M920^{CA} & M920^{CA}w
pH/Dual ORP Controller

Owner's Manual

IPS Controllers

Simply intelligent water care.

Table of Contents

I. Introduction 2
A. Water Chemistry 2
B. IMPORTANT SAFETY INSTRUCTIONS 3
C. System Components 4
D. Specifications 7
E. Controller Panel Descriptions 8
F. Electrical Descriptions 10

II. Installation 11
A. Setup 11
B. Tools 11
C. Procedure 11
D. Connection Requirements for Remote Monitoring 15

III. Operation 17
A. Startup and Shutdown 17
B. Modes and Adjustments 18
C. Maintenance 25

IV. IPS-M920CA Wi-Fi Setup 28
A. Smart Phone Wi-Fi Setup 28
B. Desktop/Laptop Wi-Fi Setup 30

V. Troubleshooting 32

VI. Warranty 35

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 (HOCI), 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 M920CA 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 M920CA will monitor temperature and display on the front panel when in Temp mode.
   d. Displays the calculated Free Available Chlorine (FAC) in parts per million (PPM) when connected to the IPS Controllers monitoring website. The ORP / FAC display will alternate between the current ORP and the last calculated FAC. FAC (PPM) calculation is not certified to NSF 50.
   e. Monitors up to two chemical tanks equipped with level switches and displays status using LEDs on the front panel.

   In addition, six separate function buttons allow simple pushbutton control of these individual parameters:
      1. Set Level – ORP or pH level to be maintained,
      2. Dose Timer – Timed or continuous feed modes,
      3. Delay Timer – 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.
      8. FAC Cal – Free Available Chlorine Calibration
      9. CYA Cal – Cyanuric Acid Calibration/Entry

   f. If the ORP (sanitizer) levels reach a preset set level, then the controller will activate the chemical feeder until the preset set level is reached. The pH is similarly maintained.

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 M920CA 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
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)
8. Temperature Sensor – Senses the current water temperature and displays the temperature in the display when in Temp mode.
9. Remote Monitoring – When connected to the Internet through the Internal Ethernet or wi-fi connection, the controller will send data to a central website. Users can monitor controller activity remotely and report on activity for a date range.

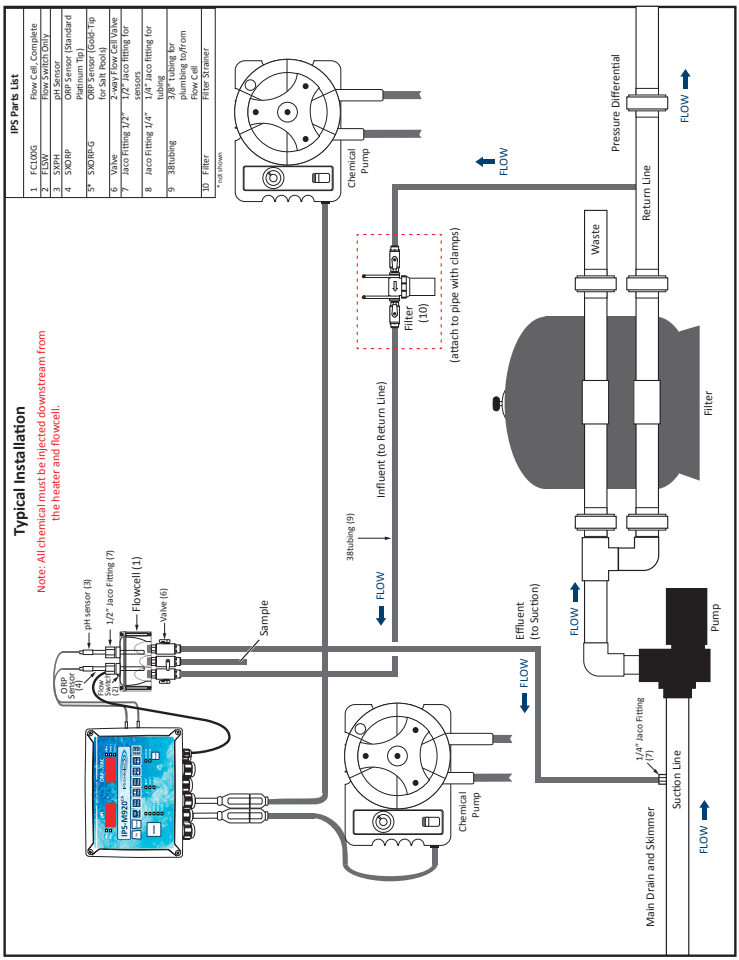

Figure 1: This is a typical installation using IPS' system package, which consists of an M920CA pH/dual ORP Controller, flow cell with switch, and two pumps mounted on the large board.

D. Specifications

Enclosure: 7.95"L x 5.98"W x 3.54"D

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

ORP Set Level: 400 mV to 900 mV

pH Set Level: 7.0 to 8.0

Dose Timer: Off, Continuous, or Timed cycle

Delay Time: 1 - 99 minutes

Overfeed 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

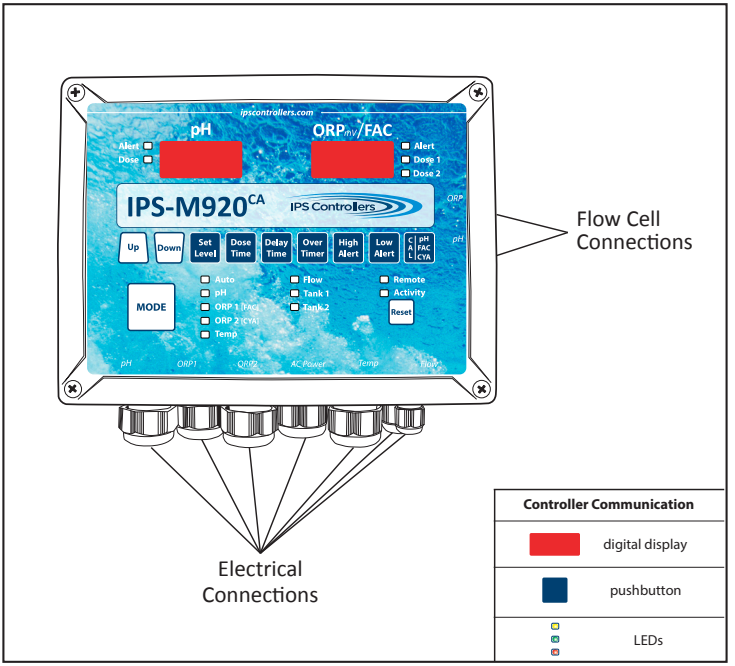

Figure 2: M920CA Controller Components Connections

E. Controller Panel Descriptions

1. Digital Displays and Function LEDs
   a. pH
      1. Alert - red LED
      2. Dose - green LED
   b. ORP/FAC
      1. Alert - red LED
      2. Dose 1 - yellow LED
      3. Dose 2 - yellow LED

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.
3. Arrows - pushbutton adjustments
   a. Up - For increasing feature values
   b. Down - For decreasing features values
4. Set Level – pushbutton adjustments
5. Dose Timer – pushbutton adjustments
6. Delay Time - pushbutton adjustments
7. Over Timer – pushbutton adjustments
8. High Alert – pushbutton adjustments
9. Low Alert – pushbutton adjustments
10. pH, FAC, CYA Cal – pushbutton adjustments
11. Flow - green LED
12. Tank 1 - red LED
13. Tank 2 - red LED
14. Remote (Power) - green LED
15. Activity (Remote) - yellow LED
16. Electrical Connections (peripherals)
    a. pH output (left receptacle) - max. 3.15 amps @ 120 VAC max, 1.6 amps@240 VAC
    b. ORP1 output (center receptacle)- max. 3.15 amps @ 120 VAC max, 1.6 amps@240 VAC

c. ORP2 output (right receptacle) - max. 3.15 amps @ 120 VAC max, 1.6 amps@240 VAC

d. AC power - 120 VAC, 50-60 Hz

e. Flow - from flow cell

f. Tank 1 - from tank level switch (optional)

g. Tank 2 - from tank level switch (optional)

h. External audible/visible alarm (optional)

i. pH sensor - BNC connection

j. ORP sensor - BNC connection

k. 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: There is an option to convert to 240 VAC input/output.**

2. Dip Switches (1-4) - See Figure 3.

   a. *1*: pH/ORP interlock (default: **OFF**)

      No ORP1 or ORP2 feed if pH is feeding (ON).

   b. *2*: pH/ORP alert interlock (default: **ON**)

      No ORP1 or ORP2 if pH is in alert mode (ON).

   c. *3*: Acid/Base default acid (default: **OFF**)

      1. Feed base chemical when pH level falls below set point. (ON)
      2. Feed acid chemical when pH above set point. (OFF)

   d. *4*: Not in use.

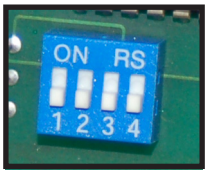

Figure 3: Dipswitches

II. Installation

A. Setup (Installation video available at 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
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 M920CA 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 M920CA 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

a. Drill a 1/4" or 3/8" inch hole (depending on the sensor size) 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. Remote Monitoring Ethernet Connection
   a. Run the Ethernet cable with connector into the M920CA through the largest strain relief connector on the bottom or the enclosure.
   b. Connect to the Ethernet connector on the front circuit board.
   c. When a valid connection is made, the green "Remote" LED will light up and the orange "Activity" LED will blink intermittently.
6. Electrical Connections (Should be completed by a licensed electrician)
   a. Verify that the M920CA 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 M920CA when the circulation pump is running.
   e. Method 2: Connect the AC power cord to a GFCI power source.
   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.
7. Optional connection to a Salt Chlorine Generator (SCG)
   The M920CA controller is capable of controlling (turning on/off) a SCG depending on the current ORP reading. This action can be accomplished through the use of a 120V or 240V relay, or by connecting the SCG to the "normally open" dry contact relay (ORP1) included with the M920CA controller. Contact the factory for more information.

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 105º 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 105º 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.

9. Continue to the next section for the connection requirements for remote monitoring. The remote monitoring module and the Internet are needed to complete this process.

D. Connection Requirements for Remote Monitoring

1. IPS-M920CAw (Wi-Fi)

The remote monitoring module used with the IPS-M920CAw (or the RX-365w used with the IPS-M820) is a Wi-Fi device which will access an existing Wi-Fi network to send controller data to the central monitoring website.

If an existing Wi-Fi network is not available, a MiFi or "cellular hotspot" can be added (contact a local wireless provider).

Note: The Ethernet connector on the M920CAw is disabled and cannot be used.

a. How it works:
   The remote monitoring module is programmed to "wake up" at a customer-determined interval (minutes) to send all current readings, settings, and alerts to IPS Controllers' remote monitoring website.

   Because the data is being sent to the website rather than the website pulling the data from the module, the port is not left open and a static IP Address is not needed. This should address any concerns regarding firewall security.

   When changes are made to the controller settings remotely, the new settings are delivered back to the remote monitoring module on its next scheduled connection.

b. Setup - Go to Section IV-A on Page 28 for installation instructions.

2. IPS-M920CA (Hardwire)

The remote monitoring module included with the IPS-M920CA (or the RX-365 used with the IPS-M820) requires:

- An Ethernet connection provided by a hard wire directly from a router,
- A Wi-Fi to Ethernet Adapter,
- Or a Cellular Modem (requires carrier service such as Verizon or AT&T).

The provided connection must allow the remote monitoring module to access the Internet without providing any usernames, passwords, etc. via Port 80 for outbound data only.

The best test for this ability is to connect a laptop to the Ethernet cable and open a web browser. If the browser can open directly to the web without credentials, the connection will function properly for the remote monitoring module (laptop Wi-Fi should be turned off when doing this test).

a. How it works:
   The remote module is programmed to "wake up" at a customer determined interval (minutes) and send all current readings, settings, and alerts to the IPS Controllers remote monitoring website.

   Because the data is being sent to the website rather than the website pulling the data from the module, the port is not left open and a static IP Address is not needed. This should address any concerns regarding firewall security.

   When changes are made to the controller settings remotely, the new settings are delivered back to the remote monitoring module on its next scheduled connection.

b. Setup - Go to Section IV-B on Page 30 for installation instructions.

III. Operation

A. Startup and Shutdown

1. Startup

   a. Provide power to the M920CA 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 50 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).

   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).

i. Press the Mode pushbutton momentarily until the red Auto LED is illuminated.

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 M920CA 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.

B. Modes and Adjustments

1. Auto

a. This is the normal operational mode of the M920CA 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 Timer

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.
2. Selectable range: OFF, CON (continuous), and Timed (0.6 – 900 seconds ON and 5 minutes OFF)

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 feed 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 Overfeed timer is interlocked with the Dose Timer selection.
   i. If the Dose Timer is set to a timed cycle, the Over Timer will count timed feed cycles. When the preset cycle is reached, the pH digital display will flash and the pH output relay will de-energize. Default is 60 cycles.
      - Selectable range: 5 to 100 cycles
   ii. If the Dose Timer 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 Timer 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.

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.

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. Default: 0-volt sensor input, displays 7.0 pH
2. Selectable range: With a 0-volt sensor input, the display is adjustable from 6.1 pH to 7.9 pH.

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 Timer

1. Default: 10-second ORP feed relay energized and 5 minutes ORP feed relay de-energized (timed dose timer). 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.
2. Selectable range: OFF, CON (continuous), and Timed (0.6 to 900 seconds ON and 5 minutes OFF)

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 feed timer does not automatically reset. It must be reset by turning the controller off, then on.
2. The Overfeed timer is interlocked with the Dose Timer selection.
   i. If the Dose Timer is set to a timed cycle, the Over Timer will count timed feed cycles. When the preset cycle is reached, the ORP digital display will flash and the ORP1 output relay will de-energize. Default is 60 cycles.
      - Selectable range: 5 to 100 cycles
   ii. If the Dose Timer 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 Timer 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.

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. FAC Cal

1. Default is .0 and will not change if controller is not communicating with the monitoring website.
2. Calculated Free Available Chlorine (ppm) will display from website and can be calibrated in .1 increments (+/-). When calibrating down, arrow past "OFF" or the PPM display will be turned off.
3. Value is calculated using pH, ORP, Temp, and CYA. *FAC (PPM) calculation is not certified to NSF 50.

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 Timer

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.
2. Selectable range: OFF, CON (continuous), and Timed (0.6 to 900 seconds ON and 5 minutes OFF)

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 feed timer does not automatically reset. It must be reset by turning the controller off, then on.
2. The Overfeed timer is interlocked with the Dose Timer selection.
   i. If the Dose Timer is set to a timed cycle, the Over Timer will count timed feed cycles. When the preset cycle is reached, the ORP digital display will flash and the ORP2 output relay will de-energize. Default is 60 cycles.
      - Selectable range: 5 to 100 cycles
   ii. If the Dose Timer 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 Timer is changed from either timed or continuous feed, the Over Timer is reset to Default.
4. ORP2 will not flash ORP digital display if ORP2 overfeed occurs).
5. Turning off the Over Timer will void any NSF Certification.

e. High Alert controlled by ORP1.

f. Low Alert controlled by ORP1.

g. CYA Cal

- Default is 0
- Tested CYA level must be entered for accurate FAC/ppm Calculation. CYA should be tested and entered at least monthly.

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 4: 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).

7. Hidden Features - See Figure 5.

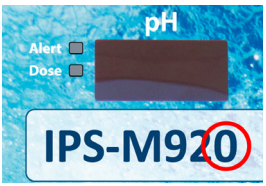

Figure 5: Hidden button

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-M920CA on the front overlay. Place the M920CA 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 M920CA can be forced to manually dose pH, ORP1, or ORP2 by placing the M920CA into the standby mode that is desired (pH, ORP1, ORP2), and then simultaneously holding down the dose timer button and delay time button. the M920CA 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 pushbutton.
   c. Press and hold both the Set Level and pH Cal pushbuttons, and then press the Mode pushbutton. Both the pH and ORP displays will show "Ld". The controller will be returned to the factory default functions, and be placed in the test mode.
   d. Return the controller to full operation by again turning off the controller with the Mode pushbutton. Turn the controller on again by pressing the Mode pushbutton. **Note: Failure to complete this action will leave the controller in the test mode.**

C. Maintenance

1. Winterizing (extended shutdowns or colder climates)
    a. Turn off the M920CA 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 in order 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 M920CA 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 M920CA 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. The ORP sensor must be checked every 6 months, or after an over-sanitization event.
   b. Clean the sensor tip as shown in the previous section.
   c. Place the sensor in a clean glass of tap water. The reading should show between 200mV and 400mV.
   d. After adding a pinch of Dichlor or Trichlor into the water, the reading should show between 750mV and 800mV. **Note: if a sanitizer with high pH is used in place of Dichlor or Trichlor, the reading should show between 650mV and 750mV.**
   e. If the sensor does not show the indicated readings, then it must be replaced.
4. Checking the pH sensor
   a. The pH sensor must be checked every 6 months, or after any incident when the pH level goes out of range.
   b. Place the sensor in a clean glass of tap water.
   c. Add a small amount of acid to the water and take a reading. It should show a low number.
   d. Place the sensor into a solution that is higher than 7.5pH, and verify that the reading is increasing.
   e. If the sensor does not show the indicated readings, then it must be replaced.

IV. IPS-M920CA Wi-Fi Setup

A. Smart Phone Wi-Fi Setup

1. Turn on the IPS-M920CA.
2. Search for available Wi-Fi networks. See Figure 6.
3. Select XPicoWiFi_XXXXXX to connect.
   Note: XXXXXX indicates the last six characters of the MAC/Serial # located on the XPicoWifi device, on a label near the antenna and on the inside of the controller cover (e.g. 00-80-A3-AB-01-C8).
4. After clicking Connect, enter "xpicowifi" in lower case as the network security password. Click on Join button to complete the connection. See Figure 7.
5. Once connected, open a browser window and type "192.168.0.1:8081" in the address bar. Press the Enter key. See Figure 8.
6. A dialog box will appear. Type "admin" in lower case in the User Name box and the full MAC/ Serial # without dashes (e.g. 0080A3AB01C8) in the Password box. Click on Log In button. See Figure 9.

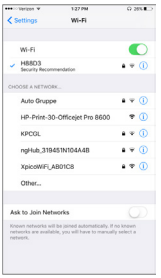

Figure 6: Available WiFi networks

Figure 7: Network Security Password

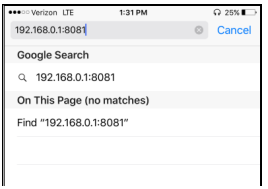

Figure 8: xPicoWiFi Web Address

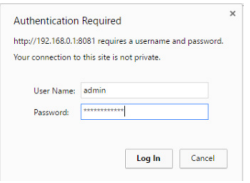

Figure 9: xPicoWiFi Login Dialog Box

7. The XPico WiFi main page will open. Click on Quick Connect at the top of the menu and select the WiFi network to be used (e.g. H88d3). See Figure 10.

8. Type in the Network Key associated with the selected Wi-Fi network. **Note:** Keys are case sensitive. Click on the Submit button. See Figure 11.

9. Click on the OK button in the dialog box. Ignore the displayed warning during the final process. **Note:** The device in the warning is XPicoWiFi. See Figure 12.

10. The Wi-Fi network connection is complete, and the green remote light on the front of the controller should show as a solid green.

    If the light is not a solid green, verify that the correct Wi-Fi network is selected and re-enter the network key. **Note:** Keys are case sensitive.

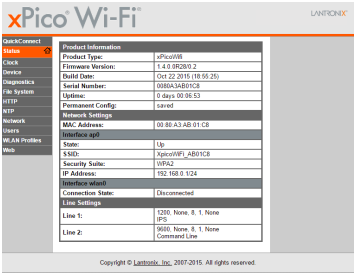

Figure 10: xPico WiFi Main Page

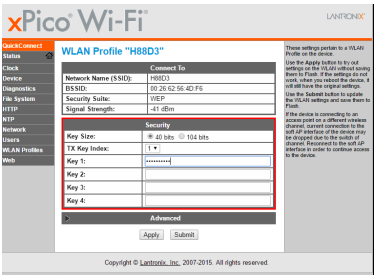

Figure 11: Wi-Fi Network Key

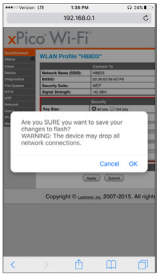

Figure 12: Complete Connection

B. Desktop/Laptop Wi-Fi Setup

1. Turn on the IPS-M920CA.
2. Search for available Wi-Fi networks.

Select XPicoWiFi_XXXXXX to connect. See Figure 13.
Note: XXXXXX indicates the last six characters of the MAC/Serial # located on the XPicoWifi device, on a label near the antenna and on the inside of the controller cover (e.g. 00-80-A3-AB-01-C8).

3. After clicking Connect, enter "xpicowifi" in lower case as the network security password. Click on Next button to complete the connection. See Figure 14.
4. Once connected, open a browser window and type "192.168.0.1:8081" in the address bar. Press the Enter key. See Figure 15.
5. A dialog box will appear. Type "admin" in lower case in the User Name box and the full MAC/ Serial # without dashes (e.g. 0080A3AB01C8) in the Password box. Click on Log In button. See Figure 16.
6. The XPico WiFi main page will open. Click on Quick Connect at the top of the menu and select the WiFi network to be used (e.g. H88d3). See Figure 17.

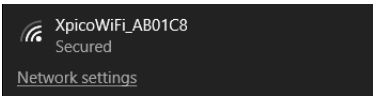

Figure 13: XpicoWiFi Connection

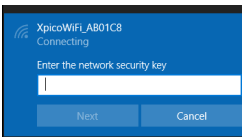

Figure 14: Network Security Password

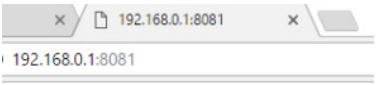

Figure 15: xPicoWiFi Web Address

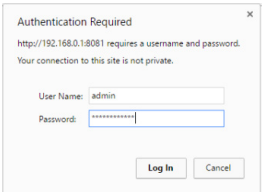

Figure 16: xPicoWiFi Login Dialog Box

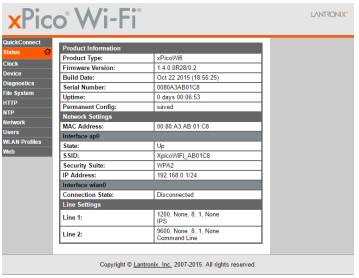

Figure 17: xPico WiFi Main Page

7. Type in the Network Key associated with the selected Wi-Fi network. **Note:** Keys are case sensitive. Click on the Submit button. See Figure 18.

8. Click on the OK button in the dialog box. Ignore the displayed warning during the final process. **Note:** The device in the warning is XPicoWiFi. See Figure 19.

9. The Wi-Fi network connection is complete, and the green remote light on the front of the controller should show as a solid green.

   If the light is not a solid green, verify that the correct Wi-Fi network is selected and re-enter the network key. **Note:** Keys are case sensitive.

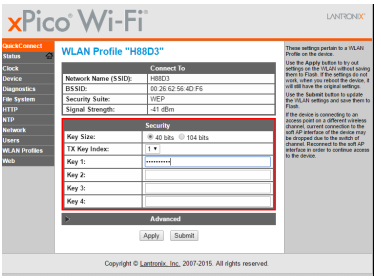

Figure 18: Wi-Fi Network Key

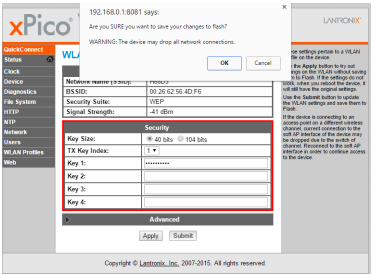

Figure 19: Complete Connection

V. Troubleshooting

A. Chlorine/Bromine level too low

1. ORP *Set level is too low:* Check Sanitizer level with test kit and adjust Set Level as necessary
2. *Chemical feed rate too low:* Increase the feed rate.
3. *Chemical feeder is empty:* Refill the feeder.
4. *Chemical check valve/injector is clogged:* Switch acid feed tube to chlorine injector to clean.
5. *Feed pump malfunction:* Repair the feed pump.
6. *Sensor malfunction:* Replace sensor.

B. Chlorine/Bromine level too high

1. ORP *Set level is too high:* Check Sanitizer level with test kit and adjust Set Level as necessary.
2. *Sensor tip is dirty:* Clean according to maintenance instructions.

C. pH level too low

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

D. pH level too high

1. pH Set Level is too low: Check pH level with test kit and adjust Set Level as necessary.
2. *Sensor tip is dirty:* Clean according to maintenance instructions.
3. *Improper pH sensor calibration:* Adjust pH calibration.

4. *Chemical feeder is empty (base):* Refill the feeder.
5. *Feed pump malfunction:* Repair the feed pump.
6. *Chemical feed rate too low:* Increase feed rate.

E. pH alert LED on

1. *Problem with acid supply:* Verify that the acid tank is not empty.
2. *Controller undershooting set level:* Increase dosing time if using a timed feed cycle, or switch to continuous feed.
3. *Manual addition:* Verify that the acid was not manually added.
4. *Controller overshooting set level:* 1) Dilute acid with water, or 2) Lower dosing time, or switch from continuous feed to timed feed.

F. ORP alert LED on

1. *Problem with acid supply:* Verify that chlorine was not manually added.
2. *Controller overshooting set level:* Lower dosing time, or switch from continuous feed to timed feed.
3. *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.
4. *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.

G. Calculated FAC ppm not matching manual test

1. This is not uncommon, especially as pH and ORP sensors age. Calibrate FAC to match your tested ppm of sanitizer in ORP1 Mode.
2. Add measured CYA using the CYA Cal setting in ORP2 Mode.

H. Display and LEDs off

1. *No power supply:* Check circuit breaker.

I. Feeder not operating

1. *Inadequate Flow*: Check flow light and verify flow through the flow cell.
2. *Bad fuse:* Replace fuse.

J. 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.

VI. Warranty

IPS-M920CA pH/Dual ORP Controllers

IPS Controllers warrants the IPS-M920CA 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 at the contact point listed below. After receiving a Returned Merchandise Authorization (RMA) number, all product must be returned (shipping prepaid) to the factory for evaluation.

Simply intelligent water care.

Factory Contact:
26111 Ynez Road, Suite C-4, Temecula, CA 92591
phone. 877-693-6903, fax. 951-693-3224
web. www.ipscontrollers.com

M920CAOM 05/17