

Aquasol XPC

Swimming Pool/Spa Chemical Controller
Firmware V 1.7

Instruction Manual



Aquasol Controllers, Inc.
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Introduction

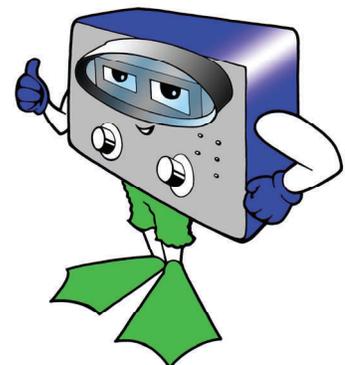
Congratulations and thank you for your purchase of the Aquasol XPC Pool/Spa chemical controller. Your investment will reward you with many years of accurate and simple chemical automation for your pool/spa which will result in tremendous labor and chemical savings in addition to helping you achieve unparalleled water sanitation.

We do recommend your pool still be tested at least once a day with a DPD test kit.

Aquasol Controllers, Inc. has been manufacturing chemical controllers specifically designed for pools and spas since 1975. Our products are renowned throughout the industry for their simplicity and longevity. Our company is also known for it's unrivaled technical support.

At any time, please feel free to pick up the phone and call us at 800-444-0675 with any questions about the installation or operation of your new XPC.

The XPC has been designed to retain the simplicity and longevity of our previous models, but it leverages the abilities of it's powerful microprocessor design to include more features with superior simplicity.



Contact Information

Manufacturer's name: Aquasol Controllers, Inc.
Address: 1707 Townhurst Houston, TX 77043
Phone Number: 713-683-6406
E-mail Contact: sales@aquasol.com
Model Number: XPC
Input Ratings: 110/220 VAC 50/60 Hz .1A/.05A
Signal Inputs: 5 VDC Max, 100mA Max

Environmental Conditions—For indoor or outdoor use;
Altitude at or below 2000 m
Ambient temperatures 5 c to 40 c
Maximum relative humidity 80% for temperatures up to
31c decreasing linearly to 50% relative humidity at 40c.

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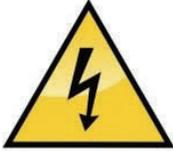
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General Warnings and Instructions

Read the instructions and keep this manual for reference. Do not use the unit for other than described in this manual.

Warnings



There are hazardous voltages underneath the screwed on cover, marked with the symbol above. Before removing this cover, disconnect mains power. The only parts that can be replaced by the operator are the fuses and relay. There are no other user replaceable parts, refer service to an authorized service person. After replacing the fuse(s) or relay, insert the screws into the cover and replace cover before applying power to unit.

Units may be used indoors or outdoors.

Connect power to a circuit breaker control panel, with the circuit breaker rated at the proper voltage and 15 amps maximum.



This manual contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Legend:

- a. **Alternating Current;** 
- b. **DC,** 
- c. **Protective Earth;** 
- d. **Standby;** 
- e. **Warning -** 

General Warnings and Instructions, continued



WARNING

IF EQUIPMENT IS SUPPLIED WITH A PLUG:

If an appliance coupler or separable plug is used as the disconnecting device, it shall be readily identifiable and easily reached by the operator. For single-phase portable equipment, a plug on a cord of length not greater than 3m is considered to be easily reached.



WARNING

IF EQUIPMENT IS NOT SUPPLIED WITH A PLUG:

- A) a switch or circuit-breaker shall be included in the building installation
- B) It shall be in close proximity to the equipment and within easy reach of the operator
- C) It shall be marked as the disconnecting device for the equipment

Section 1— Theory of Operation—Options

The XPC is primarily designed as a pH/ORP controller for swimming pools and spas. It tests pH and ORP and activates feed circuits to keep water sanitary much like a thermostat controls air temperature in a house.

ORP (Oxidation-Reduction Potential), the red probe, is how the XPC measures chlorine. ORP is a measure of quality and quantity of the sanitizer in the pool water. It does not directly correlate with the reading from your test kit (ppm) because that reading is quantity only. Typically ORP is maintained between 650-800 mV but this can vary depending on other factors in the pool water like stabilizer, pH, and TDS. The World Health Organization (WHO) recommends 710 mV as a minimum.

The blue probe measures pH. pH is important for proper sanitation of pool water when using chlorine and is important for water balance to prevent corrosive or scale forming water.

It is important that Total Alkalinity be maintained between 80-120 ppm for optimal pH control.

Additionally, the XPC can function as a flowmeter and flow totalizer with the purchase of the Aquasol flow sensor. The XPC will calculate and display the turnover rate in real time, totalized flow, and current flow rate. Low flow alerting is possible.

Pressure filter monitoring (influent and effluent) is possible with the purchase of the Aquasol Filter Monitor sensor. This sensor is used with any type of pressure filter (DE, Sand, Cartridge) to monitor differential pressure and determine when the filter or filter bank needs to be cleaned or backwashed.

Cl and pH tank level sensors are available. These sensors will alert the user when a low tank level scenario is detected.



Safety Pressure switch and Safety flow switch. One of these items must be used with each installation. These devices interrupt the feed pumps and display an alert if there is no flow or pressure at the point of chemical injection. The Safety Pressure Switch is included with each XPC but either or both may be used.

The XPC also has an included communications package that allows it to communicate wirelessly in real time as long as it is within range of a 2G GSM cellular tower. The user interface is web based. Alerts may be generated to e-mail or text message. This is a subscription service.

Section 2— Features Summary

Inputs

ORP—sanitizer monitoring, control and alerting.

pH—pH monitoring, control, and alerting.

Flow Rate—circulation monitoring and alerting with TO rate calculations.

Influent & Effluent Pressure—filtering monitoring, and backwash alerting (pressure sand, DE, or cartridge filters).

Chemical Tank Levels—low level alerting.

Flow Switch—Safety Interrupt Input used with flow or pressure switch.

Stand-By—Secondary Safety Interrupt used with flow or pressure switch.

Outputs

(2)110v 8a—Feed system direct feed outputs.

(2)Pulse Output—Feed system proportional outputs.

Auxiliary Sanitizer (Dry Contact) - Signals chlorine generators.

Alert (Dry Contact) - External alert signaling output.

RS-232—Communications.

Firmware/Interface Features

Simple Interface

User Level/Supervisor Level

Backlit Scrolling Graphic Display with Large pH/ORP

Pool Naming Feature

Functions as Flowmeter/Totalizer

True Proportional Feed when used with Aquasol Diaphragm Feed Pumps

Bi-Directional Wireless Communications

Automatic Voltage sensing—85-240 v

Unique “jog dial” user input.

Enclosure

IP65 ABS Plastic

Integrated mounting flanges.

Section 3— Shipping Contents

The following items are shipped with each XPC:

- 1 XPC Controller
- 1 Sample Flow Cell
- 1 ORP probe
- 1 pH probe
- 1 20' HDPE Black 3/8" Tubing
- 2 1/4 MNPT Plugs
- 2 1/2 NPT x Probe Fittings
- 4 1/4 MNPT x 3/8" Tube Fittings
- 1 Roll Teflon Tape
- 1 Owner's Manual
- 1 Integrated Safety Pressure Switch
- 2 Tank Level Sensors
- 1 Spare Instrument Fuse
- 1 Spare Feed Fuse

The XPC will also come factory pre-configured/wired for your application. The following is specified at the time of order:

- 1) Pump outputs. 110v pigtails (direct feed) or BNC pigtails (pulse output for proportional feed).
- 2) Auxiliary sanitizer output (12vdc dry contact).
- 3) Communications (GSM network activation).
- 4) Flow Meter pigtail. (with purchase of sensor)
- 5) Filter Monitor pigtail. (with purchase of sensors)
- 6) Flow Switch BNC.
- 7) Pressure Switch BNC. (standard)



Section 4— Installation

Your Aquasol XPC is designed to be easily installed on the circulation system. It may be installed indoors or out. Installation directly above chemical containers or electrical equipment is discouraged.

Pressure Filter Systems (Sand, DE, Cartridge)

Step 1

Turn off the pool/spa circulation pump. Identify the line from the pump to the filter and the return line to the pool after the filter and heater (if present).

Step 2

Wrap all fittings with at least three wraps of PTFE tape. Install the water flow fittings (1/4 NPT x 3/8 tube) in the flow cell holes labeled INLET and OUTLET (9 o'clock and 12 o'clock). **Hand tighten only! Applying a wrench to the fittings can cause damage to the flow cell.** Install the electrode fittings (1/2 NPT) into their respective holes in the flow cell (11 o'clock and 1 o'clock). If you are not using any auxiliary equipment, the two plugs may be installed in the two remaining 1/4 NPT holes (6 o'clock, and 3 o'clock).

Step 3

Mount the XPC and flow cell on a convenient wall. The XPC should be close to a properly grounded power outlet (85-264 VAC). Do not use extension cords. The flow cell must be mounted within 9' of the controller (or closer if using shorter wired electrodes). The Flow cell must be mounted vertically so the water OUTLET is on top. The flow cell should be mounted out of direct sunlight as sunlight can depress ORP, particularly in pools utilizing stabilizer.

Step 4

Drill a 7/16" hole in the circulation line between the pump and filter and another in the return line as noted in Step 1. Tap both holes with the 1/4 NPT tap. **Do not over tap!** Install a PTFE wrapped water flow fitting into each hole. **Hand tighten only!**

Step 5

Cut a proper length of 3/8" tubing to run from the fitting between the pump and filter to the INLET fitting on the flow cell. Install another piece of tubing between the OUTLET fitting on the flow cell and the fitting in the return line of the pool.

Step 6

Carefully remove the storage bottle from each electrode. Electrodes are fragile. Damage to electrodes by mishandling is not covered by the war-

Section 4— Installation—Continued

ranty. Dip each electrode in some pool acid (if available) to help clean off the storage solution.

Insert each electrode all the way into the fitting per Fig. 6A. Note that the nut for the fitting slides down the length of the electrode cable. Hand tighten the nut to hold the electrode in place.

Step 7

Connect each electrode to the proper BNC connector on the bottom of the controller. Slide the rubber boot on the electrode cable over the BNC to protect it from corrosion. Secure and protect the electrode cables from accidental damage.



Step 8

Connect your Safety Pressure Switch or Safety Flow Switch BNC connection wire to the BNC connector on the controller labeled “Flow” or “Pressure Switch”. Make sure the other end is connected to the pressure or flow switch. Please see instructions that ship with the Safety Pressure switch or Safety Flow switch for installation of that component. A Safety Pressure Switch or Safety Flow switch is recommended to be used with all forms of sanitizer but **MUST** be used with positive displacement liquid chemical feed systems.

Step 9

Turn on the circulation pump. Check for leaks in the Flow Cell water lines. If you are using a pressure switch, check to make sure it is operating properly by referring to the instructions that came with the pressure switch.

Step 10

Manually balance your pool water to your or your health department's desired levels of chlorine/ bromine, pH and total alkalinity.

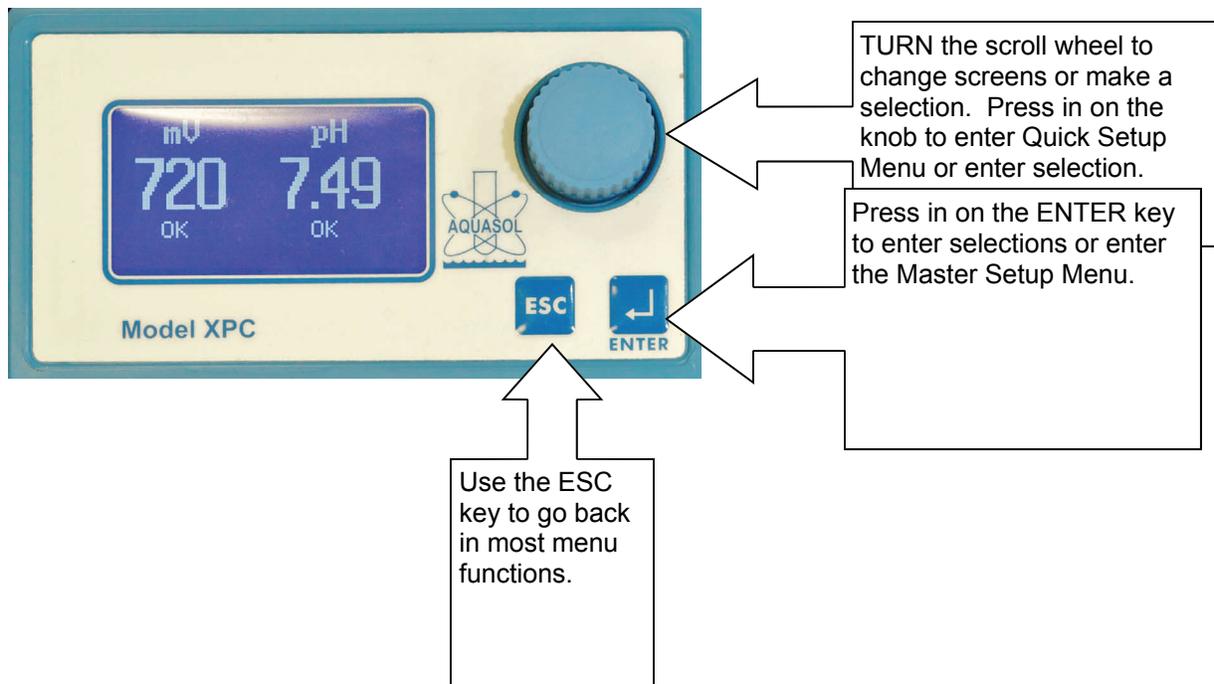
Step 11

Allow the circulation system to run for 30 minutes before calibrating. This will allow the electrodes to acclimate to your pool water. Do not plug chemical feeders into the controller during this period.

Section 5— General Navigation

The User Interface of the XPC is designed to operate simply and as intuitively as possible, while still allowing great flexibility to the operator. Most functions are controlled by the “scroll wheel”, with a few handled by the [ENTER] or [ESCAPE] keys.

Here are the basic navigational instructions:



The scroll wheel scrolls and also functions as a button and may be pushed in to make selections.

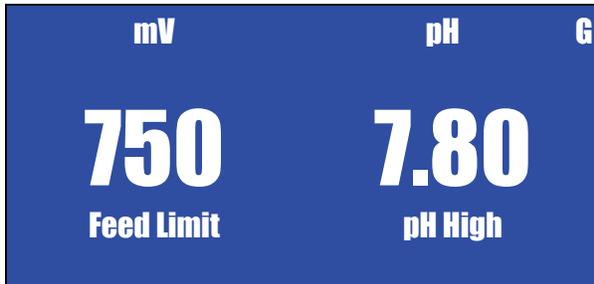


Section 6— Quick Setup

This section of the users guide is for the daily pool operator.

To View Data on the Controller:

All main data is displayed on the front default screen:



ORP Display

ORP current reading and status is displayed on the left half of the screen. Status or alerts specific to the ORP channel are displayed directly underneath the ORP reading. Possible ORP channel statuses or alerts are as follows:

OK = setpoint is achieved and everything is fine.

ORP Low = ORP has fallen below the low ORP alert setpoint.

ORP High = ORP is higher than high alert setpoint.

Feed Limit = ORP Channel has been feeding continuously for the maximum time allotted in settings.

ESC to Reset = If Feed Limit activate, the XPC will alternatively flash “Feed Limit” and “ESC to Reset”.

Simply press ESC key to Reset, but if this happens consistently it is an indicator of a problem with the ORP/cl/br feed system. IE, the feed pump isn’t large enough to keep up with demand, or is malfunctioning.

TNK Lo = the tank level sensor has been triggered at whatever level it is at in the chlorine tank.

pH Display

pH current reading and status is displayed on the right half of the screen. Status or alerts specific to the pH channel are displayed directly underneath the pH reading. Possible pH channel statuses or alerts are as follows:

OK = setpoint is achieved and everything is fine.

pH Low = pH has fallen below the low pH alert setpoint.

pH High = pH is higher than high alert setpoint.

Feed Limit = pH Channel has been feeding continuously for the maximum time allotted in settings.

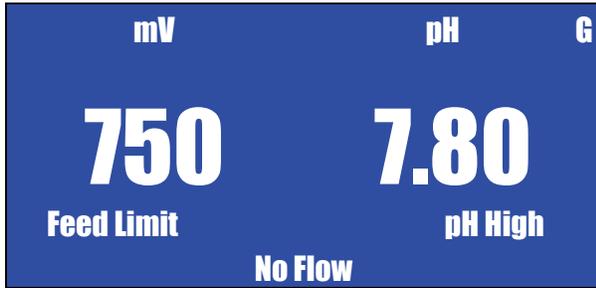
ESC to Reset = If Feed Limit activate, the XPC will alternatively flash “Feed Limit” and “ESC to Reset”.

Simply press ESC key to Reset, but if this happens consistently it is an indicator of a problem with the pH/acid/caustic feed system. IE, the feed pump isn’t large enough to keep up with demand, or is malfunctioning.

TNK Lo = the tank level sensor has been triggered at whatever level it is at in the pH tank.

Section 6— Quick Setup, continued

Center Alerts



Directly between the two channels in the middle lower portion of the display, alerts that apply to the overall system will be displayed. Those possible alerts include:

No Flow—This alert means that the Safety Pressure Switched has sensed no flow at the point of chemical injection. When the XPC is in “No Flow” alert, the chemical injection outputs are disabled and no chemicals will be injected.

Standby—This means the same thing as No Flow above, but is specific to a secondary Flow/Pressure sensor. This sensor may not be installed in all systems.

Startup Delay—When the XPC is first powered on, or after a No Flow or Standby alert is generated the XPC will be in Startup Delay mode. Default is one minute. The XPC will not activate any chemical injection outputs until this delay time is passed to allow the probes time to stabilize.

Backwash Now— If the Aquasol Filter Pressure Monitor is installed and a backwash PSI setpoint input in the Setup menu, the XPC will display Backwash Now when the pressure is exceeded.

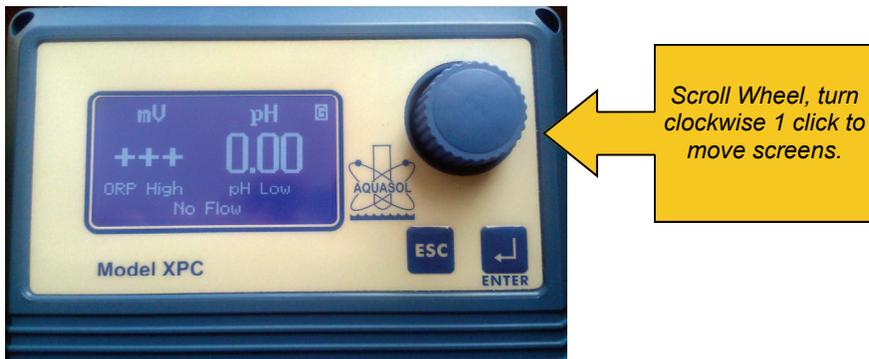
Low Flow—This alert is only active when the optional Aquasol Flow Meter is installed and a Low Flow setpoint is entered in the Full Setup menu. This is used to alert when the pool flow is lower than the operator desires. It may also be set to interrupt chemical feed in the Full Setup menu.

Communication Status

If the XPC has a live connection to the internet and is reaching Aquasol’s servers, a small “G”, for GSM, will be displayed in the upper right corner.

Moving Between Screens

To move between screens on the XPC, simply rotate the jog dial clockwise one click for each screen.



Section 6— Quick Setup, continued

Detail Screen

One click clockwise from the front default screen is the detail screen:



12:47 PM	12/30/11
Flow:	00000 Gpm
Tot:	0000000000 Gal
TO Rate:	XX:XX
Pressure:	00 Psi

Information on the Detail Screen:

Time

Date

Flow—Current Flow if Aquasol Flow Sensor is installed, displayed in GPM.

Tot—Flow Totalizer, total gallons through flowmeter since last reset. Can be reset in Full Setup menu.

Aquasol Flow Sensor must be installed for this feature.

To Rate—Calculates the turnover rate of the pool and displays in Hours:Minutes based on input from the Aquasol Flow Meter and the gallons of the pool entered in the Full Setup menu.

Pressure— Must have Aquasol Pressure Monitor installed. If both influent and effluent sensors are installed Pressure will be displayed as differential pressure. If just influent pressure sensor is installed then actual influent pressure will be displayed.

Pool Name

One click clockwise from the Detail screen is the Pool Name screen.



Information on the Pool Name Screen:

Pool Name— A unique Pool Name may be entered in the Full Setup Menu. This allows the operator or service person to easily identify the XPC in a pumphouse of multiple pools.

The rest of the screen are simple operation directions.

Support/Software Version Screen

This screen (not pictured) lists Factory Support contact information as well as the firmware version for the XPC. It is not used in Daily operation but exists for reference. It will also display the GSM connection strength and network connection. -85dbms to -50 dbms represents a strong enough signal for the XPC to operate in full bi-directional mode. Readings lower than -85 dbms may result in communication only from the controller but no access back from the website and may also result in sporadic readings coming from the controller.

Section 6— Quick Setup, continued

Quick Setup—Adjust Setpoints, Calibrate pH

From the main screen, press in on the knob and the password entry screen for Passcode 1 will be displayed:



Enter Passcode 1 to gain access to setpoint adjustment. Default is 0000. Select each number from the row under the entry box with the knob and once highlighted press in on the knob to select the number. Press the knob a 5th time to enter the passcode.

The following Quick Setup Menu will now be displayed:



Use the knob to scroll through the menu options. The information under the white line will change to let denote what each option highlighted is, basically providing an expanded description.

Press in on the knob once the desired option is highlighted.

Here is pH Calib.—Set to Pool:



This is where the pH probe reading is calibrated to the pool. Simply enter the test kit reading from your pool under pH pool by highlighting the appropriate numbers, clicking on the knob, and using the knob to scroll to the correct test kit reading. Then use the knob to scroll down to "OK" at the bottom of the screen and press in on the knob again. The XPC will respond with a confirmation screen that shows the mV offset (next page):

Section 6— Quick Setup, continued

Confirmation screen after pH calibration entered:

Calibration OK	
offset: XXX mV	
← Exit	OK

If error screen displayed on pH calibration, pH probe is too far out of range. Try cleaning or replacing probe.

Use the knob to scroll to OK, select it, and press Knob.

The next option in the Quick Setup menu is pH Setpoint:

pH Setpoint
D1—07.50 Acid
P1—OFF
← Standard Set Point

Both pH outputs will be listed (D1—Direct 110v feed, and P1—Proportional Pulse feed), but only the feed outputs activated in the Master Setup will be adjustable. The other output will be listed as OFF. In the above screen D1 is adjustable, P1 is OFF.

To change the pH setpoints, rotate the knob to highlight the line to change, then rotate the knob to highlight the value to change, press the knob in and rotate the knob to the new value. Then press the knob again, press ESC button, rotate knob down to EXIT (below P1), select Exit by pressing knob, the XPC asks Save?, high light yes and press in on knob.

pH Setpoint
Save?
Yes
No
← Exit and Save

The next option is the ORP Setpoint:

ORP Setpoint
D1—720 mV Chlor
D2—OFF
P1—OFF
← Standard Set Point

There are three output options for ORP (D1 Direct 110v Feed, D2 12v Dry Contact, P1 Proportional Pulse feed). Like pH, only those turned on in the Master Setup will be adjustable.

Section 6— Quick Setup, continued

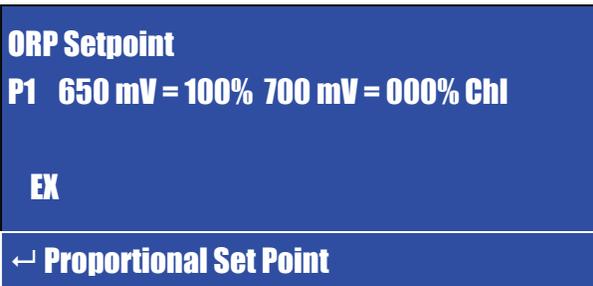
To change the ORP setpoints, rotate the knob to highlight the line to change, then rotate the knob to highlight the value to change, press the knob in and rotate the knob to the new value. Then press the knob again, press ESC button, rotate knob down to EXIT (below P1), select Exit by pressing knob, the XPC asks Save?, highlight yes and press in on knob.



Proportional Setpoints

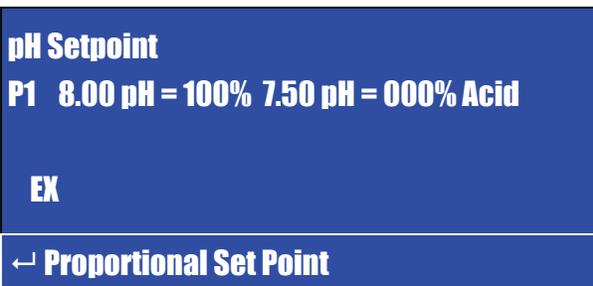
If the proportional setpoints are activated for ORP or pH they require two settings each. The proportional setpoints connect digitally from the XPC to the feed pump via BNC cable and the XPC sends a pulse signal to the pump each time it needs to pump. The frequency of the pulses is determined by how close to the setpoints the ORP probe reads the water. So, the XPC will feed faster when it is further from the setpoint and slower when it is closer. This is useful in situations where the bather load or environmental conditions for the pool change rapidly and traditional feed pump sizing may result in over or under feed situations. PROPORTIONAL SETPOINTS MAY ONLY BE USED WITH PUMPS THAT HAVE PULSE INPUT.

Here is what the ORP proportional setpoint looks like:



The minimum setpoint (the same as a regular setpoint in direct mode) should be set to 000%. A lower value than the desired setpoint should be used for the 100% setting. The pump will then come on at 100% capacity at the 100% set point and ramp down to off as it gets closer to the 000% setpoint. So, in the example above at 675 mV the pump would be on at 50%.

The pH proportional setpoint operates the same way:



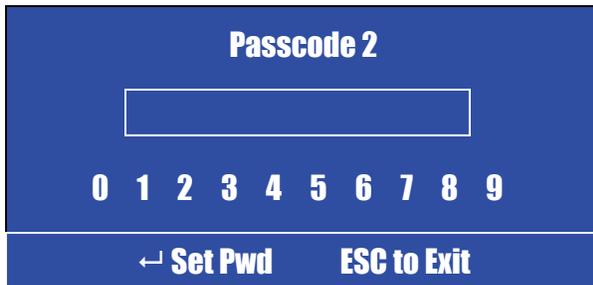
These are all of the adjustments under "Quick Setup". All alerts, feed limits and settings must be configured under the Main Menu, Passcode 2.

Note—Alerts do not need to be re-adjusted when setpoints are changed. They "float" based on the setpoint.

Section 7— Master Setup

Entering the Master Setup Menu

To enter the Master Setup menu, press the ENTER button. Enter the Master Passcode (Passcode 2) by using the knob to select the numbers and then use the ENTER key to submit:



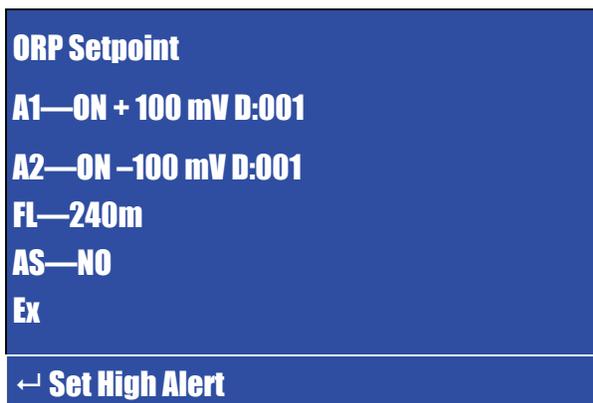
There are five main options in the **Master Setup menu**:



The Master Setup menu above is expanded longer than can be seen on the XPC screen for clarity in this manual. To access the options below pH Setpoint, simply scroll down with the knob.

pH Calib.—Set to Pool is exactly the same as in the Quick Setup menu, please see page 15 of the manual for instructions.

ORP Setpoint—This is also the same as in the Quick Setup menu, except it includes options for adjusting the High and Low Alert setpoints, the feed limit for the channel, and the Alert Stop. Here are the additional settings:



A1—this is the high ORP alert. It is designed to float around the setpoint. So, if it is set for +100 mV that means if the ORP setpoint is 720, the high alert will be 820 mV. If the user changes the setpoint to 705 mV in the Quick Setup menu the alert will automatically adjust to 805 mV with no further intervention by the user. The D: is for Delay. The high ORP alert may be delayed by 000-999 minutes. The high ORP alert may be delayed by 000-999 minutes. Default is +100 mV and 00 Delay.

Section 7— Master Setup, continued

A2—this is the Low ORP alert. It is designed to float around the setpoint. So, if it is set for -100 mV that means if the ORP setpoint is 720, the low alert will be 620 mV. If the user changes the setpoint to 705 mV in the Quick Setup menu the alert will automatically adjust to 605 mV with no further intervention by the user. The D: is for Delay. The Low ORP alert may be delayed by 000-999 minutes. Default is -100mV and 00 Delay.

FL—This is the Feed Limit for the ORP feed. Factory default is 240 minutes, or 4 hours but it may be changed up to 600 minutes or set at 0 to disable. The feed limit is used to prevent the feed systems from continually pumping if they are not achieving setpoint for at least 1 minute of the setting timeframe. It assumes that there is something wrong with the feed system, i.e. broken feed tube and shuts down the feed. If this alert is coming on and the feed system is working the feed system may be undersized for the chemical demand.

AS—Alert stop. This setting means that when the XPC goes into low chlorine alert it will stop feeding. Default is NO. This is a safety feature intended to prevent the XPC from continuing to run the feed systems if not achieving the setpoint. If active, it will prevent the XPC from recovering automatically if the chemical tank runs dry and is then refilled.

pH Setpoint—This is also the same as in the Quick Setup menu, except it includes options for adjusting the High and Low Alert setpoints, the feed limit for the channel, and the Alert Stop. Here are the additional settings:



A1—this is the high pH alert. It is designed to float around the setpoint. So, if it is set for +1.00 mV that means if the pH setpoint is 7.50, the high alert will be 8.50 pH. If the user changes the setpoint to 7.20 pH in the Quick Setup menu the alert will automatically adjust to 8.05 pH with no further intervention by the user. The D: is for Delay. The high pH alert may be delayed by 000-999 minutes. Default is +1.00 pH and 00 Delay.

A2—this is the Low pH alert. It is designed to float around the setpoint. So, if it is set for -1.00 mV that means if the pH setpoint is 7.50, the low alert will be 6.50 pH. If the user changes the setpoint to 7.30 pH in the Quick Setup menu the alert will automatically adjust to 6.30 pH with no further intervention by the user. The D: is for Delay. The Low pH alert may be delayed by 000-999 minutes. Default is -1.00 pH and 00 Delay.

FL—This is the Feed Limit for the pH feed. Factory default is 240 minutes, or 4 hours but it may be changed up to 600 minutes or set at 0 to disable. The feed limit is used to prevent the feed systems from continually pumping if they are not achieving setpoint for at least 1 minute of the setting timeframe. It assumes that there is something wrong with the feed system, i.e. broken feed tube and shuts down the feed. If this alert is coming on and the feed system is working the feed system may be undersized for the chemical demand.

AS—Alert stop. This setting means that when the XPC goes into low pH alert it will stop feeding. Default is NO. This is a safety feature intended to prevent the XPC from continuing to run the feed systems if not achieving the setpoint. If active, it will prevent the XPC from recovering automatically if the chemical tank runs dry and is then refilled.

Section 7— Master Setup, continued

Settings are the main settings in the controller. Below is an expanded screen for clarity that shows all of the Settings menu, in the actual XPC, scroll down to see all settings:



Section 7— Master Setup, continued

Unit# - This setting is only adjustable by the factory.

Time—Enter your local time.

Date—Enter your local date.

Name—Enter the name of the pool/facility this XPC is installed on. This name will appear on Screen 2 of the main display. This prevents the operator from needing to physically write the pool on the XPC.

Display Cycle— The 5 main display screens can be set to cycle instead of constantly showing the main screen.

Startup Delay—This may be turned ON/OFF. There is also a delay for this setting that may be set between 00-99 minutes. The startup delay if turned on will stop the controller from feeding or sending alerts for the delay period specified once the controller first powers on or goes out of a low flow or standby mode.

DRR— Display Refresh Rate, controls how quickly the display refreshes. Typically left on default.

Passcode 1— Passcode for Quick Setup or Operator settings (setpoints only, no configuration). Default set to 0000. May be reset to any 4 digit combination.

Passcode 2— Passcode for Master Setup (setpoints and configuration). Default set to 0000. May be reset to any 4 digit combination. Do not lose this passcode. It can only be overridden by the factory.

Tank Low— NO/NC When NO Tank Low will display on the screen and tank low alert sent when tank level drops below tank sensor. Applies to both cl and pH tanks. Delay in 00-99 minutes available, prevents false alerts from liquid disturbance when tanks filled.

Stand-By— NO/NC, used for additional pressure or flow safety switch.

Flow Sw— Used for primary Safety Pressure Switch

FM Control— Turn ON to utilize pool flowmeter as safety switch. If Low Setpoint achieved with this feature on, the feed pumps will be deactivated due to low flow in the pool just like the Safety pressure Switch.

K-Factor— This is the factor found on a chart in the flow sensor instruction manual. It is entered here to calibrate the XPC to the flow sensor. K-Factor is generally based on size and type of pump and manufacturer of flow sensor.

FM Lo SP— Enter a low flow alert setpoint for alerting purposes or chemical feed interruption (if FM control turned ON).

Pool Vol— Enter pool volume in gallons. If entered and flow sensor installed, XPC will display a live calculation of the turnover rate in the pool.

Reset Totalizer— The XPC aggregates total flow since last reset. Change this to Yes to reset to 0.

ORP Max SPM— If in proportional feed mode for ORP this setting electronically limits the maximum Strokes Per Minute sent to the pump by the XPC. This is a safety feature that limits how much chemical can be fed.

pH Max SPM— If in proportional feed mode for ORP this setting electronically limits the maximum Strokes Per Minute sent to the pump by the XPC. This is a safety feature that limits how much chemical can be fed.

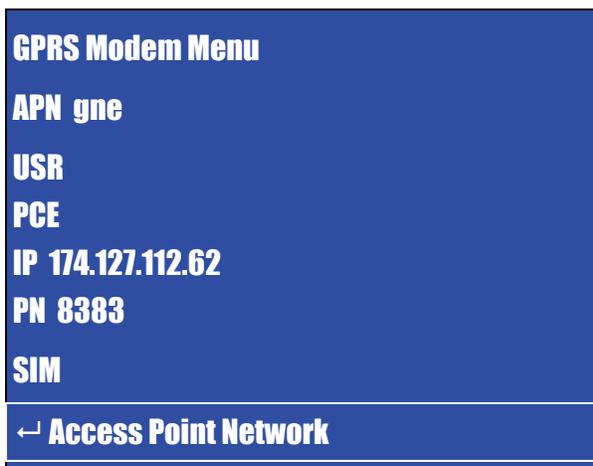
Section 7— Master Setup, continued

BW Change— Enter the desired pressure differential to display and transmit a “Backwash Now Alert” if Aquasol Pressure Filter Sensor is installed.

Probe Fail— If either probe “sticks” at one reading for an extended period of time it is likely bad. This can be set between 00 (OFF) and 999 minutes. 30 minutes is the usual setting.

pH Priority— When in pH priority mode the XPC will not initiate an ORP feed cycle until the pH reading is within the hysteresis for the pH output (normally .1 or .2 pH units). This is because ORP readings are dependent on pH. If the pH is high the ORP will be decreased and the unit may overfeed on the ORP side to compensate, resulting in a high FAC level. This feature is always recommended to be turned on. pH pumps must be sized large enough to adjust the pH of the pool quickly enough to allow the XPC to maintain ORP setpoint. Using the D1 output for pH allows the hysteresis and therefore pH priority buffer to be adjusted under the Master Setup menu. Using P1 output will result automatically in a pH priority buffer of .2 pH units which cannot be further adjusted.

GPRS Modem —This is where data is input to control the flow of data for the wireless service. Generally it is factory pre-configured and the factory must be consulted before any changes are made.



APN—Access Point Network—this is dependent upon the SIM provided with the unit. GNE, and data421d.com are the two most common. Consult factory before changing.

USR—Username—if required by APN provider. Generally left blank.

PCE—Password—if required by APN provider. Generally left blank.

IP—IP Address of xpc.aquasol.net server. Always set to 174.127.112.62.

PN—Port Number—port number for data traffic from XPC to xpc.aquasol.net—always 8383.

SIM—SIM Number as provided by SIM provider. Must match SIM number entered on xpc.aquasol.net for security purposes. Consult factory before changing.

Section 8— Menu List

Firmware V1.7 Outline

This is a text outline of all functions in the XPC in both Quick Setup and Master Setup modes.

The Quick Setup (Passcode 1) is typically used by the pool operator, while Master Setup (Passcode 2) is typically reserved for use by the service technician or facility manager.

To access the Quick Setup menu, press in the knob.

To access the Master Setup menu, press in the Enter button.

The two sections following this outline will go step by step through most of these options with screenshots.

It is important when installing an XPC to change the passcodes to prevent unauthorized access.

Passcode 1 (Quick Setup) – default passcode 0000

pH Calibration

pH Pool - 07.00-08.00

ORP Setpoint

D1 - 000-999

D2 - 000-999

P1 - 000-649 = 000-100% 650-999 = 000-100%

pH Setpoint

D1 - 07.00 - 08.00

P1 - 07.20 - 14.00 = 000-100% 00.00 - 07.20 = 000-100%

Passcode 2 (Master Setup) – default passcode 0000

pH Calibration

pH Pool - 07.00-08.00

ORP Setpoint

D1 - 000-999 HY 00-20

D2 - 000-999

P1 - 650-999 = 000-100% 650-999 = 000-100%

A1 - ON/OFF if ON + 005-200 D: 000-599 M

A2 - ON/OFF if ON - 005-200 D: 000-599 M

FL - 000-599

AS - YES/NO

pH Setpoint

D1 - 07.00 - 08.00

P1 - 650-999 = 000-100% 650-999 = 000-100%

A1 - ON/OFF if ON + 0.05 - 1.00 D: 000-599 M

A2 - ON/OFF if ON - 0.05 - 1.00 D: 000-599 M

FL - 000-599

AS - YES/NO

Settings

Unit # - Not user changeable

Time - 01-12:00-59 AM/PM

Date - 01-12/01-31/00-99

Section 8— Menu List

Firmware V1.7 Outline, Cont'd

Name - XXXXXXXXXXXXXXXXXXXXXXXXXXXX (A-Z, 0-9, Special Characters, 25 spaces on V1.6)

Disp Cycle - ON/OFF

Stup Delay - ON/OFF

DRR - 00-30

Passcode1 - 0000-9999

Passcode2 - 0000-9999

Tank Low - N.O./N.C. D:00-10 m

Stand-by - N.O./N.C. D:00-10 m

Flow Sw - N.O./N.C. D:00-10 m

FM Control - ON/OFF

K-Factor - 0000.0000 - 9999.9999

FM Lo SP - 00000-99999 GPM

Pool Volume - 0000000-9999999 G

Reset Totalizer - YES/NO

ORP M SPM - 000-180

pH MX SPM - 000-180

BW Change - 00-30 psi

Probe Fail - 000-699 m If probe is “stuck” on a reading for defined number of minutes, alert generated.

pH Priority - YES/NO (*Hysteresis is buffer for pH priority. In P1 feed, pure buffer, in D1 mode buffer is limited to the hysteresis buffer zone until it goes above the buffer then it must come back down to original setpoint.*)

SP Timer - XXXX m (0-9999 minutes)

Fact Def - YES/NO

ORP Feed - Chlor/Dechlor

pH Feed - Acid/Caustic

ORP D1 - ON/OFF

ORP D2 - ON/OFF

ORP P1 - ON/OFF

pH D1 - ON/OFF

pH P1 - ON/OFF

TL Stop - ON/OFF—*If ON, XPC will stop pumps from pumping when tank level low is detected, if OFF XPC will send alert but will not stop pumps (useful if tank level sensor not at bottom of tank when used as early warning for delivery needed).*

TR Deactivate—ON/OFF *Prevents the XPC from sending alerts via the serial port once the flow is disrupted as sensed by the Safety Pressure Switch or Safety Flow Switch due to no flow in circulation system.*

GPRS Modem

APN – Access Point Name – from wireless provider (Wyless = gne) (WGN-USA “Super SIM” = data421d.com)

USR – APN Username - from wireless to provider (Wyless = not used)

PCE – APN Passcode – from wireless provider (Wyless = not used)

IP – IP address of Aquasol Server Data Reporting to (174.127.112.62)

PN – Port Number of Aquasol Server data Reporting to (8383)

SIM – Number of the SIM card – written on SIM, Super SIM must get from Aquasol, does not Match imprint on SIM.

Section 9— Communications & Web Portal

The Aquasol Model XPC is available with integrated GPRS over GSM communications. GPRS is a data connection on the most popular worldwide cellular telephone networks. At present, coverage is available in over 200 countries worldwide.

Generally speaking, in the United States, anywhere there is a T-Mobile or ATT cellular signal the XPC should also have a signal and be able to communicate. In some cases, extended antennas may be necessary.

For other carrier/country availability and costs please contact Aquasol.

The communications ability of the Aquasol XPC is a subscription based service that includes access to the xpc.aquasol.net web portal, all communications charges for the cellular service, and datalogging of each controller. All data is maintained live on the web portal for a minimum of six months and indefinitely archived and available on request.

Some features of xpc.aquasol.net and your XPC include:

- Real time monitoring of all XPC inputs and settings.
- Remote setup
- Real time alerts via web, e-mail or SMS.
- Datalogging
- Online pool logbook access for XPC and manual readings.
- Graphing
- Downloadable reports in .csv or .pdf format.

If your XPC is ordered from the factory with an active subscription it will come with a pre-provisioned and activated SIM card along with username and password to xpc.aquasol.net. All you need to do is power on the XPC and login to xpc.aquasol.net. The XPC will display a “G” in the upper right hand corner of the main display when it has an active connection.

If your XPC is not ordered from the factory with an active subscription you will need to contact your dealer or Aquasol to purchase a subscription. Once purchased you will be sent a SIM card and instructions for setting up the XPC.

Generic SIM cards not provisioned by Aquasol are not compatible with the XPC.

Please See “Aquasol XPC Communications Manual” for further instruction on communications.

Section 10— Troubleshooting

Common Alerts

General (Center of Display)

No Flow

Pressure Switch or Flow Switch or Flow Meter senses insufficient flow/pressure in system. Solutions: Check flow in pool circulation system. Normally caused by dirty filters that need cleaning or backwashing or clogs in strainer, skimmer or other obstructions in system. If new installation and using pressure switch it may need to be adjusted, see pressure switch owners manual for directions.

Stand-By (Only with secondary flow/pressure sensor)

Pressure Switch or Flow Switch or Flow Meter senses insufficient flow/pressure in system. Solutions: Check flow in pool circulation system. Normally caused by dirty filters that need cleaning or backwashing or clogs in strainer, skimmer or other obstructions in system. If new installation and using pressure switch it may need to be adjusted, see pressure switch owners manual for directions.

Backwash Now (Only with Pressure Sensor Module)

Displayed when pressure differential to trigger backwash alert is exceeded. Backwash or clean filter when this is displayed.

Low Flow (Only with Digital Flowmeter)

Flow rate in the pool has fallen below the low flow alert trigger. Check pool's circulation system for obstructions, blockages, low water level, pump malfunction, etc.

ORP Channel (Under ORP Readout)

Feed Limit— flashes Esc to Reset

Feed Limit for channel has been exceeded. Solutions: Press Esc key to reset timer. Feed pump may not be large enough, if proportional feed SPM or % feed may be too low, or if trying to increase ORP from low starting point pool may need manual dose of chlorine or temporary increase of feed limit, deactivation of pH priority, or increase in proportional % or max SPM.

Low ORP

High ORP

Tank Low (only with tank level sensor)

Your chlorine tank is low. Add chlorine to the tank. Only add chlorine in accordance with the tank label. Do not mix incompatible chemicals.

pH Channel (Under pH Readout)

Section 10— Troubleshooting, Cont'd

(Continued from page 27)

Feed Limit— flashes Esc to Reset

Feed Limit for channel has been exceeded. Solutions: Press Esc key to reset timer. Feed pump may not be large enough, if proportional feed SPM or % feed may be too low, or if trying to increase pH from low starting point pool may need manual dose of chlorine or temporary increase of feed limit, deactivation of pH priority, or increase in proportional % or max SPM.

Low pH—*check pH in pool with test kit. Adjust and recalibrate XPC pH probe calibration if needed.*

High pH—*check pH in pool with test kit. Adjust and recalibrate XPC pH probe calibration if needed.*

Tank Low (only with tank level sensor)

Your acid tank is low. Add acid to the tank. Only add acid in accordance with the tank label. Do not mix incompatible chemicals.

No Power to XPC

Unplug XPC from main power supply and check system fuse. One spare fuse ships with each XPC. If fuse is bad, replace. This is caused by a power surge.

Power to XPC, but D1 Feed pumps do not come on when XPC shows “Feed D1” on either pH or ORP channel.

- 1) Unplug XPC from main power supply and check feed fuse. One spare fuse ships with each XPC. If fuse is bad, replace. Check feed pumps. This is caused by feed pumps drawing too may amps which may indicate a bad motor.*
- 2) Unplug XPC from main power supply and check relay. Relay will look cloudy if bad. Relay may wear out after years of use. Replace with XXXX part number.*

Section 11— Warranty Statement

We guarantee the Aquasol XPC controller to be free from defects in material and workmanship for one (1) year from the date of sale to the individual purchaser, with an additional extended warranty on specified electronic components.

Should a defect occur, return part or component postage or shipping prepaid as provided below, and we will:

- 1) During the first twelve (12) months from the date of sale to the customer at our option, either replace or repair any defective parts free of charge, charging only for postage or shipping.
- 2) During the first 5 years (60 months) from the date of sale, Aquasol Controllers will replace or repair any defective electronic component (except fuses or relays) on the printed circuit board free of charge, charging only for postage or shipping. This warranty is limited to electronic components only, and to the original purchaser, and is set in force only by the return of the included warranty registration card. Any modification or alteration of the electronic circuitry renders this warranty null and void. Chemical damage is not covered.

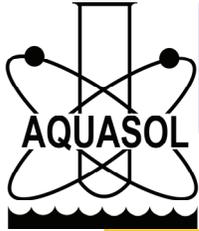
NOTE: ALL PARTS NEEDING REPAIR OR REPLACEMENT MUST BE SENT PRE-PAID TO:

AQUASOL CONTROLLERS, INC.
1707 TOWNHURST DR.
HOUSTON, TX 77043

This guarantee does not provide for labor for service rendered at the site of installation, nor does it include service necessitated by damage due to misuse, abuse, improper line voltage, fire, or other acts of God. This guarantee is limited only to the Aquasol control unit and does not apply to other accessories used in conjunction with its operation. THE LIABILITY OF AQUASOL CONTROLLERS, INC. ON ANY EXPRESSED OR IMPLIED WARRANTY IS LIMITED TO THE ORIGINAL PURCHASE PRICE OR THE COST OF UNIT REPLACEMENT AS STIPULATED ABOVE. Should a defect occur, the defective part should be returned to the selling dealer for shipment to Aquasol Controllers, Inc. or may be returned direct should this not be reasonable. Repairs or replacement will be made within a reasonable period of time. AQUASOL CONTROLLERS, INC. WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES OR INCONVENIENCE CAUSED BY A DEFECT IN OR THE ABSENCE OF THE CONTROL UNIT. The period of time deemed reasonable will be dependent upon the nature of the defect and the availability of parts.

THIS WARRANTY CONTAINS ALL WARRANTIES EXTENDED BY AQUASOL CONTROLLERS, INC., EITHER EXPRESSED OR IMPLIED, AND THE DURATION HEROF IS LIMITED TO THE PERIOD OF TIME SPECIFIED ABOVE. THIS WARRANTY WILL BECOME VALID ONLY UPON COMPLETION AND RETURN OF THE INCLUDED WARRANTY CARD WITHIN 10 DAYS AFTER THE DATE OF PURCHASE.

Section 12— Specifications



Aquasol XPC Pool Controller

5 Year Electronics Warranty!

Wireless

Web Communications



ORP/pH Control

Multiple outputs for backup or salt systems.

Integrated Pressure or Flow Switch

Use both or one.

True Proportional Feed

For use with pulse input pumps.

Flow Monitoring

Flow Rate, Flow Totalizer, TO Rate

Pressure Filter Sensor

Backwash alerts for any pressure filter(s).

Tank Level Monitoring

Alert when low or stop pumps when out.

Wireless Communications

No software to install, worldwide monitoring.

Highly Intuitive User Interface
Simplicity, the ultimate sophistication!

No Keypad!

Easy to use.

Powerful 32 Bit Microprocessor
Highly accurate.

IP65/NEMA 4X enclosure.
Rugged indoors or out.

Readable backlit display.
Easily viewable in dark pump rooms.

Plain English Alerts

No codes or LED's to Interpret

Quick Setup

Make three entries and be up and running!

Included

XPC (85-264 VAC auto switching)

Flow Cell, tubing, fittings.

ORP & pH Electrodes

Tank level sensors (2)

Integrate Safety Pressure Switch

Communications card built in.*

* Subscription Required.

Control

ORP—0-1000 Chlor/Dechlor

pH—0-14.00 Acid/Caustic

Monitor/Alert/Communicate

Tank Levels—Empty/Full

Flow—0-99999 GPM

Pressure—0-99 PSI

Section 13— Options & Accessories

Aquasol Flow Monitor— Monitors Flow Total, Flow GPM, and TO rate of Pool.

Aquasol Filter Monitor— Monitors absolute influent or differential influent/effluent filter pressure in single or bank of pressure filters.

Aquasol Tank Level Sensors— Standard with every XPC

ORP Meter (Handheld)— For testing probes, part number M020.

Probe Simulator/Signal Generator — Used to test probes and simulate probe readings into the controller.

3/8" Flow Cell Tubing— Black HDPE, 3/8" OD, sold by the foot. 20' included with each XPC. Part number M016B.

Web Service— Available Now! Contact Aquasol for details.

Flow Cell Grounding Electrode— For removing minor stray voltage from pool water, part number S005.

Flow Cell Sample Valve— Allows easy test kit sampling of the water at flow cell, screws in bottom port. Part number M022.

Section 14— Replacement Parts, Electrode Care, and Winter Storage

S010—ORP Electrode
S020—pH Electrode
X043—Instrument Fuse, 2a
X044—Feed Fuse, 8a
X041—Feed Relay
S030—Flow Cell

Electrode Care

The electrodes provided are the finest available. Electrodes are fragile and are subject to damage by freezing, bending, crushing or dropping on a hard service. Damaged electrodes cannot be repaired, they must be replaced. Damaged electrodes are not covered by warranty.

The tip of the electrode must be kept wet. If not in service or if you are storing them for the winter, they can be stored in a glass with the tips immersed in water, or add some water to the storage bottle (if available) and slide on the electrode tip.

Electrodes should be cleaned every 1 to 2 months. Carefully remove the electrode from the flow cell. First swirl the tip in a soapy water solution for 5 to 10 seconds. Then rinse thoroughly. Next swirl the tip in muriatic acid for 5 to 10 seconds. Rinse and return to flow cell. After returning the electrode to the flow cell, do not attempt any calibration of the controller until the electrodes have been flushed with water for at least 15 minutes.

Electrode Test Procedure

Connect electrode to a high impedance millivolt meter (part # XXXX).

Get two cups (about 8 oz.) of pool water. Add several drops of muriatic acid to one cup.

The ORP electrode should read somewhere between 500 mv and 800 mv when put in pool water. When moved to the "acid" water the millivolt reading should increase at least 200 mv.

The pH electrode should read -25 to -100 mv in the pool water. When put in the "acid" water the millivolt reading will change about 100 mv or more to the positive. Example: Pool water reading is -40 mv, "acid" water reading should be +60 mv or more.

If electrodes do not react as outline above, try the cleaning procedure or replace them.

Winter Storage

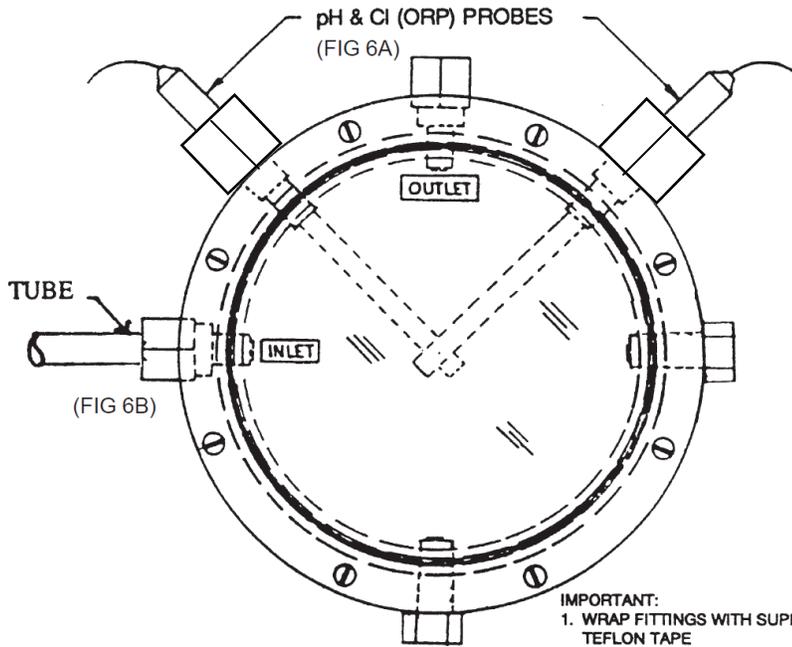
If your pool circulation system is shut down during the winter, the flow cell must be drained and the electrodes removed and stored to prevent freeze damage. (See Section 8A)

The electrodes must be kept wet. Put them in a container of water with the tips immersed or use the storage bottle that came with the electrode.

Section 15— Diagrams

AQUASOL SAMPLE CELL FIG. 6

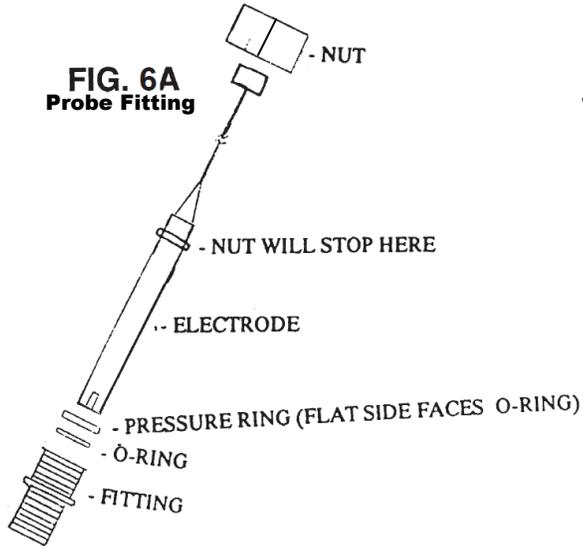
INSERT PROBES IN GLAND FITTINGS
BEFORE INSTALLING FITTINGS IN
FLOW CELL



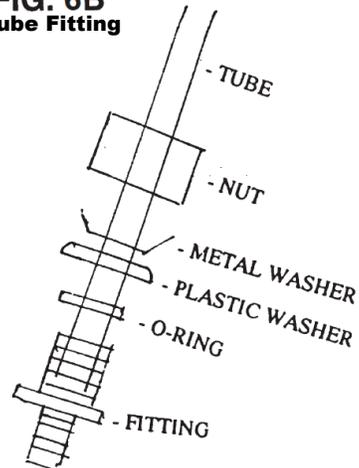
This nut should slide down the length of the cable where it will set on the shoulder of the electrode, as indicated.

IMPORTANT:
1. WRAP FITTINGS WITH SUPPLIED
TEFLON TAPE
2. TIGHTEN FITTINGS SECURELY
CAUTION:
DO NOT OVERTIGHTEN

**FIG. 6A
Probe Fitting**

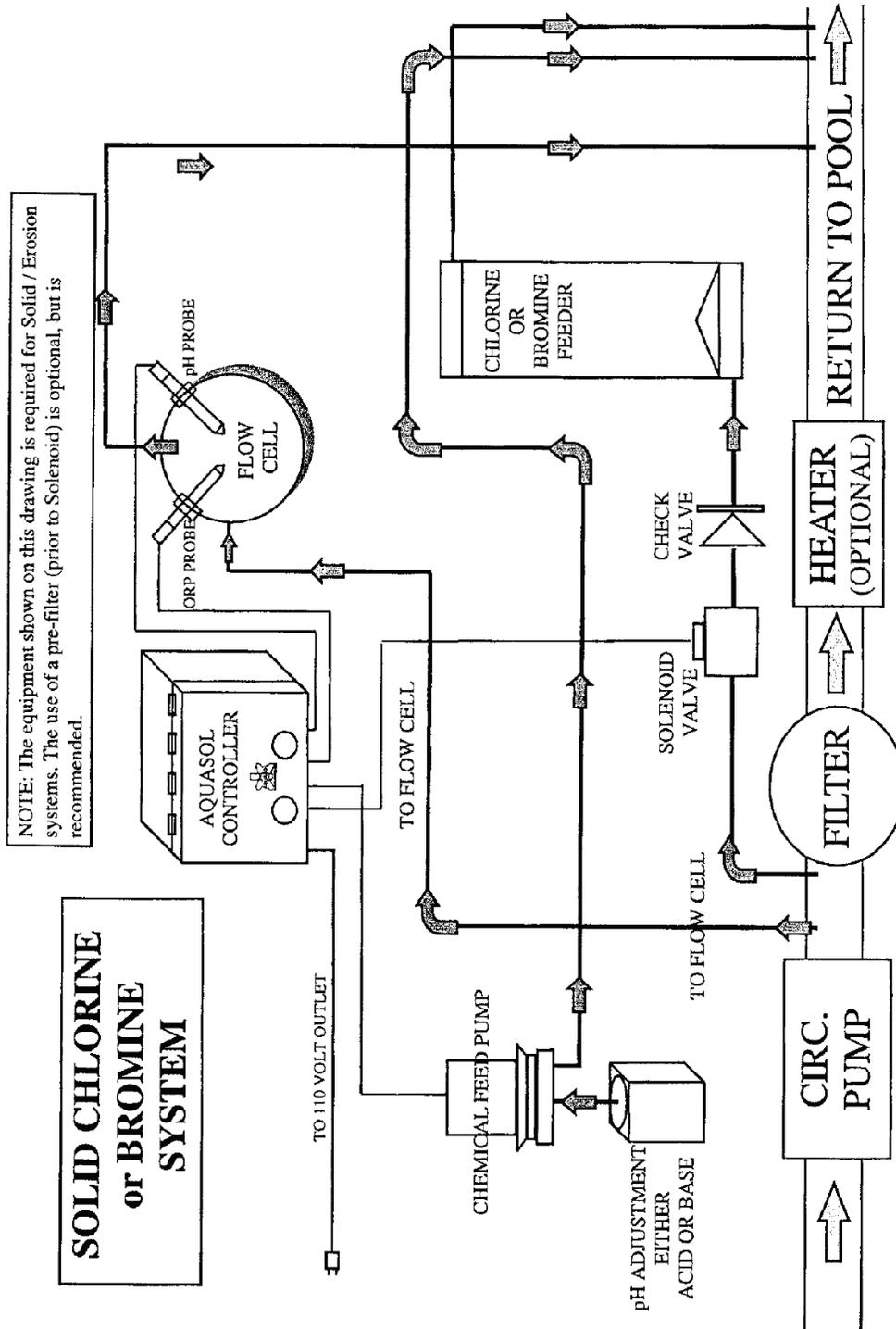


**FIG. 6B
Tube Fitting**



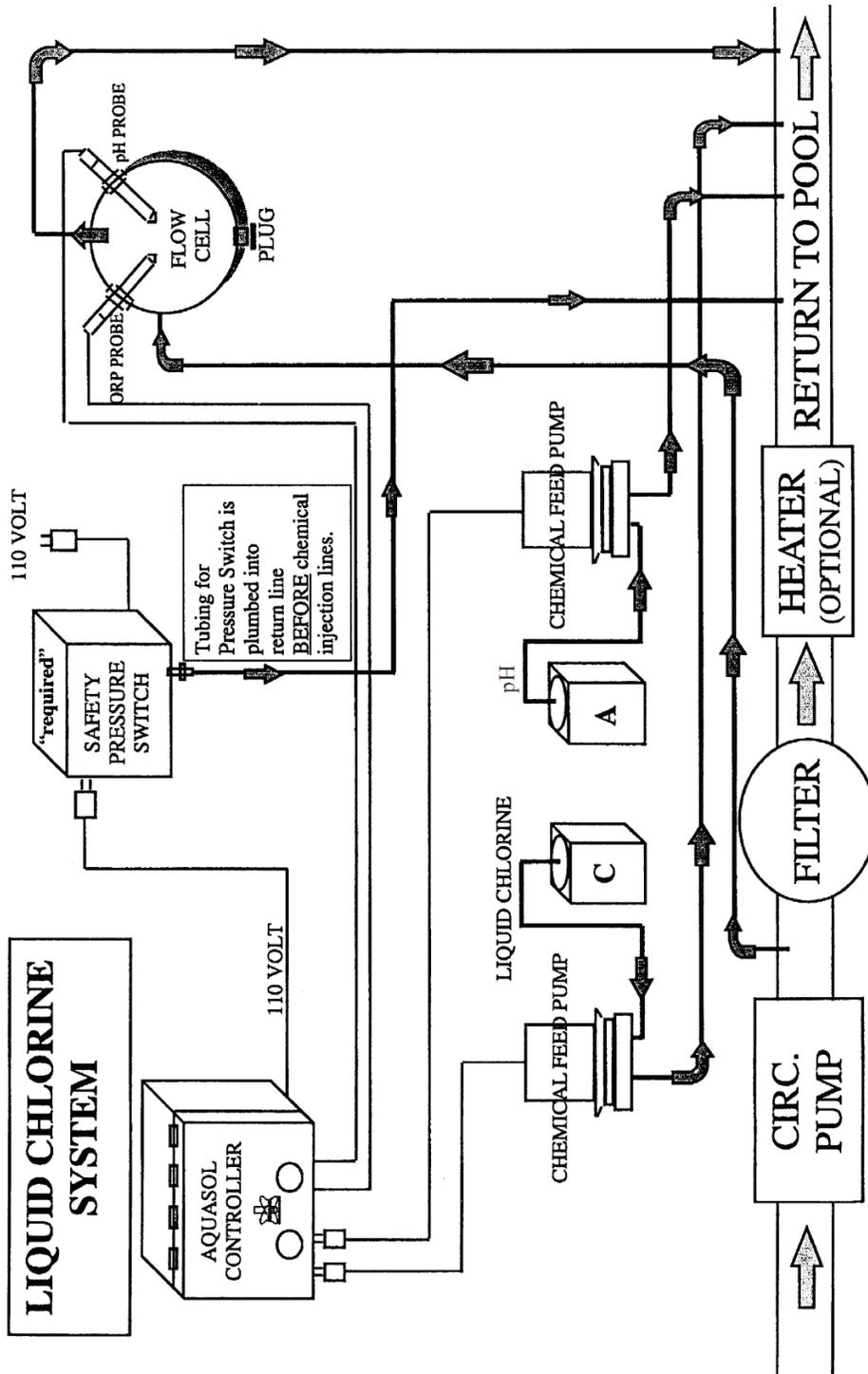
Section 15— Diagrams

FIG. 7

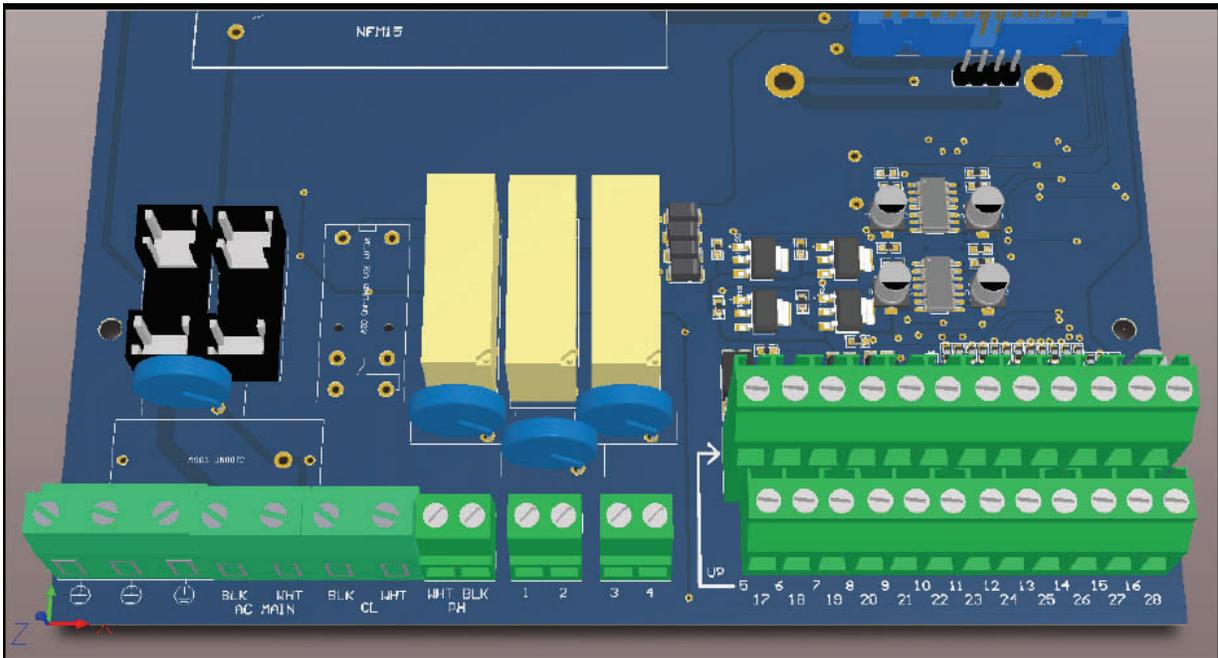


Section 15— Diagrams

FIG. 8



Section 16— Circuit Board Connections



Left Hand Side

- | | |
|----------------------|--|
| Left Fuse: | Feed circuit fuse 8a 250v 5mmx20mm |
| Right Fuse: | Instrument fuse 2a 250v 5mmx20mm |
| Relay (replaceable): | G2R-1-E 5VDC signal/16A 250VAC Switching |
| AC Main BLK/WHT: | Power Supply 85-264 VAC |
| CL BLK/WHT: | Supply to chlorine pump (D1 cl) |
| PH BLK/WHT: | Supply to PH pump (D1pH) |
| 1,2: | Dry contact chlorine pump (D2) |
| 3,4: | dry contact general alarm |



There are hazardous voltages underneath the screwed on cover, marked with the symbol above. Before removing this cover, disconnect mains power. The only parts that can be replaced by the operator are the fuses and relay. There are no other user replaceable parts, refer service to an authorized service person. After replacing the fuse (s) or relay, insert the screws into the cover and

Right Hand Side (Upper Connector)

- | | |
|---------|--|
| 5-, 6+: | pH digital proportional pulse (open collector) (P1 pH) |
| 7,8: | Ground |
| 9: | probe Flow Switch (hot) (Close to Ground) |
| 10: | Chlorine tank level (hot) (close to ground) |
| 11: | pH tank level (hot) (close to ground) |
| 12: | Stand-by input (hot) (close to ground) |
| 13: | RS232 Ground (DB9 Female pin 5) |
| 14: | RS232 TX output (DB9 Female Pin 2) |
| 15: | RS232 RX input (DB9 Female Pin 3) |
| 16: | Modem power supply +5vdc 2a |

Right Hand Side (Lower Connector)

- | | |
|-----------|---|
| 17-, 18+: | Chlorine digital proportional pulse (open collector) (p1 ORP) |
| 19: | Ground |
| 20: | Analog ground for pressure sensor (pin 3) |
| 21: | +10 VDC power supply for pressure sensor (pin 1) |
| 22: | Pressure sensor #1 input A (pin 2) |
| 23: | Pressure sensor #1 input B (pin 4) |
| 24: | Pressure sensor #2 input A (pin 2) |
| 25: | Pressure sensor #2 input B (pin 4) |
| 26: | Ground (Flow meter) |
| 27: | Flow meter input Frequency |
| 28: | Flow meter supply +15 VDC |