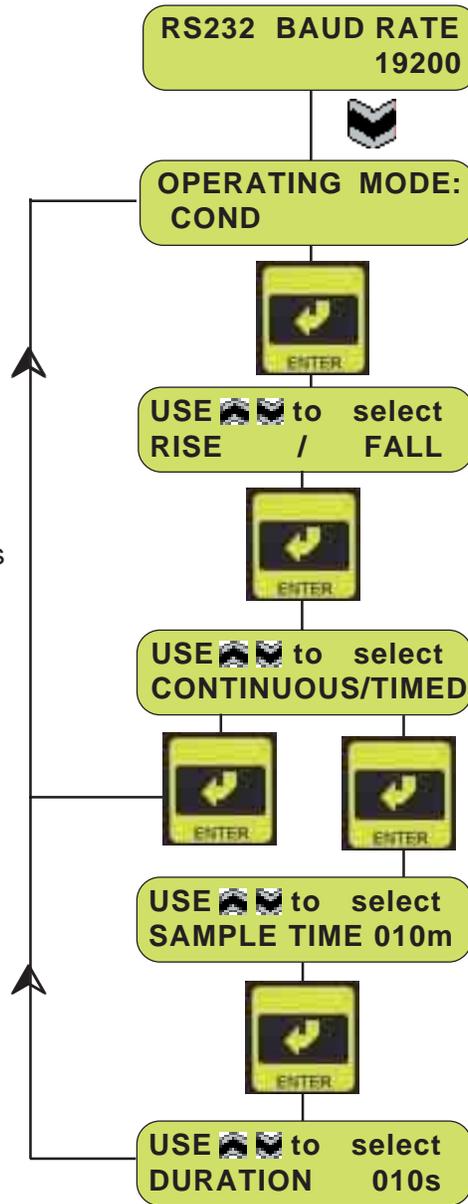
## Operating Mode (Cond)

The Conductivity Operating Mode menu displays the setting for whether or not the controller will monitor conductivity or not. Press “ENTER” to modify the Operating Mode settings.

Use the **up/down** buttons to select whether or not the controller will monitor conductivity. Press “ENTER” to save the setting.

Use the **up/down** buttons to choose between “RISE” or “FALL”. The blinking cursor will be the selected setting. Press “ENTER”.

Use the **up/down** buttons to choose between “CONTINUOUS” or “TIMED”. This will determine the operation of the bleed valve. Press “ENTER” to save and return to the Conductivity Operating Mode menu.



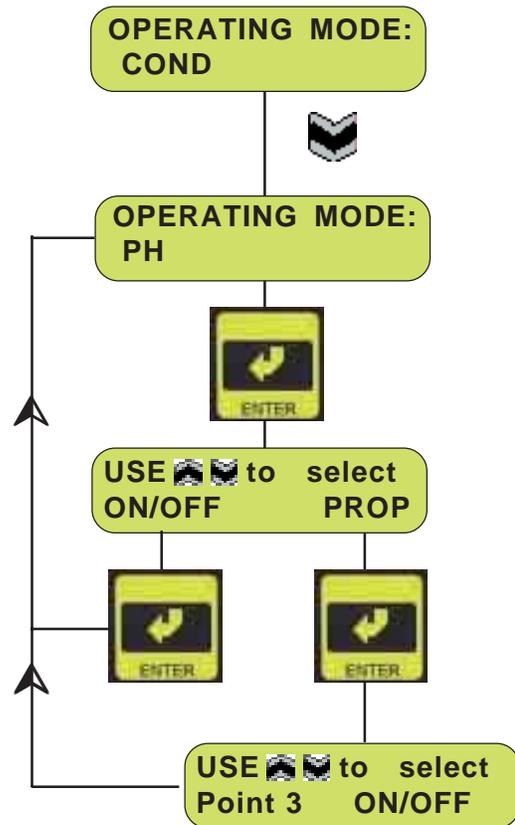
## SECTION 7: ADVANCED SETUP

### Operating Mode pH (or ORP)

The pH/ORP Operating Mode menu displays the setting for whether or not the controller will monitor pH (or ORP) or not. Press “ENTER” to modify the Operating Mode settings.

Use the **up/down** buttons to select whether or not the controller will monitor pH (or ORP). Press “ENTER” to save the setting.

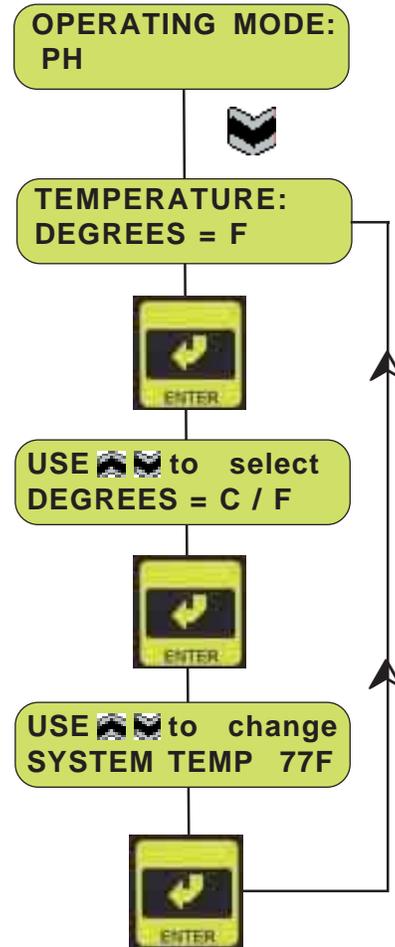
Next select “ON/OFF” or “PROP” (proportional) and press “ENTER”. If “PROP” is selected, turn the 3 Point setting on or off. This allows for entering 3 set points in the proportional mode.



# SECTION 7: ADVANCED SETUP

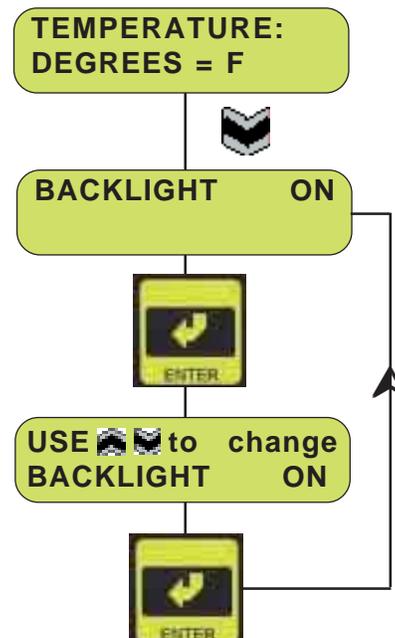
## Temperature

The Temperature menu displays the current temperature units that the controller will display. Press “ENTER” to modify this setting. Use the **up/down** arrows to select degrees “C” or “F”, then press “ENTER”. Next, enter the system temperature. This is provided in the event that there is no temperature probe connected. Press “ENTER” to save and to return to the Temperature menu.



## BackLight

The Backlight menu offers you the option of having the display backlight turned ON or OFF. Use the **up/down** arrows to toggle between the backlight turned ON or OFF. Press “ENTER” to save and to return to the Backlight menu.







# SECTION 8 MANUAL OPERATION MODE

## Manual Output

To access the Manual Output SetUp screen from the System Run screen, press the **down** button.

At the Conductivity SetUp menu press the **down** button.

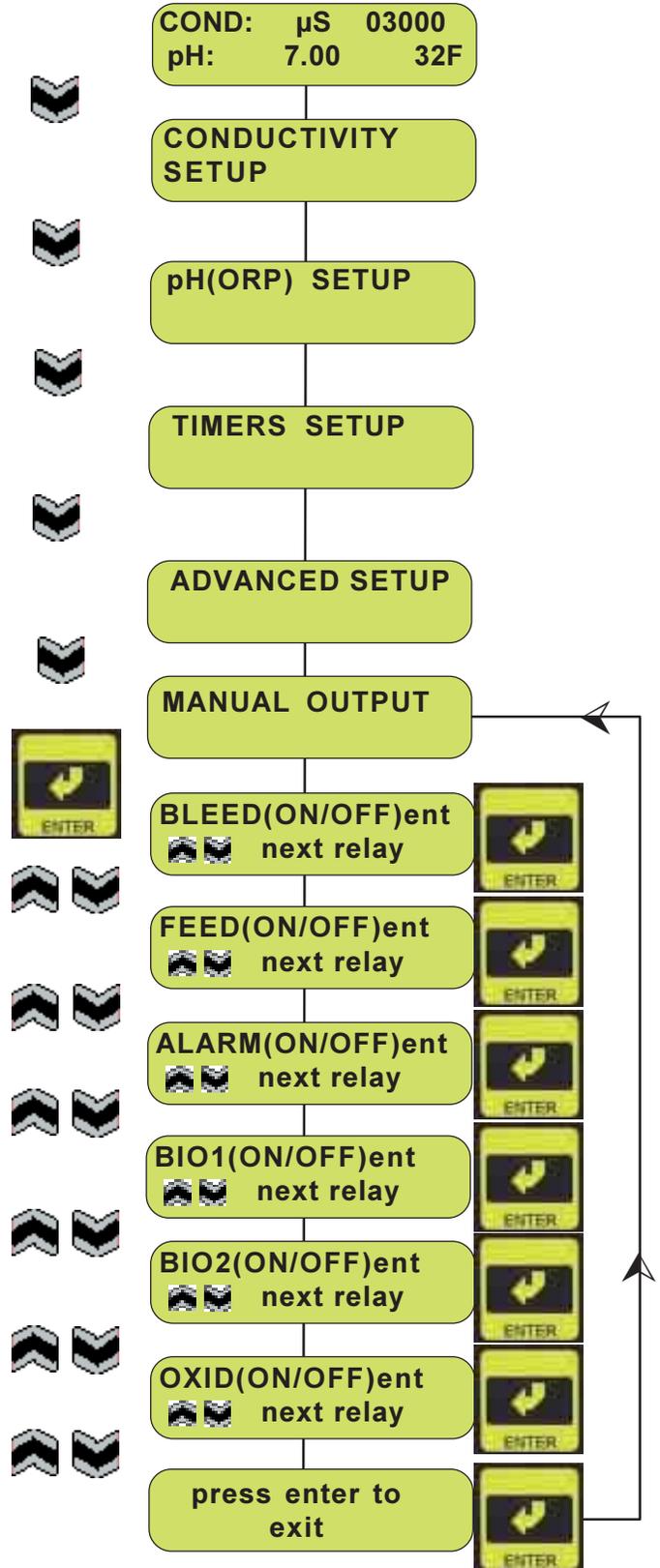
At the pH/ORP SetUp menu press the **down** button.

At the Timers SetUp menu press the **down** button.

At the Advanced SetUp menu press the the **down** button.

At the Manual Output SetUp menu press the the **“ENTER”** button.

The Manual Outputs mode is provided to allow for manual energizing of each relay output. Once the external devices have been connected, they may be individually or collectively energized and tested. Testing of all these components is recommended after system start up. Press **“ENTER”** to access the sub-menu screens. Press the **up/down** buttons to move to each relay control screen. Press **“ENTER”** from each relay output screen to energize that output relay. Press **“ENTER”** a second time to de-energize that relay. One or all of the relays may be energized in this manner.





## **SECTION 9: MAINTENANCE**

### **Controller**

The DX6000 controller requires very little maintenance. Wiping the controller down with a damp cloth will clean it. Do not spray down the controller unless the enclosure door is closed and latched.

### **Probe**

The probe may occasionally become coated with various substances that require cleaning, in order to maintain accurate measurements. The frequency of cleaning will vary from application to application. In new installations, it is recommended that the probe be cleaned after two (2) weeks of service. Normally the probe can be cleaned using a soft cloth or paper towel, and a mild cleaning solution such as 409 cleanser. Occasionally more stubborn coatings may require a more vigorous cleaning procedure. Usually these type of coatings will be visible, but not always. To clean a coated probe, use a fine grit abrasive, such as emery paper. Lay the probe on a flat surface, and move the probe in a back and forth motion. The probe should always be cleaned parallel to the carbon electrodes, NOT perpendicular to the carbon electrodes.

Frequency of cleaning should be determined by the following procedure:

1. Read and record the conductivity with your probe in your system.
2. Remove the probe, clean it, and place it back into your system.
3. Read the conductivity of the probe after it has been cleaned and record it.

Compare the 1st conductivity reading with the 2nd. If the variance is greater than 5%, increase the frequency of probe cleaning. If there is less than 5% change in the readings, the probe should not be considered to have been dirty, and can be cleaned less frequently.



## SECTION 10: TROUBLESHOOTING

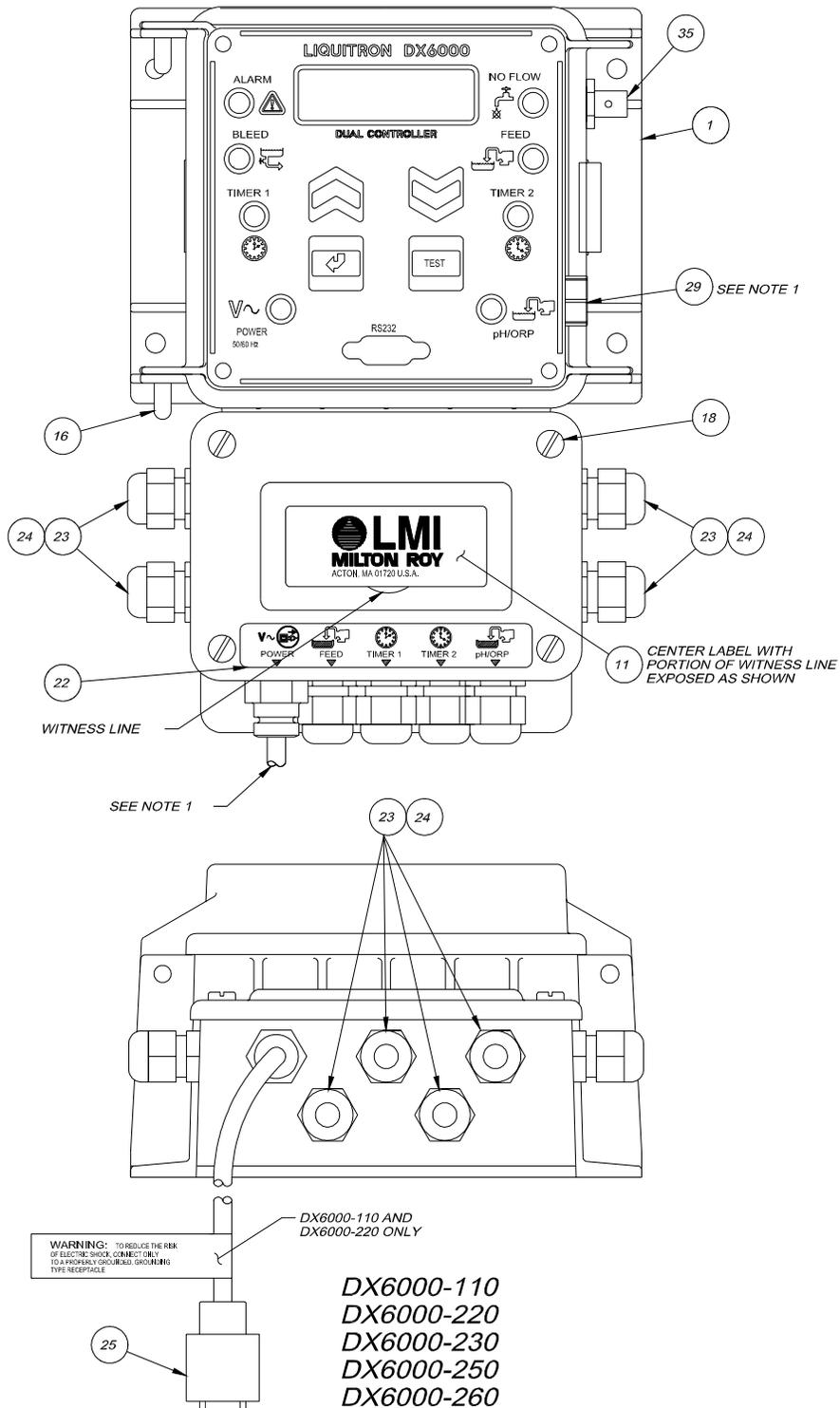
### CAUTION:

Disconnect the power to the controller before opening the front panel! Troubleshooting an repair of a malfunctioning controller should only be attempted by qualified personnel using caution to insure safety and to limit unnecessary further damage. Contact your local LMI distributor for assistance.

PROBLEM	POSSIBLE CAUSE	SOLUTION	
No Power Light	Blown Main Fuse	Test with multimeter/ replace if required	
	No Power supplied	Check power source	
	Loose/Incorrect wiring	Verify wiring connections	
No Display	Blown main fuse	Test with multimeter/ replace if required	
	Blown secondary fuse	Test with multimeter/ replace if required	
	Faulty P.C. Board	Consult Factory	
No Pump Power	Alarm State/No Flow	Check flow switch: "Alarm light On" *	
	Incorrect wiring to pump	Check wiring by using Relay Test program	
	Pump has failed	Plug pump directly into live outlet	
	Incorrect pump settings	Check programmed settings and modes	
*Alarm Light On	Alarm Condition Exists	Verify high conductivity set point	
		Verify low conductivity set point	
		Low chemical tank level (when wired)	
No Valve Power	Flow Switch Off	Check flow switch and wiring	
	Incorrect wiring to valve	Check wiring by using Relay Test program	
	Valve has failed	Test per manufacturers instructions	
	Incorrect Blowdown setpoint	Verify setpoint and rising/falling trip selection	
Low Conductivity	Bypass valve open	Verify valve alignment	
	Airbound probe	Change probe location	
	Solenoid valve stuck open	Repair or replace	
	Sensor disconnected	Check and verify sensor	
	Faulty cable or connector	Replace as required	
High Conductivity	Probe is fouled or dirty	Clean as required & Recalibrate	
	Solenoid valve stuck shut	Repair or replace	
Erratic Conductivity	Unit out of calibration	Recalibrate	
	Unit will not calibrate	Out of range limits- Use Conductivity Test Switch	
	Stagnant Sample	Check system for proper flow	
	Reading stuck on one value	Verify Test Switch is in Run mode not Test mode	
	Faulty P.C. Board	Consult Factory	
	Alarm & Bio LED's On	Biocides pump at same time	Check programmed setting and modes
			Ensure prebleed and lockout do not conflict
No Flow Light On	No Flow circuit energized	Check wiring from flow switch to terminals	
		Verify flow switch is moving freely	
		Verify flow is present in manifold line	



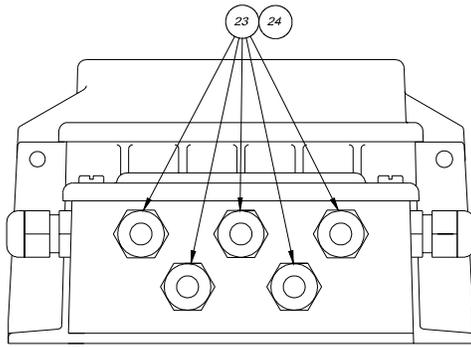
# APPENDIX "A"



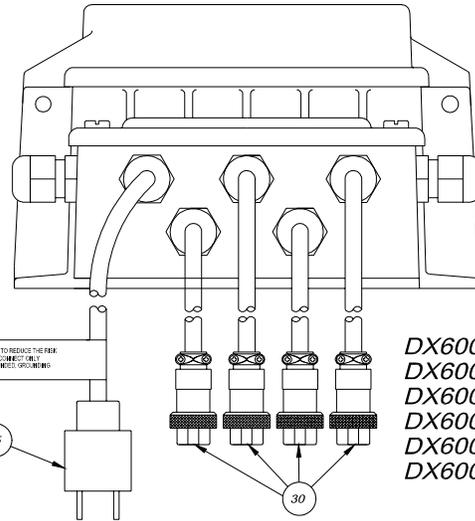
## NOTES:

1. NOT INCLUDED IN DX6000-100, DX6000-102, DX6000-200 AND DX6000-202 USE ITEMS #23 AND #24.
2. PART NUMBERS FOR CALL OUT ITEMS ON PAGE 62

# APPENDIX "A"



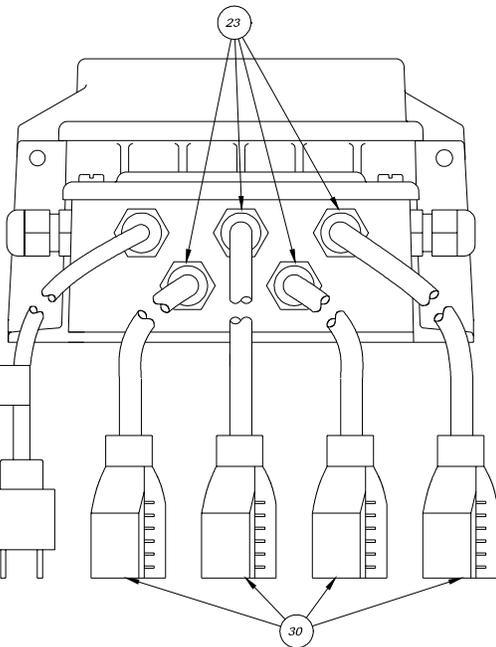
*DX6000-100  
DX6000-200*



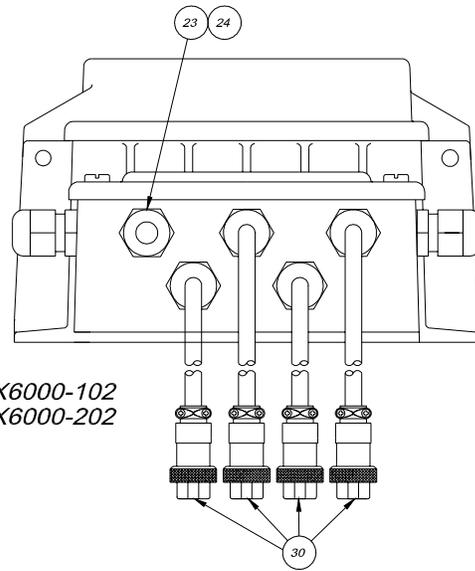
*DX6000-112  
DX6000-222  
DX6000-232  
DX6000-252  
DX6000-262  
DX6000-272*

*DX6000-112 AND  
DX6000-222 ONLY*

**WARNING:** TO REDUCE THE RISK  
OF ELECTRIC SHOCK, CONNECT ONLY  
TO A PROPERLY GROUNDED, GROUNDING  
TYPE RECEPTACLE.



*DX6000-111*



*DX6000-102  
DX6000-202*

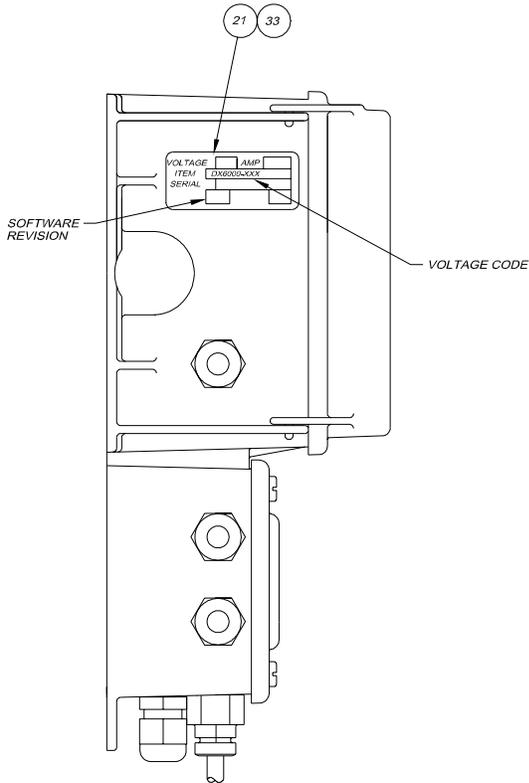
**WARNING:** TO REDUCE THE RISK  
OF ELECTRIC SHOCK, CONNECT ONLY  
TO A PROPERLY GROUNDED, GROUNDING  
TYPE RECEPTACLE.

**NOTES:**

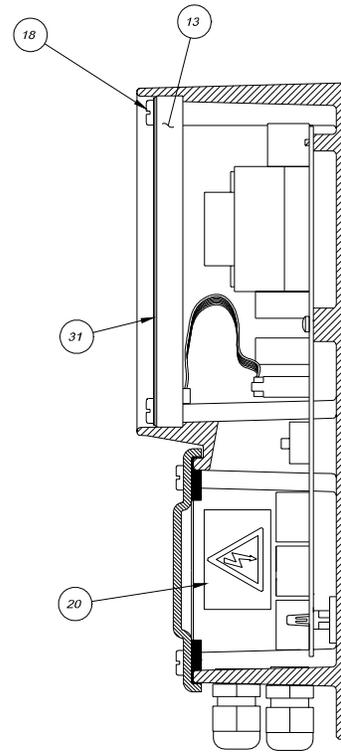
1. NOT INCLUDED IN DX6000-100, DX6000-102, DX6000-200 AND DX6000-202 USE ITEMS #23 AND #24.
2. PART NUMBERS FOR CALL OUT ITEMS ON PAGE 62



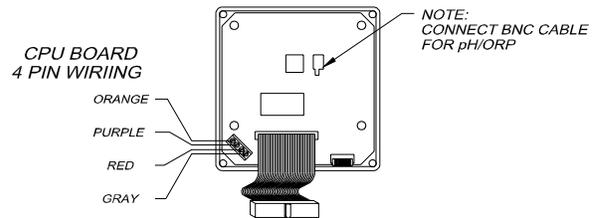
# APPENDIX "A"



VIEW SHOWN WITH COVERS CLOSED



SECTION A-A  
VIEW SHOWN WITH COVER OPEN.



**NOTES:**

1. PART NUMBERS FOR CALL OUT ITEMS ON PAGE 62
2. NOT INCLUDED IN DX6000-100, DX6000-102, DX6000-200 AND DX6000-202.
3. DX6000-100, DX6000-102, DX6000-110, DX6000-111 AND DX6000-112 ARE 115 VOLTS. ALL OTHERS ARE 230 VOLTS.



# APPENDIX "A"

## Part Numbers for Call Outs from Drawings pages 57 - 61

BUBBLE No.	Part No.	Description
1	38210	HOUSING, MACHINED DX6000
2	32186	SCREW, 4-40 X .37 FHSS
3	32187	NUT, 4-40 FLUSH THREADS
4	32209	LATCH, LIQUITRON HOUSING
5	38201	PCB ASM DX6000 I/O
6	31632	SCREW, 6 X .38
7	10955	WIRE, 24 SOLID BUS
8	34716	STANDOFF, ADHESIVE
9	34074	GASKET, FOAM
10	34088	COVER, UTILITY BOX
11	30588	LABEL, LMI LOGO
12	38204	LABEL, TERMINAL STRIP
13	38202	PANEL ASM DX6000 CPU
14	31617	COVER
15	32094	LABEL, HOUSING COVER LMI
16	32211	CAP,
17	32352	O-RING, SPONGE
18	32395	SCREW, SELF TAPPING
19	34911	COVER, FUSE
20	34913	LABEL, HIGH VOLTAGE
21	35184	LABEL SET, SILVER, PER DWG
22	38205	LABEL, DX6000 TERMINAL
23	25957-1	CORD CLAMP
24	36810	DOWEL, PLASTIC .312 X
25	30749	CORD, POWER 115V W/STR.
	30751	CORD, POWER 230V US
	34783	CORD, POWER, UK
	30754	CORD, POWER, AUST
	34784	CORD, POWER, SWISS
26	36739	CONNECTOR ASM, #18 WIRE
27	33566	TERMINAL, SOLDER LUG
28	34735	GROUND WIRE ASM
29	25930	CAP, 4-PIN JACK, CD-67, YELLOW
30	35711	CORD, 115V POWER NEMA
	33636	CABLE ASM, 4 PIN, DPC-40
33	30643	LABEL COVER, CLEAR
34	37434	LABEL, UL (CONTROLLER)
35	34329	CABLE ASM, BNC
36	35712	FUSE, 4A TIME DELAY

# APPENDIX "B"

## Controller Default Settings

Day	Random
Hour	Random
Minute	Random
Temperature	Fahrenheit
Conductivity Set point	2000 uS
Hysteresis	100 uS
Low Alarm	100 uS
High Alarm	4000 uS
Feed Mode	Pulse Timer
Pulse Timer	10 seconds
Pulse Count	1 flow meter count
% Time - Cycle Time	10 minutes
% Time	10%
Feed after Bleed	10%
Feed after Bleed - Limit	10 minutes
Limit (Feed & Bleed)	10 minutes
Flow Alarm (On/Off)	Off
Trip (Rise/Fall)	Rise
4 mA setting	0 uS
20 mA setting	20,000 uS
Display (uS/PPM TDS)	uS
Pump Pulse Feed (0-180 SPM limit)	100 strokes/minute
Pump Pulse Biocide #1 (0-180 SPM limit)	100 strokes/minute
Pump Pulse Biocide #2 (0-180 SPM limit)	100 strokes/minute
Controller Cooling Continuous/Timed	Continuous
Biocide Lockout (0-999 minute limit)	10 minutes
Biocide Prebleed (0-60 minute limit)	0 minutes
Biocide Repeat Cycle ( OFFc- 4 week limit)	1 week
RS-232 Baud Rate	57,600
RS-485 Baud Rate	57,600
Back Light	On

# APPENDIX "B"

## Controller Default Settings

	ORP			pH		
	Proportional		On/Off	Proportional		On/Off
	Pt 1	Pt 2		Pt 1	Pt 2	
Pump pH/ORP Set Point	100	750	100	7.5	10.5	7.5
Pump pH/ORP Pulses/Min.	20	90		20	90	
<b>Hysteresis</b>						
Hysteresis 1			50			0.5
Hysteresis 2			50			0.5
<b>Alarms</b>						
	Alarms			Alarms		
Alarm 1	-1000mV			2pH		
Alarm 2	1000mV			12.5pH		
Hysteresis	10 mV			.5pH		
<b>mA Response</b>						
	mA Response			mA Response		
Current Low	4.0 mA			4.0 mA		
Signal Low	-1000 mV			0.0 pH		
Current High	20.0 mA			20.0 mA		
Signal High	1000 mA			14.0 pH		
<b>Timers</b>						
	Timers			Timers		
Pump pH/ORP On-Time	20:00 Min			20:00 Min		
<b>Calibration</b>						
	Calibration			Calibration		
Number of Points	2			2		
Buffer 1	80			7		
Buffer 2	400			10		





201 Ivyland Road  
Ivyland, PA 18974 USA  
TEL: 215-293-0401  
FAX: 215-293-0445  
<http://www.lmipumps.com>