

# Pool Pilot<sup>®</sup> eCONANO

## Salt Chlorine Generator

Swimming Pool & Spa Purification System

Model:75096

For use with PPC1 Cells only



## Owner's Manual Installation and Operation

**IMPORTANT !**  
Read This Manual Before  
Installing or Operating

**INSTALLER: THIS DOCUMENT IS PURCHASER'S PROPERTY AND IS TO REMAIN WITH THE EQUIPMENT OWNER**



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# CONTACT INFORMATION

## What We Need To Know If You Need To Contact Us...

If you should need to call AquaCal AutoPilot, Inc. for questions, service or parts, please have the following information ready:

INSTALLER - Please record the following information prior to installation:

Installer: Date Installed:	
Control Unit Model #: Serial #:	
Pool Pilot® Cell PPC1 Serial #:	
Pool Volume (Gallons/Liters)	

If you have questions, please refer to our web site at [www.AutoPilot.com](http://www.AutoPilot.com) for the latest manual revisions, additional information, and helpful service advice.

You can also call us at: (727) 823-5642. We are here to serve you from 8:00 A.M. to 5:00 P.M. Eastern Time, Monday through Friday. If calling after hours, our voice mail system will handle your call. Please be sure to leave your name, a complete address, and your telephone number.

You may also reach us by email at: [customersupport@aquacal.com](mailto:customersupport@aquacal.com).

Or, if you prefer, you may FAX us at: (877) 408-8142. Be certain to provide your full address and a daytime telephone number.



Manufactured by  
AquaCal AutoPilot, Inc.  
2737 24th Street North  
St. Petersburg, Florida 33713  
U.S.A.

# **SAFETY INFORMATION**

Used and maintained properly, your chlorine generator will provide year-upon-year of safe and economical service. However, as with any mechanical or electrical device, to get the most from your equipment—while ensuring personal safety for you and others—certain operational and maintenance factors must be observed.

Likewise, excepting a few minor owner-capable maintenance items (explained later in this manual), repair and service of your chlorinator must be performed only by experienced service personnel. Should you suspect your chlorine generator is not performing properly, please refer to the section in this manual entitled: "Troubleshooting." You can also access the most current troubleshooting advice at [www.autopilot.com](http://www.autopilot.com). If you determine that a service call is necessary, your installer can be one source of service, or AquaCal AutoPilot Customer Support can recommend a service company.

Please note that warranties may be voided if the chlorinator has been installed, operated, maintained, or repaired improperly. In addition to voiding the manufacturer's warranty, unapproved installation methods, modifications, poor or incorrect maintenance, service by unqualified personnel, or improper use of the chlorinator may result in personal injury and/or property damage. For personal safety, and to avoid damage to equipment, follow all safety instructions displayed on the equipment and within this manual.

## **Safety Signals**

Throughout this manual the following two safety signals are placed where particular attention is required. Please note "WARNING" relates to personal safety, while "CAUTION" relates to possible equipment damage.

<b>WARNING !</b>	Failure to heed the following may result in permanent injury or death.
A "warning" signal appears in this manual where special attention is required for personal safety. (Specific instructions will appear in this box.)	

<b>CAUTION !</b>	Failure to heed the following may result in equipment damage.
A "caution" signal appears in this manual where special care is required to avoid equipment damage. (Specific instructions will appear in this box.)	



Follow all National Electric Codes (NEC), State and Local guidelines. When installing and using your Eco Nano, basic safety precautions must always be followed, including the following:

### **Safety Information Main Table**

<b>WARNING !</b>	Failure to heed the following may result in permanent injury or death.
<b>CHLORINATOR CONTAINS NO OWNER-REPAIRABLE COMPONENTS</b> - Repairs must not be attempted by untrained and/or unqualified individuals. If service is deemed necessary, contact installing dealer or AquaCal AutoPilot Customer Support at: (727) 823-5642.	

<b>WARNING !</b>	Failure to heed the following may result in permanent injury or death.
<b>RISK OF ELECTRICAL SHOCK</b> - A bonding lug has been provided on the outside of the control unit. This lug permits the connection of a No. 8 AWG (8.4mm <sup>2</sup> ) solid copper-bonding conductor (No. 6 AWG in Canada). Make this connection between the control unit and all other electrical equipment and exposed metal within 5-feet (1.5m) of the control unit. All field-installed metal components (such as rails, ladders, drains, etc.) within 10-feet of the pool, spa, or hot tub, must be bonded to the equipment grounding bus using copper conductors not smaller than No. 8-AWG (8.4mm <sup>2</sup> ) (No. 6 AWG in Canada).	

# **SAFETY INFORMATION**

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**RISK OF ELECTRICAL SHOCK** - Disconnect all AC power when installing or servicing this system.

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**RISK OF ELECTRICAL SHOCK...** Ensure electrical power is disconnected before wiring the unit. Follow all State/Local/NEC (CEC if applicable) electrical codes. Use copper conductors only.

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**RISK OF ELECTRICAL SHOCK** - Control units configured to 110-120VAC must be installed at least 10-feet (3 m) from the pool or spa wall. Control units configured to 220-240VAC must be installed at least 5-feet (1.5m) from the pool or spa wall.

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**RISK OF ELECTRICAL SHOCK** - A disconnect device, incorporated into the fixed wiring, must be included in the supply circuit (such as a time clock, relay, or circuit breaker).

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**CHEMICAL HAZARD...** To avoid damaging splashes, always add acid to water, never water to acid. Wear safety glasses and use other appropriate personal protection equipment.

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**RISK OF CHILD DROWNING OR INJURY** - Children must be closely supervised at all times around pool or spa equipment.

## **WARNING !**

Failure to heed the following may result in permanent injury or death.

**WATER CHEMISTRY SAFETY** - Improper water chemistry can present a serious health hazard. The proper residual chlorine level and water chemistry must be maintained. The addition of certain pool maintenance chemicals can reduce the effectiveness of chlorine. Maintain Pool/Spa water per standards detailed later in this manual.

## **CAUTION !**

Failure to heed the following may result in equipment damage.

The AquaCal AutoPilot Chlorinator must be installed and operated as specified. Failure to do so will void the equipment warranty.

## **CAUTION !**

Failure to heed the following may result in equipment damage.

To permit proper air circulation, the control unit must be mounted at least 1-foot (300 mm) above ground level.

# SPECIFICATIONS

## Input Power:

Model 75096-When converted to 110V in the field: 110-220 VAC, 2.0 Amp Maximum,  
with standard 115 VAC plug

Model 75096 ..... : 220-240 VAC, 1.0 Amp Maximum

## Chlorine Output:

Pool Pilot® Type	Water Chemistry	Max lbs/day	Max kg/day
PPC1	Standard Pool Salt	0.80	0.36

## Flow Requirements for 75097 & 75097M Inline Cell Assy:

Minimum Flow Rate.....: 20-gallons per minute (gpm) (76 liters/minute (L/m))

Maximum Flow Rate.....: 100-gallons per minute (gpm) (379 liters/minute (L/m))

Maximum Op. Pressure.....: 85-psi

## Agency Approvals:

Tested to conform to the following specifications:

UL1081.....: Standard for Safety for Swimming Pool Pumps, Filters, and Chlorinators

CAN/CSA-E60335-1.....: Safety of Household and Similar Electrical Appliances

## How Your Chlorine Generator Works

The system requires a low concentration of dissolved salt (sodium chloride) in the water. The salt concentration level is normally maintained below the taste threshold. The Eco Nano automatically converts the salt into chlorine, which your pool/spa requires to remain sanitized and algae free. The chlorine reverts back to salt after treating the water. Since the salt is constantly recycled, there is minimal loss during a swimming season. However, salt can be lost due to filter backwashing, rain water overflow, leaks, or bather splashing/carry out... but not through evaporation.

The Eco Nano is designed to handle the purification needs of residential swimming pools and spas. The amount of chlorine required for proper sanitization will vary based on the pool size and various factors such as water temperature, bather load, exposure to direct sunlight, and special water features.

The water circulation pump must be operating for your Eco Nano to produce chlorine, so run time is one of several key components to maintaining the proper sanitizer levels.

**Most installations require a minimum of eight (8) hours-per-day pump run time to properly filter and sanitize the water.**



# SPECIFICATIONS

## What's Included:

Both an Inline Cell Assembly and an Eco Nano control unit are required for complete installation.



Control Unit



Inline Cell Assembly  
75097 or 75097M

## *Eco Nano Control Unit (75096):*

Before attempting the installation, verify the following items have been included with the Control Unit:

Eco Nano Controller 220V

QUANTITY	DESCRIPTION
1	5 Foot AC Power Lead
1	Plastic Anchors
4	Mounting Screws

## *Inline Cell Assembly (75097 & 75097M):*

The inline cell assembly is connected into the plumbing after all other equipment. Water from the pool/spa is moved through the inline cell assembly by the circulation pump.

Before attempting the installation, verify the following items have been included with the inline cell assembly:

Included w/Inline Cell Assembly

QUANTITY	DESCRIPTION
1	Flow Switch/Cord
1	Cell Cord
1	Cell Cord Cap
2	312-D - Union Half
2	312-G – Union Half -Flex

Inline Cell Assembly Replacement Parts

QUANTITY	DESCRIPTION
1	PPC1 Pool Pilot® Cell
1	APK0019 Inline Flow Switch
1	APK0040 Plumbing Pkg for Inline Cell
1	952 Cell Cord
1	STK0048 Cracked Union Nut Service Kit
2	19059 Metric Adapters (75097M)

# INSTALLATION

## Basic System Overview:

The Eco Nano unit is a salt chlorination system for pool or spa purification, and is designed to operate in the following configuration:



## Plumbing the Inline Cell Assembly (75097 & 75097M):

The inline cell is typically plumbed into the pool return line; and, if applicable, after the heater and spa return diverter valve. Adaptors are supplied for 2" PVC (312-D) or 1 1/2" flex hose (312-G).

Note: When using this product in Canada, the CAN/CSA-C22.2#218.1 Standard requires that the Eco Nano Inline Cell be installed outdoors.

Note: Do not install the Pool Pilot<sup>®</sup> Cell directly into the pool/spa.

### STEP-1: Select the location for installing the inline cell:

- It is recommended the inline cell be installed prior to installation of the control unit. The control unit must be installed close enough to the inline cell assembly to allow the flow switch and cell cables sufficient slack to enable component service and maintenance. The cables are 12' long.
- The direction of the water flow through the inline cell must be as indicated for the system to operate properly.
- For a Pool/Spa combination, the inline cell must be located as the last component in the POOL RETURN LINE (to avoid over-sanitization of the spa).

**STEP-2:** The inline cell assembly will accept a PPC1 Pool Pilot<sup>®</sup> residential cell; use of any other cell may damage the power supply and the equipment warranty will be voided.

**CAUTION!** Use a PPC1 Pool Pilot<sup>®</sup> Cell only. Install the cell into the assembly. Tighten the unions by hand for a watertight seal.

### Flow Rates:

- The inline cell can be directly plumbed into the system (as shown in the diagram).
- If the flow rate for the system is less than 20 gpm (76 L/m), a larger pump must be installed (or steps taken to improve flow rate).

Note: Ensure flow rates for two-speed pump can provide sufficient flow at low speed.

# INSTALLATION

## Mounting the Control Unit:

*All electrical connections should be made by a licensed electrician or certified electrical contractor.*

The Eco Nano control unit is suitable for indoor or outdoor mounting.

When connected to 220-240VAC, the control unit must be installed at least 5' (1.5 m) horizontal distance from the pool or spa wall.

When connected to 110-120VAC with a standard plug, the control unit must be mounted at least 10' from the pool or spa wall. A GFCI (Ground Fault Circuit Interrupter) must be used.

When using the Inline Cell (75097 & 75097M) the control unit should be wired load-side to ensure the control unit is powered on and off with the circulation pump.

### **To avoid damage to the equipment, thoroughly read the following section before proceeding:**

1. Hold the control unit chassis in the selected mounting location. Through the top, narrow portion of mounting slots, mark the wall for the four (4) mounting holes.
2. Plastic anchors and screws have been provided for concrete or stucco walls; anchors are not required when mounting to wood or composite materials. Drill and install the plastic anchors (as applicable). Using a screwdriver, run the screws into the anchors, leaving a ¼" gap between the wall and the underside of the screw heads.
3. Holding the control unit slotted openings to the screw heads, allow the screw heads to pass through the larger portion of the mount holes; hang the control units on the four (4) mounting screws; using a long shaft screwdriver, tighten the screws.



# INSTALLATION

## Electrical Connections:

All electrical connections should be made by a licensed electrician or certified electrical contractor.

### WARNING!

Failure to heed the following may result in permanent injury or death.

**RISK OF ELECTRICAL SHOCK...** Ensure electrical power is disconnected before wiring the unit. Follow all State / Local / NEC (CEC if applicable) electrical codes. Use copper conductors only.

The Eco Nano 75096 has been factory configured for 220-240VAC operation.

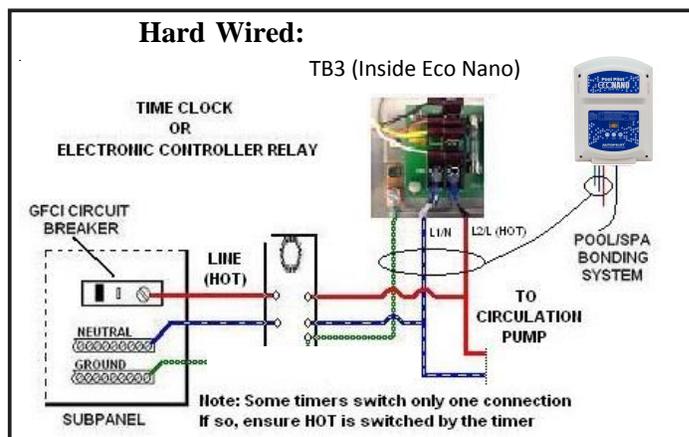
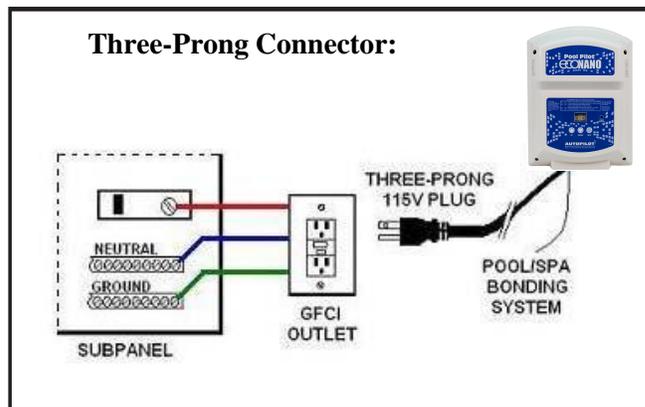
The control unit uses both high (line) and low voltage connections. Line-voltage connections are intended as electrical input to the control unit. Low-voltage cables connect to the Flow-Switch and Pool Pilot Cell.

## Grounding and Bonding:

The Eco Nano must also be connected to the pool/spa bonding system with an 8-AWG (6-AWG for Canada) wire. A bonding lug is provided at the bottom, exterior of the control unit.

## High Voltage Wiring:

Determine what type of connector is to be used when installing the Eco Nano control unit. (Three-Prong connector or hard wired to the electrical panel) then connect as shown in diagram below.



# INSTALLATION

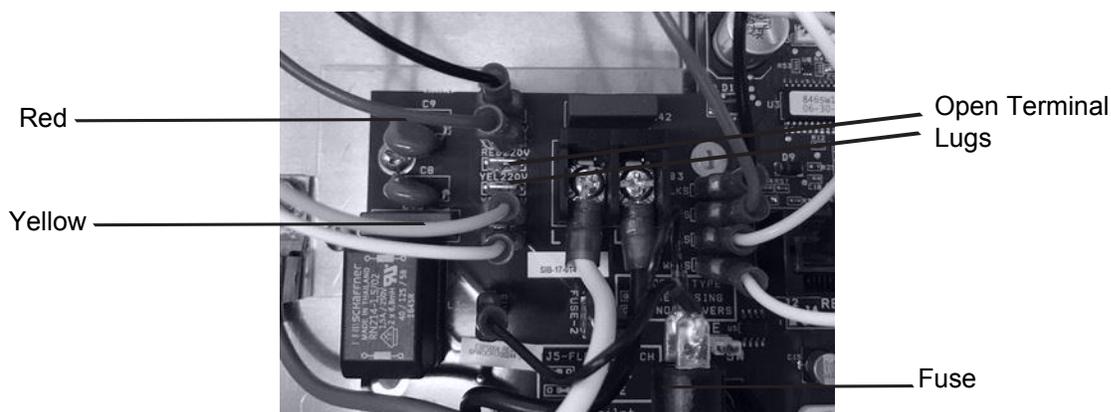
The Eco Nano voltage configuration can be changed from 220v to 110v in the field by a qualified electrician if required.

Refer to the wiring diagram located on the inside of the power center cover to reconfigure the wires on the terminal block, if the unit AC input voltage is going to be changed from 230 Vac to 115 Vac, or see below.

## **Configuring the Power Supply for 110V-120V Operation:**

- 1) Remove the cover by loosening the (4) recessed Phillips screws in the front corners of the cover.
- 2) On the left side of the main circuit board, remove the YELLOW wire from the YEL220V terminal on the circuit board. Install on the YEL110V terminal on the main circuit board.
- 3) On the left side of the main circuit board, remove the RED wire from the RED220V terminal on the circuit board. Install on the RED110V terminal on the main circuit board.
- 4) Replace the 1A fuse with the 2A fuse.
- 5) Reinstall the cover.

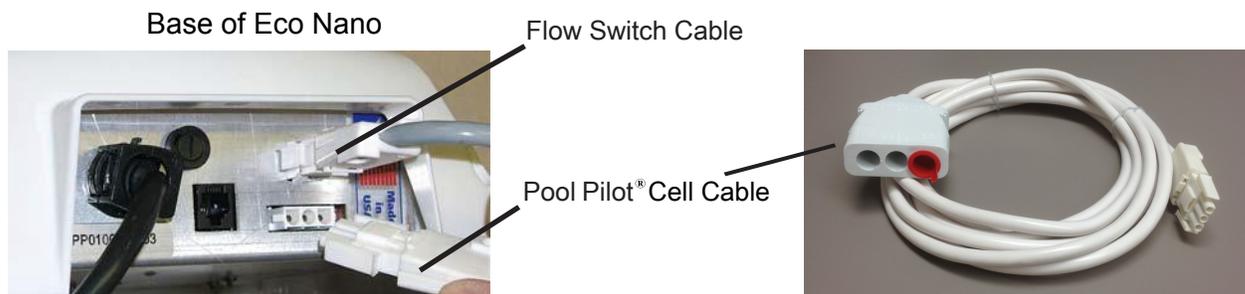
**NOTE: You can contact AquaCal AutoPilot Customer Support for an optional 110V-120V Cord Kit.**



## **Low Voltage Wiring:**

### ***Connecting the Cell Cable***

1. The Pool Pilot® Cell cable connector is keyed and must be aligned to connect properly. Line up the cell cord and plug into the cell cord connector located on the bottom right of the Eco Nano base plate.
2. The other end of the Pool Pilot® Cell cable is connected to two (2) of the cells' electrical terminals. Align the two open holes with the two mating cell terminals: push gently, but firmly, to connect. A red weather plug is placed in the unused contact hole.
3. The Flow Switch cable connector is also keyed, and must be aligned to connect properly.



# PREPARING THE POOL WATER

## Installer Please Note:

When properly sized to the site, the Eco Nano will meet the sanitizer “maintenance” requirements of the pool/ spa. The Eco Nano is *not* designed to chlorine shock treat or build up a chlorine residual, when starting with a zero or very low chlorine level.

Before starting the Eco Nano, the water must be properly balanced, and the chlorine level must be adjusted to between 1-to-3 ppm free chlorine. More information on adjusting water balance and start-up chlorine levels is listed below.

## Steps to Prepare Water:

1. Calculate Pool Volume: See next section, below.
2. Adjust Water Chemistry: (Via Saturation Index... consider pH, total alkalinity, hardness, and water temperature; also adjust stabilizer level). See Reference sections on pages 17-19.
3. Add Initial Chlorine Dosage: Use liquid chlorine (sodium hypochlorite), obtained from a pool supply center, to achieve 1-3 ppm free chlorine.
4. Add Salt to Water (test the water for salt level, first): Adjust to 3,000 - 4,500 ppm. See salt chart on page 17.

## Calculating Pool Volume:

$$\text{Average Depth} = \frac{\text{depth of deep end} + \text{depth of shallow end}}{2}$$

Gallons (pool size measured in feet)

$$\text{Rectangular} = \text{Length} \times \text{Width} \times \text{Average Depth} \times 7.5$$

$$\text{Round} = \text{Diameter} \times \text{Diameter} \times \text{Average Depth} \times 5.9$$

$$\text{Oval} = \text{Length} \times \text{Width} \times \text{Average Depth} \times 5.9$$

Liters (pool size measured in meters)

$$\text{Rectangular} = \text{Length} \times \text{Width} \times \text{Average Depth} \times 1000$$

$$\text{Round} = \text{Diameter} \times \text{Diameter} \times \text{Average Depth} \times 785$$

$$\text{Oval} = \text{Length} \times \text{Width} \times \text{Average Depth} \times 785$$

Calculated pool volume is: \_\_\_\_\_

*Enter Pool Volume figure in the information section, page 5.*

# PREPARING THE POOL WATER

## Using Standard Pool Salt

### Adding Salt:

#### Type of Salt to Add...

It is important to use Sodium Chloride (NaCl) salt that is greater than 99% pure. Acceptable types of salt include pool salt, granular food grade salt, water softener pellets, or solar salt flakes; these are usually available in 25-lb to 80-lb bags at local pool or building supply outlets. Water softener and solar salt will have a slower dissolve rate than food grade salt. Rock salt and granular salt with Iodine or rust preventatives should not be used, as these mixtures contain high levels of impurities and may cause staining.

Note: While not recommended, granular salt containing anti-caking additives such as YPS (Yellow Prussiate of Soda) or Sodium Ferrocyanide *can* be used. However, these mixtures—if not mixed and dissolved immediately— may cause a localized tint to the water or yellow staining of the pool/spa finish.

#### Determine Amount of Salt Required (and salt level to maintain)...

*FIRST... Test the water for current salt content !!!*

The ideal salt range is 3,000 - 4,500 ppm (2,500 minimum) (2.5 - 3.5 g/l). However, if so desired, the Eco Nano *can* operate with salt levels in excess of 35,000 PPM (35.0 g/l). Salt levels above 6,000 PPM are not normally recommended, as corrosion issues may result. Salt levels below 2,500 ppm will reduce the efficiency of the Eco Nano, and will result in low chlorine production and shorten the life of Pool Pilot<sup>®</sup> Cell. Please see the reference table on page 17 for information on amount of salt to be added, relative to the gallons of water to be treated vs. existing salt level.

### **CAUTION !**

Failure to heed the following may result in equipment damage.

Do not allow granular salt to pile up in one location without brushing, as staining may occur.

#### Add Salt to Pool Water...

How to add the salt (or remove it if too much)...

The object is to have the salt fully dissolve into the water.

Start the water circulation pump and set to operate in continuous mode (24/7). Add salt directly to pool (or spa, if a spa-only installation), and over the main drain (if main a drain is present). If there is no main drain, a vacuum head may be used to encourage salt circulation. Distributing the salt through brushing is also helpful; brush the salt toward the main drain (if one is present). Set pump operation to normal run time after salt has fully dissolved into water.

If the salt level becomes undesirably high, the only way to remove excess salt is to partially drain the pool/spa and refill with fresh water.

Note: High salt levels do NOT adversely affect the operation of the machine.

# OPERATION

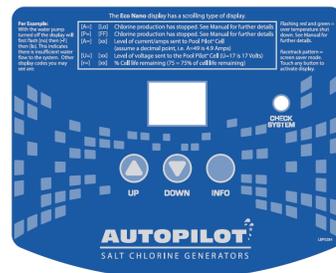
## ***Adjusting Chlorine Output:***

1. Start with prepared pool water as described in the prior section.
2. Test the pool water for free chlorine.
3. If the free chlorine level is not at least 1 ppm, add liquid chlorine to ensure a 1-3 ppm free chlorine residual.
4. Add the proper amount of salt as described on next page, and run the circulation pump continuously for 24-hours, allowing the salt to be fully mixed and dissolved into the pool.
5. Use the UP and DOWN arrow buttons to set the purifier percentage to 50%, and then allow the pool to operate normally. Display will show P=50 (scrolling) once output is adjusted.
6. For the first two weeks, test the water chemistry parameters every 3-4 days. Adjust output percentage as needed to maintain free chlorine reading. After the optimal output percentage (%) has been determined, this setting will not normally require further adjustment.

Note: It may be necessary to occasionally adjust the output percentage to accommodate water temperature changes.

## ***Getting Unit Information:***

1. Press the INFO button.
2. Continue pressing the INFO button to cycle through the information displays.
  - A = xx (Measured current sent to the Pool Pilot®, where xx is assumed to have a decimal point. i.e. "A=49" = 4.9 Amps.)
  - U = (Measured voltage sent to the Pool Pilot®, i.e. "U=17" = 17 Volts.)
  - Lr = xxx (Percentage of Cell Life remaining based on 28,800 Amp Hours)
  - x.xx (The current software version)
3. The display will time out and return to the Purified Output display.



## ***Normal Operation:***

- The Eco Nano will revert to the normal display if there is no activity on the keypad for ten (10) or more seconds.
- The "Check System" light will show solid green when generating chlorine and flash red if an error condition exists. See "Troubleshooting" section if an error condition exists.
- The solid green light cycles on and off as it periodically stops generating to achieve the correct percentage output.

Note: If water temperature falls below 55 degrees F, the Eco Nano should be unplugged or set at 0% to avoid over-chlorination and/or damage to the cell.

# REFERENCE SECTION

## *Salt Addition Chart:*

To use this chart:

1. Find current salt level (ppm or g/l) of the pool in the left column.
2. Find pool/spa volume in the second row (Gallons or Liters).
3. Find the amount of salt needed to bring pool to the ideal level by finding the intersection of the row and column.

For volumes other than what is shown, use combinations of various columns.

Example:

An 11,000 gallon pool with a salt level of 500 ppm

- The column value for 1,000 gallons is 21 pounds
- The column value for 10,000 gallons is 209 pounds.
- The total of 230 pounds of salt is needed to reach pool salt level of 3,000 ppm.

The salt is constantly recycled during normal operation. Loss of salt during a swimming season should be minimal. Filter backwashing, draining due to rain water overflow, splashing and bathing suit drag out, and leaks (excessive salt loss in a short span of time) are typical ways salt is lost. Salt does not leave the pool when water evaporates.

**Pounds (kilograms) of Salt needed to attain 4,500 ppm (mg/l)**

Current level of salt ppm (mg/l)	Pool/Spa Volume in Gallons (Liters)								
	1,000 (3,786)	2,500 (9,465)	5,000 (18,930)	7,500 (28,395)	10,000 (37,860)	12,500 (47,325)	15,000 (56,790)	17,500 (66,255)	20,000 (75,720)
<b>0</b>	25 (11)	63 (28)	125 (57)	188 (85)	250 (114)	313 (142)	376 (170)	438 (199)	501 (227)
<b>250</b> <b>(0.25)</b>	23 (10)	57 (26)	115 (52)	172 (78)	230 (104)	287 (130)	344 (156)	402 (182)	459 (208)
<b>500</b> <b>(0.50)</b>	21 (9)	52 (24)	104 (47)	157 (71)	209 (95)	261 (118)	313 (142)	365 (166)	417 (189)
<b>750</b> <b>(0.75)</b>	19 (9)	47 (21)	94 (43)	141 (64)	188 (85)	235 (106)	282 (128)	329 (149)	376 (170)
<b>1,000</b> <b>(1.0)</b>	17 (8)	42 (19)	83 (38)	125 (57)	167 (76)	209 (95)	250 (114)	292 (133)	334 (151)
<b>1,250</b> <b>(1.25)</b>	15 (7)	37 (17)	73 (33)	110 (50)	146 (66)	183 (83)	219 (99)	256 (116)	292 (133)
<b>1,500</b> <b>(1.5)</b>	13 (6)	31 (14)	63 (28)	94 (43)	125 (57)	157 (71)	188 (85)	219 (99)	250 (114)
<b>1,750</b> <b>(1.75)</b>	10 (5)	26 (12)	52 (24)	78 (35)	104 (47)	130 (59)	157 (71)	183 (83)	209 (95)
<b>2,000</b> <b>(2.0)</b>	8 (4)	21 (9)	42 (19)	63 (28)	83 (38)	104 (47)	125 (57)	146 (66)	167 (76)
<b>2,250</b> <b>(2.25)</b>	6 (3)	16 (7)	31 (14)	47 (21)	63 (28)	78 (35)	94 (43)	110 (50)	125 (57)
<b>2,500</b> <b>(2.5)</b>	4 (2)	10 (5)	21 (9)	31 (14)	42 (19)	52 (24)	63 (28)	73 (33)	83 (38)
<b>3,000</b> <b>(3.0)</b>	<b>Ideal</b>								
<b>4,500</b> <b>(3.5)</b>	<b>OK</b>								
<b>35,000</b>	OK for Pool Pilot Operation - (salt water would need to be diluted to lower salt level)								

# REFERENCE SECTION

## *Basic Water Chemistry:*

The Eco Nano unit is designed to produce chlorine on a daily basis. To monitor the system's efficiency, the water chemistry ranges, and a schedule of periodic checks should be followed as per the chart below.

<b>CAUTION !</b>	Failure to heed the following may result in equipment damage.
Excessively high chlorine levels can cause premature cell failure and corrosion damage to pool fixtures and equipment.	

<b>CAUTION !</b>	Failure to heed the following may result in equipment damage.
Always follow the instructions on the manufacturer's label whenever handling or using chemicals.	

CHEMICAL or FACTOR	IDEAL RANGE	IDEAL TEST SCHEDULE	EFFECT OF LOW/HIGH LEVELS	CORRECTIVE ACTIONS
<b>Free Chlorine</b>	1 to 3 ppm	Weekly	<p><u>Low free chlorine:</u> Not enough residual chlorine to safely sanitize pool water.</p> <p><u>High free chlorine:</u> Corrosive to metallic fixtures in pool water. Can bleach swimwear and hair.</p>	<p><u>Low free chlorine:</u> Check for combined chlorine level and shock as necessary. Increase purifier output to maintain a 1-3 ppm residual reading.</p> <p><u>High free chlorine:</u> Decrease purifier output. Let chlorine dissipate normally until 1-3 ppm is achieved. In extreme cases, pool water can be diluted with fresh water or a chlorine neutralizer added. (Diluting will reduce salt and CYA. Check and adjust as needed.)</p>
<b>pH</b>	7.2 to 7.8 ppm	Weekly	<p><u>Low pH:</u> (acidic) Equipment corrosion, eye/skin irritation, plaster etching, rapid chlorine consumption.</p> <p><u>High pH:</u> (basic) Scale formation, cloudy water, eye/skin irritation, poor chlorine effectiveness.</p>	<p><u>Low pH:</u> Add sodium carbonate or soda ash.</p> <p><u>High pH:</u> Add muriatic acid or sodium bisulfate.</p>
<b>Total Alkalinity</b>	80 to 120 ppm	Monthly	<p><u>Low TA:</u> Eye irritation, pH "bounce", stained/etched plaster and metal corrosion.</p> <p><u>High TA:</u> Constant acid demand, difficulty in maintaining pH, and contributes to scale formation or cloudy water conditions.</p>	<p><u>Low TA:</u> Add sodium bicarbonate.</p> <p><u>High TA:</u> Add muriatic acid often, a little at a time (may take a week or more to lower the TA).</p>
<b>Salt</b>	3,000 to 4,500 ppm	Monthly	<p><u>Low Salt:</u> Below 2,500 ppm causes premature cell failure and reduces chlorine production.</p> <p><u>High Salt:</u> Above 6,000 ppm can cause corrosion of metallic fixtures and will taste salty. Note: The Eco Nano can safely operate with salt levels up to 35,000.</p>	<p><u>Low Salt:</u> Add salt according to the salt chart.</p> <p><u>High Salt:</u> If undesirably high, partially drain and refill the pool with fresh water. (Diluting will reduce CYA. Check and adjust as needed.)</p>
<b>Calcium Hardness</b>	200 to 400 ppm	Monthly	<p><u>Low CH:</u> Etching of plaster, equipment corrosion.</p> <p><u>High CH:</u> Scale formation, cloudy water. Rapid buildup of scale may exceed the system's self-cleaning capability and require manual cleaning of the Pool Pilot® Cell .</p>	<p><u>Low CH:</u> Add calcium chloride flakes.</p> <p><u>High CH:</u> Partially drain and refill pool with fresh water to dilute. (Diluting will reduce salt and CYA. Check and adjust as needed.)</p>
<b>Cyanuric Acid (CYA) - Stabilizer</b>	60 to 80 ppm <i>Outdoors</i>  30 to 50 ppm <i>Colder Climates</i>	Monthly	<p><u>Low CYA:</u> Destruction of chlorine by the UV rays from the sun.</p> <p><u>High CYA:</u> Requires more chlorine to maintain proper sanitizer levels. <b>Note: CYA not needed for indoor or bromine pools.</b> CYA can be reduced to 30 - 50 ppm for Eco Nano in colder climate regions.</p>	<p><u>Low CYA:</u> Add cyanuric acid (1 lb/5,000 gallons increases CYA 25 ppm).</p> <p><u>High CYA:</u> Partially drain and refill pool with fresh water to dilute. (Diluting will reduce salt. Check and adjust as needed.)</p>

# REFERENCE SECTION

## *Saturation Index (SI):*

The Saturation Index is a formula used to predict the calcium carbonate saturation of water, that is, whether your water will precipitate, dissolve, or be in equilibrium with calcium carbonate.

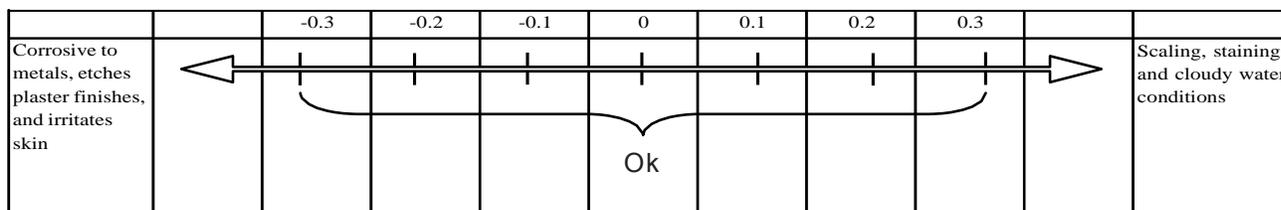
Water is properly balanced if the SI is  $0 \pm 0.3$ . If SI is greater than 0.3, scaling and staining will occur. If SI is less than -0.3, then the water is corrosive to metallic fixtures and aggressive to plaster surfaces and vinyl liners.

A high or low SI can cause premature damage to the cell, equipment or pool finish. As a general rule, higher concentrations of calcium, total dissolved solids, pH, and alkalinity all promote a greater tendency for scale. The potential to form scale is also increased as water temperature rises.

Use the chart below to determine your overall water balance. Test water for pH, water temperature, Calcium Hardness, Total Alkalinity, Salt Level, and use the equivalent Factors (TF, CF, AF, Constant) from the chart below to determine your Saturation Index. Adjust chemicals to maintain balanced water.

$$\text{pH} + \text{TF} + \text{CF} + \text{AF} - \text{SC} = \text{SI}$$

Temperature		TF	Calcium Hardness	CF	Total Alkalinity	AF	Salt Level	SC
60 F	15.6C	0.4	150 ppm	1.8	75 ppm	1.9	0 - 1000 ppm	12.1
66 F	18.9C	0.5	200 ppm	1.9	100 ppm	2.0	1001 - 2000 ppm	12.2
76 F	24.4C	0.6	250 ppm	2.0	125 ppm	2.1	2001 - 3000 ppm	12.3
84 F	28.9C	0.7	300 ppm	2.1	150 ppm	2.2	3001 - 4000 ppm	12.4
94 F	34.4C	0.8	400 ppm	2.2	200 ppm	2.3	4001 - 5000 ppm	12.5
103 F	39.4C	0.9	600 ppm	2.4	250 ppm	2.4	5001 - 6000 ppm	12.6



### Examples:

#### Water Test Results #1

pH = 7.4 .....: pH = 7.4  
 Water Temperature = 84 F .....: TF = 0.7  
 Calcium Hardness = 400 ppm .....: CF = 2.2  
 Total Alkalinity = 125 ppm .....: AF = 2.1  
 Salt Level = 3000 ppm .....: SC = 12.4

$7.4 + 0.7 + 2.2 + 2.1 - 12.4 = 0$   
 (Water is perfectly balanced)

#### Water Test Results #2

pH = 7.8 .....: pH = 7.8  
 Water Temperature = 84 F .....: TF = 0.7  
 Calcium Hardness = 600 ppm .....: CF = 2.4  
 Total Alkalinity = 200 ppm .....: AF = 2.3  
 Salt Level = 3000 ppm .....: SC = 12.4

$7.8 + 0.7 + 2.4 + 2.3 - 12.4 = 0.8$   
 (Water is scale forming)

# MAINTENANCE

## *Fuse Location and Ratings:*

### **WARNING !**

Failure to heed the following may result in permanent injury or death.

**ELECTRICAL SHOCK HAZARD...** Turn off the electrical power to unit before servicing.

To inspect or service the fuse:

- Disconnect power to the Eco Nano control unit.
- Take a slotted or flat-head screwdriver as indicated, and turn counter clockwise to loosen fuse holder on the bottom of the unit.
- Gently pull out the fuse holder. Replace the fuse as shown on chart below and reconnect the fuse holder.

Board	Fuse Specification	Description
Main Power Board 75096	250 Vac 1 Amp Slow Blow	Main AC Power Fuse



## **Testing the Flow Switch**

The flow switch is a critical component to the 75097 & 75097M inline cell system. When water flow has stopped, to prevent damage to the cell or system, it is important that power to the Pool Pilot<sup>®</sup> Cell be automatically turned OFF. The water flow switch performs this function.

In order to test that this component is working properly:

1. Turn off the circulation pump.
2. Confirm that the Eco Nano system is still receiving power. (Some Eco Nano systems will be installed to turn off when the water pump is off). Please follow all safety codes when routing power to the unit. DO NOT use an extension cord to provide power to the unit.
3. Verify that the red "Check System" light is flashing. The Eco Nano system will also display "no Flo" in a scrolling message. This means it has no water flow. If the check system light does not turn on, have the unit serviced.
4. Turn on the water pump. The red "Check System" light should turn off showing the unit has water flow.
5. Turn off water pump and route power back to normal.

# MAINTENANCE

## Servicing the Pool Pilot®

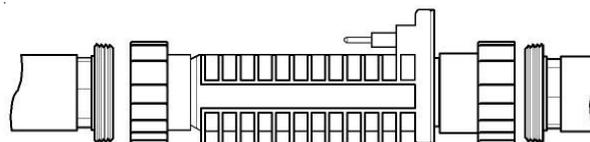
REMEMBER: The Eco Nano system is to be used ONLY with a PPC1 Pool Pilot® Cell. Use of any other cell may cause equipment damage and void warranty.

The Pool Pilot® Cell may require removal for periodic visual inspections, or for servicing when debris or calcium mineral deposits develop. The need to inspect and service the cell may be indicated by the “Check System” light flashing red and the message, “Lo Flo”, P = OFF, or A = “Lo”.

### *Removal of the Pool Pilot® Cell.*

The Pool Pilot® Cell is installed with unions on each end to allow quick and easy installation and removal.

1. Turn off the pump and shut off all power.
2. Detach the cell cable from the Pool Pilot® Cell.
3. Unscrew the unions at both ends of the Pool Pilot® Cell.
4. Slide the Pool Pilot® Cell out of the inline cell assembly.



Pool Pilot® Cell and unions – (side view)

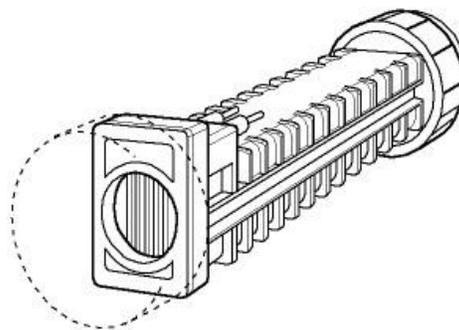
### *Visual Inspection of the Pool Pilot® Cell...*

Remove the Pool Pilot® Cell from the inline cell assembly, following the directions in the previous section.

The Pool Pilot® Cell titanium blades, seen inside the cell body, should be straight and clear of any debris on the ends or between the blades.

A white flaky or crusty calcium build up on the edge or between the blades will shorten the life of the cell.

Clean the cell immediately, and determine the cause of scaling. See “Basic Water Chemistry,” and “Using the Saturation Index” on pages 17-19. Also see “Manual Cleaning of the Pool Pilot® Cell” on next page.



End view of the Pool Pilot® Cell looking at the blades.

Your Eco Nano is designed to automatically self-clean calcium scale build up that may form on the blades during normal operation. However, unbalanced water chemistry can cause a heavy scale build up exceeding self-cleaning capabilities... thus; periodic manual cleaning may be necessary. The simplest way to avoid this extra work is to maintain the water chemistry at the levels recommended, according to the Saturation Index.

## **CAUTION !**

Failure to heed the following may result in equipment damage.

For maximum cell life, maintain water in a balanced condition. Water maintained in a scaling condition will shorten cell life and may render the chlorinator inoperative. Damage and/or service calls, caused by improper water balance, will NOT be covered under the equipment warranty.

# MAINTENANCE

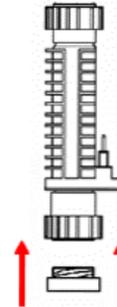
## *Manual Cleaning of the Pool Pilot® Cell...*

### **CAUTION !**

Failure to heed the following may result in equipment damage.

Scraping or scratching the titanium blade's edge or surface **will** damage the blade catalyst coating and cause premature failure of the cell... warranty will be voided. Never use any sharp or metallic objects to remove scale.

1. Turn off the circulation pump.
2. Remove the cell and place a cap or plug on the end of the cell as shown. Plugs are available at any pool supply warehouse or home improvement store. Ask for a 1.5" MPT clean out plug.



### **WARNING !**

Failure to heed the following may result in permanent injury or death.

**CHEMICAL HAZARD...** To avoid damaging splashes, always add acid to water, never water to acid. Wear safety glasses and use other appropriate personal protection equipment.

3. Fill the capped cell with water 2-inches from the top of the cell blades.
4. Fill the rest of the cell with Muriatic Acid. This allows for an approximate 4-to-1 solution. Always add the acid to the water. If you do it the other way around, it can cause the solution to spray back at you causing serious injury.
5. Allow the solution to sit in the cell for up to 20-minutes.
6. Safely dispose of the solution; pouring it into the pool is recommended.
7. Remove the cap and rinse the cell with light water pressure; reinspect the cell, and repeat acid cleaning if the cell is still scaled.
8. Once the cell has been cleaned, dry off the cell electrical terminals; reassemble the inline cell assembly, and return the system to service. **CAUTION: The electrical terminals must be completely dry** to avoid corrosion and failure of the cell or cable.

## *Installing a Pool Pilot® Cell...*

1. Clean and dry the electrical terminals on the Pool Pilot® Cell. The contacts must be completely dry to avoid corrosion and failure of the Pool Pilot® Cell or cable.
2. Tighten the unions by hand for a watertight seal.
3. The Pool Pilot® Cell will have two (2) electrical terminals.
4. The Pool Pilot® Cell cable has three (3) electrical contact terminals, the red weather plug will seal the unused contact in the cable. Position the Pool Pilot® Cell plug so the two (2) open holes align with the two mating terminals and push gently, but firmly, to connect.
5. Turn on the system.
6. Check for leaks and proper operation of the chlorinator.

# **MAINTENANCE**

## **Important Information Critical to the Survival of Your Chlorinator Winterizing**

### **CAUTION !**

Failure to heed the following may result in equipment damage.

Special measures are required in the event of freezing conditions. Your Pool Pilot<sup>®</sup> may be damaged if measures are not taken in advance of freezing conditions. Equipment damage due to freezing conditions is NOT covered under the equipment warranty.

Just as pool plumbing will be, the Eco Nano Inline Cell Assembly (including the Pool Pilot<sup>®</sup> Cell) will be damaged by freezing water. In areas that experience severe cold weather, or extended periods of freezing temperatures, the system should be winterized by draining all water from the inline cell (Pool Pilot<sup>®</sup> Cell), pump, filter, supply and return lines prior to freezing weather. The control unit is not affected by the cold and does not need to be removed.

### **Spring Start-Up**

It is recommended the water be manually chlorine-shocked when first starting up the pool in the springtime. Test water, and add the appropriate chemicals to balance the pool water per the levels recommended in the reference section on pages 17-19. Be sure to check salt and cyanuric acid (stabilizer), bringing those readings up to the recommended levels. It is also recommended to inspect the cell and test the flow switch. Clean and/or replace those items as necessary.

# TROUBLESHOOTING

Message Displayed	Problem	Typical Solution
no Flo  (Scrolling)	Chlorine generation has stopped due to insufficient water flow.	<ol style="list-style-type: none"> <li>1. Turn on the circulation pump.</li> <li>2. Turn the control valves to the correct position to allow water flow through the cell.</li> <li>3. If a suction type vacuum cleaner is used, then clean if clogged.</li> <li>4. Check and clean the skimmer basket.</li> <li>5. Check and clean the pump basket.</li> <li>6. Check and clean or backwash the main circulation filter.</li> <li>7. Test the flow switch. For instructions, see Maintenance section of manual.</li> <li>8. Clean the Pool Pilot® Cell if clogged with debris or calcium scale. (See Maintenance section of manual.)</li> <li>9. Check for a leak at the pump basket O-ring, leaking valve or fitting.</li> <li>10. If the pump is a 2-speed pump, is it on low speed? The low speed may not create enough flow for the cell.</li> </ol>
A = Lo P = OFF  (Scrolling)	Cell is completely clogged from calcium scale, has failed, or the cell cord is loose or damaged.	<ol style="list-style-type: none"> <li>1. Check cell for calcium scale buildup. Clean as needed.</li> <li>2. Check for visual wear on the edges of the terminal blades.</li> <li>3. Check the cell cord for tight connections on the cell and on the power supply. Check the plug for burns. Tighten or replace as needed.</li> <li>4. Replace cell if depleted.</li> </ol>
	The cell cord is disconnected.	Verify cell cables are inserted fully into the Eco Nano base cell connector.
	The cell is heavily scaled.	Remove and acid wash as described in Maintenance section of manual.
	If this is a new installation...	Verify that the incoming voltage matches the voltage of the control unit. (See Specifications and Installation sections of manual.)
	Cell is not receiving the expected Amps.	<p>Use the "INFO" button to get cell volts and amps.</p> <ul style="list-style-type: none"> <li>• Normal Amps are (5). If Amps are low (i.e. &lt;1.5), check for improperly connected, disconnected or loose cell cord.</li> <li>• If the volts are 24-26, then the problem is usually caused by low salt, improperly connected, disconnected or loose cell cord, water less than 65°F (18.3°C), a scaled cell, or cell near end of life. Correct as appropriate.</li> <li>• If the volts are less than 20, then contact AquaCal AutoPilot, Inc. for assistance.</li> </ul> <p><u>Installer:</u> If the unit is configured for 220-240VAC operation, then verify the input AC voltage is not 110-120VAC. Supply correct voltage, or reconfigure the unit as appropriate.</p>

# TROUBLESHOOTING

Message Displayed	Problem	Typical Solution
Normal display	There are no warning messages on the display but the chlorine level is too low. Water quality looks dirty or cloudy.	<ol style="list-style-type: none"> <li>1. Check pool chemistry parameters. (See Basic Water Chemistry section in manual.) The cyanuric acid level may be low and the chlorine is being consumed quickly by the UV from the sun.</li> <li>2. The chlorine output needs to be increased. <ul style="list-style-type: none"> <li>• Use the up arrow key to increase the chlorine output setting.</li> <li>• Increase the circulation pump run time so the chlorinator is generating chlorine for a longer period of time.</li> </ul> </li> <li>3. Test water for high phosphate levels. Use a product such as LoChlor<sup>®</sup>Lo-Phos<sup>®</sup> Max to reduce phosphates if the phosphate level is higher than 22-ppm (22 mg/l).</li> <li>4. Check the salt level and adjust to 3,000 ppm (mg/L) or verify salt calibration.</li> </ol>
	There are no warning messages on the display. The chlorine level is too low but the pool water looks fine.	<ol style="list-style-type: none"> <li>1. The test kit reagents or strips may be old or have been exposed to sunlight. Replace the kit or reagents and retest.</li> <li>2. There is too much chlorine in the pool. The chlorine is bleaching the test kit reagents. Dilute the water sample with distilled water and retest. Lower the chlorine output setting with the down arrow button if the chlorine level is too high.</li> <li>3. Sodium bromide may have been introduced into the pool by using a bromine-based algaecide. The DPD (red color) chlorine test reagent will give false readings if bromine is in the water. The OTO (yellow color) test kit must be used which can test for bromine and chlorine.</li> </ol>
Blank display	The Pool Pilot <sup>®</sup> display is blank.	<ol style="list-style-type: none"> <li>1. If the display is in bright sunlight, then shade the display to read.</li> <li>2. Verify external time clock has not turned off power to control unit. (Temporarily override the time clock, if desired, to check the Eco Nano.)</li> <li>3. Verify local shutoff switch and/or main circuit breaker for the control unit is turned on.</li> <li>4. If power is provided to unit by an external control device, verify power is provided to and from the device.</li> <li>5. Fuse may be blown. See "Maintenance" for information on fuse replacement.</li> <li>6. Check whether the GFCI breaker tripped and reset.</li> </ol>
LED alternates red & green flashing	Unit is not generating Chlorine.	<p>Internal temperature of unit has exceeded shut off temperature. Chlorine generation will turn off for five (5) minutes or until temperature decreases.</p> <ol style="list-style-type: none"> <li>1. Wait until unit cools down.</li> <li>2. Move control unit to a shaded area if too hot.</li> </ol>
Racetrack Pattern	Screen saver is active.	The screen saver activates if there are no warnings and no activity is detected for > 30 minutes. Chlorine generation continues.

# **APPENDIX**

## **FCC Compliance:**

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.





[www.autopilot.com](http://www.autopilot.com)

2737 24th St. North  
St. Petersburg, FL 33713  
1-727-823-5642