

# M820 pH/Dual ORP Controller



## Owner's Manual



*Simply intelligent water care.*

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Certified to  
NSF/ANSI Standard 50

## I. Introduction

### A. Water Chemistry

Water chemistry is a complex science that contains many variables. These variables not only affect the water environment itself, but they can have adverse effects on your equipment as well as your health. These are only some of the factors which we follow closely to ensure the most healthy water interactions:

pH is the measurement of the acidity or basicity in an aqueous solution. A measurement below 7 is considered acid, while a measurement above 7 is base or alkaline. It is a significant factor in determining the water quality as it affects sanitizer levels, water color, and human reaction to the water.


ORP (Oxidation Reduction Potential) is the measurement of the oxidizing capacity present in water. ORP cannot be fooled by the effects of pH, total dissolved solids (TDS), stabilizers, and non-chlorine oxidizers. A typical ORP sensor measures Hypochlorous Acid (HOCl), which is the more effective component of free chlorine. A higher ORP reading equates to the sanitizer working more effectively.

Water balance is comprised of pH, calcium hardness, total alkalinity, temperature, and TDS. When water is balanced, the Langelier Saturation Index is 0. Values above +0.3 lead to scaling and cloudy water, while values below -0.3 can cause corrosion of pool equipment and surfaces. If the water balance is not fixed in a timely manner, secondary effects can lead to rapidly declining water conditions that can affect the health of the water occupants.

pH and ORP work conversely to one another, and are affected by other factors such as temperature, Cyanuric Acid, and TDS that can increase the negative impacts of unbalanced water.

## B. IMPORTANT SAFETY INSTRUCTIONS

### 1. READ AND FOLLOW ALL INSTRUCTIONS.

2. **Risk of electric shock:** Connect the controller to a dedicated ground-fault circuit interrupter (GFCI) circuit breaker.
  - a. A green colored terminal or a terminal marked G, GR, Ground, Grounding, or the  symbol\* is located inside the supply terminal box or compartment. To reduce the risk of electrical shock, this terminal must be connected to the grounding means provided in the electrical supply service panel with a continuous copper wire equivalent in size to the circuit conductors supplying this equipment.  
*\*IEC Publication 417, Symbol 5019.*
3. Disconnect power before servicing the controller.
4. Inspect all power cords frequently. Any damaged cords should be replaced immediately to reduce the risk of injury by shock.
5. Always maintain a record of manual water chemistry readings using an accurate test kit. Automated controllers are not a substitute for this Health Department requirement.

6. **WARNING** – To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

7. Danger – Risk of injury.
  - a. Replace damaged cord immediately.
  - b. Do not bury cord.
  - c. Connect to a grounded, grounding type receptacle only.

8. **WARNING** – Risk of electric shock. Install at least 5 feet (1.5m) from inside wall of water enclosure using non-metallic plumbing.

9. Operation of this controller without a functioning flow-switch will void the NSF Certification.

10. **WARNING** – Do not install this controller where it is accessible to the public.

11. **SAVE THESE INSTRUCTIONS.**

## C. System Components

### 1. IPS M820 pH/Dual ORP Controller

- a. Allows automatic monitoring of water sanitization and pH balance through a simple, user-friendly interface, resulting in easier management of water balance in swimming pools, spas, or circulating water environments.
- b. Can be easily installed into your existing pool environment and equipment, or can be customized to your needs.
- c. Monitors and displays the pH and ORP levels using LEDs and digital readouts on the front panel. If the temperature sensor is installed, the M820 will monitor temperature and display on the front panel when in Temp mode. Additionally, it will monitor up to two chemical tanks equipped with level switches and displays status using LEDs on the front panel.

There are six separate function buttons allow simple pushbutton control of these individual parameters:

- 1) Set Level – ORP or pH level to be maintained,
  - 2) Dose Time – Timed or continuous feed modes,
  - 3) Delay Time – Delay time between feed cycles,
  - 4) Over Timer – Maximum feed cycles or time allowed,
  - 5) High Alert – Maximum level of ORP or pH allowed,
  - 6) Low Alert – Minimum level of ORP or pH allowed,
  - 7) pH Cal – pH calibration for variation in pH sensors.
- d. When the pH level rises above (acid feed) or falls below (base feed) the set level, the controller will activate the chemical feeder for the set dose time. Then the set delay time will occur. This dose and delay time will occur until the set level is reached.
  - e. When the ORP (sanitizer) level reaches the set level, the controller will activate the chemical feeder for the set dose time. Then the set delay time will occur. This dose and delay time will occur until the set level is reached.

2. Flow Cell with Flow Switch
  - a. An injection-molded flow cell with integrated flow switch houses the pH and ORP sensors, and partners with the M820 controller to monitor the pH and ORP levels in the water.
  - b. The flow switch verifies that water is flowing during a feed cycle, and sends the controller instructions to deactivate the feed if water is not flowing.
  - c. Operation of this controller without a functioning flow-switch will void the NSF Certification. Routinely check that the flow-switch is functioning by closing the left valve on the bottom of the flow-cell (flow light should turn off).
3. pH and ORP Sensors
  - a. pH Sensor – standard (Use only IPS Controllers part # SXPH to maintain NSF Certification)
  - b. ORP Platinum Sensor – standard (Use only IPS Controllers part # SXORP to maintain NSF Certification)
  - c. ORP Gold Sensor – for use with Salt Chlorine systems (Use only IPS Controllers part # SXORP-G to maintain NSF Certification)
4. Fittings – tubing connectors (2) for tapping installation of flow cell input/output
5. In-line Filter with 2-way valves and mounting clamps (2)
6. Tubing – 25 feet of 3/8"
7. Mounting Board – ABS plastic with mounting holes and stainless hardware (16" x 12" standard, 24" x 19" optional for mounting two chemical pumps)
8. Temperature Sensor – Senses the current water temperature and displays the temperature in the display when in Temp mode.

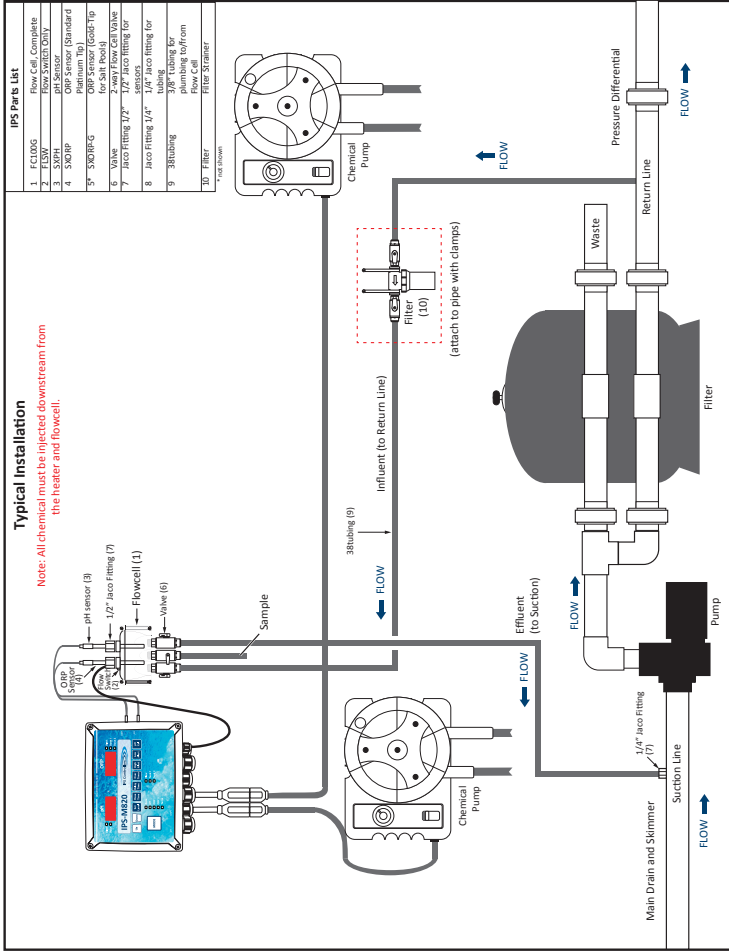


Figure 1: This is a typical installation using IPS' system package, which consists of an M820 pH/dual ORP Controller, flow cell with switch, and two pumps mounted on the large board.

## **D. Specifications**

*Enclosure:* 7.95”L x 5.98”W x 3.54”D

*Electrical Input/Output:* 120/240 VAC, 50 - 60 Hz

*ORP Set Level:* 400 mV to 900 mV

*pH Set Level:* 7.0 to 8.0

*Dose Time:* Off, Continuous, or Timed cycle

*Delay Time:* 1 - 99 minutes

*Over Timer:* Off, 20-100 timed cycles, or 20-180 continuous minutes, default of 60

*High Alert:* pH default of 8.0, ORP default of 900

*Low Alert:* pH default of 7.0, ORP default of 100

*Readout:* Function LED and numerical digital displays

*Alarm:* Red alert LEDs with optional external audible/visible alarm



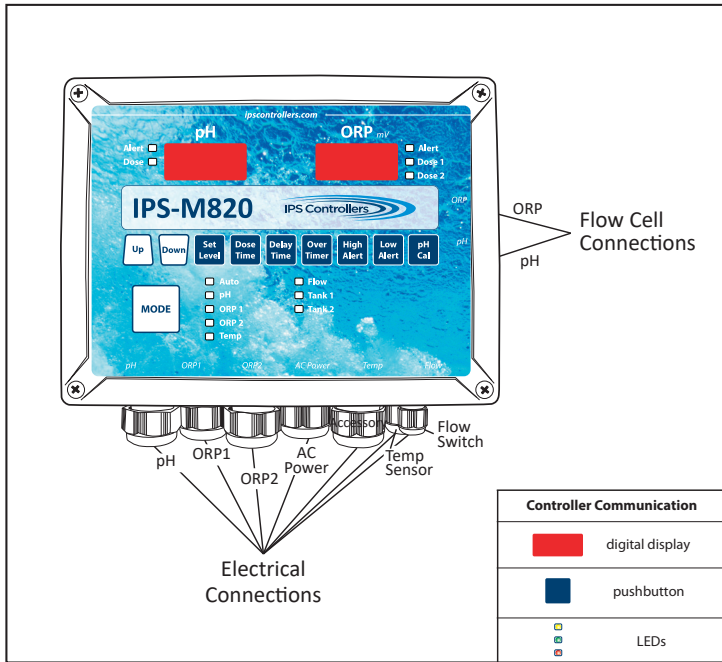


Figure 2: M820 Controller Components Connections

## E. Controller Panel Descriptions

1. Digital Displays and Function LEDs
  - a. pH
    1. Alert (High/Low) - red LED
    2. Dose - green LED
    3. Flashing LEDs - Over Timer Alert
  - b. ORP
    1. Alert (High/Low) - red LED
    2. Dose 1 - yellow LED
    3. Dose 2 - yellow LED
    4. Flashing LEDs - Over Timer Alert

2. Mode - pushbutton adjustments
  - a. Auto - red LED
  - b. pH standby - green LED
  - c. ORP1 standby - yellow LED
  - d. ORP2 standby - yellow LED
  - e. Temp display & calibrate - green LED
  - f. OFF mode - In standby, press and hold Mode button for 3 seconds to turn controller off. There is still power to the controller in this mode, but no dosing will occur. Press and hold to turn the controller back on.
3. Up/Down Arrows - pushbutton adjustments of following:
  - Set Level
  - Dose Time
  - Delay Time
  - Over Timer
  - High Alert
  - Low Alert
  - pH Cal
4. Flow - green LED
5. Tank 1 - red LED
6. Tank 2 - red LED
7. Electrical Connections (peripherals)
  - a. pH output (left receptacle) - max. 3.3 amps @ 110/230 VAC max
  - b. ORP1 output (center receptacle)- max. 3.3 amps @ 110/230 VAC max
  - c. ORP2 output (right receptacle) - max. 3.3 amps @ 110/230 VAC max
  - d. AC power - 120 VAC/240 VAC, 50-60 Hz
  - e. AC power protection - Fused at .500 amps (500mA)
  - f. Flow - from flow cell
  - g. Tank 1 - from tank level switch (optional)
  - h. Tank 2 - from tank level switch (optional)

- i. External audible/visible alarm (optional)
- j. pH sensor - BNC connection
- k. ORP sensor - BNC connection
- l. Optional dry contact ORP1 output (contact factory for instructions)

## F. Electrical Descriptions

1. Power
  - a. 120 VAC, 50-60 Hz, 3-wire grounded NEMA 5 power cord. GFCI source required. **Note: For 240 VAC, a hardwire connection is required. Use only 18AWG stranded copper wire. The controller's power supply will automatically detect the incoming power and will output the same power to your devices. All output devices (feeders) must match incoming voltage.**
2. Dip Switches (1-4)
  - 1: pH/ORP interlock (default: **OFF**)
    - No ORP1 or ORP2 feed if pH is feeding (ON).
  - 2: pH/ORP alert interlock (default: **ON**)
    - No ORP1 or ORP2 feed if pH is in alert mode (ON).
    - No interlock (OFF)
  - 3: Acid/Base default acid (default: **OFF**)
    - Feed base chemical when pH level falls below set point. (ON)
    - Feed acid chemical when pH above set point. (OFF)
  - 4: Not in use.



Figure 3: Dipswitches

## **II. Installation**

### **A. Setup (Installation video available at [ipscontrollers.com](http://ipscontrollers.com))**

1. Turn off all peripheral equipment such as heaters, chemical feeders, and pumps.
2. Relieve pressure from the filtration system.

### **B. Tools**

1. Cordless drill
2. 1/4" NPT Tap
3. 7/16" drill bit
4. 1/4" or 3/8" drill bit for Temp Sensor (optional)
5. Masonry drill bit and anchors, or other appropriate fasteners
6. 13/16" wrench or channel-lock pliers

### **C. Procedure**

1. Location
  - a. Wall area with easy access
  - b. Within 8 feet of feeder
  - c. At least 10 feet from water edge
  - d. Close proximity to time clock
  - e. Within 6 feet of GFCI power source
2. Mounting
  - a. Controller and flow cell are factory-mounted to ABS board for your convenience.
  - b. Securely mount ABS mounting board with M820 controller and flow cell on wall (vertical installation).
  - c. If applicable, securely attach the peristaltic pumps to the optional larger ABS mounting board with the provided hardware.

- d. Drill a 7/16" hole and tap a 1/4" NPT port to a location downstream from the filter and upstream from the heater and any chemical introduction points. Install a tubing connector and flex tubing to be connected to the left side flow cell port containing the flow switch. The in-line filter will also be installed in this line and mounted to a horizontal pipe with band clamps (included). **Note: Verify that the filter is installed with directional arrows pointing in the direction of the flow.**
- e. Drill a 7/16" hole and tap a 1/4" NPT port to a location that is subject to vacuum or reduced pressure (after heater). Install a tubing connector and flex tubing to be connected to the right-side flow cell port. **Note: We recommend that this tubing connector be installed into the drain hole on the suction side of the pump for best performance.**
- f. Cut a 3" - 6" length of flex tubing and insert into the flow cell's sample stream port (center).

### 3. pH and ORP Sensors

**Note: Carefully unpack the pH and ORP sensors and set aside in a clear area until ready to install into the flow cell.**

- a. Verify that the M820 controller power is OFF.
  - b. Remove the plastic protective caps from the sensors and store in a separate location for future re-use.
  - c. Slide the glass end of each sensor (pH and ORP) into one of the compression fittings located at the top of the flow cell. Ensure that the tip is submerged into the water to within 1/2" from the bottom of the flow cell. Hand tighten each nut fitting.
- ### 4. Temperature Sensor (optional)
- a. Drill a 3/8" inch hole after the filter and before the heater.
  - b. Insert the temperature sensor into the drilled hole and secure with a band clamp (included).

- c. Run the sensor cable into the controller through the strain relief marked “temp” and connect to the terminal block on the front circuit board marked “Temp”.
5. Electrical Connections (Should be completed by a licensed Electrician)
  - a. Verify that the M820 controller power is OFF.
  - b. Connect the pH feeder connection to the appropriate peristaltic pump or other device.
  - c. Connect the ORP feeder connection to the appropriate peristaltic pump or other device. **Note: There is another connection port for ORP2.**
  - d. Method 1 (recommended): Connect the AC power cord to the load-side of the circulation pump circuit. This will only provide power to the M820 when the circulation pump is running.
  - e. Method 2: Connect the AC power cord to a GFCI power source, or separately purchased IPS Controllers PressureSwitch (part # PS100).
  - f. Connect the pH sensor connector to the corresponding lower port (labeled pH) at the right edge of the controller.
  - g. Connect the ORP sensor connector to the corresponding upper port (labeled ORP) at the right edge of the controller.
6. Chemical injection must be inserted in the return line, after (downstream) any equipment.
7. Optional connection to a Salt Chlorine Generator (SCG)

The M820 controller is capable of controlling (turning on/off) a SCG depending on the current ORP reading. This action can be accomplished using a 120V or 240V relay, or by connecting the SCG to the “normally open” dry contact relay (ORP1) included with the M820 controller. When using the ORP1 Dry Contact Relay, the black plastic jumper identified as HD2 needs to be repositioned from the lower position (see Figure 4) to the open pegs at the top.



Figure 4: HD2 Jumper

## 8. Converting from Cord to Permanent Connection

- a. Remove cover.
- b. Loosen strain relief gland from AC cord.
- c. Using a 3/32" (2.44mm) slot screw driver, carefully loosen terminals that attach the AC cord to the controller box.
- d. Remove the AC cord.
- e. Replace the AC cord with a minimum jacketed cord of 18/3 AWG SW 105° 900 V, then carefully hand-tighten the terminals on the strain relief gland. **Note:** For liquid tight installation connections, replace the strain relief gland with a liquid tight connector and use a minimum stranded wire gauge of 18 AWG 105° 600 V (**do not use solid conductor**) for each conductor: Black (hot), White (common), and Green (ground).

### **Important:**

The minimum allowable conductor size is 18 AWG with an ampacity of 10 AMPS, and a ground fault interrupt circuit breaker of 15-20 AMPS.

Use stranded copper wire only.

### III. Operation

#### A. Overview

The IPS-M820 compares the readings received from the Ph and ORP sensors to the Set Levels entered for Ph, ORP1, and ORP2. If the readings are too low or too high, the controller will turn on the feed devices for the Dose Time entered during set up. Other settings are used to fine tune the delivery of chemical, as well as prevent over and under dosing.

#### B. Startup and Shutdown

##### 1. Startup

- a. Provide power to the M820 using either Method 1 or 2 as discussed in step 6d or 6e on page 13.
- b. Turn on the filter pump and verify the water flow through the flow cell by opening the sample port valve (center) and observing a steady stream of water. The right side valve may need to be partially closed to produce a steady stream. **Note: Water should pass over the pH and ORP sensors for a minimum of 5 minutes to allow for accurate, stable readings of pH and ORP levels from the pool or spa. ORP readings may take longer to stabilize.**
- c. Check for leaks and repair if necessary.
- d. Manually adjust and balance the pool or spa water to acceptable ranges using a test kit. **Note(s): 1. Use a DPD based test kit to check the chlorine level. 2. Cyanuric Acid (Conditioner) levels should not exceed 30 ppm for best results.**
- e. Verify that the green Flow LED is illuminated. Both the pH and ORP dose outputs are disabled if there is no water flow.



- f. Press the Mode pushbutton momentarily to place the controller into the pH standby mode. The green pH standby LED will illuminate. Select the desired pH set level and dose time (continuous or timed). Please call us at 877-693-6903 for assistance with initial settings.
- g. While still in the pH standby mode, press the pH Cal pushbutton to calibrate the reading to the value observed through the manual testing of the water. **Note: Always calibrate using water from the sample port of the flow cell.**
- h. Press the Mode pushbutton momentarily to place the controller in ORP1 standby mode. The yellow ORP1 standby LED will illuminate. Select the desired ORP1 set level and dose time (continuous or timed). Please call us at 877-693-6903 for assistance with initial settings.
- i. Press the Mode pushbutton momentarily until the red Auto LED is illuminated. **Note: If pH level in the pool is at desired set level and chlorine/bromine level is at desired PPM level in the pool, then the ORP set level should be the same as the current ORP reading when in Auto Mode.**

## 2. Shutdown

**Note: Each time the Mode pushbutton is momentarily pressed, the mode will cycle from Auto to pH to ORP1 to ORP2, Temp, and then return to Auto mode.**

- a. Press the Mode pushbutton momentarily to place the controller in pH standby mode. The green pH standby LED will illuminate, and both the pH and ORP digital displays will show dashes.
- b. Press and hold the Mode pushbutton for 2 seconds until both the pH and ORP digital displays read OFF.
- c. Release the Mode pushbutton. The M820 controller will turn off, and the digital displays and function LEDs will go blank. The green Flow LED will be illuminated if water is flowing through the flow cell.

## C. Modes and Adjustments

### 1. Auto

- a. This is the normal operational mode of the M820 controller.
- b. The controller allows full operation and monitoring of both pH and ORP levels.
- c. No function pushbuttons are operational in this mode.
- d. The red function LED next to Auto is illuminated.
- e. pH and ORP digital displays monitor the sensor input levels.

### 2. pH standby

**Note: While in this mode, the green pH standby LED will illuminate, both the pH and ORP digital displays will show dashes, and all Auto functions will be disabled. When a function pushbutton is pressed, the corresponding digital display will show the function. Use the Up or Down arrow buttons to the left to increase or decrease the function value.**

- a. Set Level
  1. Default: 7.4 pH
  2. Selectable range: 7.0 – 8.0 pH (in 0.1 increments)
- b. Dose Time
  1. Default: Timed dose of 10-second pH feed relay energized and 5 minutes pH feed relay de-energized. In the timed dose cycle mode, the dose LED will flash while dosing and illuminate steadily during the delay portion of the timed cycle. In continuous dose mode, the dose LED will flash while dosing, and dosing will continue until pH is 0.2 below (or above if feeding base) Set Level.
  2. Selectable range: OFF, CON (continuous), and Timed (10 – 900 seconds ON)

- c. Delay Time
  - 1. Default: Delay time of 5 minutes between feed cycles (timed feed only). After dose time, the controller will wait (delay) for the specified minutes before checking the current level and dosing again if necessary.
  - 2. Selectable range: 1 - 99 minutes.
- d. Over Timer
  - 1. Default: ON. The Over Timer does not automatically reset. It must be reset by pressing the Mode button to cycle through the Standby mode and back to the Auto mode.
  - 2. The Over Timer is interlocked with the Dose Time selection.
    - a. If the Dose Time is set to a timed cycle, the Over Timer will count timed feed cycles. Every time the set level is reached the time will reset its count. If the preset cycle is reached, the pH digital display will flash, and the pH output relay will de-energize. The controller must be reset manually by cycling out of and back into the Auto mode using the mode button.
      - Selectable range: 20 to 100 cycles
    - b. If the Dose Time is set to a continuous feed mode, the Over Timer will count in minutes. Default is 60 minutes.
      - Selectable range: 20 to 180 minutes
  - 3. When the Dose Time is changed from either timed or continuous feed, the Over Timer is reset to Default.
  - 4. Turning off the Over Timer will void any NSF Certification and is not recommended for safety reasons.

- e. High Alert
  - 1. Default: 8.0 pH
  - 2. Selectable range: OFF, 7.5 pH to 8.4 pH (acid feed). A high alert will occur if the pH level remains above the High Alert level for 10 continuous minutes, and will automatically turn off the High Alert when the pH level falls below the high alert level for 1 continuous minute. During High Alert, the pH dose output will be disabled, and by default ORP1 and ORP2 will be disabled (see Dip Switch #2 settings).
- f. Low Alert
  - 1. Default: 7.0 pH
  - 2. Selectable range: OFF, 6.8 pH to 7.4 pH (acid feed). A low alert will occur if the pH level remains below the Low Alert level for 10 continuous minutes, and will automatically turn off the Low Alert when the pH level rises above the low alert level for 1 continuous minute. During Low Alert, the pH dose output will be disabled.
- g. pH Cal
  - 1. Use to adjust pH to manually tested value.
  - 2. Maximum increase/decrease is 0.9 pH within the 6.0 to 8.4 display window.

3. ORP1 standby

**Note: While in this mode, the yellow ORP1 standby LED will illuminate, both the pH and ORP digital displays will show dashes, and all Auto functions will be disabled. Use the Up or Down arrow buttons to the left to increase or decrease the function value.**

- a. Set Level
  - 1. Default: 650 mV
  - 2. Selectable range: 400 mV to 900 mV (in 5 mV increments)

b. Dose Time

1. Default: 10-second ORP feed relay energized and 5 minutes ORP feed relay de-energized (timed dose time). In the timed dose cycle mode, the dose LED will flash while dosing, and will illuminate steadily during the delay portion of the timed cycle. In continuous dose mode, the dose LED will flash while dosing, and dosing will continue until ORP is 10 mV above Set Level.
2. Selectable range: OFF, CON (continuous), and Timed (10 to 900 seconds ON)

c. Delay Time

1. Default: Delay time of 5 minutes between feed cycles (timed feed only). After dose time, the controller will wait (delay) for the specified minutes before checking the current level and dosing again if necessary.
2. Selectable range: 1 - 99 minutes.

d. Over Timer

1. Default: ON. The Over Timer does not automatically reset. It must be reset by turning the controller off, then on.
2. The Over Timer is interlocked with the Dose Time selection.
  - i. If the Dose Time is set to a timed cycle, the Over Timer will count timed feed cycles. Every time the set level is reached the Over Timer will reset the count. If the set (default is 60 cycles) Over Timer cycle is reached, the ORP digital display will flash, and the ORP output relay will de-energize.

3. Selectable range in timed feed: OFF, 20 – 100 feed cycles. Selectable range in continuous feed: OFF, 20 – 180 minutes. When the Dose Time is changed from either timed or continuous feed, the Over Timer is reset to Default.
  4. Turning off the Over Timer will void any NSF Certification and is not recommended for safety reasons.
  - e. High Alert
    1. Default: 900 mV
    2. Selectable range: 650 mV to 900 mV, no OFF. A high alert will occur if the ORP level remains above the High Alert level for 10 continuous minutes, and will automatically turn off the High Alert when the ORP level falls below the high alert level for 1 continuous minute. During High Alert, the ORP1 dose output will be disabled.
  - f. Low Alert
    1. Default: 100 mV
    2. Selectable range: OFF, 100 mV to 640 mV. A low alert will occur if the ORP level remains below the Low Alert level for 10 continuous minutes, and will automatically turn off the Low Alert when the ORP level rises above the low alert level for 1 continuous minute. During Low Alert, the ORP1 dose output will be disabled.
  - g. pH Cal disabled
4. ORP2 standby
- Note: While in this mode, the yellow ORP2 standby LED will illuminate, both the pH and ORP digital displays will show dashes, and all Auto functions will be disabled. Use the Up or Down arrow buttons to the left to increase or decrease the function value.**

- a. Set Level
  - 1. Default: 640 mV
  - 2. Selectable range: 400 mV to 890 mV (in 5 mV increments), cannot be set for less than 10 mV below the ORP1 set level.
- b. Dose Time
  - 1. Default: OFF. In the timed dose cycle mode, the dose LED will flash while dosing and illuminate steadily during the delay portion of the timed cycle. In continuous dose mode, the dose LED will flash while dosing, and dosing will continue until ORP is 10 mV above Set Level.
  - 2. Selectable range: OFF, CON (continuous), and Timed (10 to 900 seconds ON)
- c. Delay Time
  - 1. Default: OFF. Delay time of 5 minutes between feed cycles (timed feed only). After dose time, the controller will wait (delay) for the specified minutes before checking the current level and dosing again if necessary.
  - 2. Selectable range: 1 - 99 minutes.
- d. Over Timer
  - 1. Default: ON. The Over Timer does not automatically reset. It must be reset by using the mode button to cycle out of auto and then back to auto mode.
  - 2. The Over Timer is interlocked with the Dose Time selection.
  - 3. If the Dose Time is set to a timed cycle, the Over Timer will count timed feed cycles. Every time the set level is reached the Over Timer will reset the count. If the set (default is 60 cycles) Over Timer cycle is reached, the ORP2 output relay will de-energize. ORP2 will not flash ORP digital display if ORP2 overfeed occurs).

4. Selectable range in timed feed: OFF, 20 – 100 feed cycles. Selectable range in continuous feed: OFF, 20 – 180 minutes. When the Dose Time is changed from either timed or continuous feed, the Over Timer is reset to Default.
  5. When the Dose Time is changed from either timed or continuous feed, the Over Timer is reset to Default.
  6. Turning off the Over Timer will void any NSF Certification and is not recommended for safety reasons.
- e. High Alert controlled by ORP1.
  - f. Low Alert controlled by ORP1.
  - g. pH Cal disabled
5. Temp Mode
    - a. Water Temperature will be displayed if the temperature sensor is installed. Display will show the water temp when Temp mode is entered and will not change while displayed.
    - b. Temperature can be calibrated by using the Up/Down arrow keys (+/- 10 degrees).
    - c. Display can be changed from Fahrenheit to Celsius by pressing the pH Cal button.
  6. Flow
    - a. The controller and flow cell are shipped pre-mounted to a small (16" x 12") or large (24" x 19") ABS plastic board. The integrated flow switch is pre-wired to the controller.



*Figure 5: Flow Switch Terminal*



- b. The flow switch must be installed for safety reasons to prevent dosing chemicals when there is no flow in the circulation piping.
- c. Prior to installation, the controller operation can be tested by tilting the populated mounting board until the controller's green light turns on (flow switch magnet at the switch's top).

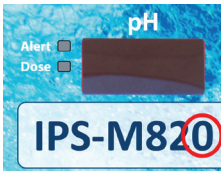


Figure 6: Hidden button

## 7. Hidden Features

- a. The Up/Down buttons can be locked out to prevent unauthorized changes to the settings. There is a hidden button behind the "0" in IPS-M820 on the front overlay. Place the M820 into standby mode and then press and hold the hidden button for 2 seconds, until the display indicates "Loc On" and the Up/Down keys do not operate. All other feature buttons will work to display current settings. Turn the lock off by holding the hidden button down for 2 seconds until the display indicates "Loc Off".
- b. The M820 can be forced to manually dose pH, ORP1, or ORP2 by placing the M820 into the standby mode that is desired (pH, ORP1, ORP2), and then holding down the Dose Time button and pressing the Delay Time button. The M820 will dose for the time set in the dose time setting (timed-feed only).

## 8. Factory defaults

To return the controller to the factory defaults:

- a. Place the controller in Standby Mode.
- b. Turn off the controller by holding down the Mode button.
- c. Press and hold both the Set Level and pH Cal pushbuttons, and then press the Mode button.
- d. The pH display will show “Ld” and the software version number will display in the ORP window.
- e. The controller will be returned to the factory default functions and be placed in the test mode.
- f. Return the controller to full operation by again turning off the controller with the Mode button. Then turn the controller on again by pressing the Mode button. **Note: Failure to complete this action will leave the controller in the test mode.**

## D. Maintenance

1. Winterizing (extended shutdowns or colder climates)
  - a. Turn off the M820 controller and shut off main power to controller.
  - b. Gently remove the pH and ORP sensors from the flow cell. Fill the provided protective caps (removed during installation) with water and re-install onto each sensor, and store in a warm, secure location. Sensor ends must remain in water for the duration of the storage time.
  - c. Drain the water from the flow cell.

### 2. Cleaning the sensor tips

**Note: It is important to keep the sensor tips clean to ensure accurate readings.**

- a. Sensor tips should be cleaned every 3 to 6 months for commercial pools and spas, and every 6 to 9 months for residential pools and spas. Determine the necessary frequency by comparing the readings before and after the cleaning. Identical readings mean that the cleaning time can be extended.
- b. Turn off the M820 controller.
- c. Close the right and left valves at the bottom of the flow cell.
- d. Loosen the nut fitting on the sensor and gently remove it from the flow cell.
- e. Swirl the sensor tip in a solution of liquid dish soap and water for 30 seconds and rinse with water.
- f. Swirl the sensor tip for 5 seconds in Muriatic acid or white vinegar and rinse with water. **Note: Do not touch or brush the sensor tip.**
- g. Gently re-insert the sensor into the flow cell and hand tighten the nut fitting.

- h. Turn on the M820 controller.
  - i. Open the flow cell valves and wait for a few minutes for the system to stabilize and get an accurate reading. Adjust the Set Level if necessary.
3. Checking the ORP sensor
- a. Place the sensor in a cup of tap water. The reading should gradually drop down to 400mV.
  - b. Add a pinch of Dichlor, Trichlor or a drop of Liquid Chlorine into the water. The reading should increase above 750mV.
4. Checking the pH sensor
- a. Place the sensor in a cup of tap water.
  - b. Add a small amount of acid to the water and take a reading. It should show a low number (probably 6.0).
  - c. Rinse the sensor, then place into a solution that is higher than 7.5pH. Verify that the reading is increasing.

## IV. Troubleshooting

### A. pH level too low or Alert Led On

1. *pH Set level is too low:* Check pH level with test kit and adjust as necessary.
2. *Chemical dose time too high:* Lower dose time.
3. *Chemical feeder is empty (base):* Refill the feeder.
4. *Sensor malfunction:* Replace sensor.

*\*Low alkalinity can also cause pH to drift to lower levels. Always target 80-120ppm*

### B. pH level too high or Alert LED On

1. *Sensor tip is dirty:* Clean according to maintenance instructions.
2. *Improper pH sensor calibration:* Adjust pH calibration.
3. *Chemical feeder is empty (Acid):* Refill the feeder.
4. *Chemical feed pump or squeeze tube malfunction:* Repair the feed pump or replace the squeeze tube. A squeeze tube will last 3-6 months for commercial properties and 6-12 months for residential properties.
5. *Chemical dose time too low:* Increase dose time.

*\*High alkalinity will require more acid than usual to maintain pH levels. Always target 80-120ppm*

### C. Chlorine/Bromine level too low or Alert LED On

1. pH should be at your desired set level before addressing any potential ORP problems.
2. *ORP Set level is too low:* Check Sanitizer level with test kit and adjust set Level as necessary

3. *Controller undershooting set level:* 1) Check for proper valve positions and leaks in chlorine lines, or 2) Increase dosing time if using timed feed, or switch to continuous feed if using a salt chlorine generator.
4. *Chemical dose time too low:* Increase the dose time.
5. *Chemical feeder is empty:* Refill the feeder.
6. *Chemical check valve/injector is clogged:* Switch acid feed tube to chlorine injector to clean, or replace them.
7. *Chemical feed pump or squeeze tube malfunction:* Repair the feed pump or replace the squeeze tube. A squeeze tube will last 3-6 months for commercial properties and 6-12 months for residential properties.
8. *Sensor malfunction:* Replace sensor.

#### **D. Chlorine/Bromine level too high or Alert LED On**

1. pH should be at your desired set level before addressing any potential ORP problems.
2. *ORP Set level is too high:* Check Sanitizer level with test kit and adjust as necessary.
3. *Controller overshooting set level:* Lower dosing time, or switch from continuous feed to timed feed.
4. *Problem with chlorine supply:* 1) Verify that the chlorine feeder is not empty, or 2) Verify that the solenoid valve on the feeder is not stuck open.
5. *Sensor tip is dirty:* Clean according to maintenance instructions.

#### **E. Display and LEDs off**

1. *No power supply:* Check circuit breaker and/or controller fuse protecting the transformer.

**F. Feeder not operating**

1. *No Flow*: Flow light LED must be on.
2. *Inadequate Flow*: Check flow through the flow cell and controller.
3. *Blown output fuse in the controller*: Replace fuse.

**G. Flow LED off**

1. Verify that all appropriate valves are open.
2. Verify that there is sufficient pressure in the line. Close right side valve slightly if necessary.
3. Verify that the flow switch is securely connected to the controller terminals.
4. Both the pH and ORP dose outputs are disabled if the green Flow LED is not illuminated.

## **V. Warranty**

### **IPS-M820 pH/Dual ORP Controllers**

IPS Controllers warrants the IPS-M820 controller to be free of defects in materials and workmanship for a period of five (5) years from the date of installation. This warranty is limited to the repair or replacement of defective components (at our discretion) when returned to the factory within the five (5) year warranty period.

### **Other Components**

IPS Controllers warrants all other components including flow cells and flow switches for a period of one (1) year from the date of installation. Sensors will be under warranty for a period of one (1) year from the date of factory purchase. This warranty is limited to the repair or replacement of defective components (at our discretion) when returned to the factory within the one (1) year warranty period.

### **Limitation of Liability**

This Limited Warranty excludes liability for any damage during transportation, consequential damages of any kind, damages due to improper installation or improper operation, improper handling of chemicals, and the use of this product in applications for which it was not designed.

### **Claims**

All warranty claims should be directed to IPS Controllers. After receiving a Returned Merchandise Authorization (RMA) number, all product must be returned (shipping prepaid) to the factory for evaluation.



## NOTES

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*Simply intelligent water care.*

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